ETSI TS 136 509 V13.1.0 (2016-11)

TECHNICAL SPECIFICATION

LTE;
Evolved Universal Terrestrial Radio Access (E-UTRA)
and Evolved Packet Core (EPC);
Special conformance testing functions for User Equipment
(UE)
(3GPP TS 36.509 version 13.1.0 Release 13)

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00   Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:
http://www.etsi.org/standards-search

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

Copyright Notification

ETSI

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

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

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under http://webapp.etsi.org/key/queryform.asp.

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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Foreword

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

    x the first digit:

        1 presented to TSG for information;

        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.

Introduction

User Equipment (UE) Test Loop functionality is a mandatory feature to support E-UTRA / EPC conformance testing. It forms part of the core requirements and thus has a direct impact on the design of the UE.

The test methods applied in RF Conformance Test Specification TS 36.521-1 [27] and the test models used in Protocol Conformance Test Specifications TS 36.523-1 [30] and TS 36.523-3 [32] define the corresponding UE Test Loop functionality. The present specification describes the location of the data loop in the protocol stack as well as the procedure and specific messages to activate/deactivate the Test Loop functionality in the UE.

1 Scope

The present document defines for User Equipment (UE) in E-UTRA FDD or TDD mode those special functions and their activation/deactivation methods that are required in UE for conformance testing purposes.

This document also describes the operation of these special functions for UEs supporting E-UTRA FDD or TDD mode, when operating in UTRA FDD and TDD mode, in GSM/GPRS mode, and in CDMA2000 mode.

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.

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

[2]   3GPP TS 23.003: "Numbering, Addressing and Identification".

[3]   3GPP TS 23.122: "Non-Access-Stratum functions related to Mobile Station (MS) in idle mode".

[4]   3GPP TS 23.401: "3GPP System Architecture Evolution; GPRS enhancements for E-UTRAN access".

[5]   3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[6]   3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[7]   3GPP TR 24.801: "3GPP System Architecture Evolution; CT WG1 Aspects".

[8]   3GPP TS 27.007: "AT command set for User Equipment (UE)".

[9]   3GPP TS 31.101: "UICC-Terminal Interface; Physical and Logical Characteristics".

[10]   3GPP TS 34.108: "Common Test Environments for User Equipment (UE) Conformance Testing".

[11]   3GPP TS 34.109: "Terminal logical test interface; Special conformance testing functions".

[12]   3GPP TS 34.123-1: "User Equipment (UE) conformance specification; Part 1: Protocol conformance specification".

[13]   3GPP TS 34.123-2: "User Equipment (UE) conformance specification; Part 2: Implementation Conformance Statement (ICS) proforma specification".

[14]   3GPP TS 34.123-3: "User Equipment (UE) conformance specification; Part 3: Abstract Test Suites (ATS)".

[15]   3GPP TS 36.133: "Requirements for support of Radio Resource Management".

[16]   3GPP TS 36.211: "Physical Channels and Modulation".

[17]   3GPP TS 36.212: "Multiplexing and Channel Coding".

[18]   3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".

[19]   3GPP TS 36.302: "Services provided by the physical layer for E-UTRA".

[20]   3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (EUTRA) User Equipment (UE) Procedures in idle mode ".

[21]   3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (EUTRA) User Equipment (UE) Radio Access capabilities ".

[22]   3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (EUTRA) Medium Access Control (MAC) protocol specification".

[23]   3GPP TS 36.322: "Evolved Universal Terrestrial Radio Access (EUTRA) Radio Link Control (RLC) protocol specification".

[24]   3GPP TS 36.323: "Evolved Universal Terrestrial Radio Access (EUTRA) Packet Data Convergence Protocol (PDCP) specification".

[25]   3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (EUTRA) Radio Resource Control (RRC) Protocol Specification".

[26]   3GPP TS 36.508: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE); Conformance Testing".

[27]   3GPP TS 36.521-1: " Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification Radio transmission and reception; Part 1: Conformance Testing".

[28]   3GPP TS 36.521-2: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification Radio transmission and reception; Part 2: Implementation Conformance Statement (ICS)".

[29]   3GPP TS 36.521-3: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification Radio transmission and reception; Part 3: Radio Resource Management Conformance Testing".

[30]   3GPP TS 36.523-1: " Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification; Part 1: Protocol conformance specification".

[31]   3GPP TS 36.523-2: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification; Part 2: Implementation Conformance Statement (ICS) proforma specification".

[32]   3GPP TS 36.523-3: " Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC)); User Equipment (UE) conformance specification; Part 3: Abstract Test Suites (ATS)".

[33]   3GPP TS 44.014: "Individual equipment type requirements and interworking; Special conformance testing functions".

[34]   3GPP TS 51.010-1: "Mobile Station (MS) conformance specification; Part 1: Conformance specification ".

[35]   ISO/IEC 9646 (all parts): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework".

[36]   3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[37]   3GPP TS 36.355: 'Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)'.

[X1]   3GPP TS 24.334: "Proximity-services (ProSe) User Equipment (UE) to ProSe function protocol aspects; Stage 3".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] apply, unless specified below:

Uni-directional Data Radio Bearer: Data radio bearer identified by a data radio bearer identifier capable to deliver data only in downlink or uplink

Bi-directional Data Radio Bearer: Data radio bearer identified by a data radio bearer identifier capable to deliver data in both downlink and uplink

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 eNB (evolved Node B) simulator

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

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

User: test user, who handles the test and measurement process via the logical test interface

3.2 Abbreviations

For the purposes of the present document, the abbreviations specified in TR 21.905 [1] apply, with any additional abbreviations specified below:

DRB	Data Radio Bearer
EMM	EPS Mobility Management
E-MBMS	Evolved Multimedia Broadcast Multicast Service
ENB	Evolved Node B
EPS Bearer	Evolved Packet System Bearer
ESM	EPS Session Management
LB	Loop Back
MAC	Media Access Control
MBMS	Multimedia Broadcast Multicast Service
MTC	Main Test Component
ProSe	Proximity-based Services
RAB	Radio Access Bearer
RMC	Reference Measurement Channel
ROHC	Robust Header Compression
SDF	Service Data Flow
SS	System Simulator
TC	Test Control
SC	Single-cell
PTM	point-to-multipoint

4 UE special conformance test functions

4.1 General description

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

The following special UE conformance testing functions can be activated (and deactivated):

- UE test loop function;

- Electrical Man Machine Interface (EMMI).

The following Test Control (TC) procedures are used to control the UE test loop function:

- Close UE test loop;

- Open UE test loop.

No specific TC procedures are associated with EMMI.

5 Test Control (TC) protocol procedures and test loop operation

5.1 General description

The UE test loop function provides access to isolated functions of the UE via the radio interface without introducing new physical interfaces just for the reason of conformance testing.

> NOTE 1: It should be emphasised that the UE test loop function only describes the functional behaviour of the UE with respect to its external interfaces; physical implementation of the UE test loop function is completely left open to the manufacturer.

The UE test loop function is activated by transmitting the appropriate TC message to the UE, see clause 6.

The UE test loop function can be operated in six different loopback modes:

- UE test loop mode A;

- UE test loop mode B;

- UE test loop mode C;

- UE test loop mode D;

- UE test loop mode E ;and

- UE test loop mode F.

UE test loop mode A provides loopback of PDCP SDUs for bi-directional data radio bearers while UE is operating in E-UTRA mode. 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 TFT of the associated EPS bearer context [36].

UE test loop mode B provides loopback of PDCP SDUs (E-UTRA and UTRA), SNDCP PDUs (GSM/GPRS) and RLP PDUs (CDMA2000) for bi-directional EPS bearers while UE is operated in E-UTRA, UTRA, GSM/GPRS or CDMA2000 modes. When operating in E-UTRA, UTRA or GSM/GPRS then 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 EPS bearer context with a TFT matching the TCP/UDP/IP protocol information within the PDCP SDU or SNDCP SDU [36]. When operating in CDMA2000 modes, the downlink RLP PDUs received by the UE on all bi-directional data radio bearers are returned by the UE on the data radio bearer with the smallest identity, regardless of the RLP PDU content and of the TFT of the associated EPS bearer context.

> NOTE 2: 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.

UE test loop mode C provides counting of successfully received MBMS Packets on a given MTCH while UE is operating in E-MBMS/E-UTRA mode. For E-MBMS then one or more MTCHs are multiplexed on a MCH. MBMS packets for a MTCH are delivered as one RLC SDU per MBMS packet segmented into one or more RLC UMD PDUs.

UE test loop mode D provides means for announcing or monitoring of ProSe Direct Discovery messages on SL-DCH, as specified by the test loop mode D setup IE in the CLOSE UE TEST LOOP message. In particular, for discovery monitor operation, UE test loop mode D provides counting of successfully received SL-DCH MAC SDUs while the UE is operating in ProSe Direct Discovery/E-UTRA mode. For discovery announce operation, UE test loop mode D provides trigger for transmission of ProSe Direct Discovery message on SL-DCH.

> NOTE 3: UE test loop mode D is intended for RF/RRM testing purposes.

> NOTE 4: ProSe Direct Discovery messages on the PC5 interface are delivered as one MAC SDU per ProSe Direct Discovery message.

UE test loop mode E provides means for either transmit or receive of ProSe Direct Communication packets, as specified by the test loop mode E setup IE in the CLOSE UE TEST LOOP message. In particular, for communication receive operation, UE test loop mode E provides counting of successfully received STCH PDCP SDUs and PSCCH transport blocks while the UE is operating in ProSe Direct Communication/E-UTRA mode. For communication transmit operation, UE test loop mode E provides trigger for transmission of IP packets for ProSe Direct Communication message on STCH.

> NOTE 5: UE test loop mode E is intended for RF/RRM testing and partially for Protocol testing - for Protocol testing it is used only in the case of Reception of communication data.

> NOTE 6: The Application trigger required to force the UE to start or stop a particular ProSe Service is out of the scope of the test loop modes D and E.

UE test loop mode F provides counting of successfully received MBMS Packets on a given SC-MTCH while UE is operating in SC-PTM/E-UTRA mode. For SC-PTM one SC-MTCH is transmitted on a DL-SCH. MBMS packets for a SC-MTCH are delivered as one RLC SDU per MBMS packet segmented into one or more RLC UMD PDUs.

UE test loop mode A is mandatory to all E-UTRA UEs.

UE test loop mode B for operation in E-UTRA mode is mandatory to all E-UTRA UEs.

UE test loop mode B for operation in UTRA mode is mandatory to all E-UTRA UEs supporting UTRA radio access.

UE test loop mode B for operation in GSM/GPRS mode is mandatory to all E-UTRA UEs supporting GSM/GPRS radio access.

UE test loop mode B for operation in CDMA2000 mode is mandatory to all E-UTRA UEs supporting CDMA2000 radio access.

UE test loop mode C is mandatory for E-UTRA UEs supporting E-MBMS.

UE test loop mode D is mandatory for E-UTRA UEs supporting ProSe Direct Discovery.

UE test loop mode E is mandatory for E-UTRA UEs supporting ProSe Direct Communication.

UE test loop mode F is mandatory for E-UTRA UEs supporting SC-PTM.

Support of UPDATE UE LOCATION INFORMATION is optional for all E-UTRA UEs with the exception of E-UTRA UEs supporting ProSe Direct Communication for which it is mandatory.

For E-UTRA UE supporting multiple radio access technologies then UE reception of Test Control messages is limited to UE operating in E-UTRA mode, while continuation of loopback of user data is provided over the change to other UE supported radio access technologies.

UE test loop mode B for operation in UTRA, GSM/GPRS and CDMA2000 mode is only applicable for loopback of user data in PS domain.

The TC entity may be seen as a L3 or a NAS entity.

Figure 5.1-1 shows a functional block diagram of UE test loop function for TC entity and UE test loop mode A. The loopback of PDCP SDUs for UE test loop mode A is specified in sub clause 5.4.3.

Figure 5.1-2 shows a functional block diagram of UE test loop function for TC entity and UE test loop mode B. The loopback of IP PDUs/PDCP SDUs for UE test loop mode B and UE in E-UTRA mode is specified in subclauses 5.4.4.2 and 5.4.4.3.

Figure 5.1-3 shows a functional block diagram of UE test loop function for UE test loop mode B and UE operating in UTRA mode. The loopback of IP PDUs/PDCP SDUs for UE test loop mode B and UE in UTRA mode is specified in subclauses 5.4.4.4 and 5.4.4.5.

Figure 5.1-4 shows a functional block diagram of UE test loop function for UE test loop mode B for UE operating in GSM/GPRS mode. The loopback of IP PDUs/SNDCP SDUs for UE test loop mode B and UE in GSM/GPRS mode is specified in subclauses 5.4.4.6 and 5.4.4.7.

Figure 5.1-5 shows a functional block diagram of UE test loop function for UE test loop mode B for UE operating in CDMA2000 mode. The loopback of IP PDUs/RLP SDUs for UE test loop mode B and UE in CDMA2000 mode is specified in subclauses 5.4.4.8 and 5.4.4.9.

Figure 5.1-6 shows a functional block diagram of UE test loop function for TC entity and UE test loop mode C. The MBMS Packet Counter function for UE test loop mode C is specified in sub clause 5.4.4.a. The MBMS Packet Counter function is limited to count successfully received MBMS packets on one MTCH configured by the SS when UE test loop mode C is activated.

Figure 5.1-7 and Figure 5.1-8 show a functional block diagram of the UE test loop mode for TC entity and UE test loop mode D. The ProSe Direct Discovery Packet Counter function for UE test loop mode D is specified in clause 5.4.4b. The ProSe Direct Discovery packet counter function is limited to count successfully received SL-DCH MAC SDUs when UE test loop mode D is activated.

Figure 5.1-9 and Figure 5.1-10 show a functional block diagram of the UE test loop mode for TC entity and UE test loop mode E. The ProSe Direct Communication Packet Counter function for UE test loop mode E is specified in clause 5.4.4c. The ProSe Direct Communication packet counter function is limited to count successfully received STCH PDCP SDUs and PSCCH PHY Transport blocks when the UE test loop mode E is activated.

Figure 5.1-11 shows a functional block diagram of UE test loop function for TC entity and UE test loop mode F. The SC-PTM Packet Counter function for UE test loop mode F is specified in sub clause 5.4.4.d. The SC-PTM Packet Counter function is limited to count successfully received MBMS packets on one SC-MTCH configured by the SS when UE test loop mode F is activated.

