ZigBee PRO Green Power feature test specification

Basic functionality set

Version 1.0

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1 Introduction

1.1 Scope

This document covers the Test Cases used to certify conformance for the ZigBee PRO Green Power feature.

1.2 Purpose

The purpose of the Green Power Test Specification is to define a set of Test Cases to certify the ZigBee PRO Green Power feature. It covers all levels of certification, from Green Power specific IEEE 802.15.4 compliance tests up to the application layer.

1.3 General notes

Unless explicitly specified otherwise, the role of the test harness (indicated by the “TH” preceding the device type abbreviation) can be performed by a golden unit device, and vice versa.

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References

The following standards contain provisions, which, through reference in this document, constitute provisions of this standard. All the standards listed are normative references. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ZigBee Alliance documents

[R1] ZigBee document 053474r21 (or later release): ZigBee Specification 2015

[R2] ZigBee document 08006r03: ZigBee 2007 Layer PICs and Stack Profiles

[R3] ZigBee document 14-0563r16: Green Power Basic specification

[R4] ZigBee document 15-0006r11: Green Power Basic PICS

[R5] ZigBee document 075123r04:ZigBee Cluster Library Specification

[R6] ZigBee document 075035r06: ZigBee PRO Test Cases Platform Test Specification

[R7] ZigBee document 13-0166: Master List of Green Power Device Definitions, revision 00 or later

[R8] ZigBee document 15-02015, Errata for Green Power Basic test specification

[R9] ZigBee document 15-00000, GP Basic PICS to test case mapping

IEEE documents

[R10] IEEE Standard for Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) specifications for Low Rate Wireless Personal Area Networks (LR-WPANs), 2003.

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Acronyms, abbreviations, and definitions

ACK .....Acknowledgement
CCA .....Clear Channel Assessment
CSMA/CA .....Carrier Sense Multiple Access with Collision Avoidance
DUT .....Device Under Test
FFD .....IEEE 802.15.4 Full Function Device
GPC.....Green Power Combo device
GPCB .....Green Power Combo Basic device
GPCT .....Green Power Commissioning Tool
GPD .....Green Power Device
GPDF .....Green Power Device Frame
GPEP.....Green Power End Point
GPP .....Green Power Proxy device
GPPB .....Green Power Proxy Basic device
GPS .....Green Power Sink device
GPT .....Green Power Target device
GPT+.....Green Power Target Plus device
IEEE.....Institute of Electrical and Electronic Engineers
MAC .....Medium Access Control
PAN .....Personal Area Network
PHY .....Physical Layer
PICS .....Protocol Implementation Conformance Statement
RFD.....IEEE 802.15.4 Reduced Function Device
TH .....Test Harness
ZED.....ZigBee End Device
ZR .....ZigBee Router

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Generic notes

For all test cases, the fields and sub-fields not explicitly listed in either Initial conditions, Test procedure or Expected outcome sections can take any valid value according to [R3].

Unless explicitly stated otherwise, the ApplicationID sub-field in all GPDF and Proxy Cluster frames shall have the value 0b000.

Tests which were NOT run during the GP Basic specification validation event are marked as NOT TESTED.

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2 Green Power Device (GPD)

If the GPD with *ApplicationID* = 0b000 supports multiple SrcID, selected tests may need to be performed for each SrcID using the to be tested feature.

If the GPD with *ApplicationID* = 0b010 supports multiple Endpoints, selected tests may need to be performed for each endpoint using the to be tested feature.

Unless explicitly specified otherwise in the respective initial conditions section, at the beginning of each test, the GPD is "factory new"; i.e. is not aware of the operational channel of the network, does not have a key established with the network, does not know the PANId of the network.

2.1 GPD 802.15.4 tests

None special 802.15.4 tests identified.

2.2 GPD frame format

Verify that GP frame format is correctly applied on transmission of Data GPDFs.

2.2.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:

DUT-GPD		DUT-GPD	GPDID = manufacturer-specific Channel – as supported by the DUT
Item	Doc. Ref.	Initial Conditions	Note

2.2.1.1.2 Test Set-Up

A packet sniffer shall be observing the communication over the air interface.

2.2.2 Basic frame format test

2.2.2.1 GPD with ApplicationID = 0b000 (SrcID)

2.2.2.1.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	No assumptions are made on DUT-GPD's capabilities, as expressed in the settable sub-fields of the *NWK Frame Control* and *Extended NWK Frame Control* fields.	

2.2.2.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	Make DUT-GPD send a Data GPDF (sequence).	

2.2.2.1.3 Expected Outcome

Pass verdict:
1) DUT-GPD sends Data GPDF with the following settings: • *NWK Frame Control* field with the following values: ▪ the Frame type sub-field set to 0b00, ▪ the *ZigBee Protocol Version* sub-field set to 0b0011. • If the *Extended NWK Frame Control* field is present, ▪ the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b1; ▪ the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b000, ▪ the *Direction* sub-field of the *Extended NWK Frame Control* field is set to 0b0. • The GPDF includes the 4B SrcID field carrying the manufacturer-specific SrcID, little-endian. • The GPDF includes the 1B GPD CommandID field. The length of the GPD Command payload does NOT exceed the maximum for ApplicationID = 0b000 of 59 octets.

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Fail verdict:
1) DUT-GPD does not send Data GPDF. AND/OR the Data GPDF does not include the fields, as specified in 2.2.2.1.3/item 1 above.

262 ***2.2.2.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPDT0	GPD device	Indirect
GPF3	Support of general GP frame format	Direct
GPF3A	Support of *nwkcProtocolVersion* = 0x3	Direct
GPF4A	ApplicationID = 0b000	Direct

263 **2.2.2.2 GPD with ApplicationID = 0b010 (IEEE address)**

264 ***2.2.2.2.1 Initial conditions***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	No assumptions are made on DUT-GPD's capabilities, as expressed in the settable sub-fields of the *NWK Frame Control* and *Extended NWK Frame Control* fields.	

265 ***2.2.2.2.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	Make DUT-GPD send a Data GPDF (sequence).	

266 ***2.2.2.2.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF with the following settings: • MAC header: ▪ *Source addressing mode* subfield of the MAC Control field is set to 0b11 ▪ *Source address* field carrying the manufacturer-specific 8B IEEE address of the DUT-GPD; • *NWK Frame Control* field with the following values: ▪ the *Frame type* sub-field set to 0b00, ▪ the *ZigBee Protocol Version* sub-field set to 0b0011, ▪ the *NWK Frame Control Extension* sub-field set to 0b1, • The *Extended NWK Frame Control* field with the following values, ▪ the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b010, ▪ the *Direction* sub-field of the *Extended NWK Frame Control* field is set to 0b0. • The 4B *GPD SrcID* field is absent. • The *Endpoint* field is present and set to one of the endpoints (0x01 – 0xf0) supported by the DUT-GPD, or 0x00, or 0xff. • The GPDF includes the 1B *GPD CommandID* field. • The length of the GPD Command payload does NOT exceed the maximum for ApplicationID = 0b010 of 54 octets.
Fail verdict:
1) DUT-GPD does not send Data GPDF. AND/OR the Data GPDF does not include the fields, as specified in2.2.2.2.3/item 1 above.

267 ***2.2.2.2.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPDT0	GPD device	Indirect
GPF3	Support of general GP frame format	Direct
GPF3A	Support of *nwkcProtocolVersion* = 0x3	Direct
GPF4B	ApplicationID = 0b010	Direct

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2.2.3 Subcase: GPD capable of sending commissioning frame

2.2.3.1.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1	[R3]A.1.4	DUT-GPD is capable of sending commissioning frame	

2.2.3.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3]A.1.4	Make DUT-GPD send a Data GPDF (sequence).	

2.2.3.1.3 Expected Outcome

Pass verdict:
1) DUT-GPD sends Data GPDF with *Auto-commissioning* sub-field of the NWK Frame Control field set to 0b0.
Fail verdict:
1) DUT-GPD does not send Data GPDF. AND/OR *Auto-commissioning* sub-field of the NWK Frame Control field is not set to 0b0.

2.2.3.1.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2	Support of pairing with Commissioning GPDF	Indirect

2.2.4 NOT TESTED: Subcase: GPD NOT capable of sending commissioning frame

2.2.4.1.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	DUT-GPD is NOT capable of sending commissioning frame	

2.2.4.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	Make DUT-GPD send a Data GPDF (sequence).	

2.2.4.1.3 Expected Outcome

Pass verdict:
1) DUT-GPD sends Data GPDF with *Auto-commissioning* sub-field of the *NWK Frame Control* field set to 0b1. The *RxAfterTx* sub-field of the *Extended NWK Frame Control* field, if present, is set to 0b0.
Fail verdict:
1) DUT-GPD does not send Data GPDF. AND/OR *Auto-commissioning* sub-field of the *NWK Frame Control* field is not set to 0b1. AND/OR the *RxAfterTx* sub-field of the *Extended NWK Frame Control* field, if present, is set to 0b1 while the *Auto-Commissioning* sub-field of the *NWK Frame Control* field is set to 0b1.

2.2.4.1.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF1	Pairing with Data GPDF with *Auto-Commissioning* bit set to 0b1	Direct

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2.2.5 NOT TESTED: Subcase: GPD with incremental MAC sequence number

Note: this test is only required to be run if the DUT-GPD supports *gpdSecurityLevel* = 0b00.

2.2.5.1.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	DUT-GPD is capable using incremental MAC sequence number.	

2.2.5.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	Make DUT-GPD send a Data GPDF (sequence).	
2	[R3] A.1.4	Make DUT-GPD send another Data GPDF (sequence).	

2.2.5.1.3 Expected Outcome

Pass verdict:
1) DUT-GPD sends Data GPDF with the MAC sequence number field set to N.
2) DUT-GPD sends Data GPDF with the MAC sequence number field set to N+1.
Fail verdict:
1) DUT-GPD does not send Data GPDF, as defined in 2.2.5.1.3/item 1 above.
2) DUT-GPD does not send Data GPDF, as defined in 2.2.5.1.3/item 2 above.

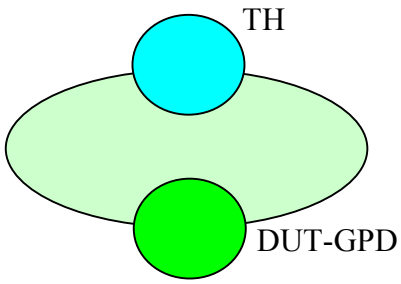
2.2.5.1.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPDF2	Incremental MAC sequence number	Direct

2.3 GPDF security

2.3.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPS (GPT+ / GPC) or TH-GPP(m)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Channel = as supported by the DUT-GPD Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific If TH-GPS: GPEP supports the application functionality of the DUT-GPD (see sec. A.4.3 of [R3]).
DUT-GPD	GPD ID = manufacturer-specific

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.1.4	TH operates in a ZigBee PAN. It may join a ZigBee network created by another device, or start as ZC.	
2	[R3] A.1.4, A.3.3.2.2	A pairing is established between the DUT-GPD and TH (e.g. as a result of any of the commissioning procedures).	

2.3.1.1.2 Test Set-Up

The TH shall be in wireless communication proximity of the DUT-GPD.

A packet sniffer shall be observing the communication over the air interface.

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295 ## 2.3.2 NOT TESTED: GPD capable of using SecurityLevel=0b00

296 ##### *2.3.2.1.1 Initial conditions*

Item	Doc. Ref.	Initial Conditions	Note
1-2	[R3] A.1.4	As in 2.3.1.1.1.	
3	[R3] A.1.4	TH implements Security Level 0b00.	

297 ##### *2.3.2.1.2 Test Procedure*

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	DUT-GPD sends Data GPDF.	

298 ##### *2.3.2.1.3 Expected Outcome*

Pass verdict:
1) DUT-GPD sends Data GPDF, with: • *MAC Sequence Number* field set to N; • the Extended NWK Frame Control field: ▪ absent OR ▪ present and its sub-fields set to: *SecurityLevel* = 0b00, *SecurityKey* = 0b0; • the *Security Frame Counter* field and the *MIC* field NOT present.
Fail verdict:
1) DUT-GPD does not send Data GPDF formatted exactly as in **Error! Reference source not found.**/Item 1 above.

299 ##### *2.3.2.1.4 PICS Covered*

PICS reference	Functionality	Tested (Direct/Indirect)
GPF8	SecurityLevel=0b00	Direct

300 ## 2.3.3 Sub-case: GPD capable of using SecurityLevel=0b01 (deprecated)

301 ## 2.3.4 Sub-case: GPD capable of using SecurityLevel=0b10

302 ##### *2.3.4.1.1 Initial Conditions*

Item	Doc. Ref.	Initial Conditions	Note
1-2	[R3] A.1.4	As in 2.3.1.1.1	
3	[R3] A.1.4	DUT-GPD and TH share a GP security key, of the *KeyType* as supported by the DUT-GPD, for SecurityLevel=0b10. TH implements SecurityLevel=0b10.	

303 ##### *2.3.4.1.2 Test Procedure*

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.1.5.4.	DUT-GPD sends Data GPDF.	
2		DUT-GPD sends another Data GPDF.	

304 ##### *2.3.4.1.3 Expected Outcome*

Pass verdict:
1) DUT-GPD sends a correctly formatted Data GPDF, with • the *Extended NWK Frame Control* field present and its sub-fields set to: *SecurityLevel* = 0b10, *SecurityKey* – according to the key type the DUT-GPD is configured with; • the *Security Frame Counter* field present and set to N; ▪ Note: the MAC sequence number does not have to be equal to the 1LSB of the *Security Frame Counter*. • the cleartext payload authenticated with 4B *MIC* field.

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• The length of the GPD Command payload does NOT exceed the maximum: ▪ for ApplicationID = 0b000 of 59 octets; ▪ for ApplicationID = 0b010 of 54 octets. For the remaining fields of a correctly formatted Data GPDF, see expected outcome in section 2.2.2 (2.2.2.1.3 and 2.2.2.2.3). TH • if GPP(m), sends GP Notification command; • if GPS, executes the GPD command. If no human-perceivable effect of the command execution is available, check correctness of the security processing separately.
2) DUT-GPD sends Data GPDF, formatted exactly as in 2.3.4.1.3/Item 1 above, only with Security Frame Counter field set to >=N+1. TH • if GPP(m), sends GP Notification command. • if GPS, executes the GPD command. If no human-perceivable effect of the command execution is available, check correctness of the security processing separately.
Fail verdict:
1) DUT-GPD does not send Data GPDF, formatted exactly as specified in 2.3.4.1.3/Item 1 above. AND/OR TH-GPP does not send GP Notification command. AND/OR TH-GPS does not execute the GPD command/correctness check of security processing fails.
2) DUT-GPD does not send Data GPDF, formatted exactly as specified in 2.3.4.1.3/Item 2 above. AND/OR TH-GPP does not send GP Notification command. AND/OR TH-GPS does not execute the GPD command/correctness check of security processing fails.

305 ***2.3.4.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPF6	SecurityLevel=0b10	Direct

306 ## 2.3.5 Sub-case: GPD capable of using SecurityLevel=0b11

307 ***2.3.5.1.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2	[R3]A.1.4	As in 2.3.1.1.1	
3	[R3]A.1.4	DUT-GPD and TH share a GP security key, of the *KeyType* as supported by the DUT-GPD, for *SecurityLevel*=0b11. TH implements the *SecurityLevel*=0b11.	

308 ***2.3.5.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3]A.1.4, A.1.5.4	DUT-GPD sends Data GPDF.	
2		DUT-GPD sends another Data GPDF.	

309 ***2.3.5.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF, with: • the *Extended NWK Frame Control* field present and its sub-fields set to: *SecurityLevel* = 0b11, *SecurityKey* – according to the key type the DUT-GPD is configured with; • the *Security Frame Counter* field present and set to N; ▪ Note: the MAC sequence number does not have to be equal to the 1LSB of the *Security Frame Counter*. • the payload encrypted and authenticated with 4B *MIC* field; • The length of the GPD Command payload does NOT exceed the maximum: ▪ for ApplicationID = 0b000 of 59 octets; ▪ for ApplicationID = 0b010 of 54 octets. For the remaining fields of a correctly formatted Data GPDF, see expected outcome in section 2.2.2 (2.2.2.1.3 and 2.2.2.2.3).

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TH • if GPP, sends GP Notification command. • if GPS, executes the GPD command. If no human-perceivable effect of the command execution is available, check correctness of the security processing separately.
2) DUT-GPD sends Data GPDF, formatted as in 2.3.5.1.3/Item 1, only with Security Frame Counter field set to >=N+1. TH • if GPP, sends GP Notification command. • if GPS, executes the GPD command. If no human-perceivable effect of the command execution is available, check correctness of the security processing separately.
Fail verdict:
1) DUT-GPD does not send Data GPDF formatted exactly as specified in 2.3.5.1.3/Item 1 above. AND/OR TH-GPP does not send GP Notification command. AND/OR TH-GPS does not execute the GPD command/correctness check of security processing fails.
2) DUT-GPD does not send Data GPDF formatted exactly as specified in 2.3.5.1.3/Item 2 above. AND/OR TH-GPP does not send GP Notification command. AND/OR TH-GPS does not execute the GPD command/correctness check of security processing fails.

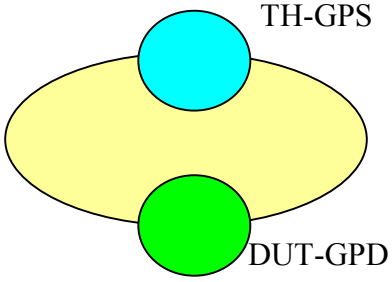
2.3.5.1.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPF5	SecurityLevel=0b11	Direct

2.4 GPD Commissioning

2.4.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPS (GPT+/GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Channel = as supported by the DUT-GPD Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific GPEP supports the application functionality of the DUT-GPD (see Section A.4.3 of [R3]).
DUT-GPD	GPD ID = manufacturer-specific. DUT-GPD capable of sending Commissioning GPDF. gpdSecurityLevel

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between TH-GPS and DUT-GPD.	

2.4.1.1.2 Test Set-Up

The TH-GPT and DUT-GPD shall be in wireless communication proximity of one another.

A packet sniffer shall be observing the communication over the air interface.

2.4.2 Base Commissioning GPDF frame format

2.4.2.1.1 Initial conditions

As in 2.4.1.1.1.

2.4.2.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.1, A.4.2.1.2, A.1.4	TH-GPS enters commissioning mode with *gpsCommissioningExitMode = On first Pairing success*. DUT-GPD sends a Commissioning GPDF. Commissioning action may need to be repeated, until DUT-GPD sends a Commissioning GPDF on the operational channel of the TH-GPS.	
2		**Incrementing frame counter:** Put the TH-GPS in commissioning mode. DUT-GPD sends a Commissioning GPDF. Put the TH-GPS back in operational mode (if it doesn't happen automatically).	
3	[R3] A.1.4	**Incrementing frame counter:** DUT-GPD sends a Data GPDF.	

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325 ***2.4.2.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Commissioning GPDF with: • MAC header fields ▪ MAC sequence number field having any value; it doesn't have to be aligned with the *GPDoutgoingCounter* field, if present; it should be different for each Commissioning GPFS transmission. ▪ *If SecurityLevelCapabilities* = 0b00 and *MACsequenceNumberCapability* = 0b1: MAC Sequence number = A; ▪ If the *Extended NWK Frame Control* field is present and its *ApplicationID* sub-field set to 0b010, the MAC header: ▪ *Source addressing mode* subfield of the MAC *Frame control* field is set to 0b11; ▪ *Source address* field carrying the manufacturer-specific 8B IEEE address of the DUT-GPD; • *NWK Frame Control* field with the following values: ▪ the *Frame type* sub-field set to 0b00, ▪ the *ZigBee Protocol Version* sub-field set to 0b0011; ▪ *Auto-Commissioning* sub-field set to 0b0; ▪ *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to: – 0b1 for GPD identified by IEEE address (*ApplicationID* = 0b010); – 0b0 or 0b1 for GPD identified by SrcID (*ApplicationID* = 0b000); • If the *Extended NWK Frame Control* field is present ▪ the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to: – 0b000 for GPD identified by SrcID; – 0b010 for GPD identified by IEEE address; ▪ the *Direction* sub-field of the *Extended NWK Frame Control* field is set to 0b0. • 4B *GPD SrcID* field ▪ Present and carrying the manufacturer-specific SrcID, little-endian for GPD identified by SrcID, i.e. if *ApplicationID* = 0b000; ▪ Absent for GPD identified by IEEE address, i.e. if *ApplicationID* = 0b010; • *Endpoint* field ▪ Absent for GPD identified by *SrcID*, i.e. if *ApplicationID* = 0b000; ▪ Present and carrying an endpoint supported by the GPD for GPD identified by IEEE address, i.e. if *ApplicationID* = 0b010; • The security fields (*Security Frame Counter*, *MIC*) corresponding to the *Security Level* sub-field of the *Extended NWK Frame Control* field, if present; • 1B GPD *CommandID* field with 0xE0. • 1B *DeviceID* field; • Settings of the *Options* and *Extended Options* field corresponding to device capabilities: ▪ *MACsequenceNumberCapability* – = 0b0 if the device supports random MAC sequence number; – = 0b1 if the device supports incremental MAC sequence number; ▪ *RxOnCapability* – = 0b1 if the device supports bidirectional operation – = 0b0 if the device does not support bidirectional operation ▪ *Fixed Location* = 0b1 if the device is supposed to be used stationary, and set to 0b0 otherwise; • The presence of the *Extended Options* field as indicated by the corresponding *Extended Options present* sub-field; ▪ *SecurityLevelCapabilities* = *gpdSecurityLevel*, which can be 0b10 or 0b11; ▪ if *SecurityLevelCapabilities* != 0b00, then: – *GPDkeyPresent* = 0b1; – *GPD Key encryption* = 0b1 – in addition, if *RxAfterTx* sub-field of the *Extended NWK Frame Control* field is set to 0b1, *KeyRequest* sub-field of the *Options* field may be set to 0b1. • the *GPDkey* field present if *GPDkeyPresent* = 0b1 and absent otherwise; ▪ the *GPDkey* field is encrypted if *GPDkeyEncryption* = 0b1 and in the clear otherwise; • the *GPDkeyMIC* field is present and encrypted if *GPDkeyPresent* = 0b1 and *GPDkeyEncryption* = 0b1; it is absent otherwise; • the *GPDoutgoingCounter* field present if *GPDoutgoingCounterPresent* = 0b1 and absent otherwise; it shall be present if *SecurityLevelCapabilities* = 0b10 or 0b11, and has value of Security Frame Counter = N; The length of the payload of the GPD Commissioning command (even if *ApplicationInformation* is included) does NOT

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exceed the maximum: • for ApplicationID = 0b000: 55 octets; • for ApplicationID = 0b010: 50 octets. TH-GPS exits commissioning mode and sends GP Pairing with *AddSink* = 0b1 and GPDID of the DUT-GPD.
2) DUT-GPD sends Commissioning GPDF formatted as specified in 2.4.2.1.3/item 1 above, only with *MAC Sequence number* and *Security Frame Counter* corresponding to *MACsequenceNumberCapability* and *SecurityLevelCapabilities*: • If *SecurityLevelCapabilities* = 0b00 and *MACsequenceNumberCapability* = 0b0: MAC Sequence number SHOULD be different than that in pass verdict 1 above; *GPD outgoing counter* field in the GPD Commissioning command payload is absent. • If *SecurityLevelCapabilities* = 0b00 and *MACsequenceNumberCapability* = 0b1: MAC Sequence number = B >= A+1; *GPD outgoing counter* field in the GPD Commissioning command payload is absent. • If *SecurityLevelCapabilities* = 0b10 or 0b11: *GPD outgoing counter* field in the GPD Commissioning command payload is present and set to M >= N+1; MAC Sequence number SHOULD be different than that in 2.4.2.1.3/item 1 above; it doesn't have to be aligned with the *GPD outgoing counter* field and does not have to be incremental.
3) DUT-GPD sends Data GPDF with MAC Sequence number and Security Frame Counter corresponding to *MACsequenceNumberCapability* and *SecurityLevelCapabilities*: • If *SecurityLevelCapabilities* = 0b00 and *MACsequenceNumberCapability* = 0b0: MAC Sequence number SHOULD be different than that in pass verdict 2 above; • If *SecurityLevelCapabilities* = 0b00 and *MACsequenceNumberCapability* = 0b1: MAC Sequence number = C >= B+1; • If *SecurityLevelCapabilities* = 0b10 or 0b11: *Security Frame Counter* in the NWK header is present and set to = P >= M+1; MAC Sequence number SHOULD be different than that in 2.4.2.1.3/item 2 above; it doesn't have to be aligned with the *GPD outgoing counter* field. TH-GPS executes the GPD command from the Data GPDF.
Fail verdict:
1) DUT-GPD does not send Commissioning GPDF formatted exactly as specified in 2.4.2.1.3/item 1 above. AND/OR *Auto-Commissioning* sub-field of the *NWK Frame Control* field is set. AND/OR TH-GPS does not exit commissioning mode and/or does not send GP Pairing.
2) DUT-GPD does not send Commissioning GPDF formatted exactly as specified in 2.4.2.1.3/item 2 above.
3) DUT-GPD does not send Data GPDF formatted exactly as specified in 2.4.2.1.3/item 3 above. AND/OR TH-GPS does not execute the GPD command.

326 ***2.4.2.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3A	Commissioning GPDF	Direct
GPF6	Bidirectional operation	Direct
GPDF3	FixedLocation capability	Direct
GPDF2	MAC sequence number capability	Direct

327 **2.4.2.2 Sub-case: GPD not capable of bidirectional commissioning**

328 ***2.4.2.2.1 Initial conditions***

329 As in 2.4.1.1.1.

330 ***2.4.2.2.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.1.1	Make DUT-GPD send a Commissioning GPDF.	

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333 ***2.4.2.2.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Commissioning GPDF with: • either the *RxAfterTx* sub-field of the *Extended NWK Frame Control* field set to 0b0, if the *Extended NWK Frame Control* field is present; • or Extended NWK Frame Control field absent.
Fail verdict:
1) DUT-GPD sends Commissioning GPDF with the *RxAfterTx* sub-field of the *Extended NWK Frame Control* field set to 0b1.

334 ***2.4.2.2.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2	Pairing with Commissioning GPDF	Direct
GPCF3A	Transmission of GPD Commissioning command	Direct

335 ### 2.4.2.3 Sub-case: ManufacturerID present

336 ***2.4.2.3.1 Initial conditions***

337 As in 2.4.1.1.1.

338 ***2.4.2.3.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.1.1	DUT-GPD sends a Commissioning GPDF.	

339 ***2.4.2.3.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Commissioning GPDF with: • the *Application information present* sub-field of the *Options* field set to 0b1; • the *Application information* field present and its sub-fields set to: *ManufacturerID present* = 0b1; • *ManufacturerID* field present and carrying a non-reserved value identifying the device vendor, as specified in the DUT-GPD PICS.
Fail verdict:
1) DUT-GPD sends Commissioning GPDF with the *Application information* and/or *ManufacturerID* field not present AND/OR the corresponding sub-field is NOT set.

340 ***2.4.2.3.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF17B	Tx of Commissioning GPDF with ManufacturerID	Direct

341 ### 2.4.2.4 Sub-case: Application information: ModelID supported

342 ***2.4.2.4.1 Initial conditions***

343 As in 2.4.1.1.1.

344 ***2.4.2.4.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.1.1	DUT-GPD sends a Commissioning GPDF.	

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347 ***2.4.2.4.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Commissioning GPDF with: • the *Application information present* sub-field of the *Options* field set to 0b1; • the *Application information* field present and its sub-fields set to: *ManufacturerID* present = 0b1, *ModelID* present = 0b1; • *ManufacturerID* field present and carrying a non-reserved value identifying the device vendor, as specified in [R5]; • *ModelID* field present.
Fail verdict:
1) DUT-GPD sends Commissioning GPDF with the *Application information, ManufacturerID* and/or *ModelID* field not present AND/OR the corresponding sub-fields are NOT set.

348 ***2.4.2.4.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF17A	Tx of Commissioning GPDF with ModelID	Direct

349 **2.4.2.5 Sub-case: Application information: GPD command list supported**

350 ***2.4.2.5.1 Initial conditions***

351 As in 2.4.1.1.1.

352 ***2.4.2.5.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.1.1	DUT-GPD sends a Commissioning GPDF.	

353 ***2.4.2.5.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Commissioning GPDF with: • the *Application information present* sub-field of the *Options* field set to 0b1; • the *Application information* field present and its *GPD Command list present* sub-field set to 0b1; • the *Number of GPD commands* field present and set to value other than 0x00; • the *GPD Command list* field present and having length in octets as indicated by the *Number of GPD commands* field; • if the *GPD Command list* contains any GPD commands from the 0xB0 - 0xBF range, the *ManufacturerID* field is also present, and the *ManufacturerID present* sub-field of the *Application information* field is set to 0b1. • The *GPD Command list* contains all the standard GPD Data commands supported by the DUT-GPD, those mandated by the DeviceID of DUT-GPD and those implemented in addition, as indicated in DUT-GPD PICS, including those transmitted and those received; inclusion of standard GPD reporting commands is not required.
Fail verdict:
1) DUT-GPD sends Commissioning GPDF with the *Application information, Number of GPD commands, GPD Command list* not present; AND/OR the length of the *GPD command list* field is not identical to the value of the *Number of GPD commands* field AND/OR the *ManufacturerID* field is not present while the *GPD Command list* contains GPD commands from the 0xB0 - 0xBF range AND/OR the *GPD command list* field does not contain some of the GPD Data commands supported by the DUT-GPD as indicated in DUT-GPD PICS.

354 ***2.4.2.5.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF17B GPCF17C GPCF17D	Tx of Commissioning GPDF with GPD command list	Direct

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2.4.2.6 Sub-case: Application information: Cluster list supported

2.4.2.6.1 Initial conditions

As in 2.4.1.1.1.

2.4.2.6.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.1.1	DUT-GPD sends a Commissioning GPDF.	

2.4.2.6.3 Expected Outcome

Pass verdict:
1) DUT-GPD sends Commissioning GPDF with: • the *Application information present* sub-field of the *Options* field set to 0b1; • the *Application information* field present and its *Cluster list present* sub-field set to 0b1; • the *Cluster list* field present and: ▪ the *Length of ClusterID list* sub-field having value other than 0x00; ▪ the *Cluster ID List Server* sub-field having the twice the length in octet as indicated by the *Number of server ClusterIDs* part of the *Length of ClusterID list* sub-field; ▪ the *Cluster ID List Client* sub-field having the twice the length in octet as indicated by the *Number of client ClusterIDs* part of the *Length of ClusterID list* sub-field; • if the *Cluster list* contains any manufacturer-specific clusters as defined by the [R5], the *ManufacturerID* field is also present, and the *ManufacturerID present* sub-field of the *Application information* field is set to 0b1. • the *Cluster list* contains at least any standard ZCL clusters as defined by the [R5],implemented in addition to those of DUT-GPD DeviceID as indicated in DUT-GPD PICS .
Fail verdict:
1) DUT-GPD sends Commissioning GPDF with the *Application information,* or *Cluster list* not present; and/or the length of the *Cluster list* field is not identical to the value of the *Number of GPD commands* field and/or the *ManufacturerID* field is not present while the *Cluster list* contains manufacturer-specific clusters AND/OR any standard ZCL clusters implemented in addition to clusters mandated for DUT-GPD DeviceID and indicated in DUT-GPD PICS are NOT included.

2.4.2.6.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF17B GPCF17E GPCF17F	Tx of Commissioning GPDF with GPD command list	Direct

2.4.2.7 Sub-case: GPD channel set

2.4.2.7.1 Initial conditions

As in 2.4.1.1.1.

2.4.2.7.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.1.1	Make the DUT-GPD send either • if it supports unidirectional commissioning, a GPD Commissioning command on each of the supported channels, as indicated in the PICS (GPDF10D-GPDF10E); • or if it supports bidirectional commissioning, a GPD Channel Request command on each of the supported channels, as indicated in the PICS (GPDF10D-GPDF10E).	Method to trigger that is implementation specific. The GPD may automatically move through the channels, or user interaction may be necessary, resulting in transmission on one or more channels.

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368 ***2.4.2.7.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Commissioning GPDF on each supported channel, as indicated in the PICS (GPDF10D-GPDF10E).
Fail verdict:
1) DUT-GPD fails to sends Commissioning GPDF on at least one of the supported channels, as indicated in the PICS (GPDF10D-GPDF10E).

369 ***2.4.2.7.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPDF10D-GPDF10E	Supported channel set	Direct

370 ## 2.4.3 Security commissioning

371 ### 2.4.3.1 NOT TESTED: DUT-GPD with *GP Security Key request* = 0b1; key delivered
372 ### encrypted, KeyType =0b001

373 ***2.4.3.1.1 Initial conditions***

Item	Doc. Ref.	Test Step	Note
1-2		As in 2.4.1.1.1.	
3	[R3] A.3.2.2.6, A.3.3.3.1, A.3.3.3.2, A.3.3.3.3	TH-GPS is configured with: • *gpsSecurityLevel* >= 0b10; • *gpSharedSecurityKeyType* = 0b001; it's value shall be different than the value of the OOB key of DUT-GPD; • default *gpLinkKey* ('ZigBeeAlliance09');	
4	[R3] A.1.4, A.1.5	*gpdSecurityLevel* >= 0b10	
5		DUT-GPD has OOB security key;.	

374 ***2.4.3.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.1, A.4.2.1.2, A.4.1, A.1.5.3.3.3	TH-GPS enters commissioning mode with *gpsCommissioningExitMode = On first Pairing success*. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback. After successful completion of GPD Channel Request/GPD Channel Configuration command, the DUT-GPD sends Commissioning GPDF with *RxAfterTx* = 0b1. Upon receipt of the second Commissioning GPDF, the TH-GPS sends Commissioning Reply GPDF with: • *Direction* subfield of the Extended NWK Frame Control field set to 0b1; • *Extended NWK Frame Control* field present and set to: *SecurityLevel* and *SecurityKey* as for the triggering Commissioning GPDF, and the *Security frame counter* field and *MIC* fields included/set accordingly; • GPDID ▪ If *ApplicationID* = 0b000: in a 4B *SrcID* field carrying the SrcID of the DUT-GPD; the *Endpoint* field is absent; ▪ If *ApplicationID* = 0b010: in the MAC header *Destination address* field, carrying the 8B IEEE address of the DUT-GPD; the *Destination address mode* sub-field of the MAC *Frame control field* is set to 0b11; the *SrcID* field is absent; the *Endpoint* field is	*gpSharedSecurityKey Type* = 0b001 (NWK key);

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		present and carries the value from the triggering Commissioning GPDF. • *CommandID* field set to 0xF0; • sub-fields of the *Options* field set to: *GPDsecurityKeyPresent* = 0b1, *GPDkeyEncryption* = 0b1, *KeyType* = 0b001, *GPDsecurityKey* field present and carrying ZigBee NWK security key, encrypted; *GPD Key MIC* field is present; *Frame Counter* field is present.	
2	[R3] A.1.4, A.1.5	After a couple of seconds, the DUT-GPD is triggered to send Data GPDF.	

375 ***2.4.3.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Commissioning GPDF with: • *Extended NWK Frame Control* field present and its sub-fields set to:, *RxAfterTx* = 0b1; • GP Security Key request of the Options field set to 0b1; • *Extended Options* field present and its sub-fields set to: *SecurityLevelCapabilities* = *gpdSecurityLevel*, *GPDoutgoingCounterPresent* = 0b1, *GPDkeyEncryption* = 0b1, and GPDkeyPresent sub-field = 0b1; • *GPDoutgoingCounter* field present and set to N; • *GPD Key* field present and encrypted; *GPD Key MIC* field present. Upon reception of GPD Commissioning Reply command with the *KeyType* = 0b001, *GPDsecurityKey* field present and carrying ZigBee NWK security key, DUT-GPD sends GPD Success command, correctly protected with the shared key; the *Security Frame Counter* has the value M >=N+1; the DUT-GPD shall only reset the security frame counter to 0x00000000 if the value N > 0x80000000.
2) DUT-GPD sends protected Data GPDF: • with *Extended NWK Frame Control* field present and its sub-fields set to: *SecurityLevel* = gpdSecurityLevel, SecurityKey = 0b0; • protected according to *gpdSecurityLevel* with the NWK key and with *Security Frame Counter* >=*M+1*. The TH-GPS executes the GPD command.
Fail verdict:
1) DUT-GPD does not send Commissioning GPDF formatted exactly as specified in 2.4.3.1.3/item 1 above. AND/OR DUT-GPD does reset the *Security Frame Counter* (if SecurityLevel 0b10 or 0b11) in the GPD Success command if N < 0x80000000. AND/OR DUT-GPD does NOT reset the *Security Frame Counter* in the GPD Success command if N > 0x80000000.
2) DUT-GPD does not sent Data GPDF, formatted exactly as specified in 2.4.3.1.3/item 2 above. AND/OR TH-GPS does not execute the GPD command.

376 **2.4.3.2 NOT TESTED: Deprecated legacy test: DUT-GPD with *GP Security Key request* =**
377 **0b1; key delivered in the clear, KeyType =0b010**

378 ***2.4.3.2.1 Initial conditions***

Item	Doc. Ref.	Test Step	Note
1-2		As in 2.4.1.1.1.	
3	[R3] A.3.2.2.6, A.3.3.3.1, A.3.3.3.2, A.3.3.3.3	TH-GPS is configured with: • gpsSecurityLevel = 0b00; • gpSharedSecurityKeyType = 0b010 (GPD group key) • gpSharedSecurityKey = 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xc 0xcc 0cd 0xce 0xcf • no gpLinkKey;	
4	[R3] A.1.5, A.1.6	gpdSecurityLevel >= 0b10	
5		DUT-GPD may or may not be configured with a security key.	

379
380
381 ***2.4.3.2.2 Test Procedure***

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Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.1, A.4.2.1.2, A.4.1, A.1.5.3.3.3	TH-GPS enters commissioning mode with *gpsCommissioningExitMode = On first Pairing success*; Upon receipt of a Commissioning GPDF, TH-GPS sends Commissioning Reply GPDF with: • secured as the triggering Commissioning GPDF; • sub-fields of the *Options* field set to: *GPDsecurityKeyPresent*=0b1; • *GPDkeyEncryption* = 0b0, *KeyType* = 0b010, *GPDsecurityKey* field present and carrying the GP group key 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xc 0xcc 0cd 0xce 0xcf. DUT-GPD is triggered to send Commissioning GPDF. After the TH-GPS sends Commissioning Reply GPDF, and the DUT-GPD sends Success GPDF, the DUT-GPD is triggered to send Data GPDF.	gpSharedSecurityKey Type = 0b010 (NWK key);

382 ***2.4.3.2.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF protected, with *Extended NWK Frame Control* field present and its *SecurityKey* sub-field set to 0b0.
Fail verdict:
1) DUT-GPD does not sent Data GPDF, formatted exactly as specified in tem 1 above.

383 **2.4.3.3 DUT-GPD with *GP Security Key request* = 0b1; key encrypted, KeyType =0b011**

384 ***2.4.3.3.1 Initial conditions***

Item	Doc. Ref.	Test Step	Note
1-2		As in 2.4.1.1.1.	
3	[R3] A.3.2.2.6, A.3.3.3.1, A.3.3.3.2, A.3.3.3.3	TH-GPS is configured with: • *gpsSecurityLevel* >= 0b10; • *gpSharedSecurityKeyType* = 0b011 (NWK key derived GPD group key); the value of the ZigBee NWK key shall be chose such that the derived GPD key is different than the value of the OOB key of DUT-GPD; • default *gpLinkKey* (‘ZigBeeAlliance09’);	
4	[R3] A.1.4, A.1.5	gpdSecurityLevel >=0b10	
5		DUT-GPD has OOB key.	

385 ***2.4.3.3.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.1, A.4.2.1.2, A.4.1, A.1.5.3.3.3	TH-GPS enters commissioning mode with *gpsCommissioningExitMode = On first Pairing success*. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback. After successful completion of GPD Channel Request/GPD Channel Configuration command, upon receipt of a second correctly formatted Commissioning GPDF (with *KeyRequest* = 0b1 and encrypted OOB key present), TH-GPS sends correctly formatted Commissioning Reply GPDF with: • secured as the triggering Commissioning GPDF; • sub-fields of the *Options* field set to: *GPDsecurityKeyPresent*=0b1; • *GPDkeyEncryption* = 0b1, *KeyType* = 0b011, *GPDsecurityKey* field present and carrying the GP group key derived from the NWK key, encrypted, *GPD Key MIC* field is present, *Frame Counter* field present.	

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		After commissioning completes, DUT-GPD is triggered to send Data GPDF.	

386 ***2.4.3.3.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF protected, with *Extended NWK Frame Control* field present and its *SecurityKey* sub-field set to 0b0.
Fail verdict:
1) DUT-GPD does not sent Data GPDF, formatted exactly as specified in item 1 above.

387 **2.4.3.4 DUT-GPD with *GP Security Key request* = 0b1; key encrypted, KeyType =0b111**

388 ***2.4.3.4.1 Initial conditions***

Item	Doc. Ref.	Test Step	Note
1-2		As in 2.4.1.1.1.	
3	[R3] A.3.2.2.6, A.3.3.3.1, A.3.3.3.2, A.3.3.3.3	TH-GPS is configured with: • *gpsSecurityLevel* >= 0b10; • *gpSharedSecurityKeyType* = 0b111 (GPD group key derived individual key); • *gpSharedSecurityKey* = 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xc 0xcc 0cd 0xce 0xcf • default gpLinkKey (‘ZigBeeAlliance09’);	
4	[R3] A.1.4, A.1.5	*gpdSecurityLevel* >= 0b10	
5		DUT-GPD has OOB key.	

389 ***2.4.3.4.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.1, A.4.2.1.2, A.4.1, A.1.5.3.3.3	TH-GPS enters commissioning mode with *gpsCommissioningExitMode* = *On first Pairing success*. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback. After successful completion of GPD Channel Request/GPD Channel Configuration command, upon receipt of a second correctly formatted Commissioning GPDF (with *KeyRequest* = 0b1 and encrypted OOB key present), TH-GPS sends correctly formatted Commissioning Reply GPDF with: • secured as the triggering Commissioning GPDF; • sub-fields of the *Options* field set to: *GPDsecurityKeyPresent*=0b1; • *GPDkeyEncryption* = 0b1, *KeyType* = 0b111, *GPDsecurityKey* field present and carrying the individual GP group key derived from the NWK key, encrypted, *GPD Key MIC* field is present, *Frame Counter* field is present. After commissioning completes, the DUT-GPD is triggered to send Data GPDF.	

390 ***2.4.3.4.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF protected, with *Extended NWK Frame Control* field present and its *SecurityKey* sub-field set to 0b1.
Fail verdict:
1) DUT-GPD does not sent Data GPDF formatted exactly as specified in item 1 above.

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391 #### 2.4.3.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3A	Tx Commissioning GPDF	Direct
GPCF4	Bidirectional commissioning	Direct
GPCF9A	Rx Commissioning Reply GPDF	Direct
GPCF13B	Rx encrypted security key in Commissioning Reply GPDF	Direct

392 #### 2.4.3.6 NOT TESTED: Deprecated legacy test: DUT-GPD with OOB key in the clear

393 ##### *2.4.3.6.1 Initial conditions*

Item	Doc. Ref.	Test Step	Note
1-2		As in 2.4.1.1.1.	
3	[R3] A.3.2.2.6, A.3.3.3.1	gpsSecurityLevel = 0b00 gpSharedSecurityKeyType = 0b000 (no key);	
4	[R3] A.1.4, A.1.5	gpdSecurityLevel >= 0b10	
5		DUT-GPD comes with pre-configured OOB key.	

394 ##### *2.4.3.6.2 Test Procedure*

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.1, A.4.2.1.2, A.4.1 A.1.5.3.3.3	TH-GPS enters commissioning mode with *gpsCommissioningExitMode = On first Pairing success*. DUT-GPD is triggered to send Commissioning GPDF. TH-GPS does NOT provide DUT-GPD with a different key. After a couple of seconds, the DUT-GPD is again triggered to send Commissioning GPDF.	The second Commissioning GPDF allows for sending the GPD the requested configuration parameters, if any (e.g. channel).
2	[R3] A.1.4, A.1.5	After a couple of seconds, the DUT-GPD is triggered to send Data GPDF.	

395 ##### *2.4.3.6.3 Expected Outcome*

Pass verdict:
1) DUT-GPD sends a Commissioning GPDF, with: • sub-fields of the *Options* field set to: *GP Security Key request*=0b0, *Extended Options* field = 0b1; • sub-fields of the *Extended Options* field set to: *SecurityLevelCapabilities*=gpdSecurityLevel, *KeyType* = 0b100, *GPDkeyPresent* = 0b1, *GPDoutgoingCounterPresent* = 0b1, *GPDkey* encryption = 0b0; • *GPDkey* field present and carrying an OOB key, • *GPDoutgoingCounter* field present and set to N. • DUT-GPD sends again Commissioning GPDF, with *Security Frame Counter* field present and set to M >= N+1.
2) DUT-GPD sends Data GPDF with: • Extended NWK Frame Control field present and its sub-fields set to: SecurityLevel = gpdSecurityLevel, SecurityKey = 0b1; • protected according to *gpdSecurityLevel* with the OOB key and *Security Frame Counter* set to *>=M+1*. • The TH-GPS executes the GPD command.
Fail verdict:
1) DUT-GPD does not send unprotected Commissioning GPDF, formatted exactly as specified in 2.4.3.6.3/item 1 above. DUT-GPD does not increment the Security Frame Counter for the second transmission of the GPDF Commissioning GPDF.
2) DUT-GPD does not sent Data GPDF, formatted exactly as specified in 2.4.3.6.3/item 2 above. AND/OR TH-GPS does not execute the GPD command.

396 ##### *2.4.3.6.4 PICS covered*

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PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3A	Tx Commissioning GPDF	Direct
GPCF11	OOB security key	Direct
GPCF12A	Tx security key in the clear in Commissioning GPDF	Direct

2.4.3.7 DUT-GPD with OOB key encrypted with TC-LK (shared key NOT requested)

2.4.3.7.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1-2		As in 2.4.1.1.1.	
3	[R3] A.3.2.2.6, A.3.3.3.1	TH-GPS is configured with: • *gpsSecurityLevel* >= 0b10 • *gpSharedSecurityKeyType* = 0b000 (no key); • default *gpLinkKey* ('ZigBeeAlliance09');	
4	[R3] A.1.6, A.1.7	gpdSecurityLevel >= 0b10	
5		DUT-GPD comes with pre-configured OOB key.	

2.4.3.7.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.1, A.4.2.1.2, A.4.1 A.1.5.3.3.3	TH-GPS enters commissioning mode with *gpsCommissioningExitMode = On first Pairing success*. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback. After successful completion of GPD Channel Request/GPD Channel Configuration command, DUT-GPD sends two correctly formatted Commissioning GPDF (with *KeyRequest* = 0b0 and encrypted OOB key present). Upon reception of a second GPD Commissioning command, TH-GPS sends Commissioning Reply GPDF with: • secured as the triggering Commissioning GPDF; • sub-fields of the *Options* field set to: ▪ *GPDsecurityKeyPresent*=0b0; ▪ *GPDkeyEncryption* = 0b0, *KeyType* = 0b100, • *GPDsecurityKey* field, *GPD Key MIC* field and *Frame Counter* field absent.	The second Commissioning GPDF allows for sending the GPD the requested configuration parameters, if any (e.g. channel).
2	[R3] A.1.4, A.1.5	After a couple of seconds, the DUT-GPD is triggered to send Data GPDF.	

2.4.3.7.3 Expected Outcome

Pass verdict:
1) DUT-GPD sends a Commissioning GPDF, with: • *GP Security Key request*=0b0, *Extended Options present* = 0b1; • sub-fields of the *Extended Options* field set to: *SecurityLevelCapabilities*=gpdSecurityLevel, *KeyType* = 0b100, *GPDkeyPresent* = 0b1, *GPDkeyEncryption* = 0b1, *GPDoutgoingCounterPresent* = 0b1; • *GPDkey* field present and carrying an encrypted OOB key and *GPDkeyMIC* field present, ▪ If the ApplicationID = 0b000 and SrcID = 0x12345678, OOB Key = {0xC0 0xC1 0xC2 0xC3 0xC4 0xC5 0xC6 0xC7 0xC8 0xC9 0xCA 0xCB 0xCC 0xCD 0xCE 0xCF}, and the default TC-LK ={0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39} is used, then the fields shall have the following values: TC-LK protected OOB key = {0x7D 0x17 0x7B 0xD2 0x9E 0xA0 0xFD 0xA6 0xB0 0x17 0x03 0x65 0x87 0xDC

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0x26 0x00},
GPDkeyMIC = {0x61 0xF1 0x63 0xA9};

- If the ApplicationID = 0b000 and SrcID = 0x12345678, OOB Key = {0x16 0x68 0x16 0x68 0x16 0x68 0x16 0x68 0x16 0x68 0x16 0x68 0x16 0x68 0x16 0x68}, and the default TC-LK ={0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39} is used, then the fields shall have the following values:
  TC-LK protected OOB key = {0xAB 0xBE 0xAF 0x79 0x4C 0x0D 0x2D 0x09 0x6E 0xB6 0xDF 0xC6 0x5D 0x79 0xFE 0xA7},
  GPDkeyMIC = {0x67 0x31 0x42 0x6A};
- If the ApplicationID = 0b010 and GPD IEEE address = 0x8877665544332211, independent of the GPD *Endpoint*, OOB Key = {0xC0 0xC1 0xC2 0xC3 0xC4 0xC5 0xC6 0xC7 0xC8 0xC9 0xCA 0xCB 0xCC 0xCD 0xCE 0xCF}, and the default TC-LK ={0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39} is used, then the fields shall have the following values:
  TC-LK protected OOB key = {0x2D 0xF0 0x67 0xAF 0xCD 0x4D 0x8C 0xF0 0xF5 0x2E 0x6C 0x85 0x8F 0x31 0x4E 0x22},
  GPDkeyMIC = {0x3F 0x9A 0xE0 0xB5};

- *GPDoutgoingCounter* field present and set to N.

DUT-GPD sends again unprotected Commissioning GPDF, with *Security Frame Counter* field present and set to M >= N+1.

Upon reception of GPD Commissioning Reply, DUT-GPD sends correctly formatted and protected GPD Success command (with *KeyType* = 0b1 and with *Security Frame Counter* field present and set to >= M +1).

2) DUT-GPD sends Data GPDF with:

- *Extended NWK Frame Control* field present and its sub-fields set to: *SecurityLevel* = gpdSecurityLevel, *SecurityKey* = 0b1;
- protected according to *gpdSecurityLevel* with the OOB key and *Security Frame Counter* set to *>=M+1*.
- The TH-GPS executes the GPD command.

Fail verdict:

1) DUT-GPD does not send unprotected Commissioning GPDF, formatted exactly as specified in 2.4.3.6.3/item 1 above.
DUT-GPD does not increment the Security Frame Counter for the second transmission of the GPDF Commissioning GPDF.
AND/OR DUT-GPD does NOT successfully complete commissioning by sending Success GPDF, formatted as in pass verdict 1 above.

2) DUT-GPD does not sent Data GPDF, formatted exactly as specified in 2.4.3.6.3/item 2 above.
AND/OR TH-GPS does not execute the GPD command.

2.4.3.7.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3	Tx Commissioning GPDF	Direct
GPCF11	OOB security key	Direct
GPCF12B	Tx encrypted security key in the clear in Commissioning GPDF	Direct

2.4.3.8 DUT-GPD with OOB key encrypted (shared key requested, not delivered)

2.4.3.8.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1-2		As in 2.4.1.1.1.	
3	[R3] A.3.2.2.6, A.3.3.3.1	TH-GPS is configured with: • *gpsSecurityLevel* >= 0b10 • *gpSharedSecurityKeyType* = 0b000 (no key); • default *gpLinkKey* (‘ZigBeeAlliance09’);	
4	[R3] A.1.6, A.1.7	gpdSecurityLevel >= 0b10	
5		DUT-GPD comes with pre-configured OOB key.	

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404 ***2.4.3.8.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.1, A.4.2.1.2, A.4.1 A.1.5.3.3.3	TH-GPS enters commissioning mode with *gpsCommissioningExitMode = On first Pairing success*. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback. After successful completion of GPD Channel Request/GPD Channel Configuration command, DUT-GPD sends two correctly formatted Commissioning GPDF (with *KeyRequest* = 0b1 and encrypted OOB key present). Upon reception of a second GPD Commissioning command, TH-GPS sends Commissioning Reply GPDF with: • secured as the triggering Commissioning GPDF; • sub-fields of the *Options* field set to: ▪ *GPDsecurityKeyPresent*=0b0; ▪ *GPDkeyEncryption* = 0b0, *KeyType* = 0b100, • *GPDsecurityKey* field, *GPD Key MIC* field and *Frame Counter* field absent.	The second Commissioning GPDF allows for sending the GPD the requested configuration parameters, if any (e.g. channel).
2	[R3] A.1.4, A.1.5	After a couple of seconds, the DUT-GPD is triggered to send Data GPDF.	

405 ***2.4.3.8.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends a Commissioning GPDF, with: • *GP Security Key request*=0b1, *Extended Options present* = 0b1; • sub-fields of the *Extended Options* field set to: *SecurityLevelCapabilities*=gpdSecurityLevel, *KeyType* = 0b100, *GPDkeyPresent* = 0b1, *GPDkeyEncryption* = 0b1, *GPDoutgoingCounterPresent* = 0b1; • *GPDkey* field present and carrying an encrypted OOB key and *GPDkeyMIC* field present, ▪ If the *ApplicationID* = 0b000 and SrcID = 0x12345678, OOB Key = {0xC0 0xC1 0xC2 0xC3 0xC4 0xC5 0xC6 0xC7 0xC8 0xC9 0xCA 0xCB 0xCC 0xCD 0xCE 0xCF}, and the default TC-LK ={0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39} is used, then the fields shall have the following values: TC-LK protected OOB key = {0x7D 0x17 0x7B 0xD2 0x9E 0xA0 0xFD 0xA6 0xB0 0x17 0x03 0x65 0x87 0xDC 0x26 0x00}, *GPDkeyMIC* = {0x61 0xF1 0x63 0xA9}; ▪ If the ApplicationID = 0b000 and SrcID = 0x12345678, OOB Key = {0x16 0x68 0x16 0x68 0x16 0x68 0x16 0x68 0x16 0x68 0x16 0x68 0x16 0x68 0x16 0x68}, and the default TC-LK ={0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39} is used, then the fields shall have the following values: TC-LK protected OOB key = {0xAB 0xBE 0xAF 0x79 0x4C 0x0D 0x2D 0x09 0x6E 0xB6 0xDF 0xC6 0x5D 0x79 0xFE 0xA7}, *GPDkeyMIC* = {0x67 0x31 0x42 0x6A}; ▪ If the ApplicationID = 0b010 and GPD IEEE address = 0x8877665544332211, independent of the GPD *Endpoint*, OOB Key = {0xC0 0xC1 0xC2 0xC3 0xC4 0xC5 0xC6 0xC7 0xC8 0xC9 0xCA 0xCB 0xCC 0xCD 0xCE 0xCF}, and the default TC-LK ={0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39} is used, then the fields shall have the following values: TC-LK protected OOB key = {0x2D 0xF0 0x67 0xAF 0xCD 0x4D 0x8C 0xF0 0xF5 0x2E 0x6C 0x85 0x8F 0x31 0x4E 0x22}, *GPDkeyMIC* = {0x3F 0x9A 0xE0 0xB5}; • *GPDoutgoingCounter* field present and set to N. • DUT-GPD sends again unprotected Commissioning GPDF, with *Security Frame Counter* field present and set to M >= N+1. Upon reception of GPD Commissioning Reply, DUT-GPD sends correctly formatted and protected GPD Success command (with *KeyType* = 0b1 and with *Security Frame Counter* field present and set to >= M +1.

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2) DUT-GPD sends Data GPDF with: • *Extended NWK Frame Control* field present and its sub-fields set to: *SecurityLevel* = gpdSecurityLevel, *SecurityKey* = 0b1; • protected according to *gpdSecurityLevel* with the OOB key and *Security Frame Counter* set to >=*M+1*. • The TH-GPS executes the GPD command.
Fail verdict:
1) DUT-GPD does not send unprotected Commissioning GPDF, formatted exactly as specified in 2.4.3.6.3/item 1 above. DUT-GPD does not increment the Security Frame Counter for the second transmission of the GPDF Commissioning GPDF. AND/OR DUT-GPD does NOT successfully complete commissioning by sending Success GPDF, formatted as in pass verdict 1 above.
2) DUT-GPD does not sent Data GPDF, formatted exactly as specified in 2.4.3.6.3/item 2 above. AND/OR TH-GPS does not execute the GPD command.

2.4.3.8.4 PICS Covered

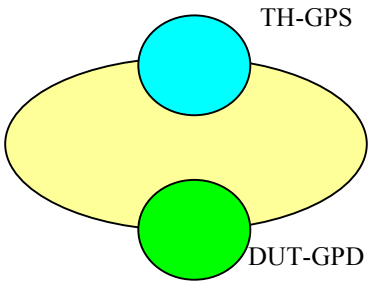
PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3	Tx Commissioning GPDF	Direct
GPCF11	OOB security key	Direct
GPCF12B	Tx encrypted security key in the clear in Commissioning GPDF	Direct

2.4.4 GPD bidirectional commissioning procedure – RxOn capable GPD

2.4.4.1 Bidirectional commissioning procedure

2.4.4.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPS (GPT+/GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Channel = as supported by the DUT-GPD Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific GPEP supports the application functionality of the DUT-GPD (see Section A.4.3 of [R3]).
DUT-GPD	GPD ID = manufacturer-specific Capable of implementing the bidirectional commissioning procedure.

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between TH-GPS and DUT-GPD.	

2.4.4.1.2 Test Set-Up

The TH-GPS and DUT-GPD shall be in wireless communication proximity of one another.

A packet sniffer shall be observing the communication over the air interface.

2.4.4.1.3 Test Procedure

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Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2, A.4.1	TH-GPS enters commissioning mode with *gpsCommissioningExitMode* = *On first Pairing success*. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback.	
1B		Upon transmission opportunity following reception of a correctly formatted GPD Channel Request command with *Auto-Commissioning* = 0b0, the TH-GPS sends correctly formatted GPD Channel Configuration command with: • the sub-fields of the *NWK Frame Control* field set to: *FrameType* = 0b01 and *NWK Frame Control Extension* = 0b0, • and the *Extended NWK Frame Control* field absent; • the fields *GPD SrcID*, *Endpoint*, *Security frame counter* and *MIC* are absent.	
1C		Upon transmission opportunity following reception of a ceorrectly formatted GPD Commissioning command with *RxAfterTx* = 0b1, the TH-GPS sends correctly formatted GPD Commissioning Reply command with: • the sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00 and *NWK Frame Control Extension* = 0b1, • the sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* – as in the triggering Commissioning GPDF; *RxAfterTx* = 0b0, *Direction* = 0b1; • the GPD ID fields corresponding to the *ApplicationID*, • command payload carrying information as requested by the DUT-GPD.	
1D		After commissioning completes, make DUT-GPD send Data GPDF.	
		Test GPD capability of re-commissioning (incl. channel toggling):	
2A		***GPD with decommissioning/reset function (GPCF10A: YES):*** Make sure TH-GPS exited commissioning mode. DUT-GPD is made to send a Data GPDF. Reset DUT-GPD in DUT-specific way. Commissioning action is performed on DUT-GPD. If required, commissioning action is performed again on DUT-GPD.	
2B		***GPD without decommissioning/reset function (GPCF10A: NO):*** Perform commissioning between TH-GPS and DUT-GPD. Make sure TH-GPS exited commissioning mode. Do NOT reset/decommission the DUT-GPD. Commissioning action is performed on DUT-GPD. If required, commissioning action is performed again on DUT-GPD.	
2C		***GPD with decommissioning/reset function (GPCF10A: YES):*** Make sure TH-GPS exited commissioning mode. DUT-GPD is made to send a Data GPDF. Do NOT reset/decommission the DUT-GPD. Commissioning action is performed on DUT-GPD. If required, commissioning action is performed again on DUT-GPD.	

417 ***2.4.4.1.4 Expected Outcome***

Pass verdict:
1A) On the first commissioning action DUT-GPD sends Channel Request GPDF with:

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- any MAC sequence number,
- sub-fields of the *NWK Frame Control* field set to:
  - *Frame* Type = 0b01,
  - *ZigBee Protocol Version = 0x3;*
  - *Auto-Commissioning*
    - 0b0, if the GPD Channel Request transmission is immediately followed by reception window;
    - 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel
  - *NWK Frame Control Extension* = 0b0
- the *Extended NWK Frame Control* field absent;
- the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* absent,
- *CommandID* = 0xE2 (GPD Channel Request);
- and the command payload of 1B length indicating the channel for the last Channel Request GPDF transmission for the next two attempts.

If the GPD automatically progresses to transmission of the next GPDF (without a separate user interaction/user trigger), it should send the next GPDF at least 200ms after the successful reception of GPD Commissioning Reply command.

On the second and subsequent commissioning action, and until reception of Channel Configuration GPDF, the DUT-GPD sends the Channel Request GPDF with:

- MAC sequence number: SHOULD be different for each GPD Channel Request GPFS;
  - If *SecurityLevelCapabilities* = 0b00 and *MACsequenceNumberCapability* = 0b1 (both values as indicated in DUT-GPD PICS or in the Commissioning GPDF that will follow): MAC Sequence number shall be higher than that in the previous attempt;
- sub-fields of the *NWK Frame Control* field set to:
  - *Frame Type* = 0b01,
  - *ZigBee Protocol Version = 0x3;*
  - *Auto-Commissioning*:
    - 0b0, if the GPD Channel Request transmission is immediately followed by reception window;
    - 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel
  - *NWK Frame Control Extension* = 0b0,
- *Extended NWK Frame Control* field absent;
- the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* absent.

The last Channel Request GPDF in each attempt is transmitted on the channel indicated in *Rx channel in the next attempt* sub-field of the preceding attempt.

During one of the following transmission opportunities, TH-GPS sends correctly-formatted Channel Configuration GPDF, with *Basic* sub-field of the *Channel* field set to 0b0, and carrying the operational channel.

1B) On the first commissioning action after reception of Channel Configuration GPDF and until reception of Commissioning Reply GPDF, DUT-GPD sends Commissioning GPDF on the operational channel, with:

- MAC sequence number: SHOULD be different for each commissioning GPFS;
  - If *SecurityLevelCapabilities* = 0b00 and *MACsequenceNumberCapability* = 0b1: MAC Sequence number shall be higher for each subsequent commissioning GPFS;
- the sub-fields of the *NWK Frame Control* field set to:
  - *Frame Type* = 0b00,
  - *ZigBee Protocol Version = 0x3;*
  - *Auto-Commissioning* = 0b0;
  - *NWK Frame Control Extension* = 0b1,
- the sub-fields of the *Extended NWK Frame Control* set to:
  - *ApplicationID* as indicated in the PICS,
  - *RxAfterTx* set to 0b1,
  - *Direction* = 0b0;
- The GPD ID fields according to the *ApplicationID* of DUT-GPD.

If *GPD outgoing counter* field is present in the payload of the GPD Commissioning command (and it SHALL if *SecurityLevel capabilities* sub-field of the *Extended Options* field is set to 0b10 or 0b11), the value it carries shall be

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incremented for every transmission of a Commissioning GPFS.

TH-GPS sends correctly-formatted Commissioning Reply GPDF with the configuration parameters requested by the DUT-GPD.

1C) On the first commissioning action after reception of Commissioning Reply GPDF, DUT-GPD sends Success GPDF on the operational channel with:

- MAC sequence number: SHOULD be different for each commissioning GPFS;
  - If *SecurityLevelCapabilities* = 0b00 and *MACsequenceNumberCapability* = 0b1: MAC Sequence number shall be higher than that in the previous commissioning GPFS;
- the sub-fields of the *NWK Frame Control* field set to:
  - *FrameType* = 0b00,
  - *ZigBee Protocol Version = 0x3;*
  - *Auto-Commissioning* = 0b0;
- If the *Extended NWK Frame Control* field is present, then its sub-fields are set to:
  - *ApplicationID* as indicated in the PICS,
  - *RxAfterTx* set to 0b0,
  - *Direction* = 0b0;
  - *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b1.
- The GPD ID fields according to the *ApplicationID* of DUT-GPD.
- the frame shall be protected accordingly:
  - *Security Level* sub-field of the *Extended NWK Frame Control* field of the Success GPDF is set to the *SecurityLevel capabilities* sub-field of the *Extended Options* field of the Commissioning GPDF;
  - *SecurityKeyType* sub-field of the *Extended NWK Frame Control* field of the Success GPDF is set to to the *KeyType* received in the *Options* field of the Commissioning Reply GPDF;
  - *Security frame counter* field present and carrying a value higher than the frame counter in the payload of the last send GPD Commissioning command;
    the DUT-GPD shall only reset the security frame counter to 0x00000000 if the value N > 0x80000000.
  - *MIC* field present;
  - *GPD CommandID* is:
    - Encrypted, if *SecurityLevel* of Success GPDF is set to 0b11,
    - Sent in the clear, if *SecurityLevel* of Success GPDF is set to 0b10.

If the GPD automatically progresses to transmission of Success GPDF (without a separate user interaction/user trigger), it sends the Success GPDF at least 50ms after the successful reception of GPD Commissioning Reply command.

If more than one Success GPFS is sent, and if *gpdSecurityLevel* is set to 0b10 or 0b11, the security frame counter is incremented for every transmission of a Success GPFS.

TH-GPS sends GP Pairing command with *AddSink* = 0b1 for the GPDID of the DUT-GPD.

1D) The Data GPDF is sent by DUT-GPD on the operational channel as exchanged in commissioning and uses the security parameters as exchanged in the Commissioning/Commissioning Reply GPDF; the security frame counter has higher value than that in the Success GPDF.

2A) – 2B) On the commissioning actions, the DUT-GPD sends Channel Request GPDF, at least one per action, on at least two different channels.

2C) On the commissioning action, the DUT-GPD sends Channel Request GPDF, at least one per action; it may only send it on the operational channel of the network.

Fail verdict:

1) On first commissioning action, the DUT-GPD does not send at least one Channel Request GPDF AND/OR the Channel Request is not formatted exactly as described in pass verdict 1A above.
AND/OR The channel of the last Channel Request GPDF transmission per second and subsequent attempts is not formatted exactly as described in pass verdict 1 above.
AND/OR TH-GPS does NOT send Channel Configuration GPDF with the operational channel.

AND/OR DUT-GPD does not accept Channel Configuration GPDF with sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b01 and *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent; the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* absent.

1B)On the first commissioning action after reception of Channel Configuration GPDF and until reception of Commissioning Reply GPDF, DUT-GPD does NOT send Commissioning GPDF on the operational channel, with the

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RxAfterTx set to 0b1, formatted exactly as specified in pass verdict 1B above. AND/OR TH-GPS does not send Commissioning Reply GPDF with the configuration parameters requested by the DUT-GPD.
1C) On the first commissioning action after reception of Commissioning Reply GPDF, DUT-GPD does not send Success GPDF on the operational channel, formatted exactly as specified in pass verdict 1C above. AND/OR DUT-GPD does reset the *Security Frame Counter* (if SecurityLevel 0b10 or 0b11) in the GPD Success command if N < 0x80000000. AND/OR DUT-GPD does NOT reset the *Security Frame Counter* (if SecurityLevel 0b10 or 0b11) in the GPD Success command if N > 0x80000000. AND/OR If more than one Success GPFS is sent, and if *gpdSecurityLevel* is set to 0b10 or 0b11, the security frame counter is NOT incremented for every transmission of a Success GPFS. AND/OR TH-GPS sends GP Pairing command with *AddSink* = 0b1.
1D) The Data GPDF is NOT sent by DUT-GPD AND?OR NOT sent on the operational channel as exchanged in commissioning, AND/OR does NOT use the security parameters as exchanged in the Commissioning/Commissioning Reply GPDF; AND/OR the security frame counter has lower value than that in the Success GPDF.
2A) – 2B) On the commissioning actions, the DUT-GPD does not send Channel Request GPDF, at least one per action. AND/OR DUT-GPD does not change the transmission channel for the Channel Request.
2C) On the commissioning actions, the DUT-GPD does not send Channel Request GPDF, at least one per action. AND/OR DUT-GPD immediately starts sending GPD Commissioning command.

418 ***2.4.4.1.5 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF4	Bidirectional communication in commissioning mode	Direct
GPF10C	Receiving in commissioning mode a GPDF frame format with *Frame type* sub-field of the *NWK Frame Control* field set to 0b01 (Maintenance frame)	Direct
GPF10D	Receiving GPDF frame format with *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b000 and *Frame type* sub-field of the *NWK Frame Control* field set to 0b00 (Data frame) in commissioning, without security	Direct
GPF10E	Receiving GPDF frame format with *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b010 in commissioning, without security	Direct
GPDF10	Configuration of operational channel in commissioning mode	Direct
GPCF5A	Transmission of GPD Channel Request command in commissioning mode	Direct
GPCF7A	Reception of Channel Configuration command in commissioning mode	Direct
GPCF3A	Transmission of GPD Commissioning Command	Direct
GPCF9A	Rx Commissioning Reply GPDF in commissioning mode	Direct
GPCF15A	Tx Success GPDF in commissioning mode	Direct
GPCF10A	Is GPD reset/decommissioning via an explicit user action supported?	Direct
GPCF10B	Is GPD removal via GPD Decommissioning command supported?	Indirect

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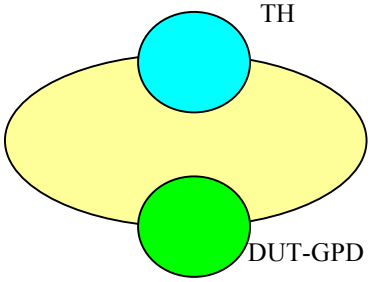
2.4.4.2 NOT TESTED: Bidirectional commissioning: Additional tests

These tests need to be executed if the DUT-GPD implements bidirectional commissioning.

2.4.4.2.1 Initial Conditions

The required network set-up for the test harness is as follows:

<table>
<tr><td rowspan="2"> 
</td><td>TH</td><td>PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF)
Channel = as supported by the DUT-GPD
Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7)
GPEP supports the application functionality of the DUT-GPD (see Section A.4.3 of [R3]).</td></tr>
<tr><td>DUT-GPD</td><td>GPD ID = manufacturer-specific (N);
Endpoint, if ApplicationID = 0b010, manufacturer-specific (X)
Implementing bidirectional commissioning procedure.</td></tr>
</table>

Item	Doc. Ref.	Initial Conditions	Note
1		TH operates in a ZigBee PAN. It may join a ZigBee network created by another device, or start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between TH and DUT-GPD.	

2.4.4.2.2 Test Set-Up

The TH and DUT-GPD shall be in wireless communication proximity of one another.

A packet sniffer shall be observing the communication over the air interface.

2.4.4.2.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
		M: State machine tests: Channel Request stage	
1A		**GPD state machine test:** ***Delayed Channel Configuration GPDF:*** If required, TH enters commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second). Make sure the first transmission of GPD Channel Configuration command by TH, following one of the reception windows (between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after) following the early transmission of a Channel Request GPDF with *Auto-Commissioning* = 0b0 by the DUT-GPD, does not reach the DUT-GPD (e.g. increase distance, or prevent TH from sending, or prevent TH from receiving the triggering GPD Channel Request). If DUT-GPD continues sending GPD Channel Request as it shall, make sure DUT-GPD can as soon as possible correctly receive one of subsequent transmissions of GPD Channel Configuration command from TH, with *Basic* = 0b1 .	
1B		***Negative test: Data GPDF from another GPD following Channel Request GPDF:*** If required, TH and/or DUT-GPD (re-)enter commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second). On one of the reception windows (between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after) following the early transmission of a Channel Request GPDF with *Auto-Commissioning* = 0b0	

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		by the DUT-GPD, TH sends Data GPDF, correctly formatted as if it was coming from another GPD (i.e. *Direction* sub-field of the *Extended NWK Frame Control* field set to 0b0 or the *Extended NWK Frame Control* field not present).	
1C		***Negative test: Commissioning Reply GPDF for another GPD following Channel Request GPDF:*** If required, TH and/or DUT-GPD (re-)enter commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second). On one of the reception windows (between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after) following the early transmission of a Channel Request GPDF with *Auto-Commissioning* = 0b0 by the DUT-GPD, TH sends correctly formatted Commissioning Reply command, addressed to another DUT-GPD.	This step can directly follow the previous step, if the DUT automatically progressing between commissioning steps (PICS item GPCF19) is still sending Channel Request GPDF. Otherwise, re-triggering of commissioning action on DUT-GPD is required.
1D		***Negative test: Commissioning Reply GPDF following Channel Request GPDF:*** If required, TH and/or DUT-GPD (re-)enter commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second). On one of the reception windows (between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after) following the early transmission of a Channel Request GPDF with *Auto-Commissioning* = 0b0 by the DUT-GPD, TH sends correctly formatted Commissioning Reply command, addressed to DUT-GPD, indicating the correct security level (as in test 2.4.4.1 or **Error! Reference source not found.**), and key type = 0b100.	
1E		***Negative test: Channel Request GPDF with* Auto-Commissioning *= 0b0 following Channel Request GPDF:*** If required, TH and/or DUT-GPD (re-)enter commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second). On one of the reception windows (between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after) following the early transmission of a Channel Request GPDF with *Auto-Commissioning* = 0b0 by the DUT-GPD, TH sends correctly formatted Channel Request GPDF command.	
1F		***Negative test: Channel Request GPDF with* Auto-Commissioning *= 0b1 following Channel Request GPDF:*** If required, TH and/or DUT-GPD (re-)enter commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second). On one of the reception windows (between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after) following the early transmission of a Channel Request GPDF with *Auto-Commissioning* = 0b1 by the DUT-GPD, TH sends correctly formatted Channel Request GPDF command (as if sent by another GPD).	
1G		***Positive test:*** If required, TH and/or DUT-GPD (re-)enter commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH provides commissioning success feedback. TH correctly responds to all DUT-GPD requests.	
State machine test: Commissioning stage ***Reset DUT-GPD if required.***			

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2A		If required, TH enters commissioning mode . Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second). The GPD Channel Configuration command the TH sends on a reception opportunity following a GPD Channel Request has *Basic* = 0b0. Make sure the transmission by TH of GPD Commissioning Reply command following the second transmission of the GPD Commissioning command with *RxAfterTx* = 0b1 by the DUT-GPD does not reach the DUT-GPD (e.g. increase distance, or prevent TH from sending, or prevent TH from receiving the triggering GPD Commissioning). If DUT-GPD continues sending GPD Commissioning with *RxAfterTx* = 0b1 as it shall, make sure DUT-GPD can as soon as possible correctly receive one of subsequent transmissions of GPD Commissioning Reply command by TH.	If required, clear Sink Table of TH before this test.
2B		***Negative test: Data GPDF from another GPD following Commissioning GPDF:*** If required, TH and/or DUT-GPD (re-)enter commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second). The GPD Channel Configuration command the TH sends on a reception opportunity following GPD Channel Request has *Basic* = 0b0. On the reception window (between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after) following the second or later transmission of a Commissioning GPDF with *RxAfterTx* = 0b1 by the DUT-GPD, TH sends Data GPDF, correctly formatted as if it was coming from another GPD.	
2C		***Negative test: Commissioning Reply GPDF for another GPD following Commissioning GPDF:*** If required, TH and/or DUT-GPD (re-)enter commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second). The GPD Channel Configuration command the TH sends on a reception opportunity following GPD Channel Request has *Basic* = 0b0. On the reception window (between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after) following the second or later transmission of a Commissioning GPDF with *RxAfterTx* = 0b1 by the DUT-GPD, TH sends correctly formatted Commissioning Reply command, addressed to another DUT-GPD.	This step can directly follow the previous step, if the DUT automatically progressing between commissioning steps (PICS item GPCF19) is still sending Channel Request GPDF. Otherwise, re-triggering of commissioning action on DUT-GPD is required.
2D		***Negative test: Channel Configuration GPDF following Commissioning GPDF:*** TH enters commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second). The GPD Channel Configuration command the TH sends on a reception opportunity following GPD Channel Request has *Basic* = 0b0. On the reception window (between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after) following the second or later transmission of a Commissioning GPDF with *RxAfterTx* = 0b1 by the DUT-GPD, TH sends correctly formatted *Channel Configuration* GPDF.	
2E		***Positive test:*** If required, TH and/or DUT-GPD (re-)enter commissioning mode. The GPD Channel Configuration command the TH sends on a reception opportunity following GPD Channel Request has *Basic* = 0b0.	

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		Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH provides commissioning success feedback. TH correctly responds to all DUT-GPD requests.	
M: Malformed Channel Configuration GPDF ***Reset DUT-GPD if required.***			
3A	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2, A.4.1	***Negative test (Wrong frame type = 0b00):*** If required, TH and/or DUT-GPD (re-)enter commissioning mode. Commissioning action is performed on DUT-GPD; if required, commissioning action is repeated. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of a GPD Channel Request with *Auto-Commissioning* = 0b0, TH sends at least one GPD Channel Configuration using Data frame format (0b00), i.e. with: • MAC header Destination Address field: ▪ 0xffff, if DUT-GPD supports *ApplicationID* = 0b000; ▪ GPD IEEE address N of DUT-GPD, if DUT-GPD supports *ApplicationID* = 0b010; • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b00, ▪ *ZigBeeProtocolVersion* =0x3; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b1; • The *Extended NWK Frame Control* field present and its sub-fields set to: ▪ *ApplicationID* as supported by DUT-GPD, ▪ *SecurityLevel* = 0b00*;* ▪ *KeyType* = 0b0*;* ▪ *RxAfterTx* = 0b0, ▪ *Direction* = 0b1; • *SrcID*; ▪ =N, if DUT-GPD supports *ApplicationID* = 0b000; ▪ absent, if DUT-GPD supports *ApplicationID* = 0b010; • *Endpoint*: ▪ absent, if DUT-GPD supports *ApplicationID* = 0b000; ▪ =X, if DUT-GPD supports *ApplicationID* = 0b010; • *Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • 1B of *Command payload*, indicating the operational channel and *Basic* = 0b1.	If required, clear Sink Table of TH before this test.
3B		***Negative test (Wrong frame type = 0b11)****:* As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration using reserved frame format (0b11).	
3C		***Negative test (Wrong frame type = 0b10)****:* As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration using reserved frame format (0b10).	
3D		***Negative test (Wrong Maintenance frame format: all fields):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration formatted exactly as in 2.4.4.2.3/step 3A above, only with *FrameType* (0b01).	
3E		***Negative test (Wrong Maintenance frame format: SrcID = 0x00000000):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to:	

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		▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x3; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b1; • The *Extended NWK Frame Control* field present and its sub-fields set to: ▪ *ApplicationID* = 0b000, ▪ *SecurityLevel* = 0b00; ▪ *KeyType* = 0b0; ▪ *RxAfterTx* = 0b0, ▪ *Direction* = 0b1; • *SrcID* = 0x00000000; • *Endpoint* field absent; • *Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • 1B of *Command payload*, indicating the operational channel and *Basic* = 0b1.	
3F		***Negative test (Wrong Maintenance frame format: Extended header included):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x3; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b1; • The *Extended NWK Frame Control* field present and its sub-fields set to: ▪ *ApplicationID* = 0b000, ▪ *SecurityLevel* = 0b00; ▪ *KeyType* = 0b0; ▪ *RxAfterTx* = 0b0, ▪ *Direction* = 0b1; • *SrcID, Endpoint, Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • 1B of *Command payload*, indicating the operational channel and *Basic* = 0b1.	
3G		***Negative test (Wrong Maintenance frame format: Extended header included, NWK Frame Control Extension = 0b0):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x3; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b0; • The *Extended NWK Frame Control* field present and its sub-fields set to: ▪ *ApplicationID* = 0b000, ▪ *SecurityLevel* = 0b00; ▪ *KeyType* = 0b0; ▪ *RxAfterTx* = 0b0, ▪ *Direction* = 0b1; • *SrcID, Endpoint, Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • 1B of *Command payload*, indicating the operational channel and *Basic* = 0b1.	

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3H		***Negative test (Wrong Maintenance frame format: SrcID included):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration using Maintenance frame format (0b01) with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x3; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b0; • The *Extended NWK Frame Control* field absent. • *SrcID* = N; • *Endpoint, Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • 1B of *Command payload*, indicating the operational channel and *Basic* = 0b1.	
3I		***Negative test (Wrong ZigBeeProtocolVersion):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x2; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b0; • The *Extended NWK Frame Control, SrcID, Endpoint, Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • 1B of *Command payload*, indicating the operational channel and *Basic* = 0b1.	
3J		***Negative test (Auto-Commissioning = 0b1):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x2; ▪ *Auto-Commissioning* = 0b1; ▪ *NWK Frame Control Extension* = 0b0; • The *Extended NWK Frame Control, SrcID, Endpoint, Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • 1B of *Command payload*, indicating the operational channel and *Basic* = 0b1.	
3K		***Negative test (CommandID != 0xF3):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x2; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b0; • The *Extended NWK Frame Control, SrcID, Endpoint, Security frame counter* and *MIC* field absent; • *CommandID* != 0xF3 • 1B of Command payload.	

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3L		***Negative test (Payloadless Channel Configuration GPDF):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x2; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b0; • The *Extended NWK Frame Control, SrcID, Endpoint, Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • NO *Command payload*.	
3M		***Positive test (all reserved fields set to 0b1)*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x2; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b0; • The *Extended NWK Frame Control, SrcID, Endpoint, Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • 1B of *Command payload*, indicating the operational channel and *Basic* = 0b1, and all the reserved fields set to 0b1	
3N		***Positive test (Channel Configuration GPDF with 2B payload):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x2; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b0; • The *Extended NWK Frame Control, SrcID, Endpoint, Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • 1B of *Command payload*, indicating the operational channel and *Basic* = 0b1. • 1B extra.	
3O		***Positive test (Channel Configuration GPDF with* Basic *= 0b0):*** As in 2.4.4.2.3/step 3A above, only TH sends GPD Channel Configuration with: • MAC header Destination Address = 0xffff, • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBeeProtocolVersion* =0x2; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b0; • The *Extended NWK Frame Control, SrcID, Endpoint, Security frame counter* and *MIC* field absent; • *CommandID* = 0xF3 • 1B of *Command payload*, indicating the operational channel and *Basic* = 0b0.	

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Malformed Commissioning Reply GPDF ***Reset DUT-GPD if required.***			
4A		**Negative test (Wrong frame type)**: TH enters commissioning mode. Commissioning action is performed on DUT-GPD; if required, commissioning action is repeated. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of a GPD Channel Request with *Auto-Commissioning* = 0b0, TH sends at least one correctly formatted GPD Channel Configuration. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of a second GPD Commissioning command, TH sends at least one GPD Commissioning Reply command using Maintenance frame format (0b01).	
4B		**Negative test (Wrong frame type)**: As in 2.4.4.2.3/step 4E above, only TH sends GPD Commissioning Reply command using a reserved frame format (0b10).	
4C		**Negative test (Wrong frame type)**: As in 2.4.4.2.3/step 4E above, only TH sends GPD Commissioning Reply command using a reserved frame format (0b11).	
4D		**Negative test (Wrong Protocol Version)**: As in 2.4.4.2.3/step 4E above, only TH-GPS sends GPD Commissioning Reply command with wrong ZigBee Protocol Version 0x2.	
4E		**Negative test (Auto-Commissioning set)**: As in 2.4.4.2.3/step 4E above, only TH-GPS sends GPD Commissioning Reply command with *Auto-Commissioning* = 0b1.	
4F		**Negative test (Extended NWK Frame Control absent)**: As in 2.4.4.2.3/step 4E above, only TH-GPS sends GPD Commissioning Reply command with *NWK Frame Control Extension* sub-field set to 0b0 and the *Extended NWK Frame Control* field not present.	
4G		**Negative test (Extended NWK Frame Control error)**: As in 2.4.4.2.3/step 4E above, only TH-GPS sends GPD Commissioning Reply command with *NWK Frame Control Extension* sub-field set to 0b1, yet the *Extended NWK Frame Control* field is not present.	
4H		**Negative test (Extended NWK Frame Control error)**: As in 2.4.4.2.3/step 4E above, only TH-GPS sends GPD Commissioning Reply command with *NWK Frame Control Extension* sub-field set to 0b0, yet the *Extended NWK Frame Control* field is present.	
4I		**Negative test (Wrong ApplicationID)**: As in 2.4.4.2.3/step 4E above, only TH sends GPD Commissioning Reply command with *ApplicationID* = 0b011.	
4J		**Negative test (Wrong ApplicationID)**: As in 2.4.4.2.3/step 4E above, only TH sends GPD Commissioning Reply command with *ApplicationID = 0b000* if DUT-GPD uses IEEE address or *ApplicationID* = 0b010, if DUT-GPD uses SrcID.	
4K		**Negative test (RxAfterTx set)**: As in 2.4.4.2.3/step 4E above, only TH sends GPD Commissioning Reply command with *RxAfterTx* = 0b1.	
4L		**Negative test (Direction = 0b0)**: As in 2.4.4.2.3/step 4E above, only TH sends GPD Commissioning Reply command with *Direction* = 0b0.	
4M		**For DUT-GPD with ApplicationID = 0b000: Negative test (wrong SrcID)**:	

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		As in 2.4.4.2.3/step 4E above, only TH sends GPD Commissioning Reply command with wrong SrcID value.	
4N		**For multi-SrcID DUT-GPD (ApplicationID = 0b000): Negative test (Wrong SrcID)** As in 2.4.4.2.3/step 4E above, only TH-GPS sends GPD Commissioning Reply command with *ApplicationID* = 0b000 and SrcID value supported by the DUT-GPD, but NOT used in the current commissioning process.	
4O		**For DUT-GPD with ApplicationID = 0b010: Negative test (IEEE address absent)** As in 2.4.4.2.3/step 4E above, only TH sends GPD Commissioning Reply command with *ApplicationID* = 0b010 and IEEE address of GPD absent (MAC Destination address mode 0b10 and Destination address = 0xffff used instead).	
4P		**For DUT-GPD with ApplicationID = 0b010: Negative test (Wrong endpoint)** As in 2.4.4.2.3/step 4E above, only TH sends GPD Commissioning Reply command with *ApplicationID* = 0b010 and Endpoint field set to a value NOT used by the DUT-GPD.	
4Q		**For multi-endpoint DUT-GPD with ApplicationID = 0b010: Negative test (Wrong endpoint)** As in 2.4.4.2.3/step 4E above, only TH sends GPD Commissioning Reply command with *ApplicationID* = 0b010 Endpoint field set to a value supported by the DUT-GPD, but NOT used in the current commissioning process.	
4R		**Positive test**: TH-GPS enters commissioning mode. Commissioning action is performed on DUT-GPD; if required, commissioning action is repeated. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of a GPD Channel Request with *Auto-Commissioning* = 0b0 following transmission of Channel Request on the operational channel of the TH, TH sends at least one correctly formatted GPD Channel Configuration. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of a second GPD Commissioning command, THS sends at least one correctly formatted GPD Commissioning Reply command.	
4S		**Positive test (additional payload of GPD Commissioning Reply)**: TH-GPS enters commissioning mode. Commissioning action is performed on DUT-GPD; if required, commissioning action is repeated. Following successful GPD Channel Request/Channel Configuration exchange, between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of a second GPD Commissioning command, TH-GPS sends at least one correctly formatted GPD Commissioning Reply command, with one additional octet appended at the end.	
Additional security tests			
5A		***Negative test: gpdSecurityLevel >= 0b10, yet key not present in GPD Commissioning Reply*** Clean Sink Table. TH-GPS enters commissioning mode. Commissioning action is performed on DUT-GPD; if required, commissioning action is repeated. Following successful GPD Channel Request/Channel Configuration exchange, DUT- sends two Commissioning GPDFs in a row, each with *RxAfterTx* of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the *Options* field set to 0b1, *SecurityLevel capabilities* sub-field	

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		of the *Options* field set to 0b10 or 0b11 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b1; *GPDkeyPresent* = 0b1, encrypted OOB key and *GPD Key MIC* field present. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after receipt of the second Commissioning GPDF, the TH-GPS sends Commissioning Reply GPDF with: • *GPDsecurityKeyPresent*=0b0, *GPDkeyEncryption* = 0b0, *KeyType* = gpSharedSecurityKeyType of TH-GPS, • *GPDsecurityKey* field absent; • *GPDkeyMIC* field absent. • *Frame Counter* field absent	
5B		***Negative test: GPD security key present = 0b1, yet key not present in GPD Commissioning Reply:*** Clean Sink Table. TH-GPS enters commissioning mode. Commissioning action is performed on DUT-GPD; if required, commissioning action is repeated. Following successful GPD Channel Request/Channel Configuration exchange, DUT-GPD sends two Commissioning GPDFs in a row, each with *RxAfterTx* of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the *Options* field set to 0b1, *SecurityLevel capabilities* sub-field of the *Options* field set to 0b10 or 0b11 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b1; *GPDkeyPresent* = 0b1, encrypted OOB key and *GPD Key MIC* field present. Upon receipt of the second Commissioning GPDF, the TH-GPS sends Commissioning Reply GPDF with: • *GPDsecurityKeyPresent*=0b1, *GPDkeyEncryption* = 0b1, *KeyType* = *gpSharedSecurityKeyType* of TH-GPS, • *GPDsecurityKey* field absent; • *GPDkeyMIC* field absent. • *Frame Control* field absent.	
5C		***Negative test: GPD security key present = 0b0, yet key present in GPD Commissioning Reply:*** Clean Sink Table. TH-GPS enters commissioning mode. Commissioning action is performed on DUT-GPD; if required, commissioning action is repeated. Following successful GPD Channel Request/Channel Configuration exchange, DUT-GPD sends two Commissioning GPDFs in a row, each with *RxAfterTx* of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the *Options* field set to 0b1, *SecurityLevel capabilities* sub-field of the *Options* field set to 0b10 or 0b11 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b1; *GPDkeyPresent* = 0b1, encrypted OOB key and *GPD Key MIC* field present. Upon receipt of the second Commissioning GPDF, the TH-GPS sends Commissioning Reply GPDF with: • *GPDsecurityKeyPresent*=0b0, *GPDkeyEncryption* = 0b0, *KeyType* = gpSharedSecurityKeyType of TH-GPS, • *GPDsecurityKey* field present and carrying the *gpSharedSecurityKeyType* of TH-GPS; • *GPDkeyMIC* field absent, *Frame Counter* field absent.	
5D		***Negative test: GPD security level mismatch:*** Clean Sink Table. TH-GPS enters commissioning mode. Commissioning action is performed on DUT-GPD; if required, commissioning action is repeated. Following successful GPD Channel Request/Channel Configuration exchange, DUT-GPD sends two Commissioning GPDFs in a row, each with	

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		RxAfterTx of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the *Options* field set to 0b1, *SecurityLevel capabilities* sub-field of the *Options* field set to 0b10 or 0b11 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b1; *GPDkeyPresent* = 0b1, encrypted OOB key and *GPD Key MIC* field present. Upon receipt of the second Commissioning GPDF, the TH-GPS sends Commissioning Reply GPDF with: • *SecurityLevel* = 0b00, *GPDsecurityKeyPresent*=0b0, *GPDkeyEncryption* = 0b0, *KeyType* = 0b000, • *GPDsecurityKey* field and *GPDkeyMIC* field absent. • *Frame Counter* field absent	
5E		***Deprecated (legacy) test:*** ***Negative test: GPDkeyEncryption = 0b1 not supported by DUT-GPD:*** Clean Sink Table. TH-GPS enters commissioning mode. DUT-GPD is triggered to send two Commissioning GPDFs in a row, each with *RxAfterTx* of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the Options field set to 0b1, *SecurityLevel capabilities* sub-field of the *Options* field set to 0b10 or 0b11 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b0. Upon receipt of the second Commissioning GPDF, the TH-GPS sends Commissioning Reply GPDF with: • *SecurityLevel* of DUT-GPD, *GPDsecurityKeyPresent*=0b1, *KeyType* = *gpSharedSecurityKeyType* of TH-GPS, • *GPDkeyEncryption* = 0b1, • *GPDsecurityKey* field present and encrypted • *GPDkeyMIC* field present. • *Frame Counter* field present.	
TC-LK encryption tests			
6A		***GPDkeyEncryption set in GPD Commissioning, yet key sent in the clear in GPD Commissioning Reply:*** Clean Sink Table. TH-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback. After successful completion of GPD Channel Request/GPD Channel Configuration command, DUT-GPD sends two Commissioning GPDFs in a row, each with *RxAfterTx* of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the Options field set to 0b1 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b1; encrypted OOB key present. Upon receipt of the second Commissioning GPDF, the TH-GPS sends Commissioning Reply GPDF with: • *GPDsecurityKeyPresent*=0b1, *GPDkeyEncryption* = 0b0, *KeyType* = gpSharedSecurityKeyType of TH-GPS, • *GPDsecurityKey* field present and carrying the value of *gpSharedSecurityKey* attribute of TH-GPS in the clear; • *GPDkeyMIC* field absent. • *Frame Counter* field absent	
6B		**Negative test**: ***GPDkeyEncryption* set, yet key sent in the clear in GPD Commissioning Reply:** Clean Sink Table. TH-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback.	

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		After successful completion of GPD Channel Request/GPD Channel Configuration command, DUT-GPD sends two Commissioning GPDFs in a row, each with *RxAfterTx* of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the Options field set to 0b1 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b1; encrypted OOB key present. Upon receipt of the second Commissioning GPDF, the TH-GPS sends Commissioning Reply GPDF with: • *GPDsecurityKeyPresent*=0b1, *GPDkeyEncryption* = 0b1, *KeyType* = gpSharedSecurityKeyType of TH-GPS, • *GPDsecurityKey* field present and carrying the value of *gpSharedSecurityKey* attribute of TH-GPS in the clear; • *GPDkeyMIC* field absent. • *Frame Counter* field absent	
6C		***Negative test: GPDkeyEncryption cleared, yet key TCLK encrypted in GPD Commissioning Reply:*** Clean Sink Table. TH-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback. After successful completion of GPD Channel Request/GPD Channel Configuration command, DUT-GPD sends two Commissioning GPDFs in a row, both with *RxAfterTx* of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the *Options* field set to 0b1 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b1; encrypted OOB key present. Upon receipt of the second Commissioning GPDF, the TH-GPS sends Commissioning Reply GPDF with: • *GPDsecurityKeyPresent*=0b1, *GPDkeyEncryption* = 0b0, *KeyType* = gpSharedSecurityKeyType of TH-GPS, • *GPDsecurityKey* field present and carrying the value of *gpSharedSecurityKey* attribute of TH-GPS correctly protected with the default TCLK; • *GPDkeyMIC* field present and correctly generated with default TCLK. • *Frame Counter* field present.	
6D		***Negative test: Incorrect MIC with TCLK:*** Clean Sink Table. TH-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback. After successful completion of GPD Channel Request/GPD Channel Configuration command, DUT-GPD sends two Commissioning GPDFs in a row, both with *RxAfterTx* of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the *Options* field set to 0b1 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b1; encrypted OOB key present. Upon receipt of the second Commissioning GPDF, the TH-GPS sends Commissioning Reply GPDF with: • *GPDsecurityKeyPresent*=0b1, *GPDkeyEncryption* = 0b1, *KeyType* = gpSharedSecurityKeyType of TH-GPS, • *GPDsecurityKey* field present and carrying the value of *gpSharedSecurityKey* attribute of TH-GPS correctly protected with the default TCLK; • *GPDkeyMIC* field present but having incorrect MIC value. • *Frame Counter* field present and having the correct value.	

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6E		***Negative test: Incorrect Frame Counter for TCLK protection:*** Clean Sink Table. TH-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback. After successful completion of GPD Channel Request/GPD Channel Configuration command, DUT-GPD sends two Commissioning GPDFs in a row, both with *RxAfterTx* of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the *Options* field set to 0b1 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b1; encrypted OOB key present. Upon receipt of the second Commissioning GPDF with *Frame Counter* in the command payload set to M, the TH-GPS sends Commissioning Reply GPDF with: • *GPDsecurityKeyPresent*=0b1, *GPDkeyEncryption* = 0b1, *KeyType* = gpSharedSecurityKeyType of TH-GPS, • *GPDsecurityKey* field present and carrying the value of *gpSharedSecurityKey* attribute of TH-GPS protected with the default TCLK, but with frame coutner M • *GPDkeyMIC* field present and corresponding to frame counter M;. • *Frame Counter* field present and carrying M+1.	
6F		***Positive test: older Frame Counter for TCLK protection:*** Clean Sink Table. TH-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback. After successful completion of GPD Channel Request/GPD Channel Configuration command, DUT-GPD sends three Commissioning GPDFs in a row, both with *RxAfterTx* of the *Extended NWK Frame Control* field set 0b1, *KeyRequest* sub-field of the *Options* field set to 0b1 and the *GPD Key encryption* sub-field of the *Extended Options* field set to 0b1; encrypted OOB key present. The *Frame Counter* in the command payload of the second Commissioning GPDF is set to M. Upon receipt of the second Commissioning GPDF with *Frame Counter* in the command payload set to N >= M+1, the TH-GPS sends Commissioning Reply GPDF with: • *GPDsecurityKeyPresent*=0b1, *GPDkeyEncryption* = 0b1, *KeyType* = gpSharedSecurityKeyType of TH-GPS, • *GPDsecurityKey* field present and carrying the value of *gpSharedSecurityKey* attribute of TH-GPS protected with the default TCLK, frame counter M • *GPDkeyMIC* field present and corresponding to frame counter M;. • *Frame Counter* field present and carrying M.	

429 ***2.4.4.2.4 Expected Outcome***

Pass verdict:
1A) DUT-GPD sends GPD Channel Request commands, until GPD Channel Configuration is received (up to a GPD-specific maximum number of attempts). On reception of GPD Channel Configuration with *Basic* = 0b1, DUT-GPD proceeds to sending a correctly formatted GPD Commissioning with *RxAfterTx* = 0b1.
1B) – 1F) On reception of the incorrect GPDF, DUT-GPD continues sending GPD Channel Request commands (up to an GPD-specific maximum number of attempts). DUT does NOT send Commissioning GPD.

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1G) DUT-GPD sends GPD Channel Request commands, until GPD Channel Configuration is received (up to a GPD-specific maximum number of attempts). On reception of GPD Channel Configuration with *Basic* = 0b1, DUT-GPD proceeds to sending GPD Commissioning with *RxAfterTx* = 0b1. On reception of GPD Commissioning Reply, DUT-GPD proceeds to sending GPD Success. TH-GPS sends GP Pairing with ApplicationID and GPD ID of DUT-GPD and *AddSink* = 0b1.
2A) After reception of GPD Channel Configuration command with *Basic* = 0b0, DUT-GPD sends GPD Commissioning command with *RxAfterTx* = 0b1, until GPD Commissioning Reply is received. On reception of GPD Commissioning Reply, DUT-GPD proceeds to sending GPD Success with *RxAfterTx* = 0b0. TH-GPS sends GP Pairing with ApplicationID and GPD ID of DUT-GPD and *AddSink* = 0b1.
2B) – 2D) On reception of the incorrect GPDF, DUT-GPD continues sending Commissioning GPDF with *RxAfterTx* = 0b1 (up to a GPD-specific maximum number of attempts). DUT does NOT send Success GPD.
2E) DUT-GPD successfully completes bidirectional commissioning (incl. Commissioning GPDF with *RxAfterTx* = 0b1 and Success GPDF with *RxAfterTx* = 0b0) procedure. TH-GPS sends GP Pairing with ApplicationID and GPD ID of DUT-GPD and *AddSink* = 0b1.
3A) – 3L) After TH transmission of the incorrect Channel Configuration GPDF, DUT-GPD does NOT send Commissioning GPDF. DUT-GPD does continue with sending correctly formatted Channel Request GPDF (up to a GPD-specific maximum number of attempts).
3M) – 3O) After reception of GPD Channel Configuration command, DUT-GPD sends correctly formatted GPD Commissioning command with *RxAfterTx* = 0b1.
4A) – 4Q) After TH transmission of the incorrect Commissioning Reply GPDF, DUT-GPD does NOT send Success GPDF. DUT-GPD does continue with sending Commissioning GPDF (up to a GPD-specific maximum number of attempts).
4R) – 4S) DUT-GPD successfully completes commissioning, sending correctly formatted and protected Success GPDF. TH-GPS sends GP Pairing with GPD ID of DUT-GPD and *AddSink* = 0b1.
5A) – 5E) Upon reception of GPD Commissioning Reply command, DUT-GPD does NOT send GPD Success command.
6A) Upon reception of GPD Commissioning Reply command, DUT-GPD sends GPD Success command, correctly protected. Upon reception of GPD Success command, the TH-GPS sends GP Pairing command with GPD ID of the DUT-GPD and *AddSink* = 0b1.
6B) – 6E) Upon reception of GPD Commissioning Reply command, DUT-GPD does NOT send GPD Success command.
6F) Upon reception of GPD Commissioning Reply command, DUT-GPD sends GPD Success command, correctly protected. Upon reception of GPD Success command, the TH-GPS sends GP Pairing command with GPD ID of the DUT-GPD and *AddSink* = 0b1.
Fail verdict:
1A) DUT-GPD stops sending GPD Channel Request commands after two attempts. AND/OR DUT-GPD does not proceed to sending GPD Commissioning on reception of GPD Channel Configuration, AND/OR stops sending GPD Commissioning after two attempts. AND/OR On reception of GPD Commissioning Reply, DUT-GPD does not send correctly protected GPD Success. AND/OR TH-GPS does not send GP Pairing with GPD ID of DUT-GPD and *AddSink* = 0b1.
1B) – 1F) On reception of the incorrect GPDF, DUT-GPD stops sending GPD Channel Request commands (before the GPD-specific maximum number of attempts). AND/OR DUT sends Commissioning GPD.
1G) DUT-GPD does NOT sends GPD Channel Request commands, until GPD Channel Configuration is received (up to a GPD-specific maximum number of attempts). AND/OR On reception of GPD Channel Configuration with *Basic* = 0b1, DUT-GPD does NOT proceed to sending AND/OR On reception of GPD Commissioning Reply, DUT-GPD does NOT proceed to sending GPD Success. AND/OR TH-GPS does NOT sends GP Pairing with *ApplicationID* and GPD ID of DUT-GPD and *AddSink* = 0b1.

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2A) After reception of GPD Channel Configuration command with *Basic* = 0b0, DUT-GPD does NOT send GPD Commissioning command with *RxAfterTx* = 0b1, until GPD Commissioning Reply is received. AND/OR On reception of GPD Commissioning Reply, DUT-GPD does NOT proceed to sending GPD Success with *RxAfterTx* = 0b0. AND/OR TH-GPS does NOT send GP Pairing with ApplicationID and GPD ID of DUT-GPD and *AddSink* = 0b1.
2B) – 2D) On reception of the incorrect GPDF, DUT-GPD does NOT continue sending Commissioning GPDF with *RxAfterTx* = 0b1 (up to a GPD-specific maximum number of attempts). AND/OR DUT does send Success GPD.
2E) DUT-GPD does NOT successfully complete bidirectional commissioning (incl. Commissioning GPDF with *RxAfterTx* = 0b1 and Success GPDF with *RxAfterTx* = 0b0) procedure. AND/OR TH-GPS does NOT send GP Pairing with ApplicationID and GPD ID of DUT-GPD and *AddSink* = 0b1.
3A) – 3L) After TH transmission of the incorrect Channel Configuration GPDF, DUT-GPD sends Commissioning GPDF. AND/OR DUT-GPD does NOT continue with sending Channel Request GPDF (up to a GPD-specific maximum number of attempts).
3M) – 3O) After reception of GPD Channel Configuration command, DUT-GPD does NOT send correctly formatted GPD Commissioning command with *RxAfterTx* = 0b1.
4A) – 4Q) After TH transmission of the incorrect Commissioning Reply GPDF, DUT-GPD sends Success GPDF. AND/OR DUT-GPD does NOT continue with sending Commissioning GPDF (up to a GPD-specific maximum number of attempts).
4R) – 4S) DUT-GPD does NOT successfully complete commissioning. AND/OR TH-GPS does not send GP Pairing with GPD ID of DUT-GPD and *AddSink* = 0b1.
5A) – 5E) Upon reception of GPD Commissioning Reply command, DUT-GPD sends GPD Success command.
6A) Upon reception of GPD Commissioning Reply command, DUT-GPD does NOT send GPD Success command, AND/OR GPD Success is NOT correctly protected. AND/OR Upon reception of GPD Success command, the TH-GPS does not send a GP Pairing command with GPD ID of the DUT-GPD and *AddSink* = 0b1.
6B) – 6E) Upon reception of GPD Commissioning Reply command, DUT-GPD send GPD Success command.
6F) Upon reception of GPD Commissioning Reply command, DUT-GPD sends GPD Success command, correctly protected. Upon reception of GPD Success command, the TH-GPS sends GP Pairing command with GPD ID of the DUT-GPD and *AddSink* = 0b1.

430 ##### 2.4.4.2.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF4	Bidirectional communication in commissioning mode	Direct
GPDF10	Configuration of operational channel in commissioning mode	Direct
GPCF5A	Transmission of GPD Channel Request command in commissioning mode	Direct
GPCF7A	Reception of Channel Configuration command in commissioning mode	Direct
GPCF3A	Transmission of GPD Commissioning Command	Direct
GPCF9A	Rx Commissioning Reply GPDF in commissioning mode	Direct
GPCF15A	Tx Success GPDF in commissioning mode	Direct

431 ### 2.4.4.3 Bidirectional commissioning with PANId request

432 ##### 2.4.4.3.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 2.4.4.1.	

433 ##### 2.4.4.3.2 Test Set-Up

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The TH-GPS and DUT-GPD shall be in wireless communication proximity of one another.

A packet sniffer shall be observing the communication over the air interface.

2.4.4.3.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2, A.4.1	TH-GPS enters commissioning mode with *gpsCommissioningExitMode = On first Pairing success*. Commissioning action is (repeatedly, if required) performed on DUT-GPD (if manually: not more often than once per second), until TH-GPS provides commissioning success feedback, TH-GPS correctly responds to all DUT-GPD requests.	
2		Trigger DUT-GPD to send Data GPDF.	

2.4.4.3.4 Expected Outcome

Pass verdict:
1) Upon successful exchange of Channel Request/Channel Configuration GPDF, DUT-GPD sends Commissioning GPDF on the operational channel, correctly formatted, and with: • *PANId request* sub-field of the *Option* field set to 0b1. Upon reception of Commissioning Reply GPDF, correctly formatted, with: • *PANID present* sub-field of the *Options* field set to 0b1; • *PANId* field present and carrying PANId of TH-GPS, DUT-GPD sends correctly formatted (and protected, if DUT-GPD supports security) Success GPDF; the MAC header Destination PANId field is set to PANId of TH-GPS.
2) DUT-GPD sends correctly formatted (and protected, if DUT-GPD supports security) Data GPDF; the MAC header Destination PANId field is set to PANId of TH-GPS.
Fail verdict:
1) Upon successful exchange of Channel Request/Channel Configuration GPDF, DUT-GPD does NOT send Commissioning GPDF on the operational channel, correctly formatted, AND/OR *PANId request* sub-field of the *Option* field is set to 0b0. AND/OR Upon reception of Commissioning Reply GPDF, correctly formatted, carrying the PANId, DUT-GPD does NOT sends correctly formatted (and protected, if DUT-GPD supports security) Success GPDF AND/OR the MAC header Destination PANId field is NOT set to PANId of TH-GPS.
2) DUT-GPD does NOT sends correctly formatted (and protected, if DUT-GPD supports security) Data GPDF AND/OR the MAC header Destination PANId field is NOT set to PANId of TH-GPS.

2.4.4.3.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF4	Bidirectional communication in commissioning mode	Direct
GPCF16	In-band configuration of PANId (via GPD Commissioning Reply command)	Direct

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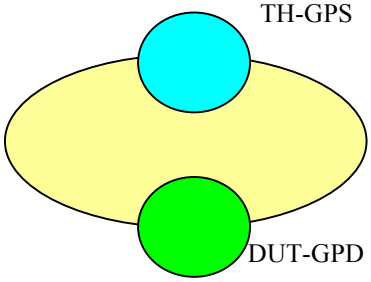
2.4.4.4 Unidirectional commissioning procedure

2.4.4.4.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPS (GPT+/GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Channel = as supported by the DUT-GPD Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific GPEP supports the application functionality of the DUT-GPD (see Section A.4.3 of [R3]).
DUT-GPD	GPD ID = manufacturer-specific Implementing the unidirectional commissioning procedure.

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between TH-GPS and DUT-GPD.	

2.4.4.4.2 Test Set-Up

The TH-GPS and DUT-GPD shall be in wireless communication proximity of one another.

A packet sniffer shall be observing the communication over the air interface.

2.4.4.4.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2, A.4.1	TH-GPS enters commissioning mode with *gpsCommissioningExitMode = On first Pairing success*. Commissioning action is repeatedly performed on DUT-GPD, not more often than once per second, until TH-GPS provides commissioning success feedback.	
1B		After commissioning completes, make DUT-GPD send Data GPDF.	
Test GPD capability of re-commissioning (incl. channel toggling):			
2A		***GPD with decommissioning/reset function (GPCF10A: YES):*** Make sure TH-GPS exited commissioning mode. DUT-GPD is made to send a Data GPDF. Reset DUT-GPD in DUT-specific way. Commissioning action is performed on DUT-GPD. Commissioning action is performed again on DUT-GPD.	
2B		***GPD without decommissioning/reset function (GPCF10A: NO):*** Perform commissioning between TH-GPS and DUT-GPD. Make sure TH-GPS exited commissioning mode. Do NOT reset/decommission the DUT-GPD. Commissioning action is performed on DUT-GPD. Commissioning action is performed again on DUT-GPD.	

2.4.4.4.4 Expected Outcome

Pass verdict:
1A) On each commissioning action, DUT-GPD sends Commissioning GPDF, using channels from a channel set as supported by DUT-GPD, with:

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• MAC sequence number: SHOULD be different for each commissioning GPFS; ▪ If *SecurityLevelCapabilities* = 0b00 and *MACsequenceNumberCapability* = 0b1: MAC Sequence number shall be higher for each subsequent commissioning GPFS; • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b00, ▪ *ZigBee Protocol Version = 0x3;* ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b1, • the sub-fields of the *Extended NWK Frame Control* set to: ▪ *ApplicationID* as indicated in the PICS, ▪ *RxAfterTx* set to 0b0, ▪ *Direction* = 0b0; • The GPD ID fields according to the *ApplicationID* of DUT-GPD. • Security capability information according to the DUT-GPD; if gpdSecurityLevel >= 0b10 (as it shall), encrypted OOB key is included. If *GPD outgoing counter* field is present in the payload of the GPD Commissioning command (and it SHALL if *SecurityLevel capabilities* sub-field of the *Extended Options* field is set to 0b10 or 0b11), the value it carries shall be incremented for every transmission of a Commissioning GPFS.
1B) The Data GPDF is sent by DUT-GPD on the operational channel, being the channel on which the last Commissioning GPDF was sent; the security frame counter has higher value than that in the payload of last last Commissioning GPDF.
2A) – 2B) On the commissioning actions, the DUT-GPD sends Commissioning GPDF, formatted exactly as in pass verdict 1A) above, at least one per action, on at least two different channels.
Fail verdict:
1A) DUT-GPD does NOT send Commissioning GPDF using channels from the DUT-GPD channel set, with the *RxAfterTx* set to 0b0, formatted exactly as specified in pass verdict 1A above.
1B) The Data GPDF is NOT sent by DUT-GPD AND/OR NOT sent on the operational channel being the channel on which the last Commissioning GPDF was sent AND/OR does NOT use the security parameters as exchanged in the Commissioning GPDF; AND/OR the security frame counter has lower value than that in the payload of last Commissioning GPDF.
2A) – 2B) On the commissioning actions, the DUT-GPD does not send Commissioning GPDF, formatted exactly as in pass verdict 1A) above, at least one per action. AND/OR DUT-GPD does not change the transmission channel for the Channel Request.

449 ***2.4.4.4.5 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF3A	Transmission of GPD Commissioning Command	Direct
GPCF10A	Is GPD reset/decommissioning via an explicit user action supported?	Direct
GPCF10B	Is GPD removal via GPD Decommissioning command supported?	Indirect

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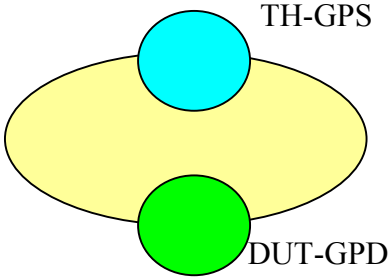
2.4.5 GPD Decommissioning command

2.4.5.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPS (GPT+/GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Channel = as supported by the DUT-GPD Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific GPEP supports the application functionality of the DUT-GPD (see Section A.4.3 of [R3]).
DUT-GPD	GPD ID = manufacturer-specific Capable of sending GPD Decommissioning command Security capabilities and application functionality: manufacturer-specific

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or start as ZC.	
2	[R3] A.3.9	A pairing exists between TH-GPS and DUT-GPD, if *ApplicationID* = 0b010, and if supported by the DUT-GPD, for a particular Endpoint X. if *ApplicationID* = 0b010, there are no other pairings for this DUT-GPD.	

2.4.5.1.2 Test Set-Up

The TH-GPS and DUT-GPD shall be in wireless communication proximity of one another.

A packet sniffer shall be observing the communication over the air interface.

2.4.5.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.2.3, A.1.4, A.3.5.2.5, A.4.2.1.3	Read out Sink Table of the TH-GPS. DUT-GPD is made to send a Data GPDF. Put TH-GPS in commissioning mode. DUT-GPD is made to send Decommissioning GPDF. If *ApplicationID* = 0b010, and if supported by the DUT-GPD, the Decommissioning GPDF carries the particular paired Endpoint X; otherwise, if supported by the DUT-GPD, Decommissioning GPDF carries the particular paired Endpoint 0xff. Read out Sink Table of the TH-GPS.	DUT-GPD supports multiple Decommissioning frames (with different Endpoint or SrcID values), the test has to be repeated for each combination; the existing pairing should match the data in the Decommissioning GPDF.

2.4.5.1.4 Expected Outcome

Pass verdict:
1) The TH-GPS has a Sink Table entry for the DUT-GPD, and, if *ApplicationID* = 0b010, a particular *Endpoint* X. The Decommissioning GPDF sent by the DUT-GPD uses the same SecurityLevel and SecurityKey as the preceding Data GPDF; the Security Frame Counter (in case of SecurityLevel 0b10 or 0b11) is one higher than for the preceding Data GPDF. The *Auto-Commissioning* sub-field shall be set to 0b0; the *RxAfterTx* sub-field should be set to 0b0. The *GPD CommandID* field shall carry the value 0xE1 and no *GPD Command Payload*.

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If *ApplicationID* = 0b010, the *Endpoint* field carries the value for which the Decommissioning was triggered (X or 0xff). After reception of the Decommissioning GPDF, the TH-GPS does NOT have a Sink Table entry for the DUT-GPD. TH-GPS may send GP Pairing command with *AddSink*=0b0 and *RemoveGPD*=0b1.
Fail verdict:
1) The DUT-GPD does not send the Decommissioning GPDF. OR the Decommissioning GPDF is not formatted exactly as specified in 2.4.5.1.4/item 1 above. AND/OR On reception of the Decommissioning GPDF, TH-GPS does NOT remove the entry for the DUT-GPD from the TH-GPS's Sink Table.

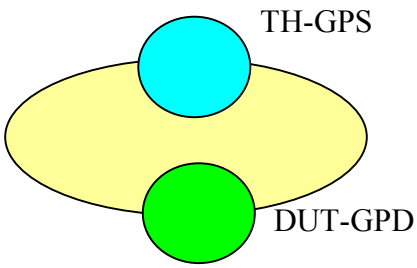
460 ***2.4.5.1.5 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF10	Decommissioning GPDF	Direct

461 ## 2.5 NOT TESTED: Advanced GP only: Bidirectional GPD operation

462 ***2.5.1.1.1 Initial Conditions***

463 The required network set-up for the test harness is as follows:



TH-GPS (GPT+ or GPC)/TH-Tool	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Channel = as supported by the DUT-GPD Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific GPEP supports the application functionality of the DUT-GPD (see Section A.4.3 of [R3]).
DUT-GPD	GPD ID = manufacturer-specific *Auto-Commissioning* shall be clear. Must include *Extended NWK Frame Control* field. *MACsequenceNumberCapability* and GPD security usage according to DUT capabilities.

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or may start as ZC.	
2	[R3] A.3.9	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures). The pairing has to be created with the *RxOnCapability* of the DUT-GPD set to 0b1.	

464 ***2.5.1.1.2 Test Set-Up***

465 The TH-GPS shall be in wireless communication proximity of the DUT-GPD.

466 A packet sniffer shall be observing the communication over the air interface.

467 ### 2.5.1.2 NOT TESTED: Baseline operation

468 Note: preferably, if implemented by the DUT-GPD, the GPD command sent by the TH to the GPD has an observable
469 effect, either on the device or over the air, immediate or e.g. observable upon next exchange with the DUT-GPD. E.g.,
470 GPD Channel Configuration, GPD Commissioning Reply or GPD Read Attributes commands could be used, if
471 supported by the GPD.

472 ***2.5.1.2.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.5.1.1.1.	
2	[R3] A.3.9	The pairing between the DUT-GPD and TH-GPS is preferably without security, if supported by the DUT.	

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3	A.3.6.1.5	TH-GPS supports a bidirectional operation command also supported by the DUT-GPD. If possible, select such bidirectional operation command, which allows for checking of execution correctness by the DUT-GPD (e.g. over the air response, like GPD Read Attributes command, or changed value of a readable attribute, like GPD Write Attributes command, or other observable reaction).	

473 ***2.5.1.2.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.6.1.5	Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1.	the *RxAfterTx* setting may be DUT-specific, e.g. require longer harvesting time, etc.
2	[R3] A.1.4, A.3.6.1.5	Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF (as measured on the medium), TH-GPS sends at least one Data GPDF with: • Any MAC sequence number; • If the *Extended NWK Frame Control* field is present and its *ApplicationID* sub-field set to 0b010, the MAC header: ▪ *Destination addressing mode* subfield of the MAC *Frame control* field is set to 0b11; ▪ *Destination address* field carrying the manufacturer-specific 8B IEEE address of the DUT-GPD; • sub-fields of the *NWK Frame Control* field set to: ▪ *Frame type* 0b00 ▪ *ZigBee Protocol Version* 0b0011; ▪ *Auto-Commissioning* 0b0; ▪ *NWK Frame Control Extension* 0b1; • *Extended NWK Frame Control* field present and its sub-fields: ▪ *ApplicationID* as in the triggering Data GPDF ▪ Security settings as in the triggering Data GPDF ▪ *RxAfterTx* set to 0b0; ▪ *Direction* set to 0b1; • *GPD SrcID* field ▪ If the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b000: present and carrying the 4B SrcID of the DUT-GPD; ▪ If the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b010: absent; • *Endpoint* field ▪ If the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b000: absent; ▪ If the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b010: present and carrying an endpoint value supported by the DUT-GPD; • The security-related fields according to the pairing established with the DUT-GPD; ▪ Frame Counter as in the triggering Data GPDF • *GPD CommandID* and *GPD Command payload* as supported by the DUT-GPD. • The transmission SHALL NOT exceed *gpTxDuration*. If possible, check command execution by DUT-GPD.	

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3A	[R3] A.1.4, A.3.6.1.5	***Negative test (Wrong Direction flag value):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with *Direction* sub-field set to 0b0. If possible, check command execution by DUT-GPD.	
3B		***Negative test (Wrong Frame type: Maintenance frame in operation):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Maintenance frame (Frame type = 0b01), carrying a GPD Data command. If possible, check command execution by DUT-GPD.	
3C		***Negative test (Wrong Frame type):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one GPDF with Frame type = 0b11, carrying a GPD Data command. If possible, check command execution by DUT-GPD.	
3D		***Negative test (Auto-Commissioning set):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with *Auto-Commissioning* sub-field set to 0b1. If possible, check command execution by DUT-GPD.	
3E		***Negative test (RxAfterTx set):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with *RxAfterTx* sub-field set to 0b1. If possible, check command execution by DUT-GPD.	
3F		***Negative test if gpdSecurityLevel = 0b00 (Wrong security level):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with *SecurityLevel* sub-field set to 0b10, and the frame correctly protected with a shared key of the TH-GPS. If possible, check command execution by DUT-GPD.	
4A	[R3] A.1.4, A.3.6.1.5	***Negative test (No Extended NWK Frame Control field):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with the *NWK Frame Control Extension* sub-field set to 0b0 and the *Extended NWK Frame Control* field not present. If possible, check command execution by DUT-GPD.	
4B	[R3] A.1.4, A.3.6.1.5	***Negative test (NWK Frame Control Extension = 0b0):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with the *NWK Frame Control Extension* sub-field set to 0b0 but the *Extended NWK Frame Control* field is present. If possible, check command execution by DUT-GPD.	
4C	[R3] A.1.4, A.3.6.1.5	***Negative test (No Extended NWK Frame Control field):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with the *NWK Frame Control Extension* sub-field set to 0b1, but the *Extended NWK Frame Control* field is not present. If possible, check command execution by DUT-GPD.	

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5A	[R3] A.1.4, A.3.6.1.5	***Negative test (Wrong ApplicationID):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with the *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b011. If possible, check command execution by DUT-GPD.	
5B	[R3] A.1.4, A.3.6.1.5	**Negative test (Wrong *ApplicationID*)**: Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with the *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b000 or set to 0b010 if DUT-GPD uses ApplicationID = 0b010. If possible, check command execution by DUT-GPD.	
5C	[R3] A.1.4, A.3.6.1.5	***Negative test (Wrong ApplicationID):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with the *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b001. If possible, check command execution by DUT-GPD.	
6	[R3] A.1.4, A.3.6.1.5	***Negative test (Wrong ZigBee Protocol Version)****:* Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with the *ZigBee Protocol Version* sub-field of the *NWK Frame Control* field set to 0b0010. If possible, check command execution by DUT-GPD.	
7A	[R3] A.1.4, A.3.6.1.5	***For GPD with ApplicationID = 0b000: Negative test (Wrong SrcID):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with SrcID differing by 1bit with the DUT-GPD SrcID. If possible, check command execution by DUT-GPD.	
7B		***For GPD with ApplicationID = 0b010: Negative test (IEEE address absent)*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with *ApplicationID* = 0b010 and IEEE address of GPD absent (MAC Destination address mode 0b10 and Destination address = 0xffff used instead). If possible, check command execution by DUT-GPD.	
7C	[R3] A.1.4, A.3.6.1.5	**Positive test**: Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between gpTxOffset and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly formatted Data GPDF. If possible, check command execution by DUT-GPD.	
8		***For GPD with ApplicationID = 0b010: Specific endpoint X:*** TH-GPS has in its gpTxQueue a Data GPDF for the DUT-GPD, addressed to a specific endpoint X implemented by the DUT-GPD. Make DUT-GPD send a Data GPDF from specific endpoint X with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one copy of the queued Data GPDF to the specific endpoint X of DUT-GPD. If possible, check command execution by DUT-GPD.	If GPD implements multiple endpoints, the test is to be repeated for each endpoint.

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9		***For GPD with ApplicationID = 0b010 AND implementing at least two specific (i.e. !=0xff) endpoints X and Y:*** TH-GPS has in its gpTxQueue a Data GPDF for the DUT-GPD, addressed to a specific endpoint X implemented by the DUT-GPD. Make DUT-GPD send a Data GPDF from specific endpoint Y with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one copy of the queued Data GPDF to the specific endpoint X of DUT-GPD. If possible, check command execution by DUT-GPD.	
10A		***For GPD with ApplicationID = 0b010: Endpoint 0xff:*** TH-GPS has in its gpTxQueue a Data GPDF for the DUT-GPD, addressed to endpoint 0xff of DUT-GPD; *Transmit on endpoint match* = 0b0. Make DUT-GPD send a Data GPDF from any specific endpoint != 0xff with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one copy of the queued Data GPDF to the endpoint 0xff of DUT-GPD. If possible, check command execution by DUT-GPD.	
10B		***For GPD with ApplicationID = 0b010: Endpoint 0x00:*** TH-GPS has in its gpTxQueue a Data GPDF for the DUT-GPD, addressed to endpoint 0x00 of DUT-GPD; *Transmit on endpoint match* = 0b0. Make DUT-GPD send a Data GPDF from any specific endpoint != 0x00 with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one copy of the queued Data GPDF to the endpoint 0xff of DUT-GPD. If possible, check command execution by DUT-GPD.	
11		***For GPD with ApplicationID = 0b010: Negative test: Specific endpoint Z:*** TH-GPS has in its gpTxQueue a Data GPDF for the DUT-GPD, addressed to a specific endpoint Z NOT implemented by the DUT-GPD; *Transmit on endpoint match* = 0b0. Make DUT-GPD send a Data GPDF from any specific endpoint != Z with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one copy of the queued Data GPDF to the endpoint Z of DUT-GPD. If possible, check command execution by DUT-GPD.	

474 ***2.5.1.2.3 Expected Outcome***

Pass verdict:
1) DUT-GPD send a Data GPDF with • sub-fields of the *NWK Frame Control* field set to: ▪ *Auto-Commissioning* 0b0; ▪ *NWK Frame Control Extension* 0b1; • *Extended NWK Frame Control* field present and its *RxAfterTx* sub-field set to 0b1.
2) DUT-GPD executes the received command.
3A) – 7B) DUT-GPD shall NOT execute the received command.
7C) – 10B) DUT-GPD executes the received command.
11) DUT-GPD does NOT execute the received command.
Fail verdict:
1) DUT-GPD does not send GPDF with *Extended NWK Frame Control* field present and its *RxAfterTx* sub-field set to 0b1.

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2) DUT-GPD does NOT execute the received command.
3A) – 7B) DUT-GPD executes the received command.
7C) – 10B) DUT-GPD does NOT execute the received command.
11) DUT-GPD executes the command.

2.5.1.3 NOT TESTED: Subcase: Secure operation

2.5.1.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.5.1.1.1.	
2	[R3] A.3.9	The pairing between the DUT-GPD and TH-GPS has a security level and key type, as supported by the DUT-GPD.	

2.5.1.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
0	[R3] A.1.4, A.1.5, A.3.6.1.5	Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with: • Any MAC sequence number; • If the *Extended NWK Frame Control* field is present and its *ApplicationID* sub-field set to 0b010, the MAC header: ▪ *Destination addressing mode* subfield of the MAC *Frame control* field is set to 0b11; ▪ *Destination address* field carrying the manufacturer-specific 8B IEEE address of the DUT-GPD: Z; • sub-fields of the *NWK Frame Control* field set to: ▪ *Frame type* 0b00 ▪ *ZigBeeProtocolVersion* 0b0011; ▪ *Auto-Commissioning* 0b0; ▪ *NWK Frame Control Extension* 0b1; • *Extended NWK Frame Control* field present and its sub-fields: ▪ *ApplicationID* as in the triggering Data GPDF; ▪ *SecurityLevel* as in the triggering Data GPDF; ▪ *SecurityKeyType* as in the triggering Data GPDF: – 0b0 in case of a shared key; – 0b1 in case of an individual key; ▪ *RxAfterTx* set to 0b0; ▪ *Direction* set to 0b1; • *SrcID* field ▪ If the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b000: present and set to DUT-GPD's SrcID Z; ▪ If the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b010: absent; • *Endpoint* field ▪ If the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b000: absent; ▪ If the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b010: present and carrying an endpoint value supported by the DUT-GPD; • *SecurityFrameCounter* field of 4B is present and carries the value as in the triggering Data GPDF; • *MIC* field of 4B is present. • *GPD CommandID* and *GPD Command payload* as supported by the DUT-GPD; if SecurityLevel = 0b11, both are encrypted.	the *RxAfterTx* setting may be DUT-specific, e.g. require longer harvesting time, etc.

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1A		***Negative test (Wrong Frame type: Maintenance frame in operation):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected GPDF formatted as in step 1A, but with Maintenance frame (Frame type = 0b01). If possible, check command execution by DUT-GPD.	
1B		***Negative test (Wrong Frame type):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected GPDF formatted as in step 1A, but with frame type = 0b11. If possible, check command execution by DUT-GPD.	
1C		***Negative test (Wrong Frame type):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected GPDF formatted as in step 1A, but with frame type = 0b10. If possible, check command execution by DUT-GPD.	
1D		***Negative test (Wrong ZigBee Protocol Version):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with the *ZigBee Protocol Version* sub-field of the *NWK Frame Control* field set to 0b0010. If possible, check command execution by DUT-GPD.	
1E		***Negative test (Auto-Commissioning set):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with *Auto-Commissioning* sub-field set to 0b1. If possible, check command execution by DUT-GPD.	
1F		**Negative test (No *Extended NWK Frame Control* field)**: Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with the *NWK Frame Control Extension* sub-field set to 0b0 and the *Extended NWK Frame Control* field not present. If possible, check command execution by DUT-GPD.	
1G		**Negative test (*Extended NWK Frame Control* field error)**: Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with the *NWK Frame Control Extension* sub-field set to 0b0 but the *Extended NWK Frame Control* field is present. If possible, check command execution by DUT-GPD.	
1H		**Negative test (*Extended NWK Frame Control* field error)**: Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with the *NWK Frame Control Extension* sub-field set to 0b1, but the *Extended NWK Frame Control* field is not present. If possible, check command execution by DUT-GPD.	

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1I		**Negative test (Wrong *ApplicationID*)**: Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with the *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b011. If possible, check command execution by DUT-GPD.	
1J		**Negative test (Wrong *ApplicationID*)**: Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with the *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b000 or set to 0b010 if DUT-GPD uses ApplicationID = 0b010. If possible, check command execution by DUT-GPD.	
1K		***Negative test (RxAfterTx set):*** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with *RxAfterTx* sub-field set to 0b1. If possible, check command execution by DUT-GPD.	
1L		**Negative test (Wrong Direction flag value)**: Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with *Direction* sub-field set to 0b0. If possible, check command execution by DUT-GPD.	
1M		**For GPD with ApplicationID = 0b000: Negative test (Wrong SrcID)**: Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with SrcID differing by 1bit with the DUT-GPD SrcID. If possible, check command execution by DUT-GPD.	
1N		**For GPD with ApplicationID = 0b010: Negative test (IEEE address absent)** Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly protected Data GPDF formatted as in step 1A, but with *ApplicationID* = 0b010 and IEEE address of GPD absent (MAC Destination address mode 0b10 and Destination address = 0xffff used instead). If possible, check command execution by DUT-GPD.	
1O		**For GPD with ApplicationID = 0b010: Negative test: Wrong endpoint Z:** TH-GPS has in its gpTxQueue a correctly protected Data GPDF for the DUT-GPD, addressed to a specific endpoint Z NOT implemented by the DUT-GPD; *Transmit on endpoint match* = 0b0. Make DUT-GPD send a Data GPDF from any specific endpoint != Z with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one copy of the	

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		queued Data GPDF to the endpoint Z of DUT-GPD. If possible, check command execution by DUT-GPD.	
1P		**Positive test**: Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between gpTxOffset and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one correctly formatted and protected Data GPDF. If possible, check command execution by DUT-GPD.	
1Q		**For GPD with ApplicationID = 0b010: Specific endpoint X:** TH-GPS has in its gpTxQueue a Data GPDF for the DUT-GPD, addressed to a specific endpoint X implemented by the DUT-GPD. Make DUT-GPD send a Data GPDF from specific endpoint X with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one copy of the queued Data GPDF to the specific endpoint X of DUT-GPD. If possible, check command execution by DUT-GPD.	
1R		**For GPD with ApplicationID = 0b010 AND implementing at least two specific (i.e. !=0xff) endpoints X and Y:** TH-GPS has in its gpTxQueue a Data GPDF for the DUT-GPD, addressed to a specific endpoint X implemented by the DUT-GPD. Make DUT-GPD send a Data GPDF from specific endpoint Y with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one copy of the queued Data GPDF to the specific endpoint X of DUT-GPD. If possible, check command execution by DUT-GPD.	
1S		**For GPD with ApplicationID = 0b010: Endpoint 0xff:** TH-GPS has in its gpTxQueue a Data GPDF for the DUT-GPD, addressed to endpoint 0xff of DUT-GPD; *Transmit on endpoint match* = 0b0. Make DUT-GPD send a Data GPDF from any specific endpoint != 0xff with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one copy of the queued Data GPDF to the endpoint 0xff of DUT-GPD. If possible, check command execution by DUT-GPD.	
1T		**For GPD with ApplicationID = 0b010: Endpoint 0x00:** TH-GPS has in its gpTxQueue a Data GPDF for the DUT-GPD, addressed to endpoint 0x00 of DUT-GPD; *Transmit on endpoint match* = 0b0. Make DUT-GPD send a Data GPDF from any specific endpoint != 0x00 with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one copy of the queued Data GPDF to the endpoint 0xff of DUT-GPD. If possible, check command execution by DUT-GPD.	
2	[R3] A.1.4, A.1.5, A.3.6.1.5	**Negative test (Too low Security Frame Counter)**: Make DUT-GPD send a Data GPDF with RxAfterTx set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF using Security Frame Counter lower than that in the triggering Data GPDF.	
3	[R3] A.1.4, A.1.5, A.3.6.1.5	**Negative test (Too high Security Frame Counter)**: Make DUT-GPD send a Data GPDF with RxAfterTx set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with MAC sequence number/Frame Counter higher than that in the	

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		triggering Data GPDF.	
4	[R3] A.1.4, A.1.5, A.3.6.1.5	**Negative test (Wrong SecurityLevel):** Make DUT-GPD send a Data GPDF with RxAfterTx set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with SecurityLevel lower than that in the triggering Data GPDF.	
5	[R3] A.1.4, A.1.5, A.3.6.1.5	**Negative test (Wrong Key Type):** Make DUT-GPD send a Data GPDF with RxAfterTx set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF protected with correct key, but with Key Type other that in the triggering Data GPDF.	
6	[R3] A.1.4, A.1.5, A.3.6.1.5	**Security Failure (Wrong key):** Make DUT-GPD send a Data GPDF with RxAfterTx set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with SecurityLevel and KeyType sub-fields set correctly, but protected using wrong key, thus resulting in wrong MIC.	

478 ***2.5.1.3.3 Expected Outcome***

Pass verdict:
1A) DUT-GPD send a Data GPDF with • sub-fields of the *NWK Frame Control* field set to: ▪ *Auto-Commissioning* 0b0; ▪ *NWK Frame Control Extension* 0b1; • *Extended NWK Frame Control* field present and its *RxAfterTx* sub-field set to 0b1. DUT-GPD executes the command.
1B) – 1O) DUT-GPD shall NOT execute the command.
1P) – 1T) DUT-GPD executes the command.
2) - 6) DUT-GPD shall NOT execute the command.
Fail verdict:
1A) DUT-GPD does not send GPDF with *Extended NWK Frame Control* field present and its *RxAfterTx* sub-field set to 0b1. AND/OR DUT-GPD does NOT execute the command.
1B) – 1O) DUT-GPD executes the command.
1P) – 1T) DUT-GPD does NOT execute the command.
2) - 6) DUT-GPD executes the command.

479 **2.5.1.4 PICS Covered**

PICS reference	Functionality	Tested (Direct/Indirect)
GPF10A	Receiving GPDF frame format with *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b000 and *Frame type* sub-field of the *NWK Frame Control* field set to 0b00 (Data frame) in operation, with security	Direct
GPF10B	Receiving GPDF frame format with *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b010 in operation, with security	Direct
GPF8B	Does the device support SecurityLevel=0b00 in operation?	

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482 ## 2.5.2 NOT TESTED: Subcase: Read Attributes / Read Attributes Response

483 ### *2.5.2.1.1 Initial conditions*

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 2.5.1.1.1.	
3	[R3] A.4.2.6.4	DUT-GPD supports at least one readable attribute of cluster X. The AttributeID (0xXXXX) and its initial value (Y) are known.	If DUT-GPD supports multiple readable attributes, the test shall be repeated for all of them.
4	[R3] A.3.6.1.5, A.4.2.6.4	TH-GPS shall have a GPDF pending in its gpTxQueue for the DUT-GPD GPD ID with the GPD Read Attributes command for AttributeID 0xXXXX.	

484 ### *2.5.2.1.2 Test Procedure*

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4 A.4.2.6.4	Make DUT-GPD send a Data GPDF with RxAfterTx set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with appropriate MAC and NWK header settings and GPDF protection, carrying: • *GPD CommandID* carrying Read Attribute command (0xF2) • *GPD Command payload* ▪ *Multi-cluster* sub-field of the *Options* field set to 0b0 ▪ If the supported attribute is ▪ manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data; ▪ standard: *Manufacturer field present* sub-field of the *Options* field set to 0b0, and *Manufacturer ID* field absent.1 *Attribute Request* record present, with *ClusterID* of the requested attribute (X), *Number of attributes* field not present, and *Attribute* field carrying the requested AttributeID (0xXXXX).	If DUT-GPD supports multiple readable attributes, the test is repeated for all of them.
2	[R3] A.1.4 A.4.2.6.4	Add to the *gpTxQueue* of the TH a GPD Read Attributes command for DUT-GPD, with: • If the cluster X with AttributeID 0xXXXX supported by DUT-GPD is ▪ manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data; ▪ standard: *Manufacturer field present* sub-field of the *Options* field set to 0b0, and *Manufacturer ID* field absent. • *AttributeID* 0xXXXX of cluster X as implemented by DUT-GPD; • if implemented by DUT-GPD: at least one further AttributeID 0xYYYY supported by DUT-GPD, of the same or another cluster; • at least one AttributeID 0xAAAA not supported by DUT-GPD of a ClusterID X, • at least one AttributeID 0xBBBB of a ClusterID (B) not supported by the DUT-GPD. Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH sends to DUT-GPD at least one Data GPDF with GPD Read Attributes command as specified before.	

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3	[R3] A.1.4 A.4.2.6.4	**Negative test: Filtering by ManufacturerID**: Add to the *gpTxQueue* of the TH a GPD Read Attributes command for DUT-GPD, with: • *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set to a value NOT supported by the DUT; • *AttributeID* 0xXXXX of cluster X as implemented by DUT-GPD; • If DUT-GPD supports manufacturer-specific cluster C: at least one AttributeID 0xCCCC of a ClusterID (C) as supported by the DUT-GPD. Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH sends to DUT-GPD at least one Data GPDF with GPD Read Attributes command as specified before.	

2.5.2.1.3 Expected Outcome

Pass verdict:
1) Some time after reception of the GPD Read Attributes command, DUT-GPD responds with Data GPDF with correct MAC and NWK header settings and GPDF protection, carrying: • *GPD CommandID* carrying *Read Attributes Response* command (0xA5); • *GPD command payload* carrying: ▪ *Multi-cluster* sub-field of the *Options* field set to 0b0; ▪ If the requested attribute is manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data else: *Manufacturer field present* sub-field of the *Options* field set to 0b0, and *Manufacturer ID* field not present ▪ 1 *Cluster record* present, with: *ClusterID* of the requested attribute, *Length of read attribute record list* field not present, 1 *Read Attribute record* field with: the requested *AttributeID* (0xXXXX), *Status* set to SUCCESS, *AttributeDataType*: DUT-specific and *Attribute Value* set to Y.
2) Some time after reception of the GPD Read Attributes command, DUT-GPD responds with one or multiple Data GPDF with *GPD CommandID* set to *Read Attributes Response* command (0xA5); carrying the response with the *Status* SUCCESS for AttributeID 0xXXXX of cluster X, and, if supported, AttributeID 0xYYYY. If GPD responds with one or multiple *Read Attributes Response* command (0xA5) for AttributeID 0xAAAA of cluster X, and/or AttributeID 0xBBBB of Cluster B, the *Status* field in those Read Attribute Records carries value other than SUCCESS.
3) Some time after reception of the GPD Read Attributes command, DUT-GPD responds with one or multiple Data GPDF with *GPD CommandID* set to *Read Attributes Response* command (0xA5); carrying the response with the *Status* SUCCESS for AttributeID 0xXXXX of cluster X, and NOT including Attribute 0xCCCC of Cluster C. If GPD responds with one or multiple *Read Attributes Response* command (0xA5) for AttributeID 0xCCCC of cluster C, the *Status* field in those Read Attribute Records carries value other than SUCCESS.
Fail verdict:
1) DUT-GPD does not send Data GPDF with Read Attributes Response command, formatted exactly as specified in 2.5.2.1.3/item 1 above.
2) DUT-GPD does not respond with one or multiple Read Attributes Response commands with the *Status* SUCCESS for AttributeID 0xXXXX of cluster X, and/or, if supported, AttributeID 0xYYYY. AND/OR DUT-GPD does respond with one or multiple Read Attributes Response commands with the Status SUCCESS for AttributeID 0xAAAA of cluster X and/or AttributeID 0xBBBB of Cluster B.
3) DUT-GPD does not respond with Read Attributes Response commands with the *Status* SUCCESS for AttributeID 0xXXXX of cluster X. AND/OR DUT-GPD does respond with Read Attributes Response commands with the Status SUCCESS for AttributeID 0xCCCC of cluster C.

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488 ***2.5.2.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPF102	Reception of Read Attributes command	Direct
GPF103	Transmission Read Attributes Response command	Direct
AREAD1-18	Readable ZigBee attributes	Indirect

489 ## 2.5.3 NOT TESTED: Subcase: Write Attributes

490 ***2.5.3.1.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 2.5.1.1.1.	
3	[R3] A.4.2.6.3	DUT-GPD supports at least one writable attribute. The AttributeID (0xXXXX) and its initial value (X) are known.	If DUT-GPD supports multiple writable attributes, the test shall be repeated for all of them.
4	[R3] A.3.6.1.5, A.4.2.6.3	TH-GPS shall have a Data GPDF pending in its gpTxQueue for the DUT-GPD GPD ID with the GPDF Write Attributes command for AttributeID 0xXXXX, value Y.	

491 ***2.5.3.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.6.3	Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with GPD CommandID *Write Attributes* (0xF1), with appropriate MAC and NWK headers settings and GPDF protection, carrying: • *GPD CommandID* carrying Write Attributes command (0xF1) • *GPD Command payload* ▪ *Multi-cluster* sub-field of the *Options* field set to 0b0 ▪ If the supported attribute is: – manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data; – standard: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set to a value not supported by the DUT-GPD; ▪ 1 *Cluster record* present, with *ClusterID* of the requested attribute, *Length of write attribute record list* field not present, and 1 *Write Attribute record* with: *AttributeID* field carrying 0xXXXX; *AttributeDataType* – DUT-specific; *AttributeValue*: Y. Send GPD Read Attributes command to DUT-GPD, requesting attribute 0xXXXX.	the RxAfterTx setting may be DUT-specific, e.g. require longer harvesting time, etc.
2)	[R3] A.1.4, A.4.2.6.3	Add to the gpTxQueue of the TH a GPD Write Attributes command for DUT-GPD, with: • AttributeID 0xXXXX of cluster X as implemented by DUT-GPD; • if implemented by DUT-GPD: at least one further AttributeID 0xYYYY supported by DUT-GPD, of the same or another cluster; • at least one AttributeID 0xAAAA not supported by DUT-GPD of a ClusterID X,	

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		• at least one AttributeID 0xBBBB of a ClusterID (B) not supported by the DUT-GPD. Make DUT-GPD send a Data GPDF with RxAfterTx set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH sends to DUT-GPD at least one Data GPDF with GPD Read Attributes command as specified before. Send GPD Read Attributes Request to DUT-GPD, requesting attributes 0xXXXX, 0xYYYY, 0xAAAA and 0xBBBB.	

492 ***2.5.3.1.3 Expected Outcome***

Pass verdict:
1) On reception of GPD Write Attributes command, DUT-GPD does store the new value Y for Attribute 0xXXXX. DUT-GPD sends Read Attributes Response carrying the new value of Attribute 0xXXXX.
2) DUT-GPD stores the new value Attribute 0xXXXX, and – if implemented, 0xYYYY; DUT-GPD does not store the value of attribute 0xAAAA nor 0xBBBB. DUT-GPD sends one or more Read Attributes Response(s), carrying the new value of Attribute 0xXXXX and 0xYYYY. If DUT-GPD sends one or more Read Attributes Response(s) for Attribute 0xAAAA and 0xBBBB, the Status carries value other than SUCCESS.
Fail verdict:
1) DUT-GPD does not store the new value Y for Attribute 0xXXXX.
2) DUT-GPD does not store the new value Attribute 0xXXXX, AND/OR – if implemented, 0xYYYY; AND/OR DUT-GPD does store the value of attribute 0xAAAA nor 0xBBBB. AND/OR DUT-GPD does not send one or more Read Attributes Response(s), carrying the new value of Attribute 0xXXXX and 0xYYYY. AND/OR DUT-GPD does send Read Attributes Response(s), carrying the new value of Attribute 0xAAAA and 0xBBBB with Status other than SUCCESS.

