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LTE;
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Subscriber and equipment trace;
Trace data definition and management
(3GPP TS 32.423 version 9.6.0 Release 9)**



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Foreword

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Introduction

The present document is part of a TS-family covering the 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management, as identified below:

TS 32.421: "Subscriber and equipment trace; Trace concepts and requirements";

TS 32.422: "Subscriber and equipment trace; Trace control and configuration management";

TS 32.423: "Subscriber and equipment trace; Trace data definition and management";

Subscriber and MS Trace provide very detailed information at call level on one or more specific mobile(s). This data is an additional source of information to Performance Measurements and allows going further in monitoring and optimisation operations.

Contrary to Performance Measurements, which are a permanent source of information, Trace is activated on user demand for a limited period of time for specific analysis purpose

Trace plays a major role in activities such as determination of the root cause of a malfunctioning mobile, advanced troubleshooting, optimisation of resource usage and quality, RF coverage control and capacity improvement, dropped call analysis, Core Network and UTRAN end to end 3G procedure validation.

The capability to log data on any interface at call level for a specific user (e.g. IMSI) or mobile type (e.g. IMEI or IMEISV) allows getting information which cannot be deduced from Performance Measurements such as perception of end-user QoS during his call (e.g. requested QoS vs. provided QoS), correlation between protocol messages and RF measurements, or interoperability with specific mobile vendors.

Moreover, Performance Measurements provide values aggregated on an observation period, Subscriber and Equipment Trace give instantaneous values for a specific event (e.g. call, location update, etc.).

If Performance Measurements are mandatory for daily operations, future network planning and primary trouble shooting, Subscriber and MS Trace is the easy way to go deeper into investigation and 3G network optimisation.

In order to produce this data, Subscriber and MS trace are carried out in the NEs, which comprise the network. The data can then be transferred to an external system (e.g. an Operations System (OS) in TMN terminology, for further evaluation).

1 Scope

The present document describes Trace data definition and management. It covers the trace records content, their format and transfer.

The objectives of the present document are:

- To provide the descriptions for a standard set of Trace data;
- To define the common format of trace records; and
- To define a method for Trace results reporting across the management interfaces.

Clause 4 details the various Trace records content, Annex A provides Trace report file format, Annex B provides the trace report file conventions and transfer procedure, Annex C provides the trace reporting functional architecture and Annex D provides some trace files examples. Trace concepts and requirements are covered in TS 32.421 [2] while Trace control and configuration management are described in 3GPP TS 32.422 [3].

The definition of Trace data is intended to result in comparability of Trace data produced in a multi-vendor wireless UMTS and/or EPS network.

The following is beyond the scope of the present document, and therefore the present document does not describe:

- Any notification mechanisms or IRPs for trace. Only file transfer mechanism is specified for trace data transfer;
- Any data compression mechanisms for trace data transfer;
- Any Trace capability limitations (e.g. maximum number of simultaneous traced mobiles for a given NE).

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 TS 32.101: "Telecommunication management; Principles and high level requirements".
- [2] 3GPP TS 32.421: "Telecommunication management; Subscriber and equipment trace: Trace concepts and requirements."
- [3] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace: Trace control and configuration management".
- [4] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [5] W3C Recommendation "Extensible Markup Language (XML) 1.0" (Second Edition, 6 October 2000) <http://www.w3.org/TR/2000/REC-xml-20001006>
- [6] W3C Recommendation "Namespaces in XML" (14 January 1999) <http://www.w3.org/TR/1999/REC-xml-names-19990114>
- [7] W3C Recommendation "XML Schema Part 0: Primer" (2 May 2001) <http://www.w3.org/TR/2001/REC-xmlschema-0-20010502>
- [8] W3C Recommendation "XML Schema Part 1: Structures" (2 May 2001) <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502>

- [9] W3C Recommendation "XML Schema Part 2: Datatypes" (2 May 2001)
<http://www.w3.org/TR/2001/REC-xmlschema-2-20010502>
- [10] International Standard ISO 8601: 1988 (E) "Representations of dates and times" (1988-06-15)
<http://www.iso.ch/markete/8601.pdf>
- [11] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".
- [12] 3GPP TS 32.622: "Telecommunication management; Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Network Resource Model (NRM)".
- [13] 3GPP TS 29.274: '3GPP Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3'
- [14] 3GPP TS 29.212: 'Policy and Charging Control over Gx reference point'
- [15] 3GPP TS 29.273: 'Evolved Packet System (EPS); 3GPP EPS AAA interfaces'

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 32.421 [2] and 3GPP TS 32.422 [3] apply.

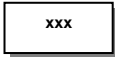
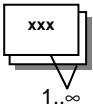





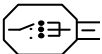
Minimum Level of detail: Allows for retrieval of a decoded subset of the IEs contained in the signalling interface messages.

Medium Level of detail: Allows for retrieval of the decoded subset of the IEs contained in the signalling interface messages in the Minimum Level plus a selected set of decoded radio measurement IEs.

Maximum Level of detail: Allows for retrieval of signalling interface messages within the Trace Scope in encoded format.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

| | |
|---|--|
|  | : Element named xxx The maximum number of occurrence is 1 |
|  | : Element named xxx The maximum number of occurrence is unbounded |
|  | : Global element |
|  | The XML element has a value part |
|  | : Required element |
|  | : Optional element |
|  | : Sequence |
|  | : Choice |

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [4] and 3GPP TS 32.101 [1] apply.

4 Trace Record Contents

4.1 General

The trace reference, trace type and operation system identification are all provided on trace activation.

Each record may contain an MSC Server, MGW, SGSN, GGSN, S-CSCF, P-CSCF, UTRAN, HSS, MME, Serving GW, or E-UTRAN event record. A key is included in the table indicating whether or not the field is mandatory.

The following table shows the template for trace record description for minimum and medium trace depth:

| Interface name | Protocol name | IE name | Message name(s) | Trace depth | | Notes |
|----------------|---------------|---------|-----------------|-------------|-----|-------|
| | | | | Min | Med | |
| | | | | | | |

Interface name: Contains the name of the interface, where the IE is available.

Protocol name: Contains the protocol name on the interface, where the IE is available.

IE name: The name of the Information Element, which should be decoded.

Message name(s): The name of the message(s), where the IE is included.

Trace depth: Shows in which trace depth the IE should be recorded. It also classifies whether the IE is mandatory in the trace record or not (M, O or X: meaning described in the previous table)

| | | |
|-----------|-----------------------|---|
| M | Mandatory | This field must be in the trace record if it is available, i.e. if the message appears during the trace recording session and the IE is present in the message. |
| O | Optional | This field is optional and its support is a matter for agreement between equipment manufacturer and network operator. |
| X | Not applicable | This field is not required in this instance. |
| CM | Conditional Mandatory | This field must be in the trace record if it is available and the condition is met. |

NOTE: Any kind of comments related to the IE can be made here. Also this is the placeholder for referencing the relevant 3GPP specifications, which define the IE.

4.2 MSC Server Trace Record Content

The following table shows the trace record content for MSC Server.

The trace record is the same for management based activation and for signalling based activation.

For MSC Server, the Minimum level of detail shall be supported.

| Interface name | Prot. name | IE name | Message name(s) | Trace depth | | Notes |
|------------------------------|---|------------------------------|---|--------------|---|------------------------|
| | | | | Min | Med | |
| lu, A | CC | Facility | ALERTING CALL PROCEEDING CONNECT DISCONNECT FACILITY RELEASE RELEASE COMPLETE SETUP | M | M | TS 24.008 TS 24.080 |
| | | Bearer capability | CALL CONFIRMED CALL PROCEEDING EMERGENCY SETUP MODIFY MODIFY COMPLETE MODIFY REJECT SETUP | M | M | TS 24.008 |
| | | Cause | CALL CONFIRMED CONGESTION CONTROL DISCONNECT HOLD REJECT MODIFY REJECT RELEASE RELEASE COMPLETE RETRIEVE REJECT START DTMF REJECT STATUS | M | M | TS 24.008 |
| | | Connected number | CONNECT | M | M | TS 24.008 |
| | | Calling party BCD number | SETUP | M | M | TS 24.008 |
| | | Called party BCD number | SETUP | M | M | TS 24.008 |
| | | Redirecting party BCD number | SETUP | M | M | TS 24.008 |
| | | lu, A | MM | Reject cause | AUTHENTICATION FAILURE CM SERVICE REJECT ABORT LOCATION UPDATING REJECT MM STATUS | M |
| Location area identification | CM RE-ESTABLISHMENT REQUEST LOCATION UPDATING ACCEPT LOCATION UPDATING REQUEST TMSI REALLOCATION COMMAND | | | M | M | TS 24.008 |

| | | | | | | |
|-------|--------|-------------------------------|--|---|---|-----------|
| | | Mobile identity | CM RE-ESTABLISHMENT REQUEST CM SERVICE REQUEST IDENTITY REQUEST IDENTITY RESPONSE IMSI DETACH INDICATION LOCATION UPDATING ACCEPT LOCATION UPDATING REQUEST TMSI REALLOCATION COMMAND | M | M | TS 24.008 |
| | | CM service type | CM SERVICE REQUEST | M | M | TS 24.008 |
| | | Location updating type | LOCATION UPDATING REQUEST | M | M | TS 24.008 |
| lu, A | SS | Facility | FACILITY REGISTER RELEASE COMPLETE | M | M | TS 24.008 |
| | | Cause | RELEASE COMPLETE | M | M | TS 24.008 |
| lu, A | SMS | TP-Originating-Address | SMS-DELIVER | M | M | TS 23.040 |
| | | TP-Service-Centre- Time-Stamp | SMS-DELIVER SMS-SUBMIT-REPORT SMS-STATUS-REPORT | M | M | TS 23.040 |
| | | TP-Failure-Cause | SMS-DELIVER-REPORT SMS-SUBMIT-REPORT | M | M | TS 23.040 |
| | | TP-Destination-Address | SMS-SUBMIT SMS-COMMAND | M | M | TS 23.040 |
| | | TP-Recipient-Address | SMS-STATUS-REPORT | M | M | TS 23.040 |
| A | BSSMAP | Channel Type | ASSIGNMENT REQUEST HANDOVER REQUEST | M | M | TS 48.008 |
| | | Circuit | ASSIGNMENT REQUEST | M | M | TS 48.008 |
| | | Cell Identifier (Serving) | ASSIGNMENT COMPLETE HANDOVER REQUEST HANDOVER COMMAND HANDOVER PERFORMED PERFORM LOCATION REQUEST | M | M | TS 48.008 |
| | | Chosen Channel | ASSIGNMENT COMPLETE HANDOVER REQUEST ACKNOWLEDGE HANDOVER PERFORMED | M | M | TS 48.008 |
| | | Speech version (chosen) | ASSIGNMENT COMPLETE HANDOVER REQUEST HANDOVER REQUIRED HANDOVER REQUEST ACKNOWLEDGE HANDOVER PERFORMED | M | M | TS 48.008 |
| | | Cause | ASSIGNMENT FAILURE HANDOVER REQUEST HANDOVER REQUIRED HANDOVER FAILURE CLEAR REQUEST CLEAR COMMAND HANDOVER PERFORMED HANDOVER REQUIRED REJECT | M | M | TS 48.008 |
| | | RR Cause | ASSIGNMENT FAILURE HANDOVER COMPLETE HANDOVER FAILURE | M | M | TS 48.008 |
| | | Cell Identifier (target) | HANDOVER REQUEST | M | M | TS 48.008 |

| | | | | | | |
|---|-----|-------------------------------------|---|---|----|------------------------|
| | | Current Channel type 1 | HANDOVER REQUEST HANDOVER REQUIRED | M | M | TS 48.008 |
| | | Cell Identifier List (Preferred) | HANDOVER REQUIRED PAGING | | O | TS 48.008 |
| | | IMSI | PAGING OCOMON ID | O | M | TS 48.008 |
| | | Location Type | PERFORM LOCATION REQUEST | M | M | TS 48.008 |
| | | Location Estimate | PERFORM LOCATION RESPONSE | M | MC | TCS 48.008 |
| | | LCS Cause | PERFORM LOCATION RESPONSE PERFORM LOCATION ABORT | M | M | TS 48.008 |
| B | MAP | SS-Code | MAP_REGISTER_SS MAP_ERASE_SS MAP_ACTIVATE_SS MAP_DEACTIVATE_SS MAP_INTERROGATE_SS MAP_REGISTER_PASSWORD MAP_REGISTER_CC_ENTRY MAP_ERASE_CC_ENTRY | M | M | TS 29.002 |
| | | Forwarded-to number with subaddress | MAP_REGISTER_SS | M | M | TS 29.002 |
| | | Basic service | MAP_REGISTER_SS MAP_ERASE_SS MAP_ACTIVATE_SS MAP_DEACTIVATE_SS MAP_INTERROGATE_SS | M | M | TS 29.002 |
| | | SM RP DA | MAP-SEND-INFO-FOR-MT-SMS | M | M | TS 29.002 |
| | | Service Centre Address | MAP-SEND-INFO-FOR-MO-SMS | M | M | TS 29.002 |
| | | Alert Reason | MAP-READY-FOR-SM | M | M | TS 29.002 |
| | | Abort reason | Abort | M | M | TS 29.002 TS 23.018 |
| C | MAP | MSISDN | Complete Call Process Access Request ack Process Call Waiting Send Info For Incoming Call ack MAP-SEND-INFO-FOR-MT-SMS MAP-SEND-INFO-FOR-MO-SMS | M | M | TS 29.002 TS 23.018 |
| | | IMEI(SV) | Complete Call Page MS ack Process Access Request Process Access Request ack Provide IMEI ack Search For MS ack | M | M | TS 29.002 TS 23.018 |
| | | PLMN bearer capability | Complete Call Process Call Waiting | M | M | TS 29.002 TS 23.018 |
| | | ISDN bearer capability | Complete Call Process Call Waiting | M | M | TS 29.002 TS 23.018 |
| | | IMSI | Page MS Process Access Request Process Access Request ack Provide IMSI ack Search For MS Send Info For Incoming Call ack MAP-SEND-INFO-FOR-MT-SMS | M | M | TS 29.002 TS 23.018 |

| | | | | | |
|--|---|---|---|---|------------------------|
| | Location area ID / Current location area ID | Page MS Page MS ack Process Access Request Search For MS ack | M | M | TS 29.002 TS 23.018 |
| | Page type | Page MS Search For MS | M | M | TS 29.002 TS 23.018 |
| | Serving cell ID | Page MS ack Process Access Request Search For MS ack | M | M | TS 29.002 TS 23.018 |
| | Service area ID | Page MS ack Process Access Request Search For MS ack | M | M | TS 29.002 TS 23.018 |
| | CM service type | Process Access Request | M | M | TS 29.002 TS 23.018 |
| | MSRN | Send Info For Incoming Call | M | M | TS 29.002 TS 23.018 |
| | Bearer service | Send Info For Incoming Call Send Info For Outgoing Call | M | M | TS 29.002 TS 23.018 |
| | Teleservice | Send Info For Incoming Call Send Info For Outgoing Call | M | M | TS 29.002 TS 23.018 |
| | Dialled number | Send Info For Incoming Call | M | M | TS 29.002 TS 23.018 |
| | Number of forwarding | Send Info For Incoming Call | M | M | TS 29.002 TS 23.018 |
| | Forwarded-to number | Send Info For Incoming Call ack | M | M | TS 29.002 TS 23.018 |
| | Forwarding reason | Send Info For Incoming Call ack | M | M | TS 29.002 TS 23.018 |
| | Called number | Send Info For Outgoing Call | M | M | TS 29.002 TS 23.018 |
| | MSISDN | Send Routeing Info | M | M | TS 29.002 TS 23.018 |
| | User error | Every message where it appears | M | M | TS 29.002 |
| | Provider error | Every message where it appears | M | M | TS 29.002 |
| | Service Centre Address | MAP-SEND-ROUTING-INFO-FOR-SM MAP-REPORT-SM-DELIVERY-STATUS MAP-ALERT-SERVICE-CENTRE | M | M | TS 29.002 |
| | SM Delivery Outcome | MAP-REPORT-SM-DELIVERY-STATUS | M | M | TS 29.002 |
| | MSISdn-Alert | MAP-ALERT-SERVICE-CENTRE MAP-INFORM-SERVICE-CEN | M | M | TS 29.002 |
| | Number of forwarding | Send Routeing Info | M | M | TS 29.002 TS 23.018 |
| | ISDN BC | Send Routeing Info | M | M | TS 29.002 TS 23.018 |
| | IMSI | Send Routeing Info ack | M | M | TS 29.002 TS 23.018 |
| | Roaming number | Send Routeing Info ack | M | M | TS 29.002 TS 23.018 |
| | Forwarded-to number | Send Routeing Info ack | M | M | TS 29.002 TS 23.018 |
| | Forwarding reason | Send Routeing Info ack | M | M | TS 29.002 TS 23.018 |

| | | | | | | |
|---|-----|-------------------------------------|---|---|---|------------------------|
| | | MSISDN | Send Routeing Info ack MAP_SEND_ROUTING_INFO_FOR_SM | M | M | TS 29.002 TS 23.018 |
| | | User error | Every message where it appears | M | M | TS 29.002 |
| | | Provider error | Every message where it appears | M | M | TS 29.002 |
| D | MAP | HLR number | MAP_RESTORE_DATA | M | M | TS 29.002 |
| | | MS Not Reachable Flag | MAP_RESTORE_DATA | M | M | TS 29.002 |
| | | SS-Code | MAP_REGISTER_SS MAP_ERASE_SS MAP_ACTIVATE_SS MAP_DEACTIVATE_SS MAP_INTERROGATE_SS MAP_REGISTER_PASSWORD MAP_REGISTER_CC_ENTRY MAP_ERASE_CC_ENTRY | M | M | TS 29.002 |
| | | Forwarded-to number with subaddress | MAP_REGISTER_SS | M | M | TS 29.002 |
| | | Basic service | MAP_REGISTER_SS MAP_ERASE_SS MAP_ACTIVATE_SS MAP_DEACTIVATE_SS MAP_INTERROGATE_SS | M | M | TS 29.002 |
| | | Alert Reason | MAP-READY-FOR-SM | M | M | TS 29.002 |
| | | MSC Address | MAP_UPDATE_LOCATION | M | M | TS 29.002 |
| | | IMSI | Provide Roaming Number Provide Subscriber Info MAP_UPDATE_LOCATION MAP_CANCEL_LOCATION MAP_PURGE_MS MAP-INSERT-SUBSCRIBER-DATA MAP-DELETE-SUBSCRIBER-DATA MAP_RESTORE_DATA | M | M | TS 29.002 TS 23.018 |
| | | MSISDN | Provide Roaming Number MAP-INSERT-SUBSCRIBER-DATA | M | M | TS 29.002 TS 23.018 |
| | | PLMN bearer capability | Provide Roaming Number | M | M | TS 29.002 TS 23.018 |
| | | ISDN BC | Provide Roaming Number | M | M | TS 29.002 TS 23.018 |
| | | Roaming number | Provide Roaming Number ack | M | M | TS 29.002 TS 23.018 |
| | | Service area ID | Provide Subscriber Info ack | M | M | TS 29.002 TS 23.018 |
| | | Cell ID | Provide Subscriber Info ack | M | M | TS 29.002 TS 23.018 |
| | | IMEI(SV) | Provide Subscriber Info ack | M | M | TS 29.002 TS 23.018 |
| | | User error | Every message where it appears | M | M | TS 29.002 |
| | | Provider error | Every message where it appears | M | M | TS 29.002 |
| F | MAP | IMEI(SV) | MAP_CHECK_IMEI | M | M | TS 29.002 TS 23.018 |
| | | Equipment status | MAP_CHECK_IMEI | M | M | TS 29.002 TS 23.018 |
| | | User error | Every message where it appears | M | M | TS 29.002 |