   NOTE 7: ROHC functionality in PDCP Layer 2 is optional for UE implementations.
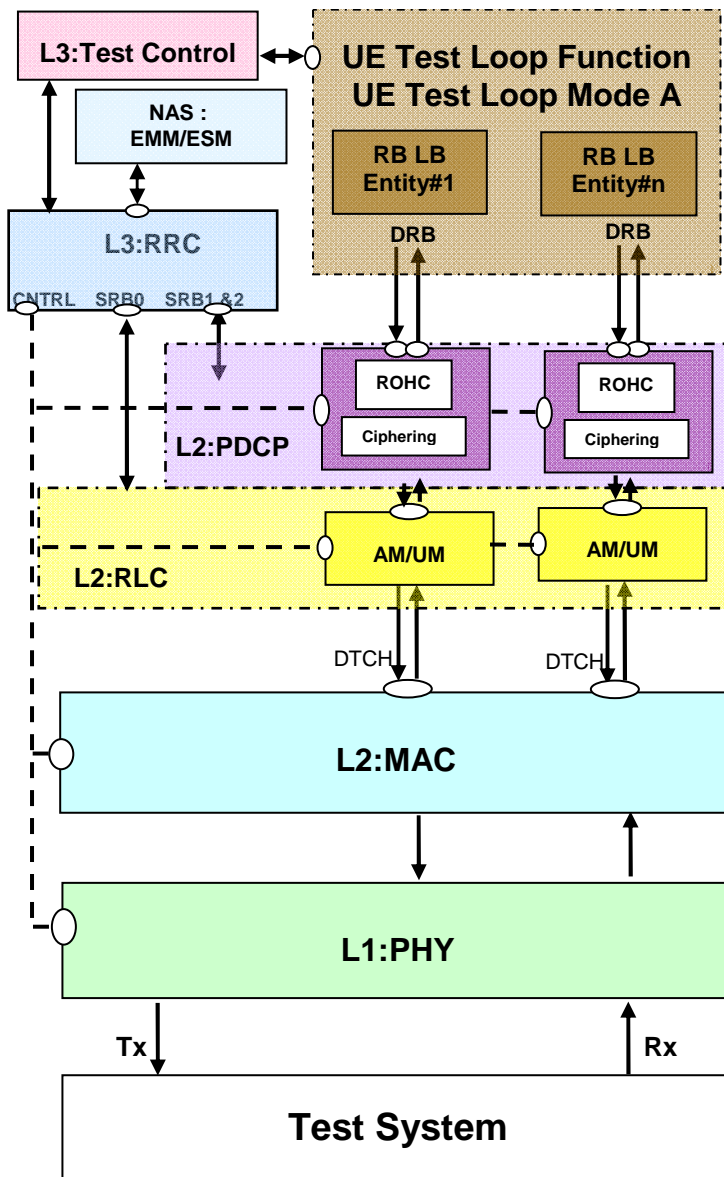
Figure 5.1-1: Model for Test Control and UE Test Loop Mode A on UE side for E-UTRA
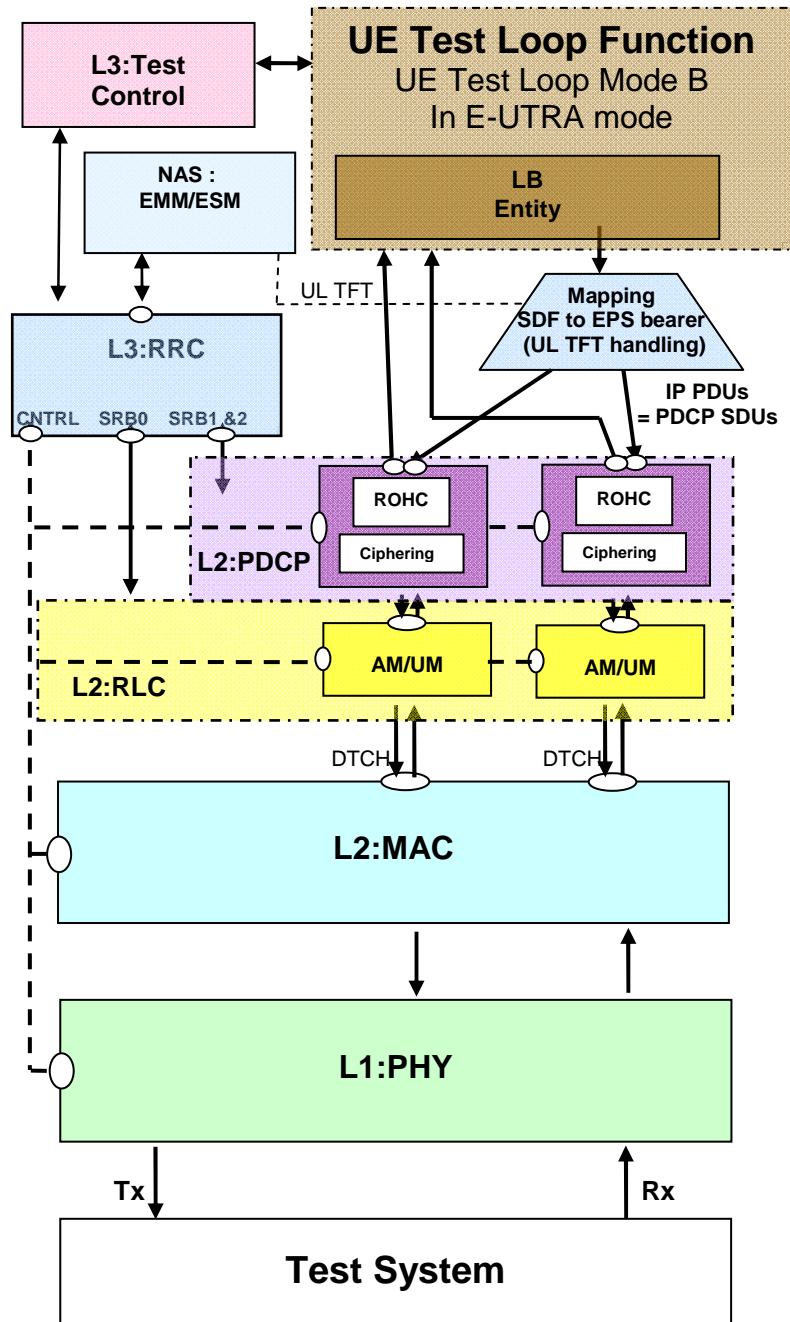
Figure 5.1-2: Model for Test Control and UE Test Loop Mode B on UE side for E-UTRA
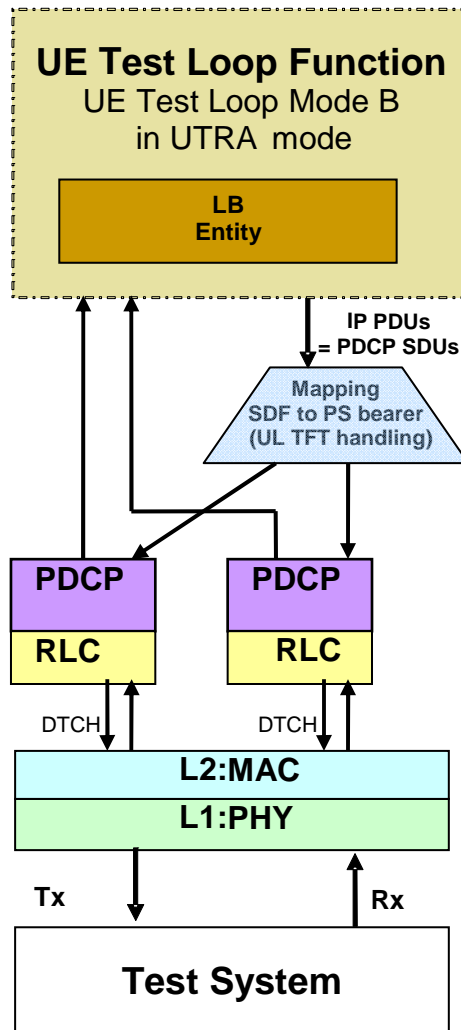
Figure 5.1-3: Model for UE Test Loop Mode B on UE side for UTRA
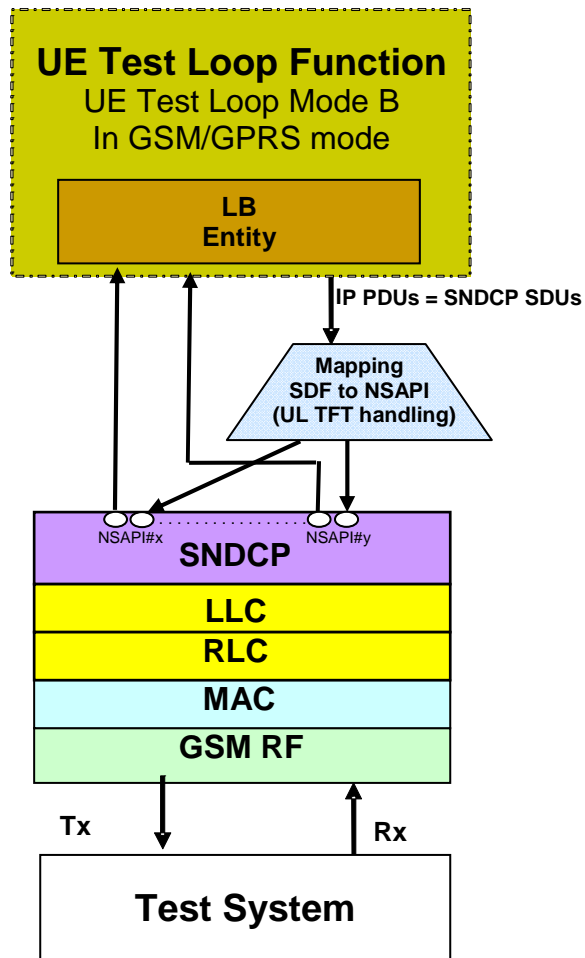
Figure 5.1-4: Model for UE Test Loop Mode B on UE side for GSM/GPRS
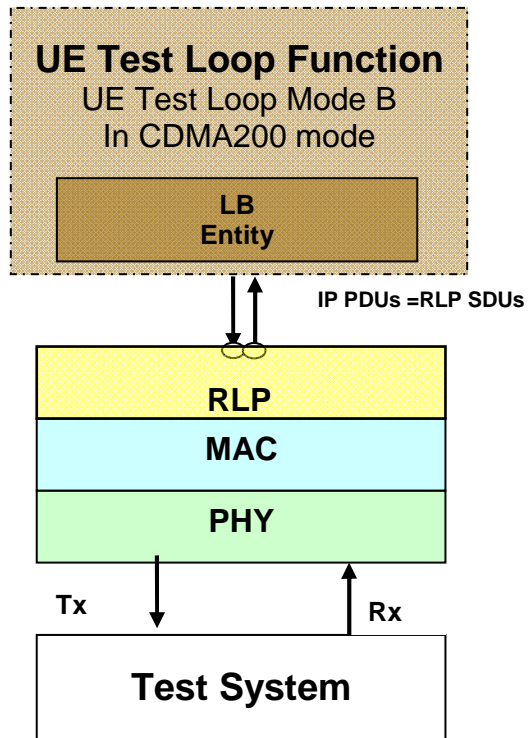
Figure 5.1-5: Model for UE Test Loop Mode B on UE side for CDMA2000
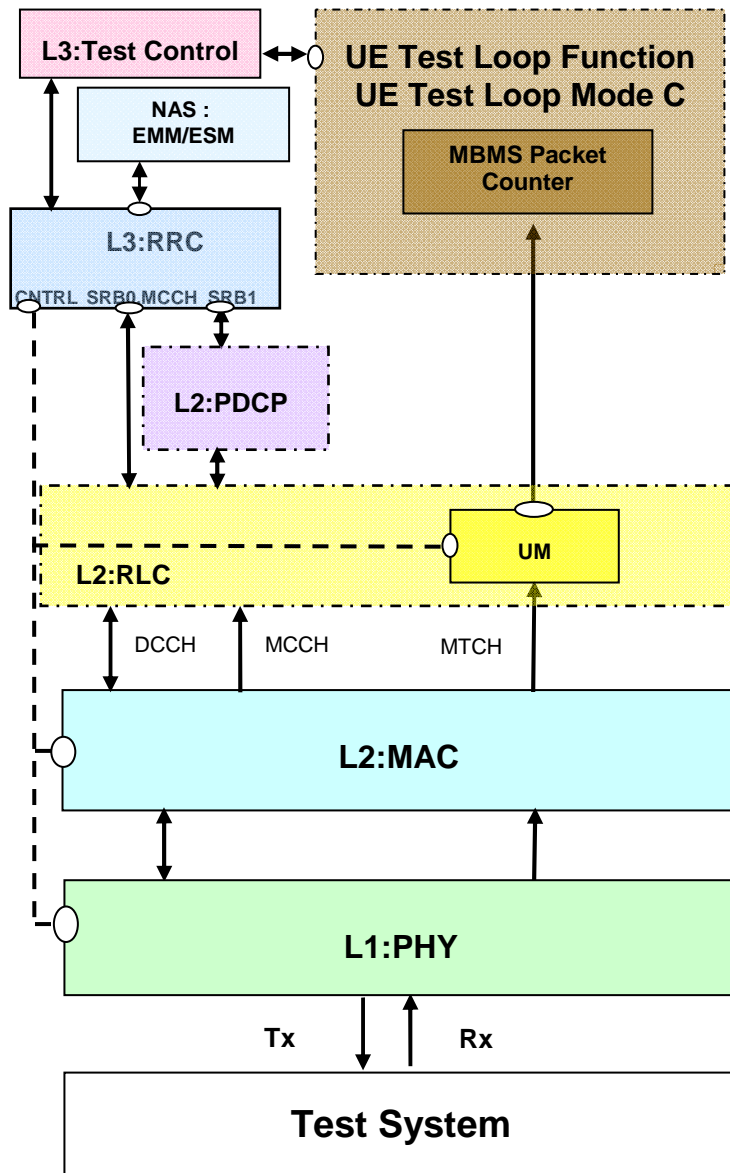
Figure 5.1-6: Model for UE test loop mode C on UE side
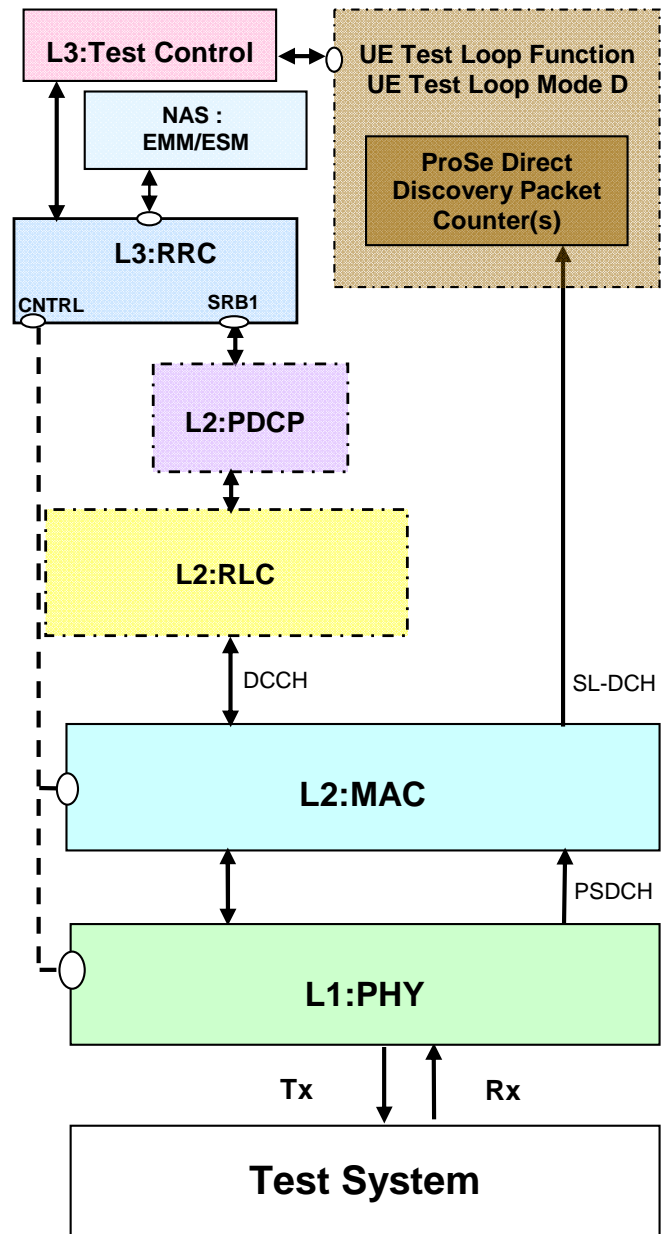
**Figure 5.1-7: Model for UE test loop mode D on UE side
(when Discovery monitor is indicated in the UE test loop mode D setup IE)**
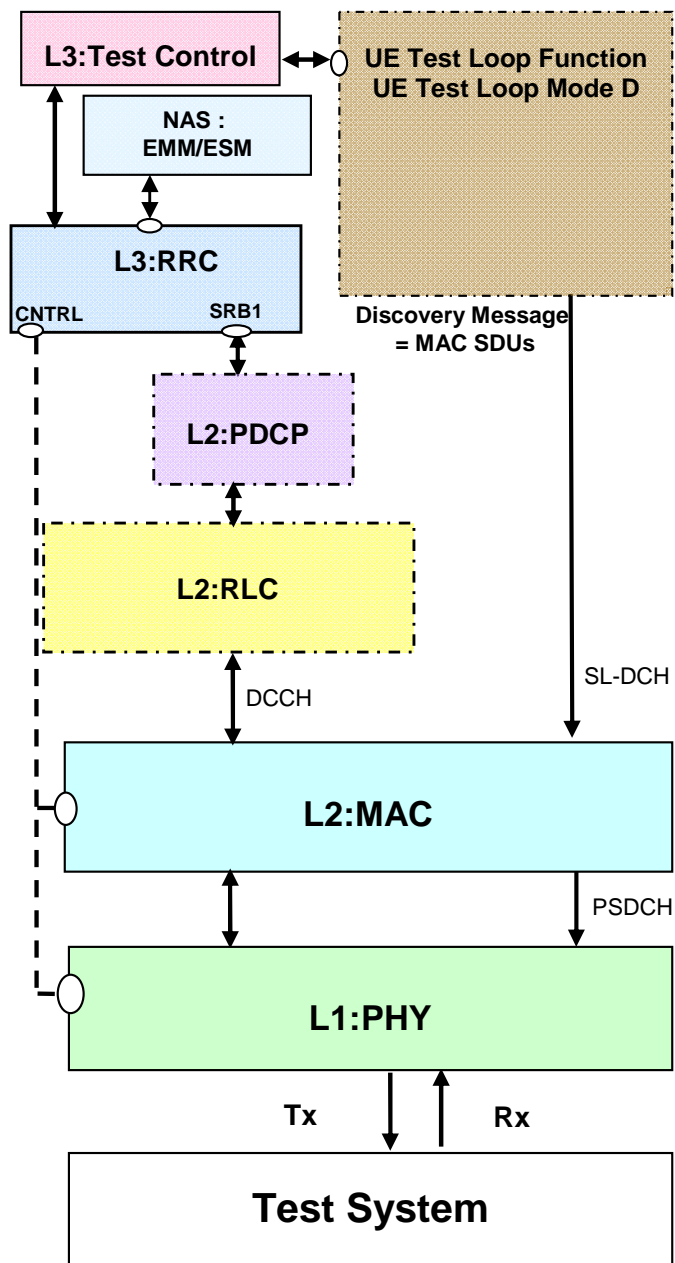
**Figure 5.1-8: Model for UE test loop mode D on UE side
(when Discovery announce is indicated in the UE test loop mode D setup IE)**
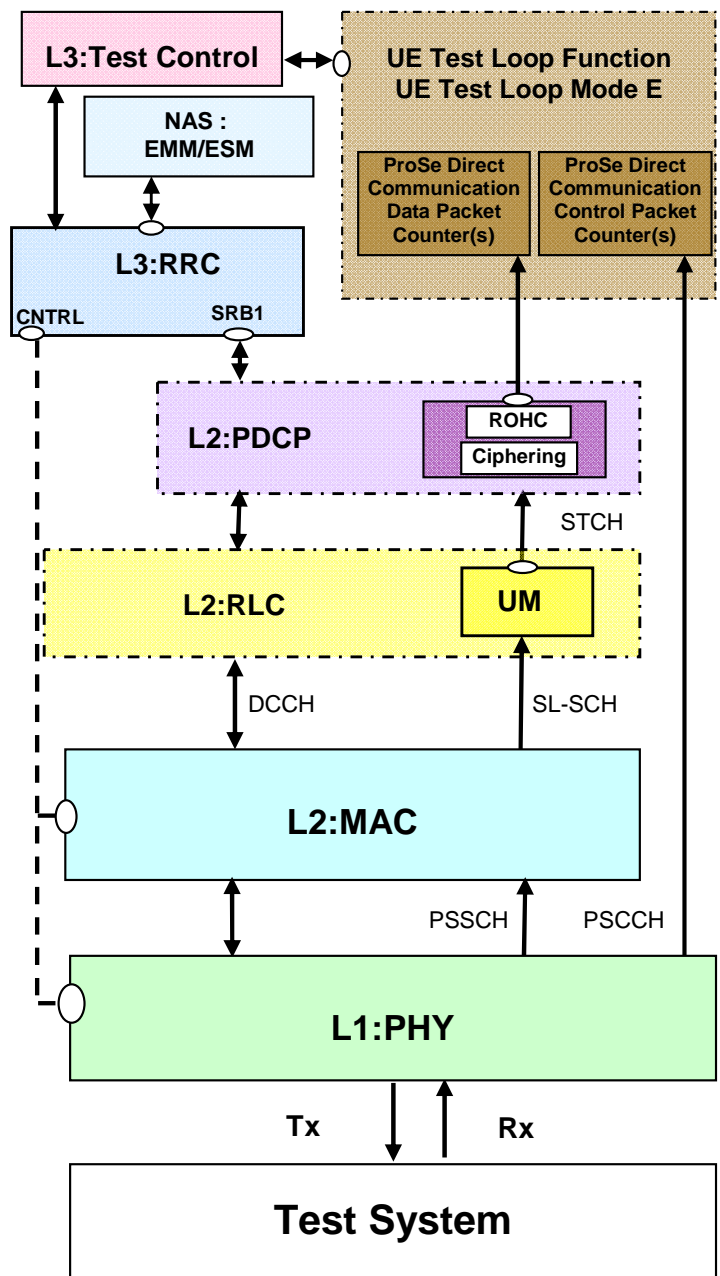
**Figure 5.1-9: Model for UE test loop mode E on UE side
(when Communication receive is indicated in UE test loop mode E setup IE)**
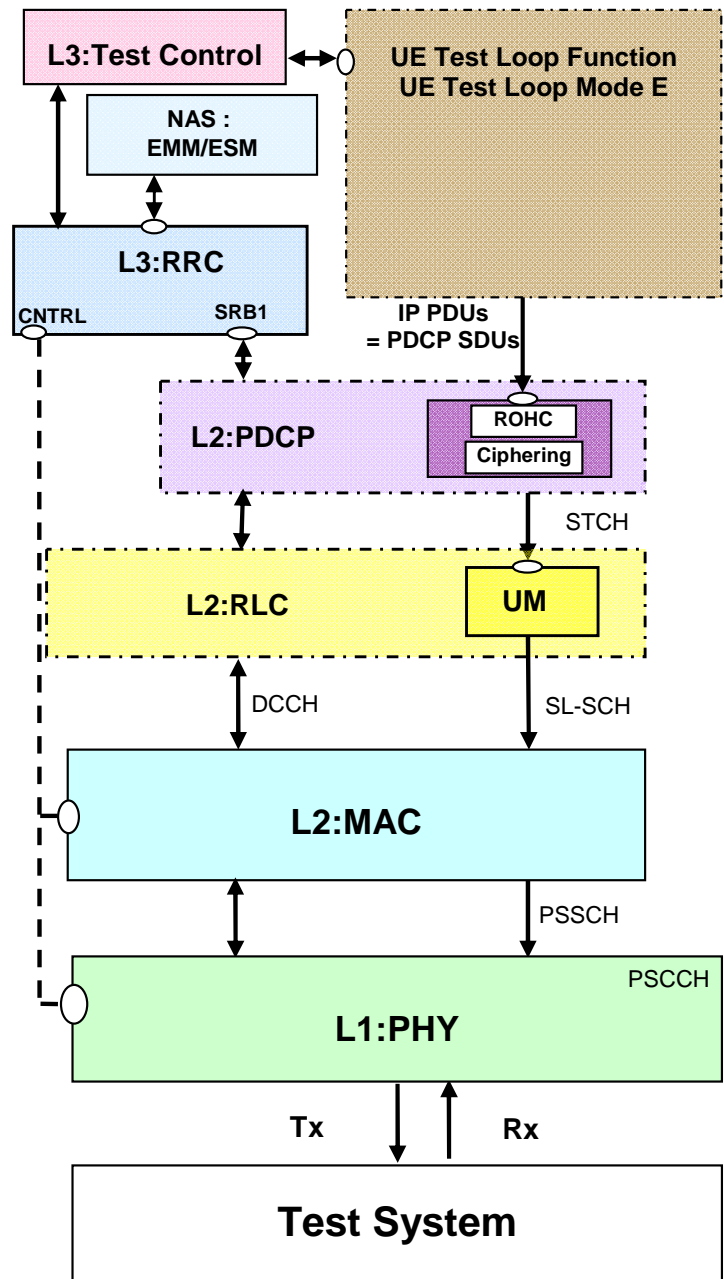
Figure 5.1-10: Model for UE test loop mode E on UE side
(when Communication transmit is indicated in the UE test loop mode E setup IE)
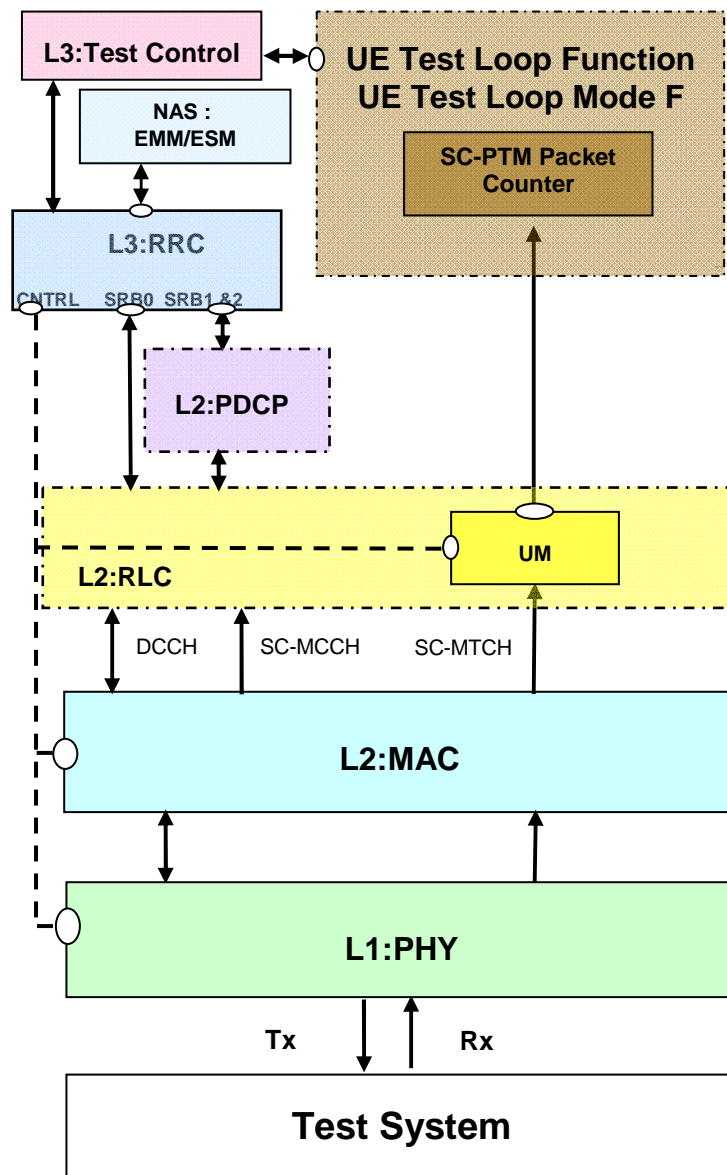
Figure 5.1-11: Model for UE test loop mode F on UE side