493 ***2.5.3.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPF108	Reception of Write Attributes command	Direct
AWRITE1	Writing of OutOfService attribute	Indirect

494 ## 2.5.4 NOT TESTED: Subcase: Request Attributes/Write Attributes

495 ***2.5.4.1.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 2.5.1.1.1.	
3	[R3] A.3.6.1.5, A.4.2.6.3	DUT-GPD supports at least one writable attribute, which it also requests via GPD Request Attributes command. The AttributeID(s) and the initial value(s) is/are known.	

496 ***2.5.4.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.6.1	Make DUT-GPD send Data GPDF with GPD Request Attributes command and *RxAfterTx* set to 0b1.	Methods to trigger that are DUT-specific.
2	[R3] A.1.4, A.4.2.6.3	Make DUT-GPD send Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, TH-GPS sends at least one Data GPDF with GPD Write Attributes command, carrying Cluster records for the attributes requested by the GPD before (at least one record).	

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		If the attribute(s) requested by the DUT-GPD are readable, TH-GPS sends one or multiple GPD Read Attributes command, to check if the value supplied with GPD Write Attributes was correctly stored.	

497 ***2.5.4.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF with appropriate MAC and NWK headers settings and GPDF protection, carrying: • *GPD CommandID* set to 0xA4 (Request Attributes); • GPD Command payload with: ▪ *Multi-record* sub-field of the *Options* field set to – 0b0, if only one Cluster record field is included; – 0b1, if more than one Cluster record is included; ▪ If the requested AttributeID or ClusterID is manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data; else: *Manufacturer field present* sub-field of the *Options* field may be set to 0b0; *Manufacturer ID* field is then not present; ▪ Remaining bits of the Options field set to 0b0; ▪ At least one *Cluster record request* present, each with: – *ClusterID* for the requested attribute, – *Length of record list* field present, and indicating the length in octets of the attribute list. – At least one *AttributeID* (0xXXXX).
2) DUT-GPD correctly stores the new values for the attributes from the GPD Write Attributes command (if possible, verified via GPD Read Attributes Response from the DUT-GPD).
Fail verdict:
1) DUT-GPD does not send a Data GPDF formatted exactly as in 2.5.4.1.3/item 1 above.
2) DUT-GPD does not correctly stores the new values for the attributes from the GPD Write Attributes command.

498 ***2.5.4.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPF105	Transmission of Request Attributes command	Direct
GPF108	Reception of Write Attributes command	Direct

499 ## 2.5.5 NOT TESTED: Sub-case: unsolicited Commissioning Reply GPDF

500 ***2.5.5.1.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 2.5.1.1.1.	
3	[R3] A.1.6, A.1.7	The channels supported by the DUT-GPD are known. DUT-GPD supports security level 0b10 or 0b11 and infrastructure-configured key (0b001, 0b010, 0b011, 0b111), with MAC sequence number (for security level 0b00)/frame counter (for security level 0b10 and 0b11) having the value S.	If DUT-GPD supports multiple security levels, this test shall be repeated for each security level supported, unless bidirectional operation security was tested separately.
4	[R3] A.3.6.1.5 A.4.2.1.2	In the gpTxQueue of the TH-GPS, there is a Commissioning Reply GPDF for the GPD ID of the DUT-GPD, carrying a new key type and a new key value.	

501 ***2.5.5.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note

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1	[R3] A.1.4, A.4.2.1.2	Make DUT-GPD send Data GPDF with *RxAfterTx* set to 0b1, correctly secured with the credentials it was configured with. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, TH-GPS sends at least one Commissioning Reply GPDF carrying new key type and new key value. Since in GP v1.0.1 specification there is no other mechanism to update the GPD key on the proxy/sink, if required the TH can send to the TH-GPS a GP Pairing Configuration command, with the same new key type and value as previously provided in the Commissioning Reply GPDF. After some time, make DUT-GPD send Data GPDF. Read out Sink Table of TH-GPS.	Methods to trigger that are DUT-specific.
2		**Negative test, if gpdSecurityLevel >= 0b10: Unprotected GPD Commissioning Reply:** Make DUT-GPD send Data GPDF with *RxAfterTx* set to 0b1, correctly secured with the credentials it was configured with. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, TH-GPS sends at least one unprotected Commissioning Reply GPDF carrying new key type and new key value. After some time, make DUT-GPD send Data GPDF. Read out Sink Table entry of TH-GPS.	

502 ***2.5.5.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends the first Data GPDF correctly protected with the old key and key type; the security frame counter has value N. After reception of Commissioning Reply, DUT-GPD sends the Data GPDF protected with the new key type and key as supplied in the GPD Commissioning Reply, and frame counter (for SecurityLevel 0b10/0b11) is only reset is the security frame counter of the DUT-GPD N was >0x80000000. TH-GPS updates its Sink Table with the new frame counter value. If observable, TH-GPS executes the command.
2) After reception of Commissioning Reply, DUT-GPD sends the Data GPDF protected with the old key type and key value; frame counter is NOT reset, even if it had value >0x80000000. TH-GPS updates its Sink Table with the new frame counter value. If observable, TH-GPS executes the command.
Fail verdict:
1) DUT-GPD does not send a Data GPDF formatted exactly as in 2.5.5.1.3/item 1 above. AND/OR after reception of Commissioning Reply, DUT-GPD does NOT send the Data GPDF protected with the new key type and key as supplied in the GPD Commissioning Reply, AND/OR DUT-GPD does reset frame counter (for SecurityLevel 0b10/0b11) if N < 0x80000000 AND/OR DUT-GPD does NOT frame counter (for SecurityLevel 0b10/0b11) if N > 0x80000000. AND/OR TH-GPS does NOT updates its Sink Table with the new frame counter value. AND/OR If observable, TH-GPS does not execute the command.
2) After reception of Commissioning Reply, DUT-GPD sends the Data GPDF protected with the new key type and/or new key value; AND/OR frame counter is reset. AND/OR TH-GPS does not update the frame counter value in its Sink Table entry for DUT-GPD. AND/OR If observable, TH-GPS does not execute the command.

503 ***2.5.5.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF9B	Rx Commissioning Reply GPDF in operational mode	Direct

504

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2.5.6 NOT TESTED: Sub-case: unsolicited Channel Configuration GPDF

Note: the sniffer shall be observing two channels in this test case: the original channel of the network and the channel the DUT-GPD shall switch to (i.e. carried in the GPD Channel Configuration).

2.5.6.1.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 2.5.1.1.1.	
3	[R3] A.1.6, A.1.7,	The security level supported by DUT-GPD is known.	If DUT-GPD supports multiple security levels, this test shall be repeated for each security level supported, unless bidirectional operation security was tested separately.
4		The channels supported by the DUT-GPD are known.	
5	[R3] A.3.6.1.5, A.4.2.1.5	In the gpTxQueue of the TH-GPS, there is a Channel Configuration GPDF for the GPD ID of the DUT-GPD, carrying a new operational channel; with the sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00 and *NWK Frame Control Extension* = 0b1, and the *Extended NWK Frame Control* field present; the *GPD ID* of the type and at the location as defined by the *ApplicationID* sub-field present, the security settings as supported by the DUT-GPD.	

2.5.6.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.1.5	Make DUT-GPD send Data GPDF with *RxAfterTx* set to 0b1, on the channel it was originally configured on, with MAC sequence number (for security level 0b00)/frame counter (for security level 0b10 and 0b11) S. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, TH-GPS sends at least one Channel Configuration GPDF with Frame type = 0b00 (Data frame), carrying new channel value. Since in GP v1.0.1 specification there is no other mechanism to update the channel of the proxy/sink, if required, the TH can send to the TH-GPS a Mgmt_NWK_Update_req, setting the network manager address to that of the TH, and then a Mgmt_NWK_Update_req, with ScanDuration = 0xfe, and *ScanChannels* bitmap including only the new channel previously provided in the Channel Configuration GPDF. After some time, make DUT-GPD send Data GPDF.	Methods to trigger that are DUT-specific.
2A		**Negative test (Maintenance frame in operation):** Make DUT-GPD send Data GPDF with *RxAfterTx* set to 0b1, on the channel it was originally configured on. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, TH-GPS sends at least one Channel Configuration GPDF with Frame type = 0b01 (Maintenance frame), carrying new channel value. After some time, make DUT-GPD send Data GPDF.	

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2B		**Negative test if GPD does NOT support full channel set (unsupported channel):** Make DUT-GPD send Data GPDF with *RxAfterTx* set to 0b1, on the channel it was originally configured on. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, TH-GPS sends at least one Channel Configuration GPDF with Frame type = 0b00, and carrying new channel which is NOT supported by the DUT-GPD. After some time, make DUT-GPD send Data GPDF.	

511 ***2.5.6.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends the second Data GPDF on the new channel as supplied in the GPD Channel Configuration; security key type and security key remain unmodified; frame counter (for SecurityLevel 0b10/0b11) has the value of >=S+1.
2A) - 2B) DUT-GPD sends the second Data GPDF on the old channel.
Fail verdict:
1) DUT-GPD does not send a Data GPDF on the new channel as supplied in the GPD Channel Configuration. AND/OR DUT-GPD changes security key type and security key. AND/OR DUT-GPD re-sets the frame counter (for SecurityLevel 0b10/0b11).
2A) – 2B) DUT-GPD sends the second DATA GPDF on the new channel.

512 ***2.5.6.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF7B	Rx Channel Configuration GPDF in operational mode	Direct

513 ## 2.5.7 NOT TESTED: Subcase: Reception of GPD ZCL Tunneling command
514 ## (0xF6)

515 ***2.5.7.1.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 2.5.1.1.1.	
3	[R3] A.4.2.6.4	DUT-GPD supports at least one readable attribute. The AttributeID (0xXXXX) and ClusterID (0xZZZZ) and its initial value (Y) are known.	If DUT-GPD supports multiple readable attributes, the test shall be repeated for all of them.

516 ***2.5.7.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4 A.4.2.6.4; A.3.6.1.5	TH-GPS has a GPDF pending in its gpTxQueue for the DUT-GPD GPD ID (and, if *ApplicationID* = 0b010, the paired Endpoint) with the GPD ZCL Tunneling command (0xF6), carrying ZCL Read Attributes command (0x00) for *ZigBee Cluster ID* = 0xZZZZ, AttributeID = 0xXXXX Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with appropriate MAC and NWK headers settings and GPDF protection, carrying, formatted as follows: • *GPD CommandID* carrying ZCL Tunneling command (0xF6) • *GPD Command payload*	If DUT-GPD supports multiple readable attributes, the test is repeated for all of them.

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		▪ *The Options* field of the GPD ZCL Tunneling command (0xF6) set to: – *Frame type* sub-field: generic; – *ManufacturerID present* sub-field: absent/present, respectively, depending on the public/manufacturer-specific ClusterID 0xZZZZ; – *Direction* sub-field set according to the carried ZCL content; – *Reserved* sub-fields set to 0b0; ▪ *ManufacturerID* present/absent, depending on the value of the *ManufacturerID present* sub-field; ▪ *ZigBee Cluster ID* = 0xZZZZ; ▪ *ZigBee Command ID* = ZCL Read Attributes command (0x00) – *Length of Payload* = 0x02; – ZigBee Command Payload = 0xXXXX.	
2		TH-GPS has a GPDF pending in its gpTxQueue for the DUT-GPD GPD ID (and, if *ApplicationID* = 0b010, the paired Endpoint) with the GPD ZCL Tunneling command (0xF6), carrying the ZCL command other than ZCL Read Attributes, as supported by the DUT-GPD. Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, TH-GPS sends at least one Data GPDF with appropriate MAC and NWK headers settings and GPDF protection, carrying, formatted as follows: • *GPD CommandID* carrying ZCL Tunneling command (0xF6) • *GPD Command payload* ▪ *The Options* field of the GPD ZCL Tunneling command (0xF6) set to: – *Frame type* sub-field: generic or cluster-specific, depending on the ZCL command; – *ManufacturerID present* sub-field: absent/present, respectively, depending on the public/manufacturer-specific ClusterID; – *Direction* sub-field set according to the carried ZCL content; – *Reserved* sub-fields set to 0b0; ▪ *ManufacturerID* present/absent, depending on the value of the *ManufacturerID present* sub-field; ▪ *ZigBee Cluster ID* = as required by the DUT-GPD; ▪ *ZigBee CommandID* = as required by the DUT-GPD; ▪ *Length of Payload* and *ZigBee Command Payload* corresponding to *ZigBee CommandID*.	If DUT-GPD supports multiple ZCL commands, the test is repeated for all of them.

517 ***2.5.7.1.3 Expected Outcome***

Pass verdict:
1) Some time after reception of the GPD ZCL Tunneling command, DUT-GPD responds with Data GPDF with appropriate MAC and NWK headers settings and GPDF protection, carrying a GPD ZCL Tunneling command (0xA6), formatted as follows • *GPD CommandID* carrying ZCL Tunneling command (0xA6) • *GPD Command payload* ▪ *The Options* field of the GPD ZCL Tunneling command (0xA6) set to: – *Frame type* sub-field: generic; – *ManufacturerID present* sub-field: absent/present, respectively, depending on the public/manufacturer-specific ClusterID 0xZZZZ; – *Direction* sub-field set according to the carried ZCL content; – *Reserved* sub-fields set to 0b0; ▪ *ManufacturerID* present/absent, depending on the value of the *ManufacturerID present* sub-field; ▪ *ZigBee Cluster ID* = 0xZZZZ; ▪ *ZigBee Command ID* = ZCL Read Attributes Response command (0x01) ▪ *Length of Payload* equal to sum of the length in octets of all included read attribute status records ; ▪ *At least one* Read attribute status record, with: – AttributeID = 0xXXXX;

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– Status: SUCCESS; – Attribute data type of attribute 0xXXXX; • Attribute data: length and value corresponding to the attribute data type of 0xXXXX
Fail verdict:
1) DUT-GPD does not send Data GPDF with GPD ZCL Tunneling command containing ZCL Read attributes response (0x01) command, carrying the requested *AttributeID* (0xXXXX) of ClusterID 0xZZZZ *Attribute Value* set to Y.

518 ***2.5.7.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPF110	Reception of ZCL Tunneling (0xF6) command	Direct
GPF111	Tunneled ZCL-defined functionality	Direct

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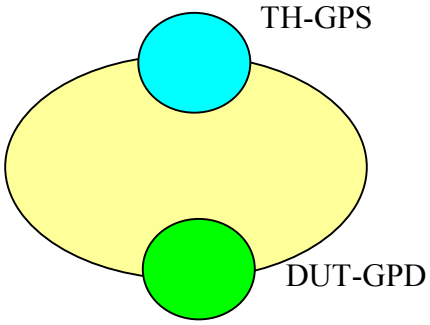
2.6 Application functionality

If the GPD with *ApplicationID* = 0b000 supports multiple SrcID, the application tests need to be performed for each SrcID separately.

If the GPD with *ApplicationID* = 0b010 supports multiple Endpoints, the application tests need to be performed for each endpoint separately.

2.6.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:

<table>
<tr><td rowspan="2"> 
</td><td>TH-GPS (GPT+ or GPC)</td><td>PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF)
Channel = as supported by the DUT-GPD
Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7)
IEEE address=manufacturer-specific
GPEP supports the application functionality of the DUT-GPD (see Section A.4.3 of [R3]).</td></tr>
<tr><td>DUT-GPD</td><td>GPD ID = manufacturer-specific
MACsequenceNumberCapability, *Auto-commissioning,* presence of *Extended NWK Frame Control* field, GPD security usage and *RxAfterTx* are according to DUT-GPD capabilities.</td></tr>
</table>

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or may start as ZC.	

2.6.1.1.2 Test Set-Up

The TH-GPS shall be in wireless communication proximity of the DUT-GPD.

A packet sniffer shall be observing the communication over the air interface.

2.6.2 GPD Simple Generic 1-state Switch: Device ID 0x00

2.6.2.1.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9, A.4.3	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for Generic 1-state Switch.	
3	[R3] A.4.3, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	The GPD Command Translation Table of the TH-GPS, if supported, maps the GPD CommandID 0x60 (Press 1 of 1) into ZHA Toggle command.	

2.6.2.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.3	Press DUT-GPD switch.	
2	[R3] A.4.3 A.4.2.1.1	**Opt. (mandatory if the DUT-GPD implements the GPD Commissioning command)** Make DUT-GPD send GPD Commissioning command.	

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536 ***2.6.2.1.3 Expected Outcome***

Pass verdict:
1) On being pressed, DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x60 (Press 1 of 1) and no payload. On being released, DUT-GPD sends GPD CommandID command 0x61 (Release 1 of 1) and no payload. If the DUT-GPD supports GPD security and/or incremental MAC sequence number, then the GPD Release 1 of 1 command shall be sent with MAC sequence number / Security frame counter higher than that for the GPD Press 1 of 1 command. TH-GPS toggles.
2) DUT-GPD sends GPD Commissioning command with DeviceID field set to 0x00.
Fail verdict:
1) DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x60 (Press 1 of 1) and no payload on being pressed. AND/OR DUT-GPD sends GPD CommandID command 0x61 (Release 1 of 1) and no payload on being released. AND/OR the DUT-GPD supporting GPD security and/or incremental MAC sequence number does not increment MAC sequence number / Security frame counter for the transmission of the GPD Release 1 of 1 command. AND/OR TH-GPS does not toggle.
2) DUT-GPD does not send GPD Commissioning command with DeviceID field set to 0x00.

537 ***2.6.2.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPD0	Generic 1-state switch	Direct
GPDTX60	Transmit Press 1 of 1 command	Direct
GPDTX61	Transmit Release 1 of 1 command	Direct

538 ## 2.6.3 NOT TESTED: GPD Simple Generic 2-state Switch: Device ID 0x01

539 ***2.6.3.1.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9, A.4.3	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for Generic 2-state Switch.	
3	[R3] A.4.3, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	The *GPD Command Translation Table* of the TH-GPS, if supported, maps the GPD CommandID 0x62 and 0x64 into ZHA Toggle command.	

540 ***2.6.3.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.3	Press button 1 of DUT-GPD switch.	
2	[R3] A.4.3	Press button 2 of DUT-GPD switch.	
3	[R3] A.4.3, A.4.2.1.1	**Opt. (mandatory if the DUT-GPD implements the GPD Commissioning command)** Make DUT-GPD send GPD Commissioning command.	

541 ***2.6.3.1.3 Expected Outcome***

Pass verdict:
1) On being pressed, DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x62 (Press 1 of 2) and no payload. On being released, DUT-GPD sends GPD CommandID command 0x63 (Release 1 of 2) and no payload. If the DUT-GPD supports GPD security and/or incremental MAC sequence number, then the GPD Release 1 of 2 command shall be sent with MAC sequence number / Security frame counter higher than that for the GPD Press 1 of 2 command.

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TH-GPS toggles.
2) On being pressed, DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x64 (Press 1 of 2) and no payload. On being released, DUT-GPD sends GPD CommandID command 0x65 (Release 2 of 2) and no payload. If the DUT-GPD supports GPD security and/or incremental MAC sequence number, then the GPD Release 2 of 2 command shall be sent with MAC sequence number / Security frame counter higher than that for the GPD Press 2 of 2 command. TH-GPS toggles.
3) DUT-GPD sends GPD Commissioning command with DeviceID field set to 0x01.
Fail verdict:
1) DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x62 (Press 1 of 2) and no payload on being pressed. AND/OR DUT-GPD sends GPD CommandID command 0x63 (Release 1 of 2) and no payload on being released. AND/OR the DUT-GPD supporting GPD security and/or incremental MAC sequence number does not increment MAC sequence number / Security frame counter for the transmission of the GPD Release 1 of 2 command. AND/OR TH-GPS does not toggle.
2) DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x64 (Press 2 of 2) and no payload on being pressed. AND/OR DUT-GPD sends GPD CommandID command 0x65 (Release 2 of 2) and no payload on being released. AND/OR the DUT-GPD supporting GPD security and/or incremental MAC sequence number does not increment MAC sequence number / Security frame counter for the transmission of the GPD Release 2 of 2 command. AND/OR TH-GPS does not toggle.
3) DUT-GPD does not send GPD Commissioning command with DeviceID field set to 0x01.

542 ***2.6.3.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPD1	Generic 2-state switch	Direct
GPDTX62	Transmit Press 1 of 2 command	Direct
GPDTX63	Transmit Release 1 of 2 command	Direct
GPDTX64	Transmit Press 2 of 2 command	Direct
GPDTX65	Transmit Release 2 of 2 command	Direct

543 ## 2.6.4 GPD On / Off Switch: Device ID 0x02

544 ### 2.6.4.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.4.3, A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for On/Off Switch.	

545 ### 2.6.4.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command ON.	If supported by device.
2	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command OFF.	If supported by device
3	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command TOGGLE.	If device supported by device
4	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command RELEASE.	If supported by device.

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5	[R3] A.4.3, A.4.2.1.1	**Opt. (mandatory if the DUT-GPD implements the GPD Commissioning command)** Make DUT-GPD send GPD Commissioning command.	

2.6.4.3 Expected Outcome

Pass verdict:
1) DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x21 (ON) and no payload. DUT-GPD may also send GPD CommandID command 0x23 (RELEASE) and no payload on releasing the button. TH-GPS switches On.
2) DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x20 (OFF) and no payload. DUT-GPD may also send GPD CommandID command 0x23 (RELEASE) and no payload on releasing the button. TH-GPS switches Off.
3) DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x22 (TOGGLE) and no payload. DUT-GPD may also send GPD CommandID command 0x23 (RELEASE) and no payload on releasing the button. TH-GPS toggles.
4) On releasing the button, DUT-GPD sends Data GPDF according to its configuration with GPD CommandID command 0x23 (RELEASE) and no payload.
5) DUT-GPD does send GPD Commissioning command with *DeviceID* field set to 0x02.
Fail verdict:
1) DUT-GPD does not send Data GPDF with GPD CommandID 0x21 (ON) and no payload. AND/OR TH-GPS does not switch On.
2) DUT-GPD does not send Data GPDF data with GPD CommandID 0x20 (OFF) and no payload. AND/OR TH-GPS does not switch off.
3) DUT-GPD does not send Data GPDF with command GPD CommandID 0x22 (TOGGLE) and no payload. TH-GPS does not toggle.
4) On releasing the button, DUT-GPD does not send Data GPDF with GPD CommandID 0x23 (RELEASE) and no payload.
5) DUT-GPD does not send GPD Commissioning command with *DeviceID* field set to 0x02.

2.6.4.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD2	On/off switch	Direct
GPDTX20	Transmit Off command	Direct
GPDTX21	Transmit On command	Direct
GPDTX22	Transmit Toggle Command	Direct
GPDTX23	Transmit Release command	Direct

2.6.5 NOT TESTED: GPD Level Control Switch: Device ID 0x03 or GPD level control functionality

2.6.5.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9, A.4.3, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for Level Control Switch.	

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551 #### 2.6.5.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command MOVE UP.	If supported by DUT-GPD.
1B	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STOP.	
1C	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command MOVE DOWN.	
1D	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STOP.	
2A	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STEP UP.	If supported by DUT-GPD.
2B	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STEP DOWN.	
3A	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command Move Up (with On/Off).	If supported by DUT-GPD.
3C	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command Move Down (with On/Off).	
3D	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STOP.	
4A	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STEP UP.	If supported by DUT-GPD.
4B	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STEP DOWN.	
5A	[R3] A.4.3, A.4.2.1.1	**Opt. (mandatory if DUT-GPD implements the GPD Commissioning command):** Make DUT-GPD send GPD Commissioning command.	
5B	[R3] A.4.3, A.4.2.1.2.4	**Commissioning: DeviceID = any; Level Control support indicated via Application information** Make DUT-GPD send GPD Commissioning command.	

552 #### 2.6.5.3 Expected Outcome

Pass verdict:
1A) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x30 (MOVE UP). The 1B Rate field may be present in the GPD Command payload. If possible, check the TH-GPS correctly executes the command.
1B) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID STOP 0x34 and no payload. If possible, check the TH-GPS correctly executes the command.
1C) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x31 (MOVE DOWN). The 1B Rate field may be present in the GPD Command payload. If possible, check the TH-GPS correctly executes the command..
1D) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x34 (STOP) and no payload. If possible, check the TH-GPS correctly executes the command.
2A) DUT-GPD sends Data GPDF with GPD CommandID 0x32 (STEP UP) and the 1B field Step size in the GPD Command payload. The 2B Transition time field may also be present in the GPD Command payload. If possible, check the TH-GPS correctly executes the command.
2B) DUT-GPD sends Data GPDF with GPD CommandID 0x33 (STEP DOWN) and the 1B field Step size in the GPD Command payload. The 2B Transition time field may also be present in the GPD Command payload. If possible, check the TH-GPS correctly executes the command.
3A) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x35 (MOVE UP with on/off). The 1B Rate field may be present in the GPD Command payload. If possible, check the TH-GPS correctly executes the command.
3B) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x36 (MOVE DOWN with on/off). The 1B Rate field may be present in the GPD Command payload. If possible, check the TH-GPS correctly executes the command.
3C) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x34 (STOP) and no payload. If possible, check the TH-GPS correctly executes the command.
4A) DUT-GPD sends Data GPDF with GPD CommandID 0x37 (STEP UP with on/off) and the 1B field Step size in the GPD Command payload. The 2B Transition time field may also be present in the GPD Command payload. If possible, check the TH-GPS correctly executes the command.

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4B) DUT-GPD sends Data GPDF with GPD CommandID 0x38 (STEP DOWN with on/off) and the 1B field Step size in the GPD Command payload. The 2B Transition time field may also be present in the GPD Command payload. If possible, check the TH-GPS correctly executes the command.
5A) DUT-GPD does send GPD Commissioning command with *DeviceID* field set to 0x03. If the *ApplicationInformation* field is present, then the *GPD CommandID list* field SHALL be present and it SHALL contain at least all the GPD level control commands supported by DUT-GPD (0x30-0x31-0x34 AND/OR 0x32-0x33 AND/OR 0x34-0x35-0x36 AND/OR 0x37-0x38).
5B) DUT-GPD does send GPD Commissioning command; the *ApplicationInformation* field is present, the *GPD CommandID list* field is present and contains at least all the GPD level control commands supported by DUT-GPD.
Fail verdict:
1A) DUT-GPD does not send Data GPDF with command MOVE UP 0x30 AND/OR if the Rate field is present, it's not 1B in length.
1B) DUT-GPD does not send Data GPDF with command STOP 0x34 and no payload.
1C) DUT-GPD does not send Data GPDF with command MOVE DOWN 0x31 AND/OR if the Rate field is present, it's not 1B in length.
1D) DUT-GPD does not send Data GPDF with command STOP 0x34 and no payload.
2A) DUT-GPD does not send Data GPDF with command STEP UP 0x32 AND/OR the Step size field is NOT present AND/OR if the Transition Time field is present, it's not 2B in length.
2B) DUT-GPD does not send Data GPDF with command STEP DOWN 0x33 AND/OR the Step size field is NOT present AND/OR if the Transition Time field is present, it's not 2B in length.
3A) DUT-GPD does not send Data GPDF with command MOVE UP with on/off 0x35 AND/OR if the Rate field is present, it's not 1B in length.
3B) DUT-GPD does not send Data GPDF with command MOVE DOWN with on/off 0x36 AND/OR if the Rate field is present, it's not 1B in length.
3C) DUT-GPD does not send Data GPDF with command STOP 0x34 and no payload.
4A) DUT-GPD does not send Data GPDF with command STEP UP with on/off 0x37 AND/OR the Step size field is NOT present AND/OR if the Transition Time field is present, it's not 2B in length.
4B) DUT-GPD does not send Data GPDF with command STEP DOWN with on/off 0x38 AND/OR the Step size field is NOT present AND/OR if the Transition Time field is present, it's not 2B in length.
5A) DUT-GPD does not send GPD Commissioning command AND/OR *DeviceID* field is not set to 0x03. AND/OR If the *ApplicationInformation* field is present, then the *GPD CommandID list* field is not present and/or it does not contain some of the GPD level control commands supported by DUT-GPD (0x30-0x31-0x34 AND/OR 0x32-0x33 AND/OR 0x34-0x35-0x36 AND/OR 0x37-0x38).
5B) DUT-GPD does not send GPD Commissioning command; AND/OR the *ApplicationInformation* field is not present, AND/OR the *GPD CommandID list* field is not present and/or it does not contain some of the GPD level control commands supported by DUT-GPD.

553 #### 2.6.5.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD3	Level Control Switch	Direct
GPDTX30	Transmit Move Up command	Direct
GPDTX31	Transmit Move Down command	Direct
GPDTX32	Transmit Step Up command	Direct
GPDTX33	Transmit Step Down command	Direct
GPDTX34	Transmit Stop command	Direct
GPDTX35	Transmit GPD Move Up (with On/Off) command	Direct
GPDTX36	Transmit GPD Move Down (with On/Off) command	Direct
GPDTX37	Transmit GPD Step Up (with On/Off) command	Direct
GPDTX38	Transmit GPD Step Down (with On/Off) command	Direct

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554 ## 2.6.6 GPD Advanced Generic 1-state Switch: Device ID 0x05

555 ### *2.6.6.1.1 Initial conditions*

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9, A.4.3,	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for Advanced Generic 1-state Switch. TH-GPS supports dimming. Preferably, the light of TH-GPS is initially off.	
3	[R3] A.4.3, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	The GPD Command Translation Table of the TH-GPS, if supported, maps the GPD CommandID 0x65 (Short Press 1 of 1) into ZHA Toggle command; the GPD CommandID 0x60 (Press 1 of 1) into ZHA Move down command, and the GPD CommandID 0x61 (Release 1 of 1) into ZHA Stop command.	

556 ### *2.6.6.1.2 Test Procedure*

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.3	Shortly press and release the DUT-GPD switch.	Time threshold for the short press is implementation-specific, and an item in the PICS.
2	[R3] A.4.3	Make long press at the DUT-GPD switch; release the switch.	
3	[R3] A.3.9, A.4.2.1.1, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**Opt. (mandatory if the DUT-GPD implements the GPD Commissioning command)** Make DUT-GPD send GPD Commissioning command.	

557 ### *2.6.6.1.3 Expected Outcome*

Pass verdict:
1) Upon short press, DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x66 (Short Press 1 of 1) and no payload. DUT-GPD does NOT send GPD CommandID 0x60 (Press 1 of 1). DUT-GPD does not send GPD CommandID 0x61 (Release 1 of 1). TH-GPS toggles (preferably: on).
2) Upon long press, DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x60 (Press 1 of 1) and no payload. TH-GPS starts dimming. Upon release, DUT-GPD sends GPD CommandID 0x61 (Release 1 of 1). If the DUT-GPD supports GPD security and/or incremental MAC sequence number, then the GPD Release 1 of 1 command shall be sent with MAC sequence number / Security frame counter higher than that for the GPD Press 1 of 1 command. TH-GPS stops dimming.
3) DUT-GPD sends GPD Commissioning command with *DeviceID* field set to 0x05.
Fail verdict:
1) Upon short press, DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x66 (Short press 1 of 1) and no payload. OR DUT-GPD does send Data GPDF with GPD CommandID 0x60 (Press 1 of 1). AND/OR on being released DUT-GPD sends GPD CommandID command 0x61 (Release 1 of 1). AND/OR TH-GPS does not toggle.
2) Upon long press, DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x60 (Press 1 of 1) and no payload. OR Upon long press, DUT-GPD does send Data GPDF with GPD CommandID 0x66 (Short press 1 of 1).

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AND/OR TH-GPS does not start dimming. AND/OR Upon release, DUT-GPD does not send GPD CommandID 0x61 (Release 1 of 1). OR DUT-GPD sends upon release any of the GPD press commands. AND/OR the DUT-GPD supporting GPD security and/or incremental MAC sequence number does not increment MAC sequence number / Security frame counter for the transmission of the GPD Release 1 of 1 command. AND/ ORTH-GPS does not stop dimming.
3) DUT-GPD does not send GPD Commissioning command with *DeviceID* field set to 0x05.

558 ***2.6.6.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPD4	Advanced Generic 1-state switch	Direct
GPDTX60	Transmit Press 1 of 1 command	Direct
GPDTX61	Transmit Release 1 of 1 command	Direct
GPDTX66	Transmit Short Release 1 of 1 command	Direct

559 ## 2.6.7 NOT TESTED: GPD Advanced Generic 2-state Switch: Device ID 0x06

560 ***2.6.7.1.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9, A.4.3, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for Generic 2-state Switch. TH-GPS supports dimming. Preferably, the light of TH-GPS is initially off.	
3	[R3] A.4.3, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	The GPD Command Translation Table of the TH-GPS, if supported, maps the GPD CommandID 0x67 into ZHA On and 0x68 into ZHA Off command; 0x62 into ZHA Move up with on/off, 0x64 into ZHA Move down with on/off, and 0x63 and 0x65 into ZHA Stop command.	

561 ***2.6.7.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.3	Short-Press button 1 of DUT-GPD switch.	
2	[R3] A.4.3	Make long press of button 2 of the DUT-GPD switch; release the switch.	
3	[R3] A.4.3	Short Press button 2 of DUT-GPD switch.	
4	[R3] A.4.3	Make long press of button 1 of the DUT-GPD switch; release the switch.	
5	[R3] A.4.3, A.4.2.1.1	**Opt. (mandatory if the DUT-GPD implements the GPD Commissioning command)** Make DUT-GPD send GPD Commissioning command.	

562 ***2.6.7.1.3 Expected Outcome***

Pass verdict:
1) Upon short press of button 1, DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x67 (Short Press 1 of 2) and no payload. DUT-GPD does not send GPD CommandID 0x62 (Press 1 of 2). Upon button release, DUT-GPD does NOT send GPD CommandID 0x63 (Release 1 of 2). TH-GPS turns on.
2) Upon long press of button 2, DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x64 (Press 2 of 2) and no payload. TH-GPS starts dimming down.

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Upon release, DUT-GPD sends GPD CommandID 0x65 (Release 2 of 2). If the DUT-GPD supports GPD security and/or incremental MAC sequence number, then the GPD Release 2 of 2 command shall be sent with MAC sequence number / Security frame counter higher than that for the GPD Press 2 of 2 command. TH-GPS stops dimming.
3) Upon short press of button 2, DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x68 (Short Press 2 of 2) and no payload. DUT-GPD does not send GPD CommandID 0x64 (Press 2 of 2) or 0x65 (Release 2 of 2). TH-GPS turns off.
4) Upon long press of button 1, DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x62 (Press 1 of 2) and no payload. TH-GPS starts dimming up. Upon release, DUT-GPD sends GPD CommandID 0x63 (Release 1 of 2). If the DUT-GPD supports GPD security and/or incremental MAC sequence number, then the GPD Release 1 of 2 command shall be sent with MAC sequence number / Security frame counter higher than that for the GPD Press 1 of 2 command. TH-GPS stops dimming.
5) DUT-GPD sends GPD Commissioning command with *DeviceID* field set to 0x06.
Fail verdict:
1) Upon short press of button 1, DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x67 (Short Press 1 of 2) and no payload. OR DUT-GPD does send GPD CommandID 0x62 (Press 1 of 2) or 0x63 (Release 1 of 2). AND/OR TH-GPS does not turn on.
2) Upon long press of button 2, DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x64 (Press 2 of 2) and no payload. OR DUT-GPD does send 0x68. AND/OR TH-GPS does not start dimming down. AND/OR Upon release, DUT-GPD does not send GPD CommandID 0x65 (Release 2 of 2). OR DUT-GPD sends any of the GPD press commands. AND/OR the DUT-GPD supporting GPD security and/or incremental MAC sequence number does not increment MAC sequence number / Security frame counter for the transmission of the GPD Release 1 of 2 command. AND/OR TH-GPS does not stop dimming.
3) Upon short press of button 2, DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x68 (Short Press 2 of 2) and no payload. OR DUT-GPD does send GPD CommandID 0x64 (Press 2 of 2) or 0x65 (Release 2 of 2). AND/OR TH-GPS does not turn off.
4) Upon long press of button 1, DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x62 (Press 1 of 2) and no payload. OR DUT-GPD does send GPD CommandID 0x67. AND/OR TH-GPS does not start dimming up. AND/OR Upon release, DUT-GPD does not send GPD CommandID 0x63 (Release 1 of 2). OR DUT-GPD sends any of the GPD press commands. AND/OR the DUT-GPD supporting GPD security and/or incremental MAC sequence number does not increment MAC sequence number / Security frame counter for the transmission of the GPD Release 1 of 2 command. AND/OR TH-GPS does not stop dimming.
5) DUT-GPD does not send GPD Commissioning command with *DeviceID* field set to 0x06.

563 ***2.6.7.1.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPD5	Advanced Generic 2-state switch	Direct
GPDTX62	Transmit Press 1 of 2 command	Direct
GPDTX63	Transmit Release 1 of 2 command	Direct
GPDTX64	Transmit Press 2 of 2 command	Direct
GPDTX65	Transmit Release 2 of 2 command	Direct
GPDTX67	Transmit Short Press 1 of 2 command	Direct
GPDTX68	Transmit Short Press 2 of 2 command	Direct

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2.6.8 NOT TESTED: GPD Door Lock Controller: Device ID 0x20: NOT CERTIFIED!

2.6.8.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9, A.4.3	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for Door Lock Controller.	
3	[R3] A.4.3, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	Opt. The GPD Command Translation Table of the TH-GPS, if supported, maps the GPD CommandID 0x50/0x51 (Lock/unlock door) into ZHA on/off command, respectively.	If there is no way of controlling open/closed on the TH-GPS.

2.6.8.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.3	Make DUT-GPD switch send GPD Lock door command.	
2	[R3] A.4.3	Make DUT-GPD switch send GPD Unlock door command.	
3	[R3] A.4.3, A.4.2.1.1	**Opt. (mandatory if the DUT-GPD implements the GPD Commissioning command)** Make DUT-GPD send GPD Commissioning command.	

2.6.8.3 Expected Outcome

Pass verdict:
1) DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x50 and no payload. TH-GPS turns on.
2) DUT-GPD sends Data GPDF according to its configuration with GPD CommandID 0x51 and no payload. TH-GPS turns off.
3) DUT-GPD sends GPD Commissioning command with *DeviceID* field set to 0x20.
Fail verdict:
1) DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x50 and no payload. AND/OR TH-GPS does not turn on.
2) DUT-GPD does not send Data GPDF according to its configuration with GPD CommandID 0x51 and no payload. AND/OR TH-GPS does not turn off.
3) DUT-GPD does not send GPD Commissioning command with *DeviceID* field set to 0x20.

2.6.8.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD20	Door lock controller	Direct
GPDTX50	Transmit Lock Door command	Direct
GPDTX51	Transmit Unlock Door command	Direct

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2.6.9 NOT TESTED: GPD Color Dimmer Switch: Device ID 0x10: NOT CERTIFIED!

2.6.9.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9, A.4.3, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for Color Dimmer Switch.	

2.6.9.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command MOVE HUE UP.	If supported by DUT-GPD.
2	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command MOVE HUE STOP.	
3	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command MOVE HUE DOWN. DUT-GPD sends Data GPDF with GPD command MOVE HUE STOP.	
4	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STEP HUE UP.	If supported by DUT-GPD.
5	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STEP HUE DOWN.	
6	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command MOVE SATURATION UP.	If supported by DUT-GPD.
7	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command MOVE SATURATION STOP.	
8	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command MOVE SATURATION DOWN. DUT-GPD sends Data GPDF with GPD command MOVE SATURATION STOP.	
9	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STEP SATURATION UP.	If supported by DUT-GPD.
10	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STEP SATURATION DOWN.	
11	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command MOVE COLOR.	If supported by DUT-GPD.
12	[R3] A.4.3	DUT-GPD sends Data GPDF with GPD command STEP COLOR.	If supported by DUT-GPD.
13	[R3] A.4.3, A.4.2.1.1	**Opt. (mandatory if DUT-GPD implements the GPD Commissioning command)** Make DUT-GPD send GPD Commissioning command.	

2.6.9.3 Expected Outcome

Pass verdict:
1) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x41 (MOVE HUE UP). The 1B Rate field may be present in the GPD Command payload. TH-GPS moves hue up.
2) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x40 (MOVE HUE STOP) and no payload. TH-GPS stops moving hue up.
3) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x42 (MOVE HUE DOWN). The 1B Rate field may be present in the GPD Command payload. TH-GPS moves hue down. On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x40 (MOVE HUE STOP) and no payload. TH-GPS stops moving down.
4) DUT-GPD sends Data GPDF with GPD CommandID 0x43 (STEP HUE UP) and the 1B field Step size in the GPD

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Command payload. The 2B Transition time field may also be present in the GPD Command payload. TH-GPS steps hue up.
5) DUT-GPD sends Data GPDF with GPD CommandID 0x44 (STEP HUE DOWN) and the 1B field Step size in the GPD Command payload. The 2B Transition time field may also be present in the GPD Command payload. TH-GPS steps hue down.
6) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x46 (MOVE HUE UP). The 1B Rate field may be present in the GPD Command payload. TH-GPS moves hue up.
7) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x45 (MOVE SATURATION STOP) and no payload. TH-GPS stops moving saturation up.
8) On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x47 (MOVE SATURATION DOWN). The 1B Rate field may be present in the GPD Command payload. TH-GPS moves saturation down. On DUT-specific action, DUT-GPD sends Data GPDF with GPD CommandID 0x45 (MOVE SATURATION STOP) and no payload. TH-GPS stops moving down.
9) DUT-GPD sends Data GPDF with GPD CommandID 0x48 (STEP SATURATION UP) and the 1B field Step size in the GPD Command payload. The 2B Transition time field may also be present in the GPD Command payload. TH-GPS steps saturation up.
10) DUT-GPD sends Data GPDF with GPD CommandID 0x49 (STEP SATURATION DOWN) and the 1B field Step size in the GPD Command payload. The 2B Transition time field may also be present in the GPD Command payload. TH-GPS steps saturation down.
11) DUT-GPD sends Data GPDF with GPD CommandID 0x4A (MOVE COLOR) and the 2B fields RateX and RateY are both present. TH-GPS moves the color.
12) DUT-GPD sends Data GPDF with GPD CommandID 0x4B (STEP COLOR) and the 2B fields StepX and StepY are both present. The 2B Transition time field may also be present. TH-GPS steps the color.
13) DUT-GPD sends GPD Commissioning command with *DeviceID* field set to 0x10.
Fail verdict:
1) DUT-GPD does not send Data GPDF with command MOVE HUE UP 0x41, formatted as described in 2.6.9.3/item 1 above. AND/OR TH-GPS does not move hue up.
2) DUT-GPD does not send Data GPDF with command MOVE HUE STOP 0x40 and no payload. AND/OR TH-GPS does not stop.
3) DUT-GPD does not send Data GPDF with command MOVE HUE DOWN 0x42, formatted as described in 2.6.9.3/item 3 above. AND/OR TH-GPS does not move hue down. AND/OR DUT-GPD does not send Data GPDF with command MOVE HUE STOP 0x40 and no payload. AND/OR TH-GPS does not stop.
4) DUT-GPD does not send Data GPDF with command STEP HUE UP 0x43, formatted as described in 2.6.9.3/item 4 above. AND/OR TH-GPS does not step hue up.
5) DUT-GPD does not send Data GPDF with command STEP HUE DOWN 0x44, formatted as described in 2.6.9.3/item 5 above. AND/OR TH-GPS does not step hue down.
6) DUT-GPD does not send Data GPDF with command MOVE SATURATION UP 0x46, formatted as described in 2.6.9.3/item 6 above. AND/OR TH-GPS does not move saturation up.
7) DUT-GPD does not send Data GPDF with command MOVE SATURATION STOP 0x45 and no payload. AND/OR TH-GPS does not stop.
8) DUT-GPD does not send Data GPDF with command MOVE SATURATION DOWN 0x47, formatted as described in 2.6.9.3/item 8 above. AND/OR TH-GPS does not move saturation down. AND/OR DUT-GPD does not send Data GPDF with command MOVE SATURATION STOP 0x45 and no payload. AND/OR TH-GPS does not stop.
9) DUT-GPD does not send Data GPDF with command STEP SATURATION UP 0x48, formatted as described in 2.6.9.3/item 9 above. AND/OR TH-GPS does not step saturation up.
10) DUT-GPD does not send Data GPDF with command STEP SATURATION DOWN 0x49, formatted as described in 2.6.9.3/item 10 above. AND/OR TH-GPS does not step saturation down.

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11) DUT-GPD does not send Data GPDF with GPD CommandID 0x4A (MOVE COLOR), formatted as described in 2.6.9.3/item 11 above. AND/OR TH-GPS does not move the color.
12) DUT-GPD does not send Data GPDF with GPD CommandID 0x4B (STEP COLOR), formatted as described in 2.6.9.3/item 12 above. AND/OR TH-GPS does not step the color.
13) DUT-GPD does not send GPD Commissioning command AND/OR *DeviceID* field is not set to 0x10.

2.6.9.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD10	Color Dimmer Switch	Direct
GPDTX40 – GPDTX4B	Move/Step/Stop Hue/Saturation	Direct

2.6.10 NOT TESTED: GPD Simple Sensor: DeviceID 0x04: NOT CERTIFIED!

2.6.10.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.4.3	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for GPD Simple Sensor.	

2.6.10.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.3, A.4.2.1.1	Make DUT-GPD send GPD Commissioning command.	

It is also required to perform the tests for the reportable attributes as defined in [R7], see sec. 2.6.19.1 - 2.6.19.5 of this test specification.

If the device supports bidirectional operation, it is also required to perform the test for the readable and writable attributes, as defined in [R7], see sec. 2.5.2 and 2.5.3 of this test specification.

2.6.10.3 Expected Outcome

Pass verdict:
1) DUT-GPD sends GPD Commissioning command with *DeviceID* field set to 0x04.
Fail verdict:
1) DUT-GPD does not send GPD Commissioning command with *DeviceID* field set to 0x04.

2.6.10.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD4	GPD device description Simple Sensor	Direct

2.6.11 NOT TESTED: GPD Light Sensor: DeviceID 0x11 or support for ZCL Illuminance Measurement Cluster

2.6.11.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	

2.6.11.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.4.3, A.4.2.1.1	Make DUT-GPD send GPD Commissioning command.	
1B		**Commissioning: Illuminance Measurement support indicated via Application information** Make DUT-GPD send GPD Commissioning command.	

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2		**Illuminance reporting:** Make the DUT-GPD send its regular Illuminance report.	The action to enable that is device-specific. Waiting may be sufficient.
3A		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0000: MeasuredValue of the Illuminance Measurement Cluster.	
3B		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0001: MinMeasuredValue of the Illuminance Measurement Cluster.	
3C		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0002: MaxMeasuredValue of the Illuminance Measurement Cluster.	
3D		**If DUT-GPD supports bidirectional communication: Multiple attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing three attributes 0x0000: MeasuredValue, 0x0001: MinMeasuredValue and 0x0002: MaxMeasuredValue of the Illuminance Measurement Cluster,	
3E		**If DUT-GPD supports bidirectional communication: Attribute read-out: Negative test: Wrong attribute:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting an attribute of the Illuminance Measurement cluster not supported by the DUT-GPD (e.g. attribute 0x0003).	
3F		**If DUT-GPD supports bidirectional communication: Attribute read-out: Negative test: Wrong cluster:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting attribute 0x0000 of a cluster NOT supported by the DUT-GPD (e.g. Occupancy sensing).	
4A		**Additional reportable attributes:** Make the DUT-GPD report the additional attributes, as specified in the PICS. If necessary, repeat this test, until all the additional reportable attributes are tested.	The action to enable that is device-specific. Waiting may be sufficient.

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4B		**If DUT-GPD supports additional readable attributes: Read the additional attributes:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting a single attribute from the list of additional attributes as indicated in the PICS.	Repeat test for each attribute as indicated in the PICS.
4C		**If DUT-GPD supports writable attributes: Write the attributes:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Write Attributes command requesting a single attribute from the list of additional attributes as indicated in the PICS. As soon as possible (to avoid that GPD overwrites the value, e.g. with a measurement result), trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting a single attribute; the same as in the GPD Write Attributes command.	Repeat test for each attribute as indicated in the PICS.

If the device supports bidirectional operation, it is also required to perform the test for the readable and writable attributes, as defined in [R7], see sec. 2.5.2 and 2.5.3 of this test specification.

2.6.11.3 Expected Outcome

Pass verdict:
1A) DUT-GPD does send Commissioning GPDF with DeviceID field set to 0x11. If the ClusterList field of the application extensions is present, it contains at least the Illuminance Measurement cluster (0x0400). If the GPD CommandID list is present, it contains at least one of the commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
1B) DUT-GPD sends Commissioning GPDF with DeviceID field which can take any non-reserved value listed in the GP specification [R3]. The ClusterList field of the application information is present, and contains at least the Illuminance Measurement cluster (0x0400). If the GPD CommandID list is present, it contains at least one of the GPD commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
2) The DUT-GPD sends at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, and correctly protected, as agreed on during the commissioning. The reporting command contains at least one attribute: 0x0000: MeasuredValue of the Illuminance Measurement Cluster, the attribute data type is 0x21 (unsigned 16-bit integer); the Attribute data is of 2B length.
3A) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Illuminance Measurement cluster, containing at least one Read Attribute Record sub-field for the 0x0000 attribute, with the Status SUCCESS, the attribute data type is 0x21 (unsigned 16-bit integer); the Attribute data is of 2B length.
3B) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Illuminance Measurement cluster, containing at least one Read Attribute Record sub-field for the 0x0001 attribute, with the Status SUCCESS, the attribute data type is 0x21 (unsigned 16-bit integer); the Attribute data is of 2B length.
3C) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Illuminance Measurement cluster, containing at least one Read Attribute Record sub-field for the 0x0002 attribute, with the Status SUCCESS, the attribute data type is 0x21 (unsigned 16-bit integer); the Attribute data is of 2B length.
3D) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends one or multiple GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Illuminance Measurement cluster, containing at least the Read Attribute Record sub-field(s) for the 0x0000, 0x0001, and 0x0002 attribute, with Status SUCCESS and the correct attribute data type and attribute data length.
3E) If the GPD returns GPD Read Attributes Response (formatted as specified in sec. 2.5.2), for the Illuminance Measurement cluster, Attribute 0x0003, then the Status is not equal to SUCCESS.

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3F) If the GPD returns GPD Read Attributes Response (formatted as specified in sec. 2.5.2), for the requested unsupported cluster, then the Status is not equal to SUCCESS.
4A) The DUT-GPD sends at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, and correctly protected, as agreed on during the commissioning. For an additional AttributeID, as listed in the PICS, the command contains the correct ClusterID, correct attribute data type and correct attribute data length. Once the test is done, all additional reportable attributes are tested.
4B) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends at least one GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the requested cluster, containing at least the Read Attribute Record sub-field(s) for the requested attribute with the Status SUCCESS; the attribute data type and attribute data length correspond to this AttributeID. Once the test is done, all additional readable attributes are tested.
4C) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends at least one GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the requested cluster, containing at least the Read Attribute Record sub-field(s) for the requested attribute with the Status SUCCESS; the attribute data type and attribute data length correspond to this AttributeID, and attribute value s previously written by the GPD Write Attributes command. Once the test is done, all additional writable attributes are tested.
Fail verdict:
1A) DUT-GPD does not send Commissioning GPDF with DeviceID field set to 0x30. AND/OR If the ClusterList field of the application extensions is present, it does not contain at least the Illuminance Measurement cluster (0x0400). AND/OR If the GPD CommandID list is present, it does not contain any of the commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
1B) The ClusterList field of the application information is not present, AND/OR it does not contain at least the Illuminance Measurement cluster (0x0400). AND/OR If the GPD CommandID list is present, it does not contain any of the GPD commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
2) The DUT-GPD does not send any of the GPD reporting commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} AND/OR the command is not correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, AND/OR not correctly protected, as agreed to during the commissioning. AND/OR, (any of) the reporting command(s) does not contain the attribute: 0x0000: MeasuredValue of the Illuminance Measurement Cluster.
3A) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record field for the Illuminance Measurement cluster with at least one Read Attribute Record sub-field for the 0x0000 attribute AND/OR Attribute data type and attribute data length is incorrect.
3B) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record field for the Illuminance Measurement cluster with at least one Read Attribute Record sub-field for the 0x0001 attribute AND/OR Attribute data type and attribute data length is incorrect.
3C) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record field for the Illuminance Measurement cluster with at least one Read Attribute Record sub-field for the 0x0002 attribute AND/OR Attribute data type and attribute data length is incorrect.
3D) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does/they do not contain the Cluster Record field for the Illuminance Measurement cluster with Read Attribute Record sub-fields for the 0x0000, 0x0001 and 0x0002 attribute AND/OR for any of the attribute records, attribute data type and attribute data length is incorrect.
3E) If the GPD returns GPD read Attributes Response for the Illuminance Measurement cluster, Attribute 0x0003, then the Status is equal to SUCCESS.
3F) If the GPD returns GPD read Attributes Response for the requested unsupported cluster, then the Status is equal to SUCCESS.
4A) The DUT-GPD does not send any of the GPD reporting commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} AND/OR

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the command is not correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, AND/OR not correctly protected, as agreed to during the commissioning. AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect. AND/OR GPD does not report some of the additional attributes.
4B) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR Status is not SUCCESS AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect. AND/OR it is not possible to read out some of the additional readable attributes from the DUT-GPD.
4C) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect AND/OR the attribute value is different than written by the GPD Write Attributes command. AND/OR it is not possible to write some of the additional writeable attributes from the DUT-GPD.

2.6.11.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD11	GPD device description Light Sensor	Direct
GPD100B	Additional ZCL cluster support	Direct
AREP2	Reporting MeasuredValue attribute from Illuminance Measurement Cluster	Direct
AREAD4 – AREAD6	Reading attribute 0x0000, 0x0001, 0x0002 from Illuminance Measurement Cluster	Direct
AREPF	Additional reportable attributes	Direct
AREADF	Additional readable attributes	Direct
AWRITEF	Additional writable attributes	Direct

2.6.12 NOT TESTED: GPD Occupancy Sensor: DeviceID 0x12 or support for ZCL Occupancy Sensing cluster

2.6.12.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	

2.6.12.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.4.3, A.4.2.1.1	Make DUT-GPD send GPD Commissioning command.	
1B		**Commissioning: Occupancy Sensing support indicated via Application information** Make DUT-GPD send GPD Commissioning command.	
2		***Occupancy* reporting:** Make the DUT-GPD send its regular Occupancy report.	The action to enable that is device-specific. Waiting may be sufficient.
3A		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0000: Occupancy of the Occupancy Sensing Cluster.	

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3B		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0001: OccupancySensorType of the Occupancy Sensing Cluster.	
3C		**If DUT-GPD supports bidirectional communication: Multiple attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing three attributes 0x0000: Occupancy, 0x0001: OccupancySensorType of the Occupancy Sensing Cluster.	
3D		**If DUT-GPD supports bidirectional communication: Attribute read-out: Negative test: Wrong attribute:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting an attribute of the Occupancy Sensing cluster not supported by the DUT-GPD (e.g. attribute 0x0003).	
3E		**If DUT-GPD supports bidirectional communication: Attribute read-out: Negative test: Wrong cluster:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting attribute 0x0000 of a cluster NOT supported by the DUT-GPD (e.g. Temperature Measurement).	
4A		**Additional reportable attributes:** Make the DUT-GPD report the additional attributes, as specified in the PICS. If necessary, repeat this test, until all the additional reportable attributes are tested.	The action to enable that is device-specific. Waiting may be sufficient.
4B		**If DUT-GPD supports additional readable attributes: Read the additional attributes:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting a single attribute from the list of additional attributes as indicated in the PICS.	Repeat test for each attribute as indicated in the PICS.
4C		**If DUT-GPD supports writable attributes: Write the attributes:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Write Attributes command requesting a single attribute from the list of additional attributes as indicated in the PICS. As soon as possible (to avoid that GPD overwrites the value, e.g. with a measurement result), trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting a single attribute; the same as in the GPD Write Attributes command.	Repeat test for each attribute as indicated in the PICS.

If the device supports bidirectional operation, it is also required to perform the test for the readable and writable attributes, as defined in [R7], see sec. 2.5.2 and 2.5.3 of this test specification.

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Pass verdict:
1A) DUT-GPD does send Commissioning GPDF with DeviceID field set to 0x12. If the ClusterList field of the application extensions is present, it contains at least the Occupancy Sensing cluster (0x0406). If the GPD CommandID list is present, it contains at least one of the commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
1B) DUT-GPD sends Commissioning GPDF with DeviceID field which can take any non-reserved value listed in the GP specification [R3]. The ClusterList field of the application information is present, and contains at least the Occupancy Sensing cluster (0x0406). If the GPD CommandID list is present, it contains at least one of the GPD commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
2) The DUT-GPD sends at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, and correctly protected, as agreed on during the commissioning. The reporting command contains at least one attribute: 0x0000: Occupancy of the Occupancy Sensing Cluster, the attribute data type is 0x18 (8-bit bitmap); the Attribute data is of 1B length.
3A) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Occupancy Sensing cluster, containing at least one Read Attribute Record sub-field for the 0x0000 attribute, with the Status SUCCESS, the attribute data type is 0x18 (8-bit bitmap); the Attribute data is of 1B length.
3B) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Occupancy Sensing cluster, containing at least one Read Attribute Record sub-field for the 0x0001 attribute, with the Status SUCCESS, the attribute data type is 0x30 (8-bit enumeration); the Attribute data is of 1B length.
3C) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends one or multiple GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Occupancy Sensing cluster, containing at least the Read Attribute Record sub-field(s) for the 0x0000 and 0x0001 attribute, with Status SUCCESS and the correct attribute data type and attribute data length.
3D) If the GPD returns GPD Read Attributes Response (formatted as specified in sec. 2.5.2), for the Occupancy Sensing cluster, Attribute 0x0003, then the Status is not equal to SUCCESS.
3E) If the GPD returns GPD Read Attributes Response (formatted as specified in sec. 2.5.2), for the requested unsupported cluster, then the Status is not equal to SUCCESS.
4A) The DUT-GPD sends at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, and correctly protected, as agreed on during the commissioning. For an additional AttributeID, as listed in the PICS, the command contains the correct ClusterID, correct attribute data type and correct attribute data length. Once the test is done, all additional reportable attributes are tested.
4B) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends at least one GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the requested cluster, containing at least the Read Attribute Record sub-field(s) for the requested attribute with the Status SUCCESS; the attribute data type and attribute data length correspond to this AttributeID. Once the test is done, all additional readable attributes are tested.
4C) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends at least one GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the requested cluster, containing at least the Read Attribute Record sub-field(s) for the requested attribute with the Status SUCCESS; the attribute data type and attribute data length correspond to this AttributeID, and attribute value s previously written by the GPD Write Attributes command. Once the test is done, all additional writable attributes are tested.
Fail verdict:
1A) DUT-GPD does not send Commissioning GPDF with DeviceID field set to 0x12. AND/OR If the ClusterList field of the application extensions is present, it does not contain at least the Occupancy Sensing cluster (0x0406). AND/OR If the GPD CommandID list is present, it does not contain any of the commands {0xA0, 0xA1 0xA2, 0xA3,

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0xA6}.
1B) The ClusterList field of the application information is not present, AND/OR it does not contain at least the Occupancy sensing cluster (0x0406). AND/OR If the GPD CommandID list is present, it does not contain any of the GPD commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
2) The DUT-GPD does not send any of the GPD reporting commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} AND/OR the command is not correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, AND/OR not correctly protected, as agreed to during the commissioning. AND/OR, (any of) the reporting command(s) does not contain the attribute: 0x0000: Occupancy of the Occupancy Sensing Cluster.
3A) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record field for the Occupancy Sensing cluster with at least one Read Attribute Record sub-field for the 0x0000 attribute AND/OR Attribute data type and attribute data length is incorrect.
3B) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record field for the Occupancy Sensing cluster with at least one Read Attribute Record sub-field for the 0x0001 attribute AND/OR Attribute data type and attribute data length is incorrect.
3C) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does/they do not contain the Cluster Record field for the Occupancy Sensing cluster with Read Attribute Record sub-fields for the 0x0000, 0x0001 attribute AND/OR for any of the attribute records, attribute data type and attribute data length is incorrect.
3D) If the GPD returns GPD read Attributes Response for the Occupancy Sensing cluster, Attribute 0x0003, then the Status is equal to SUCCESS.
3E) If the GPD returns GPD read Attributes Response for the requested unsupported cluster, then the Status is equal to SUCCESS.
4A) The DUT-GPD does not send any of the GPD reporting commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} AND/OR the command is not correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, AND/OR not correctly protected, as agreed to during the commissioning. AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect. AND/OR GPD does not report some of the additional attributes.
4B) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR Status is not SUCCESS AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect. AND/OR it is not possible to read out some of the additional readable attributes from the DUT-GPD.
4C) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect AND/OR the attribute value is different than written by the GPD Write Attributes command. AND/OR it is not possible to write some of the additional writeable attributes from the DUT-GPD.

2.6.12.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD12	GPD device description Occupancy Sensor	Direct
GPD100B	Additional ZCL cluster support	Direct
AREP3	Reporting Occupancy attribute from Occupancy Sensing Cluster	Direct
AREAD7 – AREAD8	Reading attribute 0x0000, 0x0001, from Occupancy Sensing Cluster	Direct
AREPF	Additional reportable attributes	Direct
AREADF	Additional readable attributes	Direct
AWRITEF	Additional writable attributes	Direct

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2.6.13 GPD Temperature Sensor: DeviceID 0x30 or support for ZCL Temperature Measurement cluster

2.6.13.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	

2.6.13.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.4.3, A.4.2.1.1	Make DUT-GPD send GPD Commissioning command.	
1B		**Commissioning: Temperature Measurement support indicated via Application information** Make DUT-GPD send GPD Commissioning command.	
2A		**Temperature reporting:** Make the DUT-GPD send its regular temperature report.	The action to enable that is device-specific. Waiting may be sufficient.
3A		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0000: MeasuredValue of the Temperature Measurement Cluster.	
3B		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0001: MinMeasuredValue of the Temperature Measurement Cluster.	
3C		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0002: MaxMeasuredValue of the Temperature Measurement Cluster.	
3D		**If DUT-GPD supports bidirectional communication: Multiple attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing three attributes 0x0000: MeasuredValue, 0x0001: MinMeasuredValue and 0x0002: MaxMeasuredValue of the Temperature Measurement Cluster,	
3E		**If DUT-GPD supports bidirectional communication: Attribute read-out: Negative test: Wrong attribute:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting an attribute of the Temperature Measurement cluster not supported by the DUT-GPD (e.g. attribute 0x0003).	
3F		**If DUT-GPD supports bidirectional communication: Attribute read-out: Negative test: Wrong cluster:**	

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		Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting attribute 0x0000 of a cluster NOT supported by the DUT-GPD (e.g. Occupancy sensing).	
4A		**Additional reportable attributes:** Make the DUT-GPD report the additional attributes, as specified in the PICS. If necessary, repeat this test, until all the additional reportable attributes are tested.	The action to enable that is device-specific. Waiting may be sufficient.
4B		**If DUT-GPD supports additional readable attributes: Read the additional attributes:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting a single attribute from the list of additional attributes as indicated in the PICS.	Repeat test for each attribute as indicated in the PICS.
4C		**If DUT-GPD supports writable attributes: Write the attributes:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Write Attributes command requesting a single attribute from the list of additional attributes as indicated in the PICS. As soon as possible (to avoid that GPD overwrites the value, e.g. with a measurement result), trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting a single attribute; the same as in the GPD Write Attributes command.	Repeat test for each attribute as indicated in the PICS.

If the DUT supports bidirectional operation and writable attributes, it is also required to perform the test for the readable and writable attributes, see sec. 2.5.2 and 2.5.3 of this test specification.

2.6.13.3 Expected Outcome

Pass verdict:
1A) DUT-GPD does send Commissioning GPDF with DeviceID field set to 0x30. If the ClusterList field of the application extensions is present, it contains at least the Temperature Measurement cluster (0x0402). If the GPD CommandID list is present, it contains at least one of the commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
1B) DUT-GPD sends Commissioning GPDF with DeviceID field which can take any non-reserved value listed in the GP specification [R3]. The ClusterList field of the application information is present, and contains at least the Temperature Measurement cluster (0x0402). If the GPD CommandID list is present, it contains at least one of the GPD commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
2) The DUT-GPD sends at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, and correctly protected, as agreed on during the commissioning. The reporting command contains at least one attribute: 0x0000: MeasuredValue of the Temperature Measurement Cluster, the attribute data type is 0x29 (signed 16-bit integer); the Attribute data is of 2B length.
3A) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Temperature Measurement cluster, containing at least one Read Attribute Record sub-field for the 0x0000 attribute, with the Status SUCCESS, the attribute data type is 0x29 (signed 16-bit integer); the Attribute data is of 2B length.
3B) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Temperature Measurement cluster, containing at least one Read Attribute Record sub-field for the 0x0001 attribute, with the Status

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SUCCESS, the attribute data type is 0x29 (signed 16-bit integer); the Attribute data is of 2B length.
3C) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Temperature Measurement cluster, containing at least one Read Attribute Record sub-field for the 0x0002 attribute, with the Status SUCCESS, the attribute data type is 0x29 (signed 16-bit integer); the Attribute data is of 2B length.
3D) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends one or multiple GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Temperature Measurement cluster, containing at least the Read Attribute Record sub-field(s) for the 0x0000, 0x0001, and 0x0002 attribute, with Status SUCCESS and the correct attribute data type and attribute data length.
3E) If the GPD returns GPD Read Attributes Response (formatted as specified in sec. 2.5.2), for the Temperature Measurement cluster, Attribute 0x0003, then the Status is not equal to SUCCESS.
3F) If the GPD returns GPD Read Attributes Response (formatted as specified in sec. 2.5.2), for the requested unsupported cluster, then the Status is not equal to SUCCESS.
4A) The DUT-GPD sends at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, and correctly protected, as agreed on during the commissioning. For an additional AttributeID, as listed in the PICS, the command contains the correct ClusterID, correct attribute data type and correct attribute data length. Once the test is done, all additional reportable attributes are tested.
4B) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends at least one GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the requested cluster, containing at least the Read Attribute Record sub-field(s) for the requested attribute with the Status SUCCESS; the attribute data type and attribute data length correspond to this AttributeID. Once the test is done, all additional readable attributes are tested.
4C) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends at least one GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the requested cluster, containing at least the Read Attribute Record sub-field(s) for the requested attribute with the Status SUCCESS; the attribute data type and attribute data length correspond to this AttributeID, and attribute value s previously written by the GPD Write Attributes command. Once the test is done, all additional writable attributes are tested.
Fail verdict:
1A) DUT-GPD does not send Commissioning GPDF with DeviceID field set to 0x30. AND/OR If the ClusterList field of the application extensions is present, it does not contain at least the Temperature Measurement cluster (0x0402). AND/OR If the GPD CommandID list is present, it does not contain any of the commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
1B) The ClusterList field of the application information is not present, AND/OR it does not contain at least the Temperature Measurement cluster (0x0402). AND/OR If the GPD CommandID list is present, it does not contain any of the GPD commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
2) The DUT-GPD does not send any of the GPD reporting commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} AND/OR the command is not correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, AND/OR not correctly protected, as agreed to during the commissioning. AND/OR, (any of) the reporting command(s) does not contain the attribute: 0x0000: MeasuredValue of the Temperature Measurement Cluster.
3A) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record field for the Temperature Measurement cluster with at least one Read Attribute Record sub-field for the 0x0000 attribute AND/OR Attribute data type and attribute data length is incorrect.
3B) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record field for the Temperature Measurement cluster with at least one Read Attribute Record sub-field for the 0x0001 attribute AND/OR Attribute data type and attribute data length is incorrect.
3C) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record

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field for the Temperature Measurement cluster with at least one Read Attribute Record sub-field for the 0x0002 attribute AND/OR Attribute data type and attribute data length is incorrect.
3D) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does/they do not contain the Cluster Record field for the Temperature Measurement cluster with Read Attribute Record sub-fields for the 0x0000, 0x0001 and 0x0002 attribute AND/OR for any of the attribute records, attribute data type and attribute data length is incorrect.
3E) If the GPD returns GPD read Attributes Response for the Temperature Measurement cluster, Attribute 0x0003, then the Status is equal to SUCCESS.
3F) If the GPD returns GPD read Attributes Response for the requested unsupported cluster, then the Status is equal to SUCCESS.
4A) The DUT-GPD does not send any of the GPD reporting commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} AND/OR the command is not correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, AND/OR not correctly protected, as agreed to during the commissioning. AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect. AND/OR GPD does not report some of the additional attributes.
4B) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR Status is not SUCCESS AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect. AND/OR it is not possible to read out some of the additional readable attributes from the DUT-GPD.
4C) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect AND/OR the attribute value is different than written by the GPD Write Attributes command. AND/OR it is not possible to write some of the additional writeable attributes from the DUT-GPD.

2.6.13.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD30 GPCF17E	GPD device description Temperature Sensor	Direct
GPD100B	Additional ZCL cluster support	Direct
AREP4	Reporting MeasuredValue attribute from Temperature Measurement Cluster	Direct
AREAD9 – AREAD11	Reading attribute 0x0000, 0x0001, 0x0002 from Temperature Measurement Cluster	Direct
AREPF	Additional reportable attributes	Direct
AREADF	Additional readable attributes	Direct
AWRITEF	Additional writable attributes	Direct

2.6.14 NOT TESTED: GPD Pressure Sensor: DeviceID 0x31: NOT CERTIFIED!

2.6.14.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9, A.4.3, A.4.2.1.1	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for GPD Pressure Sensor.	

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2.6.14.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.3, A.4.2.1.1	Make DUT-GPD send Commissioning GPDF.	

It is also required to perform the tests for the reportable attributes as defined in [R7], see sec. 2.6.19.1 - 2.6.19.5 of this test specification.

If the device supports bidirectional operation, it is also required to perform the test for the readable and writable attributes, as defined in [R7], see sec. 2.5.2 and 2.5.3 of this test specification.

2.6.14.3 Expected Outcome

Pass verdict:
1) DUT-GPD does send Commissioning GPDF with DeviceID field set to 0x31.
Fail verdict:
1) DUT-GPD does not send Commissioning GPDF with DeviceID field set to 0x31.

2.6.14.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD31	GPD device description Pressure Sensor	Direct

2.6.15 NOT TESTED: GPD Flow Sensor: DeviceID 0x32: NOT CERTIFIED!

2.6.15.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.4.3, A.3.9, A.4.2.1.1	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for GPD Flow Sensor.	

2.6.15.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.3, A.4.2.1.1	Make DUT-GPD send Commissioning GPDF.	

It is also required to perform the tests for the reportable attributes as defined in [R7], see sec. 2.6.19.1 - 2.6.19.5 of this test specification.

If the device supports bidirectional operation, it is also required to perform the test for the readable and writable attributes, as defined in [R7], see sec. 2.5.2 and 2.5.3 of this test specification.

2.6.15.3 Expected Outcome

Pass verdict:
1) DUT-GPD does send Commissioning GPDF with DeviceID field set to 0x32.
Fail verdict:
1) DUT-GPD does not send Commissioning GPDF with DeviceID field set to 0x32.

2.6.15.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD32	GPD device description Flow Sensor	Direct

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2.6.16 NOT TESTED: GPD Indoor Environment Sensor: DeviceID 0x33 or support for Relative Humidity Measurement cluster

2.6.16.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	

2.6.16.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.4.3, A.4.2.1.1	Make DUT-GPD send GPD Commissioning command.	
1B		**Commissioning: Relative Humidity Measurement support indicated via Application information** Make DUT-GPD send GPD Commissioning command.	
		RELATIVE HUMIDITY	
2		**Relative Humidity reporting:** Make the DUT-GPD send its regular Relative Humidity report.	The action to enable that is device-specific. Waiting may be sufficient.
3A		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0000: MeasuredValue of the Relative Humidity Measurement Cluster.	
3B		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0001: MinMeasuredValue of the Relative Humidity Measurement Cluster.	
3C		**If DUT-GPD supports bidirectional communication: Single attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing one attribute: 0x0002: MaxMeasuredValue of the Relative Humidity Measurement Cluster.	
3D		**If DUT-GPD supports bidirectional communication: Multiple attribute read-out:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command containing three attributes 0x0000: MeasuredValue, 0x0001: MinMeasuredValue and 0x0002: MaxMeasuredValue of the Relative Humidity Measurement Cluster,	
3E		**If DUT-GPD supports bidirectional communication: Attribute read-out: Negative test: Wrong attribute:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting an attribute of the Relative Humidity Measurement cluster not supported by the DUT-GPD (e.g. attribute 0x0003).	

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3F		**If DUT-GPD supports bidirectional communication: Attribute read-out: Negative test: Wrong cluster:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting attribute 0x0000 of a cluster NOT supported by the DUT-GPD (e.g. Occupancy sensing).	
		TEMPERATURE MEASSUREMENT	
4		**For DeviceID = 0x33:** Test support of Temperature Measurement cluster, i.e. steps 2 – 3F of 2.6.13.	
		ILLUMINANCE MEASUREMENT	
5		**For DeviceID = 0x33:** Test support of Illuminance Measurement cluster, i.e. steps 2 – 3F of 2.6.11.	
		ADDITIONAL FUNCTIONALITY	
6A		**Additional reportable attributes:** Make the DUT-GPD report the additional attributes, as specified in the PICS. If necessary, repeat this test, until all the additional reportable attributes are tested.	The action to enable that is device-specific. Waiting may be sufficient
6B		**If DUT-GPD supports additional readable attributes: Read the additional attributes:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting a single attribute from the list of additional attributes as indicated in the PICS.	Repeat test for each attribute as indicated in the PICS.
6C		**If DUT-GPD supports writable attributes: Write the attributes:** Trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Write Attributes command requesting a single attribute from the list of additional attributes as indicated in the PICS. As soon as possible (to avoid that GPD overwrites the value, e.g. with a measurement result), trigger DUT-GPD to send Data GPDF with RxAfterTx = 0b1. TH-GPS sends correctly formatted and protected GPD Read Attributes command requesting a single attribute; the same as in the GPD Write Attributes command.	Repeat test for each attribute as indicated in the PICS.

If the device supports bidirectional operation, it is also required to perform the test for the readable and writable attributes, as defined in [R7], see sec. 2.5.2 and 2.5.3 of this test specification.

2.6.16.3 Expected Outcome

Pass verdict:
1A) DUT-GPD does send Commissioning GPDF with DeviceID field set to 0x33. If the ClusterList field of the application extensions is present, it contains at least the Temperature Measurement cluster (0x0402), Illuminance Measurement cluster (0x0400) and Relative Humidity Measurement cluster (0x0405). If the GPD CommandID list is present, it contains at least one of the commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
1B) DUT-GPD sends Commissioning GPDF with DeviceID field which can take any non-reserved value listed in the GP specification [R3]. The ClusterList field of the application information is present, and contains at least the Relative Humidity Measurement cluster (0x0405). If the GPD CommandID list is present, it contains at least one of the GPD commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
2) The DUT-GPD sends at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, correctly formatted as

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specified in sec. 2.6.19.1-2.6.19.5, respectively, and correctly protected, as agreed on during the commissioning. The reporting command contains at least one attribute: 0x0000: MeasuredValue of the Relative Humidity Measurement Cluster, the attribute data type is 0x29 (signed 16-bit integer); the Attribute data is of 2B length.
3A) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Relative Humidity Measurement cluster, containing at least one Read Attribute Record sub-field for the 0x0000 attribute, with the Status SUCCESS, the attribute data type is 0x29 (signed 16-bit integer); the Attribute data is of 2B length.
3B) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Relative Humidity Measurement cluster, containing at least one Read Attribute Record sub-field for the 0x0001 attribute, with the Status SUCCESS, the attribute data type is 0x29 (signed 16-bit integer); the Attribute data is of 2B length.
3C) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends GPD Read Attributes Response command (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Relative Humidity Measurement cluster, containing at least one Read Attribute Record sub-field for the 0x0002 attribute, with the Status SUCCESS, the attribute data type is 0x29 (signed 16-bit integer); the Attribute data is of 2B length.
3D) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends one or multiple GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the Relative Humidity Measurement cluster, containing at least the Read Attribute Record sub-field(s) for the 0x0000, 0x0001, and 0x0002 attribute, with Status SUCCESS and the correct attribute data type and attribute data length.
3E) If the GPD returns GPD Read Attributes Response (formatted as specified in sec. 2.5.2), for the Relative Humidity Measurement cluster, Attribute 0x0003, then the Status is not equal to SUCCESS.
3F) If the GPD returns GPD Read Attributes Response (formatted as specified in sec. 2.5.2), for the requested unsupported cluster, then the Status is not equal to SUCCESS.
4) Pass verdicts 2) – 3F) of 2.6.13.
5) Pass verdicts 2) – 3F) of 2.6.11.
6A) The DUT-GPD sends at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, and correctly protected, as agreed on during the commissioning. For an additional AttributeID, as listed in the PICS, the command contains the correct ClusterID, correct attribute data type and correct attribute data length. Once the test is done, all additional reportable attributes are tested.
6B) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends at least one GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the requested cluster, containing at least the Read Attribute Record sub-field(s) for the requested attribute with the Status SUCCESS; the attribute data type and attribute data length correspond to this AttributeID. Once the test is done, all additional readable attributes are tested.
6C) (Some time) after the reception of the GPD Read Attributes command, DUT-GPD sends at least one GPD Read Attributes Response command(s) (formatted as specified in sec. 2.5.2), with at least one Cluster Record field for the requested cluster, containing at least the Read Attribute Record sub-field(s) for the requested attribute with the Status SUCCESS; the attribute data type and attribute data length correspond to this AttributeID, and attribute value s previously written by the GPD Write Attributes command. Once the test is done, all additional writable attributes are tested.
Fail verdict:
1A) DUT-GPD does not send Commissioning GPDF with DeviceID field set to 0x30. AND/OR If the ClusterList field of the application extensions is present, it does not contain at least the Relative Humidity Measurement cluster (0x0402). AND/OR If the GPD CommandID list is present, it does not contain any of the commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
1B) The ClusterList field of the application information is not present, AND/OR it does not contain at least the Relative Humidity Measurement cluster (0x0402). AND/OR If the GPD CommandID list is present, it does not contain any of the GPD commands {0xA0, 0xA1 0xA2, 0xA3, 0xA6}.
2) The DUT-GPD does not send any of the GPD reporting commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} AND/OR the command is not correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, AND/OR not correctly protected,

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as agreed to during the commissioning. AND/OR, (any of) the reporting command(s) does not contain the attribute: 0x0000: MeasuredValue of the Relative Humidity Measurement Cluster.
3A) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record field for the Relative Humidity Measurement cluster with at least one Read Attribute Record sub-field for the 0x0000 attribute AND/OR Attribute data type and attribute data length is incorrect.
3B) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record field for the Relative Humidity Measurement cluster with at least one Read Attribute Record sub-field for the 0x0001 attribute AND/OR Attribute data type and attribute data length is incorrect.
3C) DUT-GPD does not send GPD Read Attributes Response command, formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does not contain at least one Cluster Record field for the Relative Humidity Measurement cluster with at least one Read Attribute Record sub-field for the 0x0002 attribute AND/OR Attribute data type and attribute data length is incorrect.
3D) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR it does/they do not contain the Cluster Record field for the Relative Humidity Measurement cluster with Read Attribute Record sub-fields for the 0x0000, 0x0001 and 0x0002 attribute AND/OR for any of the attribute records, attribute data type and attribute data length is incorrect.
3E) If the GPD returns GPD read Attributes Response for the Relative Humidity Measurement cluster, Attribute 0x0003, then the Status is equal to SUCCESS.
3F) If the GPD returns GPD read Attributes Response for the requested unsupported cluster, then the Status is equal to SUCCESS.
4) Fail verdicts 2) – 3F) of 2.6.13.
5) Fail verdicts 2) – 3F) of 2.6.11.
6A) The DUT-GPD does not send any of the GPD reporting commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} AND/OR the command is not correctly formatted as specified in sec. 2.6.19.1-2.6.19.5, respectively, AND/OR not correctly protected, as agreed to during the commissioning. AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect. AND/OR GPD does not report some of the additional attributes.
6B) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR Status is not SUCCESS AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect. AND/OR it is not possible to read out some of the additional readable attributes from the DUT-GPD.
6C) DUT-GPD does not send any GPD Read Attributes Response command(s), formatted as specified in sec. 2.5.2, (some time) after the reception of the GPD Read Attributes command AND/OR within the attribute record for an additional attribute, either of ClusterID, AttributeID, Attribute data type and attribute data length is incorrect AND/OR the attribute value is different than written by the GPD Write Attributes command. AND/OR it is not possible to write some of the additional writeable attributes from the DUT-GPD.

640 #### 2.6.16.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPD33	GPD device description Indoor Environment Sensor	Direct
GPD100B	Additional ZCL cluster support	Direct
AREP4	Reporting MeasuredValue attribute from Temperature Measurement Cluster	Indirect
AREP2	Reporting MeasuredValue attribute from Illuminance Measurement Cluster	Indirect
AREP7	Reporting MeasuredValue attribute from Relative Humidity Measurement Cluster	Direct
AREAD9 – AREAD11	Reading attribute 0x0000, 0x0001, 0x0002 from Temperature Measurement Cluster	Indirect
AREAD4 – AREAD6	Reading attribute 0x0000, 0x0001, 0x0002 from Illuminance Measurement Cluster	Indirect

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PICS reference	Functionality	Tested (Direct/Indirect)
AREAD16 - AREAD18	Reading attribute 0x0000, 0x0001, 0x0002 from Relative Humidity Measurement Cluster	Direct
AREPF	Additional reportable attributes	Direct
AREADF	Additional readable attributes	Direct
AWRITEF	Additional writable attributes	Direct

2.6.17 Unspecified GPD device (DeviceID = 0xFE)

2.6.17.1.1 Initial conditions

As in 2.4.1.1.1.

2.6.17.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.1.1	DUT-GPD sends a Commissioning GPDF.	

2.6.17.1.3 Expected Outcome

Pass verdict:
1) DUT-GPD sends Commissioning GPDF with: • *DeviceID* = 0xFE; • the *Application information present* sub-field of the *Options* field set to 0b1; • the *Application information* field present and at least one of the following sub-fields set to 0b1: *ModelID*; *GPD command list present*, *Cluster list present*. • At least one of the following fields present: ▪ *ModelID* field; ▪ *GPD command list*: – listing all the standard GPD Data commands supported by the device (as indicated in DUT-GPD PICS); inclusion of standard GPD reporting commands is not required – manufacture-specific GPD commands may be included (as indicated in the PICS); – the list shall not include any GPD Commissioning commands; ▪ *Cluster list*: listing all standard ZCL clusters supported by the device (as indicated in DUT-GPD PICS); manufacturer-specific clusters may be included (as indicated in the PICS); • If any manufacturer-specific functionality (GPD commands, clusters and/or ModelID) is included, the *ManufacturerID* field is present and the *ManufacturerID present* sub-field of the *Application information* field is set to 0b1.
Fail verdict:
1) DUT-GPD sends Commissioning GPDF without the *Application information* AND/OR none of the fields *ModelID, GPD command list, Cluster list* is present AND/OR the *GPD command list* field omits at least one standard GPD Data command listed in the DUT-GPD PICS, AND/OR the *Cluster list* field omits at least one standard ZCL cluster listed in the DUT-GPD PICS, AND/OR *ManufacturerID* field is absent while manufacturer-specific functionality is used.

2.6.17.1.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF17; GPDFE	Commissioning GPDF with Application information	Direct

2.6.18 Application information present (DeviceID other than 0xFE)

2.6.18.1.1 Initial conditions

As in 2.4.1.1.1.

2.6.18.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.4.2.1.1	DUT-GPD sends a Commissioning GPDF.	

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651 ***2.6.18.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Commissioning GPDF with: • *DeviceID* set to one of the non-reserved values as defined in [R7] other than 0xFE; • the *Application information present* sub-field of the *Options* field set to 0b1; • If the *GPD command list* is present, ▪ it lists all standard GPD Data commands supported by the device (as indicated in the PICS), inclusion of standard GPD reporting commands is not required; ▪ it may also include any manufacture-specific (as indicated in the PICS); ▪ it shall not include any GPD Commissioning commands; • If the *Cluster list*: is present, it lists at least all standard ZCL clusters supported by the device implemented in addition to the standard ZCL clusters mandatory for the DeviceID of DUt-GPD (as indicated in the PICS); manufacturer-specific clusters may be present (as indicated in the PICS); • If any manufacturer-specific functionality (GPD commands, clusters and/or ModelID) is included, the *ManufacturerID* field is present and the *ManufacturerID present* sub-field of the *Application information* field is set to 0b1.
Fail verdict:
1) DUT-GPD sends Commissioning GPDF without the *Application information* AND/OR the *GPD command list* field omits at least one standard GPD Data commands listed in the PICS, AND/OR the *Cluster list* field omits at least one standard ZCL clusters listed in the PICS but not mandatory for the DeviceID of DUT-GPD, AND/OR *ManufacturerID* field is absent while manufacturer-specific functionality is used.

652 ***2.6.18.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF17	Commissioning GPDF with Application information	Direct

653 ## 2.6.19 GPD commands

654 ### 2.6.19.1 Attribute Reporting command: 0xA0

655 ***2.6.19.1.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for the required GPD DeviceID, as supported by the DUT-GPD.	
3	[R3] A.4.3, A.4.2.3.1	DUT-GPD supports at least one reportable attribute. For each such attribute, the AttributeID (0xXXXX), ClusterID (0xWWWW), and initial value Y is known.	

656 ***2.6.19.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.3.1	Make DUT-GPD send Data GPDF with GPD Attribute Reporting command with at least one attribute.	

657 ***2.6.19.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF with: • *Auto-Commissioning* sub-field of *NWK Frame Control* field set to 0b0; • *GPD ID* – manufacturer-specific; • *GPD CommandID*: 0xA0 • *GPD Command payload* with: ▪ *ZigBee Cluster ID* as supported by the device type of the DUT-GPD; ▪ At least one Attribute report with AttributeID, corresponding Attribute data type, and Attribute data.

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Fail verdict:
1) DUT-GPD does not send Data GPDF, formatted exactly as defined in 2.6.19.1.3/item 1 above.

658 ***2.6.19.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPDTXA0	Attribute Reporting command	Direct
AREP1-7	GPD-specific reported attributes	Direct

659 **2.6.19.2 Manufacturer Specific Attribute Reporting command: 0xA1**

660 ***2.6.19.2.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for the required GPD DeviceID, as supported by the DUT-GPD.	
3	[R3] A.4.3, A.4.2.3.2	DUT-GPD supports at least one manufacturer-specific reportable attribute for *ManufacturerID* 0xGGGG. For each such attribute, the AttributeID (0xXXXX), ClusterID (0xWWWW), and initial value Y is known.	

661 ***2.6.19.2.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.3.2	Make DUT-GPD send Data GPDF with GPD Manufacturer Specific Attribute Reporting command for at least one attribute.	

662 ***2.6.19.2.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF with: • *Auto-Commissioning* sub-field of *NWK Frame Control* field set to 0b0; • *GPD ID* – manufacturer-specific; • *GPD CommandID*: 0xA1 • *GPD Command payload* with: ▪ Manufacturer Code 0xGGGG; ▪ At least one Cluster ID; ▪ At least one Attribute report with AttributeID, corresponding Attribute data type, and Attribute data.
Fail verdict:
1) DUT-GPD does not send Data GPDF, formatted exactly as defined in item 1 above.

663 ***2.6.19.2.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPDTXA1	Manufacturer-Specific Attribute Reporting command	Direct

664 **2.6.19.3 Multi-cluster reporting command: 0xA2**

665 ***2.6.19.3.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for the required GPD DeviceID, as supported by the DUT-GPD.	

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3	[R3] A.4.3, A.4.2.3.3	DUT-GPD supports at least two reportable attributes from two different clusters: the AttributeID (0xXXXX) of ClusterID (0xWWWW), and initial value Y, and AttributeID 0xMMMM of ClusterID 0xNNNN and initial value P.	

666 ***2.6.19.3.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.3.3	Make DUT-GPD send Data GPDF with GPD Multi Cluster Reporting command for at least one attribute of cluster 0xWWWW and at least one attribute of cluster 0xNNNN.	

667 ***2.6.19.3.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF with: • *Auto-Commissioning* sub-field of *NWK Frame Control* field set to 0b0; • *GPD ID* – manufacturer-specific; • *GPD CommandID*: 0xA2 • *GPD Command payload* with: ▪ At least one Cluster report with ClusterID 0xWWWW and at least one AttributeID, corresponding Attribute data type, and Attribute data; ▪ At least one other Cluster report with ClusterID 0xNNNN and at least one AttributeID 0xMMMM, corresponding Attribute data type, and Attribute data set to P.
Fail verdict:
1) DUT-GPD does not send Data GPDF, formatted exactly as defined in item 1 above.

668 ***2.6.19.3.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPDTXA2	Multi-Cluster Reporting command	Direct
AREP1-7	GPD-specific reported attributes	Direct

669 **2.6.19.4 Manufacturer-specific multi-cluster reporting command: 0xA3**

670 ***2.6.19.4.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for the required GPD DeviceID, as supported by the DUT-GPD.	
3	[R3] A.4.3, A.4.2.3.4	DUT-GPD supports at least two reportable manufacturer-specific attributes for ManufacturerID 0xGGGG from two different clusters; for each of such attributes the initial value is known: the AttributeID (0xXXXX) of ClusterID (0xWWWW), and initial value Y, and AttributeID 0xMMMM of ClusterID 0xNNNN and initial value P.	

671 ***2.6.19.4.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.3.4	Make DUT-GPD send Data GPDF with GPD Manufacturer Specific Multi Cluster Reporting command for at least one attribute 0xXXXX of cluster 0xWWWW and at least one attribute 0xMMMM of cluster 0xNNNN.	

672 ***2.6.19.4.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF with:

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- *Auto-Commissioning* sub-field of *NWK Frame Control* field set to 0b0;
- *GPD ID* – manufacturer-specific;
- *GPD CommandID*: 0xA3
- *GPD Command payload* with:
  - *Manufacturer Code* 0xGGGG;
  - At least one Cluster report with ClusterID 0xWWWW and at least one AttributeID 0xXXXX, corresponding Attribute data type, and Attribute data set to Y;
  - At least one other Cluster report with ClusterID 0xNNNN and at least one AttributeID 0xMMMM, corresponding Attribute data type, and Attribute data set to P.

Fail verdict:

1) DUT-GPD does not send Data GPDF, formatted exactly as defined in item 1 above.

673 ***2.6.19.4.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPDTXA3	Manufacturer-Specific Multi-Cluster Reporting command	Direct

674 **2.6.19.5 NOT TESTED: GPD ZCL Tunneling command (0xA6)**

675 ***2.6.19.5.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 2.6.1.1.1.	
3		DUT-GPD supports GPD ZCL Tunneling command (0xA6), for a particular ZCL command (generic or cluster specific); the ZCL CommandID (0xXX), the ClusterID (0xYYYY), AttributeID (0xZZZZ), if required, and the command payload, if required, is known.	
4	[R3] A.4.2.6.4	TH-GPS supports at the reception of the GPD ZCL Tunneling command (0xA6) for the same ZCL object.	

676 ***2.6.19.5.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4 A.4.2.6.4	Make DUT-GPD send a GPDF with the GPD ZCL Tunneling command (0xA6).	
2	[R3] A.1.4 A.4.2.6.4	**Specific case: GPD uses GPD ZCL Tunneling command (0xA6) for attribute reporting**: Make DUT-GPD send a GPDF with the GPD ZCL Tunneling command (0xA6), carrying the ZCL Report Attributes command.	

677 ***2.6.19.5.3 Expected Outcome***

Pass verdict:

1) DUT-GPD sends GPD ZCL Tunneling command, formatted as follows:

- *Auto-Commissioning* sub-field of *NWK Frame Control* field set to 0b0;
- *GPD ID* – manufacturer-specific;
- *GPD CommandID* carrying ZCL Tunneling command (0xA6)
- *GPD Command payload*
  - *The Options* field of the GPD ZCL Tunneling command set to:
    - *Frame type* sub-field: generic or specific, corresponding to the tunneled ZCL command;
    - *ManufacturerID present* sub-field: absent/present, respectively, depending on the public/manufacturer-specific ClusterID 0xYYYY;
    - *Direction* sub-field set according to the carried ZCL content;
    - *Reserved* sub-fields set to 0b0;
  - *ManufacturerID* present/absent, depending on the value of the *ManufacturerID present* sub-field;
  - *ZigBee Cluster ID* = 0xYYYY;
  - *ZigBee Command ID* = DUT-GPD-specific (0xXX)
  - *Length of Payload* = depending on the ZCL command;

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▪ ZigBee Command Payload = depending on the ZCL command. If the tunneled ZCL command requires a response (as defined by [R5]), some time after the reception of the GPD ZCL Tunneling command, TH-GPS responds with GPD ZCL Tunneling command (0xF6) containing the matching ZCL response command.
2) DUT-GPD sends GPD ZCL Tunneling command, formatted as follows: • *Auto-Commissioning* sub-field of *NWK Frame Control* field set to 0b0; • *ApplicationID, GPD ID* and *Endpoint* – manufacturer-specific; • *GPD CommandID* carrying ZCL Tunneling command (0xA6) • *GPD Command payload* ▪ *The Options* field of the GPD ZCL Tunneling command set to: – *Frame type* sub-field: 0b00; – *ManufacturerID present* sub-field: SHALL be set if ClusterID is from the manufacturer-specific range (0xfc00 – 0xffff) or if the AttributeID is from the manufacturer-specific range (0x4000 – 0xffff); it MAY be set in other cases; – *Direction* sub-field set according to the carried ZCL content; – *Reserved* sub-fields set to 0b0; ▪ *ManufacturerID* field: SHALL be present if ClusterID is from the manufacturer-specific range (0xfc00 – 0xffff) or if the AttributeID is from the manufacturer-specific range (0x4000 – 0xffff); it MAY be present in other cases; ▪ *ZigBee Cluster ID* = 0xYYYY; ▪ *ZigBee Command ID* = ZCL Report Attributes (0x0A); ▪ *Length of Payload* = 5 octets or more; ▪ ZigBee Command Payload with: – ZCL header – carrying the value of the *Options* field of the GPD ZCL Tunneling command; – At least one Attribute report, with AttributeID (0xZZZZ), Attribute data type specific for this Attribute, and Attribute data corresponding to AttributeID and type.
Fail verdict:
1) DUT-GPD does not send GPD ZCL Tunneling command (0xA6), formatted exactly as specified in 2.6.19.5/item 1 above. AND/OR if the tunneled ZCL command requires a response (as defined by [R5]), TH-GPS does not respond with GPD ZCL Tunneling command (0xF6) the matching response.
2) DUT-GPD does not send GPD ZCL Tunneling command (0xA6), formatted exactly as specified in 2.6.19.5/item 2 above.

2.6.19.5.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPDTXA6	Transmission of ZCL Tunneling (0xa6) command	Direct

2.6.19.6 GPD Recall Scene commands (0x10-0x17)

If DUT-GPD supports more than one GPD Recall Scene command, the test is to be repeated for each of the GPD Recall Scene commands supported.

2.6.19.6.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for the required GPD DeviceID, as supported by the DUT-GPD.	
3	[R3] A.4.3, A.4.2.6	DUT-GPD supports at least one GPD Recall Scene command (0x10 – 0x17).	
4	[R3] A.4.3, A.4.2.6	The TH-GPS supports at least the same amount of GPD Recall Scene commands, incl. appropriate Translation Table entries, if supported (default Translation Table entries can be used). The application stores a scene with the SceneID X and for the GroupID Y as triggered by the DUT-GPD. The application endpoint is a member of the GroupID Y.	Methods to configure that are out of scope. The GPD Store Scene commands or the ZCL Groups and Scene cluster commands and the GP Translation Table Update commands can be used.

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683 ***2.6.19.6.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.6	Make DUT-GPD send Data GPDF with GPD Recall Scene X command.	

684 ***2.6.19.6.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF according to its configuration with GPD Recall Scene CommandID from the range 0x10 – 0x17, as indicated in the PICS, (Scene 0 - 7) and no payload. The TH-GPS executes the scene (validate the user-perceivable effects, if any, or by reading out the CurrentScene and CurrentGroup attributes of the Scenes cluster of the paired endpoint of the TH-GPS).
Fail verdict:
1) DUT-GPD does not send Data GPDF, formatted exactly as defined in item 1 above. AND/OR TH-GPS does not execute the scene.

685 ***2.6.19.6.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPDTX10 – GPDTX17	GPD Recall Scene command	Direct

686 **2.6.19.7 GPD Store Scene commands (0x18-0x1f)**

687 If DUT-GPD supports more than one GPD Store Scene command, the test is to be repeated for each of the Store Scene
688 commands supported.

689 ***2.6.19.7.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 2.6.1.1.1.	
2	[R3] A.3.9	A pairing is established between the DUT-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures) for the required GPD DeviceID, as supported by the DUT-GPD.	
3	[R3] A.4.3, A.4.2.6	DUT-GPD supports at least one GPD Store Scene command (0x18 – 0x1f).	
4	[R3] A.4.3, A.4.2.6	The TH-GPS supports at least the same amount of GPD Store Scene commands.	

690 ***2.6.19.7.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.6	Set the application endpoint TH-GPS into the state corresponding to the required scene (e.g. in case of light, by changing light color and/or intensity); the methods to accomplish that are out-of-scope. Make DUT-GPD send Data GPDF with GPD Store Scene X command. If implemented, read out Translation Table of GPEP, and Scenes and Groups table of the application endpoint; otherwise set the application endpoint of the TH-GPS to another state and send a corresponding GPD Recall Scene command from a TH.	

691 ***2.6.19.7.3 Expected Outcome***

Pass verdict:
1) DUT-GPD sends Data GPDF according to its configuration with GPD Store Scene X CommandID from the range 0x18 – 0x1f, as indicated in the PICS, (Store Scene 0 - 7) and no payload. TH-GPS, if it implements a Translation Table, has at least the following Translation Table entry: An entry for the GPD Scene command corresponding to the received GPD Store Scene command (CommandID – 0x08), mapped to Scenes cluster (ClusterID = 0x0005), Recall Scene command (CommandID = 0x0005), and ZigBee

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command payload length set to 0x04; ZigBee command payload containing GroupID M, either 0xffff or specific, and SceneID corresponding to the GPD Store Scene command; either for ApplicationID = 0b000 and SrcID = 0xffffffff or for GPD ID = N, and the corresponding *ApplicationID*. The application endpoint of the TH-GPS is a member of at least one GroupID: If the GroupID in the ZigBee command payload field of the Translation Table entry was set to 0xffff: the GroupID derived from the GPD ID = N of the DUT-GPD; If the GroupID in the ZigBee command payload field of the Translation Table entry had a value M other than 0xffff: the GroupID =M. The application endpoint of the TH-GPS stores a scene with the GroupID as described above, SceneID corresponding to the GPD Scene command, and the scene parameters as set in the beginning. If GPD Recall Scene command is sent, TH-GPS recalls the required scene.
Fail verdict:
1) DUT-GPD does not send Data GPDF, formatted exactly as defined in item 1 above. AND/OR, TH-GPS does not have the appropriate Translation Table entry, Scene table and/or group table entry, as described in item 1 above. AND/OR, If GPD Recall Scene command is sent, TH-GPS does not recall the required scene.

692 ***2.6.19.7.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPDTX18 – GPDTX1f	GPD Store Scene command	Direct

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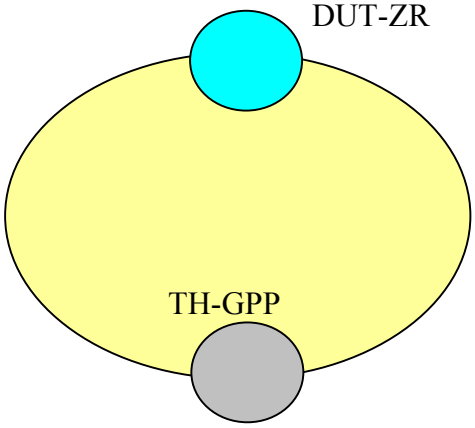
3 Core stack errata (all ZR)

3.1 Alias usage: DUT- ZR (non-GP capable)

3.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-ZR	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Short address = 0xWXYZ. Noted with sniffer. NV store settings and remove power. IEEE address=manufacturer-specific GPEP supports the application functionality of the DUT-GPD (see Section A.4.3 of [R3]).
TH-GPS/TH-Tool	Pan id=same PANID as TH-GPT Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7, but must be restarted in the case it is equal to the alias address) IEEE address=manufacturer-specific Note: a TH-tool capable of sending the required GP-related commands (Device_annce) is preferably used instead of the full TH-GPP

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPP and DUT-ZR operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.9, A.3.4.2.2	TH-GPP has *Proxy Table* with GPD ID ending with 0xWXYZ, i.e. such that the derived alias is identical to the Short Address 0xWXYZ of the DUT-ZR.	

3.1.1.2 Test Set-Up

The DUT-ZR shall be in wireless communication proximity of TH-GPP.

A packet sniffer shall be observing the communication over the air interface.

3.1.2 Subcase: Device_annce reception

ZR with conflicting NWK address receives Device_annce.

3.1.2.1 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.2.6	Make TH-Tool/TH-GPS send Device_annce with Alias_short_addr WXYZ (conflicting with short address of DUT-ZR) and IEEE address 0xFFFFFFFFFFFFFFFF.	

3.1.2.2 Expected Outcome

Pass verdict:
1) On reception of Device_annce, DUT-ZR changes its NWK short address as specified in ZigBee PRO (and announces that via Device_annce).
Fail verdict:
1) On reception of GP Notification, DUT-ZR does not change its NWK short address as specified in ZigBee PRO. AND/OR the DUT-ZR does not announce that via Device_annce.

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3.1.2.3 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
AZD19	Address conflict checking on reception of Device_annce with IEEE address 0xffffffffffffffff	Direct

3.1.3 Subcase: Reception of non–incremental NWK sequence number

3.1.3.1 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.2.5	Make TH request Node descriptor from the DUT-ZR in unicast, using TH's own NWK source address, and NWK sequence number N and APS Counter N. Make TH request Node descriptor from the DUT-ZR in unicast, using TH's own NWK source address, and NWK sequence number N-2 and APS Counter N-2.	

3.1.3.2 Expected Outcome

Pass verdict:
1) On reception of both Node descriptor requests, DUT-ZR responds with Node descriptor.
Fail verdict:
1) DUT-ZR does not respond with Node descriptor to at least one of the requests.

3.1.3.3 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
NDF5	Rx of non-incremental NWK sequence number	Direct

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4 Green Power Sink (GPS)

Unless explicitly specified otherwise in the respective initial conditions section, at the beginning of each test, the sink's GPEP is "factory new"; i.e. the Sink Table is empty; the Translation Table, if supported, is empty or contains only default generic translations; the gpTxQueue is empty, and the sink is in operational mode; the duplicate filtering is empty.

Throughout the current document, the *(GPD command) execution (at the sink)* is defined to encompass all actions of the GP endpoint of the GP sink leading to providing GP application input to the application on the same radio node. The actions may include GPD command translation, mapping to local application endpoints, forwarding to local application endpoints, local GPD storage, update of attributes, combination with other control inputs, and user feedback.

Vendors of the sinks NOT using the default translations or not implementing the Translation Table functionality should think of ways how to explain the application behavior on reception of GPD commands (to the user and the testers), and how correct execution may be made observable (for the users and for certification). They MAY also provide means for controlling this functionality, other than the Translation Table.

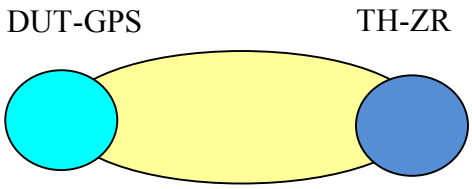
Unless explicitly specified otherwise, throughout section 4, the DUT-GPS is assumed to join using default TC-LK ('ZigBeeAlliance09'), so that the *Involve TC* sub-field of the *gpsSecurityLevel* attribute is automatically set to 0b0.

4.1 Green Power cluster basics

4.1.1 Test GPEP DeviceID read-out

4.1.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT (GPT/GPT+/GPC/GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-ZR	PAN id=same PANID as DUT-GPS Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-ZR operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	

4.1.1.1.2 Test Set-Up

The DUT shall be in wireless communication proximity of TH-ZR.

A packet sniffer shall be observing the communication over the air interface.

4.1.1.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.2	TH-ZR requests a Simple Descriptor from the DUT-GPS on GPEP endpoint (0xF2).	

4.1.1.1.4 Expected Outcome

Pass verdict:
1) DUT-GPS reports • Application profile identifier= 0xA1E0; • Application device identifier: GPCB (0x0066), according to the device type, • Application device version = 0x0, • at least one cluster, Green Power cluster with ClusterID 0x0021, among both in and out clusters.

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Fail verdict:
1) DUT-GPS does report DeviceID other than GPCB (0x0066) on the GPEP and/or does not report Application device version = 0x0 and/or does not report the Green Power cluster with ClusterID 0x0021.

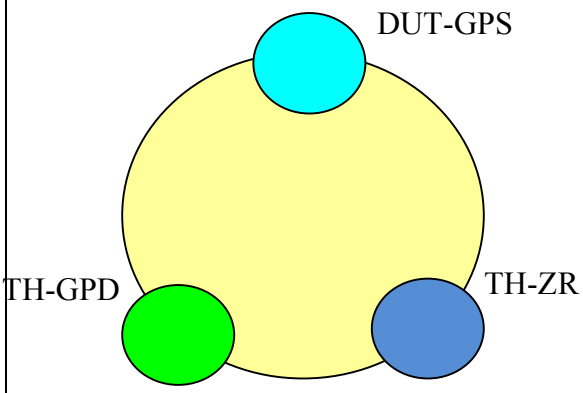
735 ***4.1.1.1.5 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPDT3	Green Power Device Type: Sink	Direct
GPPC2	GPEP support	Direct
GPPCC1, GPPCS1	Green Power cluster support	Direct

736 ## 4.1.2 Attribute writing and reading

737 ***4.1.2.1.1 Initial Conditions***

738 The required network set-up for the test harness is as follows:



DUT-GPS(GPT/GPT+/GPC/GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-ZR	PAN id=same PANID as DUT-GPS Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N When using ApplicationID = 0b010: Endpoint X Supports GPD application functionality of DUT-GPS's GPEP.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-ZR operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2	Sink Table of DUT-GPS is empty.	

739 ***4.1.2.1.2 Test Set-Up***

740 The DUT-GPS shall be in wireless communication proximity of TH-ZR and TH-GPD.

741 A packet sniffer shall be observing the communication over the air interface.

742 ### 4.1.2.2 Sink Attributes

743 ***4.1.2.2.1 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.2.3	TH-ZR reads out the value of the *gpsCommunicationMode* attribute, using ZCL Read Attributes command. TH-ZR writes a different value M (e.g. byte "0x02") to the *gpsCommunicationMode* attribute, using ZCL Write Attributes No Response command. TH-ZR reads out the value of the *gpsCommunicationMode* attribute.	The written values differ from the default values. Note: if the written value is related to some functionality, the functionality should preferably be supported on the DUT.
2	[R3] A.3.3.2.4	TH-ZR reads out the value of the *gpsCommissioningExitMode* attribute. TH-ZR writes a different value M (e.g. byte "0x00") to the *gpsCommissioningExitMode* attribute. TH-ZR reads out the value of the *gpsCommissioningExitMode* attribute.	

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3	[R3] A.3.3.2.5	TH-ZR reads out the value of the *gpsCommissioningWindow* attribute. TH-ZR writes different value M (e.g. 2 bytes "0x003d") to the *gpsCommissioningWindow* attribute TH-ZR reads out the value of the *gpsCommissioningWindow* attribute.	
4	[R3] A.3.3.2.6	TH-ZR reads out the value of the *gpsSecurityLevel* attribute. TH-ZR writes a byte different value M (e.g. "0x02") to the *gpsSecurityLevel* attribute. TH-ZR reads out the value of the *gpsSecurityLevel* attribute.	
5	[R3] A.3.3.2.1	TH-ZR reads out the value of the *gpsMaxSinkTableEntries* attribute. TH-ZR attempts to write a different value M (e.g. byte "0x0f") to the *gpsMaxSinkTableEntries* attribute, using ZCL Write Attributes No Response command. TH-ZR reads out the value of the *gpsMaxSinkTableEntries* attribute.	
6	[R3] A.3.3.2.2	TH-ZR reads out the value of the *Sink Table* attribute. TH-ZR attempts to write a different value M (e.g. two bytes "0x0000") to the *Sink Table* attribute, using ZCL Write Attributes No Response command. TH-ZR reads out the value of the *Sink Table* attribute.	
7	[R3] A.3.3.2.7	TH-ZR reads out the value of the *gpsFunctionality* attribute. TH-ZR attempts to write a different value M (e.g. two bytes "0xffff") to the *gpsFunctionality* attribute, using ZCL Write Attributes No Response command. TH-ZR reads out the value of the *gpsFunctionality* attribute.	
8	[R3] A.3.3.2.8	TH-ZR reads out the value of the *gpsActiveFunctionality* attribute. TH-ZR attempts to write a different value M (e.g. "0x0000") to the *gpsActiveFunctionality* attribute, using ZCL Write Attributes No Response command. TH-ZR reads out the value of the *gpsActiveFunctionality* attribute.	
9A	[R3] A.3.3.4.7	**Negative test: empty Sink Table:** Clean the Sink Table. TH unicasts GP Sink Table Request with *Index* = 0x00.	
9B	[R3] A.3.9, A.3.3.2.2	Establish a pairing between DUT-GPS and TH-GPD identified by GPD SrcID N (*ApplicationID* = 0b000), using single-/multi-hop pairing, if DUT-GPS supports it and security if DUT-GPS supports it. TH-ZR reads the *Sink Table* attribute.	
9C	[R3] A.3.3.4.7	Keep the pairing as created in step 9. TH unicasts GP Sink Table Request with *Index* = 0x00.	
10	[R3] A.3.9, A.3.3.2.2	Keep the Sink Table entry from step 9A. Establish a pairing between DUT-GPS and TH-GPD identified by GPD IEEE address N and Endpoint X (*ApplicationID* = 0b010), using single-/multi-hop pairing, if DUT-GPS supports it and security if DUT-GPS supports it. TH-ZR reads the *Sink Table* attribute.	
11	[R3] A.3.3.4.7	Keep the pairing as created in step 9. Create additional pairing between TH-GPD2 and TH-GPS, including security, for GPD ID = M. TH unicasts GP Sink Table Request with *Index* = 0x01.	
12A	[R3] A.3.3.4.7	Keep the pairing as created in step 9 and 11.	

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		TH unicasts GP Sink Table Request with SrcID = N.	
12B	[R3] A.3.3.4.7	Keep the pairing as created in step 9 and 11. TH unicasts GP Sink Table Request with GPD IEEE address = N and Endpoint X.	
13	[R3] A.3.3.4.7	**Negative test: wrong Index:** Keep the pairing as created in step 9 and 11. TH unicasts GP Sink Table Request with Index = 0x03.	
14A	[R3] A.3.3.4.7	**Negative test: wrong GPDID:** Keep the pairing as created in step 9 and 11. TH unicasts GP Sink Table Request with SrcID other than N and M.	
14B	[R3] A.3.3.4.7	**Negative test: wrong GPDID:** Keep the pairing as created in step 9 and 11. TH unicasts GP Sink Table Request with GPD IEEE address other than N.	
15	[R3] A.3.4.3.1	**Opt. Negative test: if DUT-GPS does NOT implement a Proxy Table:** TH unicasts GP Proxy Table Request with Index = 0x00.	

744 ***4.1.2.2.2 Expected Outcome***

Pass verdict:
1) On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsCommunicationMode* attribute. If the Write Attributes contains a value unsupported by DUT-GPS, DUT-GPS sends Write Attributes Response with Status INVALID_FIELD. On reception of the second Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsCommunicationMode* attribute set to M.
2) On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsCommissioningExitMode* attribute. On reception of the second Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsCommissioningExitMode* attribute set to M.
3) On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsCommissioningWindow* attribute. On reception of the second Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsCommissioningWindow* attribute set to M.
4) On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsSecurityLevel* attribute. If the Write Attributes contains a value unsupported by DUT-GPS, DUT-GPS sends Write Attributes Response with Status INVALID_FIELD. On reception of the second Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsSecurityLevel* attribute set to M.
5) On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsMaxSinkTableEntries* attribute set to N. A DUT-GPS supporting the Sink Table based groupcast forwarding functionality (as indicated in the PICS and the *gpsFunctionality* attribute) has N >= 10. A DUT-GPS NOT supporting the Sink Table based groupcast forwarding functionality (as indicated in the PICS and the *gpsFunctionality* attribute) has N >= 5. On reception of the second Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsMaxSinkTableEntries* attribute unmodified (set to N).

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6) On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *Sink Table* attribute set to 0x0000.

On reception of the second Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *Sink Table* attribute unmodified (set to 0xffff).

7) On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsFunctionality* attribute set to N.

On reception of the second Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsFunctionality* attribute unmodified (set to N).

8) On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsActiveFunctionality* attribute set to N.

On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpsActiveFunctionality* attribute unmodified (set to N).

9A) DUT-GPS responds with GP Sink Table Response command with:

- Status SUCCESS;
- Total number of Sink Table entries = 0x00;
- Start Index = 0x00;
- Entries count = 0x00;
- No Sink Table entry present.

9B) As part of the commissioning process, DUT-GPS may send GP Pairing command.

DUT-GPS responds with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for GPD SrcID = N, *ApplicationID* = 0b000, formatted as defined in the GP specification:

- *Options* field present and its sub-fields
  - *ApplicationID* = 0b000;
  - *CommunicationMode* sub-field set to a communication mode supported by this GPS (as in *gpsFunctionality* attribute, and as in GP Pairing, if transmitted);
  - *Sequence number capabilities*, *RxOnCapability*, *FixedLocation* sub-fields set to values as supplied by the GPD;
  - *SecurityUse* set to 0b1 if *gpsSecurityLevel* >= 0b10;
- *GPD ID* field present and carrying 4B GPD SrcID = N;
- *Endpoint* field is absent;
- *DeviceID* field present and carrying the value as supplied by the TH-GPD in the Commissioning GPD;
- *GroupList* field shall be present if *CommunicationMode* sub-field of the *Options* field is set for 0b10, and absent otherwise; if present, it has a value as in GP Pairing, if transmitted;
- *GPD Assigned Alias* field shall be present if *AssignedAlias* sub-field, and absent otherwise; if present, it has a value as in GP Pairing, if transmitted;
- *Groupcast radius* present; it has a value as in GP Pairing, if transmitted;
- The fields *Security Options*, *GPDkey* ***shall*** all be present if *SecurityUse* is set to 0b1, and absent otherwise. If present, they ***shall*** be set to:
  - *SecurityLevel* and *SecurityKeyType* sub-fields and *GPDkey* field carrying values as negotiated with GPD during commissioning; and as in GP Pairing, if transmitted;
- *GPD security frame counter*,
  - Shall be present if *SecurityUse* is set to 0b1 or if *Sequence number capabilities* = 0b1 and *SecurityUse* = 0b0, and absent otherwise; and carry the value provided by the GPD in the last correctly protected frame, or if none exchanged yet, as in the payload of Commissioning GPDF and as in GP Pairing, if transmitted.

9C) DUT-GPS responds with GP Sink Table Response command with:

- *Status* SUCCESS;
- *Total number of non-empty Sink Table entries* = 0x01;
- *Start Index* = 0x00;
- *Entries count* = 0x01;

one *Sink Table entry* field for GPD SrcID = N, formatted as defined in the GP specification sec. A.3.3.2.2.1:

- *Octet count* field – carrying the length of the *Sink Table entry* field -1;
- *GPD ID* field
  is 4B in length and carries the SrcID = N of the GPD; the *Endpoint* field is absent;
- *Options* field present and:
  - *ApplicationID* sub-field = 0b000;

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- *CommunicationMode* sub-field set to a communication mode supported by this GPS (as in *gpsFunctionality* attribute);
- *Sequence number capabilities, RxOnCapability, FixedLocation* sub-fields set to values as supplied by the GPD;
- *SecurityUse* set to 0b1 if gpsSecurityLevel >= 0b10;

- *DeviceID* field present and carrying the value as supplied by the TH-GPD in the Commissioning GPD;
- *GroupList* field shall be present if *CommunicationMode* sub-field of the *Options* field is set for 0b10, and absent otherwise;
- *GPD Assigned Alias* field shall be present if *AssignedAlias* sub-field, and absent otherwise;
- Groupcast radius present;
- The fields *Security Options*, *GPDkey* ***shall*** all be present if *SecurityUse* is set to 0b1, and absent otherwise. If present, they ***shall*** be set to:
- *SecurityLevel* and *SecurityKeyType* sub-fields and *GPDkey* field carrying values as negotiated with GPD during commissioning;
- The GPD security frame counter,
  - Shall be present if *SecurityUse* is set to 0b1 or if *Sequence number capabilities* = 0b1 and *SecurityUse* = 0b0, and absent otherwise;
  - and carry the value provided by the GPD in the last correctly protected frame.

10) As part of the commissioning process, DUT-GPS may send GP Pairing command.

DUT-GPS responds with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having:

one entry for *ApplicationID* = 0b000 and SrcID = N, formatted exactly as in 4.1.2.2.2/pass verdict 9B above;

one entry for *ApplicationID* = 0b010, GPD IEEE address = N, formatted as defined in the GP specification:

- *Options* field present and
  - *ApplicationID* -= 0b010;
  - *CommunicationMode* sub-field set to a communication mode supported by this GPS (as in gpsFunctionality attribute and as in GP Pairing, if transmitted);
  - *Sequence number capabilities*, *RxOnCapability*, *FixedLocation* sub-fields set to values as supplied by the GPD;
  - SecurityUse set to 0b1 if *gpsSecurityLevel* >= 0b10;
- *GPD ID* field is 8B in length and carries the IEEE address = N of the GPD;
- the *Endpoint* field is present and carries the endpoint of the TH-GPD = X
- *DeviceID* field present and carrying the value as supplied by the TH-GPD in the Commissioning GPD; and as in GP Pairing, if transmitted
- *GroupList* field shall be present if *CommunicationMode* sub-field of the *Options* field is set for 0b10, and absent otherwise; and as in GP Pairing, if transmitted
- *GPD Assigned Alias* field shall be present if *AssignedAlias* sub-field, and absent otherwise; and as in GP Pairing, if transmitted;
- Groupcast radius present; and as in GP Pairing, if transmitted
- The fields *Security Options*, *GPDkey* ***shall*** all be present if *SecurityUse* is set to 0b1, and absent otherwise. If present, they ***shall*** be set to:
  - *SecurityLevel* and *SecurityKeyType* sub-fields and *GPDkey* field carrying values as negotiated with GPD during commissioning and as in GP Pairing, if transmitted;
- The GPD security frame counter,
  - Shall be present if *SecurityUse* is set to 0b1 or if *Sequence number capabilities* = 0b1 and *SecurityUse* = 0b0, and absent otherwise;
  - and carry the value provided by the GPD in the last correctly protected frame or if none exchanged yet, as in the payload of Commissioning GPDF and as in GP Pairing, if transmitted.

If both entires do NOT fit in a single ZCL Read Attributes Response frame (without fragmentation or partitioning cluster usage), DUT-GPS responds with ZCL Read Attributes Response with Status = INSUFFICIENT_SPACE and no entries included.

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11) DUT-GPS responds with GP Sink Table Response command with: • *Status* SUCCESS; • Total number of Sink Table entries = 0x03; • Start Index = 0x01; • Entries count = 0x01; • one *Sink Table entry* field for GPD IEEE address = N and Endpoint X, formatted as defined in the GP specification, sec. A.3.3.2.2.1, and as described in step 10 of 4.1.2.2.2 above. or with • *Status* SUCCESS; • *Total number of Sink Table entries* = 0x03; • *Start Index* = 0x01; • Entries count = 0x02; • one *Sink Table entry* field for GPD IEEE address = N and Endpoint X, formatted as defined in the GP specification, sec. A.3.3.2.2.1, and as described in step 10 of 4.1.2.2.2 above; • one Sink Table entry field for GPD SrcID=M, formatted according to the information carried in the GP Pairing message of step 11.
12A) DUT-GPS responds with GP Sink Table Response command with: • *Status* SUCCESS; • Total number of Sink Table entries = 0x03; • Start Index = 0xff; • Entries count = 0x01; • one *Sink Table entry* field attribute having one entry for GPD SrcID = N, formatted as defined in the GP specification sec. A.3.3.2.2.1, and as described in step 9C of 4.1.2.2.2 above.
12B) DUT-GPS responds with GP Sink Table Response command with: • *Status* SUCCESS; • Total number of Sink Table entries = 0x03; • Start Index = 0xff; • Entries count = 0x01; • one *Sink Table entry* field for GPD IEEE address = N and Endpoint X, formatted as defined in the GP specification, sec. A.3.3.2.2.1, and as described in step 10 of 4.1.2.2.2 above.
13)DUT-GPS responds with GP Sink Table Response command with: • Status NOT_FOUND; • Total number of Sink Table entries = 0x03; • Start Index – as in the triggering request: 0x02; • Entries count = 0x00; • No Sink Table entry present.
14A) – 14B) DUT-GPS responds with GP Sink Table Response command with: • Status NOT_FOUND; • Total number of Sink Table entries = 0x03; • Start Index = 0xff; • Entries count = 0x00; • No Sink Table entry present.
15) DUT-GPS that does not implement the Proxy Table, responds with ZCL Default Response command, with *Command identified* field carrying 0x0a and *Status code* field carrying UNSUP_CLUSTER_COMMAND.
Fail verdict:
1) On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpsCommunicationMode* attribute. AND/OR If the Write Attributes contains a value unsupported by DUT-GPS, DUT-GPS does NOT send Write Attributes Response with Status INVALID_FIELD. AND/OR On reception of the second Read Attributes command, the DUT-GPS does not send the Read Attribute Responses with Status SUCCESS and the *gpsCommunicationMode* attribute set to M.

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2) On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpsCommissioningExitMode* attribute. AND/OR On reception of the second Read Attributes command, the DUT-GPS does not send the Read Attribute Responses with Status SUCCESS and the *gpsCommissioningExitMode* attribute set to M.
3) On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpsCommissioningWindow* attribute. AND/OR On reception of the second Read Attributes command, the DUT-GPS does not send the Read Attribute Responses with Status SUCCESS and the *gpsCommissioningWindow* attribute set to M.
4) On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpsSecurityLevel* attribute. AND/OR If the Write Attributes contains a value unsupported by DUT-GPS, DUT-GPS does NOT send Write Attributes Response with Status INVALID_FIELD. AND/OR On reception of the second Read Attributes command, the DUT-GPS does not send the Read Attribute Responses with Status SUCCESS and the *gpsSecurityLevel* attribute set to M.
5) On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpsMaxSinkTableEntries* attribute set to N. A DUT-GPS supporting the Sink Table based groupcast forwarding functionality (as indicated in the PICS and the *gpsFunctionality* attribute) does NOT have N >= 10. A DUT-GPS NOT supporting the Sink Table based groupcast forwarding functionality (as indicated in the PICS and the *gpsFunctionality* attribute) does NOT have N >= 5. AND/OR On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpsMaxSinkTableEntries* attribute AND/OR the *gpsMaxSinkTableEntries* attribute does not have the value of N.
6) On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *Sink Table* attribute set to 0x0000. AND/OR On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *Sink Table* attribute AND/OR the *Sink Table* attribute does not have the value of 0x0000.
7) On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpsFunctionality* attribute set to N. AND/OR On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpsFunctionality* attribute AND/OR the *gpsFunctionality* attribute does not have the value of 0xN.
8) On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpsActiveFunctionality* attribute set to N. AND/OR On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpsActiveFunctionality* attribute AND/OR the *gpsActiveFunctionality* attribute does not have the value of 0xN.
9A) DUT-GPS does not respond with GP Sink Table Response command formatted exactly as specified in pass verdict 9A) of 4.1.2.2.2 above.
9B) DUT-GPS does not respond with Read Attributes Response with Status SUCCESS and carrying *Sink Table* attribute AND/OR *Sink Table* of DUT-GPS does not have exactly one entry for ApplicationID = 0b000, GPD SrcID = N, AND/OR the *Sink Table* entry of DUT-GPS is not formatted as defined in 4.1.2.2.2/item 9B above AND/OR the data in the entry differs from that supplied during commissioning AND/OR as supplied in GP Pairing, if sent.
9C) DUT-GPS does not respond with GP Sink Table Response command AND/OR the GP Sink Table Response command is not formatted exactly as specified in pass verdict 9C of 4.1.2.2.2 above.

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10) DUT-GPS does not respond with Read Attributes Response with Status SUCCESS and carrying *Sink Table* attribute AND/OR *Sink Table* of DUT-GPS does not have exactly one entry for ApplicationID = 0b010, GPD IEEE address = N, AND/OR the *Sink Table* entry of DUT-GPS is not formatted as defined in 4.1.2.2.2/item 9B above AND/OR the data in the entry differs from that supplied during commissioning AND/OR as supplied in GP Pairing, if sent. AND/OR *Sink Table* of DUT-GPS does not have exactly one entry for ApplicationID = 0b000, GPD SrcID = N, AND/OR the *Sink Table* entry of DUT-GPS is not formatted as defined in 4.1.2.2.2/item 9A above AND/OR the data in the entry differs from that supplied during commissioning. AND/OR If both entires do NOT fit in a single ZCL Read Attributes Response frame (without fragmentation or partitioning cluster usage), DUT-GPS does NOT respond ZCL Read Attributes Response with Status = INSUFFICIENT_SPACE and no entries included. AND/OR DUT-GPS responds with some partially included entries.
11) DUT-GPS does not responds with GP Sink Table Response command formatted exactly as specified one fo the ways in pass verdict 11 of 4.1.2.2.2 above.
12A) DUT-GPS does not respond with GP Sink Table Response command formatted exactly as specified in pass verdict 12A) of 4.1.2.2.2 above.
12B) DUT-GPS does not respond with GP Sink Table Response command formatted exactly as specified in pass verdict 12B) of 4.1.2.2.2 above.
13)DUT-GPS does not respond with GP Sink Table Response command formatted exactly as specified in pass verdict 13 of 4.1.2.2.2 above.
14A) -14B) DUT-GPS does not respond with GP Sink Table Response command formatted exactly as specified in pass verdict 14A) -14B) of 4.1.2.2.2 above.
15) DUT-GPS that does not implement the Proxy Table, does not respond with ZCL Default Response command, formatted exactly as specified in pass verdict 16) of 4.1.2.2.2 above.

745 ***4.1.2.2.3 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCCS2	gpsMaxSinkTableEntries attribute	Direct
GPCCS3A	Sink Table attribute	Direct
GPCCS3B	Is the required minimal number of entries in the Sink Table attribute supported?	Direct
GPCCS4	Communication mode attribute	Direct
GPCCS5	Commissioning Exit Mode attribute	Direct
GPCCS6	Commissioning Window attribute	Direct
GPCCS7	Security Level attribute	Direct
GPCCS8, 9	gpsFunctionality, gpsActiveFunctionality attribute	Direct
GPPCS3D GPPCS111, GPPCS156	Sink Table readout via GP Sink Table Request/Response commands	Direct

746 ### 4.1.2.3 Common attributes

747 ***4.1.2.3.1 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.3.1	TH-ZR reads out the value of the *gpSharedSecurityKeyType* attribute, using ZCL Read Attributes command. TH-ZR writes a different value M (e.g. byte “0x07”) to the *gpSharedSecurityKeyType* attribute, using ZCL Write Attributes No Response command. *TH-ZR reads out the value of the gpSharedSecurityKeyType attribute.*	The written values differ from the default values. Note: if the written value is related to some functionality, the functionality should preferably be supported on the DUT.
2	[R3] A.3.3.3.2	TH-ZR reads out the value of the *gpSharedSecurityKey* attribute. TH-ZR writes a different value M (e.g. “0xB0 0xB1 0xB2 0xB3 0xB4 0xB5 0xB6 0xB7 0xB8 0xB9 0xBA 0xBB 0xBC 0xBD 0xBE 0xBF”) to the *gpSharedSecurityKey* attribute. TH-ZR reads out the value of the *gpSharedSecurityKey* attribute.	

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3	[R3] A.3.3.3.3	TH-ZR reads out the value of the *gpLinkKey* attribute. TH-ZR writes different value M (e.g. "ZigBeeAlliance11") to the *gpLinkKey* attribute. TH-ZR reads out the value of the *gpLinkKey* attribute.	
4	[R3] A.3.3.3.4	TH-ZR reads out the value of the *ClusterRevision* attribute (*AttributeID* = 0xfffd, a Cluster global attribute).	

748 ***4.1.2.3.2 Expected Outcome***

Pass verdict:
1) If DUT-GPS supports this attribute (DUT-GPS being a Combo Basic shall), then, on reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKeyType* attribute. The default value for DUT-GPS being a Basic Combo is 0b000. If DUT-GPS does not support the *gpSharedSecurityKeyType* attribute, it responds with Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE. On reception of the second Read Attributes command, the DUT-GPS that supports the *gpSharedSecurityKeyType* attribute sends the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKeyType* attribute set to M.
2) If DUT-GPS supports this attribute (DUT-GPS being a Basic Combo shall), then, on reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKey* attribute. If DUT-GPS does not support the *gpSharedSecurityKey* attribute, it responds with Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE. On reception of the second Read Attributes command, the DUT-GPS that supports the *gpSharedSecurityKey* attribute sends the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKey* attribute set to M.
3) On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpLinkKey* attribute. The default value for DUT-GPS being a Basic Combo is 'ZigBeeAlliance09', i.e. {0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39}. On reception of the second Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *gpLinkKey* attribute set to M.
4) On reception of the first Read Attributes command, the DUT-GPS sends the Read Attributes Response with Status SUCCESS and the *ClusterRevision* attribute with the default value of 0x01.
Fail verdict:
1) On reception of the first Read Attributes command, the DUT-GPS supporting this attribute does not send the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKeyType* attributeAND/OR the value for the Basic Combo is not 0b000. AND/OR DUT-GPS that does not support the *gpSharedSecurityKeyType* attribute, does NOT respond with Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE. AND/OR On reception of the second Read Attributes command, the DUT-GPS that supports the *gpSharedSecurityKeyType* attribute does not send the Read Attribute Responses with Status SUCCESS and the *gpSharedSecurityKeyType* attribute set to M.
2) On reception of the first Read Attributes command, the DUT-GPS supporting this attribute does not send the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKey* attribute. AND/OR DUT-GPS that does not support the *gpSharedSecurityKey* attribute, does NOT respond with Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE. AND/OR On reception of the second Read Attributes command, the DUT-GPS that supports the *gpSharedSecurityKey* attribute does not send the Read Attribute Responses with Status SUCCESS and the *gpSharedSecurityKey* attribute set to M.
3) On reception of the first Read Attributes command, the DUT-GPS does not send the Read Attributes Response with Status SUCCESS and the *gpLinkKey* attribute. AND/OR The default value for Basic Combo is NOT 'ZigBeeAlliance09', i.e. {0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39}. AND/OR On reception of the second Read Attributes command, the DUT-GPS does not send the Read Attribute Responses with Status SUCCESS and the *gpLinkKey* attribute set to M.

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4) On reception of the first Read Attributes command, the DUT-GPS does NOT sends the Read Attributes Response with Status SUCCESS and the *ClusterRevision* attribute with the default value of 0x01.

749 ***4.1.2.3.3 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPC101	Is the *gpSharedSecurityKeyType* attribute supported?	Direct
GPPC102	Is the *gpSharedSecurityKey* attribute supported?	Direct
GPPC103	Is the *gpLinkKey* attribute supported?	Direct
GPPC104	Is the *ClusterRevision* global attribute supported?	Direct

750 ## 4.1.3 Functionality support

751 ### 4.1.3.1 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.2.7, A.3.2.8, A.3.2.9	TH-ZR reads out the value of the *gpsFunctionality* attribute.	

752 ### 4.1.3.2 Expected Outcome

Pass verdict:
1) TH-ZR receives the Read Attribute Response with Status SUCCESS and the sub-fields of the *gpsFunctionality* attribute set to the values in DUT-GPS's PICS corresponding to its sink role: • b0 (GP feature) == 0b1; • b1 (Direct communication (reception of GPDF via GP stub)) = ▪ 0b1 if the DUT-GPS implements GP stub, and 0b0 otherwise; ▪ b1 == 0b1 for DUT-GPCB; • b2 (Derived groupcast communication) = ▪ 0b1 if the DUT-GPS implements derived groupcast, and 0b0 otherwise; • b3 (Pre-commissioned groupcast communication) = ▪ 0b1 if the DUT-GPS implements commissioned groupcast, and 0b0 otherwise; • b4 (Unicast communication) = ▪ 0b1 if the DUT-GPS supports unicast communication, and 0b0 otherwise; ▪ b4 == 0b0 for DUT-GPCB; • b5 (Lightweight unicast communication) = ▪ 0b1 if the DUT-GPS supports lightweight unicast communication, and 0b0 otherwise; • b6 = ▪ 0b1 if the DUT-GPS supports proximity bidirectional operation, and 0b0 otherwise; ▪ b6 == 0b0 for DUT-GPCB; • b7 = ▪ 0b1 if the DUT-GPS supports multi-hop bidirectional operation, and 0b0 otherwise; ▪ b7 == 0b0 for DUT-GPCB; • b8 = ▪ 0b1 if the DUT-GPS supports Proxy Table maintenance, and 0b0 otherwise; ▪ b8 == 0b0 for DUT-GPCB; • b9 = ▪ 0b1 if the DUT-GPS supports proximity commissioning, and 0b0 otherwise; ▪ b9 == 0b1 for DUT-GPCB; • b10 = ▪ 0b1 if the DUT-GPS supports multi-hop commissioning, and 0b0 otherwise; ▪ b10 == 0b1 for DUT-GPCB; • b11 = ▪ 0b1 if the DUT-GPS supports CT-based commissioning, and 0b0 otherwise;

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- b11 == 0b1 for DUT-GPCB;

- b12 =
  - 0b1 if the DUT-GPS supports Maintenance of GPD, and 0b0 otherwise;
  - b12 == 0b0 for DUT-GPCB;
- b13 =
  - 0b1 if the DUT-GPS supports gpdSecurityLevel = 0b00, and 0b0 otherwise;
- b14 = 0b0;
- b15 =
  - 0b1 if the DUT-GPS supports gpdSecurityLevel = 0b10, and 0b0 otherwise;
- b16 =
  - 0b1 if the DUT-GPS supports gpdSecurityLevel = 0b11, and 0b0 otherwise;
- b17 =
  - 0b1 if the DUT-GPS supports Sink Table based groupcast forwarding, and 0b0 otherwise;
  - b17 == 0b0 for DUT-GPCB;
- b18 =
  - 0b1 if the DUT-GPS supports Translation Table, and 0b0 otherwise;
- b19 =
  - 0b1 if the DUT-GPS supports GPD IEEE address, and 0b0 otherwise;
  - b19 == 0b1 for DUT-GPCB;
- b20 – b23 = 0b0.

Fail verdict:

1) TH-ZR does not receive the Read Attribute Response, formatted exactly as defined in 4.1.3.2/item 1 above.

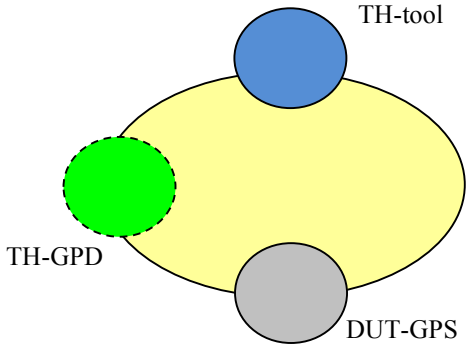
4.1.3.3 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF1 - GPPCSF20	Green Power cluster functionality	Direct

4.1.4 Persistent storage of Sink Table

4.1.4.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-tool	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
DUT-GPS	PANId=same PANID as TH-tool Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD/TH-Tool	GPD ID = N Supports GPD application layer functionality corresponding to DUT-GPS's GPEP.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-tool operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2	Sink Table of DUT-GPS is empty.	

4.1.4.1.2 Test Set-Up

The DUT-GPS shall be in wireless communication proximity of TH-ZR (and TH-GPD, if used).

A packet sniffer shall be observing the communication over the air interface.

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760 ***4.1.4.1.3 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1A		Read out Sink Table of DUT-GPS.	
1B		A pairing with *SecurityLevel* >= 0b10 is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures); *Security frame counter* has an initial value M. Read out Sink Table of DUT-GPS.	
1C		Make TH-GPD send a correctly formatted and protected Data GPDF with incremented *Security frame counter* N => M+1, carrying a GPD command supported by DUT-GPS. Read out Sink Table of DUT-GPS.	
2A		Switch off the DUT-GPS for approximately 5 seconds. Switch the DUT-GPS back on and make sure it can communicate on the network. Read out Sink Table of DUT-GPS.	
2B		Make TH-GPD send a correctly formatted and protected Data GPDF with incremented *Security frame counter* O => N+1, carrying a GPD command supported by DUT-GPS. Read out Proxy Table of DUT-GPS.	

761 ***4.1.4.1.4 Expected Outcome***

Pass verdict:
1A) DUT-GPS responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Sink Table* attribute, being empty.
1B) DUT-GPS responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Sink Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = M.
1C) On reception of the Data GPDF from TH-GPD, if perceivable, DUT-GPS executes the GPD command. DUT-GPS responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Sink Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = N.
2A) Once operational again, DUT-GPS responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Sink Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* is equal to M or N.
2B) On reception of the Data GPDF from TH-GPD, if perceivable, DUT-GPS executes the GPD command. DUT-GPS responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Sink Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = O.
Fail verdict:
1A) DUT-GPS does NOT respond with ZCL Read Attributes Response with the status SUCCESS and carrying the *Sink Table* attribute, AND/OR DUT-GPP's Proxy Table is not empty.
1B) DUT-GPS does NOT responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Sink Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = M.
1C) On reception of the Data GPDF from TH-GPD, if perceivable, DUT-GPS does NOT execute the GPD command. AND/OR DUT-GPS does NOT respond with ZCL Read Attributes Response with the status SUCCESS and carrying the *Sink Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = N.
2A) Once operational again, DUT-GPS does NOT respond with ZCL Read Attributes Response with the status SUCCESS and carrying the *Sink Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* is equal to M or N.

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2B) On reception of the Data GPDF from TH-GPD, if perceivable, DUT-GPS does NOT execute the GPD command. AND/OR DUT-GPS does NOT respond with ZCL Read Attributes Response with the status SUCCESS and carrying the *Sink Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = O.

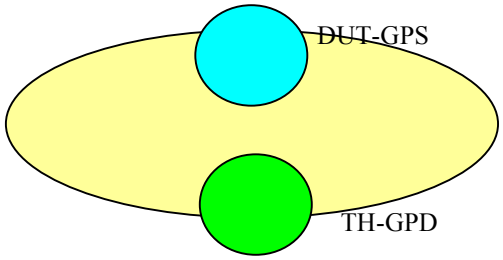
4.1.4.1.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCS3A	Sink Table attribute	Direct
GPPCS201	Persistent storage of Sink Table	Direct

4.2 GPDF frame format

4.2.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT+ or GPC or GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = A *MACsequenceNumberCapability* = Incremental

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or may start as ZC.	
2	[R3] A.3.3.2.2	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures). Initial MAC sequence number is Z.	

4.2.1.1.2 Test Set-Up

The DUT-GPS shall be in wireless communication proximity of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.2.2 Basics

4.2.2.1 ApplicationID = 0b000

4.2.2.1.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1 -2		As in 4.2.1.1.1.	
3	[R3] A.3.3.2.2, A.1.4, A.3.2.9	TH-GPD uses *ApplicationID* = 0b000 and GPD SrcID A. TH-GPD uses incremental MAC sequence number.	

4.2.2.1.2 Test Procedure

Note: Only basic GPDF frame format reception is tested here. Filtering of the GPD ID is tested separately. Duplicate filtering (based on GPD's *Sequence number capabilities*) to be tested separately. Rx capabilities are tested separately, with bidirectional operation. Security is also tested separately.

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.5.2.5	Make TH-GPD send a Data GPDF with: • MAC Sequence number W >= Z+1; • *NWK Frame Control* field with the following values: ▪ the *Frame type* sub-field set to 0b00, ▪ the *ZigBee Protocol Version* sub-field set to 0b0011. ▪ the *NWK Frame Control Extension* sub-field set to 0b1;	

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		• the *Extended NWK Frame Control* field is present, with the following values: ▪ the *ApplicationID* sub-field set to 0b000, ▪ the *Direction* sub-field set to 0b0. • Only one of *Auto-Commissioning* field of *NWK Frame Control* field and *RxAfterTx* field of *Extended NWK Frame Control* field is set to 0b1. Read out Sink Table entry of the DUT-GPS.	
2	[R3] A.1.4, A.3.5.2.5	**Opt. (M if the pairing uses SecurityLevel 0b00):** Make TH-GPD send a Data GPDF with: • MAC Sequence number Q >= W+1; • *NWK Frame Control* field with the following values: ▪ the *Frame type* sub-field set to 0b00, ▪ the *ZigBee Protocol Version* sub-field set to 0b0011. ▪ the *NWK Frame Control Extension* sub-field set to 0b0; • Extended NWK Frame Control field absent. Read out Sink Table entry of the DUT-GPS.	
The test steps below can only be executed if the GPD role is taken by a TH			
3A	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong frame type 0b10):** Make TH-GPD send a Data GPDF formatted as in 4.2.2.1.2/item 1 above with the following changes: incremented MAC *Sequence number*; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b10.	
3B	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong frame type 0b11):** Make TH-GPD send a Data GPDF formatted as in 4.2.2.1.2/item 1 above with the following changes: incremented MAC *Sequence number*; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b11.	
3C	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong frame type 0b01):** Make TH-GPD send a Data GPDF formatted as in 4.2.2.1.2/item 1 above with the following changes: incremented MAC *Sequence number*; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01.	
3D	[R3] A.1.4, A.3.5.2.5	***Negative test (Wrong Protocol Version)***: Make TH-GPD (or TH-Tool in the role of TH-GPD) send a correctly formatted Data GPDF with incremented MAC Sequence number, but with wrong *ZigBee Protocol Version* (0x2).	
4	[R3] A.1.4, A.3.5.2.5	**Negative test (malformed frame)**: Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: incremented MAC *Sequence number*; the *Extended NWK Frame Control* field is present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b0.	
5	[R3] A.1.4, A.3.5.2.5	**Negative test (malformed frame)**: Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: incremented MAC *Sequence number*; the *Extended NWK Frame Control* field is NOT present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b1.	
6	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong ApplicationID)**: Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: incremented MAC *Sequence number*; the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b001.	
7	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong ApplicationID)**: Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: incremented MAC *Sequence number*; the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b011.	

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8	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong Direction)**: Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: incremented MAC *Sequence number*; the *Direction* sub-field of the *Extended NWK Frame Control* field is set to 0b1. Read Sink Table of DUT-GPS.	
9	[R3] A.1.4, A.3.5.2.5	***MAC duplicate filtering test:*** Make TH-GPD send 2 identical Data GPDFs formatted as in item 1 above, with the same MAC *Sequence Number* R >= Q+1, within 2s.	Note: the effect can only be observed in case of commands which each command has an effect (e.g. toggle, step up).
10	[R3] A.1.4.1.3, A.3.5.2.5	***Negative test (Auto-Commissioning and RxAfterTx both set to 0b1):*** Make TH-GPD send Data GPDF with incremented MAC *Sequence number*; *Auto-Commissioning* field of *NWK Frame Control* field set to 0b1 and *RxAfterTx* field of *Extended NWK Frame Control* field is set to 0b1. Otherwise, the frame shall be correctly formatted, incl. fresh MAC sequence number/security frame counter, as required. Read Sink Table of DUT-GPS.	
11A	[R3] A.3.5.2.4	***Negative test: SrcID = 0x00000000:*** TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send a correctly formatted Data GPDF with incremented MAC *Sequence number*, but with *ApplicationID* = 0b000, *SrcID* = 0x00000000. Read Sink Table of DUT-GPS.	
11B	[R3] A.3.5.2.4	***Negative test: wrong SrcID:*** TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send a correctly formatted Data GPDF with incremented MAC *Sequence number*, but with *ApplicationID* = 0b000, *SrcID* differing by one bit. Read Sink Table of DUT-GPS.	
12	[R3] A.1.4, A.3.5.2.5	***Negative test (SecurityLevel = 0b10)***: Make TH-GPD (or TH-Tool in the role of TH-GPD) send a correctly formatted GPDF, but protected with SecurityLevel = 0b10, security frame counter corresponding to an incremented MAC Sequence number, and with correctly generated MIC. Read Sink Table of DUT-GPS.	
13		***Positive test:*** Make TH-GPD send a correctly formatted Data GPDF with *RxAfterTx* = 0b0 and updated MAC sequence number. Read Sink Table of DUT-GPS.	
14		***Basic Sink only: Positive test: RxAfterTx = 0b1:*** Make TH-GPD send a correctly formatted Data GPDF with *RxAfterTx* = 0b1 and updated MAC sequence number. Read Sink Table of DUT-GPS.	

