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Foreword

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

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

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:

32.401 Performance Management (PM); Concept and requirements

52.402 Performance Management (PM); Performance measurements – GSM

32.404 Performance Management (PM); Performance measurements - Definitions and template

32.405 Performance Management (PM); Performance measurements Universal Terrestrial Radio Access Network (UTRAN)

32.406 Performance Management (PM); Performance measurements Core Network (CN) Packet Switched (PS) domain

32.407 Performance Management (PM); Performance measurements Core Network (CN) Circuit Switched (CS) domain

32.408 Performance Management (PM); Performance measurements Teleservice

32.409 Performance Management (PM); Performance measurements IP Multimedia Subsystem (IMS)

The present document is part of a set of specifications, which describe the requirements and information model necessary for the standardised Operation, Administration and Maintenance (OA&M) of a multi-vendor 3G-system.

During the lifetime of a 3G network, its logical and physical configuration will undergo changes of varying degrees and frequencies in order to optimise the utilisation of the network resources. These changes will be executed through network configuration management activities and/or network engineering, see TS 32.600 [3].

Many of the activities involved in the daily operation and future network planning of a 3G network require data on which to base decisions. This data refers to the load carried by the network and the grade of service offered. In order to produce this data performance measurements are executed 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. The purpose of the present document is to describe the mechanisms involved in the collection of the data and the definition of the data itself.

Annex B of 32.404 helps in the definition of new performance measurements that can be submitted to 3GPP for potential adoption and inclusion in the present document. Annex B of 32.404 discusses a top-down performance measurement definition methodology that focuses on how the end-user of performance measurements can use the measurements.

1 Scope

The present document describes the measurements for UMTS and combined UMTS/GSM.

TS 32.401 [1] describes Performance Management concepts and requirements.

The present document is valid for all measurement types provided by an implementation of a UMTS network and combined UMTS/GSM network.

Only measurement types that are specific to UMTS or combined UMTS/GSM networks are defined within the present documents. Vendor specific measurement types used in UMTS and combined UMTS/GSM networks are not covered. Instead, these could be applied according to manufacturer's documentation.

Measurements related to "external" technologies (such as ATM or IP) as described by "external" standards bodies (e.g. ITU-T or IETF) shall only be referenced within this specification, wherever there is a need identified for the existence of such a reference.

The definition of the standard measurements is intended to result in comparability of measurement data produced in a multi-vendor network, for those measurement types that can be standardised across all vendors' implementations.

The structure of the present document is as follows:

- Header 1: Network Element (e.g. RNC related measurements);
- Header 2: Measurement function (e.g. soft handover measurements);
- Header 3: Measurements.

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 and/or edition number or version number) 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 32.401: "Telecommunication management; Performance Management (PM); Concept and requirements".
- [2] 3GPP TS 23.140: "Multimedia Messaging Service (MMS); Functional description; Stage 2".
- [3] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".
- [4] 3GPP TS 23.172: "Technical realization of Circuit Switched (CS) multimedia service UDI/RDI fallback and service modification; Stage 2".
- [5] ITU-T Q.763: "Signalling System No. 7 – ISDN user part formats and codes".
- [6] ITU-T Q.723: "Specifications of Signalling System No. 7 – Telephone user part; Formats and codes".
- [7] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".
- [8] 3GPP TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

- [9] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".
- [10] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".
- [11] ITU-T Q.1902: "Specifications of signalling related to Bearer Independent Call Control (BICC)".
- [12] 3GPP TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 4; Stage 2".

3 Measurement family and abbreviations

3.1 Measurement family

The measurement names defined in the present document are all beginning with a prefix containing the measurement family name (e.g. RAB.AttEstabCS.Conv, MM.AttGprsAttach). This family name identifies all measurements which relate to a given functionality and it may be used for measurement administration (see TS 32.401 [1]).

The list of families currently used in the present document is as follows:

- MMS (measurements related to Multimedia Messaging Services);
- SMS (measurements related to Short Message Service);
- MMC (measurements related to MultiMedia calls);
- VSC (measurements related to voice call);
- IN (measurements related to Intelligent Service).

