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TECHNICAL SPECIFICATION

5G;
LTE;
5GS;
Special conformance testing functions
for User Equipment (UE)
(3GPP TS 38.509 version 16.2.0 Release 16)

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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x the first digit:

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2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document defines for User Equipment (UE) those special functions and their activation/deactivation methods that are required in the UE for conformance testing purposes when the UE is connected to the 5G System (5GS) via its radio interface(s).

The document also describes the operation of these special functions when the 5GS capable UEs are connected via a non-5GS system e.g. E-UTRA FDD or TDD system.

Depending on the 5GS system's architecture some relevant for the UE for conformance testing special functions may be defined in TS 36.509 [6].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

> References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document* unless the context in which the reference is made suggests a different Release is relevant (information on the applicable release in a particular context can be found in e.g. test case title, description or applicability, message description or content).

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 38.508-1: "5GS; User Equipment (UE) conformance specification; Part 1: Common test environment ".

[3] 3GPP TS 38.523-1: "5GS; User Equipment (UE) conformance specification; Part 1: Protocol ".

[4] 3GPP TS 38.523-3: "5GS; User Equipment (UE) conformance specification; Part 3: Protocol Test Suites "

[5] 3GPP TS 38.522: "NR; User Equipment (UE) conformance specification; Applicability of RF and RRM test cases".

[6] 3GPP TS 36.509: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Special conformance testing functions for User Equipment (UE)".

[7] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General Aspects".

[8] 3GPP TS 34.109: "Terminal logical test interface; Special conformance testing functions".

[9] 3GPP TS 44.014: "Individual equipment type requirements and interworking; Special conformance testing functions".

[10] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (EUTRA) Radio Resource Control (RRC) Protocol Specification".

[11] 3GPP TS 38.331: "NR Radio Resource Control (RRC) protocol specification".

[12] 3GPP TS 38.521-1: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone".

[13] 3GPP TS 38.521-2: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 Standalone".

[14] 3GPP TS 38.521-3: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".

[15] 3GPP TS 38.521-4: "NR; User Equipment conformance specification; Radio transmission and reception; Part 4: Performance".

[16] 3GPP TS 38.533: NR; "User Equipment (UE) conformance specification; Radio resource management".

[17] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[18] 3GPP TS 36.323: "Evolved Universal Terrestrial Radio Access (E-UTRA); Packet Data Convergence Protocol (PDCP) specification".

[19] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) specification".

[20] 3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".

[21] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[22] 3GPP TS 38.215: "NR; Physical Layer Measurements".

[23] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

Frequency Range 2 (FR2): The frequency ranges in which NR can operate being in the range of 24250 MHz - 52600 MHz.

Logical Test Interface: interface which provides the logical service to interwork and to communicate between UE and System Simulator during the test of a UE

SS (System Simulator): test system (or equipment) that drives the test process with UE, like 5G System simulator

TMC (Test Mode Control): UE protocol entity used by the SS to control the UE specific testing functions

NOTE: In other Special conformance testing functions for User Equipment (UE) 3GPP specifications e.g. 36.509 [6], the term Test Control (TC) is used for describing the same UE entity. The different names do not preclude the implementation of a single entity to handle all the functionality in a UE supporting different 3GPP technologies.

UE (User Equipment): user equipment as defined in [1] that is under test

3.2 Symbols

No specific symbols apply for the purposes of the present document.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

EMMI	Electrical Man Machine Interface
FFS	For further Study
FR2	Frequency Range 2
LB	Loop Back
MTC	Main Test Component
NSSAI	Network Slice Selection Assistance Information
SS	System Simulator
TMC	Test Mode Control

4 UE special conformance test functions overview

4.1 Requirements for UE support of test functions

The UE special conformance test functions are required for the support of 5GS conformance testing. They form a part of the core requirements and thus have a direct impact on the design of the UE. The use of the word "mandatory" in the present specification shall be understood as a particular requirement being mandatory for performing UE conformance testing.

> NOTE: While the importance of conformance testing should not be underestimated, and hence is highly recommended, the implementation of facilitation of it is left to the Device implementation.

4.2 UE special conformance test functions concept

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

The conformance test methods applied in RF/RRM Conformance Test Specification TS 38.521-1 [12], TS 38.521-2 [13], TS 38.521-3 [14], TS 38.521-4 [15] and TS 38.533 [16], and, the conformance test models used in Protocol Conformance Test Specifications TS 38.523-1 [3] and TS 38.523-3 [4], as well as, common test environment definition and Generic procedures specified in TS 38.508-1 [2] utilise the UE special conformance test functions. Default TMC messages and information element contents utilised in all before mentioned test specifications are specified in TS 38.508-1 [2].

The UE special conformance test functions vary depending on the conformance testing functionality they are designed to support. The following broader groups of UE special conformance test functions can be identified:

- **Test Loop Functions**: Functions which require a loop to be established between the UE and the System Simulator (SS) to allow e.g. DL data packets sent by the SS to be looped back UL by the UE

- **General Test Functions**: Commands send by the SS e.g. to trigger a certain UE behaviour which may be a behaviour determined by 3GPP core spec requirements or such needed to facilitate conformance testing and not being part of any 3GPP core spec requirements, or, to provide to the UE information needed for the conformance testing.

> NOTE 1: An example for behaviour needed to facilitate conformance testing and not representing behaviour determined by 3GPP core spec requirements is counting and reporting the number of received data packets thereby providing means to the SS to verify 3GPP core spec requirements.

The utilisation of any UE special conformance test functions shall be considered as putting the UE in a test mode. The duration of the test mode depends on the UE special conformance test function and in most of the cases will be delimited by an activation and a deactivation command. However, in the case of general test functions used e.g. only to provide information relevant for the conformance testing the test mode can be considered as entered as soon as the information is received and exited as soon as the information has been acted upon.

As a common rule the UE special conformance test functions provide access to isolated functions of the UE via the radio interface without introducing new physical interfaces just for the reason of conformance testing. However, in certain cases the usage of AT Commands may be required which will require an external interface e.g. EMMI.

NOTE 2: It should be emphasised that the UE test functions only describe the functional behaviour of the UE with respect to its external interfaces; physical implementation of the UE test function is completely left open to the manufacturer.

Depending on the conformance testing functionality they are designed to support, the UE special conformance test functions may comprise:

- A single DL message (e.g. a test function intended to provide to the UE information needed for the conformance testing)

- A Request/Acknowledgement type of 2 messages exchange, an DL message followed by a UL message, (e.g. a test function intended to request the UE to execute an action which requires acknowledgment that request was received and acted upon)

Furthermore, depending on the conformance test scenarios

- An UE special conformance test function can be used in isolation.

NOTE 3: An example for this is the provision to the UE of location information which can then be used by the UE throughout its "normal" i.e. not test mode functions dependant behaviour.

- Two, or more, UE special conformance test functions may need to be executed in a particular sequence before the target UE behaviour can be assumed.

NOTE 4: An example for this are the Activate UE test mode and Close UE test loop functions. The former needs to be executed first, at a particular moment of time, in order a specific type of test bearer terminated in a particular UE protocol layer to be established. Followed by the latter, executed at different point of time, which will instruct the UE to start looping back the received packets.

- Two, or more, UE special conformance test functions may be executed simultaneously with no particular relation one to another allowing for different test mode functionality to take place at the same time.

NOTE 5: An example for this are the UE Beamlock test function and the test functions needed for test loop mode operation (see NOTE 4). The former may need to be active throughout the entire tests with the latter being active in parts of the test as appropriate. Both being active independently.

For the specification of UE special conformance test functions the present specification may refer to other specifications. In the case when text on the same matter exists in the present specification and in the referred specification, the text in the present specification takes precedence.

5 UE special conformance test functions operation

5.1 General

For consistency with legacy terminology, the present specification uses the terms 'Activate UE test mode' and 'Deactivate UE test mode' for denoting the activation and the deactivation of 5GS test mode bearers procedures respectively. Consequently, 'Activate UE test mode' should not be understood as setting the UE in test mode in general rather, as setting the UE in a mode (i.e. establishing a special type of test bearers) which other special UE conformance testing functions require for proper operation. As this has been mentioned elsewhere in the present specification, not all special UE conformance testing functions require such a setting.

Similarly, the present specification may use the term 'UE test loop mode X operation", where X is a chose letter, for denoting operation which does not represent true looping back of data being received rather, it represents what can be called as a "pseudo loop" i.e. providing back information about the received data e.g. the number of the received packets.

5.2 Activation and deactivation of 5GS test mode bearers (UE test mode procedures)

5.2.1 General

The SS performs, where applicable, activation and deactivation of the conformance test functions in the UE by sending Security Protected NAS Layer 3 messages.

The UE test mode procedures are intended for setting the UE into a test mode where the SS can set up test bearers terminated at a particular point in the 5GS protocol stack as specified in the functional block diagram of each UE test loop mode of operation. The following test bearers are defined in the present specification:

- data radio bearers (UE test loop mode A),

- EPS bearers or 5GS QoS flows (UE test loop mode B).

- NR PC5 QoS flows (UE test loop mode E).

5.2.2 Activate UE test mode

Same as TS 36.509 [6], subclause 5.3.2 with the following exceptions:

- where E-UTRA is mentioned the same applies for NR;

- where V2X is mentioned the same applies for NR sidelink;

    the NB-IoT mode is out of the scope of the present specification;

    where different UE test loop modes are mentioned only those applicable to 5GS should be taken into account (see subclause 5.3.4 for the applicable 5GS UE test loop modes).

5.2.3 Deactivate UE test mode

Same as TS 36.509 [6], subclause 5.3.3 with the following exceptions

- where E-UTRA is mentioned the same applies for NR;

- where V2X is mentioned the same applies for NR sidelink;

- the NB-IoT mode is out of the scope of the present specification;

- where different UE test loop modes are mentioned only those applicable to 5GS should be taken into account (see subclause 5.3.4 for the applicable 5GS UE test loop modes).

Apart from sending the appropriate deactivation command to the UE the functions shall be deactivated by:

    switching off the UE; or

    by removing the USIM.

5.3 Test loop functions

5.3.1 General

Before a loop functionality can be exercised, the test loop needs to be closed; this is to be understood as the UE being instructed to start looping back received data packets. When looping back received data packets is not any longer required the loop should be re-opened; opening of a loop does not change the type of bearer being established by the UE test mode activation function (subclause 5.2.2).

To limit the number of special test functions, the concept of closing and opening a loop is also used as instruction to the UE to initiate/terminate other actions. An example of this is counting the received packets and reporting the number of received packets back to the SS; in the context of this utilisation closing a loop is to be understood as the UE being instructed to start counting the packets, whereas opening a loop should be understood as stop counting the packets. Other utilisation of the closing/opening a "test loop" test functionality can be specified if appropriate.

The UE test loop functions for 5GS are intended for:

- NR receiver and transmitter testing to disable application data transfer in downlink and uplink during SS UE measurements.

- NR layer 2 (MAC, RLC, PDCP, SDAP) and data radio bearer testing to generate data transfer in downlink and uplink.

- NR layer 2 (MAC, RLC, PDCP, SDAP) and sidelink data radio bearer testing to generate data transfer in sidelink.

- 5GC and NR layer 3 testing to verify data transfer continuation over RRC and 5GC procedures.

- 5GC and NR layer 3 testing to verify data transfer over PC5 interface.

- 5GC NAS user-plane testing to verify uplink QoS flow descriptions handling.

- PC5-U testing to verify sidelink PC5 QoS flow descriptions handling.

5.3.2 Close UE test loop

5.3.2.0 General

Same as TS 36.509 [6], subclause 5.4.2 with the following exceptions:

- where E-UTRA is mentioned the same applies for NR;

- where V2X is mentioned the same applies for NR sidelink;

- the NB-IoT mode is out of the scope of the present specification

- where different UE test loop modes are mentioned only those applicable to 5GS should be taken into account (see subclause 5.3.4 for the applicable 5GS UE test loop modes).

- where EPS bearers are mentioned the same applies for 5GS QoS flows; and

- UE supported minimum buffer size for MR-DC and NR shall match the required total layer 2 buffer size as specified in TS 38.306 [20], clause 4.1.4.

- Subclause 5.4.2.3 in TS 36.509 [6] is replaced by 5.3.2.1 in current specification.

- Subclause 5.4.2.4in TS 36.509 [6] is replaced by 5.3.2.2 in current specification.

5.3.2.1 Reception of CLOSE UE TEST LOOP message by the UE

Same as TS 36.509 [6], subclause 5.4.2.3 with the following exceptions:

…

1> else if UE test loop mode E has been selected;

  2> if UE test loop mode A or UE test loop mode B operation is already closed on one or more data radio bearers; or

  2> if TEST_LOOP_MODE_C_ACTIVE = TRUE or TEST_LOOP_MODE_D_ACTIVE = TRUE or TEST_LOOP_MODE_E_ACTIVE = TRUE or TEST_LOOP_MODE_F_ACTIVE = TRUE or TEST_LOOP_MODE_G_ACTIVE = TRUE or TEST_LOOP_MODE_H_ACTIVE = TRUE or TEST_LOOP_MODE_I_ACTIVE = TRUE; or

  2> if the UE is unable to read the pre-configured parameters for NR sidelink Communication from the USIM; or

  2> when test loop mode E is utilised in NR sidelink out-of-coverage scenarios:

    3> the UE behaviour is unspecified.

  2> otherwise:

    3> set TEST_LOOP_MODE_E_ACTIVE to TRUE

    3> if the E0 bit in Communication Transmit or Receive parameter in UE test loop mode E setup IE is set as zero;

      4> set TEST_LOOP_MODE_E_TRIGGER to RECEIVE

      4> set state variable PROSE_COMMUNICATION_MONITOR_N to the number of entities in the list of Group Destination IDs to individually monitor included in the UE test loop mode E setup IE;

      4> if PROSE_COMMUNICATION_MONITOR_N is greater than MAX_ModeE_Monitor_Entities:

        5> the UE behaviour is unspecified.