5.2 Security protection of test control messages

The test control messages, i.e. ACTIVATE TEST MODE, DEACTIVATE TEST MODE, CLOSE UE TEST LOOP, and OPEN UE TEST LOOP, are integrity protected and ciphered according to TS 24.301 clause 4.4.

5.3 UE test mode procedures

5.3.1 General

The UE test mode procedures are intended for setting the UE into a test mode where the SS can set up data radio bearers (UE test loop mode A) or EPS bearers (UE test loop mode B) or MTCH data radio bearers (UE test loop mode C) or SL-DCH (UE test loop mode D) or STCH and PSCCH (UE test loop mode E) or SC-MTCH (UE test loop mode F) to be terminated in the UE test loop function; as well as, for making UE leave the test mode if it has previously been set into it and return to normal operation.

5.3.2 Activate UE test mode
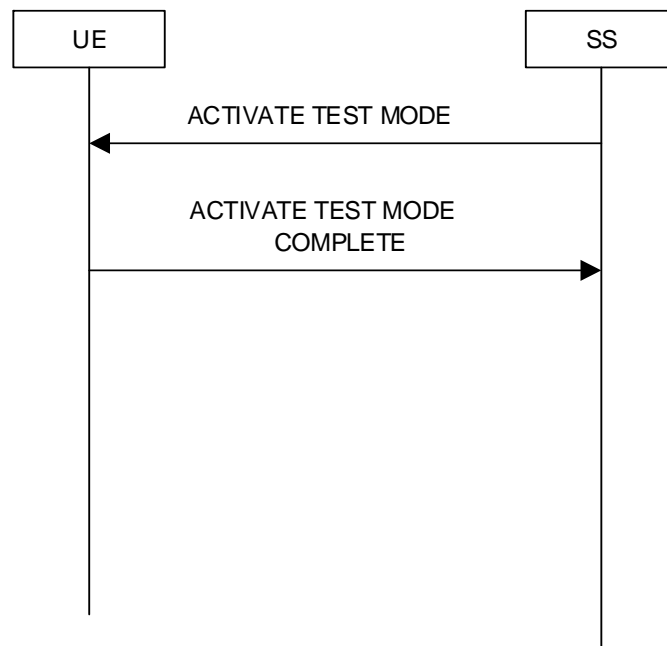
Figure 5.3.2-1: Activate UE test mode procedure

5.3.2.1 General

The SS uses the activate UE test mode procedure to get the UE into a test mode where the SS can set up one or more sets of data radio bearers with an associated EPS bearer context (UE test loop mode A) or EPS bearers (UE test loop mode B) or MTCH data radio bearers (UE test loop mode C) or SC-MTCH data radio bearers (UE test loop mode F) before commanding the UE to terminate them in the UE test loop function. The activation of the UE test loop function in UE test loop mode A, UE test loop mode B, UE Test loop mode C, UE test loop mode D, or UE test loop mode E, or UE test loop mode F will control if the UE is terminating the data radio bearers, the EPS bearers or the MTCH data radio bearer or the SL-DCH or the STCH/PSCCH or the SC-MTCH in the UE test loop function.

5.3.2.2 Initiation

The SS can activate the UE test mode when UE is in E-UTRA connected state.

   NOTE: Refer to TS 36.508 [28] subclause 4.5.1 for more details on UE states.

The SS requests the UE to activate the UE test mode by transmitting an ACTIVATE TEST MODE message.

5.3.2.3 Reception of ACTIVATE TEST MODE message by UE

Upon receiving the ACTIVATE TEST MODE message the UE shall:

   1> if a default EPS bearer context is already activated:

      2> the UE behaviour is unspecified.

   1> else:

      2> activate the UE test mode;

      2> send ACTIVATE TEST MODE COMPLETE message.

When the UE test mode is active, the UE operates normally, except for the following:

1> the UE shall accept any request to establish a data radio bearer with an associated EPS bearer context, both included in the same RRC message, and within the radio access capabilities of the UE;

1> optionally, if the UE supports CSG Proximity Indication;

2> the UE shall ignore any non 3GPP radio signals which are normally used in determining proximity to a CSG (closed subscriber group) cell and delete any previously stored cell information for proximity detection.

NOTE 1: The UE may provide other means which would guarantee that the UE ignores any non 3GPP radio signals which are normally used in determining proximity to a CSG (closed subscriber group) cell and deletes any previously stored cell information for proximity detection. For such UEs the above mentioned CSG requirements in UE test mode may not apply.

1> if neither test loop mode A operation, test loop mode B operation, test loop mode C operation, test loop mode D operation,   test loop mode E nor test loop mode F operation is ongoing:

2> if the UE is operating in E-UTRAN mode, for each PDN connection requested by the UE:

3> if the UE has not received the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message in response to the PDN CONNECTIVITY REQUEST message; or

3> if the UE has received the response message with the PDN type IE set to 'IPv4' and an IPv4 address value different from '0.0.0.0' and "IPv4 address allocation via DHCPv4" was not requested by the UE:

4> the UE shall not transmit any uplink PDCP SDU on any DRB associated with the requested PDN:

4> the UE may discard any received downlink PDCP SDU on any DRB associated with the requested PDN.