776 ***4.2.2.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPS executes the GPD command. DUT-GPS has Sink Table entry for SrcID = A with security frame counter value W.
2) DUT-GPS executes the GPD command. DUT-GPS has Sink Table entry for SrcID = A with *GPD security frame counter* value Q.
3) – 8) DUT-GPS does not execute the GPD command. DUT-GPS has Sink Table entry for SrcID = A with *GPD security frame counter* value Q.
9) DUT-GPS executes the GPD command exactly once.
10) – 12) DUT-GPS does NOT execute the GPD command.

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DUT-GPS has Sink Table entry for SrcID = A with SecurityLevel = 0b00, and security frame counter value R.
13) -14) DUT-GPS executes the GPD command. DUT-GPS has Sink Table entry for SrcID = A with updated *GPD security frame counter* field value.
Fail verdict:
1) DUT-GPS does not execute the GPD command. OR DUT-GPS does execute the GPD command more than once. AND/OR DUT-GPS does not have Sink Table entry for SrcID = A with security frame counter value W.
2) DUT-GPS does not execute the GPD command. OR DUT-GPS does execute the GPD command more than once. AND/OR DUT-GPS does not have Sink Table entry for SrcID = A with security frame counter value Q.
3) - 8) DUT-GPS does react. AND/OR DUT-GPS does not have Sink Table entry for SrcID = A with security frame counter value Q.
9) DUT-GPS does not react on GPDF received. OR DUT-GPS does react more than once on GPDF received.
10) – 12) DUT-GPS executes the GPD command. AND/OR DUT-GPS does not have Sink Table entry for SrcID = A with security level = 0b00 and security frame counter value R.
13) -14) DUT-GPS does not execute the GPD command. OR DUT-GPS does execute the GPD command more than once. AND/OR DUT-GPS does not have Sink Table entry for SrcID = A with updated *GPD security frame counter* value.

4.2.2.1.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPF3	Support of GPDF frame format	Direct
GPF3A	Support of *nwkcProtocolVersion* = 0x3	Direct
GPF4C	Reception of GPDF frame format with *ApplicationID* = 0b000	Direct

4.2.2.2 ApplicationID = 0b010

4.2.2.2.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.2.1.1.1.	
2	[R3] A.3.3.2.2, A.1.4, A.3.2.9	TH-GPD uses *ApplicationID* = 0b010 and GPD IEEE address A; *Endpoint* X and Y.	
3		A pairing is established between the TH-GPD (IEEE address and endpoint X) and DUT-GPS (e.g. as a result of any of the commissioning procedures), with security level = 0b00, TH-GPD uses incremental MAC sequence number; the initial value N is known.	

4.2.2.2.2 Test Procedure

Note: Only basic GPDF frame format reception with *ApplicationID* = 0b010 is tested here. Negative frame format tests are tested separately. Filtering of the GPD ID is tested separately. Duplicate filtering (based on GPD's *Sequence number capabilities*) to be tested separately. Rx capabilities are tested separately, with bidirectional operation. Security is also tested separately.

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.1.4, A.3.5.2.5	Make TH-GPD send a Data GPDF with: • MAC source address field carrying GPD IEEE address A; • *NWK Frame Control* field with the following values: ▪ the *Frame type* sub-field set to 0b00, ▪ the *ZigBee Protocol Version* sub-field set to 0b0011. ▪ the *NWK Frame Control Extension* sub-field set to 0b1; • the *Extended NWK Frame Control* field is present, with the following values: ▪ the *ApplicationID* sub-field set to 0b010,	

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		▪ the *Direction* sub-field set to 0b0. • *SrcID* field absent; • *Endpoint* field present and carrying value X. • *CommandID* as supported by the DUT-GPS. Read Sink Table entry of DUT-GPS.	
The test steps below can only be executed if the GPD role is taken by a TH			
1B	[R3] A.1.4.1.5	Make TH-GPD send a Data GPDF, formatted as in 4.2.2.2.2/step 1A above, but with *Endpoint* field present and carrying value 0x00. Read Sink Table entry of DUT-GPS.	
1C	[R3] A.1.4.1.5	Make TH-GPD send a Data GPDF, formatted as in 4.2.2.2.2/step 1A above, but with *Endpoint* field present and carrying value 0xff. Read Sink Table entry of DUT-GPS.	
2		***Negative test: wrong GPD endpoint (Y):*** Make TH-GPD send a Data GPDF as specified in 4.2.2.2.2/step 1, only with Endpoint field carrying the value Y (from the range 0x01-0xef). Read Sink Table entry of DUT-GPS.	
3		***Negative test (IEEE address absent):*** Make TH-GPD send a Data GPDF formatted as specified in 4.2.2.2.2/step 1 above, with *RxAfterTx* set to 0b0, with *ApplicationID* = 0b010 and IEEE address of GPD absent (MAC Source address mode 0b10 and Source address = 0xffff used instead); the Endpoint field is present and set to X. Read out Sink Table of DUT-GPS. If possible, check command execution by DUT-GPS.	
4	[R3] A.3.5.2.4	***Negative test: GPD IEEE address= 0x0000000000000000:*** TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send a correctly formatted Data GPDF, but with *ApplicationID* = 0b010, GPD IEEE address = 0x0000000000000000.	
5		***Positive test:*** Make TH-GPD send a correctly formatted Data GPDF with updated MAC sequence number. Read Sink Table of DUT-GPS.	

785 ***4.2.2.2.3 Expected Outcome***

Pass verdict:
1A) – 1C) DUT-GPS executes the GPD command.
2) DUT-GPS does NOT execute the GPD command.
3) DUT-GPS does NOT update the security frame counter field of the Sink Table entry for TH-GPD. If observable, DUT-GPS does not execute the command.
4) DUT-GPS does NOT execute the GPD command.
5) DUT-GPS updates the security frame counter field of the Sink Table entry for TH-GPD. If observable, DUT-GPS executes the command.
Fail verdict:
1A) – 1C) DUT-GPS does not execute the GPD command. OR DUT-GPS does execute the GPD command more than once.
2) DUT-GPS executes the GPD command.
3) DUT-GPS updates the *GPD security frame counter* field of the Sink Table entry for TH-GPD. AND/OR If observable, DUT-GPS executes the GPD command.
4) DUT-GPS executes the GPD command.
5) DUT-GPS does NOT update the security frame counter field of the Sink Table entry for TH-GPD. If observable, DUT-GPS does not execute the command.

786 ***4.2.2.2.4 PICS Covered***

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PICS reference	Functionality	Tested (Direct/Indirect)
GPF3	Support of GPDF frame format	Direct
GPF3A	Support of *nwkcProtocolVersion* = 0x3	Direct
GPF4D	Reception of GPDF frame format with *ApplicationID* = 0b010	Direct

4.2.3 Security

4.2.3.1 SecurityLevel = 0b01 (deprecated)

4.2.3.2 SecurityLevel = 0b10 and ApplicationID = 0b000

4.2.3.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.2.1.1.1.	
3	[R3] A.3.3.2.2	TH-GPD and DUT-GPS have a pairing with *ApplicationID* = 0b000, SrcID = A, SecurityLevel = 0b10 and any shared key type (*gpSharedSecurityKeyType* 0b001, 0b010 or 0b011); the key value (*gpSharedSecurityKey*) and *SecurityFrameCounter* value are known.	

4.2.3.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.5.2.5	TH-GPD sends Data GPDF, with the *Extended NWK Frame Control* field present, *ApplicationID* = 0b000, SrcID = A, the *SecurityLevel* sub-field set to 0b10, *SecurityKey* set to 0b0, the *SecurityFrameCounter* field present and set to correct value N, and the payload correctly authenticated with 4B MIC. Read out Sink Table of DUT-GPS.	
The test steps below can only be executed if the GPD role is taken by a TH			
2	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong key):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, SrcID = A, protected with a correct security level (0b10), correct frame counter value (=M>=N+1), correct key type (0b0) but wrong key.	
3	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong key type):** TH-GPD sends a Data GPDF with ApplicationID = 0b000, SrcID = A, protected with a correct security level (0b10), correct frame counter value (=P>=M+1), correct key but wrong key type (0b1).	
4	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong security level):** TH-GPD sends an unprotected Data GPDF with *ApplicationID* = 0b000, SrcID = A, with correct frame counter value (=Q>=P+1). (SecurityLevel = 0b00).	
5	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong security level):** Opt. TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, SrcID = A, security level lower than the before (SecurityLevel = 0b01), with counter value =R>=Q+1.	
6A	[R3] A.1.4, A.3.5.2.5	**Negative test (replayed frame):** TH-GPD sends a correctly secured replayed Data GPDF with ApplicationID = 0b000, SrcID = A, (with old frame counter N-1). Read out Sink Table of DUT-GPS.	
6B		**Positive test:** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, SrcID = A, correctly formatted and protected with Security frame counter value =M>=N+1. Read out Sink Table of DUT-GPS.	
7A	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong frame type 0b10):** Make TH-GPD send a correctly protected Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*, the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b10.	

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7B	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong frame type 0b11):** Make TH-GPD send a correctly protected Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b11.	
7C	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong frame type 0b01):** Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01.	
7D	[R3] A.1.4, A.3.5.2.5	***Negative test (Wrong Protocol Version)***: Make TH-GPD (or TH-Tool in the role of TH-GPD) send a correctly protected Data GPDF formatted as in 4.2.3.2.2/item 1 above, with the following changes: incremented *Security frame counter*; wrong *ZigBee Protocol Version* sub-field of the *NWK Frame Control* field (0x2).	
7E	[R3] A.1.4.1.3, A.3.5.2.5	***Negative test (Auto-Commissioning and RxAfterTx both set to 0b1):*** Make TH-GPD send Data GPDF formatted as in 4.2.3.2.2/item 1 above, with the following changes: incremented *Security frame counter*; *Auto-Commissioning* field of *NWK Frame Control* field set to 0b1 and *RxAfterTx* field of *Extended NWK Frame Control* field is set to 0b1.	
7F	[R3] A.1.4, A.3.5.2.5	**Negative test (malformed frame)**: Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *Extended NWK Frame Control* field is present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b0.	
7G	[R3] A.1.4, A.3.5.2.5	**Negative test (malformed frame)**: Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *Extended NWK Frame Control* field is NOT present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b1.	
7H	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong ApplicationID)**: Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b001.	
7I	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong ApplicationID)**: Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b011.	
7J	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong Direction)**: Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *Direction* sub-field of the *Extended NWK Frame Control* field is set to 0b1. Read Sink Table of DUT-GPS.	
7K	[R3] A.3.5.2.4	***Negative test: SrcID = 0x00000000:*** TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send a correctly protected Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; with *ApplicationID* = 0b000, *SrcID* = 0x00000000. Read Sink Table of DUT-GPS.	
7L	[R3] A.3.5.2.4	***Negative test: wrong SrcID:*** TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send a correctly protected Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; but with *ApplicationID* = 0b000, *SrcID* differing by one bit from A. Read Sink Table of DUT-GPS.	
8		**Positive test:** TH-GPD sends a Data GPDF with ApplicationID = 0b000,	

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		SrcID = A, correctly formatted and protected with Security frame counter value =L>=M+1. Read out Sink Table of DUT-GPS.	

792 ***4.2.3.2.3 Expected Outcome***

Pass verdict:
1) DUT-GPS successfully security processes the received GPDF, stores the new frame counter value in its Sink Table entry for the SrcID =A and executes the GPD command.
2) – 6A) DUT-GPS silently drops the GPDF without executing GPD command. DUT-GPS does not store the frame counter value in its Sink Table entry for the SrcID = A.
6B) DUT-GPS successfully security processes the received GPDF, stores the new frame counter value in its Sink Table entry for the SrcID =A and executes the GPD command.
7A) – 7L) DUT-GPS silently drops the GPDF without executing GPD command. DUT-GPS does not store the frame counter value in its Sink Table entry for the SrcID = A.
8) DUT-GPS successfully security processes the received GPDF, stores the new frame counter value in its Sink Table entry for the SrcID =A and executes the GPD command.
Fail verdict:
1) DUT-GPS does not execute the GPD command. AND/OR DUT-GPS does not store the new frame counter value in its Sink Table entry for the SrcID =A.
2) – 6A) DUT-GPS does not silently drop the GPDF. AND/OR DUT-GPS executes the GPD command. AND/OR DUT-GPS stores the frame counter value in its Sink Table entry for the SrcID =A.
6B) DUT-GPS does not stores the new frame counter value in its Sink Table entry for the SrcID =A and/or does not execute the GPD command.
7A) – 7L) DUT-GPS does not silently drop the GPDF. AND/OR DUT-GPS executes the GPD command. AND/OR DUT-GPS stores the frame counter value in its Sink Table entry for the SrcID =A.
8) DUT-GPS does not stores the new frame counter value in its Sink Table entry for the SrcID =A and/or does not execute the GPD command.

793 ***4.2.3.2.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GFP6	Support security level=0b10	Direct

794 **4.2.3.3 SecurityLevel = 0b11 and ApplicationID = 0b000**

795 ***4.2.3.3.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.2.1.1.1.	
3	[R3] A.3.3.2.2	TH-GPD and DUT-GPS have a pairing with *ApplicationID* = 0b000, SrcID = A, SecurityLevel = 0b11 and any shared key type *gpSharedSecurityKeyType* (0b001, 0b010 or 0b011); the key value (*gpSharedSecurityKey*) and *SecurityFrameCounter* value are known.	

796 ***4.2.3.3.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.5.2.5	TH-GPD sends Data GPDF, with *ApplicationID* = 0b000, SrcID = A, with the *Extended NWK Frame Control* field present, the *SecurityLevel* sub-field set to 0b11, SecurityKey set to 0b0, the *SecurityFrameCounter* field present and set to correct value N, and the payload correctly authenticated with 4B MIC. Read Sink Table of DUT-GPS.	

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The test steps below can only be executed if the GPD role is taken by a TH			
2	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong key):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, SrcID = A, protected with a correct security level (0b11), correct frame counter value (=M>=N+1), correct key type (0b0) but wrong key.	
3	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong key type):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, SrcID = A, protected with a correct security level (0b11), correct frame counter value (=P>=M+1), correct key but wrong key type (0b1).	
4	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong security level):** TH-GPD sends an unprotected Data GPDF, with *ApplicationID* = 0b000, SrcID = A, with correct frame counter value (=Q>=P+1). (SecurityLevel = 0b00).	
5	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong security level):**Opt. TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, SrcID = A, with security level lower than the before (SecurityLevel = 0b10), with counter value =R>=Q+1.	
6A	[R3] A.1.4, A.3.5.2.5	**Negative test (replayed frame):** TH-GPD sends a correctly secured replayed Data GPDF (with old frame counter N-1) with *ApplicationID* = 0b000, SrcID = A. Read Sink Table of DUT-GPS.	
6B		**Positive test:** TH-GPD sends a Data GPDF with ApplicationID = 0b000, SrcID = A, correctly formatted and protected with Security frame counter value =M>=N+1. Read out Sink Table of DUT-GPS.	
7A	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong frame type 0b10):** Make TH-GPD send a correctly protected Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*, the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b10.	
7B	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong frame type 0b11):** Make TH-GPD send a correctly protected Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b11.	
7C	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong frame type 0b01):** Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01.	
7D	[R3] A.1.4, A.3.5.2.5	***Negative test (Wrong Protocol Version)***: Make TH-GPD (or TH-Tool in the role of TH-GPD) send a correctly protected Data GPDF formatted as in 4.2.3.2.2/item 1 above, with the following changes: incremented *Security frame counter*; wrong *ZigBee Protocol Version* sub-field of the *NWK Frame Control* field (0x2).	
7E	[R3] A.1.4.1.3, A.3.5.2.5	***Negative test (Auto-Commissioning and RxAfterTx both set to 0b1):*** Make TH-GPD send Data GPDF formatted as in 4.2.3.2.2/item 1 above, with the following changes: incremented *Security frame counter*; *Auto-Commissioning* field of *NWK Frame Control* field set to 0b1 and *RxAfterTx* field of *Extended NWK Frame Control* field is set to 0b1.	
7F	[R3] A.1.4, A.3.5.2.5	**Negative test (malformed frame)**: Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *Extended NWK Frame Control* field is present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b0.	

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7G	[R3] A.1.4, A.3.5.2.5	**Negative test (malformed frame)**: Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *Extended NWK Frame Control* field is NOT present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b1.	
7H	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong ApplicationID)**: Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b001.	
7I	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong ApplicationID)**: Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b011.	
7J	[R3] A.1.4, A.3.5.2.5	**Negative test (wrong Direction)**: Make TH-GPD send a Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; the *Direction* sub-field of the *Extended NWK Frame Control* field is set to 0b1. Read Sink Table of DUT-GPS.	
7K	[R3] A.3.5.2.4	***Negative test: SrcID = 0x00000000:*** TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send a correctly protected Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; with *ApplicationID* = 0b000, *SrcID* = 0x00000000. Read Sink Table of DUT-GPS.	
7L	[R3] A.3.5.2.4	***Negative test: wrong SrcID:*** TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send a correctly protected Data GPDF formatted as in 4.2.3.2.2/item 1 above with the following changes: incremented *Security frame counter*; but with *ApplicationID* = 0b000, *SrcID* differing by one bit from A. Read Sink Table of DUT-GPS.	
8		**Positive test:** TH-GPD sends a Data GPDF with ApplicationID = 0b000, SrcID = A, correctly formatted and protected with Security frame counter value =L>=M+1. Read out Sink Table of DUT-GPS.	

797 ***4.2.3.3.3 Expected Outcome***

Pass verdict:
1) DUT-GPS successfully security processes the received GPDF, stores the new frame counter value in its Sink Table entry for the GPD ID =A and executes the GPD command.
2) – 6A) DUT-GPS silently drops the GPDF without executing GPD command. DUT-GPS does not store the frame counter value in its Sink Table entry for the GPD ID =A.
6B) DUT-GPS successfully security processes the received GPDF, stores the new frame counter value in its Sink Table entry for the SrcID =A and executes the GPD command.
7A) – 7L) DUT-GPS silently drops the GPDF without executing GPD command. DUT-GPS does not store the frame counter value in its Sink Table entry for the SrcID = A.
8) DUT-GPS successfully security processes the received GPDF, stores the new frame counter value in its Sink Table entry for the SrcID =A and executes the GPD command.
Fail verdict:
1) DUT-GPS does not execute the GPD command. AND/OR DUT-GPS does not store the new frame counter value in its Sink Table entry for the GPD ID =A.
2) – 6A) DUT-GPS does not silently drop the GPDF. AND/OR DUT-GPS executes the GPD command. AND/OR DUT-GPS stores the frame counter value in its Sink Table entry for the GPD ID = A.

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6B) DUT-GPS does not stores the new frame counter value in its Sink Table entry for the SrcID =A and/or does not execute the GPD command.
7A) – 7L) DUT-GPS does not silently drop the GPDF. AND/OR DUT-GPS executes the GPD command. AND/OR DUT-GPS stores the frame counter value in its Sink Table entry for the SrcID =A.
8) DUT-GPS does not stores the new frame counter value in its Sink Table entry for the SrcID =A and/or does not execute the GPD command.

798 ***4.2.3.3.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GFP5	Support security level=0b11	Direct

799 ### 4.2.3.4 SecurityLevel = 0b10 and ApplicationID = 0b010

800 Note: negative tests for GPDF frame format for ApplicationID = 0b010 are done in sec. 4.2.2.2; negative tests for
801 security level 0b10 are done in sec. 4.2.3.2. Completing those tests is pre-requisite for running the current test.
802 Thus, this test contains only one positive test.

803 ***4.2.3.4.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.2.1.1.1.	
3	[R3] A.3.3.2.2	TH-GPD and DUT-GPS have a pairing with *ApplicationID* = 0b010, GPD IEEE address = A, Endpoint X, SecurityLevel = 0b10 and any shared key type (*gpSharedSecurityKeyType* 0b001, 0b010 or 0b011); the key value (*gpSharedSecurityKey*) and *SecurityFrameCounter* value are known.	

804 ***4.2.3.4.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.5.2.5	TH-GPD sends Data GPDF, with the *Extended NWK Frame Control* field present, ApplicationID = 0b010, GPD IEEE address = A, Endpoint X, the SecurityLevel sub-field set to 0b10, SecurityKey set to 0b0, the *SecurityFrameCounter* field present and set to correct value N, and the payload correctly authenticated with 4B MIC. Read out Sink Table of DUT-GPS.	

805 ***4.2.3.4.3 Expected Outcome***

Pass verdict:
1) DUT-GPS successfully security processes the received GPDF, stores the new frame counter value in its Sink Table entry for the GPD ID =A and executes the GPD command.
Fail verdict:
1) DUT-GPS does not execute the GPD command. AND/OR DUT-GPS does not store the new frame counter value in its Sink Table entry for the GPD ID =A.

806 ***4.2.3.4.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GFP6	Support security level=0b10	Direct

807

808 ### 4.2.3.5 SecurityLevel = 0b11 and ApplicationID = 0b010

809 Note: negative tests for GPDF frame format for ApplicationID = 0b010 are done in sec. 4.2.2.2; negative tests for
810 security level 0b11 are done in sec. 4.2.3.3. Completing those tests is pre-requisite for running the current test.
811 Thus, this test contains only one positive test.

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812 ***4.2.3.5.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.2.1.1.1.	
3	[R3] A.3.3.2.2	TH-GPD and DUT-GPS have a pairing with *ApplicationID* = 0b010, GPD IEEE address = A, Endpoint X, SecurityLevel = 0b11 and any shared key type (*gpSharedSecurityKeyType* 0b001, 0b010 or 0b011); the key value (*gpSharedSecurityKey*) and *SecurityFrameCounter* value are known.	

813 ***4.2.3.5.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.5.2.5	TH-GPD sends Data GPDF, with the *Extended NWK Frame Control* field present, ApplicationID = 0b010, GPD IEEE address = A, Endpoint X, the SecurityLevel sub-field set to 0b11, SecurityKey set to 0b0, the *SecurityFrameCounter* field present and set to correct value N, and the payload correctly authenticated with 4B MIC. Read out Sink Table of DUT-GPS.	

814 ***4.2.3.5.3 Expected Outcome***

Pass verdict:
1) DUT-GPS successfully security processes the received GPDF, stores the new frame counter value in its Sink Table entry for the GPD ID =A and executes the GPD command.
Fail verdict:
1) DUT-GPS does not execute the GPD command. AND/OR DUT-GPS does not store the new frame counter value in its Sink Table entry for the GPD ID =A.

815 ***4.2.3.5.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GFP6	Support security level=0b10	Direct

816

817

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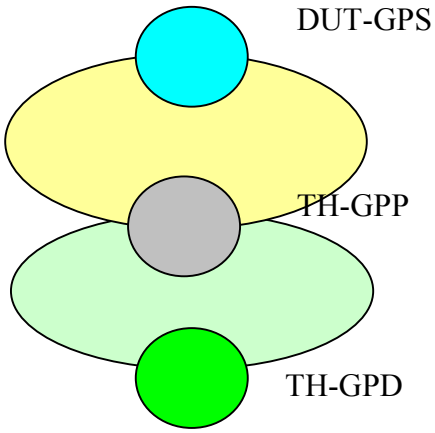
4.3 Green Power cluster: Tunneling mechanism

4.3.1 Basic test

4.3.1.1.1 Initial conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT/GPT+/GPC/GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPP/TH-tool	Pan id=same PANID as TH-GPS Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific Note: a TH-Tool capable of sending GP Notification command can be used instead of a full GPP/GPPB + GPD
TH-GPD/TH-Tool	GPD ID – defined per sub-case TH-GPD supports the application functionality of the TH-GPS's GPEP (see Section A.4.3 of [R3]). Note: a TH-Tool capable of sending GPDF can be used instead of a full GPP/GPPB + GPD.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	

4.3.1.1.2 Test Set-Up

The DUT-GPS shall be in wireless communication proximity of TH-GPP; TH-GPP shall be in wireless communication proximity of the TH-GPD.

If DUT-GPS is GPT+ or GPC they must be out of range of TH-GPD.

Note: a TH-Tool capable of sending GP Notification and GPD Commissioning command is preferably used instead of a full GPP/GPPB + GPD. This also solves the problem of preventing direct GPDF reception by GPS with GP stub (GPT+/GPC/GPCB).

A packet sniffer shall be observing the communication over the air interface.

4.3.2 Derived Groupcast Communication Mode

4.3.2.1.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.6.3.3	The alias derived from the GPD ID of the TH-GPD is not in conflict with any of the ZigBee devices.	
2	[R3] A.3.3.2.2	A pairing with derived groupcast communication mode is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with the security settings as required by the DUT-GPS.	
3	[R3] A.3.4.2.2	The corresponding information is also included in TH-GPP (e.g. as a result of any of the commissioning procedures), with the *Entry Active* and *Entry Valid* of the *Options* field both having value 0b1.	

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834 ***4.3.2.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	Make TH-GPP/TH-Tool send a GP Notification with the settings and for a GPD command according to the DUT-GPS pairing, to the DGroupID; with *ProxyInfoPresent* = 0b1; and the fields *GPP short address* and *GPP-GPD link* present.	This can also be achieved by making the TH-GPD the send Data GPDF, but then for DUT-GPT+/GPC/GPCB care must be taken, than the Data GPDF from the GPD cannot be received directly.

835 ***4.3.2.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPS does react on received GP Notification. DUT-GPS does NOT send APS ACK. DUT-GPS does NOT send GP Notification Response or any other GP command.
Fail verdict:
1) DUT-GPS does not react on received GP Notification. AND/OR DUT-GPS does send APS ACK. AND/OR DUT-GPS does send GP Notification Response or any other GP command.

836 ***4.3.2.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCS102	Reception of GP Notification command in derived groupcast	Direct

837 ## 4.3.3 DGroupID and alias derivation (DUT: GPS with derived groupcast
838 communication mode)

839 ### 4.3.3.1 Subcase: No alias conflict

840 ***4.3.3.1.1 Initial conditions***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	TH-GPD has GPD ID N, not being any of the reserved value and not resulting in a reserved DGroupID.	

841 ***4.3.3.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.3.3	Perform pairing between TH-GPD and DUT-GPS. Make TH-GPD send Data GPDF with GPD CommandID as supported by the DUT-GPS. OR Make TH-Tool send GP Notification with TH-GPD GPD ID, addressed to NWK DestAddr 0xfffd and APS GroupID =DGroupID, carrying GPD command as supported by the DUT-GPS.	

842 ***4.3.3.1.3 Expected Outcome***

Pass verdict:
1) As part of the proximity or multi-hop pairing procedure, DUT-GPS shall send Device_annce with the NWKAddr equal to 0x5678 if derived alias is used; and GP Pairing command with GroupID equal to 0x5678. DUT-GPS executes the GPD command sent in the GP Notification, addressed to NWK DestAddr 0xfffd and APS GroupID = DGroupID (0x5678).
Fail verdict:
1) DUT-GPS does not send Device_annce and/or GP Pairing as part of proximity or multi-hop pairing procedure. OR

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DUT-GPS sends Device_annce with the NWKAddr not equal to 0x5678. OR DUT-GPS send GP Pairing with GroupID not equal to 0x5678. AND/OR DUT-GPS does not execute the GPD command from the GP Notification.

843 #### 4.3.3.2 Subcase: GPD ID with 2LSB 0xffff

844 ##### *4.3.3.2.1 Initial conditions*

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	TH-GPD has GPD ID: • If GPD's *ApplicationID* = 0b000: with SrcID = 0x1234FFFF. • If GPD's *ApplicationID* = 0b010: with 4LSB carrying the value 0x1234FFFF.	

845 ##### *4.3.3.2.2 Test Procedure*

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.3.3	Perform pairing between TH-GPD and DUT-GPS. Make TH-GPD send Data GPDF with GPD CommandID as supported by the DUT-GPS. OR Make TH-Tool send GP Notification with TH-GPD GPD ID, addressed to NWK DestAddr 0xfffd and APS GroupID 0xEDCB, carrying GPD command as supported by the DUT-GPS.	

846 ##### *4.3.3.2.3 Expected Outcome*

Pass verdict:
1) As part of the proximity or multi-hop pairing procedure, DUT-GPS shall send Device_annce with the NWKAddr equal to 0xEDCB if derived alias is used; and GP Pairing command with GroupID equal to 0xEDCB. DUT-GPS executes the GPD command sent in the GP Notification, addressed to NWK DestAddr 0xfffd and APS GroupID 0xEDCB.
Fail verdict:
1) DUT-GPS does not send Device_annce and/or GP Pairing as part of proximity or multi-hop pairing procedure. OR DUT-GPS sends Device_annce with the NWKAddr not equal to 0xEBCD. OR DUT-GPS send GP Pairing with GroupID not equal to 0xEBCD. AND/OR DUT-GPS does not execute the GPD command from the GP Notification.

847 #### 4.3.3.3 Subcase: GPD ID with 2LSB 0x0000

848 ##### *4.3.3.3.1 Initial conditions*

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	TH-GPD has GPDID: • If GPD's *ApplicationID* = 0b000: with SrcID = 0x12340000. • If GPD's *ApplicationID* = 0b010: with 4LSB carrying the value 0x12340000.	

849 ##### *4.3.3.3.2 Test Procedure*

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.3.3	Perform pairing between TH-GPD and DUT-GPS. Make TH-GPD send Data GPDF with GPD CommandID as supported by the DUT-GPS. OR Make TH-Tool send GP Notification with TH-GPD GPD ID, addressed to NWK DestAddr 0xfffd and APS GroupID 0x1234, carrying GPD command as supported by the DUT-GPS.	

850 ##### *4.3.3.3.3 Expected Outcome*

Pass verdict:
1) As part of the proximity or multi-hop pairing procedure, DUT-GPS shall send Device_annce with the NWKAddr equal to 0x1234 if derived alias is used; and GP Pairing command with GroupID equal to 0x1234.

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DUT-GPS executes the GPD command sent in the GP Notification, addressed to NWK DestAddr 0xfffd and APS GroupID 0x1234.
Fail verdict:
1) DUT-GPS does not send Device_annce and/or GP Pairing as part of proximity or multi-hop pairing procedure. OR DUT-GPS sends Device_annce with the NWKAddr not equal to 0x1234. OR DUT-GPS send GP Pairing with GroupID not equal to 0x1234. AND/OR DUT-GPS does not execute the GPD command from the GP Notification.

4.3.3.4 Subcase: GPD ID 0xFFFF0000

4.3.3.4.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	TH-GPD has GPD ID: • If GPD's *ApplicationID* = 0b000: with SrcID = 0xFFFF0000; • If GPD's *ApplicationID* = 0b010: with 4LSB carrying the value 0xFFFF0000.	

4.3.3.4.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.3.3	Perform pairing between TH-GPD and DUT-GPS. Make TH-GPD send Data GPDF with GPD CommandID as supported by the DUT-GPS. OR Make TH-Tool send GP Notification with TH-GPD GPD ID, addressed to NWK DestAddr 0xfffd and APS GroupID 0x0007, carrying GPD command as supported by the DUT-GPS.	

4.3.3.4.3 Expected Outcome

Pass verdict:
1) As part of the proximity or multi-hop pairing procedure, DUT-GPS shall send Device_annce with the NWKAddr equal to 0x0007 if derived alias is used; and GP Pairing command with GroupID equal to 0x0007. DUT-GPS executes the GPD command sent in the GP Notification, addressed to NWK DestAddr 0xfffd and APS GroupID 0x0007.
Fail verdict:
1) DUT-GPS does not send Device_annce and/or GP Pairing as part of proximity or multi-hop pairing procedure. OR DUT-GPS sends Device_annce with the NWKAddr not equal to 0x0007. OR DUT-GPS send GP Pairing with GroupID not equal to 0x0007. AND/OR DUT-GPS does not execute the GPD command from the GP Notification.

4.3.3.5 Subcase: GPD ID = 0x0000FFFF

4.3.3.5.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	TH-GPD has GPD ID: • If GPD's *ApplicationID* = 0b000: with SrcID = 0x0000FFFF; • If GPD's *ApplicationID* = 0b010: with 4LSB carrying the value 0x0000FFFF.	

4.3.3.5.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.3.3	Perform pairing between TH-GPD and DUT-GPS. Make TH-GPD send Data GPDF with GPD CommandID as supported by the DUT-GPS. OR Make TH-Tool send GP Notification with TH-GPD GPD ID, addressed to NWK DestAddr 0xfffd and APS GroupID 0xfff7, carrying GPD command as supported by the DUT-GPS.	

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858 ***4.3.3.5.3 Expected Outcome***

Pass verdict:
1) As part of the proximity or multi-hop pairing procedure, DUT-GPS shall send Device_annce with the NWKAddr equal to 0xFFF7. If derived alias is used; and GP Pairing command with GroupID equal to 0xFFF7. DUT-GPS executes the GPD command sent in the GP Notification, addressed to NWK DestAddr 0xfffd and APS GroupID 0xFFF7.
Fail verdict:
1) 7DUT-GPS does not send Device_annce and/or GP Pairing as part of proximity or multi-hop pairing procedure. OR DUT-GPS sends Device_annce with the NWKAddr not equal to 0xFFF7. OR DUT-GPS send GP Pairing with GroupID not equal to 0xFFF7. AND/OR DUT-GPS does not execute the GPD command from the GP Notification.

859 ***4.3.3.5.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPC100	GP Notification reception	Direct
GPPC102	Derived groupcast GP Notification reception	Direct
GPPC4	Device_annce sending	Indirect

860 ## 4.3.4 Commissioned Groupcast Communication Mode

861 ### 4.3.4.1 Basic test

862 ***4.3.4.1.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		The DUT-GPS's application endpoint to-be-paired with the TH-GPD is known and it is a member of group 0xMMMM. Preferably, this application endpoint to-be-paired with the TH-GPD is not a member of any other group.	
2	[R3] A.3.3.2.2	A pairing with pre-commissioned groupcast communication mode is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with the security settings as required by the DUT-GPS.	
3	[R3] A.3.4.2.2	The corresponding information is also included in TH-GPP (e.g. as a result of any of the commissioning procedures), with the *Entry Active* and *Entry Valid* of the *Options* field both having value 0b1, GroupID = 0xMMMM.	

863 ***4.3.4.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	Make TH-GPP/TH-Tool send a GP Notification with the settings and for a GPD command according to the DUT-GPS pairing, to GroupID = 0xMMMM; with *ProxyInfoPresent* = 0b1; and the fields *GPP short address* and *GPP-GPD link* present.	This can also be achieved by making the TH-GPD the send Data GPDF, but then for DUT-GPT+/GPC/GPCB care must be taken, than the Data GPDF from the GPD cannot be received directly.

864 ***4.3.4.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPS does react on received GP Notification. DUT-GPS does NOT send APS ACK. DUT-GPS does NOT send GP Notification Response or any other GP command.

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Fail verdict:
1) DUT-GPS does not react on received GP Notification. AND/OR DUT-GPS does send APS ACK. AND/OR DUT-GPS does send GP Notification Response or any other GP command.

865 ***4.3.4.1.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCS103	Reception of GP Notification command in pre-commissioned groupcast	Direct

866 ### 4.3.4.2 NOT TESTED: Additional tests

867 ***4.3.4.2.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.3.2.2	No pairing exists between the DUT-GPS and TH-GPD with GPD ID N. No application endpoint of the DUT-GPS is a member of group 0xMMMM.	
2	[R3] A.3.5.2.5	The DUT-GPS's application endpoint to-be-paired with the TH-GPD is known and it is NOT member of group 0xMMMM. Preferably, the application endpoint to-be-paired with the TH-GPD is not a member of any group.	
3		DUT-GPS is put a mode when it expects to create pairings using pre-commissioning groupcast communication mode (e.g. by setting the *gpsCommunicationMode* attribute to 0b10).	

868 ***4.3.4.2.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
0A	[R3] A.3.3.4.7, A.3.5.2.5	**Negative test & Sink Table-based forwarding test**: The DUT-GPS's application endpoint to-be-paired with the TH-GPD is not a member of any group. TH-Tool sends GP Pairing Configuration with *Action* sub-field of the *Actions* field set to 0b001, the *Send GP Pairing* sub-field set to 0b0, GPD ID = N, *GroupList* field present and carrying the GroupID the pairing was added for, but for which the DUT-GPS has no member endpoints (0xMMMM) and the corresponding alias, and the *Number of paired endpoints* field set to 0xfe, with *DeviceID* as supported by DUT-GPS and security parameters as required by the DUT-GPS. Read Sink Table and, if DUT-GPS supports the Translation Table functionality, read the Translation Table of DUT-GPS. TH-Tool sends Data GPDF, with MAC sequence number Z, GPD ID = N, GPD *CommandID* as supported by DUT-GPS and security settings as required by DUT-GPS (as established in by the GP Pairing Configuration).	
0B	[R3] A.3.3.4.7, A.3.5.2.5	**Negative test & Sink Table-based forwarding test**: The DUT-GPS's application endpoint to-be-paired with the TH-GPD is not a member of any group. Put DUT-GPS in commissioning mode. TH-Tool sends GPD Commissioning command with *RxAfterTx* = 0b0, GPD ID = N, with *DeviceID* as supported by DUT-GPS and security parameters as required by the DUT-GPS. Read Sink Table and, if DUT-GPS supports the Translation Table functionality, read the Translation Table of DUT-GPS. TH-Tool sends Data GPDF, with MAC sequence number Z, GPD ID = N, GPD *CommandID* as supported by DUT-GPS and security settings as required by DUT-GPS (as established in commissioning).	

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1	[R3] A.3.5.2.5	**Create Pre-Commissioned Group pairing in the DUT-GPS**: Clean Sink Table. e.g. TH-Tool sends ZCL Groups Cluster Add Group command with the *GroupID* field set to 0xMMMM to the DUT-GPS, in unicast, with *DestEP* field set to the DUT-GPS's endpoint supporting the TH-GPD matching application functionality.	
Optional tests (M if DUT-GPS supports single-/multi-hop pairing):			
2A	[R3] A.3.9, A.3.5.2.5	**CGroup pairing establishment and GP Pairing Configuration propagation**: Put DUT-GPS in commissioning mode. Perform single-/multi-hop paring (whichever is supported by the GPS) for the endpoint being the member of the group 0xMMMM. TH-Tool reads out DUT-GPS's *Sink Table* attribute. If DUT-GPS supports the Translation Table functionality, TH-Tool reads the Translation Table of DUT-GPS.	Note: if the DUT-GPS supports the commissioning methods of step 2A and 3A, the test shall be run for both.
2B	[R3] A.3.5.2.5	**Receive GP Notification for the pre-commissioned group:** TH-Tool sends GP Notification in groupcast to *GroupID* = 0xMMMM, with GPD ID = N, GPD *CommandID* as supported by DUT-GPS and security settings as required by DUT-GPS (as established in step 1 above); with *ProxyInfoPresent* = 0b1; and the fields *GPP short address* and *GPP-GPD link* present.	
2C		**Optional Sink Table-based forwarding test (only if supported by DUT-GPS)**: TH-Tool sends Data GPDF, with MAC sequence number Z, GPD ID = N, GPD *CommandID* as supported by DUT-GPS and security settings as required by DUT-GPS (as established in commissioning),	
2D	[R3] A.3.9, A.3.5.2.5	**CGroup removal and GP Pairing Configuration propagation**: Put TH-GPS in commissioning mode. TH-GPD sends appropriately secured GPD Decommissioning command. TH-Tool reads our DUT-GPS's *Sink Table* attribute. If DUT-GPS supports the Translation Table functionality, TH-Tool reads the Translation Table of DUT-GPS.	
Optional tests (if GPS supports CT-based commissioning): CGroup pairing establishment			
3A	[R3] A.3.3.4.7, A.3.5.2.5	TH-Tool sends GP Pairing Configuration with *Action* sub-field of the *Actions* field set to 0b001, the *Send GP Pairing* sub-field set to 0b0, GPD ID = N, *GroupList* field present and carrying the GroupID the pairing was added for (0xMMMM) and the corresponding alias, and the *Number of paired endpoints* field set to 0xfe, with *DeviceID* as supported by DUT-GPS and security parameters as required by the DUT-GPS. TH-Tool reads out DUT-GPS's *Sink Table* attribute. If DUT-GPS supports the Translation Table functionality, TH-Tool reads the Translation Table of DUT-GPS.	
3B	[R3] A.3.5.2.5	**Receive GP Notification for the pre-commissioned group:** TH-Tool sends GP Notification in groupcast to *GroupID* = 0xMMMM, with GPD ID = N, GPD *CommandID* as supported by DUT-GPS and security settings as required by DUT-GPS (as established in step 1 above); with *ProxyInfoPresent* = 0b1; and the fields *GPP short address* and *GPP-GPD link* present.	
3C		**Optional Sink Table-based forwarding test (only if supported by DUT-GPS)**: TH-Tool sends Data GPDF, with MAC sequence number Z, GPD ID = N, GPD *CommandID* as supported by DUT-GPS and security settings as required by DUT-GPS (as established by GP Pairing Configuration),	

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3D	[R3] A.3.3.4.7, A.3.5.2.5	**Remove Pre-Commissioned Group pairing in the DUT-GPS**: TH-Tool sends GP Pairing Configuration with *Action* sub-field of the *Actions* field set to 0b100, the *Send GP Pairing* sub-field set to 0b1, GPD ID = N, and the *Number of paired endpoints* field set to 0xfe. TH-Tool reads our DUT-GPS's *Sink Table* attribute. If DUT-GPS supports the Translation Table functionality, TH-Tool reads the Translation Table of DUT-GPS.	

869 ***4.3.4.2.3 Expected Outcome***

Pass verdict:
0A) – 0B) DUT-GPS responds to ZCL Read Attributes command and , if DUT-GPS supports Translation Table functionality, to GP Translation Table Request command with either: if DUT-GPS does not support Sink Table based groupcast forwarding functionality: • no Sink Table entry for GPD ID = N and no Translation Table entry for GPD ID = N; • Sink Table entry for GPD ID = N with the information as derived from the GP Pairing Configuration command (GroupID 0xMMMM) and no Translation Table entry for GPD ID = N; it shall not have default Translation Table entries for this GPD command(s); • Sink Table entry for GPD ID = N with the information as derived from the GP Pairing Configuration command (GroupID 0xMMMM) and – if it supports the Translation Table functionality - one Translation Table entry for GPD ID = N; with *Endpoint* field set to value 0x00; • if DUT-GPS does support Sink Table based groupcast forwarding functionality: Sink Table entry for GPD ID = N with the information as derived from the GP Pairing Configuration command (GroupID 4) and – if it supports the Translation Table functionality - one Translation Table entry for GPD ID = N with *Endpoint* field set to value 0xfd. DUT-GPS ***shall NOT*** execute the GPD command. If the DUT-GPS supports Sink Table-based groupcast forwarding functionality, it shall send GP Notification command with the following fields: • NWK header fields: ▪ Destination Address 0xfffd; ▪ Source Address set to the alias; ▪ Sequence Number = (Z – 9 mod 256); ▪ *Radius* field set to the value of *ForwardingRadius* parameter of the Sink Table entry; – If *ForwardingRadius* was 0x00, the *Radius* field shall be set to twice the value of the nwkMaxDepth attribute of the NIB, as specified by [R1]. • APS header fields: ▪ Group address: 0xMMMM; ▪ ProfileID: 0xA1E0; ▪ ClusterID: 0x0021; ▪ source endpoint: GPEP (242); ▪ destination endpoint: not present or if present, GPEP (242); ▪ APS Counter: (Z – 9 mod 256); • ZCL header fields: ▪ *Command Identifier*: 0x00 ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b0, *Disable default response* = 0b1; • ZCL payload fields: ▪ *Options* sub-fields set to: *Also Unicast* 0b0, *AlsoDerivedGroup* 0b0, *AlsoCommissionedGroup* 0b1, and *RxAfterTx* 0b0, *ProxyInfoPresent* = 0b1; ▪ *GPD ID* field carrying N; ▪ SecurityLevel, SecurityKeyType, and GPD security frame counter as in the triggering GPDF; ▪ *GPD CommandID* copied from the GPDF and *GPD Command Payload* copied from the GPDF, if present there, and else carrying 0xff; ▪ *GPP short address* and *GPP-GPD link* present.

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2A) Upon successful completion of the commissioning procedure, the DUT-GPS sends: • GP Pairing with *ApplicationID* – as for the GPDID, *AddSink*=0b1, *RemoveGPD* = 0b0, *CommunicationMode* = 0b10, GPD ID = N, sink GroupID present and set to 0xMMMM; • Device_annce for the Alias, • GP Pairing Configuration command with *Action* sub-field of the *Actions* field set to 0b001, the *Send GP Pairing* sub-field set to 0b0, GPD ID = N, *GroupList* field present and carrying the GroupID the pairing was added for (0xMMMM) and the corresponding alias, and the *Number of paired endpoints* field set to 0xfe, and all parameters as in the established pairing. If the GPD Commissioning command resulting in creation of this pairing contained *Application Information*, the sink MAY include it in the GP Pairing Configuration command. On reception of ZCL Read Attributes command, DUT-GPS sends Read Attributes Response with Sink Table entry for *GPD ID* N, *CommunicationMode* for = 0b10, *GroupList* field present and carrying the GroupID the pairing was added for (0xMMMM) and the corresponding alias, and all parameters as in the established pairing. If DUT-GPS supports Translation Table functionality, DUT-GPS shall have at least one Translation Table entry, either with ApplicationID = 0b000 and SrcID = 0xffffffff or with GPD ID = N, and the corresponding *ApplicationID*, with the number of paired endpoints having value other than 0xfd or 0x00.
2B) DUT-GPS executes the received GP Notification. DUT-GPS does NOT send APS ACK. DUT-GPS does NOT send GP Notification Response or any other GP command.
2C) If the DUT-GPS supports Sink Table-based groupcast forwarding functionality, it shall send GP Notification command, formatted exactly as specified in pass verdict 0A) – 0B) above.
2D) Upon successful decommissioning of the GPD, the DUT-GPS sends: • GP Pairing with the sub-fields of the *Options* field set as follows: *ApplicationID* as for the GPDID, *AddSink* = 0b0; *RemoveGPD* = 0b1; GPD ID = N, • GP Pairing Configuration command with *Action* sub-field of the *Actions* field set to 0b100, the *Send GP Pairing* sub-field set to 0b0, GPD ID = N and the matching *ApplicationID*, and the *Number of paired endpoints* field set to 0xfe. On reception of ZCL Read Attributes command, DUT-GPS sends read Attributes Response with Sink Table empty. The Translation Table, if supported, shall not contain any entry for GPD ID N.
3A) On reception of ZCL Read Attributes command, DUT-GPS sends Read Attributes Response with Sink Table entry for GPD ID N, Communication mode for = 0b10 and GroupID = 0xMMMM. If DUT-GPS supports Translation Table functionality, DUT-GPS shall have at least one Translation Table entry, either with ApplicationID = 0b000 and SrcID = 0xffffffff or with GPD ID = N, and the corresponding *ApplicationID*, with the number of paired endpoints having value other than 0xfd or 0x00.
3B) DUT-GPS executes the received GP Notification. DUT-GPS does NOT send APS ACK. DUT-GPS does NOT send GP Notification Response or any other GP command.
3C) If the DUT-GPS supports Sink Table-based groupcast forwarding functionality, it shall send GP Notification command, formatted exactly as specified in pass verdict 0A) – 0B) above.
3D) On reception of ZCL Read Attributes command, DUT-GPS sends read Attributes Response with Sink Table empty. The Translation Table, if supported, shall not contain any entry for GPD ID N.
Fail verdict:
0A) – 0B) DUT-GPS executes the GPD command from the GP Notification. AND/OR A DUT-GPS which supports *Sink Table-based groupcast forwarding* functionality does not send the GP Notification, formatted as specified in 4.3.4.2.3/item 0 above.
2A) DUT-GPS does not send GP Pairing, and/or Device_annce and/or GP Configure Pairing, formatted as specified in 4.3.4.2.3/item 1A above. AND/OR DUT-GPS does not create Sink Table entry, formatted as specified in 4.3.4.2.3/item 1A above. AND/OR DUT-GPS supporting Translation Table functionality does not have a Translation Table entry(s), formatted as specified in 4.3.4.2.3/item 1A above.
2B) DUT-GPS does not react on received of GP Notification. AND/OR DUT-GPS does send APS ACK. AND/OR DUT-GPS does send GP Notification Response or any other GP command.
2C) A DUT-GPS that supports Sink Table-based groupcast forwarding functionality, does NOT send GP Notification command, formatted exactly as specified in pass verdict 0A) – 0B) above.
2D) DUT-GPS does not send GP Pairing, and/or GP Configure Pairing, formatted as specified in 4.3.4.2.3/item 3A above.

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AND/OR DUT-GPS has a Sink Table entry or Translation Table entry for GPD ID N.
3A) DUT-GPS does not create Sink Table entry, formatted as specified in 4.3.4.2.3/item 1B above. AND/OR DUT-GPS supporting Translation Table functionality does not have a Translation Table entry(s), formatted as specified in 4.3.4.2.3/item 1B above
3B) DUT-GPS does not react on received of GP Notification. AND/OR DUT-GPS does send APS ACK. AND/OR DUT-GPS does send GP Notification Response or any other GP command.
3C) A DUT-GPS that supports Sink Table-based groupcast forwarding functionality, does NOT send GP Notification command, formatted exactly as specified in pass verdict 0A) – 0B) above.
3D) DUT-GPS has a Sink Table entry or Translation Table entry for GPD ID N.

870 ***4.3.4.2.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF4	Pre-commissioned groupcast communication	Direct
GPPC100	GP Notification reception	Direct
GPPC103	Pre-commissioned groupcast GP Notification reception	Direct
GPPC4	Device_annce sending	Indirect

871 ## 4.3.5 NOT TESTED: Unicast Communication Mode

872 ***4.3.5.1.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.3.2.2	A pairing with unicast *Communication mode* is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with the security settings as required by the DUT-GPS.	
2	[R3] A.3.4.2.2	The corresponding information is also included in TH-GPP (e.g. as a result of any of the commissioning procedures), with the *Entry Active* and *Entry Valid* sub-fields of the *Options* field both having value 0b1.	

873 ***4.3.5.1.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.4.1, A.3.5.2.5	Make TH-GPP send a GP Notification the settings and for a GPD command according to the DUT-GPS pairing, with GPD security frame counter having the value N; with *ProxyInfoPresent* = 0b1; and the fields *GPP short address* and *GPP-GPD link* present.	This can also be achieved by making the TH-GPD the send Data GPDF, but then for DUT-GPT+/GPC/GPCB care must be taken, than the Data GPDF from the GPD cannot be received directly.

874 ***4.3.5.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPS does react on received of GP Notification. AND DUT-GPS sends GP Notification Response with the following fields: • NWK header fields: ▪ Destination Address – unicast address of the TH-GPS; ▪ Source Address - short address of the DUT-GPS; ▪ Sequence Number – of the DUT-GPS. • APS header fields: ▪ source endpoint: GPEP (242); ▪ *ProfileID*: 0xA1E0;

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- *ClusterID*: 0x0021;
- destination endpoint: GPEP (242);
- APS Counter: of the DUT-GPS;

- ZCL header fields:
  - *Command Identifier*: 0x00
  - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* 0b1 (server to client), *Disable default response* 0b1;
- ZCL payload fields:
  - *Options* sub-fields set to: *ApplicationID* of the TH-GPD; *FirstToForward* 0b1, *NoPairing* 0b0;
  - *GPD ID* field of the type corresponding to the *ApplicationID* and carrying value N;
  - *Endpoint* field present if *ApplicationID* = 0b010 and set to the endpoint of TH-GPD as in the triggering GP Notification;
  - *GPD security frame counter* copied from GP Notification (N).

  AND TH-GPP does not re-send GP Notification.

Fail verdict:

1) DUT-GPS does not execute the received GPD command.
AND/OR DUT-GPS does not send GP Notification Response formatted exactly as described in 4.3.5.1.3/item 1 above.
AND/OR TH-GPP does re-send GP Notification.

875 #### 4.3.5.2 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCS100	GP Notification reception	Direct
GPPCS101A	Full unicast GP Notification reception	Direct
GPPCS150	GP Notification Response transmission	Direct

876 ### 4.3.6 Lightweight unicast communication mode

877 ##### *4.3.6.1.1 Initial conditions*

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.3.2.2	A pairing with lightweight unicast *Communication mode* is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with the security settings as required by the DUT-GPS.	
2	[R3] A.3.4.2.2	The corresponding information is also included in TH-GPP (e.g. as a result of any of the commissioning procedures), with the *Entry Active* and *Entry Valid* sub-fields of the *Options* field both having value 0b1.	

878 ##### *4.3.6.1.2 Test Procedure*

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.4.1, A.3.5.2.5	Make TH-GPP send a lightweight unicast GP Notification the settings and for a GPD command according to the DUT-GPS pairing, with GPD security frame counter having the value N; with *ProxyInfoPresent* = 0b1; and the fields *GPP short address* and *GPP-GPD link* present.	This can also be achieved by making the TH-GPD the send Data GPDF, but then for DUT-GPT+/GPC/GPCB care must be taken, than the Data GPDF from the GPD cannot be received directly.

879 ##### *4.3.6.1.3 Expected Outcome*

Pass verdict:

1) DUT-GPS does react on received of GP Notification.
DUT-GPS does NOT send GP Notification Response.

Fail verdict:

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1) DUT-GPS does not execute the received GPD command. AND/OR DUT-GPS sends GP Notification Response.

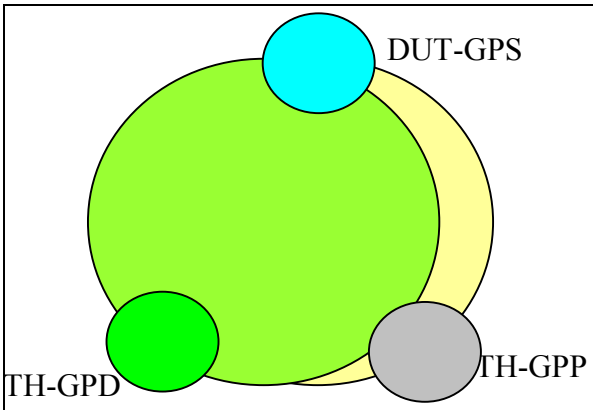
4.3.6.2 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCS100	GP Notification reception	Direct
GPPCS101B	Lightweight unicast GP Notification reception	Direct

4.3.7 NOT TESTED: GPD ID filtering

4.3.7.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT/GPT+/GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPP/TH-Tool	PAN id=same PANID as DUT-GPT Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD/TH-Tool	TH-GPD supports the application functionality of the DUT-GPS (see Section A.4.3 of [R3]). GPD ID = N; If *ApplicationID* = 0b010: *Endpoint* E;

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.3.2.2, A.3.4.2.2	DUT-GPT and TH-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC. No pairing is established between TH-GPT and TH-GPD.	

4.3.7.1.2 Test Set-Up

TH-GPP/TH-Tool can generate arbitrary *GP Notification* commands.

A packet sniffer shall be observing the communication over the air interface.

4.3.7.2 NOT TESTED: Empty Sink Table

4.3.7.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.3.7.1.1.	
2	[R3] A.3.3.2.2	The Sink Table attribute of DUT-GPT does NOT have an entry with GPD ID value N.	

4.3.7.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.4.1, A.3.5.2.5	Make TH-GPP send a GP Notification command with GPD ID value N in unicast to DUT-GPS, carrying a GPD CommandID supported by the DUT-GPS.	
2		Make TH-GPP send a GP Notification command with GPD ID value N in derived groupcast to DUT-GPS, carrying a GPD CommandID supported by the DUT-GPS.	
3		Make TH-GPP send a GP Notification command with GPD ID value N in commissioned groupcast for group = DGroupID to DUT-GPS, carrying a GPD CommandID supported by the DUT-GPS.	

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4		**Optional (mandatory for GPT+/GPC/GPCB)**: Switch TH-GPP off. Make TH-GPD send Data GPDF, carrying a GPD CommandID supported by the DUT-GPS.	

890 ***4.3.7.2.3 Expected Outcome***

Pass verdict:
1) If supported, DUT-GPS first sends a *GP Notification Response* command in unicast to TH-GPP, with the *NoPairing* sub-field of the *Options* field equal to 0b1. Next, DUT-GPS broadcasts a GP Pairing command with *GPD ID* field value N and the *AddSink* sub-field of the *Options* field having value 0b0. DUT-GPS does not execute the GPD command.
2) DUT-GPS does not execute the GPD command. DUT-GPS does not send any GP command.
3) DUT-GPS does not execute the GPD command. DUT-GPS does not send any GP command.
4) DUT-GPS does not execute the GPD command. DUT-GPT/GPT+ does not send any GP command.
Fail verdict:
1) DUT-GPS sends a GP Notification Response command in unicast to TH-GPP, but the *NoPairing* sub-field of the *Options* field is not equal to 0b0, and/or DUT-GPS does not broadcast a GP Pairing command with *GPD ID* field value N for which the *AddSink* sub-field of the *Options* field has value 0b1, and/or or it broadcasts a *GP Pairing* command with *GPD ID* value N before it sends a GP Notification Response command in unicast to TH-GPP. AND/OR DUT-GPS does execute the GPD command.
2) DUT-GPS does execute the GPD command. AND/OR DUT-GPS does send any GP command.
3) DUT-GPS does execute the GPD command. AND/OR DUT-GPS does send any GP command.
4) DUT-GPS does execute the GPD command. AND/OR DUT-GPT/GPT+ does send any GP command.

891 ### 4.3.7.3 NOT TESTED: Unicast GPS

892 ***4.3.7.3.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.3.7.1.1.	
2	[R3] A.3.3.2.2	The Sink Table attribute of DUT-GPS has a unicast entry with GPD ID value N', differing by 1 bit only from the GPD ID value N.	

893 ***4.3.7.3.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.4.1, A.3.5.2.5	Make TH-GPP send a GP Notification command with GPD ID value N in unicast to DUT-GPS, carrying a GPD CommandID supported by the DUT-GPS.	
2	[R3] A.3.3.4.1, A.3.5.2.5	**Optional (mandatory for GPT+/GPC)**: Switch TH-GPP off. Make TH-GPD send Data GPDF, carrying a GPD CommandID supported by the DUT-GPS.	

894 ***4.3.7.3.3 Expected Outcome***

Pass verdict:
1) DUT-GPS first sends a *GP Notification Response* command in unicast to TH-GPP, with the *NoPairing* sub-field of the *Options* field equal to 0b1. Next, DUT-GPS broadcasts a *GP Pairing* command with *GPD ID* field value N and the *AddSink* sub-field of the *Options* field having value 0b0. DUT-GPS does NOT execute the GPD command.
2) DUT-GPS does NOT execute the GPD command. DUT/GPT/GPT+ does not send any GP command.
Fail verdict:

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1) DUT-GPT does not send a *GP Notification Response* command in unicast to TH-GPP with the *NoPairing* sub-field of the *Options* field equal to 0b0, and/or DUT-GPT does not broadcast a *GP Pairing* command with *GPD ID* field value N for which the *AddSink* sub-field of the *Options* field has value 0b1, and/or or it broadcasts a *GP Pairing* command with *GPD ID* value N before it sends a *GP Notification Response* command in unicast to TH-GPP.
2) DUT-GPS does execute the GPD command. AND/OR DUT/GPT/GPT+ does send any GP command.

4.3.7.4 NOT TESTED: Derived groupcast GPS

4.3.7.4.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.3.7.1.1.	
2	[R3] A.3.3.2.2	The Sink Table attribute of DUT-GPS has a derived groupcast entry with GPD ID value N', differing by 1 bit only from the GPD ID value N.	

4.3.7.4.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.4.1, A.3.5.2.5	Make TH-GPP send a GP Notification command to DUT-GPS with: GPD ID value N, *Also Derived Group* and *Also Commissioned Group* sub-fields of the *Options* field set to 0b1, in groupcast to DGroupID, carrying a *GPD CommandID* supported by the DUT-GPS.	
2	[R3] A.3.3.4.1, A.3.5.2.5	**Optional (mandatory for GPT+/GPC)**: Switch TH-GPP off. Make TH-GPD send Data GPDF with GPD ID value N, carrying a GPD CommandID supported by the DUT-GPS.	

4.3.7.4.3 Expected Outcome

Pass verdict:
1) - 2) DUT-GPS does NOT execute the GPD command. DUT-GPT/GPT+ does not send any GP command.
Fail verdict:
1) - 2) DUT-GPS does execute the command. AND/OR DUT-GPT/GPT+ does send any GP command.

4.3.7.5 NOT TESTED: Commissioned groupcast GPS

4.3.7.5.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.3.7.1.1.	
2	[R3] A.3.3.2.2	The Sink Table attribute of DUT-GPS is empty.	
3	[R3] A.3.5.2.5	One of application endpoints (but NOT GPEP) of GPS is member of GroupID at APS level, which has a value 0xNNNN identical to DGroupID derived from GPD ID = N.	

4.3.7.5.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	**(Negative test)**: **GPEP group membership filtering**. Make TH-GPP send a GP Notification command to DUT-GPS with: *GPD ID* value N, *Also Derived Group* and *Also Commissioned Group* sub-fields of the *Options* field set to 0b1, in groupcast to 0xNNNN, carrying a *GPD CommandID* supported by the DUT-GPS.	

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2	[R3] A.3.5.2.5	**(Negative test): GPD ID filtering in CGroup forwarding:** Create a commissioned groupcast pairing at DUT-GPS for GPD with GPD ID N' (preferably differing from N by 1 msb, such that the DGroupID is identical). DUT-GPS's GPEP becomes member of GroupID 0xNNNN. Make TH-GPP send to DUT-GPS a *GP Notification* command in pre-commissioned groupcast to GroupID 0xNNNN with: GPD ID value N, *Also Derived Group* and *Also Commissioned Group* sub-fields of the *Options* field set to 0b1, carrying a GPD CommandID supported by the DUT-GPS.	
3	[R3] A.3.5.2.5	**Optional (mandatory for GPT+/GPC):** **(Negative test): GPD ID filtering in CGroup direct reception** Switch TH-GPP off. Make TH-GPD with GPD ID N send Data GPDF, carrying a GPD CommandID supported by the DUT-GPS.	

902 ***4.3.7.5.3 Expected Outcome***

Pass verdict:
1 – 3) DUT-GPS does NOT execute the GPD command. DUT-GPT/GPT+ does not send any GP command.
Fail verdict:
1 – 3) DUT-GPS does execute the command. AND/OR DUT-GPT/GPT+ does send any GP command.

903 ***4.3.7.5.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCS100	GP Notification reception	Direct
GPPCS150	GP Notification Response transmission	Direct
GPPCS152	GP Pairing Transmission	Direct
GPPCS3A	Support of Sink Table Attribute	Direct

904 **4.3.7.6 NOT TESTED: GPDID type filtering**

905 ***4.3.7.6.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.3.7.1.1.	
2	[R3] A.3.3.2.2	The Sink Table attribute of DUT-GPT does NOT have any entry with GPD ID N = IEEE address value N (any endpoint) nor for GPDID M = SrcID = 4LSB of N.	

906 ***4.3.7.6.2 Test procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	**(Negative test): Secure pairing with IEEE address** Establish a pairing for GPD ID N = IEEE address value N, Endpoint = E at DUT-GPS, with the application and security settings as required by the DUT-GPS, with security frame counter value < A. Make TH-GPD send correctly protected Data GPDF for GPD IEEE address N, Endpoint E, with security frame counter value A. Make TH-GPD send correctly protected Data GPDF for GPD SrcID M = 4LSB of N, with security frame counter value B >= A+1. Make TH-GPP send GP Notification for Data GPDF for GPD SrcID M = 4LSB of N, with security frame counter value C >= B+1. Read out Sink Table entry(s) of DUT-GPS.	
2		**O: (Negative test): Pairing with IEEE address and no security (if supported by DUT-GPS)** Establish a pairing for GPD ID N = IEEE address value N Endpoint E at DUT-GPS, with the application settings as required by the DUT-GPS, and no security (if supported by DUT-GPS), with incremental MAC sequence	

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		number < A. Make TH-GPD send unprotected Data GPDF for GPD IEEE address N, endpoint E, with sequence number A. Make TH-GPD send unprotected Data GPDF for GPD SrcID M = 4LSB of N, with sequence number B >= A + 1. Make TH-GPP send GP Notification for unprotected Data GPDF for GPD SrcID M = 4LSB of N, with the GPD security frame counter field carrying the value C >= B+1. Read out Sink Table entry(s) of DUT-GPS.	
3		**O: (Negative test): Pairing with SrcID and no security (if supported by DUT-GPS)** Clean Sink Table of DUT-GPS. Establish a pairing for GPD ID M = SrcID M at DUT-GPS, with the application settings as required by the DUT-GPS, with incremental MAC sequence number < A. Make TH-GPD send unprotected Data GPDF for GPD SrcID M, with sequence number A. Make TH-GPD send unprotected Data GPDF for GPD IEEE address N with 4LSB = M, any endpoint, with sequence number B >= A + 1. Make TH-GPP send GP Notification for unprotected Data GPDF for GPD IEEE address N with 4LSB = M, any endpoint, with the GPD security frame counter field carrying the value C >= B+1. Read out Sink Table entry(s) of the DUT-GPS.	
4		**(Negative test): Secure pairing with SrcID** Clean Sink Table of DUT-GPS. Establish a pairing for GPD ID M = SrcID M at DUT-GPS, with the application and security settings as required by the DUT-GPS, with security frame counter value < A. Make TH-GPD send correctly protected Data GPDF for GPD SrcID M, with security frame counter value A. Make TH-GPD send correctly protected Data GPDF for GPD IEEE address N with 4LSB = M, any endpoint, with security frame counter value B >= A+1. Make TH-GPP send GP Notification for Data GPDF for GPD IEEE address N with 4LSB = M, any endpoint, with security frame counter value C >= B+1.	
5		**(Negative test): 2 pairings.** Clean Sink Table of DUT-GPS. Establish a pairing for GPD ID N = IEEE address value N, endpoint E at DUT-GPS, with the application and security settings as required by the DUT-GPS, preferably with security or else with incremental MAC sequence number, with security frame counter value/sequence number < X. Establish a pairing for GPD ID M = SrcID M = 4LSB of N at DUT-GPS, with the application and security settings as required by the DUT-GPS, preferably with security. Make TH-GPD send correctly protected Data GPDF for GPD SrcID M, with frame counter X. Make TH-GPD send correctly protected Data GPDF for GPD IEEE address N with 4LSB = M, endpoint E, with frame counter Y >= X+1. Read out Sink Table. Make TH-GPP send GP Notification for Data GPDF for GPD SrcID = M; and frame counter Z >= Y+1.	

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		Make TH-GPP send GP Notification for Data GPDF for GPD IEEE address N with 4LSB = M; endpoint E and frame counter A >= Z+1. Read out Sink Table.	

907 ***4.3.7.6.3 Expected Outcome***

Pass verdict:
1 – 4) DUT-GPS does execute the first GPD command. DUT-GPS does NOT execute the second GPD command. DUT-GPS does NOT execute the GPD command carried in the GP Notification command. The Sink Table entry of the DUT-GPS for the TH-GPD has security frame counter value A.
5) DUT-GPS executes both GPD commands. Sink Table entry for GPD SrcID M has the frame counter value X. Sink Table entry for GPD IEEE address N Endpoint E has the frame counter value Y. DUT-GPS executes both GPD commands carried in GP Notification. Sink Table entry for GPD SrcID M has the frame counter value Z. Sink Table entry for GPD IEEE address N Endpoint E has the frame counter value A.
Fail verdict:
1 – 4) DUT-GPS does not execute the first GPD command. AND/OR DUT-GPS does execute the second GPD command. AND/OR DUT-GPS does NOT execute the GPD command carried in the GP Notification command. The Sink Table entry of the DUT-GPS for the TH-GPD has security frame counter value other than A.
5) DUT-GPS executes does not execute either or both GPD commands. AND/OR Sink Table entry for GPD SrcID M has the frame counter value other than X. AND/OR Sink Table entry for GPD IEEE address N Endpoint E has the frame counter value other than Y. AND/OR DUT-GPS does not execute either or both GPD commands carried in GP Notification. AND/OR Sink Table entry for GPD SrcID M has the frame counter value other than Z. AND/OR Sink Table entry for GPD IEEE address N Endpoint E has the frame counter value other than A.

908 ***4.3.7.6.4 PICS Covered***

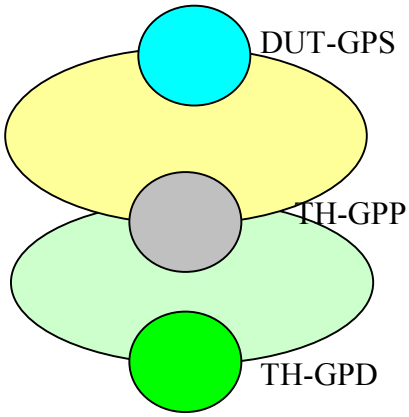
PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF20	GPD IEEE address functionality	Direct

909 ## 4.3.8 MAC sequence number filtering

910 This test is only required to be run if the DUT-GPP supports *gpSecurityLevel* = 0b00.

911 ***4.3.8.1.1 Initial Conditions***

912 The required network set-up for the test harness is as follows:



DUT-GPS (GPT/GPT+/GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPP/TH-Tool	PAN id=same PANID as TH-GPT Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N TH-GPD supports the application functionality of the DUT-GPS (see Section A.4.3 of [R3]).

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPP and DUT-GPS operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	

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4.3.8.1.2 Test Set-Up

TH-GPP/TH-Tool can generate arbitrary *GP Notification* commands.

A packet sniffer shall be observing the communication over the air interface.

4.3.8.2 Random GPD MAC sequence numbers

4.3.8.2.1 Initial conditions

In addition to the initial conditions specified in sec. 4.3.8.1.1, the following applies.

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.2.2	A pairing is established between TH-GPD and DUT-GPS, in the communication mode as requested by the DUT-GPS. For the entry of the Sink Table with GPD ID value N, the *Sequence number capabilities* sub-field of the Options field has value 0b0.	
2	[R3] A.3.4.2.2	The corresponding information is available in TH-GPP's Proxy Table attribute.	

4.3.8.2.2 Test procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.4.1, A.3.5.2.5	Make TH-GPP send a GP Notification command to DUT-GPS with GPD ID N and with GPD security frame counter field carrying 0xC3.	The time between two consecutive steps in the test should be at least *gpDuplicateTimeout*.
2		Make TH-GPP send a GP Notification command to DUT-GPS with GPD ID N and with GPD security frame counter field carrying 0xC3.	
3		Make TH-GPP send a GP Notification command to DUT-GPS with GPD ID N and with GPD security frame counter field carrying 0xC2.	
4		Make TH-GPP send a GP Notification command to DUT-GPS with GPD ID N and with GPD security frame counter field carrying 0xC5.	

4.3.8.2.3 Expected Outcome

Pass verdict:
1) – 4) DUT-GPS executes the command. If the CommunicationMode is unicast, the DUT-GPS sends a *GP Notification Response* command to TH-GPP.
Fail verdict:
1) – 4) For at least one of the four Data GPDFs, the DUT-GPS does not execute the command. AND/OR If the CommunicationMode is unicast, the DUT-GPS does not send a *GP Notification Response* command to TH-GPP.

4.3.8.3 Incremental GPD MAC sequence numbers

4.3.8.3.1 Initial conditions

In addition to the initial conditions specified in sec. 4.3.8.1.1, the following applies.

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.2.2	A pairing is established between TH-GPD and DUT-GPS, in the communication mode as requested by the DUT-GPS. For the entry of the Sink Table with ID value N, the *MAC sequence number capability* subfield of the *Options* field has value 0b1. The Security frame counter parameter of the SINK TABLE entry < = 0xC2.	
2	[R3] A.3.4.2.2	The corresponding information is available in TH-GPP's Proxy Table attribute.	

4.3.8.3.2 Test Procedure

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Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.4.1, A.3.5.2.5	Make TH-GPP send a GP Notification command to DUT-GPS with GPD ID N and with *GPD security frame counter* field carrying 0xC3.	The *Sequence number* parameter in the TH-GPP's Proxy Table needs to be modified.
2		Make TH-GPP send a GP Notification command to DUT-GPS GPD ID N and with *GPD security frame counter* field carrying 0xC3.	The time between two consecutive steps in the test should be at least *gpDuplicateTimeout*.
3		Make TH-GPP send a GP Notification command to DUT-GPS with GPD ID N and with *GPD security frame counter* field carrying 0xC2.	
4		Make TH-GPP send a GP Notification command to DUT-GPS with GPD ID N and with *GPD security frame counter* field carrying 0xC5.	
5		Make TH-GPP send a GP Notification command to DUT-GPS with GPD ID N and with *GPD security frame counter* field carrying 0x05.	

925 ***4.3.8.3.3 Expected Outcome***

Pass verdict:
1) – 5) DUT-GPS executes the command. If the CommunicationMode is full unicast, the DUT-GPS sends a *GP Notification Response* command to TH-GPP.
Fail verdict:
1) – 5) DUT-GPS does not execute the command. AND/OR If the CommunicationMode is full unicast, the DUT-GPS does not send a *GP Notification Response* command to TH-GPP.

926 ***4.3.8.3.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCS100	GP Notification reception	Direct
GPPC3r	Random MAC sequence numbers for duplicate filtering	Direct
GPCC3i	Incremental MAC sequence numbers for duplicate filtering	Direct

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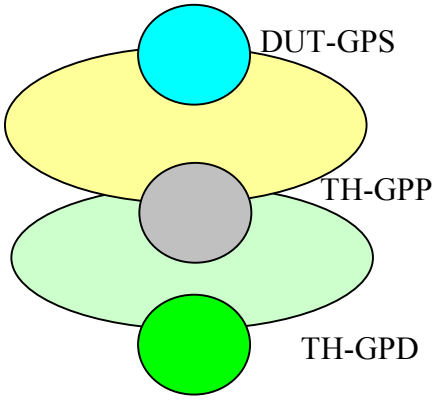
4.3.9 GPD security in GP Notification

4.3.9.1.1 Initial conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT/GPT +/GPC)	PANId= Generated in a random manner (within the range 0x0000 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPP/TH-Tool	Pan id=same PANID as DUT-GPT Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD/TH-Tool	GPD ID = N TH-GPD supports the application functionality of the DUT-GPT (see Section A.4.3 of [R3]).

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPT and TH-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2, A.3.4.2.2	A pairing is established between the TH-GPD and DUT-GPT (e.g. as a result of any of the commissioning procedures). The corresponding information is also included in TH-GPP (e.g. as a result of any of the commissioning procedures).	
3		The initial frame counter value (M) for TH-GPD is known.	

4.3.9.1.2 Test Set-Up

The DUT-GPS shall be in wireless communication proximity of TH-GPP, but out of range of TH-GPD; and the TH-GPP shall be in wireless communication proximity of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.3.9.2 Sub-case: SecurityLevel 0b10

4.3.9.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.3.9.1.1	
3	[R3] A.3.3.2.2, A.3.4.2.2	TH-GPD, TH-GPP and DUT-GPS use *SecurityLevel* 0b10 and SecurityKeyType 0b010 (GPD group key). Initial value (M) of the security frame counter of TH-GPD is known.	

4.3.9.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.1.5.4, A.3.5.2.5	TH-GPD sends Data GPDF, with the *Extended NWK Frame Control* field present, the *SecurityLevel* sub-field set to 0b10, and the payload authenticated with 4B *MIC*, using frame counter value 0xWWXXYYZZ >= M+1. OR: TH-GPP/TH-Tool GP Notification with the *SecurityLevel* sub-field set to 0b10, the frame counter value 0xWWXXYYZZ >= M+1 and GPD command as supported by DUT-GPS.	
2	[R3] A.1.4, A.1.5.4, A.3.5.2.5	**Negative test (incorrect frame counter)**: TH-GPP sends GP Notification with GPD command supported by DUT-GPS, *SecurityLevel* sub-field set to 0b10, *KeyType* sub-field set to 0b010, and an incorrect Frame counter value 0xWWXXYY00.	

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3	[R3] A.1.4, A.1.5.4, A.3.5.2.5	**Negative test (incorrect security level)**: TH-GPP sends GP Notification with GPD command supported by DUT-GPS, with the *SecurityLevel* sub-field set incorrect (0b00), the *KeyType* sub-field set to 0b010, and an correct Frame counter value 0xWWXXYYZZ+1.	
4	[R3] A.1.4, A.1.5.4, A.3.5.2.5	**Negative test (incorrect key type)**: TH-GPP sends GP Notification with GPD command supported by DUT-GPS, with the *SecurityLevel* set to 0b10, incorrect *KeyType* 0b100, and an correct Frame counter value 0xWWXXYYZZ+2.	

939 ##### 4.3.9.2.3 Expected Outcome

Pass verdict:
1) DUT-GPS executes the GPD command and does store the new frame counter value.
2) - 4) DUT-GPS does not execute the GPD command and does not store the new frame counter value. DUT-GPS may send GP Pairing command for GPD ID N, with the correct security parameters values.
Fail verdict:
1) DUT-GPS does not execute the GPD command AND/OR does not store the new frame counter value.
2) – 4) DUT-GPS does execute the GPD command AND/OR DUT-GPS does store the new frame counter value.

940 ### 4.3.9.3 Sub-case: SecurityLevel 0b11

941 ##### 4.3.9.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.3.9.1.1	
3	[R3] A.3.3.2.2, A.3.4.2.2	TH-GPD, TH-GPP and DUT-GPS use *SecurityLevel* 0b11 and SecurityKeyType 0b010 (GPD group key). The initial value M of the security frame counter of the TH-GPD is known.	

942 ##### 4.3.9.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.1.5.4, A.3.5.2.5	TH-GPD sends Data GPDF, with the *Extended NWK Frame Control* field present, the SecurityLevel sub-field set to 0b11, and the payload authenticated with 2B *MIC*, using frame counter value 0xWWXXYYZZ >= M+1. OR: TH-GPP/TH-Tool GP Notification with the SecurityLevel sub-field set to 0b11, the frame counter value 0xWWXXYYZZ >= M+1 and GPD command as supported by DUT-GPS.	
2	[R3] A.1.4, A.1.5.4, A.3.5.2.5	**Negative test (incorrect frame counter):** TH-GPP sends GP Notification with *GPD command* supported by DUT-GPS, *SecurityLevel* sub-field set to 0b11, *KeyType* sub-field set to 0b010, and an incorrect Frame counter value 0xWWXXYY00.	
3	[R3] A.1.4, A.1.5.4, A.3.5.2.5	**Negative test (incorrect security level):** TH-GPP sends GP Notification with GPD command supported by DUT-GPS, with the SecurityLevel sub-field set incorrect (0b00), the KeyType sub-field set to 0b010, and an correct Frame counter value 0xWWXXYYZZ+1.	
4	[R3] A.1.4, A.1.5.4, A.3.5.2.5	**Negative test (incorrect key type):** TH-GPP sends GP Notification with GPD command supported by DUT-GPS, with the SecurityLevel set to 0b11, incorrect KeyType 0b100, and an correct Frame counter value 0xWWXXYYZZ+2.	

943 ##### 4.3.9.3.3 Expected Outcome

Pass verdict:
1) DUT-GPS executes the GPD command and does store the new frame counter value.

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2) - 4) DUT-GPS does not execute the GPD command and does not store the new frame counter value. DUT-GPS may send GP Pairing command for GPD ID N, with the correct security parameters values.
Fail verdict:
1) DUT-GPS does not execute the GPD command and/or does not store the new frame counter value.
2) - 4) DUT-GPS does execute the GPD command AND/OR DUT-GPS does store the new frame counter value.

4.3.9.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCS100	GP Notification reception	Direct
GFP6	Support of Security Level = 0b10	Direct
GFP5	Support of Security Level = 0b11	Direct
GPPC3s	Support of GPD security frame counter for GPD's command filtering	Direct

4.3.10 Legacy test: ProxyInfoPresent = 0b0

4.3.10.1.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.6.3.3	The alias derived from the GPD ID of the TH-GPD is not in conflict with any of the ZigBee devices.	
2	[R3] A.3.3.2.2	A pairing with derived groupcast communication mode is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with the security settings as required by the DUT-GPS.	
3	[R3] A.3.4.2.2	The corresponding information is also included in TH-GPP (e.g. as a result of any of the commissioning procedures), with the *Entry Active* and *Entry Valid* of the *Options* field both having value 0b1.	

4.3.10.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	Make TH-GPP/TH-Tool send a GP Notification with the settings and for a GPD command according to the DUT-GPS pairing; with *ProxyInfoPresent* = 0b0; *RxAfterTx* = 0b0 and the fields *GPP short address* and *GPP-GPD link* absent.	
2	[R3] A.3.5.2.5	Make TH-GPP/TH-Tool send a GP Notification with the settings and for a GPD command according to the DUT-GPS pairing; with *ProxyInfoPresent* = 0b0; *RxAfterTx* = 0b1 and the fields *GPP short address* and *GPP-GPD link* present.	

4.3.10.1.3 Expected Outcome

Pass verdict:
1) - 2) DUT-GPS does react on received GP Notification.
Fail verdict:
1) – 2) DUT-GPS does not react on received GP Notification.

4.4 GPS commissioning

Note: in case of proximity and multi-hop commissioning, it may happened that the Device_annce – which should be sent upon successful pairing with communication mode other than lightweight unicast - does not appear in the sniffer log. This would be the case, if during the commissioning process, an aliased GP Commissioning Notification with alias NWK sequence number 0x00 was sent; the Device_annce using the same number and a fixed alias NWK sequence number 0x00 would then be blocked as a duplicate by the sink's broadcast transaction table. This is not a GP implementation failure, but a correct behavior of the ZigBee stack. The test should then be repeated to obtain a complete log, preferably with other values of the GPD security frame counter values.

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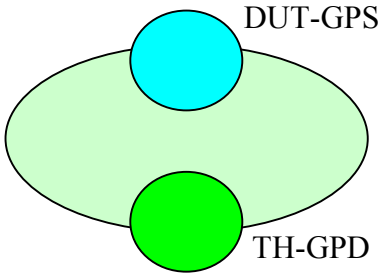
4.4.1 Proximity commissioning

4.4.1.1 Bidirectional commissioning with shared key requested & delivered, ApplicationID = 0b000

A number of additional tests is included in sections 4.4.1.7 (additional bidirectional commissioning tests), 4.4.1.7.5 (general additional tests), 4.4.4 and 4.4.7 (additional security tests); successful completion of those tests is required to complement the current test.

4.4.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT, GPT+, GPC, GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports proximity commissioning.
TH-GPD	GPD ID = N GPD security usage according to DUT-GPS capabilities; TH-GPD application functionality matches that of the DUT-GPS's GPEP. TH-GPD implements bidirectional commissioning procedure.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between DUT-GPS and TH-GPD.	
3		TH-GPD uses ApplicationID = 0b000 and SrcID = N. If GPS supports security, TH-GPD shall request the shared key and shall provide OOB key; TC-LK encryption shall be used. Initially, TH-GPD has no shared key.	
4	[R3] A.3.3.3.1, A.3.3.3.2	If GPS supports security, TH-Tool sets the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b010 and the *gpSharedSecurityKey* attribute to 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf.	

4.4.1.1.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

4.4.1.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2, A.4.3	DUT-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. The TH-GPD first sends Channel Request GPDF with: • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *Auto-Commissioning*: – 0b0, if the GPD Channel Request transmission is immediately followed by reception window; – 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel	Note: it is absolutely necessary to test that the GPS can deliver the GPD Channel Configuration on a channel other than the operational channel of the network.

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		▪ *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent; • the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* are absent. The TH-GPD is configured such, that the DUT-GPS has to deliver the GPD Channel Configuration on a channel other than the operational channel. After reception of Channel Configuration GPDF the TH-GPD sends Commissioning GPDF with: • *Frame Type* = 0b00, *Auto-Commissioning* = 0b0 and *RxAfterTx* set to 0b1; • and if DUT-GPS supports security, with *GP Security Key request* = 0b1, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1, and the *GPD Key* and *GPD Key MIC* fields present; *GPD outgoing counter* field present . After reception of Commissioning Reply GPDF carrying a shared key, the TH-GPD sends correctly protected Success GPDF with *Auto-Commissioning* = 0b0 and *RxAfterTx* set to 0b0 and the security frame counter higher than in the payload of the GPD Commissioning command. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	

969 ***4.4.1.1.4 Expected Outcome***

Pass verdict:
1) DUT-GPS may send GP Proxy Commissioning Mode command (*Action*=Enter). Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with GPD Channel Request command with *Auto-Commissioning* = 0b0, the DUT-GPS sends at least one GPDF with: • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBee Protocol Version* = 0x3; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent; • the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* are absent. • GPD Channel Configuration command, carrying: ▪ the operational channel ▪ the *Basic* sub-field set to 0b0 for a Basic Combo. The transmission SHALL NOT exceed *gpTxDuration*. Before delivery of the Channel Configuration GPDF, the DUT-GPS may send GP Response with its own address in the *TempMasterShortAddress* field. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command –and, if DUT-GPS supports security, with *GP Security Key request* = 0b1, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1 -, the DUT-GPS sends at least one copy of a GPDF carrying GPD Commissioning Reply command with: • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b00, ▪ *ZigBee Protocol Version* = 0x3; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b1; • the sub-fields of the *Extended NWK Frame Control* field set to:

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  - *ApplicationID* = 0b000;
  - *RxAfterTx* set to 0b0;
  - *Direction* = 0b1.
- *SrcID* = N;
- *Endpoint* field absent;
- with the following settings in the command payload:
  - sub-field of the *Options* field set to:
    - *GPD security key present* = 0b1;
    - *GPD key encryption* = 0b1;
    - *SecurityLevel* – as requested by the TH-GPD in the Commissioning GPDF;
    - *KeyType* = 0b010;
  - *GPD security key* field carrying the GPD Group key 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf, encrypted;
  - *GPD Key MIC* field present;
  - *Frame Counter* field present and carrying the frame counter used for the key encryption.

The transmission SHALL NOT exceed *gpTxDuration*.

Before delivery of the Commissioning Reply GPDF, the DUT-GPS may send GP Response with its own address in the *TempMasterShortAddress* field.

DUT-GPS accepts GPD Success command, if correctly protected, i.e. if *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) value is not reset (unless the frame counter value in the payload of the Commissioning GPDF was > 0x80000000).

On reception of at least one GPD Success command, DUT-GPS:

- provides success indication,
- if DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias and NWK sequence number = 0x00 and *APS Counter* = 0x00;
  if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent;
- sends out GP Pairing with:
  - APS header fields:
    - *ProfileID*: 0xA1E0;
    - *ClusterID*: 0x0021;
    - *source endpoint*: GPEP (242);
    - *destination endpoint*, if present: GPEP (242);
  - ZCL header fields:
    - *Command Identifier*: 0x01;
    - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b1 (server to client), *Disable default response* = 0b1;

    ZCL payload fields:
  - Sub-fields of the *Options* field set to:
    - *ApplicationID* = 0b000, *AddSink*=0b1, *RemoveGPD* = 0b0;
    - *Communication Mode*: set according to DUT-GPS capabilities
    - *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
    - *SecurityLevel* as exchanged during commissioning;
    - *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: 0b010);
    - *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;
  - *GPD SrcID* = N;
  - *Endpoint* field absent;
  - *Sink IEEE address* and *Sink NWK address* fields:
    - present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
    - absent otherwise;
  - *Sink GroupID* field:
    - present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;

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– present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;
– absent otherwise;
- *DeviceID* field - copied from the GPD Commissioning command payload;
- *GPD security Frame Counter* field – as in GPD Success command;
- *GPD key* field:
  – present and carrying GPD Group Key in the clear, if *SecurityLevel* >= 0b10;
  – absent otherwise;
- *Assigned alias* field:
  – present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
  – absent otherwise;
- *Forwarding Radius* field:
  – present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
  – absent otherwise.

On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with ApplicationID = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

Fail verdict:

1) The DUT-GPS does not send GPDF with GPD Channel Configuration command on reception of any of the GPDF with GPD Channel Request command with *Auto-Commissioning* = 0b0, formatted exactly as specified in pass verdict 1 above. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration.*

AND/OR DUT-GPS sends GPDF with GPD Channel Configuration command on reception of any of the GPDF with GPD Channel Request command with *Auto-Commissioning* = 0b1.
AND/OR the DUT-GPS does not specify the operational channel in the GPD Channel Configuration command.
AND/OR Basic Sink does NOT set the *Basic* sub-field to 0b1.

AND/OR TH-GPD does not accept the Channel Configuration GPDF and does not progress to Commissioning GPDF transmission.
AND/OR The DUT-GPS does not send GPDF with GPD Commissioning Reply command on reception of any of the GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration.*
AND/OR The DUT-GPS does not provide the GPD Group key 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf, key type 0b010 in the Commissioning Reply GPDF correctly encrypted (MIC field present), if requested in Commissioning GPDF by setting sub-fields to *GP Security Key request* = 0b1,

GPDkeyEncryption = 0b1 and *GPDkeyPresent* = 0b1.
AND/OR On reception of GPD Success command, DUT-GPS:

- does not provide success indication
- and/or
  - In case of *Communication Mode* != 0b11: does not send Device_annce and/or the Device_annce does not carry IEEE = 0xff..ff and alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias and NWK sequence number = 0x00 and APS Counter = 0x00;
  - In case of *Communication Mode* = 0b11: does send Device_annce for the alias;
- and/or does not send GP Pairing, formatted exactly as described 4.4.1.1.4/pass verdict 1 above.

AND/OR DUT-GPS does not report a Sink Table entry for the TH-GPD GPD ID N AND/OR all relevant parameters exchanged in the commissioning process are not stored there.

AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in 4.4.1.1.4/item 1 above.

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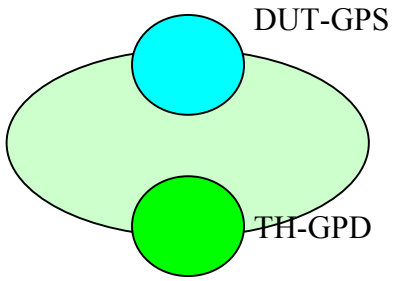
4.4.1.1 Bidirectional commissioning with OOB key (shared key not available, and not requested), ApplicationID = 0b000

A number of additional tests is included in sections 4.4.1.7 (additional bidirectional commissioning tests), 4.4.1.7.5 (general additional tests), 4.4.4 and 4.4.7 (additional security tests); successful completion of those tests is required to complement the current test.

4.4.1.1.1. Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT, GPT+ or GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports proximity commissioning.
TH-GPD	GPD ID = N GPD security usage according to DUT-GPS capabilities; TH-GPD application functionality matches that of the DUT-GPS's GPEP. TH-GPD implements bidirectional commissioning procedure.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between DUT-GPS and TH-GPD.	
3		TH-GPD uses ApplicationID = 0b000 and SrcID = N. If GPS supports security, TH-GPD shall provide OOB key and NOT request a key; TC-LK encryption shall be used.	
4	[R3] A.3.3.3.1, A.3.3.3.2	If GPS supports security, TH-Tool sets the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b000 and the *gpSharedSecurityKey* attribute to 0x00.. 0x00.	

4.4.1.1.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

4.4.1.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2, A.4.3	DUT-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. The TH-GPD first sends Channel Request GPDF with: • the sub-fields of the NWK Frame Control field set to: ▪ Frame Type sub-field of the NWK Frame Control field set to 0b01, ▪ *Auto-Commissioning* – 0b0, if the GPD Channel Request transmission is immediately followed by reception window; – 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel ▪ ▪ *Frame Control Extension* = 0b0; the *Extended NWK Frame Control field absent*;	Note: it is absolutely necessary to test that the GPS can deliver the GPD Channel Configuration on a channel other than the operational channel of the network.

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		• the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* absent. The TH-GPD is configured such, that the DUT-GPS has to deliver the GPD Channel Configuration on a channel other than the operational channel. After reception of GPD Channel Configuration command indicating the operational channel, the TH-GPD sends on the operational channel Commissioning GPDF with: • *Frame Type* = 0b00, Auto-Commissioning = 0b0 • *RxAfterTx* set to 0b1 • and if DUT-GPS supports security, with *GP Security Key request* sub-field = 0b0, GPDkeyEncryption = 0b1 and GPDkeyPresent = 0b1 and carrying the TH-GPD's OOB key encrypted (MIC field present); *GPD outgoing counter* field present. After reception of Commissioning Reply GPDF the TH-GPD sends Success GPDF with *Auto-Commissioning* = 0b0 and *RxAfterTx* set to 0b0. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	

4.4.1.1.4 Expected Outcome

Pass verdict:
1) DUT-GPS may send GP Proxy Commissioning Mode command (*Action*=Enter). Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with GPD Channel Request command with *Auto-Commissioning* = 0b0, the DUT-GPS sends at least one GPDF with GPD Channel Configuration command with • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *ZigBee Protocol Version* = 0x3; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent; • the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* are absent. • GPD Channel Configuration command, carrying: ▪ the operational channel; ▪ the *Basic* sub-field set to 0b0 for a Basic Combo. The transmission SHALL NOT exceed *gpTxDuration*. Before delivery of the Channel Configuration GPDF, the DUT-GPS may send GP Response with its own address in the *TempMasterShortAddress* field. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command – if DUT-GPS supports security, with *GP Security Key request* = 0b0, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1 and carrying the TH-GPD's OOB key -, the DUT-GPS sends at least one copy of a GPDF carrying GPD Commissioning Reply command with: • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b00, ▪ *ZigBee Protocol Version* = 0x3; ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b1; • the sub-fields of the *Extended NWK Frame Control* field set to: ▪ *ApplicationID* = 0b000; ▪ *RxAfterTx* set to 0b0; ▪ *Direction* = 0b1. • *SrcID* = N; • *Endpoint* field absent;

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- with the following settings in the command payload:
  - sub-field of the *Options* field set to:
    - *GPD security key present* = 0b0;
    - *GPD key encryption* = 0b0;
    - *SecurityLevel* – as requested by the TH-GPD in the Commissioning GPDF;
    - *KeyType* = 0b100;
  - *GPD security key* field and *GPD Key MIC* absent; *Frame Counter* field absent.

The transmission SHALL NOT exceed *gpTxDuration*.

Before delivery of the Commissioning Reply GPDF, the DUT-GPS may send GP Response with its own address in the *TempMasterShortAddress* field.

On reception of at least one GPD Success command, DUT-GPS:

- provides success indication,
- if DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, and NWK sequence number = 0x00 and APS Counter = 0x00;
  if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent;
- sends out GP Pairing with:
  - Sub-fields of the *Options* field set to:
    - *ApplicationID* = 0b000, *AddSink*=0b1, *RemoveGPD* = 0b0;
    - *Communication Mode*: set according to DUT-GPS capabilities
    - *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
    - *SecurityLevel* as exchanged during commissioning;
    - *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: 0b100);
    - *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;
  - *GPD SrcID* = N;
  - *Endpoint* field absent;
  - *Sink IEEE address* and *Sink NWK address* fields:
    - present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
    - absent otherwise;
  - *Sink GroupID* field:
    - present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;
    - present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;
    - absent otherwise;
  - *DeviceID* field - copied from the GPD Commissioning command payload;
  - *GPD security Frame Counter* field – as in GPD Success command;
  - *GPD key* field:
    - present and carrying TH-GPD's OOB key in the clear, if *SecurityLevel* >= 0b10;
    - absent otherwise;
  - *Assigned alias* field:
    - present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise;
  - *Forwarding Radius* field:
    - present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise.

On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD

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ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).
Fail verdict:
1) The DUT-GPS does not send GPDF with GPD Channel Configuration command formatted exactly as specified in pass verdict 1 above; on reception of any of the GPDF with GPD Channel Request command with *Auto-Commissioning* = 0b0. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration*. AND/OR DUT-GPS sends GPDF with GPD Channel Configuration command on reception of any of the GPDF with GPD Channel Request command with *Auto-Commissioning* = 0b1. AND/OR the DUT-GPS does not specify the operational channel in the GPD Channel Request Configuration command. AND/OR Basic Sink does NOT set the *Basic* sub-field to 0b1. AND/OR TH-GPD does NOT accept the Channel Configuration GPDF and does NOT progress to Commissioning GPDF transmission. AND/OR The DUT-GPS does not send GPDF with GPD Commissioning Reply command on reception of any of the GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration*. AND/OR The DUT-GPS does include a key in the Commissioning Reply GPDF,; AND/OR key type is NOT 0b100. AND/OR On reception of GPD Success command, DUT-GPS: • does not provide success indication • and/or: ▪ in case of Communciation Mode != 0b11: does not send Device_annce and/or the Device_annce does not carry IEEE = 0xff..ff and alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00; ▪ in case of Communication Mode = 0b11: does send Device_annce for the alias; • and/or does not send GP Pairing with *AddSink*=0b1 and the appropriate communication mode and security information. AND/OR DUT-GPS does not report a Sink Table entry for the TH-GPD GPD ID N AND/OR all relevant parameters exchanged in the commissioning process are not stored there. AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in 4.4.1.1.4/item 1 above.

982 ***4.4.1.1.5 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF10	Proximity commissioning method	Direct
GPSF2	Transmitting a response GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the request GPDF	Indirect
GPCF2, GPCF3B	Commissioning GPDF	Direct
GPCF4	Bidirectional commissioning	Direct
GPCF5B, GPCF6A GPCF16	In-band bidirectional channel commissioning	Direct
GPCF8A	Commissioning Reply GPDF	Direct
GPCF12A, GPCF13A	Key exchange in Commissioning/Reply GPDF	Direct
GPCF15B	Success GPDF	Direct

983 **4.4.1.2 Unidirectional in-range commissioning**

984 A number of additional tests is included in sections 4.4.1.7.5 (general additional tests), 4.4.4 and 4.4.7 (additional
985 security tests); successful completion of those tests is required to complement the current test.

986 ***4.4.1.2.1 Initial Conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.4.1.1.1.	
3		If GPS supports security, TH-GPD shall provide OOB key TC-LK encryption shall be used.	

987 ***4.4.1.2.2 Test Set-Up***

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The DUT-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

4.4.1.2.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.1	DUT-GPS enters commissioning mode. TH-GPD is triggered to send the Commissioning GPDF with: • MAC Sequence number having a value unrelated to the value of the *GPD outgoing counter* in the Commissioning command payload; • sub-fields of the *NWK Frame Control* field set to: *Frame type* = 0b00, *Auto-Commissioning* = 0b0, • the *Extended NWK Frame Control* field present and its *RxAfterTx* sub-field set to 0b0, and all other fields set as required by the DUT-GPS. • If DUT-GPS supports security, the payload of the GPD Commissioning command carries OOB key (KeyType 0b100), encrypted. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	

4.4.1.2.4 Expected Outcome

Pass verdict:

1) DUT-GPS may send GP Proxy Commissioning Mode command (*Action*=Enter).

On reception of Commissioning GPDF, DUT-GPS:

- does NOT send a Commissioning Reply (since *RxAfterTx* of the received Commissioning GPDF is set to 0b0);
- provides success indication,
- sends out GP Pairing with:
  - APS header fields:
    - ProfileID: 0xA1E0;
    - ClusterID: 0x0021;
    - source endpoint: GPEP (242);
    - destination endpoint, if present: GPEP (242);
  - ZCL header fields:
    - *Command Identifier*: 0x01;
    - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b1 (server to client), *Disable default response* = 0b1;

    ZCL payload fields:
  - Sub-fields of the *Options* field set to:
    - *ApplicationID* = as supported by TH-GPD,
    - *AddSink*=0b1, *RemoveGPD* = 0b0;
    - *Communication Mode*: set according to DUT-GPS capabilities
    - *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
    - *SecurityLevel* as exchanged during commissioning;
    - *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: 0b100);
    - *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;
  - *GPD ID* and *Endpoint* fields according to the *ApplicationID* of TH-GPD;
  - *Sink IEEE address* and *Sink NWK address* fields:
    - present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
    - absent otherwise;
  - *Sink GroupID* field:
    - present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;
    - present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;

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– absent otherwise;
- *DeviceID* field - copied from the GPD Commissioning command payload;
- *GPD security Frame Counter* field – as in GPD Commissioning command;
- *GPD key* field:
  – present and carrying TH-GPD's OOB key in the clear, if *SecurityLevel* >= 0b10;
  – absent otherwise;
- *Assigned alias* field:
  – present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
  – absent otherwise;
- *Forwarding Radius* field:
  – present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
- absent otherwise.

• if DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias and NWK sequence number = 0x00;

if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

Fail verdict:

1) On reception of Commissioning GPDF with RxAfterTx = 0b0, DUT-GPS:

• does send Commissioning Reply GPDF (despite RxAfterTx of the received Commissioning GPDF being set to 0b0),
• does not provide success indication,
• AND/OR does not send out GP Pairing for TH-GPD's GPD ID with *AddSink*=0b1, *RemoveGPD* = 0b0, appropriate communication mode and security level for the DUT-GPS, and other parameters as derived from the Commissioning GPDF (as indicated in 4.4.1.2.4/pass verdict 1 above);
• AND/OR:
  - In case of Communication Mode != 0b11: does not send out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00;
  - In case of Communication Mode = 0b11: does send Device_annce for the alias.

AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters established in the commissioning process.

AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in 4.4.1.2.4/item 1 above.

992 ***4.4.1.2.5 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF10	Proximity commissioning method	Direct
GPCF3B	Rx of Commissioning command	Direct
GPCF12A	GPD key exchange in GPD Commissioning command	Indirect

993 **4.4.1.3 NOT TESTED: Auto-commissioning**

994 ***4.4.1.3.1 Initial Conditions***

995 The required network set-up for the test harness is as follows:

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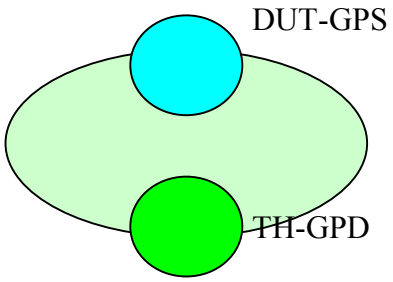	DUT-GPS (GPT, GPT+ or GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports proximity commissioning and SecurityLevel=0b00.
	TH-GPD/TH-Tool	GPD ID = N TH-GPD application functionality matches that of the DUT-GPS's GPEP. TH-GPD is capable of Auto-Commissioning. gpdSecurityLevel = 0b00.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between DUT-GPS and TH-GPD.	
3	[R3] A.3.3.2.6	DUT-GPS is configured with gpsSecurityLevel = 0b00.	

4.4.1.3.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

4.4.1.3.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.3.3.2.2	DUT-GPS enters commissioning mode. TH-GPD is put on the appropriate channel in a device-specific way, and then triggered to send the Data GPDF with *Frame Type* sub-field set to 0b00, and *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1, and the *Extended NWK Frame Control* field not present. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
2	[R3] A.1.4.1.3	***Negative test: both Auto-Commissioning and RxAfterTx set:*** DUT-GPS enters commissioning mode. TH-GPD sends on the operational channel a Data GPDF with *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1, and the RxAfterTx sub-field of the *Extended NWK Frame Control* field set to 0b0. After 2s, TH-GPD sends on the operational channel another Data GPDF with another MAC sequence number, with *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1, and the *RxAfterTx* sub-field of the *Extended NWK Frame Control* field set to 0b1. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	

4.4.1.3.4 Expected Outcome

Pass verdict:
1) DUT-GPS may send GP Proxy Commissioning Mode command (*Action*=Enter).

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On reception of Data GPDF with *Auto-Commissioning* = 0b1, DUT-GPS: • provides success indication, • sends out GP Pairing for TH-GPD's GPD ID with *AddSink*=0b1, *RemoveGPD* = 0b0, appropriate communication mode for the DUT-GPS, *GPD Fixed* = 0b0, *MAC sequence number capabilities* = 0b0, *SecurityLevel* = 0b00; • if DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00; if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there. If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID* ; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).
2) DUT-GPS does NOT send GP Pairing for TH-GPD nor Device_annce. DUT-GPS does NOT have any Sink Table entry nor Translation Table entry for TH-GPD.
Fail verdict:
1) On reception of Data GPDF with *Auto-Commissioning* = 0b1, DUT-GPS: • does not provide success indication, • AND/OR does not send out GP Pairing for TH-GPD's GPD ID with *AddSink*=0b1, *Remove GPD* = 0b0, appropriate communication mode for the DUT-GPS, *GPD Fixed* = 0b0, *MAC sequence number capabilities* = 0b0, *SecurityLevel* = 0b00; • AND/OR: ▪ In case of Communication Mode != 0b11: does not send out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00; ▪ In case of Communication Mode = 0b11: does send Device_annce for the alias. AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters established in the commissioning process. AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in 4.4.1.3.4/item 1 above.
2) DUT-GPS sends GP Pairing for TH-GPD AND/OR Device_annce. AND/OR DUT-GPS creates Sink Table entry AND/OR Translation Table entry for TH-GPD.

4.4.1.3.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF10	Proximity commissioning method	Direct
GPCF1	Commissioning with Auto-commissioning flag	Direct

4.4.1.4 Bidirectional commissioning with PANId request

A number of additional tests is included in sections 4.4.1.7 (additional bidirectional commissioning tests), 4.4.1.7.5 (general additional tests), 4.4.4 and 4.4.7 (additional security tests); successful completion of those tests is required to complement the current test.

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1007 ***4.4.1.4.1 Initial Conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.4.1.1.1.	
3		TH-GPD uses ApplicationID = 0b000 and SrcID = N. TH-GPD shall provide OOB key and request a key; TC-LK encryption shall be used. TH-GPD shall request the PANId, by setting the *PANId request* sub-field of the *Options* field of the GPD Commissioning payload to 0b1.	
4	[R3] A.3.3.3.1, A.3.3.3.2	DUT-GPS does support security. TH-Tool sets the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b000 and the *gpSharedSecurityKey* attribute to 0x00..00.	

1008 ***4.4.1.1.2 Test Set-Up***

1009 The DUT-GPS and TH-GPD shall be in wireless communication proximity.

1010 A packet sniffer shall be observing the communication over the air interface.

1011 ***4.4.1.1.3 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2, A.4.3	DUT-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. After successful exchange of GPD Channel Request and GPD Channel Configuration between the TH-GPD and DUT-GPS, TH-GPD sends on the operational channel Commissioning GPDF with: • *Frame Type* = 0b00, *Auto-Commissioning* = 0b0 • *RxAfterTx* set to 0b1 • the *PANId request* sub-field of the *Options* field of the GPD Commissioning payload set to 0b1 • *GP Security Key request* sub-field = 0b1, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1 and carrying the TH-GPD's OOB key, encrypted (MIC present); *GPD outgoing counter* field present. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS.	

1012 ***4.4.1.1.4 Expected Outcome***

Pass verdict:
1) DUT-GPS may send GP Proxy Commissioning Mode command (*Action*=Enter). Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command, the DUT-GPS sends GPDF carrying GPD Commissioning Reply command with the following settings in the command payload: ▪ sub-field of the *Options* field set to: – *PANID present* = 0b1; – *GPD security key present* = 0b0; – *GPD key encryption* = 0b0; – *SecurityLevel* – as requested by the TH-GPD in the Commissioning GPDF; – *KeyType* = 0b100; ▪ *PANId* field present and set to the PANId of the DUT-GPS network; ▪ *GPD security key* field included (encrypted) and *GPD Key MIC* included ▪ *Frame Counter* field present and carrying the frame counter used for the key encryption. The transmission SHALL NOT exceed *gpTxDuration*. On reception of the GPD Commissioning Reply command, TH-GPD sends GPD Success command, correctly protected and with MAC Destination PANId set to the PANId of DUT-GPS network.

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DUT-GPS sends GP Pairing for TH-GPD, with *AddSink* = 0b1 and all the relevant commissioning information. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there (incl. OOB key, KeyType 0b100).
Fail verdict:
1) The DUT-GPS does not send GPDF with GPD Commissioning Reply command on reception of any of the GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration*. AND/OR The DUT-GPS does include the shared key in the Commissioning Reply GPDFAND/OR key type is NOT 0b100. AND/OR The DUT-GPS does NOT include the PANID in the Commissioning Reply GPDFAND/OR the PANId value is not that of the DUT-GPS network. AND/OR DUT-GPS does NOT send GP Pairing for TH-GPD, with *AddSink* = 0b1 and all the relevant commissioning information. AND/OR DUT-GPS does not report a Sink Table entry for the TH-GPD GPD ID N AND/OR all the relevant parameters exchanged in the commissioning process (incl. OOB key, KeyType 0b100) are NOT stored there.

4.4.1.5 Bidirectional commissioning with shared key requested & delivered, ApplicationID = 0b010

A number of additional tests is included in sections 4.4.1.7 (additional bidirectional commissioning tests), 4.4.1.7.5 (general additional tests), 4.4.4 and 4.4.7 (additional security tests); successful completion of those tests is required to complement the current test.

4.4.1.5.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between DUT-GPS and TH-GPD.	
3		TH-GPD uses ApplicationID = 0b010, GPD IEEE address = N and Endpoint X. If GPS supports security, TH-GPD shall provide OOB key and request a key; TC-LK encryption shall be used. Initially, TH-GPD has no shared key.	
4	[R3] A.3.3.3.1, A.3.3.3.2	TH-Tool sets the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b010 and the *gpSharedSecurityKey* attribute to 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf.	

4.4.1.5.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

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1024 ***4.4.1.5.3 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2, A.4.3	DUT-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. The TH-GPD first sends Channel Request GPDF with: • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *Auto-Commissioning*: – 0b0, if the GPD Channel Request transmission is immediately followed by reception window; – 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel ▪ *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent; • the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* are absent. The TH-GPD is configured such, that the DUT-GPS has to deliver the GPD Channel Configuration on a channel other than the operational channel. After reception of Channel Configuration GPDF the TH-GPD sends Commissioning GPDF with: • MAC header Source address field carrying GPD IEEE address N; • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b00, ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b1; • the sub-fields of the *Extended NWK Frame Control* field set to: ▪ *ApplicationID* = 0b010; ▪ *RxAfterTx* set to 0b1; • *SrcID* field absent; • *Endpoint* = X; • and if DUT-GPS requires security, with the following settings in the command payload: ▪ *GP Security Key request* = 0b1, ▪ *GPDkeyEncryption* = 0b1; ▪ *GPDkeyPresent* = 0b1; ▪ the fields *GPD Key* and *GPD Key MIC* present; ▪ *GPD outgoing counter* field present. After reception of Commissioning Reply GPDF the TH-GPD sends Success GPDF with: • *ApplicationID* = 0b010, MAC header Source Address = GPD IEEE address N, SrcID absent; *Endpoint* = X; • the sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • the sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* = 0b010, *RxAfterTx* set to 0b0 • correctly protected with the security level and key as in Commissioning Reply; and the security frame counter higher than in the payload of the GPD Commissioning command. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	Note: it is absolutely necessary to test that the GPS can deliver the GPD Channel Configuration on a channel other than the operational channel of the network.

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1025 ***4.4.1.5.4 Expected Outcome***

Pass verdict:

1) DUT-GPS may send GP Proxy Commissioning Mode command.

Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with GPD Channel Request command, the DUT-GPS sends at least one GPDF with:

- the sub-fields of the *NWK Frame Control* field set to:
  - *Frame Type* = 0b01,
  - *ZigBee Protocol Version* = 0x3;
  - *Auto-Commissioning* = 0b0;
  - *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent;
- the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* are absent.
- GPD Channel Configuration command, carrying:
  - the operational channel
  - the *Basic* sub-field set 0b0 for Basic combo.

The transmission SHALL NOT exceed *gpTxDuration*.

Before delivery of the Channel Configuration GPDF, the DUT-GPS may send GP Response with its own address in the *TempMasterShortAddress* field.

Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command with - if DUT-GPS supports security, with *GP Security Key request* = 0b1, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1- the DUT-GPS sends at least one GPDF carrying GPD Commissioning Reply command, with:

- MAC header Destination address field carrying GPD IEEE address N;
- the sub-fields of the *NWK Frame Control* field set to:
  - *Frame Type* = 0b00,
  - *ZigBee Protocol Version* = 0x3;
  - *Auto-Commissioning* = 0b0;
  - *NWK Frame Control Extension* = 0b1
- the sub-fields of the *Extended NWK Frame Control* field set to:
  - *ApplicationID* = 0b010;
  - *RxAfterTx* set to 0b0;
  - *Direction* = 0b1.
- *SrcID* field absent;
- *Endpoint* = X;
- with the following settings in the command payload:
  - sub-field of the *Options* field set to:
    - *GPD security key present* = 0b1;
    - *GPD key encryption* = 0b1;
    - *SecurityLevel* – as requested by the TH-GPD in the Commissioning GPDF;
    - *KeyType* = 0b010;
  - *GPD security key* field carrying the GPD Group key 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf, correctly encrypted;
  - *GPD Key MIC* present;
  - *Frame Counter* field present and carrying the frame counter used for the key encryption.

The transmission SHALL NOT exceed *gpTxDuration*.

Before delivery of the Commissioning Reply GPDF, the DUT-GPS may send GP Response with its own address in the *TempMasterShortAddress* field.

DUT-GPS accepts GPD Success command, if correctly protected, i.e. if *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) value is not reset (unless the frame counter value in the payload of the Commissioning GPDF was > 0x80000000).

On reception of at least one GPD Success command, DUT-GPS:

- provides success indication,

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- if DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00;
  if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent;
- sends out GP Pairing with:
  - APS header fields:
    - ProfileID: 0xA1E0;
    - ClusterID: 0x0021;
    - source endpoint: GPEP (242);
    - destination endpoint, if present: GPEP (242);
  - ZCL header fields:
    - *Command Identifier*: 0x01;
    - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b1 (server to client), *Disable default response* = 0b1;

  ZCL payload fields:
  - Sub-fields of the *Options* field set to:
    - *ApplicationID* = 0b010, *AddSink*=0b1, *RemoveGPD* = 0b0;
    - *Communication Mode*: set according to DUT-GPS capabilities
    - *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
    - *SecurityLevel* as exchanged during commissioning;
    - *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: *gpSharedSecurityKeyType* = 0b010);
    - *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;
  - GPD IEEE address = N;
  - *Endpoint* field present and set to X or 0xff;
  - *Sink IEEE address* and *Sink NWK address* fields:
    - present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
    - absent otherwise;
  - *Sink GroupID* field:
    - present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;
    - present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;
    - absent otherwise;
  - *DeviceID* field - copied from the GPD Commissioning command payload;
  - *GPD security Frame Counter* field – as in GPD Success command;
  - *GPD key* field:
    - present and carrying *gpSharedSecurityKey* being GPD Group Key in the clear, if *SecurityLevel* >= 0b10;
    - absent otherwise;
  - *Assigned alias* field:
    - present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise;
  - *Forwarding Radius* field:
    - present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise.

On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with ApplicationID = 0b010) and/or entries for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

Fail verdict:

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1) The DUT-GPS does not send GPDF with GPD Channel Configuration command on reception of any of the GPDF with GPD Channel Request command with *Auto-Commissioning* = 0b0, formatted exactly as specified in pass verdict 1 above. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration*.
AND/OR DUT-GPS sends GPDF with GPD Channel Configuration command on reception of any of the GPDF with GPD Channel Request command with *Auto-Commissioning* = 0b1.

AND/OR the DUT-GPS does not specify the operational channel in the GPD Channel Configuration command.

AND/OR Basic Sink does NOT set the *Basic* sub-field to 0b1.

AND/OR TH-GPD does not accept the Channel Configuration GPDF and does not progress to Commissioning GPDF transmission.
AND/OR The DUT-GPS does not send GPDF with GPD Commissioning Reply command on reception of any of the GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration*.
AND/OR The DUT-GPS does not provide the GPD Group key 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf, key type 0b010 in the Commissioning Reply GPDF correctly encrypted (MIC field present), if requested in Commissioning GPDF by setting sub-fields to *GP Security Key request* = 0b1, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1.
AND/OR On reception of GPD Success command, DUT-GPS:

- does not provide success indication
- and/or:
  - in case of Communciation Mode != 0b11: does not send Device_annce and/or the Device_annce does not carry IEEE = 0xff..ff and alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias. NWK sequence number = 0x00 and APS Counter = 0x00;
  - in case of Communication Mode = 0b11: does send Device_annce for the alias;
- and/or does not send GP Pairing with *AddSink*=0b1 and the appropriate communication mode and security information.

AND/OR DUT-GPS does not report a Sink Table entry for the TH-GPD GPD ID N AND/OR all relevant parameters exchanged in the commissioning process are NOT stored there.

AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in pass verdict 1 above.

4.4.1.6 Bidirectional commissioning with OOB key (shared key not available, and not requested), ApplicationID = 0b010

A number of additional tests is included in sections 4.4.1.7 (additional bidirectional commissioning tests), 4.4.1.7.5 (general additional tests), 4.4.4 and 4.4.7 (additional security tests); successful completion of those tests is required to complement the current test.

4.4.1.6.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between DUT-GPS and TH-GPD.	
3		TH-GPD uses ApplicationID = 0b010, GPD IEEE address = N and Endpoint X. If GPS supports security, TH-GPD shall provide OOB key and NOT request a key; TC-LK encryption shall be used.	
4	[R3] A.3.3.3.1, A.3.3.3.2	If GPS supports security, TH-Tool sets the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b000 and the *gpSharedSecurityKey* attribute to 0x00..00.	

4.4.1.6.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

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1035 ***4.4.1.6.3 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2, A.4.3	DUT-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. The TH-GPD first sends Channel Request GPDF with: • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *Auto-Commissioning*: – 0b0, if the GPD Channel Request transmission is immediately followed by reception window; – 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel ▪ *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent; • the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* are absent. The TH-GPD is configured such, that the DUT-GPS has to deliver the GPD Channel Configuration on a channel other than the operational channel. After reception of Channel Configuration GPDF the TH-GPD sends Commissioning GPDF with: • MAC header Source address field carrying GPD IEEE address N; • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b00, ▪ *Auto-Commissioning* = 0b0; ▪ *NWK Frame Control Extension* = 0b1; • the sub-fields of the *Extended NWK Frame Control* field set to: ▪ *ApplicationID* = 0b010; ▪ *RxAfterTx* set to 0b1; • *SrcID* field absent; • *Endpoint* = X; • and if DUT-GPS requires security, with the following settings in the command payload: ▪ *GP Security Key request* = 0b0, ▪ *GPDkeyEncryption* = 0b1; ▪ *GPDkeyPresent* = 0b1; ▪ the fields *GPD Key* and *GPD Key MIC* present; ▪ *GPD outgoing counter* field present. After reception of Commissioning Reply GPDF the TH-GPD sends Success GPDF with: • *ApplicationID* = 0b010, MAC header Source Address = GPD IEEE address N, SrcID absent; *Endpoint* = X; • the sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • the sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* = 0b010, *RxAfterTx* set to 0b0 • correctly protected with the security level and key as in Commissioning Reply; and the security frame counter higher than in the payload of the GPD Commissioning command. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	Note: it is absolutely necessary to test that the GPS can deliver the GPD Channel Configuration on a channel other than the operational channel of the network.

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1036 ***4.4.1.6.4 Expected Outcome***

Pass verdict:

1) DUT-GPS may send GP Proxy Commissioning Mode command.

Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with GPD Channel Request command, the DUT-GPS sends at least one GPDF with:

- the sub-fields of the *NWK Frame Control* field set to:
  - *Frame Type* = 0b01,
  - *ZigBee Protocol Version* = 0x3;
  - *Auto-Commissioning* = 0b0;
  - *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent;
- the fields *GPD SrcID, Endpoint, Security frame counter* and *MIC* are absent.
- GPD Channel Configuration command, carrying:
  - the operational channel
  - the *Basic* sub-field set 0b0 for Basic combo.

The transmission SHALL NOT exceed *gpTxDuration*.

Before delivery of the Channel Configuration GPDF, the DUT-GPS may send GP Response with its own address in the *TempMasterShortAddress* field.

Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command with - if DUT-GPS supports security, with *GP Security Key request* = 0b1, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1- the DUT-GPS sends at least one GPDF carrying GPD Commissioning Reply command, with:

- MAC header Destination address field carrying GPD IEEE address N;
- the sub-fields of the *NWK Frame Control* field set to:
  - *Frame Type* = 0b00,
  - *ZigBee Protocol Version* = 0x3;
  - *Auto-Commissioning* = 0b0;
  - *NWK Frame Control Extension* = 0b1
- the sub-fields of the *Extended NWK Frame Control* field set to:
  - *ApplicationID* = 0b010;
  - *RxAfterTx* set to 0b0;
  - *Direction* = 0b1.
- *SrcID* field absent;
- *Endpoint* = X;
- with the following settings in the command payload:
  - sub-field of the *Options* field set to:
    - *GPD security key present* = 0b0;
    - *GPD key encryption* = 0b0;
    - *SecurityLevel* – as requested by the TH-GPD in the Commissioning GPDF;
    - *KeyType* = 0b100;
  - *GPD security key* absent;
  - *GPD Key MIC* absent;
  - *Frame Counter* field absent.

The transmission SHALL NOT exceed *gpTxDuration*.

Before delivery of the Commissioning Reply GPDF, the DUT-GPS may send GP Response with its own address in the *TempMasterShortAddress* field.

DUT-GPS accepts GPD Success command, if correctly protected, i.e. if *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) value is not reset (unless the frame counter value in the payload of the Commissioning GPDF was > 0x80000000).

On reception of at least one GPD Success command, DUT-GPS:

- provides success indication,
- if DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): sends out Device_annce for the alias (assigned, if it was included in the GP Pairing

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command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00;
if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent;

- sends out GP Pairing with:
  - APS header fields:
    - ProfileID: 0xA1E0;
    - ClusterID: 0x0021;
    - source endpoint: GPEP (242);
    - destination endpoint, if present: GPEP (242);
  - ZCL header fields:
    - *Command Identifier*: 0x01;
    - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b1 (server to client), *Disable default response* = 0b1;

  ZCL payload fields:
  - Sub-fields of the *Options* field set to:
    - *ApplicationID* = 0b010, *AddSink*=0b1, *RemoveGPD* = 0b0;
    - *Communication Mode*: set according to DUT-GPS capabilities
    - *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
    - *SecurityLevel* as exchanged during commissioning;
    - *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: 0b100);
    - *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;
  - GPD IEEE address = N;
  - *Endpoint* present and set to X or 0xff;
  - *Sink IEEE address* and *Sink NWK address* fields:
    - present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
    - absent otherwise;
  - *Sink GroupID* field:
    - present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;
    - present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;
    - absent otherwise;
  - *DeviceID* field - copied from the GPD Commissioning command payload;
  - *GPD security Frame Counter* field – as in GPD Success command;
  - *GPD key* field:
    - present and TH-GPD OOB key in the clear, if *SecurityLevel* >= 0b10;
    - absent otherwise;
  - *Assigned alias* field:
    - present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise;
  - *Forwarding Radius* field:
    - present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise.

On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with ApplicationID = 0b010) and/or entries for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

Fail verdict:

1) The DUT-GPS does not send GPDF with GPD Channel Configuration command on reception of any of the GPDF with GPD Channel Request command with *Auto-Commissioning* = 0b0, formatted exactly as specified in pass verdict 1 above. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and

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gpTxOffset+gpMaxTxOffsetVariation ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration*.
AND/OR DUT-GPS sends GPDF with GPD Channel Configuration command on reception of any of the GPDF with GPD Channel Request command with *Auto-Commissioning* = 0b1.

AND/OR the DUT-GPS does not specify the operational channel in the GPD Channel Configuration command.

AND/OR Basic Sink does NOT set the *Basic* sub-field to 0b1.

AND/OR TH-GPD does not accept the Channel Configuration GPDF and does not progress to Commissioning GPDF transmission.
AND/OR The DUT-GPS does not send GPDF with GPD Commissioning Reply command on reception of any of the GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration*.
AND/OR The DUT-GPS does include the shared key in the Commissioning Reply GPDF correctly encrypted (MIC field present) AND/OR key type is NOT 0b100.
AND/OR On reception of GPD Success command, DUT-GPS:

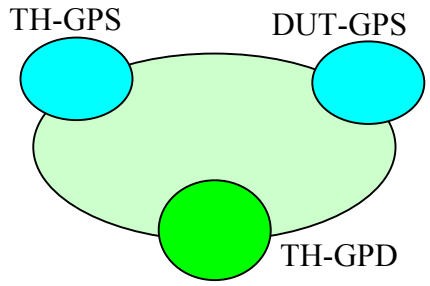
- does not provide success indication
- and/or:
  - in case of Communication Mode != 0b11: does not send Device_annce and/or the Device_annce does not carry IEEE = 0xff..ff and alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias. NWK sequence number = 0x00 and APS Counter = 0x00;
  - in case of Communication Mode = 0b11: does send Device_annce for the alias;
- and/or does not send GP Pairing with *AddSink*=0b1 and the appropriate communication mode and security information.

AND/OR DUT-GPS does not report a Sink Table entry for the TH-GPD GPD ID N AND/OR all relevant parameters exchanged in the commissioning process are NOT stored there.

AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in pass verdict 1 above.

4.4.1.7 Bidirectional proximity commissioning: additional tests

4.4.1.7.1 Initial Conditions



DUT-GPS (GPT, GPT+, GPC, GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports proximity commissioning.
TH-GPS	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N GPD security usage according to DUT-GPS capabilities; TH-GPD application functionality matches that of the DUT-GPS's GPEP. TH-GPD implements bidirectional commissioning procedure.

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.4.1.1.1.	

4.4.1.7.2 Test Set-Up

The DUT-GPS, TH-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

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1042 ***4.4.1.7.3 Test Procedure***

Item	Doc. Ref.	Test Step	Note
		Negative tests	
1A	[R3] A.3.9, A.3.3.5.3, A.3.3.4.4, A.3.3.5.4, A.3.3.5.2, A.3.4.2.2	Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends on the operational channel a correctly formatted GPD Channel Request with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1; • *Channel Toggling Behavior* field listing a channel other than the operational channel. ***Negative test: Channel Request on the operational channel:*** Asap within the 5s *TransmitChannel* timeout, make the TH-GPD send Channel Request GPDF on the operational channel, with: • *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, • *Auto-Commissioning* = 0b0, • *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field absent, • *GPD SrcID* field, *Endpoint*, *Security frame counter* and *MIC* field absent.	
1B	[R3] A.1.4.1.2	***Handling on Auto-Commissioning flag in GPD Channel Request:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends on the operational channel a correctly formatted GPD Channel Request with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1; • *Channel Toggling Behavior* field listing the operational channel. Within 5s *TransmitChannel* timeout, TH-GPD sends on the operational channel a correctly formatted GPD Channel Request with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1; • *Channel Toggling Behavior* field listing the operational channel. Within 5s *TransmitChannel* timeout, TH-GPD sends on the operational channel a correctly formatted GPD Channel Request with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0; • *Channel Toggling Behavior* field listing the operational channel.	
1C		***Handling on Auto-Commissioning flag in GPD Channel Request on TransmitChannel:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends on the operational channel a correctly formatted GPD Channel Request with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1; • *Channel Toggling Behavior* field listing a channel X other than the operational channel. Within 5s *TransmitChannel* timeout, TH-GPD sends on the *TransmitChannel* X a correctly formatted GPD Channel Request with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1; • *Channel Toggling Behavior* field listing channel X. Within 5s *TransmitChannel* timeout, TH-GPD sends on the *TransmitChannel* X a correctly formatted GPD Channel Request with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0; • *Channel Toggling Behavior* field listing channel X.	

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1D		***State test (Channel Request):*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends on the operational channel a correctly formatted GPD Channel Request with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1; • *Channel Toggling Behavior* field listing the operational channel. within the 5s *TransmitChannel* timeout, TH-GPD sends on the operational channel a correctly formatted GPD Channel Request with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0; • *Channel Toggling Behavior* field listing the operational channel. After DUT-GPS sends GPD Channel Configuration command to the TH-GPD, TH-GPD sends correctly formatted Channel Request GPDF on the operational channel with *Auto-Commissioning* = 0b0.	
2A		***State test (Commissioning):*** Clear Sink Table of DUT-GPS. Set *gpSharedSecurityKeyType* of DUT-GPS to 0b010, and *gpSharedSecurityKey* of DUT-GPS to a non-zero value. Set *gpsCommissioningModeExit* to 0x02 (first pairing success). DUT-GPS enters commissioning mode. After successful exchange of GPD Channel Request and GPD Channel Configuration between the TH-GPD and DUT-GPS, TH-GPD sends two, spaced at least 1 second apart, GPD Commissioning command with *RxAfterTx* = 0b1 and *Security Key Request* sub-field of the *Options* field set to 0b1 and *GPD key encryption* sub-field of the *Extended Options* field set to 0b1, and with application and security settings as supported by the DUT-GPS. On receipt of GPD Commissioning Reply, TH-GPD sends Commissioning GPDF, formatted as before.	
2B		On receipt of GPD Commissioning Reply, TH-GPD sends correctly protected GPD Success command. Read out Sink Table entry of the DUT-GPS.	
2C		***Confirm DUT-GPS exited commissioning mode:*** TH-GPD sends correctly formatted and protected Success GPDF.	
		Additional tests	
3	[R3] A.3.9.1, A.1.4.1	***Negative test: reception of Data GPDF carrying Channel Request:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends on the operational channel a correctly formatted GPD Channel Request with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1; • *Channel Toggling Behavior* field listing the operational channel. Within 5s, TH-GPD sends on the operational channel: • Channel Request GPDF, using Frame Type = 0b00 (Data frame), with *Extended NWK Frame Control* field absent, SrcID = 0x00000000. • Channel Request GPDF, with Frame Type = 0b01 (Maintenance frame), but using *ZigBeeProtocolVersion* = 0x2; • Channel Request GPDF, with *Frame* Type = 0b01 (Maintenance frame), but using *NWK Frame Control Extension* sub-field set to 0b1; and with *Extended NWK Frame Control* field present.	

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4		***Negative test: reception of GPDF other than Channel Request on TransmitChannel:*** ***(following step 3, within the commissioning window of DUT-GPS)*** TH-GPD sends on the operational channel a Channel Request GPDF, listing channel other than the operational channel in both *Rx channel in the (second) next attempt* sub-fields. Within the TransmitChannel 5s timeout, TH-GPD sends on the TransmitChannel channel: • Channel Configuration GPDF with *Auto-Commissioning* = 0b0; • Commissioning GPDF with *RxAfterTx* = 0b1. • Commissioning GPDF with *RxAfterTx* = 0b0, • Success GPDF, • Finally (still within the 5s timeout), Channel Request GPDF with *Auto-Commissioning* = 0b0.	Monitoring on both operational and *TransmitChannel* required
5		***Negative test: reception of Commissioning GPDF with Auto-Commissioning sub-field 0b1:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. After successful exchange of GPD Channel Request and GPD Channel Configuration between the TH-GPD and DUT-GPS, TH-GPD sends a GPD Commissioning command with *RxAfterTx* = 0b1 with application and security settings as supported by the DUT-GPS. Then, TH-GPD sends on the operational channel: • and then a Commissioning GPDF, with *Auto-Commissioning* sub-field set to 0b1 and *RxAfterTx* sub-field set to 0b1, • and then a Commissioning GPDF, with *Auto-Commissioning* sub-field set to 0b1 and *RxAfterTx* sub-field set to 0b0, • and then a Success GPDF, with *Auto-Commissioning* sub-field set to 0b1 and *RxAfterTx* sub-field set to 0b0, • and finally a Commissioning GPDF, with *Auto-Commissioning* sub-field set to 0b0 and *RxAfterTx* sub-field set to 0b1,	
Incorrectly protected Success GPDF (if sink supports security)			
6A		***Negative test: GPD Success incorrectly protected:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. After exchange of GPD Channel Request and GPD Channel Configuration commands, TH-GPD and DUT-GPS sends on the operational channel of DUT-GPS a Commissioning GPDF *ApplicationID* = 0b010, with all settings as supported by DUT-GPS. DUT-GPS responds with GPD Commissioning Reply, with the settings as requested by the TH-GPD. TH-GPD sends unprotected GPD Success. Read out Sink Table of DUT-GPS.	
6B		***Negative test: GPD Success incorrectly protected:*** TH-GPD sends GPD Success protected with frame counter value lower than that of the last GPD Commissioning command. Read out Sink Table of DUT-GPS.	Immediately after 6A, within commissioning window of DUT-GPS
6C		***Negative test: GPD Success incorrectly protected:*** TH-GPD sends GPD Success protected correctly, but with incorrect key type (individual vs. shared) indicted in the NWK Extended FC. Read out Sink Table of DUT-GPS.	Immediately after 6B, within commissioning window of DUT-GPS

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6D		***Negative test: GPD Success incorrectly protected:*** TH-GPD sends GPD Success protected correctly, but with incorrect key value (i.e. wrong MIC). Read out Sink Table of DUT-GPS.	Immediately after 6C, within commissioning window of DUT-GPS
6E		***Negative test: GPD Success incorrectly protected:*** TH-GPD sends GPD Success protected correctly, but sent with incorrect GPD ID value (!=N). Read out Sink Table of DUT-GPS.	Immediately after 6D, within commissioning window of DUT-GPS
6F	[R3] A.1.7.5, A.3.9.1, A.4.2.1.2	***Negative test: Not accepting reset frame counter in Success GPDF:*** TH-GPD sends GPD Success command correctly protected, but with reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) value 0x00000000. Read out Sink Table entry of the DUT-GPS.	Immediately after 6E, within commissioning window of DUT-GPS
6G		***Negative test: Unexpected GPD Success:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends GPD Success, correctly protected with the GPD shared key. Read out Sink Table of DUT-GPS.	
6H		***Negative test: GPD Success incorrectly protected, ApplicationID = 0b010:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. Perform commissioning between DUT-GPS and TH-GPD. Upon reception of the GPD Commissioning Reply command, with the settings as requested by the TH-GPD, TH-GPD sends GPD Success protected correctly, but with incorrect key value (i.e. wrong MIC). Read out Sink Table of DUT-GPS.	
6I		TH-GPD sends GPD Success protected correctly, but with incorrect GPD IEEE address value (!=N). Read out Sink Table of DUT-GPS.	
6J		TH-GPD sends GPD Success protected correctly, but with incorrect Endpoint Y (!=X, !=0x00, !=0xff). Read out Sink Table of DUT-GPS.	
Conditional on DUT-GPS NOT being capable of immediate response (PICS item GPSF2 NOT supported): TempMaster behavior			
7A		Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends GPD Channel Request, indicating *TxChannel* = operational channel. Within 5s, TH-GPS broadcasts a GP Response for SrcID = 0x00000000, carrying GPD Channel Configuration, with *TempMasterShortAddress* NOT equal to the network address of DUT-GPS. Make TH-GPD send correctly formatted GPD Channel Request on the operational channel.	
7B		Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends GPD Channel Request, indicating *TxChannel* = operational channel. Within 5s, TH-GPS broadcasts a GP Response for SrcID != 0x00000000, carrying GPD Channel Configuration, and with *TempMasterShortAddress* NOT equal to the network address of DUT-GPS. Make TH-GPD send correctly formatted GPD Channel Request.	

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7C		Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. After successful exchange of GPD Channel Request and GPD Channel Configuration between the TH-GPD and DUT-GPS, TH-GPD sends a GPD Commissioning command with *RxAfterTx* = 0b1 with application and security settings as supported by the DUT-GPS. Within 5s, TH-GPS broadcasts a GP Response, for GPD ID of TH-GPD, but with *TempMasterShortAddress* NOT equal to the network address of DUT-GPS. Make TH-GPD send correctly formatted GPD Commissioning with *RxAfterTx* = 0b1.	
7D		Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. After successful exchange of GPD Channel Request and GPD Channel Configuration between the TH-GPD and DUT-GPS, TH-GPD sends a GPD Commissioning command with *RxAfterTx* = 0b1 with application and security settings as supported by the DUT-GPS. Within 5s, TH-GPS broadcasts a GP Response, for GPD ID NOT equal to that of TH-GPD, and with *TempMasterShortAddress* NOT equal to the network address of DUT-GPS. Make TH-GPD send correctly formatted GPD Commissioning with *RxAfterTx* = 0b1.	
TempMaster timing			
8A		Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends GPD Channel Request on the operational channel, indicating *TxChannel* = X NOT equal to the operational channel. At approx. 4.8 seconds after transmission of the first GPD Channel Request, make TH-GPD send correctly formatted GPD Channel Request on channel X.	
8B		Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends GPD Channel Request on the operational channel, indicating *TxChannel* = X NOT equal to the operational channel. At approx. 5.1 seconds after transmission of the GP Response, make TH-GPD send correctly formatted GPD Channel Request on channel X.	
8C		***Conditional on DUT-GPS NOT being capable of immediate response (PICS item GPSF2 NOT supported):*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends GPD Channel Request, indicating *TxChannel* = X NOT equal to the operational channel. At approx. 5.1 seconds after transmission of the GP Response, make TH-GPD send correctly formatted GPD Channel Request on the operational channel; the MAC sequence number is different than that in the previous Channel Request GPDF.	
No possibility to establish a security key:			
9A		***Negative test: No possibility to establish a security key:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. After exchange of GPD Channel Request and GPD Channel Configuration commands, TH-GPD sends on the operational channel of DUT-GPS a Commissioning GPDF with all settings as supported by DUT-GPS, only with *SecurityLevelCapabilities* sub-field of the *Extended Options* field set to >=0b10, the *GPD Key present* sub-field of the *Extended Options* field set to 0b0, the *GP security Key request* sub-field of the *Options* field set to 0b0, and	

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		the *GPD Key field* absent. Read out Sink Table of DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
GPD ID = 0x00..00			
10A		***Negative test: SrcID = 0x00000000;*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. Perform commissioning between DUT-GPS and TH-GPD. Upon reception of the GPD Channel Configuration command, TH-GPD sends GPD Commissioning command, with all settings as required by the DUT-GPS, but with *ApplicationID* = 0b000 and with SrcID set to 0x00000000, and then another one, after ~2sec.	
10B)		***Negative test: IEEE = 0x0000000000000000;*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. Perform commissioning between DUT-GPS and TH-GPD. Upon reception of the GPD Channel Configuration command, TH-GPD sends GPD Commissioning command, will all settings as required by the DUT-GPS, but with ApplicationID = 0b010 and with MAC header Source address set to 0x0000000000000000, and then another one, after ~2sec.	

1043 ***4.4.1.7.4 Expected Outcome***

Pass verdict:
1A) DUT-GPS does NOT send GPD Channel Configuration on the operational channel.
1B) DUT-GPS only sends GPD Channel Configuration on the operational channel upon reception of GPD Channel Request with *Auto-Commissioning* = 0b0.
1C) DUT-GPS only sends GPD Channel Configuration on the *TransmitChannel* upon reception of GPD Channel Request with *Auto-Commissioning* = 0b0.
1D) On receipt of the GPD Channel Request following the sending of the GPD Channel Configuration, DUT-GPS sends another GPD Channel Configuration, indicating the operational channel.
2A) On receipt of the GPD Commissioning command following the sending of the GPD Commissioning Reply, DUT-GPS sends another correctly formatted GPD Commissioning Reply command, carrying the GPD shared key as configured at the beginning of the test step.
2B) DUT-GPS sends GP Pairing for TH-GPD, with all the settings (incl. shared key) as exchanged during the commissioning process in step 2A. If Communication Mode of the Options field of the GP Pairing is set to a value other than 0b11, DUT-GPS sends Device_annce for the GPD alias. DUT-GPS has a Sink Table entry for the TH-GPD, with all relevant pairing information as exchanged during the commissioning process in step 2A.
2C) DUT-GPS does NOT send another GP Pairing command nor another Device_annce for GPD alias.
3) DUT-GPS does NOT send a GPD Channel Configuration on reception of the GPD Channel Request with FrameType = 0b00.
4) Only after reception of the Channel Request GPDF with *Auto-Commissioning* = 0b0 on the TransmitChannel, the DUT-GPS sends GPD Channel Configuration on the TransmitChannel.
5) Only after reception of the Commissioning GPDF with *Auto-Commissioning* = 0b0 and *RxAfterTx* = 0b1, the DUT-GPS sends GPD Commissioning Reply, correctly formatted.
6A) – 6E) DUT-GPS does NOT send GP Pairing for DUT-GPD, does NOT create Sink Table nor Translation Table entry for GPD ID N.
6F) DUT-GPS does NOT accept either GPD Success command with the reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11); it does NOT send Device_annce or GP Pairing command. DUT-GPS does NOT have a Sink Table entry for the GPD ID N.

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6G) – 6J) DUT-GPS does NOT send GP Pairing for DUT-GPD, does NOT create Sink Table nor Translation Table entry for GPD ID N.
7A) On receipt of the second GPD Channel Request command, DUT-GPS does NOT send a GPD Channel Configuration command, correctly formatted.
7B) On receipt of the second GPD Channel Request command, DUT-GPS does send a GPD Channel Configuration command, correctly formatted.
7C) On receipt of the second GPD Commissioning command, DUT-GPS does NOT send to TH-GPD a GPD Commissioning Reply, correctly formatted.
7D) On receipt of the second GPD Commissioning command, DUT-GPS does send to TH-GPD a GPD Commissioning Reply, correctly formatted.
8A) DUT-GPS does send GPD Channel Configuration on TransmitChannel X.
8B) DUT-GPS does NOT send GPD Channel Configuration on TransmitChannel X.
8C) DUT-GPS does NOT send GPD Channel Configuration on the operational channel.
9A) DUT-GPS does NOT send GP Pairing for DUT-GPD, does NOT create Sink Table nor Translation Table entry for GPD ID N.
10A) - 10B) DUT-GPS does NOT send Commissioning Reply GPDF for DUT-GPD.
Fail verdict:
1A) DUT-GPS sends GPD Channel Configuration on the operational channel.
1B) DUT-GPS does NOT send GPD Channel Configuration on the operational channel upon reception of GPD Channel Request with *Auto-Commissioning* = 0b0 AND/OR sends GPD Channel Configuration on the operational channel upon reception of GPD Channel request with *Auto-Commissioning* = 0b1 AND/OR GPD Channel Configuration does not carry the operational channel of the network.
1C) DUT-GPS does NOT send GPD Channel Configuration on the *TransmitChannel* upon reception of GPD Channel Request with *Auto-Commissioning* = 0b0 AND/OR sends GPD Channel Configuration on TransmitChannel upon reception of GPD Channel request with *Auto-Commissioning* = 0b1 AND/OR GPD Channel Configuration does not carry the operational channel of the network.
1D) On receipt of the GPD Channel Request following the sending of the GPD Channel Configuration, DUT-GPS does NOT sends another GPD Channel Configuration AND/OR the Channel Configuration content is incorrect.
2A) On receipt of the GPD Commissioning command following the sending of the GPD Commissioning Reply, DUT-GPS does NOT send another correctly formatted GPD Commissioning Reply command AND/OR the GPD Commissioning Reply does NOT carry the GPD shared key as configured at the beginning of the test step.
2B) DUT-GPS does NOT send a GP Pairing for TH-GPD, with all the settings (incl. shared key) as exchanged during the commissioning process in step 2A. AND/OR DUT-GPS does NOT send Device_annce for the GPD alias if Communciation Mode != 0b11 OR DUT-GPS does send Device_annce for GPD alias if Communication Mode = 0b11. AND/OR DUT-GPS does NOT have a Sink Table entry for the TH-GPD, with all relevant pairing information as exchanged during the commissioning process in step 2A.
2C) DUT-GPS sends another GP Pairing command AND/OR another Device_annce for GPD alias.
3) DUT-GPS sends a GPD Channel Configuration on reception of the GPD Channel Request with FrameType = 0b00.
4) DUT-GPS does NOT send GPD Channel Configuration on the TransmitChannel after reception of the Channel Request GPDF with *Auto-Commissioning* = 0b0 on the TransmitChannel. AND/OR DUT-GPS does send GPD Channel Configuration on the TransmitChannel after reception of any prior frames.
5) DUT-GPS does NOT send GPD Commissioning Reply after reception of the Commissioning GPDF with *Auto-Commissioning* = 0b0 and *RxAfterTx* = 0b1. AND/OR DUT-GPS does send GPD Commissioning Reply after reception of any prior frames.
6A) – 6E) DUT-GPS sends GP Pairing for TH-GPD AND/OR creates Sink Table entry for GPD ID = N AND/OR Translation Table entry(s) for GPD ID = N.
6F) DUT-GPS accepts either GPD Success command with the reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) AND/OR it sends Device_annce or GP Pairing command. AND/OR DUT-GPS creates a Sink Table entry for the GPD ID N.
6G) – 6J) DUT-GPS sends GP Pairing for TH-GPD AND/OR creates Sink Table entry for GPD ID = N AND/OR

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Translation Table entry(s) for GPD ID = N.
7A) On receipt of the second GPD Channel Request command, DUT-GPS does send a GPD Channel Configuration command, correctly formatted.
7B) On receipt of the second GPD Channel Request command, DUT-GPS does NOT send a GPD Channel Configuration command, correctly formatted.
7C) On receipt of the second GPD Commissioning command, DUT-GPS does send to TH-GPD a GPD Commissioning Reply, correctly formatted.
7D) On receipt of the second GPD Commissioning command, DUT-GPS does NOT send to TH-GPD a GPD Commissioning Reply, correctly formatted.
8A) DUT-GPS does NOT send GPD Channel Configuration on TransmitChannel X.
8B) DUT-GPS does send GPD Channel Configuration on TransmitChannel X.
8C) DUT-GPS does send GPD Channel Configuration on the operational channel.
9A) DUT-GPS does NOT send GP Pairing for DUT-GPD, does NOT create Sink Table nor Translation Table entry for GPD ID N.
10A) - 10B) DUT sends Commissioning Reply GPDF.