      4> for SL_ID = 0…(PROSE_COMMUNICATION_MONITOR_N-1):

        5> set state variable PROSE_COMMUNICATION_DEST_ID(SL_ID) to the parameter Group Destination ID #(SL_ID) to monitor of the UE test loop mode E setup IE;

        5> set state variable STCH_PACKET_COUNTER(SL_ID) to zero;

        5> set state variable PSCCH_PACKET_COUNTER(SL_ID) to zero;

        5> set state variable PSSCH_PACKET_COUNTER(SL_ID) to zero;

      4> set state variable STCH_PACKET_COUNTER(PROSE_COMMUNICATION_MONITOR_N) to zero;

      4> set state variable PSCCH_PACKET_COUNTER(PROSE_COMMUNICATION_MONITOR_N) to zero;

      4> set state variable PSSCH_PACKET_COUNTER(PROSE_COMMUNICATION_MONITOR_N) to zero;

      4> perform the UE actions for UE Test Loop Mode E operation as specified in subclause 5.4.4c;

    3> if the E0 bit in Communication Transmit or Receive parameter in UE test loop mode E setup IE is set as one;

      4> if the E1 bit in Communication Transmit or Receive parameter in UE test loop mode E setup IE is set as zero;

        5> set TEST_LOOP_MODE_E_TRIGGER to TRANSMIT;

      4> else

        5> set TEST_LOOP_MODE_E_TRIGGER to TRANSMIT_SL_MIMO;

      4> perform the UE actions for UE Test Loop Mode E operation as specified in subclause 5.4.4c;

> 3> send CLOSE UE TEST LOOP COMPLETE message (the loopback shall be operational prior to the sending of the acknowledgement).

5.3.2.2 Reception of AT Command +CCUTLE by the UE

Upon receiving the AT Command +CCUTLE=<status=0>[,<direction>[,<format>,<length>,<monitor_list>]] the UE shall:

> 1> if UE test loop mode E has been selected;

>> 2> if TEST_LOOP_MODE_E_ACTIVE = TRUE; or

>> 2> if the UE is unable to read the pre-configured parameters for NR sidelink Communication from the USIM:

>>> 3> the UE behaviour is unspecified.

>> 2> otherwise:

>>> 3> set TEST_LOOP_MODE_E_ACTIVE to TRUE

>>> 3> if the <direction> parameter in +CCUTLE set command is set as zero;

>>>> 4> set TEST_LOOP_MODE_E_TRIGGER to RECEIVE

>>>> 4> if the <format> parameter in +CCUTLE set command is set as 1

>>>>> 5> set state variable PROSE_COMMUNICATION_MONITOR_N to the number of entities in the list of Destination Layer-2 IDs to individually monitor included in the <monitor_list> parameter of +CCUTLE set command;

>>>>> 5> if PROSE_COMMUNICATION_MONITOR_N is greater than MAX_ModeE_Monitor_Entities:

>>>>>> 6> the UE behaviour is unspecified.

>>>>> 5> for SL_ID = 0…(PROSE_COMMUNICATION_MONITOR_N-1):

>>>>>> 6> set state variable PROSE_COMMUNICATION_DEST_ID(SL_ID) to the parameter Destination Layer-2 ID #(SL_ID) to monitor in the +CCUTLE set command;

>>>>>> 6> set state variable STCH_PACKET_COUNTER(SL_ID) to zero;

>>>>>> 6> set state variable PSCCH_PACKET_COUNTER(SL_ID) to zero;

>>>>>> 6> set state variable PSSCH_PACKET_COUNTER(SL_ID) to zero;

>>>>> 5> set state variable STCH_PACKET_COUNTER(PROSE_COMMUNICATION_MONITOR_N) to zero;

>>>>> 5> set state variable PSCCH_PACKET_COUNTER(PROSE_COMMUNICATION_MONITOR_N) to zero;

>>>>> 5> set state variable PSSCH_PACKET_COUNTER(PROSE_COMMUNICATION_MONITOR_N) to zero;

>>>>> 5> perform the UE actions for UE Test Loop Mode E operation as specified in subclause 5.4.4c;

>>>> 4> else

>>>>> 5> the UE behaviour is unspecified.

>>> 3> if the <direction> parameter in +CCUTLE set command is set as one;

>>>> 4> if the [<2-layer>] parameter in UE test loop mode E setup IE is set as zero

>>>>> 5> set TEST_LOOP_MODE_E_TRIGGER to TRANSMIT

>>>> 4> else

        5> set TEST_LOOP_MODE_E_TRIGGER to TRANSMIT_SL_MIMO;

      4> perform the UE actions for UE Test Loop Mode E operation as specified in subclause 5.4.4c;

1> else;

  2> the UE behaviour is unspecified.

Editor's Note: The AT command [2-layer] is pending to be added by CT1.

5.3.3   Open UE test loop

Same as TS 36.509 [6], subclause 5.4.5 with the exceptions:

-    where E-UTRA is mentioned the same applies for NR;

-    where V2X is mentioned the same applies for NR sidelink;

-    the NB-IoT mode is out of the scope of the present specification;

-    where different UE test loop modes are mentioned only those applicable to 5GS should be taken into account (see subclause 5.3.4 for the applicable 5GS UE test loop modes).

5.3.4   UE functionality when test loop is closed

5.3.4.1   UE test loop mode A operation

Editor's note: Functional block diagrams for UE test loop mode A for NE-DC need to be added.

UE test loop mode A provides loopback of PDCP SDUs for bi-directional data radio bearers while UE is operating in NR. The downlink PDCP SDUs received by the UE on each bi-directional data radio bearer are returned on the same radio bearer regardless of the PDCP SDU contents and of the QoS flow descriptions of the associated QoS Flow as specified in TS 24.501 [21].

Figures 5.3.4.1-1 and 5.3.4.1-2 show functional block diagrams of UE test loop function for the TMC entity and UE test loop mode A for the case when EN-DC or NGEN-DC with a MCG bearer and a SCG bearer is configured and for the case EN-DC or NGEN-DC with a MCG and a split bearer is configured.

Figures 5.3.4.1-3 shows functional block diagrams of UE test loop function for the TMC entity and UE test loop mode A for the case when standalone NR is configured.

  NOTE 1: The number and the order of RB LB Entities in the functional block diagrams are provided for illustration only. No specific order or numbering is precluded.
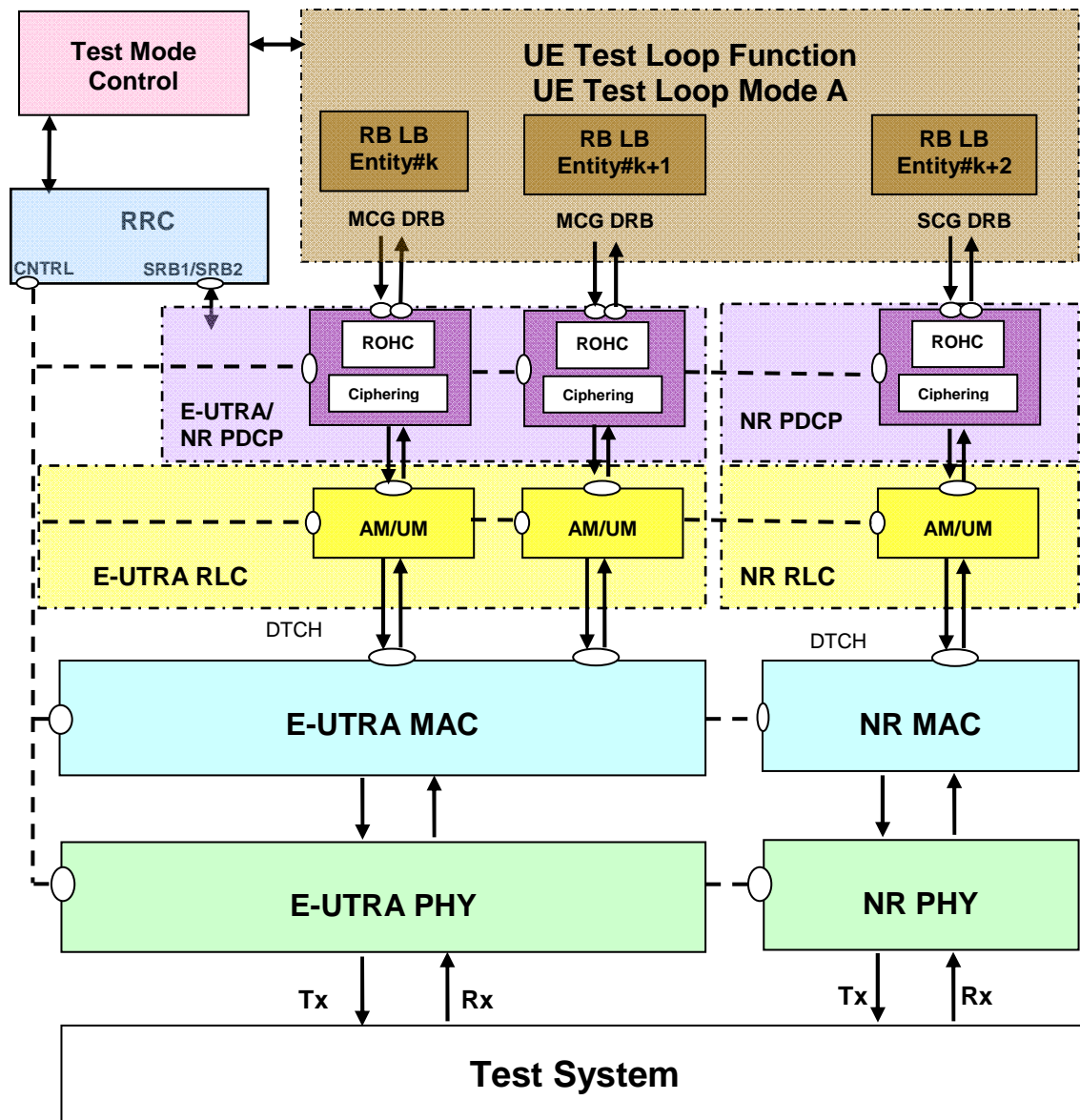
Figure 5.3.4.1-1: Model for Test Mode Control and UE Test Loop Mode A on UE side when EN-DC or NGEN-DC with MCG bearer and SCG bearer is configured
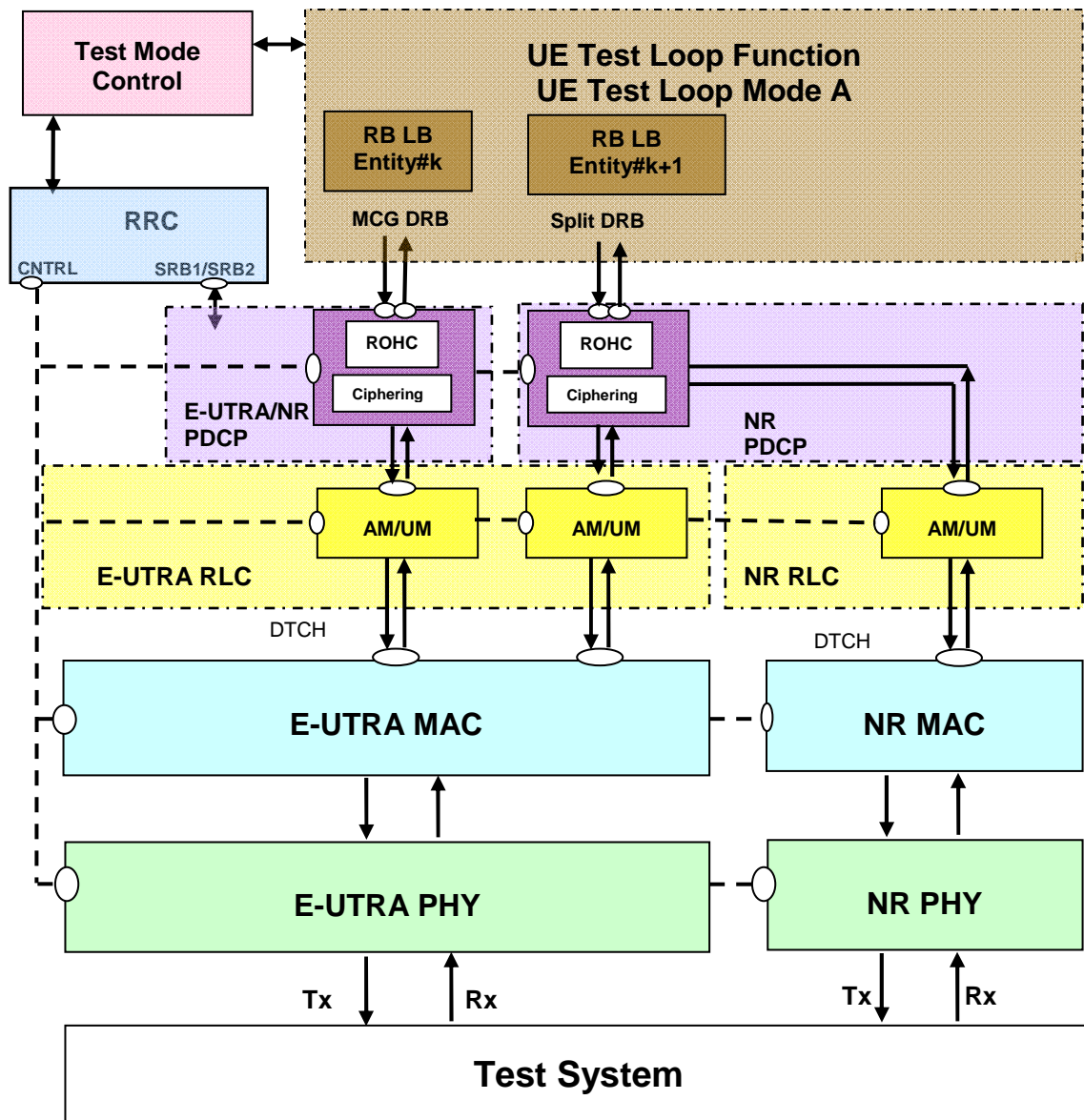
Figure 5.3.4.1-2: Model for Test Mode Control and UE Test Loop Mode A on UE side when EN-DC or NGEN-DC with MCG and split bearer configured
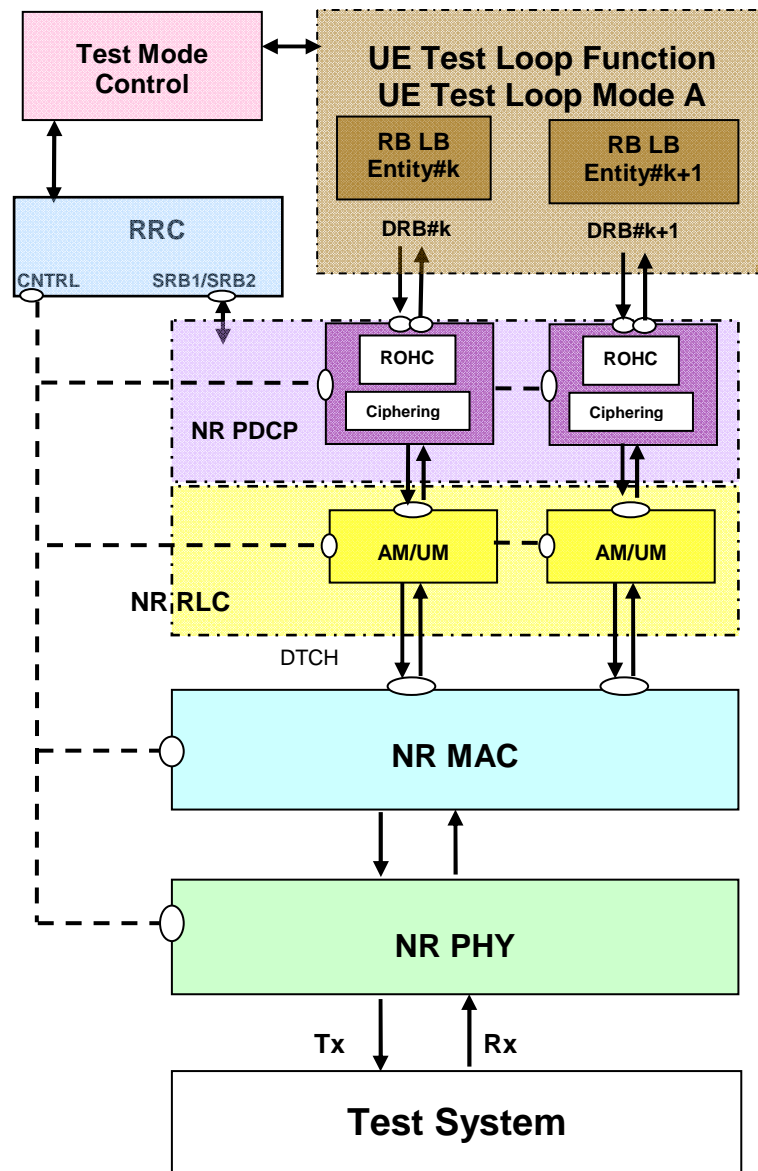
Figure 5.3.4.1-3: Model for Test Mode Control and UE Test Loop Mode A on UE side when standalone NR is configured