3.2 Abbreviations

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

CAMEL	Customized Application for Mobile network Enhanced Logic
BICC	Bearer Independent Call Control
CN	Core Network
EM	(Network) Element Manager
IN	Intelligent Service
ITU-T	International Telecommunication Union - Telecommunications Standardisation Sector
MM	MultiMedia
MSC	Mobile services Switching Centre
NE	Network Element
NM	Network Manager
OS	Operations System (EM, NM)
QoS	Quality of Service
UTMS	Universal Mobile Telecommunications System
RANAP	Radio Access Network Application Part
UTRAN	Universal Terrestrial Radio Access Network

You can find below a list of abbreviations used within the measurement types for field E of the measurement template.

Ans	Answer(ed)
Att	Attempt(s,ed)
Conv	Conversational
CS	Circuit switched
Fail	Fail(ed, ure)
FB	Fallback
IN	Intelligent Service
Inc	Incoming
Init	Init

Inter	Inter
Max	Maximum
MM	Mobility Management
MM	MultiMedia
MMC	Multimedia Call
Origi	Originating
PS	Packet switched
Req	Request(s,ed)
Res	Resource
SC	Service Change
Setup	Setup
SGSN	SGSN
Sub	Subscriber
Succ	Success(es,ful)
Termi	Terminating
UE	User Equipment
User	User
Vce	Voice

4 Measurements related to the MMS Relay/Server

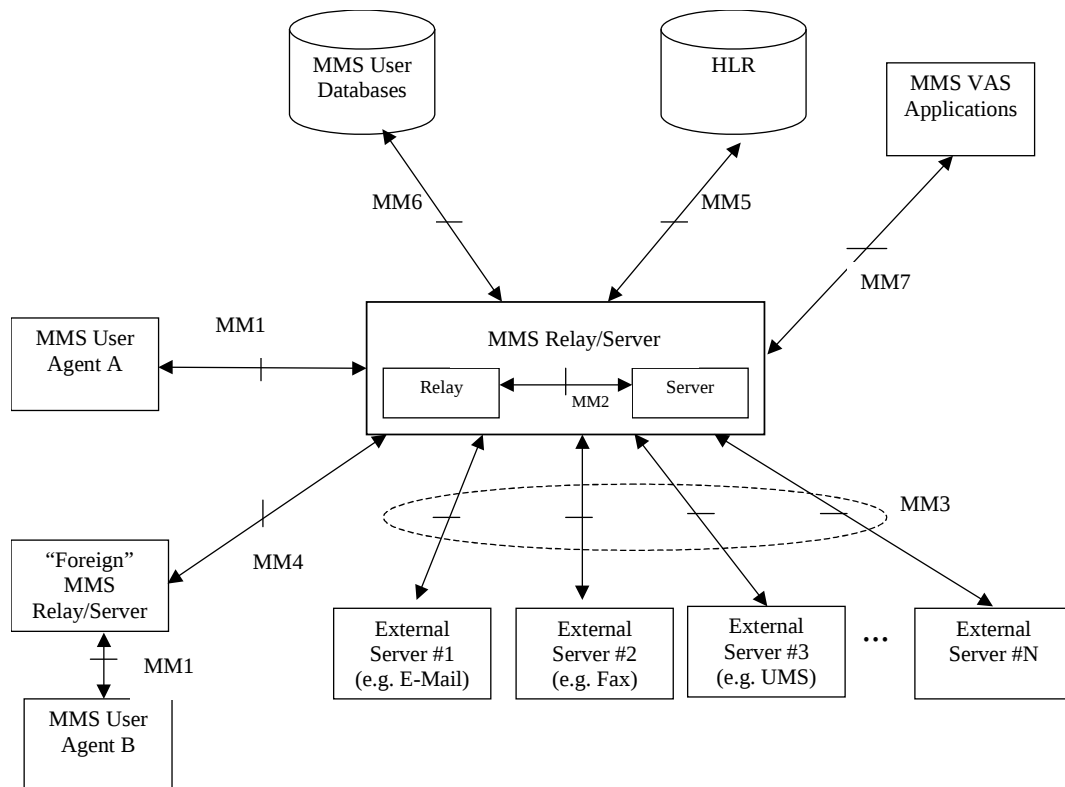


Figure 4.1

MM1: Reference point MM1 is used to submit Multimedia Messages from MMS User Agent to MMS Relay/Server, to let the MMS User Agent pull MMs from the MMS Relay/Server, let the MMS Relay/Server push information about MMs to the MMS User Agent as part of an MM notification, and to exchange delivery reports between MMS Relay/Server and MMS User Agents.