| | | | | | | |
|----------------|-----------------------------------|-------------------------------|---|-----------|-------------------------|-----------|
| | | Provider error | Every message where it appears | M | M | TS 29.002 |
| E | MAP | Target Cell Id | MAP_PREPARE_HANDOVER MAP_PREPARE_SUBSEQUENT_HANDOVER | M | M | TS 29.002 |
| | | Target RNC Id | MAP_PREPARE_HANDOVER MAP_PREPARE_SUBSEQUENT_HANDOVER | M | M | TS 29.002 |
| | | IMSI | MAP_PREPARE_HANDOVER | M | M | TS 29.002 |
| | | RAB ID/ Selected RAB id | MAP_PREPARE_HANDOVER MAP_PROCESS_ACCESS_SIGNALLING MAP_PREPARE_SUBSEQUENT_HANDOVER | M | M | TS 29.002 |
| | | Handover Number | MAP_PREPARE_HANDOVER MAP_SEND_HANDOVER_REPORT | M | M | TS 29.002 |
| | | User error | Every message where it appears | M | M | TS 29.002 |
| | | Provider error | Every message where it appears | M | M | TS 29.002 |
| | | Iu-Selected Codec | MAP_PREPARE_HANDOVER MAP_PROCESS_ACCESS_SIGNALLING MAP_FORWARD_ACCESS_SIGNALLING | M | M | TS 29.002 |
| | | Iu-Currently Used Codec | MAP_PREPARE_HANDOVER MAP_FORWARD_ACCESS_SIGNALLING | M | M | TS 29.002 |
| | | Iu-Supported Codecs List | MAP_PREPARE_HANDOVER MAP_FORWARD_ACCESS_SIGNALLING | M | M | TS 29.002 |
| | | Iu-Available Codecs List | MAP_PREPARE_HANDOVER MAP_PROCESS_ACCESS_SIGNALLING | M | M | TS 29.002 |
| | | Target MSC Number | MAP_PREPARE_SUBSEQUENT_HANDOVER | M | M | TS 29.002 |
| | | G | MAP | IMSI | MAP_SEND_IDENTIFICATION | M |
| MSC Number | MAP_SEND_IDENTIFICATION | | | M | M | TS 29.002 |
| User error | Every message where it appears | | | M | M | TS 29.002 |
| Provider error | Every message where it appears | | | M | M | TS 29.002 |
| Mc | Megaco | Context | Every procedure where it appears | M | M | TS 23.205 |
| | | Bearer Termination 1 | Every procedure where it appears | M | M | TS 23.205 |
| | | Bearer Termination 2 | Every procedure where it appears | M | M | TS 23.205 |
| | | Bearer Characteristics | Establish Bearer | M | M | TS 23.205 |
| | | Destination Binding Reference | Establish Bearer | M | M | TS 23.205 |
| | | Sender Binding Reference | Prepare Bearer | M | M | TS 23.205 |
| | | Codec | Prepare Bearer Modify Bearer Characteristics | M | M | TS 23.205 |
| Release Cause | Release Bearer Bearer Released | M | M | TS 23.205 | | |
| Iu | RANAP | RAB ID | RAB ASSIGNMENT REQUEST RAB ASSIGNMENT RESPONSE RAB RELEASE REQUEST IU RELEASE COMPLETE RELOCATION REQUEST RELOCATION REQUEST ACKNOWLEDGE RELOCATION COMMAND | M | M | TS 25.413 |

| | | | | | | |
|--|--|---------------------------|---|---|---|-----------|
| | | Cause | RAB ASSIGNMENT REQUEST RAB ASSIGNMENT RESPONSE RAB RELEASE REQUEST IU RELEASE REQUEST IU RELEASE COMMAND RELOCATION REQUIRED RELOCATION REQUEST RELOCATION REQUEST ACKNOWLEDGE RELOCATION PREPARATION FAILURE RELOCATION FAILURE RELOCATION CANCEL SECURITY MODE REJECT LOCATION REPORT ERROR INDICATION | M | M | TS 25.413 |
| | | Source ID | RELOCATION REQUIRED | M | M | TS 25.413 |
| | | Target ID | RELOCATION REQUIRED | M | M | TS 25.413 |
| | | Paging Cause | PAGING | M | M | TS 25.413 |
| | | Permanent NAS UE Identity | COMMON ID PAGING RELOCATION REQUEST | M | M | TS 25.413 |
| | | Area Identity | LOCATION REPORT | M | M | TS 25.413 |
| | | Last Known Service Area | LOCATION REPORT | M | M | TS 25.413 |
| | | LAI | INITIAL UE MESSAGE DIRECT TRANSFER | M | M | TS 25.413 |
| | | SAI | INITIAL UE MESSAGE DIRECT TRANSFER | M | M | TS 25.413 |
| | | Global RNC-ID | ERROR INDICATION | M | M | TS 25.413 |

4.3 MGW Trace Record Content

The following table describes the trace record content for minimum and medium trace depth for Megaco protocol in the Media GateWay (MGW).

| Interface name | Prot. name | IE name | Procedure name(s) | Trace depth | | Notes |
|----------------|---------------|--|---|-------------|-----------|-----------|
| | | | | Min | Med | |
| Mc | Megaco | Context | Every procedure where it appears | M | M | TS 23.205 |
| | | Bearer Termination 1 | Every procedure where it appears | M | M | TS 23.205 |
| | | Bearer Termination 2 | Every procedure where it appears | M | M | TS 23.205 |
| | | Bearer Characteristics | Establish Bearer | M | M | TS 23.205 |
| | | Destination Binding Reference | Establish Bearer | M | M | TS 23.205 |
| | | Destination Bearer Address | Establish Bearer | M | M | TS 23.205 |
| | | Sender Binding Reference | Prepare Bearer | M | M | TS 23.205 |
| | | Sender Bearer Address | Prepare Bearer | M | M | TS 23.205 |
| | | Codec | Prepare Bearer Modify Bearer Characteristics | M | M | TS 23.205 |
| | Release Cause | Release Bearer Bearer Released | M | M | TS 23.205 | |
| Iu-UP, Nb-UP | | Error Cause value | Every NACK message | M | M | TS 25.415 |
| Iu-UP, Nb-UP | | RFCI indicators | Rate control procedure | M | M | TS 25.415 |
| Iu-UP, Nb-UP | | Local_Channel_Type | TFO_TRANS | M | M | TS 28.062 |
| Iu-UP, Nb-UP | | Indication whether <ENQUIRY> character is received by the CTM receiver | CTM availability negotiation | M | M | TS 26.226 |

4.4 SGSN Trace Record Content

The following table shows the trace record content for SGSN.

The trace record is the same for management based activation and for signalling based activation.

For SGSN, the Minimum level of detail shall be supported.

| Interface name | Prot. name | IE name | Message name(s) | Trace depth | | Notes |
|----------------|------------|---------------------------------|---|-------------|-----|------------------------|
| | | | | Min | Med | |
| lu | SM | Requested QoS/Requested new QoS | ACTIVATE PDP CONTEXT REQUEST ACTIVATE SECONDARY PDP CONTEXT REQUEST MODIFY PDP CONTEXT REQUEST | M | M | TS 24.008 |
| | | Requested PDP address | ACTIVATE PDP CONTEXT REQUEST | M | M | TS 24.008 |
| | | Access point name | ACTIVATE PDP CONTEXT REQUEST REQUEST PDP CONTEXT ACTIVATION | M | M | TS 24.008 TS 23.003 |
| | | Negotiated QoS/New QoS | ACTIVATE PDP CONTEXT ACCEPT ACTIVATE SECONDARY PDP CONTEXT ACCEPT MODIFY PDP CONTEXT REQUEST MODIFY PDP CONTEXT ACCEPT | M | M | TS 24.008 |
| | | PDP Address | ACTIVATE PDP CONTEXT ACCEPT MODIFY PDP CONTEXT REQUEST | M | M | TS 24.008 |
| | | SM cause | ACTIVATE PDP CONTEXT REJECT ACTIVATE SECONDARY PDP CONTEXT REJECT REQUEST PDP CONTEXT ACTIVATION REJECT MODIFY PDP CONTEXT REJECT DEACTIVATE PDP CONTEXT REQUEST SM STATUS | M | M | TS 24.008 |
| | | Offered PDP address | REQUEST PDP CONTEXT ACTIVATION | M | M | TS 24.008 |
| lu | MM | MS network capability | ATTACH REQUEST ROUTING AREA UPDATE REQUEST | M | M | TS 24.008 |
| | | Attach type | ATTACH REQUEST | M | M | TS 24.008 |
| | | IMSI | ATTACH REQUEST | M | M | TS 24.008 |
| | | MS Radio Access capability | ATTACH REQUEST ROUTING AREA UPDATE REQUEST | M | M | TS 24.008 |
| | | Attach result | ATTACH ACCEPT | M | M | TS 24.008 |
| | | Routing area identification | ATTACH ACCEPT ROUTING AREA UPDATE REQUEST ROUTING AREA UPDATE ACCEPT | M | M | TS 24.008 |
| | | GMM cause | ATTACH ACCEPT ATTACH REJECT DETACH REQUEST AUTHENTICATION AND CIPHERING FAILURE ROUTING AREA UPDATE ACCEPT ROUTING AREA UPDATE REJECT GMM STATUS | M | M | TS 24.008 |
| | | Detach type | DETACH REQUEST | M | M | TS 24.008 |
| | | Mobile identity | AUTHENTICATION AND CIPHERING RESPONSE IDENTITY RESPONSE ROUTING AREA UPDATE ACCEPT | M | M | TS 24.008 |
| | | Update type | ROUTING AREA UPDATE REQUEST | M | M | TS 24.008 |

| | | | | | | |
|----|-----|------------------------------|---|----------|----------|-----------|
| | | Update result | ROUTING AREA UPDATE ACCEPT | M | M | TS 24.008 |
| lu | SMS | TP-Originating-Address | SMS-DELIVER | M | M | TS 23.040 |
| | | TP-Service-Centre-Time-Stamp | SMS-DELIVER SMS-SUBMIT-REPORT SMS-STATUS-REPORT | M | M | TS 23.040 |
| | | TP-Failure-Cause | SMS-DELIVER-REPORT SMS-SUBMIT-REPORT | M | M | TS 23.040 |
| | | TP-Destination-Address | SMS-SUBMIT SMS-COMMAND | M | M | TS 23.040 |
| | | TP-Recipient-Address | SMS-STATUS-REPORT | M | M | TS 23.040 |
| Gn | GTP | IMSI | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST PDU NOTIFICATION REQUEST IDENTIFICATION RESPONSE SGSN CONTEXT REQUEST FORWARD RELOCATION REQUEST RELOCATION CANCEL REQUEST MBMS NOTIFICATION REQUEST CREATE MBMS CONTEXT REQUEST UPDATE MBMS CONTEXT REQUEST DELETE MBMS CONTEXT REQUEST | M | M | TS 29.060 |
| | | RAI | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST IDENTIFICATION REQUEST SGSN CONTEXT REQUEST CREATE MBMS CONTEXT REQUEST UPDATE MBMS CONTEXT REQUEST | M | M | TS 29.060 |
| | | End User Address | CREATE PDP CONTEXT REQUEST CREATE PDP CONTEXT RESPONSE UPDATE PDP CONTEXT REQUEST PDU NOTIFICATION REQUEST PDU NOTIFICATION REJECT REQUEST MBMS NOTIFICATION REQUEST MBMS NOTIFICATION REJECT REQUEST CREATE MBMS CONTEXT REQUEST DELETE MBMS CONTEXT REQUEST MBMS REGISTRATION REQUEST MBMS DE-REGISTRATION REQUEST MBMS SESSION START REQUEST MBMS SESSION STOP REQUEST | M | M | TS 29.060 |
| | | Access Point Name | CREATE PDP CONTEXT REQUEST PDU NOTIFICATION REQUEST PDU NOTIFICATION REJECT REQUEST MBMS NOTIFICATION REQUEST MBMS NOTIFICATION REJECT REQUEST CREATE MBMS CONTEXT REQUEST DELETE MBMS CONTEXT REQUEST MBMS REGISTRATION REQUEST MBMS DE-REGISTRATION REQUEST MBMS SESSION START REQUEST MBMS SESSION STOP REQUEST | M | M | TS 29.060 |

| | | | | | |
|--|-------------------------------|--|----------|----------|-----------|
| | SGSN Address for signalling | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST IDENTIFICATION REQUEST SGSN CONTEXT REQUEST SGSN CONTEXT RESPONSE FORWARD RELOCATION REQUEST FORWARD RELOCATION RESPONSE CREATE MBMS CONTEXT REQUEST UPDATE MBMS CONTEXT REQUEST | M | M | TS 29.060 |
| | SGSN Address for user traffic | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST SGSN CONTEXT ACKNOWLEDGE MBMS SESSION START RESPONSE | M | M | TS 29.060 |
| | MSISDN | CREATE PDP CONTEXT REQUEST CREATE MBMS CONTEXT REQUEST | M | M | TS 29.060 |
| | Quality of Service Profile | CREATE PDP CONTEXT REQUEST CREATE PDP CONTEXT RESPONSE UPDATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT RESPONSE MBMS SESSION START REQUEST | M | M | TS 29.060 |
| | RAT Type | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST | M | M | TS 29.060 |
| | IMEI(SV) | CREATE PDP CONTEXT REQUEST | M | M | TS 29.060 |
| | User Location Information | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST | M | M | TS 29.060 |
| | Cause | CREATE PDP CONTEXT RESPONSE UPDATE PDP CONTEXT RESPONSE DELETE PDP CONTEXT RESPONSE PDU NOTIFICATION RESPONSE PDU NOTIFICATION REJECT REQUEST PDU NOTIFICATION REJECT RESPONSE IDENTIFICATION RESPONSE SGSN CONTEXT RESPONSE SGSN CONTEXT ACKNOWLEDGE FORWARD RELOCATION RESPONSE RELOCATION CANCEL RESPONSE FORWARD RELOCATION COMPLETE ACKNOWLEDGE FORWARD SRNS CONTEXT ACKNOWLEDGE MBMS NOTIFICATION RESPONSE MBMS NOTIFICATION REJECT REQUEST MBMS NOTIFICATION REJECT RESPONSE CREATE MBMS CONTEXT RESPONSE UPDATE MBMS CONTEXT RESPONSE DELETE MBMS CONTEXT RESPONSE MBMS REGISTRATION RESPONSE MBMS DE-REGISTRATION RESPONSE MBMS SESSION START RESPONSE MBMS SESSION STOP RESPONSE | M | M | TS 29.060 |

| | | | | | | |
|----|--------|------------------------------------|---|---|---|-----------|
| | | GGSN Address for Control Plane | CREATE PDP CONTEXT RESPONSE UPDATE PDP CONTEXT RESPONSE PDU NOTIFICATION REQUEST MBMS NOTIFICATION REQUEST CREATE MBMS CONTEXT RESPONSE UPDATE MBMS CONTEXT RESPONSE | M | M | TS 29.060 |
| | | GGSN Address for user traffic | CREATE PDP CONTEXT RESPONSE UPDATE PDP CONTEXT RESPONSE | M | M | TS 29.060 |
| | | GSN Address | ERROR INDICATION | M | M | TS 29.060 |
| | | SGSN Number | SGSN CONTEXT REQUEST FORWARD RELOCATION RESPONSE | M | M | TS 29.060 |
| | | MBMS UE Context | SGSN CONTEXT RESPONSE FORWARD RELOCATION REQUEST | M | M | TS 29.060 |
| | | RANAP Cause | FORWARD RELOCATION REQUEST FORWARD RELOCATION RESPONSE | M | M | TS 29.060 |
| | | Target Identification | FORWARD RELOCATION REQUEST | M | M | TS 29.060 |
| Gs | BSSAP+ | IMSI | BSSAP+-ALERT-ACK BSSAP+-ALERT-REJECT BSSAP+-ALERT-REQUEST BSSAP+-DOWNLINK-TUNNEL-REQUEST BSSAP+-GPRS-DETACH-ACK BSSAP+-GPRS-DETACH-INDICATION BSSAP+-IMSI-DETACH-ACK BSSAP+-IMSI-DETACH-INDICATION BSSAP+-LOCATION-UPDATE-ACCEPT BSSAP+-LOCATION-UPDATE-REJECT BSSAP+-LOCATION-UPDATE-REQUEST BSSAP+-MOBILE-STATUS BSSAP+-MS-ACTIVITY-INDICATION BSSAP+-MS-UNREACHABLE BSSAP+-PAGING-REJECT BSSAP+-PAGING-REQUEST BSSAP+-TMSI-REALLOCATION-COMPLETE BSSAP+-UPLINK-TUNNEL-REQUEST | M | M | TS 29.018 |
| | | Gs Cause | BSSAP+-ALERT-REJECT BSSAP+-MOBILE-STATUS BSSAP+-MS-UNREACHABLE BSSAP+-PAGING-REJECT | M | M | TS 29.018 |
| | | VLR number | BSSAP+-DOWNLINK-TUNNEL-REQUEST BSSAP+-PAGING-REQUEST BSSAP+-RESET-ACK BSSAP+-RESET-INDICATION | M | M | TS 29.018 |
| | | SGSN number | BSSAP+-GPRS-DETACH-INDICATION BSSAP+-IMSI-DETACH-INDICATION BSSAP+-LOCATION-UPDATE-REQUEST BSSAP+-RESET-ACK BSSAP+-RESET-INDICATION BSSAP+-UPLINK-TUNNEL-REQUEST | M | M | TS 29.018 |
| | | IMSI detach from GPRS service type | BSSAP+-GPRS-DETACH-INDICATION | M | M | TS 29.018 |