UE test loop mode A is mandatory to all 5GS UEs.

Prior to closing the UE test loop mode A, thereby requesting the UE to start looping back the received data packets, at least one 5GS test mode bi-directional data radio bearer shall have been established between SS and UE. This implies that before the procedure for establishing the bi-directional data radio bearer takes place the SS needs to activate the UE test mode as specified in subclause 5.2.2.

The 5GS UE test loop mode A operation is the same as the one described in TS 36.509 [6], subclause 5.4.3 with the exception where E-UTRA is mentioned the same applies for NR, and, the understanding that the NB-IoT mode is out of the scope of the present specification.

5.3.4.2 UE test loop mode B operation

Editor's note: Functional block diagrams for UE test loop mode B for NE-DC need to be added.

5.3.4.2.1 General

UE test loop mode B is mandatory to all 5GS UEs supporting one or more PDU session establishments.

5.3.4.2.2 UE test loop mode B operation for EN-DC and NGEN-DC

UE test loop mode B provides loopback of PDCP SDUs for bi-directional EPS bearers while UE is operated in NR or E-UTRA modes. When operating in NR or E-UTRA, the downlink PDCP SDUs or SNDCP PDUs received by the UE on all bi-directional data radio bearers are returned by the UE on the data radio bearer associated with an QoS Flow with a QoS flow descriptions matching the TCP/UDP/IP protocol information within the PDCP SDU or SNDCP SDU as specified in TS 24.501 [21].

NOTE 1: When multiple PDN connections are established (or multiple Primary PDP Contexts are active), it is assumed that different IP addresses are allocated to the UE by the SS on each PDN.

Figures 5.3.4.2.2-1 and 5.3.4.2.2-2 show functional block diagrams of UE test loop function for the TMC entity and UE test loop mode B for the case when EN-DC or NGEN-DC with a MCG bearer and a SCG bearer is configured and for the case EN-DC or NGEN-DC with a MCG and a split bearer is configured.

NOTE 2: The number and the order of RB LB Entities in the UE Test Loop Function in the functional block diagrams are provided for illustration only. No specific order or numbering is precluded.
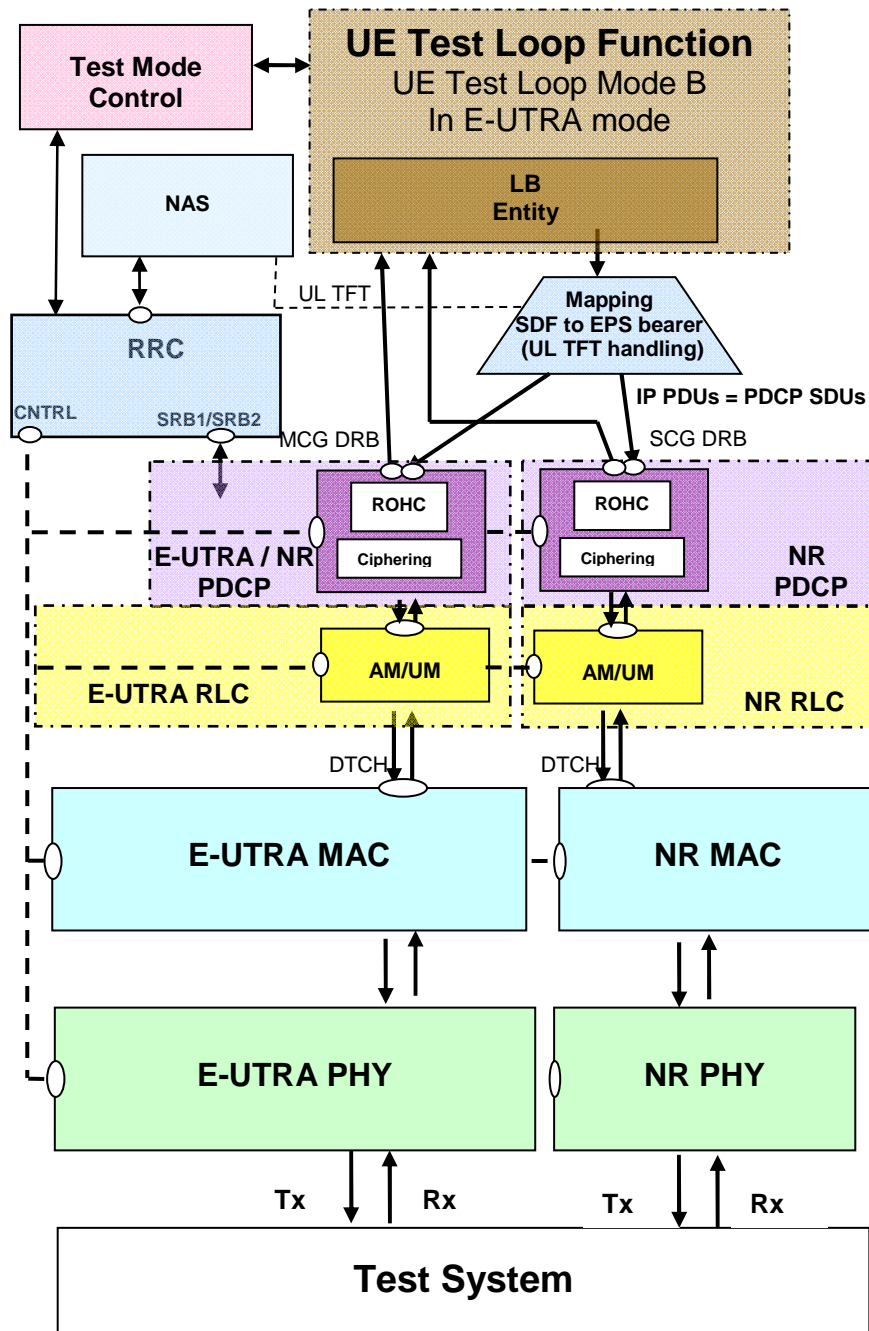
Figure 5.3.4.2.2-1: Model for Test Mode Control and UE Test Loop Mode B on UE side when EN-DC or NGEN-DC with MCG bearer and SCG bearer is configured
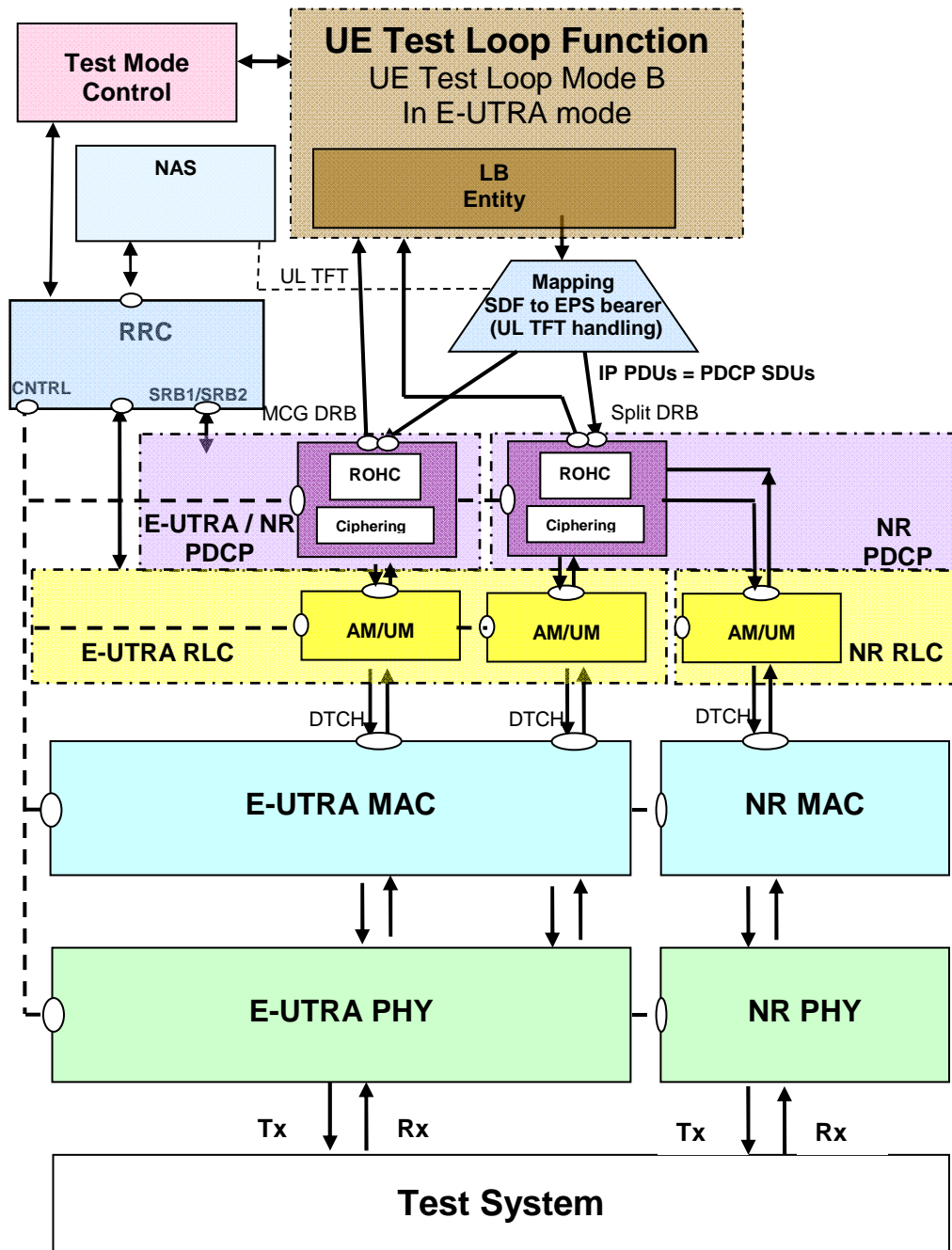
Figure 5.3.4.2.2-2: Model for Test Mode Control and UE Test Loop Mode B on UE side when EN-DC or NGEN-DC with MCG and split bearer configured

5.3.4.2.3   UE test loop mode B operation for Standalone NR

UE test loop mode B provides loopback of SDAP SDUs for bi-directional QoS Flows while UE is operated in standalone NR mode. Prior to closing the UE test loop mode B, thereby requesting the UE to start looping back the received data packets, at least one 5GS test mode bi-directional QoS Flow shall have been established between SS and UE. This implies that before the procedure for establishing the bi-directional QoS Flows takes place the SS needs to activate the UE test mode as specified in subclause 5.2.2

The downlink SDAP SDUs or IP PDU's received by the UE on all bi-directional QoS Flows are returned by the UE without any modification of the IP header to the UL QoS flow descriptions handling SAP for transmission in uplink.