MM2: Not specified yet

MM3: Reference point MM3 is used by the MMS Relay/Server to send Multimedia Messages to and retrieve MMs from servers of external (legacy) messaging systems that are connected to the service provider's MMS Relay/Server.

MM4: Reference point MM4 between MMS Relay/Servers belonging to different MMSEs is used to transfer messages between them.

MM5: Reference point MM5 may be used to provide information to the MMS Relay/Server about the subscriber.

MM6: Not specified

MM7: Reference point MM7 is used to transfer MMs from MMS Relay/Server to MMS VAS applications and to transfer MMs from MMS VAS applications to MMS Relay/Server.

MMS uses a number of technologies to realise the requirements of the stage 1 description (TS 22.140) [2]. As far as possible existing protocols (e.g. WAP, SMTP, ESMTP as transfer protocols; lower layers to provide push, pull, notification) and existing message formats (e.g. SMIL, MIME) shall be used for the realisation of the Multimedia Messaging Service.

In order to define generic measurements, 3GPP should specify Performance measurements based on the Reference Points (MM1 to MM7) and not specific to the protocol implemented. So whatever the implementation IP or WAP for example, the Reference Point messages are generic and so the measurements will be the same.

The main interfaces involved in the MMS delivery are the interface MM1 and MM4, we can see in this diagram the exact messages involved in the delivery. Those messages can be used to define Performance Measurement on a MMS Relay/Server basis.

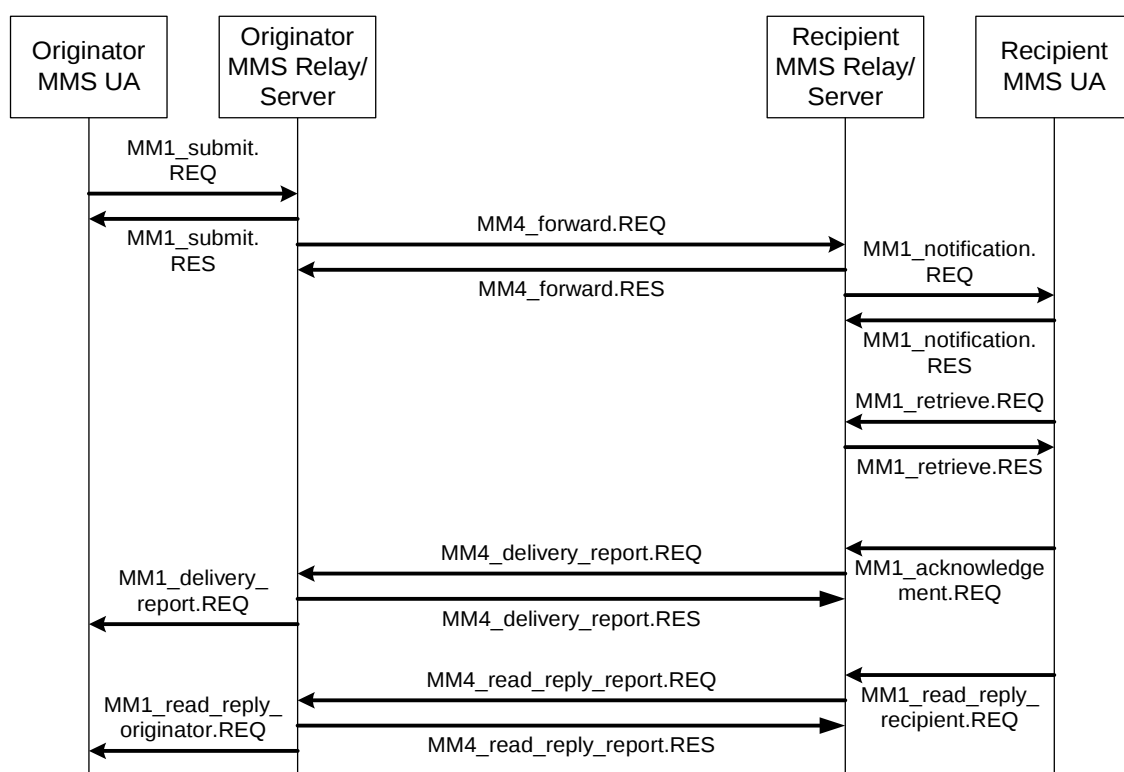


Figure 4.2: Example Abstract Message Flow

The most important quality metrics for MMS are availability, accuracy and speed. This contribution addresses the first two, the speed will require additional measurements based on time to deliver the multimedia messages. Availability and accuracy are a measure of the percentage of request that are successfully served and how complete the response is. The mentioned triggering points enable to define raw number of messages sent and received by the MMS Relay/Server, but is not good enough to gather service quality measurement, because those are only volume measurements. Also Response messages provide an acknowledgement mechanism for the request messages and those response messages can be positive or negative acknowledgement. This information is in the "Request Status code" which is contained by the "Request Status" field in the response messages. So in order to gather service quality measurements, a higher granularity is required for the response messages measurements: subcounters per request status code are introduced for that purpose. This is for MM1 submission and retrieval as well as every MM4 response messages measurements.