| | | | | | | |
|-----------------------|--|--------------------------------------|---|----------|--|-----------|
| | | Cell global identity/ New CGI | BSSAP+-GPRS-DETACH-INDICATION BSSAP+-IMSI-DETACH-INDICATION BSSAP+-LOCATION-UPDATE-REQUEST BSSAP+-MS-ACTIVITY-INDICATION BSSAP+-TMSI-REALLOCATION-COMPLETE | M | M | TS 29.018 |
| | | Service area identification /New SAI | BSSAP+-GPRS-DETACH-INDICATION BSSAP+-IMSI-DETACH-INDICATION BSSAP+-LOCATION-UPDATE-REQUEST BSSAP+-MS-ACTIVITY-INDICATION BSSAP+-TMSI-REALLOCATION-COMPLETE | M | M | TS 29.018 |
| | | Detach type | BSSAP+-IMSI-DETACH-INDICATION | M | M | TS 29.018 |
| | | Reject cause | BSSAP+-LOCATION-UPDATE-REJECT | M | M | TS 29.018 |
| | | Update type | BSSAP+-LOCATION-UPDATE-REQUEST | M | M | TS 29.018 |
| | | LAI/Old LAI | BSSAP+-LOCATION-UPDATE-ACCEPT BSSAP+-LOCATION-UPDATE-REQUEST BSSAP+-PAGING-REQUEST | M | M | TS 29.018 |
| | | IMEISV | BSSAP+-LOCATION-UPDATE-REQUEST | M | M | TS 29.018 |
| | | Erroneous message | BSSAP+-MOBILE-STATUS | M | M | TS 29.018 |
| Gr | MAP | IMSI | MAP_CANCEL_LOCATION MAP_PURGE_MS MAP_UPDATE_GPRS_LOCATION MAP_NOTE_MM_EVENT MAP-INSERT-SUBSCRIBER-DATA MAP-DELETE-SUBSCRIBER-DATA MAP-READY-FOR-SM | M | M | TS 29.002 |
| | | Cancellation Type | MAP_CANCEL_LOCATION | M | M | TS 29.002 |
| | | User error | Every message where it appears | M | M | TS 29.002 |
| | | Provider error | Every message where it appears | M | M | TS 29.002 |
| | | Location Information for GPRS | MAP_NOTE_MM_EVENT | M | M | TS 29.002 |
| | | MSISDN | MAP-INSERT-SUBSCRIBER-DATA | M | M | TS 29.002 |
| | | Alert Reason | MAP-READY-FOR-SM | M | M | TS 29.002 |
| | | Gd | MAP | SM RP OA | MAP-MO-FORWARD-SHORT-MESSAGE MAP-MT-FORWARD-SHORT-MESSAGE | M |
| SM RP DA | MAP-MO-FORWARD-SHORT-MESSAGE MAP-MT-FORWARD-SHORT-MESSAGE | | | M | M | TS 29.002 |
| IMSI | MAP-MO-FORWARD-SHORT-MESSAGE | | | M | M | TS 29.002 |
| More Messages To Send | MAP-MT-FORWARD-SHORT-MESSAGE | | | M | M | TS 29.002 |
| Gf | MAP | IMEI(SV) | MAP_CHECK_IMEI | M | M | TS 29.002 |
| | | Equipment status | MAP_CHECK_IMEI | M | M | TS 29.002 |
| | | User error | Every message where it appears | M | M | TS 29.002 |
| | | Provider error | Every message where it appears | M | M | TS 29.002 |
| Iu | RANAP | RAB ID | RAB ASSIGNMENT REQUEST RAB ASSIGNMENT RESPONSE RAB RELEASE REQUEST IU RELEASE COMPLETE RELOCATION REQUEST RELOCATION REQUEST ACKNOWLEDGE RELOCATION COMMAND | M | M | TS 25.413 |

| | | | | | | |
|----|--------|---------------------------|---|---|---|-----------|
| | | Cause | RAB ASSIGNMENT REQUEST RAB ASSIGNMENT RESPONSE RAB RELEASE REQUEST IU RELEASE REQUEST IU RELEASE COMMAND RELOCATION REQUIRED RELOCATION REQUEST RELOCATION REQUEST ACKNOWLEDGE RELOCATION PREPARATION FAILURE RELOCATION FAILURE RELOCATION CANCEL SECURITY MODE REJECT LOCATION REPORT ERROR INDICATION | M | M | TS 25.413 |
| | | Source ID | RELOCATION REQUIRED | M | M | TS 25.413 |
| | | Target ID | RELOCATION REQUIRED | M | M | TS 25.413 |
| | | Paging Cause | PAGING | M | M | TS 25.413 |
| | | Permanent NAS UE Identity | COMMON ID PAGING RELOCATION REQUEST | M | M | TS 25.413 |
| | | Area Identity | LOCATION REPORT | M | M | TS 25.413 |
| | | Last Known Service Area | LOCATION REPORT | M | M | TS 25.413 |
| | | RAC | INITIAL UE MESSAGE DIRECT TRANSFER | M | M | TS 25.413 |
| | | SAI | INITIAL UE MESSAGE DIRECT TRANSFER | M | M | TS 25.413 |
| | | Global RNC-ID | ERROR INDICATION | M | M | TS 25.413 |
| S3 | GTPv2C | IMSI | DETACH NOTIFICATION CS PAGING INDICATON RELOCATION CANCEL Request IDENTIFICATION RESPONSE CONTEXT RESPONSE CONTEXT REQUEST FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| | | TMSI | CS PAGING INDICATON | M | M | TS 29.274 |
| | | GUTI | CONTEXT REQUEST IDENTIFICATION Request | M | M | TS 29.274 |
| | | RAI | IDENTIFICATION Request CONTEXT REQUEST | M | M | TS 29.274 |
| | | P-TMSI | IDENTIFICATION Request CONTEXT REQUEST | M | M | TS 29.274 |
| | | Indication | FORWARD RELOCATION COMPLETE NOTIFICATION FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| | | BSSGP Cause | FORWARD RELOCATION RESPONSE FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| | | RANAP Cause | FORWARD RELOCATION RESPONSE FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| | | eNodeB Cause | FORWARD RELOCATION RESPONSE | M | M | TS 29.274 |
| | | RAT Type | CONTEXT REQUEST | M | M | TS 29.274 |
| | | Target Identification | FORWARD RELOCATION REQUEST | M | M | TS 29.274 |

| | | | | | | |
|----|--------|-------------------------------------|--|---|---|-----------|
| | | Cause | RELOCATION CANCEL RESPONSE FORWARD SRNS CONTEXT ACKNOWLEDGE IDENTIFICATION RESPONSE CONTEXT ACKNOWLEDGE CONTEXT RESPONSE FORWARD RELOCATION COMPLETE ACKNOWLEDGE FORWARD RELOCATION RESPONSE DETACH NOTIFICATION DETACH ACKNOWLEDGE | M | M | TS 29.274 |
| | | RAN Cause | FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| | | Selected PLMN ID | FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| S4 | GTPV2C | Traffic Aggregate Description (TAD) | Bearer Resource Command | M | M | TS 25.413 |
| | | Linked Bearer Identity (LBI) | Bearer Resource Command Create Bearer Request Delete Bearer Response | M | M | TS 25.413 |
| | | Linked EPS Bearer ID | Bearer Resource Failure Indication Delete Session Request Delete Bearer Request | M | M | TS 25.413 |
| | | Cause | Bearer Resource Failure Indication Create Session Response Create Bearer Response Modify Bearer Response Delete Session Response Delete Bearer Response Downlink Data Notification Acknowledgement Downlink Data Notification Failure Indication Update Bearer Response Create Indirect Data Forwarding Tunnel Response Update Bearer Complete | M | M | TS 25.413 |
| | | Bearer Contexts to be modified | Modify Bearer Request | M | M | TS 25.413 |
| | | Bearer Contexts to be removed | Modify Bearer Request | M | M | TS 25.413 |
| | | IMSI | Create Session Request Update Bearer Request | M | M | TS 25.413 |
| | | MSISDN | Create Session Request Modify Bearer Response | M | M | TS 25.413 |
| | | Serving Network | Create Session Request | M | M | TS 25.413 |
| | | Access Point Name (APN) | Create Session Request | M | M | TS 25.413 |
| | | PDN Type | Create Session Request | M | M | TS 25.413 |
| | | Bearer Contexts | Create Session Request Create Bearer Request Create Bearer Response Delete Bearer Request Delete Bearer Response Update Bearer Request Update Bearer Response Create Indirect Data Forwarding Tunnel Request Create Indirect Data Forwarding Tunnel Response Update Bearer Complete | M | M | TS 25.413 |
| | | RAT Type | Create Session Request Modify Bearer Request | M | M | TS 25.413 |
| | | Bearer Contexts created | Create Session Response | M | M | TS 25.413 |
| | | Bearer Contexts marked for removal | Create Session Response | M | M | TS 25.413 |

| | | | | | | |
|-----|----------|------------------------------------|--|---|---|-----------|
| | | Bearer Contexts modified | Modify Bearer Response | M | M | TS 25.413 |
| | | Bearer Contexts marked for removal | Modify Bearer Response | M | M | TS 25.413 |
| S6d | Diameter | User Name | NOTIFY REQUEST AUTHENTICATION INFORMATION REQUEST DELETE SUBSCRIBER DATA REQUEST INSERT SUBSCRIBER DATA REQUEST PURGE UE REQUEST CANCEL LOCATION REQUEST UPDATE LOCATION REQUEST | M | M | TS 29.272 |
| | | Terminal Information | NOTIFY REQUEST UPDATE LOCATION REQUEST | M | M | TS 29.272 |
| | | Result | NOTIFY ANSWER AUTHENTICATION INFORMATION ANSWER DELETE SUBSCRIBER DATA ANSWER INSERT SUBSCRIBER DATA ANSWER PURGE UE ANSWER CANCEL LOCATION ANSWER UPDATE LOCATION ANSWER | M | M | TS 29.272 |
| | | RAT Type | UPDATE LOCATION REQUEST | M | M | TS 29.272 |
| | | APN | NOTIFY REQUEST | M | M | TS 29.272 |
| | | Visited PLMN Id | AUTHENTICATION INFORMATION REQUEST UPDATE LOCATION REQUEST | M | M | TS 29.272 |

4.5 GGSN Trace Record Content

The following table describes the trace record content for minimum and medium trace depth for GGSN.

The record content is same for management based activation and for signalling based activation.

For GGSN, the Minimum level of detail shall be supported.

| Interface name | Prot. Name | IE name | MESSAGE NAME(S) | Trace depth | | Notes |
|----------------|------------|-----------------------------|---|-------------|-----|-----------|
| | | | | Min | Med | |
| Gn | GTP | IMSI | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST PDU NOTIFICATION REQUEST SEND ROUTEING INFORMATION FOR GPRS REQUEST SEND ROUTEING INFORMATION FOR GPRS RESPONSE FAILURE REPORT REQUEST NOTE MS PRESENT REQUEST MBMS NOTIFICATION REQUEST CREATE MBMS CONTEXT REQUEST UPDATE MBMS CONTEXT REQUEST DELETE MBMS CONTEXT REQUEST | M | M | TS 29.060 |
| | | RAI | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST CREATE MBMS CONTEXT REQUEST UPDATE MBMS CONTEXT REQUEST | M | M | TS 29.060 |
| | | End User Address | CREATE PDP CONTEXT REQUEST CREATE PDP CONTEXT RESPONSE UPDATE PDP CONTEXT REQUEST PDU NOTIFICATION REQUEST PDU NOTIFICATION REJECT REQUEST MBMS NOTIFICATION REQUEST MBMS NOTIFICATION REJECT REQUEST CREATE MBMS CONTEXT REQUEST DELETE MBMS CONTEXT REQUEST MBMS REGISTRATION REQUEST MBMS DE-REGISTRATION REQUEST MBMS SESSION START REQUEST MBMS SESSION STOP REQUEST | M | M | TS 29.060 |
| | | Access Point Name | CREATE PDP CONTEXT REQUEST PDU NOTIFICATION REQUEST PDU NOTIFICATION REJECT REQUEST MBMS NOTIFICATION REQUEST MBMS NOTIFICATION REJECT REQUEST CREATE MBMS CONTEXT REQUEST DELETE MBMS CONTEXT REQUEST MBMS REGISTRATION REQUEST MBMS DE-REGISTRATION REQUEST MBMS SESSION START REQUEST MBMS SESSION STOP REQUEST | M | M | TS 29.060 |
| | | SGSN Address for signalling | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST CREATE MBMS CONTEXT REQUEST UPDATE MBMS CONTEXT REQUEST | M | M | TS 29.060 |

| | | | | | | |
|-----|--------------------------------|---|---|---|-----------|-----------|
| | SGSN Address for user traffic | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST MBMS SESSION START RESPONSE | M | M | TS 29.060 | |
| | MSISDN | CREATE PDP CONTEXT REQUEST CREATE MBMS CONTEXT REQUEST | M | M | TS 29.060 | |
| | Quality of Service Profile | CREATE PDP CONTEXT REQUEST CREATE PDP CONTEXT RESPONSE UPDATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT RESPONSE MBMS SESSION START REQUEST | M | M | TS 29.060 | |
| | RAT Type | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST | M | M | TS 29.060 | |
| | IMEI(SV) | CREATE PDP CONTEXT REQUEST | M | M | TS 29.060 | |
| | User Location Information | CREATE PDP CONTEXT REQUEST UPDATE PDP CONTEXT REQUEST | M | M | TS 29.060 | |
| | Cause | CREATE PDP CONTEXT RESPONSE UPDATE PDP CONTEXT RESPONSE DELETE PDP CONTEXT RESPONSE PDU NOTIFICATION RESPONSE PDU NOTIFICATION REJECT REQUEST PDU NOTIFICATION REJECT RESPONSE SEND ROUTEING INFORMATION FOR GPRS RESPONSE FAILURE REPORT RESPONSE NOTE MS GPRS PRESENT RESPONSE MBMS NOTIFICATION RESPONSE MBMS NOTIFICATION REJECT REQUEST MBMS NOTIFICATION REJECT RESPONSE CREATE MBMS CONTEXT RESPONSE UPDATE MBMS CONTEXT RESPONSE DELETE MBMS CONTEXT RESPONSE MBMS REGISTRATION RESPONSE MBMS DE-REGISTRATION RESPONSE MBMS SESSION START RESPONSE MBMS SESSION STOP RESPONSE | M | M | TS 29.060 | |
| | GGSN Address for Control Plane | CREATE PDP CONTEXT RESPONSE UPDATE PDP CONTEXT RESPONSE PDU NOTIFICATION REQUEST MBMS NOTIFICATION REQUEST CREATE MBMS CONTEXT RESPONSE UPDATE MBMS CONTEXT RESPONSE | M | M | TS 29.060 | |
| | GGSN Address for user traffic | CREATE PDP CONTEXT RESPONSE UPDATE PDP CONTEXT RESPONSE | M | M | TS 29.060 | |
| | MAP Cause | SEND ROUTEING INFORMATION FOR GPRS RESPONSE FAILURE REPORT RESPONSE | M | M | TS 29.060 | |
| | GSN Address | SEND ROUTEING INFORMATION FOR GPRS RESPONSE NOTE MS PRESENT REQUEST | M | M | TS 29.060 | |
| Gmb | Diameter Gmb | IMSI | MBMS AUTHORIZATION REQUEST (AAR) MBMS AUTHORIZATION RESPONSE (AAA) | M | M | TS 29.061 |
| | | RAI | MBMS AUTHORIZATION REQUEST (AAR) | M | M | TS 29.061 |
| | | Access Point Name | MBMS AUTHORIZATION REQUEST (AAR) | M | M | TS 29.061 |
| | | MSISDN | MBMS AUTHORIZATION REQUEST (AAR) | M | M | TS 29.061 |
| | | IMEI(SV) | MBMS AUTHORIZATION REQUEST (AAR) | M | M | TS 29.061 |

| | | | | | |
|--|----------------------|--|----------|----------|-----------|
| | IP Multicast Address | MBMS AUTHORIZATION REQUEST (AAR) | M | M | TS 29.061 |
| | TMGI | MBMS AUTHORIZATION RESPONSE (AAA) | M | M | TS 29.061 |
| | Result-Code | MBMS AUTHORIZATION RESPONSE (AAA) MBMS USER DEACTIVATION RESPONSE (STA) MBMS SESSION START-STOP INDICATION RESPONSE (RAA) MBMS SERVICE TERMINATION ANSWER (ASR) | M | M | TS 29.061 |
| | Experimental-Result | MBMS AUTHORIZATION RESPONSE (AAA) MBMS SESSION START-STOP INDICATION RESPONSE (RAA) | M | M | TS 29.061 |
| | Error-Reporting-Host | MBMS AUTHORIZATION RESPONSE (AAA) MBMS USER DEACTIVATION RESPONSE (STA) MBMS SESSION START-STOP INDICATION RESPONSE (RAA) MBMS SERVICE TERMINATION ANSWER (ASR) | M | M | TS 29.061 |

4.6 UTRAN Trace Record Content

For RNC, the Maximum level of detail shall be supported.

Table 4.6.1 : UTRAN Trace Record Content

| Interface (specific messages) | Format | Level of details | | | Description |
|---|---------|------------------|----------|----------|--|
| | | Min | Med | Max | |
| RRC (without rrc dedicated measurements) | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | rnclD of traced RNC |
| | | M | M | X | Dedicated IE extracted from RRC messages between the traced RNC and the UE. A subset of IEs as given in the table 4.6.2. is provided. |
| | ASN.1 | X | X | M | Raw Uu Messages: RRC messages between the traced RNC and the UE. The encoded content of the message is provided |
| Iub (without nbap dedicated measurements) | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | rnclD of traced RNC cld |
| | | M | M | X | rbld + Dedicated IE extracted from NBAP messages send/received inside traced UEs communication context. A subset of IEs as given in the table 4.6.2. is provided |
| | ASN.1 | X | X | M | Raw Iub Messages: NBAP messages between the traced RNC and the NodeB or cell. The encoded content of the message is provided |
| Iu | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | rnclD of traced RNC CoreNetworkID CN Domain Indicator |
| | | M | M | X | rbld + Dedicated IE extracted from RANAP messages between the traced RNC and Core Network. A subset of IEs as given in the table 4.6.2. is provided. |
| | ASN.1 | X | X | M | Raw Iu Messages RANAP: messages between the traced RNC and Core Network The encoded content of the message is provided |
| Iur | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | rnclD of traced RNC rnclD of neighbouring RNC |
| | | M | M | X | rllD + Dedicated IE extracted from RNSAP messages between the traced RNC and the neighbouring RNC. A subset of IEs as given in the table 4.6.2. is provided |
| | ASN.1 | X | X | M | Raw Iur Messages: RNSAP messages between the traced RNC and the neighbouring RNC. The encoded content of the message is provided |
| nbap (only dedicated measurements) | Decoded | X | M | X | Iub IEs from NBAP measurement reports messages |
| | ASN.1 | X | X | M | NBAP measurement reports messages |
| rrc (only dedicated measurements) | Decoded | X | M | X | Uu IEs from RRC measurement reports messages |
| | ASN.1 | X | X | M | RRC measurement reports messages |

Definitions:

- rncID of traced RNC: The id of the RNC traced, e.g. the RNC which handles the connection of the traced MS, during the Trace Recording Session.
- rncID of neighbouring RNC: The ids of all Neighbouring RNC involved in the Iur procedures during the Trace Recording Session.
- cId:
RNSAP messages
The cIds of all cells involved in the Iub and Iur procedures during the Trace Recording Session. The cId is provided with each NBAP and
for which the cId is relevant.
- rabId: Specific recorded IE that contains the RAB identifier.
- rliId: Specific recorded IE that contains the Radio Link identifier
- rbiId: Specific recorded IE that contains the Radio Bearer identifier
- Message name: Name of the protocol message
- Record extensions: A set of manufacturer specific extensions to the record
- Decoded: Some IEs shall be decoded (cf. detailed list in table 4.6.2. depending on trace depth)
- ASN.1: Messages in encoded format