4.4.1.7.5 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF10	Proximity commissioning method	Direct
GPSF2	Transmitting a response GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the request GPDF	Indirect
GPCF2, GPCF3B	Commissioning GPDF	Direct
GPCF4	Bidirectional commissioning	Direct
GPCF5B, GPCF6A GPCF16	In-band bidirectional channel commissioning	Direct
GPCF8A	Commissioning Reply GPDF	Direct
GPCF12A, GPCF13A	Key exchange in Commissioning/Reply GPDF	Direct
GPCF15B	Success GPDF	Direct

4.4.1.8 Proximity commissioning: general tests

4.4.1.8.1 Initial Conditions

Item	Doc. Ref.	Test Step	Note
1-2		As in 4.4.1.1.1.	

4.4.1.8.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

4.4.1.8.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	***Negative test: different sequence number/frame counter in both modes:*** TH-GPS enters commissioning mode. Commissioning is successfully performed between TH-GPD and DUT-GPS; gpdSecurityLevel >= 0b10 is used. After DUT-GPS sends GP Pairing, read out Sink Table entry of the DUT-GPS. TH-GPD is made to send a Data GPDF with wrong MAC sequence number/security frame counter number (lower than or equal to those used in commissioning mode by the Success GPDF). Read out Sink Table entry of the DUT-GPS.	

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Security errors in commissioning			
2A		***Negative test: gpdSecurityLevel = 0b01:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends on the operational channel of DUT-GPS a Commissioning GPDF with *RxAfterTx* = 0b0, with all settings as supported by DUT-GPS, only with *SecurityLevelCapabilities* sub-field of the *Extended Options* field set to 0b01. Read out Sink Table of DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
2B		***Negative test: gpdSecurityLevel >=0b10, no key:*** Clean Sink Table of the DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send the Commissioning GPDF with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0, • the *Extended NWK Frame Control* field, if present, with its *RxAfterTx* sub-field set to 0b0, • *SecurityLevelCapabilities* sub-field of the *Extended Options* field != 0b00, • *GPDkey present* sub-field of the *Extended Options* field set to 0b0 and *GPDkey* field not present; • all other sub-fields and fields set as required by the DUT-GPS. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
2C		***Negative test: GPD Key not encrypted:*** Clean Sink Table of the DUT-GPS. Set *Protection with gpLinkKey* sub-field of the *gpsSecurityLevel* attribute to 0b1. DUT-GPS enters commissioning mode. TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send a correctly formatted Commissioning GPDF with: • the *Extended NWK Frame Control* field, if present, with its *RxAfterTx* sub-field set to 0b0, • *SecurityLevelCapabilities* sub-field of the *Extended Options* field set to the minimum security level required by DUT-GPD, as indicated in *Minimal GPD Security Level sub-field of the gpsSecurityLevel attribute,* • *GPDkey present* sub-field of the *Extended Options* field set to 0b1, *GPD Key encryption* = 0b0 and *GPDkey* field present in the clear; *GPD Key MIC* field absent, *GPD outgoing counter* field present; • all other sub-fields and fields set as required by the DUT-GPS. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
2D		***Negative test (only if sink supports both gpdSecurityLevel 0b10 and 0b11): too low security level:*** Clean Sink Table of the DUT-GPS. Set *Minimal GPD Security Level* sub-field of the gpsSecurityLevel attribute to 0b11.	

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		DUT-GPS enters commissioning mode. TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send a correctly formatted Commissioning GPDF with: • the *Extended NWK Frame Control* field, if present, with its *RxAfterTx* sub-field set to 0b0, • *SecurityLevelCapabilities* sub-field of the *Extended Options* field = 0b10, • *GPDkey present* sub-field of the *Extended Options* field set to 0b1, *GPD Key encryption* = 0b1 and *GPDkey* field present and correctly encrypted; *GPD Key MIC* field present, *GPD outgoing counter* field present; • all other sub-fields and fields set as required by the DUT-GPS. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
2E		***Negative test: wrong GPDkeyMIC:*** Clean Sink Table of DUT-GPS. Enable commissioning mode on DUT-GPS. Perform commissioning, whereby the TH-GPD, sends Commissioning GPDF, correctly formatted, only with: • *GPDkeyMIC* field carrying an incorrect value.	
Malformed commissioning frame			
3A		***Negative test: GPD Commissioning command with Auto-Commissioning sub-field set to 0b1:*** Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends GPD Commissioning command with all settings as supported by DUT-GPS, only with *Auto-commissioning* sub-field of the *NWK Frame control* field set to 0b1. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
3B		***Negative test: Commissioning GPDF with wrong FrameType:*** Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends Commissioning GPDF, with all the options as supported by the TH-GPS, with *RxAfterTx* = 0b0 (or not present), but with *FrameType* sub-field of the *NWK Frame Control* field set to 0b11.	
3C		***Negative test: Commissioning GPDF with wrong ZigBeeProtocolVersion:*** Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends Commissioning GPDF, with all the options as supported by the TH-GPS, with *RxAfterTx* = 0b0 (or not present), but with *ZigBeeProtocolVersion* sub-field of the *NWK Frame Control* field set to 0b0010.	
3D		***Negative test: Commissioning GPDF with wrong ApplicationID***: Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends Commissioning GPDF, with all the options as supported by the TH-GPS, with *RxAfterTx* = 0b0 (or not present), but with *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b011.	

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3E		***Negative test: Commissioning GPDF with wrong Direction:*** Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD sends Commissioning GPDF, with all the options as supported by the TH-GPS, with RxAfterTx = 0b0 (or not present), but with Direction sub-field of the Extended NWK Frame Control field set to 0b1.	
GPD ID = 0x00..00			
4A	[R3] A.3.3.4.7, A.3.5.2.4.1	***Negative test: SrcID = 0x00000000:*** Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send the Commissioning GPDF with: *RxAfterTx* = 0b0 and *ApplicationID* = 0b000, *SrcID* = 0x00000000. Read out Sink Table of the DUT-GPS.	
4B	[R3] A.3.3.4.7, A.3.5.2.4.1	***Negative test: GPD IEEE address = 0x0000000000000000:*** Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send the Commissioning GPDF with: *RxAfterTx* = 0b0 and *ApplicationID* = 0b010, GPD IEEE address (in MAC header source address field) = 0x0000000000000000 and Endpoint X. Read out Sink Table of the DUT-GPS.	
Handling of Commissioning GPDF in operation			
5		**Negative test: GPD Commissioning in operational mode** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. DUT-GPS is in operational mode. Make TH-GPD send GPD Commissioning command, using appropriate GPD security. Read out Sink Table of the DUT-GPS.	
Extendibility of GPD Commissioning frame			
6	[R3] A.3.9, A.4.2.1.1, 3.2.3	Clean Sink Table of the DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send the Commissioning GPDF with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0, • the *Extended NWK Frame Control* field present and its *RxAfterTx* sub-field set to 0b0, • the *Reserved* sub-fields of the *Options* field set to 0b1 • all other sub-fields and fields set as required by the DUT-GPS; • at the end of the Commissioning GPDF (i.e. after *ApplicationInformation*, if included), 5 additional bytes of payload, 0xe0 0xe1 0xe2 0xe3 0xe4, are applied; the maximal GPDF length is NOT exceeded. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
GPD Endpoint handling			

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7		Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD is triggered to send the Commissioning GPDF with *ApplicationID* = 0b010, *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0, the *Extended NWK Frame Control* field present and its *RxAfterTx* sub-field set to 0b0, Endpoint field set to 0xFF, and all other fields set as required by the DUT-GPS. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS. TH-GPD sends a correctly formatted Data GPDF, with Endpoint = X. TH-GPD sends a correctly formatted Data GPDF, with Endpoint = 0xff.	

1051 ***4.4.1.8.4 Expected Outcome***

Pass verdict:
1) DUT-GPS does NOT execute the GPDF. DUT-GPS does NOT write the new (incorrect) frame counter value to its Sink Table.
2A) – 3E) DUT-GPS does NOT send GP Pairing nor Device_annce for TH-GPD, does NOT create Sink Table nor Translation Table entry for GPD ID N.
4A) – 4B) DUT-GPS does NOT create Sink Table entry. It does NOT send GP Pairing.
5) DUT-GPS does NOT open commissioning mode nor does send GP Proxy Commissioning Mode (*Action*=Enter) command. DUT-GPS still has Sink Table entry for TH-GPD. DUT-GPS MAY make a product-specific indication of the attempted commissioning.
6) DUT-GPS may send GP Proxy Commissioning Mode command (*Action*=Enter). On reception of Commissioning GPDF, DUT-GPS: • does NOT send a Commissioning Reply (since *RxAfterTx* of the received Commissioning GPDF is set to 0b0); • provides success indication, • sends out correctly formatted GP Pairing for TH-GPD: • if DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00; if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there. If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint). The value of the appended extra field 0xe0 0xe1 0xe2 0xe3 0xe4 shall not be misused as any GPD configuration value or its part.
7) DUT-GPS does send GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to Enter. On reception of GP Commissioning Notification carrying GPD Commissioning command with *RxAfterTx* = 0b0, DUT-GPS:

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- provides success indication,
- sends out GP Pairing for TH-GPD with *AddSink*=0b1, *Remove GPD* = 0b0, ApplicationID = 0b010, GPD IEEE address = N, Endpoint = 0xff, appropriate communication mode and security level for the DUT-GPS, and other parameters as derived from the Commissioning GPDF;
- if DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00;
  if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent;
- Does NOT send GP Response carrying GPD Commissioning Reply command (since the *RxAfterTx* sub-field of the received GP Commissioning Notification command is set to 0b0).

On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD with ApplicationID = 0b010 , GPD IEEE address = N, Endpoint = 0xff, and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for ApplicationID = 0b010, GPD IEEE address = N, GPD Endpoint = 0xff; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

DUT-GPS correctly executes the GPD command in both Data GPDF.

Fail verdict:

1) DUT-GPS does execute the GPDF.
AND/OR DUT-GPS does write the new (incorrect) frame counter value to its Sink Table.

2A) – 3E) DUT-GPS creates Sink Table entry for GPD ID = N with SecurityLevel = 0b01 AND/OR Translation Table entry(s) for GPD ID = N AND/OR sends GP Pairing with status AddSink for GPD ID = N AND/OR Device_annce for GPD alias.

4A) – 4B) DUT-GPS creates Sink Table entry AND/OR sends GP Pairing.

5) DUT-GPS does open commissioning mode AND/OR does send GP Proxy Commissioning Mode (*Action*=Enter) command.

AND/OR DUT-GPS removes Sink Table entry for TH-GPD.

6) On reception of Commissioning GPDF with RxAfterTx = 0b0, DUT-GPS:

- does send Commissioning Reply GPDF (despite RxAfterTx of the received Commissioning GPDF being set to 0b0),
- does not provide success indication,
- AND/OR does not send out GP Pairing for TH-GPD's GPD ID with *AddSink*=0b1, *RemoveGPD* = 0b0, appropriate communication mode and security level for the DUT-GPS, and other parameters as derived from the Commissioning GPDF;
- AND/OR:
  - In case of Communication Mode != 0b11: does not send out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00;
  - In case of Communication Mode = 0b11: does send Device_annce for alias.

AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters established in the commissioning process.

AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in pass verdict 1 above.

AND/OR the value of the appended extra field 0xe0 0xe1 0xe2 0xe3 0xe4 appears as any GPD configuration value or its part.

7) DUT-GPS does NOT send GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to Enter.

AND/OR On reception of GP Commissioning Notification carrying GPD Commissioning command with *RxAfterTx* = 0b0, DUT-GPS:

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- does NOT provides success indication,
- AND/OR does NOT send out GP Pairing for TH-GPD with *AddSink*=0b1, *Remove GPD* = 0b0, ApplicationID = 0b010, GPD IEEE address = N, Endpoint = 0xff, appropriate communication mode and security level for the DUT-GPS, and other parameters as derived from the Commissioning GPDF;
- AND/OR:
  - In case of Communication Mode != 0b11: does NOT send out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00;
  - In case of Communication Mode = 0b11: does send Device_annce for alias;
- AND/OR sends GP Response carrying GPD Commissioning Reply command (since the *RxAfterTx* sub-field of the received GP Commissioning Notification command is set to 0b0).

AND/OR On reception of ZCL Read Attributes command, DUT-GPS does NOT respond with Read Attributes Response with Sink Table having one entry for the TH-GPD with ApplicationID = 0b010 , GPD IEEE address = N, Endpoint = 0xff, and all relevant parameters exchanged in the commissioning process are stored there.

AND/OR If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS does NOT respond with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for ApplicationID = 0b010, GPD IEEE address = N, GPD Endpoint = 0xff; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

AND/OR DUT-GPS does NOT correctly execute the GPD command in both Data GPDF.

4.4.1.8.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF15 GPF7	gpdSecurityLevel = 0b01 functionality (deprecated)	Direct

4.4.1.9 Bidirectional commissioning with OOB key (shared key available, but not requested), ApplicationID = 0b000

4.4.1.1.1. Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.4.1.1.1.	
3		TH-GPD uses ApplicationID = 0b000 and SrcID = N. TH-GPD shall provide OOB key and NOT request a key; TC-LK encryption shall be used.	
4	[R3] A.3.3.3.1, A.3.3.3.2	DUT-GPS does support security. TH-Tool sets the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b010 and the *gpSharedSecurityKey* attribute to 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf.	

4.4.1.1.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

4.4.1.1.3 Test Procedure

Note: This test procedure only tests the steps directly related to the bidirectional commissioning with OOB key with *ApplicationID* = 0b000. All generic tests for bidirectional procedure, incl. negative tests, are performed in the test for bidirectional commissioning with shared key, ApplicationID = 0b000.

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2,	DUT-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. After successful exchange of GPD Channel Request and GPD Channel	

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	A.4.3	Configuration between the TH-GPD and DUT-GPS, TH-GPD sends on the operational channel Commissioning GPDF with: • *Frame Type* = 0b00, *Auto-Commissioning* = 0b0 • *RxAfterTx* set to 0b1 • *GP Security Key request* sub-field = 0b0, *GPDkeyEncryption* = 0b1 and GPDkeyPresent = 0b1 and carrying the TH-GPD's OOB key, encrypted (MIC present); *GPD outgoing counter* field present. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS.	

4.4.1.1.4 Expected Outcome

Pass verdict:
1) DUT-GPS may send GP Proxy Commissioning Mode command (*Action*=Enter). Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command, the DUT-GPS sends GPDF carrying GPD Commissioning Reply command with the following settings in the command payload: ▪ sub-field of the *Options* field set to: – *GPD security key present* = 0b0; – *GPD key encryption* = 0b0; – *SecurityLevel* – as requested by the TH-GPD in the Commissioning GPDF; – *KeyType* = 0b100; ▪ *GPD security key* field and *GPD Key MIC* absent. ▪ *Frame Counter* field absent. The transmission SHALL NOT exceed *gpTxDuration*. On reception of the GPD Commissioning Reply command, TH-GPD sends GPD Success command. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there (incl. OOB key, KeyType 0b100).
Fail verdict:
1) The DUT-GPS does not send GPDF with GPD Commissioning Reply command on reception of any of the GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration.* AND/OR The DUT-GPS does include a key in the Commissioning Reply GPDFAND/OR key type is NOT 0b100. AND/OR On reception of the GPD Commissioning Reply command, TH-GPD does NOT send GPD Success command. AND/OR DUT-GPS does not report a Sink Table entry for the TH-GPD GPD ID N AND/OR all the relevant parameters exchanged in the commissioning process (incl. OOB key, KeyType 0b100) are NOT stored there.

4.4.1.10 Bidirectional commissioning with OOB key (shared key requested, but not available), ApplicationID = 0b000

4.4.1.1.1. Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.4.1.1.1.	
3		TH-GPD uses ApplicationID = 0b000 and SrcID = N. TH-GPD shall provide OOB key and request a key; TC-LK encryption shall be used.	
4	[R3] A.3.3.3.1, A.3.3.3.2	DUT-GPS does support security. TH-Tool sets the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b000 and the *gpSharedSecurityKey* attribute to 0x00..00.	

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4.4.1.1.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

4.4.1.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.4.2.1.4, A.4.2.1.5, A.4.2.1.1, A.4.2.1.2, A.4.3	DUT-GPS enters commissioning mode. Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. After successful exchange of GPD Channel Request and GPD Channel Configuration between the TH-GPD and DUT-GPS, TH-GPD sends on the operational channel Commissioning GPDF with: • *Frame Type* = 0b00, *Auto-Commissioning* = 0b0 • *RxAfterTx* set to 0b1 • *GP Security Key request* sub-field = 0b1, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1 and carrying the TH-GPD's OOB key, encrypted (MIC present); *GPD outgoing counter* field present. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS.	

4.4.1.1.4 Expected Outcome

Pass verdict:
1) DUT-GPS may send GP Proxy Commissioning Mode command (*Action*=Enter). Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of at least one GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command, the DUT-GPS sends GPDF carrying GPD Commissioning Reply command with the following settings in the command payload: ▪ sub-field of the *Options* field set to: – *GPD security key present* = 0b0; – *GPD key encryption* = 0b0; – *SecurityLevel* – as requested by the TH-GPD in the Commissioning GPDF; – *KeyType* = 0b100; ▪ *GPD security key* field and *GPD Key MIC* absent. ▪ *Frame Counter* field absent. The transmission SHALL NOT exceed *gpTxDuration*. On reception of the GPD Commissioning Reply command, TH-GPD sends GPD Success command. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there (incl. OOB key, KeyType 0b100)..
Fail verdict:
1) The DUT-GPS does not send GPDF with GPD Commissioning Reply command on reception of any of the GPDF with *RxAfterTx* = 0b1 and GPD Commissioning command. AND/OR DUT-GPS does NOT send any copy of the GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR transmission of DUT-GPS exceeds *gpTxDuration*. AND/OR The DUT-GPS does include the shared key in the Commissioning Reply GPDFAND/OR key type is NOT 0b100. AND/OR DUT-GPS does not report a Sink Table entry for the TH-GPD GPD ID N AND/OR all the relevant parameters exchanged in the commissioning process (incl. OOB key, KeyType 0b100) are NOT stored there.

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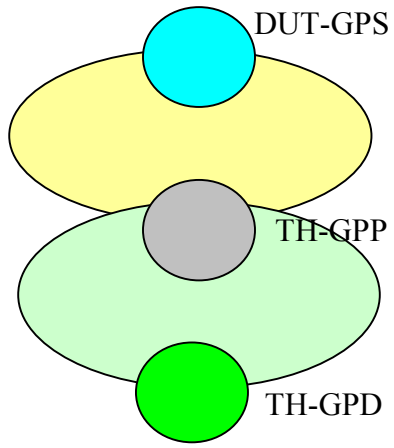
4.4.2 Multi-hop commissioning

4.4.2.1 Bidirectional multi-hop commissioning: shared key requested & delivered, ApplicationID = 0b000

4.4.2.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT, GPT+, GPC, GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports multi-hop commissioning.
TH-GPP	PAN id=same PANId as DUT-GPS Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N GPD security usage according to DUT capabilities; TH-GPD application functionality matches that of the DUT-GPS's GPEP. TH-GPD implements bidirectional commissioning procedure. Note: the presence of the TH-GPD may be emulated by TH-GPP sending appropriate commands.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPP operate in a ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2, A.3.4.2.2	No pairing exists between DUT-GPS and TH-GPD; there is not Proxy Table entry for TH-GPD in the TH-GPP.	
3		TH-GPD uses *ApplicationID* = 0b000 and SrcID = N if GPS supports security, TH-GPD shall request the shared key by setting the sub-fields *Security Key request* = 0b1; *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1, encrypted *GPD Key* field is present and *GPD Key MIC* field is present.	
4	[R3] A.3.3.3.1, A.3.3.3.2	DUT-GPS's attributes have the value: *gpSharedSecurityKeyType* = 0b010 and the *gpSharedSecurityKey* = 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf.	

4.4.2.1.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity of TH-GPP; DUT-GPS is out of range of TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.4.2.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.9, A.3.3.2.2, A.3.3.4.4, A.3.3.5.3, A.3.3.5.4, A.3.3.5.2	DUT-GPS enters commissioning mode.	
1B		Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. The TH-GPD first sends Channel Request GPDF with: • *Frame Type* sub-field of the NWK Frame Control field set to 0b01,	

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		• *Auto-Commissioning* ▪ 0b0, if the GPD Channel Request transmission is immediately followed by reception window; ▪ 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel • *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field, • *GPD SrcID field, Endpoint, Security frame counter* and *MIC* field absent; The TH-GPD is configured such, that the GPD Channel Configuration has to be delivered on a channel other than the operational channel. TH-GPP forwards the corresponding GP Commissioning Notification, correctly formatted; in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command.	
1C		After reception of GPD Channel Configuration, the TH-GPD sends Commissioning GPDF with: • *Auto-Commissioning* = 0b0, • *RxAfterTx* = 0b1 • if DUT-GPS supports security, with *GP Security Key request* = 0b1, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1; *GPD Key* field present and encrypted and *GPD Key MIC* field present. TH-GPP forwards the corresponding GP Commissioning Notification, correctly formatted; in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command.	
1D		After reception of Commissioning Reply GPDF, the TH-GPD sends Success GPDF with *Auto-Commissioning* = 0b0 and *RxAfterTx* = 0b0, protected using the security parameters exchanged in GPD Commissioning/Commissioning Reply. TH-GPP forwards the corresponding GP Commissioning Notification, correctly formatted, with • sub-fields of the *Options* field set to: ▪ *Security processing failed* = 0b0, ▪ *SecurityLevel* – copied from the *SecurityLevel* sub-field of the *Extended NWK Frame Control* field; ▪ *SecurityKeyType* = 0b010; • GPD CommandID in the clear and *MIC* field absent, • the *GPD security frame counter* field carrying the value from the *Security frame counter* field of the Success GPDF; in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command. If required, DUT-GPS is put back into operational mode. TH-GPP reads out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table Request to DUT-GPS.	

4.4.2.1.4 Expected Outcome

Pass verdict:
1A) DUT-GPS sends GP Proxy Commissioning Mode command (in broadcast or unicast to TH-GPP) with: • APS header fields: ▪ *ProfileID*: 0xA1E0; ▪ *ClusterID*: 0x0021; ▪ source endpoint: GPEP (242); ▪ destination endpoint: not present or if present, GPEP (242);

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- ZCL header fields:
  - *Command Identifier*: 0x02
  - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1;
- Command payload:
  - *Action*=Enter and *Channel present* sub-field set to 0b0;
  - *Unicast communication* sub-field set according to DUT-GPS capabilities.

1B) On reception of (each) GP Commissioning Notification with *RxAfterTx* sub-field set to 0b1 and GPD Channel Request command, the DUT-GPS sends GP Response command (in broadcast or unicast to TH-GPP) with:

- APS header fields:
  - *ProfileID*: 0xA1E0;
  - *ClusterID*: 0x0021;
  - source endpoint: GPEP (242);
  - destination endpoint: not present or if present, GPEP (242);
    - ZCL header fields:
  - *Command Identifier*: 0x06
  - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1;
- Command payload:
  - *ApplicationID* sub-field of the *Options* field set to 0b000,
  - *GPD ID* field set to 0x00000000;
  - *Endpoint* field absent;
  - carrying GPD Channel Configuration command with:
    - operational channel
    - *Basic* = 0b0 if DUT-GPS is a Basic Sink,
  - listing the TH-GPP in the *TempMasterShortAddress* field;
  - the *TransmitChannel* the TH-GPP shall transmit on, being one of the channels from the GPD Channel Request payload.

The payload of the GPD command sent by the DUT-GPS in GP Response does NOT exceed:

- For a GPD with *ApplicationID* = 0b000: 64 octets;
- For a GPD with *ApplicationID* = 0b010: 59 octets.

1C) On reception of (each) GP Commissioning Notification with *RxAfterTx* sub-field set to 0b1 and GPD Commissioning command, the DUT-GPS sends GP Response (in broadcast or unicast to TH-GPP) with:

- APS header fields:
  - *ProfileID*: 0xA1E0;
  - *ClusterID*: 0x0021;
  - source endpoint: GPEP (242);
  - destination endpoint: not present or if present, GPEP (242);
- ZCL header fields:
  - *Command Identifier*: 0x06
  - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1;
- Command payload:
  - the *ApplicationID* sub-field of the *Options* field set to 0b000;
  - the *GPD ID* field of 4B length set to GPD SrcID of the TH-GPD (as in the triggering GP Commissioning Notification);
  - carrying the GPD Commissioning Reply command,
    - If DUT-GPS supports security and the Commissioning GPDF had *GP Security Key request* = 0b1, *GPDkeyEncryption*= 0b1 and *GPDkeyPresent* = 0b1; the GPD Commissioning Reply command carries the shared key 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf; encrypted; *GPD Key MIC* field is present and *Frame Counter* field is present; *KeyType* sub-field is set to 0b010; *GPD key encryption* = 0b1.
  - listing the TH-GPP in the T*empMasterShortAddress* field and *TransmitChannel* set to the operational channel.

The payload of the GPD command sent by the DUT-GPS in GP Response does NOT exceed:

- For a GPD with *ApplicationID* = 0b000: 64 octets;

For a GPD with ApplicationID = 0b010: 59 octets.

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1D) On reception of GP Commissioning Notification with GPD Success command and *RxAfterTx* = 0b0, DUT-GPS provides success indication, and sends out GP Pairing with:

- APS header fields:
  - ProfileID: 0xA1E0;
  - ClusterID: 0x0021;
  - source endpoint: GPEP (242);
  - destination endpoint, if present: GPEP (242);
- ZCL header fields:
  - *Command Identifier*: 0x01;
    - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b1 (server to client), *Disable default response* = 0b1;
- ZCL payloadwith:
  - Sub-fields of the *Options* field set to:
    - *ApplicationID* = 0b000, *AddSink*=0b1, *RemoveGPD* = 0b0;
    - *Communication Mode*: set according to DUT-GPS capabilities
    - *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
    - *SecurityLevel* as exchanged during commissioning;
    - *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: 0b010);
    - *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;
  - *GPD SrcID* = N;
  - *Endpoint* field absent;
  - *Sink IEEE address* and *Sink NWK address* fields:
    - present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
    - absent otherwise;
  - *Sink GroupID* field:
    - present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;
    - present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;
    - absent otherwise;
  - *DeviceID* field - copied from the GPD Commissioning command payload;
  - *GPD security Frame Counter* field – as in GPD Success command;
  - *GPD key* field:
    - present and carrying GPD Group Key in the clear, if *SecurityLevel* >= 0b10;
    - absent otherwise;
  - *Assigned alias* field:
    - present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise;
  - *Forwarding Radius* field:
    - present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise.

If DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): DUT-GPS sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00; if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent.
It may also send GP Proxy Commissioning Mode with *Action*=Exit.

On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with a Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

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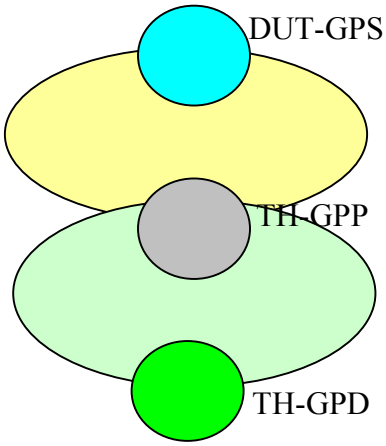
Fail verdict:
1A) DUT-GPS does not sends GP Proxy Commissioning Mode command with *Action=Enter* AND/OR *Channel present* sub-field is not set to 0b0.
1B) On reception of (each) GP Commissioning Notification with GPD Channel Request command and *RxAfterTx* = 0b1, the DUT-GPS does not send GP Response carrying GPD Channel Configuration command, formatted exactly as specified in pass verdict 1B) above.
1C) On reception of (each) GP Commissioning Notification with GPD Commissioning command and RxAfterTx=0b1, the DUT-GPS does not send GP Response carrying Commissioning Reply command, formatted exactly as specified in pass verdict 1C) above.
1D) On reception of GP Commissioning Notification with GPD Success command, DUT-GPS does not provide success indication and/or does not send GP Pairing with AddSink=0b1, formatted exactly as specified in pass verdict 1D) above. AND/OR: • in case of Communication Mode != 0b11: DUT-GPS does not send Device_annce for the alias with IEEE = 0xff..ff; • in case of Communciation Mode = 0b11: DUT-GPS sends Device_annce for the alias. AND/OR DUT-GPS does not respond with Read Attributes Response having a Sink Table entry for the TH-GPD GPD ID N AND/OR all relevant parameters exchanged in the commissioning process are not stored there. AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in 4.4.2.1.4/item 1D) above.

4.4.2.1 Bidirectional multi-hop commissioning with OOB key (shared key not available&not requested), ApplicationID = 0b000

4.4.2.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT, GPT+, GPC,GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports multi-hop commissioning.
TH-GPP	PAN id=same PANId as DUT-GPS Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N GPD security usage according to DUT capabilities; TH-GPD application functionality matches that of the DUT-GPS's GPEP. TH-GPD implements bidirectional commissioning procedure. Note: the presence of the TH-GPD may be emulated by TH-GPP sending appropriate commands.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPP operate in a ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2, A.3.4.2.2	No pairing exists between DUT-GPS and TH-GPD; there is not Proxy Table entry for TH-GPD in the TH-GPP.	
3		TH-GPD uses *ApplicationID* = 0b000 and SrcID = N if GPS supports security, TH-GPD shall provide OOB key and set the subfields *Security Key request* = 0b0, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1; encrypted *GPD Key* field is present and *GPD Key*	

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		MIC field is present.	
4	[R3] A.3.3.3.1, A.3.3.3.2	DUT-GPS's attributes have the value: *gpSharedSecurityKeyType* = 0b000.	

4.4.2.1.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity of TH-GPP; DUT-GPS is out of range of TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.4.2.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.9, A.3.3.2.2, A.3.3.4.4, A.3.3.5.3, A.3.3.5.4, A.3.3.5.2	DUT-GPS enters commissioning mode.	
1B		Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. The TH-GPD first sends Channel Request GPDF with: • *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, • *Auto-Commissioning* ▪ 0b0, if the GPD Channel Request transmission is immediately followed by reception window; ▪ 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel. • • *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field absent, • The *GPD ID field, Endpoint, Security frame counter* and *MIC* field absent TH-GPD sets the *Rx channel in the (second) next attempt* sub-fields of the GPD Channel Request such, that the DUT-GPS has to select *TransmitChannel* other than the operational channel. TH-GPP forwards the corresponding GP Commissioning Notification, correctly formatted; in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command.	
1C		After reception of Channel Configuration, the TH-GPD sends Commissioning GPDF with: • *Auto-Commissioning* = 0b0, • *RxAfterTx* set to 0b1; • if DUT-GPS supports security, with *GP Security Key request* = 0b0, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1 ; *GPD Key* field present and encrypted and *GPD Key MIC* field present. TH-GPP forwards the corresponding GP Commissioning Notification, correctly formatted; in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command.	
1D		After reception of Commissioning Reply GPDF the TH-GPD sends correctly protected Success GPDF with *Auto-Commissioning* = 0b0, *RxAfterTx* set to 0b0. TH-GPP forwards the corresponding GP Commissioning Notification, correctly formatted, with: • sub-fields of the *Options* field set to: ▪ *Security processing failed* = 0b1,	

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		▪ *SecurityLevel* – copied from the *SecurityLevel* sub-field of the *Extended NWK Frame Control* field; ▪ *SecurityKeyType* = 0b100; • GPD CommandID encrypted and *MIC* field present, • the *GPD security frame counter* field carrying the value from the *Security frame counter* field of the Success GPDF; in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command. If required, DUT-GPS is put back into operational mode. TH-GPP reads out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table Request to DUT-GPS.	

1093 ***4.4.2.1.4 Expected Outcome***

Pass verdict:
1A) DUT-GPS sends GP Proxy Commissioning Mode command (in broadcast or unicast to TH-GPP) with: • APS header fields: ▪ *ProfileID*: 0xA1E0; ▪ *ClusterID*: 0x0021; ▪ source endpoint: GPEP (242); ▪ destination endpoint: not present or if present, GPEP (242); • ZCL header fields: ▪ *Command Identifier*: 0x02 ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1; • Command payload: ▪ *Action*=Enter and *Channel present* sub-field set to 0b0; ▪ *Unicast communication* sub-field set according to DUT-GPS capabilities.
1B) On reception of (each) GP Commissioning Notification with *RxAfterTx* sub-field set to 0b1 and GPD Channel Request command, the DUT-GPS sends GP Response command (in broadcast or unicast to TH-GPP) with: • APS header fields: ▪ *ProfileID*: 0xA1E0; ▪ *ClusterID*: 0x0021; ▪ source endpoint: GPEP (242); ▪ destination endpoint: not present or if present, GPEP (242); – ZCL header fields: ▪ *Command Identifier*: 0x06 ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1; • Command payload: ▪ *ApplicationID* sub-field of the *Options* field set to 0b000, ▪ *GPD ID* field set to 0x00000000; ▪ *Endpoint* field absent; ▪ carrying GPD Channel Configuration command with: – operational channel – *Basic* = 0b0 if DUT-GPS is a Basic Sink, ▪ listing the TH-GPP in the *TempMasterShortAddress* field; ▪ the *TransmitChannel* the TH-GPP shall transmit on, being one of the channels from the GPD Channel Request payload. The payload of the GPD command sent by the DUT-GPS in GP Response does NOT exceed: • For a GPD with *ApplicationID* = 0b000: 64 octets; • For a GPD with *ApplicationID* = 0b010: 59 octets.
1C) On reception of (each) GP Commissioning Notification with *RxAfterTx* sub-field set to 0b1 and GPD Commissioning command, the DUT-GPS sends GP Response (in broadcast or unicast to TH-GPP) with:

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- APS header fields:
  - *ProfileID*: 0xA1E0;
  - *ClusterID*: 0x0021;
  - source endpoint: GPEP (242);
  - destination endpoint: not present or if present, GPEP (242);
- ZCL header fields:
  - *Command Identifier*: 0x06
  - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1;
- Command payload:
  - the *ApplicationID* sub-field of the *Options* field set to 0b000;
  - the *GPD ID* field of 4B length set to GPD SrcID of the TH-GPD (as in the triggering GP Commissioning Notification);
  - carrying the GPD Commissioning Reply command,
    - If DUT-GPS supports security and the Commissioning GPDF had *GP Security Key request* = 0b0, *GPDkeyEncryption*= 0b1 and *GPDkeyPresent* = 0b1 and carried the OOB key; the Commissioning Reply does not carry any key; the key type is set 0b100, *GPD key encryption* = 0b0.
  - listing the TH-GPP in the T*empMasterShortAddress* field and *TransmitChannel* set to the operational channel.

The payload of the GPD command sent by the DUT-GPS in GP Response does NOT exceed:

- For a GPD with *ApplicationID* = 0b000: 64 octets;
- For a GPD with *ApplicationID* = 0b010: 59 octets.

1D) On reception of GP Commissioning Notification with GPD Success command (even despite the *Security processing failed* = 0b1), DUT-GPS:

provides success indication,

sends out GP Pairing with:

- APS header fields:
  - ProfileID: 0xA1E0;
  - ClusterID: 0x0021;
  - source endpoint: GPEP (242);
  - destination endpoint, if present: GPEP (242);
- ZCL header fields:
  - *Command Identifier*: 0x01;
  - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b1 (server to client), *Disable default response* = 0b1;
- ZCL payload with:
  - Sub-fields of the *Options* field set to:
    - *ApplicationID* = 0b000, *AddSink*=0b1, *RemoveGPD* = 0b0;
    - *Communication Mode*: set according to DUT-GPS capabilities
    - *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
    - *SecurityLevel* as exchanged during commissioning;
    - *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: 0b100);
    - *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;
  - *GPD SrcID* = N;
  - *Endpoint* field absent;
  - *Sink IEEE address* and *Sink NWK address* fields:
    - present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
    - absent otherwise;
  - *Sink GroupID* field:
    - present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;
    - present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;
    - absent otherwise;
  - *DeviceID* field - copied from the GPD Commissioning command payload;
  - *GPD security Frame Counter* field – as in GPD Success command;
  - *GPD key* field:
    - present and carrying TH-GPD's OOB key in the clear, if *SecurityLevel* >= 0b10;

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– absent otherwise;
- *Assigned alias* field:
  – present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
  – absent otherwise;
- *Forwarding Radius* field:
  – present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
  – absent otherwise.

If DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): DUT-GPS sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00; if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent.

It may also send GP Proxy Commissioning Mode with *Action*=Exit.

On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with a Sink Table having one entry for the TH-GPD *ApplicationID* = 0b000 and SrcID = N; and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD SrcID = N and the corresponding *ApplicationID* = 0b000; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

Fail verdict:

1A) DUT-GPS does not sends GP Proxy Commissioning Mode command with *Action*=Enter AND/OR *Channel present* sub-field is not set to 0b0.

1B) AND/OR On reception of (each) GP Commissioning Notification with GPD Channel Request command and *RxAfterTx* = 0b1, the DUT-GPS does not send GP Response AND/OR the GP Response command does have *ApplicationID* sub-field set to 0b000 and/or does not include the *GPD ID* field set to 0x00000000 or GPD Channel Configuration command (with operational channel and *Basic* = 0b0), listing the TH-GPP in the *TempMasterShortAddress* field and the *TransmitChannel* the GPP shall transmit on.

1C) AND/OR On reception of (each) GP Commissioning Notification with GPD Commissioning command, the DUT-GPS does not send GP Response AND/OR the GP Response command does not contain the *GPD SrcID* = N and *ApplicationID* = 0b000 or GPD Commissioning Reply command listing the TH-GPP in the *TempMasterShortAddress* field and *TransmitChannel* set to the operational channel.
AND/OR If DUT-GPS supports security and the Commissioning GPDF had *GP Security Key request* = 0b0, *GPDkeyEncryption* = 0b0 and *GPDkeyPresent* = 0b1; the Commissioning Reply does carry any key.

1D) AND/OR On reception of GP Commissioning Notification with GPD Success command, DUT-GPS does not provide success indication and/or does not send GP Pairing with *AddSink*=0b1, and the appropriate communication mode and security data.

AND/OR:

- in case of Communication Mode !=0b11: DUT-GPS does not send Device_annce for the alias with IEEE = 0xff..ff;
- in case of Communication Mode = 0b11: DUT-GPS does send Device_annce for the alias.

AND/OR DUT-GPS does not respond with Read Attributes Response having a Sink Table entry for the TH-GPD GPD SrcID N (*ApplicationID* = 0b000) AND/OR all relevant parameters exchanged in the commissioning process are not stored there.

AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in 4.4.2.1.4/item 1 above.

1094 ***4.4.2.1.5 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF11	Multi-hop commissioning	Direct
GPCF2, GPCF3B	Rx Commissioning GPDF	Direct
GPCF4	Bidirectional commissioning	Direct

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PICS reference	Functionality	Tested (Direct/Indirect)
GPCF5B, GPCF6A, GPCF16	In-band bidirectional channel commissioning	Direct
GPCF8A	Commissioning Reply GPDF	Direct
GPCF12A, GPCF13A	Key exchange in Commissioning/Reply GPDF	Direct
GPCF15B	Rx Success GPDF	Direct
GPPCS154	Transmission of GP Proxy Commissioning Mode command	Direct
GPPCS107	Reception of GP Commissioning Notification	Direct
GPPCS151	Transmission of GP Response command	Direct

4.4.2.2 Sub-case: Unidirectional multi-hop commissioning

4.4.2.2.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.4.2.1.1	
3		TH-GPD uses *ApplicationID* = 0b000 and SrcID = N if GPS supports security, TH-GPD shall provide OOB key and set the subfields *Security Key request* = 0b0, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1; encrypted *GPD Key* field is present and *GPD Key MIC* field is present.	

4.4.2.2.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity; DUT-GPS is out of range of TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.4.2.2.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.3.3.2.2, A.3.3.4.4, A.3.3.5.3, A.3.3.5.4, A.3.3.5.2	***GPD addressed by SrcID:*** DUT-GPS enters commissioning mode. TH-GPD is triggered to send on the operational channel of DUT-GPS the Commissioning GPDF with *ApplicationID* = 0b000, *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0, the *Extended NWK Frame Control* field present and its *RxAfterTx* sub-field set to 0b0, GPD SrcID = N and all other fields set as required by the DUT-GPS. TH-GPP forwards the corresponding GP Commissioning Notification, correctly formatted; in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS. TH-GPD sends a correctly formatted Data GPDF.	

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1B		***GPD addressed by IEEE:*** Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPD is triggered to send on the operational channel of DUT-GPS the Commissioning GPDF with *ApplicationID* = 0b010, *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0, the *Extended NWK Frame Control* field present and its *RxAfterTx* sub-field set to 0b0, GPD IEEE address (in the MAC header source address field) = N, *Endpoint* field set to endpoint X from the range 0x01 – 0xFE), and all other fields set as required by the DUT-GPS. TH-GPP forwards the corresponding GP Commissioning Notification, correctly formatted; in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS. TH-GPD sends a correctly formatted Data GPDF, with Endpoint = X.	

1101 ***4.4.2.2.4 Expected Outcome***

Pass verdict:
1A)DUT-GPS does send GP Proxy Commissioning Mode command with: • APS header fields: ▪ *ProfileID*: 0xA1E0; ▪ *ClusterID*: 0x0021; ▪ source endpoint: GPEP (242); ▪ destination endpoint: not present or if present, GPEP (242); • ZCL header fields: ▪ *Command Identifier*: 0x02 ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1; • Command payload: ▪ *Action*=Enter and *Channel present* sub-field set to 0b0; ▪ *Unicast communication* sub-field set according to DUT-GPS capabilities. On reception of GP Commissioning Notification carrying GPD Commissioning command with *RxAfterTx* = 0b0, DUT-GPS: provides success indication, sends out GP Pairing for TH-GPD with: • APS header fields: ▪ ProfileID: 0xA1E0; ▪ ClusterID: 0x0021; ▪ source endpoint: GPEP (242); ▪ destination endpoint, if present: GPEP (242); • ZCL header fields: ▪ *Command Identifier*: 0x01; ▪The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b1 (server to client), *Disable default response* = 0b1; • ZCL payload with: ▪ Sub-fields of the *Options* field set to: – *ApplicationID* = 0b000, *AddSink*=0b1, *RemoveGPD* = 0b0; – *Communication Mode*: set according to DUT-GPS capabilities

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- – *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
- – *SecurityLevel* as exchanged during commissioning;
- – *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: 0b100);
- – *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;

▪ *GPD SrcID* = N;
▪ *Endpoint* field absent;
▪ *Sink IEEE address* and *Sink NWK address* fields:
  – present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
  – absent otherwise;
▪ *Sink GroupID* field:
  – present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;
  – present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;
  – absent otherwise;
▪ *DeviceID* field - copied from the GPD Commissioning command payload;
▪ *GPD security Frame Counter* field – as in GPD Commissioning command;
▪ *GPD key* field:
  – present and carrying TH-GPD's OOB key in the clear, if *SecurityLevel* >= 0b10;
  – absent otherwise;
▪ *Assigned alias* field:
  – present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
  – absent otherwise;
▪ *Forwarding Radius* field:
  – present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
  – absent otherwise.

If DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): DUT-GPS sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00; if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent;

does NOT send GP Response carrying GPD Commissioning Reply command (since the *RxAfterTx* sub-field of the received GP Commissioning Notification command is set to 0b0).

On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD with ApplicationID = 0b000, GPD SrcID= N, Endpoint field absent and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

DUT-GPS correctly executes the GPD command in the Data GPDF.

1B) DUT-GPS does send GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to Enter.

On reception of GP Commissioning Notification carrying GPD Commissioning command with *RxAfterTx* = 0b0, DUT-GPS:

provides success indication,

sends out GP Pairing for TH-GPD with:

- APS header fields:
  ▪ ProfileID: 0xA1E0;
  ▪ ClusterID: 0x0021;
  ▪ source endpoint: GPEP (242);
  ▪ destination endpoint, if present: GPEP (242);

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- ZCL header fields:
  - *Command Identifier*: 0x01;
    - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b1 (server to client), *Disable default response* = 0b1;
- ZCL payload with:
  - Sub-fields of the *Options* field set to:
    - ApplicationID = 0b010, *AddSink*=0b1, *Remove GPD* = 0b0,
    - *Communication Mode*: set according to DUT-GPS capabilities
    - *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
    - *SecurityLevel* as exchanged during commissioning;
    - *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: 0b100);
    - *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;
  - GPD ID of 8B length set to N;
  - *Endpoint* = X;
  - *Sink IEEE address* and *Sink NWK address* fields:
    - present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
    - absent otherwise;
  - *Sink GroupID* field:
    - present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;
    - present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;
    - absent otherwise;
  - *DeviceID* field - copied from the GPD Commissioning command payload;
  - *GPD security Frame Counter* field – as in GPD Success command;
  - *GPD key* field:
    - present and carrying TH-GPD's OOB key in the clear, if *SecurityLevel* >= 0b10;
    - absent otherwise;
  - *Assigned alias* field:
    - present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise;
  - *Forwarding Radius* field:
    - present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise.

If DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): DUT-GPS sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00; if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent;

does NOT send GP Response carrying GPD Commissioning Reply command (since the *RxAfterTx* sub-field of the received GP Commissioning Notification command is set to 0b0).

On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD with ApplicationID = 0b010 , GPD IEEE address = N, Endpoint = X, and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for ApplicationID = 0b010, GPD IEEE address = N, GPD Endpoint = X; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

DUT-GPS correctly executes the GPD command in the Data GPDF with Endpoint X.

Fail verdict:

1A) DUT-GPS does not send GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to Enter.
AND/OR On reception of GP Commissioning Notification carrying the GPD Commissioning command with *RxAfterTx* = 0b0, DUT-GPS:

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- does not provide success indication,
- AND/OR does not send out GP Pairing for TH-GPD with *ApplicationID*= 0b000, *SrcID* = N, *Endpoint* field absent, *AddSink*=0b1, *Remove GPD* = 0b0, appropriate communication mode and security level for the DUT-GPS, and other parameters as derived from the Commissioning GPDF;
- AND/OR:
  - In case of Communication Mode !=0b11: does not send out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00;
  - In case of Communication Mode = 0b11: does send Device_annce for the alias;
- AND/OR does send GP Response carrying GPD Commissioning Reply command (despite the *RxAfterTx* sub-field of the received GP Commissioning Notification command being set to 0b0);.

AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Sink Table having one entry for the TH-GPD with *ApplicationID*= 0b000, *SrcID* = N, *Endpoint* field absent, and all relevant parameters established in the commissioning process.

AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in 4.4.2.2.4/item 1 above.

1B) DUT-GPS does NOT send GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to Enter.

AND/OR On reception of GP Commissioning Notification carrying GPD Commissioning command with *RxAfterTx* = 0b0, DUT-GPS:

- does NOT provide success indication,
- AND/OR does NOT send out GP Pairing for TH-GPD with *AddSink*=0b1, *Remove GPD* = 0b0, ApplicationID = 0b010, GPD ID = N, Endpoint field = X, appropriate communication mode and security level for the DUT-GPS, and other parameters as derived from the Commissioning GPDF;
- AND/OR:
  - In case of Communication Mode != 0b11: does NOT send out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00;
  - In case of Communication Mode = 0b11: does send Device_annce for the alias;
- AND/OR sends GP Response carrying GPD Commissioning Reply command (since the *RxAfterTx* sub-field of the received GP Commissioning Notification command is set to 0b0).

AND/OR On reception of ZCL Read Attributes command, DUT-GPS does NOT respond with Read Attributes Response with Sink Table having one entry for the TH-GPD with ApplicationID = 0b010 , GPD IEEE address = N, Endpoint = X, and all relevant parameters exchanged in the commissioning process are stored there.

AND/OR If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS does NOT respond with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for ApplicationID = 0b010, GPD IEEE address = N, GPD Endpoint = X; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

AND/OR DUT-GPS does NOT correctly execute the GPD command in the Data GPDF with Endpoint X.

4.4.2.2.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF11	Proximity commissioning method	Direct
GPCF3B	Rx of Commissioning command	Direct
GPCF12A	GPD key exchange in GPD Commissioning command	Indirect

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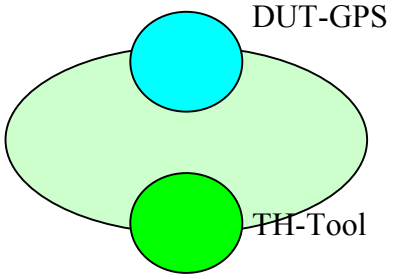
4.4.2.3 NOT TESTED: Sub-case: Multi-hop auto-commissioning

4.4.2.3.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT, GPT+ or GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports multi-hop commissioning and SecurityLevel=0b00.
TH-Tool	TH-Tool supports multi-hop commissioning and SecurityLevel=0b00.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-Tool operate in a ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2	DUT-GPS has no pairings.	
3	[R3] A.3.3.2.2	DUT-GPS is configured with gpsSecurityLevel = 0b00.	

4.4.2.3.2 Test Set-Up

The DUT-GPS and TH-tool shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

4.4.2.3.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.3.3.2.2, A.3.3.4.4, A.3.3.5.3, A.3.3.5.4, A.3.3.5.2	DUT-GPS enters commissioning mode. TH-Tool sends GP Commissioning Notification command with • Sub-fields of the *Options* field set to: *RxAfterTx* = 0b0, *SecurityLevel* = 0b00, *SecurityKeyType* = 0b000, *Security processing failed* = 0b0. • *GPD ID* = N; • *GPD CommandID* carrying a GPD Data command supported by the DUT-GPS. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
2	[R3] A.1.4.1.3	***Negative test: both Auto-Commissioning and RxAfterTx set:*** DUT-GPS enters commissioning mode. TH-Tool sends GP Commissioning Notification command with • Sub-fields of the *Options* field set to: *RxAfterTx* = 0b1, *SecurityLevel* = 0b00, *SecurityKeyType* = 0b000, *Security processing failed* = 0b0. • *GPD ID* = N; • *GPD CommandID* carrying a GPD Data command supported by the DUT-GPS. After 2s, TH-Tool sends another GP Commissioning Notification, formatted as above, with incremented frame counter value. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	

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4.4.2.3.4 Expected Outcome

Pass verdict:
1) DUT-GPS does send GP Proxy Commissioning Mode (*Action*=Enter) command. On reception of GP Commissioning Notification command, DUT-GPS: • provides success indication, • sends out GP Pairing for TH-GPD's GPD ID with *AddSink*=0b1, *Remove GPD* = 0b0, appropriate communication mode for the DUT-GPS, *GPD Fixed* = 0b0, *MAC sequence number capabilities* = 0b0, *SecurityLevel* = 0b00; • If DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived); if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there. If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID* ; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).
2) Upon reception of GP Commissioning Notification, DUT-GPS does NOT send GP Response nor GPD Commissioning Reply. DUT-GPS does NOT send GP Pairing nor Device_annce for GPDID = N. DUT-GPS does NOT create Sink Table entry nor Translation Table entry for GPDID = N.
Fail verdict:
1) DUT-GPS does not send GP Proxy Commissioning Mode (*Action*=Enter) command. AND/OR On reception of GP Commissioning Notification, DUT-GPS: • does not provide success indication, • does not send out GP Pairing for TH-GPD's GPD ID with *AddSink*=0b1, *Remove GPD* = 0b0, appropriate communication mode for the DUT-GPS, *GPD Fixed* = 0b0, *MAC sequence number capabilities* = 0b0, *SecurityLevel* = 0b00; • in case of Communication Mode != 0b11: does not send out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived); in case of Communication Mode = 0b11: does send Device_annce for the alias. AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters established in the commissioning process. AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in 4.4.2.3.4/item 1 above.
2) Upon reception of GP Commissioning Notification, DUT-GPS send GP Response AND/OR GPD Commissioning Reply. AND/OR DUT-GPS sends GP Pairing AND/OR Device_annce for GPDID = N. AND/OR DUT-GPS creates Sink Table entry AND/OR Translation Table entry for GPDID = N.

4.4.2.3.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF11	Proximity commissioning method	Direct
GPCF1	Commissioning with Auto-commissioning flag	Direct

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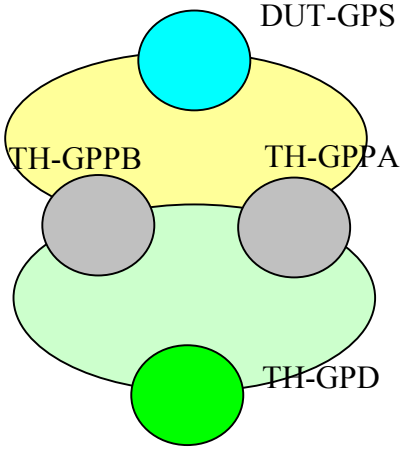
4.4.2.4 NOT TESTED: Advanced GP only: Bidirectional commissioning with mixed proxies (DUT: Advanced GPS)

Note: Advanced GP only.

4.4.2.4.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT, GPT+ or GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports multi-hop commissioning.
TH-GPPA GPP Advanced	PANId=same PANId as TH-GPS Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPPB GPP Basic	PANId=same PANId as TH-GPS Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N GPD security usage according to DUT capabilities; if GPS supports security, TH-GPD shall provide OOB key and set the subfields *Security Key request* = 0b0, *GPDkeyEncryption* = 0b0 and *GPDkeyPresent* = 0b1. TH-GPD application functionality matches that of the DUT-GPS's GPEP. TH-GPD implements bidirectional commissioning procedure.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPP operate in a ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2, A.3.4.2.2	No pairing exists between DUT-GPS and TH-GPD; there is not Proxy Table entry for TH-GPD in the TH-GPP.	
3	[R3] A.3.3.3.1, A.3.3.3.2	DUT-GPS's attributes have the value: *gpSharedSecurityKeyType* = 0b000.	

4.4.2.1.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity of TH-GPPA and TH-GPPB; if DUT-GPS supports proximity-based commissioning, it shall be out of range of TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.4.2.4.2 Test Procedure (TBD Advanced GP)

4.4.2.4.3 Expected outcome (TBD Advanced GP)

4.4.2.4.4 PICS covered

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4.4.2.5 Bidirectional multi-hop commissioning with shared key (requested&delivered), ApplicationID = 0b010

4.4.2.5.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.4.2.1.1.	
3		TH-GPD uses ApplicationID = 0b010 and IEEE address = N; Endpoint = X if GPS supports security, TH-GPD shall request the shared key by setting the sub-fields *Security Key request* = 0b1; *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1, encrypted *GPD Key* field is present and *GPD Key MIC* field is present.	
4	[R3] A.3.3.3.1, A.3.3.3.2	DUT-GPS's attributes have the value: *gpSharedSecurityKeyType* = 0b010 and the *gpSharedSecurityKey* = 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf.	

4.4.2.5.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity of TH-GPP; DUT-GPS is out of range of TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.4.2.5.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.9, A.3.3.2.2, A.3.3.4.4, A.3.3.5.3, A.3.3.5.4, A.3.3.5.2	DUT-GPS enters commissioning mode.	
1B		Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. The TH-GPD first sends Channel Request GPDF with: • *Frame Type* sub-field of the NWK Frame Control field set to 0b01, • *Auto-Commissioning* ▪ 0b0, if the GPD Channel Request transmission is immediately followed by reception window; ▪ 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel • *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field, • *GPD SrcID field, Endpoint, Security frame counter* and *MIC* field absent; The TH-GPD is configured such, that the GPD Channel Configuration has to be delivered on a channel other than the operational channel. TH-GPP sends GP Commissioning Notification in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command, with: • the sub-fields of the *Options* field set to: ▪ *RxAfterTx* = 0b1; ▪ *BidirectionalCommunicationCapability* = 0b0; *ProxyInfoPresent* = 0b1; ▪ Remaining sub-fields correctly derived from the triggering GPDF (*ApplicationID* = 0b000, *SrcID* = 0x00000000); • GPD CommandID = 0xE3, and 1B of command payload copied from the triggering GPDF; • GPP short address field and GPP-GPD link field present.	
1C		After reception of GPD Channel Configuration command, the TH-GPD sends Commissioning GPDF with MAC source address carrying GPD IEEE address N; *Auto-Commissioning* = 0b0, *RxAfterTx* set to 0b1, *ApplicationID* = 0b010, SrcID field absent; *GPD Endpoint* = X – and if DUT-GPS supports security,	

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		with *GP Security Key request* = 0b1, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1; *GPD Key* field present and encrypted and *GPD Key MIC* field present. TH-GPP sends GP Commissioning Notification in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command, with: • the sub-fields of the *Options* field set to: ▪ *ApplicationID* = 0b010; ▪ *RxAfterTx* = 0b1; ▪ *BidirectionalCommunicationCapability* = 0b0; ▪ Remaining sub-fields correctly derived from the triggering GPDF • GPD CommandID = 0xE0, and the entire command payload copied from the triggering GPDF; • GPP short address field and GPP-GPD link field present.	
1D		After reception of Commissioning Reply GPDF the TH-GPD sends correctly formatted (*ApplicationID* = 0b010, MAC source address = GPD IEEE address N, SrcID field absent; *GPD Endpoint* = X) Success GPDF with *Auto-Commissioning* = 0b0 and *RxAfterTx* set to 0b0, protected using the security parameters exchanged in GPD Commissioning/Commissioning Reply. TH-GPP sends GP Commissioning Notification in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command, with: • the sub-fields of the *Options* field set to: ▪ *ApplicationID* = 0b010; ▪ *RxAfterTx* = 0b0; ▪ *Security processing failed* = 0b0; ▪ *BidirectionalCommunicationCapability* = 0b0 ▪ *ProxyInfoPresent = 0b1*; ▪ *SecurityLevel* – copied from the *SecurityLevel* sub-field of the *Extended NWK Frame Control* field; ▪ *SecurityKeyType* = 0b010; ▪ Remaining sub-fields correctly derived from the triggering GPDF • the *GPD security frame counter* field carrying the value from the *Security frame counter* field of the Success GPDF; • GPD CommandID = 0xE2 (in the clear); MIC field absent; • GPP short address field and GPP-GPD link field present. If required, DUT-GPS is put back into operational mode. TH-GPP reads out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	

4.4.2.5.4 Expected Outcome

Pass verdict:
1A) DUT-GPS sends GP Proxy Commissioning Mode command with: • APS header fields: ▪ *ProfileID*: 0xA1E0; ▪ *ClusterID*: 0x0021; ▪ source endpoint: GPEP (242); ▪ destination endpoint: not present or if present, GPEP (242); • ZCL header fields: ▪ *Command Identifier*: 0x02 ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1; • Command payload: ▪*Action*=Enter and *Channel present* sub-field set to 0b0 ▪*Unicast communication* sub-field set according to DUT-GPS capabilities.

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1B) On reception of (each) GP Commissioning Notification with *RxAfterTx* sub-field set to 0b1 and GPD Channel Request command, the DUT-GPS sends GP Response command (in broadcast or unicast to TH-GPP) with:

- APS header fields:
  - *ProfileID*: 0xA1E0;
  - *ClusterID*: 0x0021;
  - source endpoint: GPEP (242);
  - destination endpoint: not present or if present, GPEP (242);
- ZCL header fields:
  - *Command Identifier*: 0x06
  - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1;
- Command payload:
  - *ApplicationID* sub-field of the *Options* field set to 0b000,
  - GPD SrcID = 0x00000000;
  - *Endpoint* field absent;
  - carrying GPD Channel Configuration command with:
    - operational channel;
    - *Basic* = 0b0 if DUT-GPS is a Basic Sink,
  - listing the TH-GPP in the *TempMasterShortAddress* field;
  - the *TransmitChannel* the TH-GPP shall transmit on, being one of the channels from the GPD Channel Request payload.

The payload of the GPD command sent by the DUT-GPS in GP Response does NOT exceed:

- For a GPD with *ApplicationID* = 0b000: 64 octets;
- For a GPD with *ApplicationID* = 0b010: 59 octets.

1C) On reception of (each) GP Commissioning Notification with *RxAfterTx* sub-field set to 0b1 and GPD Commissioning command, the DUT-GPS sends GP Response (in broadcast or unicast to TH-GPP) with:

- APS header fields:
  - *ProfileID*: 0xA1E0;
  - *ClusterID*: 0x0021;
  - source endpoint: GPEP (242);
  - destination endpoint: not present or if present, GPEP (242);
- ZCL header fields:
  - *Command Identifier*: 0x06
  - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1;
- Command payload:
  - the *ApplicationID* sub-field of the *Options* field set to 0b010;
  - the *GPD ID* field of 8B length carrying GPD IEEE address N of the TH-GPD (as in the triggering GP Commissioning Notification);
  - *Endpoint* = X (as in the triggering GP Commissioning Notification);
  - carrying the GPD Commissioning Reply command,
    - If DUT-GPS supports security and the Commissioning GPDF had *GP Security Key request* = 0b1, *GPDkeyEncryption*= 0b1 and *GPDkeyPresent* = 0b1; the GPD Commissioning Reply command carries correctly encrypted the shared key of type *gpSharedSecurityKeyType* (0b010) and value *gpSharedSecurityKey; GPD Key MIC* field is present, *Frame Counter* field is present; *GPD key encryption* = 0b1.
  - listing the TH-GPP in the T*empMasterShortAddress* field and *TransmitChannel* set to the operational channel.

The payload of the GPD command sent by the DUT-GPS in GP Response does NOT exceed:

- For a GPD with *ApplicationID* = 0b000: 64 octets;
- For a GPD with *ApplicationID* = 0b010: 59 octets.

1D) On reception of GP Commissioning Notification with GPD Success command, DUT-GPS provides success indication, and sends out GP Pairing with:

- APS header fields:
  - *ProfileID*: 0xA1E0;
  - *ClusterID*: 0x0021;
  - source endpoint: GPEP (242);
  - destination endpoint, if present: GPEP (242);

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- ZCL header fields:
  - *Command Identifier*: 0x01;
    The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b1 (server to client), *Disable default response* = 0b1;
- ZCL payload with:
  - Sub-fields of the *Options* field set to:
    - *ApplicationID* = 0b010, *AddSink*=0b1, *RemoveGPD* = 0b0;
    - *Communication Mode*: set according to DUT-GPS capabilities
    - *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
    - *SecurityLevel* as exchanged during commissioning;
    - *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: *gpSharedSecurityKeyType* = 0b010);
    - *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;
  - GPD IEEE address = N;
  - *Endpoint* field present and set to X or 0xff ;
  - *Sink IEEE address* and *Sink NWK address* fields:
    - present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
    - absent otherwise;
  - *Sink GroupID* field:
    - present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;
    - present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;
    - absent otherwise;
  - *DeviceID* field - copied from the GPD Commissioning command payload;
  - *GPD security Frame Counter* field – as in GPD Success command;
  - *GPD key* field:
    - present and carrying *gpSharedSecurityKey* being GPD Group Key in the clear, if *SecurityLevel* >= 0b10;
    - absent otherwise;
  - *Assigned alias* field:
    - present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise;
  - *Forwarding Radius* field:
    - present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
    - absent otherwise.

If DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than 0b11 (lightweight unicast): DUT-GPS sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias and NWK sequence number = 0x00; if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent.

It may also send GP Proxy Commissioning Mode with *Action*=Exit.

On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with a Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there.

If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD IEEE address N and *GPD Endpoint* = X and the corresponding *ApplicationID* = 0b010; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

Fail verdict:

1A) DUT-GPS does not sends GP Proxy Commissioning Mode command, formatted exactly as in pass verdict 1A) above.

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1B) AND/OR On reception of (each) GP Commissioning Notification with GPD Channel Request command and *RxAfterTx* = 0b1, the DUT-GPS does not send GP Response, formatted exactly as in pass verdict 1B) above.
1C) AND/OR On reception of (each) GP Commissioning Notification with GPD Commissioning command, the DUT-GPS does not send GP Response AND/OR the GP Response, formatted exactly as in pass verdict 1C) above
1D) AND/OR On reception of GP Commissioning Notification with GPD Success command, DUT-GPS does not provide success indication and/or does not send GP Pairing formatted exactly as specified in pass verdict 1D) above. AND/OR: • in case of Communciation Mode != 0b11: DUT-GPS does not send Device_annce for the alias with IEEE = 0xff..ff; • in case of Communication Mode = 0b11" DUT does send Device_annce for the alias. AND/OR DUT-GPS does not respond with Read Attributes Response having a Sink Table entry for the TH-GPD IEEE address N and Endpoint X (*ApplicationID* = 0b010)AND/OR all relevant parameters exchanged in the commissioning process are not stored there. AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in pass verdict 1D) above.

4.4.2.6 Bidirectional multi-hop commissioning with OOB key (shared key noe requested and not available), ApplicationID = 0b010

4.4.2.6.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.4.2.1.1.	
3		TH-GPD uses *ApplicationID* = 0b010 and GPD IEEE address = N; *Endpoint* = X if GPS supports security, TH-GPD shall NOT request the shared key by setting the sub-fields *Security Key request* = 0b0; *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1, encrypted *GPD Key* field is present and *GPD Key MIC* field is present.	
4	[R3] A.3.3.3.1, A.3.3.3.2	DUT-GPS's attribute have the value: *gpSharedSecurityKeyType* = 0b000.	

4.4.2.6.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity of TH-GPP; DUT-GPS is out of range of TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.4.2.6.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.9, A.3.3.2.2, A.3.3.4.4, A.3.3.5.3, A.3.3.5.4, A.3.3.5.2	DUT-GPS enters commissioning mode.	
1B		Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until DUT-GPS provides commissioning success feedback. The TH-GPD first sends Channel Request GPDF with: • *Frame Type* sub-field of the NWK Frame Control field set to 0b01, • *Auto-Commissioning* ▪ 0b0, if the GPD Channel Request transmission is immediately followed by reception window; ▪ 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel • *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field, • *GPD SrcID field, Endpoint, Security frame counter* and *MIC* field absent;	

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		The TH-GPD is configured such, that the GPD Channel Configuration has to be delivered on a channel other than the operational channel. TH-GPP sends GP Commissioning Notification in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command, with: • the sub-fields of the *Options* field set to: ▪ *RxAfterTx* = 0b1; ▪ *BidirectionalCommunicationCapability* = 0b0; *ProxyInfoPresent* = 0b1; ▪ Remaining sub-fields correctly derived from the triggering GPDF (*ApplicationID* = 0b000, *SrcID* = 0x00000000); • GPD CommandID = 0xE3, and 1B of command payload copied from the triggering GPDF; • GPP short address field and GPP-GPD link field present.	
1C		After reception of GPD Channel Configuration command, the TH-GPD sends Commissioning GPDF with MAC source address carrying GPD IEEE address N; *Auto-Commissioning* = 0b0, *RxAfterTx* set to 0b1, *ApplicationID* = 0b010, SrcID field absent; GPD Endpoint = X – and if DUT-GPS supports security, with *GP Security Key request* = 0b0, *GPDkeyEncryption* = 0b1 and *GPDkeyPresent* = 0b1; *GPD Key* field present and encrypted and *GPD Key MIC* field present. TH-GPP sends GP Commissioning Notification in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command, with: • the sub-fields of the *Options* field set to: ▪ *ApplicationID* = 0b010; ▪ *RxAfterTx* = 0b1; ▪ *BidirectionalCommunicationCapability* = 0b0; ▪ Remaining sub-fields correctly derived from the triggering GPDF • GPD CommandID = 0xE0, and the entire command payload copied from the triggering GPDF; • GPP short address field and GPP-GPD link field present.	
1D		After reception of Commissioning Reply GPDF the TH-GPD sends correctly formatted (*ApplicationID* = 0b010, MAC source address = GPD IEEE address N, SrcID field absent; GPD Endpoint = X) Success GPDF with *Auto-Commissioning* = 0b0 and *RxAfterTx* set to 0b0, protected using the security parameters exchanged in GPD Commissioning/Commissioning Reply. TH-GPP sends GP Commissioning Notification in broadcast or unicast to DUT-GPS, depending on the *Unicast communication* sub-field setting in the GP Proxy Commissioning Mode command, with: • the sub-fields of the *Options* field set to: ▪ *ApplicationID* = 0b010; ▪ *RxAfterTx* = 0b0; ▪ *Security processing failed* = 0b1; ▪ *BidirectionalCommunicationCapability* = 0b0; ▪ *SecurityLevel* – copied from the *SecurityLevel* sub-field of the *Extended NWK Frame Control* field; ▪ *SecurityKeyType* = 0b100; ▪ *ProxyInfoPresent* = 0b1; ▪ Remaining sub-fields correctly derived from the triggering GPDF • the *GPD security frame counter* field carrying the value from the *Security frame counter* field of the Success GPDF; • *GPD CommandID* = 0xE2 encrypted; *MIC* field present; • *GPP short address* field and *GPP-GPD link* field present.	

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		If required, DUT-GPS is put back into operational mode. TH-GPP reads out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	

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Pass verdict:
1A) DUT-GPS sends GP Proxy Commissioning Mode command with: • APS header fields: ▪*ProfileID*: 0xA1E0; ▪*ClusterID*: 0x0021; ▪source endpoint: GPEP (242); ▪destination endpoint: not present or if present, GPEP (242); • ZCL header fields: ▪*Command Identifier*: 0x02 ▪The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1; • Command payload: ▪*Action*=Enter and *Channel present* sub-field set to 0b0 ▪*Unicast communication* sub-field set according to DUT-GPS capabilities.
1B) On reception of (each) GP Commissioning Notification with *RxAfterTx* sub-field set to 0b1 and GPD Channel Request command, the DUT-GPS sends GP Response command (in broadcast or unicast to TH-GPP) with: • APS header fields: ▪*ProfileID*: 0xA1E0; ▪*ClusterID*: 0x0021; ▪source endpoint: GPEP (242); ▪destination endpoint: not present or if present, GPEP (242); • ZCL header fields: ▪*Command Identifier*: 0x06 ▪The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1; • Command payload: ▪*ApplicationID* sub-field of the *Options* field set to 0b000, ▪*GPD SrcID* = 0x00000000; ▪*Endpoint* field absent; ▪ carrying GPD Channel Configuration command with: – operational channel; – *Basic* = 0b0 if DUT-GPS is a Basic Sink, ▪listing the TH-GPP in the *TempMasterShortAddress* field; ▪the *TransmitChannel* the TH-GPP shall transmit on, being one of the channels from the GPD Channel Request payload. The payload of the GPD command sent by the DUT-GPS in GP Response does NOT exceed: • For a GPD with *ApplicationID* = 0b000: 64 octets; • For a GPD with *ApplicationID* = 0b010: 59 octets.
1C) On reception of (each) GP Commissioning Notification with *RxAfterTx* sub-field set to 0b1 and GPD Commissioning command, the DUT-GPS sends GP Response (in broadcast or unicast to TH-GPP) with: • APS header fields: ▪*ProfileID*: 0xA1E0; ▪*ClusterID*: 0x0021; ▪source endpoint: GPEP (242); ▪destination endpoint: not present or if present, GPEP (242); • ZCL header fields: ▪*Command Identifier*: 0x06

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▪The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b1 (server to client), *Disable default response* 0b1;

- Command payload:
  - ▪the *ApplicationID* sub-field of the *Options* field set to 0b010;
  - ▪the *GPD ID* field of 8B length carrying GPD IEEE address N of the TH-GPD (as in the triggering GP Commissioning Notification);
  - ▪*Endpoint* = X (as in the triggering GP Commissioning Notification);
  - ▪carrying the GPD Commissioning Reply command,
    - – If DUT-GPS supports security and the Commissioning GPDF had *GPDkeyEncryption*= 0b1 and *GPDkeyPresent* = 0b1; the GPD Commissioning Reply carries: *KeyType* (0b100), *GPD key encryption* = 0b0*; GPD Key* and *GPD Key MIC* fields are absent; *Frame counter* field is absent;
  - ▪ listing the TH-GPP in the T*empMasterShortAddress* field and *TransmitChannel* set to the operational channel.

The payload of the GPD command sent by the DUT-GPS in GP Response does NOT exceed:

- For a GPD with *ApplicationID* = 0b000: 64 octets;
- For a GPD with *ApplicationID* = 0b010: 59 octets.

1D) On reception of GP Commissioning Notification with GPD Success command, DUT-GPS provides success indication, and sends out GP Pairing with:

- APS header fields:
  - ▪ProfileID: 0xA1E0;
  - ▪ClusterID: 0x0021;
  - ▪source endpoint: GPEP (242);
  - ▪destination endpoint, if present: GPEP (242);
- ZCL header fields:
  - ▪*Command Identifier*: 0x01;

  The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0, *Direction* = 0b1 (server to client), *Disable default response* = 0b1;
- ZCL payload with:
  - ▪ Sub-fields of the *Options* field set to:
    - – *ApplicationID* = 0b010, *AddSink*=0b1, *RemoveGPD* = 0b0;
    - – *Communication Mode*: set according to DUT-GPS capabilities
    - – *GPD Fixed* and *GPD MAC sequence number capabilities* – copied from the GPD Commissioning command payload;
    - – *SecurityLevel* as exchanged during commissioning;
    - – *SecurityKeyType* as exchanged during commissioning (if DUT-GPS supports security: 0b100);
    - – *Assigned Alias present* and *Forwarding Radius present*: set according to DUT-GPS capabilities;
  - ▪ GPD IEEE address = N;
  - ▪ *Endpoint* present and set to X or 0xff;
  - ▪ *Sink IEEE address* and *Sink NWK address* fields:
    - – present if *Communication Mode* sub-field of the *Options* field was set to 0b00 or 0b11;
    - – absent otherwise;
  - ▪ *Sink GroupID* field:
    - – present and set to derived alias, if *Communication Mode* sub-field of the *Options* field was set to 0b01;
    - – present and set any value, if *Communication Mode* sub-field of the *Options* field was set to 0b10;
    - – absent otherwise;
  - ▪ *DeviceID* field - copied from the GPD Commissioning command payload;
  - ▪ *GPD security Frame Counter* field – as in GPD Success command;
  - ▪ *GPD key* field:
    - – present and TH-GPD OOB key in the clear, if *SecurityLevel* >= 0b10;
    - – absent otherwise;
  - ▪ *Assigned alias* field:
    - – present and set to any value if *Assigned Alias present* sub-field of the *Options* field was set to 0b1;
    - – absent otherwise;
  - ▪ *Forwarding Radius* field:
    - – present and set to any value <= 0x1E if *Forwarding Radius present* sub-field of the *Options* field was set to 0b1;
    - – absent otherwise.

If DUT-GPS sets *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to value other than

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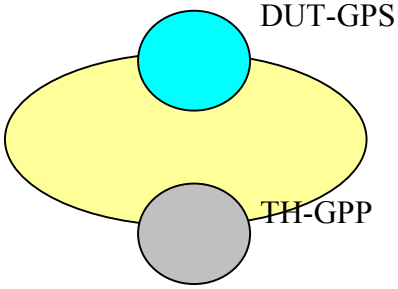
0b11 (lightweight unicast): DUT-GPS sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias and NWK sequence number = 0x00; if DUT-GPS set *CommunicationMode* sub-field of the *Options* field of the GP Pairing command to 0b11 (lightweight unicast), Device_annce SHALL not be sent. It may also send GP Proxy Commissioning Mode with *Action*=Exit. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with a Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there. If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD IEEE address N and GPD Endpoint = X and the corresponding *ApplicationID* = 0b010; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).
Fail verdict:
1A) DUT-GPS does not sends GP Proxy Commissioning Mode command, formatted exactly as in pass verdict 1A) above.
1B) AND/OR On reception of (each) GP Commissioning Notification with GPD Channel Request command and *RxAfterTx* = 0b1, the DUT-GPS does not send GP Response, formatted exactly as in pass verdict 1B) above.
1C) AND/OR On reception of (each) GP Commissioning Notification with GPD Commissioning command, the DUT-GPS does not send GP Response AND/OR the GP Response, formatted exactly as in pass verdict 1C) above
1D) AND/OR On reception of GP Commissioning Notification with GPD Success command, DUT-GPS does not provide success indication and/or does not send GP Pairing formatted exactly as specified in pass verdict 1D) above. AND/OR: • in case of Communciation Mode != 0b11: DUT-GPS does not send Device_annce for the alias with IEEE = 0xff..ff; • in case of Communciaiton Mode = 0b11: DUT-GPS does send Device_annce for the alias. AND/OR DUT-GPS does not respond with Read Attributes Response having a Sink Table entry for the TH-GPD IEEE address N and Endpoint X (*ApplicationID* = 0b010)AND/OR all relevant parameters exchanged in the commissioning process are not stored there. AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in pass verdict 1D) above.

4.4.2.7 Bidirectional multi-hop commissioning: Additional test

4.4.2.7.1 Initial Conditions

The required network set-up for the test harness is as follows:

	DUT-GPS (GPT, GPT+ or GPC, GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports multi-hop commissioning.
	TH-GPP	PANId=same PANId as DUT-GPS Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPP operate in a ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	

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2	[R3] A.3.3.2.2, A.3.4.2.2	No pairing exists between DUT-GPS and any GPD; there is no Proxy Table entry in the TH-GPP.	
3	[R3] A.3.3.3.1, A.3.3.3.2	DUT-GPS's *gpSharedSecurityKeyType* attribute has the value 0b000.	

4.4.2.7.2 Test Set-Up

The DUT-GPS shall be in wireless communication proximity of TH-GPP.

A packet sniffer shall be observing the communication over the air interface.

4.4.2.7.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
0	[R3] A.3.2.7, A.3.6.1.5, A.4.2.1.2	**Negative test: TempMaster election**: Enable commissioning mode on the DUT-GPS. TH-GPP sends a GP Commissioning Notification with *RxAfterTx* sub-field of the *Options* field set to 0b0, carrying GPD Channel Request command.	
		Frame and state tests	
1		***State test (Channel Request):*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPP sends on the operational channel a correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b1, carrying GPD Channel Request with *Channel Toggling Behavior* field listing the operational channel. After DUT-GPS sends GP Response to TH-GPP, carrying GPD Channel Configuration command, TH-GPP sends another correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b1 carrying GPD Channel Request with *Channel Toggling Behavior* field listing the operational channel. After DUT-GPS sends a second GP Response to TH-GPP, carrying GPD Channel Configuration command, TH-GPP sends yet another correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b1 carrying GPD Channel Request with *Channel Toggling Behavior* field listing the operational channel.	
2A		***State test (Commissioning):*** Clear Sink Table of DUT-GPS. Set *gpSharedSecurityKeyType* of DUT-GPS to 0b010, and *gpSharedSecurityKey* of DUT-GPS to a non-zero value. Set *gpsCommissioningModeExit* to 0x02 (first pairing success). DUT-GPS enters commissioning mode. After successful exchange of GPD Channel Request and GPD Channel Configuration between the TH-GPP and DUT-GPS, TH-GPP sends two, spaced at least 1 second apart, GP Commissioning Notification commands with *RxAfterTx* = 0b1 carrying GPD Commissioning command with *Security Key Request* sub-field of the *Options* field set to 0b1 and *GPD key encryption* sub-field of the *Extended Options* field set to 0b1, and with application and security settings as supported by the DUT-GPS. On receipt of GP Response carrying GPD Commissioning Reply, TH-GPP sends GP Commissioning Notification command with *RxAfterTx* = 0b1 carrying Commissioning GPDF, formatted as before.	
2B		On receipt of the third GP Response carrying GPD Commissioning Reply of step 2A, TH-GPP sends GP Commissioning Notification commands with *RxAfterTx* = 0b0, carrying GPD Success command,	

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		with *Security processing failed* sub-field of the *Options* field set to 0b0, and all correct security parameters. Read out Sink Table entry of the DUT-GPS.	
2C		***Confirm DUT-GPS exited commissioning mode:*** TH-GPP sends correctly formatted GP Commissioning Notification commands with *RxAfterTx* = 0b0, carrying GPD Success command, with *Security processing failed* sub-field of the *Options* field set to 0b0, and all correct security parameters (frame counter increased).	
Incorrectly protected Success GPDF (if DUT-GPS supports security):			
3.0		***Preparation:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. After successful exchange of GPD Channel Request and GPD Channel Configuration commands, and GPD Commissioning and GPD Commissioning Reply commands between TH-GPP and DUT-GPS using *gpdSecurityLevel* >= 0b10.	
3A		***Negative test: GPD Success unprotected:*** TH-GPP sends correctly formatted GP Commissioning Notification command with *RxAfterTx* = 0b0, with: • The sub-fields of the *Options* field set to: ▪ *SecurityLevel* = 0b00; ▪ *SecurityKeyType* = 0b0; ▪ *Security processing failed* = 0b0; • GPD CommandID carrying GPD Success in the clear; • MIC field absent. Read out Sink Table of DUT-GPS.	
3B		TH-GPP sends correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b0, with: • The sub-fields of the *Options* field set to: ▪ *SecurityLevel* and *SecurityKeyType* – as agreed during the prior commissioning steps; ▪ *Security processing failed* = 0b1; • GPD security frame counter value lower than that of the last GPD Commissioning command; • GPD CommandID carrying GPD Success encrypted (if *gpdSecurityLevel* =0b11); • MIC field present Read out Sink Table of DUT-GPS.	Immediately after previous step, within commissioning window of DUT-GPS. If DUT-GPS exits commissioning in previous step, repeat the preparation step 3.0.
3C		TH-GPP sends correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b0, with: • The sub-fields of the *Options* field set to: ▪ *SecurityLevel* – as agreed during the prior commissioning steps; ▪ *SecurityKeyType* - incorrect key type (individual vs. shared); ▪ *Security processing failed* = 0b1; • GPD security frame counter value higher than that of the last GPD Commissioning command; • *GPD CommandID* carrying GPD Success encrypted (if *gpdSecurityLevel* =0b11); • MIC field present. Read out Sink Table of DUT-GPS.	Immediately after previous step, within commissioning window of DUT-GPS. If DUT-GPS exits commissioning in previous step, repeat the preparation step 3.0.

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3D		TH-GPP sends correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b0 and *Security processing failed* = 0b1 carrying encrypted GPD Success (if *gpdSecurityLevel* =0b11), correct security parameters (frame counter, key type, security level), but carrying wrong MIC value. Read out Sink Table of DUT-GPS.	Immediately after previous step, within commissioning window of DUT-GPS. If DUT-GPS exits commissioning in previous step, repeat the preparation step 3.0.
3E		TH-GPP sends correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b0, *Security Processing Failed* = 0b1 carrying encrypted GPD Success (if *gpdSecurityLevel* =0b11), correct security parameters (frame counter, key type, security level), but with incorrect GPD ID (!=N). Read out Sink Table of DUT-GPS.	Immediately after previous step, within commissioning window of DUT-GPS. If DUT-GPS exits commissioning in previous step, repeat the preparation step 3.0.
3F		TH-GPP sends correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b0, with: • The sub-fields of the *Options* field set to: ▪ *SecurityLevel* and *SecurityKeyType* – as agreed during the prior commissioning steps; ▪ *Security processing failed* = 0b0; • GPD security frame counter value lower than that of the last GPD Commissioning command; • GPD CommandID carrying GPD Success in the clear; • *MIC* field absent Read out Sink Table of DUT-GPS.	Immediately after previous step, within commissioning window of DUT-GPS. If DUT-GPS exits commissioning in previous step, repeat the preparation step 3.0.
3G		TH-GPP sends correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b0, with: • The sub-fields of the *Options* field set to: ▪ *SecurityLevel* – as agreed during the prior commissioning steps; ▪ *SecurityKeyType* - incorrect key type (individual vs. shared); ▪ *Security processing failed* = 0b0; ▪ *BidirectionalCommunicationCapability* = 0b0 for Basic Proxy/Combo; ▪ *ProxyInfoPresent = 0b1;* • GPD security frame counter value higher than that of the last GPD Commissioning command; • GPD CommandID carrying GPD Success in the clear; • MIC field absent. Read out Sink Table of DUT-GPS.	Immediately after previous step, within commissioning window of DUT-GPS. If DUT-GPS exits commissioning in previous step, repeat the preparation step 3.0.
3H		TH-GPP sends correctly formatted GP Commissioning Notification (*RxAfterTx* = 0b0, *Security Processing Failed* = 0b0) carrying GPD Success and indicating it was protected correctly (frame counter, key type), but with incorrect GPD SrcID (!=N). Read out Sink Table of DUT-GPS.	Immediately after previous step, within commissioning window of DUT-GPS. If DUT-GPS exits commissioning in previous step, repeat the preparation step 3.0.

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3I	[R3] A.1.7.5, A.3.9.1, A.4.2.1.2	***Negative test: Not accepting reset frame counter in Success GPDF:*** TH-GPP sends correctly formatted GP Commissioning Notification carrying GPD Success command correctly protected, but with reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) value 0x00000000. Read out Sink Table entry of the DUT-GPS.	Immediately after previous step, within commissioning window of DUT-GPS. If DUT-GPS exits commissioning in previous step, repeat the preparation step 3.0.
3J		**Negative test: Unexpected GPD Success:** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPP sends correctly formatted GP Commissioning Notification carrying GPD Success, correctly protected with GPD shared key. Read out Sink Table of DUT-GPS.	
3L		***GPD Success incorrectly protected, ApplicationID = 0b010:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. Perform commissioning between DUT-GPS and TH-GPP. Upon reception of the GP Response carrying Commissioning Reply command, TH-GPP sends correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b0 and *Security processing failed* = 0b1 carrying encrypted GPD Success, correct security parameters (frame counter, key type, security level), but carrying wrong MIC value. Read out Sink Table of DUT-GPS.	
3M		***GPD Success with wrong GPD IEEE address:*** TH-GPP sends correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b0 and *Security processing failed* = 0b0 carrying GPD Success in the clear, indicating correct protection, but with MAC source address field carrying incorrect GPD IEEE address (!=N). Read out Sink Table of DUT-GPS.	Immediately after previous step, within commissioning window of DUT-GPS. If DUT-GPS exist commissioning in previous step, repeat the preparation step 3.0.
3N		***GPD Success with wrong GPD IEEE address:*** TH-GPP sends correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b0 and *Security processing failed* = 0b0 carrying GPD Success in the clear, indicating correct protection, but with incorrect Endpoint Y (!=X, !=0x00, !=0xff). Read out Sink Table of DUT-GPS.	Immediately after previous step, within commissioning window of DUT-GPS. If DUT-GPS exist commissioning in previous step, repeat the preparation step 3.0.
Additional security tests			
4A	[R3] A.3.5.2.5	***Security processing failed test; Success GPDF with SecurityLevel = 0b11:*** Clean Sink Table of the DUT-GPS. Clean Proxy Table of the TH-GPP. After exchange of GPD Channel Request and GPD Channel Configuration commands, TH-GPP is made to send a correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b1; GPD Commissioning command has the *Security Key request* = 0b1 and *SecurityLevelCapabilities* sub-field of the *Extended Option* field set to 0b11. After the DUT-GPS sends a GP Response with the GPD	

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		Commissioning Reply command carrying the shared key, TH-GPP is made to send a correctly formatted GP Commissioning Notification carrying GPD Success command with *SecurityLevel* = 0b11 and the *SecurityProcessingFailed* = 0b1; the *GPD CommandID*, and the *MIC* field is correctly encrypted using the shared key provided by the DUT-GPS in the Commissioning Reply and the correct frame counter value; the *GPD Command Payload* field is set to 0x00 or 0xff.	
4B	[R3] A.3.5.2.5	***Negative test: Security processing failed test; Success GPDF with SecurityLevel = 0b10:*** Clean Sink Table of the DUT-GPS. Clean Proxy Table of the TH-GPP. After exchange of GPD Channel Request and GPD Channel Configuration commands, TH-GPP is made to send a correctly formatted GP Commissioning Notification with *RxAfterTx* = 0b1; GPD Commissioning command has the *Security Key request* = 0b1 and *SecurityLevelCapabilities* sub-field of the *Extended Option* field set to 0b11. After the DUT-GPS sends a GP Response with the GPD Commissioning Reply command carrying the shared key, TH-GPP is made to send a correctly formatted GP Commissioning Notification carrying GPD Success command with *SecurityLevel* = 0b10 and the *SecurityProcessingFailed* = 0b1; the *MIC* field is correctly generated using the shared key provided by the DUT-GPS in the Commissioning Reply and the correct frame counter value; the GPD CommandID (0xE3) is in the clear; the GPD Command Payload field is set to 0x00 or 0xff.	
5A		***Negative test (gpdSecurityLevel = 0b01):*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. After exchange of GPD Channel Request and GPD Channel Configuration commands, TH-GPP sends on the operational channel of DUT-GPS a correctly formatted GP Commissioning Notification carrying Commissioning GPDF with all settings as supported by DUT-GPS, only with *SecurityLevelCapabilities* sub-field of the *Extended Options* field set to 0b01. Read out Sink Table of DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
5B		***Negative test: No possibility to establish a security key:*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. After exchange of GPD Channel Request and GPD Channel Configuration commands, TH-GPP sends on the operational channel of DUT-GPS a correctly formatted GP Commissioning Notification carrying Commissioning GPDF with all settings as supported by DUT-GPS, only with *SecurityLevelCapabilities* sub-field of the *Extended Options* field set to >=0b10, the *GPD Key present* sub-field of the *Extended Options* field set to 0b0, the *GP security Key request* sub-field of the *Options* field set to 0b0, and the *GPD Key field* absent. Read out Sink Table of DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
GPD ID = 0x00..00			
6A		***Negative test: SrcID = 0x00000000;*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. Perform commissioning	

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		between DUT-GPS and TH-GPP. Upon reception of the GP Response with GPD Channel Configuration command, TH-GPP sends GP Commissioning Notification carrying GPD Commissioning command, with all settings as required by the DUT-GPS, but with *ApplicationID* = 0b000 and with SrcID set to 0x00000000.	
6B		***Negative test: IEEE = 0x0000000000000000;*** Clear Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. Perform commissioning between DUT-GPS and TH-GPP. Upon reception of the GP Response with GPD Channel Configuration command, TH-GPP sends GP Commissioning Notification carrying Commissioning command, will all settings as required by the DUT-GPS, but with *ApplicationID* = 0b010 and with MAC header Source address set to 0x0000000000000000.	

1154 ***4.4.2.7.4 Expected Outcome***

Pass verdict:
0) DUT-GPS does not send GP Response command.
1) On receipt of each GP Commissioning Notification with *RxAfterTx* = 0b1 carrying GPD Channel Request, DUT-GPS send GP Response carrying GPD Channel Configuration, indicating the operational channel.
2A) On receipt of each GP Commissioning Notification with *RxAfterTx* = 0b1 carrying GPD Commissioning command, DUT-GPS sends correctly formatted GP Response carrying GPD Commissioning Reply command, carrying the GPD shared key as configured at the beginning of the test step.
2B) DUT-GPS sends GP Pairing for TH-GPD, with all the settings (incl. shared key) as exchanged during the commissioning process in step 2A. With the exception of lightweight unicast communication mode, DUT-GPS sends Device_annce for the GPD alias. DUT-GPS has a Sink Table entry for the TH-GPD, with all relevant pairing information as exchanged during the commissioning process in step 2A.
2C) DUT-GPS does NOT send another GP Pairing command nor another Device_annce for GPD alias.
3A) – 3H) DUT-GPS does NOT send GP Pairing for DUT-GPD, does NOT create Sink Table nor Translation Table entry for GPD ID N.
3I) DUT-GPS does NOT accept either GPD Success command with the reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11); it does NOT send Device_annce or GP Pairing command. DUT-GPS does NOT have a Sink Table entry for the GPD ID N.
3J) – 3N) DUT-GPS does NOT send GP Pairing for DUT-GPD, does NOT create Sink Table nor Translation Table entry for GPD ID N.
4A)Upon reception of the GP Commissioning Notification with the Success GPDF, the DUT-GPS sends GP Pairing with *AddSink* = 0b1, *SecurityLevel* = 0b11, *SecurityKeyType* as exchanged in the Commissioning Reply, and *Security frame counter* value as in the Success GPDF,
4B) DUT-GPS does NOT send GP Pairing for DUT-GPD, does NOT create Sink Table nor Translation Table entry for GPD ID N.
5A) – 6B) DUT-GPS does NOT respond with GP Response carrying GPD Commissioning Reply. DUT-GPS does NOT send GP Pairing. DUT-GPS does NOT create Sink Table nor Translation Table entry for GPD ID = N.
Fail verdict:
0) DUT-GPS sends GP Response command.
1) On receipt of at least one of the GP Commissioning Notification with *RxAfterTx* = 0b1 carrying GPD Channel Request DUT-GPS does NOT send GP Response carrying GPD Channel Configuration AND/OR it does NOT indicate the operational channel.
2A) On receipt of at least one GP Commissioning Notification with *RxAfterTx* = 0b1 carrying GPD Commissioning command, DUT-GPS does NOT send correctly formatted GP Response carrying GPD Commissioning Reply command AND/OR DUT-GPS does NOT include the GPD shared key as configured at the beginning of the test step.

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2B) DUT-GPS does NOT send a GP Pairing for TH-GPD, with all the settings (incl. shared key) as exchanged during the commissioning process in step 2A. AND/OR DUT-GPS does NOT send Device_annce for the GPD alias in case of Communication Mode != 0b11 OR does send it in case of Communciation Mode = 0b11. AND/OR DUT-GPS does NOT have a Sink Table entry for the TH-GPD, with all relevant pairing information as exchanged during the commissioning process in step 2A.
2C) DUT-GPS sends another GP Pairing command AND/OR another Device_annce for GPD alias.
3A) – 3H) DUT-GPS sends GP Pairing for TH-GPD AND/OR creates Sink Table entry for GPD ID = N AND/OR Translation Table entry(s) for GPD ID = N.
3I) DUT-GPS accepts either GPD Success command with the reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) AND/OR it sends Device_annce or GP Pairing command. AND/OR DUT-GPS creates a Sink Table entry for the GPD ID N.
3J) – 3N) DUT-GPS sends GP Pairing for TH-GPD AND/OR creates Sink Table entry for GPD ID = N AND/OR Translation Table entry(s) for GPD ID = N.
4A) Upon reception of the GP Commissioning Notification with the Success GPDF, the DUT-GPS does not send GP Pairing with *AddSink* = 0b1, AND/OR *SecurityLevel* is not 0b11, AND/OR *SecurityKeyType* is not as exchanged in the Commissioning Reply, AND/OR *security frame counter* does not have a value as in the Success GPDF,
4B) DUT-GPS sends GP Pairing for TH-GPD AND/OR creates Sink Table entry for GPD ID = N AND/OR Translation Table entry(s) for GPD ID = N.
5A) – 6B) DUT-GPS does respond with GP Response carrying GPD Commissioning Reply. AND/OR DUT-GPS does send GP Pairing. AND/OR DUT-GPS does create Sink Table and/or Translation Table entry for GPD ID = N.

4.4.2.8 Multi-hop commissioning: general tests

4.4.2.8.1 Initial Conditions

Item	Doc. Ref.	Test Step	Note
1-2		As in 4.4.1.1.1.	

4.4.2.8.2 Test Set-Up

The DUT-GPS and TH-GPD shall be in wireless communication proximity.

A packet sniffer shall be observing the communication over the air interface.

4.4.2.8.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	***Negative test: different frame counter in both modes:*** TH-GPS enters commissioning mode. Commissioning is successfully performed between TH-GPP (on behalf of TH-GPD) and DUT-GPS; *gpdSecurityLevel* >= 0b10 is used. After DUT-GPS sends GP Pairing, read out Sink Table entry of the DUT-GPS. TH-GPP is made to send a GP Notification carrying Data GPDF with wrong security frame counter number (lower than or equal to that carried in commissioning mode by the last Commissioning GPDF payload). Read out Sink Table entry of the DUT-GPS.	
Security errors in commissioning			
2A		***Negative test (gpdSecurityLevel = 0b01)***: Clean Sink Table of the DUT-GPS. DUT-GPS enters commissioning mode. TH-GPP (or TH-Tool) sends GP Commissioning Notification with all settings as supported by DUT-GPS, only with *SecurityLevelCapabilities* sub-field of the *Extended Options* field of the GPD Commissioning command set to 0b01. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	

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2B		***Negative test: gpdSecurityLevel >=0b10, no key:*** Clean Sink Table of the DUT-GPS. DUT-GPS enters commissioning mode. TH-GPP sends the GP Commissioning Notification with *RxAfterTx* = 0b0 carrying GPD Commissioning command with: • *SecurityLevelCapabilities* sub-field of the *Extended Options* field != 0b00, • *GPDkey present* sub-field of the *Extended Options* field set to 0b0 and *GPDkey* field not present; • all other sub-fields and fields set as required by the DUT-GPS. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
2C		***Negative test: GPD Key not encrypted:*** Clean Sink Table of the DUT-GPS. Set *Protection with gpLinkKey* sub-field of the *gpsSecurityLevel* attribute to 0b1. DUT-GPS enters commissioning mode. TH-GPP sends the GP Commissioning Notification with *RxAfterTx* = 0b0 carrying GPD Commissioning command with: • *SecurityLevelCapabilities* sub-field of the *Extended Options* field set to the minimum security level required by DUT-GPD, as indicated in *Minimal GPD Security Level* sub-field of the *gpsSecurityLevel* attribute, • *GPDkey present* sub-field of the *Extended Options* field set to 0b1, *GPD Key encryption* = 0b0 and *GPDkey* field present in the clear; *GPD Key MIC* field absent, *GPD outgoing counter* field present; • all other sub-fields and fields set as required by the DUT-GPS. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
2D		***Negative test (only if sink supports both gpdSecurityLevel 0b10 and 0b11): too low security level:*** Clean Sink Table of the DUT-GPS. Set *Minimal GPD Security Level* sub-field of the gpsSecurityLevel attribute to 0b11. DUT-GPS enters commissioning mode. TH-GPP sends the GP Commissioning Notification with *RxAfterTx* = 0b0 carrying GPD Commissioning command with: • *SecurityLevelCapabilities* sub-field of the *Extended Options* field = 0b10, • *GPDkey present* sub-field of the *Extended Options* field set to 0b1, *GPD Key encryption* = 0b1 and *GPDkey* field present and correctly encrypted; *GPD Key MIC* field present, *GPD outgoing counter* field present; • all other sub-fields and fields set as required by the DUT-GPS. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	
Malformed commissioning frame			
3		***Negative test: Commissioning GPDF with wrong ApplicationID***: Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPP sends GP Commissioning Notification carrying Commissioning GPDF, with all the options as supported by the TH-GPS, with *RxAfterTx* = 0b0 (or not present), but with *ApplicationID* sub-field of the *Options* field set to 0b011.	

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GPD ID = 0x00..00			
4A	[R3] A.3.3.4.7, A.3.5.2.4.1	***Negative test: SrcID = 0x00000000:*** Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPP sends GP Commissioning Notification carrying Commissioning GPDF with: *RxAfterTx* = 0b0 and *ApplicationID* = 0b000, *SrcID* = 0x00000000. Read out Sink Table of the DUT-GPS.	
4B	[R3] A.3.3.4.7, A.3.5.2.4.1	***Negative test: GPD IEEE address = 0x0000000000000000:*** Clean Sink Table of DUT-GPS. DUT-GPS enters commissioning mode. TH-GPP sends GP Commissioning Notification carrying: *RxAfterTx* = 0b0 and *ApplicationID* = 0b010, GPD IEEE = 0x0000000000000000 and Endpoint X. Read out Sink Table of the DUT-GPS.	
Handling of GPD Commissioning command in operation			
5		**Negative test: GP Notification carrying GPD Commissioning in operational mode** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. DUT-GPS is in operational mode. Make TH-GPP send GP Notification carrying GPD Commissioning command for TH-GPD, indicating use of appropriate GPD security.	
Extendibility of GPD Commissioning frame			
6	[R3] A.3.9, A.3.3.2.2, A.3.3.4.4, A.3.3.5.3, A.3.3.5.4, A.3.3.5.2, 3.2.3	Clean Sink Table of the DUT-GPS. DUT-GPS enters commissioning mode. TH-GPP sends the GP Commissioning Notification carrying the Commissioning GPDF with: • *RxAfterTx* sub-field set to 0b0, • the *Reserved* sub-fields of the *Options* field set to 0b1 • all other sub-fields and fields set as required by the DUT-GPS; • at the end of the GPD Commissioning command payload (i.e. after *ApplicationInformation*, if included), 5 additional bytes of payload, 0xe0 0xe1 0xe2 0xe3 0xe4, are applied; the maximal GPDF length is NOT exceeded. If required, DUT-GPS is put back into operational mode. Read out Sink Table entry of the DUT-GPS. If DUT-GPS supports Translation Table functionality, send GP Translation Table request to DUT-GPS.	

1161 ***4.4.2.8.4 Expected Outcome***

Pass verdict:
1) DUT-GPS does NOT execute the GPDF. DUT-GPS does NOT write the new (incorrect) frame counter value to its Sink Table.
2A) – 3) DUT-GPS does NOT send GP Pairing nor Device_annce for TH-GPD, does NOT create Sink Table nor Translation Table entry for GPD ID N.
4A) – 4B) DUT-GPS does NOT create Sink Table entry. It does NOT send GP Pairing.
5) DUT-GPS does NOT open commissioning mode nor does send GP Proxy Commissioning Mode (*Action*=Enter) command. DUT-GPS still has Sink Table entry for TH-GPD. DUT-GPS MAY make a product-specific indication of the attempted commissioning.

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6) DUT-GPS may send GP Proxy Commissioning Mode command (*Action*=Enter). On reception of Commissioning GPDF, DUT-GPS: • does NOT send a Commissioning Reply (since *RxAfterTx* of the received Commissioning GPDF is set to 0b0); • provides success indication, • sends out correctly formatted GP Pairing for TH-GPD: • with the exception of lightweight unicast communication mode, sends out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters exchanged in the commissioning process are stored there. If DUT-GPS supports Translation Table functionality, on receipt of GP Translation Table Request command, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint). The value of the appended extra field 0xe0 0xe1 0xe2 0xe3 0xe4 shall not be misused as any GPD configuration value or its part.
Fail verdict:
1) DUT-GPS does execute the GPDF. AND/OR DUT-GPS does write the new (incorrect) frame counter value to its Sink Table.
2A) – 3) DUT-GPS creates Sink Table entry for GPD ID = N with SecurityLevel = 0b01 AND/OR Translation Table entry(s) for GPD ID = N AND/OR sends GP Pairing with status AddSink for GPD ID = N AND/OR Device_annce for GPD alias.
4A) – 4B) DUT-GPS creates Sink Table entry AND/OR sends GP Pairing.
5) DUT-GPS does open commissioning mode AND/OR does send GP Proxy Commissioning Mode (*Action*=Enter) command. AND/OR DUT-GPS removes Sink Table entry for TH-GPD.
6) On reception of Commissioning GPDF with RxAfterTx = 0b0, DUT-GPS: • does send Commissioning Reply GPDF (despite RxAfterTx of the received Commissioning GPDF being set to 0b0), • does not provide success indication, • AND/OR does not send out GP Pairing for TH-GPD's GPD ID with *AddSink*=0b1, *RemoveGPD* = 0b0, appropriate communication mode and security level for the DUT-GPS, and other parameters as derived from the Commissioning GPDF; • AND/OR does not send out Device_annce for the alias (assigned, if it was included in the GP Pairing command, and else the derived), with NWK source address equal to the alias, NWK sequence number = 0x00 and APS Counter = 0x00 in case of Communication Mode != 0b11 OR does send it in case of Communication Mode = 0b11. AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Sink Table having one entry for the TH-GPD GPD ID N and all relevant parameters established in the commissioning process. AND/OR DUT-GPS supporting Translation Table functionality does not have Translation Table entries, as described in pass verdict 1 above. AND/OR the value of the appended extra field 0xe0 0xe1 0xe2 0xe3 0xe4 appears as any GPD configuration value or its part.

1162 ***4.4.2.8.5 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF15 GPF7	gpdSecurityLevel = 0b01 functionality (deprecated)	Direct

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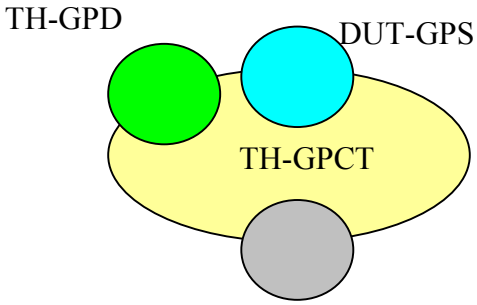
4.4.3 CT-based commissioning and Sink Table based groupcast forwarding

4.4.3.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT, GPT+, GPC or GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports CT-based commissioning.
TH-GPCT or TH-GPCB	PAN id=same PANId as TH-GPS Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = Z GPD security usage according to DUT capabilities. TH-GPD application functionality matches that of the DUT-GPS's GPEP

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPCT operate in a ZigBee PAN. They may join a ZigBee network created by another device, or TH-GPCT may start as ZC.	
2	[R3] A.3.3.2.2	The Sink Table of the DUT-GPS is empty.	
3	[R3] A.3.5.2.5	If the DUT-GPS supports pre-commissioned groupcast, at least one application endpoint of the DUT-GPS is a member of GroupID 1, 2, and 3.	

4.4.3.1.2 Test Set-Up

The TH-GPCT and TH-GPD shall be in wireless communication proximity of DUT-GPS.

A packet sniffer shall be observing the communication over the air interface.

4.4.3.1.3 Test Procedure

Note: if devices containing Proxy Tables are involved in the test, incl. the case when a GPC is tested, for all the test cases below the *SendPairing* sub-field of the *Actions* field of the GP Pairing Configuration command ***shall*** be set to 0b1, to ensure that Proxy Tables are up to date.

Item	Doc. Ref.	Test Step	Note
		Pre-commissioned groupcast and Sink Table-based groupcast forwarding tests ***(Tests 1-9 are only mandatory if DUT-GPS supports Sink Table-based groupcast forwarding functionality)***	
1	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**CREATE ENTRY:** TH-GPCT sends GP Pairing Configuration to DUT-GPS for GPD ID Z, with: • *Action* sub-field of the *Actions* field set to 0b010 (replace Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • all GPD functionality and pairing parameters as required by the DUT-GPS; (DeviceID, GroupID 1 DUT-GPS is member of) • Number of paired endpoints set to 0xfe. TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS. If DUT-GPS supports Sink Table based groupcast forwarding functionality, TH-GPD sends correctly protected Data GPDF.	

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2	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**EXTEND ENTRY:** TH-GPCT sends GP Pairing Configuration to DUT-GPS for the TH-GPD, with: • *Action* sub-field of the *Actions* field set to 0b001 (extend Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b0; • all GPD functionality and pairing parameters as required by the DUT-GPS; (DeviceID, GroupID 2 DUT-GPS is member of) • Number of paired endpoints set to 0xfe. TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS. If DUT-GPS supports Sink Table based groupcast forwarding functionality, TH-GPD sends correctly protected Data GPDF.	
3	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**TRIGGER GP PAIRING:** TH-GPCT sends GP Pairing Configuration to DUT-GPS for the TH-GPD, with: • *Action* sub-field of the *Actions* field set to 0b000 (no action); • *Send GP Pairing* sub-field of the *Actions* field set to 0b0; • GPD ID = Z;	
4	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**REMOVE ENTRY:** TH-GPCT sends GP Pairing Configuration to DUT-GPS for the TH-GPD, with: • *Action* sub-field of the *Actions* field set to 0b011 (remove pairing); • *Send GP Pairing* sub-field of the *Actions* field set to 0b0; • with GroupID 1 TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS. If DUT-GPS supports Sink Table based groupcast forwarding functionality, TH-GPD sends correctly protected Data GPDF.	
5	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**REPLACE ENTRY:** TH-GPCT sends GP Pairing Configuration to DUT-GPS for GPD ID Z, with: • *Action* sub-field of the *Actions* field set to 0b010 (replace Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b0; • all GPD functionality and pairing parameters as required by the DUT-GPS; (DeviceID, GroupID 3 DUT-GPS is member of) • Number of paired endpoints set to 0xfe. TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS. If DUT-GPS supports Sink Table based groupcast forwarding functionality, TH-GPD sends correctly protected Data GPDF.	
6	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**REMOVE ENTRY:** TH-GPCT sends GP Pairing Configuration to DUT-GPS for the TH-GPD, with: • *Action* sub-field of the *Actions* field set to 0b100 (remove GPD); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • all GPD functionality and pairing parameters as required by the DUT-GPS; (DeviceID, GroupID 3) • Number of paired endpoints set to 0xfe. TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS. If DUT-GPS supports Sink Table based groupcast forwarding functionality, TH-GPD sends correctly protected Data GPDF.	

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7	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**SINK TABLE BASED FORWARDING ONLY (NO EXECUTION):** TH-GPCT sends GP Pairing Configuration to DUT-GPS for GPD ID N, with: • *Action* sub-field of the *Actions* field set to 0b010 (replace Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b0; • for DeviceID, GroupID 4 (DUT-GPS is NOT member of); • Number of paired endpoints set to 0xfd. TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS. If DUT-GPS supports Sink Table based groupcast forwarding functionality, TH-GPD sends correctly protected Data GPDF.	
8	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**SINK TABLE BASED FORWARDING ONLY (NO EXECUTION):** Clear DUT-GPS Sink Table. TH-GPCT sends GP Pairing Configuration to DUT-GPS for GPD ID N, with: • *Action* sub-field of the *Actions* field set to 0b010 (replace Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b0; • for DeviceID, GroupID 1 DUT-GPS is member of; • Number of paired endpoints set to 0xfd. TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS. If DUT-GPS supports Sink Table based groupcast forwarding functionality, TH-GPD sends correctly protected Data GPDF.	
9	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**SINK TABLE BASED FORWARDING ONLY (NO EXECUTION):** Clear DUT-GPS Sink Table. TH-GPCT sends GP Pairing Configuration to DUT-GPS for GPD ID N, with: • *Action* sub-field of the *Actions* field set to 0b010 (replace Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b0; • for DeviceID, GroupID 4 DUT-GPS is NOT member of; • Number of paired endpoints set to 0xfe. TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS. If DUT-GPS supports Sink Table based groupcast forwarding functionality, TH-GPD sends correctly protected Data GPDF.	
Generic CT-commissioning tests ***Note: the tests steps below shall use the gpsCommunicationMode as supported by DUT-GPS, other than pre-commissionined groupcast (which is tested in steps 1-9).*** ***If DUT-GPS supports multiple of those communication modes, test steps 10A) – 10E) shall be repeated for each supported communication mode.***			
10A	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**CREATE ENTRY:** Clean Sink Table of DUT-GPS. TH-GPCT sends GP Pairing Configuration to DUT-GPS for GPD ID Z, with: • *Action* sub-field of the *Actions* field set to 0b010 (replace Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • all GPD functionality and pairing parameters as required by the DUT-GPS; incl. communication mode; • Number of paired endpoints set to 0xfe. TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS.	

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10B	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**REMOVE ENTRY:** TH-GPCT sends GP Pairing Configuration to DUT-GPS for the TH-GPD, with: • *Action* sub-field of the *Actions* field set to 0b011 (remove pairing); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • with same communication mode as in step 10A) TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS.	
10C	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**EXTEND ENTRY:** TH-GPCT sends GP Pairing Configuration to DUT-GPS for the TH-GPD, with: • *Action* sub-field of the *Actions* field set to 0b001 (extend Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b0; • all GPD functionality and pairing parameters as required by the DUT-GPS, incl. communication mode; • Number of paired endpoints set to 0xfe. TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS.	
10D	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**TRIGGER GP PAIRING:** TH-GPCT sends GP Pairing Configuration to DUT-GPS for the TH-GPD, with: • *Action* sub-field of the *Actions* field set to 0b000 (no action); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • GPD ID = Z;	
10E	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**REMOVE ENTRY:** TH-GPCT sends GP Pairing Configuration to DUT-GPS for the TH-GPD, with: • *Action* sub-field of the *Actions* field set to 0b100 (remove GPD); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • all GPD functionality and pairing parameters as required by the DUT-GPS, incl. communication mode; • *Number of paired endpoints* set to 0xfe. TH-GPCT reads out Sink Table entry of DUT-GPS. If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS.	
Additional CT-commissioning tests ***Note: the tests steps below shall use the gpsCommunicationMode as supported by DUT-GPS***			
11A	[R3] A.3.3.4.7, A.3.5.2.4.1	***Negative test: SrcID = 0x00000000:*** TH-Tool sends GP Pairing Configuration command with: • *Action* sub-field of the *Actions* field set to 0b001 (extend Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • *ApplicationID* = 0b000, *SrcID* = 0x00000000. Read out Sink Table of the DUT-GPS.	
11B	[R3] A.3.3.4.7, A.3.5.2.4.1	***Negative test: GPD IEEE address = 0x0000000000000000:*** TH-Tool sends GP Pairing Configuration command with: • *Action* sub-field of the *Actions* field set to 0b001 (extend Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • SecurityLevel = 0b00; • *ApplicationID* = 0b010, GPD IEEE address = 0x0000000000000000 and Endpoint X. Read out Sink Table of the DUT-GPS.	

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11C	[R3] A.3.3.4.7, A.3.5.2.4.1, A.3.3.2.2, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	***Negative test: gpdSecurityLevel = 0b01*** Clear DUT-GPS Sink Table. TH-GPCT sends GP Pairing Configuration to DUT-GPS for GPD ID N, with all settings as supported by the DUT-GPS, only with *SecurityLevel* sub-field of the *SecurityOptions* field set to 0b01. TH-GPCT reads out Sink Table entry of DUT-GPS. ***If DUT-GPS supports Translation Table functionality, TH-GPCT sends GP Translation Table Request command with Index = 0 to DUT-GPS.***	
12A	[R3] A.3.3.4.7, A.3.5.2.4.1	****NOT* tested for GP Basic:*** ***Positive test: SrcID = 0xFFFFFFFF:*** TH-Tool sends GP Pairing Configuration command with: • *Action* sub-field of the *Actions* field set to 0b001 (extend Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • *SecurityLevel* = 0b00; • *ApplicationID* = 0b000, SrcID = 0xFFFFFFFF. Read out Sink Table of the DUT-GPS. TH-Tool sends unprotected Data GPDF with SrcID = 0x12345678. TH-Tool sends unprotected Data GPDF with SrcID = 0x87654321.	
12B	[R3] A.3.3.4.7, A.3.5.2.4.1	****NOT* tested for GP Basic:*** ***Positive test: GPD IEEE address = 0xFFFFFFFFFFFFFFFF:*** Clean Sink Table. TH-Tool sends GP Pairing Configuration command with: • *Action* sub-field of the *Actions* field set to 0b001 (extend Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • SecurityLevel = 0b00; • *ApplicationID* = 0b010, GPD IEEE address = 0xFFFFFFFFFFFFFFFF and Endpoint X. Read out Sink Table of the DUT-GPS. TH-Tool sends unprotected Data GPDF with IEEE = 0x1122334455667788. TH-Tool sends unprotected Data GPDF with IEEE = 0x8877665544332211.	
12C	[R3] A.3.3.4.7, A.3.5.2.4.1	***Positive test: GPD IEEE address = X, Endpoint = 0xff:*** Clean Sink Table. TH-Tool sends GP Pairing Configuration command with: • *Action* sub-field of the *Actions* field set to 0b001 (extend Sink Table entry); • *Send GP Pairing* sub-field of the *Actions* field set to 0b1; • *ApplicationID* = 0b010, GPD IEEE address = X and Endpoint = 0xff. Read out Sink Table of the DUT-GPS. TH-Tool sends correctly protected Data GPDF with IEEE = 0x1122334455667788. TH-Tool sends correctly protected Data GPDF with IEEE = 0x8877665544332211.	

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1175 ***4.4.3.1.4 Expected Outcome***

Pass verdict:
1) Upon reception of GP Pairing Configuration, DUT-GPS sends GP Pairing command for the TH-GPD, with *AddSink* sub-field of the *Options* field set to 0b1, and the information as derived from the GP Pairing Configuration command. DUT-GPS sends Device_annce for the alias, derived or assigned, as specified in the GP Pairing Configuration command. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for GPD ID = Z, and the information as derived from the GP Pairing Configuration command (GroupID 1). If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID*=0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z with the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint). DUT-GPS executes Data GPDF. If DUT-GPS supports Sink Table based groupcast forwarding functionality, upon reception of Data GPDF, DUT-GPS sends GP Notification for GroupID 1, with all parameters (incl. alias and security) as stored with the Sink Table.
2) On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for GPD ID = Z, and the information as derived from the GP Pairing Configuration command (GroupID 1 and GroupID 2). If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint). DUT-GPS executes Data GPDF. If DUT-GPS supports Sink Table based groupcast forwarding functionality, upon reception of Data GPDF, DUT-GPS sends GP Notification for GroupID 1 and for GroupID 2, with all parameters (incl. alias and security) as stored with the Sink Table.
3) On reception of GP Pairing Configuration, DUT-GPS sends GP Pairing command for the TH-GPD, with AddSink sub-field of the Options field set to 0b1, and the information as derived from the GP Pairing Configuration command. DUT-GPS sends Device_annce for the alias, derived or assigned, as specified in the GP Pairing Configuration command.
4) On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Status SUCCESS and Sink Table attribute having one entry for GPD ID = Z and the corresponding *ApplicationID*, and only one paired group, GroupID 1. If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID*; with Endpoint field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint). DUT-GPS executes Data GPDF. If DUT-GPS supports Sink Table based groupcast forwarding functionality, upon reception of Data GPDF, DUT-GPS sends GP Notification for GroupID 2, with all parameters (incl. alias and security) as stored with the Sink Table.

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5) On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with *Status* SUCCESS and Sink Table attribute having one entry for *GPD ID* = Z, and the information as derived from the GP Pairing Configuration command (GroupID 3 or unicast). If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z and the corresponding *ApplicationID*. DUT-GPS executes Data GPDF. If DUT-GPS supports Sink Table based groupcast forwarding functionality, upon reception of Data GPDF, DUT-GPS sends GP Notification for GroupID 3, with all parameters (incl. alias and security) as stored with the Sink Table.
6) On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Status SUCCESS and *Sink Table* empty. DUT-GPS sends GP Pairing command for the TH-GPD, with RemoveGPD sub-field of the Options field set to 0b1. If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, containing default generic entries (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) for GPD commands corresponding to TH-GPD DeviceID, with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint), or no entries. It shall not have any entries for GPD ID = Z. DUT-GPS does NOT execute Data GPDF. If DUT-GPS supports Sink Table based groupcast forwarding functionality, upon reception of Data GPDF, DUT-GPS does NOT send GP Notification.
7) GPS responds to ZCL Read Attributes command and GP Translation Table Request command with either: • if DUT-GPS does not support Sink Table based groupcast forwarding functionality: ▪ no Sink Table entry for GPD ID = Z and no Translation Table entry for GPD ID = Z; ▪ Sink Table entry for GPD ID = Z with the information as derived from the GP Pairing Configuration command (GroupID 4) and no Translation Table entry for GPD ID = N; it shall not have default Translation Table entries for this GPD command(s); ▪ Sink Table entry for GPD ID = Z with the information as derived from the GP Pairing Configuration command (GroupID 4) and – if it supports the Translation Table functionality - one Translation Table entry for GPD ID = N and the corresponding *ApplicationID*; with *Endpoint* field set to value 0x00; • if DUT-GPS does support Sink Table based groupcast forwarding functionality: Sink Table entry for GPD ID = Z with the information as derived from the GP Pairing Configuration command (GroupID 4) and – if it supports the Translation Table functionality - one Translation Table entry for GPD ID = Z and the corresponding *ApplicationID* with *Endpoint* field set to value 0xfd. DUT-GPS does NOT execute the Data GPDF. If DUT-GPS supports Sink Table based groupcast forwarding functionality, upon reception of Data GPDF, DUT-GPS sends GP Notification.

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8) GPS responds to ZCL Read Attributes command and GP Translation Table Request command with either:

- if DUT-GPS does not support Sink Table based groupcast forwarding functionality:
  - no Sink Table entry for GPD ID = Z and no Translation Table entry for GPD ID = Z;
  - Sink Table entry for GPD ID = Z with the information as derived from the GP Pairing Configuration command (GroupID 1) and no Translation Table entry for GPD ID = Z; it shall not have default Translation Table entries for this GPD command(s);
  - Sink Table entry for GPD ID = Z with the information as derived from the GP Pairing Configuration command (GroupID 1) and – if it supports the Translation Table functionality - one Translation Table entry for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value 0x00;
- if DUT-GPS does support Sink Table based groupcast forwarding functionality: Sink Table entry for GPD ID = N with the information as derived from the GP Pairing Configuration command (GroupID 1) and – if it supports the Translation Table functionality - one Translation Table entry for GPD ID = N and the corresponding *ApplicationID* with *Endpoint* field set to value 0xfd.

DUT-GPS does NOT execute the Data GPDF.

If DUT-GPS supports Sink Table based groupcast forwarding functionality, upon reception of Data GPDF, DUT-GPS sends GP Notification.

9) GPS responds to ZCL Read Attributes command and GP Translation Table Request command with either:

if DUT-GPS does not support Sink Table based groupcast forwarding functionality:

- no Sink Table entry for GPD ID = Z and no Translation Table entry for GPD ID = Z;
- Sink Table entry for GPD ID = Z with the information as derived from the GP Pairing Configuration command (GroupID 1) and no Translation Table entry for GPD ID = Z; it shall not have default Translation Table entries for this GPD command(s);
- Sink Table entry for GPD ID = Z with the information as derived from the GP Pairing Configuration command (GroupID 1) and – if it supports the Translation Table functionality - one Translation Table entry for GPD ID = Z and the corresponding *ApplicationID*; with *Endpoint* field set to value 0x00;

- if DUT-GPS does support Sink Table based groupcast forwarding functionality: Sink Table entry for GPD ID = N with the information as derived from the GP Pairing Configuration command (GroupID 1) and – if it supports the Translation Table functionality - one Translation Table entry for GPD ID = Z and the corresponding *ApplicationID* with *Endpoint* field set to value 0xfd.

DUT-GPS does NOT execute the Data GPDF.

If DUT-GPS supports Sink Table based groupcast forwarding functionality, upon reception of Data GPDF, DUT-GPS sends GP Notification.

10A) Upon reception of GP Pairing Configuration, DUT-GPS sends:

- GP Pairing command for the TH-GPD, with *AddSink* sub-field of the *Options* field set to 0b1, and the information as derived from the GP Pairing Configuration command;
- With the exception of lightweight unicast communication mode, Device_annce for the alias, derived or assigned, as specified in the GP Pairing Configuration command.

DUT-GPS *Sink Table* has one entry for GPD ID = Z, and the information as derived from the GP Pairing Configuration command (incl. communication mode).

If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID*=0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z with the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).

10B) Upon reception of GP Pairing Configuration, DUT-GPS sends GP Pairing command for the TH-GPD, with *RemoveGPD* sub-field of the *Options* field set to 0b0 and the *AddSink* sub-field of the *Options* field set to 0b0.

DUT-GPS does not have any Sink Table nor Translation Table entries for GPD ID = Z.

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10C) Upon reception of GP Pairing Configuration, DUT-GPS does NOT send GP Pairing nor Device_annce for the alias. DUT-GPS *Sink Table* has one entry one entry for GPD ID = Z, and the information as derived from the GP Pairing Configuration command (incl. communication mode). If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, containing default entries for GPD commands corresponding to TH-GPD DeviceID, being generic entries (with *ApplicationID*=0b000 and SrcID = 0xffffffff) and/or entries for GPD ID = Z with the corresponding *ApplicationID*; with *Endpoint* field set to value other than 0xfd or 0x00 (e.g. 0xff or specific application endpoint).
10D) Upon reception of GP Pairing Configuration, DUT-GPS sends: • GP Pairing command for the TH-GPD, with *AddSink* sub-field of the *Options* field set to 0b1, and the information as derived from the GP Pairing Configuration command; • With the exception of lightweight unicast communication mode, Device_annce for the alias, derived or assigned, as specified in the GP Pairing Configuration command.
10E) Upon reception of GP Pairing Configuration, DUT-GPS sends GP Pairing command for the TH-GPD, with *RemoveGPD* sub-field of the *Options* field set to 0b1 and the *AddSink* sub-field of the *Options* field set to 0b0. DUT-GPS does not have any Sink Table nor Translation Table entries for GPD ID = Z.
11A) -11B) DUT-GPS does NOT create Sink Table entry. It does NOT send GP Pairing.
11C) DUT-GPS does NOT have a Sink Table entry nor Translation Table entry(s) for GPD ID = Z.
12) DUT-GPS creates Sink Table entry for the supplied GPDID. It sends the GP Pairing for the supplied GPDID. On reception of each Data GPDF, DUT-GPS executes the GPD command.
Fail verdict:
1) DUT-GPS does NOT send GP Pairing with *AddSink* = 0b1 and the data as in the GP Pairing Configuration (Group1). AND/OR DUT-GPS does NOT send Device_annce for the alias. AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Status SUCCESS AND/OR *Sink Table* attribute does not contain one entry for GPD ID = Z, AND/OR the information in this Sink Table entry does not match that in the GP Pairing Configuration command (Group 1). AND/OR DUT-GPS which does support Translation Table functionality, does not respond with GP Translation Table Response command, formatted as specified in 0/item 1 above. AND/OR DUT-GPS does NOT execute Data GPDF. AND/OR DUT-GPS supporting Sink Table based forwarding does not forward GP Notification for GroupID 1, formatted as specified in 0/item 1 above.
2) On reception of ZCL Read Attributes command, DUT-GPS does not responds with Read Attributes Response with Status SUCCESS. AND/OR *Sink Table* attribute does not have one entry for GPD ID = Z, and the information as derived from the GP Pairing Configuration command (GroupID 1 and GroupID 2). AND/OR DUT-GPS which does support Translation Table functionality, does not respond with GP Translation Table Response command, formatted as specified in 0/item 2 above. AND/OR DUT-GPS does NOT execute Data GPDF. AND/OR DUT-GPS supporting Sink Table based forwarding does not forward GP Notification for GroupID 1 and GroupID2, formatted as specified in 0/item 2 above.
3) On reception of GP Pairing Configuration, DUT-GPS does not send GP Pairing command for the TH-GPD, with *AddSink* sub-field of the *Options* field set to 0b1, and the information as derived from the GP Pairing Configuration command. AND/OR DUT-GPS does not send Device_annce for the alias, derived or assigned, as specified in the GP Pairing Configuration command.

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4) On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Status SUCCESS and/or *Sink Table* attribute does not have one entry for GPD ID = Z, and only one paired group, GroupID 1. AND/OR DUT-GPS which does support Translation Table functionality, does not respond with GP Translation Table Response command, formatted as specified in 0/item 4 above. AND/OR DUT-GPS does NOT execute Data GPDF. AND/OR DUT-GPS supporting Sink Table based forwarding does not forward GP Notification for GroupID 2, formatted as specified in 0/item 4 above.
5) On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with *Status* SUCCESS and/or *Sink Table* attribute does not have one entry for GPD ID = Z, and the information as derived from the GP Pairing Configuration command (GroupID 3 or unicast). AND/OR DUT-GPS which does support Translation Table functionality, does not respond with GP Translation Table Response command, formatted as specified in 0/item 5 above. AND/OR DUT-GPS does NOT execute Data GPDF. AND/OR DUT-GPS supporting Sink Table based forwarding does not forward GP Notification for GroupID 3, formatted as specified in 0/item 5 above.
6) On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Status SUCCESS and *Sink Table* empty. AND/OR DUT-GPS does not send GP Pairing command for the TH-GPD, with *RemoveGPD* sub-field of the *Options* field set to 0b1. AND/OR DUT-GPS which does support Translation Table functionality, does not respond with GP Translation Table Response command, formatted as specified in 0/item 6 above. AND/OR DUT-GPS does execute Data GPDF. AND/OR DUT-GPS supporting Sink Table based forwarding does forward GP Notification.
7) DUT-GPS does NOT respond to ZCL Read Attributes command and GP Translation Table Request command with either of the options as specified in 0/item 7 above. AND/OR DUT-GPS does execute the Data GPDF. AND/OR DUT-GPS supporting Sink Table based forwarding does NOT forward GP Notification, formatted as specified in 0/item 7 above.
8) DUT-GPS does NOT respond to ZCL Read Attributes command and GP Translation Table Request command with either of the options as specified in 0/item 8 above. AND/OR DUT-GPS does execute the Data GPDF. AND/OR DUT-GPS supporting Sink Table based forwarding does NOT forward GP Notification, formatted as specified in 0/item 8 above.
9) DUT-GPS does NOT respond to ZCL Read Attributes command and GP Translation Table Request command with either of the options as specified in 0/item 9 above. AND/OR DUT-GPS does execute the Data GPDF. AND/OR DUT-GPS supporting Sink Table based forwarding does NOT forward GP Notification, formatted as specified in 0/item 9 above.
10A) Upon reception of GP Pairing Configuration, DUT-GPS does NOT send: • GP Pairing command for the TH-GPD, with *AddSink* sub-field of the *Options* field set to 0b1, and the information as derived from the GP Pairing Configuration command; • AND/OR Device_annce for the alias, derived or assigned, as specified in the GP Pairing Configuration command for communication mode !- 0b11 OR does send it for Communication Mode = 0b11. AND/OR DUT-GPS *Sink Table* does NOT have one entry one entry for GPD ID = Z, with the information as derived from the GP Pairing Configuration command (incl. communication mode). AND/OR DUT-GPS which does support Translation Table functionality, does not respond with GP Translation Table Response command, formatted as specified in 0/pass verdict 10A above.
10B) Upon reception of GP Pairing Configuration, DUT-GPS does NOT send GP Pairing command for the TH-GPD, with *RemoveGPD* sub-field of the *Options* field set to 0b0 and the *AddSink* sub-field of the *Options* field set to 0b0. AND/OR DUT-GPS has any Sink Table nor Translation Table entry for GPD ID = Z.

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10C) Upon reception of GP Pairing Configuration, DUT-GPS does sends GP Pairing AND/OR Device_annce for the alias. AND/OR DUT-GPS *Sink Table* does NOT have one entry one entry for GPD ID = Z, with the information as derived from the GP Pairing Configuration command (incl. communication mode). AND/OR DUT-GPS which does support Translation Table functionality, does not respond with GP Translation Table Response command, formatted as specified in 0/pass verdict 10C above.
10D) Upon reception of GP Pairing Configuration, DUT-GPS does NOT send: • GP Pairing command for the TH-GPD, with *AddSink* sub-field of the *Options* field set to 0b1, and the information as derived from the GP Pairing Configuration command; • AND/OR Device_annce for the alias, derived or assigned, as specified in the GP Pairing Configuration command for communication mode !- 0b11 OR does send it for Communication Mode = 0b11.
10E) Upon reception of GP Pairing Configuration, DUT-GPS does NOT send GP Pairing command for the TH-GPD, with *RemoveGPD* sub-field of the *Options* field set to 0b1 and the *AddSink* sub-field of the *Options* field set to 0b0. AND/OR DUT-GPS has any Sink Table or Translation Table entries for GPD ID = Z.
11A) -11B) DUT-GPS creates Sink Table entry AND/OR sends GP Pairing.
11C) DUT-GPS creates Sink Table entry for GPD ID = Z with SecurityLevel = 0b01. AND/OR DUT-GPS creates Translation Table entries for GPD ID = N.
12) DUT-GPS does NOT create Sink Table entry AND/OR does NOT send the GP Pairing for the supplied GPDID. AND/OR On receipt of at least one Data GPDF, the DUT-GPS does NOT execute the GPD command.

4.4.3.1.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF12	CT-based commissioning method	Direct
GPPCS110	Rx GP Pairing Configuration command	Direct
GPPCSF19	Translation Table functionality	Direct
GPPCSF18	Sink Table based groupcast forwarding functionality	Direct

4.4.4 GPD key handling in commissioning

4.4.4.1 DUT-GPS using key type NWK-key derived GPD group key (TCLK encrypted)

4.4.4.1.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2	[R3] A.3.3.2.2	As in 4.4.1.1 or 4.4.2.2, depending on the commissioning method supported by the DUT-GPS (i.e. proximity or multi-hop).	
3		TH-GPD uses ApplicationID = 0b000 and SrcID = N. If GPS supports security, TH-GPD shall request the shared key and shall provide OOB key; TC-LK encryption shall be used. Initially, TH-GPD has no shared key.	
4	[R3] A.3.3.3.1, A.3.3.3.2	If GPS supports security, TH-Tool sets: • the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b011; • The NWK key DUT-GPS stores in the NIB is known.	

4.4.4.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.1.5.3.3.1	Enable commissioning mode on DUT-GPS. Perform commissioning, whereby the TH-GPD, if involved, supports security level required by the DUT-GPS, supports bidirectional commissioning and – after exchange of GPD Channel request and GPD Channel Configuration commands – sends Commissioning GPDF with *RxAfterTx* = 0b1 and:	

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		• The *Security Level* sub-field of the *Extended NWK Frame Control* field set to 0b00 (unprotected frame); • *GP Security Key Request* sub-field of the *Options* field to 0b1; • both *GPDkeyPresent* sub-field and *GPDkeyEncryption* sub-field of the *Extended Options* field to 0b1; encrypted OOB key present; *GPD Key MIC* field present. TH-Tool reads out Sink Table of the DUT-GPS using the ZCL Read Attributes command. TH-GPD sends correctly protected Data GPDF (*SecurityKey* sub-field of the *Extended NWK Frame Control* field is set to 0b0).	
2		***Conditional on DUT-GPS supporting bidirectional operation functionality in-range:*** In device-specific way add a GPDF for TH-GPD to the gpTxQueue of the DUT-GPS. If possible, the queued GPD command has observable effect on the TH-GPD (e.g. Read Attributes). TH-GPD sends a correctly formatted and protected Data GPDF with: • *RxAfterTx* of the NWK Frame Control field set to 0b1; • *SecurityKey* field of the *Extended NWK Frame Control* field set to 0b0 (shared key).	

1181 ***4.4.4.1.3 Expected Outcome***

Pass verdict:
1) DUT-GPS sends Commissioning Reply GPDF, with: • *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • *GPDkeyEncryption* sub-field of the *Options* field set to 0b1, • *KeyType* sub-field of the *Options* field set to 0b011, • and *GPDsecurityKey* field present and carrying the NWK-key derived GP Group Key, encrypted; • *GPD Key MIC* field is present. • *Frame Counter* field is present and carries the value used for key encryption; TH-GPD sends correctly protected GPD Success command (*SecurityKey* sub-field of the *Extended NWK Frame Control* field is set to 0b0) upon reception of the GPD Commissioning Reply. On reception of the GPD Success, DUT-GPS sends GP Pairing command, with: • *SecurityKeyType* sub-field of the *Options* field set to 0b011, • the *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • and the *GPDsecurityKey* field present and carrying in the clear the NWK-key derived GP Group Key. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for GPD ID = N, with the *SecurityKeyType* sub-field of the *Security Options* field set to 0b011; the *GPDkey* field present and carrying in the clear the NWK-key derived GP Group Key. DUT-GPS executes the Data GPDF.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one copy of the queued GPDF, correctly protected and formatted, and with *SecurityKey* field of the *Extended NWK Frame Control* field set to 0b0 (shared key). If observable: TH-GPD executes the GPD command.
Fail verdict:
1) DUT-GPS does not send Commissioning Reply GPDF, formatted exactly as in test case 4.4.4.1/pass verdict 1 above. AND/OR TH-GPD does not send correctly protected GPD Success command upon reception of the GPD Commissioning Reply. AND/OR On reception of the GPD Success, DUT-GPS does not send the GP Pairing command on reception of the GPD Success, formatted exactly as in test case 4.4.4.1/pass verdict 1 above. AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for GPD ID = N, formatter exactly as in test case 4.4.4.1/pass verdict 1 above. AND/OR DUT-GPS does NOT execute the Data GPDF.

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2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS does not send at least one copy of the queued GPDF, correctly protected and formatted AND/OR with *SecurityKey* field of the *Extended NWK Frame Control* field is not set to 0b0 (shared key). AND/OR If observable: TH-GPD does not execute the GPD command.

4.4.4.2 NOT TESTED: Deprecated legacy test: DUT-GPS using key type GPD group key in the clear

4.4.4.2.1 Initial Conditions

As in 4.4.1 - 4.4.2.2, (i.e. proximity or multi-hop), depending on the method supported by the DUT-GPS.

The NWK key DUT-GPS stores in the NIB is known and different from the to-be-used GP group key (e.g. 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf).

4.4.4.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9	TH-Tool sets the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b010 and the *gpSharedSecurityKey* attribute to 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf. Enable commissioning mode on DUT-GPS. Perform commissioning, whereby the TH-GPD, if involved, supports security level required by the DUT-GPS, supports bidirectional commissioning and – after exchange of GPD Channel request and GPD Channel Configuration commands – sends Commissioning GPDF with *RxAfterTx* = 0b1 and: • The *Security Level* sub-field of the *Extended NWK Frame Control* field set to 0b00 (unprotected frame); • *GP Security Key Request* sub-field of the *Options* field to 0b1; • both *GPDkeyPresent* sub-field and *GPDkeyEncryption* sub-field of the *Extended Option*s field to 0b0. TH-Tool reads out Sink Table of the DUT-GPS using the ZCL Read Attributes command.	
2		***Conditional on DUT-GPS supporting bidirectional operation functionality in-range:*** In device-specific way add a GPDF for TH-GPD to the gpTxQueue of the DUT-GPS. If possible, the queued GPD command has observable effect on the TH-GPD (e.g. Read Attributes). TH-GPD sends a correctly formatted and protected Data GPDF with: • *RxAfterTx* of the NWK Frame Control field set to 0b1; • *SecurityKey* field of the *Extended NWK Frame Control* field set to 0b0 (shared key).	

4.4.4.2.3 Expected Outcome

Pass verdict:
1) DUT-GPS sends Commissioning Reply GPDF, with: • *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • *GPDkeyEncryption* sub-field of the *Options* field set to 0b0, • *KeyType* sub-field of the *Options* field set to 0b010 (*gpSharedSecurityKeyType*), • *GPDsecurityKey* field present and carrying in the clear the GP Group Key 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf (*gpSharedSecurityKey)*. TH-GPD sends correctly protected GPD Success command upon reception of the GPD Commissioning Reply. On reception of the GPD Success, the DUT-GPS sends GP Pairing command, with: • *SecurityKeyType* sub-field of the *Options* field set to 0b010 (*gpSharedSecurityKeyType*), • the *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • the *GPDsecurityKey* field present and carrying in the clear the GP Group Key 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf (*gpSharedSecurityKey*). On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for GPD ID = N, with the *SecurityKeyType* sub-field of the

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Security Options field set to 0b010; the *GPDkey* field present and carrying in the clear the GP Group Key 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS does not send at least one copy of the queued GPDF, correctly protected and formatted AND/OR with *SecurityKey* field of the *Extended NWK Frame Control* field is not set to 0b0 (shared key). AND/OR If observable: TH-GPD does not execute the GPD command.
Fail verdict:
1) DUT-GPS does not send Commissioning Reply GPDF, formatted exactly as in test case 4.4.4.2/pass verdict 1 above. AND/OR TH-GPD does not send correctly protected GPD Success command upon reception of the GPD Commissioning Reply. AND/OR On reception of the GPD Success, DUT-GPS does not send the GP Pairing command formatted exactly as in test case 4.4.4.2/pass verdict 1 above. AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for GPD ID = N, formatted exactly as in test case 4.4.4.2/pass verdict 1 above.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS does not send at least one copy of the queued GPDF, correctly protected and formatted AND/OR with *SecurityKey* field of the *Extended NWK Frame Control* field is not set to 0b0 (shared key). AND/OR If observable: TH-GPD does not execute the GPD command.

4.4.4.3 DUT-GPS using key type Derived individual GPD key (encrypted), ApplicationID = 0b000

4.4.4.3.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2	[R3] A.3.3.2.2	As in 4.4.1.1 or 4.4.2.2, depending on the commissioning method supported by the DUT-GPS (i.e. proximity or multi-hop).	
3		TH-GPD uses ApplicationID = 0b000 and SrcID = N. If GPS supports security, TH-GPD shall request the shared key and shall provide OOB key; TC-LK encryption shall be used. Initially, TH-GPD has no shared key.	
4	[R3] A.3.3.3.1, A.3.3.3.2	If GPS supports security, TH-Tool sets: • the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b111; • the *gpSharedSecurityKey* attribute to 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf; • The NWK key DUT-GPS stores in the NIB is known and different from the *gpSharedSecurityKey* attribute value.	

4.4.4.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.1.5.3.3.2	Enable commissioning mode on DUT-GPS. Perform commissioning, whereby the TH-GPD with *ApplicationID* = 0b000, GPD SrcID = N, if involved, supports security level required by the DUT-GPS, supports bidirectional commissioning and – after exchange of GPD Channel request and GPD Channel Configuration commands – sends Commissioning GPDF with *RxAfterTx* = 0b1 and: • The *Security Level* sub-field of the *Extended NWK Frame Control* field set to 0b00 (unprotected frame); • *GP Security Key request* sub-field of the *Options* field to 0b1; • both *GPDkeyPresent* sub-field and *GPDkeyEncryption* sub-field of the *Extended Option*s field to 0b1; encrypted OOB key present; *GPD Key MIC* field present. TH-Tool reads out Sink Table of the DUT-GPS using the ZCL Read Attributes command. TH-GPD sends correctly protected Data GPDF (*SecurityKey* sub-field of the *Extended NWK Frame Control* field is set to 0b0).	

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2		***Conditional on DUT-GPS supporting bidirectional operation functionality in-range:*** In device-specific way add a GPDF for TH-GPD to the gpTxQueue of the DUT-GPS. If possible, the queued GPD command has observable effect on the TH-GPD (e.g. Read Attributes). TH-GPD sends a correctly formatted and protected Data GPDF with: • *RxAfterTx* of the NWK Frame Control field set to 0b1; • *SecurityKey* field of the *Extended NWK Frame Control* field set to 0b1 (individual key).	

1194 ***4.4.4.3.3 Expected Outcome***

Pass verdict:
1) DUT-GPS sends Commissioning Reply GPDF, with: • *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • *GPDkeyEncryption* sub-field of the *Options* field set to 0b1, • *KeyType* sub-field of the *Options* field set to 0b111, • *GPDsecurityKey* field present and carrying the Derived Individual Key, encrypted; • *GPD Key MIC* field is present • *Frame Counter* field is present and carries the value used for key encryption. If the GPD SrcID is 0x87654321 and the *gpSharedSecurityKey* is 0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, 0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, then the Derived Individual Key shall have the value 0x7a, 0x3a, 0x73, 0x43, 0x8d, 0x6e, 0x47, 0x55, 0x28, 0x81, 0xa0, 0x28, 0xad, 0x59, 0x23, 0x2e. If the GPD SrcID is 0x12345678 and the *gpSharedSecurityKey* is 0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, 0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, then the Derived Individual Key shall have the value 0xC9, 0x78, 0x60, 0x0D, 0xB7, 0xB3, 0x65, 0xB4, 0xC1, 0x85, 0xC1, 0x63, 0x25, 0x2C, 0x73, 0xFB. TH-GPD sends correctly protected GPD Success command (*SecurityKey* sub-field of the *Extended NWK Frame Control* field is set to 0b0) upon reception of the GPD Commissioning Reply. On reception of the GPD Success, DUT-GPS sends GP Pairing command, with: • *SecurityKeyType* sub-field of the *Options* field set to 0b111, • the *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • and the *GPDsecurityKey* field present and carrying in the clear the Derived Individual Key as sent in the Commissioning Reply GPDF. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for ApplicationID = 0b000, GPD SrcID = N, with the *SecurityKeyType* sub-field of the *Security Options* field set to 0b111; the *GPDkey* field present and carrying in the clear the Derived Individual Key as sent in the Commissioning Reply GPDF. DUT-GPS executes the Data GPDF.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one copy of the queued GPDF, correctly protected and formatted with *SecurityKey* field of the *Extended NWK Frame Control* field set to 0b1 (individual key). If observable: TH-GPD executes the GPD command.
Fail verdict:
1) DUT-GPS does not send Commissioning Reply GPDF, formatted exactly as specified in 4.4.4.3.3/pass verdict 1 above. AND/OR TH-GPD does not send correctly protected GPD Success command upon reception of the GPD Commissioning Reply. AND/OR On reception of the GPD Success, the DUT-GPS does not send the GP Pairing command formatted exactly as specified in 4.4.4.3.3/pass verdict 1 above. AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for GPD ID = N, formatted exactly as specified in 4.4.4.3.3/pass verdict 1 above. AND/OR DUT-GPS does NOT execute the Data GPDF.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS does not send at least one copy of the queued GPDF, correctly protected and formatted AND/OR with *SecurityKey* field of the *Extended NWK Frame Control* field is not set to 0b1 (individual key). AND/OR If observable: TH-GPD does not execute the GPD command.