   NOTE 1: When multiple PDU sessions are established, it is assumed that different IP addresses are allocated to the UE by the SS on each PDU session.

Figure 5.3.4.2.3-1 shows functional block diagrams of UE test loop function for the TMC entity and UE test loop mode B for the case when standalone NR is configured.

NOTE 2: The number and the order of QoS Flow LB Entities in the UE Test Loop Function in the functional block diagrams are provided for illustration only. No specific order or numbering is precluded.

The 5GS UE test loop mode B operation is the same as the one described in TS 36.509 [6], subclause 5.4.4 with the exception where E-UTRA is mentioned the same applies for NR, and, where PDCP SDU is mentioned the same applies for SDAP SDU.

Figure 5.3.4.2.3-1: Model for Test Mode Control and UE Test Loop Mode B on UE side when standalone NR is configured

5.3.4.3 UE test loop mode E operation

5.3.4.3.0 General

UE test loop mode E is mandatory to all 5GS UEs supporting NR sidelink.

UE test loop mode E provides means for either transmit or receive of SDAP SDUs for PC5 QoS Flows while UE is operating in NR sidelink, as specified by the test loop mode E setup IE in the CLOSE UE TEST LOOP message. The SDAP SDUs received by the UE on each PC5 QoS Flows are returned on the same PC5 QoS Flows regardless of the SDAP SDU contents and of the QoS flow descriptions of the associated QoS Flow.

For communication receive operation, UE test loop mode E provides counting of successfully received STCH PDCP SDUs, PSCCH PHY transport blocks and PSSCH PHY transport blocks while the UE is operating in NR sidelink communication mode.

For communication transmit operation, UE test loop mode E provides trigger for transmission of NR sidelink communication packets. For the V2X out-of-coverage scenarios this trigger utilises AT commands and requires an appropriate physical interface.

Figure 5.3.4.3.0-1 shows functional block diagrams of UE test loop function for the TMC entity and UE test loop mode E for the intra-frequency or inter-frequency concurrent operation case when Communication receive is indicated in UE test loop mode E setup IE.

Figure 5.3.4.3.0-2 shows functional block diagrams of UE test loop function for the TMC entity and UE test loop mode E for the PC5-only operation case when Communication receive is indicated in UE test loop mode E setup IE.

Figure 5.3.4.3.0-3 shows functional block diagrams of UE test loop function for the TMC entity and UE test loop mode E for the intra-frequency or inter-frequency concurrent operation case when Communication transmit is indicated in UE test loop mode E setup IE.

Figure 5.3.4.3.0-4 shows functional block diagrams of UE test loop function for the TMC entity and UE test loop mode E for the PC5-only operation case when Communication transmit is indicated in UE test loop mode E setup IE.
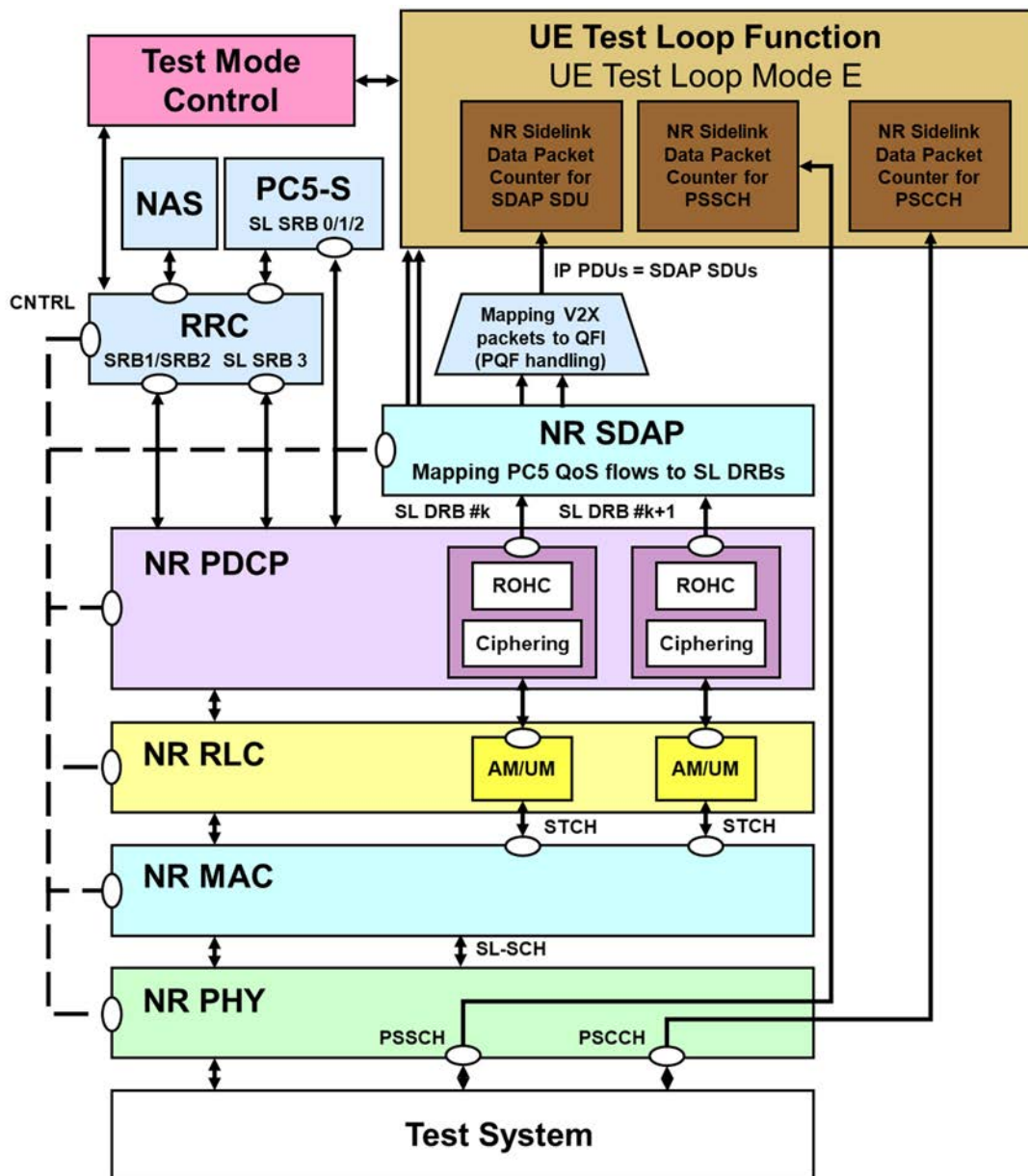
Figure 5.3.4.3.0-1: Model for Test Mode Control and UE Test Loop Mode E on UE side when UE is in intra-frequency or inter-frequency concurrent operation (Communication receive is indicated in UE test loop mode E setup IE)
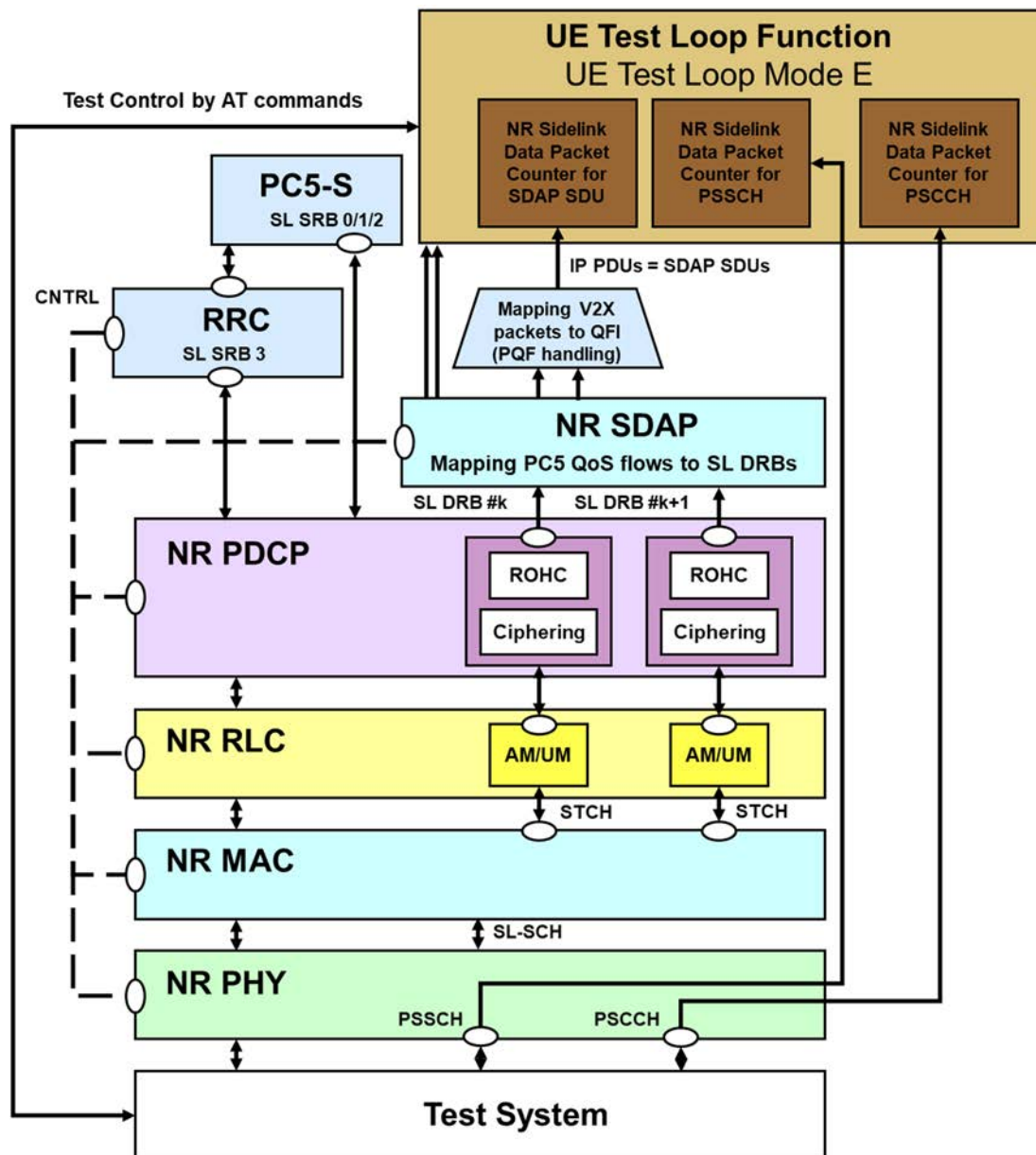
Figure 5.3.4.3.0-2: Model for Test Mode Control and UE Test Loop Mode E on UE side when UE is in PC5-only operation (Communication receive is indicated in UE test loop mode E setup IE)

Figure 5.3.4.3.0-3: Model for Test Mode Control and UE Test Loop Mode E on UE side when UE is in intra-frequency or inter-frequency concurrent operation (Communication transmit is indicated in UE test loop mode E setup IE)
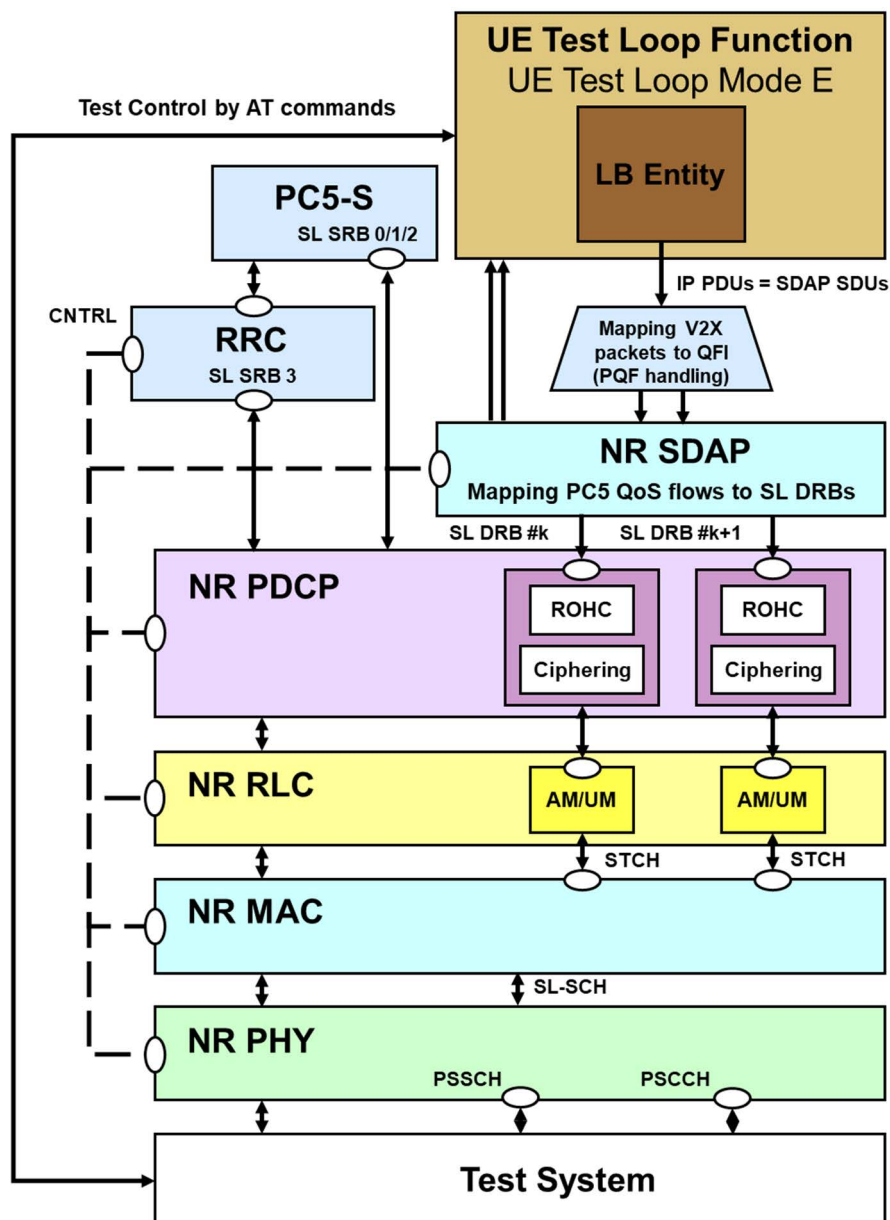
Figure 5.3.4.3.0-4: Model for Test Mode Control and UE Test Loop Mode E on UE side when UE is in PC5-only operation (when Communication transmit is indicated in UE test loop mode E setup IE)

The 5GS UE test loop mode E operation is the same as the one described in TS 36.509 [6], subclause 5.4.4c with the exceptions:

- where V2X is mentioned the same applies for NR sidelink.