Table 4.6.2 : trace record description for minimum and medium trace depth

| Interface name | Prot. name | IE name | Message name(s) | Trace depth | | Notes |
|----------------|------------|--------------------------|--|-------------|-----|-----------|
| | | | | Min | Med | |
| Uu | RRC | RAB info type | RADIO BEARER SETUP HO TO UTRAN COMMAND RADIO BEARER RELEASE RADIO BEARER RECONFIGURATION | M | M | TS 25.331 |
| | | RB info type | RADIO BEARER RECONFIGURATION RADIO BEARER RELEASE RADIO BEARER SETUP HO TO UTRAN COMMAND | M | M | TS 25.331 |
| | | URA identity | RADIO BEARER SETUP RADIO BEARER RELEASE URA UPDATE CONFIRM RADIO BEARER RECONFIGURATION | M | M | TS 25.331 |
| | | CN domain | SIGNALLING CONNECTION RELEASE INITIAL DIRECT TRANSFER DL DIRECT TRANSFER UL DIRECT TRANSFER | M | M | TS 25.331 |
| | | Logical channel priority | RADIO BEARER SETUP | M | M | TS 25.331 |

| | | | | | |
|--|---|--|----------|----------|-----------|
| | RRC state indicator | RADIO BEARER SETUP PHYSICAL CHANNEL RECONFIGURATION TRANSPORT CHANNEL RECONFIGURATION RADIO BEARER RECONFIGURATION CELL UPDATE CONFIRM URA UPDATE CONFIRM | M | M | TS 25.331 |
| | Primary CPICH scrambling code of added cell | ACTIVE SET UPDATE | O | O | TS 25.331 |
| | Primary CPICH scrambling code of removed cell | ACTIVE SET UPDATE | O | O | TS 25.331 |
| | Target cell identity | CELL CHANGE ORDER | M | M | TS 25.331 |
| | Cell synchronisation information | RRC/MEASUREMENT REPORT for measurement = intra frequency | X | M | TS 25.331 |
| | Cell parameters Id | RRC/MEASUREMENT REPORT for measurement = intra frequency | O | O | TS 25.331 |
| | Timeslot list | RRC/MEASUREMENT REPORT for measurement = intra frequency | X | O | TS 25.331 |
| | CPICH Ec/No | RRC/MEASUREMENT REPORT for measurement = intra frequency | X | O | TS 25.331 |
| | CPICH RSCP | RRC/MEASUREMENT REPORT for measurement = intra frequency | X | O | TS 25.331 |
| | PCCPCH RSCP | RRC/MEASUREMENT REPORT for measurement = intra frequency | X | O | TS 25.331 |
| | Pathloss | RRC/MEASUREMENT REPORT for measurement = intra frequency | X | M | TS 25.331 |
| | UARFCN uplink (Nu) | RRC/MEASUREMENT REPORT for measurement = inter frequency | X | O | TS 25.331 |
| | UARFCN downlink (Nd) | RRC/MEASUREMENT REPORT for measurement = inter frequency | X | O | TS 25.331 |
| | UARFCN (Nt) | RRC/MEASUREMENT REPORT for measurement = inter frequency | X | O | TS 25.331 |
| | Cell synchronisation information | RRC/MEASUREMENT REPORT for measurement = inter frequency | X | M | TS 25.331 |
| | CPICH Ec/No | RRC/MEASUREMENT REPORT for measurement = inter frequency | X | O | TS 25.331 |
| | CPICH RSCP | RRC/MEASUREMENT REPORT for measurement = inter frequency | X | O | TS 25.331 |
| | PCCPCH RSCP | RRC/MEASUREMENT REPORT for measurement = inter frequency | X | O | TS 25.331 |
| | Pathloss | RRC/MEASUREMENT REPORT for measurement = inter frequency | X | M | TS 25.331 |

| | | | | | | |
|-----|------|----------------------------------|---|---|---|-----------|
| | | Cell parameters Id | RRC/MEASUREMENT REPORT for measurement = inter frequency | O | O | TS 25.331 |
| | | Timeslot list | RRC/MEASUREMENT REPORT for measurement = inter frequency | X | O | TS 25.331 |
| | | BCCH ARFCN | RRC/MEASUREMENT REPORT for measurement = inter RAT | X | M | TS 25.331 |
| | | GSM Carrier RSSI | RRC/MEASUREMENT REPORT for measurement = inter RAT | X | M | TS 25.331 |
| | | RLC buffer Payload | RRC/MEASUREMENT REPORT for measurement = traffic volume | X | M | TS 25.331 |
| | | Average RLC buffer payload | RRC/MEASUREMENT REPORT for measurement = traffic volume | X | M | TS 25.331 |
| | | Variance of RLC buffer payload | RRC/MEASUREMENT REPORT for measurement = traffic volume | X | M | TS 25.331 |
| Iub | NBAP | RL identity | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK RECONFIGURATION REQUEST RADIO LINK RECONFIGURATION READY RADIO LINK RECONFIGURATION FAILURE RADIO LINK RECONFIGURATION RESPONSE RADIO LINK ADDITION REQUEST RADIO LINK RECONFIGURATION REQUEST RADIO LINK SETUP RESPONSE RADIO LINK SETUP FAILURE RADIO LINK ADDITION RESPONSE RADIO LINK ADDITION FAILURE RADIO LINK DELETION REQUEST | M | M | TS 25.433 |
| | | RL info type | RADIO LINK SETUP FAILURE RADIO LINK ADDITION FAILURE RADIO LINK RECONFIGURATION FAILURE | M | M | TS 25.433 |
| | | C-ID | RADIO LINK SETUP REQUEST RADIO LINK ADDITION REQUEST | M | M | TS 25.433 |
| | | UL Scrambling Code | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE | O | O | TS 25.433 |
| | | UL Timeslot information | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE | O | O | TS 25.433 |
| | | UL SIR target | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE | M | M | TS 25.433 |
| | | Minimum UL channelization length | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE | O | O | TS 25.433 |
| | | Initial DL transmission Power | RADIO LINK SETUP REQUEST RADIO LINK ADDITION REQUEST | M | M | TS 25.433 |

| | | | | | | |
|----|-------|---------------------------------|---|---|---|-----------|
| | | Maximum DL transmission Power | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK ADDITION REQUEST RADIO LINK RECONFIGURATION REQUEST | M | M | TS 25.433 |
| | | Minimum DL transmission Power | RADIO LINK SETUP REQUEST RADIO LINK ADDITION REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK RECONFIGURATION REQUEST | M | M | TS 25.433 |
| | | DL scrambling code | RADIO LINK SETUP REQUEST RADIO LINK ADDITION REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK RECONFIGURATION REQUEST | O | O | TS 25.433 |
| | | DL Code information | RADIO LINK SETUP REQUEST RADIO LINK ADDITION REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK RECONFIGURATION REQUEST | O | O | TS 25.433 |
| | | DL Timeslot information | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK RECONFIGURATION REQUEST | O | O | TS25.433 |
| | | Puncture limit | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE | M | M | TS 25.433 |
| | | UL Time Slot ISCP Info | RADIO LINK SETUP RESPONSE RADIO LINK ADDITION RESPONSE | O | O | TS 25.433 |
| | | Received total wide band power | RADIO LINK SETUP RESPONSE RADIO LINK SETUP FAILURE RADIO LINK ADDITION RESPONSE RADIO LINK ADDITION FAILURE | O | O | TS 25.433 |
| lu | RANAP | RAB identity | All messages where it is present | M | M | TS 25.413 |
| | | RAB info type | RAB ASSIGNMENT REQUEST RELOCATION REQUEST RAB MODIFY REQUEST RAB ASSIGNMENT RESPONSE | M | M | TS 25.413 |
| | | RAB parameters | RAB ASSIGNMENT REQUEST RELOCATION REQUEST | M | M | TS 25.413 |
| | | Assigned RAB parameters values | RAB ASSIGNMENT RESPONSE | M | M | TS 25.413 |
| | | Requested RAB parameters values | RAB MODIFY REQUEST | M | M | TS 25.413 |
| | | Source ID | RELOCATION REQUIRED | M | M | TS 25.413 |
| | | Target ID | RELOCATION REQUIRED | M | M | TS 25.413 |
| | | LAI | DIRECT TRANSFER | M | M | TS 25.413 |
| | | RAC | DIRECT TRANSFER | M | M | TS 25.413 |
| | | SAI | DIRECT TRANSFER | M | M | TS 25.413 |

| | | | | | | |
|------------------------|---|----------------------------------|---|-----------|---|-----------|
| Iur | RNSAP | RL id identity | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK RECONFIGURATION REQUEST RADIO LINK RECONFIGURATION READY RADIO LINK RECONFIGURATION FAILURE RADIO LINK RECONFIGURATION RESPONSE RADIO LINK ADDITION REQUEST RADIO LINK RECONFIGURATION REQUEST RADIO LINK SETUP RESPONSE RADIO LINK SETUP FAILURE RADIO LINK ADDITION RESPONSE RADIO LINK ADDITION FAILURE RADIO LINK DELETION REQUEST | M | M | TS 25.423 |
| | | C-ID | RADIO LINK SETUP REQUEST RADIO LINK ADDITION REQUEST | M | M | TS 25.423 |
| | | RL info type | RADIO LINK SETUP FAILURE RADIO LINK ADDITION FAILURE RADIO LINK SETUP FAILURE RADIO LINK RECONFIGURATION FAILURE | M | M | TS 25.423 |
| | | UL Scrambling Code | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE | O | O | TS 25.423 |
| | | UL Timeslot information | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE | O | O | TS25.423 |
| | | UL SIR target | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE | M | M | TS 25.423 |
| | | Minimum UL channelization length | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE | O | O | TS 25.423 |
| | | Initial DL transmission Power | RADIO LINK SETUP REQUEST RADIO LINK ADDITION REQUEST | M | M | TS 25.423 |
| | | Maximum DL transmission Power | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK ADDITION REQUEST RADIO LINK RECONFIGURATION REQUEST | M | M | TS 25.423 |
| | | Minimum DL transmission Power | RADIO LINK SETUP REQUEST RADIO LINK ADDITION REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK RECONFIGURATION REQUEST | M | M | TS 25.423 |
| | | DL scrambling code | RADIO LINK SETUP REQUEST RADIO LINK ADDITION REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK RECONFIGURATION REQUEST | O | O | TS 25.423 |
| DL channelization code | RADIO LINK SETUP REQUEST RADIO LINK ADDITION REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK RECONFIGURATION REQUEST | O | O | TS 25.423 | | |

| | | | | | |
|--|--------------------------------|--|---|---|-----------|
| | DL Timeslot information | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE RADIO LINK RECONFIGURATION REQUEST | O | O | TS 25.423 |
| | Puncture limit | RADIO LINK SETUP REQUEST RADIO LINK RECONFIGURATION PREPARE | M | M | TS 25.423 |
| | UL Time Slot ISCP Info | RADIO LINK SETUP RESPONSE RADIO LINK ADDITION RESPONSE | O | O | TS 25.423 |
| | Received total wide band power | RADIO LINK SETUP RESPONSE RADIO LINK SETUP FAILURE RADIO LINK ADDITION RESPONSE RADIO LINK ADDITION FAILURE | O | O | TS 25.423 |

Constraints:

The following optional IE names shall be supported for corresponding modes as described below:

For FDD mode:

- Primary CPICH scrambling code of added cell
- Primary CPICH scrambling code of removed cell
- CPICH Ec/No
- CPICH RSCP
- UL Scrambling Code
- Minimum UL channelization length
- UARFCN downlink (Nd)
- UARFCN uplink (Nu)
- DL Scrambling Code
- DL Code information
- DL channelization code
- Received total wide band power

For TDD mode :

- PCCPCH RSCP
- Cell parameters Id
- UARFCN (Nt)
- Timeslot list
- UL Timeslot information
- DL Timeslot information
- UL Time Slot ISCP Info

4.7 S-CSCF Trace Record Content

[Editor's Note: CR should be provided in Rel-6.]

4.8 P-CSCF Trace Record Content

[Editor's Note: CR should be provided in Rel-6.]

4.9 HSS Trace Record Content

The following table contains the Trace record description for the minimum and medium trace depth for MAP and Diameter protocol for the C, D, Gr, Gc,Cx,and Sh interfaces in the HSS.

The trace record is the same for management based activation and for signalling based activation.

| Interface name | Prot. name | IE name | Message name(s) | Trace depth | | Notes |
|---------------------|--|-------------------------------------|---|------------------------|------------------------------|-----------|
| | | | | Min | Med | |
| D | MAP | IMSI | MAP_UPDATE_LOCATION MAP_CANCEL_LOCATION MAP_PURGE_MS MAP-INSERT-SUBSCRIBER-DATA MAP_RESTORE_DATA MAP-SEND-IMSI MAP-READY-FOR-SM | M | M | TS 29.002 |
| | | MSC Address | MAP_UPDATE_LOCATION | M | M | TS 29.002 |
| | | VLR number | MAP_UPDATE_LOCATION MAP_PURGE_MS | M | M | TS 29.002 |
| | | User error | Every message where it appears | M | M | TS 29.002 |
| | | Provider error | Every message where it appears | M | M | TS 29.002 |
| | | SGSN number | MAP_PURGE_MS | M | M | TS 29.002 |
| | | MSISDN | MAP-INSERT-SUBSCRIBER-DATA MAP-SEND-IMSI | M | M | TS 29.002 |
| | | MS Not Reachable Flag | MAP_RESTORE_DATA | M | M | TS 29.002 |
| | | SS-Code | MAP_REGISTER_SS MAP_ERASE_SS MAP_ACTIVATE_SS MAP_DEACTIVATE_SS MAP_INTERROGATE_SS MAP_REGISTER_PASSWORD MAP_REGISTER_CC_ENTRY MAP_ERASE_CC_ENTRY | M | M | TS 29.002 |
| | | Forwarded-to number with subaddress | MAP_REGISTER_SS | M | M | TS 29.002 |
| | | Alert Reason | MAP-READY-FOR-SM | M | M | TS 29.002 |
| | | Basic service | MAP_REGISTER_SS MAP_ERASE_SS MAP_ACTIVATE_SS MAP_DEACTIVATE_SS MAP_INTERROGATE_SS | M | M | TS 29.002 |
| | | C | MAP | Service Centre Address | MAP-SEND-ROUTING-INFO-FOR-SM | M |
| Network Node Number | MAP-SEND-ROUTING-INFO-FOR-SM | | | M | M | TS 29.002 |
| GPRS Node Indicator | MAP-SEND-ROUTING-INFO-FOR-SM | | | M | M | TS 29.002 |
| User error | Every message where it appears | | | M | M | TS 29.002 |
| Provider error | Every message where it appears | | | M | M | TS 29.002 |
| MSISDN | MAP-SEND-ROUTING-INFO-FOR-SM Send Routeing Info ack | | | M | M | TS 29.002 |

| | | | | | | |
|-----------------------------|--|----------------------|---|----------|--|------------------------|
| | | Number of forwarding | Send Routeing Info | M | M | TS 29.002 TS 23.018 |
| | | IMSI | Send Routeing Info ack | M | M | TS 29.002 TS 23.018 |
| | | Roaming number | Send Routeing Info ack | M | M | TS 29.002 TS 23.018 |
| | | Forwarded-to number | Send Routeing Info ack | M | M | TS 29.002 TS 23.018 |
| | | Forwarding reason | Send Routeing Info ack | M | M | TS 29.002 TS 23.018 |
| | | Additional Number | MAP-SEND-ROUTING-INFO-FOR-SM | M | M | TS 29.002 |
| Gr | MAP | SGSN address | MAP_UPDATE_GPRS_LOCATION | M | M | TS 29.002 |
| | | IMSI | MAP_CANCEL_LOCATION MAP_PURGE_MS MAP_UPDATE_GPRS_LOCATION MAP-INSERT-SUBSCRIBER-DATA MAP-READY-FOR-SM | M | M | TS 29.002 |
| | | SGSN number | MAP_UPDATE_GPRS_LOCATION MAP_PURGE_MS | M | M | TS 29.002 |
| | | Alert Reason | MAP-READY-FOR-SM | M | M | TS 29.002 |
| | | User error | Every message where it appears | M | M | TS 29.002 |
| | | Provider error | Every message where it appears | M | M | TS 29.002 |
| | | Gc | MAP | IMSI | MAP_SEND_ROUTING_INFO_FOR_GPRS MAP_FAILURE_REPORT MAP_NOTE_MS_PRESENT_FOR_GPRS | M |
| SGSN address | MAP_SEND_ROUTING_INFO_FOR_GPRS MAP_NOTE_MS_PRESENT_FOR_GPRS | | | M | M | TS 29.002 |
| GGSN address | MAP_SEND_ROUTING_INFO_FOR_GPRS MAP_FAILURE_REPORT MAP_NOTE_MS_PRESENT_FOR_GPRS | | | M | M | TS 29.002 |
| Mobile Not Reachable Reason | MAP_SEND_ROUTING_INFO_FOR_GPRS | | | M | M | TS 29.002 |
| User error | Every message where it appears | | | M | M | TS 29.002 |
| Provider error | Every message where it appears | | | M | M | TS 29.002 |

4.10 BM-SC Trace Record Content

The following table describes the trace record content for minimum and medium trace depth for BM-SC.

The record content is same for management based activation and for signalling based activation.

For BM-SC, the Minimum level of detail shall be supported.

| Interface name | Prot. name | IE name | Message name(s) | Trace depth | | Notes |
|----------------|--------------|----------------------|--|-------------|-----|-----------|
| | | | | Min | Med | |
| Gmb | Diameter Gmb | IMSI | MBMS AUTHORIZATION REQUEST (AAR) MBMS AUTHORIZATION RESPONSE (AAA) | M | M | TS 29.061 |
| | | RAI | MBMS AUTHORIZATION REQUEST (AAR) | M | M | TS 29.061 |
| | | Access Point Name | MBMS AUTHORIZATION REQUEST (AAR) | M | M | TS 29.061 |
| | | MSISDN | MBMS AUTHORIZATION REQUEST (AAR) | M | M | TS 29.061 |
| | | IMEI(SV) | MBMS AUTHORIZATION REQUEST (AAR) | M | M | TS 29.061 |
| | | IP Multicast Address | MBMS AUTHORIZATION REQUEST (AAR) | M | M | TS 29.061 |
| | | TMGI | MBMS AUTHORIZATION RESPONSE (AAA) | M | M | TS 29.061 |
| | | Result-Code | MBMS AUTHORIZATION RESPONSE (AAA) MBMS USER DEACTIVATION RESPONSE (STA) MBMS SESSION START-STOP INDICATION RESPONSE (RAA) MBMS SERVICE TERMINATION ANSWER (ASR) | M | M | TS 29.061 |
| | | Experimental-Result | MBMS AUTHORIZATION RESPONSE (AAA) MBMS SESSION START-STOP INDICATION RESPONSE (RAA) | M | M | TS 29.061 |
| | | Error-Reporting-Host | MBMS AUTHORIZATION RESPONSE (AAA) MBMS USER DEACTIVATION RESPONSE (STA) MBMS SESSION START-STOP INDICATION RESPONSE (RAA) MBMS SERVICE TERMINATION ANSWER (ASR) | M | M | TS 29.061 |

4.11 PGW Trace Record Content

The following table shows the trace record content for PGW.

The trace record is the same for management based activation and for signalling based activation.

PGW shall support at least one of the following trace depth levels – Maximum, Medium or Minimum.