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4.4.4.4 NOT TESTED: Deprecated legacy test: DUT-GPS receiving the OOB key in the clear

4.4.4.4.1 Initial Conditions

As in 4.4.1 - 4.4.2.2, (i.e. proximity or multi-hop), depending on the method supported by the DUT-GPS.

4.4.4.4.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.1.5.3.3.3	TH-Tool sets the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b000. Enable commissioning mode on DUT-GPS. Perform commissioning, whereby the TH-GPD, if involved, has *ApplicationID* = 0b000, *SrcID* = N, supports security level required by the DUT-GPS, supports commissioning method as required by DUT-GPS and sends – either as part of bidirectional commissioning after exchange of GPD Channel request and GPD Channel Configuration commands or as part of unidirectional commissioning – sends Commissioning GPDF with *RxAfterTx* set accordingly and : • The *Security Level* sub-field of the *Extended NWK Frame Control* field set to 0b00 (unprotected frame); • *GP Security Key Request* sub-field of the *Options* field to 0b0; • *SecurityLevelCapabilities* sub-field of the *Extended Options* field set to the level required by DUT-GPS; • *SecurityKeyType* sub-field of the *Extended Options* field set to 0b100; • *GPDkeyPresent* sub-field of the *Extended Options* field to 0b1; • *GPDkeyEncryption* sub-field of the *Extended Options* field to 0b0; • *GPDke*y included in the clear • *GPDkeyMIC* field absent. TH-Tool reads out Sink Table of the DUT-GPS using the ZCL Read Attributes command. Make TH-GPD send correctly-protected Data GPDF (*SecurityKey* sub-field of the *Extended NWK Frame Control* field is set to 0b1)..	
2		***Conditional on DUT-GPS supporting bidirectional operation functionality in-range:*** In device-specific way add a GPDF for TH-GPD to the gpTxQueue of the DUT-GPS. If possible, the queued GPD command has observable effect on the TH-GPD (e.g. Read Attributes). TH-GPD sends a correctly formatted and protected Data GPDF with: • *RxAfterTx* of the NWK Frame Control field set to 0b1; • *SecurityKey* field of the *Extended NWK Frame Control* field set to 0b1 (individual key).	

4.4.4.4.3 Expected Outcome

Pass verdict:
1) In case of bidirectional commissioning, • DUT-GPS sends Commissioning Reply GPDF, with: ▪ *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b0, ▪ *GPDkeyEncryption* sub-field of the *Extended Options* field to 0b0; ▪ *KeyType* sub-field of the *Options* field set to 0b100. TH-GPD sends correctly protected GPD Success command upon reception of the GPD Commissioning Reply. At the end of the commissioning procedure, the DUT-GPS sends GP Pairing command, with: • *SecurityKeyType* sub-field of the *Options* field set to 0b100, • the *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • and the *GPDsecurityKey* field present and carrying in the clear the GPD OOB key. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for *ApplicationID* = 0b000, GPD SrcID = N, with the

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SecurityKeyType sub-field of the *Security Options* field set to 0b100; the *GPDkey* field present and carrying in the clear the GPD key. DUT-GPS executes the Data GPDF. If the execution does not result in any user-perceivable reaction, the security applied to the GPDF needs to be verified independently.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one copy of the queued GPDF, correctly protected and formatted with *SecurityKey* field of the *Extended NWK Frame Control* field set to 0b1 (individual key). If observable: TH-GPD executes the GPD command.
Fail verdict:
1) In case of bidirectional commissioning: • DUT-GPS does not send Commissioning Reply GPDF, formatted exactly as in 4.4.4.4.2/pass verdict 1 above. • AND/OR TH-GPD does NOT send correctly protected GPD Success command upon reception of the GPD Commissioning Reply. AND/OR At the end of the commissioning procedure, the DUT-GPS does not send the GP Pairing command, formatted exactly as in 4.4.4.4.2/pass verdict 1 above. AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for ApplicationID = 0b000, GPD SrcID = N, formatted exactly as in 4.4.4.4.2/pass verdict 1 above. AND/OR DUT-GPS does not execute the Data GPDF.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS does not send at least one copy of the queued GPDF, correctly protected and formatted AND/OR with *SecurityKey* field of the *Extended NWK Frame Control* field is not set to 0b1 (individual key). AND/OR If observable: TH-GPD does not execute the GPD command.

4.4.4.5 NOT TESTED: DUT-GPS using key type NWK key, encrypted

4.4.4.5.1 Initial Conditions

The NWK key DUT-GPS stores in the NIB is known; if possible, it is set to 0x01, 0x03, 0x05, 0x07, 0x09, 0x0b, 0x0d, 0x0f, 0x00, 0x02, 0x04, 0x06, 0x08, 0x0a, 0x0c, 0x0d.

Item	Doc. Ref.	Initial Conditions	Note
1-2	[R3] A.3.3.2.2	As in 4.4.1 - 4.4.2.2, (i.e. proximity or multi-hop), depending on the method supported by the DUT-GPS.	
3		TH-GPD uses ApplicationID = 0b010 and IEEE address = N, Endpoint Z. If GPS supports security, TH-GPD shall request the shared key and shall provide OOB key; TC-LK encryption shall be used. Initially, TH-GPD has no shared key.	
4	[R3] A.3.3.3.1, A.3.3.3.2	TH-Tool sets: • the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b001; • The NWK key DUT-GPS stores in the NIB is known.	

4.4.4.5.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.1.5.3.3.1	Enable commissioning mode on DUT-GPS. Perform commissioning, whereby the TH-GPD, if involved, supports security level required by the DUT-GPS, supports bidirectional commissioning and – after exchange of GPD Channel request and GPD Channel Configuration commands – sends Commissioning GPDF with *RxAfterTx* = 0b1 and: • The *Security Level* sub-field of the *Extended NWK Frame Control* field set to 0b00 (unprotected frame); • *GP Security Key Request* sub-field of the *Options* field to 0b1;	

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		• both *GPDkeyPresent* sub-field and *GPDkeyEncryption* sub-field of the *Extended Options* field to 0b1; encrypted OOB key present; *GPD Key MIC* field present. TH-Tool reads out Sink Table of the DUT-GPS using the ZCL Read Attributes command. TH-GPD sends correctly protected Data GPDF (*SecurityKey* sub-field of the *Extended NWK Frame Control* field is set to 0b0).	
2		***Conditional on DUT-GPS supporting bidirectional operation functionality in-range:*** In device-specific way add a GPDF for TH-GPD to the gpTxQueue of the DUT-GPS. If possible, the queued GPD command has observable effect on the TH-GPD (e.g. Read Attributes). TH-GPD sends a correctly formatted and protected Data GPDF with: • *RxAfterTx* of the NWK Frame Control field set to 0b1; • *SecurityKey* field of the *Extended NWK Frame Control* field set to 0b0 (shared key).	

1206 ***4.4.4.5.3 Expected Outcome***

Pass verdict:
1) DUT-GPS sends Commissioning Reply GPDF, with: • *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • *GPDkeyEncryption* sub-field of the *Options* field set to 0b1, • *KeyType* sub-field of the *Options* field set to 0b001, • and *GPDsecurityKey* field present and carrying the NWK key, encrypted; • *GPD Key MIC* field is present • *Frame Counter* field is present and carries the value used for key encryption. TH-GPD sends correctly protected GPD Success command (*SecurityKey* sub-field of the *Extended NWK Frame Control* field is set to 0b0) upon reception of the GPD Commissioning Reply. On reception of the GPD Success, DUT-GPS sends GP Pairing command, with: • *SecurityKeyType* sub-field of the *Options* field set to 0b001, • the *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • and the *GPDsecurityKey* field present and carrying in the clear the NWK key. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for GPD ID = N, with the *SecurityKeyType* sub-field of the *Security Options* field set to 0b001; the *GPDkey* field present and carrying in the clear the NWK key. DUT-GPS executes the Data GPDF.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one copy of the queued GPDF, correctly protected and formatted, and with *SecurityKey* field of the *Extended NWK Frame Control* field set to 0b0 (shared key). If observable: TH-GPD executes the GPD command.
Fail verdict:
1) DUT-GPS does not send Commissioning Reply GPDF, formatted exactly as in test case 4.4.4.5/pass verdict 1 above. AND/OR TH-GPD does not send correctly protected GPD Success command upon reception of the GPD Commissioning Reply. AND/OR On reception of the GPD Success, DUT-GPS does not send the GP Pairing command on reception of the GPD Success, formatter exactly as in test case 4.4.4.5/pass verdict 1 above. AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having one entry for GPD ID = N, formatter exactly as in test case 4.4.4.5/pass verdict 1 above. AND/OR DUT-GPS does NOT execute the Data GPDF.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS does not send at least one copy of the queued GPDF, correctly protected and formatted AND/OR with *SecurityKey* field of the *Extended NWK Frame Control* field is not set to 0b0 (shared key). AND/OR If observable: TH-GPD does not execute the GPD command.

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4.4.4.6 DUT-GPS using key type Derived individual GPD key, ApplicationID = 0b010; encrypted

4.4.4.6.1 Initial Conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2	[R3] A.3.3.2.2	As in 4.4.1 - 4.4.2.2, (i.e. proximity or multi-hop), depending on the method supported by the DUT-GPS.	
3		TH-GPD uses ApplicationID = 0b010 and IEEE address = N, Endpoint Z. If GPS supports security, TH-GPD shall request the shared key and shall provide OOB key; TC-LK encryption shall be used. Initially, TH-GPD has no shared key.	
4	[R3] A.3.3.3.1, A.3.3.3.2	TH-Tool sets: • the *gpSharedSecurityKeyType* attribute of the DUT-GPS to 0b111 • and the *gpSharedSecurityKey* attribute to 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf. • The NWK key DUT-GPS stores in the NIB is known and different from the *gpSharedSecurityKey* attribute value.	

4.4.4.6.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.1.5.3.3.2	Enable commissioning mode on DUT-GPS. Perform commissioning, whereby the TH-GPD if involved, has *ApplicationID* = 0b010, GPD IEEE = N, Endpoint Z, supports security level required by the DUT-GPS, supports bidirectional commissioning and – after exchange of GPD Channel request and GPD Channel Configuration commands – sends Commissioning GPDF with *RxAfterTx* = 0b1 and: • The *Security Level* sub-field of the *Extended NWK Frame Control* field set to 0b00 (unprotected frame); • *GP Security Key request* sub-field of the *Options* field to 0b1; • both *GPDkeyPresent* sub-field and *GPDkeyEncryption* sub-field of the *Extended Option*s field to 0b1; encrypted OOB key present; *GPD Key MIC* field present. TH-Tool reads out Sink Table of the DUT-GPS using the ZCL Read Attributes command.	

4.4.4.6.3 Expected Outcome

Pass verdict:
1) DUT-GPS sends Commissioning Reply GPDF, with: • *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • *GPDkeyEncryption* sub-field of the *Options* field set to 0b1, • *KeyType* sub-field of the *Options* field set to 0b111, • *GPDsecurityKey* field present and carrying the Derived Individual Key with the correct value for the GPD ID of TH-GPD, encrypted; • *GPD Key MIC* field is present • *Frame Counter* field is present and carries the value used for key encryption. TH-GPD sends correctly protected GPD Success command (*SecurityKey* sub-field of the *Extended NWK Frame Control* field is set to 0b1) upon reception of the GPD Commissioning Reply. On reception of the GPD Success, DUT-GPS sends GP Pairing command, with: • *SecurityKeyType* sub-field of the *Options* field set to 0b111, • the *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • the *GPDsecurityKey* field present and carrying in the clear the Derived Individual Key as sent in the Commissioning Reply GPDF. On reception of ZCL Read Attributes command, DUT-GPS responds with Read Attributes Response with Status

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SUCCESS and *Sink Table* attribute having one entry for *ApplicationID* = 0b010, GPD IEEE address = N, *Endpoint* = Z, with the *SecurityKeyType* sub-field of the *Security Options* field set to 0b111; the *GPDkey* field present and carrying in the clear the Derived Individual Key as sent in the Commissioning Reply GPDF.
Fail verdict:
1) DUT-GPS does not send Commissioning Reply GPDF, formatted exactly as specified in 4.4.4.6.3/pass verdict 1 above. AND/OR TH-GPD does not send correctly protected GPD Success command upon reception of the GPD Commissioning Reply. AND/OR On reception of the GPD Success, the DUT-GPS does not send the GP Pairing command formatted exactly as specified in 4.4.4.6.3/pass verdict 1 above. AND/OR On reception of ZCL Read Attributes command, DUT-GPS does not respond with Read Attributes Response with Status SUCCESS and *Sink Table* attribute having an entry for GPD IEEE address = N, Endpoint = Z, formatted exactly as specified in 4.4.4.6.3/pass verdict 1 above.

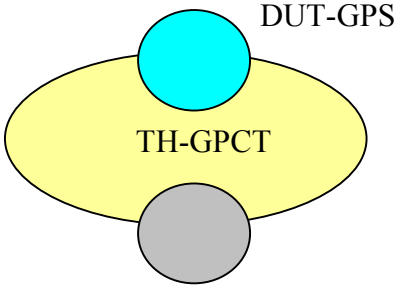
4.4.4.7 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF12A	Key exchange in Commissioning GPDF	Direct
GPCF13A	Key exchange in Commissioning Reply GPDF	Direct
GPPC101	gpSharedSecurityKeyType attribute	Direct
GPPC102	gpSharedSecurityKey attribute	Direct
GPPCS152	Transmission of the GP Pairing command	Direct
GPCF12B	Encrypted Key exchange in Commissioning GPDF	Direct
GPCF13B	Encrypted Key exchange in Commissioning Reply GPDF	Direct

4.4.5 NOT TESTED: Translation Table configuration

4.4.5.1.1 Initial Conditions

The required network set-up for the test harness is as follows:

<table>
<tr><td rowspan="2"> 
</td><td>DUT-GPS (GPT, GPT+, GPC or GPCB)</td><td>PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF)
Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7)
IEEE address=manufacturer-specific
DUT-GPS supports CT-based commissioning.</td></tr>
<tr><td>TH-GPCT or TH-GPCB</td><td>PANId=same PANId as TH-GPS
Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7)
IEEE address=manufacturer-specific</td></tr>
</table>

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPCT operate in a ZigBee PAN. They may join a ZigBee network created by another device, or TH-GPCT may start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between DUT-GPS and TH-GPD.	

4.4.5.1.2 Test Set-Up

The TH-GPCT shall be in wireless communication proximity of DUT-GPS.

A packet sniffer shall be observing the communication over the air interface.

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1220 ***4.4.5.1.3 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5, A.3.3.4.5	DUT-GPS enters commissioning mode. TH-GPCT sends GP Translation Table Request to DUT-GPS.	
2		Create a pairing for GPD ID = Z with GP Pairing Configuration command. TH-GPCT sends GP Translation Table Update to DUT-GPS, with the *Action* sub-field of the *Options* field set to 0b00 (add) and *Index* = 0xff, creating a non-default translation for a specific GPD ID Z and command X, whereby the GPD command (payload) is NOT supported by the DUT-GPS's application endpoint and the mapped ZigBee application functionality is supported by the DUT-GPS's application endpoint. TH-GPCT sends GP Translation Table Request to DUT-GPS. TH sends Data GPDF with GPD ID = Z, command X, correctly protected.	E.g., for GPS supporting on/off, GPD command 0x70 (reserved) may be mapped to ZigBee On/off cluster command TOGGLE (CommandID = 0x02).
3		TH-GPCT sends GP Translation Table Update to DUT-GPS, with the *Action* sub-field of the *Options* field set to 0b01 (replace) and *Index* carrying the entry number of the entry created in step 2, for a specific GPD ID Z and command Y, whereby the GPD command (payload) is NOT supported by the DUT-GPS's application endpoint and the mapped ZigBee application functionality is supported by the DUT-GPS's application endpoint. TH-GPCT sends GP Translation Table Request to DUT-GPS. TH sends Data GPDF with GPD ID = Z, command Y, correctly protected.	
4		TH-GPCT sends GP Translation Table Update to DUT-GPS, with the *Actions* sub-field of the *Options* field set to 0b10 and *Index* carrying the entry number of the entry created in step 2, removing the previously created translation for the specific GPD ID Z. TH-GPCT sends GP Translation Table Request to DUT-GPS.	

1221 ***4.4.5.1.4 Expected Outcome***

Pass verdict:
1) DUT-GPS sends GP Translation Table Response command to TH-GPCT, with either • the default translations (with *ApplicationID* = 0b000 and SrcID = 0xffffffff) required for the GPD application functionality as supported by this GPS; • or indicating the Translation Table is empty (*Status* = SUCCESS and *TotalNumberOfEntries* = *StartIndex* = *EntriesCount* = 0x00).
2) Upon reception of GP Translation Table Request, DUT-GPS sends GP Translation Table Response command to TH-GPCT, carrying at least the translation for GPD ID Z and the corresponding *ApplicationID,* command X as supplied by the TH-GPCT in the GP Translation Table Update command. DUT-GPS executes the mapped ZigBee command.
3) Upon reception of GP Translation Table Request, DUT-GPS sends GP Translation Table Response command to TH-GPCT, carrying at least the translation for GPD ID Z and the corresponding *ApplicationID,* command Y as supplied by the TH-GPCT in the GP Translation Table Update command. DUT-GPS executes the mapped ZigBee command.
4) Upon reception of GP Translation Table Request, DUT-GPS sends GP Translation Table Response command to TH-GPCT, with NO translation for GPD ID Z.
Fail verdict:
1) DUT-GPS does not send GP Translation Table Response.
2-3) DUT-GPS does NOT send sends GP Translation Table Response command to TH-GPCT upon GP Translation Table Request.

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AND/OR GP Translation Table Response does not contain the translations supplied by the TH-GPCT in the GP Translation Table Update command. AND/OR DUT-GPS does not execute the ZigBee command.
4) DUT-GPS does not send GP Translation Table Response.

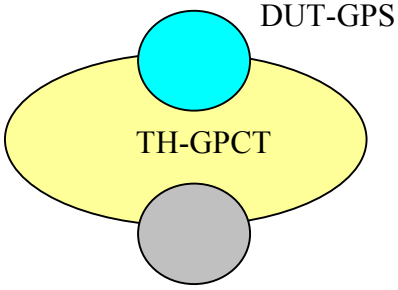
1222 ***4.4.5.1.5 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF19	Translation Table functionality	Direct
GPPCS109	Reception of GP Translation Table Request command	Direct
GPPCS108	Reception of GP Translation Table Update command	Direct
GPPCS155	Transmission of GP Translation Table Response	Direct

1223 ## 4.4.6 Remote sink commissioning control

1224 ***4.4.6.1.1 Initial Conditions***

1225 The required network set-up for the test harness is as follows:



DUT-GPS (GPT, GPT+, GPC or GPCB)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS supports CT-based commissioning.
TH-GPCT or TH-GPCB	PANId=same PANId as TH-GPS Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPCT operate in a ZigBee PAN. They may join a ZigBee network created by another device, or TH-GPCT may start as ZC.	
2	[R3] A.3.3.2.2	No pairing exists between DUT-GPS and TH-GPD.	
3	[R3] A.3.3.2.4	The value of the *gpsCommissioningExitMode* attribute is known.	

1226 ***4.4.6.1.2 Test Set-Up***

1227 The TH-GPCT shall be in wireless communication proximity of DUT-GPS.

1228 A packet sniffer shall be observing the communication over the air interface.

1229 ***4.4.6.1.3 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9.1, A.3.3.4.7	TH-GPCT sends GP Sink Commissioning Mode command with: • *Action* = 0b1, • Involve GPM in security = 0b0, and GPM address for security = 0xffff; • Involve GPM in pairing = 0b0, and GPM address for pairing = 0xffff; • Involve proxies = 0b0, • *Endpoint* = 0xff. TH-GPCT sends GPD Commissioning command with RxAfterTx = 0b0, with application and security settings as required by the DUT-GPS.	

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2		DUT-GPS is in operational mode; Sink Table is empty. TH-GPCT sends GP Sink Commissioning Mode command with: • *Action* = 0b1, • Involve GPM in security = 0b0, and GPM address for security = 0xffff; • Involve GPM in pairing = 0b0, and GPM address for pairing = 0xffff; • Involve proxies = 0b1, • *Endpoint* = 0xff. TH-GPCT sends GPD Commissioning command with RxAfterTx = 0b0, with application and security settings as required by the DUT-GPS.	
3		DUT-GPS is in operational mode; Sink Table is empty. TH-GPCT identifies active endpoint(s) of the DUT-GPS. TH-GPCT sends GP Sink Commissioning Mode command with: • *Action* = 0b1, • Involve GPM in security = 0b0, and GPM address for security = 0xffff; • Involve GPM in pairing = 0b0, and GPM address for pairing = 0xffff; • Involve proxies = 0b0, • *Endpoint* carrying the identifier M of (one of the) active endpoint(s) of DUT-GPS. TH-GPCT sends GPD Commissioning command with RxAfterTx = 0b0, with application and security settings as required by the endpoint M of the DUT-GPS.	
4		**Opt. negative test (application functionality matching):** (if DUT-GPS supports multiple application endpoints); immediately following step 3: TH-GPCT sends GPD Commissioning command with RxAfterTx = 0b0, with application and security settings as required by endpoint other than M (and not supported by endpoint M) of the DUT-GPS (which is NOT in commissioning mode).	
5	[R3] A.3.9.1, A.3.3.4.7	DUT-GPS is in operational mode; Sink Table is empty. TH-GPCT sends GP Sink Commissioning Mode command with: • *Action* = 0b1, • Involve GPM in security = 0b0, and GPM address for security = 0xffff; • Involve GPM in pairing = 0b0, and GPM address for pairing = 0xffff; • Involve proxies = 0b1, • *Endpoint* = 0xff. TH-GPCT sends GP Sink Commissioning Mode command with: • *Action* = 0b0, • Involve GPM in security = 0b0, and GPM address for security = 0xffff; • Involve GPM in pairing = 0b0, and GPM address for pairing = 0xffff; • Involve proxies = 0b1, • *Endpoint* = 0xff. TH-GPCT sends GPD Commissioning command with RxAfterTx = 0b0, with application and security settings as required by the DUT-GPS.	
6)		**Negative test (unsupported endpoint)**: DUT-GPS is in operational mode; Sink Table is empty.	

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		TH-GPCT sends GP Sink Commissioning Mode command with: • *Action* = 0b1, • Involve GPM in security = 0b0, and GPM address for security = 0xffff; • Involve GPM in pairing = 0b0, and GPM address for pairing = 0xffff; • Involve proxies = 0b1, • *Endpoint* carrying an endpoint number NOT implemented by DUT-GPS.	
7)		**Negative test (GPM involvement):** DUT-GPS is in operational mode; Sink Table is empty. TH-GPCT sends GP Sink Commissioning Mode command with: • *Action* = 0b1, • Involve GPM in security = 0b1, and GPM address for security = 0x1111; • Involve GPM in pairing = 0b1, and GPM address for pairing = 0x2222; • Involve proxies = 0b1, • *Endpoint* = 0xff.	

1230 ***4.4.6.1.4 Expected Outcome***

Pass verdict:
1) If DUT-GPS: • supports Proximity commissioning, it does NOT send GP Proxy Commissioning Mode command, and enters proximity commissioning mode; • does not support Proximity commissioning, but it supports Multi-hop commissioning, it does NOT send GP Proxy Commissioning Mode command, and enters multi-hop commissioning mode. Upon reception of GPD Commissioning command, DUT-GPS successfully performs pairing. DUT-GPS exits the commissioning mode according to the conditions specified in *gpsCommissioningExitMode* attribute.
2) If DUT-GPS: • supports Multi-hop commissioning, it sends GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to 0b1 (enter), and enters multi-hop commissioning mode; • does not support Multi-hop commissioning, but it supports Proximity commissioning, it does NOT send GP Proxy Commissioning Mode command, and enters proximity commissioning mode Upon reception of GPD Commissioning command, DUT-GPS successfully performs pairing. DUT-GPS exits the commissioning mode according to the conditions specified in *gpsCommissioningExitMode* attribute.
3) If DUT-GPS: • supports Proximity commissioning, it does NOT send GP Proxy Commissioning Mode command, and enters proximity commissioning mode; • does not support Proximity commissioning, but it supports Multi-hop commissioning, it does NOT send GP Proxy Commissioning Mode command, and enters multi-hop commissioning mode. Upon reception of GPD Commissioning command, DUT-GPS successfully performs pairing for endpoint M.
4) Upon reception of GPD Commissioning command, DUT-GPS does NOT complete pairing for endpoint M or any other endpoint.
5) DUT-GPS, if it supports Multi-hop commissioning, sends GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to 0b1 (enter). DUT-GPS, if it supports Multi-hop commissioning, sends GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to 0b0 (exit). Upon reception of GPD Commissioning command, DUT-GPS does not complete pairing.
6) DUT-GPS does NOT send GP Proxy Commissioning Mode.
7) DUT-GPS does NOT send GP Proxy Commissioning Mode. DUT-GPS does NOT send any command to address 0x1111 or 0x2222.

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Fail verdict:
1) DUT-GPS sends GP Proxy Commissioning Mode command. AND/OR Upon reception of GPD Commissioning command, DUT-GPS does not successfully perform pairing.
2) DUT-GPS that supports Multi-hop commissioning does not send GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to 0b1 (enter). AND/OR Upon reception of GPD Commissioning command, DUT-GPS does not successfully perform pairing.
3) DUT-GPS sends GP Proxy Commissioning Mode command. AND/OR Upon reception of GPD Commissioning command, DUT-GPS successfully performs pairing for endpoint M.
4) Upon reception of GPD Commissioning command, DUT-GPS does complete pairing for endpoint M or any other endpoint.
5) DUT-GPS that supports Multi-hop commissioning does NOT send GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to 0b1 (enter). AND/OR DUT-GPS that supports Multi-hop commissioning does NOT send GP Proxy Commissioning Mode command with *Action* sub-field of the *Options* field set to 0b0 (exit). AND/OR Upon reception of GPD Commissioning command, DUT-GPS completes pairing.
6) DUT-GPS does send GP Proxy Commissioning Mode.
7) DUT-GPS does send GP Proxy Commissioning Mode. AND/OR DUT-GPS does send any command to address 0x1111 or 0x2222.

4.4.6.1.5 PICS Covered

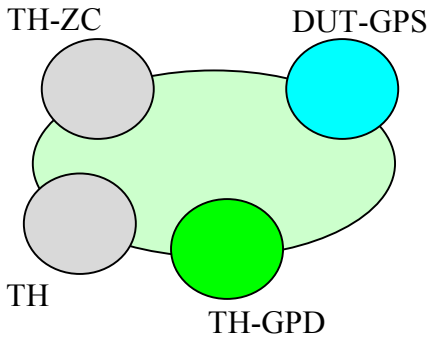
PICS reference	Functionality	Tested (Direct/Indirect)
GPPCS113	Reception of GP Sink Commissioning Mode	Direct

4.4.7 Involve TC sub-field tests

4.4.7.1 dTCLK joining, Involve TC sub-field set via attribute

4.4.7.1.1 Initial conditions

The required network set-up for the test harness is as follows:

<table>
<tr><td rowspan="4"> 
</td><td>DUT-GPS (GPCB)</td><td>PANId = of TH-ZC
Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7)
IEEE address=manufacturer-specific</td></tr>
<tr><td>TH-ZC</td><td>PANId = Generated in a random manner (within the range 0x0001 to 0x3FFF)
Logical Address=0x0000
IEEE address=manufacturer-specific</td></tr>
<tr><td>TH</td><td>PANId = of TH-ZC
Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7)
IEEE address=manufacturer-specific
TH is capable of sending various GP cluster commands</td></tr>
<tr><td>TH-GPD</td><td>GPD ID = N
If ApplicationID = 0b010: Endpoint = E and F;
GPD security usage according to DUT capabilities.
TH-GPD application functionality matches that of the DUT-GPS’s GPEP.</td></tr>
</table>

Item	Doc. Ref.	Initial Conditions	Note

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1	A.3.3.2.6	TH-ZC creates a centralized network. TH-ZC allows for joining with dTCLK	
2		DUT-GPS joins the ZigBee network of TH-ZC, using dTCLK (‘ZigBeeAlliance09’).	
3		Initially, DUT-GPS does NOT have any pairings, i.e. Sink Table of DUT-GPS is empty.	

4.4.7.1.2 Test Set-Up

DUT-GPS shall be in wireless communication proximity of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.4.7.1.3 Test procedure

Item	Doc. Ref.	Test step	Note
1A	A.3.3.2.6	TH reads out the *gpsSecurityLevel* attribute of DUT-GPS.	
1B	A.3.3.2.6	TH writes the value 0x0E or 0x0F to the *gpsSecurityLevel* attribute of DUT-GPS, depending on whether the DUT-GPS had the value 0x06 or 0x07 in step 1A. TH reads out the *gpsSecurityLevel* attribute of DUT-GPS.	
2	A.3.3.2.6, A.3.2.9	Trigger commissioning on the DUT-GPS (multi-hop commissioning, if supported by DUT-GPS). TH-GPD sends GPD Commissioning command with *RxAfterTx* = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH sends GP Commissioning Notification carrying GPD Commissioning command for TH-GPD with *RxAfterTx* = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH reads out the Sink Table of DUT-GPS.	
3	A.3.3.2.6, A.3.2.9	***If DUT-GPS supports reception of GP Sink Commissioning Mode commands:*** TH unicasts GP Sink Commissioning Mode command to DUT-GPS, with Action=Enter and Involve proxies = 0b1. TH-GPD sends GPD Commissioning command with RxAfterTx = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH sends GP Commissioning Notification carrying GPD Commissioning command for TH-GPD with RxAfterTx = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH reads out the Sink Table of DUT-GPS.	
4	A.3.3.2.6, A.3.5.2.4.1	TH unicasts to DUT-GPS a GP Pairing Configuration command for TH-GPD, with the sub-fields of the *Actions* field set to: *Action* = 0b001 and *Send GP Pairing* = 0b1, correctly formatted and with communication mode, security and application as supported by DUT-GPS. TH reads out the Sink Table of DUT-GPS. TH-GPD sends correctly formatted and protected Data GPDF.	

4.4.7.1.4 Expected outcome

Pass verdict:
1A) DUT-GPS responds with Read Attribute Response with: • Status = SUCCESS;

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• Sub-fields of the attribute value field set to: ▪ *Minimal GPD Security Level* = 0b10 or 0b11; ▪ *Protection with gpLinkKey* = 0b1; ▪ *Involve TC* = 0b0.
1B) DUT-GPS responds with Read Attribute Response with: • Status = SUCCESS; • Sub-fields of the attribute value field set to the value as written by the TH, i.e.: ▪ *Minimal GPD Security Level* = 0b10 or 0b11; ▪ *Protection with gpLinkKey* = 0b1; ▪ *Involve TC* = 0b1.
2) – 3) DUT-GPS does NOT send GP Proxy Commissioning Mode with Action=Enter. DUT-GPS does NOT send GP Pairing (nor GP Response, nor GP Commissioning Notification) upon reception of the GPD Commissioning command. DUT-GPS does NOT send GP Pairing upon reception of the GP Commissioning Notification command. Sink Table of DUT-GPS is empty.
4) DUT-GPS sends correctly formatted GP Pairing command for TH-GPD, with *AddSink* = 0b1, carrying the pairing information previously included in the GP Pairing Configuration command sent by the TH. DUT-GPS has Sink Table entry for TH-GPD with the pairing information previously included in the GP Pairing Configuration command sent by the TH. DUT-GPS executes the Data GPDF of TH-GPD.
Fail verdict:
1A) DUT-GPS does NOT respond with Read Attribute Response with Status = SUCCESS AND/OR the sub-fields of the attribute value field are NOT set exactly as in pass verdict 1A above.
1B) DUT-GPS does NOT respond with Read Attribute Response with Status = SUCCESS AND/OR the sub-fields of the attribute value field are NOT set exactly as in pass verdict 1B above.
2) – 3) DUT-GPS does send GP Proxy Commissioning Mode with Action=Enter. AND/OR DUT-GPS does send GP Pairing (nor GP Response, nor GP Commissioning Notification) upon reception of the GPD Commissioning command. AND/OR DUT-GPS does send GP Pairing upon reception of the GP Commissioning Notification command. AND/OR Sink Table of DUT-GPS has an entry for TH-GPD.
4) DUT-GPS does NOT send correctly formatted GP Pairing command for TH-GPD, with AddSink = 0b1, carrying the pairing information previously included in the GP Pairing Configuration command sent by the TH. AND/OR DUT-GPS does NOT have Sink Table entry for TH-GPD with the pairing information previously included in the GP Pairing Configuration command sent by the TH. AND/OR DUT-GPS does NOT execute the Data GPDF of TH-GPD.

4.4.7.2 IC-based joining

4.4.7.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	A.3.3.2.6	TH-ZC creates a centralized network. TH-ZC allows for joining with IC	
2		DUT-GPS joins the ZigBee network of TH-ZC, using an IC-based TCLK.	
3		Initially, DUT-GPS does NOT have any pairings, i.e. Sink Table of DUT-GPS is empty.	

4.4.7.2.2 Test Set-Up

DUT-GPS shall be in wireless communication proximity of the TH-GPD.

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A packet sniffer shall be observing the communication over the air interface.

4.4.7.2.3 Test procedure

Item	Doc. Ref.	Test step	Note
1	A.3.3.2.6	TH reads out the gpsSecurityLevel attribute of DUT-GPS.	
2	A.3.3.2.6, A.3.2.9	Trigger commissioning on the DUT-GPS (multi-hop commissioning, if supported by DUT-GPS). TH-GPD sends GPD Commissioning command with RxAfterTx = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH sends GP Commissioning Notification carrying GPD Commissioning command for TH-GPD with RxAfterTx = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH reads out the Sink Table of DUT-GPS.	
3	A.3.3.2.6, A.3.2.9	***If DUT-GPS supports reception of GP Sink Commissioning Mode commands:*** TH unicasts GP Sink Commissioning Mode command to DUT-GPS, with Action=Enter and Involve proxies = 0b1. TH-GPD sends GPD Commissioning command with RxAfterTx = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH sends GP Commissioning Notification carrying GPD Commissioning command for TH-GPD with RxAfterTx = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH reads out the Sink Table of DUT-GPS.	
4	A.3.3.2.6, A.3.5.2.4.1	TH unicasts to DUT-GPS a GP Pairing Configuration command for TH-GPD, with the sub-fields of the *Actions* field set to: *Action* = 0b001 and *Send GP Pairing* = 0b1, correctly formatted and with communication mode, security and application as supported by DUT-GPS. TH reads out the Sink Table of DUT-GPS. TH-GPD sends correctly formatted and protected Data GPDF.	

4.4.7.2.4 Expected outcome

Pass verdict:
1) DUT-GPS responds with Read Attribute Response with: • Status = SUCCESS; • Sub-fields of the attribute value field set to: ▪ *Minimal GPD Security Level* = 0b10 or 0b11; ▪ *Protection with gpLinkKey* = 0b1; ▪ *Involve TC* = 0b1.
2) – 3) DUT-GPS does NOT send GP Proxy Commissioning Mode with Action=Enter. DUT-GPS does NOT send GP Pairing (nor GP Response, nor GP Commissioning Notification) upon reception of the GPD Commissioning command. DUT-GPS does NOT send GP Pairing upon reception of the GP Commissioning Notification command. Sink Table of DUT-GPS is empty.

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4) DUT-GPS sends correctly formatted GP Pairing command for TH-GPD, with AddSink = 0b1, carrying the pairing information previously included in the GP Pairing Configuration command sent by the TH. DUT-GPS has Sink Table entry for TH-GPD with the pairing information previously included in the GP Pairing Configuration command sent by the TH. DUT-GPS executes the Data GPDF of TH-GPD.
Fail verdict:
1) DUT-GPS does NOT respond with Read Attribute Response with Status = SUCCESS AND/OR the sub-fields of the attribute value field are NOT set exactly as in pass verdict 1A above.
2) – 3) DUT-GPS does send GP Proxy Commissioning Mode with Action=Enter. AND/OR DUT-GPS does send GP Pairing (nor GP Response, nor GP Commissioning Notification) upon reception of the GPD Commissioning command. AND/OR DUT-GPS does send GP Pairing upon reception of the GP Commissioning Notification command. AND/OR Sink Table of DUT-GPS has an entry for TH-GPD.
4) DUT-GPS does NOT send correctly formatted GP Pairing command for TH-GPD, with AddSink = 0b1, carrying the pairing information previously included in the GP Pairing Configuration command sent by the TH. AND/OR DUT-GPS does NOT have Sink Table entry for TH-GPD with the pairing information previously included in the GP Pairing Configuration command sent by the TH. AND/OR DUT-GPS does NOT execute the Data GPDF of TH-GPD.

4.4.7.3 IC-based joining, Involve TC sub-field cleared

4.4.7.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	A.3.3.2.6	TH-ZC creates a centralized network. TH-ZC allows for joining with IC	
2		DUT-GPS joins the ZigBee network of TH-ZC, using an IC-based TCLK.	
3		Initially, DUT-GPS does NOT have any pairings, i.e. Sink Table of DUT-GPS is empty.	

4.4.7.3.2 Test Set-Up

DUT-GPS shall be in wireless communication proximity of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.4.7.3.3 Test procedure

Item	Doc. Ref.	Test step	Note
1A	A.3.3.2.6	TH reads out the gpsSecurityLevel attribute of DUT-GPS.	
1B	A.3.3.2.6	TH writes the value 0x06 or 0x07 to the gpsSecurityLevel attribute of DUT-GPS, depending on whether the DUT-GPS had the value 0x0E or 0x0F in step 1A. TH reads out the *gpsSecurityLevel* attribute of DUT-GPS.	
2A	A.3.3.2.6, A.3.2.9	Trigger commissioning on the DUT-GPS (multi-hop commissioning, if supported by DUT-GPS). TH-GPD sends GPD Commissioning command with *RxAfterTx* = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH reads out the Sink Table of DUT-GPS. TH-GPD sends correctly formatted and protected Data GPDF.	
2B		Clear Sink Table. Trigger commissioning on the DUT-GPS (multi-hop commissioning, if supported by DUT-GPS). TH sends GP Commissioning Notification carrying GPD	

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		Commissioning command for TH-GPD with *RxAfterTx* = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH reads out the Sink Table of DUT-GPS. TH sends GP Notification, carrying correctly formatted and protected Data GPDF of TH-GPD.	
3A	A.3.3.2.6, A.3.2.9	***If DUT-GPS supports reception of GP Sink Commissioning Mode commands:*** TH unicasts GP Sink Commissioning Mode command to DUT-GPS, with *Action*=Enter and *Involve proxies* = 0b1. TH-GPD sends GPD Commissioning command with *RxAfterTx* = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH reads out the Sink Table of DUT-GPS. TH-GPD sends correctly formatted and protected Data GPDF.	
3B	A.3.3.2.6, A.3.2.9	***If DUT-GPS supports reception of GP Sink Commissioning Mode commands:*** TH unicasts GP Sink Commissioning Mode command to DUT-GPS, with Action=Enter and Involve proxies = 0b1. TH sends GP Commissioning Notification carrying GPD Commissioning command for TH-GPD with *RxAfterTx* = 0b0, correctly formatted and with security and application matching that of DUT-GPS. TH reads out the Sink Table of DUT-GPS. TH sends GP Notification, carrying correctly formatted and protected Data GPDF of TH-GPD.	
4	A.3.3.2.6, A.3.5.2.4.1	TH unicasts to DUT-GPS a GP Pairing Configuration command for TH-GPD, with the sub-fields of the *Actions* field set to: *Action* = 0b001 and *Send GP Pairing* = 0b1, correctly formatted and with communication mode, security and application as supported by DUT-GPS. TH reads out the Sink Table of DUT-GPS. TH-GPD sends correctly formatted and protected Data GPDF.	

1256 ***4.4.7.3.4 Expected outcome***

Pass verdict:
1A) DUT-GPS responds with Read Attribute Response with: • Status = SUCCESS; • Sub-fields of the attribute value field set to: ▪ *Minimal GPD Security Level* = 0b10 or 0b11; ▪ *Protection with gpLinkKey* = 0b1; ▪ *Involve TC* = 0b1.
1B) DUT-GPS responds with Read Attribute Response with: • Status = SUCCESS; • Sub-fields of the attribute value field set to the value as written by the TH, i.e.: ▪ *Minimal GPD Security Level* = 0b10 or 0b11; ▪ *Protection with gpLinkKey* = 0b1; ▪ *Involve TC* = 0b0.

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2A) – 3B) DUT-GPS sends GP Proxy Commissioning Mode with Action=Enter. DUT-GPS sends GP Pairing upon reception of the GPD Commissioning command (direct or tunneled). DUT-GPS has Sink Table entry for TH-GPD. DUT-GPS executes the Data GPDF of TH-GPD (direct or tunneled).
4) DUT-GPS sends correctly formatted GP Pairing command for TH-GPD, with AddSink = 0b1, carrying the pairing information previously included in the GP Pairing Configuration command sent by the TH. DUT-GPS has Sink Table entry for TH-GPD with the pairing information previously included in the GP Pairing Configuration command sent by the TH. DUT-GPS executes the Data GPDF of TH-GPD.
Fail verdict:
1A) DUT-GPS does NOT respond with Read Attribute Response with Status = SUCCESS AND/OR the sub-fields of the attribute value field are NOT set exactly as in pass verdict 1A above.
1B) DUT-GPS does NOT respond with Read Attribute Response with Status = SUCCESS AND/OR the sub-fields of the attribute value field are NOT set exactly as in pass verdict 1B above.
2A) – 3B) DUT-GPS does NOT send GP Proxy Commissioning Mode with Action=Enter. AND/OR DUT-GPS does NOT send GP Pairing upon reception of the GPD Commissioning command (direct or tunneled). AND/OR DUT-GPS does NOT have Sink Table entry for TH-GPD. AND/OR DUT-GPS does NOT execute the Data GPDF of TH-GPD (direct or tunneled).
4) DUT-GPS does NOT send correctly formatted GP Pairing command for TH-GPD, with AddSink = 0b1, carrying the pairing information previously included in the GP Pairing Configuration command sent by the TH. AND/OR DUT-GPS does NOT have Sink Table entry for TH-GPD with the pairing information previously included in the GP Pairing Configuration command sent by the TH. AND/OR DUT-GPS does NOT execute the Data GPDF of TH-GPD.

4.4.7.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCCS7	Security Level attribute	Direct

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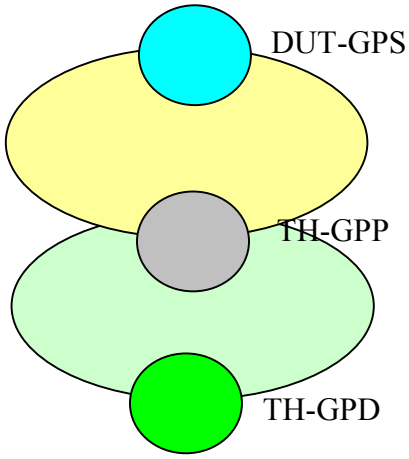
4.5 Other Green Power cluster functionality

4.5.1 Sink table maintenance

4.5.1.1 GPS receives tunneled GPD Decommissioning command

4.5.1.1.1 Initial conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT, GPT+ or GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific DUT-GPS shall support multi-hop commissioning.
TH-GPP/TH-Tool	PANId=same PANId as TH-GPS Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N If *ApplicationID* = 0b010: Endpoint = E and F; GPD security usage according to DUT capabilities. TH-GPD application functionality matches that of the DUT-GPS's GPEP.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPP operate in a ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.9	A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10.	

4.5.1.1.2 Test Set-Up

TH-GPP shall be in wireless communication proximity of the TH-GPD and of the DUT-GPS.

A packet sniffer shall be observing the communication over the air interface.

4.5.1.1.3 Test procedure

Item	Doc. Ref.	Test step	Note
2	[R3] A.4.2.1.3, A.3.5.2.5	TH-GPD uses *ApplicationID* = 0b000 and SrcID N; DUT-GPS has a pairing for this TH-GPD. Put the DUT-GPS in commissioning mode. Make the TH-GPD send a Decommissioning GPDF/make TH-GPP/TH-Tool send a GP Commissioning Notification for SrcID N, appropriately secured. Read out the Sink Table of DUT-GPS.	
3		**GPD Decommissioning command in GP Notification in operational mode:** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. Make TH-GPP send GP Notification for TH-GPD GPD ID, carrying GPD Decommissioning command, indicating appropriate GPD security. Read out the Sink Table of DUT-GPS.	
The tests below can only be perfomed if the GPD/GPP role is taken by a TH			

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4A		**Incorrectly protected GPD Decommissioning command:** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. Put the DUT-GPS in commissioning mode. Make TH-GPP send GP Commissioning Notification for TH-GPD GPD ID, carrying GPD Decommissioning command, indicating usage of wrong GPD security level (lower than required). Read out the Sink Table of DUT-GPS.	
4B		**Incorrectly protected GPD Decommissioning command:** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. Put the DUT-GPS in commissioning mode. Make TH-GPP send GP Commissioning Notification for TH-GPD GPD ID, carrying GPD Decommissioning command, indicating usage of wrong GPD security key type. Read out the Sink Table of DUT-GPS.	
4C		**Incorrectly protected GPD Decommissioning command:** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. Put the DUT-GPS in commissioning mode. Make TH-GPP send GP Commissioning Notification for TH-GPD GPD ID, carrying GPD Decommissioning command, indicating lower than required security frame counter. Read out the Sink Table of DUT-GPS.	
5		***ApplicationID* = 0b010. decommissioning specific endpoint:** Clean Sink Table. TH-GPD uses *ApplicationID* = 0b010 and GPD IEEE address N, Endpoint E; DUT-GPS has a pairing for this TH-GPD. DUT-GPS has a pairing for TH-GPD, GPD IEEE address N, Endpoint F. Put the DUT-GPS in commissioning mode. Make the TH-GPD send a Decommissioning GPDF/make TH-GPP/TH-Tool send a GP Commissioning Notification with *ApplicationID* = 0b010, *GPD IEEE address* = E, appropriately secured. Read out the Sink Table of DUT-GPS.	
6		***ApplicationID* = 0b010. DUT-GPS having multiple Sink Table entries for GPD ID, decommissioning endpoint 0xff:** Clean Sink Table. TH-GPD uses *ApplicationID* = 0b010 and GPD IEEE address N, Endpoint E; DUT-GPS has a pairing for this TH-GPD. DUT-GPS has a pairing for TH-GPD, GPD IEEE address N, Endpoint F. Put the DUT-GPS in commissioning mode. Make the TH-GPD send a Decommissioning GPDF/make TH-GPP/TH-Tool send a GP Commissioning Notification with *ApplicationID* = 0b010, *GPD IEEE address* = N, *Endpoint* = 0xff, appropriately secured. Read out the Sink Table of DUT-GPS.	
7		***ApplicationID* = 0b010. decommissioning non-matching specific endpoint:** TH-GPD uses *ApplicationID* = 0b010 and *GPD IEEE address* N, *Endpoint* E; DUT-GPS has a pairing for this TH-GPD. Put the DUT-GPS in commissioning mode. Make the TH-GPD send a Decommissioning GPDF/make TH-GPP/TH-	

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		Tool send a GP Commissioning Notification with ApplicationID = 0b010, GPD IEEE address N, Endpoint X not supported by the DUT-GPS, appropriately secured. Read out the Sink Table of DUT-GPS.	

1269 ***4.5.1.1.4 Expected outcome***

Pass verdict:
2) When put in commissioning mode, the DUT-GPS sends GP Proxy Commissioning Mode (*Action*=Enter) with *Channel present* sub-field set to 0b0. After reception of the GP Commissioning Notification carrying GPD Decommissioning command, the DUT-GPS sends a GP Pairing command with GPD SrcID field having value N, *AddSink* sub-field set to 0b0 and the *Remove GPD* sub-field of the Options field set to 0b1. The Sink Table of the DUT-GPS does NOT have any entry for SrcID N.
3) DUT-GPS does NOT open commissioning mode nor does send GP Proxy Commissioning Mode (*Action*=Enter) command. DUT-GPS broadcasts GP Pairing command with *AddSink* = 0b0 and *RemoveGPD* = 0b1. DUT-GPS does NOT have Sink Table entry for TH-GPD. DUT-GPS MAY make a product-specific indication of the performed decommissioning.
4A) - 4C) DUT-GPS does NOT send GP Pairing with AddSink = 0b0 and/or with RemoveGPD = 0b1. DUT-GPS still has Sink Table entry for TH-GPD.
5) After reception of the GP Commissioning Notification carrying GPD Decommissioning command, the DUT-GPS sends a GP Pairing command with GPD IEEE address field having value N, Endpoint field having value E, *AddSink* sub-field set to 0b0 and the *Remove GPD* sub-field of the Options field set to 0b1. DUT-GPS does NOT send a GP Pairing for GPD IEEE address field having value N, Endpoint F. The Sink Table of the DUT-GPS does NOT have any entry for GPD IEEE address N, endpoint E. The Sink Table of the DUT-GPS does have an entry for GPD IEEE address N, endpoint F.
6) After reception of the GP Commissioning Notification carrying GPD Decommissioning command, the DUT-GPS sends a GP Pairing command with GPD IEEE address field having value N, Endpoint field having value 0xff, *AddSink* sub-field set to 0b0 and the *Remove GPD* sub-field of the Options field set to 0b1. The Sink Table of the DUT-GPS does NOT have any entry for GPD IEEE address N.
7) DUT-GPS does NOT send a GP Pairing for GPD IEEE address field having value N, Endpoint Z. The Sink Table of the DUT-GPS does have an entry for GPD IEEE address N, endpoint E.
Fail verdict:
2) DUT-GPS does NOT remove the Sink Table entry for the TH-GPD (SrcID N). AND/OR DUT-GPS does NOT send GP Pairing command with *AddSink*=0b0, *RemoveGPD* = 0b1 for SrcID=N.
3) DUT-GPS does open commissioning mode AND/OR does send GP Proxy Commissioning Mode (*Action*=Enter) command. AND/OR DUT-GPS does NOT send GP Pairing command with *AddSink* = 0b0 and *RemoveGPD* = 0b1. AND/OR DUT-GPS does NOT remove Sink Table entry for TH-GPD.
4A) - 4C) DUT-GPS does send GP Pairing with AddSink = 0b0 and/or with RemoveGPD = 0b1. AND/OR DUT-GPS removes Sink Table entry for TH-GPD.
5) DUT-GPS does NOT remove the Sink Table entry for the TH-GPD IEEE address N, endpoint E. AND/OR DUT-GPS does remove the Sink Table entry for the TH-GPD IEEE address N, endpoint F. AND/OR DUT-GPS does NOT send GP Pairing command with *AddSink*=0b0, *RemoveGPD* = 0b1 for IEEE address N, endpoint E. AND/OR DUT-GPS does send GP Pairing command with *AddSink*=0b0, *RemoveGPD* = 0b1 for IEEE address N, endpoint F.
6) DUT-GPS has any Sink Table entry for GPD IEEE address = N. AND/OR DUT-GPS does NOT send GP Pairing command with *AddSink*=0b0, *RemoveGPD* = 0b1 for IEEE address N, endpoint 0xff.
7) DUT-GPS sends a GP Pairing for GPD IEEE address field having value N, Endpoint Z. AND/OR The Sink Table of the DUT-GPS does NOT have an entry for GPD IEEE address N, endpoint E.

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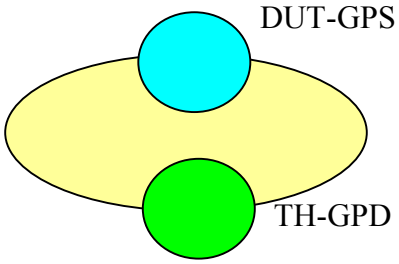
4.5.1.1.5 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF10	Rx Decommissioning GPDF	Direct
GPPCS107	Reception of GP Commissioning Notification	Direct
GPPCS153	Generation of GP Pairing Command with Remove GPD subfield set to 0b1	Direct

4.5.1.2 GPS directly receives Decommissioning GPDF (DUT: GPT+/GPC)

4.5.1.2.1 Initial conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT+ or GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD/TH-Tool	GPD ID = N GPD security usage according to DUT capabilities. TH-GPD application functionality matches that of the DUT-GPS's GPEP.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or may start as ZC.	
2	[R3] A.3.9	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures) with the communication mode as required by the DUT-GPS.	

4.5.1.2.2 Test set-up

The DUT-GPS shall be in wireless communication proximity of TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.5.1.2.3 Test procedure

Item	Doc. Ref.	Test step	Note
2	[R3] A.4.2.1.3, A.3.5.2.5	Put the DUT-GPS in commissioning mode. Make the TH-GPD send a Decommissioning GPDF, appropriately secured. Read out the Sink Table of DUT-GPS.	
3		**GPD Decommissioning command in in operational mode:** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. DUT-GPS is in operational mode. Make TH-GPD send GPD Decommissioning command, using appropriate GPD security. Read out Sink Table of the DUT-GPS.	
Test steps below are only to be executed when the GPD role is performed by a TH			
4A		**Incorrectly protected GPD Decommissioning command:** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. Put the DUT-GPS in commissioning mode. Make TH-GPD send GP GPD Decommissioning command, using of wrong GPD security level (lower than required).	

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4B		**Incorrectly protected GPD Decommissioning command:** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. Put the DUT-GPS in commissioning mode. Make TH-GPD send GPD Decommissioning command, using of wrong GPD security key type.	
4C		**Incorrectly protected GPD Decommissioning command:** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. Put the DUT-GPS in commissioning mode. Make TH-GPD send GPD Decommissioning command, using lower than required security frame counter.	
4D		**Incorrectly protected GPD Decommissioning command:** A pairing exists between DUT-GPS and TH-GPD; if supported by DUT-GPS, it should preferably use SecurityLevel >= 0b10. Put the DUT-GPS in commissioning mode. Make TH-GPD send GPD Decommissioning command, wrong security key (MIC check fails).	
5		***ApplicationID* = 0b010. decommissioning specific endpoint:** Clean Sink Table. TH-GPD uses *ApplicationID* = 0b010 and GPD IEEE address N, Endpoint E; DUT-GPS has a pairing for this TH-GPD. DUT-GPS has a pairing for TH-GPD, GPD IEEE address N, Endpoint F. Put the DUT-GPS in commissioning mode. Make the TH-GPD send a Decommissioning GPDF with ApplicationID = 0b010, GPD IEEE address = E, appropriately secured. Read out the Sink Table of DUT-GPS.	
6		***ApplicationID* = 0b010. DUT-GPS having multiple Sink Table entries for GPD ID, decommissioning endpoint 0xff:** Clean Sink Table. TH-GPD uses *ApplicationID* = 0b010 and GPD IEEE address N, Endpoint E; DUT-GPS has a pairing for this TH-GPD. DUT-GPS has a pairing for TH-GPD, GPD IEEE address N, Endpoint F. Put the DUT-GPS in commissioning mode. Make the TH-GPD send a Decommissioning GPDF with ApplicationID = 0b010, GPD IEEE address = N, Endpoint = 0xff, appropriately secured. Read out the Sink Table of DUT-GPS.	
7		***ApplicationID* = 0b010. decommissioning non-matching specific endpoint:** TH-GPD uses *ApplicationID* = 0b010 and GPD IEEE address N, Endpoint E; DUT-GPS has a pairing for this TH-GPD. Put the DUT-GPS in commissioning mode. Make the TH-GPD send a Decommissioning GPDF with ApplicationID = 0b010, GPD IEEE address N, Endpoint X not supported by the DUT-GPS, appropriately secured. Read out the Sink Table of DUT-GPS.	

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1280 ***4.5.1.2.4 Expected outcome***

Pass verdict:
2) When put in commissioning mode, the DUT-GPS may send GP Proxy Commissioning Mode (*Action*=Enter) and *Channel present* sub-field set to 0b0. After reception of the Decommissioning GPDF, the DUT-GPS sends a GP Pairing command with GPD ID field having value N, *AddSink* sub-field set to 0b0 and the *RemoveGPD* sub-field of the *Options* field set to 0b1. The Sink Table of the DUT-GPS does NOT have any entry for GPD ID N.
3) DUT-GPS does NOT open commissioning mode nor does send GP Proxy Commissioning Mode (*Action*=Enter) command. DUT-GPS broadcasts GP Pairing command with *AddSink* = 0b0 and *RemoveGPD* = 0b1. DUT-GPS does NOT have Sink Table entry for TH-GPD. DUT-GPS MAY make a product-specific indication of the performed decommissioning.
4A) – 4D) DUT-GPS does NOT send GP Pairing command with the sub-fields of the Options field set to: *AddSink* = 0b0 and/or *Remove GPD* = 0b0. DUT-GPS still has Sink Table entry for TH-GPD.
5) After reception of the GPD Decommissioning command, the DUT-GPS sends a GP Pairing command with GPD IEEE address N, Endpoint field having value E, *AddSink* sub-field set to 0b0 and the *Remove GPD* sub-field of the Options field set to 0b0. DUT-GPS does NOT send any Pairing for GPD IEEE address N, Endpoint F. The Sink Table of the DUT-GPS does NOT have any entry for GPD IEEE address N, Endpoint E. The Sink Table of the DUT-GPS does have any entry for GPD IEEE address N, Endpoint F.
6) After reception of the GPD Decommissioning command, the DUT-GPS sends a GP Pairing command with GPD IEEE address field having value N, Endpoint field having value 0xff, *AddSink* sub-field set to 0b0 and the *Remove GPD* sub-field of the Options field set to 0b1. The Sink Table of the DUT-GPS does NOT have any entry for GPD IEEE address N.
7) DUT-GPS does NOT send a GP Pairing for GPD IEEE address field having value N, Endpoint Z. The Sink Table of the DUT-GPS does have an entry for GPD IEEE address N, endpoint E.
Fail verdict:
2) DUT-GPS does NOT remove the Sink Table entry for the TH-GPD (GPD ID N). AND/OR DUT-GPS does NOT send GP Pairing command with *AddSink*=0b0, *RemoveGPD* = 0b1 for GPD ID=N.
3) DUT-GPS does open commissioning mode AND/OR does send GP Proxy Commissioning Mode (*Action*=Enter) command. AND/OR DUT-GPS does NOT send GP Pairing command with *AddSink* = 0b0 and *RemoveGPD* = 0b1. AND/OR DUT-GPS does NOT remove Sink Table entry for TH-GPD.
4A) – 4D) DUT-GPS does send GP Pairing with AddSink = 0b0 and/or with RemoveGPD = 0b1. AND/OR DUT-GPS removes Sink Table entry for TH-GPD.
5) DUT-GPS does NOT remove the Sink Table entry for the TH-GPD IEEE address N, endpoint E. AND/OR DUT-GPS does remove the Sink Table entry for the TH-GPD IEEE address N, endpoint F. AND/OR DUT-GPS does NOT send GP Pairing command with *AddSink*=0b0, *RemoveGPD* = 0b1 for IEEE address N, endpoint E. AND/OR DUT-GPS does send GP Pairing command with *AddSink*=0b0, *RemoveGPD* = 0b1 for IEEE address N, endpoint F.
6) DUT-GPS has any Sink Table entry for GPD IEEE address = N. AND/OR DUT-GPS does NOT send GP Pairing command with *AddSink*=0b0, *RemoveGPD* = 0b1 for IEEE address N, endpoint 0xff.
7) DUT-GPS sends a GP Pairing for GPD IEEE address field having value N, Endpoint Z. AND/OR The Sink Table of the DUT-GPS does NOT have an entry for GPD IEEE address N, endpoint E.

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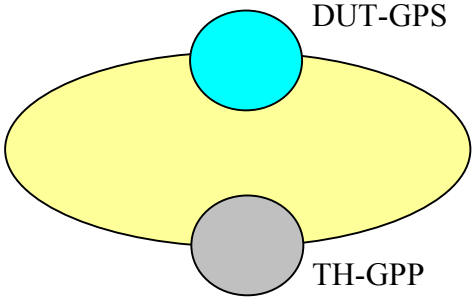
4.5.1.2.5 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF10	Rx Decommissioning GPDF	Direct
GPPCS153	Generation of GP Pairing Command with Remove GPD subfield set to 0b1	Direct

4.5.2 Device_annce reception

4.5.2.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT/GPT+/GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) IEEE address=manufacturer-specific Short address = 0xWXYZ. Noted with sniffer.
TH-GPP/TH-Tool	PANId=same PANID as DUT-GPS Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7, but must be restarted in the case it is equal to the alias address) IEEE address=manufacturer-specific

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	

4.5.2.1.2 Test Set-Up

The DUT-GPS shall be in wireless communication proximity of TH-GPP; and the TH-GPP shall be in wireless communication proximity of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.5.2.2 Device_annce for non-all-F address conflicts with derived alias

4.5.2.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.5.2.1.1	
2	[R3] A.3.9, A.3.3.2.2	TH-GPS has a pairing with derived alias.	

4.5.2.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	Send from TH-Tool Device_annce for the derived alias of 0xWXYZ (not equal to any of the reserved short addresses) and IEEE not equal to 0xFFFFFFFFFFFFFFFF.	

4.5.2.2.3 Expected Outcome

Pass verdict:
1) On reception of Device_annce with the short address 0xWXYZ and IEEE address not equal to 0xFFFFFFFFFFFFFFFF, DUT-GPS sends Device_annce with the short address equal to 0xWXYZ and IEEE 0xFFFFFFFFFFFFFFFF, using NWK SrcAddr 0xWXYZ and NWK sequence counter 0x00.
Fail verdict:
1) The DUT-GPS does not send a Device_annce command, formatted as specified in 4.5.2.2.3/item 1 above. AND/OR DUT-GPS changes the alias.

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1295 ***4.5.2.2.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPC5	Conflict checking on Device_annce reception	Direct
GPPC6	Tx of Device_annce for the alias upon alias conflict detection	Direct

1296 ### 4.5.2.3 Device_annce for non-all-F address conflicts with assigned alias

1297 ***4.5.2.3.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.5.2.1.1	
2	[R3] A.3.9, A.3.3.2.2	TH-GPS has a pairing with assigned alias.	

1298 ***4.5.2.3.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	Send from TH-Tool Device_annce for the assigned alias of 0xWXYZ (not equal to any of the reserved short addresses) and IEEE not equal to 0xFFFFFFFFFFFFFFFF.	

1299 ***4.5.2.3.3 Expected Outcome***

Pass verdict:
1) On reception of Device_annce with the short address 0xWXYZ and IEEE address not equal to 0xFFFFFFFFFFFFFFFF, DUT-GPS sends commandDevice_annce with the short address equal to 0xWXYZ and IEEE 0xFFFFFFFFFFFFFFFF, using NWK SrcAddr 0xWXYZ and NWK sequence counter 0x00.
Fail verdict:
1) The DUT-GPS does not send a Device_annce formatted as specified in 4.5.2.2.3/item 1 above. AND/OR DUT-GPS changes the alias.

1300 ***4.5.2.3.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPC5	Conflict checking on Device_annce reception	Direct
GPPC6	Tx of Device_annce for the alias upon alias conflict detection	Direct

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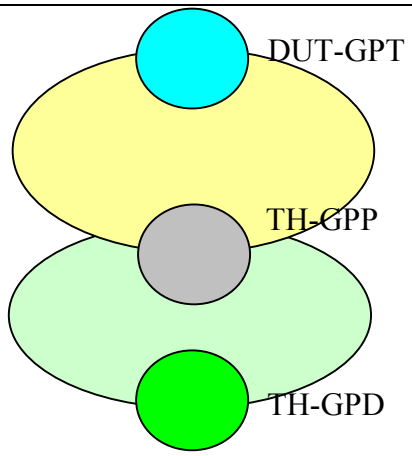
4.5.3 NOT TESTED: Advanced GP only: GPS receives Notification in broadcast or a Pairing Search

4.5.3.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPT	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific TH-GPT's GPEP supports the application functionality of the TH-GPD (see Section A.4.3 of [R3]).
TH-GPP	PANId=same PANId as DUT-GPT Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH -GPD	GPD ID = N TH-GPD supports the application functionality of the TH-GPT (see Section A.4.3 of [R3]).

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPT and TH-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.9	A groupcast pairing is established between TH-GPD and TH-GPT, using the derived group ID (e.g. as a result of any of the commissioning procedures from Section A.3.9 of [R3]).	

4.5.3.2 Test Set-Up

TH-GPP can generate arbitrary *GP Notification* and *GP Pairing Search* commands.

A packet sniffer shall be observing the communication over the air interface.

4.5.3.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	Make TH-GPP send a GP Notification command for GPD ID N in broadcast	
2		Make TH-GPP send a GP Pairing Search command for GPD ID N in broadcast with the *RequestDerivedGroupcastSinks* sub-field of the Options field having value 0b0.	
3		Make TH-GPP send a GP Pairing Search command for GPD ID N in broadcast with the *RequestDerivedGroupcastSinks* sub-field of the Options field having value 0b1.	

4.5.3.4 Expected outcome

Pass verdict:
1) DUT-GPT executes the sent command, and broadcasts a *GP Pairing command* with GPD ID value N, for which the *Add Sink*, *Remove GPD* and *Communications mode* sub-fields of the *Options* field have values 0b1, 0b0, and 0b01, respectively.
2) DUT-GPT does not broadcast a *GP Pairing* command with GPD ID value N.
3) DUT-GPT broadcasts a *GP Pairing* command with GPD ID value N, for which the *Add Sink*, *Remove GPD* and *Communications mode* sub-fields of the *Options* field have values 0b1, 0b0, and 0b01, respectively.
Fail verdict:
1) DUT-GPT does not execute the sent command, and/or does not broadcast a *GP Pairing command* with GPD ID value N, for which the *Add Sink*, *Remove GPD* and *Communication mode* sub-fields have values 0b1, 0b0 and 0b01, respectively.

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2) DUT-GPT broadcasts a *GP Pairing* command with GPD ID value N.
3) DUT-GPT does not broadcast a *GP Pairing* command with GPD ID value N for which the *Add Sink*, *Remove GPD* and *Communication mode* sub-fields have values 0b1, 0b0 and 0b01, respectively.

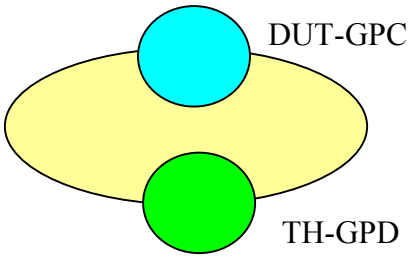
4.5.3.5 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCS104	Reception of GP Notification in broadcast	Direct
GPPCS105	Reception of GP Pairing Search	Direct

4.5.4 NOT TESTED: GPC internal table maintenance (groupcast)

4.5.4.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT- GPC	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N TH-GPD application functionality matches that of the DUT-GPS's GPEP.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or may start as ZC.	
2	[R3] A.3.9, A.3.3.2.2, A.3.4.2.2	A derived/pre-commissioned groupcast pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures). The pairing is also stored in the Proxy Table of the DUT-GPC (e.g. as a result of any of the commissioning procedures).	

4.5.4.1.2 Test Set-Up

The DUT-GPS shall be in wireless communication proximity of TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.5.4.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.6	***Conditional on DUT-GPC supporting Proxy Table Maintenance feature:*** Switch DUT-GPC off. Switch DUT-GPC on. After gppDiscoveryDuration (10s), make TH-GPD send Data GPDF. After gppDiscoveryDuration (10s), make TH-GPD send second Data GPDF.	
2A	[R3] A.3.5.2.4	***Conditional on DUT-GPC supporting pre-commissioned groupcast: Proxy Table creation in a combo:*** Clear Proxy Table and Sink Table of the DUT-GPC. Set *gpsCommunicationMode* attribute to 0b10 (pre-commissioned groupcast). Make sure a GP-controllable application endpoint of the DUT-GPC is a member of a group. Enable commissioning on the DUT-GPC. Make TH-GPD send correct Commissioning GPDF. After DUT-GPC sends GP Pairing command with *AddSink* = 0b1, read out Sink Table and Proxy Table of the DUT-GPC.	

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4.5.4.1.4 Expected Outcome

Pass verdict:
1) After being switched on, DUT-GPC may send no GP command. OR DUT-GPC may send GP Pairing Search command. Then, DUT-GPC shall respond with GP Pairing. OR DUT-GPC may send GP Pairing. OR DUT-GPC may send, upon reception of the first Data GPDF, a GP Pairing Search or a broadcast GP Notification command. Then, DUT-GPC shall respond with GP Pairing. After reception of second Data GPDF, DUT-GPC does forward GP Notification in the appropriate groupcast mode. DUT-GPS does not send GP Pairing Search or broadcast GP Notification.
2) The sink side of the DUT-GPC has Sink Table entry for the TH-GPD, correctly formatted The proxy side of the DUT-GPC has Proxy Table entry for the TH-GPD, correctly formatted.
Fail verdict:
1) After being switched on, DUT-GPC does NOT send GP Pairing in response to GP Pairing Search/GP Notification sent by itself (if sent). AND/OR After reception of the second Data GPDF, DUT-GPC does NOT forward GP Notification in the appropriate groupcast. OR After reception of the second Data GPDF, DUT-GPC does send broadcast GP Notification and/or GP Pairing Search.
2) The sink side of the DUT-GPC does NOT have Sink Table entry for the TH-GPD, correctly formatted. AND/OR The proxy side of the DUT-GPC does NOT have Proxy Table entry for the TH-GPD, correctly formatted.

4.5.4.1.5 PICS covered

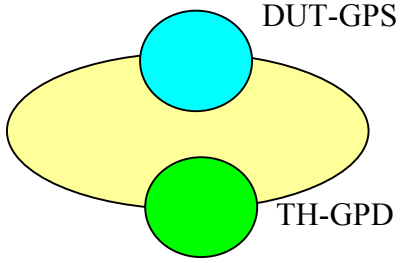
PICS reference	Functionality	Tested (Direct/Indirect)
GPPSC201	Persistent storage of Sink Table	Direct

4.6 NOT TESTED: Advanced GP only: Bidirectional operation

4.6.1 NOT TESTED: GPS in range of GPD

4.6.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT+ or GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = Z *Auto-commissioning* shall be clear. Must include *Extended NWK Frame control* field. RxOnCapability shall be set to 0b1. MAC Sequence Number is incremental. GPD security usage according to DUT capabilities. TH-GPD application functionality matches that of the DUT-GPS's GPEP.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS operates in a ZigBee PAN. It may join a ZigBee network created by another device, or may start as ZC.	
2	[R3] A.3.9	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures). The pairing has to be created with the *RxOnCapability* of the TH-GPD set to 0b1.	

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4.6.1.1.2 Test Set-Up

The DUT-GPS shall be in wireless communication proximity of TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

4.6.1.2 NOT TESTED: Basic tests - subcase: no security, ApplicationID = 0b000

4.6.1.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.6.1.	
2	[R3] A.3.9	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with *ApplicationID*=0b000 and the security level = 0b00. The pairing has to be created with the *RxOnCapability* of the TH-GPD set to 0b1. *MACsequenceNumberCapability* = 0b1, the initial value of the frame counter in the Sink Table is N-1.	
3	[R3] A.3.3.2.7, A.4.2.1.5, A.3.6.1.5	DUT-GPS supports bidirectional operation; TH-GPD implements the bidirectional GPD command as supported by DUT-GPS. If DUT-GPS supports multiple bidirectional commands, select one which results in observable reaction of the GPD (e.g. response, attribute change, local reaction, etc.)	
4		DUT-GPS has a GPD command pending in its gpTxQueue for TH-GPD GPD ID Z.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior. DUT-GPS may need to choose new TempMaster (itself).

4.6.1.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.5.2.5, A.4.2.1.5, A.3.6.1.5	**Negative test: RxAfterTx=0b0:** TH-GPD sends an unprotected Data GPDF, with MAC sequence number equal to N, *RxAfterTx* set to 0b0.	
1B		**Negative test: RxAfterTx field not present**: TH-GPD sends an unprotected Data GPDF with *Extended NWK Frame Control* field NOT present.	
1C		**Negative test: old MAC sequence number**: TH-GPD sends an unprotected Data GPDF with *RxAfterTx* = 0b1, and MAC sequence number = N-1.	
1D		**Negative test: protected frame**: TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, and SecurityLevel != 0b00, and the frame correctly protected with DUT-GPS's shared key.	
1E		**Negative test: wrong SrcID:** TH-GPD sends an unprotected Data GPDF with *RxAfterTx*=0b1 and with SrcID != Z.	
2		TH-GPD sends an unprotected Data GPDF with *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset*. After DUT-GPS sends the queued GPDF, check the GPD command execution by the GPD (this action is dependent on the queued GPDF and may e.g. require inspection of the GPD by the tester or sending another GPDF).	

4.6.1.2.3 Expected Outcome

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Pass verdict:
1A) – 1E) DUT-GPS does NOT execute the GPD command from the Data GPDF sent by TH-GPD. DUT-GPS does NOT transmit the queued GPDF.
2) DUT-GPS executes the GPD command from the Data GPDF. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one copy of the queued GPDF with: • MAC header: ▪ sequence number having any value; ▪ *Destination address* field carrying 0xffff; • *NWK Frame Control* sub-fields: *Frame type* = 0b00, ZigBee *Protocol Version*=0x3, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • *Extended NWK Frame Control* sub-fields: ▪ *ApplicationID* = 0b000; ▪ *SecurityLevel* = 0b00; ▪ SecurityKey = 0b0; ▪ *RxAfterTx* = 0b0, ▪ *Direction* = 0b1. • *SrcID* field present and set to TH-GPD's SrcID Z; • *Endpoint* field absent; • *SecurityFrameCounter* and *MIC* fields not present; • *GPD CommandID* field is present and carrying the a GPD CommandID from the 0xf0-0xff range in the clear; • *GPD Command payload* length and content corresponding to the GPD CommandID, in the clear. The transmission SHALL NOT exceed *gpTxDuration*. TH-GPD executes the received GPD command.
Fail verdict:
1A) – 1E) DUT-GPS does not execute the GPD command from the Data GPDF. AND/OR DUT-GPS does transmit the queued GPD command.
2) DUT-GPS does not send at least one GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR The transmission by DUT-GPS exceeds *gpTxDuration*. AND/OR DUT-GPS does not send the GPDF, formatted exactly as in 4.6.1.8.3/item 2 above. AND/OR TH-GPD does not execute the received GPD command.

4.6.1.2.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF7	Proximity bidirectional communication	Direct
GPF8	GPDF security level = 0b00	Direct

4.6.1.3 NOT TESTED: Basic tests - subcase: gpdSecurityLevel = 0b10, ApplicationID = 0b000

4.6.1.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.6.1.	
2	[R3] A.3.9	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with *ApplicationID*=0b000 and the gpdSecurityLevel = 0b10. The pairing has to be created with the *RxOnCapability* of the TH-GPD set to 0b1. The initial value of the frame counter in the Sink Table is N-1.	
3	[R3] A.3.3.2.7, A.4.2.1.5, A.3.6.1.5	DUT-GPS supports bidirectional operation; TH-GPD implements the bidirectional GPD command as supported by DUT-GPS. If DUT-GPS supports multiple bidirectional commands, select one which results in observable reaction of the GPD (e.g. response, attribute change, local reaction, etc.)	

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4		DUT-GPS has a GPD command pending for TH-GPD GPD ID Z.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior. DUT-GPS may need to choose new TempMaster (itself).

4.6.1.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.5.2.5, A.4.2.1.5, A.3.6.1.5	***Negative test: RxAfterTx=0b0:*** TH-GPD sends a Data GPDF with security level, key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, but with *RxAfterTx* set to 0b0.	
1B		***Negative test: MIC failure:*** TH-GPD sends a Data GPDF with security level, key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, with *RxAfterTx* set to 0b1, but with incorrect MIC.	
1C		***Negative test: unprotected frame:*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, but unprotected.	
1D		***Negative test: wrong security level:*** TH-GPD sends a Data GPDF with key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, with *RxAfterTx* set to 0b1, but with security level set to 0b11.	
1E		***Negative test: wrong key type:*** TH-GPD sends a Data GPDF with security level, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, with *RxAfterTx* set to 0b1, but with incorrect key type.	
1F		***Negative test: old frame counter:*** TH-GPD sends a Data GPDF with security level, key type and key as in the established pairing, *RxAfterTx* set to 0b1, but *SecurityFrameCounter* = N-1 and matching MIC value.	
1G		***Negative test: wrong GPD ID:*** TH-GPD sends a Data GPDF with *RxAfterTx*=0b1, correctly protected, but with GPD ID != Z.	
2		TH-GPD sends a correctly protected Data GPDF with *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset*. After DUT-GPS sends the queued GPDF, check the GPD command execution by the GPD (this action is dependent on the queued GPDF and may e.g. require inspection of the GPD by the tester or sending another GPDF).	

4.6.1.3.3 Expected Outcome

Pass verdict:
1A) – 1G) DUT-GPS does NOT execute the GPD command from the Data GPDF. DUT-GPS does NOT transmit the queued GPDF.
2) DUT-GPS executes the GPD command from the Data GPDF. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one copy of the queued GPDF with: • MAC header: ▪ sequence number having any value; ▪ *Destination address* field set to 0xffff; • *NWK Frame Control* sub-fields: *Frame type* = 0b00, ZigBee *Protocol Version*=0x3, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • *Extended NWK Frame Control* sub-fields:

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▪ *ApplicationID* of the TH GPD, i.e. either 0b000 or 0b010; ▪ *SecurityLevel* = 0b10, ▪ SecurityKey – as in the established pairing: – 0b0 in case of a shared key; – 0b1 in case of an individual key; ▪ *RxAfterTx* = 0b0, ▪ *Direction* = 0b1. • *SrcID* field present and set to TH-GPD's SrcID Z; • *Endpoint* field absent • the *SecurityFrameCounter* field of 4B is present and carries the value N; • the *MIC* field of 4B is present and correctly calculated; • *GPD CommandID* field is present and carrying the a GPD CommandID from the 0xf0-0xff range in the clear; • *GPD Command payload* length and content corresponding to the GPD CommandID, in the clear. The transmission SHALL NOT exceed *gpTxDuration*. TH-GPD executes the received GPD command.
Fail verdict:
1A) – 1G) DUT-GPS does not execute the GPD command from the Data GPDF. AND/OR DUT-GPS does transmit the queued GPD command.
2) DUT-GPS does not send at least one GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR The transmission by DUT-GPS exceeds *gpTxDuration*. AND/OR DUT-GPS does not send the GPDF, formatted exactly as in 4.6.1.3.3/item 2 above. AND/OR TH-GPD does not execute the received GPD command.

4.6.1.3.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF7	Proximity bidirectional communication	Direct
GPF6	GPDF security level = 0b10	Direct

4.6.1.4 NOT TESTED: Basic tests - subcase: gpdSecurityLevel = 0b11, ApplicationID = 0b000

4.6.1.4.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.6.1.	
2	[R3] A.3.9	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with *ApplicationID*=0b000 and the security level = 0b11. The pairing has to be created with the *RxOnCapability* of the TH-GPD set to 0b1. The initial value of the frame counter in the Sink Table is N-1.	
3	[R3] A.3.3.2.7, A.4.2.1.5, A.3.6.1.5	DUT-GPS supports bidirectional operation; TH-GPD implements the bidirectional GPD command as supported by DUT-GPS. If DUT-GPS supports multiple bidirectional commands, select one which results in observable reaction of the GPD (e.g. response, attribute change, local reaction, etc.)	
4		DUT-GPS has a GPD command pending for TH-GPD GPD ID Z.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior. DUT-GPS may need to choose new TempMaster (itself).

1345 ***4.6.1.4.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.5.2.5, A.4.2.1.5, A.3.6.1.5	**Negative test: RxAfterTx=0b0:** TH-GPD sends a Data GPDF with security level, key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, but with *RxAfterTx* set to 0b0.	
1B		**Negative test: MIC failure**: TH-GPD sends a Data GPDF with security level, key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, with *RxAfterTx* set to 0b1, but with incorrect MIC.	
1C		**Negative test: unprotected frame**: TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, but unprotected.	
1D		**Negative test: wrong security level**: TH-GPD sends a Data GPDF with key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, with *RxAfterTx* set to 0b1, but with security level set to 0b10.	
1E		**Negative test: wrong key type**: TH-GPD sends a Data GPDF with security level, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, with *RxAfterTx* set to 0b1, but with incorrect key type.	
1F		**Negative test: old frame counter**: TH-GPD sends a Data GPDF with security level, key type and key as in the established pairing, *RxAfterTx* set to 0b1, but *SecurityFrameCounter* = N-1 and matching MIC value.	
1G		**Negative test: wrong GPD ID:** TH-GPD sends a Data GPDF with *RxAfterTx*=0b1, correctly protected, but with GPD ID != Z.	
2E		TH-GPD sends a correctly protected Data GPDF with *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset*. After DUT-GPS sends the queued GPDF, check the GPD command execution by the GPD (this action is dependent on the queued GPDF and may e.g. require inspection of the GPD by the tester or sending another GPDF).	

1346 ***4.6.1.4.3 Expected Outcome***

Pass verdict:
1A) – 1G) DUT-GPS does NOT execute the GPD command from the Data GPDF. DUT-GPS does NOT transmit the queued GPDF.
2) DUT-GPS executes the GPD command from the Data GPDF. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one copy of the queued GPDF with: • MAC header: ▪ sequence number having any value; ▪ *Destination address* field set to 0xffff; • *NWK Frame Control* sub-fields: *Frame type* = 0b00, ZigBee *Protocol Version*=0x3, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • *Extended NWK Frame Control* sub-fields: ▪ *ApplicationID* of the TH GPD, i.e. either 0b000 or 0b010; ▪ *SecurityLevel* = 0b11, ▪ SecurityKey – as in the established pairing: – 0b0 in case of a shared key; – 0b1 in case of an individual key; ▪ *RxAfterTx* = 0b0, ▪ *Direction* = 0b1.

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• *SrcID* field present and set to TH-GPD's SrcID Z; • *Endpoint* field absent • the *SecurityFrameCounter* field of 4B is present and carries the value N; • the *MIC* field of 4B is present and correctly calculated. • *GPD CommandID* field is present and carrying the encrypted GPD CommandID from the 0xf0-0xff range; • *GPD Command payload* length and content corresponding to the GPD CommandID, encrypted. The transmission SHALL NOT exceed *gpTxDuration*. TH-GPD executes the received GPD command.
Fail verdict:
1A) – 1G) DUT-GPS does not execute the GPD command from the Data GPDF. AND/OR DUT-GPS does transmit the queued GPD command.
2) DUT-GPS does not send at least one GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR The transmission by DUT-GPS exceeds *gpTxDuration*. AND/OR DUT-GPS does not send the GPDF, formatted exactly as in 4.6.1.4.3/item 2 above. AND/OR TH-GPD does not execute the received GPD command.

4.6.1.4.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF7	Proximity bidirectional communication	Direct
GPF5	GPDF security level = 0b11	Direct

4.6.1.5 NOT TESTED: Basic tests - subcase: no security, ApplicationID = 0b010

4.6.1.5.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.6.1.	
2	[R3] A.3.9	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with *ApplicationID*=0b010 and the security level 0b00. The pairing has to be created with the *RxOnCapability* of the TH-GPD set to 0b1. MACsequenceNumberCapability = 0b1, the initial value of the *GPD security frame counter* in the Sink Table is N-1.	
3	[R3] A.3.3.2.7, A.4.2.1.5, A.3.6.1.5	DUT-GPS supports bidirectional operation; TH-GPD implements the bidirectional GPD command as supported by DUT-GPS. If DUT-GPS supports multiple bidirectional commands, select one which results in observable reaction of the GPD (e.g. response, attribute change, local reaction, etc.)	
4		DUT-GPS has a GPD command pending for TH-GPD GPD ID Z.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior. DUT-GPS may need to choose new TempMaster (itself).

4.6.1.5.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.5.2.5, A.4.2.1.5, A.3.6.1.5	**Negative test: RxAfterTx=0b0:** TH-GPD sends an unprotected Data GPDF, with MAC sequence number equal to N, *RxAfterTx* set to 0b0.	
1B		**Negative test: old MAC sequence number**: TH-GPD sends an unprotected Data GPDF with *RxAfterTx* = 0b1, and MAC sequence number = N-1.	

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1C		**Negative test: protected frame**: TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, and SecurityLevel != 0b00, and the frame correctly protected with DUT-GPS's shared key.	
1D		**Negative test: wrong IEEE address:** TH-GPD sends an unprotected Data GPDF with *RxAfterTx*=0b1 and with MAC layer Destination address != Z.	
2		TH-GPD sends an unprotected Data GPDF with *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset*. After DUT-GPS sends the queued GPDF, check the GPD command execution by the GPD (this action is dependent on the queued GPDF and may e.g. require inspection of the GPD by the tester or sending another GPDF).	

1351 ***4.6.1.5.3 Expected Outcome***

Pass verdict:
1A) – 1D) DUT-GPS does NOT execute the GPD command from the Data GPDF. DUT-GPS does NOT transmit the queued GPDF.
2) DUT-GPS executes the GPD command from the Data GPDF. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one copy of the Data GPDF with: • MAC header: ▪ sequence number having any value; ▪ *Destination addressing mode* subfield of the MAC *Frame Control* field is set to 0b11; ▪ *Destination address* field carrying the manufacturer-specific 8B IEEE address of the DUT-GPD Z; • *NWK Frame Control* sub-fields: *Frame type* = 0b00, ZigBee *Protocol Version*=0x3, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • *Extended NWK Frame Control* sub-fields: ▪ *ApplicationID* = 0b010; ▪ *SecurityLevel* 0b00, ▪ SecurityKey = 0b0; ▪ *RxAfterTx* = 0b0; ▪ *Direction* = 0b1; • *SrcID* field absent; • *Endpoint* field present and set to TH-GPD's Endpoint (0x01 – 0xef) or 0xff; • *SecurityFrameCounter* and *MIC* fields not present; • *GPD CommandID* field is present and carrying the a GPD CommandID from the 0xf0-0xff range in the clear; • *GPD Command payload* length and content corresponding to the GPD CommandID, in the clear. The transmission SHALL NOT exceed *gpTxDuration*. TH-GPD executes the received GPD command.
Fail verdict:
1A) – 1D) DUT-GPS does not execute the GPD command from the Data GPDF. AND/OR DUT-GPS does transmit the queued GPD command.
2) DUT-GPS does not send at least one GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR The transmission by DUT-GPS exceeds *gpTxDuration*. AND/OR DUT-GPS does not send the GPDF, formatted exactly as in 4.6.1.5.3/item 2 above. AND/OR TH-GPD does not execute the received GPD command.

1352 ***4.6.1.5.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF7	Proximity bidirectional communication	Direct
GPF8	GPDF security level = 0b10	Direct

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4.6.1.6 NOT TESTED: Basic tests - subcase: gpdSecurityLevel = 0b10, ApplicationID = 0b010

4.6.1.6.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.6.1.	
2	[R3] A.3.9	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with *ApplicationID* = 0b010 and the security level 0b10. The pairing has to be created with the *RxOnCapability* of the TH-GPD set to 0b1. The initial value of the *GPD security frame counter* in the Sink Table is N-1.	
3	[R3] A.3.3.2.7, A.4.2.1.5, A.3.6.1.5	DUT-GPS supports bidirectional operation; TH-GPD implements the bidirectional GPD command as supported by DUT-GPS. If DUT-GPS supports multiple bidirectional commands, select one which results in observable reaction of the GPD (e.g. response, attribute change, local reaction, etc.)	
4		DUT-GPS has a GPD command pending for TH-GPD GPD ID Z.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior. DUT-GPS may need to choose new TempMaster (itself).

4.6.1.6.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.5.2.5, A.4.2.1.5, A.3.6.1.5	**Negative test: RxAfterTx=0b0:** TH-GPD sends a Data GPDF with security level, key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, but with *RxAfterTx* set to 0b0.	
1B		**Negative test: MIC failure**: TH-GPD sends a Data GPDF with security level, key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, with *RxAfterTx* set to 0b1, but with incorrect MIC.	
1C		**Negative test: unprotected frame**: TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, but unprotected.	
1D		**Negative test: wrong security level**: TH-GPD sends a Data GPDF with key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, with *RxAfterTx* set to 0b1, but with security level set to 0b11.	
1E		**Negative test: wrong key type**: TH-GPD sends a Data GPDF with security level, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, with *RxAfterTx* set to 0b1, but with incorrect key type.	
1F		**Negative test: old security frame counter**: TH-GPD sends a Data GPDF with security level, key type and key as in the established pairing, *RxAfterTx* set to 0b1, but *SecurityFrameCounter* = N-1 and matching MIC value.	
1G		**Negative test: wrong GPD ID:** TH-GPD sends a Data GPDF with *RxAfterTx*=0b1, correctly protected, but with MAC Destination address IEEE address != Z.	

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2		TH-GPD sends a correctly protected Data GPDF with *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset*. After DUT-GPS sends the queued GPDF, check the GPD command execution by the GPD (this action is dependent on the queued GPDF and may e.g. require inspection of the GPD by the tester or sending another GPDF).	

4.6.1.6.3 Expected Outcome

Pass verdict:
1A) – 1G) DUT-GPS does NOT execute the GPD command from the Data GPDF. DUT-GPS does NOT transmit the queued GPDF.
2) DUT-GPS executes the GPD command from the Data GPDF. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one copy of the queued GPDF with: • MAC header: ▪ sequence number having any value; ▪ *Destination addressing mode* subfield of the MAC *Frame Control* field is set to 0b11; ▪ *Destination address* field carrying the manufacturer-specific 8B IEEE address of the DUT-GPD Z; • *NWK Frame Control* sub-fields: *Frame type* = 0b00, ZigBee *Protocol Version*=0x3, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • *Extended NWK Frame Control* sub-fields: ▪ *ApplicationID* = 0b010; ▪ *SecurityLevel* 0b10, ▪ SecurityKey – as in the established pairing: – 0b0 in case of a shared key; – 0b1 in case of an individual key; ▪ *RxAfterTx* = 0b0, ▪ *Direction* = 0b1 • *SrcID* field absent; • *Endpoint* field present and set to TH-GPD's Endpoint (0x01 – 0xef) or 0xff; • *SecurityFrameCounter* field of 4B present and carrying value N; • *MIC* field of 4B present and correctly calculated; • *GPD CommandID* field is present and carrying the a GPD CommandID from the 0xf0-0xff range in the clear; • *GPD Command payload* length and content corresponding to the GPD CommandID, in the clear. The transmission SHALL NOT exceed *gpTxDuration*. TH-GPD executes the received GPD command.
Fail verdict:
1A) – 1G) DUT-GPS does not execute the GPD command from the Data GPDF. AND/OR DUT-GPS does transmit the queued GPD command.
2) DUT-GPS does not send at least one GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR The transmission by DUT-GPS exceeds *gpTxDuration*. AND/OR DUT-GPS does not send the GPDF, formatted exactly as in 4.6.1.6/item 2 above. AND/OR TH-GPD does not execute the received GPD.

4.6.1.6.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF7	Proximity bidirectional communication	Direct
GPF6	GPDF security level = 0b10	Direct

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4.6.1.7 NOT TESTED: Basic tests - subcase: gpdSecurityLevel = 0b11, ApplicationID = 0b010

4.6.1.7.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.6.1.	
2	[R3] A.3.9	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with *ApplicationID* = 0b010 the security level 0b11. The pairing has to be created with the *RxOnCapability* of the TH-GPD set to 0b1. The initial value of the *GPD security frame counter* in the Sink Table is N-1.	
3	[R3] A.3.3.2.7, A.4.2.1.5, A.3.6.1.5	DUT-GPS supports bidirectional operation; TH-GPD implements the bidirectional GPD command as supported by DUT-GPS. If DUT-GPS supports multiple bidirectional commands, select one which results in observable reaction of the GPD (e.g. response, attribute change, local reaction, etc.)	
4		DUT-GPS has a GPD command pending for TH-GPD GPD ID Z.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior. DUT-GPS may need to choose new TempMaster (itself).

4.6.1.7.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.5.2.5, A.4.2.1.5, A.3.6.1.5	**Negative test: RxAfterTx=0b0:** TH-GPD sends a Data GPDF with security level, key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, but with *RxAfterTx* set to 0b0.	
1B		**Negative test: MIC failure**: TH-GPD sends a Data GPDF with security level, key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, with *RxAfterTx* set to 0b1, but with incorrect MIC.	
1C		**Negative test: unprotected frame**: TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, but unprotected.	
1D		**Negative test: wrong security level**: TH-GPD sends a Data GPDF with key type, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, with *RxAfterTx* set to 0b1, but with security level set to 0b10.	
1E		**Negative test: wrong key type**: TH-GPD sends a Data GPDF with security level, key as in the established pairing, with *SecurityFrameCounter* equal to N, correct MIC, with *RxAfterTx* set to 0b1, but with incorrect key type.	
1F		**Negative test: old security frame counter**: TH-GPD sends a Data GPDF with security level, key type and key as in the established pairing, *RxAfterTx* set to 0b1, but *SecurityFrameCounter* = N-1 and matching MIC value.	
1G		**Negative test: wrong GPD ID:** TH-GPD sends a Data GPDF with *RxAfterTx*=0b1, correctly protected, but with MAC Destination address IEEE address != Z.	

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2		TH-GPD sends a correctly protected Data GPDF with *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset*. After DUT-GPS sends the queued GPDF, check the GPD command execution by the GPD (this action is dependent on the queued GPDF and may e.g. require inspection of the GPD by the tester or sending another GPDF).	

4.6.1.7.3 Expected Outcome

Pass verdict:
1A) – 1G) DUT-GPS does NOT execute the GPD command from the Data GPDF. DUT-GPS does NOT transmit the queued GPDF.
2) DUT-GPS executes the GPD command from the Data GPDF. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one copy of the queued GPDF with: • MAC header: ▪ sequence number having any value; ▪ *Destination addressing mode* subfield of the MAC *Frame Control* field is set to 0b11; ▪ *Destination address* field carrying the manufacturer-specific 8B IEEE address of the DUT-GPD Z; • *NWK Frame Control* sub-fields: *Frame type* = 0b00, ZigBee *Protocol Version*=0x3, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • *Extended NWK Frame Control* sub-fields: ▪ *ApplicationID* = 0b010; ▪ *SecurityLevel* 0b11, ▪ SecurityKey – as in the established pairing: – 0b0 in case of a shared key; – 0b1 in case of an individual key; ▪ *RxAfterTx* = 0b0, ▪ *Direction* = 0b1 • *SrcID* field absent; • *Endpoint* field present and set to TH-GPD's Endpoint (0x01 – 0xef) or 0xff; • *SecurityFrameCounter* field of 4B present and carrying value N; • *MIC* field of 4B present and correctly calculated; • *GPD CommandID* field is present and carrying the a GPD CommandID from the 0xf0-0xff range; encrypted; • *GPD Command payload* length and content corresponding to the GPD CommandID, encrypted. The transmission SHALL NOT exceed *gpTxDuration*. TH-GPD executes the received GPD command.
Fail verdict:
1A) – 1G) DUT-GPS does not execute the GPD command from the Data GPDF. AND/OR DUT-GPS does transmit the queued GPD command.
2) DUT-GPS does not send at least one GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms AND/OR The transmission by DUT-GPS exceeds *gpTxDuration*. AND/OR DUT-GPS does not send the GPDF, formatted exactly as in 0/item 2 above. AND/OR TH-GPD does not execute the received GPD command.

4.6.1.7.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF7	Proximity bidirectional communication	Direct
GPF5	GPDF security level = 0b00	Direct

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4.6.1.8 NOT TESTED: Sub-case: unsolicited Channel Configuration GPDF

4.6.1.8.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.6.1.	
2	[R3] A.3.9	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with the security level as required by the DUT-GPS. The pairing has to be created with the *RxOnCapability* of the TH-GPD set to 0b1.	If the DUT-GPS supports multiple security levels, the test shall be repeated for each security level supported.
3	[R3] A.4.2.1.5, A.3.6.1.5	TH-GPD supports Channel Configuration GPDF reception during operation.	
4	[R3] A.3.3.2.7, A.4.2.1.5, A.3.6.1.5	DUT-GPS supports bidirectional operation and GPD Maintenance functionality (i.e. delivery of Channel Configuration GPDF in operation).	
5		DUT-GPS shall have a GPD Channel Configuration command pending for TH-GPD GPD ID Z, with *Operational Channel* sub-field of the *Channel* field set to a value different than the current operational channel.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior. DUT-GPS may need to choose new TempMaster (itself).

4.6.1.8.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1		TH-GPD sends a Data GPDF with security settings according to the established pairing, *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to N, *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset*. After DUT-GPS sends Channel Configuration GPDF, Since in GP v1.0.1 specification there is no other mechanism to update the channel of the proxy/sink, if required, the TH can send to the DUT-GPS a Mgmt_NWK_Update_req, setting the network manager address to that of the TH, and then a Mgmt_NWK_Update_req, with ScanDuration = 0xfe, and *ScanChannels* bitmap including only the new channel previously provided in the Channel Configuration GPDF. Then, TH-GPD sends a second Data GPDF. Read out Sink Table of DUT-GPS.	

4.6.1.8.3 Expected Outcome

Pass verdict:
1) DUT-GPS executes the GPD command from the Data GPDF. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one Channel Configuration GPDF with: • MAC header: ▪ sequence number having any value; ▪ If *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b010: – *Destination addressing mode* subfield of the MAC *Frame Control* field is set to 0b11; – *Destination address* field carrying the manufacturer-specific 8B IEEE address of the DUT-GPD N; • *MAC Sequence number* field having any value; • *Frame type* sub-field of the *NWK Frame Control* field set to 0b00

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- *NWK Frame Control Extension* = 0b1;
- *Direction* sub-field of the *Extended NWK Frame Control* field set to 0b1:
- *SrcID* field
  - If *ApplicationID* = 0b000: present and set to TH-GPD's SrcID Z;
  - If *ApplicationID* = 0b010: absent;
- *Endpoint* field
  - If *ApplicationID* = 0b000: absent
  - If *ApplicationID* = 0b010: present and set to TH-GPD's Endpoint (0xf1 – 0xf0) or 0x00;
- Depending on security level:
  - If 0b00: the *SecurityFrameCounter* and *MIC* fields not present;
  - If 0b10 or 0b11: the *SecurityFrameCounter* field of 4B is present and carries the value N; the *MIC* field of 4B is present.
- *GPD CommandID* field is present and – if SecurityLevel !=0b11 - carries the value 0xF3;
- *GPD Command payload* is 1B in length and – if SecurityLevel !=0b11 - carries *Operational Channel* sub-field of the *Channel* field set to the new operational channel.

The transmission SHALL NOT exceed *gpTxDuration*.

TH-GPD sends the second Data GPDF on the new operational channel, as delivered in the Channel Configuration GPDF.
If gpdSecurityLevel >= 0b10 or MACsequenceNumberCapability = 0b1, DUT-GPS updates *GPD security frame counter* field of the Sink Table entry for TH-GPD.

Fail verdict:

1) DUT-GPS does not send at least one copy of the Channel Configuration GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms
AND/OR DUT-GPS does not send Channel Configuration GPDF, formatted exactly as in 4.6.1.8.3/item 1 above.

AND/OR The transmission by DUT-GPS exceeds *gpTxDuration*.
AND/OR TH-GPD does send the second Data GPDF on the new operational channel.

AND/OR If gpdSecurityLevel >= 0b10 or MACsequenceNumberCapability = 0b1, DUT-GPS does NOT update the *GPD security frame counter* field of the Sink Table entry for TH-GPD.

4.6.1.8.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF7	Proximity bidirectional communication	Direct
GPCF6B	Tx Channel Configuration in operational mode	Direct

4.6.1.9 NOT TESTED: Sub-case: unsolicited Commissioning Reply GPDF

GP TG agreement: Postpone key update testing for the SINK until the Green Power management feature is approved.

4.6.1.9.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.6.1.	
2	[R3] A.3.3.2.7	DUT-GPS must support security level >= 0b10.	
3	[R3] A.3.9	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with the security level as required by the DUT-GPS. The pairing has to be created with the *RxOnCapability* of the TH-GPD set to 0b1.	
4	[R3] A.4.2.1.2	TH-GPD supports Commissioning Reply GPDF reception during operation.	
5	[R3] A.3.3.2.7, A.4.2.1.2,	DUT-GPS supports bidirectional operation and GPD Maintenance functionality (i.e. delivery of Commissioning Reply GPDF in operation).	

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6	A.3.6.1.5	DUT-GPS shall have a GPD Commissioning Reply command pending for TH-GPD GPD ID N, with: • *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • *SecurityLevel* sub-field of the *Options* field set according to the security level in the DUT-GPD Sink Table entry for GPD ID N; • *KeyType* sub-field of the *Options* field set to 0b010, • *GPDsecurityKey* field present and carrying a value M different than that in the current Sink Table entry for GPD ID N.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior. DUT-GPS may need to choose new TempMaster (itself).

1379 ***4.6.1.9.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.1.2, A.3.6.1.5	TH-GPD sends a Data GPDF with security settings according to the established pairing, *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to N, *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset*. After DUT-GPS sends Commissioning Reply GPDF, change the value of the DUT's *gpSharedSecurityKeyType* attribute to 0b010 and *gpSharedSecurityKey* attribute to M. Since in GP v1.0.1 specification there is no other mechanism to update the GPD key on the proxy/sink, if required the TH can send to the TH-GPS a GP Pairing Configuration command, with the same new key type and value as previously provided in the Commissioning Reply GPDF. Then, make TH-GPD sends a second Data GPDF, with Frame Counter (if SecurityLevel 0b10 or 0b11) value O >= N+1. Read Sink Table of DUT-GPS.	
2)		**Negative test (not accepting reset security frame counter)**: DUT-GPS shall have a GPD Commissioning Reply command pending for TH-GPD GPD ID N, with • *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • *SecurityLevel* sub-field of the *Options* field set according to the security level in the DUT-GPD Sink Table entry for GPD ID N; • *KeyType* sub-field of the *Options* field different than the key type in the DUT-GPD Sink Table entry for GPD ID N (to 0b111), • *GPDsecurityKey* field present and carrying a value Z different than that in the current Sink Table entry for GPD ID N (and as delivered to the TH-GPD in step 1 above). TH-GPD sends a correctly protected Data GPDF with *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to N (N < 0x7ffffffe), *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset*. After DUT-GPS sends Commissioning Reply GPDF, (i) change the value of the DUT's *gpSharedSecurityKeyType* attribute to 0b111 and *gpSharedSecurityKey* attribute to O, then make TH-GPD send a second Data GPDF, correctly protected, but with *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to 0x00000000. Make TH-GPD send a second Data GPDF, correctly protected, but with *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to 0x00000001. Read the Sink Table of the DUT-GPS.	
3)		Test security frame counter reset: ***GP TG agreement: Postpone key update testing for the SINK until the Green Power management feature is approved.***	

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1381 ***4.6.1.9.3 Expected Outcome***

Pass verdict:
1) DUT-GPS executes the GPD command from the Data GPDF. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPS sends at least one Commissioning Reply GPDF with: • *GPD CommandID* field is present and – if SecurityLevel !=0b11 - carries the value 0xF0; • *GPD Command payload* is at least 17B in length and – if SecurityLevel !=0b11 – carries: ▪ *Options* field with the sub-fields set to *GPDsecurityKeyPresent*=0b1, *SecurityLevel* sub-field set according to the security level in the DUT-GPD Sink Table entry for GPD ID N; *KeyType* = 0b010; ▪ *GPDsecurityKey* field present and carrying a value M; The transmission SHALL NOT exceed *gpTxDuration*. TH-GPD sends the second Data GPDF using the new security key, as delivered in the Commissioning Reply GPDF. DUT-GPS executes the second Data GPDF, with the *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to O >= N+1. The Sink Table entry for TH-GPD of the DUT-GPS contains the new key type, new key value, and the *GPD security frame counter* value O. If observable, DUT-GPS executes the command. Note: if there is no way to make the execution human-perceivable, the correctness of TH-GPD security processing with the new key needs to be verified separately.
2) DUT-GPS does NOT execute either Data GPDF with the reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11). DUT-GPS does NOT reset the *GPD security frame counter* field of the Sink Table entry for the GPD ID N.
Fail verdict:
1) DUT-GPS does not send at least one copy of the Commissioning Reply GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms. AND/OR The transmission by DUT-GPS exceeds *gpTxDuration*. AND/OR DUT-GPS does not send Commissioning Reply GPDF, formatted exactly as in 0/item 1 above. AND/OR TH-GPD does send the second Data GPDF using the new key. AND/OR DUT-GPS does not execute the second Data GPDF, with the *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) O >= N+1. AND/OR The Sink Table entry for TH-GPD of the DUT-GPS does NOT contain the new key type, new key value, and/or the *GPD security frame counter* value O. AND/OR If observable, DUT-GPS does not execute the command.
2) DUT-GPS executes either Data GPDF with the reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11). AND/OR DUT-GPS resets the *GPD security frame counter* field of the Sink Table entry for the GPD ID N.

1382 ***4.6.1.9.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF7	Proximity bidirectional communication	Direct
GPCF8B	Tx Channel Configuration in operational mode	Direct

1383 **4.6.1.10 NOT TESTED: Subcase: Read Attributes / Read Attributes Response**

1384 ***4.6.1.10.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.6.1.1.1.	
3	[R3] A.3.6.1.5, A.4.2.6.4, A.4.2.6.2	TH-GPD supports a readable attribute, with Attribute ID 0xXXXX, also supported by the DUT-GPS. The initial value of Attribute 0xXXXX is known: Y.	
4	[R3] A.3.6.1.5, A.4.2.6.4	DUT-GPS shall have a GPD Read Attributes command pending for TH-GPD's GPD ID N for AttributeID 0xXXXX.	Methods to enforce that may be application- and DUT-GPS-specific. DUT-GPS may need to choose new TempMaster (itself).

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4.6.1.10.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.1.5, A.4.2.6.4, A.4.2.6.2	TH-GPD sends a Data GPDF with *RxAfterTx* set.	

4.6.1.10.3 Expected Outcome

Pass verdict:

1) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, DUT-GPS sends at least one Data GPDF with:

- *GPD CommandID* carrying Read Attribute command (0xF2)
- *GPD Command* payload
  - *Multi-cluster* sub-field of the *Options* field set to:
    - 0b0 if there is only one attribute record included;
    - 0b1 if there are multiple attribute records included;
  - If the supported attribute is manufacturer-specific, the DUT-GPS SHALL set the *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data; otherwise it MAY set those fields;
  - At least1 *Attribute Request* record present, with *ClusterID* of the requested attribute, and *Attribute* field carrying the requested AttributeID(s).

The transmission SHALL NOT exceed *gpTxDuration*.

DUT-GPS executes the GPD command from the Data GPDF.
Some time later, TH-GPD responds with Data GPDF with Read Attributes Response command carrying the requested attribute(s).

Fail verdict:

2) DUT-GPS does not execute the GP command from the Data GPDF.
AND/OR DUT-GPS does not send at least one Data GPDF with GPD Read Attributes command to TH-GPD, formatted exactly as specified in 4.6.1.10.3/item 1 above; between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx* AND/OR the GPFS transmission exceeds *gpTxDuration*.
AND/OR DUT-GPS does send GP Response command with GPD Read Attribute command, with Proxy Address other that its own.
AND/OR TH-GPD does not send Data GPDF with GPD Read Attributes Response command.

4.6.1.10.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPF101	Transmission of GPD Read Attributes command	Direct

4.6.1.11 NOT TESTED: Subcase: Write Attributes

4.6.1.11.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.6.1.1.1.	
3	[R3] A.3.6.1.5, A.4.2.6.3	TH-GPD supports a writable Attribute, with Attribute ID 0xXXXX, also supported by the DUT-GPS. The initial value of Attribute ID 0xXXXX is known: X.	
4	[R3] A.3.6.1.5, A.4.2.6.3	DUT-GPS shall have a GPD Write Attributes command pending for TH-GPD's GPD ID N, for AttributeID 0xXXXX, value Y.	Methods to enforce that may be application- and DUT-GPS-specific. DUT-GPS may need to choose new TempMaster (itself).

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1394 ***4.6.1.11.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.1.5, A.4.2.6.3	• Make TH-GPD send a Data GPDF with *RxAfterTx* sub-field of the *Extended NWK Frame Control* set to 0b1. After the DUT-GPS sends the GPD Write Attributes command, check if the TH-GPD did execute the command (make TH-GPD report the written attribute or read it out)	

1395 ***4.6.1.11.3 Expected Outcome***

Pass verdict:
1)Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF, DUT-GPS sends at least one Data GPDF with GPD CommandID *Write Attributes* (0xF1), with: • *GPD CommandID* carrying Write Attributes command (0xF1) • *GPD Command payload* ▪ *Multi-cluster* sub-field of the *Options* field set to 0b0; ▪ If the supported attribute is manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data; else: *Manufacturer field present* sub-field of the *Options* field set to 0b0, and *Manufacturer ID* field not present ▪ 1 *Cluster record* present, with *ClusterID* of the requested attribute, *Length of write attribute record list* field not present, and 1 *Write Attribute record* with: *AttributeID* field carrying 0xXXXX; *AttributeDataType* – DUT-specific; *AttributeValue*: Y. The transmission SHALL NOT exceed *gpTxDuration*. DUT-GPS does execute the original GPD command from TH-GPD. TH-GPD does store the new value Y for Attribute 0xXXXX (read it out or make the TH-GPD report it).
Fail verdict:
1) DUT-GPS does not send at least one Data GPDF, formatted exactly as described in item 1 above; between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx* AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR DUT-GPS does execute the original GPD command from TH-GPD. AND/OR TH-GPD does not store the new value Y for Attribute 0xXXXX.

1396 ***4.6.1.11.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPF107	Transmission of GPD Write Attributes command	Direct

1397 **4.6.1.12 NOT TESTED: Subcase: Request Attributes/Write Attributes**

1398 ***4.6.1.12.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.6.1.1.1.	
3	[R3] A.3.6.1.5, A.4.2.6.3	TH-GPD supports at least one writable attribute, also supported by the DUT-GPS. The AttributeID (0xXXXX) and its initial value (X) are known.	If DUT-GPD supports multiple writable attributes, the test shall be repeated for all of them.

1399 ***4.6.1.12.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.1.5, A.4.2.6.1	Make TH-GPD send Data GPDF with: • sub-fields of the *NWK Frame Control* field set to: ▪ *Auto-Commissioning* 0b0; ▪ *NWK Frame Control Extension* 0b1;	

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		• *RxAfterTx* sub-field of the Extended NWK Frame Control set to 0b1. • *GPD CommandID* set to 0xA4 (Request Attributes) • *GPD Command payload* formatted as defined in [R3], with: ▪ *Multi-cluster* sub-field of the *Options* field set to 0b0; ▪ If the supported attribute is manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data; else: *Manufacturer field present* sub-field of the *Options* field set to 0b0, and *Manufacturer ID* field not present ▪ 1 *Attribute request* record present, with: *ClusterID* of the requested attribute, *Number of Attributes* field not present, one *Attribute* field carrying 0xXXXX.	
2	[R3] A.3.6.1.5, A.4.2.6.3	Make TH-GPD send Data GPDF with *RxAfterTx* set to 0b1. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, TH-GPS sends at least one Data GPDF with GPD Write Attributes command, carrying Cluster records for the attributes requested by the GPD before (at least one record for 0xXXXX with new value Y); the transmission SHALL NOT exceed *gpTxDuration*.	
3	[R3] A.3.6.1.5, A.4.2.6.3	TH-GPD sends Data GPDF with RxAfterTx set and *GPD CommandID* set to 0xA4 (Request Attributes). TH-GPD sends a Data GPDF with RxAfterTx set to 0b1 and with GPD ID N.	

1400 ***4.6.1.12.3 Expected Outcome***

Pass verdict:
1) DUT-GPS does not send GP Response.
2) DUT-GPS sends the Data GPDF with GPD CommandID *Write Attributes* (0xF1), with: • MAC header: ▪ Sequence number field having any value; ▪ If *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b010: – *Destination addressing mode* subfield of the MAC *Frame Control* field is set to 0b11; – *Destination address* field carrying the manufacturer-specific 8B IEEE address of the DUT-GPD N; • *SecurityFrameCounter* as in the triggering Data GPDF • Security settings as in the triggering Data GPDF • sub-fields of the *NWK Frame Control* field set to: Auto-Commissioning 0b0; NWK Frame Control Extension 0b1; • *Extended NWK Frame Control* field present and its sub-fields: *ApplicationID*: as used by the TH-GPD; *Direction* set to 0b1; *RxAfterTx* set to 0b0; • *SrcID* field: ▪ If *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b000: present and set to TH-GPD's SrcID N; ▪ If *ApplicationID* sub-field of the *Extended NWK Frame Control* field is present and set to 0b010: absent; • *Endpoint* field ▪ If *ApplicationID* = 0b000: absent ▪ If *ApplicationID* = 0b010: present and set to TH-GPD's Endpoint (0xf1 – 0xf0) or 0xff; • *GPD CommandID* carrying Write Attributes command (0xF1) • *GPD Command payload* ▪ *Multi-cluster* sub-field of the *Options* field set to 0b0; ▪ If the supported attribute is manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data; else: *Manufacturer field present* sub-field of the *Options* field set to 0b0, and *Manufacturer ID* field not present ▪ 1 Cluster record present, with ClusterID of the requested attribute, Length of write attribute record list field not present, and 1 Write Attribute record with: *AttributeID* field carrying 0xXXXX; *AttributeDataType* – DUT-specific; *AttributeValue*: Y. DUT-GPS executes the GPD command.

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3) DUT does send Data GPDF with GPD CommandID *Write Attributes* (0xF1), formatted as in item 2 above. DUT-GPS does execute the second Data GPDF.
Fail verdict:
1) DUT-GPS does send GP Response.
2) DUT-GPS does not send Data GPDF with *GPD CommandID* Write Attributes (0xF1), formatted exactly as specified in item 2 above.
3) DUT does send Data GPDF with GPD CommandID *Write Attributes* (0xF1), formatted as in item 2 above. DUT-GPS does execute the GPD command.

1401 ***4.6.1.12.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPF106	Reception of GP Request Attributes	Direct
GPF107	Transmission of GPD Write Attributes command	Direct

1402 **4.6.1.13 NOT TESTED: Transmission of ZCL Tunneling command (0xf6)**

1403 ***4.6.1.13.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.6.1.1.1.	
3		TH-GPD supports GPD ZCL Tunneling command (0xf6), for a particular ZCL command (generic or cluster specific); the ZCL CommandID (0xXX), the ClusterID (0xYYYY), if required, and the command payload, if required, is known.	
4	[R3] A.4.2.6.4	TH-GPD supports at the reception of the GPD ZCL Tunneling command (0xF6) for the same ZCL object.	

1404 ***4.6.1.13.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4 A.4.2.6.4	Make DUT-GPS prepare and place in the gpTxQueue a GPDF for the TH-GPD GPD ID with the GPD ZCL Tunneling command (0xF6). Make DUT-GPD send a Data GPDF with *RxAfterTx* set to 0b1.	

1405 ***4.6.1.13.3 Expected Outcome***

Pass verdict:

1) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx* = 0b1, DUT-GPS sends at least one Data GPDF with:

- *GPD CommandID* carrying ZCL Tunneling command (0xF6)
- *GPD Command payload*
  - *The Options* field of the GPD ZCL Tunneling command (0xF6) set to:
    - *Frame type* sub-field: generic or specific, corresponding to the tunneled ZCL command;
    - *ManufacturerID present* sub-field: absent/present, respectively, depending on the public/manufacturer-specific ClusterID 0xYYYY;
    - *Direction* sub-field set according to the carried ZCL content;
    - *Reserved* sub-fields set to 0b0;
  - *ManufacturerID* present/absent, depending on the value of the *ManufacturerID present* sub-field;
  - *ZigBee Cluster ID* = 0xYYYY;
  - *ZigBee Command ID* = DUT-GPS-specific (0xXX)
  - *Length of Payload* = depending on the ZCL command;
  - ZigBee Command Payload = depending on the ZCL command.

The transmission SHALL NOT exceed *gpTxDuration*.

If the tunneled ZCL command requires a response (as defined by [R5]), some time after the reception of the GPD ZCL Tunneling command, TH-GPD responds with the GPD ZCL Tunneling command (0xa6) containing ZCL Read attributes response (0x01).

Fail verdict:

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1) DUT-GPS does not send at least one GPD ZCL Tunneling command (0xf6), formatted exactly as specified above between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx* AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR if the tunneled ZCL command requires a response (as defined by [R5]), TH-GPD does not respond with GPD ZCL Tunneling command (0xa6) containing ZCL Read attributes response (0x01)

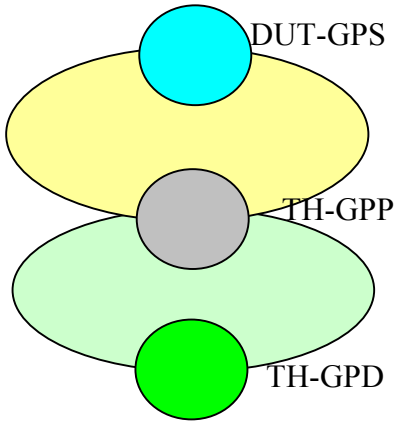
4.6.1.13.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPF109	Transmission of ZCL Tunneling (0xf6) command	Direct

4.6.2 NOT TESTED: GPS via GPP

4.6.2.1.1 Initial conditions

The required network set-up for the test harness is as follows:



DUT-GPS	PANId= Generated in a random manner (within the range 0x0000 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPP	PANId=same PANID as DUT-GPT Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N TH-GPD supports the application functionality of the DUT-GPS (see Section A.4.3 of [R3]). Attribute ID 0xXXXX shall have a value set to Y.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS and TH-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.3.2.2, A.3.4.2.2	A pairing is established between the TH-GPD and DUT-GPS (e.g. as a result of any of the commissioning procedures), with communication mode as required by the DUT-GPS. The corresponding information is also included in TH-GPP Proxy Table.	

4.6.2.1.2 Test Set-Up

The DUT-GPS shall be in wireless communication proximity of TH-GPP; and the TH-GPP shall be in wireless communication proximity of the TH-GPD. The DUT-GPS and the TH-GPD shall be out of radio range.

A packet sniffer shall be observing the communication over the air interface.

4.6.2.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.2.7, A.3.6.1.5, A.4.2.1.2	**Negative test: TempMaster election**: Make sure DUT-GPS has a GPD Command to be delivered to the TH-GPD. TH-GPP sends a GP Notification for TH-GPD (GPD ID, and if *ApplicationID* = 0b010, *Endpoint* as paired with the DUT-GPS), with *RxAfterTx* sub-field of the *Options* field set to 0b1 and the *gpTxQueueFull* sub-field of the *Options* field set to 0b1.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior.

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2)	[R3] A.3.2.7, A.3.6.1.5, A.4.2.1.2	**Negative test: TempMaster election**: Make sure DUT-GPS has a GPD Command to be delivered to the TH-GPD. TH-GPP sends a GP Notification for TH-GPD (GPD ID, and if *ApplicationID* = 0b010, Endpoint as paired with the DUT-GPS), with *RxAfterTx* sub-field of the *Options* field set to 0b0 and the *gpTxQueueFull* sub-field of the *Options* field set to 0b1.	

4.6.2.1.4 Expected Outcome

Pass verdict:
1) – 2) DUT-GPS does not send GP Response command.
Fail verdict:
1) – 2) DUT-GPS sends GP Response command.

4.6.2.2 NOT TESTED: Sub-case: unsolicited Commissioning Reply GPDF

GP TG agreement: Postpone key update testing for the SINK until the Green Power management feature is approved.

4.6.2.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.6.2.1.1.	
3	[R3] A.1.5.4	DUT-GPS must support security level >= 0b10.	
4	[R3] A.3.6.1.5, A.4.2.1.2	TH-GPD supports Commissioning Reply GPDF reception during operation.	
5	[R3] A.3.2.7, A.3.6.1.5, A.4.2.1.2	DUT-GPS supports bidirectional operation and GPD Maintenance functionality (i.e. delivery of Commissioning Reply GPDF in operation).	

4.6.2.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.2.7, A.3.6.1.5, A.4.2.1.2	Make DUT-GPS send GP Response command to one of the TH-GPP, carrying GPD Commissioning Reply command for TH-GPD GPD ID N, with: • *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • *SecurityLevel* sub-field of the *Options* field set according to the security level in the DUT-GPD Sink Table entry for GPD ID N; • *KeyType* sub-field of the *Options* field set to 0b10, • *GPDsecurityKey* field present and carrying a value M different than that in the current Sink Table entry for GPD ID N. TH-GPD sends a Data GPDF with *RxAfterTx* set to 0b1, *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to X. Upon transmission of the GPD Commissioning Reply command, update key type and key on the DUT-GPS. Since in GP v1.0.1 specification there is no other mechanism to update the GPD key on the proxy/sink, if required the TH can send to the TH-GPS a GP Pairing Configuration command, with the same new key type and value as previously provided in the Commissioning Reply GPDF. Then, TH-GPD sends another Data GPDF, correctly protected, with *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) value equal to Y>=X+1. Read Sink Table entry of DUT-GPS.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior.

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2)		**Negative test (not accepting reset security frame counter)**: Make DUT-GPS send GP Response command to one of the TH-GPP, with GPD Commissioning Reply command for TH-GPD GPD ID N, with: • *GPDsecurityKeyPresent* sub-field of the *Options* field set to 0b1, • *SecurityLevel* sub-field of the *Options* field set according to the security level in the DUT-GPD Sink Table entry for GPD ID N; • *KeyType* sub-field of the *Options* field set according to the security level in the DUT-GPD Sink Table entry for GPD ID N (to 0b010), • *GPDsecurityKey* field present and carrying a value M equal to that in the current Sink Table entry for GPD ID N (and as delivered to the TH-GPD in step 1 above). TH-GPD sends a correctly protected Data GPDF with *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to Z, *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset* ms. After DUT-GPS sends Commissioning Reply GPDF, make TH-GPD send a second Data GPDF, correctly protected, but with reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to 0. Make TH-GPD send a second Data GPDF, correctly protected, but with reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to 1. Read the Sink Table of the DUT-GPS.	

1421 ***4.6.2.2.3 Expected Outcome***

Pass verdict:
1) DUT-GPS sends GP Response command to one of the TH-GPP, with: • GPD ID field present and set to TH-GPD's GPD ID N; • *Transmit on endpoint match* sub-field of the Options field set to 0b0 or 0b1 (only if *ApplicationID* = 0b010); • If *ApplicationID* = 0b010, the *Endpoint* field is present and set to 0x00 or any specific endpoint supported by the GPD. carrying GPD Commissioning Reply command with: • *GPD CommandID* field is present and carries the value 0xF0; • *GPD Command* payload is at least 17B in length and carries: ▪ *Options* field with the sub-fields set to *GPDsecurityKeyPresent*=0b1, *SecurityLevel* sub-field set according to the security level in the DUT-GPD Sink Table entry for GPD ID N; *KeyType* = 0b10; ▪ *GPDsecurityKey* field present and carrying a value different than that in the current Sink Table entry for GPD ID N Upon reception of Data GPDF with *RxAfterTx* =0b1 from the TH-GPD, the TH-GPP sends the Commissioning Reply GPDF, with the values as supplied by the DUT-GPS. Upon reception of the GP Notification carrying the GPD Data command with the *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) Y>=X+1, DUT-GPS updates the Sink Table entry with the *GPD security frame counter* value Y, and if observable, executes the command.
2) DUT-GPS does NOT execute either GPD Data command with the reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11). DUT-GPS does NOT reset the *GPD security frame counter* field of the Sink Table entry for the GPD ID N.
Fail verdict:
1) DUT-GPS does not send GP Response command, formatted as described in 4.6.2.2.3/ item 1 above. AND/OR TH-GPP does send the Commissioning Reply GPDF. AND/OR DUT-GPS does not execute the GPD Data command with the *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) Y>=X+1.
2) DUT-GPS executes either GPD Data command with the reset *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11). AND/OR DUT-GPS resets the GPD security frame counter field of the Sink Table entry for the GPD ID N.

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1424 ***4.6.2.2.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF8	Multi-hop bidirectional communication	Direct
GPCF8B	Tx GPD Commissioning Reply command in operational mode	Direct
GPPCS151	Transmission of GP Response command	Direct

1425 **4.6.2.3 NOT TESTED: Sub-case: unsolicited Channel Configuration GPDF**

1426 ***4.6.2.3.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.6.2.1.1.	
3	[R3] A.3.6.1.5, A.4.2.1.5	TH-GPD supports Channel Configuration GPDF reception during operation.	
4	[R3] A.3.2.7, A.3.6.1.5, A.4.2.1.5	DUT-GPS supports bidirectional operation and GPD Maintenance functionality (i.e. delivery of Channel configuration GPDF in operation).	

1427 ***4.6.2.3.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.1.5, A.4.2.1.5	Make DUT-GPS send GP Response command to one of the TH-GPP, GPD Channel Configuration command pending for TH-GPD GPD ID N, with *Operational Channel* sub-field of the *Channel* field set to a value different than the current operational channel. Since in GP v1.0.1 specification there is no other mechanism to update the channel of the proxy/sink, if required, the TH can send to the DUT-GPS and TH-GPP a Mgmt_NWK_Update_req, setting the network manager address to that of the TH, and then a Mgmt_NWK_Update_req, with ScanDuration = 0xfe, and *ScanChannels* bitmap including only the new channel previously provided in the Channel Configuration GPDF. TH-GPD sends a Data GPDF with security settings according to the established pairing, *SecurityFrameCounter* (if SecurityLevel 0b10 or 0b11) equal to N, *RxAfterTx* set to 0b1, and enters Rx mode after *gpdRxOffset* ms. Read Sink Table of DUT-GPS.	Methods to enforce that may be application- and DUT-GPS-specific. E.g., DUT-GPS may provide a menu item to activate this behavior.

1428 ***4.6.2.3.3 Expected Outcome***

Pass verdict:
1) DUT-GPS sends GP Response command to one of the TH-GPP, with: • *Transmit on endpoint match* sub-field of the Options field set to 0b0 or 0b1 (if *ApplicationID* = 0b010); • If *ApplicationID* = 0b010, the *Endpoint* field is present and set to 0x00 or any specific endpoint supported by the GPD; • *GPD ID* field present and set to TH-GPD's GPD ID N; carrying GPD Channel Configuration command with: • *GPD CommandID* field is present and carries the value 0xF3; • *GPD Command payload* is 1B in length and carries *Operational Channel* sub-field of the *Channel* field set to the new operational channel; Upon reception of Data GPDF with *RxAfterTx* =0b1 from the TH-GPD, the TH-GPP sends the Channel Configuration GPDF, with the values as supplied by the DUT-GPS. If gpdSecurityLevel >= 0b10 or MACsequenceNumberCapability = 0b1, DUT-GPS updates GPD security frame counter field of the Sink Table entry for TH-GPD.
Fail verdict:

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1) DUT-GPS does not send GP Response command, formatted exactly as described in 4.6.2.3.3/item 1 above. AND/OR TH-GPP does not send Channel Configuration GPDF, formatted exactly as in 4.6.2.3.3/item 1 above. AND/OR If gpdSecurityLevel >= 0b10 or MACsequenceNumberCapability = 0b1, DUT-GPS does NOT update GPD security frame counter field of the Sink Table entry for TH-GPD.

1429 ***4.6.2.3.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF8	Multi-hop bidirectional communication	Direct
GPCF6B	Tx GPD Channel configuration command in operational mode	Direct
GPPCS151	Transmission of GP Response command	Direct

1430 **4.6.2.4 NOT TESTED: Subcase: Read Attributes/Read Attributes Response**

1431 ***4.6.2.4.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.6.2.1.1.	
3	[R3] A.3.6.1.5, A.4.2.6.4	TH-GPD supports a readable attribute, with Attribute ID 0xXXXX, also supported by the DUT-GPS. The initial value of Attribute ID 0xXXXX is known: X.	
4	[R3] A.3.6.1.5, A.4.2.6.4	DUT-GPS shall have a GPD Read Attributes command pending for GPD ID N, with at least one AttributeID.	Methods to enforce that may be application- and DUT-GPS-specific.

1432 ***4.6.2.4.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.6.4	TH-GPD sends a Data GPDF with *RxAfterTx* set. TH-GPD sends another Data GPDF with *RxAfterTx* set.	

1433 ***4.6.2.4.3 Expected Outcome***

Pass verdict:

1) On reception of GP Notification command, DUT-GPS executes the GPD command from the Data GPDF.
DUT-GPS does NOT send Data GPDF with Read Attribute command.
On reception of the GP Notification, or earlier, DUT-GPS does send GP Response command:

- Either:
  - If DUT-GPS's *gpsCommunicationMode* is unicast: As unicast to the TH-GPP, with the *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the TH-GPP;
  - If DUT-GPS's *gpsCommunicationMode* is groupcast: as groupcast, with the *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the TH-GPP;
- with:
  - *Transmit on endpoint match* sub-field of the Options field set to 0b0 or 0b1 (if *ApplicationID* = 0b010);
  - *GPD ID* field present and set to TH-GPD's GPD ID N;
  - If *ApplicationID* = 0b010, the *Endpoint* field is present and set to 0x00 or any specific endpoint supported by the GPD;
- *GPD CommandID* field carrying GPD Read Attribute command
- *GPD Command payload* field carrying
  - *Multi-cluster* sub-field of the *Options* field set to 0b0;
  - If the supported attribute is manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data;
  - At least one *Attribute Request* record present, with *ClusterID* of the requested attribute, *Number of attributes* field not present, and at least one *Attribute* field carrying the requested AttributeID.

On reception of the second Data GPDF with *RxAfterTx* set, TH-GPP delivers the GPD Read Attribute command, as supplied by the DUT-GPS.

Some time after reception of GPD Read Attribute command, TH-GPD responds with Data GPDF carrying GPD Read Attribute Response command, with at least one *Cluster Attribute* record present and carrying the attribute requested by the DUT-GPS.

Fail verdict:

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1) DUT-GPS does not execute the GPD command in the GP Notification. AND/OR DUT-GPS does send Data GPDF with GPD Read Attribute command. AND/OR DUT-GPS does not send GP Response, formatted exactly as in item 1 above.

1434 ***4.6.2.4.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF8	Multi-hop bidirectional communication	Direct
GPF101	Transmission of GPD Read Attributes Command	Direct
GPPCS151	Transmission of GP Response command	Direct

1435 ### 4.6.2.5 NOT TESTED: Subcase: Write Attributes

1436 ***4.6.2.5.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.6.2.1.1.	
3	[R3] A.4.2.6.3	TH-GPD supports a writable Attribute, with Attribute ID 0xXXXX, also supported by the DUT-GPS. The initial value of Attribute ID 0xXXXX is known: X.	
4	[R3] A.4.2.6.3	DUT-GPS shall have a GPD Write Attributes command pending for GPD ID N, for at least one AttributeID.	Methods to enforce that may be application- and DUT-GPS-specific.

1437 ***4.6.2.5.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.6.3	Make TH-GPD send a Data GPDF with: • sub-fields of the *NWK Frame Control* field set to: ▪ *Auto-Commissioning* 0b0; ▪ *NWK Frame Control Extension* 0b1; • RxAfterTx sub-field of the Extended NWK Frame Control set to 0b1. Make TH-GPD send a Data GPDF with RxAfterTx sub-field of the Extended NWK Frame Control set to 0b1.	

1438 ***4.6.2.5.3 Expected Outcome***

Pass verdict:
1) On GP Notification reception, TH-GPD does execute the GPD command. Then, TH-GPS sends GP Response command with: • Either: ▪ If DUT-GPS's *gpsCommunicationMode* is unicast: As unicast to the TH-GPP, with the *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the TH-GPP ▪ If DUT-GPS's *gpsCommunicationMode* is groupcast: as groupcast, with the *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the TH-GPP • *GPD ID* = N; • *GPD CommandID* field carrying Write Attributes command (0xF1) • *GPD Command payload* field ▪ *Multi-cluster* sub-field of the *Options* field set to 0b0 ▪ If the supported attribute is manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data; else: *Manufacturer field present* sub-field of the *Options* field set to 0b0, and *Manufacturer ID* field not present ▪ 1 Cluster record present, with ClusterID of the requested attribute, Length of write attribute record list field not present, and 1 Write Attribute record with: *AttributeID* field carrying 0xXXXX; *AttributeDataType* – DUT-specific; *AttributeValue*: Y. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after receipt of the second Data GPDF, TH-GPP sends at least one Data GPDF with Write Attributes command (0xF1) and the GPD Command payload copied from the GP Response.

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Fail verdict:
1) DUT-GPS does not execute the GPD command. AND/OR DUT-GPS does not send GP Response, formatted exactly as in item 1 above. AND/OR TH-GPP does not send Data GPDF with Write Attributes command.

1439 ***4.6.2.5.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF8	Multi-hop bidirectional communication	Direct
GPF107	Transmission of GP Write Attributes command	Direct
GPPCS151	Transmission of GP Response command	Direct

1440 **4.6.2.6 NOT TESTED: Subcase: Request Attributes / Write Attributes**

1441 ***4.6.2.6.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 4.6.2.1.1.	
3	[R3] A.3.6.1.5	TH-GPD supports a writable Attribute, with Attribute ID 0xXXXX, also supported by the DUT-GPS. The initial value of Attribute ID 0xXXXX is known: X.	

1442 ***4.6.2.6.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.1.5, A.4.2.6.1, A.4.2.6.3	Make TH-GPD send a Data GPDF with *RxAfterTx* sub-field set to 0b1 and: • *GPD CommandID* set to 0xA4 (Request Attributes); • *GPD Command payload* formatted as defined in [R3], with: ▪ *Multi-cluster* sub-field of the *Options* field set to 0b0; ▪ If the supported attribute is manufacturer-specific: *Manufacturer field present* sub-field of the *Options* field set to 0b1, and *Manufacturer ID* field present and set according to the DUT data; else: *Manufacturer field present* sub-field of the *Options* field set to 0b0, and *Manufacturer ID* field not present ▪ 1 *Attribute request* record present, with: *ClusterID* of the requested attribute, *Number* of *Attributes* field not present, one *Attribute* field carrying 0xXXXX. Make TH-GPD send a Data GPDF with RxAfterTx 0b1.	
2		Make TH-GPD send a Data GPDF with *RxAfterTx* sub-field set to 0b1 and *GPD CommandID* set to 0xA4 (Request Attributes).	

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1444 ***4.6.2.6.3 Expected Outcome***

Pass verdict:
1) On GP Notification reception, DUT-GPS sends GP Response command with: • Either: ▪ If DUT-GPS's *gpsCommunicationMode* is unicast: As unicast to the TH-GPP, with the *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the TH-GPP ▪ If DUT-GPS's *gpsCommunicationMode* is groupcast: as groupcast, with the *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the TH-GPP • GPD ID = N; • GPD CommandID field carrying Write Attributes command (0xF1); • GPD Command field payload; ▪ *Multi-cluster* sub-field of the *Options* field set to 0b0 ▪ *Manufacturer field present* sub-field and *Manufacturer ID* field - as in the triggering Request Attributes command; ▪ 1 Cluster record present, with ClusterID of the requested attribute, *Length of write attribute record list* field not present, and 1 *Write Attribute* record with: *AttributeID* field carrying 0xXXXX; *AttributeDataType* – DUT-specific; *AttributeValue*: Y. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after receipt of the second Data GPDF, TH-GPP sends Data GPDF with Write Attributes command (0xF1) and the GPD Command payload copied from the GP Response.
2) On reception of GP Notification for GPD Request Attributes command from TH-GPP, DUT-GPS sends GP Response command to TH-GPP: • Either as unicast to the TH-GPP, with the *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the TH-GPP • Or as groupcast, with the *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the TH-GPP.
Fail verdict:
1) DUT-GPS does not send GP Response, formatted exactly as in item 1 above. AND/OR TH-GPP does not send Data GPDF with Write Attributes command.
2) DUT-GPS does not send GP Response to TH-GPP.

1445 ***4.6.2.6.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCSF8	Multi-hop bidirectional communication	Direct
GPF106	Reception of GP Request Attributes Command	Direct
GPF107	Transmission of GP Write Attributes command	Direct
GPPCS151	Transmission of GP Response command	Direct

1446 **4.6.2.7 NOT TESTED: Sub-case: GPD ZCL Tunneling command (0xF6)**

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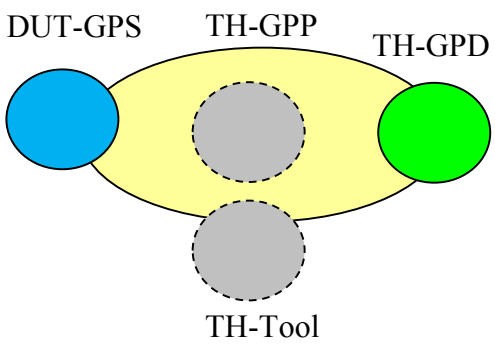
4.7 Application functionality

Throughout the current document, the *(GPD command) execution (at the sink)* is defined to encompass all actions of the GP endpoint of the GP sink leading to providing GP application input to the application on the same radio node. The actions may include GPD command translation, mapping to local application endpoints, forwarding to local application endpoints, local GPD storage, update of attributes, combination with other control inputs, and user feedback.

Vendors of the sinks NOT using the default translations or not implementing the Translation Table functionality should think of ways how to explain the application behavior on reception of GPD commands (to the user and the testers), and how correct execution may be made observable (for the users and for certification). They MAY also provide means for controlling this functionality, other than the Translation Table.

4.7.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPS (GPT/GPT +/GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPP	PANId=same PANId as TH-GPS Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific If the DUT-GPS is a GPT, TH-GPP shall be present. If the DUT-GPS is a GPT+, GPC or GPCB, the TH-GPP shall be omitted.
TH-Tool	Pan id=same PANID as TH-GPS Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific Capable of generating ZDO, ZCL and Green Power Cluster commands to test/change the DUT-GPS configuration
TH-GPD	GPD ID = N

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPS - and TH-GPP and TH-Tool, if present - operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	

4.7.1.1.2 Test Set-Up

The DUT-GPS, TH-GPD - and TH-GPP and TH-Tool, if present - shall be in wireless communication proximity of one another. A packet sniffer shall be observing the communication over the air interface.

4.7.2 GPS supporting GPD On / Off Switch: Device ID 0x02

4.7.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.7.1.1.1.	
2	[R3] A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	The TH-GPD supports for GPD On / Off Switch functionality (Device ID 0x02).	
3	[R3] A.3.3.2.2	The Sink Table of the DUT-GPS is empty. If possible, start with the light OFF.	

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4.7.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
0	[R3] A.3.3.4.6, A.3.3.5.5	If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0.	If supported by the device
1	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	Perform commissioning procedure, using Data GPDF with Auto-Commissioning bit set to 0b1 and GPD command ON. Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. TH-GPD sends Data GPDF with GPD command that would create a visible effect (OFF/ON). TH-GPD sends Data GPDF with the other GPD command (ON/OFF).	If supported by GPS and allowed by DUT-GPS's security capabilities. If DUT-GPS requires gpsSecurityLevel >= 0b10, the shared key may be programmed into the GPD.
2	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	Clear Sink Table of DUT-GPS. Perform commissioning procedure, using Data GPDF with Auto-Commissioning bit set to 0b1 and GPD command OFF. Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. TH-GPD sends Data GPDF with GPD command that would create a visible effect (ON/OFF). TH-GPD sends Data GPDF with the other GPD command (OFF/ON).	
3	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	Clear Sink Table of DUT-GPS. Perform commissioning procedure, using Data GPDF with Auto-Commissioning bit set to 0b1 and GPD command TOGGLE. Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. TH-GPD sends Data GPDF with GPD command TOGGLE. TH-GPD sends Data GPDF with GPD command TOGGLE.	
4	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	Clear Sink Table of DUT-GPS. Perform commissioning procedure, using Commissioning GPDF. Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. TH-GPD sends Data GPDF with GPD command ON. TH-GPD sends Data GPDF with GPD command OFF.	If supported by DUT-GPS.
5	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	Clear Sink Table of DUT-GPS. Perform commissioning procedure, using Commissioning GPDF. Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. TH-GPD sends Data GPDF with GPD command TOGGLE. TH-GPD sends Data GPDF with GPD command TOGGLE.	
6	[R3] A.3.3.4.7, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	Clear Sink Table of DUT-GPS. Perform CT-based commissioning procedure. Read out Sink Table of the DUT-GPS. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. TH-GPD sends Data GPDF with GPD command ON. TH-GPD sends Data GPDF with GPD command OFF.	If supported by DUT-GPS.

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7	[R3] A.3.3.4.7, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	Clear Sink Table of DUT-GPS. Perform CT-based commissioning procedure. Read out Sink Table of the DUT-GPS. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. TH-GPD sends Data GPDF with GPD command TOGGLE. TH-GPD sends Data GPDF with GPD command TOGGLE.	If supported by DUT-GPS.

4.7.2.3 Expected Outcome

Pass verdict:
0) If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, • Either indicating the Translation Table is empty (Status = SUCCESS, TotalNumberOfEntries = StartIndex = EntriesCount = 0x00); • or containing at least the default entries: ▪ Either: – An entry for the GPD OFF command (0x20), for *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to On/Off cluster (ClusterID = 0x0006), Off command (*CommandID* = 0x00), and ZigBee command payload length set to 0x00. – and An entry for the GPD ON command (0x21), for *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to On/Off cluster (ClusterID = 0x0006), On command (*CommandID* = 0x01), and ZigBee command payload length set to 0x00; ▪ OR An entry for the GPD TOGGLE command (0x22), for *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to On/Off cluster (ClusterID = 0x0006), Toggle command (CommandID = 0x02), and ZigBee command payload length set to 0x00;
1) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with DeviceID = 0x02. The DUT-GPS may execute the ON command. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • An entry for the GPD OFF command (0x20), mapped to On/Off cluster (*ClusterID* = 0x0006), Off command (*CommandID* = 0x00), and ZigBee command payload length set to 0x00; either for ApplicationID = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • An entry for the GPD ON command (0x21), mapped to On/Off cluster (*ClusterID* = 0x0006), On command (*CommandID* = 0x01), and ZigBee command payload length set to 0x00; either for ApplicationID = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; DUT-GPS executes the (OFF/ON) command. DUT-GPS executes the (ON/OFF) command.
2) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with DeviceID = 0x02. The DUT-GPS may execute the OFF command. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • An entry for the GPD OFF command (0x20), mapped to On/Off cluster (ClusterID = 0x0006), Off command (CommandID = 0x00), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • An entry for the GPD ON command (0x21), mapped to On/Off cluster (ClusterID = 0x0006), On command (CommandID = 0x01), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; DUT-GPS executes the (ON/OFF) command. DUT-GPS executes the (OFF/ON) command.
3) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with DeviceID = 0x02. The DUT-GPS may execute the TOGGLE command. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entry: • An entry for the GPD TOGGLE command (0x22), mapped to On/Off cluster (ClusterID = 0x0006), Toggle command (CommandID = 0x02), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; DUT-GPS executes the TOGGLE command. DUT-GPS executes the TOGGLE command.

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4) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with DeviceID = 0x02. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • An entry for the GPD OFF command (0x20), mapped to On/Off cluster (ClusterID = 0x0006), Off command (CommandID = 0x00), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • An entry for the GPD ON command (0x21), mapped to On/Off cluster (ClusterID = 0x0006), On command (CommandID = 0x01), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; Or • An entry for the GPD TOGGLE command (0x22), mapped to On/Off cluster (ClusterID = 0x0006), Toggle command (CommandID = 0x02), and ZigBee command payload length = 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; DUT-GPS executes the ON command. DUT-GPS executes the OFF command.
5) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with DeviceID = 0x02. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • An entry for the GPD OFF command (0x20), mapped to On/Off cluster (ClusterID = 0x0006), Off command (CommandID = 0x00), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • An entry for the GPD ON command (0x21), mapped to On/Off cluster (ClusterID = 0x0006), On command (CommandID = 0x01), and ZigBee command payload length = 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; Or • An entry for the GPD TOGGLE command (0x22), mapped to On/Off cluster (ClusterID = 0x0006), Toggle command (CommandID = 0x02), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; DUT-GPS executes both TOGGLE commands.
6) At the end of the commissioning procedure, DUT-GPS reports Sink Table entry for GPD ID =N with DeviceID = 0x02. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • An entry for the GPD OFF command (0x20), mapped to On/Off cluster (ClusterID = 0x0006), Off command (CommandID = 0x00), and ZigBee command payload length set to 0x00; either for ApplicationID = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • An entry for the GPD ON command (0x21), mapped to On/Off cluster (ClusterID = 0x0006), On command (CommandID = 0x01), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; Or • An entry for the GPD TOGGLE command (0x22), mapped to On/Off cluster (ClusterID = 0x0006), Toggle command (CommandID = 0x02), and ZigBee command payload length = 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; DUT-GPS executes the ON command. DUT-GPS executes the OFF command.
7) At the end of the commissioning procedure, DUT-GPS reports Sink Table entry for GPD ID = N with DeviceID = 0x02. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • An entry for the GPD OFF command (0x20), mapped to On/Off cluster (ClusterID = 0x0006), Off command (CommandID = 0x00), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • An entry for the GPD ON command (0x21), mapped to On/Off cluster (ClusterID = 0x0006), On command (CommandID = 0x01), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; Or • An entry for the GPD TOGGLE command (0x22), mapped to On/Off cluster (ClusterID = 0x0006), Toggle command (CommandID = 0x02), and ZigBee command payload length set to 0x00; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; DUT-GPS executes both TOGGLE commands.