NOTE 2: If the UE has requested the use of DHCPv4 signalling for allocation of an IPv4 address, the UE may either accept the IPv4 address provided via NAS signalling and not transmit any uplink PDCP SDU on any DRB and may discard downlink PDCP SDUs on any DRB, or the UE may transmit and receive DHCPv4 messages to obtain an IPv4 address, according to the procedure described in TS 36.508 clause 4.5.2A.

3> if the UE has received the response message with the PDN type IE set to "IPv6" or "IPv4v6" or "IPv4 address allocation via DHCPv4" was requested by the UE , and the UE has not yet obtained its IP address(es);

4> the UE may transmit uplink PDCP SDUs on any DRB associated with the requested PDN, for the sole purpose of obtaining its IP address(es).

3> if the UE has obtained its IP address(es):

4> the UE shall not transmit any uplink PDCP SDU on any DRB associated with the requested PDN:

4> the UE may discard any received downlink PDCP SDU on any DRB associated with the requested PDN.

5.3.3 Deactivate UE test mode
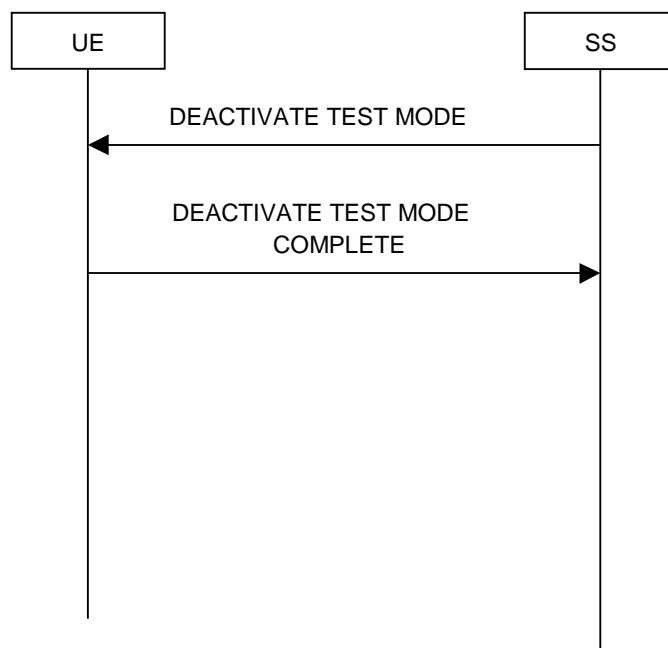
Figure 5.3.3-1: Deactivate UE test mode procedure

5.3.3.1 General

The purpose of this procedure is to deactivate the UE test mode and return UE to normal operation.

NOTE: Deactivation of the UE test loop mode may occur as well as a result of other events. For further details see e.g. 4.1, 5.4.2.1.

5.3.3.2 Initiation

The SS can deactivate the UE test mode when UE is in E-UTRA connected state and the UE test mode is active.

NOTE: Refer to TS 36.508 [28] subclause 4.5.1 for more details on UE states.

The SS requests the UE to deactivate the UE test mode by transmitting a DEACTIVATE TEST MODE message.

5.3.3.3 Reception of DEACTIVATE TEST MODE message by UE

Upon receiving the DEACTIVATE TEST MODE message the UE shall:

1> deactivate the UE test mode;

1> send a DEACTIVATE TEST MODE COMPLETE message.

5.4 UE test loop procedures

5.4.1 General

The UE test loop function is intended for:

- E-UTRA RF receiver and transmitter testing to generate data transfer in downlink and uplink.

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

- EPC and E-UTRA layer 3 testing to verify data transfer continuation over RRC and EPC procedures.

- EPC NAS user-plane testing to verify uplink TFT handling.

- E-UTRA/EPC Inter-system testing to verify data transfer continuation over Inter-system change procedures to and from UTRA, GSM/GPRS and CDMA2000.

- E-UTRA/E-MBMS MCH performance testing.

- E-UTRA/E-MBMS layer 2 (MAC, RLC) and MTCH data radio bearer testing.

- E-UTRA/ProSe RF receiver and transmitter testing to generate data transfer in sidelink.

- E-UTRA/ProSe Direct Discovery layer 2 (MAC) SL-DCH performance testing.

- E-UTRA/ProSe Direct Communication layer 2 (MAC, RLC, PDCP) STCH and layer 1 (PHY) PSCCH performance testing.

5.4.2 Close UE test loop
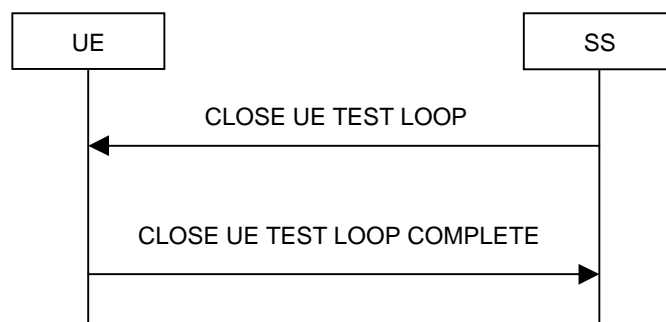
Figure 5.4.2-1: Close UE test loop procedure

5.4.2.1 General

The SS uses the close UE test loop procedure to start the UE Test Loop function in the UE while in E-UTRA mode.

A prerequisite for UE test loop mode A is that at least one bi-directional data radio bearer has been established between SS and UE.

A prerequisite for UE test loop mode B is that at least one EPS bearer context has been established between SS and UE.

A prerequisite for UE test loop mode C is that at least one MTCH data radio bearer has been established between SS and UE.

A prerequisite for UE test loop mode D is that the UE is pre-authorized for ProSe Direct Discovery operation.

NOTE 1: No radio bearer setup is required to transmit or receive ProSe Direct Discovery messages.

A prerequisite for UE test loop mode E is that the UE is pre-authorized for ProSe Direct Communication operation and pre-configured parameters are provided in the USIM.

NOTE 2: Explicit signalling for sidelink radio bearer (SLRB) is not required to transmit or receive STCH for ProSe Direct Communication.

A prerequisite for UE test loop mode F is that at least one SC-MTCH data radio bearer has been established between SS and UE.

The UE shall provide for normal layer 1, layer 2, RRC, EMM and ESM functionality while the UE test loop function is active. This includes (but is not limited to) handover procedures and normal disconnection of the data radio bearer.

For UE test loop mode A the loopback shall be maintained across handovers within E-UTRA, but after data radio bearer release, the loopback shall cease to exist.

For UE test loop mode B the loopback shall be maintained across handovers within E-UTRA and between radio access system (E-UTRA to/from UTRA, E-UTRA to/from GSM/GPRS and E-UTRA to/from CDMA2000). This means that any buffered IP PDUs in the UE test loop function at the time of the intra- or inter-system change shall be kept in the UE test loop function and being scheduled for transmission transparently to the intra- or inter-system change.

For UE test loop mode A or B, UE shall not transmit any uplink U-plane data other than the data returned by the loopback entity.

For UE test loop mode D and E, the UE (and not the test loop) shall provide full normal ProSe functionality as specified in TS 24.334 [X1] and TS 36.331 [25] e.g. ProSe synchronization signals transmission and/or reception as configured by RRC, while the UE test loop is active.

5.4.2.1a UE test loop mode A PDCP SDU and UE test loop mode B IP PDU buffer size requirement

The minimum UE loopback buffer size for PDCP SDUs (UE test loop mode A) and IP PDUs (UE test loop mode B), when UE is operated in RLC AM or UM mode, shall be according to table 5.4.2.1a-1. The UE behaviour, when the loopback buffer capacity is exceeded, is unspecified.

Table 5.4.2.1a-1: Minimum loopback buffer size for different UE categories

UE Category	Minimum loopback buffer size [bytes] (note 1)
Category M1	4000
Category 0	4000
Category 1	60000
Category 2	60000
Category 3	60000
Category 4	60000
Category 5	60000
Note 1: Minimum loopback buffer size has been selected 1) for each UE category such that the UE shall be able to forward all data received in one TTI when the applicable maximum transport block size of the UE is used, and 2) to allow execution of MAC test cases 7.1.4.3 and 7.1.4.3a in TS 36.523-1 [30], which requires a minimum loopback buffer size of 3600 bytes for Category M1, Category 0 and Category 1 (7.1.4.3a) and 57280 bytes for all other UE categories(7.1.4.3).	

5.4.2.2 Initiation

The SS can request the UE to close a test loop in mode A if at least one bi-directional data radio bearer is established and the UE test mode is active.

The SS can request the UE to close a test loop in mode B if at least one EPS bearer is established and the UE test mode is active. The SS can request the UE to close a test loop in mode C if at least one MTCH data radio bearer is established and the UE test mode is active.

The SS requests the UE to close its UE test loop mode A, UE test loop mode B, UE test loop mode C, UE test loop mode D or UE test loop mode E by transmitting a CLOSE UE TEST LOOP message.

5.4.2.3 Reception of CLOSE UE TEST LOOP message by the UE

Upon receiving the CLOSE UE TEST LOOP message the UE shall:

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

    2> if no bi-directional data radio bearers are established or if the UE test mode is not active; or

    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:

        3> the UE behaviour is unspecified

    2> else:

        3> for LB_ID=0 MAX_ModeA_LB_entities -1:

            4> set DRB_ID(LB_ID) to 0 (indicate no DRB mapped)

            4> set UL_PDCP_SDU_scaling(LB_ID) to FALSE

        3> set LB_ID to 0

        3> for each established bi-directional data radio bearer in ascending order and starting with the data radio bearer with the lowest configured Data Radio bearer identity number:

            4> if LB_ID is less than MAX_ModeA_LB_entities:

                5> set DRB_ID(LB_ID) to the Data Radio bearer identity number

                5> increment LB_ID by 1

            4> else:

                5> the UE behaviour is unspecified

        3> if the UE test loop mode A setup IE is included:

            4> for each LB Setup DRB IE in the LB setup list of the UE test loop mode A setup IE:

                5> for LB_ID=0 to MAX_ModeA_LB_entities-1:

                    6> if DRB_ID(LB_ID) is equal to the Data Radio bearer identity number parameter of the LB Setup DRB IE:

                        7> if the LB Setup DRB(LB_ID) IE is included:

                        7> set UL_PDCP_SDU_scaling(LB_ID) to TRUE

                        7> set UL_PDCP_SDU_size(LB_ID) to UL PDCP SDU size parameter of the LB Setup DRB(LB_ID) IE

        3> perform the UE actions for UE Test Loop Mode A operation as specified in subclause 5.4.3; and

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

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

    2> if no EPS bearer is established or if the UE test mode is not active; or

    2> if the test loop is already active on one or more EPS 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:

        3> the UE behaviour is unspecified.

    2> otherwise:

   3> set TEST_LOOP_MODE_B_ACTIVE to TRUE

   3> set timer T_delay_modeB to the value of IP PDU delay timer parameter of the UE test loop mode B IE;

   3> if the IP PDU delay timer parameter of the UE test loop mode B IE has a value larger than zero:

    4> set BUFFER_IP_PDUs to TRUE

   3> else:

    4> set BUFFER_IP_PDUs to FALSE

   3> set CDMA2000_INITIATED to FALSE

   3> perform the UE actions for UE Test Loop Mode B operation as specified in subclause 5.4.4 and 5.4.4.1 to 5.4.4.11; and

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

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

 2> if no MTCH data radio bearer is established or if the UE test mode is not active; or

 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:

  3> the UE behaviour is unspecified.

 2> otherwise:

  3> set TEST_LOOP_MODE_C_ACTIVE to TRUE

  3> set state variable MBMS_PACKET_COUNTER to zero;

  3> perform the UE actions for UE Test Loop Mode C operation as specified in subclause 5.4.4a; and

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

1> else if UE test loop mode D 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:

  3> the UE behaviour is unspecified.

 2> otherwise:

  3> set TEST_LOOP_MODE_D_ACTIVE to TRUE

  3> if the Discovery Announce or Monitor parameter in UE test loop mode D setup IE is set as zero;

   4> set TEST_LOOP_MODE_D_TRIGGER to MONITOR

   4> set state variable PROSE_DISCOVERY_MONITOR_N to the number of entities in the list of ProSe App Codes to individually monitor included in the UE test loop mode D setup IE;

   4> if PROSE_DISCOVERY_MONITOR_N is greater than MAX_ModeD_Monitor_Entities:

    5> the UE behaviour is unspecified.

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

     5> set state variable PROSE_DISCOVERY_APPCODE(SL_ID) to the parameter ProSe App Code (LSBs) #(SL_ID) to monitor of the UE test loop mode D setup IE;

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

    4> set state variable PSDCH_PACKET_COUNTER(PROSE_DISCOVERY_MONITOR_N) to zero;

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

   3> if the Discovery Announce or Monitor parameter in UE test loop mode D setup IE is set as one;

    4> set TEST_LOOP_MODE_D_TRIGGER to ANNOUNCE

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

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

 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

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

   3> the UE behaviour is unspecified.

  2> otherwise:

   3> set TEST_LOOP_MODE_E_ACTIVE to TRUE

   3> if the 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;

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

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

    4> set TEST_LOOP_MODE_E_TRIGGER to TRANSMIT

    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).

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

  2> if no SC-MTCH data radio bearer is established or if the UE test mode is not active; or

  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:

   3> the UE behaviour is unspecified.

  2> otherwise:

   3> set TEST_LOOP_MODE_F_ACTIVE to TRUE

   3> set state variable SCPTM_PACKET_COUNTER to zero;

   3> perform the UE actions for UE Test Loop Mode F operation as specified in subclause 5.4.4d; and

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

1> else;

  2> the UE behaviour is unspecified.

5.4.3   UE test loop mode A operation

Upon receiving a PDCP SDU identified by LB_ID when operating in E-UTRA mode with UE Test Loop Mode A active the UE shall:

1> if UL_PDCP_SDU_scaling(LB_ID) is FALSE:

  2> take the PDCP SDU from the output of the PDCP Service Access Point (SAP) and provide it as input to the correspondent PDCP SAP in uplink and transmit, see Figure 5.4.3-1.

1> else:

  2> if UL_PDCP_SDU_size(LB_ID) = 0:

   3> discard the PDCP SDU (no data is returned).

  2> else:

   3> if the size of the received PDCP SDU in downlink is equal to UL_PDCP_SDU_size(LB_ID):

    4> take the PDCP SDU from the output of the PDCP SAP and provide it as input to the correspondent PDCP SAP in uplink and transmit, see Figure 5.4.3-1.

   3> else if the size of the received PDCP SDU in downlink is bigger than UL_PDCP_SDU_size(LB_ID):

    4> create a UL PDCP SDU of size UL_PDCP_SDU_size(LB_ID) by taking the first K bits of the received PDCP SDU in downlink PDCP SAP, where K is equal to UL_PDCP_SDU_size(LB_ID) and provide it as input to the correspondent PDCP SAP in uplink and transmit, see Figure 5.4.3-2.

   3> else if the size of the received PDCP SDU in downlink is less than UL_PDCP_SDU_size(LB_ID):

    4> create a UL PDCP SDU of size UL_PDCP_SDU_size(LB_ID) by repeating the data received in downlink PDCP SDU in downlink to fill the UL PDCP SDU (truncating the last block if necessary), provide it as input to the correspondent PDCP SAP in uplink and transmit, see Figure 5.4.3-3.