Table 4.11.1 : PGW Trace Record Content

| Interface (specific messages) | Format | Level of details | | | Description |
|-------------------------------|----------|------------------|-----|-----|--|
| | | Min | Med | Max | |
| S2a/S2b | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | SGSNID of connected SGSN PGW ID of the traced PGW |
| | | M | M | X | Dedicated IE extracted from S2a/S2b messages between the traced PGW and the SGSN. A subset of IEs as given in the table 4.11.2. is provided. |
| | Encoded* | X | X | M | Raw Messages: S2a/S2b messages between the traced PGW and the SGSN. The encoded content of the message is provided. |
| S5/S8 | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | SGW ID of the connected SGW PGW of the traced PGW |
| | | M | M | X | IE extracted from S5/S8 messages between the traced PGW and SGW. A subset of IEs as given in the table 4.11.2. is provided. |
| | Encoded* | X | X | M | Raw S5/S8 Messages: messages between the traced PGW and SGW. The encoded content of the message is provided |
| S6b | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | PGWID of the traced PGW |
| | | M | M | X | Dedicated IE extracted from S6b messages between the traced PGW and the AAA. A subset of IEs as given in the table 4.11.2.is provided |
| | Encoded* | X | X | M | Raw S6b messages between the traced PGW and the AAA. The encoded content of the message is provided |
| Gx | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | PCRF ID of the connected PCRF PGW ID of the traced PGW |
| | | M | M | X | Dedicated IE extracted from Gx messages between the traced PGW and another PCRF. A subset of IEs as given in the table 4.11.2.is provided |
| | Encoded* | X | X | M | Raw Gx messages between the traced PGW and another PCRF. The encoded content of the message is provided |

Encoded* - the messages are left encoded in the format it was received.

Table 4.11.2 : PGW trace record description for minimum and medium trace depth

| Interface name | Prot. name | IE name | Message name(s) | Trace depth | | Notes |
|----------------|------------|-------------------------|---|-------------|-----|-----------|
| | | | | Min | Med | |
| S2a/S2b | PMIP | | | | | |
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| | | | | | | |
| S5/S8 | GTPv2C | IMSI | Create Session Request Update Bearer Request | M | M | TS 29.274 |
| | | MSISDN | Create Session Request Modify Bearer Response | M | M | TS 29.274 |
| | | Serving Network | Create Session Request Modify Bearer Request | M | M | TS 29.274 |
| | | Access Point Name (APN) | Create Session Request | M | M | TS 29.274 |
| | | PDN Type | Create Session Request | M | M | TS 29.274 |
| | | Bearer Contexts | Create Session Request Create Bearer Request Create Bearer Response Delete Bearer Request Delete Bearer Response Modify Bearer Command Modify Bearer Failure Indication Update Bearer Request Update Bearer Response Delete Bearer Command Delete Bearer Failure Indication | M | M | TS 29.274 |

| | | | | | | |
|------------------------------------|----------|-------------------------------------|--|--------------|---|--------------|
| | | Cause | Create Session Response Create Bearer Response Bearer Resource Failure Indication Modify Bearer Response Delete Session Response Delete Bearer Response Modify Bearer Failure Indication Update Bearer Response Delete Bearer Failure Indication | M | M | TS 29.274 |
| | | Bearer Contexts created | Create Session Response | M | M | TS 29.274 |
| | | Bearer Contexts marked for removal | Create Session Response | M | M | TS 29.274 |
| | | APN Restriction | Create Session Response | M | M | TS 29.274 |
| | | Linked Bearer Identity (LBI) | Create Bearer Request Bearer Resource Command Delete Bearer Response | M | M | TS 29.274 |
| | | Traffic Aggregate Description (TAD) | Bearer Resource Command | M | M | TS 29.274 |
| | | Linked EPS Bearer ID | Bearer Resource Failure Indication Delete Session Request Delete Bearer Request | M | M | TS 29.274 |
| | | RAT Type | Create Session Request Modify Bearer Request | M | M | TS 29.274 |
| | | Bearer Contexts to be modified | Modify Bearer Request | M | M | TS 29.274 |
| | | Bearer Contexts to be removed | Modify Bearer Request | M | M | TS 29.274 |
| | | Bearer Contexts modified | | M | M | TS 29.274 |
| Bearer Contexts marked for removal | | M | M | TS 29.274 | | |
| S6b | Diameter | MIP Subscriber Profile | AAR AAA | M | M | TS 29.273 |
| | | APN | AAR | M | M | TS 29.273 |
| | | QoS capabilities | AAR | M | M | TS 29.273 |
| | | Result Code | AAA | M | M | TS 29.273 |
| | | QoS resources | AAA | M | M | TS 29.273 |

| | | | | | | |
|-----|----------|------------------------|--------------------------|---|---|--------------|
| | | 3GPP AAA Server Name | AAA | M | M | TS 29.273 |
| S2c | DSMIP | | | | | |
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| Gx | Diameter | Bearer-Identifier | CCR | M | M | TS 29.212 |
| | | Bearer-Operation | CCR | M | M | TS 29.212 |
| | | IP-CAN-Type | CCR | M | M | TS 29.212 |
| | | RAT-Type | CCR | M | M | TS 29.212 |
| | | QoS-Information | CCR CCA RAR | M | M | TS 29.212 |
| | | QoS-Negotiation | CCR | M | M | TS 29.212 |
| | | QoS-Upgrade | CCR | M | M | TS 29.212 |
| | | Default-EPS-Bearer-QoS | CCR CCA RAR | M | M | TS 29.212 |
| | | Supported-Features | CCR CCA RAR RAA | M | M | TS 29.212 |
| | | Event-Trigger | CCR CCA RAR | M | M | TS 29.212 |
| | | Result Code | RAA | M | M | TS 29.212 |

| | | | | | |
|-----|-------------------|--------------------------|----------|----------|--------------|
| | Origin-Realm | CCR CCA RAR RAA | M | M | TS 29.212 |
| | Destination-Realm | CCR RAR | M | M | TS 29.212 |
| SGi | | | | | |

4.12 MME Trace Record Content

The following table shows the trace record content for MME.

The trace record is the same for management based activation and for signalling based activation.

MME shall support at least one of the following trace depth levels – Maximum, Medium or Minimum.

Table 4.12.1 : MME Trace Record Content

| Interface (specific messages) | Format | Level of details | | | Description |
|-------------------------------|----------------------------------|------------------|----------|---|--|
| | | Min | Med | Max | |
| S1 | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | eNBID of connected eNB MME ID of the traced MME |
| | | M | M | X | Dedicated IE extracted from S1 messages between the traced eNB and the MME. A subset of IEs as given in the table 4.12.2. is provided. |
| | ASN.1 | X | X | M | Raw Messages: S1 messages between the traced eNB and the MME. The encoded content of the message is provided. |
| S1 NAS PDU IE | 3GPP TS 24.301, sections 8 and 9 | X | X | M | Hexdata dump of the decrypted NAS message formatted according to 3GPP TS 24.301, sections 8 and 9, recorded as a separate message entry in the call trace file |
| S3 | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | SGSN ID of the connected SGSN MME ID of the traced MME |
| | M | M | X | IE extracted from S3 messages between the traced MME and SGSN. A subset of IEs as given in the table 4.12.2. is provided. | |
| Encoded * | | X | X | M | Raw S3 Messages: messages between the traced MME and SGSN. The encoded content of the message is provided |
| S11 | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | SGW ID of the connected SGW MME ID of the traced MME |
| | | M | M | X | Dedicated IE extracted from S11 messages between the traced SGW and the MME. A subset of IEs as given in the table 4.12.2. is provided |
| | Encoded * | | X | X | M |

| | | | | | |
|-----|-----------|----------|----------|---|---|
| S6a | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | HSS ID of the connected HSS MME ID of the traced MME |
| | M | M | X | Dedicated IE extracted from S6a messages between the traced HSS and the MME. A subset of IEs as given in the table 4.12.2.is provided | |
| | Encoded * | X | X | M | Raw S6a messages between the traced HSS and the MME. The encoded content of the message is provided |
| S10 | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | MME ID of the connected MME MME ID of the traced MME |
| | M | M | X | Dedicated IE extracted from S10 messages between the traced MME and another MME. A subset of IEs as given in the table 4.12.2.is provided | |
| | Encoded * | X | X | M | Raw S10 messages between the traced MME and another MME. The encoded content of the message is provided |

Encoded* - the messages are left encoded in the format it was received.

Table 4.12.2 : MME trace record description for minimum and medium trace depth

| Interface name | Prot. name | IE name | Message name(s) | Trace depth | | Notes |
|----------------|------------|----------------------------------|--|-------------|-----|-----------|
| | | | | Min | Med | |
| S1 | MM | EPS attach type | ATTACH REQUEST | M | M | TS 24.301 |
| | | GUTI | ATTACH REQUEST ATTACH ACCEPT TRACKING AREA UPDATE REQUEST TRACKING AREA UPDATE ACCEPT DETACH REQUEST GUTI REALLOCATION COMMAND | M | M | TS 24.301 |
| | | IMSI | ATTACH REQUEST DETACH REQUEST | M | M | TS 24.301 |
| | | Old P-TMSI | ATTACH REQUEST TRACKING AREA UPDATE REQUEST | M | M | TS 24.301 |
| | | M-TMSI | | M | M | TS 24.301 |
| | | Last visited registered TAI | ATTACH REQUEST TRACKING AREA UPDATE REQUEST | M | M | TS 24.301 |
| | | UE network capability | ATTACH REQUEST TRACKING AREA UPDATE REQUEST | M | M | TS 24.301 |
| | | MS network capability | ATTACH REQUEST | M | M | TS 24.301 |
| | | LAI | ATTACH REQUEST ATTACH ACCEPT TRACKING AREA UPDATE REQUEST TRACKING AREA UPDATE ACCEPT | M | M | TS 24.301 |
| | | EPS attach result | ATTACH ACCEPT | M | M | TS 24.301 |
| | | EMM cause | ATTACH ACCEPT ATTACH REJECT TRACKING AREA UPDATE ACCEPT TRACKING AREA UPDATE REJECT DETACH REQUEST AUTHENTICATION FAILURE SERVICE REJECT SECURITY MODE REJECT EMM STATUS | M | M | TS 24.301 |
| | | EPS bearer context status | TRACKING AREA UPDATE REQUEST TRACKING AREA UPDATE ACCEPT | M | M | TS 24.301 |
| | | Detach type | DETACH REQUEST | M | M | TS 24.301 |
| | | EPS update type | TRACKING AREA UPDATE REQUEST | M | M | TS 24.301 |
| | | EPS update result | TRACKING AREA UPDATE ACCEPT | M | M | TS 24.301 |
| | | Identity type | IDENTITY REQUEST | M | M | TS 24.301 |
| | | Mobile identity | IDENTITY RESPONSE | M | M | TS 24.301 |
| | | IMEISV request | SECURITY MODE COMMAND | M | M | TS 24.301 |
| | | IMEISV | SECURITY MODE COMPLETE | M | M | TS 24.301 |
| | | Selected NAS security algorithms | SECURITY MODE COMMAND | M | M | TS 24.301 |

| | | | | | | |
|----|----|--------------------------------|--|---|---|-----------|
| | | UE security capability | SECURITY MODE COMMAND | M | M | TS 24.301 |
| | | Equivalent PLMNs list | ATTACH ACCEPT TRACKING AREA UPDATE ACCEPT | M | M | TS 24.301 |
| | | TAI list | ATTACH ACCEPT TRACKING AREA UPDATE ACCEPT GUTI REALLOCATION COMMAND | M | M | TS 24.301 |
| S1 | SM | EPS bearer identity | PDN CONNECTIVITY REQUEST PDN CONNECTIVITY REJECT PDN DISCONNECT REQUEST PDN DISCONNECT REJECT ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT ACTIVATE DEFAULT EPS BEARER CONTEXT REJECT ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT ACTIVATE DEDICATED EPS BEARER CONTEXT REJECT ESM STATUS DEACTIVATE EPS BEARER CONTEXT REQUEST DEACTIVATE EPS BEARER CONTEXT ACCEPT MODIFY EPS BEARER CONTEXT REQUEST MODIFY EPS BEARER CONTEXT ACCEPT MODIFY EPS BEARER CONTEXT REJECT BEARER RESOURCE ALLOCATION REQUEST BEARER RESOURCE ALLOCATION REJECT BEARER RESOURCE MODIFICATION REQUEST BEARER RESOURCE MODIFICATION REJECT | M | M | TS 24.301 |
| | | Linked EPS bearer identity | PDN DISCONNECT REQUEST ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST BEARER RESOURCE ALLOCATION REQUEST BEARER RESOURCE MODIFICATION REQUEST | M | M | TS 24.301 |
| | | Procedure Transaction Identity | PDN CONNECTIVITY REQUEST PDN CONNECTIVITY REJECT PDN DISCONNECT REQUEST PDN DISCONNECT REJECT ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT ACTIVATE DEFAULT EPS BEARER CONTEXT REJECT ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT ACTIVATE DEDICATED EPS BEARER CONTEXT REJECT ESM STATUS DEACTIVATE EPS BEARER CONTEXT REQUEST DEACTIVATE EPS BEARER CONTEXT ACCEPT MODIFY EPS BEARER CONTEXT REQUEST MODIFY EPS BEARER CONTEXT ACCEPT MODIFY EPS BEARER CONTEXT REJECT BEARER RESOURCE ALLOCATION REQUEST BEARER RESOURCE ALLOCATION REJECT BEARER RESOURCE MODIFICATION REQUEST BEARER RESOURCE MODIFICATION REJECT | M | M | TS 24.301 |
| | | Request type | PDN CONNECTIVITY REQUEST | M | M | TS 24.301 |
| | | APN | PDN CONNECTIVITY REQUEST ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST | M | M | TS 24.301 |

| | | | | | | |
|-----------------------|----------------------------|---------------------------|--|-----------|----------|-----------|
| | | EPS QoS | ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST MODIFY EPS BEARER CONTEXT REQUEST | M | M | TS 24.301 |
| | | Negotiated QoS/New QoS | ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST MODIFY EPS BEARER CONTEXT REQUEST | M | M | TS 24.301 |
| | | PDN address | ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST | M | M | TS 24.301 |
| | | APN-AMBR | ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST MODIFY EPS BEARER CONTEXT REQUEST | M | M | TS 24.301 |
| | | ESM cause | PDN CONNECTIVITY REJECT PDN DISCONNECT REJECT ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST ACTIVATE DEFAULT EPS BEARER CONTEXT REJECT ACTIVATE DEDICATED EPS BEARER CONTEXT REJECT ESM STATUS DEACTIVATE EPS BEARER CONTEXT REQUEST MODIFY EPS BEARER CONTEXT REJECT BEARER RESOURCE ALLOCATION REJECT BEARER RESOURCE MODIFICATION REQUEST BEARER RESOURCE MODIFICATION REJECT | M | M | TS 24.301 |
| | | Traffic flow template | ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST MODIFY EPS BEARER CONTEXT REQUEST | M | M | TS 24.301 |
| | | Traffic flow aggregate | BEARER RESOURCE ALLOCATION REQUEST BEARER RESOURCE MODIFICATION REQUEST | M | M | TS 24.301 |
| | | Required traffic flow QoS | BEARER RESOURCE ALLOCATION REQUEST BEARER RESOURCE MODIFICATION REQUEST | M | M | TS 24.301 |
| | | PDN type | PDN CONNECTIVITY REQUEST | M | M | TS 24.301 |
| S3 | GTPv2-C | IMSI | DETACH NOTIFICATION CS PAGING INDICATON | M | M | TS 29.274 |
| | | TMSI | CS PAGING INDICATON | M | M | TS 29.274 |
| | | Cause | DETACH NOTIFICATION DETACH ACKNOWLEDGE | M | M | TS 29.274 |
| S3/S10 | GTPv2-C | IMSI | RELOCATION CANCEL REQUEST IDENTIFICATION RESPONSE CONTEXT RESPONSE CONTEXT REQUEST FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| | | GUTI | CONTEXT REQUEST IDENTIFICATION REQUEST | M | M | TS 29.274 |
| | | RAI | IDENTIFICATION REQUEST CONTEXT REQUEST | M | M | TS 29.274 |
| | | P-TMSI | IDENTIFICATION REQUEST CONTEXT REQUEST | M | M | TS 29.274 |
| | | Indication | FORWARD RELOCATION COMPLETE NOTIFICATION FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| | | BSSGP Cause | FORWARD RELOCATION RESPONSE FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| | | RANAP Cause | FORWARD RELOCATION RESPONSE FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| | | eNodeB Cause | FORWARD RELOCATION RESPONSE | M | M | TS 29.274 |
| | | RAT Type | CONTEXT REQUEST | M | M | TS 29.274 |
| Target Identification | FORWARD RELOCATION REQUEST | M | M | TS 29.274 | | |

| | | | | | | |
|-----|----------|----------------------|---|---|---|-----------|
| | | Cause | RELOCATION CANCEL RESPONSE FORWARD SRNS CONTEXT ACKNOWLEDGE IDENTIFICATION RESPONSE CONTEXT ACKNOWLEDGE CONTEXT RESPONSE FORWARD RELOCATION COMPLETE ACKNOWLEDGE FORWARD RELOCATION RESPONSE | M | M | TS 29.274 |
| | | RAN Cause | FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| | | Selected PLMN ID | FORWARD RELOCATION REQUEST | M | M | TS 29.274 |
| S6a | Diameter | User Name | NOTIFY REQUEST AUTHENTICATION INFORMATION REQUEST DELETE SUBSCRIBER DATA REQUEST INSERT SUBSCRIBER DATA REQUEST PURGE UE REQUEST CANCEL LOCATION REQUEST UPDATE LOCATION REQUEST | M | M | TS 29.272 |
| | | Terminal Information | NOTIFY REQUEST UPDATE LOCATION REQUEST | M | M | TS 29.272 |
| | | Result | NOTIFY ANSWER AUTHENTICATION INFORMATION ANSWER DELETE SUBSCRIBER DATA ANSWER INSERT SUBSCRIBER DATA ANSWER PURGE UE ANSWER CANCEL LOCATION ANSWER UPDATE LOCATION ANSWER | M | M | TS 29.272 |
| | | RAT Type | UPDATE LOCATION REQUEST | M | M | TS 29.272 |
| | | APN | NOTIFY REQUEST | | | |
| | | Visited PLMN Id | AUTHENTICATION INFORMATION REQUEST UPDATE LOCATION REQUEST | M | M | TS 29.272 |
| S11 | GTPv2-C | IMSI | CREATE SESSION REQUEST CHANGE NOTIFICATION REQUEST CHANGE NOTIFICATION RESPONSE SUSPEND NOTIFICATION SUSPEND ACKNOWLEDGE RESUME NOTIFICATION RESUME ACKNOWLEDGE | M | M | TS 29.274 |
| | | APN | CREATE SESSION REQUEST | M | M | TS 29.274 |
| | | Indication Flags | MODIFY BEARER REQUEST DELETE SESSION REQUEST | M | M | TS 29.274 |
| | | EPS Bearer ID | CREATE SESSION RESPONSE CREATE BEARER RESPONSE MODIFY BEARER REQUEST MODIFY BEARER RESPONSE DELETE BEARER REQUEST DELETE BEARER RESPONSE UPDATE USER PLANE RESPONSE MODIFY BEARER COMMAND MODIFY BEARER FAILURE INDICATION UPDATE BEARER RESPONSE DELETE BEARER FAILURE INDICATION CREATE INDIRECT DATA FORWARDING TUNNEL RESPONSE UPDATE BEARER COMPLETE | M | M | TS 29.274 |

