



**DECT-2020 New Radio (NR);
Conformance Test Specification;
Part 2: Radio Protocols**

Reference

DTS/DECT-00414

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Digital Enhanced Cordless Telecommunications (DECT).

The present document is part 2 of a multi-part deliverable covering the conformance test specifications of DECT-2020 New Radio (NR); Conformance Test Specification, as identified below:

Part 1: "Radio Transmission and Reception";

Part 2: "Radio Protocols".

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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1 Scope

The present document is one of the parts of the radio conformance test specifications of the DECT-2020 New Radio (NR) radio device.

The present document specifies radio device protocol conformance testing including Medium Access (MAC), Data Link Control (DLC) and Convergence Layer (CVG) protocol layers. Further the present document defines the test conditions, test configurations, and requirement for testing functions and a test system, to be used for protocol conformance testing.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are necessary for the application of the present document.

- [1] [ETSI TS 103 636-1](#): "DECT-2020 New Radio (NR); Part 1: Overview".
- [2] [ETSI TS 103 636-2](#): "DECT-2020 New Radio (NR); Part 2: Radio reception and transmission requirements".
- [3] [ETSI TS 103 636-3](#): "DECT-2020 New Radio (NR); Part 3: Physical layer".
- [4] [ETSI TS 103 636-4](#): "DECT-2020 New Radio (NR); Part 4: MAC layer".
- [5] [ETSI TS 103 636-5](#): "DECT-2020 New Radio (NR); Part 5: DLC and Convergence layers".
- [6] [ETSI TS 103 874-1](#): "DECT-2020 New Radio (NR); Access Profile; Part 1: Overview".
- [7] [ETSI TS 103 874-2](#): "DECT-2020 New Radio (NR); Access Profile Part 2; Smart Metering, City and Buildings".
- [8] [ETSI TS 103 874-3](#): "DECT-2020 New Radio (NR); Application Profile; Part 3: IPv6 Profile".
- [9] [ETSI TS 104 047-1](#): "DECT-2020 New Radio (NR); Conformance Specification; Part 1: Radio Transmission and Reception".

2.2 Informative references

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- [i.1] ETSI ES 202 553: "Methods for Testing and Specification (MTS); TPLan: A notation for expressing Test Purposes".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI TS 103 636-4 [4], ETSI TS 103 636-5 [5] and the following apply:

companion device: functionality of a lower tester implemented within a real test device

FT-PT: RD operating in both FT and PT modes

Lower Tester FT (LT_FT): tester entity operating strictly in FT mode, providing indirect control and observation of the EUT via the DECT-2020 NR radio interface

Lower Tester FT-PT (LT_FT_PT): tester entity operating in both FT and PT modes, providing indirect control and observation of the EUT via the DECT-2020 NR radio interface

Lower Tester PT (LT_PT): tester entity operating strictly in PT mode, providing indirect control and observation of the EUT via the DECT-2020 NR radio interface

Lower Tester Test Component (LT_TC): tester component within the test system used to observe events in both directions during testing

reference time accuracy: As defined in ETSI TS 103 636-2 [2].

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI TS 103 636-4 [4] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 103 636-1 [1], ETSI TS103 636-4 [4], ETSI TS103 636-5 [5] and the following apply:

NOTE: An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in ETSI TS 103 636-1 [1], ETSI TS 103 636-4 [4] or ETSI TS 103 636-5 [5].

ATM	Abstract Test Method
EUT	Equipment Under Test
IUT	Implementation Under Test
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
TD	Test Description
TP	Test Purpose
TPLan	Test Purpose Language
TS	Test System
TSS	Test Suite Structure

4 Overview

4.1 Handling of conformance requirements in different releases of the core specification

The core specifications, ETSI TS 103 636 series, and application specific profiles, ETSI TS 103 874 series, consist of multiple releases, where each release introduces new functionalities, procedures and configurations, that are then carried to the future releases. Therefore, each function or procedure is tested according to the specification release when introduced first time in the corresponding specifications.

In case a function or procedure is updated or even removed from a future release the impact to the test purpose(s) and/or test case(s) is indicated in corresponding test purpose(s) and test case(s) clauses. Therefore, when differences between conformance requirements in different releases of the core specifications have an impact on the Pre-test conditions, Test procedure sequence or/and the Specific message contents, the Conformance requirements related to different releases are specified separately in the given test and indicated separately per release.

Further, when there is no Release indicated for a conformance requirement text, this should be understood that the conformance requirements in the latest version of the specification of the release are valid and identical to the requirements when the feature was first introduced to the core specifications.

The declaration by the apparatus supplier i.e. the Protocol Implementation Conformance Statement (PICS) is used to determine the release of the RD. The PICS pro forma is provided in Annex B.

The used configuration for test cases is defined in the supported application profile specifications as defined ETSI TS 103 874-1 [6] and Protocol Implementation Conformance Statement (PICS). In case device does not support any application profile the device vendor should declare a test configuration based on valid parameter values of the core specifications.

4.2 Testing of optional functions and procedures

Any function or procedure which is optional, as indicated in the present document, may be subject to a conformance test if it is implemented in the RD. The implementation of the certain optional feature can be determined based on RD's support on given application profile specification as defined ETSI TS 103 874-1 [6], and by a declaration by the apparatus supplier.

The declaration by the apparatus supplier i.e. the Protocol Implementation Conformance Statement (PICS) is used to determine whether an optional function/procedure has been implemented. The PICS pro forma is provided in Annex B.

4.3 Implicit testing

For some DECT-2020 NR signalling and protocol features conformance is not verified explicitly in the present document. This does not imply that correct functioning of these features is not essential, but that these are implicitly tested to a sufficient degree in other tests.

4.4 Repetition of testing

As a general rule, the test cases specified in the present document are highly reproducible and do not need to be repeated unless otherwise stated.

However, the rate of correct RD behaviour can be specified statistically, e.g. "at least 90 %", which is defined separately in the specific test case. Additionally, in some of the test cases, HARQ retransmissions are not tolerated, because of characteristics of the test case.

For tests that expect the RD behaviour described above and are not fully (100 %) reproducible, if a RD fails the test on its first attempt and the tester suspects the reason is due to the statistical nature of the test, the UE should be re-tested one or more times to confirm the result.

When an EUT supports both FT and PT modes, any test which is applicable for both modes may be tested using only either one of the configurations.

5 Reference conditions, generic and test procedures, and test parameters

5.1 Reference conditions

The reference environmental conditions used by all signalling and protocol tests are as specified in ETSI TS 103 636-2 [2], Annex C or according to the conditions existing at the intended use of the RD declared by the device manufacturer.

The generic test architectures are defined in Annex A, and where a test requires an environment or configuration that are different, these will be specified in the test itself.

5.2 Generic and test procedures

A set of basic generic procedures for bringing the IUT into a specific initial state, as well as test procedures on comprising of well-defined actions after the IUT enters the specific state are specified in clause 8.4. These procedures are used in numerous test cases throughout the present document.

6 Test Suite Structure and Test Purposes

6.1 Structure for DECT-2020 NR tests

The test grouping is organized according to the structure of the protocols defined in the core specifications ETSI TS 103 636-4 [4] and ETSI TS 103 636-5 [5].

Moreover, test purposes are identified and categorized by a group, subgroup and sequential two-digits number (uniquely assigned upon definition of each test purpose).

Table 6.1-1 shows the DECT-2020 NR Test Suite Structure (TSS) defined for conformance testing.

Table 6.1-1: Test Suite Structure (TSS)

Root	Group	Sub-group
MAC	Spectrum management	Beaconing transmissions
		Operating Channel(s) and Subslot(s) selection
		Power Control
		Selecting RD for association
	Broadcast Procedure	
	Random Access Procedure	Random Access Transmission
		Random Access Reception
	Scheduled Access data transfer	
	HARQ Procedures	HARQ Transmission
		HARQ Feedback
	Multiplexing and Assembly	
	Mobility Procedures	
	Association Procedure	Association Request
		Association Response
		Association Release
	Security Procedures	
	Paging Procedures	
DLC	DLC Retransmissions (ARQ)	
	DLC SDU Lifetime control	
	Routing Services	Uplink hop-by-hop routing
		Downlink flooding
CVG	Transparent Procedures	
	Multiplexing Procedures	
	Duplicate removal Procedure	
	CVG Segmentation	

6.2 Test Purpose definition conventions

6.2.1 General

The TPs are defined according to Table 6.2.1-1.

Table 6.2.1-1: Test Purpose definition rules

Field	Description
TP id	The TP id is a unique identifier. It shall be specified according to the TP naming conventions defined in the present document.
Test objective	The test objective gives a brief description of the test to indicate which conformance requirement is intended to be tested in the test purpose.
Reference	The reference field of the TP header indicates where the tested requirement is expressed. The field may refer to several clauses.
Mode	The field indicates to which operating mode(s) of the IUT the test purpose may be applied to. The value of this field is either FT, PT, FT-PT, or a set of the preceding.
Config	The Config field indicates the test system configuration required for testing the current TP.
PICS Selection	The PICS selection row contains a Boolean expression which may be used to indicate whether the test purpose is applicable according to a completed PICS. An empty row implicitly indicates that the test purpose is applicable for every implementation.
Initial conditions	
The initial conditions define in which initial state the IUT shall be to apply the actual TP. In the corresponding Test Case, when the execution of the initial condition fails, it leads to the assignment of an Inconclusive verdict.	
NOTE 1: The initial condition is written using the TPLan notation and ETSI style for Programming Language (PL).	
Expected behaviour	
The expected behaviour defines the events which are parts of the TP objective, and according to which the IUT are expected to perform in order to conform to the base specification. In the corresponding Test Case, Pass or Fail verdicts can be assigned here.	
NOTE 2: The expected behaviour is written using the TPLan notation and ETSI style for Programming Language (PL).	

6.2.2 TP Identifier naming conventions

The identifier of a TP is built according to Table 6.2.2-1.

Table 6.2.2-1: TP naming convention

TP/<root>/<pg>/<gr>/<sgr>/<nn>	Abbreviation	Description
<root> = root	DECTNR	DECT-2020 NR
TP/MAC/<gr>/<sgr>/<nn>	MAC	Medium Access Control
TP/MAC/SPM/<sgr>/<nn>	SPM	Spectrum Management Procedures
TP/MAC/SPM/BEA/<nn>	BEA	Beaconing Transmissions
TP/MAC/SPM/OCS/<nn>	OCS	Operating Channel(s) and Subslot(s) selection
TP/MAC/SPM/RDS/<nn>	RDS	Selecting RD for association
TP/MAC/SPM/PC/<nn>	PC	Power Control
TP/MAC/BC/<nn>	BC	Broadcast Procedure
TP/MAC/RACH/<sgr>/<nn>	RACH	Random Access Procedures
TP/MAC/RACH/TX/<nn>	TX	Random Access Transmission
TP/MAC/RACH/RX/<nn>	RX	Random Access Reception
TP/MAC/HARQ/<sgr>/<nn>	HARQ	HARQ Operation
TP/MAC/HARQ/TX/<nn>	TX	HARQ Transmission
TP/MAC/HARQ/FB/<nn>	FB	HARQ Feedback
TP/MAC/MUXA/<nn>	MUXA	Multiplexing and Assembly
TP/MAC/MOB/<nn>	MOB	Mobility Procedures
TP/MAC/ASS/<sgr>/<nn>	ASS	Association Procedure
TP/MAC/ASS/REQ/<nn>	REQ	Association Request
TP/MAC/ASS/RES/<nn>	RES	Association Response
TP/MAC/ASS/REL/<nn>	REL	Association Release
TP/MAC/SEC/<nn>	SEC	Security Procedures
TP/MAC/PG/<nn>	PG	Paging Procedures
TP/DLC/<gr>/<sgr>/<nn>	DLC	Data Link Control
TP/DLC/SEG/<nn>	SEG	DLC Segmentation
TP/DLC/REA/<nn>	REA	DLC Reassembly
TP/DLC/RETX/<nn>	RETX	DLC Retransmission
TP/DLC/LFT/<nn>	LFT	DLC SDU lifetime control
TP/DLC/ROU/<nn>	ROU	Routing Services
TP/CVG/<gr>/<sgr>/<nn>	CVG	Convergence
TP/CVG/MUX/<sgr>/<nn>	MUX	Multiplexing
TP/CVG/MUX/EP/<nn>	EP	Endpoint Multiplexing
TP/CVG/MUX/MT/<nn>	MT	Mux Tag Multiplexing
TP/CVG/DUP/<nn>	DUP	Duplicate Removal
TP/CVG/SEG/<nn>	SEG	CVG Segmentation
<nn> = sequential number		01 to 99

6.2.3 Rules for the behaviour description

All Test Purposes are described with ETSI standardized TPLan notation as defined in ETSI ES 202 553 [i.1]. The TPs shall be designed such that they can be derived into a test case according to the specified test architecture (ATM) as defined in Annex A.

The behaviour description should only refer to externally observable events (send/receive PDUs, timer, counters, etc.) or to events or states which can be observed externally either directly or indirectly, and the behaviour part is specified in the referenced specification.

The initial conditions used in the TPs should describe previously observed events after which the IUT is ready to start the test execution. The wording rules apply for both the initial conditions and the behaviour description.

The Test Purposes do not strictly limit the IUT to only the specified behaviour during a test procedure; other actions or messages may occur after the test stimuli or the initial conditions. However, the test response is still expected within the requirement time frame. If no time requirement is specified for a behaviour response, a test procedure should ensure that the expected behaviour response can be observed at least once.

In the TP the following wordings are used:

- "receives": Used for packets received by the IUT, sent by the Test System.
- "does not receive": Used when the IUT does not receive a packet matching the description from the Test System, typically within some specified time window. The reason for not receiving the packet is irrelevant.
- "sends": Used for packets sent by the IUT to the Test System.
- "does not send": Used when the IUT is observed not to send or shall not send a packet matching the description to the Test System, typically within some specified time window.
- "containing": Used for specifying either that a packet contains a PDU, PDU contains an Information Element, or an Information Element contains an optional bitfield.
- "indicating": Used for expressing that a bitfield within an Information Element shall indicate a specific value for the initial condition or the expected behaviour to match with the test case.
- When message or IE content is defined in test purpose as expected behaviour of the EUT, the defined content defines minimum expected content, allowing message or IE contain optional IEs or information fields as defined in core specifications.
- When the expected behaviour/initial condition cannot be defined by the bit content of a packet, more free wording should be used to describe the expected behaviour.
- The verbs in the initial condition wording should be written in past tense.

6.3 Test Description definition conventions

6.3.1 General

This clause defines guidelines for defining Test Descriptions within the present document. The Test Descriptions are defined in clause 8.

6.3.2 Test Purpose

The Test Purpose part of the Test Descriptions should be defined using the following conventions.

Table 6.3.2-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Name of the Test Purpose as it is in the definition	Reference to the TP	1
Name of the Test Purpose as it is in the definition	Reference to the TP	2
Name of the Test Purpose as it is in the definition	Reference to the TP	3
...	...	...

Test Name: Name of the Test Purpose as it is in the definition.

Reference: Reference to the Test Purpose.

TP: Test Purpose number which is used in the Test Procedure sequence.

6.3.3 Test Applicability

The Test Applicability part of the Test Descriptions should be defined using the following conventions. The Test Applicability is based on the PICS, and is used for determining whether the test is applicable for an implementation.

Table 6.3.3-1: PICS selection parameters

PICS selection	Description	Status
Mnemonic of a PICS item	Description of a PICS item	m
...	...	...

PICS selection: Mnemonic of a PICS item, which is required to support this test.

Description: Description of the PICS item as is in the PICS table in Annex B.

Status: Requirement status of the PICS item for performing the test procedure. Possible values either 'm' mandatory or 'o.i.' qualified optional.

6.3.4 Pre-Test conditions

The Pre-Test conditions part of the Test Descriptions should be defined using the following conventions.

Prerequisite tests: Defines other tests that should be done in advance to verify that all dependencies for the current test behave in the standard way.

Test System: Defines requirements for the Test System configuration for the given test procedure.

Shall specify the Test-System Configuration as defined in clause A.3.

May define other essential Test Specific parameters.

EUT: Defines requirements for the EUT configuration for the given test procedure.

Shall specify the EUT operating mode: FT, PT or FT-PT.

May define other essential Test Specific parameters.

Preamble: Defines a Test Preamble Sequence which shall be performed to bring the TS and EUT to a state which enables execution of the given test procedure. Test Preambles are defined in clause 8.4 as common procedures.

PICS and PIXIT parameters:

Table 6.3.4-1: Additional PICS parameters

PICS parameter	Description	Status
pc_mnemonic_of_a_pics_item	Description as defined for PICS items in Annex B	o
...	...	...

Table 6.3.4-2: PIXIT parameters

PIXIT parameter	Description	Status
px_parameter_name	Well defined description of the parameter in question	m
...	...	...

PICS parameter: Additional optional PICS parameters which modify the test procedure in some way. Used for testing optional features.

PIXIT parameter: The PIXIT parameters provide extra information for testing.

Description: A text describing the purpose of the parameter. For the additional PICS parameters, the description is as for the PICS item in the PICS table in Annex B.

Status: Indicates the requirement level for the PICS or PIXIT parameter in the Test Case. The status is either mandatory "m", conditional "c.i" or optional "o".

6.3.5 Test Procedure sequence

The Test Procedure sequence part of the Test Descriptions should be defined using the following conventions. The Test Procedure sequence always contains a table describing a step-by-step test sequence. If a feature is supported for both modes, but where the test sequences significantly differ from each other, multiple Test Procedure sequences may be included for a single test description.

Table 6.3.5-1: Test Procedure

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	Descriptive text defining what should happen before continuing to the next step. A procedure step may include the following keywords: EXCEPTION, Check.	<-- or -->	Name of a message	-	-
-	EXCEPTION: Describes an exception for the execution of following step(s). An exception only adds information, and itself is not a test step.	-	-	-	-
2	Check: A more detailed test check should be performed in this step, which is described as a question. A step with a check always includes a verdict for that check. When a Test Purpose is linked to a step with a check, the Test Purpose shall be evaluated at that step.	-	-	1	P or F

Step: Number of a step in the sequence. The steps may indicate sub-sequences which shall be performed in sequence. These sequences are indicated by a lower-case letter following the main step number followed by the sub-sequence numbers. The sub-sequences are used for optional sequences of steps.

Procedure: Described in Table 6.3.5-1.

Message Sequence:

EUT-TS: Shows the direction of the message within the Test Environment. If the test system contains multiple lower tester components, the lower tester in question shall be explicitly indicated in the procedure text.

Message: Indicates the content of the transmitted packet which is relevant to the test procedure. If the message of interest is not on the tested protocol layer, a layer identifier should be added, such as PHY, MAC, DLC, CVG or TMC.

TP: Test Purpose identifier. Maps a Test Purpose to a test step which gives a more in-depth details of a performed check. A step linked with a Test Purpose always contains a check.

Verdict: The verdict field is present only on steps with a "check".

The verdict defines the pass criterion for the whole Test Case based on test checks. The verdict field has a value of either "P" (Pass) or "F" (Fail).

When a result of a check is "Yes/True" and the verdict for that check is "P" the test check is considered as pass.

When a result of a check is "Yes/True" and the verdict for that check is "F" the test check is considered as fail.

When a result of a check is "No/False" and the verdict for that check is "P" the test check is considered as fail.

When a result of a check is "No/False" and the verdict for that check is "F" the test check is considered as pass.

If all checks within a Test Procedure pass, the whole test case is considered to pass. However, if any of the checks within a Test Procedure fail, the whole test case is considered to fail.

Additional tables of information supporting the test procedure may be included.

7 Test purposes

7.1 MAC

7.1.1 Spectrum Management Procedures

7.1.1.1 Beaconsing Transmissions

7.1.1.1.1 Validity of Network Beacon Message

Field	Description
TP id	DECTNR/MAC/SPM/BEA/01
Test objective	Check that the IUT sends a valid Network Beacon message
Reference	ETSI TS 103 636-4 [4], clause 6.4.2.2
Mode	FT
Config	CF01
PICS Selection	pc_mac_bea_network_tx
Initial conditions	
with { IUT switched on }	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet containing MAC PDU containing Network Beacon message IE } then { IUT sends a broadcast packet containing Network Beacon MAC PDU } } </pre>	
NOTE: The "when" and "then" statements refer to the same packet.	

Variants			
#	Profile	Network Beacon MAC PDU	Selection criteria
1	ETSI TS 103 636-4 [4] (Core)	packet containing Physical Layer Control Field: Type 1 indicating Header Format 000 and containing MAC PDU containing MAC Header Type	
		indicating MAC security: 10	pc_mac_sec
		and containing Beacon Header	
		and containing Security Info IE	pc_mac_sec
		and containing Network Beacon Message IE	
		and containing Route Info IE	pc_dect_mesh
		and containing MIC	pc_mac_sec
2	ETSI TS 103 874-2 [7]	As defined in ETSI TS 103 874-2 [7], clause 11.2.1	pc_smcb

7.1.1.1.2 Validity of Cluster Beacon Message

Field	Description
TP id	DECTNR/MAC/SPM/BEA/02
Test objective	Check that the IUT sends a valid Cluster Beacon message
Reference	ETSI TS 103 636-4 [4], clause 6.4.2.3
Mode	FT
Config	CF01
PICS Selection	pc_mac_bea_cluster_tx
Initial conditions	
with { IUT switched on }	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet containing MAC PDU containing Cluster Beacon message IE } then { IUT sends a packet containing Cluster Beacon MAC PDU } } </pre>	
NOTE: The "when" and "then" statements refer to the same packet.	

Variants			
#	Profile	Cluster Beacon MAC PDU	Condition
1	ETSI TS 103 636-4 [4] (Core)	packet	
		containing Physical Layer Control Field: Type 1 indicating Header Format 000	
		and containing MAC PDU containing MAC Header Type	
		indicating MAC security: 10	pc_mac_sec
		and containing Beacon Header	
		and containing Security Info IE	pc_mac_sec
		and containing Cluster Beacon Message IE and containing Random Access Resource IE	
		and containing Route Info IE	pc_dect_mesh
		and containing MIC	pc_mac_sec
2	ETSI TS 103 874-2 [7]	As defined in ETSI TS 103 874-2 [7], clause 11.2.2	pc_smcb

7.1.1.1.3 Next Cluster Channel in Cluster Beacon Message

Field	Description
TP id	DECTNR/MAC/SPM/BEA/03
Test objective	Check that the IUT sends the Cluster Beacon according to the channel information provided in a preceding Cluster Beacon message
Reference	ETSI TS 103 636-4 [4], clauses 5.1.5 and 6.4.2.3
Mode	FT
Config	CF01
PICS Selection	pc_mac_bea_cluster_tx AND pc_mac_bea_cluster_nc
Initial conditions	
with { IUT having sent a packet containing Cluster Beacon message IE indicating "Next Cluster Channel": NEXT_CLUSTER_CHANNEL }	
Expected behaviour	
ensure that { when { IUT sends a packet containing Cluster Beacon MAC PDU } then { IUT sends a packet containing Cluster Beacon MAC PDU to channel NEXT_CLUSTER_CHANNEL } }	
NOTE: The "when" and "then" statements refer to the same packet.	

7.1.1.1.4 Network Beacon Period

Field	Description
TP id	DECTNR/MAC/SPM/BEA/04
Test objective	Check that the IUT sends Network Beacons at the indicated interval
Reference	ETSI TS 103 636-4 [4], clause 6.4.2.2
Mode	FT
Config	CF01
PICS Selection	pc_mac_bea_network_tx
Initial conditions	
with { IUT switched on }	
Expected behaviour	
ensure that { when { IUT sends a packet containing Network Beacon MAC PDU containing Network Beacon message IE indicating "Network Beacon period": NB_PERIOD } then { IUT sends packet(s) containing Network Beacon MAC PDU with average periodicity of NB_PERIOD } }	
NOTE: At least 10 Network Beacons should be observed to verify the average interval.	