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Fail verdict:
0) DUT-GPS supporting Translation Table functionality does not send GP Translation Table Response.
1) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry the value 0x02 in the DeviceID field. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the first GPD command in the operational mode (OFF/ON). AND/OR DUT-GPS does not execute the second GPD command in the operational mode (ON/OFF).
2) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry the value 0x02 in the DeviceID field. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the first GPD command in the operational mode (ON/OFF). AND/OR DUT-GPS does not execute the second GPD command in the operational mode (OFF/ON).
3) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry the value 0x02 in the DeviceID field. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute either of the GPD TOGGLE command in the operational mode.
4) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry the value 0x02 in the DeviceID field. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the GPD ON command in the operational mode. AND/OR DUT-GPS does not execute the GPD OFF command in the operational mode.
5) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry the value 0x02 in the DeviceID field. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute either of the GPD TOGGLE commands in the operational mode.
6) DUT-GPS does not report Sink Table entry for GPD ID = N AND/OR the Sink Table entry stores DeviceID other than 0x02. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the GPD ON command in the operational mode. AND/OR DUT-GPS does not execute the GPD OFF command in the operational mode.
7) DUT-GPS does not report Sink Table entry for GPD ID =N AND/OR the Sink Table entry stores DeviceID other than 0x02. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute either of the GPD TOGGLE commands in the operational mode.

4.7.2.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPDRX20	Rx of GPD Off command	Direct
GPDRX21	Rx of GPD On command	Direct
GPDRX22	Rx of GPD Toggle command	Direct

4.7.3 GPS supporting GPD Temperature Sensor: Device ID 0x30 or GPD-controllable Temperature Measurement functionality

4.7.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.7.1.1.1.	
2	[R3] A.3.6.2.1, A.3.6.2.2	The TH-GPD supports for GPD Temperature sensor functionality (Device ID 0x30) or GPD-controllable Temperature Measurement functionality (cluster 0x0402).	
3	[R3] A.3.3.2.2	The Sink Table of the DUT-GPS is empty.	

4.7.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
0	[R3] A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	

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1A	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**Commissioning:** Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* = 0x30; *ApplicationInformation* not included. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1B		Clean Sink Table. Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* = 0x30; with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, *ClusterList* present and including at least the Temperature Measurement cluster. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1C		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* = 0x30 and *SendPairing* sub-field set to 0b1, and *ApplicationInformation* absent. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1D		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* = 0x30 and *SendPairing* sub-field set to 0b1, with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, *ClusterList* field present and including at least the Temperature Measurement cluster. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1E		Clean Sink Table. Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* other than 0x30; with *ApplicationInformation* present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and *ClusterList* including at least the Temperature Measurement cluster. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1F		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* other than 0x30 and *SendPairing* sub-field set to 0b1, with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6},*ClusterList* present and including at least the Temperature Measurement cluster.	

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		The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
2A		**Attribute reporting:** If reception of GPD command 0xA0 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Attribute reporting command (0xA0) with only the *MeasuredValue* Attribute of the *Temperature Measurement* cluster. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2B		**Attribute reporting:** If reception of GPD command 0xA0 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Attribute reporting command (0xA0) with 3 attributes of the *Temperature Measurement* cluster: the *MeasuredValue, MinValue and MaxValue* attribute. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2C		**Attribute reporting:** If reception of GPD command 0xA1 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific attribute reporting command (0xA1), with *ManufacturerID* as supported by DUT-GPS, one attribute report for the *MeasuredValue* Attribute of the *Temperature Measurement* cluster (0x0402). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2D		**Attribute reporting:** If reception of GPD command 0xA1 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific attribute reporting command (0xA1), with ManufacturerID NOT supported by DUT-GPS, with one attribute report for the *MeasuredValue* Attribute of the *Temperature Measurement* cluster (0x0402). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2E		**Attribute reporting:** If reception of GPD command 0xA2 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA2), with one cluster report for the *MeasuredValue* Attribute of the *Temperature Measurement* cluster. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2F		**Attribute reporting:** If reception of GPD command 0xA2 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA2), with two cluster reports: one for the *MeasuredValue* Attribute of the *Temperature Measurement* cluster and one for an attribute of a cluster unsupported by DUT-GPS (e.g. *MeasuredValue* of the *Relative Humidity Measurement* cluster). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	

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2G		**Attribute reporting:** If reception of GPD command 0xA3 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific multi-cluster reporting command (0xA3), with *ManufacturerID* as supported by DUT-GPS, one cluster report for the *MeasuredValue* Attribute of the *Temperature Measurement* cluster (0x0402). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2H		**Attribute reporting:** If reception of GPD command 0xA3 is supported by DUT-GPS,TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA3), with *ManufacturerID* NOT supported by DUT-GPS, with two cluster reports: one for the *MeasuredValue* Attribute of the *Temperature Measurement* cluster (0x0402) and one for an attribute of a cluster unsupported by DUT-GPS (e.g. 0xfdfd). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2I		**Attribute reporting:** If reception of GPD command 0xA6 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD ZCL tunnelling command (0xA6), carrying ZCL generic Report Attributes command (0xA0) for the *MeasuredValue* Attribute of the *Temperature Measurement* cluster (0x0402). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
3		**If DUT-GPS supports reading out GPD attributes:** Trigger DUT-GPS to send GPD Read Attributes command. If the DUT-GPS supports multiple variants of this command (e.g. with different AttributeIDs or attribute combinations), repeat the test for each variant that included the Temperature Measurement cluster..	
4		**Note: DUT-GPS's support for writing GPD attributes of Illuminance Measurement cluster not tested; since all attributes of the Relative Humidity Measurement cluster are read only [R5].**	
5A		**Negative test: GPD CommandID list without any GPD sensor command:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, *ClusterList* field present and including Temperature Measurement cluster, *GPD CommandID list* field present, but containing none of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field correctly set, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
5B		**Negative test: GPD Commissioning command without GPD CommandID list field:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, with *ClusterList* field present and including Temperature Measurement ClusterID, and *GPD CommandID list* field absent, and the sub-field of the	

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		Application information field set accordingly, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
5C		**Negative test: GPD Commissioning command ClusterList without Temperature Measurement:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, with *ClusterList* field present and NOT including Temperature Measurement ClusterID, and *GPD CommandID list* field present and including at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
5D		**Negative test: GPD Commissioning command without ClusterList:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, without *ClusterList* field present and with *GPD CommandID list* field present and including at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS.	

4.7.3.3 Expected Outcome

Pass verdict:
0) If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, • Either indicating the Translation Table is empty (Status = SUCCESS, *TotalNumberOfEntries* = *StartIndex* = EntriesCount = 0x00); • or containing at least the following default generic entries: ▪ EITHER an entry for any GPD sensor reporting command, with *GPD Command* field set to command (0xAF), with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command (0x0A) with ZigBee command payload length set to 0xff (to be copied from the GPDF); ▪ OR five entries with *GPD Command* = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command (0x0A) with ZigBee command payload length set to 0xff (to be copied from the GPDF).
1A) – 1D) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with *AddSink* = 0b1 and *DeviceID* = 0x30. DUT-GPS has a Sink Table entry for GPD ID = N with DeviceID = 0x30. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • EITHER: Either an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with *GPD Command* = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF); • OR an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with *GPD Command* = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with GPD ID = N and the corresponding *ApplicationID*, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF).
1E) – 1F) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with *AddSink* = 0b1 and *DeviceID* as copied from the Commissioning GPDF. DUT-GPS has a Sink Table entry for GPD ID = N. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • EITHER: Either an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with GPD Command = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF); • OR an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with GPD Command = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, with GPD ID = N and the corresponding *ApplicationID*, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF).

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2A) – 2I) If possible, verify that DUT-GPS executes the TH-GPD command. (e.g. if supported, DUT-GPS has a correct value for the *MeasuredValue* attribute of the *Temperature Measurement* cluster (0x0402)).
3) DUT-GPS sends out at least one correctly protected GPD Read Attributes command (0xF2), formatted as specified in test 4.6.1.10, carrying at least one Cluster Record, for the Temperature Measurement cluster (0x0402), with at least one attribute of Measured Value (0x0000), MinMeasuredValue (0x0001) and MaxMeasuredValue (0x0002). Some time after reception of the GPD Read Attributes command, TH-GPD responds with GPD Read Attributes Response for the requested attribute(s).
4) None.
5A) – 5D) DUT-GPS does not send GP Pairing command for the TH-GPD. DUT-GPS does not have a Sink Table entry for TH-GPD.
Fail verdict:
0) DUT-GPS supporting Translation Table does not send GP Translation Table Response.
1A) – 1D) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry: AddSink = 0b1 and/or DeviceID = 0x30. AND/OR DUT-GPS does not have a Sink Table entry for GPD ID = N with DeviceID = 0x30 AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries as defined in 4.7.3.3/item 1A) above.
1E) – 1F) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry: AddSink = 0b1. AND/OR DUT-GPS does not have a Sink Table entry for GPD ID = N. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries as defined in 4.7.3.3/item 1E) above.
2A) – 2I) If there is a way to check the execution correctness, and the DUT-GPS incorrectly executes the TH-GPD command.
3) DUT-GPS does NOT sends at least one correctly protected GPD Read Attributes command (0xF2), AND/OR GPD Read Attributes is NOT formatted as specified in test 4.6.1.10, AND/OR the Cluster Record for the Temperature Measurement cluster (0x0402), does not include at least one attribute of Measured Value (0x0000), MinMeasuredValue (0x0001) and MaxMeasuredValue (0x0002). AND/OR TH-GPD does NOT respond with GPD Read Attributes Response for the requested attribute(s).
4) None.
5A) – 5D) DUT-GPS sends GP Pairing command for the TH-GPD. AND/OR DUT-GPS has a Sink Table entry for TH-GPD.

4.7.3.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPDRXA0 – GPDRXA3	Reception of GPD Attribute reporting command	Direct
GPDRXA6	Reception of GP ZCL Tunneling command (0xA6)	Direct
GPS9	Temperature Measurement GP functionality	Direct

4.7.4 GPS supporting GPD Simple Generic 1-state Switch: Device ID 0x00

4.7.4.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.7.1.1.1.	
2	[R3] A.3.6.2.2, A.3.3.4.6, A.3.3.5.5 A.4	The TH-GPD supports for GPD Simple Generic 1-state switch (Device ID 0x00).	
3	[R3] A.3.3.2.2	The Sink Table of the DUT-GPS is empty. If possible, start with the light OFF.	

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Item	Doc. Ref.	Test Step	Note
0	[R3] A.3.3.4.6, A.3.3.5.5	If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0.	If Translation Table functionality is supported by the device.
1A	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5. A.4	**Auto-Commissioning**: Perform commissioning procedure, using Data GPDF with Auto-Commissioning sub-field of the NWK Frame control field set to 0b1, and the CommandID = 0x60 (Press 1 of 1). Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. If the DUT-GPS supports the Translation Table functionality, but the Translation Table is empty upon successful commissioning completion, then the TH-Tool shall send GP Translation Table Update command, mapping either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*: • GPD Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster); • GPD Release 1 of 1 command to another ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster). TH-GPD sends Data GPDF with GPD command Press 1 of 1. TH-GPD sends Data GPDF with GPD command Release 1 of 1.	If Auto-Commissioning is supported by GPS and TH-GPD settings are allowed by DUT-GPS's security capabilities. If DUT-GPS requires gpsSecurityLevel >= 0b10, the shared key may be programmed into the GPD.
1B	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5. A.4	**Auto-Commissioning**: Clear Sink Table of DUT-GPS. Perform commissioning procedure, using Data GPDF with Auto-Commissioning sub-field of the NWK Frame control field set to 0b1, and the CommandID = 0x61 (Release 1 of 1). Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. If the DUT-GPS supports the Translation Table functionality, but the Translation Table is empty upon successful commissioning completion, then the TH-Tool shall send GP Translation Table Update command, mapping either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*: • GPD Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster); • GPD Release 1 of 1 command to another ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster). TH-GPD sends Data GPDF with GPD command Press 1 of 1. TH-GPD sends Data GPDF with GPD command Release 1 of 1.	If Auto-Commissioning is supported by GPS and TH-GPD settings are allowed by DUT-GPS's security capabilities. If DUT-GPS requires gpdSecurityLevel >= 0b10, the shared key may be programmed into the GPD.

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2	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**Commissioning via GPD Commissioning command**: Clear Sink Table of DUT-GPS. Perform commissioning procedure, using Commissioning GPDF. Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. If the DUT-GPS supports the Translation Table functionality, but the Translation Table is empty upon successful commissioning completion, then the TH-Tool shall send GP Translation Table Update command, mapping either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*: • GPD Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster); • GPD Release 1 of 1 command to another ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster). TH-GPD sends Data GPDF with GPD command Press 1 of 1. TH-GPD sends Data GPDF with GPD command Release 1 of 1.	If proxy- or proximity-based commissioning functionality is supported by DUT-GPS. If the Translation Table functionality is NOT supported by the GPS, its vendor shall indicate what functionality it maps the commands to.
3	[R3] A.3.3.4.7, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**Commissioning via GP Pairing Configuration command**: Clear Sink Table of DUT-GPS. Perform CT-based commissioning procedure. Read out Sink Table of the DUT-GPS. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. If the DUT-GPS supports the Translation Table functionality, but the Translation Table is empty upon successful commissioning completion, then the TH-Tool shall send GP Translation Table Update command, mapping either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*: • GPD Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster); • GPD Release 1 of 1 command to another ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster). TH-GPD sends Data GPDF with GPD command Press 1 of 1. TH-GPD sends Data GPDF with GPD command Release 1 of 1.	If CT-based commissioning functionality is supported by DUT-GPS.

4.7.4.3 Expected Outcome

Pass verdict:
0) If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, • Either indicating the Translation Table is empty (Status = SUCCESS, TotalNumberOfEntries = StartIndex = EntriesCount = 0x00); • or containing at least the default entry: ▪ An entry for the GPD Press 1 of 1 command (0x60), for *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to a cluster supported by this DUT-GPS and formatted accordingly; ▪ It may also contain an entry for the GPD Release 1 of 1 command (0x61), for *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to a cluster supported by this DUT-GPS and formatted accordingly;
1A) – 1B) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with DeviceID = 0x00 or DeviceID = 0x05. If DUT-GPS supports Translation Table functionality, upon Translation Table readout, DUT-GPS may have at least the following Translation Table entries: • An entry for the GPD Press 1 of 1 command (0x60), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*;

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• It may also have an entry for the GPD Release 1 of 1 command (0x61), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • It may also have an entry for the GPD Short Press 1 of 1 command (0x66), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • Or the Translation Table entries just created by the TH-Tool. DUT-GPS executes the mapped GPD Press 1 of 1 command. DUT-GPS executes the mapped GPD Release 1 of 1 command.
2) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with DeviceID = 0x00. If DUT-GPS supports Translation Table functionality, upon Translation Table readout, DUT-GPS may have at least the following Translation Table entries: • An entry for the GPD Press 1 of 1 command (0x60), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • It may also have an entry for the GPD Release 1 of 1 command (0x61), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • Or the Translation Table entries just created by the TH-Tool. DUT-GPS executes the mapped GPD Press 1 of 1 command. DUT-GPS executes the mapped GPD Release 1 of 1 command.
3) At the end of the commissioning procedure, DUT-GPS reports Sink Table entry for SrcID =N with DeviceID = 0x00. If DUT-GPS supports Translation Table functionality, upon Translation Table readout, DUT-GPS may have at least the following Translation Table entries: • An entry for the GPD Press 1 of 1 command (0x60), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • It may also have an entry for the GPD Release 1 of 1 command (0x61), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • Or the Translation Table entries just created by the TH-Tool. DUT-GPS executes the mapped GPD Press 1 of 1 command. DUT-GPS executes the mapped GPD Release 1 of 1 command.
Fail verdict:
0) DUT-GPS supporting Translation Table functionality does not send GP Translation Table Response.
1A) – 1B) DUT-GPS does not send GP Pairing AND/OR the GP Pairing carries other DeviceID value than 0x00 or 0x05. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the GPD Press 1 of 1 command in the operational mode as mapped. AND/OR DUT-GPS does not execute the GPD Release 1 of 1 command in the operational mode as mapped.
2) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry the value 0x00 in the DeviceID field. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the GPD Press 1 of 1 command in the operational mode as mapped. AND/OR DUT-GPS does not execute the GPD Release 1 of 1 command in the operational mode as mapped.
3) DUT-GPS does not report Sink Table entry for GPD ID = N AND/OR the Sink Table entry stores DeviceID other than 0x00. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the GPD Press 1 of 1 command in the operational mode as mapped. AND/OR DUT-GPS does not execute the GPD Release 1 of 1 command in the operational mode as mapped.

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4.7.4.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPS1A	GPD Simple Generic 1-state switch	Direct
GPDRX60	Rx of GPD Press 1 of 1 command	Direct
GPDRX61	Rx of GPD Release 1 of 1 command	Direct

4.7.5 GPS supporting GPD Advanced Generic 1-state Switch: Device ID 0x05

4.7.5.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.7.1.1.1.	
2	[R3] A.3.6.2.2, A.3.3.4.6, A.3.3.5.5, A.4	The TH-GPD supports for GPD Advanced Generic 1-state switch (Device ID 0x05).	
3	[R3] A.3.3.2.2	The Sink Table of the DUT-GPS is empty. If possible, start with the light OFF.	

4.7.5.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
0	[R3] A.3.3.4.6, A.3.3.5.5	If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0.	If Translation Table functionality is supported by the device
1A	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5, A.4	**Auto-Commissioning**: Clear Sink Table of DUT-GPS. Perform commissioning procedure, using Data GPDF with the Auto-Commissioning sub-field of the NWK Frame Control field set to 0b1, and the GPD CommandID carrying 0x66 (GPD Short Press 1 of 1). Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. If the DUT-GPS supports the Translation Table functionality, but the Translation Table is empty upon successful commissioning completion, then the TH-Tool shall send GP Translation Table Update command, mapping either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*: • GPD Short Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster); • GPD Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. MOVE up/down of the Level control cluster); • GPD Release 1 of 1 command to another ZCL command supported by DUT-GPS (e.g. STOP of the Level control cluster). TH-GPD sends Data GPDF with GPD command Short Press 1 of 1. TH-GPD sends Data GPDF with GPD command Press 1 of 1. TH-GPD sends Data GPDF with GPD command Release 1 of 1.	If Auto-Commissioning is supported by GPS and TH-GPD settings are allowed by DUT-GPS's security capabilities. If DUT-GPS requires gpsSecurityLevel >= 0b10, the shared key may be programmed into the GPD.
1B	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5, A.4	**Auto-Commissioning**: Clear Sink Table of DUT-GPS. Perform commissioning procedure, using Data GPDF with the Auto-Commissioning sub-field of the NWK Frame Control field set to 0b1, and the GPD CommandID carrying 0x60 (GPD Press 1 of 1). Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool	

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		sends GP Translation Table Request command with *Start Index* 0. If the DUT-GPS supports the Translation Table functionality, but the Translation Table is empty upon successful commissioning completion, then the TH-Tool shall send GP Translation Table Update command, mapping either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*: • GPD Short Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster); • GPD Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. MOVE up/down of the Level control cluster); • GPD Release 1 of 1 command to another ZCL command supported by DUT-GPS (e.g. STOP of the Level control cluster). TH-GPD sends Data GPDF with GPD command Short Press 1 of 1. TH-GPD sends Data GPDF with GPD command Press 1 of 1. TH-GPD sends Data GPDF with GPD command Release 1 of 1.	
1C	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5, A.4	**Auto-Commissioning**: Clear Sink Table of DUT-GPS. Perform commissioning procedure, using Data GPDF with the Auto-Commissioning sub-field of the NWK Frame Control field set to 0b1, and the GPD CommandID carrying 0x61 (GPD Release 1 of 1). Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. If the DUT-GPS supports the Translation Table functionality, but the Translation Table is empty upon successful commissioning completion, then the TH-Tool shall send GP translation Table Update command, mapping either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*: • GPD Short Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster); • GPD Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. MOVE up/down of the Level control cluster); • GPD Release 1 of 1 command to another ZCL command supported by DUT-GPS (e.g. STOP of the Level control cluster). TH-GPD sends Data GPDF with GPD command Short Press 1 of 1. TH-GPD sends Data GPDF with GPD command Press 1 of 1. TH-GPD sends Data GPDF with GPD command Release 1 of 1.	
2	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5, A.4	**Commissioning via GPD Commissioning command** Clear Sink Table of DUT-GPS. Perform commissioning procedure, using Commissioning GPDF. Exit commissioning, if required. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. If the DUT-GPS supports the Translation Table functionality, but the Translation Table is empty upon successful commissioning completion, then the TH-Tool shall send GP translation Table Update command, mapping either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*: • GPD Short Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster); • GPD Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. MOVE up/down of the Level control cluster); • GPD Release 1 of 1 command to another ZCL command supported by DUT-GPS (e.g. STOP of the Level control cluster).	If proxy- or proximity-based commissioning functionality is supported by DUT-GPS. If the Translation Table functionality is NOT supported by the GPS, its vendor shall indicate what functionality it maps the commands to.

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		TH-GPD sends Data GPDF with GPD command Short Press 1 of 1. TH-GPD sends Data GPDF with GPD command Press 1 of 1. TH-GPD sends Data GPDF with GPD command Release 1 of 1.	
3	[R3] A.3.3.4.7, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5, A.4	**Commissioning via GP Pairing Configuration command** Clear Sink Table of DUT-GPS. Perform CT-based commissioning procedure. Read out Sink Table of the DUT-GPS. If DUT-GPS supports Translation Table functionality, the TH-Tool sends GP Translation Table Request command with *Start Index* 0. If the DUT-GPS supports the Translation Table functionality, but the Translation Table is empty upon successful commissioning completion, then the TH-Tool shall send GP translation Table Update command, mapping either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*: • GPD Short Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. TOGGLE of the on/off cluster); • GPD Press 1 of 1 command to a ZCL command supported by DUT-GPS (e.g. MOVE up/down of the Level control cluster); • GPD Release 1 of 1 command to another ZCL command supported by DUT-GPS (e.g. STOP of the Level control cluster). TH-GPD sends Data GPDF with GPD command Short Press 1 of 1. TH-GPD sends Data GPDF with GPD command Press 1 of 1. TH-GPD sends Data GPDF with GPD command Release 1 of 1.	If CT-based commissioning functionality is supported by DUT-GPS.

1481 #### 4.7.5.3 Expected Outcome

Pass verdict:
0) If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, • Either indicating the Translation Table is empty (Status = SUCCESS, TotalNumberOfEntries = StartIndex = EntriesCount = 0x00); • or containing at least the default entries: ▪ An entry for the GPD Short Press 1 of 1 command (0x66), for ApplicationID = 0b000 and SrcID = 0xffffffff, mapped to a cluster supported by this DUT-GPS and formatted accordingly; ▪ An entry for the GPD Press 1 of 1 command (0x60), for ApplicationID = 0b000 and SrcID = 0xffffffff, mapped to a cluster supported by this DUT-GPS and formatted accordingly; ▪ It may also contain an entry for the GPD Release 1 of 1 command (0x61), for *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to a cluster supported by this DUT-GPS and formatted accordingly.
1A) At the end of the commissioning procedure, DUT-GPS sends GP Pairing for GPD ID = N with DeviceID = 0x05. DUT-GPS may execute the GPD Short press 1 of 1 command (as mapped). If DUT-GPS supports Translation Table functionality, upon Translation Table readout, DUT-GPS may have at least the following Translation Table entries: • An entry for the GPD Short Press 1 of 1 command (0x66), for *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to a cluster supported by this DUT-GPS and formatted accordingly; • An entry for the GPD Press 1 of 1 command (0x60), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and corresponding *ApplicationID*; • It may also have an entry for the GPD Release 1 of 1 command (0x61), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; or the Translation Table entries just created by the TH-Tool. DUT-GPS executes the mapped GPD Short Press 1 of 1 command. DUT-GPS executes the mapped GPD Press 1 of 1 command. DUT-GPS executes the mapped GPD Release 1 of 1 command.
1B) – 1C) At the end of the commissioning procedure, DUT-GPS sends GP Pairing for GPD ID = N with DeviceID = 0x00 or DeviceID = 0x05.

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If DUT-GPS supports Translation Table functionality, upon Translation Table readout, DUT-GPS may have at least the following Translation Table entries: • An entry for the GPD Press 1 of 1 command (0x60), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • It may also have an entry for the GPD Release 1 of 1 command (0x61), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*; • Or the Translation Table entries just created by the TH-Tool. DUT-GPS executes the mapped GPD Press 1 of 1 command. DUT-GPS executes the mapped GPD Release 1 of 1 command. If DUT-GPS has a Translation table entry for GPD Short Press 1 of 1 command (0x66), it executes it as mapped.
2) At the end of the commissioning procedure, DUT-GPS sends GP Pairing for GPD ID = N with DeviceID = 0x05. If DUT-GPS supports Translation Table functionality, upon Translation Table readout, DUT-GPS may have at least the following Translation Table entries: • An entry for the GPD Short Press 1 of 1 command (0x66), for *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to a cluster supported by this DUT-GPS and formatted accordingly; • An entry for the GPD Press 1 of 1 command (0x60), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and corresponding *ApplicationID*; • It may also have an entry for the GPD Release 1 of 1 command (0x61), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and corresponding *ApplicationID*; or the Translation Table entries just created by the TH-Tool. DUT-GPS executes the mapped GPD Short Press 1 of 1 command. DUT-GPS executes the mapped GPD Press 1 of 1 command. DUT-GPS executes the mapped GPD Release 1 of 1 command.
3) At the end of the commissioning procedure, DUT-GPS reports Sink Table entry for GPD ID =N with DeviceID = 0x05. If DUT-GPS supports Translation Table functionality, upon Translation Table readout, DUT-GPS may have at least the following Translation Table entries: • An entry for the GPD Short Press 1 of 1 command (0x66), for *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to a cluster supported by this DUT-GPS and formatted accordingly; • An entry for the GPD Press 1 of 1 command (0x60), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and corresponding *ApplicationID*; • It may also have an entry for the GPD Release 1 of 1 command (0x61), mapped to a cluster supported by DUT-GPS and formatted accordingly; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and corresponding *ApplicationID*; or the Translation Table entries just created by the TH-Tool. DUT-GPS executes the mapped GPD Short Press 1 of 1 command. DUT-GPS executes the mapped GPD Press 1 of 1 command. DUT-GPS executes the mapped GPD Release 1 of 1 command.
Fail verdict:
0) DUT-GPS supporting Translation Table functionality does not send GP Translation Table Response.
1A) DUT-GPS does not send GP Pairing for GPD ID = N AND/OR the GP Pairing does not carry the value 0x05 in the DeviceID field. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the GPD Short Press 1 of 1 command in the operational mode, exactly as mapped. AND/OR DUT-GPS does not execute the GPD Press 1 of 1 command in the operational mode, exactly as mapped. AND/OR DUT-GPS does not execute the GPD Release 1 of 1 command in the operational mode, exactly as mapped.
1B) – 1C) DUT-GPS does not send GP Pairing for GPD ID = N AND/OR the GP Pairing carries other DeviceID value

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than 0x00 or 0x05. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the GPD Press 1 of 1 command in the operational mode as mapped. AND/OR DUT-GPS does not execute the GPD Release 1 of 1 command in the operational mode as mapped. AND/OR If DUT-GPS has a Translation table entry for GPD Short Press 1 of 1 command (0x66), it does not execute it as mapped.
2) DUT-GPS does not send GP Pairing for GPD ID = N AND/OR the GP Pairing does not carry the value 0x05 in the DeviceID field. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the GPD Short Press 1 of 1 command in the operational mode, exactly as mapped. AND/OR DUT-GPS does not execute the GPD Press 1 of 1 command in the operational mode, exactly as mapped. AND/OR DUT-GPS does not execute the GPD Release 1 of 1 command in the operational mode, exactly as mapped.
3) DUT-GPS does not report Sink Table entry for GPD ID = N AND/OR the Sink Table entry stores DeviceID other than 0x05. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries. AND/OR DUT-GPS does not execute the GPD Short Press 1 of 1 command in the operational mode, exactly as mapped. AND/OR DUT-GPS does not execute the GPD Press 1 of 1 command in the operational mode, exactly as mapped. AND/OR DUT-GPS does not execute the GPD Release 1 of 1 command in the operational mode, exactly as mapped.

4.7.5.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPS14A	GPD Advanced Generic 1-state switch	Direct
GPDRX60	Rx of GPD Press 1 of 1 command	Direct
GPDRX61	Rx of GPD Release 1 of 1 command	Direct
GPDRX66	Rx of GPD Short Press 1 of 1 command	Direct

4.7.6 NOT TESTED: GPS supporting GP Level control switch (TBD)

4.7.7 NOT TESTED: GPS supporting GP Simple Generic 2-state switch (TBD)

4.7.8 NOT TESTED: GPS supporting GP Light Sensor or GPD-controllable Illuminance Measurement functionality

4.7.8.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.7.1.1.1.	
2	[R3] A.3.6.2.1, A.3.6.2.2	The TH-GPD supports for GPD Light sensor functionality (Device ID 0x11) or GPD-controllable Illuminance Measurement functionality (cluster 0x0400).	
3	[R3] A.3.3.2.2	The Sink Table of the DUT-GPS is empty.	

4.7.8.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
0	[R3] A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	

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1A	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**Commissioning:** Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* = 0x11; *ApplicationInformation* not included. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1B		Clean Sink Table. Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* = 0x11; with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, *ClusterList* present and including at least the Illuminance Measurement cluster. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1C		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* = 0x11 and *SendPairing* sub-field set to 0b1, and *ApplicationInformation* absent. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1D		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* = 0x11 and *SendPairing* sub-field set to 0b1, with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, *ClusterList* field present and including at least the Illuminance Measurement cluster. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1E		Clean Sink Table. Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* other than 0x11; with *ApplicationInformation* present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and *ClusterList* including at least the Illuminance Measurement cluster. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1F		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* other than 0x11 and *SendPairing* sub-field set to 0b1, with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6},*ClusterList* present and including at least the Illuminance Measurement cluster.	

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		The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
2A		**Attribute reporting:** If reception of GPD command 0xA0 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Attribute reporting command (0xA0) with only the *MeasuredValue* Attribute of the *Illuminance Measurement* cluster. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2B		**Attribute reporting:** If reception of GPD command 0xA0 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Attribute reporting command (0xA0) with 3 attributes of the *Illuminance Measurement* cluster: the *MeasuredValue, MinValue and MaxValue* attribute. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2C		**Attribute reporting:** If reception of GPD command 0xA1 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific attribute reporting command (0xA1), with *ManufacturerID* as supported by DUT-GPS, one attribute report for the *MeasuredValue* Attribute of the *Illuminance Measurement* cluster (0x0400). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2D		**Attribute reporting:** If reception of GPD command 0xA1 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific attribute reporting command (0xA1), with ManufacturerID NOT supported by DUT-GPS, with one attribute report for the *MeasuredValue* Attribute of the *Illuminance Measurement* cluster (0x0400). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2E		**Attribute reporting:** If reception of GPD command 0xA2 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA2), with one cluster report for the *MeasuredValue* Attribute of the *Illuminance Measurement* cluster. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2F		**Attribute reporting:** If reception of GPD command 0xA2 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA2), with two cluster reports: one for the *MeasuredValue* Attribute of the *Illuminance Measurement* cluster and one for an attribute of a cluster unsupported by DUT-GPS (e.g. *MeasuredValue* of the *Relative Humidity Measurement* cluster). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	

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2G		**Attribute reporting:** If reception of GPD command 0xA3 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific multi-cluster reporting command (0xA3), with *ManufacturerID* as supported by DUT-GPS, one cluster report for the *MeasuredValue* Attribute of the *Illuminance Measurement* cluster (0x0400). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2H		**Attribute reporting:** If reception of GPD command 0xA3 is supported by DUT-GPS,TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA3), with *ManufacturerID* NOT supported by DUT-GPS, with two cluster reports: one for the *MeasuredValue* Attribute of the *Illuminance Measurement* cluster (0x0400) and one for an attribute of a cluster unsupported by DUT-GPS (e.g. 0xfdfd). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2I		**Attribute reporting:** If reception of GPD command 0xA6 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD ZCL tunnelling command (0xA6), carrying ZCL generic Report Attributes command (0xA0) for the *MeasuredValue* Attribute of the *Illuminance Measurement* cluster (0x0400). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
3		**If DUT-GPS supports reading out GPD attributes:** Trigger DUT-GPS to send GPD Read Attributes command. If the DUT-GPS supports multiple variants of this command (e.g. with different AttributeIDs or attribute combinations), repeat the test for each variant that included the Illuminance Measurement cluster.	
4		**Note: DUT-GPS's support for writing GPD attributes of Illuminance Measurement cluster not tested; since all Illuminance Measurement cluster attributes are read only [R5].**	
5A		**Negative test: GPD CommandID list without any GPD sensor command:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, *ClusterList* field present and including Illuminance Measurement cluster, *GPD CommandID list* field present, but containing none of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field correctly set, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
5B		**Negative test: GPD Commissioning command without GPD CommandID list field:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, with *ClusterList* field present and including Illuminance Measurement	

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		ClusterID, and *GPD CommandID list* field absent, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
5C		**Negative test: GPD Commissioning command ClusterList without Illuminance Measurement:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, with *ClusterList* field present and NOT including Illuminance Measurement ClusterID, and *GPD CommandID list* field present and including at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
5D		**Negative test: GPD Commissioning command without ClusterList:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, without *ClusterList* field present and with *GPD CommandID list* field present and including at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS.	

4.7.8.3 Expected Outcome

Pass verdict:
0) If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, • Either indicating the Translation Table is empty (Status = SUCCESS, *TotalNumberOfEntries* = *StartIndex* = EntriesCount = 0x00); • or containing at least the following default generic entries: ▪ EITHER an entry for any GPD sensor reporting command, with *GPD Command* field set to GPD command (0xAF), with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command (0x0A) with ZigBee command payload length set to 0xff (to be copied from the GPDF); ▪ OR five entries with *GPD Command* = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command (0x0A) with ZigBee command payload length set to 0xff (to be copied from the GPDF).
1A) – 1D) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with *AddSink* = 0b1 and *DeviceID* = 0x11. DUT-GPS has a Sink Table entry for GPD ID = N with DeviceID = 0x30. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • EITHER: Either an entry for any GPD sensor reporting command, (GPD Command =0xAF) five entries with *GPD Command* = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF); • OR an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with *GPD Command* = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, with GPD ID = N and the corresponding *ApplicationID*, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF).
1E) – 1F) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with *AddSink* = 0b1 and *DeviceID* as copied from the Commissioning GPDF. DUT-GPS has a Sink Table entry for GPD ID = N. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • EITHER: Either an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with GPD Command = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF);

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• OR an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with GPD Command = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, with GPD ID = N and the corresponding *ApplicationID*, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF).
2A) – 2I) If possible, verify that DUT-GPS executes the TH-GPD command. (e.g. if supported, DUT-GPS has a correct value for the *MeasuredValue* attribute of the *Illuminance Measurement* cluster (0x0400)).
3) DUT-GPS sends out at least one correctly protected GPD Read Attributes command (0xF2), formatted as specified in test 4.6.1.10, carrying at least one Cluster Record, for the Illuminance Measurement cluster (0x0400), with at least one attribute of Measured Value (0x0000), MinMeasuredValue (0x0001) and MaxMeasuredValue (0x0002). Some time after reception of the GPD Read Attributes command, TH-GPD responds with GPD Read Attributes Response for the requested attribute(s).
4) None.
5A) – 5D) DUT-GPS does not send GP Pairing command for the TH-GPD. DUT-GPS does not have a Sink Table entry for TH-GPD.
Fail verdict:
0) DUT-GPS supporting Translation Table does not send GP Translation Table Response.
1A) – 1D) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry: AddSink = 0b1 and/or DeviceID = 0x11. AND/OR DUT-GPS does not have a Sink Table entry for GPD ID = N with DeviceID = 0x11 AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries as defined in 4.7.3.3/item 1A) above.
1E) – 1F) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry: AddSink = 0b1. AND/OR DUT-GPS does not have a Sink Table entry for GPD ID = N. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries as defined in 4.7.3.3/item 1E) above.
2A) – 2I) If there is a way to check the execution correctness, and the DUT-GPS incorrectly executes the TH-GPD command.
3) DUT-GPS does NOT sends at least one correctly protected GPD Read Attributes command (0xF2), AND/OR GPD Read Attributes is NOT formatted as specified in test 4.6.1.10, AND/OR the Cluster Record for the Illuminance Measurement cluster (0x0400), does not include at least one attribute of Measured Value (0x0000), MinMeasuredValue (0x0001) and MaxMeasuredValue (0x0002). AND/OR TH-GPD does NOT respond with GPD Read Attributes Response for the requested attribute(s).
4) None.
5A) – 5D) DUT-GPS sends GP Pairing command for the TH-GPD. AND/OR DUT-GPS has a Sink Table entry for TH-GPD.

4.7.8.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPDRXA0 – GPDRXA3	Reception of GPD Attribute reporting command	Direct
GPDRXA6	Reception of GP ZCL Tunneling command (0xA6)	Direct
GPS6	Illuminance Measurement GP functionality	Direct

4.7.9 NOT TESTED: GPS supporting GP Occupancy Sensor or GPD-controllable Occupancy Sensing functionality

4.7.9.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.7.1.1.1.	
2	[R3] A.3.6.2.1, A.3.6.2.2	The TH-GPD supports for GPD Occupancy sensor functionality (Device ID 0x11) or GPD-controllable Occupancy Sensing functionality (cluster 0x0406).	
3	[R3] A.3.3.2.2	The Sink Table of the DUT-GPS is empty.	

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Item	Doc. Ref.	Test Step	Note
0	[R3] A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1A	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**Commissioning:** Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* = 0x12; *ApplicationInformation* not included. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1B		Clean Sink Table. Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* = 0x12; with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, *ClusterList* present and including at least the Occupancy Sensing cluster. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1C		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* = 0x12 and *SendPairing* sub-field set to 0b1, and *ApplicationInformation* absent. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1D		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* = 0x12 and *SendPairing* sub-field set to 0b1, with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, *ClusterList* field present and including at least the Occupancy Sensing cluster. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1E		Clean Sink Table. Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* other than 0x12; with *ApplicationInformation* present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and *ClusterList* including at least the Occupancy Sensing cluster. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	

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1F		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* other than 0x12 and *SendPairing* sub-field set to 0b1, with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6},*ClusterList* present and including at least the Occupancy Sensing cluster. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
2A		**Attribute reporting:** If reception of GPD command 0xA0 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Attribute reporting command (0xA0) with only the *Occupancy* Attribute of the *Occupancy Sensing* cluster. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2B		**Attribute reporting:** If reception of GPD command 0xA0 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Attribute reporting command (0xA0) with 2 attributes of the *Occupancy Sensing* cluster: the *Occupancy, OccupancySensorType* attribute. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2C		**Attribute reporting:** If reception of GPD command 0xA1 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific attribute reporting command (0xA1), with *ManufacturerID* = as supported by DUT-GPS, one attribute report for the *Occupancy* Attribute of the *Occupancy Sensing* cluster (0x0406). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2D		**Attribute reporting:** If reception of GPD command 0xA1 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific attribute reporting command (0xA1), with *ManufacturerID* NOT supported by DUT-GPS, with one attribute report for the *Occupancy* Attribute of the *Occupancy Sensing* cluster (0x0406). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2E		**Attribute reporting:** If reception of GPD command 0xA2 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA2), with one cluster report for the *Occupancy* Attribute of the *Occupancy Sensing* cluster. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	

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2F		**Attribute reporting:** If reception of GPD command 0xA2 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA2), with two cluster reports: one for the *Occupancy* Attribute of the *Occupancy Sensing* cluster and one for an attribute of a cluster unsupported by DUT-GPS (e.g. *MeasuredValue* of the *Relative Humidity Measurement* cluster). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2G		**Attribute reporting:** If reception of GPD command 0xA3 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific multi-cluster reporting command (0xA3), with *ManufacturerID* = as supported by DUT-GPS, one cluster report for the *Occupancy* Attribute of the *Occupancy Sensing* cluster (0x0406). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2H		**Attribute reporting:** If reception of GPD command 0xA3 is supported by DUT-GPS,TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA3), with *ManufacturerID* NOT supported by DUT-GPS, with two cluster reports: one for the *Occupancy* Attribute of the *Occupancy Sensing* cluster (0x0406) and one for an attribute of a cluster unsupported by DUT-GPS (e.g. 0xfdfd). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2I		**Attribute reporting:** If reception of GPD command 0xA6 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD ZCL tunnelling command (0xA6), carrying ZCL generic Report Attributes command (0xA0) for the *Occupancy* Attribute of the *Occupancy Sensing* cluster (0x0406). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
3		**If DUT-GPS supports reading out GPD attributes:** Trigger DUT-GPS to send GPD Read Attributes command. If the DUT-GPS supports multiple variants of this command (e.g. with different AttributeIDs or attribute combinations), repeat the test for each variant that included the Occupancy Sensing cluster.	
4		**If DUT-GPS supports writing GPD attributes:** Trigger DUT-GPS to send GPD Write Attributes command. If the DUT-GPS supports multiple variants of this command (e.g. with different AttributeIDs or attribute combinations), repeat the test for each variant that included the Occupancy Sensing cluster. Trigger DUT-GPS to send GPD Read Attributes command(s) to test the attribute(s) written.	
5A		**Negative test: GPD CommandID list without any GPD sensor command:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30,	

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		ClusterList field present and including Occupancy Sensing cluster, *GPD CommandID list* field present, but containing none of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field correctly set, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
5B		**Negative test: GPD Commissioning command without GPD CommandID list field:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, with *ClusterList* field present and including Occupancy Sensing ClusterID, and *GPD CommandID list* field absent, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
5C		**Negative test: GPD Commissioning command ClusterList without Illuminance Measurement:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, with *ClusterList* field present and NOT including Occupancy Sensing ClusterID, and *GPD CommandID list* field present and including at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
5D		**Negative test: GPD Commissioning command without ClusterList:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, without *ClusterList* field present and with *GPD CommandID list* field present and including at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS.	

4.7.9.3 Expected Outcome

Pass verdict:
0) If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, • Either indicating the Translation Table is empty (Status = SUCCESS, *TotalNumberOfEntries* = *StartIndex* = EntriesCount = 0x00); • or containing at least the following default generic entries: ▪ EITHER an entry for any GPD sensor reporting command, with *GPD Command* field set to GPD command (0xAF), with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command (0x0A) with ZigBee command payload length set to 0xff (to be copied from the GPDF); ▪ OR five entries with *GPD Command* = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command (0x0A) with ZigBee command payload length set to 0xff (to be copied from the GPDF).
1A) – 1D) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with *AddSink* = 0b1 and *DeviceID* = 0x12. DUT-GPS has a Sink Table entry for GPD ID = N with DeviceID = 0x30. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • EITHER: Either an entry for any GPD sensor reporting command, (GPD Command =0xAF) five entries with *GPD Command* = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF);

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• OR an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with *GPD Command* = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, with GPD ID = N and the corresponding *ApplicationID*, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF).
1E) – 1F) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with *AddSink* = 0b1 and *DeviceID* as copied from the Commissioning GPDF. DUT-GPS has a Sink Table entry for GPD ID = N. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • EITHER: Either an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with GPD Command = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF); • OR an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with GPD Command = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, with GPD ID = N and the corresponding *ApplicationID*, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF).
2A) – 2I) If possible, verify that DUT-GPS executes the TH-GPD command. (e.g. if supported, DUT-GPS has a correct value for the *MeasuredValue* attribute of the *Occupancy Sensing* cluster (0x0406)).
3) DUT-GPS sends out at least one correctly protected GPD Read Attributes command (0xF2), formatted as specified in test 4.6.1.10, carrying at least one Cluster Record, for the Occupancy Sensing cluster (0x0406), with at least one attribute of Occupancy (0x0000), Occupancy Sensor Type (0x0001). Some time after reception of the GPD Read Attributes command, TH-GPD responds with GPD Read Attributes Response for the requested attribute(s).
4) DUT-GPS sends out at least one correctly protected GPD Write Attributes command (0xF1), formatted as specified in test 4.6.1.11, carrying at least one Cluster Record, for the Occupancy Sensing cluster (0x0406), with at least one attribute record with AttributeID, attribute data type and attribute data length as defined in [R5]. Some time after reception of the GPD Read Attributes command, TH-GPD responds with GPD Read Attributes Response for the requested attribute(s), and the Attribute data as written by the DUT-GPS.
5A) – 5D) DUT-GPS does not send GP Pairing command for the TH-GPD. DUT-GPS does not have a Sink Table entry for TH-GPD.
Fail verdict:
0) DUT-GPS supporting Translation Table does not send GP Translation Table Response.
1A) – 1D) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry: AddSink = 0b1 and/or DeviceID = 0x12. AND/OR DUT-GPS does not have a Sink Table entry for GPD ID = N with DeviceID = 0x12. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries as defined in 4.7.3.3/item 1A) above.
1E) – 1F) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry: AddSink = 0b1. AND/OR DUT-GPS does not have a Sink Table entry for GPD ID = N. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries as defined in 4.7.3.3/item 1E) above.
2A) – 2I) If there is a way to check the execution correctness, and the DUT-GPS incorrectly executes the TH-GPD command.
3) DUT-GPS does NOT sends at least one correctly protected GPD Read Attributes command (0xF2), AND/OR GPD Read Attributes is NOT formatted as specified in test 4.6.1.10, AND/OR the Cluster Record for the Occupancy Sensing cluster (0x0406), does not include at least one attribute of Measured Value (0x0000), MinMeasuredValue (0x0001) and MaxMeasuredValue (0x0002). AND/OR TH-GPD does NOT respond with GPD Read Attributes Response for the requested attribute(s).
4) DUT-GPS does NOT sends at least one correctly protected GPD Write Attributes command (0xF1), AND/OR GPD Write Attributes is NOT formatted as specified in test 4.6.1.11, AND/OR in the Cluster Record for the Occupancy Sensing cluster (0x0406), AND/OR in the attribute record, at least one if AttributeID, attribute data type and attribute data length is not as defined in [R5]. AND/OR Some time after reception of the GPD Read Attributes command, TH-GPD does NOT respond with GPD Read Attributes Response for the requested attribute(s) AND/OR and the Attribute data has value other as written by the DUT-GPS.
5A) – 5D) DUT-GPS sends GP Pairing command for the TH-GPD. AND/OR DUT-GPS has a Sink Table entry for TH-GPD.

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4.7.9.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPDRXA0 – GPDRXA3	Reception of GPD Attribute reporting command	Direct
GPDRXA6	Reception of GP ZCL Tunneling command (0xA6)	Direct
GPS6	Occupancy Sensing GP functionality	Direct

4.7.10 NOT TESTED: GPS supporting GP Indoor Environment Sensor or GPD-controllable Relative Humidity Measurement functionality

4.7.10.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.7.1.1.1.	
2	[R3] A.3.6.2.1, A.3.6.2.2	The TH-GPD supports for GPD Indoor Environment sensor functionality (Device ID 0x33) or GPD-controllable Relative Humidity Measurement functionality (cluster 0x0405).	
3	[R3] A.3.3.2.2	The Sink Table of the DUT-GPS is empty.	

4.7.10.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
0	[R3] A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1A	[R3] A.3.9, A.3.6.2.2, A.3.3.4.6, A.3.3.5.5	**Commissioning:** Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* = 0x33; *ApplicationInformation* not included. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1B		Clean Sink Table. Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* = 0x33; with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, *ClusterList* present and including at least the Temperature Measurement, Illuminance Measurement and Relative Humidity Measurement cluster. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1C		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* = 0x33 and *SendPairing* sub-field set to 0b1, and *ApplicationInformation* absent. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1D		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* = 0x33	

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		and *SendPairing* sub-field set to 0b1, with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, *ClusterList* field present and including at least the Temperature Measurement, Illuminance Measurement and Relative Humidity Measurement cluster. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1E		Clean Sink Table. Put DUT-GPS in commissioning mode. Perform commissioning procedure, with TH-GPD sending Commissioning GPDF with *DeviceID* other than 0x33; with *ApplicationInformation* present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and *ClusterList* including at least the Temperature Measurement, Illuminance Measurement and Relative Humidity Measurement cluster. Exit commissioning, if required. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
1F		**CT-based commissioning:** Clean Sink Table. TH-GPD sends GP Pairing Configuration message with *DeviceID* other than 0x33 and *SendPairing* sub-field set to 0b1, with *ApplicationInformation* field present, *GPD CommandID list* field present and including at least one of {0xA0, 0xA1, 0xA2, 0xA3, 0xA6},*ClusterList* present and including at least the Temperature Measurement, Illuminance Measurement and Relative Humidity Measurement cluster. The TH-Tool reads Sink Table of DUT-GPS. **If DUT-GPS supports Translation Table functionality:** The TH-Tool sends GP Translation Table Request command with *Start Index* 0.	
		RELATIVE HUMIDITY MEASUREMENT	
2A		**Attribute reporting:** If reception of GPD command 0xA0 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Attribute reporting command (0xA0) with only the *MeasuredValue* Attribute of the *Relative Humidity Measurement* cluster. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2B		**Attribute reporting:** If reception of GPD command 0xA0 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Attribute reporting command (0xA0) with 3 attributes of the *Relative Humidity Measurement* cluster: the *MeasuredValue, MinValue and MaxValue* attribute. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2C		**Attribute reporting:** If reception of GPD command 0xA1 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific attribute reporting command (0xA1), with *ManufacturerID* as supported by DUT-GPS, one attribute report for the *MeasuredValue* Attribute of the *Relative Humidity Measurement* cluster (0x0405).	

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		If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2D		**Attribute reporting:** If reception of GPD command 0xA1 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific attribute reporting command (0xA1), with ManufacturerID NOT supported by DUT-GPS, with one attribute report for the *MeasuredValue* Attribute of the *Relative Humidity Measurement* cluster (0x0405). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2E		**Attribute reporting:** If reception of GPD command 0xA2 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA2), with one cluster report for the *MeasuredValue* Attribute of the *Relative Humidity Measurement* cluster. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2F		**Attribute reporting:** If reception of GPD command 0xA2 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA2), with two cluster reports: one for the *MeasuredValue* Attribute of the *Relative Humidity Measurement* cluster and one for an attribute of a cluster unsupported by DUT-GPS (e.g. *Occupancy* of the *Occupancy Sensing* cluster). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2G		**Attribute reporting:** If reception of GPD command 0xA2 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA2), with three cluster reports: one for the *MeasuredValue* Attribute of the *Relative Humidity Measurement* cluster; one for the *MeasuredValue* Attribute of the *Temperature Measurement* cluster and one for the *MeasuredValue* Attribute of the *Illuminance Measurement* cluster. If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2H		**Attribute reporting:** If reception of GPD command 0xA3 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD Manufacturer-specific multi-cluster reporting command (0xA3), with *ManufacturerID* as supported by DUT-GPS, one cluster report for the *MeasuredValue* Attribute of the *Relative Humidity Measurement* cluster (0x0405). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2I		**Attribute reporting:** If reception of GPD command 0xA3 is supported by DUT-GPS,TH-GPD sends correctly formatted Data GPDF, carrying GPD Multi-cluster reporting command (0xA3), with *ManufacturerID* NOT supported by DUT-GPS, with two cluster reports: one for the *MeasuredValue* Attribute	

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		of the *Relative Humidity Measurement* cluster (0x0405) and one for an attribute of a cluster unsupported by DUT-GPS (e.g. 0xfdfd). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
2J		**Attribute reporting:** If reception of GPD command 0xA6 is supported by DUT-GPS, TH-GPD sends correctly formatted Data GPDF, carrying GPD ZCL tunnelling command (0xA6), carrying ZCL generic Report Attributes command (0xA0) for the *MeasuredValue* Attribute of the *Relative Humidity Measurement* cluster (0x0405). If possible, verify the correct attribute reception by the DUT-GPS (may e.g. include user perceivable means and/or reading out of DUT-GPS attributes).	
3		**If DUT-GPS supports reading out GPD attributes:** Trigger DUT-GPS to send GPD Read Attributes command. If the DUT-GPS supports multiple variants of this command (e.g. with different AttributeIDs or attribute combinations), repeat the test for each variant that included the Relative Humidity Measurement cluster.	
4		**Note: DUT-GPS's support for writing GPD attributes of Illuminance Measurement cluster not tested; since all attributes of the Relative Humidity Measurement cluster are read only [R5].**	
		TEMPERATURE MEASUREMENT	
5		**If DUT-GPS supports GP Indoor Environment Sensor:** Perform Temperature Measurement tests, steps 2A) – 4) of sec. 4.7.3.	
		ILLUMINANCE MEASUREMENT	
6		**If DUT-GPS supports GP Indoor Environment Sensor:** Perform Illuminance Measurement tests, steps 2A) – 4) of sec. 4.7.8.	
		NEGATIVE COMMISSIONING TESTS	
7A		**Negative test: GPD CommandID list without any GPD sensor command:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, *ClusterList* field present and including Relative Humidity Measurement cluster, *GPD CommandID list* field present, but containing none of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field correctly set, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
7B		**Negative test: GPD Commissioning command without GPD CommandID list field:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, with *ClusterList* field present and including Relative Humidity Measurement ClusterID, and *GPD CommandID list* field absent, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	

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7C		**Negative test: GPD Commissioning command ClusterList without Relative Humidity Measurement:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, with *ClusterList* field present and NOT including Relative Humidity Measurement ClusterID, and *GPD CommandID list* field present and including at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS. The TH-Tool reads Sink Table of DUT-GPS.	
7D		**Negative test: GPD Commissioning command without ClusterList:** Clean Sink Table of DUT-GPS. Make DUT-GPS enter commissioning mode. TH-GPD sends GPD Commissioning command with *DeviceID* = 0x30, without *ClusterList* field present and with *GPD CommandID list* field present and including at least one of the GPD commands {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, and the sub-field of the *Application information* field set accordingly, and security settings as required by the DUT-GPS.	

4.7.10.3 Expected Outcome

Pass verdict:
0) If DUT-GPS supports Translation Table functionality, DUT-GPS responds with GP Translation Table Response command, • Either indicating the Translation Table is empty (Status = SUCCESS, *TotalNumberOfEntries* = *StartIndex* = EntriesCount = 0x00); • or containing at least the following default generic entries: ▪ EITHER an entry for any GPD sensor reporting command, with *GPD Command* field set to GPD command (0xAF), with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command (0x0A) with ZigBee command payload length set to 0xff (to be copied from the GPDF); ▪ OR an entry with *GPD Command* field set to command (0xA0) and an entry with *GPD Command* field set to command (0xA2), both with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command (0x0A) with ZigBee command payload length set to 0xff (to be copied from the GPDF).
1A) – 1D) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with *AddSink* = 0b1 and *DeviceID* = 0x30. DUT-GPS has a Sink Table entry for GPD ID = N with DeviceID = 0x30. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • EITHER: Either an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with GPD Command = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF); • OR an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with GPD Command = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, with GPD ID = N and the corresponding *ApplicationID*, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF).
1E) – 1F) At the end of the commissioning procedure, DUT-GPS sends GP Pairing with *AddSink* = 0b1 and *DeviceID* as copied from the Commissioning GPDF. DUT-GPS has a Sink Table entry for GPD ID = N. If DUT-GPS supports Translation Table functionality, DUT-GPS has at least the following Translation Table entries: • EITHER: Either an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with GPD Command = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6} with *ApplicationID* = 0b000 and SrcID = 0xffffffff, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF); • OR an entry for any GPD sensor reporting command, (GPD Command =0xAF) or five entries with GPD Command = {0xA0, 0xA1, 0xA2, 0xA3, 0xA6}, with GPD ID = N and the corresponding *ApplicationID*, mapped to ZCL Report attributes command with ZigBee command payload length set to 0xff (to be copied from the GPDF).
2A) – 2J) If possible, verify that DUT-GPS executes the TH-GPD command for the supported attributes/clusters (e.g. if supported, DUT-GPS has a correct value for the *MeasuredValue* attribute of the *Relative Humidity Measurement* cluster (0x0405)).

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3) DUT-GPS sends out at least one correctly protected GPD Read Attributes command (0xF2), formatted as specified in test 4.6.1.10, carrying at least one Cluster Record, for the Relative Humidity Measurement cluster (0x0405), with at least one attribute of Measured Value (0x0000), MinMeasuredValue (0x0001) and MaxMeasuredValue (0x0002). Some time after reception of the GPD Read Attributes command, TH-GPD responds with GPD Read Attributes Response for the requested attribute(s).
4) None.
5) Pass verdicts 2A) – 4) of sec. 4.7.3.
6) Pass verdicts 2A) – 4) of sec. 4.7.8.
7A) – 7D) DUT-GPS does not send GP Pairing command for the TH-GPD. DUT-GPS does not have a Sink Table entry for TH-GPD.
Fail verdict:
0) DUT-GPS supporting Translation Table does not send GP Translation Table Response.
1A) – 1D) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry: AddSink = 0b1 and/or DeviceID = 0x30. AND/OR DUT-GPS does not have a Sink Table entry for GPD ID = N with DeviceID = 0x30 AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries as defined in 4.7.3.3/item 1A) above.
1E) – 1F) DUT-GPS does not send GP Pairing AND/OR the GP Pairing does not carry: AddSink = 0b1. AND/OR DUT-GPS does not have a Sink Table entry for GPD ID = N. AND/OR DUT-GPS supporting Translation Table does not have the Translation Table entries as defined in 4.7.3.3/item 1E) above.
2A) – 2I) If there is a way to check the execution correctness, and the DUT-GPS incorrectly executes the TH-GPD command for the supported attributes/clusters.
3) DUT-GPS does NOT sends at least one correctly protected GPD Read Attributes command (0xF2), AND/OR GPD Read Attributes is NOT formatted as specified in test 4.6.1.10, AND/OR the Cluster Record for the Relative Humidity Measurement cluster (0x0405), does not include at least one attribute of Measured Value (0x0000), MinMeasuredValue (0x0001) and MaxMeasuredValue (0x0002). AND/OR TH-GPD does NOT respond with GPD Read Attributes Response for the requested attribute(s).
4) None.
5) Fail verdicts 2A) – 4) of sec. 4.7.3.
6) Fail verdicts 2A) – 4) of sec. 4.7.8.
7A) – 7D) DUT-GPS sends GP Pairing command for the TH-GPD. AND/OR DUT-GPS has a Sink Table entry for TH-GPD.

4.7.10.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPDRXA0 – GPDRXA3	Reception of GPD Attribute reporting command	Direct
GPDRXA6	Reception of GP ZCL Tunneling command (0xA6)	Direct
GPS12	Relative Humidity Measurement GP functionality	Direct

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4.7.11 GPS support of Application information

4.7.11.1.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.7.1.1.1.	
2		TH-GPD supports all Application information combinations.	
3		TH-GPD supports all settings (security, DeviceID, as required by the DUT-GPS). If supported by DUT-GPS, use gpsSecurityLevel >= 0b10 and OOB key type with TC-LK encryptione (to verify handling of long GPD Commissioning payload by the DUT-GPS).	
4		Initially, there is no pairing between the DUT-GPS and the TH-GPD.	

4.7.11.1.2 Test Procedure

Note: Throughout this test, the maximum length of a GPD Commissionign command payload (appropriate for the ApplicationID used by the TH-GPS) SHALL NOT be exceeded.

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.1	**Specific supported DeviceID, ManufacturerID included**: Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with: • *DeviceID* field set to a non-reserved value from [R3] other than 0xFE, as supported by DUT-GPS; • Application information field present; ▪ *ManufacturerID present* sub-field set to 0b1; ▪ *ModelID present* sub-field set to 0b0; ▪ *GPD commands present* sub-field set to 0b0; ▪ *Cluster list present* sub-field set to 0b0; ▪ *Reserved* sub-fields set to 0b0. • *ManufacturerID* field present and set to 0x1234; • *ModelID* field absent. • The fields *Number of GPD commands* and *GPD CommandID list* absent; • *Cluster list* field absent. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
2	[R3] A.4.2.1	**Specific supported DeviceID, ModelID included**: Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with: • *DeviceID* field set to a non-reserved value from [R3] other than 0xFE, as supported by DUT-GPS; • Application information field present; ▪ *ManufacturerID present* sub-field set to 0b1; ▪ *ModelID present* sub-field set to 0b1; ▪ *GPD commands present* sub-field set to 0b0; ▪ *Cluster list present* sub-field set to 0b0; ▪ *Reserved* sub-fields set to 0b0. • *ManufacturerID* field present and set to 0x1234; • *ModelID* field present and set to 0x7777. • The fields Number of *GPD commands* and *GPD CommandID list* absent; • *Cluster list* field absent. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	

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3A		**Specific supported DeviceID, GPD CommandID list included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with: • *DeviceID* field set to a non-reserved value from [R3] other than 0xFE, as supported by DUT-GPS; • Application information field present; ▪ *ManufacturerID present* sub-field set to 0b0; ▪ *ModelID present* sub-field set to 0b0; ▪ *GPD commands present* sub-field set to 0b1; ▪ *Cluster list present* sub-field set to 0b0; ▪ *Reserved* sub-fields set to 0b0. • *ManufacturerID* field absent; • *ModelID* field absent. • *Number of GPD commands* present and set to at least 0x02; • *GPD CommandID list* present and including; ▪ (At least) One GPD command X supported by the DUT-GPS; If supported by DUT-GPS, GPD commands specific for a particular GPD DeviceID different than that in the *DeviceID* field of the GPD Commissioning command should be chosen; ▪ (At least) one GPD command Y NOT supported by the DUT-GPS; If possible, GPD commands specific for a particular GPD DeviceID should be chosen. • *Cluster list* field absent. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
3B		**Specific non-supported DeviceID, GPD CommandID list included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with all fields set exactly as in step 3A) above, only with *DeviceID* field set to M, a non-reserved value from [R3] other than 0xFE and other than those supported by DUT-GPS. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
3C		**DeviceID = 0xFE, GPD CommandID list included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with all fields set exactly as in step 3A) above, only with *DeviceID* field set to 0xFE. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
4A		**Specific supported DeviceID, Cluster list included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with: • *DeviceID* field set to a non-reserved value from [R3] other than 0xFE, as supported by DUT-GPS; • Application information field present; ▪ *ManufacturerID present* sub-field set to 0b0; ▪ *ModelID present* sub-field set to 0b0; ▪ *GPD commands present* sub-field set to 0b0; ▪ *Cluster list present* sub-field set to 0b1; ▪ *Reserved* sub-fields set to 0b0. • *ManufacturerID* field absent; • *ModelID* field absent. • *Number of GPD commands* and *GPD CommandID list* absent; • *Cluster list* field present and containing.	

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		▪ (At least) One ZCL cluster X supported by the DUT-GPS; If possible, cluster NOT mandated by the received *DeviceID* should be used. ▪ (At least) One ZCL cluster Y NOT supported by the DUT-GPS. • If the cluster supported by DUT-GPS and included in the Commissioning GPDF is a ZigBee-specified one, the fields *Number of GP commands*, with a value other than 0x00, and *GPD command list* are also present. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
4B		**Specific non-supported DeviceID, Cluster list included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with all fields set exactly as in step 4A) above, only with *DeviceID* field set to M, a non-reserved value from [R3] other than 0xFE and other than those supported by DUT-GPS. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
4C		**DeviceID = 0xFE, Cluster list included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with all fields set exactly as in step 4A) above, only with *DeviceID* field set to M, a non-reserved value from [R3] other than 0xFE and other than those supported by DUT-GPS. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
Conditional on DUT-GPS supporting any manufacturer-specific GPD functionality			
5A		**Specific supported DeviceID, GPD CommandID list with manufacturer-defined GPD command included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with: • *DeviceID* field set to a non-reserved value from [R3] other than 0xFE, as supported by DUT-GPS; • Application information field present; ▪ *ManufacturerID present* sub-field set to 0b1; ▪ *ModelID present* sub-field set to 0b0; ▪ *GPD commands present* sub-field set to 0b1; ▪ *Cluster list present* sub-field set to 0b0; ▪ *Reserved* sub-fields set to 0b0. • *ManufacturerID* field present and set to the ManufacturerID supported by the DUT-GPS, if any; • *ModelID* field absent. • *Number of GPD commands* present and set to at least 0x02; • *GPD CommandID list* present and including; ▪ (At least) One manufacturer-defined GPD command X (from the range 0xB0-0xBF) supported by the DUT-GPS, if any; ▪ One manufacturer-defined GPD command Y (from the range 0xB0-0xBF) Y NOT supported by the DUT-GPS; • *Cluster list* field absent. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
5B		**Specific non-supported DeviceID, GPD CommandID list with manufacturer-defined GPD command included:** Put DUT-GPS in commissioning mode.	

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		TH-GPD sends GPD Commissioning command, with all fields set exactly as in step 5A) above, only with *DeviceID* field set to M, a non-reserved value from [R3] other than 0xFE and other than those supported by DUT-GPS. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
5C		**DeviceID = 0xFE, GPD CommandID list with manufacturer-defined GPD command included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with all fields set exactly as in step 5A) above, only with *DeviceID* field set to 0xFE. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
6A		**Specific supported DeviceID, Cluster list with manufacturer-specific cluster included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with: • *DeviceID* field set to a non-reserved value from [R3] other than 0xFE, as supported by DUT-GPS; • Application information field present; ▪ *ManufacturerID present* sub-field set to 0b1; ▪ *ModelID present* sub-field set to 0b0; ▪ *GPD commands present* sub-field set to 0b0; ▪ *Cluster list present* sub-field set to 0b1; ▪ *Reserved* sub-fields set to 0b0. • *ManufacturerID* field is present and set to a value supported by the DUT-GPS, if any; • *ModelID* field absent. • *Number of GPD commands* and *GPD CommandID list* absent; • *Cluster list* field present and containing. ▪ (At least) One manufacturer-specific ZCL cluster X supported by the DUT-GPS, if any; If possible, cluster NOT mandated by the received *DeviceID* should be used. ▪ (At least) One manufacturer-specific ZCL cluster Y NOT supported by the DUT-GPS. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
6B		**Specific non-supported DeviceID, Cluster list with manufacturer-specific cluster included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with all fields set exactly as in step 6A) above, only with *DeviceID* field set to M, a non-reserved value from [R3] other than 0xFE and other than those supported by DUT-GPS. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	
6C		**DeviceID = 0xFE, Cluster list with manufacturer-specific cluster included:** Put DUT-GPS in commissioning mode. TH-GPD sends GPD Commissioning command, with all fields set exactly as in step 6A) above, only with *DeviceID* field set to M, a non-reserved value from [R3] other than 0xFE and other than those supported by DUT-GPS. Read Sink Table entry of the DUT-GPS. If supported, read Translation Table entries of DUT-GPS.	

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General negative test			
7A		**Negative test: DeviceID = 0xFE, Application information not included**	
7B		**Negative test: DeviceID = 0xFE, Application information field included, but all 0b0**	

1510 ***4.7.11.1.3 Expected Outcome***

Pass verdict:
1) – 2) DUT-GPS creates a pairing for the TH-GPD with the functionality as indicated by the DeviceID. DUT-GPS has a corresponding Sink Table entry. If Translation Table is supported, DUT-GPS has at least the Translation Table entries corresponding to the default mandatory functionality of this DeviceID, as defined by [R3], for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff.
3A) DUT-GPS creates a pairing for the TH-GPD with the functionality as indicated by the DeviceID. DUT-GPS has a corresponding Sink Table entry. If Translation Table is supported, DUT-GPS has at least: • the Translation Table entries corresponding to the default mandatory functionality of this DeviceID, as defined by [R3], for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff; • if DUT-GPS supports a specific GPD command NOT corresponding to the *DeviceID* received: the Translation Table entries corresponding to the default mandatory functionality of the DeviceID corresponding to CommandID X, as defined by [R3], for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff. DUT-GPS does NOT have a Translation Table for the command Y.
3B) DUT-GPS creates a pairing for the TH-GPD with the functionality corresponding to GPD CommandID X. DUT-GPS has a corresponding Sink Table entry, with DeviceID corresponding to GPD CommandID X, NOT to DeviceID M. If Translation Table is supported, DUT-GPS has at least the Translation Table entries corresponding to the default mandatory functionality of the DeviceID corresponding to CommandID X, as defined by [R3], for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff. DUT-GPS does NOT have a Translation Table for the command Y or default mandatory functionality of DeviceID M.
3C) DUT-GPS creates a pairing for the TH-GPD with the functionality corresponding to GPD CommandID X. DUT-GPS has a corresponding Sink Table entry, with DeviceID corresponding to GPD CommandID X; if does NOT set DeviceID = 0xFE. If Translation Table is supported, DUT-GPS has at least the Translation Table entries corresponding to the default mandatory functionality of the DeviceID corresponding to CommandID X, as defined by [R3], for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff. DUT-GPS does NOT have a Translation Table for the command Y.
4A) DUT-GPS creates a pairing for the TH-GPD with the functionality as indicated by the DeviceID. DUT-GPS has a corresponding Sink Table entry. If Translation Table is supported, DUT-GPS has at least: • the Translation Table entries corresponding to the default mandatory functionality of this DeviceID, as defined by [R3], for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff; • if DUT-GPS supports a ZCL cluster NOT corresponding to the *DeviceID* received: the Translation Table entries for cluster X, for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff. DUT-GPS does NOT have a Translation Table for the ZCL cluster Y.
4B) DUT-GPS creates a pairing for the TH-GPD with the functionality corresponding to cluster X. DUT-GPS has a corresponding Sink Table entry, with DeviceID corresponding to cluster X, NOT to DeviceID M. If Translation Table is supported, DUT-GPS has at least: the Translation Table entry corresponding to cluster X, for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff. DUT-GPS does NOT have a Translation Table for the cluster Y or default mandatory functionality of DeviceID M.
4C) DUT-GPS creates a pairing for the TH-GPD with the functionality corresponding to cluster X. DUT-GPS has a corresponding Sink Table entry, with DeviceID corresponding to cluster X, NOT for DeviceID 0xFE. If Translation Table is supported, DUT-GPS has at least: the Translation Table entry corresponding to cluster X, for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff. DUT-GPS does NOT have a Translation Table for the cluster Y.

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5A) DUT-GPS creates a pairing for the TH-GPD with the functionality as indicated by the DeviceID. DUT-GPS has a corresponding Sink Table entry. If Translation Table is supported, DUT-GPS has at least: • the Translation Table entries corresponding to the default mandatory functionality of this DeviceID, as defined by [R3], for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff; • if DUT-GPS supports a manufacturer-specific GPD command X: at least one Translation Table entry corresponding to CommandID X, for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff. DUT-GPS does NOT have a Translation Table for the command Y.
5B) If DUT-GPS supports a manufacturer-specific GPD command X, DUT-GPS creates a pairing for the TH-GPD with the functionality corresponding to GPD CommandID X. DUT-GPS has a corresponding Sink Table entry. If Translation Table is supported and if DUT-GPS supports a manufacturer-specific GPD command X, DUT-GPS has at least one Translation Table entry corresponding to CommandID X, for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff DUT-GPS does NOT have a Translation Table for the command Y or default mandatory functionality of DeviceID M.
5C) If DUT-GPS supports a manufacturer-specific GPD command X, DUT-GPS creates a pairing for the TH-GPD with the functionality corresponding to GPD CommandID X. DUT-GPS has a corresponding Sink Table entry. If Translation Table is supported and if DUT-GPS supports a manufacturer-specific GPD command X, DUT-GPS has at least one Translation Table entry corresponding to CommandID X, for the GPDID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff DUT-GPS does NOT have a Translation Table for the command Y.
6A) DUT-GPS creates a pairing for the TH-GPD with the functionality as indicated by the DeviceID. DUT-GPS has a corresponding Sink Table entry. If Translation Table is supported, DUT-GPS has at least: • the Translation Table entries corresponding to the default mandatory functionality of this DeviceID, as defined by [R3], for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff; • if DUT-GPS supports a manufacturer-specific ZCL cluster X: at least one the Translation Table entry for cluster X, for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff. DUT-GPS does NOT have a Translation Table for the ZCL cluster Y.
6B) If DUT-GPS supports a manufacturer-specific GPD command X, DUT-GPS creates a pairing for the TH-GPD with the functionality corresponding to cluster X. DUT-GPS has a corresponding Sink Table entry. • If Translation Table is supported, DUT-GPS has at least: • if DUT-GPS supports a manufacturer-specific ZCL cluster X: at least one the Translation Table entry for cluster X, for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff. DUT-GPS does NOT have a Translation Table for the cluster Y or default mandatory functionality of DeviceID M.
6C) If DUT-GPS supports a manufacturer-specific GPD command X, DUT-GPS creates a pairing for the TH-GPD with the functionality corresponding to cluster X. DUT-GPS has a corresponding Sink Table entry. If Translation Table is supported, DUT-GPS has at least: if DUT-GPS supports a manufacturer-specific ZCL cluster X: at least one the Translation Table entry for cluster X, for the GPD ID of the TH-GPD or for *ApplicationID* = 0b000 and SrcID = 0xff..ff. DUT-GPS does NOT have a Translation Table for the cluster Y.
7A) – 7B) DUT-GPS does not create a pairing; nor does it create new Translation Table entries (if it didn't have them before).
Fail verdict:
1) – 2) DUT-GPS does not create a pairing for the TH-GPD with the functionality as indicated by the DeviceID AND/OR DUT-GPS does not have a corresponding Sink Table entry for the TH-GPD with the DeviceID is indicated by TH-GPD AND/OR If Translation Table is supported, DUT-GPS misses any of the Translation Table entries corresponding to the default mandatory functionality of this DeviceID, as defined by [R3], for the GPD ID of the TH-GPD or 0xff..ff.
3A) DUT-GPS does NOT create a pairing for the TH-GPD with the functionality as indicated by the DeviceID. AND/OR DUT-GPS does NOT have a corresponding Sink Table entry with DeviceID as in the Commissionign GPDF. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any GPD CommanID X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD CommandID Y.

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3B) DUT-GPS does NOT create a pairing for the TH-GPD with the functionality corresponding to GPD CommandID X. AND/OR DUT-GPS does NOT have a corresponding Sink Table entry, with DeviceID corresponding to GPD CommandID X, NOT to DeviceID M. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any GPD CommanID X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD CommandID Y or DeviceID M.
3C) DUT-GPS does NOT create a pairing for the TH-GPD with the functionality corresponding to GPD CommandID X. AND/OR DUT-GPS does NOT have a corresponding Sink Table entry, with DeviceID corresponding to GPD CommandID X; it does NOT set DeviceID = 0xFE. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any GPD CommanID X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD CommandID Y.
4A) DUT-GPS does NOT create a pairing for the TH-GPD with the functionality as indicated by the DeviceID. AND/OR DUT-GPS does NOT have a corresponding Sink Table entry. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any cluster X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD cluster Y.
4B) DUT-GPS does NOT create a pairing for the TH-GPD with the functionality corresponding to cluster X. AND/OR DUT-GPS does NOT have a corresponding Sink Table entry, with DeviceID corresponding to cluster, NOT to DeviceID M. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any cluster X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD cluster Y.and/or clusters of DeviceID M.
4C) DUT-GPS does NOT create a pairing for the TH-GPD with the functionality corresponding to cluster X. AND/OR DUT-GPS does NOT have a corresponding Sink Table entry, with DeviceID corresponding to GPD cluster X, NOT for DeviceID 0xFE. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any cluster X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD cluster Y.
5A) DUT-GPS does NOT create a pairing for the TH-GPD with the functionality as indicated by the DeviceID. AND/OR DUT-GPS does NOT have a corresponding Sink Table entry. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any command X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD command Y.
5B) DUT-GPS that supports a manufacturer-specific GPD command X: does NOT create a pairing for the TH-GPD with the functionality corresponding to GPD CommandID X. AND/OR does NOT have a corresponding Sink Table entry. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any command X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD command Y or unsupported default mandatory functionality of DeviceID M.
5C) DUT-GPS that supports a manufacturer-specific GPD command X: does NOT create a pairing for the TH-GPD with the functionality corresponding to GPD CommandID X. AND/OR does NOT have a corresponding Sink Table entry. AND/OR If Translation Table is supported, DUT-GPS

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• misses any of the Translation Table entries corresponding to any command X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD command Y.
6A) DUT-GPS does NOT create a pairing for the TH-GPD with the functionality as indicated by the DeviceID. AND/OR DUT-GPS does NOT have a corresponding Sink Table entry. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any cluster X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD cluster Y.
6B) DUT-GPS that supports a manufacturer-specific GPD cluster X: does NOT create a pairing for the TH-GPD with the functionality corresponding to cluster X. AND/OR does NOT have a corresponding Sink Table entry. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any command X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD command Y or unsupported default mandatory functionality of DeviceID M.
6C) DUT-GPS that supports a manufacturer-specific GPD cluster X: does NOT create a pairing for the TH-GPD with the functionality corresponding to cluster X. AND/OR does NOT have a corresponding Sink Table entry. AND/OR If Translation Table is supported, DUT-GPS • misses any of the Translation Table entries corresponding to any cluster X as supported by DUT-GPS, for the GPD ID of the TH-GPD or SrcID 0xff..ff. • AND/OR has any Translation Table entry for any unsupported GPD cluster Y.
7A) – 7B) DUT-GPS does create a pairing; AND/OR it creates new Translation Table entries (if it didn't have them before).

4.7.11.1.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF18	Does the device support reception of GPD Commissioning command with Application information?	Direct
GPCF18A	Does the device support reception of the GPD Commissioning command with the ModelID?	Direct
GPCF18B	Does the device support reception of the GPD Commissioning command with the ManufacturerID? If yes, list the ManufacturerID supported.	Direct
GPCF18C	Does the device support reception of the GPD Commissioning command with the GPD command list containing GPD-defined commands? If yes, list the GPD commands supported.	Direct
GPCF18D	Does the device support reception of the GPD Commissioning command with the GPD command list containing manufacturer-defined GPD commands? If yes, list the GPD commands supported.	Direct
GPCF18E	Does the device support reception of the GPD Commissioning command with the Cluster list containing ZCL-defined clusters? If yes, list the ZCL clusters controllable via GP.	Direct
GPCF18F	Does the device support reception of the GPD Commissioning command with the Cluster list containing manufacturer-specific clusters? If yes, list the manufacturer-specific clusters controllable via GP.	Direct

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4.7.12 GPS supporting GPD Recall Scene commands (0x10 – 0x17)

4.7.12.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.7.1.1.1.	
2	[R3] A.3.6.2.1, A.3.6.2.2	The TH-GPD supports as many GPD Recall Scene commands (0x10 – 0x17) as the DUT-GPS.	
3	[R3] A.3.3.2.2	A pairing is established between the TH-GPD and DUT-GPS. DUT-GPS, if it implements a Translation Table, has at least the following Translation Table entries: • An entry for the GPD Recall Scene command corresponding to the received GPD Store Scene X command (X = CommandID – 0x08), mapped to Scenes cluster (ClusterID = 0x0005), Recall Scene command (CommandID = 0x0005), and ZigBee command payload length set to 0x04; ZigBee command payload containing GroupID M, either 0xffff or specific, and SceneID corresponding to the GPD Recall Scene command; either for ApplicationID = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding ApplicationID.	
4	[R3] A.4.2.6	Set the application endpoint DUT-GPS into the state corresponding to the required scene (e.g. in case of light, by changing light color and/or intensity); the methods to accomplish that are out-of-scope. For the scene-supporting application endpoint of the DUT-GPS, establish a scene with the SceneID corresponding to the to-be-triggered GPD Recall Scene command (X) and the GroupID M; add this application endpoint to the same group M. Check the *scene-supporting endpoint of the DUT-GPS is a member of the GroupID M and stores the SceneID X for the GroupID M.*	This can be accomplished e.g. by sending a ZCL Store Scene X command of the ZCL Scenes cluster to the scene-supporting endpoint of the DUT-GPS, with the SceneID X and the GroupID M, and sending ZCL Add group command to the scene-supporting endpoint of the DUT-GPS, for GroupID M.

4.7.12.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.4.2.6	Set the application endpoint of the DUT-GPS to a state different than that defined by Scene X. Send a GPD Recall Scene X command from the TH-GPD.	

4.7.12.3 Expected Outcome

Pass verdict:
1) DUT-GPS recalls scene X.
Fail verdict:
1) DUT-GPS does not recall scene X.

4.7.12.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPDRX10 – GPDRX18	GPD Recall Scene commands	Direct

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4.7.13 GPS supporting GPD Store Scene commands (0x18 – 0x1f)

4.7.13.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 4.7.1.1.1.	
2	[R3] A.3.6.2.1, A.3.6.2.2	The TH-GPD supports as many GPD Recall Scene commands (0x10 – 0x17) as the DUT-GPS, in addition, the TH-GPD supports the corresponding GPD Store Scene commands (0x18 – 0x1f).	
3	[R3] A.3.3.2.2	A pairing is established between the TH-GPD and DUT-GPS.	

4.7.13.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.4.2.6	Set the application endpoint DUT-GPS into the state corresponding to the required scene (e.g. in case of light, by changing light color and/or intensity); the methods to accomplish that are out-of-scope. Make TH-GPD send Data GPDF with GPD Store Scene X command. If implemented, read out Translation Table of GPEP, and Scenes and Groups table of the application endpoint of the DUT-GPS.	
2	[R3] A.4.2.6	Set the application endpoint of the DUT-GPS to another state and send a corresponding GPD Recall Scene command from the TH-GPD.	

4.7.13.3 Expected Outcome

Pass verdict:
1) DUT-GPS, if it implements a Translation Table, has at least the following Translation Table entries: • An entry for the GPD Scene command corresponding to the received GPD Store Scene command (CommandID – 0x08), mapped to Scenes cluster (ClusterID = 0x0005), Recall Scene command (CommandID = 0x0005), and ZigBee command payload length set to 0x04; ZigBee command payload containing GroupID M, either 0xffff or specific, and SceneID corresponding to the GPD Recall Scene command; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and corresponding *ApplicationID*. • An entry for the GPD Store Scene command, mapped to Scenes cluster (ClusterID = 0x0005), Store Scene command (CommandID = 0x0004), and ZigBee command payload length set to 0x04; ZigBee command payload containing GroupID M, either 0xffff or specific, and SceneID corresponding to the GPD Store Scene command; either for *ApplicationID* = 0b000 and SrcID = 0xffffffff or for GPD ID = N and the corresponding *ApplicationID*. The application endpoint of the DUT-GPS is a member of at least one GroupID: • If the GroupID in the ZigBee command payload field of the Translation Table entry was set to 0xffff: the GroupID derived from the SrcID = N of the TH-GPD; • If the GroupID in the ZigBee command payload field of the Translation Table entry had a value M other than 0xffff: the GroupID =M. • The application endpoint of the DUT-GPS stores a scene with the GroupID as described above, SceneID corresponding to the GPD Store Scene command, and the scene parameters as set in the beginning.
2) DUT-GPS recalls the required scene.
Fail verdict:
1) DUT-GPD does not send Data GPDF, formatted exactly as defined in item 1 above. AND/OR, TH-GPS does not have the appropriate Translation Table entry, Scene table and/or group table entry, as described in item 1 above.
2) TH-GPS does not recall the required scene.

4.7.13.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPDRX10 – GPDRX1f	GPD Store Scene commands	Direct

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5 Green Power Proxy (GPP)

Unless explicitly specified otherwise in the respective initial conditions section, at the beginning of each test, the proxy's GPEP is "factory new"; i.e. the Proxy Table is empty; the gpTxQueue is empty, and the sink is in operational mode; the duplicate filtering is empty.

In the current version of the specification, only the GP infrastructure devices of type GPCB, GPPB and GPCT can be certified.

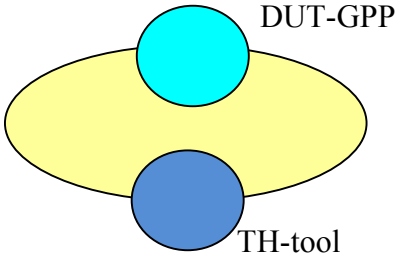
GP TG agreement: Postpone key update (and frame counter reset) testing for the PROXY until the Green Power management feature is approved.

5.1 Green Power cluster basics

5.1.1 Test GPEP DeviceID read-out

5.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:

<table>
<tr><td rowspan="2"> 
</td><td>DUT (GPP/ GPC/GPPB)</td><td>PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF)
Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7)
IEEE address=manufacturer-specific</td></tr>
<tr><td>TH-tool</td><td>PAN id=same PANID as DUT-GPP
Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7)
IEEE address=manufacturer-specific</td></tr>
</table>

Item	Doc. Ref.	Initial Conditions	Note
1		DUT and TH-ZR operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	

5.1.1.2 Test Set-Up

The DUT shall be in wireless communication proximity of TH-ZR.

A packet sniffer shall be observing the communication over the air interface.

5.1.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.2	TH-ZR requests a Simple Descriptor from the DUT-GPP on GPEP endpoint (0xF2).	

5.1.1.4 Expected Outcome

Pass verdict:
1) DUT-GPP responds with Simple_Desc_rsp frame, with: • Status = SUCCESS; • NwkAddressOfInterest set to the short address of the DUT; • Simple Description with the following fields: ▪ Endpoint: 0xF2; ▪ Application profile identifier = 0xA1E0; ▪ Application device identifier set to GPCB (0x0066) or GPPB (0x0061), according to the device type; ▪ Application device version = 0x0, ▪ If DeviceID: – =0x0061: at least the Application output cluster list present and containing at least one cluster, Green Power cluster (ClusterID = 0x0021) – =0x0066: at least Green Power cluster (ClusterID = 0x0021) present in both in and out cluster list.
Fail verdict:
1) DUT-GPP does not respond with Simple_Desc_rsp, formatted exactly as specified in 5.1.1.4/pass verdict 1 above.

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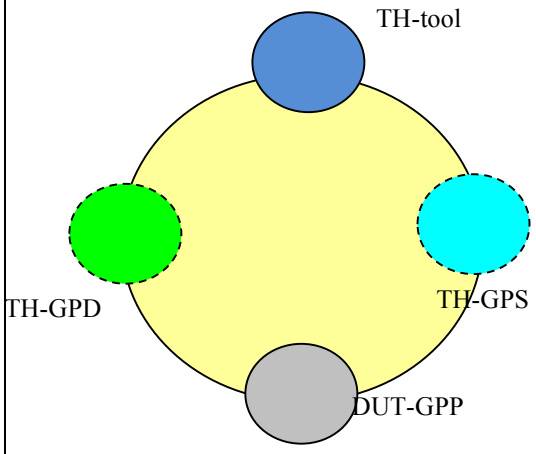
5.1.1.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPDT2	Green Power Device Types	Direct
GPCC3	GPEP support	Direct
PCCS1, PCSS1	Green Power cluster support	Direct

5.1.2 GPP Attribute writing and reading

5.1.2.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-tool	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
DUT-GPP (GPPB or proxy of GPCB)	PANId=same PANID as TH-ZR Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPS/TH-Tool	PANId=same PANID as TH-ZR Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD/TH-Tool	GPD ID = N Supports GPD application layer functionality corresponding to TH-GPS's GPEP.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPP and TH-ZR operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.4.2.x	All attributes of the DUT-GPP are at their default values. Proxy Table is empty.	

5.1.2.1.2 Test Set-Up

The DUT-GPP shall be in wireless communication proximity of TH-ZR.
A packet sniffer shall be observing the communication over the air interface.

5.1.2.2 Proxy Attributes

5.1.2.2.1 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.4.2.3	***O (Mandatory if DUT supports Full Unicast communication functionality):*** TH-tool reads out the value of the *gppNotificationRetryNumber* attribute, using ZCL Read Attributes command. TH-tool writes a different value M (e.g. byte "0x03") to the *gppNotificationRetryNumber* attribute. TH-tool reads out the value of the gppNotificationRetryNumber attribute.	These written values differ from the default values.
2	[R3] A.3.4.2.4	***O (Mandatory if DUT supports Full Unicast communication functionality):*** TH-tool reads out the value of the *gppNotificationRetryTimer* attribute, using ZCL Read Attributes command. TH-ZR writes a different value M (e.g. byte "0x33") to the *gppNotificationRetryTimer* attribute. TH-tool reads out the value of the *gppNotificationRetryTimer* attribute.	

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3	[R3] A.3.4.2.5	***O (Mandatory if DUT supports Proxy Table maintenance functionality):*** TH-tool reads out the value of the *gppMaxSearchCounter* attribute, using ZCL Read Attributes command. TH-tool writes a different value M (e.g. a byte "0x0b") to the *gppMaxSearchCounter* attribute. TH-tool reads out the value of the *gppMaxSearchCounter* attribute.	
4	[R3] A.3.4.2.6	***O (Optional if DUT supports Proxy Table maintenance functionality):*** TH-tool reads out the value of the *gppBlockedGPDID* attribute, using ZCL Read Attributes command. TH-tool writes a different value M (e.g. "0x000700010203040506") to the *gppBlockedGPDID* attribute. TH-tool reads out the value of the *gppBlockedGPDID* attribute.	
5	[R3] A.3.4.2.1	TH-tool reads out the value of the *gppMaxProxyTableEntries* attribute, using ZCL Read Attributes command. TH-tool attempts to write a different value M (e.g. byte "0x0a") to the *gppMaxProxyTableEntries* attribute, using ZCL Write Attributes No Response command. TH-tool reads out the value of the *gppMaxProxyTableEntries* attribute.	
6	[R3] A.3.4.2.2	TH-tool reads out the value of the *Proxy Table* attribute, using ZCL Read Attributes command. TH-ZR attempts to write a different value - 2 bytes "0x0000" to the *Proxy Table* attribute, using ZCL Write Attributes No Response command. TH-tool reads out the value of the *Proxy Table* attribute.	
7	[R3] A.3.4.2.7	TH-tool reads out the value of the *gppFunctionality* attribute, using ZCL Read Attributes command. TH-ZR attempts to write a different value (e.g. two bytes "0xffff") to the *gppFunctionality* attribute, using ZCL Write Attributes No Response command. TH-tool reads out the value of the *gppFunctionality* attribute.	
8	[R3] A.3.4.2.8	TH-tool reads out the value of the *gppActiveFunctionality* attribute, using ZCL Read Attributes command. TH-ZR attempts to write a different value (e.g. "0x0000") to the *gppActiveFunctionality* attribute, using ZCL Write Attributes No Response command. TH-tool reads out the value of the *gppFunctionality* attribute.	
9A	[R3] A.3.4.4.2	***Empty Proxy Table:*** TH unicasts GP Proxy Table Request with *Index* = 0x00.	
9B	[R3] A.3.9 A.3.4.2.2	Send GP Pairing command for TH-GPS with all settings as supported by DUT-GPP, including security, for SrcID = N (*ApplicationID* = 0b000). TH-ZR reads the *Proxy Table* attribute of DUT-GPP, using ZCL Read Attributes command.	
9C	[R3] A.3.9 A.3.4.2.2	Keep the pairing as created in step 9B. Send GP Pairing command for TH-GPS with all settings as supported by DUT-GPP, including security, for GPD IEEE address = N (*ApplicationID* = 0b010) and *Endpoint* = X. TH-ZR reads the *Proxy Table* attribute of DUT-GPP, using ZCL Read Attributes command.	
10A	[R3] A.3.4.4.2	Keep the pairing(s) as created in step 9. TH unicasts GP Proxy Table Request with *Index* = 0x00.	
10B	[R3] A.3.4.4.2	Keep the pairing(s) as created in step 9. TH unicasts GP Proxy Table Request with *Index* = 0x01.	

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11	[R3] A.3.4.4.2	Keep the pairing(s) as created in step 9. Send GP Pairing command for TH-GPS with all settings as supported by DUT-GPP, including security, for SrcID = M (*ApplicationID* = 0b000). TH unicasts GP Proxy Table Request with *Index* = 0x02.	
12A	[R3] A.3.4.4.2	Keep the pairing(s) as created in step 9 and 11. TH unicasts to DUT-GPP the GP Proxy Table Request with GPD SrcID = N (*ApplicationID* = 0b000).	
12B	[R3] A.3.4.4.2	Keep the pairing(s) as created in step 9 and 11. TH unicasts to DUT-GPP the GP Proxy Table Request with GPD IEEE address = N (ApplicationID = 0b010) and Endpoint = X.	
13	[R3] A.3.4.4.2	***Negative test: wrong Index:*** Keep the pairing(s) as created in step 9 and 11. TH unicasts GP Proxy Table Request with Index = 0x03.	
14A	[R3] A.3.4.4.2	***Negative test: wrong GPDID:*** Keep the pairing(s) as created in step 9 and 11. TH unicasts to DUT-GPP the GP Proxy Table Request with GPD SrcID other than N and M (ApplicationID = 0b000).	
14B	[R3] A.3.4.4.2	***Negative test: wrong GPDID:*** Keep the pairing(s) as created in step 9 and 11. TH unicasts to DUT-GPP the GP Proxy Table Request with GPD IEEE address = N (ApplicationID = 0b010) and Endpoint other than X.	
15	[R3] A.3.3.4.7	***Opt. Negative test: if DUT-GPP does NOT implement a Sink Table:*** TH unicasts GP Sink Table Request with Index = 0x00.	

5.1.2.2.2 Expected Outcome

Pass verdict:
1) On reception of the first Read Attributes command, the DUT that does support the *gppNotificationRetryNumber* attribute sends the Read Attributes Response with Status SUCCESS and the *gppNotificationRetryNumber* attribute set to N. On reception of the second Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *gppNotificationRetryNumber* attribute set to M. If the DUT does not support the *gppNotificationRetryNumber* attribute, it sends the Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE.
2) On reception of the first Read Attributes command, the DUT that does support the *gppNotificationRetryTimer* attribute sends the Read Attributes Response with Status SUCCESS and the *gppNotificationRetryTimer* attribute set to N. On reception of the second Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *gppNotificationRetryTimer* attribute set to M. If the DUT does not support the *gppNotificationRetryTimer* attribute, it sends the Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE.
3) On reception of the first Read Attributes command, the DUT that does support the *gppMaxSearchCounter* attribute sends the Read Attributes Response with Status SUCCESS and the *gppMaxSearchCounter* attribute set to N. On reception of the second Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *gppMaxSearchCounter* attribute set to M. If the DUT does not support the *gppMaxSearchCounter* attribute, it sends the Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE.
4) On reception of the Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *gppBlockedGPDID* attribute set to N or with Status UNSUPPORTED_ATTRIBUTE. Respectively, on reception of the Write Attributes command, the DUT sends the Write Attributes Response with Status READ_ONLY or with Status UNSUPPORTED_ATTRIBUTE.

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5) On reception of the first Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *gppMaxProxyTableEntries* attribute set to N, whereby N >= 5. On reception of the second Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *gppMaxProxyTableEntries* attribute unmodified (set to N).
6) On reception of the first Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *Proxy Table* attribute set to 0x0000. On reception of the second Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *Proxy Table* attribute unmodified (set to 0x0000).
7) On reception of the first Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *gppFunctionality* attribute set to N. On reception of the second Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *gppFunctionality* attribute unmodified (set to N).
8) On reception of the first Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *gppActiveFunctionality* attribute set to N. On reception of the second Read Attributes command, the DUT sends the Read Attributes Response with Status SUCCESS and the *gppActiveFunctionality* attribute unmodified (set to N).
9A) DUT-GPP responds with GP Proxy Table Response command with: • Status SUCCESS; • Total number of Proxy Table entries = 0x00; • Start Index = 0x00; • Entries count = 0x00; • No Proxy Table entry present.
9B) DUT-GPP responds with sends the Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for GPD ID N and formatted exactly as defined in the GP spec: • *Options* field present: ▪ *ApplicationID* as in the GP Pairing message (0b000); ▪ *EntryActive* and *EntryValid* set to 0b1; ▪ *MAC Sequence number capabilities* as in the GP Pairing message; ▪ *Lightweight Unicast GPS, Derived Group GPS, Commissioned Group GPS* derived from the *CommunicationMode* sub-field of the GP Pairing (0b11, 0b01, 0b10, respectively); ▪ if the *CommunicationMode* sub-field of the GP Pairing = 0b00, then: – *Options Extension* sub-field of the *Options* field is set to 0b1; – *Extended Options* field is present and its *Full unicast GPS* sub-field is set to 0b1; ▪ *InRange* = 0b1; ▪ *GPD Fixed*, *AssignedAlias* and *SecurityUse* – as in the GP Pairing message; • *GPD ID* field of 4B in length is present and carries the SrcID = N of the GPD; • *Endpoint* field absent; • *GPD Assigned Alias* field shall be included if *AssignedAlias* = 0b1 and at least one of *Derived Group GPS* and *Full unicast GPS* sub-fields is set to 0b1, it shall be omitted otherwise; if included, it stores the value as in the *AssignedAlias* field of the GP Pairing command; • the fields *Security Options* and *GPDkey* shall all be included if *SecurityUse* sub-field is set to 0b1, they all shall be omitted otherwise; if present, they shall be set to the values as in GP Pairing; • the *GPD security frame counter* is present and set to the value as in GP Pairing; *if SecurityUse* sub-field is set to 0b1 or if *Sequence number capabilities* sub-field is set to 0b1; • *Lightweight Sink address list* field shall be included if *Lightweight Unicast GPS* sub-field is set to 0b1, it shall be omitted otherwise; if present, it shall contain one entry, with 16-bit address and IEEE address of the TH-GPS as in GP Pairing; • *Sink group list* shall be included if *Commissioned Group GPS* sub-field is set to 0b1, it shall be omitted otherwise; if present, it shall contain GroupID and Alias derived from GP Pairing; • *Groupcast radius* shall be present and set to the value from GP Pairing; • *Search Counter* shall not be included. • *Full unicast sink address list* field shall be included if *Full Unicast GPS* sub-field is set to 0b1, it shall be omitted otherwise; if present, it shall contain one entry, with 16-bit address and IEEE address of the TH-GPS as in GP Pairing.

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9C) DUT-GPP responds with sends the Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly two entries:

One entry for ApplicationID = 0b000 and GPD SrcID = N, formatted exactly as in 5.1.2.2.2/pass verdict 9B above;

One entry for ApplicationID = 0b010 and GPDID field of 8B in length, carrying the IEEE address = N of the GPD, and Endpoint field carrying the value from the GP Pairing command, with:

- *Options* field present:
  - *ApplicationID* = 0b010;
  - *EntryActive* and *EntryValid* set to 0b1;
  - *MAC Sequence number capabilities* as in the GP Pairing message;
  - *Lightweight Unicast GPS, Derived Group GPS, Commissioned Group GPS* derived from the CommunicationMode sub-field of the GP Pairing (0b11, 0b01, 0b10, respectively);
  - if the *CommunicationMode* sub-field of the GP Pairing = 0b00, then:
    - *Options Extension* sub-field of the *Options* field is set to 0b1;
    - *Extended Options* field is present and its *Full unicast GPS* sub-field is set to 0b1;
  - *InRange* = 0b1;
  - *GPD Fixed*, *AssignedAlias* and *SecurityUse* – as in the GP Pairing message;
- GPDID of 8B length, carrying the GPD IEEE address N from the GP Pairing;
- Endpoint field present and carrying the value from the GP Pairing command
- *GPD Assigned Alias* field shall be included if *AssignedAlias* = 0b1 and at least one of *Derived Group GPS* and *Full unicast GPS* sub-fields is set to 0b1, it shall be omitted otherwise; if included, it stores the value as in the *AssignedAlias* field of the GP Pairing command;
- the fields *Security Options* and *GPDkey* shall all be included if *SecurityUse* sub-field is set to 0b1, they all shall be omitted otherwise; if present, they shall be set to the values as in GP Pairing;
- the *GPD security frame counter* is present and set to the value as in GP Pairing, if *SecurityUse* sub-field is set to 0b1 or if *Sequence number capabilities* sub-field is set to 0b1;
- *Lightweight Sink address list* field shall be included if *Unicast GPS* sub-field is set to 0b1, it shall be omitted otherwise; if present, it shall contain one entry, with 16-bit address and IEEE address of the TH-GPS as in GP Pairing;
- *Sink group list* shall be included if *Commissioned Group GPS* sub-field is set to 0b1, it shall be omitted otherwise; if present, it shall contain GroupID and Alias derived from GP Pairing;
- *Groupcast radius* shall be present and set to the value from GP Pairing;
- *Search Counter* shall not be included.
- *Full unicast sink address list* field shall be included if *Full Unicast GPS* sub-field is set to 0b1, it shall be omitted otherwise; if present, it shall contain one entry, with 16-bit address and IEEE address of the TH-GPS as in GP Pairing.

If both entires do NOT fit in a single ZCL Read Attributes Response frame (without fragmentation or partitioning cluster usage), DUT-GPP responds with ZCL Read Attributes Response with Status = INSUFFICIENT_SPACE and no entries included.

10A) DUT-GPP responds with GP Proxy Table Response command with:

- Status SUCCESS;
- Total number of Proxy Table entries: 0x02;
- Start Index = 0x00;
- Entries count = 0x01 or 0x02;
- one Proxy *Table entry* field for SrcID = N (*ApplicationID* = 0b000), formatted exactly as specified in 5.1.2.2.2/pass verdict 9B above;
- if *Entries count* = 0x02, then also one complete Proxy *Table entry* field for GPD IEEE address = N (*ApplicationID* = 0b010), formatted exactly as specified in 5.1.2.2.2/pass verdict 9C above, is included.

10B) DUT-GPP responds with GP Proxy Table Response command with:

- *Status* SUCCESS;
- *Total number of Proxy Table entries* = 0x02;
- *Start Index* = 0x01;
- *Entries count* = 0x01;
- one Proxy *Table entry* field for GPD IEEE address = N (ApplicationID = 0b010), formatted exactly as specified in 5.1.2.2.2/pass verdict 9C above.

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11) DUT-GPP responds with GP Proxy Table Response command with: • Status SUCCESS; • Total number of Proxy Table entries: 0x03; • Start Index = as in the triggering GP Proxy Table Request; • Entries count = 0x01 • one Proxy Table entry field attribute having one entry for GPD SrcID = M (ApplicationID = 0b000), formatted as defined in the GP specification, sec. A.3.4.2.2.1, and as described in 5.1.2.2.2/pass verdict 9B above.
12A) DUT-GPP responds with GP Proxy Table Response command with: • Status SUCCESS; • Total number of Proxy Table entries 0x03; • Start Index = 0xff; • Entries count = 0x01 • one Proxy Table entry field attribute having one entry for GPD SrcID = N (*ApplicationID* = 0b000), formatted as defined in the GP specification sec. A.3.4.2.2.1, and as described in pass verdict 9B) of 5.1.2.2.2 above.
12B) DUT-GPP responds with GP Proxy Table Response command with: • Status SUCCESS; • Total number of Proxy Table entries = 0x03; • Start Index = 0xff; • Entries count = 0x01; • one Proxy Table entry field attribute having one entry for GPD IEEE address = N (*ApplicationID* = 0b010), formatted as defined in the GP specification sec. A.3.4.2.2.1, and as described in pass verdict 9C) of 5.1.2.2.2 above.
13) DUT-GPP responds with GP Proxy Table Response command with: • Status NOT_FOUND; • Total number of Proxy Table entries: 0x03; • Start Index as in the triggering request: 0x03;: • Entries count = 0x00; • No Proxy Table entry present.
14A) -14B) DUT-GPP responds with GP Proxy Table Response command with: • *Status* NOT_FOUND; • *Total number of Proxy Table entries*: 0x03; • *Start Index* = 0xff; • *Entries count* = 0x00; • No *Proxy Table entry* present.
15) DUT-GPP that does not implement the Sink Table, responds with ZCL Default Response command, with Command identified field carrying 0x0a and Status code field carrying UNSUP_CLUSTER_COMMAND.
Fail verdict:
1) On reception of the first Read Attributes command, the DUT that does support the *gppNotificationRetryNumber* attribute does not send the Read Attributes Response with Status SUCCESS and the *gppNotificationRetryNumber* attribute. AND/OR On reception of the second Read Attributes command, the DUT does not send the Read Attribute Responses with Status SUCCESS and the *gppNotificationRetryNumber* attribute set to M. AND/OR a DUT that does not support the *gppNotificationRetryNumber* attribute does NOT send the Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE.
2) On reception of the first Read Attributes command, the DUT that does support the *gppNotificationRetryTimer* attribute does not send the Read Attributes Response with Status SUCCESS and the *gppNotificationRetryTimer* attribute. AND/OR On reception of the second Read Attributes command, the DUT does not send the Read Attribute Responses with Status SUCCESS and the *gppNotificationRetryTimer* attribute set to M. AND/OR a DUT that does not support the *gppNotificationRetryTimer* attribute does NOT send the Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE.

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3) On reception of the first Read Attributes command, the DUT does support the *gppMaxSearchCounter* attribute does not send the Read Attributes Response with Status SUCCESS and the *gppMaxSearchCounter* attribute. AND/OR On reception of the second Read Attributes command, the DUT does not send the Read Attribute Responses with Status SUCCESS and the *gppMaxSearchCounter* attribute set to M. AND/OR a DUT that does not support the *gppMaxSearchCounter* attribute does NOT send the Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE.
4) On reception of the Read Attributes command, the DUT sends the Read Attributes Response for *gppBlockedGPDID* attribute with Status different than SUCCESS or UNSUPPORTED_ATTRIBUTE. AND/OR on reception of the Write Attributes command, the DUT sends the Write Attributes Response for *gppBlockedGPDID* attribute, with Status different than READ_ONLY or UNSUPPORTED_ATTRIBUTE, respectively.
5) On reception of the first Read Attributes command, the DUT does not send the Read Attributes Response with Status SUCCESS and the *gppMaxProxyTableEntries* attribute set to N AND/OR N < 5. AND/OR On reception of the second Read Attributes command, the DUT does not send the Read Attribute Responses with Status SUCCESS and the *gppMaxProxyTableEntries* attribute unmodified (set to N).
6) On reception of the first Read Attributes command, the DUT does not send the Read Attributes Response with Status SUCCESS and the *Proxy Table* attribute set to 0x0000. AND/OR On reception of the second Read Attributes command, the DUT does not send the Read Attribute Responses with Status SUCCESS and the *Proxy Table* attribute unmodified (set to 0x0000).
7) On reception of the first Read Attributes command, the DUT does not send the Read Attributes Response with Status SUCCESS and the *gppFunctionality* attribute set to N. AND/OR On reception of the second Read Attributes command, the DUT does not send the Read Attribute Responses with Status SUCCESS and the *gppFunctionality* attribute unmodified (set to N).
8) On reception of the first Read Attributes command, the DUT does not send the Read Attributes Response with Status SUCCESS and the *gppActiveFunctionality* attribute set to N. AND/OR On reception of the second Read Attributes command, the DUT does not send the Read Attribute Responses with Status SUCCESS and the *gppActiveFunctionality* attribute unmodified (set to N).
9A) DUT-GPP does not respond with GP Proxy Table Response command formatted exactly as specified in pass verdict 9A) of 5.1.2.2.2 above.
9B) On reception of the first Read Attributes command, the DUT does not send the Read Attributes Response with Status SUCCESS and *Proxy Table* attribute. AND/OR *Proxy Table* of DUT does not have one entry for GPD SrcID = N (*ApplicationID* = 0b000), AND/OR the *Proxy Table* entry of DUT is not formatted exactly as defined in 5.1.2.2.2/pass verdict 9B) above; AND/OR the Proxy Table entry of DUT does not contains data different than supplied in the GP Pairing message.
9C) On reception of the first Read Attributes command, the DUT does not send the Read Attributes Response with Status SUCCESS and *Proxy Table* attribute. AND/OR *Proxy Table* of DUT does not have one entry for GPD IEEE address = N (*ApplicationID* = 0b010), Endpoint =X, AND/OR the *Proxy Table* entry of DUT is not formatted exactly as defined in 5.1.2.2.2/pass verdict 9C above; AND/OR the Proxy Table entry of DUT does not contains data different than supplied in the GP Pairing message. AND/OR *Proxy Table* of DUT does not have one entry for GPD SrcID = N (*ApplicationID* = 0b000), AND/OR the *Proxy Table* entry of DUT is not formatted exactly as defined in 5.1.2.2.2/pass verdict 9B) above; AND/OR the Proxy Table entry of DUT does not contain data different than supplied in the GP Pairing message. AND/OR If both entires do NOT fit in a single ZCL Read Attributes Response frame (without fragmentation or partitioning cluster usage), DUT-GPP does NOT respond ZCL Read Attributes Response with Status = INSUFFICIENT_SPACE and no entries included. AND/OR DUT-GPP responds with some partially included entries.
10A) DUT-GPP does not respond with GP Proxy Table Response command AND/OR the GP Proxy Table Response command is not formatted exactly as specified in pass verdict 10A) of 5.1.2.2.2 above.
10B) DUT-GPP does not respond with GP Proxy Table Response command AND/OR the GP Proxy Table Response command is not formatted exactly as specified in pass verdict 10B) of 5.1.2.2.2 above.
11) DUT-GPP does not responds with GP Proxy Table Response command formatted exactly as specified in pass verdict 11) of 5.1.2.2.2 above.

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12A) DUT-GPP does not respond with GP Proxy Table Response command formatted exactly as specified in pass verdict 12A) of 5.1.2.2.2 above.
12B) DUT-GPP does not respond with GP Proxy Table Response command formatted exactly as specified in pass verdict 12B) of 5.1.2.2.2 above.
13) DUT-GPP does not respond with GP Proxy Table Response command formatted exactly as specified in pass verdict 13) of 5.1.2.2.2 above.
14A) -14B) DUT-GPP does not respond with GP Proxy Table Response command formatted exactly as specified in pass verdict 14A) -14B) of 5.1.2.2.2 above.
15) DUT-GPP that does not implement the Proxy Table, does not respond with ZCL Default Response command, formatted exactly as specified in pass verdict 15) of 5.1.2.2.2 above.

5.1.2.2.3 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCC2	gppMaxProxyTableEntries attribute	Direct
GPPCC3A	Proxy Table attribute	Direct
GPPCC3B	Is the required minimal number of entries in the Proxy Table attribute supported?	Direct
GPPCC4	gppNotificationRetryNumber attribute	Direct
GPPCC5	gppNotificationRetryTimer attribute	Direct
GPPCC6	gppMaxSearchCounter attribute	Direct
GPPCC7, 8	gppFunctionality, gppActiveFunctionality	Direct
GPPCC3G, GPPCC156 GPPCC111	Proxy Table readout via GP Proxy Table Request/Response commands	Direct

5.1.2.3 Common attributes

5.1.2.3.1 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.3.1	***O (M if DUT-GPP supports this attribute):*** TH-ZR reads out the value of the *gpSharedSecurityKeyType* attribute, using ZCL Read Attributes command. TH-ZR writes a different value M (e.g. byte "0x07") to the *gpSharedSecurityKeyType* attribute, using ZCL Write Attributes No Response command. *TH-ZR reads out the value of the gpSharedSecurityKeyType* attribute.	The written values differ from the default values. Note: if the written value is related to some functionality, the functionality should preferably be supported on the DUT.
2	[R3] A.3.3.3.2	***O (M if DUT-GPP supports this attribute):*** TH-ZR reads out the value of the *gpSharedSecurityKey* attribute. TH-ZR writes a different value M (e.g. "0xB0 0xB1 0xB2 0xB3 0xB4 0xB5 0xB6 0xB7 0xB8 0xB9 0xBA 0xBB 0xBC 0xBD 0xBE 0xBF") to the *gpSharedSecurityKey* attribute. TH-ZR reads out the value of the *gpSharedSecurityKey* attribute.	
3	[R3] A.3.3.3.3	TH-ZR reads out the value of the *gpLinkKey* attribute. TH-ZR writes different value M (e.g. "ZigBeeAlliance11") to the *gpLinkKey* attribute. TH-ZR reads out the value of the *gpLinkKey* attribute.	
4	[R3] A.3.3.3.4	TH-ZR reads out the value of the *ClusterRevision* attribute (*AttributeID* = 0xfffd, a Cluster global attribute).	

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1556 ***5.1.2.3.2 Expected Outcome***

Pass verdict:
1) If DUT-GPP supports this attribute (DUT-GPP being a Basic Combo shall, DUT-GPP being a Basic Proxy may), then, on reception of the first Read Attributes command, the DUT-GPP sends the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKeyType* attribute. The default value for DUT-GPP being a Basic Proxy or Basic Combo is 0b000. If DUT-GPP does not support the *gpSharedSecurityKeyType* attribute, it responds with Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE. On reception of the second Read Attributes command, the DUT-GPP that supports the *gpSharedSecurityKeyType* attribute sends the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKeyType* attribute set to M.
2) If DUT-GPP supports this attribute (DUT-GPP being a Basic Combo shall, DUT-GPP being a Basic Proxy may), then, on reception of the first Read Attributes command, the DUT-GPP sends the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKey* attribute. If DUT-GPP does not support the *gpSharedSecurityKeyType* attribute, it responds with Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE. On reception of the second Read Attributes command, the DUT-GPP that supports the *gpSharedSecurityKey* attribute sends the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKey* attribute set to M.
3) On reception of the first Read Attributes command, the DUT-GPP sends the Read Attributes Response with Status SUCCESS and the *gpLinkKey* attribute. The default value for DUT-GPP being a Basic Combo pr a Basic Proxy is 'ZigBeeAlliance09', i.e. {0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39}. On reception of the second Read Attributes command, the DUT-GPP sends the Read Attributes Response with Status SUCCESS and the *gpLinkKey* attribute set to M.
4) On reception of the first Read Attributes command, the DUT-GPP sends the Read Attributes Response with Status SUCCESS and the *ClusterRevision* attribute with the default value of 0x01.
Fail verdict:
1) On reception of the first Read Attributes command, the DUT-GPP supporting this attribute does not send the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKeyType* attribute. AND/OR the value for the Basic Combo and Basic Proxy is not 0b000. AND/OR DUT-GPP that does not support the *gpSharedSecurityKeyType* attribute, does NOT respond with Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE. AND/OR On reception of the second Read Attributes command, the DUT-GPP that supports the *gpSharedSecurityKeyType* attribute does not send the Read Attribute Responses with Status SUCCESS and the *gpSharedSecurityKeyType* attribute set to M.
2) On reception of the first Read Attributes command, the DUT-GPP supporting this attribute does not send the Read Attributes Response with Status SUCCESS and the *gpSharedSecurityKey* attribute. AND/OR DUT-GPP that does not support the *gpSharedSecurityKey* attribute, does NOT respond with Read Attributes Response with Status UNSUPPORTED_ATTRIBUTE. AND/OR On reception of the second Read Attributes command, the DUT-GPP that supports the *gpSharedSecurityKey* attribute does not send the Read Attribute Responses with Status SUCCESS and the *gpSharedSecurityKey* attribute set to M.
3) On reception of the first Read Attributes command, the DUT-GPP does not send the Read Attributes Response with Status SUCCESS and the *gpLinkKey* attribute. AND/OR The default value for Basic Combo amd Basic Proxy is NOT 'ZigBeeAlliance09', i.e. {0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39}. AND/OR On reception of the second Read Attributes command, the DUT-GPP does not send the Read Attribute Responses with Status SUCCESS and the *gpLinkKey* attribute set to M.
4) On reception of the first Read Attributes command, the DUT-GPP does NOT send the Read Attributes Response with Status SUCCESS and the *ClusterRevision* attribute with the default value of 0x01.

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1559 ***5.1.2.3.3 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPC101	Is the *gpSharedSecurityKeyType* attribute supported?	Direct
GPPC102	Is the *gpSharedSecurityKey* attribute supported?	Direct
GPPC103	Is the *gpLinkKey* attribute supported?	Direct
GPPC104	Is the *ClusterRevision* global attribute supported?	Direct

1560 ## 5.1.3 Functionality support

1561 ### 5.1.3.1 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.4.2.7, A.3.2.8, A.3.2.9	TH-ZR reads out the value of the *gppFunctionality* attribute.	

1562 ### 5.1.3.2 Expected Outcome

Pass verdict:

1) TH-ZR receives the Read Attribute Response with Status SUCCESS and the sub-fields of the *gppFunctionality* attribute set to the values in DUT-GPP's PICS corresponding to its proxy role:

- b0 (GP feature) = 0b1;
- b1 (Direct communication (reception of GPDF via GP stub)) = 0b1;
- b2 (Derived groupcast communication) = 0b1 if the DUT-GPP implements derived groupcast, and 0b0 otherwise;
  b2 == 0b1 for DUT-GPPB and DUT-GPCB;
- b3 (Pre-commissioned groupcast communication) = 0b1 if the DUT-GPP implements commissioned groupcast, and 0b0 otherwise;
  b3 == 0b1 for DUT-GPPB and DUT-GPCB;
- b4 (Unicast communication) = 0b1 if the DUT-GPP supports unicast communication, and 0b0 otherwise;
  b4 == 0b0 for DUT-GPPB and DUT-GPCB;
- b5 (Lightweight unicast communication) = 0b1 if the DUT-GPP supports lightweight unicast communication, and 0b0 otherwise;
  b5 == 0b1 for DUT-GPPB and DUT-GPCB;
- b6 (proximity bidirectional operation) = 0b0;
- b7 = 0b1 if the DUT-GPP supports multi-hop bidirectional operation, and 0b0 otherwise;
  b7 == 0b0 for DUT-GPPB and DUT-GPCB;
- b8 = 0b1 if the DUT-GPP supports Proxy Table maintenance, and 0b0 otherwise;
  b8 == 0b0 for DUT-GPPB and DUT-GPCB;
- b9 (proximity commissioning) = 0b0;
- b10 = 0b1 if the DUT-GPP supports multi-hop commissioning, and 0b0 otherwise;
  b10 == 0b1 for DUT-GPPB and DUT-GPCB;
- b11 = 0b1 if the DUT-GPP supports CT-based commissioning, and 0b0 otherwise;
  b11 == 0b1 for DUT-GPPB and DUT-GPCB
- b12 = 0b1 if the DUT-GPP supports Maintenance of GPD, and 0b0 otherwise;
  b12 == 0b0 for DUT-GPPB and DUT-GPCB
- b13 = 0b1 if the DUT-GPP supports gpdSecurityLevel = 0b00, and 0b0 otherwise;
  b13 == 0b1 for DUT-GPPB and DUT-GPCB
- b14 = 0b0;
- b15 = 0b1 if the DUT-GPP supports gpdSecurityLevel = 0b10, and 0b0 otherwise;
  b15 == 0b1 for DUT-GPPB and DUT-GPCB
- b16 = 0b1 if the DUT-GPP supports gpdSecurityLevel = 0b11, and 0b0 otherwise;
  b16 == 0b1 for DUT-GPPB and DUT-GPCB
- b17 (Sink Table based groupcast forwarding) = 0b0;
- b18 (Translation Table) = 0b0;
- b19 = 0b1 if the DUT-GPP supports GPD IEEE address, and 0b0 otherwise;
  b19 == 0b1 for DUT-GPPB and DUT-GPCB
- b20 – b23 = 0b0 (reserved).

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Fail verdict:
1) TH-ZR does not receive the Read Attribute Response, formatted exactly as defined in 5.1.3.2/pass verdict 1 above.

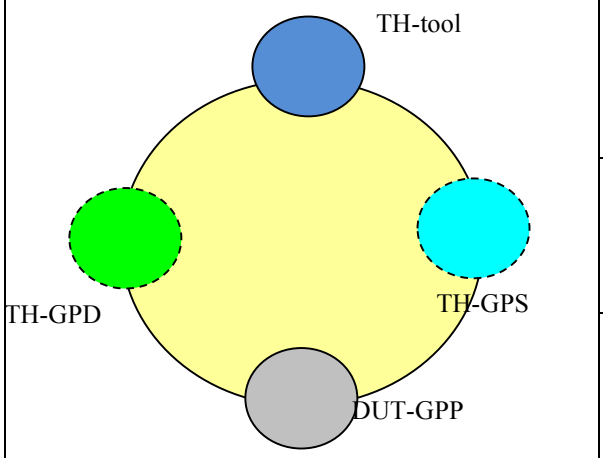
5.1.3.2.1 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF1 - GPPCCF18	Green Power cluster functionality, client side	Direct

5.1.4 Persistent storage of Proxy Table

5.1.4.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-tool	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
DUT-GPP (GPPB or proxy of GPCB)	PANId=same PANID as TH-ZR Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPS/TH-Tool	PANId=same PANID as TH-ZR Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD/TH-Tool	GPD ID = N Supports GPD application layer functionality corresponding to TH-GPS's GPEP.

Item	Doc. Ref.	Initial Conditions	Note
1		DUT-GPP and TH-ZR operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.4.2.2	Proxy Table of DUT-GPP is empty.	

5.1.4.1.2 Test Set-Up

The DUT-GPP shall be in wireless communication proximity of TH-ZR (and TH-GPD and TH-GPS, if used).

A packet sniffer shall be observing the communication over the air interface.

5.1.4.1.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A		Read out Proxy Table of DUT-GPP.	
1B		A pairing with derived groupcast communication mode and *SecurityLevel* >= 0b10 is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures); *Security frame counter* has an initial value M. The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures); *Security frame counter* has an initial value N. Read out Proxy Table of DUT-GPP.	

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1C		Make TH-GPD send a correctly formatted and protected Data GPDF with incremented *Security frame counter* N => M+1. Read out Proxy Table of DUT-GPP.	
2A		Switch off the DUT-GPP for approximately 5 seconds. Switch the DUT-GPP back on and make sure it can communicate on the network. Read out Proxy Table of DUT-GPP.	
2B		Make TH-GPD send a correctly formatted and protected Data GPDF with incremented *Security frame counter* O => N+1. Read out Proxy Table of DUT-GPP.	

1571 ***5.1.4.1.4 Expected Outcome***

Pass verdict:
1A) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, being empty.
1B) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = M.
1C) On reception of the Data GPDF from TH-GPD, DUT-GPP forwards GP Commissioning Notification in the derived groupcast communication mode, carrying the GPD command. DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = N.
2A) Once operational again, DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the sub-fields of the *Options* field set to: *EntryActive* = 0b1, *EntryValid* = 0b1, the *GPD security frame counter* is equal to M or N.
2B) On reception of the Data GPDF from TH-GPD, DUT-GPP forwards GP Commissioning Notification in the derived groupcast communication mode, carrying the GPD command. DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = O.
Fail verdict:
1A) DUT-GPP does NOT respond with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, AND/OR DUT-GPP's Proxy Table is not empty.
1B) DUT-GPP does NOT responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = M.
1C) On reception of the Data GPDF from TH-GPD, DUT-GPP does NOT forward GP Commissioning Notification in the derived groupcast communication mode, carrying the GPD command. AND/OR DUT-GPP does NOT respond with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = N.
2A) Once operational again, DUT-GPP does NOT respond with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with all the as listed in pass verdict 2A above.
2B) On reception of the Data GPDF from TH-GPD, DUT-GPP does NOT forward GP Commissioning Notification in the derived groupcast communication mode, carrying the GPD command. AND/OR DUT-GPP does NOT respond with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with all the parameters as established during the commissioning; the *GPD security frame counter* = O.

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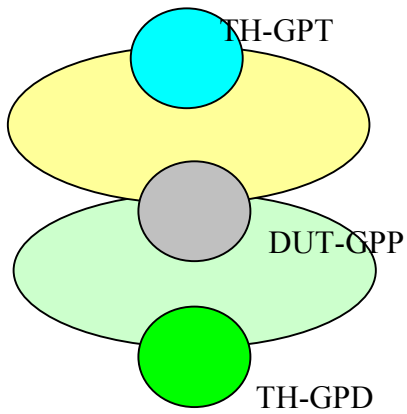
5.1.4.1.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCC3A	Proxy Table attribute	Direct
GPPCC200	Persistent storage of Proxy Table	Direct

5.2 Basic GPDF frame format

5.2.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPT/TH-Tool	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific GPEP supports the application functionality of the TH-GPD (see Section A.4.3 of [R3]).
DUT-GPP, GPPB	PANId=same PANID as TH-GPT Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD/TH-Tool	GPD ID = Z

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPT and DUT-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.4.2.2, A.3.3.2.2	A pairing with derived groupcast communication mode is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures); no security and no alias is used. The corresponding information is also included in the DUT-GPP (e.g. as a result of any of the commissioning procedures) with the *Entry Active* and *Entry Valid* sub-fields of the *Options* field both having value 0b1.	

5.2.1.1.2 Test Set-Up

The TH-GPT shall be in wireless communication proximity of the DUT-GPP, and the DUT-GPP shall be in wireless communication proximity of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

5.2.2 Baseline (no security)

5.2.2.1 ApplicationID = 0b000

5.2.2.1.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 5.2.1.1.1.	
3	[R3] A.3.4.2.2, A.3.3.2.2, A.3.5.2.3	TH-GPD uses ApplicationID = 0b000 and GPD SrcID Z.	

5.2.2.1.2 Test Procedure

Note: Only basic GPDF frame format reception is tested here. Filtering of the GPD ID is tested separately. Duplicate filtering (based on GPD's *Sequence number capabilities*) to be tested separately. Rx capabilities are tested separately, with bidirectional operation. Security is also tested separately.

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Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.5.2.1	Make TH-GPD send a Data GPDF with: • *MAC Sequence number* field = 0xC3; • *NWK Frame Control* field with the following values: ▪ the *Frame type* sub-field set to 0b00, ▪ the *ZigBee Protocol Version* sub-field set to 0b0011, ▪ the *NWK Frame Control Extension* sub-field set to 0b1; • the *Extended NWK Frame Control* field is present, with the following values: ▪ the *ApplicationID* sub-field set to 0b000, ▪ the SecurityLevel = 0b00; ▪ the SecurityKeyType = 0b0; ▪ the *RxAfterTx* sub-field set to 0b0, ▪ the *Direction* sub-field set to 0b0. • *SrcID* field present and carrying N; • *CommandID field* present; *Command payload* field MAY be present; • Endpoint, *Security frame counter* and MIC fields absent	
2	[R3] A.1.4, A.3.5.2.1	Make TH-GPD send a Data GPDF as in item 1 above with the following changes: • *MAC Sequence number* field = 0xC4; • the NWK Frame Control Extension sub-field set to 0b0, and the Extended NWK Frame Control field is absent.	
The test steps below can only be executed if the GPD role is taken by a TH			
3A	[R3] A.1.4, A.3.5.2.1	***Negative test (Frame Type mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC5; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b11.	
3B	[R3] A.1.4, A.3.5.2.1	***Negative test (Frame Type mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC5; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b10.	
3C	[R3] A.1.4, A.3.5.2.1	***Negative test (Frame Type mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC5; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01.	
3D	[R3] A.1.4, A.3.5.2.1	***Negative test (ZigBee Protocol Version mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC5; the *ZigBee Protocol Version* sub-field of the *NWK Frame Control* field set to 0b0010.	
4	[R3] A.1.4, A.3.5.2.1	***Negative test (Frame Control mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC6; the *Extended NWK Frame Control* field is present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b0.	
5	[R3] A.1.4, A.3.5.2.1	***Negative test (Frame Control mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC7; the *Extended NWK Frame Control* field is NOT present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b1.	
6	[R3] A.1.4, A.3.5.2.1	***Negative test (ApplicationID mismatch)****:* Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC8; the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b001.	

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7A	[R3] A.1.4, A.3.5.2.1	***Negative test (ApplicationID mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC9; the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b011.	
7B	[R3] A.1.4, A.3.5.2.1	***Negative test (SecurityLevel mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC9; the *SecurityLevel* sub-field of the *Extended NWK Frame Control* field is set to 0b10 and the *KeyType* sub-field set to 0b1.	
8	[R3] A.1.4, A.3.5.2.1	***Negative test (Direction mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xCA; the *Direction* sub-field of the *Extended NWK Frame Control* field is set to 0b1. Read Proxy Table entry for TH-GPD of the DUT-GPP.	
9	[R3] A.1.4, A.3.5.2.1	Make TH-GPD send 2 identical Data GPDFs formatted as in item 1 above, with the same MAC *Sequence Number*, 0xCB, within 2s.	Note: the effect can only be observed in case of commands which each command has an effect (e.g. toggle, step up).
10	[R3] A.1.4, A.3.5.2.1	Make TH-GPD send a Data GPDF with *MAC sequence number* 0xCC, SecurityLevel 0b00, *RxAfterTx* 0b0, and GPD CommandID 0xA0 with of the max allowed payload size for ApplicationID = 0b000 of 59 octets (0x00 0x01 .. 0x3A).	
11	[R3] A.1.4.1.3,	***Negative test (Both Auto-Commissioning and RxAfterTx set to 0b1):*** Make TH-GPD send s Data GPDF formatted as in item 1 above with the following changes: *Auto-Commissioning* sub-field of the NWK Frame control field set to 0b1; the *RxAfterTx* sub-field of the *Extended NWK Frame Control* field is set to 0b1.	
12A	[R3] A.1.4.1,	***Negative test (Wrong SrcID):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *SrcID* differing by 1bit.	
12B	[R3] A.1.4.1, A.3.5.2.3	***Negative test (Wrong SrcID = 0x00000000):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *SrcID* = 0x00000000.	
13	[R3] A.1.4.1,	***Positive test:*** Make TH-GPD send a correctly formatted Data GPDF as in item 1 above, only with updated MAC sequence number.	
14		***Basic Proxy only: Positive test: RxAfterTx = 0b1:*** Make TH-GPD send a correctly formatted Data GPDF as in item 1 above, only with RxAfterTx = 0b1 and updated MAC sequence number.	

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1590 ***5.2.2.1.3 Expected Outcome***

Pass verdict:
1) At least Dmin_u after GPDF reception, DUT-GPP sends GP Notification command with the following fields: • NWK header fields: ▪ Destination Address 0xfffd; ▪ Source Address: alias derived from Z (e.g. 0x5678 if SrcID = 0x12345678); ▪ Sequence Number: alias derived from MAC sequence number in the GPDF (e.g. 0xC3 for 0xC3); • APS header fields: ▪ Group address: GroupID derived from Z (e.g. 0x5678 if SrcID = 0x12345678); ▪ *ProfileID*: 0xA1E0; ▪ *ClusterID*: 0x0021; ▪ source endpoint: GPEP (242); ▪ destination endpoint: not present or if present, GPEP (242); ▪ APS Counter: alias derived from MAC sequence number in the GPDF (e.g. 0xC3 for 0xC3); • ZCL header fields: ▪ *Command Identifier*: 0x00 ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b0 (client to server), *Disable default response* 0b1; • ZCL payload fields: ▪ *Options* sub-fields set to: – *ApplicationID* 0b000 as in the triggering GPDF, *Also Unicast* 0b0, *AlsoDerivedGroup* 0b1, *AlsoCommissionedGroup* 0b0, *SecurityLevel* 0b00, *SecurityKeyType* 0b000, and *RxAfterTx* 0b0; – *gpTxQueueFull* set to 0b1 and *BidirectionalCommunicationCapability* set to 0b0, if the DUT-GPP does NOT support bidirectional communication functionality; *BidirectionalCommunicationCapability* set to 0b1, if the DUT-GPP does support bidirectional communication functionality; – *ProxyInfoPresent* set to 0b1; ▪ *GPD ID* field of 4B length, carrying Z; ▪ *Endpoint* field absent; ▪ *GPD security frame counter* carrying 0x000000C3; ▪ *GPD CommandID* copied from the GPDF and *GPD Command Payload* copied from the GPDF, if present there, and else carrying 0x00 or 0xff; ▪ *GPP short address* and *GPP-GPD link* present.
2) DUT-GPP sends GP Notification in derived groupcast, formatted exactly as specified in pass verdict 1) of 5.2.2.1.3, with the following changes: • Sequence Number field of the NWK header: alias derived from MAC sequence number in the GPDF (e.g. 0xC3 for 0xC3); • APS Counter: alias derived from MAC sequence number in the GPDF (e.g. 0xC3 for 0xC3); • *GPD security frame counter* carrying 0x000000C4.
3) DUT-GPP does not send GP Notification nor any other GP command.
4) DUT-GPP does not send groupcast GP Notification. If DUT-GPP supports the Proxy Table Maintenance functionality, it may send GP Pairing Search command. It shall not send any other GP command.
5) DUT-GPP does not send GP Notification. If the GPD command in the GPDF was payloadless, the DUT-GPP shall not send any other GP command. If the GPD command in the GPDF has a payload, and DUT-GPP supports the Proxy Table Maintenance functionality, it may send GP Pairing Search command. It shall not send any other GP command.
6) – 8) DUT-GPP does not send GP Notification nor any other GP command. The Proxy Table entry for TH-GPD of DUT-GPP has *GPD security frame counter* parameter set to 0x000000C4.
9) DUT-GPP sends exactly one GP Notification.
10) At least Dmin_u after GPDF reception, DUT-GPP sends GP Notification command, formatted exactly as in pass verdict 1) of 5.2.2.1.3 above, only with: • NWK header Sequence Number carrying 0xCC; • APS Counter carrying 0xCC; • and GPD security frame counter carrying 0x000000CC;

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• GPD CommandID carrying 0xA0; • GPD Command Payload carrying 0x3A, 0x39, .. , 0x01, 0x00.
11) DUT-GPP does not send GP Notification nor any other GP command.
12) DUT-GPP does not send groupcast GP Notification. If DUT-GPP supports the Proxy Table Maintenance functionality, it may send GP Pairing Search command. It shall not send any other GP command.
13) At least Dmin_u after GPDF reception, DUT-GPP sends GP Notification command, correctly formatted as in pass verdict 1 above, only with the fields NWK header Sequence Number, APS Counter and GPD security frame counter derived from the MAC sequence number of the triggering GPDF.
14) At least gppTunnelingDelay (corresponding to the *Link quality* sub-field of the *GPP-GPD link* field) after GPDF reception, DUT-GPP sends GP Notification command, correctly formatted as in pass verdict 1 above, only with: • the fields NWK header Sequence Number, APS Counter and GPD security frame counter derived from the MAC sequence number of the triggering GPDF; • *RxAfterTx* sub-field of the *Options* field set to 0b1.
Fail verdict:
1) DUT-GPP does not send a GP Notification, formatted exactly as specified in 5.2.2.1.3/pass verdict 1 above AND/OR DUT-GPP does not observe the minimum delay. AND/OR DUT-GPP sends an additional GP command.
2) DUT-GPP does not send a GP Notification formatted exactly as specified in 5.2.2.1.3/pass verdict 1 above.
3) DUT-GPP sends a GP Notification and/or any other GP command.
4) DUT-GPP sends a groupcast GP Notification. AND/OR DUT-GPP does send any GP command other than GP Pairing Search.
5) DUT-GPP sends a GP Notification. AND/OR in case of GPDF with payloadless GP command, DUT-GPP does send other GP command. AND/OR in case of GPDF with GP command with payload, DUT-GPP does send any GP command other than GP Pairing Search.
6) - 8) DUT-GPP sends a GP Notification or any other GP command.
9) DUT-GPP does not send a GP Notification AND/OR DUT-GPP sends multiple GP Notifications NOT being NWK leyer retransmissions. OR DUT-GPP does send other GP Notification than in derived groupcast.
10) DUT-GPP does not send a GP Notification, formatted exactly as specified in 5.2.2.1.3/pass verdict 10 above.
11) DUT-GPP sends groupcast GP Notification in or any other GP command.
12) DUT-GPP sends groupcast GP Notification. AND/OR If DUT-GPP supports the Proxy Table Maintenance functionality, it send other GP command than GP Pairing Search command.
13) DUT-GPP does NOT send GP Notification, formatted exactly as specified in pass verdict 13 above AND/OR DUT-GPP does NOT observe the minimum delay.
14) DUT-GPP does NOT send GP Notification, formatted exactly as specified in pass verdict 14 above AND/OR DUT-GPP does NOT observe the minimum delay.

5.2.2.2 ApplicationID = 0b010

5.2.2.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 5.2.1.1.1.	
2	[R3] A.3.4.2.2, A.3.3.2.2	TH-GPD uses ApplicationID = 0b010 and GPD IEEE address Z; it supports Endpoints X and Y.	
3		A pairing with derived groupcast communication mode is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures) for endpoint X; no security and no assigned alias is used. The corresponding information is also included in the DUT-GPP (e.g. as a result of any of the commissioning procedures) with the *Entry Active* and *Entry Valid* sub-fields of the *Options* field both having value 0b1.	

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5.2.2.2.2 Test Procedure

Note: Only basic GPDF frame format reception is tested here. Negative frame format tests are tested separately. Filtering of the GPD ID is tested separately. Duplicate filtering (based on GPD's *Sequence number capabilities*) to be tested separately. Rx capabilities are tested separately, with bidirectional operation. Security is also tested separately.

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.5.2.1	Make TH-GPD send a Data GPDF with: • *MAC Sequence number* field = 0xC3; • *MAC source address* field carrying GPD IEEE address Z; • *NWK Frame Control* field with the following values: ▪ the *Frame type* sub-field set to 0b00, ▪ the *ZigBee Protocol Version* sub-field set to 0b0011. ▪ the *NWK Frame Control Extension* sub-field set to 0b1; • the *Extended NWK Frame Control* field is present, with the following values: ▪ the *ApplicationID* sub-field set to 0b010, ▪ *SecurityLevel* sub-field set to 0b00; ▪ *KeyType* sub-field set to 0b1; ▪ the *RxAfterTx* sub-field set to 0b0,the *Direction* sub-field set to 0b0. • *SrcID* field absent; • *Endpoint* field present and set to X; • *Security frame counter* field and *MIC* field are absent.	
The test steps below can only be executed if the GPD role is taken by a TH			
2		***Negative test (IEEE address absent):*** Make TH-GPD send a Data GPDF with *RxAfterTx* set to 0b0, with *ApplicationID* = 0b010 and IEEE address of GPD absent (MAC Source address mode 0b10 and Source address = 0xffff used instead); the Endpoint field is present and set to X; *MAC Sequence number* field = 0xC4.	
3A	[R3] A.1.4, A.3.5.2.1	***Negative test (Frame Type mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC5; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b11.	
3B	[R3] A.1.4, A.3.5.2.1	***Negative test (Frame Type mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC5; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b10.	
3C	[R3] A.1.4, A.3.5.2.1	***Negative test (Frame Type mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC5; the *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01.	
4	[R3] A.1.4, A.3.5.2.1	***Negative test (ZigBee Protocol Version mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC6; the *ZigBee Protocol Version* sub-field of the *NWK Frame Control* field set to 0b0010.	
5A	[R3] A.1.4, A.3.5.2.1	***Negative test (Frame Control mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC7; the *Extended NWK Frame Control* field is present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b0.	
5B	[R3] A.1.4, A.3.5.2.1	***Negative test (Frame Control mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC8; the *Extended NWK Frame Control* field is NOT present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b1.	

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5C	[R3] A.1.4, A.3.5.2.1	***Negative test (Extended NWK Frame Control missing):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC8; the *Extended NWK Frame Control* field is NOT present and the *NWK Frame Control Extension* sub-field of the *NWK Frame Control* field is set to 0b0.	
6	[R3] A.1.4, A.3.5.2.1	***Negative test (ApplicationID mismatch)****:* Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xC9; the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b001.	
7	[R3] A.1.4, A.3.5.2.1	***Negative test (ApplicationID mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xCA; the *ApplicationID* sub-field of the *Extended NWK Frame Control* field is set to 0b011.	
8	[R3] A.1.4, A.3.5.2.1	***Negative test (SecurityLevel mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xCB; the *SecurityLevel* sub-field of the *Extended NWK Frame Control* field is set to 0b10 and the *KeyType* sub-field set to 0b1.	
9	[R3] A.1.4, A.3.5.2.1	***Negative test (Direction mismatch):*** Make TH-GPD send a Data GPDF formatted as in item 1 above with the following changes: *MAC Sequence number* field = 0xCC; the *Direction* sub-field of the *Extended NWK Frame Control* field is set to 0b1. Read Proxy Table entry for TH-GPD of the DUT-GPP.	
10	[R3] A.1.4, A.3.5.2.1	Make TH-GPD send a Data GPDF with *MAC sequence number* 0xCD, *SecurityLevel* 0b00, *RxAfterTx* 0b0, and GPD CommandID 0xA0 with of the maximum allowed payload length for *ApplicationID* = 0b010 of 54 octets (0x00 0x01 .. 0x35).	
11	[R3] A.1.4.1.3,	***Negative test (Both Auto-Commissioning and RxAfterTx set to 0b1):*** Make TH-GPD send s Data GPDF formatted as in item 1 above with the following changes: *Auto-Commissioning* sub-field of the NWK Frame control field set to 0b1; the *RxAfterTx* sub-field of the *Extended NWK Frame Control* field is set to 0b1; *MAC sequence number* = 0xCE.	
12A	[R3] A.1.4.1.1,	***Negative test (Wrong IEEE address):*** Make TH-GPD send s Data GPDF formatted as in item 1 above with the following changes: *IEEE address* differing by 1bit.	
12B	[R3] A.1.4.1.1, A.3.5.2.3	***Negative test: GPD IEEE address= 0x0000000000000000:*** Make TH-GPD send s Data GPDF formatted as in item 1 above with the following changes: IEEE address = 0x0000000000000000.	
13	[R3] A.1.4.1.1, A.3.5.2.3	***Negative test (Wrong Endpoint):*** Make TH-GPD send s Data GPDF formatted as in item 1 above with the following changes: *Endpoint* set to a value other that 0x00, 0xff and X.	
14	[R3] A.1.4.1.1, A.3.5.2.3	***Positive test (Endpoint 0x00):*** Make TH-GPD send s Data GPDF formatted as in item 1 above with the following changes: *Endpoint* set to 0x00.	
15	[R3] A.1.4.1.1, A.3.5.2.3	***Positive test (Endpoint 0xff):*** Make TH-GPD send s Data GPDF formatted as in item 1 above with the following changes: *Endpoint* set to 0xff.	

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1599 ***5.2.2.2.3 Expected Outcome***

Pass verdict:
1) At least Dmin_u after GPDF reception, DUT-GPP sends GP Notification command with the following fields: • NWK header fields: ▪ Destination Address 0xfffd; ▪ Source Address: alias derived from Z (0x2211 if GPD IEEE address is 0x887665544332211); ▪ Sequence Number 0xC3; • APS header fields: ▪ Group address: derived from Z (0x2211 if GPD IEEE address is 0x887665544332211); ▪ *ProfileID*: 0xA1E0; ▪ *ClusterID*: 0x0021; ▪ source endpoint: GPEP (242); ▪ destination endpoint: not present or if present, GPEP (242); ▪ APS Counter: 0xC3; • ZCL header fields: ▪ *Command Identifier*: 0x00 ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b0 (client to server), *Disable default response* 0b1; • ZCL payload fields: ▪ *Options* sub-fields set to: – *ApplicationID* 0b010 as in the triggering GPDF, *Also Unicast* 0b0, *AlsoDerivedGroup* 0b1, *AlsoCommissionedGroup* 0b0, *SecurityLevel* 0b00, *SecurityKeyType* 0b000, and *RxAfterTx* 0b0; – *gpTxQueueFull* set to 0b1 and *BidirectionalCommunicationCapability* set to 0b0, if the DUT-GPP does NOT support bidirectional communication functionality; *BidirectionalCommunicationCapability* set to 0b1, if the DUT-GPP does support bidirectional communication functionality; – *ProxyInfoPresent* = 0b1; ▪ *GPD ID* field of 8B length, carrying Z; ▪ *Endpoint* field present and carrying X; ▪ *GPD security frame counter* carrying 0x000000C3; ▪ *GPD CommandID* copied from the GPDF and *GPD Command Payload* copied from the GPDF, if present there, and else carrying 0x00 or 0xff; ▪ *GPP short address* and *GPP –GPD link* fields present.
2) DUT-GPP does not send GP Notification.
3) – 4) DUT-GPP does not send a groupcast GP Notification or any other GP command.
5A) DUT-GPP does not send groupcast GP Notification. If DUT-GPP supports the Proxy Table Maintenance functionality, it may send GP Pairing Search command. It shall not send any other GP command.
5B) – 5C) DUT-GPP does not send GP Notification. If the GPD command in the GPDF was payloadless, the DUT-GPP shall not send any other GP command. If the GPD command in the GPDF has a payload, and DUT-GPP supports the Proxy Table Maintenance functionality, it may send GP Pairing Search command. It shall not send any other GP command.
6) – 7) DUT-GPP does not send GP Notification nor any other GP command.
8) DUT-GPP does not send GP Notification. If DUT-GPP supports the Proxy Table Maintenance functionality, it may send GP Pairing Search command. It shall not send any other GP command.
9) DUT-GPP does not send GP Notification nor any other GP command. The Proxy Table entry for TH-GPD of DUT-GPP has *GPD security frame counter* parameter set to 0x000000C4.
10) At least Dmin_u after GPDF reception, DUT-GPP sends GP Notification command, formatted exactly as in pass verdict 1) of 5.2.2.1.3 above, only with: • NWK header Sequence Number and APS Counter carrying 0xCD; • and GPD security frame counter carrying 0x000000CD; • GPD CommandID carrying 0xA0; • GPD Command Payload carrying 0x35, 0x34, .. , 0x01, 0x00.
11) DUT-GPP does not send GP Notification nor any other GP command.