| | | | | | | |
|----|------|----------------------------|---|---|---|-----------|
| | | MME-CSID | CREATE SESSION REQUEST CREATE BEARER RESPONSE DELETE BEARER RESPONSE | M | M | TS 29.274 |
| | | SGW-CSID | CREATE SESSION REQUEST CREATE SESSION RESPONSE CREATE BEARER REQUEST CREATE BEARER RESPONSE DELETE BEARER REQUEST DELETE BEARER RESPONSE | M | M | TS 29.274 |
| | | MSISDN | CREATE SESSION REQUEST MODIFY BEARER RESPONSE | M | M | TS 29.274 |
| | | Bearer Level QoS | CREATE SESSION REQUEST CREATE BEARER REQUEST MODIFY BEARER REQUEST MODIFY BEARER RESPONSE MODIFY BEARER COMMAND UPDATE BEARER REQUEST | M | M | TS 29.274 |
| | | RAT Type | CREATE SESSION REQUEST MODIFY BEARER REQUEST CHANGE NOTIFICATION REQUEST | M | M | TS 29.274 |
| | | MEI | CREATE SESSION REQUEST MODIFY BEARER REQUEST | M | M | TS 29.274 |
| | | Cause | CREATE SESSION RESPONSE CREATE BEARER RESPONSE BEARER RESOURCE FAILURE INDICATION MODIFY BEARER RESPONSE DELETE SESSION RESPONSE DELETE BEARER RESPONSE DOWNLINK DATA NOTIFICATION ACKNOWLEDGEMENT DOWNLINK DATA NOTIFICATION INDICATION UPDATE USER PLANE RESPONSE MODIFY BEARER FAILURE INDICATION UPDATE BEARER RESPONSE DELETE BEARER FAILURE INDICATION CREATE INDIRECT DATA FORWARDING TUNNEL RESPONSE UPDATE BEARER COMPLETE CHANGE NOTIFICATION RESPONSE CREATE FORWARDING TUNNEL RESPONSE | M | M | TS 29.274 |
| | | PGW-CSID | CREATE BEARER REQUEST DELETE BEARER REQUEST | M | M | TS 29.274 |
| S1 | S1AP | E-RAB ID | All messages where it is present | M | M | TS 36.413 |
| | | E-RAB Level QoS Parameters | E-RAB SETUP REQUEST E-RAB MODIFY REQUEST INITIAL CONTEXT SETUP REQUEST | M | M | TS 36.413 |

| | | | | | |
|--|---------------------------------|--|----------|----------|-----------|
| | Cause | INITIAL CONTEXT SETUP FAILURE UE CONTEXT RELEASE REQUEST UE CONTEXT RELEASE COMMAND UE CONTEXT MODIFICATION FAILURE HANDOVER REQUIRED HANDOVER PREPARATION FAILURE HANDOVER REQUEST HANDOVER FAILURE HANDOVER CANCEL PATH SWITCH REQUEST FAILURE NAS NON DELIVERY INDICATION | M | M | TS 36.413 |
| | Handover Type | HANDOVER REQUIRED HANDOVER COMMAND HANDOVER REQUEST | M | M | TS 36.413 |
| | E-UTRAN CGI | HANDOVER NOTIFY PATH SWITCH REQUEST INITIAL UE MESSAGE UPLINK NAS TRANSPORT | M | M | TS 36.413 |
| | TAI | HANDOVER NOTIFY PATH SWITCH REQUEST UPLINK NAS TRANSPORT PAGING | M | M | TS 36.413 |
| | Target ID | HANDOVER REQUIRED | M | M | TS 36.413 |
| | CDMA2000 HO Status | DOWNLINK S1 CDMA2000 TUNNELING | M | M | TS 36.413 |
| | CDMA2000 RAT Type | DOWNLINK S1 CDMA2000 TUNNELING UPLINK S1 CDMA2000 TUNNELING | M | M | TS 36.413 |
| | CDMA2000 Sector ID | UPLINK S1 CDMA2000 TUNNELING | M | M | TS 36.413 |
| | CDMA2000 HO Required Indication | UPLINK S1 CDMA2000 TUNNELING | M | M | TS 36.413 |

4.13 E-UTRAN Trace Record Content

For eNB, the Maximum level of detail shall be supported.

Table 4.13.1 : E-UTRAN Trace Record Content

| Interface (specific messages) | Format | Level of details | | | Description |
|--|---------|------------------|----------|----------|---|
| | | Min | Med | Max | |
| RRC (without rrc dedicated measurements) | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | eNBID of traced eNB |
| | | M | M | X | Dedicated IE extracted from RRC messages between the traced eNB and the UE. A subset of IEs as given in the table 4.13.2. is provided. |
| | ASN.1 | X | X | M | Raw Uu Messages: RRC messages between the traced eNB and the UE. The encoded content of the message is provided |
| S1 | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | eNBID of traced eNB MME ID of the connected MME |
| | | M | M | X | E-RabId + Dedicated IE extracted from S1AP messages between the traced eNB and Core Network. A subset of IEs as given in the table 4.13.2. is provided. |
| | ASN.1 | X | X | M | Raw S1 Messages S1AP: messages between the traced eNB and Core Network The encoded content of the message is provided |
| X2 | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | eNBID of traced eNB eNBID of neighbouring eNB |
| | | M | M | X | Dedicated IE extracted from X2AP messages between the traced eNB and the neighbouring eNB. A subset of IEs as given in the table 4.13.2.is provided |
| | ASN.1 | X | X | M | Raw X2 Messages:X2AP messages between the traced eNB and the neighbouring eNB. The encoded content of the message is provided |
| RRC (only dedicated measurements) | Decoded | X | M | X | Uu IEs from RRC measurement reports messages |
| | ASN.1 | X | X | M | RRC measurement reports messages |

NOTE: For the security keys in IEs or part of IEs that are containing security keys used by the eNB (e.g. K_{eNB}), the value 0 shall be written in the trace file.

Definitions:

- eNBID of traced eNB: The id of the eNB traced, e.g. the eNB which handles the connection of the traced MS, during the Trace Recording Session.
- eNBID of neighbouring eNB: The ids of all Neighbouring eNB involved in the X2 procedures during the Trace Recording Session.
- cell Id: The cell Ids of the cells involved in the X2 procedures during the Trace Recording Session. The cell Ids is provided with each X2AP messages for which the cId is relevant.
- E-RABId: Specific recorded IE that contains the E-RAB identifier.
- Message name: Name of the protocol message
- Record extensions: A set of manufacturer specific extensions to the record
- Decoded: Some IEs shall be decoded (cf. detailed list in table 4.6.2. depending on trace depth)
- ASN.1: Messages in encoded format

Table 4.13.2 : trace record description for minimum and medium trace depth

| Interface name | Prot. name | IE name | Message name(s) | Trace depth | | Notes |
|-----------------|-----------------------------|-------------------------|--|-------------|-----|-----------|
| | | | | Min | Med | |
| Uu | RRC | Cs fallback indicator | MOBILITY FROM EUTRA COMMAND | M | M | TS 36.331 |
| | | CN domain | PAGING | O | O | TS 36.331 |
| | | S-TMSI | PAGING | O | O | TS 36.331 |
| | | ReestablishmentCause | RRC CONNECTION REESTABLISHMENT REQUEST | M | M | TS 36.331 |
| | | Wait time | RRC CONNECTION REJECT | CM | CM | TS 36.331 |
| | | Release Cause | RRC CONNECTION RELEASE | M | M | TS 36.331 |
| | | Redirection Information | RRC CONNECTION RELEASE | M | M | TS 36.331 |
| | | Establishment Cause | RRC CONNECTION REQUEST | CM | CM | TS 36.331 |
| | | Selected PLMN-Identity | RRC CONNECTION SETUP COMPLETE | CM | CM | TS 36.331 |
| | | RegisteredMME | RRC CONNECTION SETUP COMPLETE | CM | CM | TS 36.331 |
| | | Rat-Type | UE CAPABILITY INFORMATION | M | M | TS 36.331 |
| | | Measured Results | MEASUREMENT REPORT | X | M | TS 36.331 |
| | | CDMA2000-Type | HANDOVER FROM EUTRA PREPARATION REQUEST UL HANDOVER PREPARATION TRANSFER UL INFORMATION TRANSFER | M | M | TS 36.331 |
| Target RAT Type | MOBILITY FROM EUTRA COMMAND | M | M | TS 36.331 | | |
| S1 | S1AP | E-RAB ID | All messages where it is present | M | M | TS 36.413 |

| | | | | | | |
|----|------|---------------------------------|--|-----------|-----------|-----------|
| | | E-RAB Level QoS Parameters | E-RAB SETUP REQUEST E-RAB MODIFY REQUEST INITIAL CONTEXT SETUP REQUEST | M | M | TS 36.413 |
| | | Cause | INITIAL CONTEXT SETUP FAILURE UE CONTEXT RELEASE REQUEST UE CONTEXT RELEASE COMMAND UE CONTEXT MODIFICATION FAILURE HANDOVER REQUIRED HANDOVER PREPARATION FAILURE HANDOVER REQUEST HANDOVER FAILURE HANDOVER CANCEL PATH SWITCH REQUEST FAILURE NAS NON DELIVERY INDICATION | M | M | TS 36.413 |
| | | Handover Type | HANDOVER REQUIRED HANDOVER COMMAND HANDOVER REQUEST | M | M | TS 36.413 |
| | | E-UTRAN CGI | HANDOVER NOTIFY PATH SWITCH REQUEST INITIAL UE MESSAGE UPLINK NAS TRANSPORT | CM | CM | TS 36.413 |
| | | TAI | HANDOVER NOTIFY PATH SWITCH REQUEST UPLINK NAS TRANSPORT | M | M | TS 36.413 |
| | | Target ID | HANDOVER REQUIRED | M | M | TS 36.413 |
| | | CDMA2000 HO Status | DOWNLINK S1 CDMA2000 TUNNELING | M | M | TS 36.413 |
| | | CDMA2000 RAT Type | DOWNLINK S1 CDMA2000 TUNNELING UPLINK S1 CDMA2000 TUNNELING | M | M | TS 36.413 |
| | | CDMA2000 Sector ID | UPLINK S1 CDMA2000 TUNNELING | M | M | TS 36.413 |
| | | CDMA2000 HO Required Indication | UPLINK S1 CDMA2000 TUNNELING | M | M | TS 36.413 |
| X2 | X2AP | E-RAB id | All messages where it is present | M | M | TS 36.423 |
| | | E-RAB Level QoS | HANDOVER REQUEST | M | M | TS 36.423 |
| | | Cause | HANDOVER REQUEST HANDOVER PREPARATION FAILURE HANDOVER CANCEL | M | M | TS 36.423 |
| | | Target Cell ID | HANDOVER REQUEST | M | M | TS 36.423 |
| | | GUMMEI | HANDOVER REQUEST | M | M | TS 36.423 |
| | | UE History Information | HANDOVER REQUEST | M | M | TS 36.423 |

Constraints:

The condition for capturing the following Information Element is that Cell Traffic Trace is used:

- Wait time from RRC protocol
- Establishment Cause from RRC protocol
- Selected PLMN-Identity from RRC protocol
- RegisteredMME from RRC protocol
- E-UTRAN CGI from S1 interface from the following messages: Initial UE message, Handover Notify

4.14 SGW Trace Record Content

The following table shows the trace record content for SGW.

The trace record is the same for management based activation and for signalling based activation.

SGW shall support at least one of the following trace depth levels – Maximum, Medium or Minimum.

Table 4.14.1 : SGW Trace Record Content

| Interface (specific messages) | Format | Level of details | | | Description |
|-------------------------------|----------|------------------|-----|-----|---|
| | | Min | Med | Max | |
| S11 | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | MME ID of the connected MME SGW ID of the traced SGW |
| | | M | M | X | Dedicated IE extracted from S11 messages between the traced MME and the SGW. A subset of IEs as given in the table 4.14.2 is provided |
| | Encoded* | X | X | M | Raw S11 messages between the traced MME and the SGW. The encoded content of the message is provided |
| S5/S8 | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | PGW ID of the connected PGW SGW of the traced SGW |
| | | M | M | X | IE extracted from S5/S8 messages between the traced SGW and PGW. A subset of IEs as given in the table 4.14.2. is provided. |
| | Encoded* | X | X | M | Raw S5/S8 Messages: messages between the traced SGW and PGW. The encoded content of the message is provided |
| S4 | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | SGSNID of the connected SGSN SGWID of the traced SGW |
| | | M | M | X | Dedicated IE extracted from S4 messages between the traced SGW and the SGSN. A subset of IEs as given in the table 4.14.2 is provided |
| | Encoded* | X | X | M | Raw S4 messages between the traced PGW and the AAA. The encoded content of the message is provided |
| Gxc | Decoded | M | M | O | Message name |
| | | O | O | O | Record extensions |
| | | M | M | X | PCRF ID of the connected PCRF SGW ID of the traced SGW |
| | | M | M | X | Dedicated IE extracted from Gx messages between the traced SGW and another PCRF. A subset of IEs as given in the table 4.14.2 is provided |
| | Encoded* | X | X | M | Raw Gx messages between the traced SGW and another PCRF. The encoded content of the message is provided |

Encoded* - the messages are left encoded in the format it was received.

Table 4.14.2 : SGW trace record description for minimum and medium trace depth

| Interface name | Prot. name | IE name | Message name(s) | Trace depth | | Notes |
|----------------------|-------------------------|-------------------------------------|--|-------------|-----|-----------|
| | | | | Min | Med | |
| S11 | GTPv2C | IMSI | Create Session Request Suspend Notification Suspend Acknowledge Resume Notification Resume Acknowledge | M | M | TS 29.274 |
| | | MSISDN | Create Session Request Modify Bearer Response | M | M | TS 29.274 |
| | | RAT type | Create Session Request Modify Bearer Request | M | M | TS 29.274 |
| | | Serving Network | Create Session Request Modify Bearer Request | M | M | TS 29.274 |
| | | Access Point Name (APN) | Create Session Request | M | M | TS 29.274 |
| | | PDN Type | Create Session Request | M | M | TS 29.274 |
| | | Bearer Contexts | Create Session Request Create Bearer Request Create Bearer Response Delete Bearer Request Delete Bearer Response Modify Bearer Command Modify Bearer Failure Indication Update Bearer Request Update Bearer Response Delete Bearer Command Delete Bearer Failure Indication Create Indirect Data Forwarding Tunnel Request Create Indirect Data Forwarding Tunnel Response Update Bearer Complete | M | M | TS 29.274 |
| | | Cause | Create Session Response Create Bearer Response Bearer Resource Failure Indication Modify Bearer Response Delete Session Response Downlink Data Notification Acknowledgement Downlink Data Notification Failure Indication Modify Bearer Failure Indication Update Bearer Response Delete Bearer Failure Indication Create Indirect Data Forwarding Tunnel Response Update Bearer Complete | M | M | TS 29.274 |
| | | Bearer Contexts created | Create Session Response | M | M | TS 29.274 |
| | | APN Restriction | Create Session Response | M | M | TS 29.274 |
| | | Linked Bearer Identity (LBI) | Create Bearer Request Bearer Resource Command Delete Session Request Delete Bearer Request Delete Bearer Response | M | M | TS 29.274 |
| | | Traffic Aggregate Description (TAD) | Bearer Resource Command | M | M | TS 29.274 |
| Linked EPS Bearer ID | Bearer Resource Command | M | M | TS 29.274 | | |

| | | | | | | |
|----|--------|-------------------------------------|---|---|---|-----------|
| | | Bearer Contexts to be removed | Modify Bearer Request | M | M | TS 29.274 |
| | | Bearer Contexts modified | Modify Bearer Response | M | M | TS 29.274 |
| | | Bearer Contexts marked for removal | Modify Bearer Response Update User Plane Response | M | M | TS 29.274 |
| | | Bearer Contexts to be updated | Update User Plane Request | M | M | TS 29.274 |
| | | Bearer Contexts to be removed | Update User Plane Request | M | M | TS 29.274 |
| | | Bearer Contexts updated | Update User Plane Response | M | M | TS 29.274 |
| | | Bearer Contexts to be modified | Modify Bearer Request | M | M | TS 29.274 |
| S4 | GTPv2C | Traffic Aggregate Description (TAD) | Bearer Resource Command | M | M | TS 29.274 |
| | | Linked Bearer Identity (LBI) | Bearer Resource Command Create Bearer Request Delete Bearer Response | M | M | TS 29.274 |
| | | Linked EPS Bearer ID | Bearer Resource Failure Indication Delete Session Request Delete Bearer Request | M | M | TS 29.274 |
| | | Cause | Bearer Resource Failure Indication Create Session Response Create Bearer Response Modify Bearer Response Delete Session Response Delete Bearer Response Downlink Data Notification Acknowledgement Downlink Data Notification Failure Indication Update Bearer Response Create Indirect Data Forwarding Tunnel Response Update Bearer Complete | M | M | TS 29.274 |
| | | Bearer Contexts to be modified | Modify Bearer Request | M | M | TS 29.274 |
| | | Bearer Contexts to be removed | Modify Bearer Request | M | M | TS 29.274 |
| | | IMSI | Create Session Request Update Bearer Request | M | M | TS 29.274 |
| | | MSISDN | Create Session Request Modify Bearer Response | M | M | TS 29.274 |
| | | Serving Network | Create Session Request | M | M | TS 29.274 |
| | | Access Point Name (APN) | Create Session Request | M | M | TS 29.274 |
| | | PDN Type | Create Session Request | M | M | TS 29.274 |
| | | Bearer Contexts | Create Session Request Create Bearer Request Create Bearer Response Delete Bearer Request Delete Bearer Response Update Bearer Request Update Bearer Response Create Indirect Data Forwarding Tunnel Request Create Indirect Data Forwarding Tunnel Response Update Bearer Complete | M | M | TS 29.274 |
| | | RAT Type | Create Session Request Modify Bearer Request | M | M | TS 29.274 |
| | | Bearer Contexts created | Create Session Response | M | M | TS 29.274 |
| | | Bearer Contexts marked for removal | Create Session Response | M | M | TS 29.274 |

| | | | | | | |
|------------------------------------|----------|-------------------------------------|---|-----------|---|-----------|
| | | Bearer Contexts modified | Modify Bearer Response | M | M | TS 29.274 |
| | | Bearer Contexts marked for removal | Modify Bearer Response | M | M | TS 29.274 |
| S5/S8 | GTPv2C | IMSI | Create Session Request Update Bearer Request | M | M | TS 29.274 |
| | | MSISDN | Create Session Request Modify Bearer Response | M | M | TS 29.274 |
| | | Serving Network | Create Session Request Modify Bearer Request | M | M | TS 29.274 |
| | | Access Point Name (APN) | Create Session Request | M | M | TS 29.274 |
| | | PDN Type | Create Session Request | M | M | TS 29.274 |
| | | Bearer Contexts | Create Session Request Create Bearer Request Create Bearer Response Delete Bearer Request Delete Bearer Response Modify Bearer Command Modify Bearer Failure Indication Update Bearer Request Update Bearer Response Delete Bearer Command Delete Bearer Failure Indication | M | M | TS 29.274 |
| | | Cause | Create Session Response Create Bearer Response Bearer Resource Failure Indication Modify Bearer Response Delete Session Response Delete Bearer Response Modify Bearer Failure Indication Update Bearer Response Delete Bearer Failure Indication | M | M | TS 29.274 |
| | | Bearer Contexts created | Create Session Response | M | M | TS 29.274 |
| | | Bearer Contexts marked for removal | Create Session Response | M | M | TS 29.274 |
| | | APN Restriction | Create Session Response | M | M | TS 29.274 |
| | | Linked Bearer Identity (LBI) | Create Bearer Request Bearer Resource Command Delete Bearer Response | M | M | TS 29.274 |
| | | Traffic Aggregate Description (TAD) | Bearer Resource Command | M | M | TS 29.274 |
| | | Linked EPS Bearer ID | Bearer Resource Failure Indication Delete Session Request Delete Bearer Request | M | M | TS 29.274 |
| | | RAT Type | Create Session Request Modify Bearer Request | M | M | TS 29.274 |
| | | Bearer Contexts to be modified | Modify Bearer Request | M | M | TS 29.274 |
| | | Bearer Contexts to be removed | Modify Bearer Request | M | M | TS 29.274 |
| Bearer Contexts modified | | M | M | TS 29.274 | | |
| Bearer Contexts marked for removal | | M | M | TS 29.274 | | |
| Gxc | Diameter | IP-CAN-Type | CCR | M | M | TS 29.212 |
| | | RAT-Type | CCR | M | M | TS 29.212 |
| | | QoS-Information | CCR CCA RAR | M | M | TS 29.212 |
| | | QoS-Negotiation | CCR | M | M | TS 29.212 |
| | | QoS-Rule-Report | CCR RAA | M | M | TS 29.212 |

| | | | | | |
|--|------------------------|--------------------------|---|---|--------------|
| | Default-EPS-Bearer-QoS | CCR CCA RAR | M | M | TS 29.212 |
| | Supported-Features | CCR CCA RAR RAA | M | M | TS 29.212 |
| | Event-Trigger | CCR CCA RAR | M | M | TS 29.212 |
| | Result Code | RAA | M | M | TS 29.212 |
| | Origin-Realm | CCR CCA RAR RAA | M | M | TS 29.212 |
| | QoS-Rule-Remove | RAR CAA | M | M | TS 29.212 |
| | QoS-Rule-Install | RAR CAA | M | M | TS 29.212 |
| | Destination-Realm | CCR RAR | M | M | TS 29.212 |

Annex A (normative): Trace Report File Format

This annex describes the format of trace result files. Those files are to be transferred from the network (NEs or EM) to the NM.