7.1.1.1.5 Cluster Beacon Period

Field	Description
TP id	DECTNR/MAC/SPM/BEA/05
Test objective	Check that the IUT sends Cluster Beacons with the indicated periodicity when beaconing
Reference	ETSI TS 103 636-4 [4], clause 6.4.2.3
Mode	FT
Config	CF01
PICS Selection	pc_mac_bea_cluster_tx
Initial conditions	
with { IUT switched on }	
Expected behaviour	
<pre> ensure that { when { IUT sends "Cluster Beacons" containing Cluster Beacon MAC PDU containing Cluster Beacon message IE indicating "Cluster Beacon period": CB_PERIOD } then { IUT sends another packet containing Cluster Beacon MAC PDU at end of CB_PERIOD within "Reference time accuracy" } } </pre>	

7.1.1.1.6 Time to Next Cluster Beacon Transmission

Field	Description
TP id	DECTNR/MAC/SPM/BEA/06
Test objective	Check that the IUT sends the Cluster Beacon according to the time information provided in a preceding Cluster Beacon
Reference	ETSI TS 103 636-4 [4], clauses 5.1.5 and 6.4.2.2
Mode	FT
Config	CF01
PICS Selection	pc_mac_bea_cluster_tx AND pc_mac_bea_cluster_ttn
Initial conditions	
with { IUT switched on }	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet containing Cluster Beacon MAC PDU containing Cluster Beacon message IE indicating "Time to next": TIME_TO_NEXT } then { IUT sends a packet containing Cluster Beacon MAC PDU at the time defined in TIME_TO_NEXT within "Reference time accuracy" } } </pre>	

7.1.1.1.7 Cluster Beacon according to Network Beacon information

Field	Description
TP id	DECTNR/MAC/SPM/BEA/07
Test objective	Check that the IUT sends the Cluster Beacon message according to the information provided in a preceding Network Beacon message
Reference	ETSI TS 103 636-4 [4], clauses 5.1.5 and 6.4.2.2
Mode	FT
Config	CF01
PICS Selection	pc_mac_bea_network_tx
Initial conditions	
with { IUT switched on }	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet containing Network Beacon MAC PDU containing Network Beacon message IE indicating "Time to next": TIME_TO_NEXT and indicating "Next cluster channel": NEXT_CLUSTER_CHANNEL } then { IUT sends a packet containing Cluster Beacon MAC PDU at the time defined in TIME_TO_NEXT within "Reference time accuracy" to channel NEXT_CLUSTER_CHANNEL } }</pre>	

7.1.1.2 Operating Channel(s) and Subslot(s) selection

7.1.1.2.1 Channel selection within the operating band

Field	Description
TP id	DECTNR/MAC/SPM/OCS/01
Test objective	Check that the operating channel is selected from the operating band
Reference	ETSI TS 103 636-4 [4], clause 5.4
Mode	FT
Config	CF01
PICS Selection	pc_mac_ocs
Initial conditions	
with { IUT switched on }	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet containing Cluster Beacon MAC PDU } then { IUT sends packet(s) containing Cluster Beacon MAC PDU to channel within the operating band } }</pre>	
NOTE: The allowed channels depend on the used operating band.	

7.1.1.2.2 Selection of suitable channel resources

Field	Description
TP id	DECTNR/MAC/SPM/OCS/02
Test objective	Check that the operating channel the IUT chooses is sufficiently free
Reference	ETSI TS 103 636-4 [4], clause 5.1.2
Mode	FT
Config	CF01 + SG
PICS Selection	pc_mac_ocs
Initial conditions	
with { IUT switched on }	
Expected behaviour	
<pre> ensure that { when { IUT measures a channel with the number of 'free' or 'possible' sub-slots being greater or equal to SCAN_SUITABLE at SCAN_MEAS_DURATION } then { IUT sends a packet containing Cluster Beacon MAC PDU to any channel having the lowest number of 'busy' sub-slots } } </pre>	

7.1.1.2.3 Operating channel re-selection

Field	Description
TP id	DECTNR/MAC/SPM/OCS/03
Test objective	Check that the IUT re-initiates the operating channel and sub-slot selection procedure when its current channel gets busy
Reference	ETSI TS 103 636-4 [4], clause 5.1.2
Mode	FT
Config	CF01 + SG
PICS Selection	pc_mac_ocs_reselect
Initial conditions	
with { IUT having sent a packet containing Cluster Beacon MAC PDU }	
Expected behaviour	
<pre> ensure that { when { IUT measures the sub-slots of its operating channel and the number of 'busy' sub-slots is greater or equal to CHANNEL_LOADED at SCAN_MEAS_START } then { IUT re-initiates the channel selection procedure } } </pre>	
NOTE: The channel re-selection can be seen as a change in the random-access resources.	

7.1.1.3 Power Control

7.1.1.3.1 Power control for Initial transmission

Field	Description
TP id	SMCB/MAC/SPM/PC/01
Test objective	Check that the IUT uses the minimum TX power for achieving its target quality
Reference	ETSI TS 103 874-2 [7], clause 7.2.1.6
Mode	PT
Config	CF03
PICS Selection	pc_smc_b_mac_pc_initial

Initial conditions
with { IUT having a unicast packet to LT_FT }
Expected behaviour
ensure that { when { IUT receives a packet containing Physical Layer Control Field: Type 1 indicating "Transmit Power": TX_POWER containing Cluster Beacon MAC PDU indicating RSSI-2: RX_RSSI from LT_FT } then { IUT sends a packet containing Physical Layer Control Field: Type 2 indicating "Transmit Power": Value equal or less than RX_POWER_LEVEL + (TX_POWER - RX_RSSI) } }
NOTE: RX_POWER_LEVEL = -88 dBm, as defined in ETSI TS 103 874-2 [7], clause 7.2.1.6.

7.1.1.3.2 Maximum transmission power in a cluster

Field	Description
TP id	DECTNR/MAC/SPM/PC/02
Test objective	Check that the IUT follows the TX power limits of a cluster
Reference	ETSI TS 103 636-4 [4], clause 5.1.6
Mode	PT
Config	CF03
PICS Selection	pc_mac_pc
Initial conditions	
with { IUT having unicast packets to LT_FT }	
Expected behaviour	
ensure that { when { IUT receives a packet containing Physical Layer Control Field Type 1 indicating "Transmit Power": TX_POWER and containing Cluster Beacon MAC PDU from LT_FT } then { IUT sends a packet containing Physical Layer Control Field Type 2 indicating "Transmit Power": Value equal or less than TX_POWER to LT_FT } }	
NOTE: The IUT is also expected to use the transmission power it indicates.	

7.1.1.4 Selecting RD for association

7.1.1.4.1 Selection based on Minimum quality

Field	Description
TP id	DECTNR/MAC/SPM/RDS/01
Test objective	Check that when the IUT selects an RD for association, it selects an RD that meets the minimum quality requirement
Reference	ETSI TS 103 636-4 [4], clause 5.1.4
Mode	PT
Config	CF05
PICS Selection	pc_mac_rds
Initial conditions	
with { IUT switched on	

}	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing Cluster Beacon MAC PDU containing Cluster Beacon message IE indicating "Min quality": MIN_QUALITY indicating RSSI-2: RX_RSSI from multiple FTs } then { IUT sends a packet containing Association Request MAC PDU to an FT indicating RX_RSSI greater than MIN_SENSITIVITY_LEVEL + MIN_QUALITY } } </pre>	
NOTE: The MIN_SENSITIVITY_LEVEL is the EUTs own sensitivity level.	

7.1.2 Broadcast Procedures

Void.

7.1.3 Random Access Procedures

7.1.3.1 Random-access transmission

7.1.3.1.1a Transmission on random-access resources received from beacon message

Field	Description
TP id	DECTNR/MAC/RACH/TX/01a
Test objective	Check that the IUT transmits on received random-access resources
Reference	ETSI TS 103 636-4 [4], clause 5.3.3
Mode	PT
Config	CF03
PICS Selection	pc_mac_rach_tx
Initial conditions	
<pre> with { IUT having received a packet containing Physical Layer Control Field Type 1 indicating "Short Network Address": LT_FT_SHORT_NETWORK_ID and indicating "Transmitter Identity": LT_FT_SHORT_RD_ID and containing MAC PDU containing Beacon Header indicating "Transmitter Address": LT_FT_LONG_RD_ID and containing Random-access resource IE } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT has a packet to LT_FT } then { IUT sends a packet containing Physical Layer Control Field Type 2 indicating "Short Network Address": LT_FT_SHORT_NETWORK_ID and indicating "Transmitter Identity": IUT_SHORT_RD_ID and indicating "Receiver Identity": LT_FT_SHORT_RD_ID to the random-access resources indicated in the Random-access resource IE } } </pre>	

7.1.3.1.1b Transmission on random-access resources received from unicast signalling

Field	Description
TP id	DECTNR/MAC/RACH/TX/01b
Test objective	Check that the IUT transmits on random-access resources received by unicast signalling from an RD which it has association to
Reference	ETSI TS 103 636-4 [4], clause 5.3.3
Mode	FT
Config	CF02
PICS Selection	pc_mac_rach_tx AND pc_smc_b
Initial conditions	
<pre> with { IUT having an association to LT_PT and IUT having received a packet containing Physical Layer Control Field Type 2 indicating "Short Network Address": LT_PT_SHORT_NETWORK_ID and indicating "Transmitter Identity": LT_PT_SHORT_RD_ID and containing MAC PDU containing Random-access resource IE } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT has a packet to LT_PT } then { IUT sends a packet containing Physical Layer Control Field Type 2 indicating "Short Network Address": LT_PT_SHORT_NETWORK_ID and indicating "Transmitter Identity": IUT_SHORT_RD_ID and indicating "Receiver Identity": LT_PT_SHORT_RD_ID to the random-access resources indicated in the Random-access resource IE } } </pre>	

7.1.3.1.2 Listen Before Talk

Field	Description
TP id	DECTNR/MAC/RACH/TX/02
Test objective	Check that the IUT refrains from transmitting to random-access resources if the channel is 'busy'
Reference	ETSI TS 103 636-4 [4], clause 5.3.1
Mode	FT or PT
Config	IF Mode = FT THEN CF02 + SG IF Mode = PT THEN CF03 + SG
PICS Selection	pc_mac_rach_tx IF Mode = FT THEN pc_smc_b
Initial conditions	
<pre> with { IUT having received a packet containing MAC PDU containing Random-access resource IE } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT has a packet to be transmitted and IUT measures the channel as 'busy' } then { IUT does not send a packet while the channel is 'busy' to the RACH resources indicated in the Random-access resource IE } } </pre>	

7.1.3.1.3 Random access transmission length

Field	Description
TP id	DECTNR/MAC/RACH/TX/03
Test objective	Check that the IUT does not exceed the random-access resource limits
Reference	ETSI TS 103 636-4 [4], clause 5.3.3
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_rach_tx IF Mode = FT THEN pc_smc_b
Initial conditions	
<pre> with { IUT having received a packet containing MAC PDU containing Random-access resource IE indicating "Max RACH Length": MAX_RACH_LENGTH from LT } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT has a packet to LT } then { IUT sends a packet containing Physical Layer Control Field Type 2 indicating "Packet Length": Equal or less than MAX_RACH_LENGTH } } </pre>	
NOTE: It is expected that the IUT indicates the actual physical packet length correctly in either slot or sub-slot formats.	

7.1.3.2 Random-Access Reception and Response

7.1.3.2.1a Reception from random-access resources announced in beacon message and response

Field	Description
TP id	DECTNR/MAC/RACH/RX/01a
Test objective	Check that the IUT receives a packet from its random-access resources and sends a random-access response
Reference	ETSI TS 103 636-4 [4], clause 5.3.2
Mode	FT
Config	CF02
PICS Selection	pc_mac_rach_res_bea
Initial conditions	
<pre> with { IUT having sent a packet containing Physical Layer Control Field Type 1 indicating "Short Network Address": IUT_SHORT_NETWORK_ID and indicating "Transmitter Identity": IUT_SHORT_RD_ID containing MAC PDU containing Beacon Header indicating "Transmitter Address": IUT_LONG_RD_ID and containing Random-access resource IE } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing Physical Layer Control Field Type 2 indicating "Short Network Address": IUT_SHORT_NETWORK_ID and indicating "Transmitter Identity": LT_PT_SHORT_RD_ID and indicating "Receiver Identity": IUT_SHORT_RD_ID and containing MAC PDU containing Unicast Header indicating "Receiver Address": IUT_LONG_RD_ID from random-access resources } } </pre>	

```

    }
    then {
        IUT sends a packet
        containing Physical Layer Control Field Type 2
            indicating "Short Network Address": IUT_SHORT_NETWORK_ID
            and indicating "Transmitter Identity": IUT_SHORT_RD_ID
            and indicating "Receiver Identity": LT_PT_SHORT_RD_ID
        within random-access response window
    }
}

```

7.1.3.2.1b Reception from random-access resources announced in unicast message and response

Field	Description
TP id	DECTNR/MAC/RACH/RX/01b
Test objective	Check that the IUT receives a packet from its random-access resources and sends a random-access response
Reference	ETSI TS 103 636-4 [4], clause 5.3.2
Mode	PT
Config	CF03
PICS Selection	pc_mac_rach_res_uni
Initial conditions	
<pre> with { IUT having sent a packet containing Physical Layer Control Field Type 2 indicating "Short Network Address": IUT_SHORT_NETWORK_ID and indicating "Transmitter Identity": IUT_SHORT_RD_ID containing MAC PDU containing Unicast Header indicating "Transmitter Address": IUT_LONG_RD_ID containing Random-access resource IE } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing Physical Layer Control Field Type 2 indicating "Short Network Address": IUT_SHORT_NETWORK_ID and indicating "Transmitter Identity": LT_FT_SHORT_RD_ID and indicating "Receiver Identity": IUT_SHORT_RD_ID and containing MAC PDU containing Unicast Header indicating "Receiver Address": IUT_LONG_RD_ID from random-access resources } then { IUT sends a packet containing Physical Layer Control Field Type 2 indicating "Short Network Address": IUT_SHORT_NETWORK_ID and indicating "Transmitter Identity": IUT_SHORT_RD_ID and indicating "Receiver Identity": LT_FT_SHORT_RD_ID within random-access response window } } </pre>	

7.1.3.2.2 Reception of other packets

Field	Description
TP id	DECTNR/MAC/RACH/RX/02
Test objective	Check that IUT discards any packets not intended for it
Reference	ETSI TS 103 636-4 [4], clause 5.5.2
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_rach_rx IF Mode = PT THEN pc_smcb
Initial conditions	
with {	

<pre> IUT having sent a packet containing Physical Layer Control Field (Type 1 or Type 2) indicating "Short Network Address": IUT_SHORT_NETWORK_ID and indicating "Transmitter Identity": IUT_SHORT_RD_ID containing MAC PDU containing Random-access Resource IE } </pre>
Expected behaviour
<pre> ensure that { when { IUT receives a packet containing Physical Header Control Field Type 2 not indicating "Short Network ID": IUT_SHORT_NETWORK_ID or not indicating "Receiver Identity": IUT_SHORT_RD_ID from random-access resources } then { IUT discards the packet } } </pre>
NOTE 1: Reception is expected only when both the Short and Long RD ID and the Network ID match.
NOTE 2: Discarding the packet implicitly means that the EUT shall not send a random-access response.

7.1.3.2.3 Data transmission within random-access response

Field	Description
TP id	DECTNR/MAC/RACH/RX/03
Test objective	Check that the IUT is able to include a buffered message to a random-access response
Reference	ETSI TS 103 636-4 [4], clause 5.5.2
Mode	FT
Config	CF02
PICS Selection	pc_mac_rach_rx
Initial conditions	
<pre> with { IUT having an association to LT_PT and IUT having a packet to LT_PT } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet from LT_PT } then { IUT sends the packet to LT_PT within random-access response window } } </pre>	

7.1.4 Scheduled access data transfer

Void.

7.1.5 HARQ Operation

7.1.5.1 HARQ Transmission

7.1.5.1.1 Successful HARQ transmission

Field	Description
TP id	DECTNR/MAC/HARQ/TX/01
Test objective	Check that IUT ends the HARQ procedure when it receives feedback indicating ACK and indicates new data on next transmission
Reference	ETSI TS 103 636-4 [4], clause 5.3.4
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_harq_tx
Initial conditions	
<pre> with { IUT having sent a packet containing Physical Layer Control Field Type 2 indicating "Header format": 000 and indicating "DF New Data Indication": Any and indicating "DF HARQ Process Number": Any } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing Physical Layer Control Field Type 2 containing Feedback info format (1, 3, 4, or 5) indicating "HARQ Process Number": Same as in the initial condition and indicating "Transmission feedback": ACK } then { IUT sends a packet containing Physical Layer Control Field Type 2 indicating "Header format": 000 and indicating "DF Redundancy Version": 0 and indicating "DF New Data Indication": Value toggled compared to initial condition and indicating "DF HARQ Process Number": Same as in the initial condition } } </pre>	
NOTE: The IUT may send packets to other HARQ processes in between.	

7.1.5.1.2 Redundancy version reset

Field	Description
TP id	DECTNR/MAC/HARQ/TX/02
Test objective	Check that the IUT uses the redundancy version 0 for HARQ re-transmission when receiving NACK feedback in format 6
Reference	ETSI TS 103 636-4 [4], clause 5.5
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_harq_tx
Initial conditions	
<pre> with { IUT having sent a packet containing Physical Header Control Field Type 2 indicating "Header Format": 000 and indicating "DF New Data Indication": Any and indicating "DF HARQ Process Number": Any } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a HARQ feedback containing Physical Layer Control Field Type 2 </pre>	

```

        containing Feedback Info Format 6
        indicating "HARQ Process Number": Same as in the initial condition
    }
    then {
        IUT sends a packet
        containing Physical Layer Control Field Type 2
        indicating "Header Format": 000
        and indicating "DF Redundancy Version": 0
        and indicating "DF New Data Indication": Same as in the initial condition
        and indicating "HARQ Process Number": Same as in the initial condition
    }
}

```

7.1.5.1.3 Redundancy version increment

Field	Description
TP id	DECTNR/MAC/HARQ/TX/03
Test objective	Check that the IUT uses the next redundancy version for HARQ re-transmission when receiving NACK feedback in format 1, 3, 4, or 5
Reference	ETSI TS 103 636-4 [4], clause 5.5
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_harq_tx
Initial conditions	
with { IUT having sent a packet containing Physical Header Control Field Type 2 indicating "Header Format": 000 and indicating "DF Redundancy Version": Any and indicating "DF HARQ Process Number": Any }	
Expected behaviour	
ensure that { when { IUT receives a packet containing Physical Layer Control Field Type 2 containing Feedback info (format 1, 3, 4, or 5) indicating "DF HARQ Process Number": Same as in the initial condition and indicating "Transmission Feedback": NACK } then { IUT sends a packet containing Physical Layer Control Field Type 2 indicating "Header Format": 000 and indicating "DF Redundancy Version": Next in the sequence compared to the initial condition and indicating "DF New Data Indication": Same as in the initial condition and indicating "DF HARQ Process Number": Same as in the initial condition } }	

7.1.5.1.4 Max HARQ Re-Tx

Field	Description
TP id	DECTNR/MAC/HARQ/TX/04
Test objective	Check that the IUT does not perform HARQ re-transmissions after delay Max HARQ Re-Tx
Reference	ETSI TS 103 636-4 [4], clause 5.5
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_harq_tx
Initial conditions	
with { IUT having sent a packet containing Physical Header Control Field Type 2 indicating "Header Format": 000 and indicating "DF Redundancy Version": Any and indicating "DF New Data Indication": Any and indicating "DF HARQ Process Number": Any }	

}	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing Physical Layer Control Field Type 2 containing Feedback info (format 1, 3, 4, 5, or 6) indicating "HARQ Process Number": Same as in the initial condition and indicating "Transmission Feedback": NACK and timer "Max HARQ Re-Tx" expires } then { IUT sends a packet containing Physical Layer Control Field Type 2 indicating "Header Format": 000 and indicating "DF Redundancy Version": 0 and indicating "DF New Data Indication": Value toggled compared to initial condition and indicating "DF HARQ Process Number": Same as in the initial condition } } </pre>	
NOTE: Max HARQ Re-Tx is signaled during the association procedure within the Association Request/Response message IE.	

7.1.5.2 HARQ Feedback

7.1.5.2.1 NACK Feedback

Field	Description
TP id	DECTNR/MAC/HARQ/FB/01
Test objective	Check that IUT sends a NACK as HARQ feedback when PDC decoding fails for packet requesting feedback
Reference	ETSI TS 103 636-4 [4], clause 5.5.2
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_harq_feedback
Initial conditions	
<pre> with { IUT having performed association with another RD and IUT having sent a packet containing MAC PDU containing Random-access resource IE } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing Physical Layer Control Fields Type 2 indicating "Header Format": 000 and indicating "DF HARQ Process Number": Any and indicating invalid PDC CRC } then { IUT sends a packet containing Physical Header Control Field Type 2 containing Feedback info (format 1, 3, 4, 5, or 6) indicating "HARQ Process Number": Same as in the received packet and indicating "Transmission Feedback": NACK } } </pre>	

7.1.5.2.2 ACK Feedback

Field	Description
TP id	DECTNR/MAC/HARQ/FB/02
Test objective	Check that IUT sends an ACK as HARQ feedback for successful reception of packet requesting feedback
Reference	ETSI TS 103 636-4 [4], clause 5.5.2
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_harq_feedback
Initial conditions	
<pre> with { IUT having performed association with another RD and IUT having sent a packet containing MAC PDU containing Random-access resource IE } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing Physical Layer Control Fields Type 2 indicating "Header Format": 000 and indicating "DF HARQ Process Number": Any and indicating valid PDC CRC } then { IUT sends a packet containing Physical Header Control Field Type 2 containing Feedback info (format 1, 3, 4, or 5) indicating "HARQ Process Number": Same as in the received packet indicating "Transmission Feedback": ACK } } </pre>	

7.1.6 Multiplexing and Assembly

7.1.6.1 MAC PDU Multiplexing

Field	Description
TP id	DECTNR/MAC/MUXA/01
Test objective	Check that any MAC PDU transmitted by the EUT can be logically parsed into IEs
Reference	ETSI TS 103 636-4 [4], clause 5.6
Role	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_muxa
Initial conditions	
<pre> with { IUT switched on } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet } then { IUT sends a packet containing a valid MAC PDU } } </pre>	
NOTE: A valid MAC PDU contains multiplexed IEs while not having to contain any specific set of IEs.	

7.1.6.2 Padding IE

Field	Description
TP id	DECTNR/MAC/MUXA/02
Test objective	Check that the IUT includes a Padding IE to a MAC PDU such that it fills it to the next TBS size
Reference	ETSI TS 103 636-4 [4], clause 5.6
Role	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc mac muxa
Initial conditions	
with { IUT switched on }	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet } then { IUT sends a packet containing a MAC PDU containing Padding IE indicating MAC IE Length: "Lowest possible to fill the PDU to the next TBS" } }</pre>	
NOTE: The Padding IE length is allowed be absent if the PDU length without it is already a valid TBS size.	

7.1.7 Mobility Procedures

7.1.7.1 Mobility by more suitable RSSI-2

Field	Description
TP id	DECTNR/MAC/MOB/01
Test objective	Check that the IUT performs the mobility procedure when it finds a more suitable route to sink due to higher RSSI-2
Reference	ETSI TS 103 636-4 [4], clause 5.7
Mode	PT
Config	CF05
PICS Selection	pc mac mob
Initial conditions	
with { IUT having an association to LT_FT1 }	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing Cluster Beacon MAC PDU containing Cluster Beacon message IE indicating "Count to Trigger": COUNT_TO_TRIGGER and indicating "Relative Quality": RELATIVE_QUALITY indicating RSSI-2: RSSI_2_OWN from LT_FT1 and IUT receives a packet containing Cluster Beacon MAC PDU indicating RSSI-2: greater than RELATIVE_QUALITY + RSSI_2_OWN from LT_FT2 COUNT_TO_TRIGGER times in a row } then { IUT sends a packet containing Association Request MAC PDU to LT_FT2 and may send a packet containing Association Release MAC PDU } }</pre>	

<pre> } } to LT_FT1 </pre>
--

7.1.8 Association Procedure

7.1.8.1 Association Response

7.1.8.1.1 Validity of Association Response message

Field	Description
TP id	DECTNR/MAC/ASS/RES/01
Test objective	Check that the IUT sends a valid Association Response message
Reference	ETSI TS 103 636-4 [4], clause 6.4.2.5
Mode	FT
Config	CF02
PICS Selection	pc_mac_ass_ft
Initial conditions	
<pre> with { IUT having sent a packet containing MAC PDU containing Random-access resource IE } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet containing MAC PDU containing Association Response IE } then { IUT sends a packet containing Association Response MAC PDU } } </pre>	
NOTE: The "when" and "then" statements refer to the same packet.	