NOTE: Size of the received PDCP SDUs in downlink shall be bit strings that are byte aligned (i.e. multiple of 8 bits) according to TS 36.323 [24] clause 6.2.1.
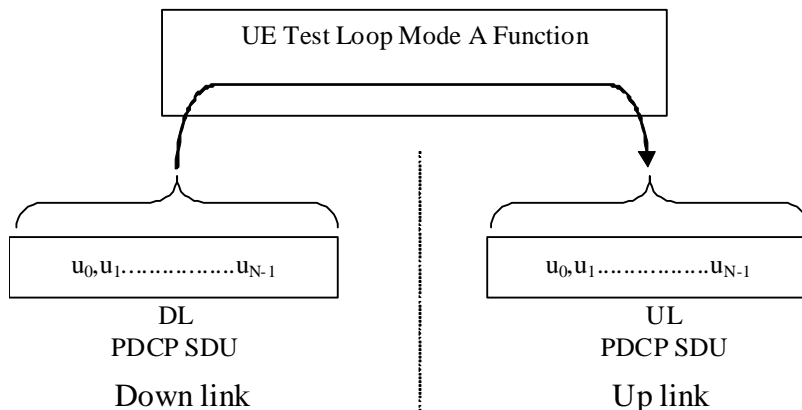
Figure 5.4.3-1: Loop back of PDCP SDU
(DL PDCP SDU size = UL PDCP SDU size = N)
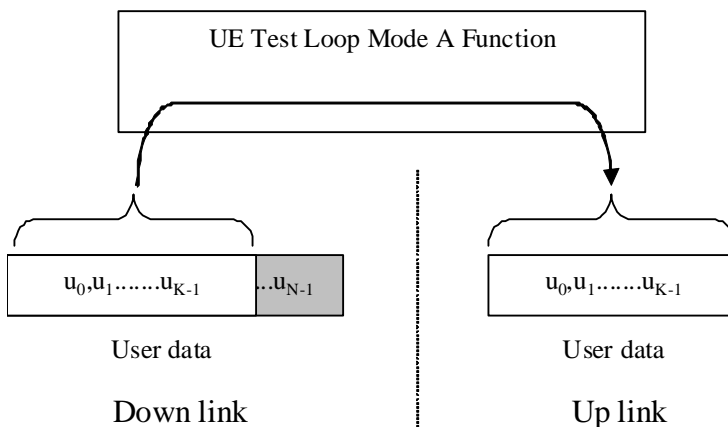
Figure 5.4.3-2: DL > UL PDCP SDU block size
(DL PDCP SDU size = N, UL PDCP SDU size = K)
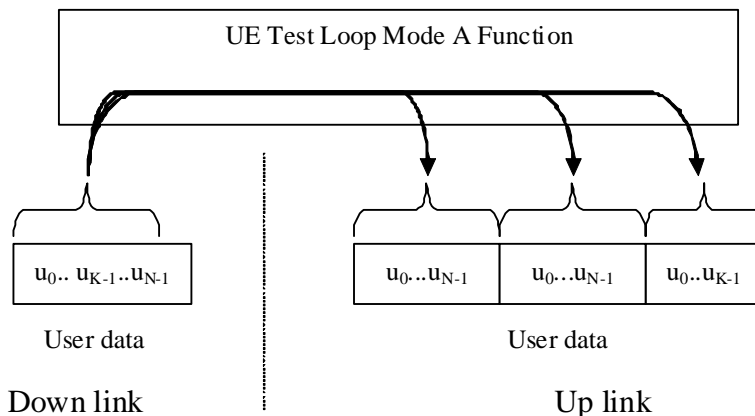
Figure 5.4.3-3: DL < UL PDCP SDU block size
(DL PDCP SDU size = N, UL PDCP SDU size = 2*N + K)

5.4.4 UE test loop mode B operation

5.4.4.1 Void

5.4.4.2 Reception of IP PDUs when UE is in E-UTRA mode

Upon receiving a PDCP SDU (=IP PDU) when operating in E-UTRA mode with UE Test Loop Mode B active the UE shall:

> 1> if T_delay_modeB timer is running:

>> 2> buffer the received PDCP SDU

> 1> else

>> 2> if BUFFER_IP_PDUs is TRUE

>>> 3> buffer the received PDCP SDU

>>> 3> Start T_delay_modeB timer

>> 2> else

>>> 3> submit the received PDCP SDU without any modification of the IP header to the UL TFT handling SAP for transmission in uplink. See note.

> NOTE 1: The UL TFT function in the UE is mapping IP PDUs received from SDF to EPS bearer/radio bearer as configured by SS in the UL TFT IE sent as part of the EPS bearer establishment procedures. See figure 5.1-2.

> NOTE 2: Size of the received PDCP SDUs in downlink shall be bit strings that are byte aligned (i.e. multiple of 8 bits) according to TS 36.323 [24] clause 6.2.1. The PDCP SDUs themselves shall contain a valid IPv4 or IPv6 Header in accordance with the PDN type (Ref. TS 24.301 [36]) accepted by the UE.

5.4.4.3 Expiry of T_delay_modeB timer when UE is in E-UTRA mode

When timer T_delay_modeB expires when UE is operating in E-UTRA mode and has UE Test Loop Mode B active then the UE shall:

> 1> submit the buffered PDCP SDUs in the same order as received (first-in-first-out) and without any modification of the IP header to the UL TFT handling SAP for transmission in uplink. See note 1.

> 1> set BUFFER_IP_PDUs to FALSE

> NOTE 1: The UL TFT function in the UE is mapping IP PDUs received from SDF to EPS bearer/radio bearer as configured by SS in the UL TFT IE sent as part of the EPS bearer establishment procedures. See figure 5.1-2.

> NOTE 2: After the PDCP SDU buffer becomes empty the loopback will return any received PDCP SDU in uplink directly as specified in clause 5.4.4.2. In order to reactivate the loopback delay and PDCP SDU buffering the SS shall deactivate UE test loop B function first.

5.4.4.4 Reception of IP PDUs when UE is in UTRA mode

When UE receives a PDCP SDU when UE is operating in UTRA mode and has UE Test Loop Mode B active then the UE shall:

> 1> if T_delay_modeB timer is running:

>> 2> buffer the received PDCP SDU

1> else

    2> if BUFFER_IP_PDUs is TRUE

        3> buffer the received PDCP SDU

        3> Start T_delay_modeB timer

    2> else

        3> submit the received PDCP SDU without any modification of the IP header to the UL TFT handling SAP for transmission in uplink.

5.4.4.5 Expiry of T_delay_modeB timer when UE is in UTRA mode

When timer T_delay_modeB expires when UE is operating in UTRA mode and has UE Test Loop Mode B active the then UE shall:

1> submit the buffered IP PDUs in the same order as received (first-in-first-out) and without any modification of the IP header to the UL TFT handling SAP for transmission in uplink.

1> set BUFFER_IP_PDUs to FALSE.

NOTE: After the IP PDU buffer becomes empty the loopback will return any received PDCP SDU in uplink directly as specified in clause 5.4.4.4. In order to reactivate the loopback delay and PDCP SDU buffering the SS shall deactivate UE test loop B function and UE shall return to E-UTRA mode first.

5.4.4.6 Reception of IP PDUs when UE is in GSM/GPRS mode

When UE receives a SNDCP SDU when UE is operating in GSM/GPRS mode and has UE Test Loop Mode B active then the UE shall:

1> if T_delay_modeB timer is running:

    2> buffer the received SNDCP SDU.

1> else

    2> if BUFFER_IP_PDUs is TRUE;

        3> buffer the received SNDCP SDU;

        3> Start T_delay_modeB timer.

    2> else

        3> submit the received SNDCP SDU without any modification of the IP header to the UL TFT handling SAP for transmission in uplink.

5.4.4.7 Expiry of T_delay_modeB timer when UE is in GSM/GPRS mode

When timer T_delay_modeB expires when UE is operating in GSM/GPRS mode and has UE Test Loop Mode B active then the UE shall:

1> submit the buffered IP PDUs without any modification of the IP header in the same order as received (first-in-first-out), to the UL TFT handling SAP for transmission in uplink.

1> set BUFFER_IP_PDUs to FALSE

NOTE: After the IP PDU buffer becomes empty the loopback will return any received SNDCP SDU in uplink directly as specified in clause 5.4.4.6. In order to reactivate the loopback delay and SNDCP SDU buffering the SS shall deactivate UE test loop B function and UE shall return to E-UTRA mode first.

5.4.4.8 Reception of IP PDUs when UE is in CDMA2000 mode

When UE receives a RLP SDU when UE is operating in CDMA2000 mode and has UE Test Loop Mode B active then the UE shall:

> 1> if CDMA2000_INITIATED is FALSE:

>> 2> if T_delay_modeB is running:

>>> 3> restart T_delay_modeB

>> 2> else:

>>> 3> start T_delay_modeB

>> 2> set CDMA2000_INITIATED to TRUE;

> 1> if T_delay_modeB is running;

>> 2> deliver the received RLP SDU to upper layers;

> 1> else

>> 2> submit the received RLP SDU without any modification of the IP header to the UL TFT handling SAP for transmission in uplink.

> NOTE: When CDMA2000_INITIATED is FALSE or when T_delay_modeB is running, the UE may send RLP SDUs in uplink upon initiation from upper layers.

5.4.4.9 Expiry of T_delay_modeB timer when UE is in CDMA2000 mode

> When timer T_delay_modeB expires when UE is operating in CDMA2000 mode and has UE Test Loop Mode B active then the UE shall not take any action.

5.4.4.10 Establishment of the RRC/RR connection in E-UTRA, UTRA, GSM/GPRS and CDMA2000 mode

When the RRC or the RR connection and one or more EPS bearers are is established, in E-UTRA, UTRA, GSM/GPRS and CDMA2000 mode then the UE shall:

> 1> if TEST_LOOP_MODE_B_ACTIVE is set to TRUE;

>> 2> perform the UE actions for UE Test Loop Mode B operation as specified in subclause 5.4.4 and 5.4.4.1 to 5.4.4.11.

5.4.4.11 Release of RRC/RR connection in E-UTRA, UTRA, GSM/GPRS and CDMA2000 mode after T_delay_modeB timer has expired

When the RRC or the RR connection is released in E-UTRA, UTRA, GSM/GPRS and CDMA2000 mode then the UE shall:

> 1> if UE test loop mode B is active; and

> 1> if BUFFER_IP_PDUs is TRUE or T_delay_modeB timer is running:

>> 2> keep UE test loop mode B active

> 1> else

>> 2> the UE behaviour is unspecified.

5.4.4a   UE test loop mode C operation

5.4.4a.1   Reception of MBMS packets

Upon receiving a MBMS packet on the MTCH identified by MTCH_ID when operating in E-UTRA idle or connected mode with UE test loop mode C active the UE shall:

> 1> if UE test loop mode C is active;

>> 2> increment MBMS_PACKET_COUNTER by 1:

> 1> else:

>> 2> the UE behaviour is unspecified.

5.4.4a.2   Release of RRC connection

When the RRC connection is released in E-UTRA mode then the UE shall:

> 1> if UE test loop mode C is active:

>> 2> keep UE test loop mode C active.

5.4.4b   UE test loop mode D operation

5.4.4b.1   Monitor or Announce ProSe Direct Discovery

When operating in E-UTRA idle or connected mode with UE test loop mode D active, the UE shall be able to either monitor or announce ProSe Direct Discovery message(s) based on the TEST_LOOP_MODE_D_TRIGGER being set as either MONITOR or ANNOUNCE, respectively. The UE shall:

> 1> if TEST_LOOP_MODE_D_ACTIVE is set to TRUE:

> 2> if TEST_LOOP_MODE_D_TRIGGER is set to MONITOR;

>> 3> upon successful reception of SL-DCH MAC SDU for ProSe Direct Discovery message:

>>> 4> set MATCH to zero;

>>> 4> if PROSE_DISCOVERY_MONITOR_N > 0

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

>>>> 6> if LSBs (8..0) of ProSe App Code in the received SL-DCH MAC SDU equals PROSE_DISCOVERY_APPCODE(SL_ID):

>>>>> 7> increment PSDCH_PACKET_COUNTER(SL_ID) by 1;

>>>>> 7> set MATCH to one.

>>> 4> if MATCH equal zero:

>>>> 5> increment PSDCH_PACKET_COUNTER(PROSE_DISCOVERY_MONITOR_N) by 1.

> 2> else if TEST_LOOP_MODE_D_TRIGGER is set to ANNOUNCE;

>> 3> create the SL-DCH MAC SDU with the payload specified below, see Figure 5.4.4b.1-1 and Table 5.4.4b.1-1, and provide as input to MAC for possible transmission in each discovery period.

> NOTE: The same SL-DCH MAC SDU is transmitted (if permitted by test specific Layer 1 and Layer 2 configuration) by the UE in every discovery period during the entire duration test loop mode D is closed.

> 2> else:

3> the UE behaviour is unspecified.

1> else:

2> the UE behaviour is unspecified.

The SL-DCH MAC SDU payload for ProSe Direct Discovery announce operation when UE test loop mode D is active shall be as specified in Figure 5.4.4b.1-1 and Table 5.4.4b.1-1.
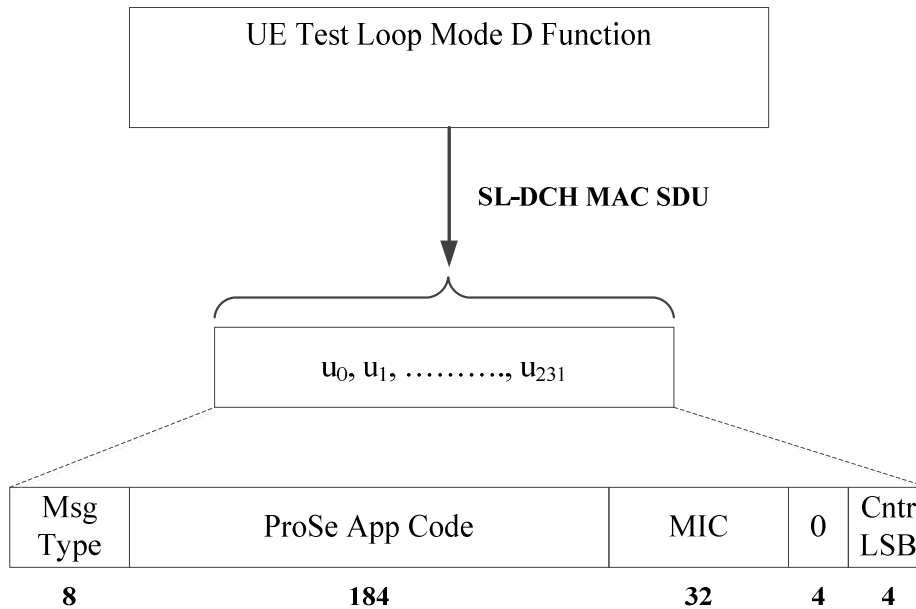
Figure 5.4.4b.1-1: ProSe Direct Discovery Announce operation in UE test loop mode D

Table 5.4.4b.1-1: SL-DCH MAC SDU payload contents for ProSe Direct Discovery Announce operation in UE test loop mode D

Parameter	Size (bits)	Value
Msg Type	8	01000001
ProSe App Code	184	00…00
MIC	32	00…00
Cntr LSB	4	0000

5.4.4b.2 Release of RRC connection

When the RRC connection is released in E-UTRA mode then the UE shall:

1> if UE test loop mode D is active:

2> keep UE test loop mode D active

5.4.4c UE test loop mode E operation

5.4.4c.1 Receive or Transmit ProSe Direct Communication

When operating in E-UTRA idle or connected or any cell selection state, with UE test loop mode E active, the UE shall be able to either receive or transmit ProSe Direct 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 ProSe Direct 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 Group Destination ID in the received PSCCH 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 ProSe Direct Communication control packet:

4> set MATCH to zero;

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

5> if Group Destination ID in the received PSCCH PHY transport block equals PROSE_COMMUNICATION_DEST_ID(SL_ID):

6> increment PSCCH_PACKET_COUNTER(SL_ID) by 1;

6> set MATCH to one.

4> if MATCH equal zero:

5> increment PSCCH_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 5.4.4c.1-1 and Table 5.4.4c.1-1 and provide as input PDCP for transmission in every SC period as per TS 36.331.