The following conditions have been considered for the definition of this file format:

- The trace data volume and trace duration is not predictable. Depending on the data retrieval and storage mechanisms, several consecutive trace result files could be generated for a single traced call. The file naming convention shall allow rebuilding the temporal file sequences.
- Since the files are transferred via a machine-machine interface, the files should be machine-readable using standard tools.
- The file format should be independent from the data transfer protocol used to carry the file from one system to another.
- The file format should be generic across UMTS and EPS systems.
- The file format should be flexible enough to support further trace data types and decoded IEs, as well as vendor specific trace data.

A.1 Parameter description and mapping table

The following table describes the XML trace file parameters.

Table : XML trace file parameters

| XML element / XML attribute specification | Description |
|---|---|
| traceCollecFile | This is the top-level element. It identifies the file as a collection of trace data. This element includes: <ul style="list-style-type: none"> - a file header (element "fileHeader") - the collection of trace data items (elements "traceRecSession"). |
| fileHeader | This is the trace file header element. This element includes: <ul style="list-style-type: none"> - a version indicator (attribute specification "fileFormatVersion") - the vendor name of the sending network node (attribute specification "vendorName") - the name of the sending network node (attribute specification "fileSender elementDn") - the type of the sending network node (attribute specification "fileSender elementType") - a time stamp (attribute specification "traceCollec beginTime"). |
| fileHeader fileFormatVersion | This attribute specification identifies the file format version applied by the sender. The format version defined in the present document shall be the abridged number and version of this 3GPP document (see below). The abridged number and version of a 3GPP document is constructed from its version specific full reference "3GPP [...] (yyyy-mm)" by: <ul style="list-style-type: none"> - removing the leading "3GPP TS" - removing everything including and after the version third digit, representing editorial only changes, together with its preceding dot character - from the resulting string, removing leading and trailing white space, replacing every multi character white space by a single space character and changing the case of all characters to uppercase. |
| fileHeader vendorName | Optional attribute specification that has the following value part: vendor of the equipment that provided the trace file. |
| fileSender elementDn | Optional attribute specification that uniquely identifies the NE or EM that assembled this trace file, according to the definitions in 3GPP TS 32.300 [11]. |
| fileSender elementType | Optional attribute specification that identifies type of the network node that generated the file, e.g. "RNC", "SGSN". |
| traceCollec beginTime | This attribute specification contains a timestamp that refers to the start of the first trace data that is stored in this file. It is a complete timestamp including day, time and delta UTC hour. E.g. "2001-09-11T09:30:47-05:00". |
| traceRecSession | Optional element that contains the traced data associated to a Trace Recording Session. It includes: <ul style="list-style-type: none"> - the DN prefix (attribute specification "dnPrefix") - the trace session identifier (attribute specification "traceSessionRef") - the trace recording session identifier (attribute specification "traceRecSessionRef") - the start time of the call (attribute specification "stime") - the ue identifier (element "ue") - the traced messages (elements "msg") |
| traceRecSession dnPrefix | Optional attribute specification that provides the DN prefix (see 3GPP TS 32.300 [11]). |
| traceRecSession traceSessionRef | Attribute specification that provides a unique trace session identifier as described in 3GPP TS 32.421 [2]. Trace Reference is composed of MCC digits, MNC digits, and Trace ID where: <ul style="list-style-type: none"> - MCC is in BCD format, 3 digits in length - MNC is in BCD format, 1 to 3 digits in length, with no filler digit for MNCs less than 3 digits - Trace ID is in hexadecimal format, 6 digits in length, hex letters (A thru F) are capitalized. |
| traceRecSession traceRecSessionRef | Attribute specification that provides a unique trace recording session identifier as described in 3GPP TS 32.421 [2] and 3GPP TS 32.422 [3]. Trace Recording Session Reference is represented in hexadecimal format. No filler digits for hex numbers of less than four digits. All hex letters (A thru F) are capitalized. |
| traceRecSession stime | Optional attribute specification that provides the start time of the call. |
| ue | This element gives the ue identifier provided in trace activation messages. It includes: <ul style="list-style-type: none"> - the ue identifier type (attribute specification "idType") - the ue identifier value (attribute specification "idValue") This element shall not be present in the Trace record of E-UTRAN. |
| ue idType | Attribute specification that provides the ue identifier type (IMSI, IMEI (SV), or Private User Id). |
| ue idValue | Attribute specification that provides the ue identifier value, represented in decimal. |

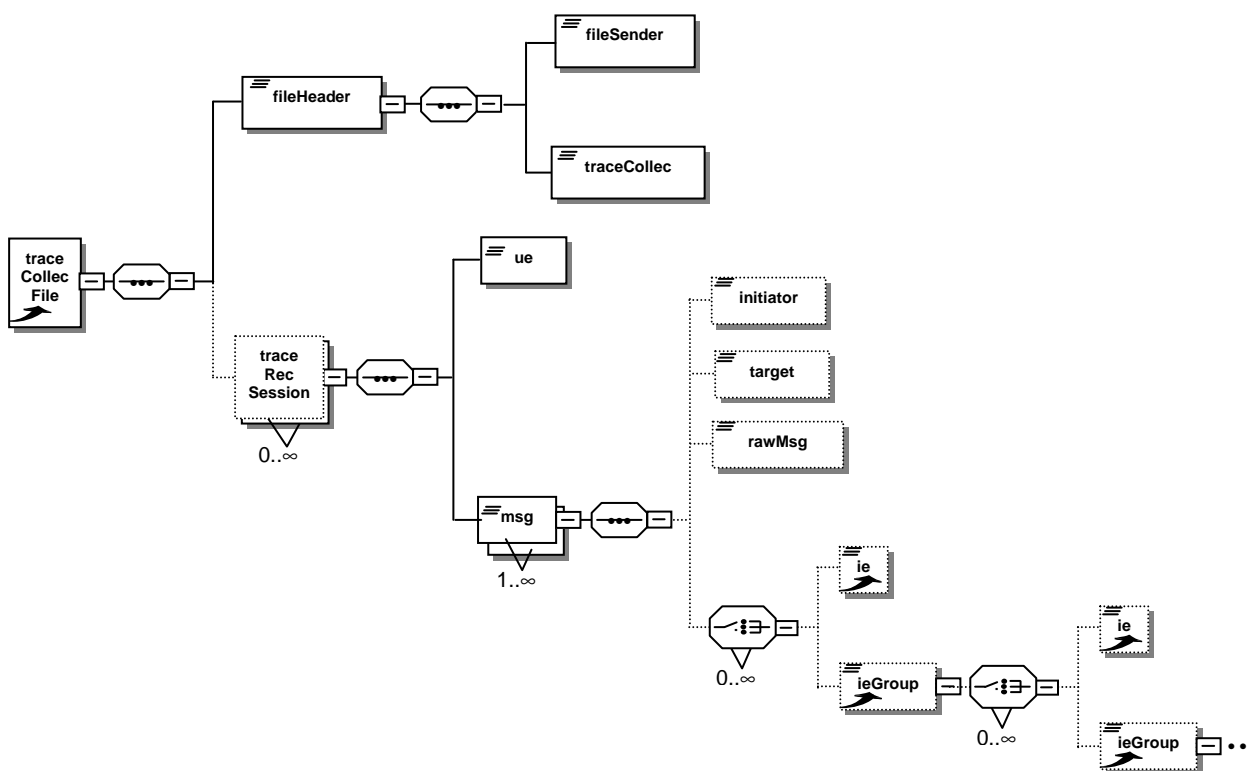
| XML element / XML attribute specification | Description |
|---|---|
| msg | This element contains the information associated to a traced message. This element will not be included if the file is from the MME for retrieving the IMSI/IMEI (SV) information. It includes: <ul style="list-style-type: none"> - the function name associated to the traced message (attribute specification "function") - the time difference with attribute specification "traceCollect beginTime" (attribute specification "changeTime") - a boolean value that indicates if the message is vendor specific (attribute specification "vendorSpecific") - the protocol message name (attribute specification "name") - the NE initiator of the protocol message (element "initiator") - the NE target(s) of the protocol message (element "target") - the encoded protocol message (element "rawMsg") - the traced IEs, either simple (elements "ie") or complex (elements "ieGroup"), in any order |
| msg function | Attribute specification that provides the function name associated to the traced message (e.g. luu, lu CS, lub, Intra frequency measurement, Gb, ...). |
| msg changeTime | Attribute specification that provides the time difference with attribute specification "traceCollect beginTime". It is expressed in number of seconds and milliseconds (nbsec.ms). |
| msg vendorSpecific | Attribute specification whose value part is a boolean value that indicates if the message is vendor specific (true) or not (false). |
| msg name | Attribute specification that provides the protocol message name. |
| initiator | Optional element that identifies the NE initiator of the protocol message. Each includes: <ul style="list-style-type: none"> - the type of the network node that initiate the message (attribute specification "type") - the LDN of NE initiator of the protocol message (element's content). The element's content may be empty in case the initiator is the sender or the mobile |
| initiator type | Optional attribute specification that provides the type of the network node that initiate the message, e.g. "RNC", "SGSN". |
| target | Optional element that identifies the NE target(s) of the protocol message. It includes: <ul style="list-style-type: none"> - the type of the network node that receive the message (attribute specification "type") - the LDN or IP Address of NE target of the protocol message (element's content). The element's content may be empty in case the target is the sender or the mobile |
| target type | Optional attribute specification that provides the type of the network node that receive the message, e.g. "RNC", "SGSN". |
| NumOfTargets | Optional attribute specification that provides the number of targets that the message is sent to. This is populated ONLY if the Target is not explicitly specified and is useful when there are a large number of targets that the message is sent to. |
| rawMsg | Optional element that contains the encoded protocol message. It includes: <ul style="list-style-type: none"> - the protocol name associated to the event (attribute specification "protocol") - the protocol version (attribute specification "version") - the hexadecimal encoded form of the message (element's content) This element is available only if the trace depth is maximum. |
| rawMsg protocol | Attribute specification that provides the protocol name associated to the event (e.g. "Ranap"). |
| rawMsg version | Attribute specification that provides the protocol version. |
| ieGroup | Optional element that contains a complex traced IE, i.e. an IE that contains other traced IEs. It includes: <ul style="list-style-type: none"> - the IE group name (attribute specification "name") - the IE group value (attribute specification "value") - zero or more traced IEs, either simple (elements "ie") or complex (elements "ieGroup"), in any order This element is available only if the trace depth is medium or minimum. |
| ieGroup name | Optional attribute specification that provides the IE group name (e.g. "RAB parameters"). |
| ieGroup value | Optional attribute specification that provides the IE group value when it exists (e.g. "RAB identifier"). |
| ie | Optional element that contains a simple traced IE, i.e. an IE decoded from the traced message. It includes: <ul style="list-style-type: none"> - the IE name (attribute specification "name") - the IE value (element's content) This element is available only if the trace depth is medium or minimum. |
| ie name | Attribute specification that provides the IE name (e.g. "Minimum DL Power"). |

A.2 XML file format definition

For encoding of the information content, XML (see Extensible Markup Language (XML) 1.0, W3C Recommendation [5]) will be used. The XML schema contains the mark-up declarations that provide a grammar for the trace file format. The XML schema is defined below.

A.2.1 XML trace file diagram

The following figure describes the XML element structure of a trace XML file.



Note: Refer to “Symbol” paragraph for the symbols meaning

Figure : XML trace file diagram

A.2.2 Trace data file XML schema

The following XML schema `traceData.xsd` is the schema for trace data XML files:

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
  3GPP TS 32.423 Subscriber and Equipment Trace data definition and management
  Trace data file XML schema
  traceData.xsd
-->
<schema
  targetNamespace=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData"
  elementFormDefault="qualified"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:td=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData"
>
<!-- XML types specific for Trace data file -->
<complexType name="TraceReference">
  <sequence>
    <element name="MCC" type="short" minOccurs="0"/>
    <element name="MNC" type="short" minOccurs="0"/>
    <element name="TRACE_ID" type="integer" />
  </sequence>
</complexType>

<!-- Trace data file root XML element -->
<element name="traceCollecFile">
  <complexType>
    <sequence>
      <element name="fileHeader">
        <complexType>
          <sequence>
            <element name="fileSender">
              <complexType>
                <attribute name="elementDn" type="string" use="optional"/>
                <attribute name="elementType" type="string" use="optional"/>
              </complexType>
            </element>
            <element name="traceCollec">
              <complexType>
                <attribute name="beginTime" type="dateTime" use="required"/>
              </complexType>
            </element>
          </sequence>
          <attribute name="fileFormatVersion" type="string" use="required"/>
          <attribute name="vendorName" type="string" use="optional"/>
        </complexType>
      </element>
      <element name="traceRecSession" minOccurs="0" maxOccurs="unbounded">
        <complexType>
          <sequence>
            <element name="ue" minOccurs="0">
              <complexType>
                <attribute name="idType" type="string" use="required" />
                <attribute name="idValue" type="long" use="required"/>
              </complexType>
            </element>
            <element name="msg" minOccurs="0" maxOccurs="unbounded">
              <complexType>
                <sequence>
                  <element name="initiator" minOccurs="0">
                    <complexType>
                      <simpleContent>
                        <extension base="string">
                          <attribute name="type" type="NCName"
use="optional"/>
                        </extension>
                      </simpleContent>
                    </complexType>
                  </element>
                </sequence>
              </complexType>
            </element>
            <element name="target" minOccurs="0" maxOccurs="unbounded">
              <complexType>
                <simpleContent>
                  <extension base="string">

```