Variants			
#	Profile	Association Response MAC PDU	Condition
1	ETSI TS 103 636-4 [4] (Core)	packet	
		containing Physical Layer Control Field: Type 2 indicating Header Format 001	
		and containing MAC PDU containing MAC Header Type and containing Unicast Header	
		and containing Security Info IE	pc_mac_sec
		IE and containing Association Response Message	
		and containing RD Capability IE	
		and containing MIC	pc_mac_sec
2	ETSI TS 103 874-2 [7]	As defined in ETSI TS 103 874-2 [7], clause 11.3.2	pc_smcb

7.1.8.1.2 Association Response

Field	Description
TP id	DECTNR/MAC/ASS/RES/02
Test objective	Check that the IUT sends an Association Response message upon receiving an Association request message
Reference	ETSI TS 103 636-4 [4], clause 5.8.5
Mode	FT
Config	CF02
PICS Selection	pc_mac_ass_ft
Initial conditions	
<pre> with { IUT having sent a packet </pre>	

containing MAC PDU containing Random-access resource IE }
Expected behaviour
<pre> ensure that { when { IUT receives a packet containing Association Request MAC PDU } then { IUT sends a packet containing Association Response MAC PDU within random-access response window } } </pre>
NOTE: The random-access response window for Association Request - Response is one frame.

7.1.8.2 Association Request

7.1.8.2.1 Validity of Association Request message

Field	Description
TP id	DECTNR/MAC/ASS/REQ/01
Test objective	Check that the IUT sends a valid Association Request message
Reference	ETSI TS 103 636-4 [4], clause 6.4.2.4
Mode	PT
Config	CF03
PICS Selection	pc_mac_ass_pt
Initial conditions	
with { IUT in any state }	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet containing MAC PDU containing Association Request message IE } then { IUT sends a packet containing Association Request MAC PDU } } </pre>	
NOTE: The "when" and "then" statements refer to the same packet.	

Variants			
#	Profile	Association Request MAC PDU	Condition
1	ETSI TS 103 636-4 [4] (Core)	packet	
		containing Physical Layer Control Field: Type 2	
		and containing MAC PDU	
		containing MAC Header Type	
2	ETSI TS 103 874-2 [7]	and containing Unicast Header	
		and containing Security Info IE	pc_mac_sec
		and containing Association Request message IE	
		and containing RD Capability IE	
3	ETSI TS 103 874-2 [7]	and containing MIC	pc_mac_sec
		As defined in ETSI TS 103 874-2 [7], clause 11.3.1	pc_smcb

7.1.8.2.2 Association Request

Field	Description
TP id	DECTNR/MAC/ASS/REQ/02
Test objective	Check that the IUT initiates the association procedure by sending an Association Request message
Reference	ETSI TS 103 636-4 [4], clause 5.8.4
Mode	PT
Config	CF03
PICS Selection	pc_mac_ass_pt
Initial conditions	
with { IUT switched on }	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing Physical Layer Control Field: Type 1 and containing MAC PDU containing Beacon Header indicating "Network ID": IUTs network ID and containing Random-access resource IE } then { IUT sends a packet containing Association Request MAC PDU } }</pre>	

7.1.8.2.3 Association Request timeout

Field	Description
TP id	DECTNR/MAC/ASS/REQ/03
Test objective	Check that the IUT retries the Association Request procedure when it does not receive a response in time
Reference	ETSI TS 103 636-4 [4], clause 5.3.4
Mode	PT
Config	CF03
PICS Selection	pc_mac_ass_pt
Initial conditions	
with { IUT having sent a packet containing Association Request MAC PDU }	
Expected behaviour	
<pre> ensure that { when { IUT does not receive a packet containing Association Response MAC PDU within random-access response window } then { IUT sends a packet containing Association Request MAC PDU } }</pre>	

7.1.8.2.4 Association Accepted

Field	Description
TP id	DECTNR/MAC/ASS/REQ/04
Test objective	Check that the IUT ends the Association procedure when it receives an association response indicating accepted association
Reference	ETSI TS 103 636-4 [4], clause 5.8.5
Mode	PT
Config	CF03
PICS Selection	pc_mac_ass_pt
Initial conditions	
with { IUT having sent a packet containing Association Request MAC PDU }	
Expected behaviour	
ensure that { when { IUT receives a packet containing Association Response MAC PDU containing Association Response IE indicating "ACK/NACK": 1 ("Association Accepted") } then { IUT ends the association procedure } }	
NOTE: After a successful association, the IUT should be capable to send uplink data.	

7.1.8.2.5 Association Rejected

Field	Description
TP id	DECTNR/MAC/ASS/REQ/05
Test objective	Check that the IUT behaves correctly when it receives an association response indicating rejected association
Reference	ETSI TS 103 636-4 [4], clause 5.8.5
Mode	PT
Config	CF03
PICS Selection	pc_mac_ass_pt
Initial conditions	
with { IUT having sent a packet containing Association Request MAC PDU to LT_FT }	
Expected behaviour	
ensure that { when { IUT receives a packet containing Association Response MAC PDU containing Association Response IE indicating "ACK/NACK": 0 ("Association Rejected") and indicating "Reject Timer": REJECT_TIMER } then { IUT does not send a packet containing Association Request MAC PDU before timer REJECT_TIMER expires to LT_FT } }	
NOTE: The IUT may send the Association Request to another FT before the timer REJECT_TIMER expires.	

7.1.8.3 Association Release

7.1.8.3.1 Validity of Association Release message

Field	Description
TP id	DECTNR/MAC/ASS/REL/01
Test objective	Check the validity of the Association Release message
Reference	ETSI TS 103 636-4 [4], clause 6.4.2.6
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_ass
Initial conditions	
with { IUT having an association to another RD }	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet containing MAC PDU containing Association Release message IE } then { IUT sends a packet containing Association Release MAC PDU } }</pre>	
NOTE: The "when" and "then" statements refer to the same packet.	

Variants			
#	Profile	Association Release MAC PDU	Condition
1	ETSI TS 103 636-4 [4] (Core)	packet containing Physical Layer Control Field: Type 2 indicating Header Format 001 and containing MAC PDU containing MAC Header Type and containing Unicast Header	
		and containing Security Info IE	pc_mac_sec
		and containing Association Release Message IE	
		and containing MIC	pc_mac_sec
2	ETSI TS 103 874-2 [7]	As defined in ETSI TS 103 874-2 [7], clause 11.3.3	pc_smc_b

7.1.8.3.2 Association Release

Field	Description
TP id	DECTNR/MAC/ASS/REL/02
Test objective	Check that the IUT releases its association with the sender when it receives an Association Release message
Reference	ETSI TS 103 636-4 [4], clause 6.4.2.6
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_ass
Initial conditions	
with { IUT having an association to another RD }	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing Association Release MAC PDU } then {</pre>	

IUT considers its association with the sender released
}
}

7.1.9 Security Procedures

7.1.9.1 Security Procedures with MAC Security IE present

7.1.9.1.1 Message integrity

Field	Description
TP id	DECTNR/MAC/SEC/01
Test objective	Check that the IUT discards the received MAC PDU when the MIC is incorrect
Reference	ETSI TS 103 636-4 [4], clause 5
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_sec
Initial conditions	
with { IUT in any state }	
Expected behaviour	
ensure that { when { IUT receives a packet containing MAC PDU containing MAC Header Type indicating "MAC Security": '10'b (MAC Security IE present) and containing incorrect MIC } then { IUT discards the MAC PDU } }	
NOTE: The MAC PDU may or may not include the Security Info IE.	

7.1.9.1.2 Deciphering Capability

Field	Description
TP id	DECTNR/MAC/SEC/02
Test objective	Check that IUT correctly deciphers a MAC PDU
Reference	ETSI TS 103 636-4 [4], clause 5
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_sec
Initial conditions	
with { IUT in any state }	
Expected behaviour	
ensure that { when { IUT receives a packet containing MAC PDU containing MAC Header Type indicating "MAC Security": '10'b (MAC Security IE present) } then { IUT deciphers the MAC PDU } }	

7.1.9.1.3 Security Capability

Field	Description
TP id	DECTNR/MAC/SEC/03
Test objective	Check that the IUT includes the MIC in a MAC PDU and ciphers it when security is used
Reference	ETSI TS 103 636-4 [4], clause 5
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_mac_sec_mode1
Initial conditions	
with { IUT having a MAC PDU to be sent using security Mode 1 }	
Expected behaviour	
<pre> ensure that { when { IUT sends a packet containing MAC PDU containing MAC Header Type indicating "MAC Security": '10'b (MAC Security IE present) and containing MAC MIC } then { IUT ciphers the MAC PDU } }</pre>	

7.1.10 Reconfiguration Procedus

Void.

7.1.11 Group Assignment Procedus

Void.

7.1.10 Paging Procedures

7.1.10.1 Paging transmission

Field	Description
TP id	DECTNR/MAC/PG/01
Test objective	Check that the IUT is able to transmit a paging to a PT
Reference	ETSI TS 103 636-4 [4], clause 5.12
Mode	FT
Config	CF02
PICS Selection	pc_mac_pg
Initial conditions	
with { IUT having an association to LT_PT supporting Paging }	
Expected behaviour	
<pre> ensure that { when { IUT has a packet to LT_PT } then { IUT sends a packet containing Cluster Beacon MAC PDU containing Broadcast Indication IE indicating "Indication type": 0b000 ("Paging") and indicating "Long/Short RD ID": LT_PT_LONG_RD_ID or LT_PT_SHORT_RD_ID } }</pre>	

7.1.10.2 Paging reception and response

Field	Description
TP id	DECTNR/MAC/PG/02
Test objective	Check that the IUT is able to receive a paging indication and send a response
Reference	ETSI TS 103 636-4 [4], clause 5.12
Mode	PT
Config	CF03
PICS Selection	pc_mac_rach_tx, pc_mac_pg
Initial conditions	
with { IUT having an association to LT_FT }	
Expected behaviour	
<pre> ensure that { when { IUT receives packet containing Cluster Beacon MAC PDU containing Broadcast Indication IE indicating "Indication type": 0b000 ("Paging") and indicating "Long/Short RD ID": IUT_LONG_RD_ID or IUT_SHORT_RD_ID and containing Random-access resource IE } then { IUT sends a packet containing MAC PDU containing Keep alive IE to random-access resources indicated in the Random-access resource IE or IUT sends a packet containing Association Request MAC PDU containing Association Request Message IE indicating "Setup cause": 0b110 ("Paging response") to random-access resources indicated in the Random-access resource IE } }</pre>	

7.2 DLC

7.2.1 DLC Segmentation and Reassembly

Void.

7.2.2 DLC Transmissions

7.2.2.1 DLC PDU retransmission

Field	Description
TP id	DECTNR/DLC/RETX/01
Test objective	Check that the IUT retransmits a DLC SDU or segment when receiving a MAC HARQ NACK feedback
Reference	ETSI TS 103 636-5 [5], clause 5.2.6
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_dlc_st2, pc_dlc_st3
Initial conditions	
with { IUT having sent a packet containing Physical Header Control Field Type 2 indicating "Header Format": 000 and indicating "DF HARQ Process Number": Any and containing DLC PDU }	
Expected behaviour	
<pre> ensure that { when {</pre>	

```

    IUT receives a packet
    containing Physical Header Field Type 2
    containing Feedback info (format 1, 3, 4, 5, or 6)
    indicating "HARQ Process Number": Same as in the initial condition
    indicating "Transmission feedback": NACK
    and timer Max HARQ Re-Tx expires
  }
  then {
    IUT sends a packet
    containing DLC PDU
    containing a DLC SDU or segment from the re-transmission buffer
  }
}

```

7.2.2.2 DLC PDU successful transmission

Field	Description
TP id	DECTNR/DLC/RETX/02
Test objective	Check that the IUT transmits a new DLC SDU or segment when receiving a MAC HARQ ACK feedback
Reference	ETSI TS 103 636-5 [5], clause 5.2.6
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_dlc_st1, pc_dlc_st2, pc_dlc_st3
Initial conditions	
with { IUT having sent a packet containing DLC PDU }	
Expected behaviour	
ensure that { when { IUT receives a packet containing Physical Header Field Type 2 containing Feedback info (format 1, 3, 4, or 5) indicating "Transmission Feedback": ACK } then { IUT sends a DLC PDU containing a new DLC SDU or segment } }	

7.2.3 DLC SDU lifetime control

Void.

7.2.4 Routing services

7.2.4.1 Packet Routing to backend (uplink)

7.2.4.1.1 Uplink routing as a router

Field	Description
TP id	DECTNR/DLC/ROU/01
Test objective	Check that the IUT routes an uplink packet towards the backend
Reference	ETSI TS 103 636-5 [5], clause 5.2.8.2
Mode	FT-PT
Config	CF04 or CF06
PICS Selection	pc_dlc_routing_000
Initial conditions	
with { IUT having an association to LT_FT }	

Expected behaviour
<pre> ensure that { when { IUT receives a packet containing DLC PDU containing a Routing header indicating "Dest_Add": '010'b ("Destination Address is backend") and indicating "Routing type": '000'b ("Uplink hop-by-hop routing") } then { IUT sends a packet containing DLC PDU to LT_FT } } </pre>

7.2.4.1.2 Uplink routing as a destination

Field	Description
TP id	DECTNR/DLC/ROU/02
Test objective	Check that the IUT having backend connectivity provides the received DLC SDU to the CVG layer at the backend interface
Reference	ETSI TS 103 636-5 [5], clause 5.2.8.2
Mode	FT
Config	CF02
PICS Selection	pc_dlc_routing_000
Initial conditions	
<pre> with { IUT operating as a sink and having a connection to the backend } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing DLC PDU containing a Routing header indicating "Dest_Add": '010'b ("Destination Address is backend") } then { IUT provides the DLC SDU to the upper layer } } </pre>	

7.2.4.2 Packet Routing from backend (downlink)

7.2.4.2.1 Unicast as a destination

Field	Description
TP id	DECTNR/DLC/ROU/03
Test objective	Check that the IUT receives a packet when the routing header indicates it as the destination
Reference	ETSI TS 103 636-5 [5], clause 5.2.8.2
Mode	PT or FT-PT
Config	IF Mode = PT THEN CF03 IF Mode = FT-PT THEN CF06
PICS Selection	pc_dlc_routing_011
Initial conditions	
<pre> with { IUT having an association to LT_FT } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing DLC PDU containing a Routing header indicating "Dest_Add": ('000'b, or '011'b) (Destination Address is present) and indicating "Routing type": '011'b ("Downlink flooding") and indicating "Destination address": IUT's Long RD ID } } </pre>	

```

    }
    then {
        IUT passes the DLC SDU to the upper layer
    }
}

```

7.2.4.2.2 Unicast destination with direct connection

Field	Description
TP id	DECTNR/DLC/ROU/04
Test objective	Check that the IUT routes a downlink unicast packet to its destination when it is an associated RD
Reference	ETSI TS 103 636-5 [5], clause 5.2.8.2
Mode	FT-PT
Config	CF04
PICS Selection	pc_dlc_routing_011
Initial conditions	
<pre> with { IUT having an association to LT_FT and LT_PT having an association to IUT } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing DLC PDU containing a Routing header indicating "Dest_Add": ('000'b or '011'b) (Destination Address is present) and indicating "Routing type": '011'b ("Downlink flooding") and indicating "Destination address": Long RD ID of LT_PT } then { IUT sends a packet containing DLC PDU containing the received DLC SDU to LT_PT } } </pre>	

7.2.4.2.3 Unicast destination without direct connection

Field	Description
TP id	DECTNR/DLC/ROU/05
Test objective	Check that the IUT routes a downlink unicast packet by flooding when the destination is not an associated RD
Reference	ETSI TS 103 636-5 [5], clause 5.2.8.2
Mode	FT-PT
Config	CF06
PICS Selection	pc_dlc_routing_011
Initial conditions	
<pre> with { IUT having an association to LT_FT and LT_PT having an association to IUT and LT_FT_PT having an association to IUT } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing DLC PDU containing a Routing header indicating "Dest_Add": ('000'b or '011'b) (Destination Address is present) and indicating "Routing type": '011'b ("Downlink flooding") and not indicating "Destination address": Long RD ID of LT_PT or LT_FT_PT } then { IUT sends a packet containing DLC PDU containing the received DLC SDU } } </pre>	

<pre> } } to LT_FT_PT } </pre>
--

7.2.4.2.4 Broadcast destination

Field	Description
TP id	DECTNR/DLC/ROU/06
Test objective	Check that the IUT routes a broadcast packet to all associated RDs
Reference	ETSI TS 103 636-5 [5], clause 5.2.8.2
Mode	FT-PT
Config	CF06
PICS Selection	pc_dlc_routing_011
Initial conditions	
<pre> with { IUT having an association to LT_FT and LT_PT having an association to IUT and LT_FT_PT having an association to IUT } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing DLC PDU containing a Routing header indicating "Dest_Add": '100'b ("Destination Address is broadcast address") and indicating "Routing type": '011'b ("Downlink flooding") } then { IUT passes the DLC SDU to the upper layer and sends a packet containing DLC PDU containing the received DLC SDU to LT_PT and sends a packet containing DLC PDU containing the received DLC SDU to LT_FT_PT } } </pre>	

7.3 CVG

7.3.1 Transparent procedure

Void.

7.3.2 Multiplexing procedures

Void.

7.3.3 Duplicate removal procedure

7.3.3.1 Duplicate CVG SDU

Field	Description
TP id	DECTNR/CVG/DR/01
Test objective	Check that the IUT discards a duplicate CVG PDU on reception
Reference	ETSI TS 103 636-5 [5], clause 6.2.5
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_cvg_dup
Initial conditions	
<pre> with { IUT having received a packet containing CVG PDU containing Data EP IE indicating "Sequence Number": Any } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT receives a packet containing CVG PDU containing Data EP IE indicating "Sequence Number": Same as in the initial condition } then { IUT discards the CVG PDU } } </pre>	

7.3.4 Delivery Order procedures

Void.

7.3.5 CVG Segmentation

7.3.5.1 Segmentation Indication 01

Field	Description
TP id	DECTNR/CVG/SEG/01
Test objective	Check that the IUT correctly sends a first segment of a CVG PDU
Reference	ETSI TS 103 636-5 [5], clause 6.2.7
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_cvg_st2, pc_cvg_st3, pc_cvg_st4
Initial conditions	
<pre> with { IUT having a CVG SDU to be sent } </pre>	
Expected behaviour	
<pre> ensure that { when { The CVG SDU does not fit in the CVG PDU as a whole } then { IUT sends a packet containing CVG PDU containing Data IE or Data EP IE indicating "SI": '01'b ("First segment") and containing Payload: The first segment of the CVG SDU } } </pre>	

7.3.5.2 Segmentation Indication 11

Field	Description
TP id	DECTNR/CVG/SEG/02
Test objective	Check that the IUT correctly sends a intermediate segment of a CVG PDU
Reference	ETSI TS 103 636-5 [5], clause 6.2.7
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_cvg_st2, pc_cvg_st3, pc_cvg_st4
Initial conditions	
<pre> with { IUT having sent a packet containing CVG PDU containing Data IE or Data EP IE indicating "SI": '01'b, or '11'b (Initial or intermediate segment) and indicating "Sequence Number": Any and containing Payload: CVG SDU segment } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT has an intermediate CVG SDU segment to be sent } then { IUT sends a packet containing CVG PDU containing Data IE or Data EP IE indicating "SI": '11'b ("Intermediate segment") and indicating "Sequence Number": Same as in the initial condition and indicating "Segmentation offset": Equal to the total size of previous segments and containing Payload: CVG SDU segment } } } </pre>	

7.3.5.3 Segmentation Indication 10

Field	Description
TP id	DECTNR/CVG/SEG/03
Test objective	Check that the IUT correctly sends the last segment of a CVG PDU
Reference	ETSI TS 103 636-5 [5], clause 6.2.7
Mode	FT or PT
Config	IF Mode = FT THEN CF02 IF Mode = PT THEN CF03
PICS Selection	pc_cvg_st2, pc_cvg_st3, pc_cvg_st4
Initial conditions	
<pre> with { IUT having sent a packet containing CVG PDU containing Data IE or Data EP IE indicating "SI": '01'b, or '11'b (Initial or intermediate segment) and indicating "Sequence Number": Any and containing Payload: CVG SDU segment } </pre>	
Expected behaviour	
<pre> ensure that { when { IUT has the last CVG SDU segment to be sent } then { IUT sends a CVG PDU containing Data IE or Data EP IE indicating "SI": '10'b ("Last segment") and indicating "Sequence Number": Same as in the initial condition and indicating "Segmentation offset": Equal to the total size of previous segments and containing Payload: CVG SDU segment with last octets of the SDU. } } } </pre>	

8 Test Descriptions

8.1 MAC Test Descriptions

8.1.1 Spectrum Management Procedures

8.1.1.1 Beaconsing Transmission

8.1.1.1.1 Test Purpose

Table 8.1.1.1.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Validity of Network Beacon message	7.1.1.1.1	1
Network Beacon Period	7.1.1.1.4	2
Cluster Beacon according to Network Beacon information	7.1.1.1.7	3
Validity of Cluster Beacon message	7.1.1.1.2	4
Cluster Beacon Period	7.1.1.1.5	5

8.1.1.1.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.1.1.2-1: PICS selection parameters

PICS selection	Description	Status
pc_mac_ft	FT mode	m
pc_mac_bea_cluster_tx	Support Cluster Beacon transmission	m

8.1.1.1.3 Pre-Test Conditions

Prerequisite tests:

- None

Test System:

- Configuration: CF01

EUT:

- Mode: FT

Preamble:

- EUT is switched on

PICS & PIXIT parameters:

Table 8.1.1.1.3-1: Additional PICS parameters

PICS parameter	Description	Status
pc_mac_bea_network_tx	Support Network Beacon transmission	o
pc_dect_mesh	Mesh Network Topology	o
pc_mac_sec	Support MAC Security procedures	o
pc_smcb	Smart Metering, City and Buildings	o

Table 8.1.1.1.3-2: PIXIT parameters

PIXIT parameter	Description	Status
px_network_channel	The channel(s) where EUT transmits Network Beacons	c.1
c.1: IF pc_mac_bea_network_tx THEN m ELSE n/a.		