- Subclause 5.4.4c.1 in TS 36.509 [6] is replaced by 5.3.4.3.1 in current specification.

5.3.4.3.1 Receive or Transmit NR sidelink Communication

When operating in NR idle or connected or any cell selection state or out-of-coverage state for NR sidelink test scenarios, with UE test loop mode E active, the UE shall be able to either receive or transmit NR sidelink communication packets based on the TEST_LOOP_MODE_E_TRIGGER being set as either RECEIVE or TRANSMIT, respectively. The UE shall:

1> if TEST_LOOP_MODE_E_ACTIVE is set to TRUE:

    2> if TEST_LOOP_MODE_E_TRIGGER is set to RECEIVE;

        3> upon successful reception of a STCH PDCP SDU for NR sidelink communication data packet:

4> set MATCH to zero;

4> if PROSE_COMMUNICATION_MONITOR_N > 0

5> for SL_ID = 0…(PROSE_COMMUNICATION_MONITOR_N-1):

6> if Destination Layer-2 ID corresponding to the STCH PDCP SDU equals PROSE_COMMUNICATION_DEST_ID(SL_ID):

7> increment STCH_PACKET_COUNTER(SL_ID) by 1;

7> set MATCH to one.

4> if MATCH equal zero:

5> increment STCH_PACKET_COUNTER(PROSE_COMMUNICATION_MONITOR_N) by 1.

3> upon successful reception of a PSCCH PHY transport block for NR sidelink communication control packet:

4> increment PSCCH_PACKET_COUNTER(PROSE_COMMUNICATION_MONITOR_N) by 1.

3> upon successful reception of a PSSCH PHY transport block for NR sidelink communication data packet:

4> set MATCH to zero;

4> for SL_ID = 0…(PROSE_COMMUNICATION_MONITOR_N-1):

5> if, in the received PSSCH PHY transport block, Destination Layer-2 ID for NR sidelink communication equals PROSE_COMMUNICATION_DEST_ID(SL_ID):

6> increment PSSCH_PACKET_COUNTER(SL_ID) by 1;

6> set MATCH to one.

4> if MATCH equal zero:

5> increment PSSCH_PACKET_COUNTER (PROSE_COMMUNICATION_MONITOR_N) by 1.

2> else if TEST_LOOP_MODE_E_TRIGGER is set to TRANSMIT;

3> create the STCH PDCP SDU with payload size and contents as specified below, see Figure 5.3.4.3.1-1 and Table 5.3.4.3.1-1 and provide as input PDCP for transmission in every PSSCH duration according to subclause 5.22.1.1 of TS 38.321 [23] for NR sidelink communication.

2> else if TEST_LOOP_MODE_E_TRIGGER is set to TRANSMIT_SL_MIMO;

3> create the STCH PDCP SDU with payload size and contents as specified below, see Figure 5.3.4.3.1-1 and Table 5.3.4.3.1-1 and provide as input PDCP for transmission in every PSSCH duration according to subclause 5.22.1.1 of TS 38.321 [23] for NR sidelink communication.

3> UE shall transmit PSSCH in SL-MIMO mode with 2-layer codebook TPMI 0.

NOTE: The same STCH PDCP SDU (1 packet) is transmitted (if permitted by test specific Layer 1 and Layer 2 configuration) by the UE in every PSSCH duration for NR sidelink communication during the entire duration test loop mode E is closed.

2> else:

3> the UE behaviour is unspecified.

1> else:

2> the UE behaviour is unspecified.

The STCH PDCP SDU payload for NR sidelink communication packet when UE test loop mode E is active shall be as specified in Figure 5.3.4.3.1-1 and Table 5.3.4.3.1-1. The UE shall also transmit the corresponding SCI control

information on PSCCH accordingly in the same slot on which the STCH PDCP SDU is transmitted for NR sidelink Communication.
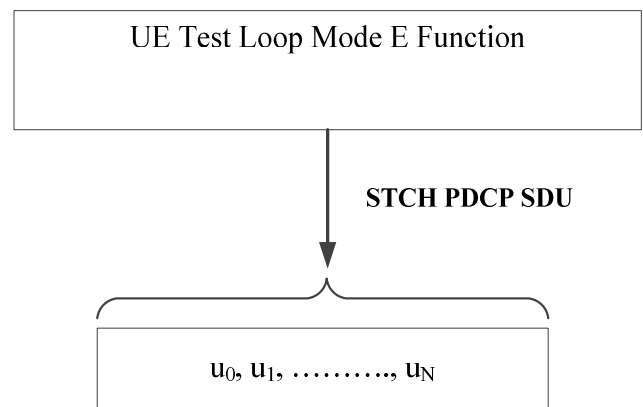
Figure 5.3.4.3.1-1: NR sidelink communication Transmit operation in UE test loop mode E

Table 5.3.4.3.1-1: STCH PDCP SDU payload contents for NR sidelink communication transmit operation in UE test loop mode E

Parameter	Value
Size (N)	300 bytes
Payload	00…00

5.4   UE Beamlock test Function (UBF)

5.4.1   General

The UE Beamlock test function is intended for making the UE to lock the UE antenna pattern once it has formed a beam towards the base station (SS) direction following the cell identification procedure in preparation for subsequent test procedures. Activating the UBF shall lock the antenna pattern of all active intra-band component carriers and all MIMO layers affected by the test function.

The Beamlock test function is mandatory for applicable UEs operating in Frequency Range 2 (FR2).

The SS uses the UE Beamlock test mode activation procedure to command the UE to lock the UE antenna pattern. The Beamlock activation procedure can apply to UE transmitter and UE receiver beams either simultaneously or independently.
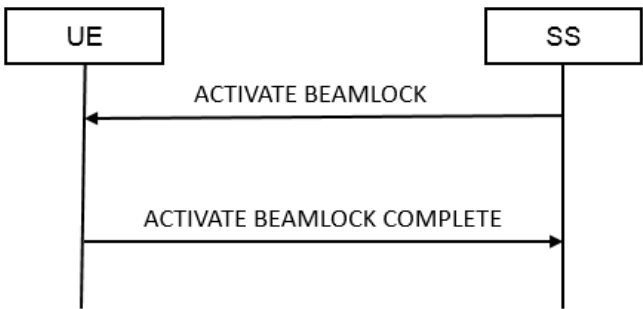
Figure 5.4.1-1: UE Beamlock test mode activation procedure

The SS uses the UE Beamlock test mode deactivation procedure to command the UE to re-tracking the beam towards the base station direction. The Beamlock deactivation procedure can apply to UE transmitter and UE receiver beams either simultaneously or independently.
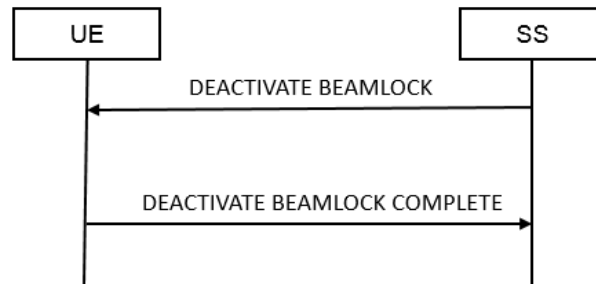
Figure 5.4.1-2: UE Beamlock test mode deactivation procedure

5.4.2 Activate Beamlock procedure

5.4.2.1 Initiation

The SS requests the UE to activate beamlock by transmitting an ACTIVATE BEAMLOCK message.

5.4.2.2 Reception of ACTIVATE BEAMLOCK message by UE

When UE receives ACTIVATE BEAMLOCK message then the UE shall:

   1> if the UE is operating in FR2 AND is in RRC_CONNECTED state:

      2> if UE Beamlock test Function = 01

         3> Lock the UE antenna pattern with Tx only

      2> else if UE Beamlock test Function = 10

         3> Lock the UE antenna pattern with Rx only

      2> else if UE Beamlock test Function = 11

         3> Lock the UE antenna pattern with both TxRx

      2> Transmit ACTIVATE BEAMLOCK COMPLETE message

   1> else:

      2> the UE behaviour is unspecified.

5.4.3 Deactivate Beamlock procedure

5.4.3.1 Initiation

The SS requests the UE to deactivate beamlock by transmitting a DEACTIVATE BEAMLOCK message. The SS should do this when the UE is in RRC_CONNECTED state.

5.4.3.2 Reception of DEACTIVATE BEAMLOCK message by UE

When UE receives DEACTIVATE BEAMLOCK message then the UE shall:

1> if the UE is operating in FR2 AND is in RRC_CONNECTED state AND the UE Beamlock test function is active:

2> unlock the UE antenna pattern and transmit DEACTIVATE BEAMLOCK COMPLETE message;

1> else:

2> the UE behaviour is unspecified.

5.4.3.3   Release of antenna beamlock by UE

When the UE leaves the RRC_CONNECTED state, the UE shall:

1> if the UE is operating in FR2 AND the UE Beamlock test Function is active

2> unlock the UE antenna pattern;

5.5   UE SS-RSRPB per receiver branch reporting

5.5.1   General

In 38.215 [22], section 5.1.18 defines SS-RSRPB as below, with its applicability only to FR2 and in RRC_CONNECTED Mode.

Definition	SS reference signal received power per branch (SS-RSRPB) is defined as the linear average over the power contributions (in [W]) of the resource elements that carry secondary synchronization signals (SS). The measurement time resource(s) for SS-RSRPB are confined within SS/PBCH Block Measurement Time Configuration (SMTC) window duration. For SS-RSRPB determination demodulation reference signals for physical broadcast channel (PBCH) and, if indicated by higher layers, CSI reference signals in addition to secondary synchronization signals may be used. SS-RSRPB using demodulation reference signal for PBCH or CSI reference signal shall be measured by linear averaging over the power contributions of the resource elements that carry corresponding reference signals taking into account power scaling for the reference signals as defined in 3GPP TS 38.213 [5]. SS-RSRPB shall be measured only among the reference signals corresponding to SS/PBCH blocks with the same SS/PBCH block index and the same physical-layer cell identity. If higher-layers indicate certain SS/PBCH blocks for performing SS-RSRPB measurements, then SS-RSRPB is measured only from the indicated set of SS/PBCH block(s). For frequency range 1, SS-RSRPB is not defined. For frequency range 2, SS-RSRPB shall be measured for each receiver branch based on the combined signal from antenna elements corresponding to the receiver branch.
Applicable for	RRC_CONNECTED intra-frequency

The SS uses the SS-RSRPB reporting procedure to command the UE to report SS-RSRP per UE receiver branch. The report from the UE shall be a vector of values, where the number of the reported values equals the number of receiver branches on the UE.
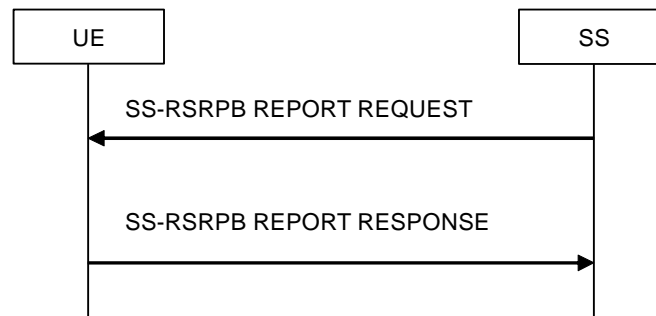
Figure 5.5.1-1: UE SS-RSRPB reporting procedure

5.5.2 Initiation

The SS requests the UE to start reporting SS-RSRP per receiver branch by transmitting a SS-RSRPB REPORT REQUEST message. And the UE responds back reporting SS-RSRP per receiver branch via SS-RSRPB REPORT RESPONSE.

5.5.3 Reception of SS-RSRPB REPORT REQUEST message by UE

When the UE receives SS-RSRPB REPORT REQUEST message then the UE shall:

1> if the UE is operating in FR2 AND in RRC_CONNECTED state:

  2> if quantityConfigRS-Index is configured to UE by RRC Signalling

    3> use the L3 filter coefficient given by quantityConfigRS-Index.

  2> else

    3> use default L3 filter coefficient of fc4.