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 SC period 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 ProSe Direct Communication packet when UE test loop mode E is active shall be as specified in Figure 5.4.4c.1-1 and Table 5.4.4c.1-1. The UE shall also transmit the corresponding SCI control information on PSCCH accordingly in every PSCCH period.
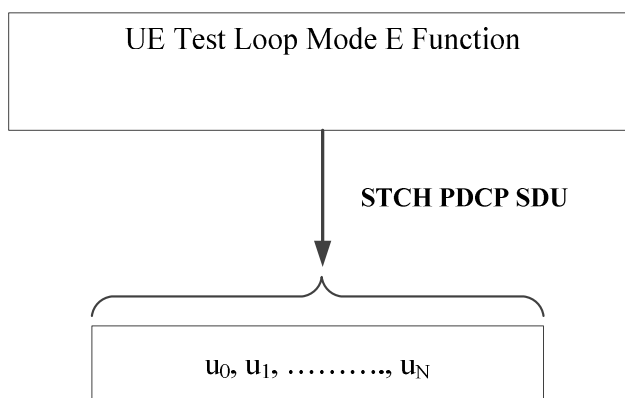
Figure 5.4.4c.1-1: ProSe Direct Communication Transmit operation in UE test loop mode E

Table 5.4.4c.1-1: STCH PDCP SDU payload contents for ProSe Direct Communication transmit operation in UE test loop mode E

Parameter	Value
Size (N)	40 bytes
Payload	00…00

5.4.4c.2 Release of RRC connection

When the RRC connection is released in E-UTRA mode then the UE shall:

1> if UE test loop mode E is active:

2> keep UE test loop mode E active

5.4.4c.3 Transition from RRC Idle/Connected to Any Cell Selection state

When the UE experiences radio link failure and transitions to RRC Any Cell Selection state in E-UTRA mode, then the UE shall:

1> if UE test loop mode E is active:

2> keep UE test loop mode E active

5.4.4d UE test loop mode F operation

5.4.4d.1 Reception of MBMS packets

Upon receiving a MBMS packet on the SC-MTCH identified by SC_MTCH_ID when operating in E-UTRA idle or connected mode with UE test loop mode F active the UE shall:

1> if UE test loop mode F is active;

2> increment SCPTM_PACKET_COUNTER by 1:

1> else:

2> the UE behaviour is unspecified.

5.4.4d.2 Release of RRC connection

When the RRC connection is released in E-UTRA mode then the UE shall:

1> if UE test loop mode F is active:

2> keep UE test loop mode F active.

5.4.5 Open UE test loop
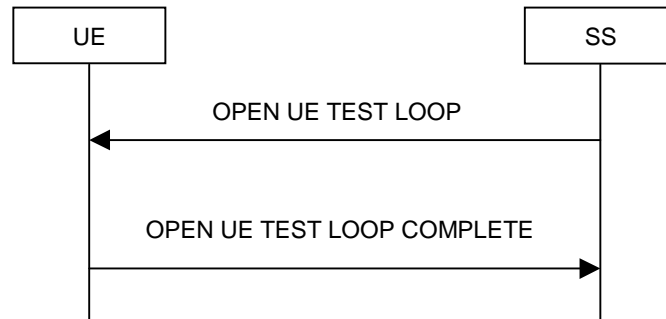
Figure 5.4.5-1: Open UE test loop procedure

5.4.5.1 General

The SS uses the procedure open UE test loop to deactivate the UE test loop function in the UE.

5.4.5.2 Initiation

The SS requests the UE to open all closed test loops by transmitting an OPEN UE TEST LOOP message.

5.4.5.3 Reception of OPEN UE TEST LOOP message by the UE

When UE receives the OPEN UE TEST LOOP message then the UE shall:

1> If no test loops are closed:

2> the UE behaviour is unspecified;

1> else if one or more test loops are closed:

2> open all test loops;

2> if TEST_LOOP_MODE_B_ACTIVE is TRUE

3> set TEST_LOOP_MODE_B_ACTIVE to FALSE

2> if TEST_LOOP_MODE_C_ACTIVE is TRUE

3> set TEST_LOOP_MODE_C_ACTIVE to FALSE

2> if TEST_LOOP_MODE_D_ACTIVE is TRUE

3> set TEST_LOOP_MODE_D_ACTIVE to FALSE

2> if TEST_LOOP_MODE_E_ACTIVE is TRUE

3> set TEST_LOOP_MODE_E_ACTIVE to FALSE

2> if TEST_LOOP_MODE_F_ACTIVE is TRUE

3> set TEST_LOOP_MODE_F_ACTIVE to FALSE

2> send OPEN UE TEST LOOP COMPLETE message;

NOTE: The UE test mode is still active so the UE continues behaving as described in 5.3.2.3

ETSI

5.5 UE Positioning test mode procedures

5.5.1 Reset UE Positioning Stored Information
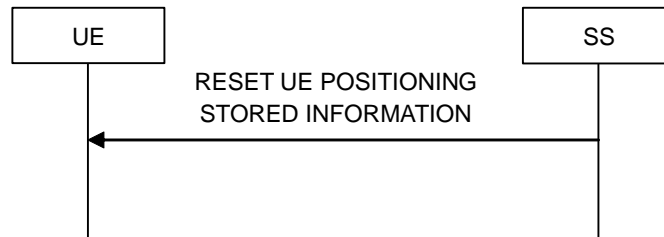
Figure 5.5.1-1: Reset UE Positioning Stored Information procedure

5.5.1.1 General

The SS uses the reset UE positioning stored information procedure to command the UE to reset the already acquired UE positioning information in preparation for subsequent test procedures.

5.5.1.2 Initiation

The SS requests the UE to reset the stored UE positioning information mode by transmitting a RESET UE POSITIONING STORED INFORMATION message.

5.5.1.3 Reception of RESET UE POSITIONING STORED INFORMATION message by UE

When UE receives RESET UE POSITIONING STORED INFORMATION message then the UE shall:

  1> if the IE "UE Positioning Technology" has the value "AGNSS":

    2> discard any stored GNSS reference time, reference position, and any other aiding data obtained or derived during the previous test instance (e.g. expected ranges and Doppler);

    2> temporarily disable any sensor data (if applicable) that can aid the positioning for the duration of the subsequent positioning procedure.

  1> if the IE "UE Positioning Technology" has the value "OTDOA":

    2> discard any stored OTDOA reference and neighbour cell info assistance data;

    2> use the reference cell in the provided OTDOA assistance data as reference cell for reporting RSTD measurements in the subsequent positioning procedure.

  1> otherwise:

    2> ignore the message.

5.5.2 Update UE Location Information
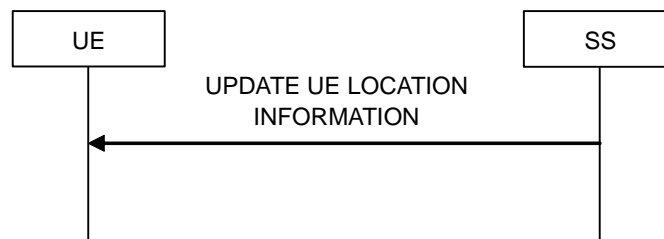
Figure 5.5.2-1: Update UE Location Information procedure

5.5.2.1 General

The SS uses the Update UE Location information procedure to send positioning information to the UE and command it to store positioning information in preparation for subsequent test procedures.

5.5.2.2 Initiation

The SS requests the UE to store the positioning information contained in the message by transmitting a UPDATE UE LOCATION INFORMATION message.

5.5.2.3 Reception of UPDATE UE LOCATION INFORMATION message by UE

When UE receives UPDATE UE LOCATION INFORMATION message then the UE shall:

1> if the UE has location information values stored:

2> discard the stored location information:

1> store the received location information (ellipsoidPointWithAltitude, horizontalVelocity and gnss-TOD-msec) and maintain it until reception of RESET UE POSITIONING STORED INFORMATION or UPDATE UE LOCATION INFORMATION message. Information not supported by the UE may be discarded.

5.6 MBMS Packet Counter reporting procedure

5.6.1 Request MBMS Packet Counter value
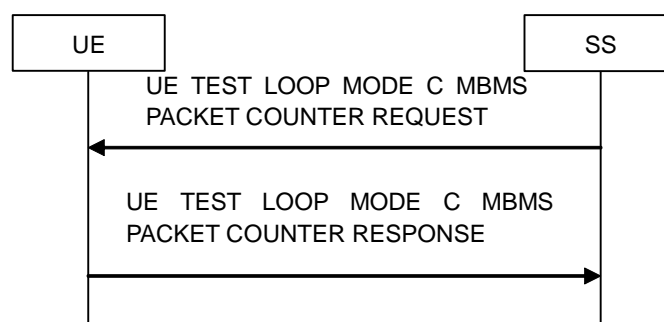
Figure 5.6.1-1: MBMS Packet Counter reporting procedure

5.6.1.1 General

The SS uses the MBMS Packet Counter reporting procedure to request reporting of current value of the state variable MBMS_PACKET_COUNTER.

5.6.1.2 Initiation

The SS requests the UE to report its current value of the state variable MBMS_PACKET_COUNTER by transmitting an UE TEST LOOP MODE C MBMS PACKET COUNTER REQUEST message.

5.6.1.3 Reception of UE TEST LOOP MODE C MBMS PACKET COUNTER REQUEST by the UE

Upon receiving the UE TEST LOOP MODE C MBMS PACKET COUNTER REQUEST message the UE shall:

1> if TEST_LOOP_MODE_C_ACTIVE is TRUE:

2> set the IE MBMS Packet Counter Value in the UE TEST LOOP MODE C MBMS PACKET COUNTER RESPONSE message to the value of the state variable MBMS_PACKET_COUNTER;

2> send the UE TEST LOOP MODE C MBMS PACKET COUNTER RESPONSE message.

1> else:

2> the UE behaviour is unspecified.

5.7 ProSe Packet Counter reporting procedure

5.7.1 Request ProSe Packet Counter value
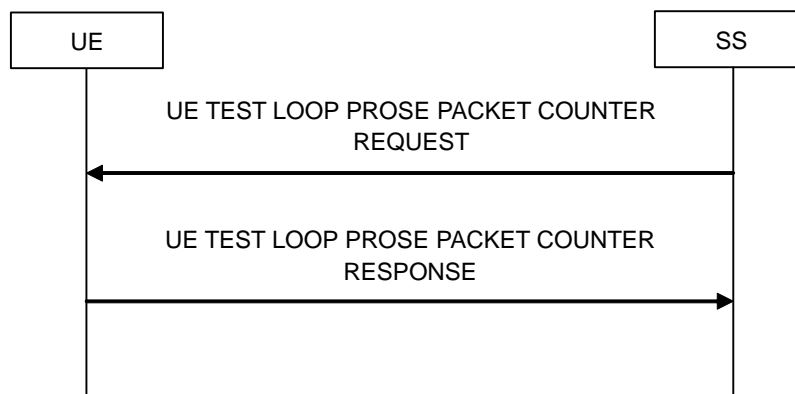
Figure 5.7.1-1: ProSe Packet Counter reporting procedure

5.7.1.1 General

The SS uses the ProSe Packet Counter reporting procedure to request reporting of current value ProSe related state variables depending on the currently active ProSe test mode. For mode D the state variable PSDCH_PACKET_COUNTER is reported. For mode E the state variables STCH_PACKET_COUNTER and PSDCH_PACKET_COUNTER are reported.

5.7.1.2 Initiation

The SS requests the UE to report its current value of the state variable PSDCH_PACKET_COUNTER for test loop mode D or STCH_PACKET_COUNTER and PSCCH_PACKET_COUNTER for test loop mode E by transmitting an UE TEST LOOP PROSE PACKET COUNTER REQUEST message.

5.7.1.3 Reception of UE TEST LOOP PROSE COUNTER REQUEST by the UE

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

1> if TEST_LOOP_MODE_D_ACTIVE is TRUE:

2> set the IE ProSe Direct Discovery Packet Counter(s) Value in the UE TEST LOOP PROSE COUNTER RESPONSE message to the value of the state variable(s) PSDCH_PACKET_COUNTER(SL_ID) with SL_ID = 0…PROSE_DISCOVERY_MONITOR_N;

2> send the UE TEST LOOP PROSE COUNTER RESPONSE message.

1> else if TEST_LOOP_MODE_E_ACTIVE is TRUE:

2> set the IE ProSe Direct Communication 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 ProSe Direct Communication 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> send the UE TEST LOOP PROSE COUNTER RESPONSE message.

1> else:

2> the UE behaviour is unspecified.

5.8 SC-PTM Packet Counter reporting procedure

5.8.1 Request SC-PTM Packet Counter value
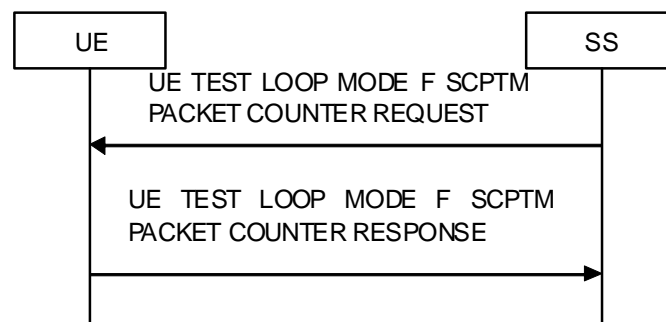
Figure 5.8.1-1: SC-PTM Packet Counter reporting procedure

5.8.1.1 General

The SS uses the SC-PTM Packet Counter reporting procedure to request reporting of current value of the state variable SCPTM_PACKET_COUNTER.

5.8.1.2 Initiation

The SS can activate the UE test mode when UE is in E-UTRA connected state.

NOTE: Refer to TS 36.508 [28] subclause 4.5.1 for more details on UE states.

The SS requests the UE to report its current value of the state variable SCPTM_PACKET_COUNTER by transmitting an UE TEST LOOP MODE F SCPTM PACKET COUNTER REQUEST message.

5.8.1.3 Reception of UE TEST LOOP MODE F SCPTM PACKET COUNTER REQUEST by the UE

Upon receiving the UE TEST LOOP MODE F SCPTM PACKET COUNTER REQUEST message the UE shall:

1> if TEST_LOOP_MODE_F_ACTIVE is TRUE:

2> set the IE SCPTM Packet Counter Value in the UE TEST LOOP MODE F SCPTM PACKET COUNTER RESPONSE message to the value of the state variable SCPTM_PACKET_COUNTER;

2> send the UE TEST LOOP MODE F SCPTM PACKET COUNTER RESPONSE message.

2> else:

2> the UE behaviour is unspecified.

6 Message definitions and contents

In this clause, only TC protocol messages are described. TC messages are intended to be sent using the *DLInformationTransfer* and *ULInformationTransfer* procedures, see TS 36.331 [25], sub clause 5.6.1 and 5.6.2.

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 [5], clause 11.

NOTE 3: E-UTRA, UTRA and GSM/GPRS test control messages use the same protocol discriminator value ("1111"). Following message type value series are reserved for GSM/GPRS testing commands as specified by TS 44.014 [33]: 0000xxxx, 0001xxxx and 0010xxxx where x represent 0 or 1. Following message type value series are reserved for UTRA testing commands as specified by TS 34.109 [11]: 0100xxxx where x represent 0 or 1. For E-UTRA test commands the message type value series 1000xxxx and 1001xxxx are reserved, where the message type values 10010000, 10010001, 10010010 and 10010011 are reserved for possible future use by the antenna test function defined in TR 36.978 for use by the two-stage MIMO OTA test method. Should MIMO OTA conformance tests be defined in the future which are applicable to the two-stage method then the message definitions in TR 36.978 may be moved to this specification.