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12) –13) DUT-GPP does not send groupcast GP Notification. If DUT-GPP supports the Proxy Table Maintenance functionality, it may send GP Pairing Search command. It shall not send any other GP command.
14) – 15) DUT-GPP sends GP Notification, formatted exactly as described in pass verdict 1 above (but with current security frame counter value).
Fail verdict:
1) DUT-GPP does not send a GP Notification, formatted exactly as specified in 5.2.2.1.3/pass verdict 1 above AND/OR DUT-GPP does not observe the minimum delay. AND/OR DUT-GPP sends an additional GP command.
2) DUT-GPP sends GP Notification.
3) – 4) DUT-GPP sends a groupcast GP Notification AND/OR any other GP command.
5A) DUT-GPP sends groupcast GP Notification. AND/OR If DUT-GPP supports the Proxy Table Maintenance functionality it sends other GP command than GP Pairing Search command.
5B) – 5C) DUT-GPP sends GP Notification. AND/OR If the GPD command in the GPDF was payloadless, the DUT-GPP sends any other GP command. AND/OR If the GPD command in the GPDF has a payload, and DUT-GPP supports the Proxy Table Maintenance functionality, it sends other GP command than GP Pairing Search command.
6) – 7) DUT-GPP sends GP Notification AND/OR other GP command.
8) DUT-GPP sends groupcast GP Notification. AND/OR If DUT-GPP supports the Proxy Table Maintenance functionality, it sends other GP command than GP Pairing Search command.
9) DUT-GPP sends GP Notification AND/OR any other GP command. The Proxy Table entry for TH-GPD of DUT-GPP has *GPD security frame counter* parameter set to value other than 0x000000C4.
10) DUT-GPP does not send a GP Notification, formatted exactly as specified in 5.2.2.1.3/pass verdict 10 above AND/OR DUT-GPP does not observe the minimum delay. AND/OR DUT-GPP sends an additional GP command.
11) DUT-GPP sends GP Notification AND/OR any other GP command.
12) –13) DUT-GPP sends groupcast GP Notification. AND/OR If DUT-GPP supports the Proxy Table Maintenance functionality, it sends any other GP command than GP Pairing Search command.
14) – 15) DUT-GPP does NOT send GP Notification, formatted exactly as described in pass verdict 14 above.

5.2.3 Random GPD MAC sequence numbers

This test is only required to be run if the DUT-GPS supports *gpsSecurityLevel* = 0b00.

5.2.3.1.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1 - 2	[R3] A.3.4.2.2, A.3.3.2.2	As in sec. 5.2.1.1.1; the *Sequence Number Capabilities* sub-field of the *Options* field of the Proxy Table entry has value 0b0.	

5.2.3.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.5.2.1	Make TH-GPD send a Data GPDF with Sequence Number 0xC3.	The time between two consecutive steps in the test should be at least *gpDuplicateTimeout*.
2		Make TH-GPD send a Data GPDF with Sequence Number 0xC3.	
3		Make TH-GPD send a Data GPDF with Sequence Number 0xC2.	
4		Make TH-GPD send a Data GDPF with Sequence Number 0xC9.	

5.2.3.1.3 Expected Outcome

Pass verdict:
1) – 4) DUT-GPP sends a *GP Notification* command in groupcast to TH-GPT, with the *GPD Security Frame Counter* field carrying 0x00 on the 3MSB and the MAC sequence number value of the received GPDF on the 1LSB.
Fail verdict:
1) – 4) For at least one of the four Data GPDFs, DUT-GPP does not send the *GP Notification* command in groupcast to TH-GPT.

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5.2.4 Incremental GPD MAC sequence numbers

This test is only required to be run if the DUT-GPS supports *gpsSecurityLevel* = 0b00.

5.2.4.1.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.4.2.2, A.3.3.2.2	As in sec. 5.2.1.1.1; the *Sequence Number Capabilities* sub-field of the *Options* field of the Proxy Table entry has value 0b1, the *SecurityFrameCounter* parameter value < 0xC3.	

5.2.4.1.2 Test procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.5.2.1	Make TH-GPD send a Data GPDF with Sequence Number 0xC3.	The time between two consecutive steps in the test should be at least *gpDuplicateTimeout*.
2		Make TH-GPD send a Data GPDF with Sequence Number 0xC3.	
3		Make TH-GPD send a Data GPDF with Sequence Number 0xC2.	
4		Make TH-GPD send a Data GPDF with Sequence Number 0xC5.	
5		Make TH-GPD send a Data GPDF with Sequence Number 0x05.	

5.2.4.1.3 Expected Outcome

Pass verdict:
1) - 5) DUT-GPP sends a *GP Notification* command in groupcast to TH-GPT, with the *GPD Security Frame Counter* field carrying 0x00 on the 3MSB and the MAC sequence number value of the received GPDF on the 1LSB.
Fail verdict:
1) - 5) DUT-GPP does not send a *GP Notification* command in groupcast to TH-GPT.

5.2.4.2 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF2	Is Direct communication (via GP stub) supported as a client? (Direct communication sub-field of the gppFunctionality attribute set?)	Direct
GPPCC100	Is transmission of the GP Notification command supported?	Direct
GPPC3r	Does the device support random MAC sequence number for GPD commands' duplicate filtering?	Direct
GPPC3i	Does the device support incremental MAC sequence number for GPD commands' duplicate filtering?	Direct
GPF3A	Support of *nwkcProtocolVersion* = 0x3	Direct
GPF4C	ApplicationID = 0b000	Direct
GPF4D	ApplicationID = 0b010	Direct
GPPCCF14	Is gpdSecurityLevel = 0b00 supported as a client? (gpdSecurityLevel = 0b00 sub-field of the gppFunctionality attribute set?)	Direct

5.2.5 Secured Data GPDF

Verify that security is correctly applied on transmission/reception of Data GPDFs.

If supported by the DUT, each test in this section shall be repeated for TH-GPD using ApplicationID = 0b000 and ApplicationID = 0b010.

5.2.5.1 Sub-case: SecurityLevel = 0b01 (deprecated)

5.2.5.2 Sub-case: SecurityLevel = 0b10, ApplicationID = 0b000

5.2.5.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 5.2.1.1.1.	
3	[R3] A.3.4.2.2	TH-GPD, DUT-GPP and TH-GPS use SecurityLevel = 0b10, preferably with *SecurityKeyType* 0b010 (GPD group key), preferably the key being key (0:15) = 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf.	
4	[R3] A.1.4, A.1.5	TH-GPD uses *ApplicationID* = 0b000 and *GPD SrcID* Z.	

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1618 ***5.2.5.2.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1, A.1.5.4	TH-GPD sends Data GPDF, with the *Extended NWK Frame Control* field present, the *ApplicationID* sub-field set to 0b000, the *SecurityLevel* sub-field set to 0b10, *SecurityKey* set to 0b0, the *SecurityFrameCounter* field present and set to N, the 4B SrcID field present and set to Z, the *Endpoint* field absent, and the payload correctly authenticated with 4B MIC. Read out Proxy Table of DUT-GPP.	
The test steps 2-8 below can only be executed if the GPD role is taken by a TH			
2	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong key):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, SrcID = Z, protected with a correct security level (0b10), correct frame counter value (=M>=N+1), correct key type (0b0) but wrong key.	
3	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong key type):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, SrcID = Z, protected with a correct security level (0b10), correct *SecurityFrameCounter* value (=P>=M+1), correct key but wrong key type (0b1).	
4	[R3] A.3.5.2.1, A.1.5.4	**Negative test (unprotected frame):** TH-GPD sends an unprotected Data GPDF, with *ApplicationID* = 0b000, SrcID = Z, and with MAC *Sequence number* value (=Q>=P+1). (SecurityLevel = 0b00).	
5	[R3] A.3.5.2.1, A.1.5.4	**Negative test (lower security level):** TH-GPD sends a Data GPDF, with *ApplicationID* = 0b000, SrcID = Z, with security level lower than the before (SecurityLevel = 0b01), with counter value >=Q+1.	
6	[R3] A.3.5.2.1, A.1.5.4	**Negative test (replayed frame):** TH-GPD sends a correctly secured replayed Data GPDF, with ApplicationID = 0b000, SrcID = Z and with old *SecurityFrameCounter* N-1.	
7	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong direction):** TH-GPD sends Data GPDF, with ApplicationID = 0b000, SrcID = Z, with the *Extended NWK Frame Control* field present, the *SecurityKeyType* 0b0, the *SecurityLevel* sub-field set to 0b10, the *SecurityFrameCounter* field present and having a correct value N+1; the payload authenticated with 4B MIC, but with the *Direction* sub-field of the *Extended NWK Frame Control* field set to 0b1. Read out Proxy Table of DUT-GPP.	
8	[R3] A.3.5.2.1, A.1.5.4	***Positive test:*** TH-GPD sends a correctly protected Data GPDF with ApplicationID = 0b000, SrcID = Z, with *SecurityFrameCounter* value N+1. Read out Proxy Table of DUT-GPP.	

1619 ***5.2.5.2.3 Expected Outcome***

Pass verdict:
1) DUT-GPP successfully security processes the received GPDF, and forwards it to the sink using GP Notification, with: • Sub-fields of the *Options* field set to: ▪ *ApplicationID* = 0b000; ▪ *SecurityLevel* = 0b10, ▪ the *SecurityKeyType* = 0b010, • GPD ID field of 4B length and carrying Z; • *Endpoint* field absent; • and the *GPD Security Frame counter* field present and carrying N. • DUT-GPP stores the new value N for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. TH-GPS executes the GPD command.
2) DUT-GPP silently drops the GPDF. OR DUT-GPP sends GP Pairing Search command for TH-GPD's GPD ID with *Request GPD Security frame counter* sub-field and/or *Request GPD Security key* sub-field of the *Options* field set to 0b1 The DUT-GPP shall not send GP Notification or store the frame counter value in its Proxy Table entry for GPD ID Z.

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3) DUT-GPP silently drops the GPDF. The DUT-GPP shall not send GP Notification or store the frame counter value in its Proxy Table entry for GPD ID Z.
4) DUT-GPP silently drops the GPDF. The DUT-GPP shall not send GP Notification or store the frame counter value in its Proxy Table entry for GPD ID Z.
5) DUT-GPP silently drops the GPDF. The DUT-GPP shall not send GP Notification or store the frame counter value in its Proxy Table entry for GPD ID Z.
6) – 7) DUT-GPP silently drops the GPDF. The DUT-GPP shall not send GP Notification or store the frame counter value in its Proxy Table entry for GPD ID Z.
8) DUT-GPP successfully security processes the received GPDF, and forwards it to the sink using GP Notification, with and the *GPD Security Frame counter* field present and carrying N+1. DUT-GPP stores the new value N+1 for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. TH-GPS executes the GPD command.
9A) – 9C) DUT-GPP forwards GP Notification in derived groupcast (since that's the *CommunicationMode* the pairing uses), with *RxAfterTx* = 0b0, *ProxyInfoPresent* = 0b1; and the fields *GPP short address* and *GPP-GPD link* present, with security settings as in the triggering GPDF, carrying the received GPD command and payload. DUT-GPP does not remove (or set to inactive/invalid) the Proxy Table entry for TH-GPD. There is no gppBlockedGPDID entry for TH-GPD Z.
9D) – 9F) DUT-GPP silently drops the GPDF. DUT-GPP does NOT forward GP Commissioning Notification nor GP Notification. DUT-GPP does not remove (or set to inactive/invalid) the Proxy Table entry for TH-GPD. There is no gppBlockedGPDID entry for TH-GPD Z or Z2.
Fail verdict:
1) DUT-GPP does not forward the GPDF to the sink using GP Notification, formatted exactly as described in pass verdict 1 of 5.2.5.2.3AND/OR DUT-GPP does not store the new value N for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. AND/OR TH-GPS does not execute the GPD command.
2) DUT-GPP does send GP Notification OR DUT-GPP does send GP Pairing Search with *Request GPD Security frame counter* sub-field and/or *Request GPD Security key* sub-field of the *Options* field set to 0b0. AND/OR DUT-GPP stores the frame counter value in its Proxy Table entry for GPD ID Z.
3) DUT-GPP does send GP Notification or any other command (e.g. GP Pairing Search). AND/OR DUT-GPP stores the frame counter value in its Proxy Table entry for GPD ID Z.
4) DUT-GPP does send GP Notification or any other command (e.g. GP Pairing Search). AND/OR DUT-GPP stores the frame counter value in its Proxy Table entry for GPD ID Z.
5) DUT-GPP does send GP Notification or any other command (e.g. GP Pairing Search). AND/OR DUT-GPP stores the frame counter value in its Proxy Table entry for GPD ID Z.
6) – 7) DUT-GPP does send GP Notification or any other command (e.g. GP Pairing Search). AND/OR DUT-GPP stores the frame counter value in its Proxy Table entry for GPD ID Z.
8) DUT-GPP does not forward the GPDF to the sink using GP Notification, formatted exactly as described in pass verdict 8 of 5.2.5.2.3.AND/OR DUT-GPP does not store the new value N+1 for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. AND/OR TH-GPS does not execute the GPD command.
9A) – 9C) DUT-GPP forwards GP Commissioning Notification AND/OR DUT-GPP does NOT forward GP Notification, formatted exactly as specified in pass verdict 9A) – 9C) above. AND/OR DUT-GPP removes (or sets to inactive/invalid) the Proxy Table entry for TH-GPD Z. AND/OR DUT-GPP creates gppBlockedGPDID entry for TH-GPD Z.
9D) – 9F) DUT-GPP does NOT silently drop the GPDF. AND/OR DUT-GPP forwards GP Commissioning Notification or GP Notification. AND/OR DUT-GPP removes (or sets to inactive/invalid) the Proxy Table entry for TH-GPD Z. AND/OR DUT-GPP creates gppBlockedGPDID entry for TH-GPD Z or Z2.

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5.2.5.3 Sub-case: SecurityLevel = 0b11, ApplicationID = 0b000

5.2.5.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 5.2.1.1.1.	
3	[R3] A.3.4.2.2	TH-GPD, DUT-GPP and TH-GPS share a GP security key (e.g. as a result of any of the commissioning procedures), preferably of type 0b010, preferably the key being key (0:15) = 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf; the pairing uses SecurityLevel=0b11.	

5.2.5.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1, A.1.5.4	TH-GPD sends a Data GPDF, with the *Extended NWK Frame Control* field present, the *ApplicationID* sub-field set to 0b000, the *SecurityKeyType* 0b0, the *SecurityLevel* sub-field set to 0b11, the *SecurityFrameCounter* field present and having the correct value N; the 4B SrcID field present and set to Z, the *Endpoint* field absent, the GPD command payload encrypted and authenticated with 4B MIC. Read out Proxy Table of DUT-GPP.	
The test steps 2-8 below can only be executed if the GPD role is taken by a TH			
2	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong key):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present, the *SecurityKeyType* 0b0, the *SecurityLevel* sub-field set to 0b11, the *SecurityFrameCounter* field present and having the correct value M >= N+1; the payload protected with a wrong key.	
3	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong key type):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present, the S*ecurityKeyType* 0b1, the *SecurityLevel* sub-field set to 0b11, the *SecurityFrameCounter* field present and having the correct value P >= M+1; the payload correctly protected.	
4	[R3] A.3.5.2.1, A.1.5.4	**Negative test (unprotected packet):** TH-GPD sends an unprotected Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present and the *SecurityLevel* sub-field set to 0b11.	
5	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong security level):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present, the *SecurityKeyType* 0b1, the *SecurityLevel* sub-field incorrectly set to 0b10, the *SecurityFrameCounter* field present and having the correct value Q >= P+1; the payload protected.	
6	[R3] A.3.5.2.1, A.1.5.4	**Negative test (replayed frame counter):** Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present, the *SecurityKeyType* 0b0, the *SecurityLevel* sub-field set to 0b11, the *SecurityFrameCounter* field present and having an old value N-1; the payload encrypted and authenticated with 4B MIC.	
7	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong direction):** Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present, the *SecurityKeyType* 0b0, the *SecurityLevel* sub-field set to 0b11, the *SecurityFrameCounter* field present and having correct value N+1; the payload encrypted and authenticated with 4B MIC, but with the *Direction* sub-field of the *Extended NWK Frame Control* field set to 0b1. Read out Proxy Table of DUT-GPP.	
8	[R3] A.3.5.2.1, A.1.5.4	***Positive test:*** TH-GPD sends a correctly protected Data GPDF with ApplicationID = 0b000, SrcID = Z, with *SecurityFrameCounter* value N+1. Read out Proxy Table of DUT-GPP.	

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1623 ***5.2.5.3.3 Expected Outcome***

Pass verdict:
1) DUT-GPP successfully security processes the received GPDF, and sends GP Notification, with: • Sub-fields of the *Options* field set to: ▪ *ApplicationID* = 0b000; ▪ *SecurityLevel* = 0b11, ▪ the *SecurityKeyType* 0b010, • GPD ID field of 4B length and carrying Z; • Endpoint field absent; • and the *GPD Security Frame counter* field present and carrying N. DUT-GPP stores the new value N for the GPD Security Frame counter field in its Proxy Table entry for GPD ID Z. TH-GPS executes the GPD command.
2) DUT-GPP does NOT send GP Notification. DUT-GPP may send GP Pairing Search for TH-GPD's GPD ID with *Request GPD Security frame counter* sub-field and/or *Request GPD Security key* sub-field of the *Options* field set to 0b1. DUT-GPP does NOT update the Proxy Table entry based on the GPDF only.
3) – 7) DUT-GPP does NOT send GP Notification or the GP Pairing Search. DUT-GPP does NOT update the Proxy Table entry.
8) DUT-GPP successfully security processes the received GPDF, and forwards it to the sink using GP Notification, with and the *GPD Security Frame counter* field present and carrying N+1. DUT-GPP stores the new value N+1 for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. TH-GPS executes the GPD command.
Fail verdict:
1) DUT-GPP does not send GP Notification, formatted exactly as specified in pass verdict 1 of 5.2.5.3.3.. AND/OR DUT-GPP does not store the frame counter value. AND/OR TH-GPS does not execute the GPD command.
2) DUT-GPP does send GP Notification AND/OR updates the Proxy Table entry based on the GPDF.
3) – 7) DUT-GPP does send GP Notification AND/OR the GP Pairing Search. AND/OR DUT-GPP does update the Proxy Table entry.
8) DUT-GPP does not forward the GPDF to the sink using GP Notification, formatted exactly as described in pass verdict 8 of 5.2.5.3.3. AND/OR DUT-GPP does not store the new value N+1 for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. AND/OR TH-GPS does not execute the GPD command.

1624 ### 5.2.5.4 Sub-case: SecurityLevel = 0b10, ApplicationID = 0b010

1625 ***5.2.5.4.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 5.2.1.1.1.	
3	[R3] A.3.4.2.2	TH-GPD, DUT-GPP and TH-GPS use SecurityLevel = 0b10, preferably with *SecurityKeyType* 0b010 (GPD group key), preferably the key being key (0:15) = 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf.	
4	[R3] A.1.4, A.1.5	TH-GPD uses *ApplicationID* = 0b010 and GPD IEEE address Z and *Endpoint* X.	

1626 ***5.2.5.4.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1, A.1.5.4	TH-GPD sends Data GPDF, with the MAC header source address field containing the GPD IEEE address Z, *Extended NWK Frame Control* field present, the *ApplicationID* sub-field set to 0b010, the *SecurityLevel* sub-field set to 0b10, *SecurityKey* set to 0b0, the *SecurityFrameCounter* field present and set to N, the SrcID field absent, the *Endpoint* = X, and the payload correctly authenticated with 4B MIC.	

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The test steps 2-8 below can only be executed if the GPD role is taken by a TH			
2	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong key):** TH-GPD sends a Data GPDF with the MAC header source address field containing the GPD IEEE address Z, *ApplicationID* = 0b010, *SrcID* absent, *Endpoint* = X, protected with a correct security level (0b10), correct *SecurityFrameCounter* value (=M>=N+1), correct key type (0b0) but wrong key.	
3	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong key type):** TH-GPD sends a Data GPDF with the MAC header source address field containing the GPD IEEE address Z, *ApplicationID* = 0b010, *SrcID* absent, *Endpoint* = X, protected with a correct security level (0b10), correct *SecurityFrameCounter* value (=P>=M+1), correct key but wrong key type (0b1).	
4	[R3] A.3.5.2.1, A.1.5.4	**Negative test (unprotected frame):** TH-GPD sends an unprotected Data GPDF, with the MAC header source address field containing the GPD IEEE address Z, *ApplicationID* = 0b010, *SrcID* absent, *Endpoint* = X, and with correct *SecurityFrameCounter* value (=Q>=P+1). (SecurityLevel = 0b00).	
5	[R3] A.3.5.2.1, A.1.5.4	**Negative test (lower security level):** TH-GPD sends a Data GPDF with the MAC header source address field containing the GPD IEEE address Z, *ApplicationID* = 0b010, *SrcID* absent, *Endpoint* = X, with security level lower than the before (SecurityLevel = 0b01), with counter value >=Q+1.	
6	[R3] A.3.5.2.1, A.1.5.4	**Negative test (replayed frame):** TH-GPD sends a correctly secured replayed Data GPDF, with the MAC header source address field containing the GPD IEEE address Z, *ApplicationID* = 0b010, *SrcID* absent, *Endpoint* = X, and with old *SecurityFrameCounter* N-1.	
7	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong direction):** TH-GPD sends Data GPDF, with the MAC header source address field containing the GPD IEEE address Z, *ApplicationID* = 0b010, *SrcID* absent, *Endpoint* = X, with the *Extended NWK Frame Control* field present, the *SecurityKeyType* 0b0, the *SecurityLevel* sub-field set to 0b10, the *SecurityFrameCounter* field present and having a correct value N+1; the payload authenticated with 4B MIC, but with the *Direction* sub-field of the *Extended NWK Frame Control* field set to 0b1. Read out Proxy Table of DUT-GPP.	
8	[R3] A.3.5.2.1, A.1.5.4	***Positive test:*** TH-GPD sends a correctly protected Data GPDF with the MAC header source address field containing the GPD IEEE address Z, *ApplicationID* = 0b010, *SrcID* absent, *Endpoint* = X, with *SecurityFrameCounter* value N+1. Read out Proxy Table of DUT-GPP.	

5.2.5.4.3 Expected Outcome

Pass verdict:
1) DUT-GPP successfully security processes the received GPDF, and forwards it to the sink using GP Notification, with: • The sub-fields of the *Options* field set to: ▪ ApplicationID = 0b010; ▪ *SecurityLevel* = 0b10, ▪ *SecurityKeyType* = 0b010, • GPD ID field of 8B length, carrying Z; • Endpoint field present and carrying X; • the GPD Security Frame counter field present. DUT-GPP stores the new value for the GPD Security Frame counter field in its Proxy Table entry for GPD ID Z. TH-GPS executes the GPD command.
2) DUT-GPP silently drops the GPDF. OR DUT-GPP sends GP Pairing Search command for TH-GPD's GPD ID with *Request GPD Security frame counter* sub-field and/or *Request GPD Security key* sub-field of the *Options* field set to 0b1 The DUT-GPP shall not send GP Notification or store the frame counter value in its Proxy Table entry for GPD ID Z.

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3) DUT-GPP silently drops the GPDF. The DUT-GPP shall not send GP Notification or store the frame counter value in its Proxy Table entry for GPD ID Z.
4) DUT-GPP silently drops the GPDF. The DUT-GPP shall not send GP Notification or store the frame counter value in its Proxy Table entry for GPD ID Z.
5) DUT-GPP silently drops the GPDF. The DUT-GPP shall not send GP Notification or store the frame counter value in its Proxy Table entry for GPD ID Z.
6) – 7) DUT-GPP silently drops the GPDF. The DUT-GPP shall not send GP Notification or store the frame counter value in its Proxy Table entry for GPD ID Z.
8) DUT-GPP successfully security processes the received GPDF, and forwards it to the sink using GP Notification, with and the *GPD Security Frame counter* field present and carrying N+1. DUT-GPP stores the new value N+1 for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. TH-GPS executes the GPD command.
Fail verdict:
1) DUT-GPP does not forward the GPDF to the sink using GP Notification, formatted exactly as specified in pass verdict 1 of 5.2.5.4.3. AND/OR DUT-GPP does not store the new value for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. AND/OR TH-GPS does not execute the GPD command.
2) DUT-GPP does send GP Notification OR DUT-GPP does send GP Pairing Search with *Request GPD Security frame counter* sub-field and/or *Request GPD Security key* sub-field of the *Options* field set to 0b0. AND/OR DUT-GPP stores the frame counter value in its Proxy Table entry for GPD ID Z.
3) DUT-GPP does send GP Notification or any other command (e.g. GP Pairing Search). AND/OR DUT-GPP stores the frame counter value in its Proxy Table entry for GPD ID Z.
4) DUT-GPP does send GP Notification or any other command (e.g. GP Pairing Search). AND/OR DUT-GPP stores the frame counter value in its Proxy Table entry for GPD ID Z.
5) DUT-GPP does send GP Notification or any other command (e.g. GP Pairing Search). AND/OR DUT-GPP stores the frame counter value in its Proxy Table entry for GPD ID Z.
6) – 7) DUT-GPP does send GP Notification or any other command (e.g. GP Pairing Search). AND/OR DUT-GPP stores the frame counter value in its Proxy Table entry for GPD ID Z.
8) DUT-GPP does not forward the GPDF to the sink using GP Notification, formatted exactly as described in pass verdict 8 of 5.2.5.4.3. AND/OR DUT-GPP does not store the new value N+1 for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. AND/OR TH-GPS does not execute the GPD command.

5.2.5.5 Sub-case: SecurityLevel = 0b11, ApplicationID = 0b010

5.2.5.5.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 5.2.1.1.1.	
3	[R3] A.3.4.2.2	TH-GPD, DUT-GPP and TH-GPS share a GP security key (e.g. as a result of any of the commissioning procedures), preferably of type 0b010, preferably the key being key (0:15) = 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf; the pairing has SecurityLevel=0b11.	

5.2.5.5.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1, A.1.5.4	TH-GPD sends a Data GPDF, with the *Extended NWK Frame Control* field present, the *ApplicationID* sub-field set to 0b000, the *SecurityKeyType* 0b0, the *SecurityLevel* sub-field set to 0b11, the *SecurityFrameCounter* field present and having the correct value N; the 4B SrcID field present and set to Z, the *Endpoint* field absent, the GPD command payload encrypted and authenticated with 4B MIC.	

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The test steps 2-8 below can only be executed if the GPD role is taken by a TH			
2	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong key):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present, the *SecurityKeyType* 0b0, the *SecurityLevel* sub-field set to 0b11, the *SecurityFrameCounter* field present and having the correct value M >= N+1; the payload protected with a wrong key.	
3	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong key type):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present, the S*ecurityKeyType* 0b1, the *SecurityLevel* sub-field set to 0b11, the *SecurityFrameCounter* field present and having the correct value P >= M+1; the payload correctly protected.	
4	[R3] A.3.5.2.1, A.1.5.4	**Negative test (unprotected packet):** TH-GPD sends an unprotected Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present and the *SecurityLevel* sub-field set to 0b11.	
5	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong security level):** TH-GPD sends a Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present, the *SecurityKeyType* 0b1, the *SecurityLevel* sub-field incorrectly set to 0b10, the *SecurityFrameCounter* field present and having the correct value Q >= P+1; the payload protected.	
6	[R3] A.3.5.2.1, A.1.5.4	**Negative test (replayed frame counter):** Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present, the *SecurityKeyType* 0b0, the *SecurityLevel* sub-field set to 0b11, the *SecurityFrameCounter* field present and having an old value N-1; the payload encrypted and authenticated with 4B MIC.	
7	[R3] A.3.5.2.1, A.1.5.4	**Negative test (wrong direction):** Data GPDF with *ApplicationID* = 0b000, *SrcID* = Z, with the *Extended NWK Frame Control* field present, the *SecurityKeyType* 0b0, the *SecurityLevel* sub-field set to 0b11, the *SecurityFrameCounter* field present and having correct value N+1; the payload encrypted and authenticated with 4B MIC, but with the *Direction* sub-field of the *Extended NWK Frame Control* field set to 0b1. Read out Proxy Table of DUT-GPP.	
8	[R3] A.3.5.2.1, A.1.5.4	***Positive test:*** TH-GPD sends a correctly protected Data GPDF with the MAC header source address field containing the GPD IEEE address Z, *ApplicationID* = 0b010, *SrcID* absent, *Endpoint* = X, with *SecurityFrameCounter* value N+1. Read out Proxy Table of DUT-GPP.	

1631 ***5.2.5.5.3 Expected Outcome***

Pass verdict:
1) DUT-GPP successfully security processes the received GPDF, and sends GP Notification, with *SecurityLevel* sub-field of the *Options* field set to 0b11, the *SecurityKeyType* 0b010, and the *GPD Security Frame counter* field present. DUT-GPP stores the new value for the GPD Security Frame counter field in its Proxy Table entry for GPD ID Z. TH-GPS executes the GPD command.
2) DUT-GPP does NOT send GP Notification. DUT-GPP may send GP Pairing Search for TH-GPD's GPD ID with *Request GPD Security frame counter* sub-field and/or *Request GPD Security key* sub-field of the *Options* field set to 0b1. DUT-GPP does NOT update the Proxy Table entry based on the GPDF only.
3) – 7) DUT-GPP does NOT send GP Notification or the GP Pairing Search. DUT-GPP does NOT update the Proxy Table entry.
8) DUT-GPP successfully security processes the received GPDF, and forwards it to the sink using GP Notification, with and the *GPD Security Frame counter* field present and carrying N+1. DUT-GPP stores the new value N+1 for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. TH-GPS executes the GPD command.
Fail verdict:

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1) DUT-GPP does not send GP Notification, formatted exactly as specified in pass verdict 1 of 5.2.5.5.3. AND/OR DUT-GPP does not store the frame counter value. AND/OR TH-GPS does not execute the GPD command.
2) DUT-GPP does send GP Notification AND/OR updates the Proxy Table entry based on the GPDF.
3) – 7) DUT-GPP does send GP Notification AND/OR the GP Pairing Search. AND/OR DUT-GPP does update the Proxy Table entry.
8) DUT-GPP does not forward the GPDF to the sink using GP Notification, formatted exactly as described in pass verdict 8 of 5.2.5.5.3. AND/OR DUT-GPP does not store the new value N+1 for the *GPD Security Frame counter* field in its Proxy Table entry for GPD ID Z. AND/OR TH-GPS does not execute the GPD command.

5.2.5.6 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF16	Is gpdSecurityLevel = 0b10 supported as a client? (gpdSecurityLevel = 0b10 sub-field of the gppFunctionality attribute set?)	Direct
GPPCCF17	Is gpdSecurityLevel = 0b11 supported as a client? (gpdSecurityLevel = 0b11 sub-field of the gppFunctionality attribute set?)	Direct

5.2.6 NOT TESTED: GPDID filtering

5.2.6.1 NOT TESTED: GPDID type filtering

5.2.6.1.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 5.2.1.1.1.	
2	[R3] A.3.3.2.2	The Proxy Table attribute of DUT-GPP does NOT have any entry with GPD ID N = IEEE address value N nor for GPDID M = SrcID = 4LSB of N.	

5.2.6.1.2 Test procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.5	**(Negative test): Secure pairing with IEEE address** Establish a pairing for GPD ID N = IEEE address value N at DUT-GPP, with the security settings as required by the DUT-GPP, with security frame counter value < A. Make TH-GPD send correctly protected Data GPDF for GPD IEEE address N, with security frame counter value A. Make TH-GPD send correctly protected Data GPDF for GPD SrcID M = 4LSB of N, with security frame counter value B >= A+1. Read out Proxy Table entry(s) of DUT-GPP.	
2		**O: (Negative test): Pairing with IEEE address and no security (if supported by DUT-GPP)** Clean Proxy Table of DUT-GPP. Establish a pairing for GPD ID N = IEEE address value N at DUT-GPP, with no security (if supported by DUT-GPP), with incremental MAC sequence number < A. Make TH-GPD send unprotected Data GPDF for GPD IEEE address N, with sequence number A. Make TH-GPD send unprotected Data GPDF for GPD SrcID M = 4LSB of N, with sequence number B >= A + 1. Read out Proxy Table entry(s) of DUT-GPP.	

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3		**O: (Negative test): Pairing with SrcID and no security (if supported by DUT-GPP)** Clean Proxy Table of DUT-GPP. Establish a pairing for GPD ID M = SrcID M at DUT-GPP, with incremental MAC sequence number < A. Make TH-GPD send unprotected Data GPDF for GPD SrcID M, with sequence number A. Make TH-GPD send unprotected Data GPDF for GPD IEEE address N with 4LSB = M, with sequence number B >= A + 1. Read out Proxy Table entry(s) of the DUT-GPP.	
4		**(Negative test): Secure pairing with SrcID** Clean Proxy Table of DUT-GPP. Establish a pairing for GPD ID M = SrcID M at DUT-GPP, with the application and security settings as required by the DUT-GPP, with security frame counter value < A. Make TH-GPD send correctly protected Data GPDF for GPD SrcID M, with security frame counter value A. Make TH-GPD send correctly protected Data GPDF for GPD IEEE address N with 4LSB = M, with security frame counter value B >= A+1. Read out Proxy Table entry(s) of the DUT-GPP.	
5		**(Negative test): 2 pairings.** Clean Proxy Table of DUT-GPP. Establish a pairing for GPD ID N = IEEE address value N at DUT-GPP, preferably with security or else with incremental MAC sequence number, with security frame counter value/sequence number < X. Establish a pairing for GPD ID M = 4LSB of N at DUT-GPP, preferably with security or else with incremental MAC sequence number, with security frame counter value/sequence number < X. Make TH-GPD send correctly protected Data GPDF for GPD SrcID M, with frame counter X. Make TH-GPD send correctly protected Data GPDF for GPD IEEE address N with 4LSB = M, with frame counter Y >= X+1. Read out Proxy Table entry(s) of the DUT-GPP.	

1637 ***5.2.6.1.3 Expected Outcome***

Pass verdict:
1 – 4) DUT-GPP does send GP Notification in the required communication mode upon reception of the first GPD command. Upon reception of the second GPD command: • If DUT does not support Proxy Table Maintenance feature, DUT-GPP does NOT send GP Notification not GP Pairing Search. • If DUT does not support Proxy Table Maintenance feature, DUT-GPP may send GP Notification not GP Pairing Search. The Proxy Table entry of the DUT-GPP for the TH-GPD has security frame counter value A.
5) DUT-GPP sends GP Notification commands for both GPD commands. Proxy Table entry for GPD SrcID M has the GPD security frame counter value X. Proxy Table entry for GPD IEEE address N has the GPD security frame counter value Y.
Fail verdict:
1 – 4) DUT-GPP does NOT send GP Notification in the required communication mode upon reception of the first GPD command. AND/OR Upon reception of the second GPD command, DUT-GPP sends GP Notification in the communication mode of the Proxy Table entry for TH-GPD. AND/OR The Proxy Table entry of the DUT-GPP for the TH-GPD has GPD security frame counter value other than A.
5) DUT-GPP executes does not send GP Notification commands for either or both GPD commands.

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AND/OR Proxy Table entry for GPD SrcID M has the GPD security frame counter value other than X. AND/OR Proxy Table entry for GPD IEEE address N has the frame counter value other than Y.

5.2.6.1.4 PICS Covered

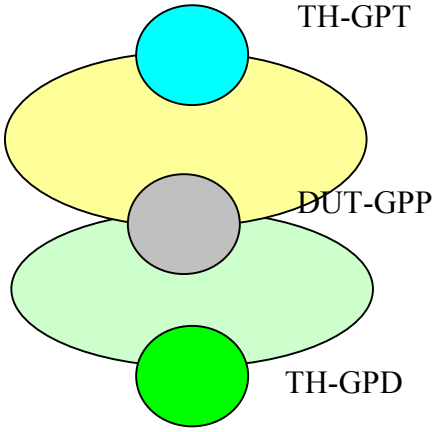
PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF20	GPD IEEE address functionality	Direct

5.3 Tunneling mechanism (GP Notification)

Note: Basic formatting of GP Notification command for *ApplicationID* = 0b000 and *ApplicationID* = 0b010 is already tested in section 5.1.4. Successful completion of those tests is pre-requisite for performing the current test.

5.3.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPT	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific GPEP supports the application functionality of the TH-GPD (see Section A.4.3 of [R3]).
DUT-GPP (GPC or GPPB or GPCB	Pan id=same PANID as TH-GPS1 Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH GPD	GPD ID = X (e.g. SrcID = 0x12345678 or IEEE address = 0x8877665544332211, Endpoint Y) Supports GPD Command 0x21 and 0xA0.

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPT and DUT-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	

5.3.1.1.2 Test Set-Up

The TH-GPT shall be in wireless communication proximity of DUT-GPP; DUT-GPP shall be in wireless communication proximity of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

5.3.1.2 Derived Groupcast Communication Mode

5.3.1.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.4.2.2	As in 5.3.1.1.1 above.	

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1652 ***5.3.1.2.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1, A.3.3.4.1	***DGroup pairing with derived alias for ApplicationID = 0b000:*** A pairing with derived groupcast communication mode and *SecurityLevel* 0b00 (incremental sequence number) is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures). Derived alias is used. *Security Frame counter* N. The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures). Read out Proxy Table of DUT-GPP. Make TH-GPD send a Data GPDF with *MAC sequence number* M => N+1, *SecurityLevel* 0b00, *RxAfterTx* = 0b0, *SrcID* = Z, *Endpoint* absent, and *GPD CommandID* (e.g. 0x22).	
2	[R3] A.3.5.2.1, A.3.3.4.1	***DGroup pairing with assigned alias for ApplicationID = 0b000:*** Clean DUT-GPP Proxy Table. A pairing with derived groupcast communication mode and *SecurityLevel* 0b00 (incremental sequence number) is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures). Assigned alias 0xXXXX is used. *Security Frame counter* N. The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures). Read out Proxy Table of DUT-GPP. Make TH-GPD send a Data GPDF with *MAC sequence number* M => N+1, *SecurityLevel* 0b00, *RxAfterTx* = 0b0, *SrcID* = Z, *Endpoint* absent, and *GPD CommandID* (e.g. 0x22).	
3	[R3] A.3.5.2.1, A.3.3.4.1	***DGroup pairing with derived alias for ApplicationID = 0b010:*** Clean DUT-GPP Proxy Table. A pairing with derived groupcast communication mode is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures). Derived alias is used. *Security Frame counter* N. The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures), with the *Entry Active* and *Entry Valid* sub-fields of the *Options* field both having the value 0b1, and *SecurityLevel* 0b00. Make TH-GPD send a Data GPDF with *MAC sequence number* M => N+1, MAC header source address field carrying GPD IEEE address Z, *SecurityLevel* 0b00, *RxAfterTx* = 0b1, *SrcID* absent, *Endpoint* = X, and GPD CommandID (e.g. 0x22).	

1653 ***5.3.1.2.3 Expected Outcome***

Pass verdict:
1) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with: • *ApplicationID* = 0b000; • *EntryActive* and *EntryValid* set to 0b1; • *Derived Group GPS* = 0b1; • *Lightweight Unicast GPS* = 0b0, and *Lightweight Sink address list* field absent; • *Commissioned Group GPS* = 0b0, and *Sink group list* field absent; • *Options Extension* = 0b0; *Extended Options* field absent; and *Full unicast sink address list* field absent; • *AssignedAlias* = 0b0 and *GPD Assigned Alias* field absent; • *GPD ID* field of 4B in length is present and carries the SrcID = X of the GPD; • *Endpoint* field absent; • *Security Options* and *GPDkey* absent;

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• the *GPD security frame counter* = N. At least Dmin_u after GPDF reception, DUT-GPP sends GP Notification command with the following fields: • NWK header fields: ▪ Destination Address 0xfffd; ▪ Source Address: alias derived from X (e.g. 0x5678 for SrcID = 0x12345678 or 0x2211 for IEEE address = 0x8877665544332211); ▪ Sequence Number: alias of value M; • APS header fields: ▪ Group address: derived from X (e.g. 0x5678 for SrcID = 0x12345678 or 0x2211 for IEEE address = 0x8877665544332211); ▪ APS Counter: M; • ZCL payload fields: ▪ *Options* sub-fields set to: – *Also Unicast* 0b0, *AlsoDerivedGroup* 0b1, *AlsoCommissionedGroup* 0b0, and *RxAfterTx* 0b0; *ProxyInfoPresent* = 0b1; – If DUT-GPP does NOT support bidirectional communication: *gpTxQueueFull* = 0b1 and *BidirectionalCommunicationCapability* = 0b0; otherwise, *BidirectionalCommunicationCapability* = 0b1 and *gpTxQueueFull* according to DUT-GPP status (0b0); ▪ *GPP short address* field is present and carries the short address of the DUT-GPP; ▪ *GPP-GPD link* field is present. TH-GPT executes the GPD command.
2) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, formatted exactly as in pass verdict 1 above, only with: • *AssignedAlias* = 0b1 and *GPD Assigned Alias* field present and set to 0x4444. After at least Dmin_u after GPDF reception, DUT-GPP sends GP Notification command, formatted exactly as in pass verdict 1 of 5.3.1.2.3, only with the following changes: • NWK header fields: ▪ Destination Address 0xfffd; ▪ Source Address 0x4444; ▪ Sequence Number M; • APS Counter: M; TH-GPT executes the GPD command.
3) After at least *gppTunnelingDelay*, corresponding to the *Link quality* sub-field of the *GPP-GPD link* field, DUT-GPP sends GP Notification command, formatted exactly as in pass verdict 1 of 5.3.1.2.3, only with the following changes: • If the DUT-GPP does NOT support bidirectional operation: ▪ *RxAfterTx* sub-field of the *Options* field set to 0b1; • If the DUT-GPP supports bidirectional operation: ▪ GP Notification is sent with NWK header fields carrying NO ALIAS: – Source Address: short address of the DUT-GPP; – NWK header Sequence Number and APS Counter: of DUT-GPP; ▪ *RxAfterTx* sub-field of the *Options* field set to 0b1; ▪ *BidirectionalCommunicationCapability* sub-field of the *Options* field set to 0b1; ▪ *gpTxQueueFull* sub-field of the *Options* field set according to the DUT-GPP status (0b0).
Fail verdict:
1) DUT-GPP does not send GP Notification command formatted exactly as in 5.3.1.2.3/pass verdict 1 above. AND/OR DUT-GPP doesn't maintain the minimum delay. AND/OR TH-GPT does not execute the GPD command.
2) DUT-GPP does not send GP Notification command formatted exactly as in 5.3.1.2.3/pass verdict 2 above. AND/OR DUT-GPP doesn't maintain the minimum delay. AND/OR TH-GPT does not execute the GPD command.
3) DUT-GPP does not send GP Notification command, formatted exactly as in 5.3.1.2.3/pass verdict 3 and corresponding to the bidirectional communication capabilities of DUT-GPP. AND/OR DUT-GPP doesn't maintain the minimum delay. AND/OR TH-GPT does not execute the GPD command.

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1654 ***5.3.1.2.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF3	Is Derived groupcast communication supported as a client? (Derived groupcast communication sub-field of the gppFunctionality attribute set?)	Indirect
GPPCC102	Is transmission of the GP Notification command in derived groupcast supported?	Direct
GPPCC205A	Is quality-based gppTunnelingDelay supported?	Indirect

1655 ### 5.3.1.3 Commissioned Groupcast Communication Mode

1656 ***5.3.1.3.1 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1, A.3.3.4.1	***CGroup pairing with derived alias for ApplicationID = 0b000:*** A pairing with pre-commissioned groupcast communication mode for GroupID 0xPPPP and derived alias and SecurityLevel = 0b00 (incremental MAC sequence number), and is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures). Derived alias is used. *Security Frame counter* N. The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures). Read out Proxy Table of DUT-GPP. Make TH-GPD send a Data GPDF with *MAC sequence number* M>=N+1, *SecurityLevel* 0b00, *RxAfterTx* 0b0, *SrcID* = Z, *Endpoint* absent, and *GPD CommandID* (e.g. 0x22).	The initial setting of the FirstToForward flag cannot be configured with the GP Pairing command. If the proxy is the only proxy involved, it will automatically set it for groupcast communication, if it forwards a GPDF in commissioning or operational mode.
2	[R3] A.3.5.2.1, A.3.3.4.1	***CGroup pairing with assigned alias for ApplicationID = 0b000:*** Clean DUT-GPP Proxy Table. A pairing with pre-commissioned groupcast communication mode for GroupID 0xPPPP and derived alias and SecurityLevel = 0b00 (incremental MAC sequence number), and is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures). Assigned alias 0xXXXX is used. *Security Frame counter* N. The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures). Read out Proxy Table of DUT-GPP. Make TH-GPD send a Data GPDF with *MAC sequence number* M>=N+1, *SecurityLevel* 0b00, *RxAfterTx* 0b0, *SrcID* = Z, *Endpoint* absent, and *GPD CommandID* (e.g. 0x22).	
3	[R3] A.3.5.2.1, A.3.3.4.1	***CGroup pairing with derived alias for ApplicationID = 0b010:*** Clean DUT-GPP Proxy Table. A pairing with pre-commissioned groupcast communication mode for GroupID 0xPPPP and derived alias, and is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures). Derived alias is used. *Security Frame counter* N. The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures), with the *Entry Active* and *Entry Valid* sub-fields of the *Options* field both having the value 0b1, and *SecurityLevel* 0b00. Make TH-GPD send a Data GPDF with *MAC sequence number* M>=N+1, MAC header source address carrying GPD IEEE address = Z, *SecurityLevel* 0b00, *RxAfterTx* 0b1, *SrcID* absent, *Endpoint* = X, and *GPD CommandID* (e.g. 0x22).	

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1658 ***5.3.1.3.2 Expected Outcome***

Pass verdict:
1) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with: • *ApplicationID* = 0b000; • *EntryActive* and *EntryValid* set to 0b1; • *Derived Group GPS* = 0b0; • *Lightweight Unicast GPS* = 0b0, and *Lightweight Sink address list* field absent; • *Commissioned Group GPS* = 0b1, and *Sink group list* field present and carrying one entry with: ▪ *Sink group* = 0xPPPP; ▪ *Alias* set either to 0xffff or to the value of the derived alias for SrcID = X; • *Options Extension* = 0b0; *Extended Options* field absent; and *Full unicast sink address list* field absent; • *AssignedAlias* = 0b0 and *GPD Assigned Alias* field absent; • *GPD ID* field of 4B in length is present and carries the SrcID = X of the GPD; • *Endpoint* field absent; • *Security Options* and *GPDkey* absent; • the GPD security frame counter = N. At least Dmin_u after GPDF reception, DUT-GPP sends GP Notification command with the following fields: • NWK header fields: ▪ Destination Address 0xfffd; ▪ Source Address: alias derived from X (e.g. 0x5678 for 0x12345678 or 0x2211 for 0x8877665544332211); ▪ Sequence Number (M – 9 mod 256) • APS header fields: ▪ destination address: 0xPPPP; ▪ APS Counter: (M – 9 mod 256); • ZCL payload fields: ▪ *Options* sub-fields set to: – *Also Unicast* 0b0, *AlsoDerivedGroup* 0b0, *AlsoCommissionedGroup* 0b1; *RxAfterTx* = 0b0; *ProxyInfoPresent* = 0b1; – If DUT-GPP does NOT support bidirectional communication: *gpTxQueueFull* = 0b1 and *BidirectionalCommunicationCapability* = 0b0; otherwise, *BidirectionalCommunicationCapability* = 0b1 and *gpTxQueueFull* according to DUT-GPP status (0b0); ▪ *GPP short address* field present and carrying the short address of the DUT-GPP; ▪ *GPP-GPD link* field is present. TH-GPT executes the GPD command.
2) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, formatted exactly as in pass verdict 1 above, only with: • *Sink group list* field present and carrying one entry with: ▪ *Sink group* = 0xPPPP; ▪ *Alias* = 0xXXXX; At least Dmin_u after GPDF reception, DUT-GPP sends GP Notification command with the following fields: • NWK header fields: ▪ Destination Address 0xfffd; ▪ Source Address 0xXXXX; ▪ Sequence Number (M – 9 mod 256) • APS header fields: ▪ destination address: 0xPPPP; ▪ APS Counter: (M – 9 mod 256); • ZCL payload fields: ▪ *Options* sub-fields set to: – *Also Unicast* 0b0, *AlsoDerivedGroup* 0b0, *AlsoCommissionedGroup* 0b1, *RxAfterTx* = 0b0; *ProxyInfoPresent* = 0b1; – If DUT-GPP does NOT support bidirectional communication: *gpTxQueueFull* = 0b1 and *BidirectionalCommunicationCapability* = 0b0;

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otherwise, *BidirectionalCommunicationCapability* = 0b1; and *gpTxQueueFull* according to DUT-GPP status (0b0); ▪ *GPP short address* field present and carrying the short address of the DUT-GPP; ▪ *GPP-GPD link* field is present. TH-GPT executes the GPD command.
3) After at least *gppTunnelingDelay*, corresponding to the Link Quality sub-field of the *GPP-GPD link* field, DUT-GPP sends GP Notification command, formatted exactly as in pass verdict 1 of 0, only with the following change: • If the DUT-GPP does NOT support bidirectional operation: ▪ *RxAfterTx* sub-field of the *Options* field set to 0b1; • If the DUT-GPP supports bidirectional operation: ▪ GP Notification is sent with NWK header fields carrying NO ALIAS: – Source Address: short address of the DUT-GPP; – NWK Sequence Number field and APS Counter field: of DUT-GPP; ▪ *RxAfterTx* sub-field of the *Options* field set to 0b1; ▪ *BidirectionalCommunicationCapability* sub-field of the *Options* field set to 0b1; ▪ *gpTxQueueFull* sub-field of the *Options* field set according to the DUT-GPP status.
Fail verdict:
1) DUT-GPP does not send GP Notification command formatted exactly as in item 1 of 0. AND/OR DUT-GPP doesn't maintain the minimum delay. AND/OR TH-GPT does not execute the GPD command.
2) DUT-GPP does not send GP Notification command formatted exactly as in item 2 of 0. AND/OR DUT-GPP doesn't maintain the minimum delay. AND/OR TH-GPT does not execute the GPD command.
3) DUT-GPP does not send GP Notification command, formatted exactly as in 0/pass verdict 3 and corresponding to the bidirectional communication capabilities of DUT-GPP. AND/OR DUT-GPP doesn't maintain the minimum delay. AND/OR TH-GPT does not execute the GPD command.

5.3.1.3.3 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF4	Is Pre-commissioned groupcast communication supported as a client? (Pre-commissioned groupcast communication sub-field of the gppFunctionality attribute set?)	Indirect
GPPCC103	Is transmission of the GP Notification command in commissioned groupcast supported?	Direct
GPPCC205A	Is quality-based gppTunnelingDelay supported?	Indirect

5.3.1.4 Groupcast Communication Mode with limited Radius

5.3.1.4.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.3.2.2	Proxy Table is empty.	

5.3.1.4.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1, A.3.3.4.1	***Groupcast pairing with limited Radius:*** A pairing with derived/pre-commissioned groupcast communication mode is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures). The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures), with the *Entry Active* and *Entry Valid* sub-fields of the *Options* field both having the value 0b1, and *SecurityLevel* 0b00, , and *Groupcast radius* field set to 0x02. Make TH-GPD send a Data GPDF with appropriate *MAC sequence number*, SecurityLevel, and *RxAfterTx* 0b0.	
2	[R3] A.3.5.2.1,	***Groupcast pairing with default Radius:***	

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	A.3.3.4.1	Clean Proxy Table. A pairing with derived/pre-commissioned groupcast communication mode is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures). The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures), with the *Entry Active* and *Entry Valid* sub-fields of the *Options* field both having the value 0b1, and *SecurityLevel* 0b00, , and *Groupcast radius* field set to 0x00. Make TH-GPD send a Data GPDF with appropriate *MAC sequence number*, SecurityLevel, and *RxAfterTx* 0b0.	

1663 ***5.3.1.4.3 Expected Outcome***

Pass verdict:
1) DUT-GPP sends correctly formatted GP Notification command with the Radius field of the NWK header set to 0x02.
2) DUT-GPP sends correctly formatted GP Notification command with the Radius field of the NWK header set to twice the value of the nwkMaxDepth attribute of the NIB, as specified by [R1].
Fail verdict:
1) DUT-GPP does not send correctly formatted GP Notification command with the Radius field of the NWK header set to 0x02.
2) DUT-GPP does not send correctly formatted GP Notification command with the Radius field of the NWK header set to twice the value of the nwkMaxDepth attribute of the NIB, as specified by [R1]. AND/OR DUT-GPP sends GP Notification command with the *Radius* field of the NWK header set to 0x00.

1664 ### 5.3.1.5 NOT TESTED: Full Unicast Communication Mode

1665 ***5.3.1.5.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.3.2.2	Proxy Table is empty.	

1666 ***5.3.1.5.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1, A.3.3.4.1	**Full unicast forwarding with assigned alias for ApplicationID = 0b000**: A pairing with full unicast communication mode and SecurityLevel =0b00 (incremental MAC sequence number) is established between the TH-GPD with GPD SrcID = Z (*ApplicationID* = 0b000) and TH-GPT (e.g. as a result of any of the commissioning procedures). Assigned alias 0x4444 is used. *Security Frame counter* N. The corresponding information for GPD ID=Z is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures). Read out Proxy Table of DUT-GPP. Make TH-GPD send a Data GPDF with *MAC sequence number* M >= N+1, *ApplicationID* = 0b000, *SecurityLevel* 0b00, *RxAfterTx* 0b0, *SrcID* = Z, *Endpoint* absent, and *GPD CommandID* (e.g. 0x22). Read Proxy Table entry of DUT-GPP.	
2	[R3] A.3.5.2.1, A.3.3.4.1	**Full unicast forwarding with derived alias for ApplicationID = 0b000:** Clean DUT-GPP Proxy Table. A pairing with full unicast communication mode and SecurityLevel =0b00 (incremental MAC sequence number) is established between the TH-GPD with GPD SrcID = Z (*ApplicationID* = 0b000) and TH-GPT (e.g. as a result of any of the commissioning procedures). Derived alias is used. *Security Frame counter* N. The corresponding information is also included in DUT-GPP (e.g. as a result	

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		of any of the commissioning procedures). Read out Proxy Table of DUT-GPP Make TH-GPD send a Data GPDF with *MAC sequence number* M>=N+1, *ApplicationID* = 0b000, *SecurityLevel* 0b00, *RxAfterTx* 0b0, *SrcID* = Z, *Endpoint* absent, and *GPD CommandID* (e.g. 0x22).	
3	[R3] A.3.5.2.1, A.3.3.4.1	**Test GPP full unicast Notification retry**: Switch TH-GPS off. Make TH-GPD send a Data GPDF with *MAC sequence number* P >= M+1, *SecurityLevel* 0b00, *RxAfterTx* 0b0, and *GPD CommandID* (e.g. 0x22).	
4	[R3] A.3.5.2.1, A.3.3.4.1	**Full unicast forwarding with assigned alias for ApplicationID = 0b010**: Clean Proxy Table of DUT-GPP. A pairing with full unicast communication mode is established between the TH-GPD with GPD IEEE address = Z, endpoint X, (*ApplicationID* = 0b010) and TH-GPT (e.g. as a result of any of the commissioning procedures). Assigned alias 0x4444 is used. *Security Frame counter* N. The corresponding information for GPD ID=Z, endpoint X is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures), with the *Entry Active* and *Entry Valid* of the *Options* field both having the value 0b1, and *SecurityLevel* 0b00, if supported by DUT-GPP. Make TH-GPD send a Data GPDF with *MAC sequence number* M >= N+1, MAC header source address carrying GPD IEEE address Z, *ApplicationID* = 0b000, *SecurityLevel* 0b00, *RxAfterTx* 0b0, *SrcID* absent, *Endpoint* = X, and *GPD CommandID* (e.g. 0x22). Read Proxy Table entry of DUT-GPP.	

5.3.1.5.3 Expected Outcome

Pass verdict:
1) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with: • *ApplicationID* = 0b000; • *EntryActive* and *EntryValid* set to 0b1; • *Derived Group GPS* = 0b0; • *Lightweight Unicast GPS* = 0b0, and *Lightweight Sink address list* field absent; • *Commissioned Group GPS* = 0b0, and *Sink group list* field absent; • *Options Extension* = 0b1; *Extended Options* field present and its *Full Unicast GPS* sub-field set to 0b1; *Full unicast sink address list* field present and including one entry with IEEE and NWK address of the TH-GPS; • *AssignedAlias* = 0b1 and *GPD Assigned Alias* field present and carrying 0x4444; • *GPD ID* field of 4B in length is present and carries the SrcID = X of the GPD; • *Endpoint* field absent; • *Security Options* and *GPDkey* absent; • the *GPD security frame counter* = N. At least *gppTunnelingDelay* (corresponding to the indicated *GPP-GPD link)* after GPDF reception, DUT-GPP sends GP Tunneling Stop command, with the following fields: • NWK header fields: ▪ Destination Address – 0xfffd; ▪ Source Address 0x4444; ▪ Sequence Number (M – 11 mod 256); ▪ Radius field 0x02; • APS header fields: ▪ source endpoint: GPEP (242); ▪ ProfileID: 0xA1E0; ▪ ClusterID: 0x0021; ▪ destination endpoint: GPEP (242);

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- APS Counter: (M – 11 mod 256);
- ZCL header fields:
  - *Command Identifier*: 0x03
  - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* = 0b0 (client to server), *Disable default response* = 0b1;
- ZCL payload fields:
  - *Options* sub-fields set to:
    - *ApplicationID* = 0b000, *AlsoDerivedGroup* = 0b0, *AlsoCommissionedGroup* = 0b0;
    - *BidirectionalCommunicationCapability* set according to the capabilities of DUT-GPP (i.e. to 0b0 for Basic Proxy); and *gpTxQueueFull* set according to DUT-GPP status (0b1 for Basic Proxy); *ProxyInfoPresent* = 0b1;
  - GPD ID field of 4B length carrying Z;
  - Endpoint field absent;
  - *GPD security frame counter* field carrying 0x000000 in the 3 MSB and M in 1 LSB;
  - *GPP short address* field carrying the short address of the DUT-GPP;
  - *GPP-GPD link* field present.

Immediately after GP Tunneling Stop command, the DUT-GPP sends GP Notification command with the following fields:

- NWK header fields:
  - Destination Address – unicast address of the paired TH-GPS;
  - Source Address - short address of the DUT-GPP;
  - Sequence Number – of the DUT-GPP (not alias).
- APS header fields:
  - source endpoint: GPEP (242);
  - ProfileID: 0xA1E0;
  - ClusterID: 0x0021;
  - destination endpoint: GPEP (242);
  - APS Counter: of the DUT-GPP (not alias)
- ZCL header fields:
  - *Command Identifier*: 0x00'
  - The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* = 0b0 (client to server), *Disable default response* = 0b1;
- ZCL payload fields:
  - *Options* sub-fields set to: *ApplicationID* = 0b000, *Also Unicast* 0b1, *AlsoDerivedGroup* 0b0, *AlsoCommissionedGroup* 0b0, *ProxyInfoPresent* = 0b1; *BidirectionalCommunicationCapability* set according to the capabilities of DUT-GPP; and *gpTxQueueFull* set according to DUT-GPP status;
  - GPD SrcID field carrying Z;
  - *Endpoint* field absent;
  - GPD security frame counter carrying 0x000000 in the 3 MSB and M in 1 LSB;
  - GPD CommandID copied from the GPDF;
  - GPD Command Payload carrying 0x00 or 0xff;
  - *GPP short address* field present and carrying the short address of the DUT-GPP;
  - *GPP-GPD link* field present.

TH-GPT executes the GPD command and sends GP Notification Response.

After reception of GP Notification Response, the DUT-GPP does not retransmit the unicast GP Notification.

DUT-GPP has Proxy Table entry with the *FirstToForward* sub-field of the *Options* field set to 0b1.

2) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, formatted exactly as in pass verdict 1 above, only with:

- *AssignedAlias* = 0b0 and *GPD Assigned Alias* field absent.

At least *gppTunnelingDelay* (corresponding to the indicated *GPP-GPD link)* after GPDF reception, DUT-GPP sends GP Tunneling Stop command, formatted exactly as in item 1 above, with the exception of:

- NWK Source Address carrying an alias derived from X;
- NWK header Sequence Number field and APS Counter field set to (M -11 mod 256);
- and GPD security frame counter set to 0x000000 on 3MSB and M on 1LSB.

Immediately after, the DUT-GPP sends GP Notification command, formatted exactly as in item 1 above.

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TH-GPT executes the GPD command and sends GP Notification Response. After reception of the GP Notification Response, the DUT-GPP does not retransmit the unicast GP Notification anymore. DUT-GPP has Proxy Table entry with the *FirstToForward* sub-field of the *Options* field set to 0b1.
3) At least *gppTunnelingDelay* (corresponding to the indicated *GPP-GPD link)* after GPDF reception, DUT-GPP sends GP Tunneling Stop command, formatted exactly as in item 2 above, with the exception of NWK header Sequence Number field and APS Counter field set to (P -11 mod 256) and GPD security frame counter set to 0x000000 on 3MSB and P on 1LSB. Immediately after, the DUT-GPP sends GP Notification command, formatted exactly as in item 2 above, with the exception of GPD security frame counter set to 0x000000 on 3MSB and P on 1LSB. After gppNotificationRetryTimer (default 100ms), the DUT-GPP sends GP Notification command, formatted exactly as in item 3 before. After another gppNotificationRetryTimer, sends GP Notification command, formatted exactly as in item 3 above. Note: there may be MAC retries between the ZCL retries.
4) At least *gppTunnelingDelay* (corresponding to the indicated *GPP-GPD link* value*)* after GPDF reception, DUT-GPP sends GP Tunneling Stop command, formatted exactly as in pass verdict 1 above, only with: ▪ *ApplicationID* sub-field of the *Options* field set to 0b010; ▪ GPD ID field of 8B length carrying Z; ▪ *Endpoint* field carrying X. Immediately after GP Tunneling Stop command, the DUT-GPP sends GP Notification command formatted exactly as in pass verdict 1 above, only with: ▪ *ApplicationID* sub-field of the *Options* field set to 0b010; ▪ GPD ID field of 8B length carrying Z; ▪ Endpoint field carrying X.
Fail verdict:
1) DUT-GPP doesn't maintain the minimum delay. AND/OR DUT-GPP does not send GP Tunnelling Stop formatted exactly as in item 1 above. AND/OR DUT-GPP does not send GP Notification command formatted exactly as in item 1 above, immediately after GP Stop Tunnelling. AND/OR TH-GPT does not execute the GPD command. AND/OR DUT-GPP does not have a Proxy Table entry for SrcID = Z with FirstToForward sub-field set to 0b1.
2) DUT-GPP doesn't maintain the minimum delay. AND/OR DUT-GPP does not send GP Tunnelling Stop formatted exactly as in item 2 above. AND/OR DUT-GPP does not send GP Notification command formatted exactly as in item 2 above, immediately after GP Stop Tunnelling. AND/OR TH-GPT does not execute the GPD command. AND/OR DUT-GPP does not have a Proxy Table entry for SrcID = Z with FirstToForward sub-field set to 0b1.
3) DUT-GPP doesn't maintain the minimum delay. AND/OR DUT-GPP does not send GP Tunnelling Stop formatted exactly as in item 3 above. AND/OR DUT-GPP does not send GP Notification command formatted exactly as in item 3above, immediately after GP Stop Tunnelling. AND/OR DUT-GPP does not re-try the GP Notification gppNotificationRetryNumber (default: 2 times) in gppNotificationRetryTimer (default: 100ms) spacing. AND/OR DUT-GPP does send other GP command.
4) DUT-GPP doesn't maintain the minimum delay. AND/OR DUT-GPP does not send GP Tunnelling Stop formatted exactly as in item 4 above. AND/OR DUT-GPP does not send GP Notification command formatted exactly as in item 4 above, immediately after GP Stop Tunnelling. AND/OR TH-GPT does not execute the GPD command. AND/OR DUT-GPP does not have a Proxy Table entry for GPD IEEE address = Z, Endpoint = X, with *FirstToForward* sub-field set to 0b1.

5.3.1.5.4 PICS Covered

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PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF5	Is Full unicast communication supported as a client? (Full unicast communication sub-field of the gppFunctionality attribute set?)	Indirect
GPPCC101A	Is transmission of the GP Notification command in full unicast supported?	Direct
GPPCC107	Is transmission of the GP Tunneling Stop command supported?	Direct
GPPCC205A	Is quality-based gppTunnelingDelay supported?	Indirect

5.3.1.6 Lightweight unicast communication

5.3.1.6.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.3.2.2	Proxy Table is empty.	

5.3.1.6.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1, A.3.3.4.1	**Lightweight unicast forwarding for *ApplicationID* = 0b000, derived alias**: A pairing with lightweight unicast communication mode and SecurityLevel = 0b00 (incremental MAC sequence number) is established between the TH-GPD with GPD SrcID = X (*ApplicationID* = 0b000) and TH-GPT (e.g. as a result of any of the commissioning procedures). *AssignedAlias* sub-field of the *Options* field is set to 0b0. *Security Frame counter* N. The corresponding information for GPD SrcID=X is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures). Read out Proxy Table of DUT-GPP. Make TH-GPD send a Data GPDF with *MAC sequence number* M >= N+1, *ApplicationID* = 0b000, *SecurityLevel* 0b00, *RxAfterTx* 0b0, *SrcID* = Z, *Endpoint* absent, and *GPD CommandID* (e.g. 0x22).	

5.3.1.6.3 Expected Outcome

Pass verdict:
1) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with: • *ApplicationID* = 0b000; • *EntryActive* and *EntryValid* set to 0b1; • *Derived Group GPS* = 0b0; • *Lightweight Unicast GPS* = 0b1, and *Lightweight Sink address list* field present and including one entry with IEEE and NWK address of the TH-GPS; • *Commissioned Group GPS* = 0b0, and *Sink group list* field absent; • *Options Extension* = 0b0; *Extended Options* field absent; *Full unicast sink address list* field absent; • *AssignedAlias* = 0b0 and *GPD Assigned Alias* field absent; • *GPD ID* field of 4B in length is present and carries the SrcID = X of the GPD; • *Endpoint* field absent; • *Security Options* and *GPDkey* absent; • the *GPD security frame counter* = N. At least Dmin_u after GPDF reception, DUT-GPP sends GP Notification command with the following fields: • NWK header fields: ▪ Destination Address – unicast address of the paired TH-GPS; ▪ Source Address - short address of the DUT-GPP; ▪ Sequence Number – of the DUT-GPP.

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• APS header fields: ▪ source endpoint: GPEP (242); ▪ ProfileID: 0xA1E0; ▪ ClusterID: 0x0021; ▪ destination endpoint: GPEP (242); ▪ APS Counter: of the DUT-GPP: • ZCL header fields: ▪ *Command Identifier*: 0x00; ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* = 0b0 (client to server), *Disable default response* = 0b1; • ZCL payload fields: ▪ *Options* sub-fields set to: *ApplicationID* = 0b000, *Also Unicast* 0b1, *AlsoDerivedGroup* 0b0, *AlsoCommissionedGroup* 0b0, *ProxyInfoPresent* = 0b1; *BidirectionalCommunicationCapability* set according to DUT-GPP's capabilities (i.e. to 0b0 for Basic Proxy); and *gpTxQueueFull* set according to DUT-GPP status (0b1 for Basic Proxy); ▪ GPD SrcID field carrying Z; ▪ *Endpoint* field absent; ▪ GPD security frame counter carrying 0x000000 in the 3 MSB and M in 1 LSB; ▪ GPD CommandID copied from the GPDF; ▪ GPD Command Payload carrying 0x00 or 0xff; ▪ *GPP short address* field present and carrying the short address of the DUT-GPP; ▪ *GPP-GPD link* field present. TH-GPT executes the GPD command and does NOT send GP Notification Response. DUT-GPP does not retransmit the unicast GP Notification.
Fail verdict:
1) DUT-GPP doesn't maintain the minimum delay. AND/OR DUT-GPP does not send GP Notification command formatted exactly as in item 1 above. AND/OR DUT-GPP sends GP Tunnelling Stop command. AND/OR TH-GPT does not execute the GPD command.

5.3.1.6.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF6	Is Lightweight unicast communication supported as a client? (Lightweight unicast communication sub-field of the gppFunctionality attribute set?)	Indirect
GPPCC101B	Is transmission of the lightweight GP Notification command in unicast supported?	Direct

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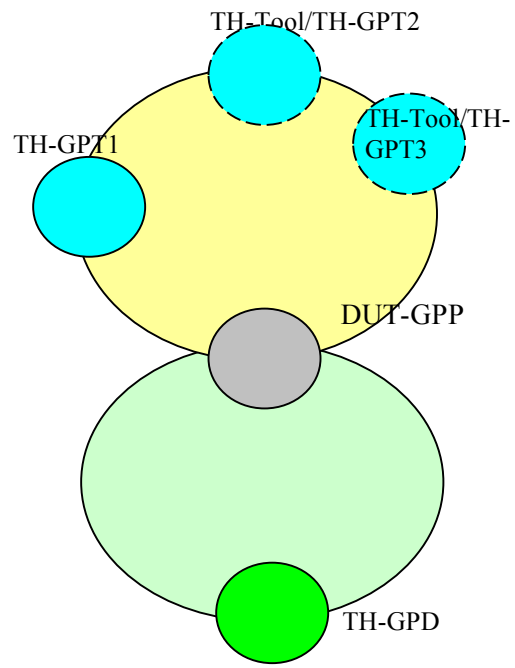
5.3.2 Sub-case: several GPS with various communication modes

5.3.2.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPT1	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific TH-GPT's GPEP supports the application functionality of the TH-GPD (see Section A.4.3 of [R3]).
TH-Tool/ TH-GPT2 TH-Tool/ TH-GPT3	TH-GPT's GPEP supports the application functionality of the TH-GPD (see Section A.4.3 of [R3]). TH-GPT2 and TH-GPT3 are members of the groups with group IDs derived from GPD ID X (e.g. 0x5678 for SrcID = 0x12345678) and 0x1247, respectively.
DUT-GPP/-GPPB/proxy side of GPCB	PAN id=same PANID as TH-GPT1 Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific. Not a member of the groups with GroupIDs 0x1247 and derived from GPD
TH-GPD	GPD ID = X TH-GPD supports the application functionality of the TH-GPT (see Section A.4.3 of [R3]).

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPT1, (opt. TH-GPT2, TH-GPT3) and DUT-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2		TH-GPT1 (opt. also TH-GPT2 – TH-GPT3) is in the radio range of DUT-GPP. DUT-GPP is in radio range from each other.	

5.3.2.2 Test Set-Up

TH-GPD shall be in wireless communication proximity of DUT-GPP. A packet sniffer shall be observing the communication over the air interface.

It shall be possible to read out the *Proxy Table* attribute of DUT-GPP.

5.3.2.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.3.3.2.2, A.3.4.2.2, A.3.5.2.1	***Only if DUT-GPP support full unicast: Test order of multiple GP Notification messages incl. full unicast, RxAfterTx = 0b0:*** A pairing is established between TH-GPD and TH-GPT1, TH-GPT2, and TH-GPT3. For the Sink Table entry for GPD ID = X, the *Communication Mode* sub-field of the *Options* field has value 0b00 for TH-GPT1 (full unicast) and derived alias, value 0b01 for TH-GPT2 (DGroup) and derived alias, and value 0b10 for TH-GPT3 and group address 0xMMMM (CGroup) and assigned alias (0xNNNN). The corresponding information is stored in the Proxy Table attribute of DUT-GPP. Read out Proxy Table entry of DUT-GPP. Make TH-GPD send a Data GPDF with *RxAfterTx* = 0b0.	Note: if real TH-GPS (not a TH-Tool) is used, the same TH-GPS is recommended to be used to establish first the group pairings and then the unicast pairing. Sink Table must then be cleared between the pairings and gpsCommunicationMode set appropriately.

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2	[R3] A.3.9, A.3.3.2.2, A.3.4.2.2, A.3.5.2.1	***Test order of multiple GP Notification messages NOT incl. full unicast, RxAfterTx = 0b0:*** Clean Proxy Table of DUT-GPP and Sink Tables of TH-GPT1, TH-GPT2, TH-GPT3. A pairing is established between TH-GPD and TH-GPT1, TH-GPT2, and TH-GPT3. For the Sink Table entry for GPD ID = X, the *Communication Mode* sub-field of the *Options* field has value 0b11 for TH-GPT1 (lightweight unicast), value 0b01 for TH-GPT2 (DGroup) and assigned alias 0xOOOO, and value 0b10 for TH-GPT3 and group address 0xMMMM (CGroup) and assigned alias 0xNNNN. The corresponding information is stored in the Proxy Table attribute of DUT-GPP. Read out Proxy Table entry of DUT-GPP. Make TH-GPD send a Data GPDF with *RxAfterTx* = 0b0.	
3		***Test order of multiple GP Notification messages NOT incl. full unicast, RxAfterTx = 0b1:*** A pairing is established between TH-GPD and TH-GPT1, TH-GPT2, and TH-GPT3. For the Sink Table entry for GPD ID = X, the *Communication Mode* sub-field of the *Options* field has value 0b11 for TH-GPT1 (lightweight unicast), value 0b01 for TH-GPT2 (DGroup), and value 0b10 for TH-GPT3 and group address 0xMMMM (CGroup). The corresponding information is stored in the Proxy Table attribute of DUT-GPP. Make TH-GPD send a Data GPDF with *RxAfterTx* = 0b1.	

1684 #### 5.3.2.4 Expected Outcome

Pass verdict:
1) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with: • *EntryActive* and *EntryValid* set to 0b1; • *Derived Group GPS* = 0b1; • *Lightweight Unicast GPS* = 0b0, and *Lightweight Sink address list* field absent; • *Commissioned Group GPS* = 0b1, and *Sink group list* field present and carrying one entry with Sink group 0xMMMM and Alias 0xNNNN: • *Options Extension* = 0b1; *Extended Options* field present and its *Full Unicast GPS* sub-field set to 0b1; *Full unicast sink address list* field present and including one entry with IEEE and NWK address of the TH-GPT1; • *AssignedAlias* = 0b0 and *GPD Assigned Alias* field absent. At least *gppTunnelingDelay* (corresponding to the *GPP-GPD link* value, as indicated in GP Tunneling Stop) after the reception of the triggering GPDF, DUT-GPP: • First sends a *GP Tunneling Stop* command in 2-hop broadcast, using derived alias, • then (in any order): ▪ sends a *GP Notification* command to TH-GPT1 in unicast, the *Also Derived Group* and *Also Commissioned Group* sub-fields of the *Options* field have value 0b1 ▪ sends two *GP Notification* commands in groupcast, – one to the derived group using derived alias, with the *Also Unicast* and *Also Commissioned Group* sub-fields of the *Options* field both have value 0b1; – and one to the pre-commissioned group with GroupID 0xMMMM, using Assigned alias 0xNNNN, with the *Also Unicast* and *Also Derived Group* sub-fields of the *Options* field both have value 0b1.
2) DUT-GPP responds with ZCL Read Attributes Response with the status SUCCESS and carrying the *Proxy Table* attribute, having exactly one entry for TH-GPD, with: • *EntryActive* and *EntryValid* set to 0b1; • *Derived Group GPS* = 0b1; • *Lightweight Unicast GPS* = 0b1, and *Lightweight Sink address list* field present and including one entry with IEEE and NWK address of the TH-GPT1;

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• *Commissioned Group GPS* = 0b1, and *Sink group list* field present and carrying one entry with Sink group 0xMMMM and Alias 0xNNNN: • *Options Extension* = 0b0; *Extended Options* field absent; *Full unicast sink address list* field absent; • *AssignedAlias* = 0b1 and *GPD Assigned Alias* field = 0xOOOO. At least *Dmin_u* after the reception of the triggering GPDF, DUT-GPP sends (in any order): • *GP Notification* command to TH-GPT1 in unicast, not using alias, and two *GP Notification* commands in groupcast, one to the derived group, and one to the pre-commissioned group with GroupID 0xMMMM, formatted as specified in pass verdict 1 above.
3) At least *Dmin_u* after the reception of the triggering GPDF, DUT-GPP sends *GP Notification* command to TH-GPT1 in unicast. At least *gppTunnelingDelay* (corresponding to the *GPP-GPD link* value, as indicated in groupcast GP Notification) after the reception of the triggering GPDF, DUT-GPP sends two *GP Notification* commands in groupcast, one to the derived group, and one to the pre-commissioned group with GroupID 0xMMMM. The GP Notification commands have the *Options* sub-fields set as specified in pass verdict 1 above.
Fail verdict:
1) – 3) DUT-GPP does not maintain the minimum delay AND/OR does not send the commands with the content as specified above or in the order as specified above. AND/OR does send GP Pairing Search command.

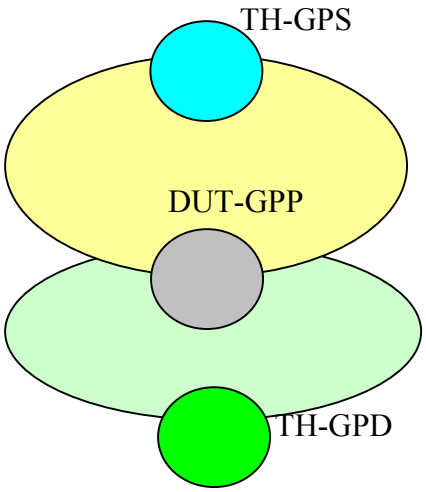
5.3.2.5 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCC105	Is transmission of the GP Notification command in multiple communication modes supported?	Direct
GPPCC3E	Is the required minimal number of simultaneously used entries in the *Sink address list* and in the *Sink group list* per Proxy Table entry supported?	Direct

5.3.3 Alias derivation

5.3.3.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPS (GPT/GPT+/GPC)	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7, but must be changed in the case it is equal to the derived alias) IEEE address=manufacturer-specific GPEP of TH-GPS supports the application functionality of the TH-GPD (see Section A.4.3 of [R3]).
DUT-GPP/-GPPB/proxy side of GPCB	PANId=same PANID as TH-GPT Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7, but must be changed in case it is equal to the derived alias) IEEE address=manufacturer-specific
TH-GPD	TH-GPD supports the application functionality of the TH-GPS (see Section A.4.3 of [R3]).

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPT and DUT-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.4.2.2	DUT-GPP has no Proxy Table entry for TH-GPD GPD ID	

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5.3.3.1.2 Test Set-Up

The TH-GPS shall be in wireless communication proximity of DUT-GPP; and the DUT-GPP shall be in wireless communication proximity of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

5.3.3.2 Subcase: No alias conflict

5.3.3.2.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
3	[R3] A.1.4	TH-GPD has SrcID 0x12345678.	

5.3.3.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.3.3	Set DUT-GPP in commissioning mode by sending GP Proxy Commissioning Mode (*Action*=Enter). Make TH-GPD send the Commissioning GPDF.	

5.3.3.2.3 Expected Outcome

Pass verdict:
1) DUT-GPP sends a GP Commissioning Notification with NWK SrcAddr equal to the alias_srcAddr 0x5678 as and NWK sequence number equal to MAC header *Sequence number* field of the triggering GPDF – 12 mod 256.
Fail verdict:
1) The DUT-GPP does not send a GP Commissioning Notification, formatted as specified above.

5.3.3.3 Subcase: SrcID with 2LSB 0xffff

5.3.3.3.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
3	[R3] A.1.4	TH-GPD has SrcID 0x1234FFFF.	

5.3.3.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.3.3	Set DUT-GPP in commissioning mode by sending GP Proxy Commissioning Mode (*Action*=enter). Send from TH-GPD the Commissioning GPDF.	

5.3.3.3.3 Expected Outcome

Pass verdict:
1) DUT-GPP sends a GP Commissioning Notification with NWK SrcAddr field equal to the alias_srcAddr 0xEDCB (0x1234 ^ 0xffff) and NWK sequence number equal to MAC header *Sequence number* field of the triggering GPDF – 12 mod 256.
Fail verdict:
1) The DUT-GPP does not send a GP Commissioning Notification as specified above.

5.3.3.4 Subcase: SrcID with 2LSB 0x0000

5.3.3.4.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
3	[R3] A.1.4	TH-GPD has SrcID 0x12340000.	

5.3.3.4.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.3.3	Set DUT-GPP in commissioning mode by sending GP Proxy Commissioning Mode (Action=Enter). Send from TH-GPD the Commissioning GPDF.	

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1704 ***5.3.3.4.3 Expected Outcome***

Pass verdict:
1) DUT-GPP sends a GP Commissioning Notification with NWK SrcAddr equal to 0x1234 and NWK sequence number equal to MAC header *Sequence number* field of the triggering GPDF – 12 mod 256.
Fail verdict:
1) The DUT-GPP does not send a GP Commissioning Notification as specified above.

1705 ### 5.3.3.5 Subcase: SrcID 0xFFFF0000

1706 ***5.3.3.5.1 Initial conditions***

Item	Doc. Ref.	Test Step	Note
3	[R3] A.1.4	TH-GPD has SrcID 0xFFFF0000.	

1707 ***5.3.3.5.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.3.3	Set DUT-GPP in commissioning mode by sending GP Proxy Commissioning Mode (*Action*=Enter). Send from TH-GPD the Commissioning GPDF.	

1708 ***5.3.3.5.3 Expected Outcome***

Pass verdict:
1) DUT-GPP sends a GP Commissioning Notification with NWK SrcAddr equal to 0x0007 as and NWK sequence number equal to MAC header *Sequence number* field of the triggering GPDF – 12 mod 256.
Fail verdict:
1) The DUT-GPP does not send a GP Commissioning Notification as specified above.

1709 ### 5.3.3.6 Subcase: SrcID = 0x0000FFFF

1710 ***5.3.3.6.1 Initial conditions***

Item	Doc. Ref.	Test Step	Note
3	[R3] A.1.4	TH-GPD has SrcID 0x0000FFFF.	

1711 ***5.3.3.6.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.6.3.3	Set DUT-GPP in commissioning mode by sending GP Proxy Commissioning Mode (*Action*=enter). Send from TH-GPD the Commissioning GPDF.	

1712 ***5.3.3.6.3 Expected Outcome***

Pass verdict:
1) DUT-GPP sends a GP Commissioning Notification with NWK SrcAddr equal to 0xFFF7 and NWK sequence number equal to MAC header *Sequence number* field of the triggering GPDF – 12 mod 256.
Fail verdict:
1) The DUT-GPP does not send a GP Commissioning Notification as specified above.

1713 ***5.3.3.6.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
NDF6	Does the device support transmission of ZigBee NWK frames with AliasSrcAddr and AliasSeqNumb, as supplied by next higher layer?	Direct

1714

1715

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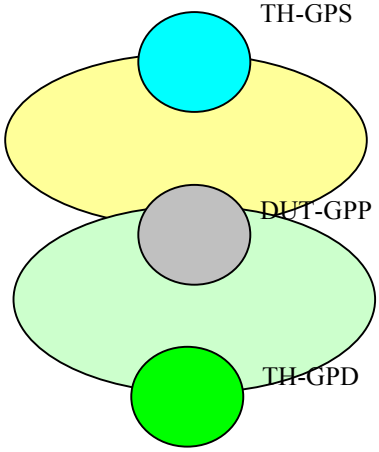
5.4 Other Green Power cluster functionality

5.4.1 Multi-hop commissioning

5.4.1.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPS/TH-Tool	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific TH-GPS supports multi-hop commissioning.
DUT-GPP	PANId=same PANId as TH-GPS Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD/TH-Tool	GPD ID = N GPD security usage according to DUT capabilities; if GPS supports security, TH-GPD shall request the shared key. TH-GPD application functionality matches that of the TH-GPS's GPEP. TH-GPD implements bidirectional commissioning procedure.

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPS and DUT-GPP operate in a ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.4.2.2, A.3.3.2.2	No pairing exists between TH-GPS and TH-GPD; there is not Proxy Table entry for TH-GPD in the DUT-GPP.	

5.4.1.1.2 Test Set-Up

The TH-GPS and TH-GPD shall be in wireless communication proximity of DUT-GPP.

A packet sniffer shall be observing the communication over the air interface.

5.4.1.2 Bidirectional commissioning, ApplicationID = 0b000; shared key

A number of additional tests is included in sections 5.4.1.10 (additional bidirectional commissioning tests), 5.4.1.12 (commissioning mode tests) and 5.4.1.13 (general additional tests); successful completion of those tests is required to complement the current test.

5.4.1.2.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1-2		As in 5.4.1.1.1.	
3	[R3] A.1.4	TH-GPD uses *ApplicationID* = 0b000 and GPD SrcID = Z.	
4		DUT-GPP (if it supports them) and TH-GPS are configured with the same gpSharedSecurityKeyType and gpSharedSecurityKey.	

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1730 ***5.4.1.2.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
		Complete procedure	
0A	[R3] A.3.9, A.3.3.5.3, A.3.3.4.4, A.3.3.5.4, A.3.3.5.2, A.3.4.2.2	TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter, *ExitMode* = On first Pairing success, *Unicast communication* = 0b0). Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), so that TH-GPD sends GPD Channel Request command with: • MAC sequence number = N; • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *Auto-Commissioning*, – 0b0, if the GPD Channel Request transmission is immediately followed by reception window; – 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel. ▪ and *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent; • the *SrcID* field and *Endpoint* field absent, the security not used (*Security frame counter* and *MIC* field absent); • preferably with *Rx channel in the (second) next attempt* indicating channel other than the operation channel of the DUT-GPP; until DUT-GPP sends GP Commissioning Notification with GPD Channel Request command and TH-GPS1 responds with GP Response with GPD Channel Configuration command and *TransmitChannel* != operational channel; in the GP Response, the *ApplicationID* sub-field is set to 0b000 and the *GPD ID* field carries 0x00000000.	Note: it is absolutely necessary to test that the GPP can deliver the GPD Channel Configuration on a channel other than the operational channel of the network.
0B		Within the 5s *TransmitChannel* timeout, make TH-GPD send Channel Request GPDF on the *TransmitChannel;* with *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b0; and the following fields absent: *Extended NWK Frame Control*, *GPD SrcID*, *Endpoint*, *Security frame counter* and *MIC*.	
0C		0.5s after TH-GPD Channel Request GPDF transmission on the *TransmitChannel*, make TH-GPD send Commissioning GPDF on the operational channel, with: • sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b1; • sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* = 0b000, *RxAfterTx* = 0b1; • with *GP Security Key request* sub-field of the *Options* field set to 0b1 • with sub-fields of the *Extended Options* field set to: *GPD Key present* = 0b1 and *GPD Key encryption* = 0b1, • the fields *GPD Key* and *GPD Key MIC* present.	
0D		Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until TH-GPS1 provides success feedback, resulting in Commissioning GPDF as in step 3A. TH-GPS1 sends GP Response command with GPD Commissioning Reply command on receipt of each GP Commissioning Notification with GPD Commissioning command, carrying the shared key.	
0E		On receipt of GPD Commissioning Reply, TH-GPD sends correctly protected GPD Success command.	
0F		On receipt of GP Commissioning Notification with GPD Success command, TH-GPS1 provides user success feedback and sends GP Pairing. Read out Proxy Table entry of the DUT-GPP.	

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1731 ***5.4.1.2.3 Expected Outcome***

Pass verdict:
0A) After TH-GPS sends GP Proxy Commissioning Mode command with *Action=Enter, Unicast communication* = 0b0 and *Channel present* sub-field set to 0b0, on reception of (each) GPD Channel Request command on the operational channel, the DUT-GPP sends GP Commissioning Notification in broadcast with: • NWK header fields: ▪ Destination Address – 0xfffd (broadcast); ▪ Source Address – alias if DUT-GPP is a Basic Proxy; ▪ Sequence Number - alias (derived from the MAC sequence number of the GPDF by subtracting 12) if DUT-GPP is a Basic Proxy • APS header fields: ▪ source endpoint: GPEP (242); ▪ ProfileID: 0xA1E0; ▪ ClusterID: 0x0021; ▪ destination endpoint: GPEP (242); ▪ APS Counter: alias if DUT-GPP is a Basic Proxy; • ZCL header fields: ▪ *Command Identifier*: 0x04 ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b0 (client to server), *Disable default response* 0b1; • ZCL payload fields: ▪ *Options* sub-fields set to: – *ApplicationID* = 0b000, *RxAfterTx* = 0b1; *SecurityLevel* – 0b00; *SecurityKeyType* = 0b000, *Security processing failed* = 0b0; *ProxyInfoPresent* = 0b1; – *BidirectionalCommunicationCapability* set according to the capabilities of DUT-GPP (i.e. to 0b0 for Basic Proxy); ▪ GPD ID field of 4B length carrying 0x00000000; ▪ *Endpoint* field absent; ▪ *GPD CommandID* = 0xE3; ▪ GPD Command payload copied from the triggering GPDF; ▪ *GPPShortAddress* present and set to NWK address of DUT-GPP, ▪ *GPP-GPD link* field present; ▪ *MIC* field absent.
0B) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Channel Request GPDF with *Auto-Commissioning* = 0b0 on the *TransmitChannel*, DUT-GPP does send at least one copy of the queued Channel Configuration GPDF on receipt of; the GPD Channel Configuration command with *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field, *GPD ID* field, *Security frame counter* and *MIC* field absent. The transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP does NOT send GP Commissioning Notification for this GPDF, not on the *TransmitChannel*, not on the operational channel.
0C) At least *gppTunnelingDelay* (corresponding to the *GPP-GPD link* value as indicated in the GP Commissioning Notification payload) after reception of the triggering GPD Commissioning command on the operational channel, the DUT-GPP sends in broadcast GP Commissioning Notification on the operational channel with: • NWK header fields: ▪ Destination Address – 0xfffd (broadcast); ▪ Source Address – alias if DUT-GPP is a Basic Proxy; ▪ Sequence Number - alias (derived from the MAC sequence number of the GPDF by subtracting 12) if DUT-GPP is a Basic Proxy • APS header fields: ▪ source endpoint: GPEP (242); ▪ ProfileID: 0xA1E0; ▪ ClusterID: 0x0021; ▪ destination endpoint: GPEP (242); ▪ APS Counter: alias if DUT-GPP is a Basic Proxy; • ZCL payload ▪ *Options* sub-fields set to:

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– *ApplicationID* = 0b000, *RxAfterTx* = 0b1; *SecurityLevel* – 0b00; *SecurityKeyType* = 0b000, *Security processing failed* = 0b0; *ProxyInfoPresent* = 0b1;
– *BidirectionalCommunicationCapability* set according to the capabilities of DUT-GPP (i.e. to 0b0 for Basic Proxy);
- GPD ID field of 4B length carrying SrcID of TH-GPD;
- *Endpoint* field absent;
- *GPD CommandID* = 0xE0;
- GPD Command payload copied from the triggering GPDF;
- *GPPShortAddress* present and set to NWK address of DUT-GPP,
- *GPP-GPD link* field present;
- *MIC* field absent.

0D) After TH-GPS sends GP Response with GPD Commissioning Reply command, between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the next Commissioning GPDF, DUT-GPP sends on the operational channel at least one copy of the Commissioning Reply GPDF, with:
- The sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00, *ZigBeeProtocolVersion* = 0x3, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b1;
- sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* = 0b000, *RxAfterTx* = 0b0, *Direction* = 0b1;
- GPD ID field of 4B length, carrying SrcID of TH-GPD (Z)
- Endpoint field absent;
- CommandID = 0xF0;
- Command payload: copied from the triggering GP Response.

The transmission SHALL NOT exceed *gpTxDuration*.

Then, DUT-GPP sends correctly formatted GP Commissioning Notification, carrying the GPD Commissioning command.
On the commissioning action following reception of GPD Commissioning Reply, the TH-GPD sends Success GPDF.

0E) On reception of Success GPDF, DUT-GPP sends GP Commissioning Notification with GPD Success command; with GPD ID field carrying the GPD ID of the TH-GPD (N).
In case of Basic Proxy, the GP Commissioning Notification carrying the GPD Success command can have the *Security Processing Failed* sub-field of the *Options* field set to 0b1; then:
- the *SecurityLevel* sub-field of the *Options* field is set to the value from the triggering Success GPDF;
- *SecurityKeyType* sub-fields of the *Options* field is set to:
  - 0b000 if the *SecurityKey* sub-field of the *Extended NWK Frame Control* field of the triggering Success GPDF was set to 0b0,
  - 0b100 if the *SecurityKey* sub-field of the *Extended NWK Frame Control* field of the triggering Success GPDF was set to 0b1
- the GPD CommandID is copied from the triggering GPDF (encrypted);
- the *MIC* field is present and carries the MIC value copied from the triggering Success GPDF,
- *GPD security frame counter* field value: copied from the *Security frame counter* field of Success GPDF.

If *Security Processing Failed* sub-field of the *Options* field is set to 0b0, then:
- the *SecurityKey* sub-field of the *Extended NWK Frame Control* field carries the actual shared key type as in gpSharedSecurityKeyType;
- the GPD CommandID is in the clear (0xE2).
- the *MIC* field is absent.

Since the *RxAfterTx* sub-field of the Success GPDF was set to 0b0, then the NWK source address field for the GP Commissioning Notification is set to the alias derived from the GPDID (N), and the NWK sequence number field and APS Counter field of the GP Commissioning Notification are set to the alias sequence number derived from the MAC sequence number of the Success GPDF (by subtracting 12); the GP Commissioning Notification is sent in broadcast at least Dmin_u after reception of the triggering Success GPDF.

0F) DUT-GPP has a Proxy Table entry for the TH-GPD GPD ID = N and all relevant parameters as in GP Pairing command.

Fail verdict:

0A) After TH-GPS sends GP Proxy Commissioning Mode command with *Action=Enter, Unicast communication* = 0b0 and *Channel present* sub-field set to 0b0, on reception of (each) GPD Channel Request command on the operational channel, the DUT-GPP does NOT sends GP Commissioning Notification with GPD Channel Request command in broadcast, formatted as in pass verdict 0A above.

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0B) On receipt of Channel Request GPDF on the *TransmitChannel,* DUT-GPP does not send at least one Channel Configuration GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms, formatted exactly as in pass verdict 0B above AND/OR The transmission by DUT-GPP exceeds *gpTxDuration*. AND/OR DUT-GPP sends Channel Configuration GPDF on the operational channel. AND/OR DUT-GPP send GP Commissioning Notification for this GPDF, on the *TransmitChannel*, and/or on the operational channel.
0C) After reception of the triggering GPD Commissioning command on the operational channel, the DUT-GPP does NOT send GP Commissioning Notification, formatted exactly as in pass verdict 0C above AND/OR minimal *gppTunnelingDelay* is not maintained AND/OR *gppTunnelingDelay* does not correspond to the *GPP-GPD link* as indicated in the GP Commissioning Notification payload.
0D) After TH-GPS sends GP Response with GPD Commissioning Reply command, the DUT-GPP does NOT respond to the next Commissioning GPDF by sending between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms at least one Commissioning Reply GPDF, formatted as in pass verdict 0D above AND/OR The transmission by DUT-GPP exceeds *gpTxDuration*.
0E) On reception of Success GPDF, DUT-GPP does NOT send GP Commissioning Notification with GPD Success command; formatted as in pass verdict 0E above.
0F) DUT-GPP does NOT have a Proxy Table entry for the TH-GPD GPD ID = N and all relevant parameters as in GP Pairing command.

1732 ***5.4.1.2.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3	Commissioning GPDF	Direct
GPCF4	Bidirectional commissioning	Direct
GPCF5, GPCF16	In-band bidirectional channel commissioning	Direct
GPCF6	Commissioning Reply GPDF	Direct
GPCF13	Success GPDF	Direct

1733

1734

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5.4.1.3 NOT TESTED: Auto-Commissioning

5.4.1.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
2		TH-GPS and DUT-GPP operate in a ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
3	[R3] A.3.4.2.2	No pairing exists between TH-GPS and TH-GPD; there is no Proxy Table entry for TH-GPD in the DUT-GPP.	
4	[R3] A.3.3.2.6	TH-GPD supports *Auto-Commissioning*. TH-GPS has *gpsSecurityLevel* = 0b00.	

5.4.1.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.3.3.4.4, A.3.3.5.3, A.3.3.5.2, A.3.4.2.2	TH-GPS sends GP Proxy Commissioning Mode (*Action* = Enter, *Unicast communication* = 0b0). Make TH-GPD send Data GPDF with *Auto-Commissioning* sub-field set to 0b1 and *RxAfterTx* sub-field set to 0b0. After TH-GPS sends GP Pairing, read out Proxy Table of the DUT-GPP.	

5.4.1.3.3 Expected Outcome

Pass verdict:
1) On reception of Data GPDF with *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b1, the DUT-GPP sends GP Commissioning Notification command in broadcast, with: • The sub-fields of the *Options* field set as follows: *ApplicationID* as in the triggering Data GPDF, *RxAfterTx* = 0b0, *SecurityLevel* = 0b00, *SecurityKeyType* = 0b000, *Security processing failed* = 0b0; *ProxyInfoPresent* = 0b1; *BidirectionalCommunicationCapability* – set according to the capability of the DUT-GPP (i.e. to 0b0 for Basic Proxy); • *GPD ID* field set to the GPD ID of the TH-GPD; • *GPD security frame counter* field carrying in the 1LSB the MAC sequence number from the triggering data GPDF, pre-padded with 0x00; • *GPD CommandID* field carrying the values form the corresponding fields of the triggering Data GPDF; • *GPD Command Payload* field carrying the value from the corresponding field of the triggering Data GPDF, if present, and 0x00 or 0xff otherwise; • *GPP short address* present and carrying the short address of the DUT-GPP; • *GPP-GPD link* field present • *MIC* fields not present. The Since the *RxAfterTx* sub-field of the GPDF was set to 0b0, then the NWK source address field for the GP Commissioning Notification is set to the alias derived from the GPDID (N), and the NWK sequence number field and APS Counter field of the GP Commissioning Notification are set to the alias sequence number derived from the MAC sequence number of the GPDF (by subtracting 12). DUT-GPP has a Proxy Table entry for the TH-GPD GPD ID = N and all relevant parameters as in GP Pairing command.
Fail verdict:
1) DUT-GPP does not send GP Commissioning Notification on reception in commissioning mode of a Data GPDF with *Auto-Commissioning* sub-field of the NWK Frame Control field set to 0b1 AND/OR the GP Commissioning Notification is NOT formatted as described in 5.4.1.3.3/item 1 above. AND/OR DUT-GPP does not have a Proxy Table entry with the parameters as provided in the GP Pairing command.

5.4.1.3.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF1	Does the device support pairing with Data GPDF with *Auto-Commissioning* bit set to 0b1?	Direct

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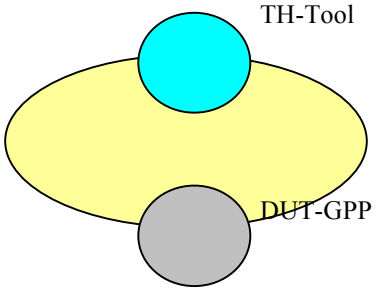
5.4.1.4 CT-based commissioning, OOB key

5.4.1.4.1 Initial conditions

The required network set-up for the test harness is as follows:



TH-Tool	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
DUT-GPP	PANId=same PANId as TH-GPT1 Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific

Item	Doc. Ref.	Initial Conditions	Note
1		TH-Tool and DUT-GPP operate in a ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.4.2.2	Proxy Table of DUT-GPP is empty. DUT-GPP is in operational mode.	

5.4.1.4.2 Test Set-Up

The TH-Tool shall be in wireless communication proximity of DUT-GPP.

5.4.1.4.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.5.2, A.3.3.5.1, A.3.4.2.2	TH-Tool sends GP Pairing for GPD ID = N with SecurityKeyType = 0b100, SecurityLevel >= 0b10 and SecurityKey [c0 : c1 : c2 : c3 : c4 : c5 : c6 : c7 : c8 : c9 : ca : cb : cc : cd : ce : cf]. Read out Proxy Table of the DUT-GPP.	
2	[R3] A.3.9.1, A.3.5.2.3	***Negative test: SecurityLevel = 0b01:*** Clean Proxy Table. TH-Tool sends GP Pairing for GPD ID = N with SecurityLevel = 0b01. Read out Proxy Table of the DUT-GPP.	
3	[R3] A.3.9.1, A.3.5.2.3	***Negative test: SrcID = 0x00000000:*** TH-Tool sends GP Pairing for ApplicationID = 0b000, SrcID = 0x00000000. Read out Proxy Table of the DUT-GPP.	
4	[R3] A.3.9.1, A.3.5.2.3	***Negative test: GPD IEEE address = 0x0000000000000000:*** TH-Tool sends GP Pairing for ApplicationID = 0b010, GPD IEEE address = 0x0000000000000000 and Endpoint X. Read out Proxy Table of the DUT-GPP.	
5	[R3] A.3.9.1, A.3.5.2.3	***Positive test: SrcID = 0xFFFFFFFF:*** TH-Tool sends GP Pairing for ApplicationID = 0b000, SrcID = 0xFFFFFFFF, *SecurityLevel* – 0b00. Read out Proxy Table of the DUT-GPP. TH-Tool sends unprotected Data GPDF with SrcID = 0x12345678. TH-Tool sends unprotected Data GPDF with SrcID = 0x87654321.	
6	[R3] A.3.9.1, A.3.5.2.3	***Positive test: GPD IEEE address = 0xFFFFFFFFFFFFFFFF:*** Clean Proxy Table. TH-Tool sends GP Pairing for ApplicationID = 0b010, GPD IEEE address = 0xFFFFFFFFFFFFFFFF and Endpoint X, *SecurityLevel* – 0b00. Read out Proxy Table of the DUT-GPP.	

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		TH-Tool sends unprotected Data GPDF with IEEE = 0x1122334455667788. TH-Tool sends unprotected Data GPDF with IEEE = 0x8877665544332211.	
7	[R3] A.3.9.1, A.3.5.2.3	***Positive test: GPD IEEE address = X, Endpoint 0xff:*** Clean Proxy Table. TH-Tool sends GP Pairing for ApplicationID = 0b010, GPD IEEE address = 0xFFFFFFFFFFFFFFFF and Endpoint X, *SecurityLevel* – 0b00. Read out Proxy Table of the DUT-GPP. TH-Tool sends unprotected Data GPDF with IEEE = X, Endpoint = E. TH-Tool sends unprotected Data GPDF with IEEE = X, Endpoint = F.	

5.4.1.4.4 Expected Outcome

Pass verdict:
1) DUT-GPP has a Proxy Table entry for the TH-GPD GPD ID = N with SecurityKeyType = 0b100, SecurityLevel >= 0b10 and SecurityKey [c0 : c1 : c2 : c3 : c4 : c5 : c6 : c7 : c8 : c9 : ca : cb : cc : cd : ce : cf].
2) – 4) DUT-GPP does NOT create Proxy Table entry.
5) – 7) DUT-GPP creates Proxy Tabe entry for the GPDID supplied. On reception of each Data GPDF, DUT-GPP creates GP Notification for the paired sink(s), carrying the GPD ID (and Endpoint, if ApplicationID = 0b010) from the triggering GPDF.
Fail verdict:
1) DUT-GPP does not have a Proxy Table entry, formatted as specified in item 1 above.
2) – 4) DUT-GPP creates Proxy Table entry.
5) – 7) DUT-GPP does NOT create Proxy Table entry for the GPDID supplied. AND/OR On reception of at least one Data GPDF, DUT-GPP does NOT create the GP Notification for the paired sink(s), AND/OR the GPD ID (and Endpoint, if ApplicationID = 0b010) is not copied from the triggering GPDF.

5.4.1.4.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF12	Is CT-based commissioning supported as a client? (CT-based commissioning sub-field of the gppFunctionality attribute set?)	Direct
GPF7	Does the device's dGP stub support GPDF SecurityLevel=0b01? (deprecated)	Direct

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5.4.1.5 Bidirectional commissioning, ApplicationID = 0b000; OOB key

A number of additional tests is included in sections 5.4.1.10 (additional bidirectional commissioning tests), 5.4.1.12 (commissioning mode tests) and 5.4.1.13 (general additional tests) ; successful completion of those tests is required to complement the current test.

5.4.1.5.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1-2		As in 5.4.1.1.1.	
3	[R3] A.1.4	TH-GPD uses ApplicationID = 0b000 and GPD SrcID = Z.	
4		DUT-GPP and TH-GPS are configured with the same gpSharedSecurityKeyType = 0b000 (i.e. no shared key).	

5.4.1.5.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.3.3.5.3, A.3.3.4.4, A.3.3.5.4, A.3.3.5.2, A.3.4.2.2	TH-GPS sends GP Proxy Commissioning Mode (*Action* = Enter, *Unicast communication* = 0b0). Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), so that TH-GPD sends GPD Channel Request command with: • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *Auto-Commissioning* = 0b0, – 0b0, if the GPD Channel Request transmission is immediately followed by reception window; – 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel. ▪ and *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent; ▪ the *GPD ID* field and *Endpoint* field absent, the security not used (*Security frame counter* and *MIC* fields absent), until DUT-GPP sends GP Commissioning Notification with GPD Channel Request command and TH-GPS1 responds with GP Response with GPD Channel Configuration command and *TransmitChannel* != operational channel; in the GP Response, the *ApplicationID* sub-field is set to 0b000 and the *GPD ID* field carries 0x00000000.	Note: it is absolutely necessary to test that the GPP can deliver the GPD Channel Configuration on a channel other than the operational channel of the network.
2		Within the 5s *TransmitChannel* timeout, make TH-GPD send Channel Request GPDF on the *TransmitChannel;* with *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b0; and the following fields absent: *Extended NWK Frame Control*, *GPD SrcID*, *Endpoint*, *Security frame counter* and *MIC*.	Monitoring on both operational and TransmitChannel required
3A		0.5s after TH-GPD Channel Request GPDF transmission on the *TransmitChannel*, make TH-GPD send Commissioning GPDF on the operational channel, with • sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b1; • sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* = 0b000, *RxAfterTx* = 0b1; • with GP Security Key request sub-field of the Options field set to 0b0; • sub-fields of the *Extended Options* field set to: GPD Key present = 0b1 and *GPD Key encryption* = 0b1; • *GPD Key* and *GPD Key MIC* fields present.	

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3B		Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until TH-GPS1 provides success feedback, resulting in Commissioning GPDF as in step 3A. On receipt of GP Commissioning Notification with GPD Commissioning command, TH-GPS1 sends GP Response command carrying GPD Commissioning Reply command with: • indicating the OOB key will be used (*KeyType* sub-field of the *Options* field set to 0b100), • Other sub-fields of the *Options* field set to: *GPD security key present* = 0b0, *GPD key encryption* = 0b0; • The fields *GPD Security Key* and *GPD Key MIC* NOT present.	
3C		On receipt of GPD Commissioning Reply, TH-GPD sends correctly protected GPD Success command. On receipt of GP Commissioning Notification with GPD Success command, TH-GPS1 provides user success feedback and sends GP Pairing; it ***may*** (if *Exit mode* has value different than the default "*On first Pairing success*": ***shall***) also send GP Proxy Commissioning Mode (*Action*=Exit). Read out Proxy Table entry of the DUT-GPP.	

1756 ***5.4.1.5.3 Expected Outcome***

Pass verdict:
1) After TH-GPS sends GP Proxy Commissioning Mode command with *Action=Enter, Unicast communication* = 0b0 and *Channel present* sub-field set to 0b0. On reception of (each) GPD Channel Request command on the operational channel, the DUT-GPP sends in broadcast GP Commissioning Notification carrying GPD Channel Request command, with: • if the DUT-GPP is a Basic Proxy, the NWK header source address field, NWK Sequence number field and APS Counter field carry the alias values. • Sub-fields of the *Options* field set to*:* ▪ *ApplicationID* sub-field set to 0b000 ▪ *RxAfterTx* sub-field set to 0b1; ▪ *ProxyInfoPresent* = 0b1; ▪ *BidirectionalCommunicationCapability* sub-field of the *Options* field according to its capabilities (i.e. to 0b0 for Basic Proxy). • *GPD ID* field carrying 0x00000000, • listing the DUT-GPP in the *GPPShortAddress* field;
2) DUT-GPP does send at least one copy of the Channel Configuration GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Channel Request GPDF on the TransmitChannel; the GPD Channel Configuration command with *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field, *GPD ID* field, *Security frame counter* and *MIC* field absent. The transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP does NOT send GP Commissioning Notification for this GPDF, not on the *TransmitChannel*, not on the operational channel.
3A) At least *gppTunnelingDelay* (corresponding to the *GPP-GPD link* value as indicated in the GP Commissioning Notification payload) after reception of the triggering GPD Commissioning command on the operational channel, the DUT-GPP sends GP Commissioning Notification in broadcast on the operational channel with GPD Commissioning command and listing the DUT-GPP in the *GPPShortAddress* field; with GPD ID field carrying the GPD ID of the TH-GPD (N); if the DUT-GPP is a Basic Proxy, the NWK header source address field, NWK Sequence number field and APS Counter field carry the alias values. DUT-GPP sets its *BidirectionalCommunicationCapability* sub-field of the *Options* field according to its capabilities (i.e. to 0b0 for Basic Proxy)
3B) After TH-GPS sends GP Response with GPD Commissioning Reply command, between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the next Commissioning GPDF DUT-GPP send at least one copy of the buffered Commissioning Reply GPDF, with:

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• The sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00, *ZigBeeProtocolVersion* = 0x3, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b1; • sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* = 0b000, *RxAfterTx* = 0b0, *Direction* = 0b1; • GPD ID field of 4B length, carrying SrcID of TH-GPD (Z) • Endpoint field absent; • CommandID = 0xF0; • Command payload: copied from the triggering GP Response. The transmission SHALL NOT exceed *gpTxDuration*. Then, DUT-GPP sends correctly formatted GP Commissioning Notification, carrying the GPD Commissioning command. On the commissioning action following reception of GPD Commissioning Reply, the TH-GPD sends Success GPDF.
3C) On reception of Success GPDF, DUT-GPP sends GP Commissioning Notification in broadcast with GPD Success command; with GPD ID field carrying the GPD ID of the TH-GPD (N). Since OOB key (*gpdSecurityKeyType* = 0b100) is used, the GP Commissioning Notification carrying the GPD Success command has: • the *Security Processing Failed* of the *Options* field set to 0b1; • the *SecurityLevel* sub-field of the *Options* field is set to the value from the triggering Success GPDF; • *SecurityKeyType* sub-fields of the *Options* field is set to: ▪ 0b000 if the *SecurityKey* sub-field of the *Extended NWK Frame Control* field of the triggering Success GPDF was set to 0b0, ▪ 0b100 if the *SecurityKey* sub-field of the *Extended NWK Frame Control* field of the triggering Success GPDF was set to 0b1 (as it should); • *GPD CommandID* is encrypted; • the *MIC* field is present and carries the MIC value copied from the triggering Success GPDF, • the *GPD security frame counter* field is present and carries the frame counter value copied from the triggering Success GPDF. Since the *RxAfterTx* sub-field of the Success GPDF was set to 0b0, then the NWK source address field for the GP Commissioning Notification is set to the alias derived from the GPDID (N), and the NWK sequence number field and APS Counter field of the GP Commissioning Notification are set to the alias sequence number derived from the MAC sequence number of the Success GPDF (by subtracting 12). DUT-GPP has a Proxy Table entry for the TH-GPD GPD ID = N and all relevant parameters as in GP Pairing command.
Fail verdict:
1) On reception of (each) GPD Channel Request command on the operational channel, the DUT-GPP does not send GP Commissioning Notification in broadcast with GPD Channel Request command, *RxAfterTx* sub-field set to 0b1, and listing the DUT-GPP in the *GPPShortAddress* field AND/OR the *ApplicationID* sub-field is not 0b000 AND/OR the *GPD ID* field is not 0x00000000 AND/OR DUT-GPP being a Basic Proxy does NOT include the alias in the NWK header fields AND/OR APS Counter field.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Channel Request GPDF on the TransmitChannel, DUT-GPP does NOT transmit any Channel Configuration GPDF formatted exactly as specified in pass verdict 2 above. AND/OR transmission by DUT-GPP exceeds *gpTxDuration.*
3A) On reception of GPD Commissioning command on the operational channel, the DUT-GPP does NOT send GP Commissioning Notification in broadcast on the operational channel with GPD Commissioning command and listing the DUT-GPP in the *GPPShortAddress* field AND/OR DUT-GPP being a Basic Proxy does NOT include the alias in the NWK header fields AND/OR APS Counter field.
3B) After TH-GPS sends GP Response with GPD Commissioning Reply command, Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the next Commissioning GPDF, DUT-GPP does not send any Commissioning Reply GPDF, formatted exactly as specified in pass verdict 3B above. AND/OR transmission by DUT-GPP exceeds *gpTxDuration.*
3C) On reception of Success GPDF, DUT-GPP does not send GP Commissioning Notification in broadcast with GPD Success command, formatted exactly as specified in 5.4.1.2.3/item 3C above. AND/OR DUT-GPP does not have a Proxy Table entry for the TH-GPD GPD ID = N and all relevant parameters as in GP Pairing command.

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1759 ***5.4.1.5.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3	Commissioning GPDF	Direct
GPCF4	Bidirectional commissioning	Direct
GPCF5, GPCF16	In-band bidirectional channel commissioning	Direct
GPCF6	Commissioning Reply GPDF	Direct
GPCF13	Success GPDF	Direct

1760 ### 5.4.1.6 Bidirectional commissioning, ApplicationID = 0b010; shared key;

1761 A number of additional tests is included in sections 5.4.1.10 (additional bidirectional commissioning tests), 5.4.1.12
1762 (commissioning mode tests) and 5.4.1.13 (general additional tests) ; successful completion of those tests is required to
1763 complement the current test.

1764 ***5.4.1.6.1 Initial conditions***

Item	Doc. Ref.	Test Step	Note
1-2		As in 5.4.1.1.1.	
3	[R3] A.1.4	TH-GPD uses *ApplicationID* = 0b010 and GPD IEEE address = Z and Endpoint X.	
4		DUT-GPP (if it supports them) and TH-GPS are configured with the same gpSharedSecurityKeyType and gpSharedSecurityKey.	

1765 ***5.4.1.6.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
		Complete procedure	
0A	[R3] A.3.9, A.3.3.5.3, A.3.3.4.4, A.3.3.5.4, A.3.3.5.2, A.3.4.2.2	TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter, *ExitMode* = On first Pairing success, *Unicast communication* = 0b0). Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), so that TH-GPD sends GPD Channel Request command with: • MAC sequence number = N; • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *Auto-Commissioning*, – 0b0, if the GPD Channel Request transmission is immediately followed by reception window; – 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel. ▪ and *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent; • the *SrcID* field and *Endpoint* field absent, the security not used (*Security frame counter* and *MIC* field absent); • preferably with *Rx channel in the (second) next attempt* indicating channel other than the operation channel of the DUT-GPP; until DUT-GPP sends GP Commissioning Notification with GPD Channel Request command and TH-GPS1 responds with GP Response with GPD Channel Configuration command and *TransmitChannel* != operational channel; in the GP Response, the *ApplicationID* sub-field is set to 0b000 and the *GPD ID* field carries 0x00000000.	Note: it is absolutely necessary to test that the GPP can deliver the GPD Channel Configuration on a channel other than the operational channel of the network.
0B		Within the 5s *TransmitChannel* timeout, make TH-GPD send Channel Request GPDF on the *TransmitChannel;* with *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b0; and the following fields absent: *Extended NWK Frame Control*, *GPD SrcID*, *Endpoint*, *Security frame counter* and *MIC*.	

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0C		0.5s after TH-GPD Channel Request GPDF transmission on the *TransmitChannel*, make TH-GPD send Commissioning GPDF on the operational channel, with: • MAC source address carrying GPD IEEE address; • sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b1; • sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* = 0b010, *RxAfterTx* = 0b1; • Endpoint = X; • with *GP Security Key request* sub-field of the *Options* field set to 0b1 • with sub-fields of the *Extended Options* field set to: *GPD Key present* = 0b1 and *GPD Key encryption* = 0b1, • the fields *GPD Key* and *GPD Key MIC* present.	
0D		Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until TH-GPS provides success feedback, resulting in Commissioning GPDF as in step 3A. TH-GPS sends GP Response command with GPD Commissioning Reply command on receipt of each GP Commissioning Notification with GPD Commissioning command, carrying the shared key.	
0E		On receipt of GPD Commissioning Reply, TH-GPD sends correctly protected GPD Success command.	
0F		On receipt of GP Commissioning Notification with GPD Success command, TH-GPS provides user success feedback and sends GP Pairing. Read out Proxy Table entry of the DUT-GPP.	

1766 ***5.4.1.6.3 Expected Outcome***

Pass verdict:
0A) After TH-GPS sends GP Proxy Commissioning Mode command with *Action=Enter, Unicast communication* = 0b0 and *Channel present* sub-field set to 0b0, on reception of (each) GPD Channel Request command on the operational channel, the DUT-GPP sends GP Commissioning Notification in broadcast with: • NWK header fields: ▪ Destination Address – 0xfffd (broadcast); ▪ Source Address – alias if DUT-GPP is a Basic Proxy; ▪ Sequence Number - alias (derived from the MAC sequence number of the GPDF by subtracting 12) if DUT-GPP is a Basic Proxy • APS header fields: ▪ source endpoint: GPEP (242); ▪ ProfileID: 0xA1E0; ▪ ClusterID: 0x0021; ▪ destination endpoint: GPEP (242); ▪ APS Counter: alias if DUT-GPP is a Basic Proxy; • ZCL header fields: ▪ *Command Identifier*: 0x04 ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b0 (client to server), *Disable default response* 0b1; • ZCL payload fields: ▪ *Options* sub-fields set to: – *ApplicationID* = 0b000, *RxAfterTx* = 0b1; *SecurityLevel* – 0b00; *SecurityKeyType* = 0b000, *Security processing failed* = 0b0; *ProxyInfoPresent* = 0b1; – *BidirectionalCommunicationCapability* set according to DUT-GPP's capabilities (i.e. to 0b0 for Basic Proxy); ▪ GPD ID field of 4B length carrying 0x00000000; ▪ *Endpoint* field absent; ▪ *GPD CommandID* = 0xE3;

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- GPD Command payload copied from the triggering GPDF;
- *GPPShortAddress* present and set to the short address of DUT-GPP,
- *GPP-GPD link* field present;
- *MIC* field absent.

0B) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Channel Request GPDF with *Auto-Commissioning* = 0b0 on the *TransmitChannel*, DUT-GPP does send at least one copy of the queued Channel Configuration GPDF on receipt of; the GPD Channel Configuration command with *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field, *GPD ID* field, *Security frame counter* and *MIC* field absent. The transmission SHALL NOT exceed *gpTxDuration*.
DUT-GPP does NOT send GP Commissioning Notification for this GPDF, not on the *TransmitChannel*, not on the operational channel.

0C) At least *gppTunnelingDelay* (corresponding to the *GPP-GPD link* value as indicated in the GP Commissioning Notification payload) after reception of the triggering GPD Commissioning command on the operational channel, the DUT-GPP sends in broadcast GP Commissioning Notification on the operational channel with:

- NWK header fields:
  - Destination Address – 0xfffd (broadcast);
  - Source Address – alias if DUT-GPP is a Basic Proxy;
  - Sequence Number - alias (derived from the MAC sequence number of the GPDF by subtracting 12) if DUT-GPP is a Basic Proxy
- APS header fields:
  - source endpoint: GPEP (242);
  - ProfileID: 0xA1E0;
  - ClusterID: 0x0021;
  - destination endpoint: GPEP (242);
  - APS Counter: alias if DUT-GPP is a Basic Proxy;
- ZCL payload
  - *Options* sub-fields set to:
    - *ApplicationID* = 0b010, *RxAfterTx* = 0b1; *SecurityLevel* – 0b00; *SecurityKeyType* = 0b000, *Security processing failed* = 0b0; *ProxyInfoPresent* = 0b1;
    - *BidirectionalCommunicationCapability* set according to the capabilities of DUT-GPP (i.e. to 0b0 for Basic Proxy);
  - GPD ID field of 8B length carrying IEEE address of TH-GPD (Z);
  - *Endpoint* =X;
  - *GPD CommandID* = 0xE0;
  - GPD Command payload copied from the triggering GPDF;
  - *GPPShortAddress* present and set to NWK address of DUT-GPP,
  - *GPP-GPD link* field present;
  - *MIC* field absent.

0D) After TH-GPS sends GP Response with GPD Commissioning Reply command, between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the next Commissioning GPDF, DUT-GPP sends on the operational channel at least one copy of the Commissioning Reply GPDF, with:

- MAC destination address set to GPD IEEE address (Z);
- The sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00, *ZigBeeProtocolVersion* = 0x3, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b1;
- sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* = 0b010, *RxAfterTx* = 0b0, *Direction* = 0b1;
- SrcID field absent
- Endpoint =X;
- CommandID = 0xF0;
- Command payload: copied from the triggering GP Response.

The transmission SHALL NOT exceed *gpTxDuration*.

Then, DUT-GPP sends correctly formatted GP Commissioning Notification, carrying the GPD Commissioning command.

On the commissioning action following reception of GPD Commissioning Reply, the TH-GPD sends Success GPDF.

0E) On reception of Success GPDF, DUT-GPP sends GP Commissioning Notification with GPD Success command; with GPD ID field carrying the GPD ID of the TH-GPD (Z) and Endpoint X.

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In case of Basic Proxy, the GP Commissioning Notification carrying the GPD Success command can have the *Security Processing Failed* sub-field of the *Options* field set to 0b1; then: • the *SecurityLevel* sub-field of the *Options* field is set to the value from the triggering Success GPDF; • *SecurityKeyType* sub-fields of the *Options* field is set to: ▪ 0b000 if the *SecurityKey* sub-field of the *Extended NWK Frame Control* field of the triggering Success GPDF was set to 0b0 (as it should); ▪ 0b100 if the *SecurityKey* sub-field of the *Extended NWK Frame Control* field of the triggering Success GPDF was set to 0b1; • the GPD CommandID is copied from the triggering GPDF (encrypted) • the *MIC* field is present and carries the MIC value copied from the triggering Success GPDF, • the *GPD security frame counter* field is present and carries the frame counter value copied from the triggering Success GPDF. If *Security Processing Failed* sub-field of the *Options* field is set to 0b0, then: • the *SecurityKey* sub-field of the *Extended NWK Frame Control* field carries the actual shared key type as in gpSharedSecurityKeyType (0b010); • the GPD CommandID is in the clear (0xE2). • the *MIC* field is absent. Since the *RxAfterTx* sub-field of the Success GPDF was set to 0b0, then the NWK source address field for the GP Commissioning Notification is set to the alias derived from the GPDID (Z), and the NWK sequence number field and APS Counter field of the GP Commissioning Notification are set to the alias sequence number derived from the MAC sequence number of the Success GPDF (by subtracting 12); the GP Commissioning Notification is sent in broadcast at least Dmin_u after reception of the triggering Success GPDF.
0F) DUT-GPP has a Proxy Table entry for the TH-GPD GPD ID = Z and all relevant parameters as in GP Pairing command.
Fail verdict:
0A) After TH-GPS sends GP Proxy Commissioning Mode command with *Action=Enter, Unicast communication* = 0b0 and *Channel present* sub-field set to 0b0, on reception of (each) GPD Channel Request command on the operational channel, the DUT-GPP does NOT sends GP Commissioning Notification with GPD Channel Request command in broadcast, formatted as in pass verdict 0A above.
0B) On receipt of Channel Request GPDF on the *TransmitChannel,* DUT-GPP does not send at least one Channel Configuration GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms, formatted exactly as in pass verdict 0B above AND/OR The transmission by DUT-GPP exceeds *gpTxDuration*. AND/OR DUT-GPP sends Channel Configuration GPDF on the operational channel. AND/OR DUT-GPP send GP Commissioning Notification for this GPDF, on the *TransmitChannel*, and/or on the operational channel.
0C) After reception of the triggering GPD Commissioning command on the operational channel, the DUT-GPP does NOT send GP Commissioning Notification, formatted exactly as in pass verdict 0C above AND/OR minimal *gppTunnelingDelay* is not maintained AND/OR *gppTunnelingDelay* does not correspond to the *GPP-GPD link* as indicated in the GP Commissioning Notification payload.
0D) After TH-GPS sends GP Response with GPD Commissioning Reply command, the DUT-GPP does NOT respond to the next Commissioning GPDF by sending between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms at least one Commissioning Reply GPDF, formatted as in pass verdict 0D above AND/OR The transmission by DUT-GPP exceeds *gpTxDuration*.
0E) On reception of Success GPDF, DUT-GPP does NOT send GP Commissioning Notification with GPD Success command; formatted as in pass verdict 0E above.
0F) DUT-GPP does NOT have a Proxy Table entry for the TH-GPD GPD ID = Z and all relevant parameters as in GP Pairing command.

1767 ***5.4.1.6.4 PICS Covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3	Commissioning GPDF	Direct
GPCF4	Bidirectional commissioning	Direct
GPCF5, GPCF16	In-band bidirectional channel commissioning	Direct
GPCF6	Commissioning Reply GPDF	Direct
GPCF13	Success GPDF	Direct

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5.4.1.7 Bidirectional commissioning, ApplicationID = 0b010; OOB key;

A number of additional tests is included in sections 5.4.1.10 (additional bidirectional commissioning tests), 5.4.1.12 (commissioning mode tests) and 5.4.1.13 (general additional tests) ; successful completion of those tests is required to complement the current test.

5.4.1.7.1 Initial conditions

Item	Doc. Ref.	Test Step	Note
1-2		As in 5.4.1.1.1.	
3	[R3] A.1.4	TH-GPD uses ApplicationID = 0b010 and GPD IEEE address = Z and Endpoint X.	
4		DUT-GPP and TH-GPS are configured with the same gpSharedSecurityKeyType = 0b000 (no key).	

5.4.1.7.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.9, A.3.3.5.3, A.3.3.4.4, A.3.3.5.4, A.3.3.5.2, A.3.4.2.2	TH-GPS sends GP Proxy Commissioning Mode (*Action* = Enter, *Unicast communication* = 0b0). Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), so that TH-GPD sends GPD Channel Request command with: • the sub-fields of the *NWK Frame Control* field set to: ▪ *Frame Type* = 0b01, ▪ *Auto-Commissioning* = 0b0, – 0b0, if the GPD Channel Request transmission is immediately followed by reception window; – 0b1, if the GPD Channel Request transmission is immediately followed by another GPD Channel Request transmission, on the same or another channel. ▪ and *NWK Frame Control Extension* = 0b0, and the *Extended NWK Frame Control* field absent; ▪ the *GPD ID* field and *Endpoint* field absent, the security not used (*Security frame counter* and *MIC* fields absent), until DUT-GPP sends GP Commissioning Notification with GPD Channel Request command and TH-GPS1 responds with GP Response with GPD Channel Configuration command and *TransmitChannel* != operational channel; in the GP Response, the *ApplicationID* sub-field is set to 0b000 and the *GPD ID* field carries 0x00000000.	Note: it is absolutely necessary to test that the GPP can deliver the GPD Channel Configuration on a channel other than the operational channel of the network.
2		Within the 5s *TransmitChannel* timeout, make TH-GPD send Channel Request GPDF on the *TransmitChannel;* with *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b0; and the following fields absent: *Extended NWK Frame Control*, *GPD SrcID*, *Endpoint*, *Security frame counter* and *MIC*.	Monitoring on both operational and TransmitChannel required
3A		0.5s after TH-GPD Channel Request GPDF transmission on the *TransmitChannel*, make TH-GPD send Commissioning GPDF on the operational channel, with: • MAC source address carrying GPD IEEE address = Z; • sub-fields of the *NWK Frame Control* field set to: *Frame Type* = b00, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b1; • sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* = 0b010, *RxAfterTx* = 0b1; • *Endpoint* = X; • Command payload with *GP Security Key request* sub-field of the *Options* field set to 0b0; • sub-fields of the *Extended Options* field set to: *GPD Key present* = 0b1; *GPD Key encryption* = 0b1, • *GPD Key* and *GPD Key MIC* fields present.	

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3B		Commissioning action is (repeatedly, if required) performed on TH-GPD (if manually: not more often than once per second), until TH-GPS1 provides success feedback, resulting in Commissioning GPDF as in step 3A. TH-GPS1 sends GP Response command with GPD Commissioning Reply command on receipt of GP Commissioning Notification with GPD Commissioning command with: • indicating the OOB key will be used (*KeyType* sub-field of the *Options* field set to 0b100), • Other sub-fields of the *Options* field set to: *GPD security key present* = 0b0, *GPD key encryption* = 0b0; • The fields *GPD Security Key* and *GPD Key MIC* NOT present.	
3C		On receipt of GPD Commissioning Reply, TH-GPD sends correctly protected GPD Success command. On receipt of GP Commissioning Notification with GPD Success command, TH-GPS1 provides user success feedback and sends GP Pairing; it ***may*** (if *Exit mode* has value different than the default "*On first Pairing success*": ***shall***) also send GP Proxy Commissioning Mode (*Action*=Exit). Read out Proxy Table entry of the DUT-GPP.	

5.4.1.7.3 Expected Outcome

Pass verdict:
1) After TH-GPS sends GP Proxy Commissioning Mode command with *Action=Enter, Unicast communication* = 0b0 and *Channel present* sub-field set to 0b0. On reception of (each) GPD Channel Request command on the operational channel, the DUT-GPP sends in broadcast GP Commissioning Notification with GPD Channel Request command, with *ApplicationID* sub-field set to 0b000 and *GPD ID* field carrying 0x00000000, with *RxAfterTx* sub-field set to 0b1, listing the DUT-GPP in the *GPPShortAddress* field; if the DUT-GPP is a Basic Proxy, the NWK header source address field, NWK Sequence number field and APS Counter field carry the alias values. DUT-GPP sets its *BidirectionalCommunicationCapability* sub-field of the *Options* field according to its capabilities (i.e. to 0b0 for Basic Proxy).
2) DUT-GPP does send at least one copy of the Channel Configuration GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Channel Request GPDF on the TransmitChannel; the GPD Channel Configuration command with *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field, *GPD ID* field, *Security frame counter* and *MIC* field absent. The transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP does NOT send GP Commissioning Notification for this GPDF, not on the *TransmitChannel*, not on the operational channel.
3A) At least *gppTunnelingDelay* (corresponding to the *GPP-GPD link* value as indicated in the GP Commissioning Notification payload) after reception of the triggering GPD Commissioning command on the operational channel, the DUT-GPP sends GP Commissioning Notification in broadcast on the operational channel with GPD Commissioning command with: • NWK header fields: ▪ Destination Address – 0xfffd (broadcast); ▪ Source Address – alias if DUT-GPP is a Basic Proxy; ▪ Sequence Number - alias (derived from the MAC sequence number of the GPDF by subtracting 12) if DUT-GPP is a Basic Proxy • ZCL payload ▪ *Options* sub-fields set to: – *ApplicationID* = 0b010, *RxAfterTx* = 0b1; *SecurityLevel* – 0b00; *SecurityKeyType* = 0b000, *Security processing failed* = 0b0; *ProxyInfoPresent* = 0b1; – *BidirectionalCommunicationCapability* set according to the capabilities of DUT-GPP (i.e. to 0b0 for Basic Proxy); ▪ GPD ID field of 8B length carrying IEEE address of TH-GPD (Z); ▪ *Endpoint* = X;

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▪ *GPD CommandID* = 0xE0; ▪ GPD Command payload copied from the triggering GPDF; ▪ *GPPShortAddress* present and set to NWK address of DUT-GPP, ▪ *GPP-GPD link* field present; ▪ *MIC* field absent.
3B) After TH-GPS sends GP Response with GPD Commissioning Reply command, between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the next Commissioning GPDF DUT-GPP send at least one copy of the buffered Commissioning Reply GPDF, with: • MAC destination address set to the GPD IEEE address of TH-GPD (Z); • The sub-fields of the *NWK Frame Control* field set to: *Frame Type* = 0b00, *ZigBeeProtocolVersion* = 0x3, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b1; • sub-fields of the *Extended NWK Frame Control* field set to: *ApplicationID* = 0b010, *RxAfterTx* = 0b0, *Direction* = 0b1; • GPD SrcID field absent; • Endpoint = X; • CommandID = 0xF0; • Command payload: copied from the triggering GP Response The transmission SHALL NOT exceed *gpTxDuration*. Then, DUT-GPP sends correctly formatted GP Commissioning Notification, carrying the GPD Commissioning command. On the commissioning action following reception of GPD Commissioning Reply, the TH-GPD sends Success GPDF.
3C) On reception of Success GPDF, DUT-GPP sends GP Commissioning Notification in broadcast with GPD Success command; with GPD ID field carrying the GPD ID of the TH-GPD (N). Since OOB key (*gpdSecurityKeyType* = 0b100) is used, the GP Commissioning Notification carrying the GPD Success command has: • the *Security Processing Failed* of the *Options* field set to 0b1; • the *SecurityLevel* sub-field of the *Options* field is set to the value from the triggering Success GPDF; • *SecurityKeyType* sub-fields of the *Options* field is set to: ▪ 0b000 if the *SecurityKey* sub-field of the *Extended NWK Frame Control* field of the triggering Success GPDF was set to 0b0, ▪ 0b100 if the *SecurityKey* sub-field of the *Extended NWK Frame Control* field of the triggering Success GPDF was set to 0b1 (as it should); • *GPD CommandID* is encrypted; • the *MIC* field is present and carries the MIC value copied from the triggering Success GPDF, • the *GPD security frame counter* field is present and carries the frame counter value copied from the triggering Success GPDF. Since the *RxAfterTx* sub-field of the Success GPDF was set to 0b0, then the NWK source address field for the GP Commissioning Notification is set to the alias derived from the GPDID (N), and the NWK sequence number field and APS Counter field of the GP Commissioning Notification are set to the alias sequence number derived from the MAC sequence number of the Success GPDF (by subtracting 12). DUT-GPP has a Proxy Table entry for the TH-GPD GPD ID = N and all relevant parameters as in GP Pairing command.
Fail verdict:
1) On reception of (each) GPD Channel Request command on the operational channel, the DUT-GPP does not send GP Commissioning Notification in broadcast with GPD Channel Request command, *RxAfterTx* sub-field set to 0b1, and listing the DUT-GPP in the *GPPShortAddress* field AND/OR the *ApplicationID* sub-field is not 0b000 AND/OR the *GPD ID* field is not 0x00000000 AND/OR DUT-GPP being a Basic Proxy does NOT includes alias in the NWK header fields AND/OR APS Counter field.
2) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Channel Request GPDF on the TransmitChannel, DUT-GPP does NOT transmit any Channel Configuration GPDF formatted exactly as specified in pass verdict 2 above. AND/OR transmission by DUT-GPP exceeds *gpTxDuration.*
3A) On reception of GPD Commissioning command on the operational channel, the DUT-GPP does NOT send GP Commissioning Notification in broadcast on the operational channel with GPD Commissioning command and listing the DUT-GPP in the *GPPShortAddress* field AND/OR DUT-GPP being a Basic Proxy does NOT include the alias in the NWK header fields AND/OR APS Counter field.
3B) After TH-GPS sends GP Response with GPD Commissioning Reply command, Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the next Commissioning GPDF, DUT-GPP does not send

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any Commissioning Reply GPDF, formatted exactly as specified in pass verdict 3B above. AND/OR transmission by DUT-GPP exceeds *gpTxDuration*.
3C) On reception of Success GPDF, DUT-GPP does not send GP Commissioning Notification in broadcast with GPD Success command, formatted exactly as specified in 5.4.1.2.3/item 3 above. AND/OR DUT-GPP does not have a Proxy Table entry for the TH-GPD GPD ID = N and all relevant parameters as in GP Pairing command.

5.4.1.7.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3	Commissioning GPDF	Direct
GPCF4	Bidirectional commissioning	Direct
GPCF5, GPCF16	In-band bidirectional channel commissioning	Direct
GPCF6	Commissioning Reply GPDF	Direct
GPCF13	Success GPDF	Direct

5.4.1.8 Unidirectional commissioning, *ApplicationID* = 0b000

5.4.1.8.1 Initial Conditions

As in 5.4.1.1.1.

5.4.1.8.2 Test Set-Up

The TH-GPS and TH-GPD shall be in wireless communication proximity of DUT-GPP. TH-GPS, if capable of direct communication with the GPD, shall be out of range of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

5.4.1.8.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.9, A.3.3.5.3, A.3.3.4.4, A.3.3.5.4, A.3.3.5.2, A.3.4.2.2	TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter, *Unicast communication* = 0b0). (E.g. as a result of commissioning action; if performed manually: not more often than once per second), TH-GPD sends GPD Commissioning command (GPD CommandID = 0xE0), at least on one channel being the operational channel of the network, with: • MAC sequence number A; • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0; • *RxAfterTx* sub-field of the *Extended NWK Frame Control* field set to 0b0 (or absent); • GPD command payload: ▪ sub-fields of the *Options* field set to: *GP Security Key request* = 0b0, *Extended Options field* = 0b1 ▪ sub-fields of the *Extended Options* field set to: *SecurityLevel capabilities* >= 0b10, *KeyType* = 0b100, *GPD Key present* = 0b1, *GPD outgoing counter present* = 0b1. ▪ *GPD Key* field present and carrying OOB key of DUT-GPD. ▪ *GPD Key MIC* field present, if *GPD Key encryption* sub-field of the *Extended Options* field was set to 0b1; ▪ *GPD outgoing counter* field present and carrying the value N.	
1B		TH-GPS provides user success feedback and sends GP Pairing. Read out Proxy Table entry of the DUT-GPP.	

5.4.1.8.4 Expected Outcome

Pass verdict:
1A) At least Dmin_u after reception of (each) GPD Commissioning command with *RxAfterTx* = 0b0 on the operational channel, the DUT-GPP sends GP Commissioning Notification with: • NWK header fields: ▪ Destination Address – 0xfffd; ▪ Source Address – derived from GPD SrcID Z (e.g. 0x5678 for SrcID = 0x12345678);

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▪ Sequence Number (A – 12 mod 256); • APS header fields: ▪ source endpoint: GPEP (242); ▪ ProfileID: 0xA1E0; ▪ ClusterID: 0x0021; ▪ destination endpoint: GPEP (242); ▪ APS Counter: (A – 12 mod 256); • ZCL header fields: ▪ *Command Identifier*: 0x04 ▪ The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b0 (client to server), *Disable default response* 0b1; • ZCL payload fields: ▪ *Options* sub-fields set to: – *ApplicationID* = 0b000, *RxAfterTx* = 0b0; *SecurityLevel* – 0b00; *SecurityKeyType* = 0b000, *Security processing failed* = 0b0; *ProxyInfoPresent* = 0b1; – *BidirectionalCommunicationCapability* set according to the capabilities of DUT-GPP (i.e. to 0b0 for Basic Proxy); ▪ GPD ID field of 4B length carrying Z; ▪ *Endpoint* field absent; ▪ *GPD CommandID* = 0xE0; ▪ GPD Command payload copied from the triggering GPDF; ▪ *GPP short address* field present and carrying short address of the DUT-GPP; ▪ *GPP-GPD link* field present; ▪ *MIC* field absent.
1B) DUT-GPP has a Proxy Table entry for the TH-GPD GPD ID = N and all relevant parameters as in GP Pairing command.
Fail verdict:
1A) On reception of (each) GPD Commissioning command with *RxAfterTx* = 0b0 on the operational channel, the DUT-GPP does NOT sends GP Commissioning Notification formatted exactly as defined in pass verdict 1A) of 5.4.1.8.4.
1B) DUT-GPP does NOT have a Proxy Table entry for the TH-GPD (ApplicationID = 0b000, GPD SrcID = N) AND/OR the Proxy Table entry does not include all relevant parameters as in GP Pairing command.

5.4.1.8.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3	Commissioning GPDF	Direct
GPCF5, GPCF16	In-band bidirectional channel commissioning	Direct

5.4.1.9 Unidirectional commissioning, ApplicationID = 0b010

5.4.1.9.1 Initial Conditions

As in 5.4.1.1.1.

5.4.1.9.2 Test Set-Up

The TH-GPS and TH-GPD shall be in wireless communication proximity of DUT-GPP. TH-GPS, if capable of direct communication with the GPD, shall be out of range of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

5.4.1.9.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.3.9, A.3.3.5.3, A.3.3.4.4, A.3.3.5.4, A.3.3.5.2, A.3.4.2.2	TH-GPS sends GP Proxy Commissioning Mode (*Action* = Enter, *Unicast communication* = 0b0). (E.g. as a result of commissioning action; if performed manually: not more often than once per second), TH-GPD sends GPD Commissioning command (GPD CommandID = 0xE0), at least on one channel being the operational channel of the network, with: • MAC sequence number A;	

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		• MAC source address field set to GPD IEEE address N; • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0; • sub-fields of the *Extended NWK Frame Control* field set to: ▪ *ApplicationID* set to 0b010; ▪ *SecurityLevel* = 0b00, *KeyType* = 0b0; ▪ *RxAfterTx* sub-field of the *Extended NWK Frame Control* field set to 0b0; • *Endpoint* = Z; • *Security Frame Counter, SrcID* and *MIC* fields absent; • GPD command payload: ▪sub-fields of the *Options* field set to: *GP Security Key request* = 0b0, *Extended Options field* = 0b1; ▪sub-fields of the *Extended Options* field set to: *SecurityLevel capabilities* >= 0b10, *KeyType* = 0b100, *GPD Key present* = 0b1, *GPD outgoing counter present* = 0b1; ▪*GPD Key* field present and carrying OOB key of DUT-GPD: – in the clear, if *GPD Key encryption* sub-field of the *Extended Options* field was set to 0b0; – encrypted, *GPD Key encryption* sub-field of the *Extended Options* field was set to 0b1; ▪*GPD Key MIC* field present, if *GPD Key encryption* sub-field of the *Extended Options* field was set to 0b1; ▪*GPD outgoing counter* field present and carrying the value N.	
1B		TH-GPS provides user success feedback and sends GP Pairing. Read out Proxy Table entry of the DUT-GPP.	

1794 ***5.4.1.9.4 Expected Outcome***

Pass verdict:
1A) At least Dmin_u after reception of (each) GPD Commissioning command with *RxAfterTx* = 0b0 on the operational channel, the DUT-GPP sends GP Commissioning Notification with: • NWK header fields: ▪Destination Address – 0xfffd; ▪Source address – alias (derived from N). ▪Sequence Number (A – 12 mod 256); • APS header fields: ▪source endpoint: GPEP (242); ▪ProfileID: 0xA1E0; ▪ClusterID: 0x0021; ▪destination endpoint: GPEP (242); • ZCL header fields: ▪Command Identifier: 0x04 ▪The sub-fields of the *Frame Control* field set to: *Frame type* = 0b01 (cluster-specific command), *Manufacturer specific* = 0b0. *Direction* 0b0 (client to server), *Disable default response* 0b1; • ZCL payload fields: ▪*Options* sub-fields set to: – *ApplicationID* = 0b010, *RxAfterTx* = 0b0; *SecurityLevel* – 0b00; *SecurityKeyType* = 0b000, *Security processing failed* = 0b0; *ProxyInfoPresent* = 0b1; – *BidirectionalCommunicationCapability* set according to the capabilities of DUT-GPP: 0b0 for Basic Proxy, 0b1 for Advanced Proxy; ▪GPD ID field of 8B length carrying GPD IEEE address N of TH-GPD; ▪GPD Endpoint field of 1B length carrying Z; ▪GPD CommandID = 0xE0; ▪GPD Command payload copied from the triggering GPDF; ▪*GPP short address* field present and carrying short address of the DUT-GPP; ▪*GPP-GPD link* field present; ▪*MIC* field absent.

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1B) DUT-GPP has a Proxy Table entry for the TH-GPD (ApplicationID = 0b010, GPD IEEE address = N, Endpoint = Z) and all relevant parameters as in GP Pairing command.
Fail verdict:
1A) On reception of (each) GPD Commissioning command with *RxAfterTx* = 0b0 on the operational channel, the DUT-GPP does NOT sends GP Commissioning Notification formatted exactly as defined in 5.4.1.9.4/pass verdict 1A) above.
1B) DUT-GPP does NOT have a Proxy Table entry for the TH-GPD (ApplicationID = 0b010, GPD IEEE address = N, Endpoint = Z) AND/OR the Proxy Table entry does not include all relevant parameters as in GP Pairing command.