Background Information on the Request Status from TS 23.140 [2]

Request Status: The originator MMS Relay/Server shall indicate the status of the MM1_submit.REQ in the associated MM1_submit.RES. The reason code given in the status information element of the MM1_submit.RES may be supported with an explanatory text further qualifying the status. If this text is available in the Request status text information element the MMS User Agent should bring it to the user's attention. The choice of the language used in the Request status text information element is at the discretion of the MMS service provider.

Table 4.1: Information elements in the MM1_submit.RES

Information element	Presence	Description
Message Type	Mandatory	Identifies this message as MM1_submit.RES.
Transaction ID	Mandatory	The identification of the MM1_submit.REQ/MM1_submit.RES pair.
MMS Version	Mandatory	Identifies the version of the interface supported by the MMS Relay/Server.
Request Status	Mandatory	The status of the MM submit request.
Request Status Text	Optional	Description which qualifies the status of the MM submit request.
Message ID	Conditional	The identification of the MM if it is accepted by the originator MMS Relay/Server.
Store Status	Conditional	If the Store request was present in MM1_submit.REQ, the status of the store request.
Store Status Text	Optional	The explanatory text corresponding to the Store Status, if present.
Stored Message Reference	Conditional	If the Store request was present in MM1_submit.REQ, the message reference to the newly stored MM.

Table 4.2: Example of Request Status Code from TS 23.140 [2]

Request-Status-Code	Meaning
Ok	The corresponding request and some or all of its contents were accepted without errors.
Error-unspecified	An unspecified error occurred during the processing or reception of the corresponding request.
Error-service-denied	The corresponding request was rejected due to failure of authentication or authorisation of the originating MMS Relay/Server.
Error-message-format-corrupt	An inconsistency with the message format was detected when the corresponding request was parsed.
Error-sending-address-unresolved	There were no MMS address (From:, To:, Cc:, Bcc:) in its proper format or none of the addresses belong to the recipient MMS Relay/Server.
Error-message-not-found	This status code is obsolete
Error-network-problem	The recipient MMS Relay/Server was not able to accept the corresponding request due to capacity overload.
Error-content-not-accepted	The MM content was not accepted due to size, media type, copyrights or some other reason.
Error-unsupported-message	The recipient MMS Relay/Server does not support the corresponding request abstract message.

4.1 MM1

MM1 is the interface between the MMS Relay/Server and the MMS User Agent, following are the proposed measurements.

4.1.1 Number of Multimedia Messages submit requests received by MMS Relay/Server

- This measurement provides the number of Multimedia Messages (MM) submit requests received by MMS Relay/Server from MMS User Agent on the Reference point MM1.
- CC.
- On receipt of an "MM1_submit.REQ" message from MMS User Agent (TS 23.140 [2]).
- A single integer value.

- e) The measurement name has the form MMS.MM1SubReq.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.1.2 Number of Multimedia Messages submit responses sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) submit responses sent by MMS Relay/Server to MMS User Agent on the Reference point MM1. The measurement is split into subcounters per request status code.
- b) CC.
- c) On transmission of an "MM1_submit.RES" message to MMS User Agent. Each submit responses is added to the relevant measurement according to the request status code. See TS 23.140 [2].
- d) A single integer value.
- e) The measurement name has the form MMS.MM1SubRes.Status
- f) where Status identifies the request status code.
- g) MMS Relay/Server Function.
- h) Valid for packet switching.
- i) GSM/UMTS.

4.1.3 Number of Multimedia Messages notification requests sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) notification requests sent by MMS Relay/Server to MMS User Agent on the Reference point MM1.
- b) CC.
- c) On transmission of an "MM1_notification.REQ" message to MMS User Agent (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM1NotReq.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.1.4 Number of Multimedia Messages notification responses received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) notification responses received by MMS Relay/Server from MMS User Agent on the Reference point MM1.
- b) CC.
- c) On receipt of an "MM1_notification.RES" message from MMS User Agent (TS 23.140 [2]).
- d) A single integer value.