6.1 CLOSE UE TEST LOOP

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 test loop mode		M	V	1
UE test loop mode A LB setup		CV-ModeA	LV	1-25
UE test loop mode B LB setup		CV-ModeB	V	1
UE test loop mode C setup		CV-ModeC	V	3
UE test loop mode D setup		CV-ModeD	LV-E	3-803
UE test loop mode E setup		CV-ModeE	LV	2-18
UE test loop mode F setup		CV-ModeF	V	2

Condition	Explanation
CV-ModeA	This IE is mandatory present if the IE "UE test loop mode" is set to UE test loop Mode A. Else it shall be absent.
CV-ModeB	This IE is mandatory present if the IE "UE test loop mode" is set to UE test loop Mode B. Else it shall be absent.
CV-ModeC	This IE is mandatory present if the IE "UE test loop mode" is set to UE test loop Mode C. Else it shall be absent.
CV-ModeD	This IE is mandatory present if the IE 'UE test loop mode' is set to UE test loop Mode D. Else it shall be absent.
CV-ModeE	This IE is mandatory present if the IE 'UE test loop mode' is set to UE test loop Mode E. Else it shall be absent.
CV-ModeF	This IE is mandatory present if the IE 'UE test loop mode' is set to UE test loop Mode F. Else it shall be absent.

where message type is:

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

where UE test loop mode is:

8	7	6	5	4	3	2	1	bit no.
0	0	0	0	0	X3	X2	X1	octet 1

X3=0 and X2=0 and X1=0 then UE test loop mode A is selected.

X3=0 and X2=0 and X1=1 then UE test loop mode B is selected.

X3=0 and X2=1 and X1=0 then UE test loop mode C is selected.

X3=0 and X2=1 and X1=1 then UE test loop mode D is selected.

X3=1 and X2=0 and X1=0 then UE test loop mode E is selected.

X3=1 and X2=0 and X1=1 then UE test loop mode F is selected.

Other combinations of X1 and X2 and X3 are reserved for future versions of the protocol.

where UE test loop mode A LB setup is:

	8 7 6 5 4 3 2 1	
	Length of UE test loop mode A LB setup list in bytes	Octet 1
	LB setup list	Octet 2 Octet N*3+1

N is the number of LB entities in the LB setup list and is less than or equal to MAX_ModeA_LB_entities.

where LB setup list is:

	8	7	6	5	4	3	2	1	
	\multicolumn{8}{c	}{LB setup DRB IE#1}	Octet 2
									Octet 3
									Octet 4
	\multicolumn{8}{c	}{LB setup DRB IE#2}	Octet 5
									Octet 6
									Octet 7
	…	
	\multicolumn{8}{c	}{LB setup DRB IE#N}	Octet N*3-1
									Octet N*3
									Octet N*3+1

where 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
\multicolumn{3}{c	}{Reserved}	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.

Q4..Q0 = Data Radio Bearer identity number, 1..32 (binary coded value of "DRB-Identity" -1, Q4 is most significant bit and Q0 least significant bit), where Data Radio Bearer identity identifies the radio bearer, see TS 36.331 [25].

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 [24] clause 6.2.1.

And where UE test loop mode B setup is:

	8 7 6 5 4 3 2 1	
	IP PDU delay	Octet 1

Where IP PDU delay is:

8	7	6	5	4	3	2	1	bit no.
T7	T6	T5	T4	T3	T2	T1	T0	octet 1

T7..T0 = value of T_delay_modeB timer 0..255 seconds (binary coded, T7 is most significant bit and T0 least significant bit).

NOTE: For E-UTRAN to CDMA2000 test cases, the SS should not sent any downlink U-plane data in E-UTRAN after sending a CLOSE UE TEST LOOP message with an IP PDU delay parameter set to value different from zero. In CDMA2000, the T_delay_modeB timer is not used to buffer downlink U-plane data, and at expiry of this timer, if there are buffered data received while in E-UTRAN, it is not specified what the UE will do with these data. See clause 7.3 for the definition of the T_delay_modeB timer.

And where UE test loop mode C setup is:

8 7 6 5 4 3 2 1	
MTCH ID	octet 1
	octet 2
	octet 3

Where MTCH ID is:

8	7	6	5	4	3	2	1	bit no.
A7	A6	A5	A4	A3	A2	A1	A0	Octet 1
Reserved				M3	M2	M1	M0	octet 2
Reserved			L4	L3	L2	L1	L0	octet 3

A7..A0 = MBSFN area identity 0.. 255 (binary coded, A7 is most significant bit and A0 least significant bit). See Note.

M3..M0 = MCH identity 0.. 14 (binary coded, M3 is most significant bit and M0 least significant bit). See Note.

L4..L0 = Logical channel identity 0..28 (binary coded, L4 is most significant bit and L0 least significant bit), See Note.

NOTE: A MTCH is identified by the MCH in the *pmch-InfoList-r9* (0..14) and the *logicalChannelIdentity-r9* (0..28) in the *mbms-SessionInfoList-r9* of the MCH. The pmch-Info-List-r9 is broadcasted on the MCCH in the *MBSFNAreaConiguration* message, see TS 36.331 [25] clause 5.8. The MBSFN area the UE is to monitor is checked against the *mbsfn-AreaId-r9* of the cell, which is broadcasted in the SystemInformationBlockType13-r9 message, see TS 36.331 [25] clause 6.3.1.

And where UE test loop mode D setup is:

8 7 6 5 4 3 2 1	
Length of UE test loop mode D setup contents in bytes	Octet 1
	Octet 2
Discovery Announce or Monitor	Octet 3
Monitor list	Octet 4
	Octet N*2+3

where Discovery Announce or Monitor is:

8	7	6	5	4	3	2	1	bit no.
Reserved							D0	octet 1

D0 = 0 is used to trigger the UE to continuously monitor the discovery messages on the PSDCH, and D0 = 1 is used to trigger the UE to continuously announce a discovery message on the PSDCH.

And where Monitor list is:

8 7 6 5 4 3 2 1	
ProSe App Code (LSBs) #1 to monitor	Octet 4
	Octet 5
ProSe App Code (LSBs) #2 to monitor	Octet 6
	Octet 7
…	
ProSe App Code (LSBs) #N to monitor	Octet N*2+2
	Octet N*2+3

N = PROSE_DISCOVERY_MONITOR_N is the number of entities in the list of ProSe App Codes to individually monitor, and is less than or equal to MAX_ModeD_Monitor_Entities.

Where ProSe App Code (LSBs) #n to monitor is:

8	7	6	5	4	3	2	1	bit no.
A7	A6	A5	A4	A3	A2	A1	A0	octet 1
Reserved							A8	octet 2

A8…A0 = LSBs of the ProSe App Code 0..512 to monitor individually. The test system shall ensure that each entity in the list of ProSe App Code (LSBs A8…A0) to monitor is unique.

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

where Communication Transmit or Receive is:

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

E0 = 0 is used to trigger the UE to continuously monitor and receive ProSe Direct Communication message (on STCH and PSCCH), and E0 = 1 is used to trigger the UE to start continuous transmitting ProSe Direct Communication messages (on STCH).

And where Monitor list is:

8 7 6 5 4 3 2 1	
Group Destination ID #1 to monitor	Octet 3
Group Destination ID #2 to monitor	Octet 4
…	
Group Destination ID #N to monitor	Octet N+2

N = PROSE_COMMUNICATION_MONITOR_N is the number of entities in the list of Group Destination ID to individually monitor, and is less than or equal to MAX_ModeE_Monitor_Entities.

Where Group Destination ID #n to monitor is:

8	7	6	5	4	3	2	1	bit no.
A7	A6	A5	A4	A3	A2	A1	A0	octet 1

A7…A0 = Group Destination ID 0..255 to monitor individually. The test system shall ensure that each entity in the list of Group Destination ID to monitor is unique.

And where UE test loop mode F setup is:

	8 7 6 5 4 3 2 1	
	SC-MTCH ID	octet 1
		octet 2

Where SC-MTCH ID is:

8	7	6	5	4	3	2	1	bit no.
A7	A6	A5	A4	A3	A2	A1	A0	octet 1
A15	A14	A13	A12	A11	A10	A9	A8	octet 2

A15..A0 = SC-PTM g-RNTI-r13 0..65535 (binary coded, A15 is most significant bit and A0 least significant bit). A SC-MTCH is identified by the *g-RNTI-r13* (0..65535) in the *sc-mtch-Infolist-r13*. The *sc-mtch-Infolist-r13* is broadcasted on SC-MCCH in the *SCPTM-Configuration* message, see TS 36.331 [25] clause 5.8a.

6.2 CLOSE UE TEST LOOP 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	1/2
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	1/2
Message type		M	V	1

where message type is:

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

6.3 OPEN UE TEST LOOP

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	0	0	0	0	1	0	octet 1

6.4 OPEN UE TEST LOOP 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	1/2
Skip indicator	TS 24.007 [5], sub clause 11.2.3.1.2	M	V	1/2
Message type		M	V	1

where message type is:

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

6.5 ACTIVATE TEST MODE

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 test loop mode		M	V	1

where message type is:

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

And where UE test loop mode is specified in clause 6.1.

NOTE: No specific UE action is currently specified upon reception of the "UE test loop mode" IE.

6.6   ACTIVATE TEST MODE 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	0	0	0	1	0	1	octet 1

6.7   DEACTIVATE TEST MODE

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	0	0	0	1	1	0	octet 1

6.8   DEACTIVATE TEST MODE 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	0	0	0	1	1	1	octet 1

6.9 RESET UE POSITIONING STORED INFORMATION

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
UE Positioning Technology		M	V	1

where message type is:

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

where UE Positioning Technology is a single octet IE:

8	7	6	5	4	3	2	1	bit no.
UE Positioning Technology								octet 1

UE Positioning Technology value

Bits
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0   AGNSS
0 0 0 0 0 0 0 1   OTDOA

All other cause values are reserved for future use.

6.10 UE TEST LOOP MODE C MBMS 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	0	0	1	0	0	1	octet 1

6.11 UE TEST LOOP MODE C MBMS 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
MBMS Packet Counter Value		M	V	4

where message type is:

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

And where MBMS Packet Counter Value is:

C31	C30	C29	C28	C27	C26	C25	C24	octet 1
C23	C22	C21	C20	C19	C18	C17	C16	octet 2
C15	C14	C13	C12	C11	C10	C9	C8	octet 3
C7	C6	C5	C4	C3	C2	C1	C0	octet 4

C31..C0 = MBMS packet counter value 0.. 4294967295 (binary coded, C31 is most significant bit and C0 least significant bit).

6.12 UPDATE UE LOCATION INFORMATION

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
ellipsoidPointWithAltitude	TS 36.355 [37], subclause 6.4.1.	M	V	8
horizontalVelocity	TS 36.355 [37], subclause 6.4.1.	M	V	3
gnss-TOD-msec	TS 36.355 [37], subclause 6.5.2.6.	M	V	3

where message type is:

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

And where ellipsoidPointWithAltitude is:

8	7	6	5	4	3	2	1	bit no.
L1	DLA22	DLA21	DLA20	DLA19	DLA18	DLA17	DLA16	octet 1
DLA15	DLA14	DLA13	DLA12	DLA11	DLA10	DLA9	DLA8	octet 2
DLA7	DLA6	DLA5	DLA4	DLA3	DLA2	DLA1	DLA0	octet 3
DLO23	DLO22	DLO21	DLO20	DLO19	DLO18	DLO17	DLO16	octet 4
DLO15	DLO14	DLO13	DLO12	DLO11	DLO10	DLO9	DLO8	octet 5
DLO7	DLO6	DLO5	DLO4	DLO3	DLO2	DLO1	DLO0	octet 6
A1	AD14	AD13	AD12	AD11	AD10	AD9	AD8	octet 7
AD7	AD6	AD5	AD4	AD3	AD2	AD1	AD0	octet 8

L1 = 'latitudeSign' value 0=north and 1=south

DLA22..DLA0 = 'degreesLatitude' value 0..8388607 (binary coded, DLA22 is most significant bit and DLA0 is least significant bit).

DLO23..DLO0 = 'degreesLongitude' value -8388608..8388607 (two"s complement binary coded as per ASN.1 encoding of an integer value, DLO23 is most significant bit and DLO0 is least significant bit).

A1 = 'altitudeDirection' value 0=height and 1=depth

AD14..AD0 = 'altitude' value 0..32767 (binary coded, AD14 is most significant bit and AD0 is least significant bit).

And where horizontalVelocity is:

8	7	6	5	4	3	2	1	bit no.
B8	B7	B6	B5	B4	B3	B2	B1	Octet 1
B0	HS10	HS9	HS8	HS7	HS6	HS5	HS4	octet 2
HS3	HS2	HS1	HS0	Reserved				octet 3

B8..B0 = 'bearing' value 0..359 (binary coded, B8 is most significant bit and B0 is least significant bit).

HS10..HS0 = 'horizontalSpeed' value 0..2047 (binary coded, HS10 is most significant bit and HS0 is least significant bit).

And where nss-TOD-msec is:

8	7	6	5	4	3	2	1	bit no.
Reserved		T21	T20	T19	T18	T17	T16	octet 1
T15	T14	T13	T12	T11	T10	T9	T8	octet 2
T7	T6	T5	T4	T3	T2	T1	T0	octet 3

T21..T0 = 'gnss-TOD-msec' value 0.. 3599999 (binary coded, T21 is most significant bit and T0 is least significant bit).

6.13 UE TEST LOOP PROSE 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	0	0	1	1	0	0	octet 1

6.14 UE TEST LOOP PROSE 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
ProSe Direct Discovery Packet Counter(s) Value		CV-ModeD	TLV-E	$4*(N^D+1)+3$
ProSe Direct Communication PSCCH Packet Counter(s) Value		CV-ModeE	TLV	$4*(N^C+1)+2$
ProSe Direct Communication STCH Packet Counter(s) Value		CV-ModeE	TLV	$4*(N^C+1)+2$

Condition	Explanation
CV-ModeD	This IE is mandatory present if TEST_LOOP_MODE_D_ACTIVE is TRUE else it shall be absent. N^D = PROSE_DISCOVERY_MONITOR_N.
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	0	0	1	1	0	1	octet 1

And where ProSe Direct Discovery Packet Counter(s) Value is:

8 7 6 5 4 3 2 1	
ProSe Direct Discovery Packet Counter(s) Value type	octet 1
Length of ProSe Direct Discovery Packet Counter(s) Value contents in bytes	octets 2-3
ProSe Direct Discovery Packet Counter IE #0	octet 4 octet 5 octet 6 octet 7
…	
ProSe Direct Discovery Packet Counter IE #N^D	octet $4+4*N^D$ octet $5+4*N^D$ octet $6+4*N^D$ octet $7+4*N^D$

And where ProSe Direct Discovery Packet Counter(s) Value type is:

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

And where ProSe Direct Discovery Packet Counter IE #n is:

C31	C30	C29	C28	C27	C26	C25	C24	octet 1
C23	C22	C21	C20	C19	C18	C17	C16	octet 2
C15	C14	C13	C12	C11	C10	C9	C8	octet 3
C7	C6	C5	C4	C3	C2	C1	C0	octet 4

C31..C0 = PSDCH packet counter value 0.. 4294967295 (binary coded, C31 is most significant bit and C0 least significant bit) corresponding to PSDCH_PACKET_COUNTER(SL_ID=n).

And where ProSe Direct Communication PSCCH Packet Counter(s) Value is:

8	7	6	5	4	3	2	1	
ProSe Direct Communication PSCCH Packet Counter(s) Value type								octet 1
Length of ProSe Direct Communication PSCCH Packet Counter(s) Value contents in bytes								octet 2
ProSe Direct Communication PSCCH Packet Counter IE #0								octet 3 octet 4 octet 5 octet 6
...								
ProSe Direct Communication 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 ProSe Direct Communication 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 ProSe Direct Communication 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 ProSe Direct Communication STCH Packet Counter(s) Value is:

8	7	6	5	4	3	2	1	
ProSe Direct Communication STCH Packet Counter(s) Value type								octet 1
Length of ProSe Direct Communication STCH Packet Counter(s) Value in bytes								octet 2
ProSe Direct Communication STCH Packet Counter IE #0								octet 3 octet 4 octet 5 octet 6
...								
ProSe Direct Communication 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 ProSe Direct Communication 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 ProSe Direct Communication 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).