8.1.1.1.4 Test Procedure Sequence

Table 8.1.1.1.4-1: Test Sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
-	EXCEPTION: IF pc_mac_bea_network_tx THEN Steps 1a1 to 1a5 are performed ELSE Steps 1b1 to 1b2 are performed.				
1a1	Check: Does the EUT transmit a Network Beacon to px_network_channel?	-->	Network Beacon message	-	P
1a2	Check: Does the EUT transmit a valid Network Beacon in step 1a1?	-	-	1	P
1a3	Check: Does the EUT transmit 10 Network Beacon(s) with the average periodicity "Network beacon period" after step 1a2?	-->	Network Beacon message x 10	2	P
1a4	Check: Does the EUT transmit a Cluster Beacon at the time indicated in "Time to next" after step 1a3, on the channel indicated as "Next Cluster channel"?	-->	Cluster Beacon message	3	P
1a5	Check: Does the EUT transmit a valid Cluster Beacon in step 1a4?	-	-	4	P
1b1	The EUT transmits a Cluster Beacon on the operating channel.	-->	Cluster Beacon message	-	-
1b2	Check: Does the EUT transmit a valid Cluster Beacon in step 1b1?	-	-	4	P
2	Check: Does the EUT transmit another Cluster Beacon at the time indicated in "Cluster Beacon period"?	-->	Cluster Beacon message	5	P

8.1.1.2 Operating Channel(s) and Subslot(s) selection

8.1.1.2.1 Test Purpose

Table 8.1.1.2.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Channel Selection within the operating band	7.1.1.2.1	1
Selection of suitable channel resources	7.1.1.2.2	2
Next Cluster Channel in Cluster Beacon message	7.1.1.1.3	3
Time to Next Cluster Beacon transmission	7.1.1.1.6	4
Operating channel re-selection	7.1.1.2.3	5

8.1.1.2.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.1.2.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	m
pc_mac_ocs	Support Operation Channel and Subslot selection procedure	m

8.1.1.2.3 Pre-Test Conditions

Prerequisite tests:

- Beaconsing transmission

Test System:

- Configuration: CF01

EUT:

- Mode: FT

Preamble:

- EUT is switched off

PICS & PIXIT parameters:

Table 8.1.1.2.3-1: Additional PICS parameters

PICS parameter	Description	Status
pc_mac_ocs_reselect	Support Operating Channel and Subslot re-selection	o
pc_mac_bea_network_tx	Support Network Beacon transmission	o
pc_mac_bea_cluster_nc	Support "Next Channel" for a Cluster Beacon	o
pc_mac_bea_cluster_ttn	Support "Time to next" for a Cluster Beacon	o

Table 8.1.1.2.3-2: PIXIT parameters

PIXIT parameter	Description	Status
px_network_channel	The channel(s) where EUT transmits Network Beacons	c.1
px_operating_band	The operating band(s) of the EUT	m
c.1: IF pc_mac_bea_network_tx THEN m ELSE n/a.		

8.1.1.2.4 Test Procedure Sequence

Table 8.1.1.2.4-1: AWGN interference signal properties

Type	Parameter	Value	Remark
1	Bandwidth	50 % of the operating band	Bandwidth to cover 50 % of the operating band
	Power level at EUT input	> RSSI_THRESHOLD_MAX+ <i>InterferenceMargin</i>	RSSI_THRESHOLD_MAX as defined in ETSI TS 103 636-4 [4], clause 5.1.2 Notes 1 and 2
	Centre frequency	Set to cover the lower/upper 50 % of the operating band	
	Duty cycle	100 %	Continuous interference
2	Bandwidth	B	Nominal channel bandwidth
	Power level at EUT input	Set to same as in Type 1	Threshold as defined in ETSI TS 103 636-4 [4], clause 5.1.2
	Centre frequency	Centre of the operating channel of the EUT	Set to a single channel
	Duty cycle	100 %	Continuous interference
<i>InterferenceMargin</i> is the sum of the RSSI-2 Measurement accuracy (positive value) and the error caused by the RSSI-2 measurement report mapping as defined in ETSI TS 103 636-2 [2] on clause 8.3.			
NOTE 1: RSSI_THRESHOLD_MAX is set to the value defined for the band where the test is performed.			
NOTE 2: When setting the <i>InterferenceMargin</i> the TS should consider its own transmission output power tolerance to ensure the correct power level at the input of the EUT.			

Table 8.1.1.2.4-2: Test Sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits an interference signal according to field "Type 1" in Table 8.1.1.2.4-1.	<--	AWGN interference	-	-
2	EUT is switched on.	-	-	-	-
3	The EUT measures the RSSI-1 values of the channels on the selected operating band (px_operating_band) and selects a suitable channel(s).	-	-	-	-
-	EXCEPTION: Steps 4 to 6 are performed IF pc_mac_bea_network_tx AND channel px_network_channel does not contain interference.	-	-	-	-
4	The EUT transmits a Network Beacon message on the channel px_network_channel.	-->	Network Beacon message	-	-
5	Check: Does the Network Beacon message value for "Next Cluster channel" belong in the range of absolute channel numbers defined for the operating band as defined in Table 5.4.2-1 in ETSI TS 103 636-2 [2]?	-->	Network Beacon message	1	P
6	Check: Does the "Network Beacon message" value for "Next Cluster channel" indicate a channel which is not interfered by the interference signal?	-->	Network Beacon message	2	P
7	Check: Does the EUT transmit a Cluster Beacon message on a channel not containing interference? (see note)	-->	Cluster Beacon message	2	P
-	EXCEPTION: The steps 8 to 14 are performed IF pc_mac_ocs_reselect.	-	-	-	-
-	EXCEPTION: The steps 8 to 11 may be repeated multiple times to verify that the channel is always selected correctly.	-	-	-	-
8	The TS transmits an interference signal according to field "Type 2" in Table 8.1.1.2.4-1.	-	-	-	-
9	Check: Does the EUT continue to transmit Cluster Beacon messages?	-->	Cluster Beacon message	-	-
-	EXCEPTION: The steps 10a1 to 10b2 define sequences which are performed depending on PICS parameters.	-	-	-	-
10a1	IF pc_mac_bea_cluster_nc THEN When: The EUT transmits a Cluster Beacon indicating "Next Cluster Channel" after step 9.	-->	-	-	-
10a2	Check: Does the EUT transmit the next Cluster Beacon message on channel indicated in "Next Cluster Channel"?	-	-	3	P
10b1	IF pc_mac_bea_cluster_ttn THEN When: The EUT transmits a Cluster Beacon indicating "Time to next" after step 9.	-->	Cluster Beacon message	-	-
10b2	Check: Does the EUT transmit the next Cluster Beacon message at "Time to next"?	-	-	4	P
11	Check: Does the EUT transmit a Cluster Beacon message on a channel which is not interfered by the interference "Type 1" nor "Type 2" at least within timer scanStatusValid after step 8?	-->	Cluster Beacon message	5	P
12	IF pc_mac_bea_network_tx THEN perform steps 5 to 6.	-	-	-	-
13	The EUT is switched off.	-	-	-	-
14	Repeat steps 1 to 13 by using the other 50 % of the operating band for the "Type 1" interference at step 1.	-	-	-	-
NOTE: With some combinations of nominal signal bandwidth (> 1,728 MHz) and operating band, adjacent operating channel frequencies overlap. Therefore, covering one channel with interference will also interfere the next channel.					

8.1.1.3 Power Control

8.1.1.3.1 Initial Transmit Power

8.1.1.3.1.1 Test Purpose

Table 8.1.1.3.1.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Power control for initial transmission	7.1.1.3.1	1

8.1.1.3.1.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.1.3.1.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_smc_b	Smart Metering, City and Buildings	m
pc_mac_pt	PT mode	m
pc_smc_b_mac_pc_initial	Support initial transmission power control	m

8.1.1.3.1.3 Pre-Test Conditions

Prerequisite tests:

- Transmission on Random-Access Resources
- Association Procedure

Test System:

- Configuration: CF03 (LT_TC + LT_FT)

EUT:

- Mode: PT

Preamble:

- The EUT is switched off

PICS & PIXIT parameters:

Table 8.1.1.3.1.3-1: Additional PICS parameters

PICS parameter	Description	Status
pc_mac_pc_tx_power_max	Highest transmission power level supported by the EUT	m

8.1.1.3.1.4 Test Procedure sequence

Table 8.1.1.3.1.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
-	EXCEPTION: The steps 1 to 6 are repeated for the following values of <i>PathLoss</i> : 63 dB - <i>MaxTXComp</i> , 80 dB - <i>MaxTXComp</i> , 100 dB - <i>MaxTXComp</i> and 120 dB – <i>MaxTXComp</i> . Note 1.	-	-	-	-
1	The system path loss is set at <i>PathLoss</i> .	-	-	-	-
2	The EUT is switched on.	-	-	-	-
3	The TS transmits Cluster Beacon message(s).	<--	Cluster Beacon message	-	-
4	Check: Does the EUT transmit an Association Request message indicating Transmit Power level less or equal to $RX_Power + PathLoss + PowerMargin$? See notes 2 and 3.	-->	Association Request message	1	P
5	The TS transmits an Association Response message.	<--	Association Response message	-	-
6	The EUT is switched off.	-	-	-	-
NOTE 1: <i>MaxTXComp</i> = 23 dBm - <i>pc_mac_pc_tx_power_max</i> . (Maximum TX power of the RD Power Class as defined ETSI TS 103 636-2 [2] in clause 6.2).					
NOTE 2: <i>PowerMargin</i> is the sum of the RSSI-2 Measurement accuracy (positive value) and the error caused by the RSSI-2 measurement report mapping as defined in ETSI TS 103 636-2 [2] in clause 8.3.					
NOTE 3: <i>RX_Power</i> is defined in ETSI TS 103 874-2 [7] as -88 dBm.					

8.1.1.3.2 Dynamic Power Control

8.1.1.3.2.1 Test Purpose

Table 8.1.1.3.2.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Maximum transmission power in a cluster	7.1.1.3.2	1

8.1.1.3.2.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.1.3.2.2-1: PICS selection parameters

PICS Selection	Description	Status
<i>pc_mac_pt</i>	PT mode	m
<i>pc_mac_pc</i>	Support Power Control	m

8.1.1.3.2.3 Pre-Test Conditions

Prerequisite tests:

- Transmission on Random-Access Resources
- Random-Access Data Transmission
- HARQ Transmission
- Association Procedure

Test System:

- Configuration: CF03 (LT_TC + LT_FT)

- The transmission power level of the Cluster Beacon messages transmitted by the Test System are set one step below the PICS parameter **pc_mac_pc_tx_power_max**, as defined in Table 6.2.1-3a of ETSI TS 103 636-4 [4].

EUT:

- Mode: PT

Preamble:

- EUT in PT mode associated to another RD, according to Table 8.4.3.2-1
- Test Mode on

PICS & PIXIT parameters:

Table 8.1.1.3.2.3-1: Additional PICS parameters

PICS Selection	Description	Status
pc_mac_pc_tx_power_min	Lowest transmission power level supported by the EUT	m
pc_mac_pc_tx_power_max	Highest transmission power level supported by the EUT	m
pc_mac_pc_target_bler	Target BLER percentage of the EUT	m

Table 8.1.1.3.2.3-2: PIXIT parameters

PIXIT parameter	Description	Status
px_min_sensitivity_level	RD sensitivity level in dBm	m

8.1.1.3.2.4 Test Procedure sequence

Table 8.1.1.3.2.4-1: Test sequence (Part 1: Power Up)

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	Set the system path loss such that the EUT signal level at the TS input when using Transmit Power <i>pc_mac_pc_tx_power_min</i> is ~10 dB above the <i>px_min_sensitivity_level</i> .	-	-	-	-
-	EXCEPTION: The steps 2 to 7 are repeated until the EUT has reached the Transmit Power <i>pc_mac_pc_tx_power_max</i> .	-	-	-	-
2	The TS transmits a Data Request message indicating: <i>request_flags</i> : 0x80 (HARQ), <i>request_t_interval</i> : 0x0a (100 ms), <i>request_n_packets</i> : 0x64 (100 packets), <i>request_n_bytes</i> : 0x000a (10-byte data payload).	<--	TMC: Data Request	-	-
-	EXCEPTION: The steps 3 to 4 are repeated until all packets requested in step 2 have been transmitted.	-	-	-	-
3	The EUT transmits a packet containing a MAC PDU.	-->	TMC: Data Request Response	-	-
4	The TS transmits a packet containing Transmission Feedback indicating ACK or NACK.	<--	ACK/NACK	-	-
5	Check: Does the EUT reach a BLER of <i>pc_mac_pc_bler_target</i> for the transmissions in step 3? This may be checked from the number of re-transmissions done by the EUT.	-	-	-	P

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
6	Check: Does the EUT transmit a packet indicating transmission power level less or equal than indicated by the TS in the Cluster Beacon messages, for all transmissions of step 3? (see note)	-	-	PC/02	P
7	The system path loss is increased by 10 dB.	-	-	-	-
NOTE: The transmission power limit implicitly comes from the Physical Layer Control Field if not explicitly indicated in the Cluster Beacon IE.					

Table 8.1.1.3.2.4-2: Test sequence (Part 2: Power Down)

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	Set the system path loss such that the EUT signal level at the TS input when using Transmit Power <i>pc_mac_pc_tx_power_max</i> is ~10 dB above the <i>px_min_sensitivity_level</i> .	-	-	-	-
-	EXCEPTION: The steps 2 to 7 are repeated until the additional system path loss is completely removed or when the EUT has reached the Transmit Power <i>pc_mac_pc_tx_power_min</i> .	-	-	-	-
2	The TS transmits a Data Request message indicating: <i>request_flags</i> : 0x00 (No HARQ), <i>request_t_interval</i> : 0x0a (100 ms), <i>request_n_packets</i> : 0x64 (100 packets), <i>request_n_bytes</i> : 0x000a (10-byte data payload).	<--	TMC: Data Request	-	-
-	EXCEPTION: The steps 3 to 4 are repeated until all packets requested in step 2 have been transmitted.	-	-	-	-
3	The EUT transmits a packet containing a MAC PDU.	-->	TMC: Data Request Response	-	-
4	The TS transmits a packet containing Transmission Feedback indicating ACK or NACK.	<--	ACK/NACK	-	-
5	Check: Does the EUT reach a BLER of <i>pc_mac_pc_target_bler</i> for the transmissions in step 3? This may be checked from the number of re-transmissions done by the EUT.	-	-	-	P
6	IF the target BLER was reached in the previous execution of step 5 THEN Check: Does the EUT lower its Transmit Power or increase the MCS in comparison to the previous repetition?	-	-	-	P
7	The system path loss is lowered by 10 dB.	-	-	-	-

8.1.1.4 Selecting RD for association

8.1.1.4.1 Test Purpose

Table 8.1.1.4.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Selection based on minimum quality	7.1.1.4.1	1

8.1.1.4.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.1.4.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_pt	PT mode	m
pc_mac_rds	Support RD selection for association	m

8.1.1.4.3 Pre-Test Conditions

Prerequisite tests:

- Transmission on Random-Access Resources
- Association Request and Release

Test System:

- Configuration: CF05

EUT:

- Mode: PT

Preamble:

- The EUT is switched off

PIXIT parameters:

Table 8.1.1.4.3-1: PIXIT parameters

PIXIT parameter	Description	Status
px_min_sensitivity_level	RD sensitivity level in dBm	m

8.1.1.4.4 Test Procedure Sequences

Table 8.1.1.4.4-1: Test System RSSI-2 configuration

Type	LT	Target RSSI-2 level of beacon transmissions at EUT input (dBm)
T1	FT1	$px_min_sensitivity_level + MIN_QUALITY + 10\text{ dB} + PowerMargin$
	FT2	$px_min_sensitivity_level + MIN_QUALITY - 10\text{ dB} - PowerMargin$
<i>PowerMargin</i> is the sum of the RSSI-2 Measurement accuracy (positive value) and the error caused by the RSSI-2 measurement report mapping as defined in ETSI TS 103 636-2 [2] on clause 8.3.		
NOTE 1: MIN_QUALITY is signalled in the Cluster Beacon IE.		
NOTE 2: When setting the <i>PowerMargin</i> the TS should consider its own transmission output power tolerance to ensure the correct power level at the input of the EUT.		

Table 8.1.1.4.4-2: Test System Route Cost Configuration

Type	LT	Route cost
T1	FT1	Not present or 1
	FT2	Not present or 1

Table 8.1.1.4.4-3: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS (FT1 and FT2) transmit Cluster beacon messages, with values according to row "T1" in Table 8.1.1.4.4-1 and row "T1" in Table 8.1.1.4.4-2.	<--	Cluster Beacon message	-	-
2	EUT is switched on.	-	-	-	-
3	Check: Does the EUT transmit an Association Request message to FT1?	-->	Association Request message	1	P
4	The TS (FT1) transmits an Association Response message as a random-access response, indicating ACK.	<--	Association Response message	-	-

8.1.2 Broadcast Procedure

Void.

8.1.3 Random Access Procedure

8.1.3.1a Transmission on Random-Access resources received from beacon message

8.1.3.1a.1 Test Purpose

Table 8.1.3.1a.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Transmission on random-access resources received from beacon message	7.1.3.1.1a	1

8.1.3.1a.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.3.1a.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_pt	PT mode	m
pc_mac_rach_tx	Support Random Access Transmission	m

8.1.3.1a.3 Pre-Test conditions

Prerequisite tests:

- None

Test System:

- Configuration: CF03

EUT:

- Mode: PT

Preamble:

- The EUT is switched on

8.1.3.1a.4 Test Procedure Sequence

Table 8.1.3.1a.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits periodic Cluster Beacon messages.	<--	Cluster Beacon message	-	-
2	Command the EUT to transmit a packet to the TS.	-	-	-	-
3a	Check: Does the EUT transmit the packet to the random-access resources?	-->	MAC PDU	1	P
3b	The TS transmits a random-access response within random-access response window.	-	-	-	-

8.1.3.1b Transmission on Random-Access resources received in unicast message

8.1.3.1b.1 Test Purpose

Table 8.1.3.1b.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Transmission on random-access resources received from unicast signalling	7.1.3.1.1b	1

8.1.3.1b.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.3.1b.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_smc_b	Smart Metering, City and Buildings	m
pc_mac_ft	FT mode	m
pc_mac_rach_tx	Support Random Access Transmission	m

8.1.3.1b.3 Pre-Test conditions

Prerequisite tests:

- Random Access Reception and Response

Test System:

- Configuration: CF02

EUT:

- Mode: FT

Preamble:

- EUT in FT mode associated to another RD, according to Table 8.4.2.2-1

8.1.3.1b.4 Test Procedure Sequence

Table 8.1.3.1b.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The EUT transmits a Cluster Beacon message.	-->	Cluster Beacon message	-	-
2	The TS transmits a Data Request message indicating: <i>request_flags</i> : 0x80 (HARQ), <i>request_t_interval</i> : 0x13 (1 second), <i>request_n_packets</i> : 0x0A (10 packets), <i>request_n_bytes</i> : 0x000a (10-byte data payload).	<--	TMC: Data Request	-	-
3	The EUT transmits a random-access response.	-->	-	-	-
4	Check: Does the EUT transmit a packet containing Data Request Response message?	-->	TMC: Data Request Response	1	P
5	The TS transmits a random-access response within random-access response window.	-	-	-	-
NOTE: The EUT should not transmit a Data Request Response message within the random-access response due to the delay.					

8.1.3.2 Listen Before Talk

8.1.3.2.1 Test Purpose

Table 8.1.3.2.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Listen Before Talk	7.1.3.1.2	1

8.1.3.2.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.3.2.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_pt	PT mode	m
pc_mac_rach_tx	Support Random Access Transmission	m

8.1.3.2.3 Pre-Test conditions

Prerequisite tests:

- Transmission on Random-Access Resources
- Association Request and Release

Test System:

- Configuration: CF03

EUT:

- Mode: PT

Preamble:

- EUT in PT mode associated to another RD, according to Table 8.4.3.2-1
- Test mode on

Table 8.1.3.2.3-1: Interference signal properties

Type	Parameter	Value	Remark
1	Bandwidth	B	Nominal channel bandwidth
	Power level at EUT input	P	RSSI_THRESHOLD_MAX + <i>InterferenceMargin</i>
	Centre frequency	Centre of the operating channel of the EUT	Set to a single channel
	Duty cycle	100 %	Continuous interference
NOTE 1: RSSI_THRESHOLD_MAX is set to value defined for the band where the test is performed.			
NOTE 2: <i>InterferenceMargin</i> as defined in Table 8.1.1.2.4-1.			

8.1.3.2.4 Test Procedure Sequence

Table 8.1.3.2.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits periodic Cluster Beacons.	<--	Cluster Beacon message	-	-
2	The TS transmits a Data Request message indicating: <i>request_flags</i> : 0x00 (No HARQ), <i>request_t_interval</i> : 0x13 (1 second), <i>request_n_packets</i> : 0xff (continuous), <i>request_n_bytes</i> : 0x000a (10-byte data payload).	<--	TMC: Data Request	-	-
3a	The EUT transmits a Data Request Response message.	-->	TMC: Data Request Response	-	-
3b	The TS transmits a packet as a random-access response.	<--	-	-	-
-	EXCEPTION: The steps 4 to 7 are repeated for 10 times.	-	-	-	-
4	The TS transmits an interference signal according to field "Type 1" in Table 8.1.3.2.3-1.	-	-	-	-
5	Check: Does the EUT transmit a packet (containing Data Request Response message) within 2 seconds?	-->	TMC: Data Request Response	1	F
6	The TS stops transmitting interference.	-	-	-	-
7a	Check: Does the EUT transmit a Data Request Response message within 1 second after removing the interference in step 6?	-->	TMC: Data Request Response	1	P
7b	The TS transmits a packet as a random-access response.	<--	-	-	-
NOTE: The interference power level is measured from the EUT transmission bandwidth at the EUT input.					

8.1.3.3 Random Access Data Transmission

8.1.3.3.1 Test Purpose

Table 8.1.3.3.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Random access transmission length	7.1.3.1.3	1

8.1.3.3.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.3.3.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_pt	PT mode	m
pc_mac_rach_tx	Support Random Access Transmission	m

8.1.3.3.3 Pre-Test conditions

Prerequisite tests:

- Transmission on random-access resources
- Association Request and Release

Test System:

- Configuration: CF03

EUT:

- Mode: PT

Preamble:

- EUT in PT mode associated to another RD, according to Table 8.4.3.2-1
- Test mode on

8.1.3.3.4 Test Procedure Sequence

Table 8.1.3.3.4-1: Test values for Max RACH Length

Profile	Max_RACH_Length
Core	2, 4, 8, 12 (Slots)
ETSI TS 103 874-2 [7]	As defined in ETSI TS 103 874-2 [7], Table 7.3.4.3.4-1

Table 8.1.3.3.4-2: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits a Cluster Beacon indicating Max_RACH_Length as defined in Table 8.1.3.3.1-1.	<--	Cluster Beacon message	-	-
2	The TS transmits a Data Request message indicating: <i>request_flags</i> : 0x80 (HARQ), <i>request_t_interval</i> : 0x13 (1 second), <i>request_n_packets</i> : 0x01 (1 packet), <i>request_n_bytes</i> : 0xffff (Maximum data payload size supported by the EUT).	<--	TMC: Data Request	-	-
3a	The EUT transmits a Data Request Response message.	-->	TMC: Data Request Response	-	-
3b	The TS transmits a packet as a random-access response.	<--	-	-	-
4	Check: Does the EUT transmit a packet indicating "Packet Length" less or equal to the "Max RACH Length" in step 3a? (see note)	-	-	1	P
NOTE: The EUT may refrain from transmitting if it cannot fit any packet to the RACH resources.					

8.1.3.4a Random Access Reception and Response (Announced in beacon message)

8.1.3.4a.1 Test Purpose

Table 8.1.3.4a.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Reception from random-access resources announced in beacon message and response	7.1.3.2.1a	1
Reception of other packets	7.1.3.2.2	2

8.1.3.4a.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.3.4a.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	m
pc_mac_rach_res_bea	Support Random Access Resource announcement in beacon messages	m

8.1.3.4a.3 Pre-Test conditions

Prerequisite tests:

- Beaconsing Transmission

Test System:

- Configuration: CF02

EUT:

- Mode: FT

Preamble:

- EUT is switched on
- EUT is commanded to transmit Cluster Beacon(s).