```

use="optional"/>
    <attribute name="type" type="NCName"
    </extension>
    </simpleContent>
  </complexType>
</element>
<element name="rawMsg" minOccurs="0">
  <complexType>
    <simpleContent>
      <extension base="hexBinary">
        <attribute name="protocol" type="string"
use="required"/>
        <attribute name="version" type="string"
use="required"/>
        <attribute name="NumOfTargets" type="integer"
use="optional"/>
      </extension>
    </simpleContent>
  </complexType>
</element>
<choice minOccurs="0" maxOccurs="unbounded">
  <element ref="td:ie"/>
  <element ref="td:ieGroup"/>
</choice>
</sequence>
<attribute name="function" type="string" use="required"/>
<attribute name="name" type="string" use="required"/>
<attribute name="changeTime" type="float" use="required"/>
<attribute name="vendorSpecific" type="boolean" use="required"/>
</complexType>
</element>
</sequence>
<attribute name="dnPrefix" type="string" use="optional"/>
<attribute name="traceSessionRef" type="td:TraceReference" use="required"/>
<attribute name="traceRecSessionRef" type="long" use="required"/>
<attribute name="stime" type="dateTime" use="optional"/>
</complexType>
</element>
</sequence>
</complexType>
</element>
<!-- Additional supporting XML elements -->
<element name="ieGroup">
  <complexType>
    <choice minOccurs="0" maxOccurs="unbounded">
      <element ref="td:ie"/>
      <element ref="td:ieGroup"/>
    </choice>
    <attribute name="name" type="string" use="optional"/>
    <attribute name="value" type="string" use="optional"/>
  </complexType>
</element>
<element name="ie">
  <complexType>
    <simpleContent>
      <extension base="string">
        <attribute name="name" type="string" use="required"/>
      </extension>
    </simpleContent>
  </complexType>
</element>
</schema>

```

Annex B (normative): Trace Report File Conventions and Transfer Procedure

This annex describes naming conventions of files containing trace results and the procedure to transfer these files from the network to the NM.

B.1 File naming convention

The following convention shall be applied for trace result file naming:

<Type><Startdate>.<Starttime>-<SenderType>.<SenderName>.[<TraceReference>].[<TraceRecordingSessionRef>]

- 1) The Type field indicates if the file contains trace data for single or multiple calls, where:
 - "A" means single Trace Recording Session, single sender NE
 - "B" means multiple Trace Recording Sessions, single sender NE
 - "C" means IMSI/IMEI (SV) information for cell traffic trace
- 2) The Startdate field indicates the date of the first record in the trace file. The Startdate field is of the form YYYYMMDD, where:
 - YYYY is the year in four-digit notation;
 - MM is the month in two digit notation (01 - 12);
 - DD is the day in two digit notation (01 - 31).
- 3) The Starttime field indicates the time of the first record in the trace file. The Starttime field is of the form HHMMshhmm, where:
 - HH is the two digit hour of the day (local time), based on 24 hour clock (00 - 23);
 - MM is the two digit minute of the hour (local time),
 - s is the sign of the local time differential from UTC (+ or -), in case the time differential to UTC is 0 then the sign may be arbitrarily set to "+" or "-";
 - hh is the two digit number of hours of the local time differential from UTC (00-23);
 - mm is the two digit number of minutes of the local time differential from UTC (00-59).
- 4) SenderType field is the type of NE defined by IOC attribute managedElementType in 3GPP TS 32.622 [12] that recorded and sent the trace file; SenderName field is the identifier of the NE that recorded and sent the trace file.
- 5) TraceRecordingSessionReference field is set only if the type field is A, and is represented in hexa-decimal format. TraceRecordingSessionReference is a 4 digit hexadecimal number and will not include filler digits for values less than 4 digits in length. All hexadecimal letters (A thru F) are capitalized.
- 6) TraceReference field is set if the type field is A. For type B the Trace Reference is optional and will be used when one trace file is created per trace session with multiple trace recording session. Trace Reference is represented in hexadecimal format. Trace Reference as defined in 3GPP TS 32.422 [1] PLMN ID (MCC, MNC) and Trace ID.

The PLMN identity consists of 3 digits for MCC followed by either - a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or 3 digits from MNC (in case of a 3 digit MNC). MCC and MNC are in BCD format.

Example: If MCC: 405, MNC: 139

octet 1: 0x04 (MCC digit 2, MCC digit 1)

octet 2: 0x15 (MNC digit 1, MCC digit 3)

octet 3: 0x93 (MNC digit 3, MNC digit 2)

Also if the MNC is 2 digits (MCC: 405 and MNC 39)

octet 1: 0x04 (MCC digit 2, MCC digit 1)

octet 2: 0xF5 (MNC digit 1, MCC digit 3)

octet 3: 0x93 (MNC digit 3, MNC digit 2)

7) Trace Reference is set if the type field is C.

See bullet 6 above for details regarding the representation of the Trace Reference. Some examples describing file naming convention:

1) file name: A20090928.2315+0200-MME.MME5.13F23200056.125,

meaning: file produced by MME<MME5> on September 28, 2009, first trace record at 23:15 local with a time differential of +2 hours against UTC. The file contains trace data for the Trace Session with the Trace reference 13F232000056 (where MCC is 312, MNC is 23, and Trace ID is 000056, all in hexadecimal format) and for the Trace Recording Session with the reference 125.

2) file name: B20030115.1700-0300-RNC.RNC02,

meaning: file produced by RNC<RNC02> on January 15, 2003, first trace record at 17:00 local with a time differential of -3 hours against UTC. The file contains trace data for several Trace Recording Sessions.

3) file name: B20030115.1700-0300-RNC.RNC02.4358070034D7,

meaning: file produced by RNC<RNC02> on January 15, 2003, first trace record at 17:00 local with a time differential of -3 hours against UTC. The file contains trace 4358070034D7 (where MCC is 348, MNC is 570, and Trace ID is 0034D7) data for Trace reference and several Trace Recording Sessions.

4) file name C20030115.1700-0300-MME.MME02.26F452550021

Meaning: file produced by MME<MME02> on January 15, 2003, first trace record at 17:00 local with a time differential of -3 hours against UTC. The file contains IMSI/IMEI (SV) information for one or more UEs traced at eNB with Trace Reference 26F452550021 (where MCC is 624, MNC is 25, and Trace ID is 550021).

B.2 File transfer

- Data retrieval and storage mechanisms are vendor specific.
- There is no constraint on data retrieval periodicity.

Annex C (informative): Trace Functional Architecture: Reporting

C.1 Figure of Trace Reporting

The following represents the trace reporting procedures.

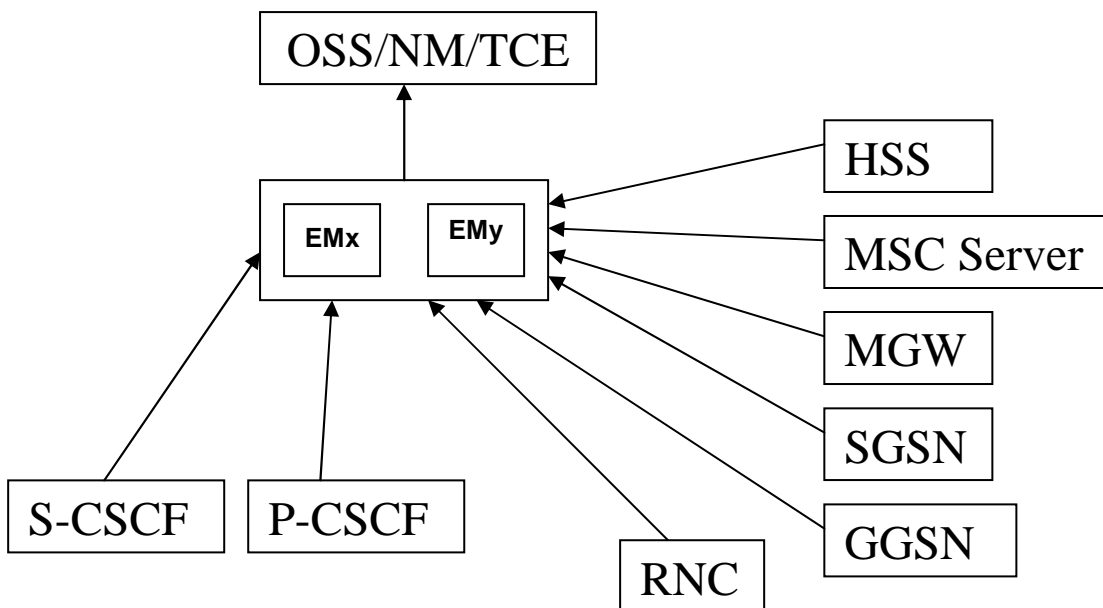


Figure C.1.1: Trace Reporting in System context A

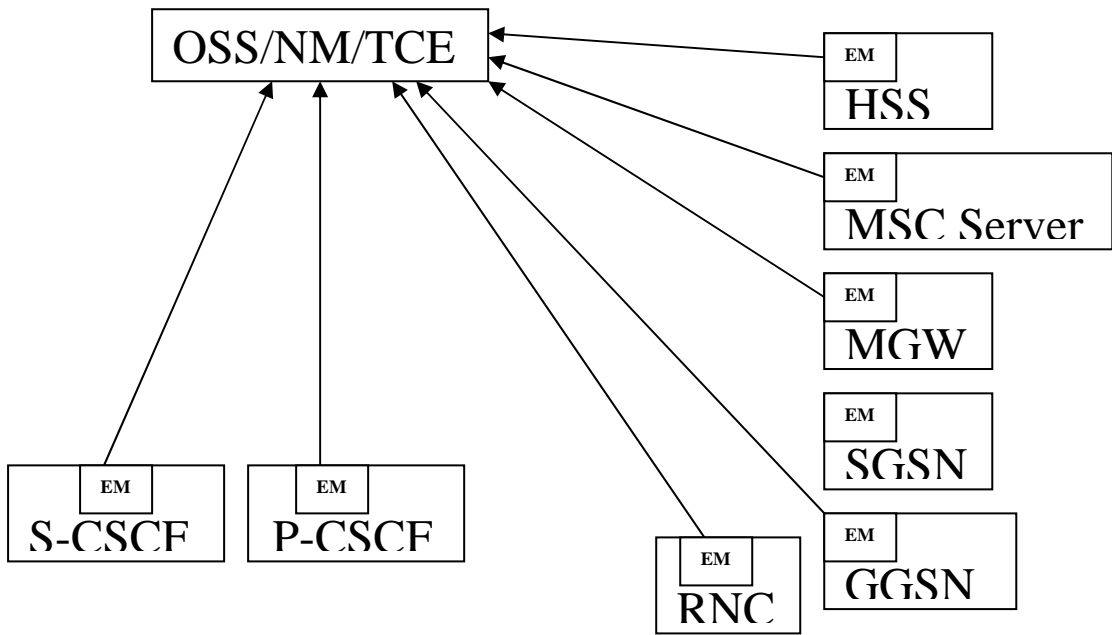


Figure C.1.2: Trace Reporting in System Context B

Annex D (informative): Examples of trace files

D.1 Examples of trace XML file

D.1.1 Example of XML trace file with the maximum level of details

```
<?xml version="1.0" encoding="UTF-8"?>
<traceCollecFile xmlns="http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData
http://www.3gpp.org/ftp/specs/archive/32_series/32423#traceData">
<fileHeader fileFormatVersion="32.423 V6.0" vendorName="Company NN">
  <fileSender elementDn="DC=a1.companyNN.com,SubNetwork=1, ManagedElement=RNC-1"
elementType="RNC"/>
  <traceCollec beginTime="2001-09-11T09:30:47-05:00"/>
</fileHeader>
  <traceRecSession dnPrefix="DC=a1.companyNN.com,SubNetwork=1" traceSessionRef="1"
traceRecSessionRef="2147483647" stime="2001-09-11T09:30:47-05:00">
  <ue idType="IMSI" idValue="32795"/>
  <msg function="Iub" name="Radio LinkSetup Request" changeTime="0.005"
vendorSpecific="false">
    <target type="Cell">SubNetwork=1,ManagedElement=Cell-1</target>
    <rawMsg protocol="Nbap" version="001">A9FD64E12C</rawMsg>
  </msg>
</traceRecSession>
</traceCollecFile>
```

An additional example added;

```
<?xml version="1.0" encoding="UTF-8"?>
<traceCollecFile xmlns="http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData
http://www.3gpp.org/ftp/specs/archive/32_series/32423#traceData">
<fileHeader fileFormatVersion="32.423 V9.0" vendorName="Company NN">
  <fileSender elementDn="DC=a1.companyNN.com,SubNetwork=1, ManagedElement=MME-1 "
elementType="MME"/>
  <traceCollec beginTime="2001-09-11T09:30:47-05:00"/>
</fileHeader>
  <traceRecSession dnPrefix="DC=a1.companyNN.com,SubNetwork=1" traceSessionRef="1"
traceRecSessionRef="2147483647" stime="2001-09-11T09:30:47-05:00">
  <ue idType="IMSI" idValue="32795"/>
  <msg function="S1AP" name="Handover Request" changeTime="0.005" vendorSpecific="false">
    <target type="Cell">SubNetwork=1,ManagedElement=Cell-1</target>
    <target type="Cell">SubNetwork=1,ManagedElement=Cell-2</target>
    <target type="Cell">123.222.213.5 </target>
    <rawMsg protocol="S1AP" version="001" NumOfTargets=3>A9FD64E12C</rawMsg>
  </msg>
</traceRecSession>
</traceCollecFile >
```

D.1.2 Example of XML trace file with the minimum level of details

```
<?xml version="1.0" encoding="UTF-8"?>
<traceCollecFile xmlns="http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData
http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData">
  <fileHeader fileFormatVersion="32.423 V6.0" vendorName="Company NN">
    <fileSender elementDn="DC=a1.companyNN.com,SubNetwork=1, ManagedElement=RNC-1"
elementType="RNC"/>
    <traceCollec beginTime="2001-09-11T09:30:47-05:00"/>
  </fileHeader>
  <traceRecSession dnPrefix="DC=a1.companyNN.com,SubNetwork=1" traceSessionRef="1"
traceRecSessionRef="2147483647" stime="2001-09-11T09:30:47-05:00">
    <ue idType="IMSI" idValue="32795"/>
    <msg function="Iub" name="Radio Link Setup Request" changeTime="0.005"
vendorSpecific="false">
      <target type="Cell">SubNetwork=1,ManagedElement=Cell-1</target>
      <ie name="UL Scrambling Code">54</ie>
      <ie name="UL SIR Target">17.3</ie>
      <ie name="Min UL Channelisation Code Length">8</ie>
      <ie name="Puncture Limit">2</ie>
      <ieGroup name="RadioLink" value="1">
        <ie name="DL Scrambling Code">1</ie>
        <ie name="DL Channelisation Code Number">15</ie>
        <ie name="Maximum DL Power">9.3</ie>
        <ie name="Minimum DL Power">-10.1</ie>
      </ieGroup>
    </msg>
    <msg function="IuPs" name="RAB Assignment Response" changeTime="0.010"
vendorSpecific="false">
      <ieGroup name="RAB" value="1">
        <ieGroup name="RAB Failed To Setup Or Modify">
          <ie name="cause">2</ie>
        </ieGroup>
      </ieGroup>
    </msg>
  </traceRecSession>
</traceCollecFile>
```

D.1.3 Example of XML trace file for IMSI information from the MME

```
<?xml version="1.0" encoding="UTF-8"?>

<traceCollecFile xmlns=http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData
http://www.3gpp.org/ftp/specs/archive/32_series/32.423#traceData">

  <fileHeader fileFormatVersion="32.423 V8.0" vendorName="Company NN">

    <fileSender elementDn="DC=a1.companyNN.com,SubNetwork=1, ManagedElement=MME" elementType="MME"/>

    <traceCollec beginTime="2001-09-11T09:30:47-05:00"/>

  </fileHeader>

  <traceRecSession dnPrefix="DC=a1.companyNN.com,SubNetwork=1" traceSessionRef="1" traceRecSessionRef="2147483647" stime="2001-09-
11T09:30:47-05:00">

    <ue idType="IMSI" idValue="32795"/>

  </traceRecSession>

  <traceRecSession dnPrefix="DC=a1.companyNN.com,SubNetwork=1" traceSessionRef="2" traceRecSessionRef="2147483647" stime="2001-09-
11T09:30:47-05:00">

    <ue idType="IMSI" idValue="12345"/>

  </traceRecSession>

</traceCollecFile>
```

Annex E (informative):
Void

Annex F (informative): Change history

| Change history | | | | | | | | |
|----------------|-------|-----------|------|-----|--|-----|-------|-------|
| Date | TSG # | TSG Doc. | CR | Rev | Subject/Comment | Cat | Old | New |
| Sep 2005 | SA_29 | SP-050623 | 0004 | 1 | Clarify Trace Messages for FDD and TDD modes | B | 6.2.0 | 7.0.0 |
| Dec 2005 | SA_30 | SP-050690 | 0007 | -- | Differentiate Trace Contents for FDD and TDD | B | 7.0.0 | 7.1.0 |
| Dec 2005 | SA_30 | SP-050709 | 0008 | -- | Remove SFN-SFN observed time difference - Align with 25.331 | A | 7.0.0 | 7.1.0 |
| Dec 2005 | SA_30 | SP-050709 | 0009 | -- | Correction to name space URI | A | 7.0.0 | 7.1.0 |
| Jun 2006 | SA_32 | SP-060258 | 0011 | -- | Correction for compilation errors of schema and addition of the missing link | A | 7.1.0 | 7.2.0 |
| Sep 2006 | SA_33 | SP-060533 | 0013 | -- | Correct UTRA Carrier RSSI for trace contents- Align with RAN2's 25.331 | A | 7.2.0 | 7.3.0 |
| Sep 2006 | SA_33 | SP-060533 | 0015 | -- | Correct CFN-SFN observed time difference for trace IE - Align with RAN2's 25.331 | A | 7.2.0 | 7.3.0 |
| Sep 2006 | SA_33 | SP-060552 | 0016 | -- | Add Trace IEs to differentiate UARFCN for FDD and TDD - Align with RAN2's 25.331 | C | 7.2.0 | 7.3.0 |
| Sep 2006 | SA_33 | SP-060552 | 0018 | -- | Correction in XML schema and examples | F | 7.2.0 | 7.3.0 |
| Dec 2006 | SA_34 | SP-060728 | 0019 | -- | Correct the errors in figure and examples | F | 7.3.0 | 7.4.0 |
| Mar 2009 | SA_43 | SP-090207 | 0020 | -- | Constraint of the presence for the 'ue' element | F | 7.4.0 | 8.0.0 |
| Mar 2009 | SA_43 | SP-090207 | 0021 | -- | Adding PGW trace record content | B | 7.4.0 | 8.0.0 |
| Mar 2009 | SA_43 | SP-090207 | 0022 | -- | Alignment with 32.421 and 32.422. Introduction medium and minimum trace dept IEs for the GTP and S1AP protocols in MME | B | 7.4.0 | 8.0.0 |
| Mar 2009 | SA_43 | SP-090207 | 0023 | -- | Alignment with 32.421 and 32.422. Introduction of E-UTRAN | B | 7.4.0 | 8.0.0 |
| Jun 2009 | SA_44 | SP-090289 | 0024 | -- | Alignment with 32.421 and 32.422 - Introduction medium and minimum trace depth IEs in MME. | F | 8.0.0 | 8.1.0 |
| Jun 2009 | SA_44 | SP-090289 | 0025 | -- | Add missing SGW Trace Record content | F | 8.0.0 | 8.1.0 |
| Jun 2009 | SA_44 | SP-090289 | 0026 | -- | Add missing PGW Trace Record content for Gx and S6b interfaces | F | 8.0.0 | 8.1.0 |
| Jun 2009 | SA_44 | SP-090289 | 0027 | -- | Alignment with 32.421 and 32.422 - Introduction medium and minimum trace dept IEs for NAS in MME. | F | 8.0.0 | 8.1.0 |
| Sep 2009 | SA_45 | SP-090534 | 0028 | -- | Correction in TS 32.423 Trace Depth requirements for MME, SGW and PGW | F | 8.1.0 | 8.2.0 |
| Sep 2009 | SA_45 | SP-090534 | 0030 | -- | Unable to uniquely identify file name when one file per UE trace | F | 8.1.0 | 8.2.0 |
| Sep 2009 | SA_45 | SP-090534 | 0031 | -- | Added a file format and example for sending the IMSI/IMEI (SV) information from the MME | F | 8.1.0 | 8.2.0 |
| Sep 2009 | SA-45 | SP-090542 | 0029 | -- | Correction on XML file format for Trace failure notification | F | 8.2.0 | 9.0.0 |
| Dec 2009 | SA-46 | SP-090719 | 0032 | -- | Clarify Trace Reference and Trace Recording Session Reference format | F | 9.0.0 | 9.1.0 |
| Jan 2010 | -- | -- | -- | -- | Removal of track changes | -- | 9.1.0 | 9.1.1 |
| Mar 2010 | SA-47 | SP-100034 | 0034 | -- | Align with 32.421 and 33.401 | A | 9.1.1 | 9.2.0 |
| Sep 2010 | SA-49 | SP-100487 | 0039 | -- | Correcting references | A | 9.2.0 | 9.3.0 |
| Sep 2010 | SA-49 | SP-100488 | 0035 | -- | Correct call trace file format to allow multiple targets | F | 9.2.0 | 9.3.0 |
| Dec 2010 | SA-50 | SP-100831 | 0046 | -- | Add missing interfaces S3, S4 and S6d trace record contents of SGSN - Align with 32.422 | A | 9.3.0 | 9.4.0 |
| Dec 2010 | SA-50 | SP-100858 | 0041 | 1 | Correcting the Trace Reference definition - Align with RAN3 TS 36.423, 36.413 | F | 9.3.0 | 9.4.0 |
| March 2012 | SA-55 | SP-120044 | 0059 | 1 | Modify E-UTRAN Trace Record Content | F | 9.4.0 | 9.5.0 |
| June 2013 | SA-60 | SP-130265 | 0070 | 1 | Correct trace file name format | F | 9.5.0 | 9.6.0 |

History

| Document history | | |
|-------------------------|--------------|-------------|
| V9.1.1 | January 2010 | Publication |
| V9.2.0 | April 2010 | Publication |
| V9.3.0 | October 2010 | Publication |
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