6.15   UE TEST LOOP MODE F SCPTM 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	0	0	1	1	1	0	octet 1

6.16   UE TEST LOOP MODE F SCPTM 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
SCPTM Packet Counter Value		M	V	4

where message type is:

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

And where SCPTM Packet Counter Value 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 = SCPTM packet counter value 0.. 4294967295 (binary coded,F31 is most significant bit and F0 least significant bit).

7 Variables, constants and timers

7.1 State variables

BUFFER_IP_PDUs

This boolean state variable is used to control if UE is to buffer IP PDUs or not.

TEST_LOOP_MODE_B_ACTIVE

This boolean state variable is used to indicate if UE test loop mode B is active. TEST_LOOP_MODE_B_ACTIVE shall be set to FALSE when UE is switched on.

CDMA2000_INITIATED

This boolean state variable is used to indicate if IP control signalling was initiated by the network on CDMA2000.

TEST_LOOP_MODE_C_ACTIVE

This boolean state variable is used to indicate if UE test loop mode C is active. TEST_LOOP_MODE_C_ACTIVE shall be set to FALSE when UE is switched on.

MBMS_PACKET_COUNTER

This 32-bit integer state variable is used to count successful reception of MBMS packets while UE test loop mode C is activate. MBMS_PACKET_COUNTER shall be set to zero when UE is switched on.

TEST_LOOP_MODE_D_ACTIVE

This boolean state variable is used to indicate if UE test loop mode D is active. TEST_LOOP_MODE_D_ACTIVE shall be set to FALSE when UE is switched on.

TEST_LOOP_MODE_E_ACTIVE

This boolean state variable is used to indicate if UE test loop mode E is active. TEST_LOOP_MODE_E_ACTIVE shall be set to FALSE when UE is switched on.

PROSE_DISCOVERY_MONITOR_N

This 9-bit integer state variable is used to indicate the number of entities in the list of ProSe App Codes to individually monitor as configured in the CLOSE_UE_TEST_LOOP message for test loop mode D. The variable shall be set to 0 when UE is switched on.

PSDCH_PACKET_COUNTER(SL_ID)

This 32-bit integer state variable is used to count successful reception of SL-DCH MAC SDUs while UE test loop mode D is activated and TEST_LOOP_MODE_D_TRIGGER is set to MONITOR. The counter variable is indexed with SL_ID = 0…(MAX_ModeD_Monitor_Entities). PSDCH_PACKET_COUNTER(SL_ID) shall be set to zero when UE is switched on.

If configured value of variable PROSE_DISCOVERY_MONITOR_N is set to 0 then UE counts all received SL-DCH MAC SDUs as part of just one counter PSDCH_PACKET_COUNTER(0) irrespective of the application code.

PROSE_COMMUNICATION_MONITOR_N

This 4-bit integer state variable is used to indicate the number of entities in the list of Group Destination IDs to individually monitor as configured in the CLOSE_UE_TEST_LOOP message for test loop mode E. The variable shall be set to 0 when UE is switched on.

STCH_PACKET_COUNTER(SL_ID)

This 32-bit integer state variable is used to count successful reception of STCH PDCP SDUs while UE test loop mode E is activated and TEST_LOOP_MODE_E_TRIGGER is set to RECEIVE. The counter variable is indexed with SL_ID = 0…(MAX_ModeE_Monitor_Entities). STCH_PACKET_COUNTER(SL_ID) shall be set to zero when UE is switched

on. If configured value of variable PROSE_COMMUNICATION_MONITOR_N is set to 0 then UE counts all STCH PDCP SDU as part of one counter STCH_PACKET_COUNTER(0)irrespective of Group Destination IDs.

PSCCH_PACKET_COUNTER(SL_ID)

This 32-bit integer state variable is used to count successful reception of PSCCH transport blocks while UE test loop mode E is activated and TEST_LOOP_MODE_E_TRIGGER is set to RECEIVE. The counter variable is indexed with SL_ID = 0…(MAX_ModeE_Monitor_Entities). PSCCH_PACKET_COUNTER(SL_ID) shall be set to zero when UE is switched on. If configured value of variable PROSE_COMMUNICATION_MONITOR_N is set to 0 then UE counts all PSCCH PHY transport blocks as part of one counter PSCCH_PACKET_COUNTER(0) irrespective of Group Destination IDs.

TEST_LOOP_MODE_F_ACTIVE

This boolean state variable is used to indicate if UE test loop mode F is active. TEST_LOOP_MODE_F_ACTIVE shall be set to FALSE when UE is switched on.

SCPTM_PACKET_COUNTER

This 32-bit integer state variable is used to count successful reception of MBMS packets while UE test loop mode F is activate. SCPTM_PACKET_COUNTER shall be set to zero when UE is switched on.

7.2   Constants

MAX_ModeA_LB_entities = 8.

MAX_ModeD_Monitor_Entities = 400.

MAX_ModeE_Monitor_Entities = 16.

7.3   Timers

T_delay_modeB

In E-UTRAN, UTRAN and GERAN, this timer is used to delay the transmission of the first IP PDU when UE test loop function is operated in UE test loop mode B. In CDMA2000, this timer is used to temporarily interrupt UE test loop mode B operation so as to allow IP control signalling required before data transmission. The timer value is configured by the UE test loop mode B setup IE in the CLOSE UE TEST LOOP message.

7.4   Configurable parameters

DRB_ID(LB_ID)

This parameter is used by the UE when operating in UE test loop mode A to map a bi-directional Data Radio bearer to a loopback entity. LB_ID = 0.. (MAX_ModeA_LB_entities-1). The value is configured when UE receives the CLOSE UE TEST LOOP message DRB_ID(LB_ID)=0 indicate that no DRB is mapped to the loopback identity.

UL_PDCP_SDU_scaling(LB_ID)

This parameter is used to enable/disable scaling of UL PDCP SDU size. If UL_PDCP_SDU_scaling is set to TRUE then scaling based on UL_PDCP_SDU_size(LB_ID) parameter is performed, otherwise no scaling is done (UL PDCP SDU size is equal to received DL PDCP SDU size). The value is configured by the UE test loop mode A setup IE in the CLOSE UE TEST LOOP message.

UL_PDCP_SDU_size(LB_ID)

This parameter is used to set the UL PDCP SDU size for returned UL PDCP SDUs on the data radio bearer with data radio bearer ID equal to DRB_ID(LB_ID). This parameter is only applicable for UE test loop mode A and when state variable UL_PDCP_SDU_scaling(LB_ID) is TRUE. The value is configured by the UE test loop mode A setup IE in the CLOSE UE TEST LOOP message.

PROSE_DISCOVERY_APPCODE(SL_ID)

This parameter is used by the UE when operating in UE test loop mode D and TEST_LOOP_MODE_D_TRIGGER is set to MONITOR to map the LSBs of the ProSe App Code to monitor to the entity index SL_ID = 0…(MAX_ModeD_Monitor_Entities-1). The value is configured in the CLOSE UE TEST LOOP message.

PROSE_COMMUNICATION_DEST_ID(SL_ID)

This parameter is used by the UE when operating in UE test loop mode E and TEST_LOOP_MODE_E_TRIGGER is set to RECEIVE to map the Group Destination ID to monitor to the entity index SL_ID = 0…(MAX_ModeE_Monitor_Entities-1). The value is configured in the CLOSE UE TEST LOOP message.

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 36.523-3 [32]. 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.

System Simulator

Upper Tester within TTCN MTC

EMMI Port (Logical Interface)

EMMI Component within SS Adaptation Layer

Hardware Driver

Physical EMMI Interface

e.g. USB

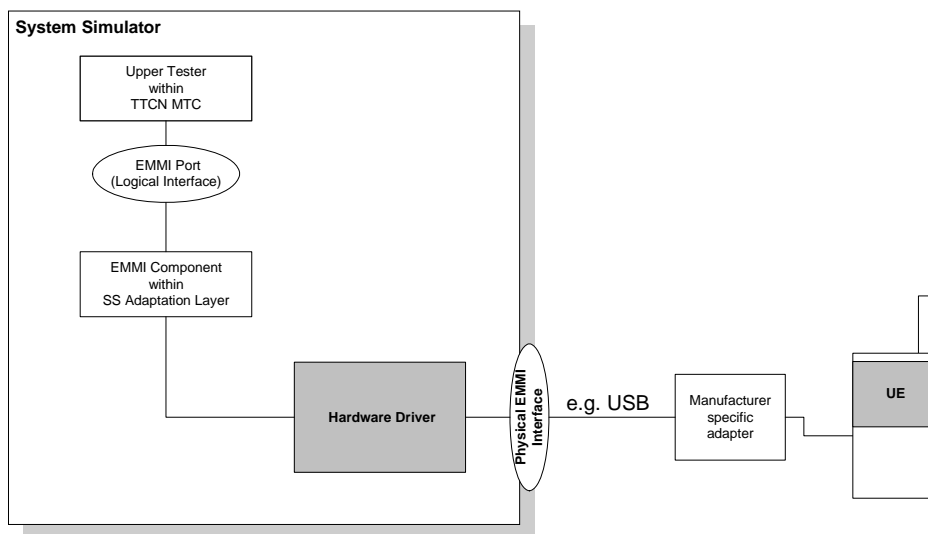Manufacturer specific adapter

UE

Figure 8-1: An example of EMMI and its use for automation of signalling testing

Annex A (informative):
Void

Void.

Annex B (informative): Change history

Change history								
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2008-01	RAN5#38	R5-080327			Initial skeleton proposal	-	-
2008-05	RAN5#39	R5-081117			First draft (text proposal)	-	0.0.1
2008-05	RAN5#39	R5-081343			Outcome of RAN5 #39 meeting agreements	0.0.1	0.1.0
2008-08	RAN5#40	R5-083498			Outcome of RAN5 #40 meeting agreements	0.1.0	1.0.0
2008-10	RAN5#40 bis	R5-084269			Outcome of RAN5 #40"bis" meeting agreements	1.0.0	1.1.0
2008-11	RAN5#41	R5-085324			Outcome of RAN5 #41 meeting agreements	1.1.0	Draft 2.0.0
2008-11	RAN5#41	R5-085526			Outcome of post-RAN5 #41 email agreements	Draft 2.0.0	2.0.0
2008-12	RAN#42	R5-080885			Approval of version 2.0.0 at RAN#42, then put to version 8.0.0.	2.0.0	8.0.0
2009-01	-	-			Editorial corrections.	8.0.0	8.0.1
2009-03	RAN43	R5-086335	0001	-	Corrections to 36.509	8.0.1	8.1.0
2009-03	RAN43	R5-086371	0002	-	Correction to 36.509 v8.0.0	8.0.1	8.1.0
2009-03	RAN43	R5-090433	0003	-	Update of Abbreviations in 36.509	8.0.1	8.1.0
2009-03	RAN43	R5-090700	0004	-	Corrections to 36.509	8.0.1	8.1.0
2009-04	RAN5#43	R5-092315	0005	-	Corrections to section 6 of 36.509.	8.1.0	8.2.0
2009-04	RAN5#43	R5-092361	0006		Clarification to TS 36.509	8.1.0	8.2.0
2009-04	RAN5#43	R5-092511	0007		Corrections and clarifications to TS 36.509	8.1.0	8.2.0
2009-04	RAN5#43	R5-092766	0008		Support of mandatory AT commands via EMMI	8.1.0	8.2.0
2009-08	RAN5#44	R5-094063	0009	-	Clarification on UL data in UE test loop mode	8.2.0	8.3.0
2009-08	RAN5#44	R5-094181	0010	-	Editorial and More corrections to TS 36.509	8.2.0	8.3.0
2009-08	RAN5#44	R5-094309	0011	-	Clarification to TS 36.509 activation and de-activation of UE Test Mode	8.2.0	8.3.0
2009-10	RAN5#45	R5-096062	0012	-	Clarification on encoding of DRB Identity in LB setup DRB IE	8.3.0	8.4.0
2009-10	RAN5#45	R5-096711	0013	3	IP control signalling in UE test mode	8.3.0	8.4.0
2010-03	RAN5#46	R5-100616	0014	-	Clarification of UL and DL PDCP SDU size	8.4.0	8.5.0
2010-03	RAN#47	-	-	-	Moved to v9.0.0 with no change	8.5.0	9.0.0
2010-06	RAN#48	R5-103164	0015	-	Corrections and clarifications to TS 36.509 Rel-9	9.0.0	9.1.0
2010-09	RAN#49	R5-104118	0016	-	Addition of RESET command for LCS	9.1.0	9.2.0
2010-12	RAN#50	R5-106154	0017	-	Correction to the section 5.4.2.3 of TS36.509	9.2.0	9.3.0
2011-06	RAN#52	R5-112397	0019	-	Additional UE positioning test mode procedures for OTDOA minimum performance test cases	9.3.0	9.4.0
2011-06	RAN#52	R5-112675	0022	-	Introduction of UE Test Loop Mode C for LTE MBMS testing	9.3.0	9.4.0
2011-06	RAN#52	R5-112700	0021	-	Corrections to TS 36.509 Rel-9	9.3.0	9.4.0
2011-09	RAN#53	R5-113241	0023		Update of IP PDU handling when in CDMA2000 mode	9.4.0	9.5.0
2011-09	RAN#53	R5-113750	0024		Update of LTE MBMS test function	9.4.0	9.5.0
2012-09	RAN#57	R5-123083	0025	-	Clarification of DL IP Header	9.5.0	9.6.0
2012-09	RAN#57	R5-123791	0026	-	Addition of Location Information functionality to 36.509	9.6.0	10.0.0
2013-06	RAN#60	R5-132057	0027	-	Removal of FFS from UPDATE UE LOCATION INFORMATION support	10.0.0	10.1.0
2014-03	RAN#63	R5-140999	0028	-	Update to UE test mode procedure for CSG proximity testing	10.1.0	10.2.0
2014-09	RAN#65	R5-144454	0029	-	Reservation of message types for antenna test function	10.2.0	10.3.0
2015-06	RAN#68	-	-	-	moved to v11.0.0 with no change	10.3.0	11.0.0
2015-06	RAN#68	R5-152059	0141	1	Addition of Device to Device Proximity Services Test Loop	11.0.0	12.0.0
2015-09	RAN#69	R5-153211	0142	-	Correction to Device to Device Proximity Services Test Loop	12.0.0	12.1.0
2015-09	RAN#69	R5-153223	0143	-	Add minimum loopback buffer size requirement for Category 0 UE	12.0.0	12.1.0
2015-09	RAN#69	R5-153970	0144	1	Update to Loopback data procedure with IMS signalling	12.0.0	12.1.0
2015-12	RAN#70	R5-155362	0149	-	ProSe test loop modes Enhancements	12.1.0	12.2.0
2016-03	RAN#71	R5-160768	0151	1	ProSe test loop modes Clarification\Updates	12.2.0	12.3.0
2016-06	RAN#72	R5-162059	0153	-	Various updates	12.3.0	12.4.0
2016-06	RAN#72	R5-162132	0154	-	D2D Prose: Various updates	12.3.0	12.4.0
2016-06	RAN#72	R5-162144	0155	-	Handling of multi-PDNs-configured UEs	12.3.0	12.4.0
2016-06	RAN#72	R5-162908	0156	1	Updates to Clause 6.1 CLOSE UE TEST LOOP and 6.14 UE TEST LOOP PROSE PACKET COUNTER RESPONSE	12.3.0	12.4.0
2016-06	RAN#72	R5-162909	0158	1	Update of 36509 modes E&D D2D	12.3.0	12.4.0
2016-06	RAN#72	R5-163091	0157	1	introducing UE Test loop mode F	12.4.0	13.0.0
2016-09	RAN#73	R5-165595	0163	-	Adding PDU definitions for UE TEST LOOP MODE F SCPTM PACKET COUNTER REQUEST/RESPONSE	13.0.0	13.1.0
2016-09	RAN#73	R5-165933	0162	1	Introduction of minimum loopback buffer size for Cat M1	13.0.0	13.1.0

History

Document history		
V13.0.0	August 2016	Publication
V13.1.0	November 2016	Publication