8.1.3.4a.4 Test Procedure Sequence

Table 8.1.3.4a.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The EUT transmits a Cluster Beacon message.	-->	Cluster Beacon message	-	-
2	The TS transmits a packet on the random-access resources of the EUT.	<--	MAC PDU	-	-
3	Check: Does the EUT transmit a random-access response within the RACH response window?	-->	RACH response	1	P
4	The TS transmits a packet indicating a different "Receiver Identity" from the EUT.	<--	MAC PDU	-	-
5	Check: Does the EUT transmit a random-access response?	-->	RACH response	2	F
6	The TS transmits a packet indicating a different "Short Network Address" from the EUT.	<--	MAC PDU	-	-
7	Check: Does the EUT transmit a random-access response?	-->	RACH response	2	F

8.1.3.4b Random Access Reception and Response (Announced in unicast message)

8.1.3.4b.1 Test Purpose

Table 8.1.3.4b.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Reception from random-access resources announced in unicast message and response	7.1.3.2.1b	1
Reception of other packets	7.1.3.2.2	2

8.1.3.4b.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.3.4b.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_smc_b	Smart Metering, City and Buildings	m
pc_mac_pt	PT mode	m
pc_mac_rach_res_uni	Support Random Access Resource announcement by unicast signalling	m

8.1.3.4b.3 Pre-Test conditions

Prerequisite tests:

- Transmission on random-access resources
- Association Request and Release

Test System:

- Configuration: CF03

EUT:

- Mode: PT

Preamble:

- EUT in PT mode associated to another RD, according to Table 8.4.3.2-1
- EUT has signalled Random Access Resource IE within a unicast message

8.1.3.4b.4 Test Procedure Sequence

Table 8.1.3.4b.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits a packet on the random-access resources of the EUT.	<--	MAC PDU	-	-
2	Check: Does the EUT transmit a random-access response within the RACH response window?	-->	RACH response	1	P
3	The TS transmits a packet indicating a different "Receiver Identity" from the EUT.	<--	MAC PDU	-	-
4	Check: Does the EUT transmit a random-access response?	-->	RACH response	2	F
5	The TS transmits a packet indicating a different "Short Network Address" from the EUT.	<--	MAC PDU	-	-
6	Check: Does the EUT transmit a random-access response?	-->	RACH response	2	F

8.1.4 Scheduled Access data transfer

Void.

8.1.5 HARQ Procedures

8.1.5.1 HARQ Transmission

8.1.5.1.1 Test Purpose

Table 8.1.5.1.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Successful HARQ transmission	7.1.5.1.1	1
Redundancy version reset	7.1.5.1.2	2
Redundancy version increment	7.1.5.1.3	3
Max HARQ Re-Tx	7.1.5.1.4	4

8.1.5.1.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.5.1.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	o.1
pc_mac_pt	PT mode	o.1
pc_mac_harq_tx	Support HARQ transmission	m
o.1: At least one of the features shall be supported.		

8.1.5.1.3 Pre-Test conditions

Prerequisite tests:

- Mode FT:
 - Beaconsing transmission
 - Transmission on Random Access Resources

- Random Access Reception
- Association Response and Release
- Mode PT:
 - Transmission on Random Access Resources
 - Random Access Data Transmission
 - Association Request and Release

Test System:

- Configuration: CF02 when EUT in FT Mode
- Configuration: CF03 when EUT in PT Mode

EUT:

- Mode: FT or PT

Preamble:

- Mode FT:
 - EUT in FT mode associated to another RD, according to Table 8.4.2.2-1
- Mode PT:
 - EUT in PT mode associated to another RD, according to Table 8.4.3.2-1
- Test Mode on

8.1.5.1.4 Test Procedure Sequence

Table 8.1.5.1.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
-	EXCEPTION: The steps 1a to 1b depend on the test parameters on whether the EUT operates in FT or PT mode.	-	-	-	-
1a	IF EUT Mode = FT THEN the EUT transmits periodic Cluster Beacon messages.	-->	Cluster Beacon message	-	-
1b	IF EUT Mode = PT THEN the TS transmits periodic Cluster Beacon messages.	<--	Cluster Beacon message	-	-
2	The TS transmits a Data Request message indicating: <i>request_flags</i> : 0x80 (HARQ enabled), <i>request_t_interval</i> : 0x13 (1 second), <i>request_n_packets</i> : 0xff (continuous), <i>request_n_bytes</i> : 0x000a (10-byte data payload).	<--	TMC: Data Request	-	-
3	The EUT transmits a packet containing PHY Header Type 2, indicating Header Format: 0.	-->	TMC: Data Request Response	-	-
4	The TS transmits a packet containing Transmission Feedback indicating ACK to indicate successful reception of the packet from step 3.	<--	HARQ ACK	-	-
5	When: The EUT transmits a packet indicating the same HARQ process number as in step 3. (see note)	-->	TMC: Data Request Response	1	P

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
5a	Check: Does the packet transmitted in step 5 indicate "DF Redundancy Version": 0?	-	-	1	P
5b	Check: Does the packet transmitted in step 5 indicate toggled "DF New Data Indication" compared to step 3.	-	-	1	P
6	The TS transmits a packet containing Transmission Feedback indicating ACK to indicate successful reception of the packet from step 5.	<--	HARQ ACK	-	-
7	The EUT transmits a packet containing PHY Header Type 2, indicating Header Format: 0.	-->	TMC: Data Request Response	-	-
8	The TS transmits a packet containing Transmission Feedback indicating NACK to indicate unsuccessful reception of the packet from step 7, and requesting redundancy version reset to 0. (Feedback info format 6)	<--	HARQ NACK	-	-
9	When: The EUT transmits a packet indicating the same HARQ process number as in step 7, and before timer Max HARQ Re-Tx expires. (see note)	-->	TMC: Data Request Response	2	P
9a	Check: Does the packet transmitted in step 9 indicate "DF Redundancy Version": 0?	-	-	2	P
9b	Check: Does the packet transmitted in step 9 indicate the same "DF New Data Indication" as in the packet in step 7?	-	-	2	P
10	The TS transmits a packet containing Transmission Feedback indicating ACK to indicate successful reception of the packet from step 9.	<--	HARQ ACK	-	-
11	The EUT transmits a packet containing PHY Header Type 2, indicating Header Format: 0.	-->	TMC: Data Request Response	-	-
12	The TS transmits a packet containing Transmission Feedback indicating NACK to indicate unsuccessful reception of the packet from step 11.	<--	HARQ NACK	-	-
-	EXCEPTION: Steps 13 to 14 are repeated until timer Max HARQ Re-Tx expires for the MAC PDU transmitted at step 11.	-	-	-	-
13	When: The EUT transmits a packet indicating the same HARQ process number as in step 11, and before timer Max HARQ Re-Tx expires. (see note)	-->	TMC: Data Request Response	3	P
13a	Check: Does the packet transmitted in step 13 indicate the next "DF Redundancy Version"?	-	-	3	P
13b	Check: Does the packet transmitted in step 13 indicate the same "DF New Data Indication" as in the packet in step 11?	-	-	3	P
14	The TS transmits a packet containing Transmission Feedback indicating NACK to indicate incorrect reception of the packet from step 13.	<--	HARQ NACK	-	-
15	When: The EUT transmits a packet indicating the same HARQ process number as in step 11, and timer Max HARQ Re-Tx expires for the packet transmitted in step 11 (see note).	-->	TMC: Data Request Response	4	P
15a	Check: Does the packet transmitted in step 15 indicate "DF Redundancy Version": 0?	-	-	4	P
15b	Check: Does the packet transmitted in step 15 indicate toggled "DF New Data Indication" compared to step 11.	-	-	4	P
16	The TS transmits a packet containing Transmission Feedback indicating ACK to indicate successful reception of the packet from step 15.	<--	HARQ ACK	-	-

NOTE: The EUT is allowed to transmit packets indicating other HARQ process numbers in between.

8.1.5.2 HARQ Feedback

8.1.5.2.1 Test Purpose

Table 8.1.5.2.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
NACK Feedback	7.1.5.2.1	1
ACK Feedback	7.1.5.2.2	2

8.1.5.2.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.5.2.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	o.1
pc_mac_pt	PT mode	o.1
pc_mac_harq_feedback	Support HARQ feedback	m
o.1: At least one of the features shall be supported.		

8.1.5.2.3 Pre-Test conditions

Prerequisite tests:

- Mode FT:
 - Beaconsing Transmission
 - Random Access Reception
 - Association Response and Release
- Mode PT:
 - Random Access Reception
 - Association Request and Response

Test System:

- Configuration: CF02 when EUT in FT Mode
- Configuration: CF03 when EUT in PT Mode

EUT:

- Mode: FT or PT

Preamble:

- Mode FT:
 - EUT in FT mode associated to another RD, according to Table 8.4.2.2-1
- Mode PT:
 - EUT in PT mode associated to another RD, according to Table 8.4.3.2-1
- Test Mode on

8.1.5.2.4 Test Procedure Sequence

Table 8.1.5.2.4-1: Test Sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
-	EXCEPTION: Steps 1 to 4 are repeated for each HARQ process.	-	-	-	-
1	The TS transmits a packet using Physical Layer Control Field Type 2 indicating "Header Format": 000, such that the EUT cannot successfully decode the PDC.	<--	MAC PDU	-	-
2	Check: Does the EUT transmit a packet containing Transmission Feedback indicating NACK, after the total HARQ feedback delay and before delay Max HARQ Re-Tx after step 1, to indicate unsuccessful reception of the packet transmitted in step 1?	-->	HARQ NACK	1	P
-	EXCEPTION: Step 3 shall be repeated until HARQ ACK is received at step 4 or until timer "Max HARQ Re-Tx" expires for the MAC PDU.	-	-	-	-
3	The TS re-transmits the packet from step 1, such that the EUT can successfully decode the PDC.	<--	MAC PDU	-	-
-	EXCEPTION: HARQ NACKs from the EUT are allowed at step 4.	-	-	-	-
4	Check: Does the EUT transmit a packet containing Transmission Feedback indicating ACK, after the total HARQ feedback delay and before delay Max HARQ Re-Tx after step 3, to indicate successful reception of the packet transmitted in step 3?	-->	HARQ ACK	2	P

8.1.6 Multiplexing and Assembly

8.1.6.1 MAC IE Multiplexing

8.1.6.1.1 Test Purpose

Table 8.1.6.1.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
MAC PDU Multiplexing	7.1.6.1	1
Padding IE	7.1.6.2	2

8.1.6.1.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.6.1.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	o.1
pc_mac_pt	PT mode	o.1
pc_mac_muxa	Support MAC PDU multiplexing and assembly	m
o.1: At least one of the features shall be supported.		

8.1.6.1.3 Pre-Test Conditions

Prerequisite tests:

- None

Test System:

- Configuration: CF02 when EUT in FT Mode
- Configuration: CF03 when EUT in PT Mode

EUT:

- Mode: FT or PT

Preamble:

- Mode FT:
 - EUT in FT mode associated to another RD, according to Table 8.4.2.2-1
- Mode PT:
 - EUT in PT mode associated to another RD, according to Table 8.4.3.2-1

PIXIT parameters:

Table 8.1.6.1.3-1: PIXIT parameters

PIXIT parameter	Description	Status
px_max_app_packet_bytes	Maximum application data payload size supported by the EUT	m

8.1.6.1.4 Test Procedure Sequence

Table 8.1.6.1.4-1: Test Sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
-	EXCEPTION: Repeat steps 1 to 4 for different values of $S = 20, 40, 80, 120$, but where $0 < S \leq \text{px_max_app_packet_bytes}$.	-	-	-	-
1	The TS transmits a Data Request message indicating: <i>request_flags</i> : 0x80 (HARQ), <i>request_t_interval</i> : 0x00 (As soon as possible), <i>request_n_packets</i> : 0x01 (1 packet), <i>request_n_bytes</i> : S .	<--	TMC: Data Request	-	-
2	The EUT transmits a packet containing Data Request Response.	-->	TMC: Data Request Response	-	-
3	Check: Does the MAC PDU transmitted in step 2 contain full and correctly multiplexed IEs?	-	-	1	P
4	Check: Does the MAC PDU transmitted in step 2 contain a Padding IE which does not increase the TBS length for the used configuration (see note).	-	-	2	P

NOTE: The Padding IE may be excluded if a valid MAC PDU size is otherwise reached.

8.1.7 Mobility Procedures

8.1.7.1 PT initiated mobility

8.1.7.1.1 Test Purpose

Table 8.1.7.1.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Mobility by more suitable RSSI-2	7.1.7.1	1
Validity of Association Release message	7.1.8.3.1	2

8.1.7.1.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.7.1.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_pt	PT mode	m
pc_mac_mob	Support mobility procedures	m

8.1.7.1.3 Pre-Test conditions

Clause 5.7 Mobility Procedures as defined in ETSI TS 103 636-4 [4] does not impose mandatory requirements for the RD but provides recommendations on how implementation should behave. Therefore, supporting test descriptions defined in this clause and test purposes defined in clause 7.1.7 are optional.

Prerequisite tests:

- Selecting RD for association
- Transmission on Random Access Resources
- Association Request and Release

Test System:

- Configuration: CF05
- The link quality between the EUT and FT1 shall be near the sensitivity level
- FT1 and FT2 use equal power levels for transmitting beacons
- FT1 and FT2 broadcast the same cost value in the Cluster Beacon message
- FT1 and FT2 operate on the same physical channel

EUT:

- Mode: PT

Preamble:

- The EUT is switched on

PIXIT parameters:

Table 8.1.7.1.3-1: PIXIT parameters

PIXIT parameter	Description	Status
px_beacon_scan_period	Time period at which the EUT scans for beacons	m
px_min_sensitivity_level	RD sensitivity level	m
c.1: IF pc_mac_bea_network_tx THEN m ELSE n/a.		

8.1.7.1.4 Test Procedure Sequence

Table 8.1.7.1.4-1: Test System RSSI-2 configuration

Type	LT	RSSI-2 level of beacon transmissions at EUT input (dBm)
T1	FT1	px_min_sensitivity_level + MIN_QUALITY + 10 dB + PowerMargin
	FT2	px_min_sensitivity_level + MIN_QUALITY
T2	FT1	px_min_sensitivity_level + MIN_QUALITY
	FT2	px_min_sensitivity_level + MIN_QUALITY + RELATIVE_QUALITY + PowerMargin
PowerMargin as defined in Table 8.1.1.4.2-1.		
NOTE 1: RELATIVE_QUALITY is signalled in the Cluster Beacon IE.		
NOTE 2: When setting the PowerMargin the TS should consider its own transmission output power tolerance to ensure the correct power level at the input of the EUT.		

Table 8.1.7.1.4-2: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The test system path losses are adjusted such that the RSSI-2 level at the EUT input is according to row "T1" in Table 8.1.7.1.4-1.	-	-	-	-
2	The TS (FT1) transmits periodic Cluster beacon message, indicating CountToTrigger value.	<--	Cluster Beacon message	-	-
3	The EUT transmits an Association Request message to the TS (FT1).	-->	Association Request message	-	-
4	The TS (FT1) transmits an Association Response message indicating ACK.	<--	Association Response message	-	-
5	The TS (FT2) transmits periodic Cluster beacon messages.	<--	Cluster Beacon message	-	-
6	Wait px_beacon_scan_period * CountToTrigger seconds.	-	-	-	-
7	Check: Does the EUT transmit an Association Request message to FT2.	-->	Association Request message	1	F
8	The test system path losses are adjusted such that the RSSI-2 level at the EUT input is according to row "T2" in Table 8.1.7.1.4-1.	-	-	-	-
9	Wait pc_mac_mob_beacon_scan_period * CountToTrigger seconds.	-	-	-	-
-	EXCEPTION: The step sequences (10a1 to 10a2) and (10b1 to 10b2) can occur in any order. The "lower case" letter identifies sequence steps that are always performed in order.	-	-	-	-
10a1	Check: Does the EUT transmit an Association Request message to FT2.	-->	Association Request message	1	P
10a2	The TS (FT2) transmits an Association Response message.	<--	Association Response message	-	-
10b1	Check: Does the EUT transmit an Association Release message to FT1.	-->	Association Release message	1	-
10b2	Check: Does the EUT transmit a valid Association Release message in step 10b1.	-	-	2	P

8.1.8 Association Procedure

8.1.8.1 Association Response and Release

8.1.8.1.1 Test Purpose

Table 8.1.8.1.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Association Response	7.1.8.1.2	1
Validity of Association Response message	7.1.8.1.1	2
Association Release	7.1.8.3.2	3

8.1.8.1.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.8.1.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	m
pc_mac_ass_ft	Support FT mode association procedures	m

8.1.8.1.3 Pre-Test conditions

Prerequisite tests:

- Beaconsing Transmission
- Random Access Reception

Test System:

- Configuration: CF02

EUT:

- Mode: FT

Preamble:

- EUT is transmitting Cluster Beacon(s).
- Test mode on

PICS parameters:

Table 8.1.8.1.3-1: Additional PICS parameters

PICS parameter	Description	Status
pc_mac_sec	Support MAC Security procedures	o
pc_smcb	Smart Metering, City and Buildings	o

8.1.8.1.4 Test Procedure Sequence

Table 8.1.8.1.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits an Association Request message.	<--	Association Request	-	-
2a	Check: Does the EUT transmit an Association Response message as a random-access response within the RACH response window?	-->	Association Response	1	P
2b	Check: Does the EUT transmit a valid Association Response message in step 2a?	-	-	2	P
-	EXCEPTION: Steps 3 to 6 are executed based on the Association Response message feedback transmitted in step 2.	-	-	-	-
3	IF the Association Response message in step 2a indicates ACK, THEN the TS transmits a Data Request message indicating: <i>request_flags</i> : 0x80 (HARQ), <i>request_t_interval</i> : 0x14 (2 seconds), <i>request_n_packets</i> : 0xff (continuous), <i>request_n_bytes</i> : 0x000a (10-byte data payload).	<--	TMC: Data Request	-	-
4	Check: Does the EUT transmit a Data Request Response message?	-->	TMC: Data Request Response	-	P
5	The TS transmits an Association Release message 1 second after step 4.	<--	Association Release message	-	-
6	Check: Does the EUT transmit a packet within 2 seconds after the reception of the Association Release message?	-->	DLC PDU	3	F

8.1.8.2 Association Request and Release

8.1.8.2.1 Test Purpose

Table 8.1.8.2.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Association Request	7.1.8.2.2	1
Validity of Association Request message	7.1.8.2.1	2
Association Request timeout	7.1.8.2.3	3
Association Rejected	7.1.8.2.5	4
Association Accepted	7.1.8.2.4	5
Association Release	7.1.8.3.2	6

8.1.8.2.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.8.2.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_pt	PT mode	m
pc_mac_ass_pt	Support PT mode association procedures	m

8.1.8.2.3 Pre-Test conditions

Prerequisite tests:

- Transmission on Random Access Resources

Test System:

- Configuration: CF03

EUT:

- Mode: PT

Preamble:

- The EUT is switched on
- Test mode on

PICS parameters:

Table 8.1.8.2.3-1: Additional PICS parameters

PICS parameter	Description	Status
pc_mac_sec	Support MAC Security procedures	0
pc_smc_b	Smart Metering, City and Buildings	0

8.1.8.2.4 Test Procedure Sequence

Table 8.1.8.2.4-1: Test Sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits periodic Cluster Beacon messages.	<--	Cluster Beacon message	-	-
2a	Check: Does the EUT transmit an Association Request message?	-->	Association Request message	1	P
2b	Check: Does the EUT transmit a valid Association Request message in step 2a?	-	-	2	P
3	The TS ignores the Association Request message.	-	-	-	-
4	Check: Does the EUT re-transmit the Association Request message after the RACH response window?	-->	Association Request message	3	P
5	The TS transmits an Association Response message as a random-access response indicating NACK.	<--	Association Response message	-	-
6	Check: Does the EUT transmit an Association Request message within the time indicated as rejectTime?	-->	Association Request message	4	F
7	The EUT transmits an Association Request message.	-->	Association Request message	-	-
8	The TS transmits an Association Response message as a random-access response indicating ACK.	<--	Association Response message	-	-
9	The TS transmits a Data Request message indicating: <i>request_flags</i> : 0x80 (HARQ), <i>request_t_interval</i> : 0x14 (2 seconds), <i>request_n_packets</i> : 0xff (continuous), <i>request_n_bytes</i> : 0x000a (10-byte data payload).	<--	TMC: Data Request	-	-
10	Check: Does the EUT transmit a Data Request Response message?	-->	TMC: Data Request Response	5	P
11	TS transmits an Association Release message 1 second after step 10.	<--	Association Release message	-	-
12	Check: Does the EUT transmit a Data Request Response message within 2 seconds after reception of the Association Release message?	-->	TMC: Data Request message	6	F

8.1.9 Security Procedures

8.1.9.1 Mode 1 as PT

8.1.9.1.1 Test Purpose

Table 8.1.9.1.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Message integrity	7.1.9.1.1	1
Deciphering Capability	7.1.9.1.2	2
Security Capability	7.1.9.1.3	3

8.1.9.1.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.9.1.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_pt	PT mode	m
pc_mac_sec	Support MAC Security procedures	m

8.1.9.1.3 Pre-Test conditions

Prerequisite Tests:

- Transmission on Random Access Resources
- Association Request and Release

Test System:

- Configuration: CF03
- The integrity and encryption keys shall match with the EUT unless otherwise specified in the procedure

EUT:

- Mode: PT

Preamble:

- The EUT is switched on

8.1.9.1.4 Test Procedure sequence

Table 8.1.9.1.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits Cluster Beacon messages, with MAC security enabled, and ciphered using different encryption key than the EUT.	<--	Cluster Beacon message	-	-
2	Check: Does the EUT send an Association Request message?	-->	Association Request message	1	F
3	The TS transmits Cluster Beacon messages, with MAC security enabled, and integrity protected using different key than the EUT.	<--	Cluster Beacon message	-	-
4	Check: Does the EUT transmit an Association Request message?	-->	Association Request message	1	F
5	The TS transmits Cluster Beacon messages, with MAC security enabled.	<--	Cluster Beacon message	-	-
6	Check: Does the EUT transmit an Association Request message?	-->	Association Request message	2	P
6a	Check: Does the EUT transmit the Association Request message in step 6a with security enabled?	-	-	3	P
7	The TS transmits an Association Response message as a random-access response.	<--	Association Response message	-	-

8.1.9.2 Mode 1 as FT

8.1.9.2.1 Test Purpose

Table 8.1.9.2.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Message integrity	7.1.9.1.1	1
Deciphering Capability	7.1.9.1.2	2
Security Capability	7.1.9.1.3	3

8.1.9.2.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.1.9.2.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	m
pc_mac_sec	Support MAC Security procedures	m

8.1.9.2.3 Pre-Test conditions

Prerequisite Tests:

- Transmission on Random Access Resources
- Association Response and Release

Test System:

- Configuration: CF02
- The integrity and encryption keys shall match with the EUT unless otherwise specified in the procedure

EUT:

- Mode: FT

Preamble:

- The EUT is switched on

8.1.9.2.4 Test Procedure sequence

Table 8.1.9.2.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The EUT transmits Cluster Beacon messages, with MAC security enabled.	-->	Cluster Beacon message	-	-
2	The TS transmits an Association Request message with MAC security enabled and ciphered using different encryption key than the EUT.	<--	Association Request message	-	-
3	Check: Does the EUT transmit an Association Response message?	-->	Association Response message	1	F
4	The TS transmits an Association Request message with MAC security enabled and integrity protected using different key than the EUT.	<--	Association Request message		
5	Check: Does the EUT transmit an Association Response message?	-->	Association Response message	1	F
6	The TS transmits an Association Request message with MAC security enabled.	<--	Association Request message		
7	Check: Does the EUT transmit an Association Response message?	-->	Association Response message	2	P
7a	Check: Does the EUT transmit the Association Response message in step 7a with security enabled?	-	-	3	P

8.1.10 Reconfiguration Procedus

Void.

8.1.11 Group Assignment Procedus

Void.