  2> if the MeasObjectId signalled by the IE SS-RSRPB Measurement Config and ReportConfigNR with reportType set to periodical which is asscociated to this MeasObjectNR are configured to the UE by RRC Signalling

    3> Reply with the SS-RSRPB REPORT RESPONSE using the Measurement configuration as in the Measurement Object identified in the SS-RSRPB Measurement Config and reportInterval, reportAmount as in the associated ReportConfigNR

    3> Report the SS-RSRPB measurement for the best SSB-ID of the serving PCI configured in the MeasObject

    3> FFS to have multiple cells and/or SSB-ID

  2> else if the MeasObjectId signalled by the IE SS-RSRPB Measurement Config is configured to the UE by RRC signalling but no ReportConfigNR with reportType set to periodical is asscociated to this MeasObjectNR:

    3> Reply with the SS-RSRPB REPORT RESPONSE using the Measurement configuration as in the Measurement Object identified in the SS-RSRPB Measurement Config and default reportInterval of 640ms, and default reportAmount of r16

    3> Report the SS-RSRPB measurement for the serving PCI and best SSB-ID configured in the MeasObject

    3> FFS to have multiple cells and/or SSB-ID

    2> else the UE behaviour is unspecified.

1> else:

  2> the UE behaviour is unspecified.

The SS-RSRPB Report Request & SS-RSRPB Report Response Message Octets are defined below in Section 6.5.

5.6 UE Positioning test mode procedures

5.6.1 Reset UE Positioning Stored Information

5.6.1.1 General

Same as TS 36.509 [6], subclause 5.5.1.1.

5.6.1.2 Initiation

Same as TS 36.509 [6], subclause 5.5.1.2.

5.6.1.3 Reception of RESET UE POSITIONING STORED INFORMATION message by UE

Same as TS 36.509 [6], subclause 5.5.1.3 with the following exception:

- where OTDOA is mentioned this applies to OTDOA using LTE cells.

5.6.2 Update UE Location Information

Figure 5.6.2-1: Update UE Location Information procedure

5.6.2.1 General

Same as TS 36.509 [6], subclause 5.5.2.1.

5.6.2.2 Initiation

Same as TS 36.509 [6], subclause 5.5.2.2.

5.6.2.3 Reception of UPDATE UE LOCATION INFORMATION message by UE

Same as TS 36.509 [6], subclause 5.5.2.3.

5.6.3 UTC time reset

FFS

5.7 NSSAI delete test function

5.7.1 General

The SS use the NSSAI delete test procedure to delete different type of NSSAI information in the UE, see Figure 5.7.1-1. The different types of NSSAI information that can be deleted in a NSSAI DELETE REQUEST message are Default configured NSSAI, Configured NSSAI or Allowed NSSAI information, see clause 6.7. The NSSAI delete test procedure is limited to delete one type of NSSAI information. To delete more than one type of NSSAI information the SS needs to repeat the procedure for each type of NSSAI information.
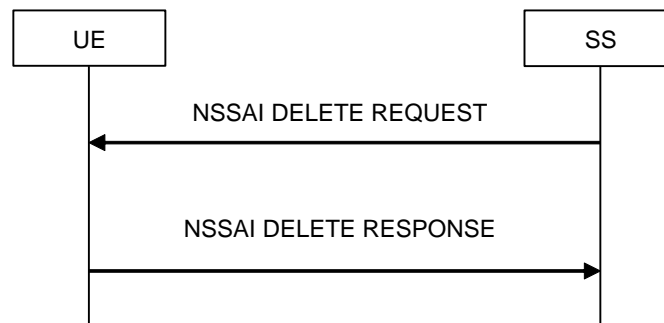
Figure 5.7.1-1: NSSAI delete test procedure

5.7.2 Initiation

The SS requests the UE to delete NSSAI information by transmitting a NSSAI DELETE REQUEST message and the UE confirms the deletion of the requested NSSAI information by responding with a NSSAI DELETE RESPONSE message.

5.7.3 Reception of NSSAI DELETE REQUEST message by UE

When UE receives NSSAI DELETE REQUEST message then the UE shall:

1> if the UE is operating in RRC_CONNECTED state:

2> if Delete NSSAI type = 00:

3> Delete the default configured NSSAI stored at the UE if any.

2> else if Delete NSSAI type = 01:

3> if Octets 3,4 and 5 all set to "00000000":

4> Delete configured NSSAI for all PLMNs stored at the UE if any.

3> else if at least one of octets 3,4 or 5 <> "00000000":

4> Delete configured NSSAI for the PLMN indicated by octet 3,4 and 5 stored at the UE if any.

2> else if Delete NSSAI type = 10:

3> if Octets 3,4 and 5 all set to "00000000":

4> if Access type =00:

5> Delete allowed NSSAI associated with 3GPP access for all PLMNs stored at the UE if any.

4> else if Access type =01:

5> Delete allowed NSSAI associated with non-3GPP access for all PLMNs stored at the UE if any.

4> else if Access type =10:

    5> Delete allowed NSSAI associated with both 3GPP and non-3GPP access for all PLMNs stored at the UE if any.

4> else

    5> The UE behaviour is unspecified.

3> else if At least one of octets 3,4 or 5 <> "00000000":

    4> if Access type =00:

        5> Delete allowed NSSAI associated with 3GPP access for the PLMN indicated by octet 3,4 and 5 stored at the UE if any.

    4> else if Access type =01:

        5> Delete allowed NSSAI associated with non-3GPP access for the PLMN indicated by octet 3,4 and 5 stored at the UE if any.

    4> else if Access type =10:

        5> Delete allowed NSSAI associated with both 3GPP and non-3GPP access for the PLMN indicated by octet 3,4 and 5 stored at the UE if any.

    4> else

        5> The UE behaviour is unspecified.

2> else

    3> The UE behaviour is unspecified.

2> Transmit NSSAI DELETE RESPONSE message.

1> else:

    2> the UE behaviour is unspecified.

5.8 Set UAI test function

5.8.1 General

The SS uses the Set UAI test procedure to trigger a change of preference in the UE that will cause the indication of UE Assistance Information (UAI) by the UE, see figure 5.8.1-1. The different types of information that can be sent in a SET UAI REQUEST is preferred RRC state, see clause 6.8.
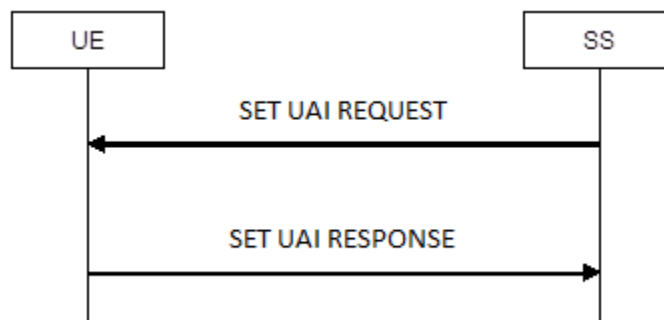
Figure 5.8.1-1: Set UAI test procedure

5.8.2 Initiation

The SS requests the UE to set the preferred RRC state of UE Assistance Information by transmitting a SET UAI REQUEST message and the UE confirms by responding with a SET UAI RESPONSE message.

5.8.3 Reception of SET UAI REQUEST message by UE

When UE receives SET UAI REQUEST message then the UE shall:

> 1> if the UE is operating in RRC_CONNECTED state:

>> 2> set its preferred RRC state within the release preference, to the equivalent value as received in the Preferred RRC State of the SET UAI REQUEST message.

>> 2> transmit SET UAI RESPONSE message.

> 1> else:

>> 2> the UE behaviour is unspecified.

5.9 NR Sidelink Packet Counter reporting procedure

5.9.1 Request NR Sidelink Packet Counter value
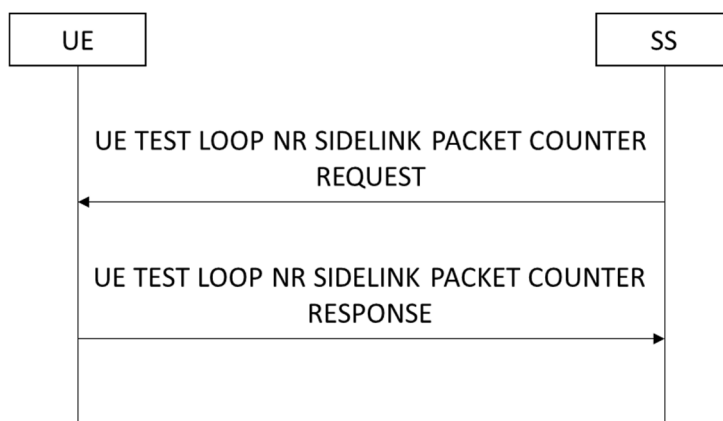
Figure 5.9.1-1: NR Sidelink Packet Counter reporting procedure based on TC protocol messages
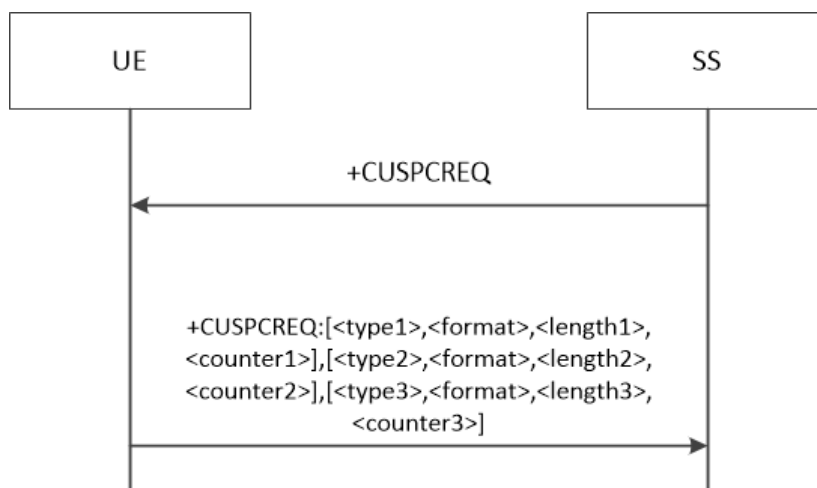
Figure 5.9.1-2: NR Sidelink Packet Counter reporting procedure based on AT Commands

5.9.1.1 General

The SS uses the NR Sidelink Packet Counter reporting procedure to request reporting of current NR sidelink related state variables. For mode E the state variables STCH_PACKET_COUNTER, PSCCH_PACKET_COUNTER and PSSCH_PACKET_COUNTER of NR sidelink are reported.

5.9.1.2 Initiation

The SS requests the UE to report its current value of STCH_PACKET_COUNTER, PSCCH_PACKET_COUNTER and PSSCH_PACKET_COUNTER of NR sidelink for test loop mode E by transmitting an UE TEST LOOP NR SIDELINK PACKET COUNTER REQUEST message or by transmitting an AT Command +CUSPCREQ.

5.9.1.3 Reception of UE TEST LOOP NR SIDELINK COUNTER REQUEST by the UE

Upon receiving the UE TEST LOOP NR SIDELINK PACKET COUNTER REQUEST message the UE shall:

    1> if TEST_LOOP_MODE_E_ACTIVE is TRUE:

        2> set the IE NR Sidelink PSCCH Packet Counter(s) Value in the UE TEST LOOP PROSE COUNTER RESPONSE message to the value of the state variable(s) PSCCH_PACKET_COUNTER(SL_ID) with SL_ID = 0…PROSE_COMMUNICATION_MONITOR_N;

        2> set the IE NR Sidelink STCH Packet Counter(s) Value in the UE TEST LOOP PROSE COUNTER RESPONSE message to the value of the state variable STCH_PACKET_COUNTER(SL_ID) with SL_ID = 0…PROSE_COMMUNICATION_MONITOR_N;

        2> set the IE NR Sidelink PSSCH Packet Counter(s) Value in the UE TEST LOOP PROSE COUNTER RESPONSE message to the value of the state variable(s) PSSCH_PACKET_COUNTER(SL_ID) with SL_ID = 0…PROSE_COMMUNICATION_MONITOR_N;

        2> send the UE TEST LOOP NR SIDELINK COUNTER RESPONSE message.

    1> else:

        2> the UE behaviour is unspecified.

5.9.1.4 Reception of AT Command +CUSPCREQ by the UE

Upon receiving the AT Command +CUSPCREQ the UE shall:

    1> if TEST_LOOP_MODE_E_ACTIVE is TRUE:

        2> in the response message of command +CUSPCREQ, set the parameter <type1> to 2; set the parameter <format> to 1; set the parameter <length1> to 4*(PROSE_COMMUNICATION_MONITOR_N+1); set the parameter <counter1> to the value of the state variable(s) PSCCH_PACKET_COUNTER(SL_ID) with SL_ID = 0…PROSE_COMMUNICATION_MONITOR_N;

        2> in the response message of command +CUSPCREQ, set the parameter <type2> to 2; set the parameter <format> to 1; set the parameter <length2> to 4*(PROSE_COMMUNICATION_MONITOR_N+1); set the parameter <counter2> to the value of the state variable STCH_PACKET_COUNTER(SL_ID) with SL_ID = 0…PROSE_COMMUNICATION_MONITOR_N;

        2> in the response message of command +CUSPCREQ, set the parameter <type3> to 2; set the parameter <format> to 1; set the parameter <length3> to 4*PROSE_COMMUNICATION_MONITOR_N+1; set the parameter <counter3> to the value of the state variable(s) PSSCH_PACKET_COUNTER(SL_ID) with SL_ID = 0…PROSE_COMMUNICATION_MONITOR_N;

        2> send the response message +CUSPCREQ: [<type1>,<format>,<length1>,<counter1>], [<type2>,<format>,<length2>,<counter2>], [<type3>,<format>,<length3>,<counter3>].

1> else:

2> the UE behaviour is unspecified.

5.10 Set UL Message test function

5.10.1 General

Same as TS 36.509 [6], subclause 5.10.1.

5.10.2 Initiation

Same as TS 36.509 [6], subclause 5.10.2.

5.10.3 Reception of SET UL MESSAGE REQUEST message by UE

Same as TS 36.509 [6], subclause 5.10.3 with the following exception:

- the predefined UE capability container is defined in Annex A.1

6 Test Mode Control message definitions

6.1 General

Clause 6 describes only TMC protocol messages.