- e) The measurement name has the form MMS.MM1NotRes.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.1.5 Number of Multimedia Messages retrieve requests received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) retrieve requests received by MMS Relay/Server from MMS User Agent on the Reference point MM1.
- b) CC.
- c) On receipt of an "MM1_retrieve.REQ" message from MMS User Agent (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM1RetReq.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.1.6 Number of Multimedia Messages retrieve responses sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) retrieve responses sent by MMS Relay/Server to MMS User Agent on the Reference point MM1. The measurement is split into subcounters per request status code.
- b) CC.
- c) On transmission of an "MM1_retrieve.RES" message to MMS User Agent. Each retrieve responses is added to the relevant measurement according to the request status code. See TS 23.140 [2].
- d) A single integer value.
- e) The measurement name has the form MMS.MM1RetRes.Status.
- f) where Status identifies the request status code.
- g) MMS Relay/Server Function.
- h) Valid for packet switching.
- i) GSM/UMTS.

4.1.7 Number of Multimedia Messages acknowledgement requests received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) acknowledgement requests received by MMS Relay/Server from MMS User Agent on the Reference point MM1.
- b) CC.
- c) On receipt of an "MM1_acknowledgement.REQ" message from MMS User Agent (TS 23.140 [2]).
- d) A single integer value.

- e) The measurement name has the form MMS.MM1AckReq.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.1.8 Number of Multimedia Messages forward requests received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) forward requests received by MMS Relay/Server from MMS User Agent on the Reference point MM1.
- b) CC.
- c) On receipt of an "MM1_forward.REQ" message from MMS User Agent (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM1fwdREQ.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.1.9 Number of Multimedia Messages forward responses sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) forward responses sent by MMS Relay/Server to MMS User Agent on the Reference point MM1.
- b) CC.
- c) On transmission of an "MM1_forward.RES" message to MMS User Agent (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM1FwdRes.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.1.10 Number of Multimedia Messages delivery report requests sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) delivery report requests sent by MMS Relay/Server to MMS User Agent on the Reference point MM1.
- b) CC.
- c) On transmission of an "MM1_delivery_report.REQ" message to MMS User Agent (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM1RepReq.
- f) MMS Relay/Server Function.

- g) Valid for packet switching.
- h) GSM/UMTS.

4.1.11 Number of Multimedia Messages read reply recipient requests received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) read reply recipient requests received by MMS Relay/Server to MMS User Agent on the Reference point MM1.
- b) CC.
- c) On receipt of an "MM1_read_reply_recipient.REQ" message from MMS User Agent (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM1ReadRecReq.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.1.12 Number of Multimedia Messages read reply originator requests sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) read reply originator requests sent by MMS Relay/Server to MMS User Agent on the Reference point MM1.
- b) CC.
- c) On transmission of an "MM1_read_reply_originator.REQ" message to MMS User Agent (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM1ReadOrigReq.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.2 MM4

MM4 is the interface between MMS Relay/Servers, following are the proposed measurements.

4.2.1 Number of Multimedia Messages forward requests received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) forward requests received by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4.
- b) CC.
- c) On receipt of an "MM4_forward.REQ" message from MMS Relay/Server (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM4FwdReqRec.

- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.2.2 Number of Multimedia Messages forward requests sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) forward requests sent by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4.
- b) CC.
- c) On transmission of an "MM4_forward.REQ" message to MMS Relay/Server (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM4FwdReqSnt.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.2.3 Number of Multimedia Messages forward responses received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) forward responses received by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4. The measurement is split into subcounters per request status code.
- b) CC.
- c) On receipt of an "MM4_forward.RES" message from MMS Relay/Server. Each forward response is added to the relevant measurement according to the request status code. See TS 23.140 [2].
- d) A single integer value.
- e) The measurement name has the form MMS.MM4FwdResRec Status.
- f) where Status identifies the request status code.
- g) MMS Relay/Server Function.
- h) Valid for packet switching.
- i) GSM/UMTS.

4.2.4 Number of Multimedia Messages forward responses sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) forward responses sent by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4. The measurement is split into subcounters per request status code.
- b) CC.
- c) On transmission of an "MM4_forward.RES" message to MMS Relay/Server. Each forward response is added to the relevant measurement according to the request status code. See TS 23.140 [2].
- d) A single integer value.