5.4.1.9.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3	Commissioning GPDF	Direct
GPCF5, GPCF16	In-band bidirectional channel commissioning	Direct

5.4.1.10 Bidirectional commissioning: additional tests

5.4.1.10.1 Initial Conditions

Item	Doc. Ref.	Test Step	Note
1-2		As in 5.4.1.1.1.	
3		DUT-GPP (if it supports them) and TH-GPS are configured with the same gpSharedSecurityKeyType and gpSharedSecurityKey.	

5.4.1.10.2 Test Set-Up

As in 5.4.1.8.2.

5.4.1.10.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
		Negative tests	
1A	[R3] A.3.9, A.3.3.5.3, A.3.3.4.4, A.3.3.5.4, A.3.3.5.2, A.3.4.2.2	Clean Proxy Table of DUT-GPP. TH-GPS sends GP Proxy Commissioning Mode (*Action* = Enter, *Exit mode* = "*On first Pairing success*", *Channel present* sub-field set to 0b0, *Unicast communication* = 0b0). TH-GPS broadcasts GP Response with: • the *ApplicationID* sub-field is set to 0b000 and the *GPD ID* field carries 0x00000000; • the *TempMaster short address* field carrying the short address of the DUT-GPP; • the TempMaster Tx Channel field carrying a value other than the operational channel; • carrying GPD Channel Configuration command with operational channel; the *Basic* sub-field is set to 0b1. ***Negative test: Channel Request on the operational channel:*** Asap within the 5s *TransmitChannel* timeout after the DUT-GPP receives the GP Response command, make the TH-GPD send Channel Request GPDF on the operational channel, with: • *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, • *Auto-Commissioning* = 0b0, • *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field absent, • *GPD SrcID* field, *Endpoint*, *Security frame counter* and *MIC* field absent.	

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1B		***Negative test: Channel Request on the TxChannel with Auto-Commissioning = 0b1:*** Asap within the 5s *TransmitChannel* timeout after the DUT-GPP receives the GP Response command, make the TH-GPD send Channel Request GPDF with *Auto-Commissioning* = 0b1 on the *TransmitChannel*, with: • *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, • *Auto-Commissioning* = 0b1, • *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field, • *GPD SrcID* field, *Endpoint, Security frame counter* and *MIC* field absent.	
1C		***Positive test:*** Within the 5s *TransmitChannel* timeout after the DUT-GPP receives the GP Response command, make the TH-GPD send Channel Request GPDF on the *TransmitChannel*, with: • *Frame Type* sub-field of the *NWK Frame Control* field set to 0b01, • *Auto-Commissioning* = 0b0, • *Frame Control Extension* = 0b0; and the *Extended NWK Frame Control* field, • *GPD SrcID* field, *Endpoint*, *Security frame counter* and *MIC* field absent.	
1D		***Emptying gpTxQueue and State test:*** Still within the 5s *TransmitChannel* timeout, make TH-GPD send correctly formatted Channel Request GPDF on the operational channel with *Auto-Commissioning* = 0b0. After DUT-GPP sends GP Commissioning Notification with GPD Channel Request, TH-GPS1 sends GP Response with GPD Channel Configuration command and *TransmitChannel* != operational channel. Still within the 5s *TransmitChannel* timeout, make TH-GPD send correctly formatted Channel Request GPDF on the *TransmitChannel* with *Auto-Commissioning* = 0b0.	
2A		TH-GPS1 sends GP Response command with GPD Commissioning Reply command on receipt of each GP Commissioning Notification with GPD Commissioning command, carrying the shared key. Make TH-GPD send on the operational channel a correctly formatted Commissioning GPDF with *Frame Type* sub-field of the *NWK Frame Control* field set to 0b00, *Auto-Commissioning* = 0b0, *Frame Control Extension* = 0b1; *RxAfterTx* sub-field of the *Extended NWK Frame Control* field set to 0b1; with *GP Security Key request* sub-field of the *Options* field set to 0b1 and *GPD Key present* sub-field of the *Extended Options* field set to 0b1, *GPD Key encryption* set to 0b1, and encrypted key and MIC field present.	
2B		***gpTxQueue emptying test:*** On receipt of GPD Commissioning Reply, TH-GPD sends Commissioning GPDF, formatted as in step 2A.	
2C		***State test:*** TH-GPS1 sends GP Response command with GPD Commissioning Reply command on receipt of each GP Commissioning Notification with GPD Commissioning command, carrying the shared key. TH-GPD sends Commissioning GPDF, formatted as in step 2A.	
2D		On receipt of GPD Commissioning Reply, TH-GPD sends correctly protected GPD Success command. On receipt of GP Commissioning Notification with GPD Success command, TH-GPS1 provides user success feedback and sends GP Pairing). Read out Proxy Table entry of the DUT-GPP.	
2E		***Confirm DUT-GPP exited commissioning mode:*** TH-GPD sends correctly formatted and protected Success GPDF.	

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		Additional tests	
3	[R3] A.3.9.1, A.1.4.1	***Negative test: reception of Data GPDF carrying Channel Request:*** Clear Proxy Table of DUT-GPP. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Enter, *Unicast communication* = 0b0). TH-GPS sends GP Response, listing DUT-GPP as a TempMaster and TransmitChannel = operational channel, carrying GPD Channel Configuration for SrcID = 0x00000000. TH-GPD sends on the operational channel: • Channel Request GPDF, using Frame Type = 0b00 (Data frame), with *Extended NWK Frame Control* field absent, SrcID = 0x00000000. • Channel Request GPDF, with Frame Type = 0b01 (Maintenance frame), but using *ZigBeeProtocolVersion* = 0x2; • Channel Request GPDF, with *Frame* Type = 0b01 (Maintenance frame), but using NWK Frame control *Extension* sub-field set to 0b1; and with *Extended NWK Frame Control* field present. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Exit).	
4		***Negative test: reception of GPDF other than Channel Request on TransmitChannel:*** Clear Proxy Table of DUT-GPP. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Enter, *Unicast communication* = 0b0). (TH-GPD sends on the operational channel a Channel Request GPDF, listing channel other than the operational channel in both *Rx channel in the (second) next attempt* sub-fields. On reception of GP Commissioning Notification carrying GPD Channel Request command,) TH-GPS sends a GP Response, listing DUT-GPP as a TempMaster and TransmitChannel != operational channel, carrying GPD Channel Configuration for SrcID = 0x00000000. Within the TransmitChannel 5s timeout, TH-GPD sends on the TransmitChannel: • Channel Configuration GPDF with *Auto-Commissioning* = 0b0; • Commissioning GPDF with *RxAfterTx* = 0b1. • Commissioning GPDF with *RxAfterTx* = 0b0, • Success GPDF. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Exit).	Monitoring on both operational and TransmitChannel required
5		***Negative test: reception of Commissioning GPDF with Auto-Commissioning sub-field 0b1:*** Clear Proxy Table of DUT-GPP. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Enter, *Unicast communication* = 0b0). TH-GPS sends a GP Response, listing DUT-GPP as a TempMaster and TransmitChannel = operational channel, carrying GPD Commissioning Reply for SrcID of TH-GPD. ***TH-GPD sends on the operational channel:*** • and then a Commissioning GPDF, with *Auto-Commissioning* sub-field set to 0b1 and *RxAfterTx* sub-field set to 0b1, • and then a Commissioning GPDF, with *Auto-Commissioning* sub-field set to 0b1 and *RxAfterTx* sub-field set to 0b0, • and then a Success GPDF, with *Auto-Commissioning* sub-field set to 0b1 and *RxAfterTx* sub-field set to 0b0. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Exit).	

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6		***Only for Advanced Proxy:*** ***Negative test: incorrectly protected Success GPDF:*** (*Action*= Enter, *Unicast communication* = 0b0). TH-GPD sends on the operational channel a Commissioning GPDF, with *RxAfterTx* = 0b1. Then, TH-GPD sends on the operational channel: • unprotected GPD Success; • GPD Success protected with frame counter value lower than that of the last GPD Commissioning command; • GPD Success protected with wrong shared key (i.e. wrong MIC); • GPD Success protected with wrong key type (individual vs. shared); • GPD Success protected correctly, but with incorrect GPD ID value. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Exit).	
		TempMaster selection	
7A		Clear Proxy Table of DUT-GPP. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Enter, *Unicast communication* = 0b0). TH-GPS1 broadcasts GP Response with: • *ApplicationID* sub-field of the *Options* field = 0b000; • *TempMasterShortAddress* = network address of DUT-GPP; • *TempMasterTxChannel* = operational channel; • *GPD ID* carries 0x00000000; • *Endpoint* field absent; • Carrying GPD Channel Configuration command with payload. TH-GPS1 broadcasts another GP Response, formatted the same as the first one, but with TempMasterShortAddress NOT equal to the network address of DUT-GPP. Make TH-GPD send correctly formatted GPD Channel Request.	
7B		TH-GPS1 broadcasts GP Response with: • *ApplicationID* sub-field of the *Options* field = 0b000; • *TempMasterShortAddress* = network address of DUT-GPP; • *TempMasterTxChannel* = operational channel; • *GPD ID* carries 0x00000000; • *Endpoint* field absent; • Carrying GPD Channel Configuration command with payload. TH-GPS1 broadcasts another GP Response, formatted the same as the first one, but with *SrcID* != 0x00000000 and TempMasterShortAddress NOT equal to the network address of DUT-GPP. Make TH-GPD send correctly formatted GPD Channel Request.	
7C		TH-GPS1 broadcasts GP Response with: • *ApplicationID* sub-field of the *Options* field = 0b000; • *TempMasterShortAddress* = network address of DUT-GPP; • *TempMasterTxChannel* = operational channel; • *GPD ID* carries SrcID of TH-GPD; • *Endpoint* field absent; • Carrying GPD Commissioning Reply command with payload. TH-GPS1 broadcasts another GP Response, formatted the same as the first one, but with TempMasterShortAddress NOT equal to the network address of DUT-GPP. Make TH-GPD send correctly formatted GPD Commissioning with *RxAfterTx* = 0b1.	

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7D		***Only for Advanced Proxy:*** TH-GPS1 broadcasts GP Response with: • *ApplicationID* sub-field of the *Options* field = 0b000; • *TempMasterShortAddress* = network address of DUT-GPP; • *TempMasterTxChannel* = operational channel; • GPD *ID* carries *SrcID* of TH-GPD; • *Endpoint* field absent; • Carrying GPD Commissioning Reply command with payload. TH-GPS1 broadcasts another GP Response, formatted the same as the first one, but with SrcID = M. Make TH-GPD send correctly formatted GPD Commissioning with SrcID = N and *RxAfterTx* = 0b1. Make TH-GPD send correctly formatted GPD Commissioning with SrcID = M and *RxAfterTx* = 0b1.	
TempMaster behavior			
8A		Clear Proxy Table of DUT-GPP. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Enter, *Unicast communication* = 0b0). TH-GPS1 broadcasts GP Response with: • *ApplicationID* sub-field of the *Options* field = 0b000; • *TempMasterShortAddress* = network address of DUT-GPP; • *TempMasterTxChannel* = X NOT equal to the operational channel; • *GPD ID* = 0x00000000; • *Endpoint* field absent; • carrying GPD Channel Configuration command with payload. At approx. 4.8 seconds after transmission of the GP Response, make TH-GPD send correctly formatted GPD Channel Request on channel X.	
8B		Clear Proxy Table of DUT-GPP. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Enter, *Unicast communication* = 0b0). TH-GPS1 broadcasts GP Response with: • *ApplicationID* sub-field of the *Options* field = 0b000; • *TempMasterShortAddress* = network address of DUT-GPP; • *TempMasterTxChannel* = X NOT equal to the operational channel; • *GPD ID* = 0x00000000; • *Endpoint* field absent; • carrying GPD Channel Configuration command with payload. At approx. 5.1 seconds after transmission of the GP Response, make TH-GPD send correctly formatted GPD Channel Request on channel X.	
8C		Clear Proxy Table of DUT-GPP. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Enter, *Unicast communication* = 0b0). TH-GPS1 broadcasts GP Response with: • *ApplicationID* sub-field of the *Options* field = 0b000; • *TempMasterShortAddress* = network address of DUT-GPP; • *TempMasterTxChannel* = X NOT equal to the operational channel; • *GPD ID* = 0x00000000; • *Endpoint* field absent; • carrying GPD Channel Configuration command with payload. At approx. 5.1 seconds after transmission of the GP Response, make TH-GPD send correctly formatted GPD Channel Request on the operational channel; the MAC sequence number is different than that in the previous Channel Request GPDF.	
Maximum length of a GPDF sent to the GPD			

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9A		Clear Proxy Table of DUT-GPP. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Enter). TH-GPS1 broadcasts GP Response with: • *ApplicationID* sub-field of the *Options* field = 0b000; • *TempMasterShortAddress* = network address of DUT-GPP; • *TempMasterTxChannel* = the operational channel; • *GPD SrcID = Z*; • *Endpoint* field absent; • carrying GPD Commissioning Reply command, with the maximum payload length allowed for GPDF sent to a GPD with *ApplicationID* = 0b000: 64 octets. Within 5 seconds after transmission of the GP Response, make TH-GPD send correctly formatted GPD Commissioning command with *ApplicationID* = 0b000 and SrcID = Z on the operational channel of DUT-GPP with *RxAfterTx* = 0b1.	
9B		Clear Proxy Table of DUT-GPP. TH-GPS sends GP Proxy Commissioning Mode (*Action*= Enter). TH-GPS1 broadcasts GP Response with: • *ApplicationID* sub-field of the *Options* field = 0b010; • *TempMasterShortAddress* = network address of DUT-GPP; • *TempMasterTxChannel* = the operational channel; • *GPD IEEE address= Z*; • *Endpoint* = X; • carrying GPD Commissioning Reply command, with the maximum payload length allowed for GPDF sent to a GPD with ApplicationID = 0b010: 59 octets. Within 5 seconds after transmission of the GP Response, make TH-GPD send correctly formatted GPD Commissioning command with *ApplicationID* = 0b010 and MAC source address carrying GPD IEEE address = Z, on the operational channel of DUT-GPP with *RxAfterTx* = 0b1 and Endpoint = X.	

5.4.1.10.4 Expected Outcome

Pass verdict:
1A) On reception of (each) GPD Channel Request command on the operational channel, the DUT-GPP does NOT send Channel Configuration GPDF nor does forward GP Commissioning Notification on the operational channel.
1B) After reception of the Channel Request GPDF with *Auto-Commissioning* = 0b1 on the *TransmitChannel*, DUT-GPP does NOT send Channel Configuration GPDF. DUT-GPP does NOT forward GP Commissioning Notification on the *TransmitChannel* nor on the operational channel.
1C) On receipt of Channel Request GPDF with *Auto-Commissioning* = 0b0 on the *TransmitChannel*; DUT-GPP sends Channel Configuration GPDF, formatted exactly as in pass verdict 0B above. DUT-GPP does NOT forward the GP Commissioning Notification on the *TransmitChannel* nor on the operational channel.
1D) On receipt of Channel Request GPDF with *Auto-Commissioning* = 0b0 on the operational channel DUT-GPP: • does NOT send Channel Configuration GPDF. • sends GP Commissioning Notification for this GPDF. On receipt of Channel Request GPDF with *Auto-Commissioning* = 0b0 on the *TransmitChannel*; DUT-GPP: • sends Channel Configuration GPDF the GPD Channel Configuration command formatted exactly as in pass verdict 0B above; • does NOT send GP Commissioning Notification for this GPDF, not on the *TransmitChannel*, not on the operational channel.
2A) After TH-GPS sends GP Response with GPD Commissioning Reply command, the DUT-GPP responds to the next Commissioning GPDF by sending Commissioning Reply GPDF, formatted exactly as in pass verdict 0D above.
2B) Since there is no entry for TH-GPD in DUT-GPP's gpTxQueue, it does not send any GPDF to TH-GPD.

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2C) After TH-GPS sends GP Response with GPD Commissioning Reply command, the DUT-GPP responds to the next Commissioning GPDF by sending Commissioning Reply GPDF, formatted exactly as in pass verdict 0D above. On the commissioning action following reception of GPD Commissioning Reply, the TH-GPD sends Success GPDF.
2D) On reception of Success GPDF, DUT-GPP sends GP Commissioning Notification with GPD Success command; formatted exactly as in pass verdict 0E above. DUT-GPP has a Proxy Table entry for the TH-GPD GPD ID = N and all relevant parameters as in GP Pairing command.
2E) Since DUT-GPP exited commissioning mode in step 3D, it does NOT forward GP Commissioning Notification for GPD Success of TH-GPD NOT GP Notification for GPD Success.
3) DUT-GPP does NOT send GP Commissioning Notification NOR Channel Configuration GPDF for any of the received GPD Channel Request.
4) For NONE of the commands received on the TransmitChannel, DUT-GPP does transmit GP Commissioning Notification, not on the TransmitChannel, not on the operational channel.
5) DUT-GPP does NOT send GP Commissioning Notification for neither Commissioning GPDF nor Success GPDF.
6) For each of the incorrectly protected Success GPDF, DUT-GPP sends a GP Commissioning Notification, with *Security processing failed* sub-field of the *Options* field set to 0b1, containing all relevant information.
7A) DUT-GPP does NOT send Channel Configuration GPDF. It sends GP Commissioning Notification carrying the GPD Channel Request.
7B) DUT-GPP sends Channel Configuration GPDF. It sends GP Commissioning Notification carrying the GPD Channel Request.
7C) DUT-GPP does NOT send Commissioning Reply GPDF to TH-GPD. It sends GP Commissioning Notification.
7D) On receipt of Commissioning GPDF with *SrcID* = N, DUT-GPP: • sends Commissioning Reply GPDF; • sends GP Commissioning Notification for this GPDF. On receipt of Commissioning GPDF with *SrcID* = M, DUT-GPP: • does NOT send Commissioning Reply GPDF. • sends GP Commissioning Notification for this GPDF.
8A) On reception of the GPD Channel Request command on channel X, the DUT-GPP sends the GPD Channel Configuration command on channel X. DUT-GPP does NOT send GP Commissioning Notification, NOT on channel X, NOT on the operational channel.
8B) On reception of the GPD Channel Request command on channel X, the DUT-GPP does NOT send the GPD Channel Configuration command on channel X. DUT-GPP does NOT send GP Commissioning Notification, NOT on channel X, NOT on the operational channel.
8C) On reception of the GPD Channel Request command on the operational channel, the DUT-GPP does NOT send the GPD Channel Configuration command on the operational channel. DUT-GPP sends GP Commissioning Notification on the operational channel.
9A) On receipt of Commissioning GPDF with *SrcID* = N, DUT-GPP: • sends Commissioning Reply GPDF, correctly formatted and carrying the entire payload of 64 octets; • sends a correctly formatted GP Commissioning Notification for the Commissioning GPDF.
9A) On receipt of Commissioning GPDF with *GPD IEEE* = N, DUT-GPP: • sends Commissioning Reply GPDF, correctly formatted and carrying the entire payload of 59 octets; • sends a correctly formatted GP Commissioning Notification for the Commissioning GPDF.
Fail verdict:
1A) - 1B) After reception of GP Response and of the Channel Request GPDF on the operational channel and/or of the Channel Request GPDF with *Auto-Commissioning* = 0b1 on the *TransmitChannel*, DUT-GPP does forward GP Commissioning Notification AND/OR DUT-GPP sends Channel Configuration GPDF.
1C) On receipt of Channel Request GPDF with *Auto-Commissioning* = 0b0 on the *TransmitChannel*; DUT-GPP does NOT send Channel Configuration GPDF formatted exactly as defined in pass verdict 1C) of 5.4.1.10.4. AND/OR DUT-GPP forwards the GP Commissioning Notification on the *TransmitChannel* and/or on the operational channel.
1D) On receipt of Channel Request GPDF with *Auto-Commissioning* = 0b0 on the operational channel DUT-GPP: • sends Channel Configuration GPDF.

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• AND/OR does not send GP Commissioning Notification for this GPDF, not on the *TransmitChannel*, not on the operational channel. AND/OR On receipt of Channel Request GPDF with *Auto-Commissioning* = 0b0 on the *TransmitChannel*; DUT-GPP: • does NOT send Channel Configuration GPDF the GPD Channel Configuration command formatted exactly as in pass verdict 0B above; • AND/OR sends GP Commissioning Notification for this GPDF, not on the *TransmitChannel*, not on the operational channel.
2A) After TH-GPS sends GP Response with GPD Commissioning Reply command, the DUT-GPP does NOT respond to the next Commissioning GPDF by sending Commissioning Reply GPDF, formatted exactly as in pass verdict 0D above.
2B) DUT-GPP sends any GPDF to TH-GPD, despite no entry for TH-GPD in DUT-GPP's gpTxQueue,.
2C) After TH-GPS sends GP Response with GPD Commissioning Reply command, the DUT-GPP does NOT responds to the next Commissioning GPDF by sending Commissioning Reply GPDF, formatted exactly as in pass verdict 0D above. AND/OR On the commissioning action following reception of GPD Commissioning Reply, the TH-GPD sends Success GPDF.
2D) On reception of Success GPDF, DUT-GPP does NOT send GP Commissioning Notification with GPD Success command; formatted exactly as in pass verdict 0E above. AND/OR DUT-GPP does NOT have a Proxy Table entry for the TH-GPD GPD ID = N and all relevant parameters as in GP Pairing command.
2E) DUT-GPP does forward GP Commissioning Notification for GPD Success of TH-GPD AND/OR GP Notification for GPD Success, despite exiting commissioning mode in step 3D.
3) DUT-GPP sends GP Commissioning Notification and/or Channel Configuration GPDF for any of the received Channel Request GPDF.
4) For any of the commands received on the TransmitChannel, DUT-GPP transmits GP Commissioning Notification, on the TransmitChannel, AND/OR on the operational channel.
5) DUT-GPP sends GP Commissioning Notification for any Commissioning GPDF AND/OR Success GPDF.
6) For any of the incorrectly protected Success GPDF, DUT-GPP sends a GP Commissioning Notification, with *Security processing failed* sub-field of the *Options* field set to 0b0.
7A) DUT-GPP sends Channel Configuration GPDF. AND/OR It does NOT send GP Commissioning Notification carrying the GPD Channel Request.
7B) DUT-GPP does NOT send Channel Configuration GPDF. AND/OR It does NOT send GP Commissioning Notification carrying the GPD Channel Request.
8C) DUT-GPP sends Commissioning Reply GPDF to TH-GPD. AND/OR it does NOT send GP Commissioning Notification.
8D) On receipt of Commissioning GPDF with *SrcID* = N, DUT-GPP: • Does NOT send Commissioning Reply GPDF; • AND/OR does NOT send GP Commissioning Notification for this GPDF. AND/OR On receipt of Commissioning GPDF with *SrcID* = M, DUT-GPP: • sends Commissioning Reply GPDF. AND/OR does NOT send GP Commissioning Notification for this GPDF.
8A) On reception of the GPD Channel Request command on channel X, the DUT-GPP does NOT send the GPD Channel Configuration command on channel X. AND/OR DUT-GPP sends GP Commissioning Notification, on channel X and/or on the operational channel.
8B) On reception of the GPD Channel Request command on channel X, the DUT-GPP sends the GPD Channel Configuration command on channel X. AND/OR DUT-GPP sends GP Commissioning Notification, on channel X and/or on the operational channel.
8C) On reception of the GPD Channel Request command on the operational channel, the DUT-GPP sends the GPD Channel Configuration command on the operational channel. AND/OR DUT-GPP does NOT send GP Commissioning Notification on the operational channel.
9A) On receipt of Commissioning GPDF with *SrcID* = N, DUT-GPP:

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• does NOT send Commissioning Reply GPDF, correctly formatted AND/OR the Commissioning Reply payload is shorter than 64 octets or incorrect; • AND/OR does NOT send a correctly formatted GP Commissioning Notification for the Commissioning GPDF.
9B) On receipt of Commissioning GPDF with *GPD IEEE* = N, DUT-GPP: • does NOT send Commissioning Reply GPDF, correctly formatted AND/OR the Commissioning Reply payload is shorter than 59 octets or incorrect; • AND/OR does NOT send a correctly formatted GP Commissioning Notification for the Commissioning GPDF.

5.4.1.10.5 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPCF2, GPCF3	Commissioning GPDF	Direct
GPCF4	Bidirectional commissioning	Direct
GPCF5, GPCF16	In-band bidirectional channel commissioning	Direct

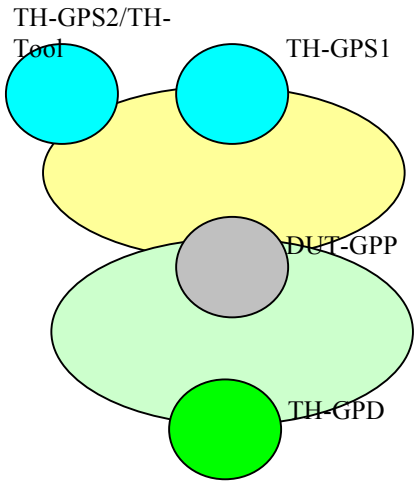
5.4.1.11 NOT TESTED: Advanced GP only: Bidirectional commissioning with mixed sinks (DUT: GP Advanced proxy)

Note: Advanced GP only.

5.4.1.12 Commissioning mode tests

5.4.1.12.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPS1/TH-Tool	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific TH-GPT supports multi-hop commissioning.
TH-GPS2/TH-Tool	PANId= same PANId as TH-GPS1 Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific TH-GPT supports multi-hop commissioning.
DUT-GPP	PAN id=same PANId as TH-GPS1 Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD/TH-Tool	GPD ID = N GPD security usage according to DUT capabilities; if GPS supports security, TH-GPD shall request the shared key. TH-GPD application functionality matches that of the TH-GPT1's GPEP. TH-GPD implements bidirectional commissioning procedure.

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPS1, TH-GPS2 and DUT-GPP operate in a ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.4.2.2, A.3.3.2.2	No pairing exists between TH-GPS1 or TH-GPS2 and TH-GPD; there is not Proxy Table entry for TH-GPD in the DUT-GPP.	

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5.4.1.12.2 Test Set-Up

As in 5.4.1.8.2.

5.4.1.12.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
		Commissioning mode tests	
1	[R3] A.3.5.2.1	***Second TH-GPS attempts to modify DUT-GPP commissioning behavior:*** Clear Proxy Table of DUT-GPP. Turn TH-GPS2 on. TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter, *Unicast communication* = 0b0). TH-GPS2 sends GP Proxy Commissioning Mode (*Action* = Exit, *Unicast communication* = 0b0). Commissioning action is performed on TH-GPD. Turn TH-GPS2 off.	
2A		***Positive test: unicast communication in commissioning mode:*** Clear Proxy Table of DUT-GPP. TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter, *Unicast communication* = 0b1). Commissioning action is performed on TH-GPD.	
2B		***Positive test: unicast communication in commissioning mode: Second TH-GPS attempts to modify DUT-GPP commissioning behavior*** Clear Proxy Table of DUT-GPP. TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter, *Unicast communication* = 0b1). TH-GPS2 sends GP Proxy Commissioning Mode (*Action* = Exit, *Unicast communication* = 0b1). Commissioning action is performed on TH-GPD.	
		Commissioning exit mode tests ***Note: Clear Proxy Table of DUT-GPP. Make sure the proxy is back in operational mode.***	
3A		***Default gppCommissioningWindow:*** TH-GPS1 sends GP Proxy Commissioning Mode with: • Sub-fields of the *Options* field set to: ▪ *Action* = Enter, ▪ *On CommissioningWindow expiration* = 0b0, ▪ *On first Pairing success* = 0b0, ▪ *On GP Proxy Commissioning Mode (exit)* = 0b0, ▪ *Channel present* = 0b0, ▪ *Unicast communication* = 0b0. TH-GPD sends correctly formatted Commissioning GPDF. Wait for 180s. TH-GPD sends correctly formatted Commissioning GPDF.	
3B		***Another CommissioningWindow duration (timeout):*** TH-GPS1 sends GP Proxy Commissioning Mode formatted exactly as in step 3A above, only with: • *On CommissioningWindow expiration* = 0b1, • *CommissioningWindow* field present and set to 10 (sec). TH-GPD sends correctly formatted Commissioning GPDF. Wait for 10s. TH-GPD sends correctly formatted Commissioning GPDF.	
3C		***Another CommissioningWindow duration:*** TH-GPS1 sends GP Proxy Commissioning Mode formatted exactly as in step 3B above.	

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		TH-GPS1 sends correctly formatted GP Pairing command, with AddSink = 0b1, for GPDID other than that of TH-GPD. Wait for 2s. TH-GPD sends correctly formatted Commissioning GPDF.	
3D		***OnFirstPairingSuccess (timeout):*** TH-GPS1 sends GP Proxy Commissioning Mode formatted exactly as in step 3A above, only with: • *On first Pairing success* = 0b1. TH-GPD sends correctly formatted Commissioning GPDF. Wait for 180s. TH-GPD sends correctly formatted Commissioning GPDF.	
3E		***OnFirstPairingSuccess:*** TH-GPS1 sends GP Proxy Commissioning Mode formatted exactly as in step 3D above. TH-GPS1 sends correctly formatted GP Pairing command, with AddSink = 0b0, for GPDID other than that of TH-GPD, as in step 3C. Wait for 2s. TH-GPD sends correctly formatted Commissioning GPDF.	
3F		***On GP Proxy Commissioning Mode (exit) - timeout:*** TH-GPS1 sends GP Proxy Commissioning Mode formatted exactly as in step 3A above, only with: • *On GP Proxy Commissioning Mode (exit)* = 0b1. TH-GPD sends correctly formatted Commissioning GPDF. Wait for 180s. TH-GPD sends correctly formatted Commissioning GPDF.	
3G		***On GP Proxy Commissioning Mode (exit):*** TH-GPS1 sends GP Proxy Commissioning Mode formatted exactly as in step 3F above. TH-GPS1 sends correctly formatted GP Pairing command, with *AddSink* = 0b1, for GPDID other than that of TH-GPD, as in step 3C. Wait for 2s. TH-GPD sends correctly formatted Commissioning GPDF.	
3H		Within the commissioning window opened in step 3G: TH-GPS1 sends GP Proxy Commissioning Mode with *Action* = Exit. Wait for 2s. TH-GPD sends correctly formatted Commissioning GPDF.	
3I		***Another CommissioningWindow duration (timeout) + Pairing success:*** TH-GPS1 sends GP Proxy Commissioning Mode formatted exactly as in step 3A above, only with: • *On CommissioningWindow expiration* = 0b1, • *CommissioningWindow* field present and set to 200 (sec), • *On first Pairing success* = 0b1. TH-GPD sends correctly formatted Commissioning GPDF. Wait for 180s. TH-GPD sends correctly formatted Commissioning GPDF. TH-GPS1 sends correctly formatted GP Pairing command, with AddSink = 0b0, for GPDID other that that of TH-GPD, as in step 3C. TH-GPD sends correctly formatted Commissioning GPDF.	

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3J		***Another CommissioningWindow duration (timeout) On GP Proxy Commissioning Mode (exit):*** TH-GPS1 sends GP Proxy Commissioning Mode formatted exactly as in step 3A above, only with: • *On CommissioningWindow expiration* = 0b1, • *CommissioningWindow* field present and set to 15 (sec), • *On GP Proxy Commissioning Mode (exit)* = 0b1. TH-GPD sends correctly formatted Commissioning GPDF. Wait for 5s. TH-GPS1 sends GP Proxy Commissioning Mode with *Action* = Exit. TH-GPD sends correctly formatted Commissioning GPDF.	
3K		TH-GPS1 sends GP Proxy Commissioning Mode formatted exactly as in step 3A above, only with: • *On CommissioningWindow expiration* = 0b1, • *CommissioningWindow* field present and set to 200 (sec), • *On GP Proxy Commissioning Mode (exit)* = 0b1, • *On first Pairing success* = 0b1. TH-GPS1 sends correctly formatted GP Pairing command, with AddSink = 0b1 for GPDID other than that of TH-GPD, as in step 3C. Wait for 2s. TH-GPD sends correctly formatted Commissioning GPDF.	
3L		TH-GPS1 sends GP Proxy Commissioning Mode formatted exactly as in step 3A above, only with: • *On CommissioningWindow expiration* = 0b1, • *CommissioningWindow* field present and set to 15 (sec), • *On GP Proxy Commissioning Mode (exit)* = 0b1, • *On first Pairing success* = 0b1. TH-GPD sends correctly formatted Commissioning GPDF. Wait for 15s. TH-GPD sends correctly formatted Commissioning GPDF.	

1812 ***5.4.1.12.4 Expected Outcome***

Pass verdict:
1) Upon reception of Commissioning GPDF, DUT-GPP does send GP Commissioning Notification in broadcast.
2A) – 2B) Upon reception of Commissioning GPDF, DUT-GPP sends GP Commissioning Notification in unicast to TH-GPS1, after gppTunnelingDelay, without alias.
3A) – 3B) Upon reception of the first Commissioning GPDF, DUT-GPP sends correctly formatted GP Commissioning Notification. Upon reception of the second Commissioning GPDF, DUT-GPP does not send any GP Commissioning Notification.
3C) Upon reception of the Commissioning GPDF, DUT-GPP sends correctly formatted GP Commissioning Notification.
3D) Upon reception of the first Commissioning GPDF, DUT-GPP sends correctly formatted GP Commissioning Notification. Upon reception of the second Commissioning GPDF, DUT-GPP does not send any GP Commissioning Notification.
3E) Upon reception of the Commissioning GPDF, DUT-GPP does not send any GP Commissioning Notification.
3F) Upon reception of the first Commissioning GPDF, DUT-GPP sends correctly formatted GP Commissioning Notification. Upon reception of the second Commissioning GPDF, DUT-GPP does not send any GP Commissioning Notification.
3G) Upon reception of the Commissioning GPDF, DUT-GPP sends correctly formatted GP Commissioning Notification.
3H) Upon reception of the Commissioning GPDF, DUT-GPP does not send any GP Commissioning Notification.

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3I) Upon reception of the first and second Commissioning GPDF, DUT-GPP sends correctly formatted GP Commissioning Notification. Upon reception of the third Commissioning GPDF, DUT-GPP does not send any GP Commissioning Notification.
3J) Upon reception of the first Commissioning GPDF, DUT-GPP sends correctly formatted GP Commissioning Notification. Upon reception of the second Commissioning GPDF, DUT-GPP does not send any GP Commissioning Notification.
3K) Upon reception of the Commissioning GPDF, DUT-GPP does not send any GP Commissioning Notification.
3L) Upon reception of the first Commissioning GPDF, DUT-GPP sends correctly formatted GP Commissioning Notification. Upon reception of the second Commissioning GPDF, DUT-GPP does not send any GP Commissioning Notification.
Fail verdict:
1) Upon reception of Commissioning GPDF, DUT-GPP does NOT send GP Commissioning Notification in broadcast.
2A) – 2B) Upon reception of Commissioning GPDF, DUT-GPP does NOT sends GP Commissioning Notification in unicast to TH-GPS1, after gppTunnelingDelay, AND/OR DUT-GPP uses alias.
3A – 3L) DUT-GPP does not behave exactly as specified above.

5.4.1.13 General commissioning tests

5.4.1.13.1 Initial Conditions

As in 5.4.1.1.1.

5.4.1.13.2 Test Set-Up

As in 5.4.1.8.2.

5.4.1.13.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1	***Negative test: Different sequence number/frame counter in both modes:*** TH-GPS sends GP Proxy Commissioning Mode (Action=Enter). Commissioning is successfully performed between TH-GPD and TH-GPS via DUT-GPP; gpdSecurityLevel >= 0b10 is used. After TH-GPS sends GP Pairing, read out Proxy Table entry of the DUT-GPP. TH-GPD is made to send a Data GPDF with wrong security frame counter value, i.e. lower than the last value used in commissioning mode. Read out Proxy Table entry of the DUT-GPP.	
Maximum length of GPD Commissioning:			
2A		Clear Proxy Table of DUT-GPP. TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter). TH-GPD using *ApplicationID* = 0b000 sends GPD Commissioning command, with payload having the maximum length for *ApplicationID* = 0b000: 55 octets.	
2B		Clear Proxy Table of DUT-GPP. TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter). TH-GPD using *ApplicationID* = 0b010 sends GPD Commissioning command, with payload having the maximum length for *ApplicationID* = 0b010: 50 octets.	
Malformed commissioning GPDF			
3A	[R3] A.3.9, step 12	***Negative test: Commissioning GPDF with Auto-Commissioning sub-field set:*** TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter, *Unicast communication* = 0b0). TH-GPD sends Commissioning GPDF, with all the options as supported by the TH-GPS, with *RxAfterTx* = 0b0 (or not present), but with *Auto-*	

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		Commissioning sub-field of the *NWK Frame Control* field set to 0b1.	
3B		***Negative test Commissioning GPDF with wrong FrameType:*** TH-GPD sends Commissioning GPDF, with all the options as supported by the TH-GPS, with *RxAfterTx* = 0b0 (or not present), but with *FrameType* sub-field of the *NWK Frame Control* field set to 0b11.	
3C		***Negative test: Commissioning GPDF with wrong ZigBeeProtocolVersion:*** TH-GPD sends Commissioning GPDF, with all the options as supported by the TH-GPS, with *RxAfterTx* = 0b0 (or not present), but with *ZigBeeProtocolVersion* sub-field of the *NWK Frame Control* field set to 0b0010.	
3D		***Negative test: Commissioning GPDF with wrong ApplicationID*:** TH-GPD sends Commissioning GPDF, with all the options as supported by the TH-GPS, with *RxAfterTx* = 0b0 (or not present), but with *ApplicationID* sub-field of the *Extended NWK Frame Control* field set to 0b011.	
3E		***Negative test: Commissioning GPDF with wrong Direction:*** TH-GPD sends Commissioning GPDF, with all the options as supported by the TH-GPS, with *RxAfterTx* = 0b0 (or not present), but with *Direction* sub-field of the *Extended NWK Frame Control* field set to 0b1.	
GPD ID = 0x00..00			
4A	[R3] A.3.3.4.7, A.3.5.2.4.1	***Negative test: SrcID = 0x00000000:*** Clear Proxy Table of DUT-GPP. TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter). TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send the Commissioning GPDF with: *RxAfterTx* = 0b0 and *ApplicationID* = 0b000, *SrcID* = 0x00000000.	
4B	[R3] A.3.3.4.7, A.3.5.2.4.1	***Negative test: GPD IEEE address = 0x0000000000000000:*** Clear Proxy Table of DUT-GPP. TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter). TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send the Commissioning GPDF with: *RxAfterTx* = 0b0 and *ApplicationID* = 0b010, GPD IEEE address (in MAC header source address field) = 0x0000000000000000 and Endpoint X.	
Extendibility of GPD Commissioning frame			
5	[R3] A.3.9, A.4.2.1.1, 3.2.3	Clear Proxy Table of DUT-GPP. TH-GPS1 sends GP Proxy Commissioning Mode (*Action* = Enter). TH-GPD (or TH-Tool in the role of TH-GPD) is triggered to send the Commissioning GPDF with: • *Auto-Commissioning* sub-field of the *NWK Frame Control* field set to 0b0, • the *Extended NWK Frame Control* field present and its *RxAfterTx* sub-field set to 0b0, • the *Reserved* sub-fields of the *Options* field set to 0b1 • all other sub-fields and fields set correctly; • at the end of the Commissioning GPDF (i.e. after ApplicationInformation, if included), 5 additional bytes of payload, 0xe0 0xe1 0xe2 0xe3 0xe4, are applied; the maximal GPDF length is NOT exceeded.	
Negative test (gpdSecurityLevel = 0b01):			
6		Clear Proxy Table of DUT-GPP. TH-Tool sends GP Pairing command with all settings as supported by DUT-GPP, but with *SecurityLevel* sub-field of the *Options* field set to 0b01. TH-ZR reads the *Proxy Table* attribute of DUT-GPP, using ZCL Read Attributes command.	

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1821 ***5.4.1.13.4 Expected outcome***

Pass verdict:
1) On reception of the Data GPDF with wrong security frame counter value, DUT-GPP does NOT forward GP Notification. DUT-GPP does NOT write the new (incorrect) frame counter value to its Proxy Table.
2A) DUT-GPP sends correctly formatted GP Commissioning Notification, carrying the entire payload of the GPD Commissioning command of 55B length.
2B) DUT-GPP sends correctly formatted GP Commissioning Notification, carrying the entire payload of the GPD Commissioning command of 50B length.
3A) – 4B) DUT-GPP silently drops the GPDF. DUT-GPP does NOT forward GP Commissioning Notification.
5) DUT-GPP sends correctly formatted GP Commissioning Notification, carrying the entire payload of the GPD Commissioning command, incl. the 5 additional bytes of payload, 0xe0 0xe1 0xe2 0xe3 0xe4. The 5 additional bytes of payload are NOT misinterpreted as any part of the GP Commissioning Notification.
6) DUT-GPP does NOT create a Proxy Table entry for the GPD ID = N with *SecurityLevel* = 0b01; DUT-GPP has an empty Proxy Table.
Fail verdict:
1) Data GPDF with wrong security frame counter value, DUT-GPP does forward GP Notification. AND/OR DUT-GPP writes the new (incorrect) frame counter value to its Proxy Table.
2A) DUT-GPP does NOT send correctly formatted GP Commissioning Notification AND/OR the GP Commissioning Notification does NOT carry the entire payload of the GPD Commissioning command of 55B length.
2B) DUT-GPP does NOT send correctly formatted GP Commissioning Notification AND/OR the GP Commissioning Notification does NOT carry the entire payload of the GPD Commissioning command of 50B length.
3A) – 4B) DUT-GPP does NOT silently drop the GPDF. AND/OR DUT-GPP forwards GP Commissioning Notification.
5) DUT-GPP does NOT sends correctly formatted GP Commissioning Notification, carrying the entire payload of the GPD Commissioning command AND/OR DUT-GPP does NOT include the 5 additional bytes of payload, 0xe0 0xe1 0xe2 0xe3 0xe4. AND/OR The 5 additional bytes of payload are misinterpreted as any part of the GP Commissioning Notification.
6) DUT-GPP has a Proxy Table entry for the GPD ID = N with *SecurityLevel* = 0b01.

1822 **5.4.1.14 Handling of GPD Commissioning/Decommissioning command in operation**

1823 ***5.4.1.14.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
1-2		As in 5.2.1.1.1.	
3	[R3] A.3.4.2.2	TH-GPD, DUT-GPP and TH-GPS use SecurityLevel = 0b10, preferably with *SecurityKeyType* 0b010 (GPD group key), preferably the key being key (0:15) = 0xc0 0xc1 0xc2 0xc3 0xc4 0xc5 0xc6 0xc7 0xc8 0xc9 0xca 0xcb 0xcc 0xcd 0xce 0xcf.	
4	[R3] A.1.4, A.1.5	TH-GPD uses *ApplicationID* = 0b000 and *GPD SrcID* Z.	

1824 ***5.4.1.14.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
The test steps 1A – 1E below can only be performed if the GPD role is taken by a TH			
1A	[R3] A.3.5.2.3	***GPD Commissioning command in operational mode*** Make TH-GPD send correctly formatted GPD Commissioning command with *SrcID* = Z and *RxAfterTx* = 0b1, using appropriate GPD security.	
1B	[R3] A.3.5.2.3	***Negative test: Unprotected GPD Commissioning command in operational mode:*** Make TH-GPD send correctly formatted unprotected GPD Commissioning command, with *SrcID* = Z.	

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1C	[R3] A.3.5.2.3	***Negative test: unprotected GPD Commissioning command from unknown GPD in operational mode:*** Make TH-GPD send correctly formatted unprotected GPD Commissioning command, with SrcID != Z.	
1D	[R3] A.3.5.2.3	***Negative test: protected GPD Decommissioning command from unknown GPD in operational mode:*** Make TH-GPD send correctly formatted and protected with the correct shared key GPD Decommissioning command, with SrcID = Z2.	
1E	[R3] A.3.5.2.3	***Negative test: Unprotected GPD Decommissioning command in operational mode:*** Make TH-GPD send correctly formatted unprotected GPD Decommissioning command, with SrcID = Z. Read the Proxy Table attribute and the *gppBlockedGPDID* attribute of DUT-GPP.	
Decommissioning test			
2	[R3] A.3.5.2.3	***GPD Decommissioning command in operational mode*** Make TH-GPD send correctly formatted GPD Decommissioning command with SrcID = Z and RxAfterTx = 0b0, using appropriate GPD security. Read the Proxy Table attribute and the gppBlockedGPDID attribute of DUT-GPP.	

1825 ***5.4.1.14.3 Expected Outcome***

Pass verdict:
1A) DUT-GPP forwards GP Notification in derived groupcast (since that's the *CommunicationMode* the pairing uses), with *RxAfterTx* = 0b0, *ProxyInfoPresent* = 0b1; and the fields *GPP short address* and *GPP-GPD link* present, with security settings as in the triggering GPDF, carrying the received GPD command and payload. DUT-GPP does not remove (or set to inactive/invalid) the Proxy Table entry for TH-GPD. There is no gppBlockedGPDID entry for TH-GPD Z.
1B) DUT-GPP silently drops the GPDF. DUT-GPP does NOT forward GP Commissioning Notification nor GP Notification. DUT-GPP does not remove (or set to inactive/invalid) the Proxy Table entry for TH-GPD. There is no gppBlockedGPDID entry for TH-GPD Z.
1C) -1D) DUT-GPP silently drops the GPDF. DUT-GPP does NOT forward GP Commissioning Notification nor GP Notification. DUT-GPP does not create Proxy Table entry nor gppBlockedGPDID entry for TH-GPD Z2.
1E) DUT-GPP silently drops the GPDF. DUT-GPP does NOT forward GP Commissioning Notification nor GP Notification. DUT-GPP does not remove (or set to inactive/invalid) the Proxy Table entry for TH-GPD. There is no gppBlockedGPDID entry for TH-GPD Z.
2) DUT-GPP forwards GP Notification in derived groupcast (since that's the *CommunicationMode* the pairing uses), with *RxAfterTx* = 0b0, *ProxyInfoPresent* = 0b1; and the fields *GPP short address* and *GPP-GPD link* present, with security settings as in the triggering GPDF, carrying the received GPD command and payload in the clear. If TH-GPS does NOT send a GP Pairing with *RemoveGPD* = 0b1, DUT-GPP does not remove (or set to inactive/invalid) the Proxy Table entry for TH-GPD. There is no gppBlockedGPDID entry for TH-GPD Z. If TH-GPS sends a GP Pairing with *RemoveGPD* = 0b1, DUT-GPP removes (or sets to inactive/invalid) the Proxy Table entry for TH-GPD or creates a gppBlockedGPDID entry for TH-GPD Z.
Fail verdict:
1A) – 1B) DUT-GPP forwards GP Commissioning Notification AND/OR DUT-GPP does NOT forward GP Notification, formatted exactly as specified in pass verdict 9A) – 9C) above. AND/OR DUT-GPP removes (or sets to inactive/invalid) the Proxy Table entry for TH-GPD Z. AND/OR DUT-GPP creates gppBlockedGPDID entry for TH-GPD Z.
1B) DUT-GPP does NOT silently drop the GPDF. AND/OR DUT-GPP forwards GP Commissioning Notification or GP Notification. AND/OR DUT-GPP removes (or sets to inactive/invalid) the Proxy Table entry for TH-GPD Z. AND/OR DUT-GPP creates gppBlockedGPDID entry for TH-GPD Z.

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1C) - 1D) DUT-GPP does NOT silently drop the GPDF. AND/OR DUT-GPP forwards GP Commissioning Notification or GP Notification. AND/OR DUT-GPP creates Proxy Table entry or gppBlockedGPDID entry for TH-GPD Z2.
1E) DUT-GPP does NOT silently drop the GPDF. AND/OR DUT-GPP forwards GP Commissioning Notification or GP Notification. AND/OR DUT-GPP removes (or sets to inactive/invalid) the Proxy Table entry for TH-GPD Z. AND/OR DUT-GPP creates gppBlockedGPDID entry for TH-GPD Z.
2) DUT-GPP forwards GP Commissioning Notification AND/OR DUT-GPP does NOT forward GP Notification, formatted exactly as specified in pass verdict 2) above. AND/OR If TH-GPS does NOT send a GP Pairing with *RemoveGPD* = 0b1, DUT-GPP removes (or sets to inactive/invalid) the Proxy Table entry for TH-GPD Z. AND/OR DUT-GPP creates gppBlockedGPDID entry for TH-GPD Z. AND/OR If TH-GPS sends a GP Pairing with *RemoveGPD* = 0b1, DUT-GPP does NOT do one of he following: remove (or set to inactive/invalid) the Proxy Table entry for TH-GPD Z, or create gppBlockedGPDID entry for TH-GPD Z.

5.4.1.15 NOT TESTED: Commissioning channel tests

5.4.1.15.1 Initial Conditions

As in 5.4.1.1.1.

5.4.1.15.2 Test Set-Up

As in 5.4.1.8.2.

5.4.1.15.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
		Channel test ***Note: sniffer shall be monitoring both the operational channel and channel X.***	
1A		TH-GPS1 sends GP Proxy Commissioning Mode with: • Sub-fields of the *Options* field set to: ▪ *Action* = Enter, ▪ *On CommissioningWindow expiration* = 0b1 and *CommissioningWindow* field present and set to 20 (sec), ▪ *On first Pairing success* = 0b0, ▪ *On GP Proxy Commissioning Mode (exit)* = 0b0, ▪ *Channel present* = 0b1, and the *Channel* field included and set to channel X other than the operational channel of the DUT-GPP. ▪ *Unicast communication* = 0b0. Wait for 10s. TH-GPS1 sends Proxy Table Request on the operational channel of DUT-GPP.	
1B		***Within the commissioning window opened in step 4A:*** TH-GPD sends correctly formatted Commissioning GPDF on channel X.	

5.4.1.15.4 Expected Outcome

Pass verdict:
1A) DUT-GPP sends GP Proxy Table Response on the operational channel.
1B) On reception of the Commissioning GPDF on channel X, DUT-GPP switches back to the operational channel and sends correctly formatted GP Commissioning Notification on the operational channel.
Fail verdict:
1A) DUT-GPP does NOT sends GP Proxy Table Response on the operational channel.
1B) On reception of the Commissioning GPDF on channel X, DUT-GPP does not send correctly formatted GP Commissioning Notification and/or it is not sent on the operational channel.

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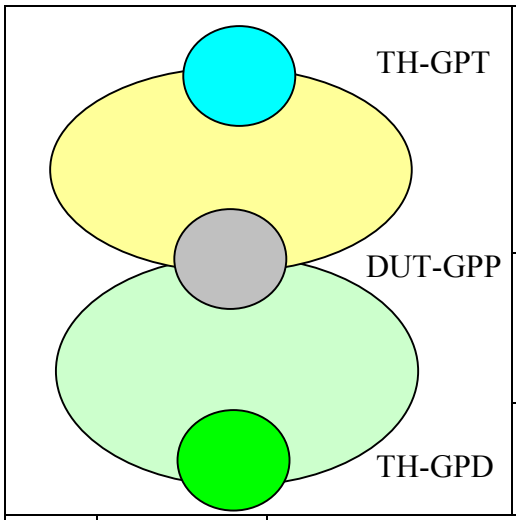
5.4.2 GPD/Pairing removal

5.4.2.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPT/ TH-Tool	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific TH-GPT's GPEP supports the application functionality of the TH-GPD (see Section A.4.3 of [R3]).
DUT-GPP/-GPPB/proxy side of GPCB	PANId=same PANId as TH-GPT Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N TH-GPD supports the application functionality of the TH-GPT (see Section A.4.3 of [R3]).

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPT and DUT-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.2.2.2	A pairing is established between TH-GPD and TH-GPT, employing group cast communication with Derived Group ID (e.g. as a result of any of the commissioning procedures from Section A.3.9 of [R3]).	.
3	[R3] A.3.4.2.2	The Proxy Table attribute of DUT-GPP has an entry with GPD ID N, for which the Entry Active and Entry Valid subfields of the Options field have shall both be set to 0b1.	

5.4.2.1.2 Test Set-Up

DUT-GPP shall be in wireless communication proximity of TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

5.4.2.2 Subcase: Decommissioning GPDF and GP Pairing with RemoveGPD = 0b1

5.4.2.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.4.2.2	The Proxy Table attribute of DUT-GPP has an entry with GPD ID N, for which the *EntryActive* and *EntryValid* subfields of the *Options* field have shall both be set to 0b1.	

5.4.2.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3]A.4.2.1.3 A.3.5.2.1, A.3.4.2.2, A.3.4.2.6	Make DUT-GPP enter commissioning mode. Make TH-GPD send appropriately secured Decommissioning GPDF. If required, make DUT-GPP exit commissioning mode.	
2	[R3] A.3.3.5.2, A.3.5.2.1, A.3.4.2.2, A.3.4.2.6	***If item 1 succeeds, this follows automatically:*** (Make) TH-GPT send(s) a *GP Pairing* command with GPD ID value N and the *Remove GPD* sub-field of the *Options* field having value 0b1. Read the *Proxy Table* attribute and the *gppBlockedGPDID* attribute of DUT-GPP.	
3	[R3] A.3.5.2.2	***Optional test (only if Proxy Table Maintenance functionality is supported): Test operation for inactive, valid entry:*** Make TH-GPD send a Data GPDF.	

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4	[R3] A.3.5.2.2	***Optional test (only if Proxy Table Maintenance functionality is supported): Test recovery from inactive valid:*** TH-GPT sends unsolicited GP Pairing with AddSink = 0b1 for TH-GPD. Read the *Proxy Table* attribute and the *gppBlockedGPDID* attribute of DUT-GPP. Make TH-GPD send appropriately secured Decommissioning GPDF.	

5.4.2.2.3 Expected Outcome

Pass verdict:
1) DUT-GPP sends GP Commissioning Notification with *Security processing failed* = 0b0, carrying the GPD Decommissioning command (0xE1), and indicating the command is payloadless.
2) After DUT-GPP receives the GP Pairing with *RemoveGPD* = 0b1, and the DUT-GPP: • supports the Proxy Table Maintenance feature, then ▪ EITHER the *Proxy Table* of DUT-GPP contains an entry with GPD ID value N, the value of the sub-fields *EntryActive*, *EntryValid*, *LighweightUnicast GPS*, *Derived Group GPS, Commissioned Group GPS* of the *Options* parameter are equal to 0b0, 0b1, 0b0, 0b0, 0b0, respectively, and the *Sink address list*, *Sink Group list* and *Search Counter* parameters are absent. ▪ OR the *gppBlockedGPDID* attribute of the DUT-GPP contains an entry for the GPD ID. • the DUT-GPP does NOT support the Proxy Table Maintenance feature, then the Proxy Table of DUT-GPP does NOT contain any entry for TH-GPD GPD ID N.
3) DUT-GPP does not send a *GP Tunneling Stop* command, nor a *GP Notification* command, nor a *GP Pairing Search* command.
4) After DUT-GPP receives the GP Pairing with AddSink = 0b1, the *Proxy Table* of DUT-GPP contains an entry with GPD ID value N, the value of the sub-fields *EntryActive*, and *EntryValid* of the *Options* parameter are equal to 0b1,0b1, respectively, and the relevant data stored. The *gppBlockedGPDID* attribute of the DUT-GPP does NOT contain any entry for the TH-GPD GPD ID N. DUT-GPP does forward the GPDF in the configured mode.
Fail verdict:
1) DUT-GPP does not send GP Commissioning Notification AND/OR the GP Commissioning Notification is not formatted as described in 5.4.2.2.3/pass verdict 1 above.
2) If DUT-GPP supports Proxy Table Maintenance feature, neither Proxy Table nor gppBlockedGPDID attribute of DUT-GPP contains an entry with GPD ID value N, OR Proxy Table does contain such an entry with is NOT formatted exactly as defined in 5.4.2.2.3/pass verdict 2 above. If DUT-GPP supports Proxy Table Maintenance feature, Proxy Table of DUT-GPP still contains an entry for TH-GPD GPD ID N.
3) DUT-GPP does send a GP Tunneling Stop command and/or a GP Notification command and/or a GP Pairing Search command.
4) After DUT-GPP receives the GP Pairing with AddSink = 0b1, the *Proxy Table* of DUT-GPP does NOT contain an entry with GPD ID = N, the value of the sub-fields *EntryActive*, and *EntryValid* of the *Options* parameter are equal to 0b1, 0b1, respectively, and the relevant data stored. AND/OR the *gppBlockedGPDID* attribute of the DUT-GPP does contain an entry for GPD ID = N. AND/OR DUT-GPP does NOT forward the GPDF in the configured mode.

5.4.2.2.4 PICS Covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCC152	Rx GP Pairing command with *RemoveGPD* sub-field set to 0b1	Direct

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5.4.2.3 NOT TESTED: Advanced GP only: Subcase: Full Unicast pairing removal with GP Notification Response with NoPairing = 0b1

5.4.2.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
3	[R3] A.3.4.2.2	The Proxy Table attribute of DUT-GPP has an entry with GPD ID N for full unicast communication mode, for which the Entry Active and Entry Valid subfields of the Options field have shall both be set to 0b1; and with Sink Address List containing addresses of two full unicast sinks: 0xMMMM and 0xNNNN.	

5.4.2.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.5.2, A.3.5.2.2, A.3.4.2.2, A.3.4.2.6	TH-GPD sends Data GPDF. After DUT-GPP forwards GP Notifications, TH-GPS 0xMMMM sends GP Notification Response command with the *NoPairing* sub-field of the *Options* field set to 0b1, and with the address 0xMMMM. Read the Proxy Table attribute and the *gppBlockedGPDID* attribute of DUT-GPP.	
2	[R3] A.3.3.5.2, A.3.5.2.2, A.3.4.2.2, A.3.4.2.6	TH-GPS sends GP Pairing command with the sub-fields of the *Options* field set to *AddSink* = 0b0, *RemoveGPD* = 0b0, *CommunicationMode* = 0b00 and the sink address 0xNNNN. Read the Proxy Table attribute and the *gppBlockedGPDID* attribute of DUT-GPP.	

5.4.2.3.3 Expected Outcome

Pass verdict:
1) After DUT-GPP receives the GP Notification Response with *NoPairing* = 0b1, the *Proxy Table* of DUT-GPP contains an entry with GPD ID = N, the value of the sub-fields *EntryActive* = 0b1, *EntryValid* = 0b1, in the *Extended Options* field: *Full Unicast GPS* = 0b1, and the *Sink address list* containing only one full unicast sink: 0xNNNN.
2) If DUT-GPP • supports Proxy Table maintenance, it sets the entry to inactive valid or shifts the GPD to *gppBlockedGPDID* list, with *Search Counter* = 0x00; • does not support Proxy Table maintenance, it removes the entry (or adds it to *gppBlockedGPDID)*.
Fail verdict:
1) DUT-GPP does not remove the 0xMMMM sink AND/OR DUT-GPP removes/sets to inactive/moves to *gppBlockedGPDID* the entry for GPD ID N.
2) DUT-GPP does not act as described in 5.4.2.3.3/item 2 above.

5.4.2.3.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCC150	Rx GP Notification Response	Direct
GPPCC110	Rx GP Pairing	Direct
GPPCC3C	Minimal number of simultaneously used entries in the *Sink address list* per Proxy Table entry	Direct

5.4.2.4 Subcase: Pre-commissioned groupcast pairing removal with GP Pairing with AddSink = 0b0

5.4.2.4.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
3	[R3] A.3.4.2.2	The Proxy Table attribute of DUT-GPP has an entry with GPD ID N for pre-commissioned groupcast communication mode, for which the *EntryActive* and *EntryValid* sub-fields of the *Options* field have shall both be set to 0b1; and with *Sink Group List* containing two GroupIDs: 0xMMMM and 0xNNNN.	

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1855 ***5.4.2.4.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.5.2, A.3.5.2.2, A.3.4.2.2, A.3.4.2.6	TH-GPS sends GP Pairing command with the sub-fields of the *Options* field set to *AddSink* = 0b0, *RemoveGPD* = 0b0, *CommunicationMode* = 0b10 and the address 0xMMMM in the *Sink Group List*. Read the Proxy Table attribute and the *gppBlockedGPDID* attribute of DUT-GPP.	
2	[R3] A.3.3.5.2, A.3.5.2.2, A.3.4.2.2, A.3.4.2.6	TH-GPS sends GP Pairing command with the sub-fields of the Options field set to *AddSink* = 0b0, *RemoveGPD* = 0b0, *CommunicationMode* = 0b10 and the address 0xNNNN in the Sink Group List. Read the Proxy Table attribute and the *gppBlockedGPDID* attribute of DUT-GPP.	

1856 ***5.4.2.4.3 Expected Outcome***

Pass verdict:
1) After DUT-GPP receives the GP Pairing with *AddSink* = 0b0, the *Proxy Table* of DUT-GPP contains an entry with GPD ID value N, the value of the sub-fields *EntryActive = 0b1*, *EntryValid 0b1*, *PreCommissionedGroupGPS = 0b1*, *Sink group list* containing only one GroupID: 0xNNNN.
2) If DUT-GPP • supports Proxy Table maintenance, it sets the entry to inactive valid or shifts the GPD to *gppBlockedGPDID* list, with *SearchCounter*=0x00; • does not support Proxy Table maintenance, it removes the entry (or adds it to *gppBlockedGPDID)*.
Fail verdict:
1) DUT-GPP does not remove the 0xMMMM group AND/OR DUT-GPP removes/sets to inactive/moves to *gppBlockedGPDID* the entry for GPD ID = N.
2) DUT-GPP does not act as described in 5.4.2.4.3/item 2 above.

1857 ***5.4.2.4.4 PICS covered***

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCC110	Rx GP Pairing	Direct
GPPCC3D	Minimal number of simultaneously used entries in the *Sink group list* per Proxy Table entry	Direct

1858

1859 **5.4.2.5 Subcase: Lightweight unicast pairing removal with GP Pairing with AddSink = 0b0**

1860 ***5.4.2.5.1 Initial conditions***

Item	Doc. Ref.	Initial Conditions	Note
3	[R3] A.3.4.2.2	The Proxy Table attribute of DUT-GPP has an entry with GPD ID N for lightweight unicast communication mode, for which the *EntryActive* and *EntryValid* sub-fields of the *Options* field are both set to 0b1; and with *Lightweight sink address list* containing two GPS with short addresses: 0xMMMM and 0xNNNN.	

1861 ***5.4.2.5.2 Test Procedure***

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.5.2, A.3.5.2.2, A.3.4.2.2, A.3.4.2.6	TH-GPS sends GP Pairing command with the sub-fields of the *Options* field set to *AddSink* = 0b0, *RemoveGPD* = 0b0, *CommunicationMode* = 0b11 and the address 0xMMMM in the *Lightweight sink address list*. Read the Proxy Table attribute and the *gppBlockedGPDID* attribute of DUT-GPP.	
2	[R3] A.3.3.5.2, A.3.5.2.2, A.3.4.2.2, A.3.4.2.6	TH-GPS sends GP Pairing command with the sub-fields of the Options field set to AddSink = 0b0, RemoveGPD = 0b0, CommunicationMode = 0b11 and the address 0xNNNN in the *Lightweight sink address list*. Read the Proxy Table attribute and the *gppBlockedGPDID* attribute of DUT-GPP.	

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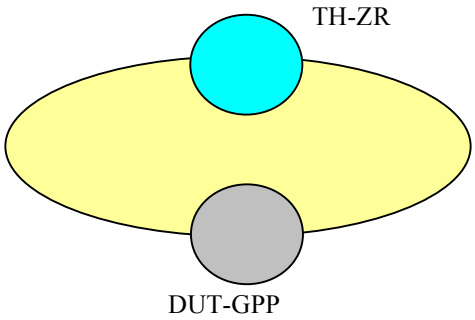
5.4.2.5.3 Expected Outcome

Pass verdict:
1) After DUT-GPP receives the GP Pairing with *AddSink* = 0b0, the *Proxy Table* of DUT-GPP contains an entry with GPD ID value N, the value of the sub-fields *EntryActive = 0b1*, *EntryValid 0b1*, *LightweightUnicastGPS = 0b1*, *Lightweight sink address list* containing only one GPS with short address: 0xNNNN.
2) If DUT-GPP • supports Proxy Table maintenance, it sets the entry to inactive valid or shifts the GPD to *gppBlockedGPDID* list, with *SearchCounter*=0x00; • does not support Proxy Table maintenance, it removes the entry (or adds it to *gppBlockedGPDID)*.
Fail verdict:
1) DUT-GPP does not remove the 0xMMMM sink AND/OR DUT-GPP removes/sets to inactive/moves to *gppBlockedGPDID* the entry for GPD ID = N.
2) DUT-GPP does not act as described in 5.4.2.4.3/item 2 above.

5.4.3 Device_annce reception

5.4.3.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



DUT-GPP/-GPPB/proxy side of GPCB	Pan id=unique Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7, but must be restarted in the case it is equal to the alias address) Channel = as supported by the DUT-GPD IEEE address=manufacturer-specific
TH-ZR	Pan id=same PANID as DUT-GPP IEEE address=manufacturer-specific Short address = 0xWXYZ.

Item	Doc. Ref.	Initial Conditions	Note
1		TH-ZR and DUT-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.4.2.2	DUT-GPP has a *Proxy Table* entry for GPD ID with 2LSB 0xWXYZ, so that it conflicts with the short address of the TH-ZR, and derived alias.	

5.4.3.1.2 Test Set-Up

The DUT-GPP shall be in wireless communication proximity of the TH-ZR.

A packet sniffer shall be observing the communication over the air interface.

5.4.3.2 Device_annce for non-all-F address conflicts with derived alias

5.4.3.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 5.4.3.1.1	
2	[R3] A.3.4.2.2	TH-GPP has a Proxy Table entry with derived alias 0xWXYZ.	

5.4.3.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1	Power on the TH-ZR. Make the TH-ZR send Device_annce for its own short address 0xWXYZ.	

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5.4.3.2.3 Expected Outcome

Pass verdict:
1) On reception of ZR's Device_annce (with 0xWXYZ and IEEE not equal to 0xFFFFFFFFFFFFFFFF), DUT-GPP sends a Device_annce for the alias_srcAddr of 0xWXYZ and IEEE 0xFFFFFFFFFFFFFFFF, with 0xWXYZ as NWK SrcAddr and 0x00 as NWK sequence number.
Fail verdict:
1) The DUT-GPP does not send a Device_annce command formatted as specified above.

5.4.3.2.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPC5	Conflict checking on Device_annce reception	Direct
GPPC6	Tx of Device_annce for the alias upon alias conflict detection	Direct

5.4.3.3 Device_annce for non-all-F address conflicts with assigned alias

5.4.3.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1		As in 5.4.3.1.1	
2	[R3] A.3.4.2.2	TH-GPP has a Proxy Table with assigned alias 0xWXYZ.	

5.4.3.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.1	Send from TH-Tool Device_annce for the assigned alias of 0xWXYZ (not equal to any of the reserved short addresses) and IEEE not equal to 0xFFFFFFFFFFFFFFFF.	

5.4.3.3.3 Expected Outcome

Pass verdict:
1) On reception of Device_annce with the short address 0xWXYZ and IEEE address not equal to 0xFFFFFFFFFFFFFFFF, DUT-GPP sends Device_annce with the short address equal to 0xWXYZ and IEEE 0xFFFFFFFFFFFFFFFF, using NWK SrcAddr 0xWXYZ and NWK sequence counter 0x00.
Fail verdict:
1) The DUT-GPP does not send a Device_annce command formatted as specified in 5.4.3.3.3/item 1 above.

5.4.3.3.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPC5	Conflict checking on Device_annce reception	Direct
GPPC6	Tx of Device_annce for the alias upon alias conflict detection	Direct

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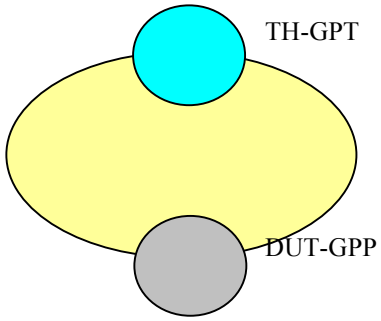
5.4.3.4 Conflict of the alias with the GPPs

5.4.3.4.1 Initial Conditions

The required network set-up for the test harness is as follows:

	TH-GPT/TH-Tool	PANid= Generated in a random manner (within the range 0x0001 to 0x3FFF) Channel = as supported by the DUT-GPD Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7, but must be changed in the case it is equal to the alias address) IEEE address=manufacturer-specific GPEP supports the application functionality of the DUT-GPD (see Section A.4.3 of [R3]).
	DUT-GPP	Pan id=same PANID as TH-GPT

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPT and TH-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.4.2.2	Proxy Table of the DUT-GPP is empty.	

5.4.3.4.2 Test Set-Up

The TH-GPT shall be in wireless communication proximity of DUT-GPP; and the DUT-GPP shall be in wireless communication proximity of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

5.4.3.4.3 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.3.5.2, A.3.6.3.3, A.3.5.2.1	Send from TH-GPS the GP Pairing, with *AssignedAliasPresent* sub-field of the *Options* field set to 0b0 and a GPD ID ending with 0xWXYZ, resulting in a derived alias conflicting with the short address of DUT-GPP 0xWXYZ.	
2	[R3] A.3.3.5.2, A.3.5.2.1	Send from TH-GPS the GP Pairing, with *AssignedAliasPresent* sub-field of the *Options f*ield set to 0b1, and *AssignedAlias* 0xMMMM conflicting with the new short address of DUT-GPP 0xMMMM.	

5.4.3.4.4 Expected Outcome

Pass verdict:
1) DUT-GPP changes its short address using standard ZigBee-Pro procedure and announces it using Device_annce with the new address 0xMMMM != 0xWXYZ and IEEE of DUT-GPP.
2) DUT-GPP changes its short address using standard ZigBee-Pro procedure and announces it using Device_annce with the new address 0xNNNN != 0xWXYZ and IEEE of DUT-GPP.
Fail verdict:
1) The DUT-GPP does not send a Device_annce with the new address 0xMMMM != 0xWXYZ and IEEE of DUT-GPP.
2) DUT-GPP does not changes its short address using standard ZigBee-Pro procedure and/or does not send Device_annce with the new address 0xNNNN != 0xWXYZ and IEEE of DUT-GPP.

5.4.3.5 PICS supported

PICS reference	Functionality	Tested (Direct/Indirect)
GPPC5	Conflict checking on Device_annce reception	Direct

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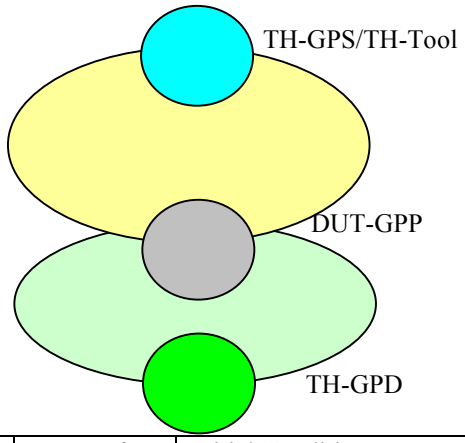
5.5 NOT TESTED: Advanced GP only: Bidirectional operation (DUT: GPP Advanced)

5.5.1.1.1 Initial conditions

The required network set-up for the test harness is as follows:



TH-GPS (GPT, GPT+ or GPC) or TH-Tool	PANId= Generated in a random manner (within the range 0x0000 to 0x3FFF) Logical Address = Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
DUT-GPP	PANId=same PANID as DUT-GPT Logical Address=Generated in a random manner(within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = N TH-GPD supports the application functionality of the TH-GPS (see Section A.4.3 of [R3]).

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPS and DUT-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.9, A.3.4.2.2	A pairing is established between the TH-GPD and TH-GPS (e.g. as a result of any of the commissioning procedures). The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures). The *RxOnCapability* of the TH-GPD is set to 0b1.	

5.5.1.1.2 Test Set-Up

The TH-GPS shall be in wireless communication proximity of DUT-GPP; and the DUT-GPP shall be in wireless communication proximity of the TH-GPD. The TH-GPD and the TH-GPS shall be out of radio range.

A packet sniffer shall be observing the communication over the air interface.

5.5.2 NOT TESTED: Baseline: no security use

5.5.2.1 NOT TESTED: ApplicationID = 0b000

5.5.2.1.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.4.2.2	As in 5.2.1.1.1. The established pairing indicates SecurityLevel = 0b00.	
2	[R3] A.1.5.2.1.1	The gpTxQueue of the DUT-GPP is initially empty.	
3		TH-GPD uses ApplicationID = 0b000 and SrcID N.	

5.5.2.1.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4	TH-GPD sends a GPDF with *RxAfterTx* set to 0b0.	
2	[R3] A.1.4	TH-GPD sends a Data GPDF with *RxAfterTx* set to 0b1.	
3	[R3] A.3.3.5.4, A.3.5.2.1	TH-GPS sends GP Response command unicast to the DUT-GPP, with *TempMasterShortAddress* field of the GP Response command payload set to the NWK address of DUT-GPP.	Note: make sure the gpTxQueue entry in the DUT-GPP did not expire; if required; re-send the GP Response from
4	[R3] A.1.4, A.1.5.2	***Negative test: RxAfterTx cleared***: TH-GPD sends a Data GPDF with *RxAfterTx* cleared.	
5		***Negative test: RxAfterTx omitted:*** TH-GPD sends a Data GPDF with *Extended NWK Frame Control* field NOT present.	

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6		***Negative test: Wrong GPD ID***: TH-GPD sends a Data GPDF with *RxAfterTx* set, but with different GPD SrcID.	the TH-GPS/TH-Tool.
7		TH-GPD sends a Data GPDF with *RxAfterTx* set.	
8	[R3] A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Broadcast GP Response:*** TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the DUT-GPP. TH-GPD sends a Data GPDF with *RxAfterTx* set.	
9	[R3] A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Replacing gpTxQueue entry:*** TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the DUT-GPP, for AttributeID 0xMMMM. TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the DUT-GPP, for AttributeID 0xNNNN. TH-GPD sends a Data GPDF with *RxAfterTx* set.	
10	[R3] A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Negative test: another TempMaster:*** TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the DUT-GPP, for AttributeID 0xMMMM. TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress field* of the GPD Response command payload carrying another short address, for AttributeID 0xMMMM. TH-GPD sends a Data GPDF with *RxAfterTx* set.	

5.5.2.1.3 Expected Outcome

Pass verdict:
1) DUT-GPP sends GP Notification in the pairing communication mode with the *gpTxQueueF*ull sub-field of the *Options* field set to 0b0, the *RxAfterTx* sub-field of the *Options* field set to 0b0, the *ProxyInfoPresent* sub-field of the *Options* field set to 0b1; and the *GPP short address* field present and carrying short address of the DUT-GPP and the *GPP-GPD link* field present. TH-GPS executes the GPD command from the GP Notification.
2) DUT-GPP sends GP Notification in the pairing communication mode with the *gpTxQueueFull* sub-field of the *Options* field set to 0b0, the *RxAfterTx* sub-field of the *Options* field set to 0b1, the *ProxyInfoPresent* sub-field of the *Options* field set to 0b1; and the *GPP short address* field present and carrying the short address of the DUT-GPP and the *GPP-GPD link* field present. TH-GPS executes the GPD command from the GP Notification.
3) DUT-GPP does NOT immediately send the Data GPDF with the GPD CommandID and GPD Command payload copied from the GP Response command.
4) DUT-GPP does NOT send Data GPDF of reception of Data GPDF with RxAfterTx cleared. DUT-GPP sends GP Notification command with the *gpTxQueueFull* sub-field of the *Options* field set to 0b0, the *RxAfterTx* sub-field of the *Options* field set to 0b0, the *ProxyInfoPresent* sub-field of the *Options* field set to 0b1; and the *GPP short address* field present and carrying the short address of the DUT-GPP and the *GPP-GPD link* field present. TH-GPS executes the GPD command from the GP Notification.
5) DUT-GPP does NOT send Data GPDF of reception of Data GPDF with *Extended NWK Frame Control* field not present. DUT-GPP sends GP Notification command.
6) DUT-GPP does NOT send Data GPDF of reception of Data GPDF from another GPD (different GPD ID). DUT-GPP may send GP Pairing Search for the new GPD ID (after discovery delay).
7) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with *RxAfterTx* set to 0b1, the DUT-GPP sends at least one Data GPDF with: • Any MAC sequence number; • MAC Destination address field absent;

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• Security settings as in the triggering Data GPDF • SrcID N; • sub-fields of the *NWK Frame Control* field set to: ▪ *Auto-Commissioning* 0b0; ▪ *NWK Frame Control Extension* 0b1; • *Extended NWK Frame Control* field present and its sub-fields: ▪ *ApplicationID* set to 0b000; ▪ *Direction* set to 0b1; ▪ *RxAfterTx* set to 0b0; • GPD CommandID and GPD Command payload copied from the GP Response command. The transmission SHALL NOT exceed *gpTxDuration*. Then, DUT-GPP sends GP Notification, with the *gpTxQueueFull* sub-field of the *Options* field set to 0b0, the *RxAfterTx* sub-field of the *Options* field set to 0b1, the *ProxyInfoPresent* sub-field of the *Options* field set to 0b1; and the *GPP short address* field present and carrying the short address of the DUT-GPP and the *GPP-GPD link* field present. If the GPD Command was Request Attributes, some time later the TH-GPD shall send Data GPDF with Read Attributes Response command carrying the value of the requested attribute.
8) DUT-GPP does NOT immediately send the Data GPDF with the GPD CommandID and GPD Command payload copied from the GP Response command. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with *RxAfterTx* set to 0b1, the DUT-GPP sends at least one Data GPDF with: • Any MAC sequence number • sub-fields of the *NWK Frame Control* field set to: ▪ *FrameType* = 0b00; ▪ *ZigBeeProtocolVersion* = 0x3; ▪ *Auto-Commissioning* 0b0; ▪ *NWK Frame Control Extension* 0b1; • *Extended NWK Frame Control* field present and its sub-fields: ▪ *ApplicationID* set to 0b000; ▪ *SecurityLevel* = 0b00, *SecurityKey* = 0b0; ▪ *RxAfterTx* set to 0b0; ▪ *Direction* set to 0b1; • *Security Frame Counter* field absent • *SrcID* N; • *Endpoint* field absent; MIC field absent; • *GPD CommandID* and *GPD Command payload* copied from the GP Response command. The GPFS transmission by DUT-GPP SHALL NOT exceed *gpTxDuration*. Then, DUT-GPP sends GP Notification, with the *gpTxQueueFull* sub-field of the *Options* field set to 0b0, the *RxAfterTx* sub-field of the *Options* field set to 0b1, the *ProxyInfoPresent* sub-field of the *Options* field set to 0b1; and the *GPP short address* field present and carrying the short address of the DUT-GPP and the *GPP-GPD link* field present. If the GPD Command was Request Attributes, some time later the TH-GPD shall send Data GPDF with Read Attributes Response command carrying the value of the requested attribute.
9) DUT-GPP does NOT immediately send the Data GPDF with the GPD CommandID and GPD Command payload copied from the GP Response command on reception of GP Notification. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after Data GPDF reception, the DUT-GPP sends at least one Data GPDF with GPD Command payload carrying AttributeID 0xNNNN. DUT-GPP does NOT send Data GPDF for AttributeID 0xMMMM. Then, DUT-GPP sends GP Notification. If the GPD Command was Request Attributes, some time later the TH-GPD shall send Data GPDF with Read Attributes Response command carrying the value of the requested attribute 0xNNNN.
10) On Data GPDF reception, DUT-GPP does NOT send Data GPDF. DUT-GPP does send GP Notification.
Fail verdict:
1) DUT-GPP does not send GP Notification formatted as defined in item 1 above. AND/OR DUT sends Data GPDF. AND/OR TH-GPS does not execute the GPD command.

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2) DUT-GPP does not send GP Notification formatted as defined in item 2 above. AND/OR DUT sends Data GPDF. AND/OR TH-GPS does not execute the GPD command.
3) DUT-GPP does send Data GPDF immediately after GP Response reception.
4) DUT-GPP does send Data GPDF on Data GPDF reception with RxAfterTx flag cleared. DUT-GPP does not send GP Notification. TH-GPS does not execute the GPD command.
5) DUT-GPP does send Data GPDF on Data GPDF reception with Extended NWK Frame Control field not present. DUT-GPP does not send GP Notification. TH-GPS does not execute the GPD command.
6) DUT-GPP does send Data GPDF on Data GPDF reception from different GPD ID.
7) DUT-GPP does NOT send at least one Data GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with *RxAfterTx* set to 0b1, formatted as specified in item 7 above. DUT-GPP does not send GP Notification. TH-GPS does not execute the GPD command. If the GPD Command was Request Attributes, TH-GPD does not send Data GPDF with Request Attributes Response.
8) DUT-GPP does send Data GPDF immediately after GP Response reception. DUT-GPP does NOT send at least one Data GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with *RxAfterTx* set to 0b1, formatted as specified in item 7 above. DUT-GPP does not send GP Notification. TH-GPS does not execute the GPD command. If the GPD Command was Request Attributes, TH-GPD does not send Data GPDF with Request Attributes Response.
9) DUT-GPP does send Data GPDF immediately after GP Response reception. DUT-GPP does NOT send Data GPDF for AttributeID 0xNNNN. DUT-GPP does send Data GPDF for AttributeID 0xMMMM. DUT-GPP does not send GP Notification. TH-GPS does not execute the GPD command. If the GPD Command was Request Attributes, TH-GPD does not send Data GPDF with Request Attributes Response for 0xNNNN.
10) DUT-GPP does send Data GPDF. DUT-GPP does not send GP Notification. TH-GPS does not execute the GPD command.

5.5.2.2 NOT TESTED: ApplicationID = 0b010

5.5.2.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
0		TH-GPD uses *ApplicationID* = 0b010 and IEEE address N, it has two GPD *Endpoints* E and F.	
1	[R3] A.3.4.2.2	The Proxy Table of the DUT-GPP (e.g. as a result of any of the commissioning procedures) has two entries for GPD IEEE address N: • For endpoint E, to a destination address (groupcast or unicast, as supported by DUT-GPP) Z1; • For endpoint F, to destination address (groupcast or unicast, as supported by DUT-GPP) Z2; The *RxOnCapability* of the TH-GPD is set to 0b1 in both. The established pairings indicate SecurityLevel = 0b00.	
2	[R3] A.1.5.2.1.1	The gpTxQueue of the DUT-GPP is initially empty.	

5.5.2.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1,	TH-GPD sends a Data GPDF with *RxAfterTx* set to 0b1, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* E. TH-GPS sends a broadcast GP Response command, with	

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	A.1.5.2	*TempMasterShortAddress* field of the GP Response command payload carrying the short address of the DUT-GPP; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to the endpoint E supported by TH-GPD. TH-GPD sends another Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* E.	
2A	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Transmit on endpoint match = 0b1, multiple gpTxQueue entries*** TH-GPS sends a broadcast GP Response command, with *TempMasterShortAddress* field of the GP Response command payload carrying the short address of the DUT-GPP; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to the endpoint F supported by TH-GPD, for AttributeID = 0xNNNN. TH-GPS sends a broadcast GP Response command, with *TempMasterShortAddress* field of the GP Response command payload carrying the short address of the DUT-GPP; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to the endpoint E supported by TH-GPD, for AttributeID = 0xMMMM. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* 0x00. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* 0xff. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* G from the range 0x01 – 0xf0, not equal to E or F. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* E. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* F.	
2B	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Transmit on endpoint match = 0b1, Endpoint = 0x00***: TH-GPS sends a broadcast GP Response command, with *TempMasterShortAddress* field of the GP Response command payload carrying the short address of the DUT-GPP; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to 0x00. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* 0xff. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* E. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* 0x00.	
2C	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Transmit on endpoint match = 0b1, Endpoint = 0xff***: TH-GPS sends a broadcast GP Response command, with *TempMasterShortAddress* field of the GP Response command payload carrying the short address of the DUT-GPP; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to 0xff. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* 0x00. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* E. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* 0xff.	
3A	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Transmit on endpoint match = 0b0, endpoint not matching*** TH-GPS sends a broadcast GP Response command, with *TempMasterShortAddress* field of the GP Response command payload carrying the short address of the DUT-GPP; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b0; the *Endpoint* field is set to the endpoint E supported by TH-GPD.	

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		TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* F.	
3B	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Transmit on endpoint match = 0b0, endpoint not matching (0x00)*** TH-GPS sends a broadcast GP Response command, with *TempMasterShortAddress* field of the GP Response command payload carrying the short address of the DUT-GPP; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b0; the *Endpoint* field is set to the endpoint E supported by TH-GPD. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* 0x00.	
3C	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Transmit on endpoint match = 0b0, endpoint not matching (0xff)*** TH-GPS sends a broadcast GP Response command, with *TempMasterShortAddress* field of the GP Response command payload carrying the short address of the DUT-GPP; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to the endpoint E supported by TH-GPD. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* 0xff.	
3D	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Transmit on endpoint match = 0b0, endpoint matching*** TH-GPS sends a broadcast GP Response command, with *TempMasterShortAddress* field of the GP Response command payload carrying the short address of the DUT-GPP; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b0; the *Endpoint* field is set to the endpoint E supported by TH-GPD. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* E.	
3E	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Transmit on endpoint match = 0b0, endpoint not matching (0x00)*** TH-GPS sends a broadcast GP Response command, with *TempMasterShortAddress* field of the GP Response command payload carrying the short address of the DUT-GPP; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b0; the *Endpoint* field is set to the endpoint 0x00 supported by TH-GPD. TH-GPD sends Data GPDF with *RxAfterTx* set, with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* E.	
4A	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Endpoint field and multi-proxy operation (Transmit on endpoint match = 0b1, same endpoint):*** TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the DUT-GPP, for AttributeID 0xMMMM; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to the endpoint E supported by TH-GPD. TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress* field of the GPD Response command payload carrying a short address NOT equal to that of the DUT-GPP, for AttributeID 0xNNNN; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to the endpoint E supported by TH-GPD. TH-GPD sends a Data GPDF with *RxAfterTx* set; with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* E.	
4B	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Endpoint field and multi-proxy operation (Transmit on endpoint match = 0b1, different endpoint):*** TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the DUT-GPP, for AttributeID 0xMMMM; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to the endpoint E supported by TH-GPD.	

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		TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress* field of the GPD Response command payload carrying a short address NOT equal to that of the DUT-GPP, for AttributeID 0xNNNN; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to the endpoint F supported by TH-GPD. TH-GPD sends a Data GPDF with *RxAfterTx* set; with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* E.	
4C	[R3] A.1.4, A.3.3.5.4, A.3.5.2.1, A.1.5.2	***Endpoint field and multi-proxy operation (Transmit on endpoint match = 0b0, different endpoint):*** TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress* field of the GPD Response command payload carrying the short address of the DUT-GPP, for AttributeID 0xMMMM; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b1; the *Endpoint* field is set to the endpoint E supported by TH-GPD. TH-GPS sends GP Response command in broadcast, with *TempMasterShortAddress* field of the GPD Response command payload carrying a short address NOT equal to that of the DUT-GPP, for AttributeID 0xNNNN; the *Transmit on endpoint match* sub-field of the *Options* field is set 0b0; the *Endpoint* field is set to the endpoint F supported by TH-GPD. TH-GPD sends a Data GPDF with *RxAfterTx* set; with *ApplicationID* = 0b010, *GPD IEEE address* N, and GPD *Endpoint* E.	

1907 ***5.5.2.2.3 Expected Outcome***

Pass verdict:
1) Upon receipt of the first Data GPDF, DUT-GPP sends GP Notification in the communication mode corresponding to Z1; with the *gpTxQueueFull* sub-field of the *Options* field set to 0b0, the *RxAfterTx* sub-field of the *Options* field set to 0b1, the *ProxyInfoPresent* sub-field of the *Options* field set to 0b1; and the *GPP short address* field present and carrying the short address of the DUT-GPP and the *GPP-GPD link* field present. TH-GPS executes the GPD command from the GP Notification. Upon reception of GP Response, DUT-GPP does NOT immediately send the Data GPDF with the GPD CommandID and GPD Command payload copied from the GP Response command. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the second Data GPDF with *RxAfterTx* set to 0b1, the DUT-GPP sends at least one Data GPDF with: • Any MAC sequence number; • MAC Destination address field carrying the GPD IEEE address of the TH-GPD N; • *SrcID* field absent; • *Endpoint* field present and carrying the value of TH-GPD endpoint E; • sub-fields of the *NWK Frame Control* field set to: ▪ *FrameType* = 0b00; ▪ *ZigBeeProtocolVersion* = 0x3; ▪ *Auto-Commissioning* 0b0; ▪ *NWK Frame Control Extension* 0b1; • *Extended NWK Frame Control* field present and its sub-fields: ▪ *ApplicationID* set to 0b010; ▪ *SecurityLevel* = 0b00 and *SecurityKey* = 0b0 (as in the triggering Data GPDF); ▪ *RxAfterTx* set to 0b0; ▪ *Direction* set to 0b1; • GPD CommandID and GPD Command payload copied from the GP Response command. The GPFS transmission SHALL NOT exceed *gpTxDuration*. Then, DUT-GPP sends GP Notification, with the *gpTxQueueFull* sub-field of the *Options* field set to 0b0, the *RxAfterTx* sub-field of the *Options* field set to 0b1, the *ProxyInfoPresent* sub-field of the *Options* field set to 0b1; and the *GPP short address* field present and carrying the short address of the DUT-GPP and the *GPP-GPD link* field present. If the GPD Command was Request Attributes, some time later the TH-GPD shall send Data GPDF with Read Attributes Response command carrying the value of the requested attribute.

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2A) DUT-GPP does NOT send a GPDF upon reception of Data GPDF with *Endpoint* 0x00 or 0xff. It SHALL send GP Notification to all sinks paired with this GPD IEEE address (i.e., Z1 and Z2); the *Endpoint* field carries the value copied from the Data GPDF. DUT-GPP does NOT send a GPDF upon reception of Data GPDF with *Endpoint* G (from the range 0x01 – 0xf0). It SHALL NOT send any unicast or groupcast GP Notification to any sinks paired with this GPD IEEE address. If the DUT-GPP supports Proxy Table Maintenance functionality, DUT-GPP MAY send GP Pairing Search or broadcast GP Notification; the *Endpoint* field carries the value copied from the Data GPDF. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* E DUT-GPP sends at least one Data GPDF for AttributeID = 0xMMMM, with Endpoint = E; the GPFS transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP sends GP Notification to the sink(s) Z1 paired with endpoint E. Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* F DUT-GPP sends at least one Data GPDF for AttributeID = 0xNNNN, with Endpoint = F. DUT-GPP sends GP Notification to the sink(s) Z2 paired with endpoint F; the GPFS transmission SHALL NOT exceed *gpTxDuration*.
2B) DUT-GPP does NOT send a GPDF upon reception of Data GPDF with *Endpoint* 0xff. It SHALL send GP Notification to all sinks paired with this GPD IEEE address (i.e. Z1 and Z2); the *Endpoint* field carries the value copied from the Data GPDF (0xff). DUT-GPP does NOT send a GPDF upon reception of Data GPDF with *Endpoint* E. It SHALL send GP Notification to sink(s) Z1 paired with endpoint E; the *Endpoint* field carries the value copied from the Data GPDF (E). Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* 0x00 DUT-GPP sends at least one Data GPDF with Endpoint = 0x00; the GPFS transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP sends GP Notification to the all sink(s) paired with GPD IEEE address N (i.e. Z1 and Z2); the *Endpoint* field carries the value copied from the Data GPDF (0x00).
2C) DUT-GPP does NOT send a GPDF upon reception of Data GPDF with *Endpoint* 0x00. It SHALL send GP Notification to all sinks paired with this GPD IEEE address (i.e., Z1 and Z2); the *Endpoint* field carries the value copied from the Data GPDF (0x00). DUT-GPP does NOT send a GPDF upon reception of Data GPDF with *Endpoint* E. It SHALL send GP Notification to sink(s) Z1 paired with endpoint E; the *Endpoint* field carries the value copied from the Data GPDF (E). Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* 0xFF DUT-GPP sends at least one Data GPDF with Endpoint = 0xFF; the GPFS transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP sends GP Notification to the all sink(s) paired with GPD IEEE address N (i.e. Z1 and Z2); the *Endpoint* field carries the value copied from the Data GPDF (0xff).
3A) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* F DUT-GPP sends at least one Data GPDF with Endpoint E; the GPFS transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP sends GP Notification with *Endpoint* F to the all sink(s) Z2 paired with GPD IEEE address N, Endpoint F.
3B) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* 0x00 DUT-GPP sends at least one Data GPDF with Endpoint E; the GPFS transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP sends GP Notification with Endpoint 0x00 to the all sink(s) paired with GPD IEEE address N (Z1 and Z2).
3C) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* 0xff DUT-GPP sends at least one Data GPDF with Endpoint 0xFF; the GPFS transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP sends GP Notification with Endpoint 0xff to the all sink(s) paired with GPD IEEE address N (Z1 and Z2).
3D) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* E DUT-GPP sends at least one Data GPDF with Endpoint E; the GPFS transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP sends GP Notification with Endpoint E to the all sink(s) Z1 paired with GPD IEEE address N, Endpoint E.
3E) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* E DUT-GPP sends at least one Data GPDF with Endpoint 0x00; the GPFS transmission SHALL NOT exceed *gpTxDuration*. DUT-GPP sends GP Notification with Endpoint E to the all sink(s) Z1 paired with GPD IEEE address N, Endpoint E.
4A) DUT-GPP does NOT send Data GPDF on reception of Data GPDF with GPD *Endpoint* E. DUT-GPP sends GP Notification to the all sink(s) Z1 paired with GPD IEEE address N, Endpoint E.
4B) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* E DUT-GPP sends at least one Data GPDF with Endpoint E, for AttributeID 0xMMMM; the GPFS transmission SHALL NOT exceed *gpTxDuration*.

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DUT-GPP sends GP Notification to the all sink(s) Z1 paired with GPD IEEE address N, Endpoint E.
4C) DUT-GPP does NOT send Data GPDF on reception of Data GPDF with GPD *Endpoint* E. DUT-GPP sends GP Notification to the all sink(s) Z1 paired with GPD IEEE address N, Endpoint E.
Fail verdict:
1) DUT-GPP does not send GP Notification formatted as defined in item 1 above. AND/OR TH-GPS does not execute the GPD command. AND/OR DUT-GPP does send Data GPDF immediately after GP Response reception. AND/OR DUT-GPP does NOT send at least one Data GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with *RxAfterTx* set to 0b1, formatted as specified in item 1 above AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR DUT-GPP does not send GP Notification. AND/OR TH-GPS does not execute the GPD command. AND/OR If the GPD Command was Request Attributes, TH-GPD does not send Data GPDF with Request Attributes Response.
2A) Upon reception of Data GPDF with *Endpoint* 0x00 or 0xff, DUT-GPP sends a GPDF. AND/OR it does NOT send GP Notification to all sinks paired with this GPD IEEE address (Z1 and Z2); and/or the *Endpoint* field does NOT carry the value copied from the Data GPDF. AND/OR upon reception of Data GPDF with *Endpoint* G (from the range 0x01 – 0xf0), DUT-GPP sends a GPDFAND/OR it sends any unicast or groupcast GP Notification to any sinks paired with this GPD IEEE address. AND/OR If DUT-GPP sends GP Pairing Search or broadcast GP Notification; the *Endpoint* field does NOT carry the value copied from the Data GPDF. AND/OR Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* E DUT-GPP does NOT send at least one Data GPDF for AttributeID = 0xMMMM, with Endpoint = E AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR DUT-GPP does NOT sends GP Notification with Endpoint E to the sink(s) Z1 paired with endpoint E. AND/OR Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* F DUT-GPP does NOT send at least one Data GPDF for AttributeID = 0xMMMM, with Endpoint = F AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR DUT-GPP does NOT send GP Notification with Endpoint F to the sink(s) Z2 paired with endpoint F.
2B) Upon reception of Data GPDF with *Endpoint* 0xff DUT-GPP sends a GPDFAND/OR it does NOT send GP Notification to all sinks paired with this GPD IEEE address (Z1 and Z2); AND/OR the *Endpoint* field does NOT carry the value copied from the Data GPDF (0xff). AND/OR Upon reception of Data GPDF with *Endpoint* E DUT-GPP sends a GPDF upon reception of Data GPDF with *Endpoint* E AND/OR it does NOT send GP Notification to sink(s) Z1 paired with endpoint E. AND/OR Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* 0x00 DUT-GPP does NOT send at least one Data GPDF with Endpoint = 0x00 AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR DUT-GPP does NOT sends GP Notification to the all sink(s) paired with GPD IEEE address N (Z1 and Z2).
2C) Upon reception of Data GPDF with *Endpoint* 0x00 DUT-GPP sends a GPDF AND/OR it does NOT send GP Notification to all sinks paired with this GPD IEEE address (Z1 and Z2); and/or the *Endpoint* field does NOT carry the value copied from the Data GPDF (0x00). AND/OR upon reception of Data GPDF with *Endpoint* E DUT-GPP sends a GPDF AND/OR it does NOT send GP Notification with Endpoint E to sink(s) Z1 paired with endpoint E. AND/OR Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* 0xFF DUT-GPP does NOT sends at least one Data GPDF with Endpoint = 0xFF AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR DUT-GPP does NOT send GP Notification with Endpoint 0xff to the all sink(s) paired with GPD IEEE address N (Z1 and Z2).
3A) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* F DUT-GPP does NOT send at least one Data GPDF with Endpoint E AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR DUT-GPP does NOT send GP Notification with Endpoint F to the all sink(s) Z2 paired with GPD IEEE address N, Endpoint F (Z2).
3B) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* 0x00 DUT-GPP does NOT send at least one Data GPDF with Endpoint E AND/OR the GPFS transmission

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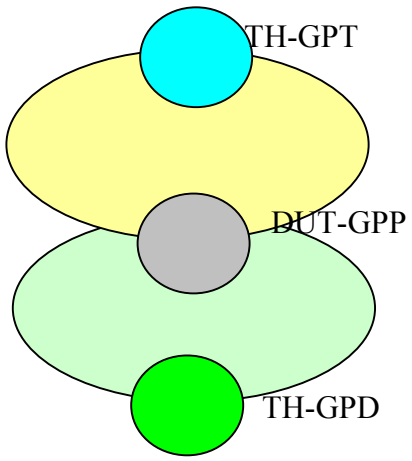
exceeds *gpTxDuration*. AND/OR DUT-GPP does NOT send GP Notification with Endpoint 0x00 to the all sink(s) paired with GPD IEEE address N (Z1 and Z2).
3C) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* 0xff DUT-GPP does NOT send at least one Data GPDF with Endpoint E AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR DUT-GPP does NOT send GP Notification with endpoint 0xff to the all sink(s) paired with GPD IEEE address N (Z1 and Z2).
3D) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* E DUT-GPP does NOT send at least one Data GPDF with Endpoint E AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR DUT-GPP does NOT send GP Notification with Endpoint E to the all sink(s) Z1 paired with GPD IEEE address N, Endpoint E.
3E) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* E DUT-GPP does NOT send at least one Data GPDF with Endpoint 0x00; AND/OR the GPFS transmission exceeds *gpTxDuration*. DUT-GPP sends GP Notification with Endpoint E to the all sink(s) Z1 paired with GPD IEEE address N, Endpoint E.
4A) DUT-GPP sends Data GPDF on reception of Data GPDF with GPD *Endpoint* E. AND/OR DUT-GPP does NOT send GP Notification to the all sink(s) Z1 paired with GPD IEEE address N, Endpoint E.
4B) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of Data GPDF with GPD *Endpoint* E DUT-GPP does NOT send at least one Data GPDF with Endpoint E, for AttributeID 0xMMMM AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR DUT-GPP does NOT send GP Notification to the all sink(s) Z1 paired with GPD IEEE address N, Endpoint E.
4A) DUT-GPP sends Data GPDF on reception of Data GPDF with GPD *Endpoint* E. AND/OR DUT-GPP does NOT send GP Notification to the all sink(s) Z1 paired with GPD IEEE address N, Endpoint E.

5.5.3 NOT TESTED: Secured bidirectional operation

If supported by the DUT, each test in this section shall be repeated for TH-GPD using ApplicationID = 0b000 and ApplicationID = 0b010.

5.5.3.1.1 Initial conditions

The required network set-up for the test harness is as follows:



TH-GPT	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific TH-GPT's GPEP supports the application functionality of the TH-GPD (see Section A.4.3 of [R3]).
DUT-GPP	PANId=same PANId as TH-GPT Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific
TH-GPD	GPD ID = Z TH-GPD supports the application functionality of the TH-GPT (see Section A.4.3 of [R3]).

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPT and DUT-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.9, A.3.4.2.2	A pairing is established between the TH-GPD and TH-GPT (e.g. as a result of any of the commissioning procedures). The corresponding information is also included in DUT-GPP (e.g. as a result of any of the commissioning procedures).	

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5.5.3.1.2 Test Set-Up

The TH-GPT shall be in wireless communication proximity of TH-GPP and DUT-GPP; and the DUT-GPP shall be in wireless communication proximity of the TH-GPD.

A packet sniffer shall be observing the communication over the air interface.

5.5.3.2 Subcase: Bidirectional operation with SecurityLevel = 0b01 (deprecated)

5.5.3.3 NOT TESTED: Subcase: Bidirectional operation with SecurityLevel = 0b10, ApplicationID = 0b000

5.5.3.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.9, A.3.3.3.1, A.3.3.3.2	A pairing is established between TH-GPD (with *ApplicationID* = 0b000, *SrcID* = N), DUT-GPP and TH-GPS, with a shared GP security key (securityKeyType = 0b011) for SecurityLevel = 0b10.	

5.5.3.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.1.4, A.1.5.4, A.4.2.6.3	TH-GPD sends a Data GPDF with *RxAfterTx* set to 0b1, protected with the correct gpsSecurityLevel, correct frame counter value 0x000000OO, correct key type and key; with MAC sequence number 0xOO.	
1B	[R3] A.1.4, A.1.5.4, A.4.2.6.3	TH-GPS sends GP Response to DUT-GPP, carrying GPD command; the GPD command has observable effect on TH-GPD (e.g. GPD Read Attributes command). Shortly thereafter, TH-GPD sends a Data GPDF with *RxAfterTx* set to 0b1, correctly protected with the correct gpsSecurityLevel, correct frame counter value 0x000000NN>=0x000000OO+1, correct key type and key; with MAC sequence number 0xNN.	
2	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (wrong key):*** TH-GPS sends GP Response to DUT-GPP, carrying GPD command. TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, protected with a correct security level (0b10), correct frame counter value and MAC sequence number (=M>=N+1), correct key type (0b0) but wrong key, thus resulting in incorrect MIC value.	Note: make sure the gpTxQueue entry in the DUT-GPP did not expire; if required; re-send the GP Response from the TH-GPS/TH-Tool.
3	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (wrong key type):*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, protected with a correct security level (0b10), correct frame counter and MAC sequence number value (=P>=M+1), correct key but wrong key type (0b1).	
4	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (unprotected frame):*** TH-GPD sends an unprotected Data GPDF with *RxAfterTx* = 0b1, with correct frame counter and MAC sequence number value (=Q>=P+1). (SecurityLevel = 0b00).	
5	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (lower security level):*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, with correct frame counter and MAC sequence number value (=R>=Q+1), correct key and key type, but wrong security level. (SecurityLevel = 0b01).	
6	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (replayed frame):*** TH-GPD sends a correctly secured replayed frame (with old frame counter 0x000000NN and MAC sequence number 0xNN).	
7	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Positive test: correctly protected frame:*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, correctly formatted and protected, with security frame counter 0x000000MM>=0x000000NN+1.	

5.5.3.3.3 Expected Outcome

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Pass verdict:
1A) DUT-GPP forwards GP Notification command, with the following values of the sub-fields of the *Options* field: *SecurityLevel* = 0b10, *SecurityKeyType* = 0b011, and *GPD security frame counter* = 0x000000OO.
1B) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with frame counter value M, DUT-GPP sends at least one Data GPDF with: • MAC header: ▪ MAC Sequence number field having any value; • *NWK Frame Control* sub-fields: *Frame type* = 0b00, *ZigBee Protocol Version*=0x3, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • *Extended NWK Frame Control* sub-fields: *ApplicationID* =0b000, *SecurityLevel* = 0b10, *SecurityKey* = 0b0, *RxAfterTx* = 0b0, *Direction* = 0b1; • 4B *SecurityFrameCounter* field present and set to 0x000000NN; • SrcID field = set to TH-GPD's SrcID N; • Endpoint field absent; • MIC field of 4B present; • *GPD CommandID* field is present and having the value as in the GP Response command; • *GPD Command payload* field as in the GP Response command. TH-GPD correctly receives, security processes and executes the GPD command. The GPFS transmission by DUT-GPP SHALL NOT exceed *gpTxDuration*.
2) – 6) DUT-GPP does NOT send Data GPDF to the TH-GPD.
7) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with frame counter value M, DUT-GPP sends at least one Data GPDF, formatted exactly as in 5.5.3.3.3/pass verdict 1, only with security frame counter 0x000000MM and GPD CommandID and payload as in the GP Response from 5.5.3.3.3/step 2.
Fail verdict:
1A) DUT-GPP does NOT forward GP Notification command, formatted exactly as specified in 5.5.3.3.3/pass verdict 1A above.
1B) DUT-GPP does not send at least one Data GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx,* formatted exactly as specified in 5.5.3.3.3/pass verdict 1B above, AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR TH-GPD does not correctly security process the command.
2) – 6) DUT-GPP does send Data GPDF to the TH-GPD.
7) DUT-GPP does not send at least one Data GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx,* formatted exactly as specified in 5.5.3.3.3/pass verdict 7 above, AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR TH-GPD does not correctly security process the command.

5.5.3.4 NOT TESTED: Subcase: Bidirectional operation with SecurityLevel = 0b11, ApplicationID = 0b000

5.5.3.4.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.9, A.3.3.3.1, A.3.3.3.2	A pairing is established between TH-GPD (with *ApplicationID* = 0b000, *SrcID* = N), DUT-GPP and TH-GPS, using a shared GP security key (securityKeyType = 0b010) for SecurityLevel = 0b11.	

5.5.3.4.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.1.4, A.1.5.4, A.4.2.6.3	TH-GPD sends a Data GPDF with RxAfterTx set to 0b1, protected with the correct gpsSecurityLevel (0b11), correct frame counter value 0x000000OO, correct key type and key; with MAC sequence number 0xOO.	

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1B	[R3] A.1.4, A.1.5.4, A.4.2.6.3	TH-GPS sends GP Response to DUT-GPP, carrying GPD command; the GPD command has observable effect on TH-GPD (e.g. GPD Read Attributes command). Shortly thereafter, TH-GPD sends a Data GPDF with RxAfterTx set to 0b1, correctly protected with the correct gpsSecurityLevel, correct frame counter value 0x000000NN>=0x000000OO+1, correct key type and key; with MAC sequence number 0xNN. If the written GPD attribute is readable/reportable, check if the TH-GPD did correctly receive/security process the value.	
2	[R3] A.1.4, A.1.5.4, A.4.2.6.3	TH-GPS sends GP Response to DUT-GPP, carrying GPD Write attribute command, for attribute Y and attribute value Z. ***Negative test (wrong key):*** TH-GPD sends a Data GPDF with RxAfterTx = 0b1, protected with a correct security level (0b11), correct frame counter value and MAC sequence number (=M>=N+1), correct key type (0b0) but wrong key.	Note: make sure the gpTxQueue entry in the DUT-GPP did not expire; if required; re-send the GP Response from the TH-GPS/TH-Tool.
3	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (wrong key type):*** TH-GPD sends a Data GPDF with RxAfterTx = 0b1, protected with a correct security level (0b11), correct frame counter and MAC sequence number value (=P>=M+1), correct key but wrong key type (0b1).	
4	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (unprotected frame):*** TH-GPD sends an unprotected Data GPDF with RxAfterTx = 0b1, with correct frame counter and MAC sequence number value (=Q>=P+1). (SecurityLevel = 0b00).	
5	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (lower security level):*** TH-GPD sends a Data GPDF with RxAfterTx = 0b1, with correct frame counter and MAC sequence number value (=R>=Q+1), correct key and key type, but wrong security level. (SecurityLevel = 0b10).	
6	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (replayed frame):*** TH-GPD sends a correctly secured replayed frame (with old frame counter 0x000000NN and MAC sequence number 0xNN).	
7	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Positive test: correctly protected frame:*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, correctly formatted and protected, with security frame counter 0x000000MM>=0x000000NN+1.	

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Pass verdict:
1A) DUT-GPP forwards GP Notification command, with the following values of the sub-fields of the *Options* field: *SecurityLevel* = 0b11, *SecurityKeyType* = 0b010, *RxAfterTx* = 0b1, and *GPD security frame counter* = 0x000000OO.
1B) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with frame counter value M, DUT-GPP sends at least one Data GPDF with: • MAC header: ▪ Sequence number field having any value; • *NWK Frame Control* sub-fields: *Frame type* = 0b00, *ZigBee Protocol Version*=0x3, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • *Extended NWK Frame Control* sub-fields: *ApplicationID* =0b000, *SecurityLevel* = 0b10, *SecurityKey* = 0b0 (shared), *RxAfterTx* = 0b0, *Direction* = 0b1; • *SecurityFrameCounter* field present and set to 0x000000NN; • SrcID field = N • *Endpoint* field absent; • the *MIC* field of 4B present; • *GPD CommandID* field is present and *GPD Command payload* from GP Response command encrypted. TH-GPD correctly receives, security processes and executes the GPD command. The GPFS transmission SHALL NOT exceed *gpTxDuration.*
2) – 6) DUT-GPP does NOT send Data GPDF to the TH-GPD.
7) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with frame

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counter value M, DUT-GPP sends at least one Data GPDF, formatted exactly as in 5.5.3.4.3/pass verdict 1, only with security frame counter 0x000000MM and GPD CommandID and payload as in the GP Response from 5.5.3.4.3/step 2.
Fail verdict:
1A) DUT-GPP does NOT forward GP Notification command, formatted exactly as specified in 5.5.3.4.3/pass verdict 1A above.
1B) DUT-GPP does not send at least one Data GPDF, formatted exactly as specified in 5.5.3.4.3/item 1B above, between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx* AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR TH-GPD does not correctly execute the command.
2) – 6) DUT-GPP does send Data GPDF to the TH-GPD.
7) DUT-GPP does not send at least one Data GPDF between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx,* formatted exactly as specified in 5.5.3.4.3/pass verdict 7 above, AND/OR the GPFS transmission exceeds *gpTxDuration*. AND/OR TH-GPD does not correctly security process the command.

5.5.3.5 NOT TESTED: Advanced only: Subcase: Bidirectional operation with SecurityLevel = 0b10, ApplicationID = 0b010

5.5.3.5.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.9, A.3.3.3.1, A.3.3.3.2	A pairing is established between TH-GPD (with ApplicationID = 0b010, GPD IEEE address = N, Endpoint = Z), DUT-GPP and TH-GPS, with an individual derived GPD security key (securityKeyType = 0b111) for SecurityLevel = 0b10.	

5.5.3.5.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1A	[R3] A.1.4, A.1.5.4, A.4.2.6.3	TH-GPD sends a Data GPDF with *RxAfterTx* set to 0b1, protected with the correct gpsSecurityLevel, correct frame counter value 0x000000OO, correct key type and key; with MAC sequence number 0xOO.	
1B	[R3] A.1.4, A.1.5.4, A.4.2.6.3	TH-GPS sends GP Response to DUT-GPP, carrying GPD command; the GPD command has observable effect on TH-GPD (e.g. GPD Read Attributes command). Shortly thereafter, TH-GPD sends a Data GPDF with *RxAfterTx* set to 0b1, correctly protected with the correct gpsSecurityLevel, correct frame counter value 0x000000NN>=0x000000OO+1, correct key type and key; with MAC sequence number 0xNN.	
2	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (wrong key):*** TH-GPS sends GP Response to DUT-GPP, carrying GPD command. TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, protected with a correct security level (0b10), correct frame counter value and MAC sequence number (=M>=N+1), correct key type (0b0) but wrong key, thus resulting in incorrect MIC value.	Note: make sure the gpTxQueue entry in the DUT-GPP did not expire; if required; re-send the GP Response from the TH-GPS/TH-Tool.
3	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (wrong key type):*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, protected with a correct security level (0b10), correct frame counter and MAC sequence number value (=P>=M+1), correct key but wrong key type (0b1).	
4	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (unprotected frame):*** TH-GPD sends an unprotected Data GPDF with *RxAfterTx* = 0b1, with correct frame counter and MAC sequence number value (=Q>=P+1). (SecurityLevel = 0b00).	
5	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (lower security level):*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, with correct frame counter and MAC sequence number value (=R>=Q+1), correct key and key type, but wrong security level. (SecurityLevel = 0b01).	

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6	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (replayed frame):*** TH-GPD sends a correctly secured replayed frame (with old frame counter 0x000000NN and MAC sequence number 0xNN).	
7	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Positive test: correctly protected frame:*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, correctly formatted and protected, with security frame counter 0x000000MM>=0x000000NN+1.	

5.5.3.5.3 Expected Outcome

Pass verdict:
1A) DUT-GPP forwards GP Notification command, with the following values of the sub-fields of the *Options* field: *SecurityLevel* = 0b10, *SecurityKeyType* = 0b111, *RxAfterTx* = 0b1, and *GPD security frame counter* = 0x000000OO.
1B) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with frame counter value M, DUT-GPP sends at least one Data GPDF with: • MAC header: ▪ MAC Sequence number field having any value; ▪ MAC Destination address field present and carrying the TH-GPD's IEEE address N; • *NWK Frame Control* sub-fields: *Frame type* = 0b00, *ZigBee Protocol Version*=0x3, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • *Extended NWK Frame Control* sub-fields: *ApplicationID* = 0b010, *SecurityLevel* = 0b10, *SecurityKey* = 0b1 (individual), *RxAfterTx* = 0b0, *Direction* = 0b1; • 4B *SecurityFrameCounter* field present and set to 0x000000NN, • SrcID field absent: • Endpoint = Z; • MIC field of 4B present; • *GPD CommandID* field is present and having the value as in the GP Response command; • *GPD Command payload* field as in the GP Response command. TH-GPD correctly receives, security processes and executes the GPD command. The GPFS transmission of DUT-GPP SHALL NOT exceed *gpTxDuration*.
2) – 6) DUT-GPP does NOT send Data GPDF to the TH-GPD.
7) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with frame counter value M, DUT-GPP sends at least one Data GPDF, formatted exactly as in 5.5.3.5.3/pass verdict 1, only with security frame counter 0x000000MM and GPD CommandID and payload as in the GP Response from 5.5.3.5.3/step 2.
Fail verdict:
1A) DUT-GPP does NOT forward GP Notification command, formatted exactly as specified in 5.5.3.5.3/pass verdict 1A above.
1B) DUT-GPP does not send at least one Data GPDF, formatted exactly as specified in 5.5.3.5.3/pass verdict 1B above, between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx* AND/OR the GPFS transmission by DUT-GPP exceeds *gpTxDuration*. AND/OR TH-GPD does not correctly security process the command.
2) – 6) DUT-GPP does send Data GPDF to the TH-GPD.
7) DUT-GPP does not send at least one Data GPDF, formatted exactly as specified in 5.5.3.5.3/pass verdict 7 above, between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx* AND/OR the GPFS transmission by DUT-GPP exceeds *gpTxDuration*. AND/OR TH-GPD does not correctly security process the command.

5.5.3.6 NOT TESTED: Advanced GP only: Subcase: Bidirectional operation with SecurityLevel = 0b11, ApplicationID = 0b010

5.5.3.6.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.9, A.3.3.3.1, A.3.3.3.2	A pairing is established between TH-GPD (with ApplicationID = 0b010, GPD IEEE address = N, Endpoint = Z), DUT-GPP and TH-GPS, with an OOB security key (securityKeyType = 0b100) for SecurityLevel = 0b11.	

5.5.3.6.2 Test Procedure

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Item	Doc. Ref.	Test Step	Note
1A	[R3] A.1.4, A.1.5.4, A.4.2.6.3	TH-GPD sends a Data GPDF with *RxAfterTx* set to 0b1, protected with the correct gpsSecurityLevel, correct frame counter value 0x000000OO, correct key type and key; with MAC sequence number 0xOO.	
1B	[R3] A.1.4, A.1.5.4, A.4.2.6.3	TH-GPS sends GP Response to DUT-GPP, carrying GPD command; the GPD command has observable effect on TH-GPD (e.g. GPD Read Attributes command). Shortly thereafter, TH-GPD sends a Data GPDF with *RxAfterTx* set to 0b1, correctly protected with the correct gpsSecurityLevel, correct frame counter value 0x000000NN>=0x000000OO+1, correct key type and key; with MAC sequence number 0xNN.	
2	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (wrong key):*** TH-GPS sends GP Response to DUT-GPP, carrying GPD command. TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, protected with a correct security level (0b10), correct frame counter value and MAC sequence number (=M>=N+1), correct key type (0b0) but wrong key, thus resulting in incorrect MIC value.	Note: make sure the gpTxQueue entry in the DUT-GPP did not expire; if required; re-send the GP Response from the TH-GPS/TH-Tool.
3	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (wrong key type):*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, protected with a correct security level (0b10), correct frame counter and MAC sequence number value (=P>=M+1), correct key but wrong key type (0b1).	
4	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (unprotected frame):*** TH-GPD sends an unprotected Data GPDF with *RxAfterTx* = 0b1, with correct frame counter and MAC sequence number value (=Q>=P+1). (SecurityLevel = 0b00).	
5	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (lower security level):*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, with correct frame counter and MAC sequence number value (=R>=Q+1), correct key and key type, but wrong security level. (SecurityLevel = 0b10).	
6	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Negative test (replayed frame):*** TH-GPD sends a correctly secured replayed frame (with old frame counter 0x000000NN and MAC sequence number 0xNN).	
7	[R3] A.1.4, A.1.5.4, A.4.2.6.3	***Positive test: correctly protected frame:*** TH-GPD sends a Data GPDF with *RxAfterTx* = 0b1, correctly formatted and protected, with security frame counter 0x000000MM>=0x000000NN+1.	

5.5.3.6.3 Expected Outcome

Pass verdict:
1A) DUT-GPP forwards GP Notification command, with the following values of the sub-fields of the *Options* field: *SecurityLevel* = 0b11, *SecurityKeyType* = 0b100, *RxAfterTx* = 0b1, and *GPD security frame counter* = 0x000000OO.
1B) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with frame counter value M, DUT-GPP sends at least one Data GPDF with: • MAC header: ▪ MAC Sequence number field having any value; ▪ MAC Destination address field present and carrying the TH-GPD's IEEE address N; • *NWK Frame Control* sub-fields: *Frame type* = 0b00, *ZigBee Protocol Version*=0x3, *Auto-Commissioning* = 0b0, *NWK Frame Control Extension* = 0b1; • *Extended NWK Frame Control* sub-fields: *ApplicationID* = 0b010, *SecurityLevel* = 0b11, *SecurityKey* = 0b1 (individual), *RxAfterTx* = 0b0, *Direction* = 0b1; • 4B *SecurityFrameCounter* field present and set to 0x000000NN, • SrcID field absent: • Endpoint = Z; • MIC field of 4B present; • *GPD CommandID* field is present and having the value as in the GP Response command; • *GPD Command payload* field as in the GP Response command.

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TH-GPD correctly receives, security processes and executes the GPD command. The GPFS transmission of DUT-GPP SHALL NOT exceed *gpTxDuration*.
2) – 6) DUT-GPP does NOT send Data GPDF to the TH-GPD.
7) Between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with frame counter value M, DUT-GPP sends at least one Data GPDF, formatted exactly as in 5.5.3.6.3/pass verdict 1, only with security frame counter 0x000000MM and GPD CommandID and payload as in the GP Response from 5.5.3.6.3/step 2.
Fail verdict:
1A) DUT-GPP does NOT forward GP Notification command, formatted exactly as specified in 5.5.3.6.3/pass verdict 1A above.
1B) DUT-GPP does not send at least one Data GPDF, formatted exactly as specified in 5.5.3.6.3/pass verdict 1B above, between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx* AND/OR the GPFS transmission by DUT-GPP exceeds *gpTxDuration*. AND/OR TH-GPD does not correctly security process the command.
2) – 6) DUT-GPP does send Data GPDF to the TH-GPD.
7) DUT-GPP does not send at least one Data GPDF, formatted exactly as specified in 5.5.3.6.3/pass verdict 7 above, between *gpTxOffset* and *gpTxOffset+gpMaxTxOffsetVariation* ms after reception of the Data GPDF with *RxAfterTx* AND/OR the GPFS transmission by DUT-GPP exceeds *gpTxDuration*. AND/OR TH-GPD does not correctly security process the command.

5.5.3.7 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF8	Is Multi-hop bidirectional operation supported as a client?	Direct
GPF107	Is transmission of GPD Write Attributes command supported?	Direct

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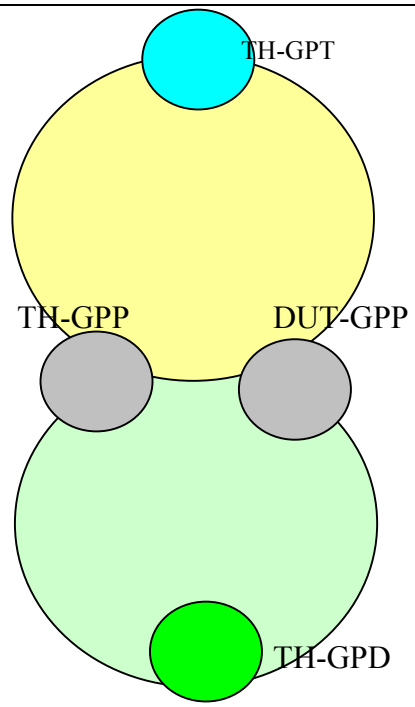
5.6 NOT TESTED: Advanced GP only: Advanced proxy operation: Proxy Table maintenance

5.6.1.1 Initial Conditions

The required network set-up for the test harness is as follows:



TH-GPT/ TH-Tool	PANId= Generated in a random manner (within the range 0x0001 to 0x3FFF) Logical Address = Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific TH-GPT's GPEP supports the application functionality of the TH-GPD (see Section A.4.3 of [R3]).
TH-GPP	PANId=same PANId as TH-GPT Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific Not a member of the group with group ID 0x5678.
DUT-GPP	PAN id=same PANID as TH-GPT Logical Address=Generated in a random manner (within the range 0x0000 to 0xFFF7) IEEE address=manufacturer-specific Not a member of the group with GroupID 0x5678.
TH GPD	GPD ID = N TH-GPD supports the application functionality of the TH-GPT (see Section A.4.3 of [R3]).

Item	Doc. Ref.	Initial Conditions	Note
1		TH-GPT, TH-GPP and DUT-GPP operate in the same ZigBee PAN. They may join a ZigBee network created by another device, or one of them may start as ZC.	
2	[R3] A.3.9	A pairing is established between TH-GPD and TH-GPT, employing unicast communication and gpdSecurityLevel = 0b10. TH-GPP stores this pairing information in its *Proxy Table.*	
3	[R3] A.3.4.2.2	The Proxy Table attribute of DUT-GPP does not have an entry with GPD ID = N.	

5.6.1.2 Test Set-Up

DUT-GPP and TH-GPP shall be in wireless communication proximity of TH-GPD, TH-GPT and of each other.

A packet sniffer shall be observing the communication over the air interface.

It shall be possible to read the *Proxy Table* attribute of DUT-GPP.

5.6.2 NOT TESTED: Sub-case: unicast communication

Unless explicitly specified otherwise, the test items in this section follow one another, i.e. devices are NOT re-set or restarted inbetween.

5.6.2.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.9, A.3.4.2.2	A pairing is established between TH-GPD and TH-GPT, employing unicast communication; the *AssignedAlias* sub-field of the Options field of the Sink Table entry is set to 0b0. The pairing uses security, as specified in the test items below. TH-GPP stores this pairing information in its *Proxy Table.*	

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2	[R3] A.3.3.3.1, A.3.3.3.2	TH-GPP, TH-GPS and DUT-GPP are all configured with *gpSharedSecurityKey* K of a shared key type *gpSharedSecurityKeyType* (i.e. 0b001, 0b010, 0b011, 0b111).	

1952 ### 5.6.2.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.2	**Test successful passive &active discovery**: Make TH-GPD send a Data GPDF with Security frame counter N, protected with *gpSharedSecurityKey* K, SecurityLevel = 0b10. TH-GPP sends GP Tunneling Stop with *Also Derived Group* sub-field = 0b1. After the TH-GPT sends GP Pairing command, read the *Proxy Table* attribute of DUT-GPP.	Make sure TH-GPP will send GP Tunneling Stop within gppDiscoveryDelay.
2	[R3] A.3.4.2.2, A.3.5.2.1	***Test SinkAddressList maintenance & FirstToForward takeover:*** Switch TH-GPP off. Make TH-GPS change address and send Device_annce. Read the *Proxy Table* attribute of DUT-GPP. Switch TH-GPS off. Make the TH-GPD send a Data GPDF with Security frame counter M ≥ N + 1, protected with *gpSharedSecurityKey* K, SecurityLevel = 0b10. Read the *Proxy Table* attribute of DUT-GPP.	
3	[R3] A.3.4.2.2, A.3.5.2.1	**Test FirstToForward clean-up:** Switch TH-GPP on. Make sure PROXY TABLE entry for GPD ID is active and valid, and *FirstToForward* set. Make TH-GPP send GP Tunneling Stop for a Data GPDF with a higher Security Frame counter than the last one observed by the DUT-GPP (≥ M+1). Read the *Proxy Table* attribute of DUT-GPP.	
4	[R3] A.3.5.2.2	**Test unsuccessful passive&active discovery:** Clean PROXY TABLE of DUT-GPP. Switch off TH-GPP. Switch off TH-GPT. Make TH-GPD send a Data GPDF with Security frame counter M ≥ N+1, protected with OOB key K2, SecurityLevel = 0b10. At least *gppDiscoveryDuration* after DUT-GPP sends GP Pairing Search command, read the *Proxy Table* and *gppBlockedGPDID* attribute of DUT-GPP.	
5	[R3] A.3.5.2.2	**Test recovery from inactive invalid**: Send GP Pairing for TH-GPD, with Security frame counter M, OOB key K2, SecurityLevel = 0b10. (If the DUT-GPP sends GP Pairing Search command, wait until *gppDiscoveryDuration* expiration and then) Read the *Proxy Table* attribute of DUT-GPP.	
6	[R3] A.3.5.2.2	**Test restart:** Switch DUT-GPP off. Switch DUT-GPP on. Immediately read out the *Proxy Table* attribute of DUT-GPP.	
7	[R3] A.3.5.2.2	**Opt. (only if the DUT does not send GP Pairing Search pro-actively on restart in the previous step): Test unsuccessful passive&active discovery on restart (active invalid):** Switch off TH-GPT. Switch off TH-GPP. Make TH-GPD send a Data GPDF with Security frame counter P ≥ M+1, protected with OOB key K2, SecurityLevel = 0b10. At least *gppDiscoveryDuration* after DUT-GPP sends GP Pairing Search command, read the *Proxy Table* attribute of DUT-GPP.	

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8	[R3] A.3.5.2.2	**Test entry (active invalid) activation by unsolicited GP Pairing:** Make sure DUT-GPP has inactive/invalid PROXY TABLE entry for GPD ID N. (will be result of step 5 and/or 6 above) Switch on TH-GPS. Make TH-GPS send GP Pairing with Security frame counter = P, OOB key K2, SecurityLevel = 0b10. Read the *Proxy Table* attribute of DUT-GPP.	

1953 #### 5.6.2.3 Expected Outcome

Pass verdict:
1) After reception of *GP Tunneling Stop*, DUT-GPP sends a broadcast *GP Notification* command using derived alias as NWK SrcAddr and NWK sequence number set to ((N-14) mod 256), with GPD ID value N. The *Proxy Table* attribute of DUT-GPP contains an entry with GPD ID value N, with the *EntryActive*, *EntryValid*, *Unicast GPS* and *InRange* subfields of the *Options* parameter all have value 0b1, *FirstToForward* set to 0b0, and the *Sink Address List* parameter has an entry containing the IEEE and NWK short address of TH-GPT.
2) The DUT-GPP has a *Proxy Table* entry with GPD ID = N, for which the *EntryActive, EntryValid* and *Unicast GPS* subfields of the *Options* parameter all have value 0b1, and the *Sink address list* parameter has an entry containing the IEEE address and the new NWK short address of TH-GPT, and does NOT have an entry containing old NWK short address of TH-GPT. On Data GPDF reception, DUT-GPP sends a *GP Tunneling Stop* command and then sends a *GP Notification* command in unicast to TH-GPT using its new NWK short address. The DUT-GPP does not send a *GP Notification* command in unicast to the old NWK short address of TH-GPT. The *FirstToForward* subfield of the *Options* parameter of the Proxy Table entry for GPD ID = N has the value 0b1.
3) DUT-GPP does not send a *GP Tunneling Stop* command, nor a *GP Notification* command, nor a *GP Pairing Search command*. The *Proxy Table* attribute of DUT-GPP contains an entry for GPD ID = N, with *Entry Active* and *Entry Valid* sub-fields of the *Options* field all have value 0b1, and the *FirstToForward* subfield has value 0b0.
4) After *gppDiscoveryDelay*, DUT-GPP sends a *Pairing Search* command using derived alias as NWK SrcAddr and NWK sequence number set to ((N-10) mod 256), with GPD ID value N with GPD ID = N with the *RequestUnicastSinks* sub-field of the *Options* field set to 0b1, and *RequestDerivedGroupcastSinks* and *RequestCommissionedGroupcastSinks* set to 0b1, if the DUT-GPP supports the respective functionality. The *Proxy Table* attribute of DUT-GPP contains an entry with GPD ID = N, and subfield of the *Options* parameter have the following values: *EntryActive* set to 0b0, *EntryValid* set to 0b0, *Unicast GPS, Derived Group GPS and Commissioned Group GPS* all set to 0b0; and *InRange* 0b1, and the *Sink Address List* empty. OR if, supported, *gppBlockedGPDID* attribute contains an entry for GPD ID=N.
5) The DUT-GPP may send GP Pairing Search. (If DUT-GPP sends GP Pairing Search, after expiration of *gppDiscoveryDuration*) The *Proxy Table* attribute of DUT-GPP contains an entry with GPD ID = N, and subfield of the *Options* parameter have the following values: *EntryActive* set to 0b1, *EntryValid* set to 0b1, *Unicast GPS* set to 0b1 and *InRange* 0b1, and the *Sink Address List* has an entry containing the IEEE and NWK short address of TH-GPT.
6) The *Proxy Table* attribute of DUT-GPP contains an entry with GPD ID = N, with *EntryActive* 0b1 and *EntryValid* 0b0, *FirstToForward* 0b0 and *HasAllUnicastRoutes* 0b0; and the *Sink Address List* parameter has an entry containing the IEEE and NWK short address of TH-GPT. If DUT-GPP sends GP Pairing Search, it has at least *Request GPD Security frame counter* flag set to 0b1 and the *RequestUnicastSinks* sub-field set to 0b1.
7) Upon reception of Data GPDF, the DUT-GPP sends GP Notification for GPD ID = N in broadcast, using derived alias as NWK SrcAddr and the received MAC sequence number as NWK Sequence Number, and carrying the payload of the Data GPDF. It does not send GP Pairing Search, with GPD ID = N. After *gppDiscoveryDuration*, the *Proxy Table* attribute of DUT-GPP contains an entry with GPD ID = N and the sub-fields of the *Options* parameter have the following values: *EntryActive* set to 0b1, *EntryValid* set to 0b0.
8) *Proxy Table* attribute of DUT-GPP contains an entry with GPD ID = N, and subfield of the *Options* parameter have the following values: *EntryActive* set to 0b1, *EntryValid* set to 0b1, *Unicast GPS* set to 0b1, and the *Sink Address List* parameter has an entry containing the IEEE and NWK short address of TH-GPS.
Fail verdict:
1) After reception of *GP Tunnelling Stop*, DUT-GPP does not send a *GP Pairing Search* formatted as specified above. AND/OR the DUT-GPP does send GP Tunneling Stop and/or unicast/groupcast GP Notification.

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AND/OR the DUT-GPP does not have a *Proxy Table* entry for GPD ID = N, formatted as specified in 5.6.2.3/step 1 above.
2) The DUT-GPP does not have a *Proxy Table* for GPD ID = N, formatted as specified in 5.6.2.3/step 2 above. AND/OR On Data GPDF reception, DUT-GPP does not send a *GP Tunneling Stop* and/or does not send *GP Notification* command in unicast to TH-GPT using its new NWK short address. AND/OR The DUT-GPP does send a *GP Notification* command in unicast to the old NWK short address of TH-GPT. AND/OR After forwarding, the DUT-GPP's Proxy Table entry for GPD ID = N does have FirstToForward = 0b0.
3) DUT-GPP does send a *GP Tunneling Stop* command, and/or a *GP Notification* command, and/or a *GP Pairing Search* command. AND/OR The DUT-GPP does not have *Proxy Table* entry for GPD ID = N, formatted as specified in 5.6.2.3/step 3 above.
4) After *gppDiscoveryDelay*, DUT-GPP does not send a *Pairing Search* command formatted as specified in 5.6.2.3/step 4 above. AND/OR The DUT-GPP does not have any of (i) *Proxy Table* entry for GPD ID = N, formatted as specified in 5.6.2.3/step 5 above (ii) *gppBlockedGPDID* with an entry for *GPD ID* = N.
5) The DUT-GPP does not have *Proxy Table* entry for *GPD ID* = N, formatted as specified in 5.6.2.3/step 5 above.
6) The DUT-GPP does not have *Proxy Table* entry for GPD ID = N, formatted as specified in 5.6.2.3/step 6 above. AND/OR if GP Pairing Search is sent, it is not formatted as specified in 5.6.2.3/item 7 above.
7) The DUT-GPP does not send GP Notification in broadcast, formatted as specified in 5.6.2.3/item 7 above. AND/OR It does send GP Pairing Search. AND/OR After gppDiscoveryDuration, the DUT-GPP does not have *Proxy Table* entry for GPD ID = N, formatted as specified in 5.6.2.3/item 7 above.
8) The DUT-GPP does not send GP Notification in broadcast, formatted as specified in 5.6.2.3/item 8 above. AND/OR It does send GP Pairing Search. AND/OR After *gppDiscoveryDuration*, the DUT-GPP does not have *Proxy Table* entry for GPD ID =N, formatted as specified in 5.6.2.3/item 8 above.

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5.6.3 NOT TESTED: Sub-case: derived groupcast communication

5.6.3.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.9	A pairing is established between TH-GPD and TH-GPT, employing derived groupcast communication.	
2	[R3] A.3.4.2.2	TH-GPP stores an entry for GPD ID = N, preferably with the pairing and FirstToForward bit set. SecurityLevel = 0b010 and OOB key K (key type 0b100) is used.	
3	[R3] A.3.4.2.2	The Proxy Table attribute for DUT-GPP is empty.	It can e.g. occur after restarting the proxy.

5.6.3.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.2	**Test successful active discovery**: Switch TH-GPP off. Make TH-GPD send a Data GPDF, with Security frame counter N, protected with OOB key K, SecurityLevel = 0b10. After DUT-GPP received the GP Pairing command from TH-GPT and gppDiscoveryDuration expires, read the *Proxy Table* attribute of DUT-GPP.	
2	[R3] A.3.5.2.2	**Test successful active re-discovery**: Switch TH-GPP off. Switch DUT-GPP off and back on. Read the *Proxy Table* attribute of DUT-GPP. Make TH-GPD send a Data GPDF, with Security frame counter M >= N+1, protected with OOB key K, SecurityLevel = 0b10. After DUT-GPP received the GP Pairing command from TH-GPT and gppDiscoveryDuration expires, read the *Proxy Table* attribute of DUT-GPP.	

5.6.3.3 Expected Outcome

Pass verdict:
1) DUT-GPP sends a *GP Pairing Search* command all the request fields (for supported communication modes) set. The *Proxy Table* attribute of DUT-GPP has an entry with GPD ID =N, with *EntryActive, EntryValid, Unicast GPS, Derived Group GPS* and *Commissioned Group GPS* subfields of the *Options* parameter have values 0b1,0b1,0b0,0b1 and 0b0, respectively.
2) The *Proxy Table* attribute of DUT-GPP has an entry with GPD ID =N, with *EntryActive, EntryValid, Unicast GPS, Derived Group GPS* and *Commissioned Group GPS* subfields of the *Options* parameter have values 0b1, 0b0, 0b0, 0b1 and 0b0, respectively; and all the relevant data stored. After GP Pairing reception, the *Proxy Table* attribute of DUT-GPP has an entry with GPD ID =N, with *EntryActive, EntryValid, Unicast GPS, Derived Group GPS* and *Commissioned Group GPS* subfields of the *Options* parameter have values 0b1,0b1,0b0,0b1 and 0b0, respectively.
Fail verdict:
1) DUT-GPP does send a *GP Tunneling Stop* command, and/or a *GP Notification* command. AND/OR DUT-GPP does not send a *GP Pairing Search* command. AND/OR The *Proxy Table* attribute of DUT-GPP does not have an entry with GPD ID = N, or it has such an entry for which at least one of the *EntryActive, EntryValid, Unicast GPS, Derived Group GPS* and *Commissioned Group GPS* subfields of the *Options* parameter does not have value 0b1,0b1,0b0,0b1 and 0b0, respectively.
2) After restart, the *Proxy Table* attribute of DUT-GPP does not have an entry with GPD ID =N, with *EntryActive, EntryValid, Unicast GPS, Derived Group GPS* and *Commissioned Group GPS* subfields of the *Options* parameter have values 0b1, 0b0, 0b0, 0b1 and 0b0, respectively. AND/OR After GP Pairing reception, the *Proxy Table* attribute of DUT-GPP does not have an entry with GPD ID =N, with *EntryActive, EntryValid, Unicast GPS, Derived Group GPS* and *Commissioned Group GPS* subfields of the *Options* parameter have values 0b1, 0b1, 0b0, 0b1 and 0b0, respectively.

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5.6.4 NOT TESTED: Subcase: search counter handling

Unless explicitly specified otherwise, the test items in this section follow one another, i.e. devices are NOT re-set or restarted inbetween.

5.6.4.1 Initial conditions

Item	Doc. Ref.	Initial Conditions	Note
1	[R3] A.3.9	A pairing is established between TH-GPD and TH-GPT, employing unicast communication; using security level as supported by the DUT-GPP.	
2	[R3] A.3.4.2.5	The gppMaxSearchCounter attribute of DUT-GPP is set to 0x02. The Proxy Table attribute of DUT-GPP does not have an entry with GPD ID=N.	The attribute *gppMaxSearchCounter* is writeable.
3		The TH-GPP is off. The TH-GPT is off.	

5.6.4.2 Test Procedure

Item	Doc. Ref.	Test Step	Note
1	[R3] A.3.5.2.2	Make TH-GPD send a Data GPDF. Read DUT-GPP's *Proxy Table* attribute. If supported, read DUT-GPP's *gppBlockedGPDID* attribute.	
2	[R3] A.3.5.2.2	Make TH-GPD send a Data GPDF. Read DUT-GPP's *Proxy Table*. If supported, read DUT-GPP's *gppBlockedGPDID* attribute.	
3	[R3] A.3.5.2.2	Make TH-GPD send a Data GPDF. Read DUT-GPP's *Proxy Table*. If supported, read DUT-GPP's *gppBlockedGPDID* attribute.	
4	[R3] A.3.5.2.2	Switch TH-GPT on. Make TH-GPD send a Data GPDF. After DUT-GPP sends GP Pairing Search command, TH-GPS sends GP Pairing. Read DUT-GPP's *Proxy Table.* If supported, read DUT-GPP's *gppBlockedGPDID* attribute. Make TH-GPD send a Data GPDF.	

5.6.4.3 Expected Outcome

Pass verdict:
1) DUT-GPP sends a *GP Pairing Search* command. If the sub-fields of the *Extended NWK Frame Control* field of the GPDF are set to Security Level >= 0b10 and DUT-GPP can correctly security process the packet using the shared key, it may send the broadcast GP Notification carrying the GPD command instead. gppDiscoveryDuration after sending GP Pairing Search/broadcast GP Notification, the DUT-GPP has either: • a *Proxy Table* entry with GPD ID =N, the values of the *EntryActive* and *EntryValid* sub-fields of the *Options* parameter both equal 0b0, and the value of the *SearchCounter* parameter equals 0x01; • OR a *gppBlockedGPDID* entry with GPD ID=N, and the *SearchCounter* parameter equals 0x01.
2) DUT-GPP does not send a *GP Pairing Search* command nor broadcast GP Notification command. DUT-GPP has either: • a *Proxy Table* entry with GPD ID =N, the values of the *EntryActive* and *EntryValid* sub-fields of the *Options* parameter both equal 0b0, and the value of the *SearchCounter* parameter equals 0x02; • OR a *gppBlockedGPDID* entry with GPD ID=N, and the *SearchCounter* parameter equals 0x02.
3) DUT-GPP does not send a *GP Pairing Search* command nor broadcast GP Notification command. DUT-GPP has either: • a *Proxy Table* with GPD ID =N, the values of the *EntryActive* and *EntryValid* sub-fields of the *Options* parameter both equal 0b0, and the value of the *SearchCounter* parameter equals 0x00; • OR either a *gppBlockedGPDID* entry with GPD ID=N, and the *SearchCounter* parameter equals 0x02 or *gppBlockedGPDID* entry with no entry for GPD ID=N.
4) DUT-GPP sends a *GP Pairing Search* command. If the sub-fields of the Extended NWK Frame Control field of the

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GPDF are set to Security Level >= 0b10 and DUT-GPP can correctly security process the packet using the shared key, it may send the broadcast GP Notification carrying the GPD command instead. After reception of GP Pairing command and expiration of gppDiscoveryDuration, DUT-GPP has *Proxy Table* has an entry with GPD ID =N, the values of the *EntryActive* and *EntryValid* sub-fields of the *Options* parameter both equal 0b1. DUT-GPP does NOT have a *gppBlockedGPDID* entry for GPD ID = N. Upon reception of the second GPDF, the DUT-GPP sends GP Notification in the required mode.
Fail verdict:
1) DUT-GPP does not send a either *GP Pairing Search* or broadcast GP Notification command. DUT-GPP does not send GP Pairing Search command for unprotected GPDF. DUT-GPP does send broadcast GP Notification command for unprotected command. AND/OR DUT-GPP does send unicast/groupcast GP Notification command. AND/OR *gppDiscoveryDuration* after sending GP Pairing Search, the DUT-GPP does not have exactly one of a *Proxy Table* entry with GPD ID =N or a *gppBlockedGPDID* entry for GPD ID = N; formatted as defined in 5.6.4.3/step 1 above.
2) DUT-GPP does send a *GP Pairing Search* or broadcast GP Notification command. AND/OR DUT-GPP does send unicast/groupcast GP Notification command. AND/OR does not have exactly one of a *Proxy Table* entry with GPD ID =N or a *gppBlockedGPDID* entry for GPD ID = N; formatted as defined in 5.6.4.3/step 2 above.
3) DUT-GPP does send a *GP Pairing Search* or broadcast GP Notification command. AND/OR DUT-GPP does send unicast/groupcast GP Notification. AND/OR does not have exactly one of a *Proxy Table* entry with GPD ID =N or a *gppBlockedGPDID* entry for GPD ID = N; formatted as defined in 5.6.4.3/step 3 above.
4) DUT-GPP sends not a *GP Pairing Search* command or broadcast GP Notification command. AND/OR DUT-GPP does not update the Proxy Table entry for GPD ID = N with the data from GP Pairing command AND/OR the entry is NOT active valid. AND/OR DUT-GPP has *gppBlockedGPDID* entry for GPD ID=N AND/OR DUT-GPP does not forward the second GPDF.

5.6.4.4 PICS covered

PICS reference	Functionality	Tested (Direct/Indirect)
GPPCCF9	Is Proxy Table maintenance (active and passive) supported as a client? (Proxy Table maintenance sub-field of the gppFunctionality attribute set?)	Direct
GPPCC201	Is handling of Proxy Table entries with status other than active and valid supported?	Direct
GPPCC202	Is passive discovery supported?	Direct
GPPCC2034	Is active discovery supported?	Direct
GPPCC204	Is active re-discovery supported?	Direct
GPPCS102	Is reception of the GP Notification command in derived groupcast supported?	Direct
GPPCS104	Is reception of the GP Notification command in broadcast supported?	Direct
GPPCC6	Is the *gppMaxSearchCounter* attribute supported?	Direct
GPPCC7	Is the *gppBlockedGPDID* attribute supported?	Direct
GPPCC104	Is transmission of the GP Notification command in broadcast supported?	Direct
GPPCC106	Is transmission of the GP Pairing Search command supported?	Direct
GPPCS106	Is reception of the GP Tunneling Stop command supported?	Direct

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