When UE under test is operated in EN-DC or NGEN-DC the TMC messages are sent using the E-UTRA RRC *DLInformationTransfer* and *ULInformationTransfer* procedures, see TS 36.331 [10], subclauses 5.6.1 and 5.6.2.

When UE under test is operated in NR or NE-DC the TMC messages are sent using the NR RRC *DLInformationTransfer* and *ULInformationTransfer* procedures, see TS 38.331 [11], subclauses 5.7.1 and 5.7.2.

NOTE 1: A message received with skip indicator different from 0 will be ignored.

NOTE 2: For general definition of Layer 3 message format see TS 24.007 [7], clause 11.

NOTE 3: 5GS use the same protocol discriminator value ("1111") as E-UTRA, UTRA and GSM/GPRS as specified in TS 24.007 [7], subclause 11.2.3.1.1. 5GS test control messages the message type value series 1010xxxx is reserved, where x represents 0 or 1. The message type values 0000xxxx to 1001xxxx are reserved to E-UTRA, UTRA and GSM/GPRS as specified in TS 36.509 [6], TS 34.109 [8] and TS 44.014 [9]. For 5GS test control messages that are common with E-UTRA control messages in TS 36.509 [6] the 5GS test control messages use the same message type values as used for the E-UTRA test control messages in TS 36.509 [6].

All the TMC messages are integrity protected and ciphered according to TS 24.301 [17] subclause 4.4 or TS 24.501 [21] subclause 4.4 depending on whether the TMC message is sent via EPS or 5GC.

6.2 Test mode messages

6.2.1 ACTIVATE TEST MODE

Same as TS 36.509 [6], subclause 6.5.

6.2.2 ACTIVATE TEST MODE COMPLETE

Same as TS 36.509 [6], subclause 6.6.

6.2.3 DEACTIVATE TEST MODE

Same as TS 36.509 [6], subclause 6.7.

6.2.4 DEACTIVATE TEST MODE COMPLETE

Same as TS 36.509 [6], subclause 6.8.

6.3 Test loop messages

6.3.1 CLOSE UE TEST LOOP

Same as TS 36.509 [6], subclause 6.1 with the following exception:

- The supported test modes for 5GS are limited to those specified in subclause 5.3.4.

- LB Setup DRB#k IE is:

8	7	6	5	4	3	2	1	bit no.
Z15	Z14	Z13	Z12	Z11	Z10	Z9	Z8	octet 1
Z7	Z6	Z5	Z4	Z3	Z2	Z1	Z0	octet 2
Reserved		Q5	Q4	Q3	Q2	Q1	Q0	octet 3

$Z15..Z0$ = Uplink PDCP SDU size in bits 0.. 12160 (binary coded, $Z15$ is most significant bit and $Z0$ least significant bit). See Note 1.
$Q5$ = 0 for E-UTRA Data Radio Bearers and $Q5$ = 1 for NR Data Radio Bearers

$Q4..Q0$ = 0..31 representing DRB-Identity -1, where DRB-Identity identifies the data radio bearer in accordance to TS 36.331 [10] for E-UTRA Data Radio Bearers and TS 38.331 [11] for NR Data Radio Bearers [11] (binary coded, $Q4$ is most significant bit and $Q0$ least significant bit).

NOTE 1: The UL PDCP SDU size is limited to 12160 bits (1520 octets).

NOTE 2: A "LB Setup DRB IE" is only needed for a DRB if UL PDCP SDU scaling is needed. If there is no "LB Setup DRB IE" associated with a DRB in the CLOSE UE TEST LOOP message, then the same size of the PDCP SDU received in downlink is returned in uplink.

NOTE 3: The UL PDCP SDU size shall be byte aligned (i.e. multiple of 8 bits) according to TS 36.323 [18] clause 6.2.1 for E-UTRA Data Radio Bearers and TS 38.323 [19] clause 6.2.1 for NR Data Radio Bearers.

- The Communication Transmit or Receive message in UE test loop mode E setup is as below:

And where UE test loop mode E setup is:

	8 7 6 5 4 3 2 1	
	Length of UE test loop mode E Monitor setup contents in bytes	Octet 1
	Communication Transmit or Receive	Octet 2
	Monitor list	Octet 3 Octet N+2 or Octet 3*N+2

where Communication Transmit or Receive is:

8	7	6	5	4	3	2	1	bit no.
Reserved						E1	E0	octet 1

E0 = 0 is used to trigger the UE to continuously monitor and receive NR sidelink communication message (on STCH, PSCCH and PSSCH), and E0 = 1 is used to trigger the UE to start continuous transmitting NR sidelink communication messages (on STCH).

If E0 = 1, E1 = 1 is used to indicate UE shall transmit with 2-layer SL-MIMO transmission with codebook TPMI 0, and E1 = 0 is used to indicate UE shall transmit with single antenna port; otherwise E1 is used as reserved bit.

6.3.2 CLOSE UE TEST LOOP COMPLETE

Same as TS 36.509 [6], subclause 6.2.

6.3.3 OPEN UE TEST LOOP

Same as TS 36.509 [6], subclause 6.3.

6.3.4 OPEN UE TEST LOOP COMPLETE

Same as TS 36.509 [6], subclause 6.4.

6.3.5 Void

6.3.6 Void

6.4 Beamlock messages

6.4.1 ACTIVATE BEAMLOCK

This message is only sent in the direction SS to UE.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], sub clause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	½
Message type		M	V	1
UE Beamlock test Function		M	V	1

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	0	0	0	0	octet 1

where UE Beamlock test Function is:

8	7	6	5	4	3	2	1	bit no.
						X1	X2	octet 1

where X1,X2 = 01 for activate beamlock of Tx only, 10 for activate beamlock of Rx only and 11 for activate beamlock of both TxRx.

NOTE: X1,X2 = 00 is not used

6.4.2 ACTIVATE BEAMLOCK COMPLETE

This message is only sent in the direction UE to SS.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], sub clause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	½
Message type		M	V	1

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	0	0	0	1	octet 1

6.4.3 DEACTIVATE BEAMLOCK

This message is only sent in the direction SS to UE.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], sub clause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	½
Message type		M	V	1

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	0	0	1	0	octet 1

6.4.4 DEACTIVATE BEAMLOCK COMPLETE

This message is only sent in the direction UE to SS.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], sub clause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	½
Message type		M	V	1

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	0	0	1	1	octet 1

6.5 UE SS-RSRP per receiver branch reporting messages

6.5.1 SS-RSRPB REPORT REQUEST

This message is only sent in the direction SS to UE.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], subclause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	½
Message type		M	V	1
SS-RSRPB Measurement Config		M	V	1

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	0	1	0	0	octet 1

where SS-RSRPB Measurement Config is:

8	7	6	5	4	3	2	1	bit no.
X8	X7	X6	X5	X4	X3	X2	X1	octet 1

This maps to the MeasObjectId as configured by the RRC Reconfig Message.

6.5.2 SS-RSRPB REPORT RESPONSE

This message is only sent in the direction UE to SS representing the measured SS-RSRPB. The reporting range of SS-RSRPB (0 to 126) maps to the RSRP values in dBm as per Table 10.1.6.1-1 in TS 38.133. To report SS-RSRPB (0 to 126) per measured SSB, UE shall send 3 Octets, the First Octet reporting the Measured SSB ID (values 0 to 63 representing 6 bits X1 to X6 of Octet 1), Second Octet reporting SS-RSRPB for Branch#0 and third Octet reporting SS-RSRPB for Branch#1.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], subclause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	½
Message type		M	V	1
SS-RSRPB report response param		M	V	3

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	0	1	0	1	octet 1

where SS-RSRPB report response param is:

8	7	6	5	4	3	2	1	bit no.
Reserved		X6	X5	X4	X3	X2	X1	octet 1
16	15	14	13	12	11	10	9	bit no.
X16	X15	X14	X13	X12	X11	X10	X9	octet 2
24	23	22	21	20	19	18	17	bit no.
X24	X23	X22	X21	X20	X19	X18	X17	octet 3

where X1 to X24 spanning over three octets shall have the following definition:

Definition	8	7	6	5	4	3	2	1	bit no.
SSB ID	Reserved		X6	X5	X4	X3	X2	X1	octet 1
RSRPB Branch #0	0	X15	X14	X13	X12	X11	X10	X9	octet 2
RSRPB Branch #1	0	X23	X22	X21	X20	X19	X18	X17	octet 3

6.6 UE Positioning messages

6.6.1 RESET UE POSITIONING STORED INFORMATION

Same as TS 36.509 [6], subclause 6.9 with the following exception:

- where OTDOA is mentioned this applies to OTDOA using LTE cells.

6.6.2 UPDATE UE LOCATION INFORMATION

Same as TS 36.509 [6], subclause 6.12

6.7 NSSAI delete messages

6.7.1 NSSAI DELETE REQUEST

This message is only sent in the direction SS to UE.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], sub clause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	½
Message type		M	V	1
Delete NSSAI type		M	V	1
Configured NSSAI		CV- ConfNSSAI	V	3
Allowed NSSAI		CV- AllowedNSSAI	V	4

Condition	Explanation
CV- ConfNSSAI	This IE is mandatory present if the IE "Delete NSSAI type" is set to Delete Configured NSSAI. Else it shall be absent.
CV- AllowedNSSAI	This IE is mandatory present if the IE "Delete NSSAI type" is set to Delete Allowed NSSAI. Else it shall be absent.

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	0	1	1	0	octet 1

where Delete NSSAI type is:

8	7	6	5	4	3	2	1	bit no.
Reserved						E1	E0	octet 2

E1=0 and E0=0; Delete default configured NSSAI.

E1=0 and E0=1; Delete Configured NSSAI.

E1=1 and E0=0: Delete Allowed NSSAI.

where Configured NSSAI type

E1=1 and E0=1: Reserved.

8	7	6	5	4	3	2	1	bit no.
MCC digit 2				MCC digit 1				octet 3
MNC digit 3				MCC digit 3				octet 4
MNC digit 2				MNC digit 1				octet 5

Octets 3,4 and 5 all set to "00000000": Delete configured NSSAI for all configured PLMNs.

At least one of octets 3,4 or 5 <> "00000000": Delete configured NSSAI for the PLMN indicated by octet 3.4 and 5,

- where octets 3 and 4 (bits 1 to 4) is MCC, Mobile country code. The MCC is BCD coding. The MCC field is coded as in ITU-T Rec. E212 [39], annex A; and

- where octet 4 (bits 5 to 8) and octet 5 is MNC, Mobile network code. The MNC is BCD coding. The MNC shall consist of 2 or 3 digits. If only two digits are used in the MNC then shall MNC digit 3 be set to "1111".

where Allowed NSSAI:

8	7	6	5	4	3	2	1	bit no.
MCC digit 2				MCC digit 1				octet 3
MNC digit 3				MCC digit 3				octet 4
MNC digit 2				MNC digit 1				octet 5
Reserved						A1	A0	octet 6

Octets 3,4 and 5 all set to "00000000": Delete NSSAI for all allowed PLMNs.

At least one of octets 3,4 or 5 <> "00000000": Delete allowed NSSAI for the PLMN indicated by octet 3.4 and 5,

- where octets 3 and 4 (bits 1 to 4): MCC, Mobile country code. The MCC is BCD Coding. The MCC field is coded as in ITU-T Rec. E212 [39], annex A; and

- where octet 4 (bits 5 to 8) and octet 5 is MNC, Mobile network code. The MNC is BCD coding. The MNC shall consist of 2 or 3 digits. If only two digits are used in the MNC then shall MNC digit 3 be coded as "1111"; and

- where octet 6 is

8	7	6	5	4	3	2	1	bit no.
Reserved						A1	A0	octet 6

where A0 and A1 define the access type:

A1	A0	Value
0	0	3GPP access
0	1	Non-3GPP access
1	0	3GPP access and non-3GPP access
1	1	reserved

6.7.1   NSSAI DELETE RESPONSE

This message is only sent in the direction UE to SS.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], sub clause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	½
Message type		M	V	1

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	0	1	1	1	octet 1

6.8   SET UAI REQUEST

6.8.1   SET UAI REQUEST

This message is only sent in the direction SS to UE.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], sub clause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	½
Message type		M	V	1
Preferred RRC State		M	V	1

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	1	0	0	0	octet 1

where Preferred RRC State is:

8	7	6	5	4	3	2	1	bit no.
Reserved						E1	E0	octet 2

E1=0 and E0=0; idle.

E1=0 and E0=1; inactive.

E1=1 and E0=0: connected.

E1=1 and E0=1: outOfConnected.

6.8.2 SET UAI RESPONSE

This message is only sent in the direction UE to SS.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], sub clause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	½
Message type		M	V	1

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	1	0	0	1	octet 1

6.9 NR SIDELINK PACKET COUNTER reporting messages

6.9.1 UE TEST LOOP NR SIDELINK PACKET COUNTER REQUEST

This message is only sent in the direction SS to UE.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], subclause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], subclause 11.2.3.1.2	M	V	½
Message type		M	V	1

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	1	0	1	0	octet 1

6.9.2 UE TEST LOOP NR SIDELINK PACKET COUNTER RESPONSE

This message is only sent in the direction UE to SS.