8.1.10 Paging procedures

8.1.10.1 Paging

8.1.10.1.1 Test Purpose

Table 8.1.10.1.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Paging transmission	7.1.10.1	1
Data transmission within random-access response	7.1.3.2.3	2

8.1.10.1.2 Test Applicability

Table 8.1.10.1.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	m
pc_mac_rach_res_bea	Support Random Access Resource announcement in beacon messages	m
pc_mac_pg	Support Paging procedures	m

8.1.10.1.3 Pre-Test conditions

Prerequisite tests:

- Transmission on Random Access Resources
- Association Request and Release

Test System

- Configuration: CF02

EUT:

- Mode: FT

Preamble:

- EUT in FT mode having association to another RD, according to Table 8.4.2.2-1
- Test Mode on

8.1.10.1.4 Test Procedure Sequence

Table 8.1.10.1.4-1: Test Sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The EUT transmits periodic Cluster Beacon messages.	-->	Cluster Beacon message	-	-
2	Command the EUT to transmit a packet to the LT_PT.	-	-	-	-
2	Check: Does The EUT transmit a Cluster Beacon message containing Broadcast Indication IE indicating paging for LT_PT.	-->	Cluster Beacon message	1	P
3	The LT_PT sends a packet containing Keep alive IE as a polling message.	<--	Keep Alive IE	-	-
4	Check: Does the EUT transmit a packet as a random-access response.	-->	MAC PDU	2	P

8.1.10.2 Paging response

8.1.10.2.1 Test Purpose

Table 8.1.10.2.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Paging reception and response	7.1.10.2	1

8.1.10.2.2 Test Applicability

Table 8.1.10.2.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_pt	PT mode	m
pc_mac_pg	Support Paging procedures	m

8.1.10.2.3 Pre-Test conditions

Prerequisite tests:

- Transmission on Random Access Resources
- Association Request and Release

Test System:

- Configuration: CF02

EUT:

- Mode: PT

Preamble:

- EUT in PT mode associated to another RD, according to Table 8.4.3.2-1
- Test Mode on

8.1.10.2.4 Test Procedure Sequence

Table 8.1.10.2.4-1: Test Sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The LT_FT transmits periodic Cluster Beacon messages.	<--	Cluster Beacon message	-	-
2	The LT_FT transmits a Cluster Beacon message containing Broadcast Indication IE indicating paging for EUT.	<--	Cluster Beacon message	-	-
-	EXCEPTION: Either one of the sequences (3a1 to 3a2) or (3b1 to 3b2) is allowed to occur.	-	-	-	-
3a1	Check: Does the EUT transmit a packet containing a Keep alive IE to LT_FT?	-->	Keep Alive IE	1	P
3a2	The LT_FT transmits a packet as response.	<--	MAC PDU	-	-
3b1	Check: Does the EUT transmit an Association Request message indicating paging response?	-->	Association Request	1	P
3b2	The LT_FT transmits an Association Response message.	<--	Association Response	-	-

8.2 DLC layer Test Descriptions

8.2.1 DLC Segmentation and Reassembly

Void.

8.2.2 DLC Retransmissions (ARQ) using implicit ACK/NACK

8.2.2.1 Test Purpose

Table 8.2.2.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
DLC PDU successful transmission	7.2.2.2	1
DLC PDU retransmission	7.2.2.1	2

8.2.2.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.2.2.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	0.1
pc_mac_pt	PT mode	0.1
pc_dlc_st1	DLC service type 1	0.2
pc_dlc_st2	DLC service type 2	0.2
pc_dlc_st3	DLC service type 3	0.2
o.1: The EUT shall support at least one of these features.		
o.2: The EUT shall support at least one of these features.		

8.2.2.3 Pre-Test conditions

Prerequisite tests:

- MAC: Transmission on Random Access Resources
- MAC: Random Access Data Transmission
- MAC: HARQ Transmission
- MAC Mode FT:
 - MAC: Beaconing Transmission
 - MAC: Association Response and Release
- MAC Mode PT:
 - MAC: Association Request and Release

Test System:

- Configuration: CF02 when EUT in FT Mode
- Configuration: CF03 when EUT in PT Mode

EUT:

- Mode: FT or PT

Preamble:

- Mode FT:
 - EUT in FT mode associated to another RD, according to Table 8.4.2.2-1
- Mode PT:
 - EUT in PT mode associated to another RD, according to Table 8.4.3.2-1
- Test mode on

PICS & PIXIT parameters:

Table 8.2.2.3-1: Additional PICS parameters

PICS parameter	Description	Status
pc_mac_harq_tx	Support HARQ transmission	0

8.2.2.4 Test Procedure sequence

Table 8.2.2.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits a Data Request message indicating: <i>request_flags</i> : 0x80 (HARQ), <i>request_t_interval</i> : 0x13 (1 second), <i>request_n_packets</i> : 0x02 (2 packets), <i>request_n_bytes</i> : 0x0a (10-byte data payload).	<--	TMC: Data Request	-	-
2	The EUT transmits a packet. (containing Data Request Response message)	-->	TMC: Data Request Response	-	-
3	The TS transmits a packet containing Transmission Feedback indicating ACK.	<--	MAC: HARQ ACK	-	-
4	Check: Does the EUT transmit a packet (containing Data Request Response message) containing new DLC SDU content.	-->	TMC: Data Request Response	1	P
5	The TS transmits a packet containing Transmission Feedback indicating ACK.	<--	MAC: HARQ ACK	-	-
-	EXCEPTION: The steps 6a to 7b are performed IF <i>pc_dlc_st2</i> OR <i>pc_dlc_st3</i> .	-	-	-	-
-	EXCEPTION: IF <i>pc_mac_harq_tx</i> THEN steps 6a to 6b are repeated until Max HARQ Re-Rx expires for the initial packet transmitted in step 6a.	-	-	-	-
6a	The EUT re-transmits a packet. (containing Data Request Response message)	-->	TMC: Data Request Response	-	-
6b	The TS transmits a packet containing Transmission Feedback indicating NACK.	<--	MAC: HARQ NACK	-	-
7a	Check: Does the EUT re-transmit a packet (containing Data Request Response message) containing the DLC SDU content as in step 6a.	-->	TMC: Data Request Response	2	P
7b	The TS transmits a packet containing Transmission Feedback indicating ACK.	-->	MAC: HARQ ACK	-	-
NOTE: Any repeated executions of the step 6a are retransmissions.					

8.2.3 DLC SDU lifetime control

Void.

8.2.4 Routing services

8.2.4.1 Uplink hop-by-hop (Routing type 000)

8.2.4.1.1 Test Purpose

Table 8.2.4.1.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Uplink routing as a router	7.2.4.1.1	1
Uplink routing as a destination	7.2.4.1.2	2

8.2.4.1.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.2.4.1.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	m
pc_mac_pt	PT mode	o
pc_dlc_routing_000	Routing Type 000	m

8.2.4.1.3 Pre-Test Conditions

Prerequisite tests:

- MAC: Beaconing Transmission
- MAC: Transmission on Random Access Resources
- MAC: Random Access Data Transmission
- MAC: Random Access Reception
- MAC: Association Response and Release
- MAC Mode FT-PT:
 - MAC: Association Request and Release

Test System:

- Configuration: CF02 when EUT in FT mode
- Configuration: CF04 when EUT in FT-PT mode

EUT:

- Mode: FT or FT-PT

Preamble:

- Mode FT:
 - EUT in FT mode associated to another RD, according to Table 8.4.2.2-1
 - Test loop function A
- Mode FT-PT:
 - EUT in FT-PT mode as a router, according to Table 8.4.4.2-1

8.2.4.1.4 Test Procedure Sequence

Table 8.2.4.1.4-1: Test sequence for EUT in FT mode (CF02)

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The LT_PT transmits a DLC PDU with Routing header indicating Dest_Add 010.	<--	DLC PDU	-	-
2	Check: Does the EUT transmit a loopback packet containing the CVG SDU from step 1?	-->	DLC PDU	2	P

Table 8.2.4.1.4-2: Test sequence for EUT in FT-PT mode (CF04)

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The LT_PT transmits a DLC PDU with Routing header indicating Dest_Add 010.	<--	DLC PDU	-	-
2	Check: Does the EUT transmit a packet containing the received DLC SDU to LT_FT.	-->	DLC PDU	1	P

8.2.4.2 Downlink flooding (Routing type 011)

8.2.4.2.1 Test Purpose

Table 8.2.4.2.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Unicast as a destination	7.2.4.2.1	1
Unicast destination with direct connection	7.2.4.2.2	2
Unicast destination without direct connection	7.2.4.2.3	3
Broadcast destination	7.2.4.2.4	4

8.2.4.2.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.2.4.2.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	m
pc_mac_pt	PT mode	m
pc_dlc_routing_011	Routing Type 011	m

8.2.4.2.3 Pre-Test conditions

Prerequisite tests:

- MAC: Beaconing Transmission
- MAC: Transmission on Random Access Resources
- MAC: Random Access Data Transmission
- MAC: Random Access Reception
- MAC: HARQ Feedback
- MAC: Association Procedure

Test System:

- Configuration: CF06

EUT:

- Mode: FT-PT

Preamble:

- EUT in FT-PT mode as a router, according to Table 8.4.4.2-1
- Test loop function on

8.2.4.2.4 Test Procedure Sequence

Table 8.2.4.2.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The LT_FT transmits a DLC PDU with Routing header indicating EUT as destination.	<--	DLC PDU	-	-
2	Check: Does the EUT transmit a looped back DLC SDU with the LT_FT as destination?	-->	DLC PDU	1	P
3	The LT_FT transmits a DLC PDU with Routing header indicating LT_PT as destination.	<--	DLC PDU	-	-
4	Check: Does the EUT transmit a packet containing the received DLC SDU only to LT_PT?	-->	DLC PDU	2	P
5	The LT_FT transmits a DLC PDU with Routing header indicating unknown RD ID as destination.	<--	DLC PDU	-	-
6	Check: Does the EUT transmit a packet containing received DLC SDU only to LT_FT_PT?	-->	DLC PDU	3	P
7	The LT_FT transmits a packet containing Routing Header with destination address set to broadcast, containing a DLC SDU.	<--	DLC PDU	-	-
8	Check: Does the EUT transmit a packet containing looped back DLC SDU with LT_FT as destination?	-->	DLC PDU	4	P
9	Check: Does the EUT transmit a downlink packet containing the received DLC SDU to both LT_PT and LT_FT_PT?	-->	DLC PDU	4	P
NOTE: Order of actions 8 and 9 can be reversed.					

8.3 CVG layer Test Descriptions

8.3.1 Transparent Procedures

Void.

8.3.2 Multiplexing procedures

Void.

8.3.3 Duplicate removal procedure

8.3.3.1 Test Purpose

Table 8.3.3.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Duplicate CVG SDU	7.3.3.1	1

8.3.3.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.3.3.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	o.1
pc_mac_pt	PT mode	o.1
pc_cvg_dup	Support Duplicate Removal of complete SDUs	m
o.1: The EUT shall support at least one of these features.		

8.3.3.3 Pre-Test conditions

Prerequisite tests:

- MAC: Random Access Reception
- MAC: HARQ Feedback
- MAC Mode FT:
 - MAC: Beaconing Transmission
 - MAC: Association Response and Release
- MAC Mode PT:
 - MAC: Association Request and Release

Test System:

- Configuration: CF02 when EUT in FT mode
- Configuration: CF03 when EUT in PT mode

EUT:

- Mode: FT or PT

Preamble:

- Mode FT:
 - EUT in FT mode associated to another RD, according to Table 8.4.2.2-1
- Mode PT:
 - EUT in PT mode associated to another RD, according to Table 8.4.3.2-1
- Test Loop Function A

8.3.3.4 Test Procedure sequence

Table 8.3.3.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits a CVG PDU.	<--	CVG PDU	-	-
2	The EUT transmits the CVG PDU from step 1 as a loopback packet.	-->	CVG PDU	-	-
3	The TS transmits a CVG PDU indicating the same CVG Sequence Number as in step 1.	<--	CVG PDU	-	-
4	Check: Does the EUT transmit a looped back CVG SDU? (see note)	-->	CVG PDU	DR/01	F
NOTE: The EUT may transmit the looped back CVG SDU either as a complete packet or in segments.					

8.3.4 Delivery Order procedures

Void.

8.3.5 CVG Segmentation

8.3.5.1 Test Purpose

Table 8.3.5.1-1: Test Purpose to sequence mapping

Test Name	Reference	TP
Segmentation Indication 01	7.3.5.1	1
Segmentation Indication 11	7.3.5.2	2
Segmentation Indication 10	7.3.5.3	3

8.3.5.2 Test Applicability

This test is applicable according to the following PICS parameters.

Table 8.3.5.2-1: PICS selection parameters

PICS Selection	Description	Status
pc_mac_ft	FT mode	0.1
pc_mac_pt	PT mode	0.1
pc_cvg_st2	CVG service type 2	0.2
pc_cvg_st3	CVG service type 3	0.2
pc_cvg_st4	CVG service type 4	0.2
o.1: The EUT shall support at least one of these features.		
o.2: The EUT shall support at least one of these features.		

8.3.5.3 Pre-Test conditions

Prerequisite tests:

- MAC: Random Access Reception
- MAC: HARQ Transmission
- MAC Mode FT:
 - MAC: Beaconing Transmission
 - MAC: Association Response and Release
- MAC Mode PT:
 - MAC: Association Request and Release

Test System:

- Configuration: CF02 when EUT in FT mode
- Configuration: CF03 when EUT in PT mode

EUT:

- Mode: FT or PT

Preamble:

- Mode FT:
 - EUT in FT mode associated to another RD, according to Table 8.4.2.2-1
- Mode PT:
 - EUT in PT mode associated to another RD, according to Table 8.4.3.2-1
- Test mode on

8.3.5.4 Test Procedure sequence

Table 8.3.5.4-1: Test sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
1	The TS transmits a Data Request message indicating: <i>request_flags</i> : 0x80 (HARQ), <i>request_t_interval</i> : 0x00 (no delay), <i>request_n_packets</i> : 0x01 (1 packet), <i>request_n_bytes</i> : 0xffff (Maximum data payload size supported by the EUT).	<--	TMC: Data Request	-	-
2a	Check : Does the EUT transmit a CVG SDU segment indicating SI 01?	-->	CVG PDU	1	P
2b	The TS transmits a packet containing Transmission Feedback indicating ACK.	<--	MAC: ACK	-	-
-	EXCEPTION : Step 3a to 3b is performed until all CVG SDUs are transmitted.	-	-	-	-
3a	Check : Does the EUT transmit a CVG SDU segment indicating SI 11 or 10?	-->	CVG PDU	2 3	P
3b	The TS transmits a packet containing Transmission Feedback indicating ACK.	<--	MAC: ACK	-	-

8.4 Common procedures

8.4.1 General

8.4.1.1 Introduction

This part defines common preamble procedures for getting the EUT into a specific initial state within the testing environment from which a Test Sequence may be performed. The Pre-Test Conditions of a Test Description (TD) specify which common procedure is used, and with what parameters, e.g. setting the EUT into a test mode or activating a test loop.

The EUT shall always be configured with necessary parameters to initiate desired operation indicated by the device vendor. Such parameters can be but not limited to:

- Operating mode
- Operating frequency band
- Network ID
- Long RD ID
- If security is enabled:
 - Ciphering and integrity keys

8.4.1.2 EUT switched off

When the EUT is described to be switched off as "EUT is switched off", it is expected to reset the state of the protocol.

- Power off the EUT

8.4.1.3 EUT switched on

When the EUT is described to be switched on as: "EUT is switched on" the following procedures are expected to be performed:

- Power on the EUT
- Enable the test mode
- Set the operating mode to FT, PT, or FT-PT
- Set the network parameters as described in clause 8.4.1.1
- Initiate the operation of the EUT

8.4.2 EUT in FT mode associated to another RD (CF02)

8.4.2.1 Procedure parameters

Prerequisite tests:

- Beaconsing transmissions
- Association procedures (FT)
- Random Access procedures

Test System:

- Configuration: CF02

EUT:

- Mode: FT

Parameters:

- Test Mode
- Test Loop Function

8.4.2.2 Procedure sequence

Table 8.4.2.2-1: Procedure sequence

Step	Procedure	Message Sequence		Verdict
		EUT-TS	Message	
-	EXCEPTION: Steps 1a and 1b describe procedure steps which are performed based on the procedure parameters.	-	-	-
1a	IF Test Mode = On THEN The EUT is switched on in Test Mode.	-	-	-
1b	ELSE EUT is switched on.	-	-	-
2	The EUT performs Operating Channel(s) and Subslot(s) selection according to ETSI TS 103 636-4 [4], clause 5.1.2.	-	-	-
3	Check: Does the EUT transmit periodic Cluster Beacon messages.	-->	MAC: Cluster Beacon message	P
4	The TS transmits an Association Request message.	<--	MAC: Association Request message	-
5	Check: Does the EUT transmit an Association Response message as a random-access response, indicating ACK.	-->	MAC: Association Response message	P
-	EXCEPTION: Steps 6a1 to 6a2 describe a sequence which is performed based on the defined procedure parameters.	-	-	-
6a1	IF Test Loop Function THEN the TS transmits an ACTIVATE_TEST_LOOP message.	<--	TMC: ACTIVATE_TEST_LOOP	-
6a2	Check: Does the EUT transmit an ACTIVATE_TEST_LOOP_COMPLETE message (see note).	-->	TMC: ACTIVATE_TEST_LOOP_C OMplete	P
NOTE: The EUT may transmit the ACTIVATE_TEST_LOOP_COMPLETE message within a random-access response.				

8.4.3 EUT in PT mode associated to another RD (CF03)

8.4.3.1 Procedure parameters

Prerequisite tests:

- Transmission on Random Access Resources
- Association Request and Release

Test System:

- Configuration: CF03

EUT:

- Mode: PT

Parameters:

- Test Mode
- Test Loop Function

8.4.3.2 Procedure sequence

Table 8.4.3.2-1: Procedure sequence

Step	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
-	EXCEPTION: Steps 1a and 1b describe procedure steps which are performed based on the procedure parameters.	-	-	-	-
1a	IF Test Mode = On THEN The EUT is switched on in test mode.	-	-	-	-
1b	ELSE EUT is switched on.	-	-	-	-
2	The LT_FT transmits periodic Cluster Beacon messages.	<--	MAC: Cluster Beacon message	-	-
3	The EUT transmits an Association Request message.	-->	MAC: Association Request message	-	-
4	The LT_FT transmits an Association Response message as a random-access response indicating "Association accepted".	<--	MAC: Association Response message	-	-
-	EXCEPTION: Steps 5a1 to 5a2 describe a sequence which is performed based on the defined procedure parameters.	-	-	-	-
5a1	IF Test Loop Function THEN the LT_FT transmits an ACTIVATE_TEST_LOOP message.	<--	TMC: ACTIVATE_TEST_LOOP	-	-
5a2	Check: Does the EUT transmit an ACTIVATE_TEST_LOOP_COMPLETE message.	-->	TMC: ACTIVATE_TEST_LOOP_COMPLETE	-	P

8.4.4 EUT in FT-PT mode as a router (CF04/CF06)

8.4.4.1 Procedure parameters

Prerequisite tests:

- Beaconsing transmissions
- Random Access transmission
- Association procedures (FT + PT)

Test System:

- Configuration: CF04/CF06

EUT:

- Mode: FT-PT

Parameters:

- Test Mode
- Test Loop Function

8.4.4.2 Procedure sequence

Table 8.4.4.2-1: Procedure sequence

St	Procedure	Message Sequence		TP	Verdict
		EUT-TS	Message		
-	EXCEPTION: Steps 1a and 1b describe procedure steps which are performed based on the procedure parameters.	-	-	-	-
1	The LT_FT transmits periodic Cluster Beacon messages.	<--	MAC: Cluster Beacon message	-	-
2a	IF Test Mode = On THEN The EUT is switched on in test mode.	-	-	-	-
2b	ELSE EUT is switched on.	-	-	-	-
3	Check: Does The EUT transmit an Association Request message to LT_FT.	-->	MAC: Association Request message	-	P
4	The LT_FT transmits an Association Response message as a random-access response indicating "Association accepted".	<--	MAC: Association Response message	-	-
5	Check: Does the EUT transmit periodic Cluster Beacon messages.	-->	MAC: Cluster Beacon message	-	P
6	The LT_PT transmits an Association Request message.	<--	MAC: Association Request message	-	-
7	Check: Does the EUT transmit an Association Response message to LT_PT as a random-access response indicating "Association accepted".	-->	MAC: Association Response message	-	P
-	EXCEPTION: The steps 9a1 to 9a2 describe a procedure which is performed based on the Test System Configuration.	-	-	-	-
8a1	IF The Test System Configuration = CF06 THEN The LT_FT_PT transmits an Association Request message to the EUT.	<--	MAC: Association Request message	-	-
8a2	Check: Does the EUT transmit an Association Response message to LT_FT_PT as a random-access response indicating "Association accepted".	-->	MAC: Association Response message	-	P
-	EXCEPTION: Steps 9a1 to 9a2 describe a sequence which is performed based on the defined procedure parameters.	-	-	-	-
9a1	IF Test Loop Function THEN the LT_FT transmits an ACTIVATE_TEST_LOOP message.	<--	TMC: ACTIVATE_TEST_LOOP	-	-
9a2	Check: Does the EUT transmit an ACTIVATE_TEST_LOOP_COMPLETE message.	-->	TMC: ACTIVATE_TEST_LOOP_COMPLETE	-	P

Annex A (normative): Abstract Test Method (ATM)

A.1 Test method

DECT-2020 NR protocol testing utilizes abstract test method ATM, with remote test method. The test system consists of a set of lower testers, and a notational upper tester.

Remote test method means that the test system shall behave as one or multiple DECT-2020 NR entities when a device supporting DECT-2020 NR device is the Equipment Under Test (EUT). The interface between the test system and the Equipment Under Test (EUT) is the physical medium. The lower layers within the test system shall be conforming with the corresponding lower layers of the EUT to use the remote test method.

Notional upper tester means that it is possible to trigger and to force the upper tester to execute predefined actions without requiring to implement any new mechanisms. (Example: sending data, configuring the EUT, etc.). This could be done by testing-specific methods defined in Annex C, and proprietary application layer inside the EUT or by other procedures clearly described by the EUT's manufacturer.

A.2 Test architecture

Figure A.2-1 defines a scalable test architecture for testing the MAC, DLC and CVG layers of DECT-2020 NR.

The test environment consists of the Test System, the EUT which comprises of IUT, its surrounding protocol layers, and a notational upper tester that can be commanded and controlled by the Test System. Depending on which protocol layer a test case concerns, the IUT in that test case is the implementation of either DECT-2020 NR Physical layer (PHY), MAC, DLC or CVG protocol layer as defined in ETSI TS 103 636-2 [2], ETSI TS 103 636-3 [3], ETSI TS 103 636-4 [4] and ETSI TS 103 636-5 [5]. The conformance of the physical layer implementation is performed according to ETSI TS 104 047-1 [9], and when performing tests defined in the present document it is expected that the physical layer implementation is conformant and can pass all relevant test cases defined in ETSI TS 104 047-1 [9].

In all test cases, the Master Test Component (MTC) communicates with the Notational Upper Tester of the EUT over Upper Tester (UT) interface defined by the vendor to command the EUT to perform desired operations, such as configuring radio device parameters, initiating connections to a network, etc.

Further the MTC controls and synchronizes one or multiple different Parallel Test Components (PTC). The PTCs control the DECT-2020 NR Test Devices (TD) and use the TDs to communicate with the EUT over DECT-2020 NR Physical medium, which can be either RF signal or a cable. A PTC and TD implements necessary parts of the DECT-2020 NR Physical and protocol layers to perform given test case.

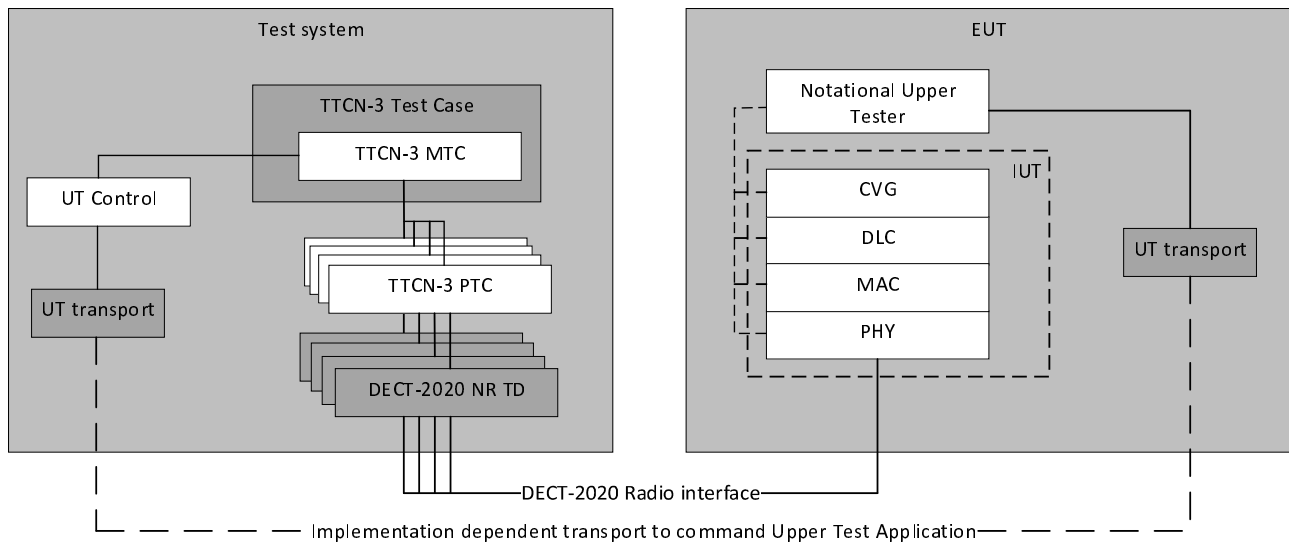


Figure A.2-1: Test architecture for DECT-2020 NR Protocol testing

A.3 Test configurations

A.3.1 Test System configurations

A.3.1.1 CF01: Test System as an observer

The test system configuration CF01, depicted in Figure A.3.1.1-1, is a setup with a single PTC configured as an LT_TC. The LT_TC PTC is a lower tester used to observe the packets sent by the EUT. The LT_TC uses the packet contents and their timings to define the outcomes of the test cases.

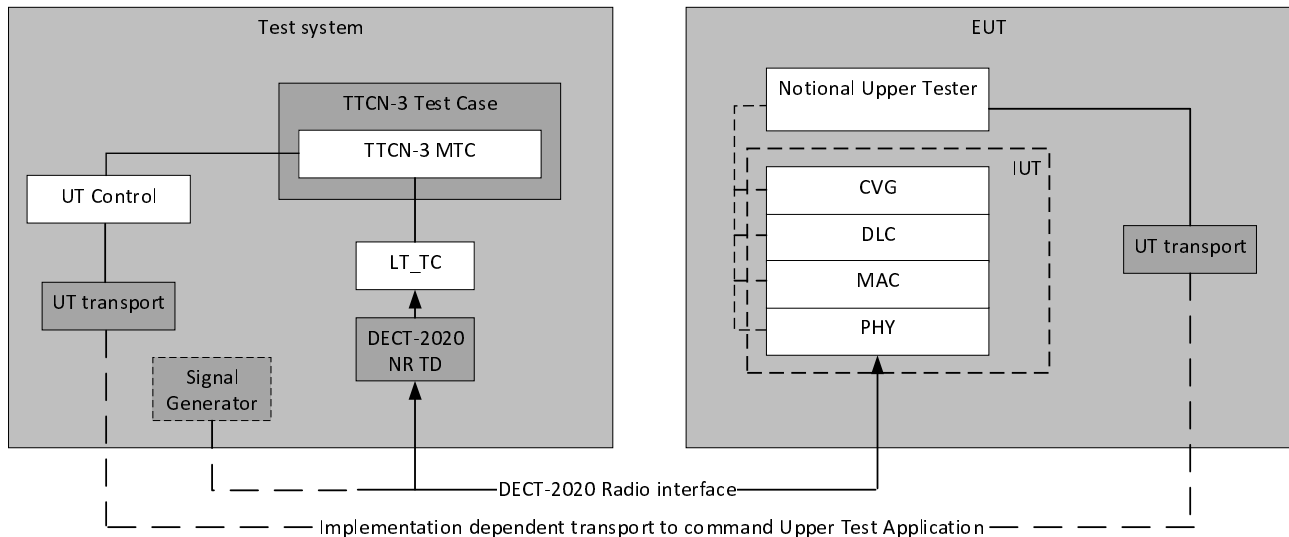


Figure A.3.1.1-1: CF01 Test architecture

A.3.1.2 CF02: Test System in PT mode

The test system configuration CF02 includes 2 PTCs, one configured as an LT_PT and another as an LT_TC. The LT_TC is a lower tester observing the transmissions of both the EUT and the other PTCs. The LT_PT is set to operate only in PT mode and it is used to trigger events in the EUT during testing using physical layer packets.

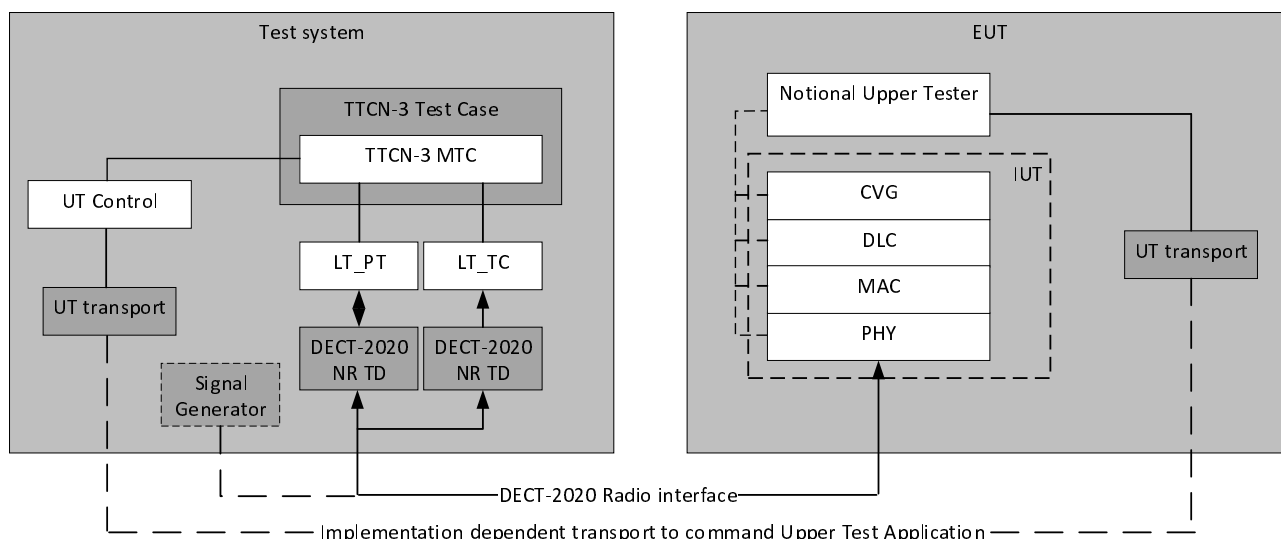


Figure A.3.1.2-1: CF02 Test architecture

A.3.1.3 CF03: Test System in FT mode

The test system configuration CF03 includes 2 PTCs, one configured as an LT_FT and another as an LT_TC. The LT_TC is a lower tester observing the transmissions of both the EUT and the other PTCs. The LT_FT is set to operate only in FT mode and it is used to trigger events in the EUT during testing using physical layer packets.

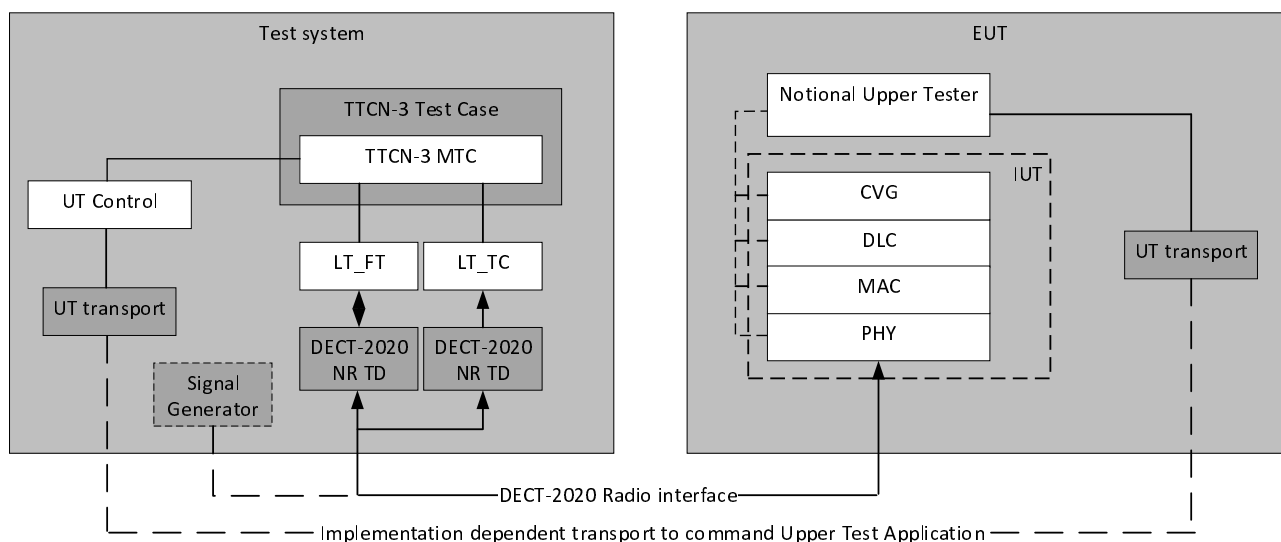


Figure A.3.1.3-1: CF03 Test architecture

A.3.1.4 CF04: Test System as FT + PT

The test system configuration CF04 includes three PTCs: one configured as an LT_FT, one configured as LT_PT, and one as an LT_TC. The LT_TC is a lower tester observing the transmissions of both the EUT and the other PTCs. The LT_PT and LT_FT are set to operate only in PT and FT modes respectively and are used to trigger events within the EUT during testing using physical layer packets.

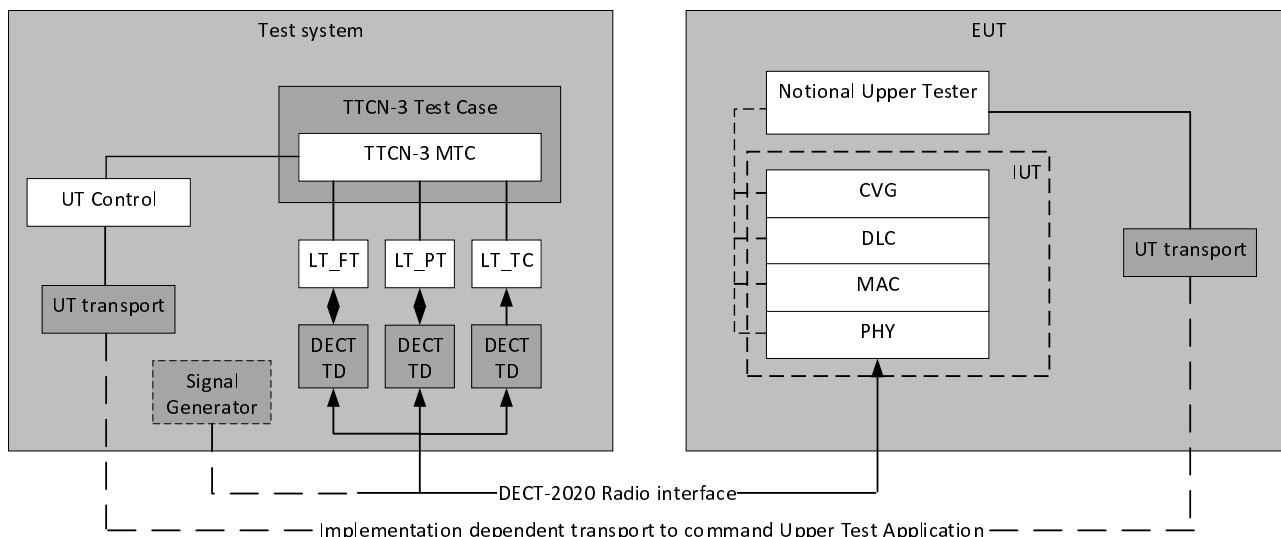


Figure A.3.1.4-1: CF04 Test architecture

A.3.1.5 CF05: Test System as FT + FT

The test system configuration CF05 includes 3 PTCs, two configured as LT_FT, one as an LT_TC. The LT_TC is a lower tester observing the transmissions of both the EUT and the other PTCs. The LT_FTs are set to operate only in FT mode as sinks and are used to trigger events within the EUT during testing using physical layer packets.

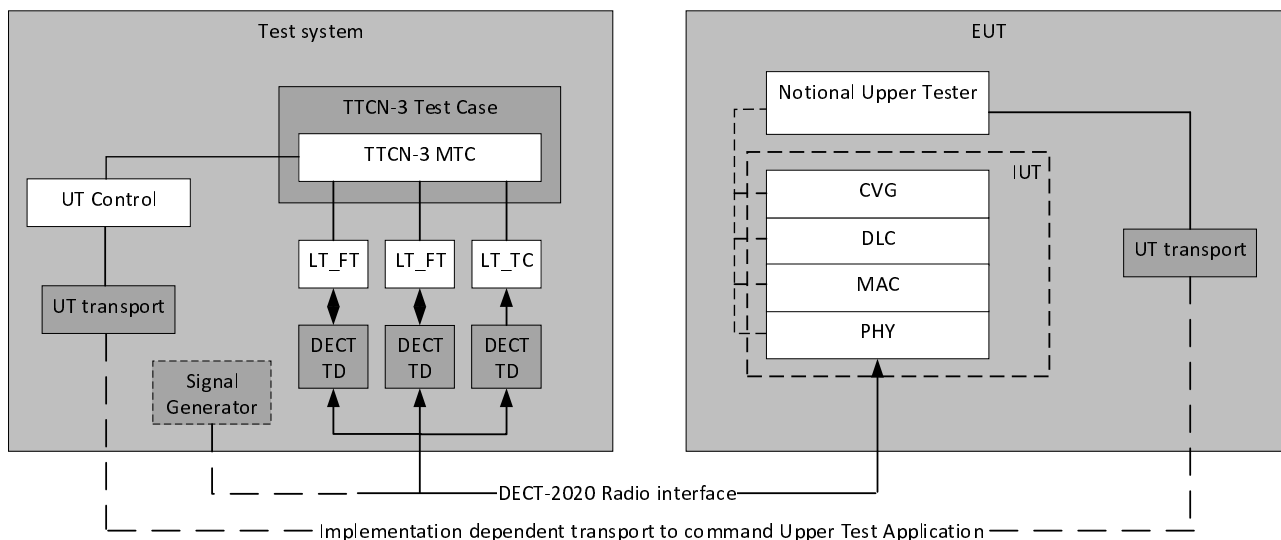


Figure A.3.1.5-1: CF05 Test architecture

A.3.1.6 CF06: Test System as FT + PT + FT-PT

The test system configuration CF06 includes 4 PTCs, one configured as an LT_TC one as LT_FT, one as LT_PT, and one as a LT_FT_PT. The LT_TC is a lower tester observing the transmissions of both the EUT and the other PTCs.

The LT_FT is a lower tester set to operate only in FT mode as a sink. The LT_PT is a lower tester that only operates in PT mode. The LT_FT_PT is configured to operate both in FT and PT modes. The lower testers are used to trigger events within the EUT during testing using physical layer packets.

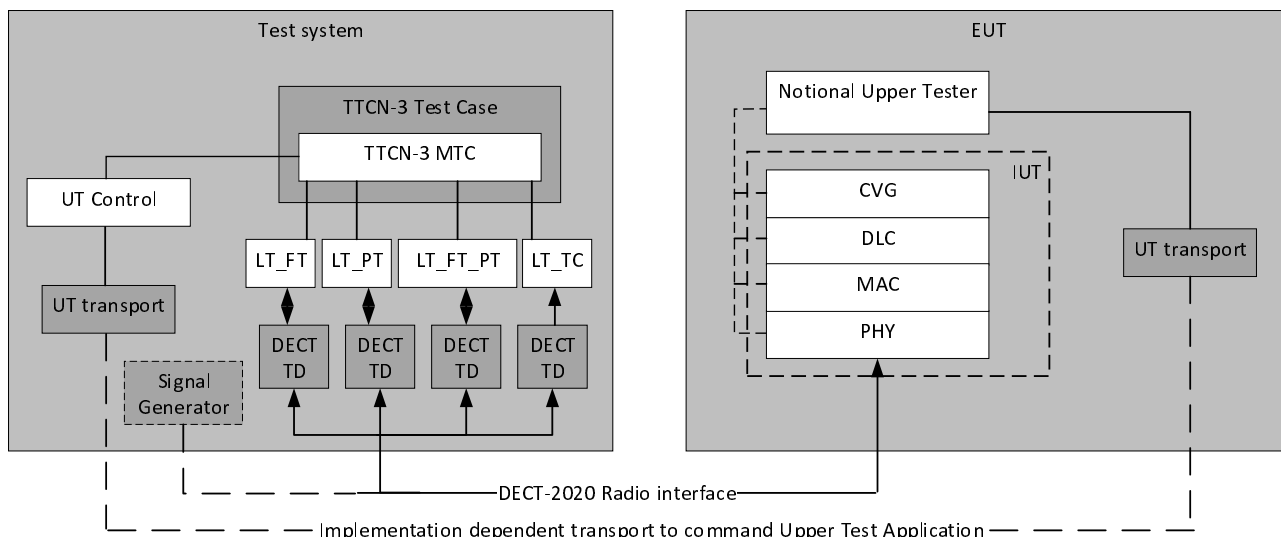


Figure A.3.1.6-1: CF06 Test architecture

A.3.2 Other test components

A.3.2.1 Signal Generator

The signal generator may be used in any of the test configurations to operate as an interference generator. In these cases:

- The presence of the signal generator is indicated in the config field of the test purposes as "CFXX + SG".
- For any interference generated by the signal generator, its power level at the EUT input shall exceed the threshold for a 'busy' channel, i.e. -52 dBm - MAX_TX_POWER, unless otherwise instructed.
- Any interference generated by the signal generator shall be a band-limited AWGN signal.
- The signal generator may be used to generate an arbitrary interference signal depending on the test purpose.

A.4 Messages and Information Elements (IEs)

The protocol behaviour, protocol messages and Information Elements (IE) contents including possible field values are defined in ETSI TS 103 636-4 [4] and ETSI TS 103 636-5 [5].

The applicable protocol behaviour, protocol messages, IEs and corresponding field values are application profile-specific and used by the tests. The application profiled specific definitions are specified in ETSI TS 103 874 series. Each test defines for which application profile the test is applicable.

If a test requires a message and/or IE contents or IE field value which is different from those specified in ETSI TS 103 874 series, the specific values are explicitly provided. Whenever a specific message is not explicitly provided in a test then this shall be understood as the message having the same content as the message in the given application profile.

Annex B (normative): Protocol ICS pro forma for DECT-2020 NR Equipment

B.0 The right to copy

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the Protocol ICS pro forma in this annex so that it can be used for its intended purposes and may further publish the completed Protocol ICS.

B.1 Introduction

The purpose of a PICS is to identify those standardized functions which an EUT shall support, those which are optional and those which are conditional on the presence of other functions. It helps to identify which functions an EUT will support when performing conformance testing. It is possible that with different choices in an ICS pro forma, several different sets of test cases will be necessary.

Item column

The item column contains a number which identifies the item in the table.

Item description column

The item description column describes in free text each respective item (e.g. parameters, timers, etc.). It implicitly means "is <item description> supported by the implementation?".

Reference column

The reference column gives reference to the relevant DECT-2020 NR core specifications.

Release column

The release column indicates the earliest release from which the capability or option is relevant.

Mnemonic column

The Mnemonic column contains mnemonic identifiers for each item.

Status column

The status column makes assessments on whether requirements, features, components and other capabilities are required according to a referenced standard and in order to achieve compliance. This assessment provides the following options:

- m mandatory - the capability shall be supported.
- o optional - the capability may or may not be supported.
- c.i conditional - the requirement on the capability ("m", "o", "n/a") depends on the support of other optional or conditional items. "i" is an integer identifying a unique conditional status expression which is defined immediately following the table.
- n/a not applicable - in the given context, it is not possible to use the capability.
- o.i qualified optional - for mutually exclusive or selectable options from a set: "i" is an integer which identifies a unique group of related optional items and the logic of their selection which is defined immediately following the table.

References to items

The mnemonics are used to reference items in the tables.

Prerequisite

The items of the current table shall only be filled if the referenced item in the prerequisite indicates a true value.

B.2 Pro forma tables

B.2.1 EUT implementation types

Table B.2.1-1: Application profiles

Item	Profile Title	Reference	Mnemonic	Status
1	Smart Metering, City and Buildings	ETSI TS 103 874-2	pc_smcb	o
2	IPv6	ETSI TS 103 874-3	pc_ipv6	o

Table B.2.1-2: Network Topology

Item	Name	Reference	Mnemonic	Status
1	Point-to-Point Link	ETSI TS 103 636-1, clause 5.1	pc_dect_p2p	m
2	Star Network Topology	ETSI TS 103 636-1, clause 5.2	pc_dect_star	o
3	Mesh Network Topology	ETSI TS 103 636-1, clause 5.3	pc_dect_mesh	o

B.2.2 Baseline Implementation Capabilities

Table B.2.2-1: Supported protocols

Item	Protocol	Reference	Mnemonic	Status
1	Physical Layer	ETSI TS 103 636-3	pc_dect_phy_release	m
2	Medium Access Control	ETSI TS 103 636-4	pc_dect_mac_release	m
3	Data Link Control (DLC)	ETSI TS 103 636-5	pc_dect_dlc_release	m
4	Convergence Layer (CVG)	ETSI TS 103 636-5	pc_dect_cvg_release	m

Table B.2.2-2: DECT-2020 NR TDD

Item	Operating Band	Reference	Mnemonic	Status
1	DECT-2020 NR Frequency band 1: 1 880 - 1 900 MHz	ETSI TS 103 636-2, clause 5.2	pc_dect_band1	o.1
2	DECT-2020 NR Frequency band 2: 1 900 - 1 920 MHz	ETSI TS 103 636-2, clause 5.2	pc_dect_band2	o.1
9	DECT-2020 NR Frequency band 9: 1 920 - 1 930 MHz	ETSI TS 103 636-2, clause 5.2	pc_dect_band9	o.1
22	DECT-2020 NR Frequency band 22: 1 910 - 1 930 MHz	ETSI TS 103 636-2, clause 5.2	pc_dect_band22	o.1
o.1: It is mandatory to support at least one of these items.				

Table B.2.2-3: Special Conformance Testing Functions

Item	Special Conformance Testing Function	Reference	Mnemonic	Status
1	EUT test loop	ETSI TS 104 047-2, clause C.3.1	pc_tmc_test_loop	m
2	EUT data request	ETSI TS 104 047-2, clause C.3.2.2	pc_tmc_data_request	m

Table B.2.2-4: DECT-2020 NR RD Operating modes

Item	EUT Operating Mode	Reference	Mnemonic	Status
1	FT mode	ETSI TS 103 636-4, clause 5.1.1	pc_mac_ft	o.1
2	PT mode	ETSI TS 103 636-4, clause 5.1.1	pc_mac_pt	o.1

o.1: It is mandatory to support at least one of these items.

Table B.2.2-5: DECT-2020 NR RD Class

Item	Radio Device Class	Reference	Mnemonic	Status
1	Class I	ETSI TS 103 636-2, clause 6.2.1	pc_rd_class1	o.1
2	Class II	ETSI TS 103 636-2, clause 6.2.1	pc_rd_class2	o.1
3	Class III	ETSI TS 103 636-2, clause 6.2.1	pc_rd_class3	o.1
4	Class IV	ETSI TS 103 636-2, clause 6.2.1	pc_rd_class4	o.1

o.1: It is mandatory to support at least one of these items.