Information Element	Reference	Presence	Format	Length
Protocol discriminator	TS 24.007 [5], subclause 11.2.3.1.1	M	V	½
Skip indicator	TS 24.007 [5], subclause 11.2.3.1.2	M	V	½
Message type		M	V	1
NR Sidelink PSCCH Packet Counter(s) Value		CV-ModeE	TLV	$4*(N^C+1)+2$
NR Sidelink STCH Packet Counter(s) Value		CV-ModeE	TLV	$4*(N^C+1)+2$
NR Sidelink PSSCH Packet Counter(s) Value		CV-ModeE	TLV	$4*(N^C+1)+2$

Condition	Explanation
CV-ModeE	This IE is mandatory present if TEST_LOOP_MODE_E_ACTIVE is TRUE else it shall be absent. N^C = PROSE_COMMUNICATION_MONITOR_N.

where message type is:

8	7	6	5	4	3	2	1	bit no.
1	0	1	0	1	0	1	1	octet 1

And where NR Sidelink PSCCH Packet Counter(s) Value is:

8 7 6 5 4 3 2 1	
NR Sidelink PSCCH Packet Counter(s) Value type	octet 1
Length of NR Sidelink PSCCH Packet Counter(s) Value contents in bytes	octet 2
NR Sidelink PSCCH Packet Counter IE #0	octet 3 octet 4 octet 5 octet 6
...	
NR Sidelink PSCCH Packet Counter IE #N^C	octet 3+4 * N^C octet 4+4 * N^C octet 5+4 * N^C octet 6+4 * N^C

And where NR Sidelink PSCCH Packet Counter(s) Value type is:

8	7	6	5	4	3	2	1	bit no.
0	0	0	0	0	0	0	1	octet 1

And where NR Sidelink PSCCH Packet Counter IE #n is:

D31	D30	D29	D28	D27	D26	D25	D24	octet 1
D23	D22	D21	D20	D19	D18	D17	D16	octet 2
D15	D14	D13	D12	D11	D10	D9	D8	octet 3
D7	D6	D5	D4	D3	D2	D1	D0	octet 4

D31..D0 = PSCCH packet counter 0.. 4294967295 (binary coded, D31 is most significant bit and D0 least significant bit) corresponding to PSCCH_PACKET_COUNTER(SL_ID = n).

And where NR Sidelink STCH Packet Counter(s) Value is:

8 7 6 5 4 3 2 1	
NR Sidelink STCH Packet Counter(s) Value type	octet 1
Length of NR Sidelink STCH Packet Counter(s) Value in bytes	octet 2
NR Sidelink STCH Packet Counter IE #0	octet 3 octet 4 octet 5 octet 6
...	
NR Sidelink STCH Packet Counter IE #N^C	octet 3+4 * N^C octet 4+4 * N^C octet 5+4 * N^C octet 6+4 * N^C

where NR Sidelink STCH Packet Counter(s) Value type is:

8	7	6	5	4	3	2	1	bit no.
0	0	0	0	0	0	1	0	octet 1

And where NR Sidelink STCH Packet Counter IE #n is:

E31	E30	E29	E28	E27	E26	E25	E24	octet 1
E23	E22	E21	E20	E19	E18	E17	E16	octet 2
E15	E14	E13	E12	E11	E10	E9	E8	octet 3
E7	E6	E5	E4	E3	E2	E1	E0	octet 4

E31..E0 = STCH Packet Counter value 0.. 4294967295 (binary coded, E31 is most significant bit and E0 least significant bit) corresponding to STCH_PACKET_COUNTER(SL_ID = n).

And where NR Sidelink PSSCH Packet Counter(s) Value is:

8	7	6	5	4	3	2	1	
NR Sidelink PSSCH Packet Counter(s) Value type								octet 1
Length of NR Sidelink PSSCH Packet Counter(s) Value contents in bytes								octet 2
NR Sidelink PSSCH Packet Counter IE #0								octet 3 octet 4 octet 5 octet 6
…								
NR Sidelink PSSCH Packet Counter IE #N^C								octet 3+4 * N^C octet 4+4 * N^C octet 5+4 * N octet 6+4 * N^C

And where NR Sidelink PSSCH Packet Counter(s) Value type is:

8	7	6	5	4	3	2	1	bit no.
0	0	0	0	0	0	1	1	octet 1

And where NR Sidelink PSSCH Packet Counter IE #n is:

F31	F30	F29	F28	F27	F26	F25	F24	octet 1
F23	F22	F21	F20	F19	F18	F17	F16	octet 2
F15	F14	F13	F12	F11	F10	F9	F8	octet 3
F7	F6	F5	F4	F3	F2	F1	F0	octet 4

F31..F0 = PSSCH packet counter 0.. 4294967295 (binary coded, F31 is most significant bit and F0 least significant bit) corresponding to PSSCH_PACKET_COUNTER(SL_ID = n).

6.10 SET UL MESSAGE

6.10.1 SET UL MESSAGE REQUEST

Same as TS 36.509 [6], subclause 6.19.1

6.10.2 SET UL MESSAGE RESPONSE

Same as TS 36.509 [6], subclause 6.19.2

7 Variables, constants and timers

7.1 State variables

Same as [9] TS 36.509, subclause 7.1.

7.2 Constants

Same as [9] TS 36.509, subclause 7.2.

7.3 Timers

Same as [9] TS 36.509, subclause 7.3.

7.4 Configurable parameters

Same as [9] TS 36.509, subclause 7.4.

8 Electrical Man Machine Interface (EMMI)

The EMMI is used for automation of conformance testing. The commands used on the EMMI by the System Simulator, shall be limited to those specified in TS 38.523-3 [3]. An illustration is given in figure 8-1 as an example.

At the System Simulator side, the logical EMMI using mandatory AT commands shall interface with the Main Test Component (MTC) of TTCN test cases which hosts the Upper Tester. The physical EMMI interface towards the UE may be for example a standard USB interface. Other interfaces of proprietary or standardized type shall not be precluded.

At the UE side an adapter needs to be provided by the UE manufacturer for converting the commands into the UE manufacturer specific interface and format.

The use of EMMI is optional for the UE.
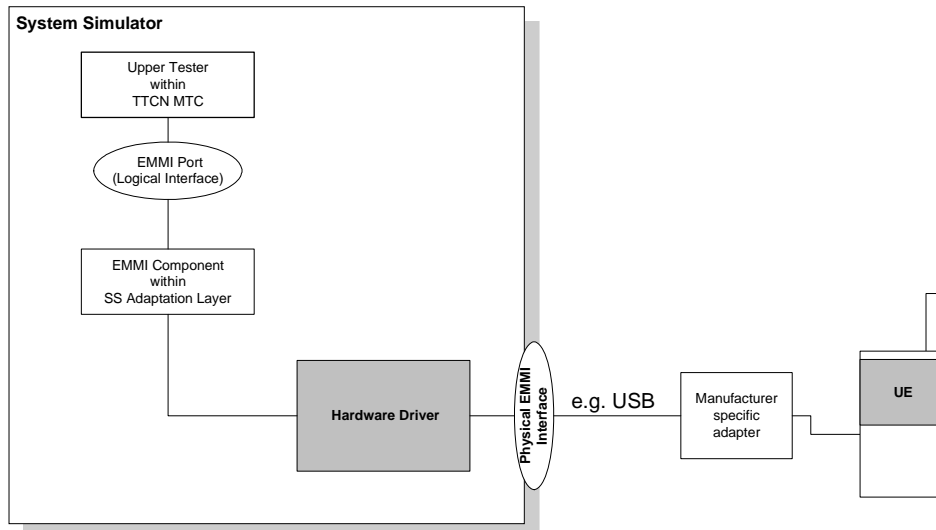
Figure 8-1: An example of EMMI and its use for automation of signalling testing

Annex A (normative):
Pre-defined message containers used for testing

A.1   Predefined UE Capability container

NOTE: For sake of testability, the below container list does not describe the true capability of the UE and does not rely on UEs support of EN-DC.

ue-CapabilityRAT-ContainerList

{

 {

  rat-Type nr,

  ue-CapabilityRAT-Container '

E9A29800575F5A935F0A03C32001609317941BCBD09009B20C39F30C7942C0E0D8040623805D46C28C0D608C
21A08107482407D6C98AB1A1CF88E3D033EC09F1991C790E7D033EC09F51CF9863CA16070387938002F800E0
00BE00088000E0551B137582308682041D20901F5B262AC6873E238F40CFB027C66471E439F40CFB027D473E61
8F28581C0E1E4E000BE0038002F800224003800D940001400001506C00D608C21A08107882405D6C98AB091C79
0E7C62471E439F51CF9863CA16070387827F7000001FDC00000110001C00408385000000061E140006134000208C
38280389A0000081587800001C4D000006120400C028809A1A00BC090226C73E1C29D3B639F0E14E9DB1CF870
A74ED8E7C37A09801F00140E0A00E060128038003012002030103C010000000080000100400001002000000C0100
0802008020000100100000A008000060040000380200100000004002030000C0080000800400004802000028010000160
080000C0339535953582B5829583359335819583B580B581B5809594B581140C040000259494100001965250400000
A594901000039652427000104B292028000B2CA480800034B292020000F2CA480800044B29202000132CA480800000
54B29282000172CA480800064B292018A55574AAAA82C552A8BA551541A2A93455038AA0F154062A935552988
AA05142405201F40A05028140A05028140A05028140A05028000300080A0041010020140400800080801000020040
104040300601002014728840004080C10181C282C30344044484C5060646C70747C8494989CA0A4A8B4BCD10519
0'H

 },

 {

  rat-Type eutra-nr,

  ue-CapabilityRAT-Container
'A107A04908360000808109870A00000011102C1C038500000048A824020C0C0385000000808B91504C040101870
A000001811722A0900030200E14000002021C88C268C01C28000C2680010881309A08070A000309A000522068260
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Annex B (informative):
Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-08	RAN5#76	R5-174100	-	-	-	Introduction of TS 38.509.	0.0.1
2017-12	RAN5#77	R5-176853	-	-	-	Adding technical content: UE beamlock special conformance testing function	0.1.0
2018-03	RAN5#78	R5-181211	-	-	-	Text proposal to add UE test loop mode A and B for 5GS (TP 38.509)	0.2.0
2018-04	RAN5#78	R5-182071	-	-	-	Text proposal to add UE functional block diagram for UE test loop modes A and B	0.3.0
2018-04	RAN5#78	R5-182070	-	-	-	Update of 38.509 general sections	0.3.0
2018-04	RAN5#78	R5-182037	-	-	-	Text Proposal on SS-RSRPB UE reporting	0.3.0
2018-05	RAN5#79	R5-182423	-	-	-	Editorial updates to 38.509	1.0.0
2018-05	RAN5#79	R5-182354	-	-	-	Text proposal to add message type ID for UBF and SS-RSRP messages'	1.0.0
2018-05	RAN5#79	R5-183081	-	-	-	Text proposal to UE test loop modes A and B	1.0.0
2018-06	RAN#80	RP-181209	-	-	-	put under revision control as v13.0.0 with small editorial changes	15.0.0
2018-09	RAN#81	R5-185057	0001	1	F	Editorial updates to 38.509	15.1.0
2018-09	RAN#81	R5-185523	0003	1	F	FR2_UE_BeamlockMode_IE_38.509	15.1.0
2018-12	RAN#82	R5-186863	0007	-	F	Update of Test Control UE Beamlock Function messages	15.2.0
2018-12	RAN#82	R5-187113	0009	-	F	Correction of 5GC terminology	15.2.0
2018-12	RAN#82	R5-187684	0008	1	F	Addition of Test Loop for SDAP testing	15.2.0
2018-12	RAN#82	R5-187891	0011	1	F	FR2 UE RSRPB Function 38.509	15.2.0
2019-03	RAN#83	R5-191128	0013	-	F	Addition of information for RESET UE POSITIONING STORED INFORMATION message	15.3.0
2019-03	RAN#83	R5-191196	0014	-	F	Resolving FFS's	15.3.0
2019-06	RAN#84	R5-194785	0017	-	F	Correction of clause used for UE position message definitions	15.4.0
2019-06	RAN#84	R5-195334	0016	1	F	Addition of NSSAI Test Mode	15.4.0
2019-09	RAN#85	R5-197184	0018	1	B	Addition of NSSAI Test Mode	15.5.0
2019-09	RAN#85	R5-197306	0020	1	F	Update to 38.509 for SS-RSRPB report	15.5.0
2019-12	RAN#86	R5-199307	0021	1	F	Deactivate Beamlock upon RRC disconnected	15.6.0
2020-01	RAN#86	-	-	-	-	Removal of duplicated rows in table 6.5.2 SS-RSRPB REPORT RESPONSE	15.6.1
2020-03	RAN#87	R5-200904	0027	1	F	Editorial update of Beamlock deactivation	15.7.0
2020-03	RAN#87	R5-201124	0024	1	F	Correction to SS-RSRPB reporting	15.7.0
2020-03	RAN#87	R5-201207	0026	1	F	Correction to NSSAI DELETE REQUEST	15.7.0
2020-06	RAN#88	R5-202884	0030	1	F	CR to 38.509 to clarify UBF for Intra-Band Carrier Aggregation	15.8.0
2020-09	RAN#89	R5-204402	0031	1	F	TMC Integrity and Ciphering Protection	15.9.0
2021-03	RAN#91	R5-211675	0033	1	F	Clarification of DRB identity in CLOSE UE TEST LOOP message in 38.509	15.10.0
2021-03	RAN#91	R5-211549	0034	1	B	Addition of UAI test function	16.0.0
2021-06	RAN#92	R5-213421	0037	1	F	Update UE Positioning test mode procedures and UE Positioning messages	16.1.0
2021-06	RAN#92	R5-213568	0035	1	B	Addition of test mode for NR sidelink	16.1.0
2021-06	RAN#92	R5-213569	0036	1	F	Addition of ProSe Packet Counter value reporting procedure for NR sidelink	16.1.0
2021-06	RAN#92	R5-213582	0039	1	B	Addition of test function Set UL Message - NR	16.1.0
2021-06	RAN#92	R5-213880	0040	1	A	UE Beamlock Function update for MIMO	16.1.0
2021-09	RAN#93	R5-216069	0045	1	F	Update to UE test loop mode E to trigger SL-MIMO transmission	16.2.0
2021-09	RAN#93	R5-216275	0044	1	B	Addition of predefined UE capability container for test function Set UL Message - NR	16.2.0

History

Document history		
V16.0.0	April 2021	Publication
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