B.2.3 MAC Implementation Capabilities

Table B.2.3-1a: Operating Channel and Subslot selection

Item	Channel Selection Capability	Reference	Release	Mnemonic	Status
1	Support Operation Channel and Subslot selection procedure	ETSI TS 103 636-4, clause 5.1.2	Rel-1	pc_mac_ocs	m
2	Support Operating Channel and Subslot re-selection	ETSI TS 103 636-4, clause 5.1.2	Rel-1	pc_mac_ocs_reselect	o

Prerequisite: pc_mac_ft.

Table B.2.3-1b: Last Minute Scan

Item	Last Minute Scan Capability	Reference	Release	Mnemonic	Status
1	Support Last Minute Scan procedure	ETSI TS 103 636-4, clause 5.1.3	Rel-1	pc_mac_lms	c.1

c.1: IF (pc_dectBand1 OR pc_dectBand2 OR pc_dectBand9 OR pc_dectBand22) THEN m ELSE o.

Prerequisite: pc_mac_ft.

Table B.2.3-1c: RD Selection Capabilities

Item	RD Selection Capability	Reference	Release	Mnemonic	Status
1	Support RD selection for association	ETSI TS 103 636-4, clause 5.1.4	Rel-1	pc_mac_rds	m

Prerequisite: pc_mac_pt.

Table B.2.3-1d: Beacons Transmissions

Item	EUT Beacons Capability	Reference	Release	Mnemonic	Status
1	Support Network Beacon transmission	ETSI TS 103 636-4, clause 6.4.2.2	Rel-1	pc_mac_bea_network_tx	o
2	Support Cluster Beacon transmission	ETSI TS 103 636-4, clause 6.4.2.3	Rel-1	pc_mac_bea_cluster_tx	m
3	Support "Next Channel" for a Cluster Beacon	ETSI TS 103 636-4, clause 6.4.2.3	Rel-1	pc_mac_bea_cluster_nc	o
4	Support "Time to next" for a Cluster Beacon	ETSI TS 103 636-4, clauses 6.4.2.2 and 6.4.2.3	Rel-1	pc_mac_bea_cluster_ttn	o

Prerequisite: pc_mac_ft.

Table B.2.3-1e: Power Control Capabilities

Item	EUT Power Control Capability	Reference	Release	Mnemonic	Status
1	Support Power Control	ETSI TS 103 636-4, clause 5.1.6	Rel-1	pc_mac_pc	m
2	Lowest transmission power level supported by the EUT	ETSI TS 103 636-4, clause 6.2.1	Rel-1	pc_mac_pc_tx_power_min	m
3	Highest transmission power level supported by the EUT	ETSI TS 103 636-4, clause 6.2.1	Rel-1	pc_mac_pc_tx_power_max	m
4	Target BLER percentage of the EUT	ETSI TS 103 636-4, clause 5.1.6	Rel-1	pc_mac_pc_target_bler	m
5	Support initial transmission power control	ETSI TS 103 874-2, clause 7.2.1.6	Rel-1	pc_smbc_mac_pc_initial	c.1
c.1: IF pc_smbc THEN o ELSE n/a.					

Table B.2.3-2: Broadcast procedures

Item	Broadcast Capability	Reference	Release	Mnemonic	Status
1	Support broadcasting Beacon messages	ETSI TS 103 636-4, clause 5.2	Rel-1	pc_mac_bc_beacon	c.1
2	Support broadcasting signalling or application data for all RDS	ETSI TS 103 636-4, clause 5.2	Rel-1	pc_mac_bc_broadcast	o
3	Support broadcasting signalling or application data for a multicast group	ETSI TS 103 636-4, clause 5.2	Rel-1	pc_mac_bc_multicast	o
c.1: IF pc_mac_ft THEN m ELSE n/a.					

Table B.2.3-3: Random Access Procedures

Item	Random Access Procedure	Reference	Release	Mnemonic	Status
1	Support Random Access Resource announcement in beacon messages	ETSI TS 103 636-4, clause 5.3.2	Rel-1	pc_mac_rach_res_bea	c.1
2	Support Random Access Resource announcement by unicast signalling	ETSI TS 103 636-4, clause 5.3.2	Rel-1	pc_mac_rach_res_uni	c.2
3	Support Random Access Reception	ETSI TS 103 636-4, clause 5.3.2	Rel-1	pc_mac_rach_rx	c.3
4	Support Random Access Transmission	ETSI TS 103 636-4, clause 5.3.3	Rel-1	pc_mac_rach_tx	c.4
c.1: IF pc_mac_ft THEN o ELSE n/a.					
c.2: IF pc_dect_mesh THEN o ELSE n/a.					
c.3: IF pc_mac_rach_res_bea OR pc_mac_rach_res_uni THEN m ELSE n/a.					
c.4: IF pc_mac_pt THEN m ELSE o.					

Table B.2.3-4: Scheduled Accesss Data Transfer

Item	Procedure	Reference	Release	Mnemonic	Status
1	Support scheduled access data transfer	ETSI TS 103 636-4, clause 5.4	Rel-1	pc_mac_sched	o

Table B.2.3-5: HARQ Capabilities

Item	EUT HARQ Capabilities	Reference	Release	Mnemonic	Status
1	Support HARQ transmission	ETSI TS 103 636-4, clause 5.5.1	Rel-1	pc_mac_harq_tx	o
2	Support HARQ feedback	ETSI TS 103 636-4, clause 5.5.2	Rel-1	pc_mac_harq_feedback	m

Table B.2.3-6: Multiplexing and Assembly

Item	Capability	Reference	Release	Mnemonic	Status
1	Support MAC PDU multiplexing and assembly	ETSI TS 103 636-4, clause 5.6	Rel-1	pc_mac_muxa	m

Table B.2.3-7: Mobility Procedures

Item	EUT Mobility Capabilities	Reference	Release	Mnemonic	Status
1	Support mobility procedures	ETSI TS 103 636-4, clause 5.7	Rel-1	pc_mac_mob	o
2	Support maintaining multiple associations simultaneously	ETSI TS 103 636-4, clause 5.7	Rel-1	pc_mac_mob_multia ssoc	c.1
c.1: IF pc_mac_mob THEN o ELSE n/a.					

Table B.2.3-8: Association Procedures

Item	Procedure	Reference	Release	Mnemonic	Status
1	Support PT mode association procedures	ETSI TS 103 636-4, clause 5.8	Rel-1	pc_mac_ass_pt	c.1
2	Support FT mode association procedures	ETSI TS 103 636-4, clause 5.8	Rel-1	pc_mac_ass_ft	c.2
c.1: IF pc_mac_pt THEN m ELSE n/a.					
c.2: IF pc_mac_ft THEN m ELSE n/a.					

Table B.2.3-9: MAC Security Procedures

Item	MAC Security Mode	Reference	Release	Mnemonic	Status
1	Support MAC Security procedures	ETSI TS 103 636-4, clause 5.9.1	Rel-1	pc_mac_sec	o

Table B.2.3-10: MAC Reconfiguration

Item	Procedure	Reference	Release	Mnemonic	Status
1	Support Reconfiguration procedure	ETSI TS 103 636-4, clause 5.10	Rel-1	pc_mac_reconf	o

Table B.2.3-11: Group Assignment procedures

Item	Procedure	Reference	Release	Mnemonic	Status
1	Support Group Assignment	ETSI TS 103 636-4, clause 5.11	Rel-1	pc_mac_ga	o

Table B.2.3-12: Paging Procedures

Item	Procedure	Reference	Release	Mnemonic	Status
1	Support Paging procedures	ETSI TS 103 636-4, clause 5.12.3	Rel-1	pc_mac_pg	o

Table B.2.3-13a: Physical Layer Control Field type formats

Item	Physical Layer Control Field	Reference	Release	Mnemonic	Status
1	Support Physical Layer Control Field Type 1, Header Format 000	ETSI TS 103 636-4, clause 6.2.1	Rel-1	pc_phy_t1_f000	m
2	Support Physical Layer Control Field Type 2, Header Format 000	ETSI TS 103 636-4, clause 6.2.1	Rel-1	pc_phy_t2_f000	c.1
3	Support Physical Layer Control Field Type 2, Header Format 001	ETSI TS 103 636-4, clause 6.2.1	Rel-1	pc_phy_t2_f001	m
c.1: IF pc_mac_harq_tx THEN m ELSE N/A.					

Table B.2.3-13b: Feedback info format

Item	Name	Reference	Release	Mnemonic	Status
1	Feedback info format 1	ETSI TS 103 636-4, clause 6.2.2	Rel-1	pc_phy_feedback_format1	m
2	Feedback info format 2	ETSI TS 103 636-4, clause 6.2.2	Rel-1	pc_phy_feedback_format2	m
3	Feedback info format 3	ETSI TS 103 636-4, clause 6.2.2	Rel-1	pc_phy_feedback_format3	m
4	Feedback info format 4	ETSI TS 103 636-4, clause 6.2.2	Rel-1	pc_phy_feedback_format4	c.1
5	Feedback info format 5	ETSI TS 103 636-4, clause 6.2.2	Rel-1	pc_phy_feedback_format5	c.2
6	Feedback info format 6	ETSI TS 103 636-4, clause 6.2.2	Rel-1	pc_phy_feedback_format6	m
c.1: IF pc_mac_harq_n_process = 8 THEN m ELSE o.					
c.2: IF MAX NSS RX > 1 THEN m ELSE o.					

B.2.4 DLC Implementation Capabilities

Table B.2.4-1: DLC Service Types

Item	DLC service type	Reference	Release	Mnemonic	Status
1	DLC service type 0	ETSI TS 103 636-5, clause 5.2.1	Rel-1	pc_dlc_st0	o.1
2	DLC service type 1	ETSI TS 103 636-5, clause 5.2.2	Rel-1	pc_dlc_st1	o.1
3	DLC service type 2	ETSI TS 103 636-5, clause 5.2.3	Rel-1	pc_dlc_st2	o.1
4	DLC service type 3	ETSI TS 103 636-5, clause 5.2.3	Rel-1	pc_dlc_st3	o.1
o.1: It is mandatory to support at least one of these items.					

Table B.2.4-2: Additional DLC Procedures

Item	Procedure	Reference	Release	Mnemonic	Status
1	Support DLC SDU lifetime control	ETSI TS 103 636-5, clause 5.2.7	Rel-1	pc_dlc_lifetime	o

Table B.2.4-3: DLC Routing Service Routing Types

Item	Routing Type	Reference	Release	Mnemonic	Status
1	Routing Type 000	ETSI TS 103 636-5, clause 5.2.8.2	Rel-1	pc_dlc_routing_000	c.1
2	Routing Type 011	ETSI TS 103 636-5, clause 5.2.8.3	Rel-1	pc_dlc_routing_011	c.1
3	Routing Type 101	ETSI TS 103 636-5, clause 5.2.8.4	Rel-1	pc_dlc_routing_101	o
c.1: IF pc_dect_mesh THEN m ELSE o.					

B.2.5 CVG Implementation Capabilities

Table B.2.5-1: CVG Service Types

Item	Service type	Reference	Release	Mnemonic	Status
1	CVG service type 0	ETSI TS 103 636-5, clause 6.2.2.2	Rel-1	pc_cvg_st0	o.1
2	CVG service type 1	ETSI TS 103 636-5, clause 6.2.2.3	Rel-1	pc_cvg_st1	o.1
3	CVG service type 2	ETSI TS 103 636-5, clause 6.2.2.4	Rel-1	pc_cvg_st2	o.1
4	CVG service type 3	ETSI TS 103 636-5, clause 6.2.2.5	Rel-1	pc_cvg_st3	o.1
5	CVG service type 4	ETSI TS 103 636-5, clause 6.2.2.6	Rel-1	pc_cvg_st4	o.1
o.1: It is mandatory to support at least one of these items.					

Table B.2.5-2: CVG Multiplexing procedures

Item	Procedure	Reference	Release	Mnemonic	Status
1	Support Endpoint Multiplexing	ETSI TS 103 636-5, clause 6.2.4.2	Rel-1	pc_cvg_mux_ep	o
2	Support Mux Tag Multiplexing	ETSI TS 103 636-5, clause 6.2.4.3	Rel-1	pc_cvg_mux_mt	o

Table B.2.5-3: CVG Duplicate Removal procedures

Item	Procedure	Reference	Release	Mnemonic	Status
1	Support Duplicate Removal of complete SDUs	ETSI TS 103 636-5, clause 6.2.5	Rel-1	pc_cvg_dup	c.1
c.1: IF (pc_cvg_st1 OR pc_cvg_st2 OR pc_cvg_st3 OR pc_cvg_st4) THEN o ELSE n/a.					

Table B.2.5-4: Delivery Order procedures

Item	Procedure	Reference	Release	Mnemonic	Status
1	Support In Sequence Delivery (ISD)	ETSI TS 103 636-5, clause 6.2.6	Rel-1	pc_cvg_delivery_isd	c.1
c.1: IF (pc_cvg_st1 OR pc_cvg_st2 OR pc_cvg_st3 OR pc_cvg_st4) THEN o ELSE n/a.					

Table B.2.5-5: CVG Tx Services configuration procedure

Item	Procedure	Reference	Release	Mnemonic	Status
1	Support Tx services configuration procedure	ETSI TS 103 636-5, clause 6.2.12	Rel-1	pc_cvg_txservice	o

Table B.2.5-6: CVG Security modes

Item	Name	Reference	Release	Mnemonic	Status
1	Support Security Mode 1	ETSI TS 103 636-5, clause 6.2.13.2	Rel-1	pc_cvg_sec_mode1	o

Annex C (normative): EUT Special conformance testing functions

C.1 General description

C.1.1 Introduction

The EUT Special Conformance testing functions are required for the support of DECT-2020 NR conformance testing.

The present annex defines the EUT special conformance test functions including any relevant procedure and the Test Mode Control (TMC) message contents used for information exchange.

C.1.2 Activating the test mode

The Test Mode Control entity is activated by setting the EUT in a Test Mode. The access to the test mode is controlled by a mechanism defined by the manufacturer, either physically or over-the-air.

When the EUT is in the test mode, the Test System may use testing-specific endpoint multiplexing value for transmitting the Test Mode Control (TMC) messages to the Test Mode Control entity within the EUT. The endpoint value used by the test system is in <https://portal.etsi.org/PNNS/Protocol-Specification-Allocation/DECT-2020-NR-Endpoint-Multiplexing-Addresses>.

If CVG layer endpoint multiplexing is not supported, and the Test Mode is active, the EUT should consider all received application layer data i.e. CVG SDUs as Test Mode Control messages.

C.2 EUT Test mode

C.2.1 General

The EUT test mode functions can be grouped into the following groups:

- 1) **Test Loop Functions:** Functions which require a loop to be established between the EUT and the Test System to allow e.g. DL data packets sent by the TS to be looped back as UL data packets by the EUT.
- 2) **General Test Functions:** Functions where the Test System triggers certain EUT behaviour which may be behaviour defined in the ETSI TS 103 636 specifications or such needed to facilitate conformance testing and not being part of any specification, or to provide the EUT information needed for the conformance testing.

The utilization of any EUT special conformance test functions shall be considered as having the EUT set in a test mode.

C.3 Test Mode Control procedures

C.3.1 Test loop functions

C.3.1.1 General

Before a loop functionality can be exercised, the test loop needs to be activated; this is to be understood as the EUT being instructed to start looping back received data packets. When looping back received data packets is no longer required the loop should be deactivated.

The test loop function is intended for:

- DECT-2020 NR (MAC, DCL, CVG) testing to generate data transfer in downlink and uplink.

C.3.1.2 Activate Test Loop

Upon receiving an ACTIVATE_TEST_LOOP message, the EUT shall activate the test loop function on the user plane data flow the message was received on.

When the loop is successfully activated by the EUT, the EUT shall transmit an ACTIVATE TEST LOOP COMPLETE message to indicate that the loop has been established and the EUT is ready to loop back any received CVG SDUs.

C.3.1.3 Deactivate Test Loop

Upon receiving a DEACTIVATE TEST LOOP message, the EUT shall stop looping back any received user plane data on the data flow the message was received on.

When the loop is successfully deactivated by the EUT, the EUT shall transmit a DEACTIVATE TEST LOOP COMPLETE message.

C.3.1.4 Test Loop Mode A operation

The Test Loop Mode A provides a loopback of CVG SDUs for bi-directional user plane data flows. CVG SDUs received by the EUT via any route are looped back to the source.

In case of segmented packets, the EUT shall loop back the CVG SDU only after it has been completely received.

Prerequisites for test loop mode A:

- The EUT test mode shall be active.
- At least one user-plane data flow shall be established between the EUT and the Test System.
- When the Test Loop Function is active, the EUT shall not transmit any other user-plane data except the loopback data.
- If the user-plane data flow is released, then the test loop function is deactivated.

Upon receiving a CVG SDU containing LOOP_DATA message while the Test Loop Mode A is active, the EUT shall:

- Generate a LOOP_DATA_RESPONSE message and copy the data part of the LOOP_DATA message.
- Set the Destination address as the Source address of the received LOOP_DATA message.
- Instruct the CVG layer to transmit the message.

C.3.2 General Test Functions

C.3.2.1 General

The general test functions consist of a request and some function-specific responses. The request message provides parameter information to the EUT on how it should perform the requested operation.

C.3.2.2 Data request function

The Data Request function provides transmission of CVG SDUs by the EUT towards the test system with configurable parameters, including message size, number of packets, and the time periodicity between multiple requested packets. The CVG SDUs are transmitted on the same data flow where the DATA_REQUEST message was received.

Prerequisites for the Data Request function:

- The EUT test mode shall be active.
- At least one user-plane data flow shall be established between the EUT and the Test System.
- If the user-plane data flow is released, any scheduled data transmissions shall be cancelled.

Upon receiving a DATA_REQUEST message, the EUT shall:

- store the Source Address from the routing header of the DATA_REQUEST message;
- remove any DATA_REQUEST_RESPONSE messages not delivered to CVG layer from the transmission buffer;
- set *requestedPackets* counter as REQUEST_N_PACKETS;
- while number of *requestedPackets* counter is greater than 0:
 - wait time REQUEST_T_INTERVAL;
 - generate a DATA_REQUEST_RESPONSE message containing REQUEST_N_BYTES bytes;
 - set the Source Address of the routing header for DATA_REQUEST message as the Destination address;
 - instruct the CVG layer to transmit the DATA_REQUEST_RESPONSE message according to the options specified in REQUEST_FLAGS;
 - if *requestedPackets* counter is less than 0xFF:
 - decrease the *requestedPackets* counter by one.
- stop generating any further DATA_REQUEST_RESPONSE messages.

C.4 Message definitions and contents

C.4.1 General

C.4.1.1 Message structure

The test mode control messages are intended to be transmitted as Data payload within a Data IE/Data EP IE to a testing specific endpoint.

C.4.1.2 Message codes

Table C.4.1.2-1 lists the test mode control message codes.

Table C.4.1.2-1: Message codes

Value	Message code
0x00	LOOP_DATA
0x01	LOOP_DATA_RESPONSE
0x02	ACTIVATE_TEST_LOOP
0x03	ACTIVATE_TEST_LOOP_COMPLETE
0x04	DEACTIVATE_TEST_LOOP
0x05	DEACTIVATE_TEST_LOOP_COMPLETE
0x06	DATA_REQUEST
0x07	DATA_REQUEST_RESPONSE

C.4.2 Test control messages

C.4.2.1 ACTIVATE_TEST_LOOP

Table C.4.2.1-1: ACTIVATE_TEST_LOOP message

Field	Octet	Description
message_code	0	Message code, set to ACTIVATE_TEST_LOOP
loop_mode	1	Test loop mode: 0x00: test loop mode A 0x01 - 0xFF: reserved
loop_response_delay	2	Delay which the EUT should add before generating the loopback packet, values: 0x00: No delay 0x01 - 0x09: 10 ms, 20 ms, 30 ms, 40 ms, 50 ms, 60 ms, 70 ms, 80 ms, 90 ms 0x0A - 0x12: 100 ms, 200 ms, 300 ms, 400 ms, 500 ms, 600 ms, 700 ms, 800 ms - 900 ms 0x13 - 0x1B: 1 s, 2 s, 3 s, 4 s, 5 s, 6 s, 7 s, 8 s, 9 s 0x1C - 0x25: 10 s, 20 s, 30 s, 40 s, 50 s, 60 s, 70 s, 80 s, 90 s, 100 s 0x26 - 0xFF: Reserved

C.4.2.2 ACTIVATE_TEST_LOOP_COMPLETE

Table C.4.2.2-1: ACTIVATE_TEST_LOOP_COMPLETE message

Field	Octet	Description
message_code	0	Message code, set to ACTIVATE_TEST_LOOP_COMPLETE

C.4.2.3 DEACTIVATE_TEST_LOOP

Table C.4.2.3-1: DEACTIVATE_TEST_LOOP message

Field	Octet	Description
message_code	0	Message code, set to DEACTIVATE_TEST_LOOP

C.4.2.4 DEACTIVATE_TEST_LOOP_COMPLETE

Table C.4.2.4-1: DEACTIVATE_TEST_LOOP message

Field	Octet	Description
message_code	0	Message code, set to DEACTIVATE_TEST_LOOP_COMPLETE

C.4.2.5 LOOP_DATA

When a test loop function is active, the LOOP_DATA message format may be used.

Table C.4.2.5-1: LOOP_DATA message

Field	Octet	Description
message_code	0	Message code, set to LOOP_DATA
data	1-n	Any bytes

C.4.2.6 LOOP_DATA_RESPONSE

When the EUT receives a LOOP_DATA message, it shall use the LOOP_DATA_RESPONSE message format.

Table C.4.2.6-1: LOOP_DATA_RESPONSE message

Field	Octet	Description
message_code	0	Message code, set to LOOP_DATA_RESPONSE
data	1-n	Loop response data is based on the test loop mode Mode A: Data bytes included in the LOOP_DATA message

C.4.2.7 DATA_REQUEST

When the test mode is active, and the EUT receives a DATA_REQUEST message, the EUT shall transmit *request_n_packets* packets, with periodicity of *request_t_interval*, having a size of *request_n_bytes* bytes. The first packet should be transmitted as soon as possible after the indicated delay when receiving the request message.

If the number of requested packets is 0x00, the EUT shall stop any ongoing periodic transmission operation. If the number of requested packets is 0xFF, the EUT shall send packets until it is commanded to stop. Otherwise, the EUT shall transmit the requested number of CVG SDUs.

Table C.4.2.7-1: DATA_REQUEST message

Field	Octet	Description
message_code	0	Message code, set to DATA_REQUEST
request_flags	1	Bit 0: Use HARQ for transmissions Bit 1-7: Reserved
request_n_packets	2	Number of packets to be transmitted by the TMC, values: 0x00: Stop any ongoing requests. 0x01-0xFE: Number of requested packets 0xFF: Request continuous packet transmission
request_t_interval	3	Delay before and in-between transmissions, values: 0x00: Transmit within random-access responses 0x01 - 0x09: 10 ms, 20 ms, 30 ms, 40 ms, 50 ms, 60 ms, 70 ms, 80 ms, 90 ms 0x0A - 0x12: 100 ms, 200 ms, 300 ms, 400 ms, 500 ms, 600 ms, 700 ms, 800 ms, 900 ms 0x13 - 0x1B: 1 s, 2 s, 3 s, 4 s, 5 s, 6 s, 7 s, 8 s, 9 s 0x1C - 0x25: 10 s, 20 s, 30 s, 40 s, 50 s, 60 s, 70 s, 80 s, 90 s, 100 s 0x26 - 0xFF: Reserved
request_n_bytes	4-5	CVG SDU size in bytes 0x0000: Reserved 0x0001-0xFFFE: Data payload size equal to field value 0xFFFF: Maximum data payload size supported by the EUT

C.4.2.8 DATA_REQUEST_RESPONSE

Table C.4.2.8-1: DATA_REQUEST_RESPONSE message

Field	Octet	Description
message_code	0	Message code, set to TEST_DATA_RESPONSE
data	1-request_n_bytes	Any random bytes, having size as indicated by request_n_bytes as indicated in a received DATA_REQUEST message

History

Document history		
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