- e) The measurement name has the form MMS.MM4FwdResSnt Status.
- f) where Status identifies the request status code.
- g) MMS Relay/Server Function.
- h) Valid for packet switching.
- i) GSM/UMTS.

4.2.5 Number of Multimedia Messages delivery report requests received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) delivery report requests received by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4.
- b) CC.
- c) On receipt of a "MM4_delivery_report.REQ" message from MMS Relay/Server (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM4RepReqRec.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.2.6 Number of Multimedia Messages delivery report requests sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) delivery report requests sent by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4.
- b) CC.
- c) On transmission of a "MM4_delivery_report.REQ" message to MMS Relay/Server (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM4RepReqSnt.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.2.7 Number of Multimedia Messages delivery report responses received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) delivery report responses received by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4. The measurement is split into subcounters per request status code.
- b) CC.
- c) On receipt of a "MM4_delivery_report.RES" message from MMS Relay/Server. Each delivery report responses is added to the relevant measurement according to the request status code. See TS 23.140 [2].
- d) A single integer value.

- e) The measurement name has the form MMS.MM4RepResRec Status.
- f) where Status identifies the request status code.
- g) MMS Relay/Server Function.
- h) Valid for packet switching.
- i) GSM/UMTS.

4.2.8 Number of Multimedia Messages delivery report responses sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) delivery report responses sent by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4. The measurement is split into subcounters per request status code.
- b) CC.
- c) On transmission of an "MM4_delivery_report.RES" message to MMS Relay/Server. Each delivery report response is added to the relevant measurement according to the request status code. See TS 23.140 [2].
- d) A single integer value.
- e) The measurement name has the form MMS.MM4RepResSnt Status.
- f) where Status identifies the request status code.
- g) MMS Relay/Server Function.
- h) Valid for packet switching.
- i) GSM/UMTS.

4.2.9 Number of Multimedia Messages read reply requests received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) read reply requests received by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4.
- b) CC.
- c) On receipt of an "MM4_read_reply.REQ" message from MMS Relay/Server (TS 23.140 [2]).
- d) A single integer value.
- e) The measurement name has the form MMS.MM4ReadReqRec.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.2.10 Number of Multimedia Messages read reply requests sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) read reply requests sent by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4.
- b) CC.
- c) On transmission of an "MM4_read_reply.REQ" message to MMS Relay/Server (TS 23.140 [2]).

- d) A single integer value.
- e) The measurement name has the form MMS.MM4ReadReqSnt.
- f) MMS Relay/Server Function.
- g) Valid for packet switching.
- h) GSM/UMTS.

4.2.11 Number of Multimedia Messages read reply responses received by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) read reply responses received by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4. The measurement is split into subcounters per request status code.
- b) CC.
- c) On receipt of an "MM4_read_reply.RES" message from MMS Relay/Server. Each read reply response is added to the relevant measurement according to the request status code. See TS 23.140 [2].
- d) A single integer value.
- e) The measurement name has the form MMS.MM4ReadResRec Status.
- f) where Status identifies the request status code.
- g) MMS Relay/Server Function.
- h) Valid for packet switching.
- i) GSM/UMTS.

4.2.12 Number of Multimedia Messages read reply responses sent by MMS Relay/Server

- a) This measurement provides the number of Multimedia Messages (MM) read reply responses sent by MMS Relay/Server from another MMS Relay/Server on the Reference point MM4. The measurement is split into subcounters per request status code.
- b) CC.
- c) On transmission of an "MM4_read_reply.RES" message to MMS Relay/Server. Each read reply response is added to the relevant measurement according to the request status code. See TS 23.140 [2].
- d) A single integer value.
- e) The measurement name has the form MMS.MM4ReadResSnt Status.
- f) where Status identifies the request status code.
- g) MMS Relay/Server Function.
- Valid for packet switching.
- h) GSM/UMTS.

5 SMS related measurements

The three measurement groups defined in subclause 5.n are subject to the "2 out of 3 approach".

5.1 SMS in the CS domain (MSC)

5.1.1 CS SMS mobile originating

5.1.1.1 Attempted CS SMS mobile originating

- a) This measurement provides the number of CS SMS mobile originating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the MSC of "RP-DATA" Message (TS 24.011 [10]) from the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMoCS:
 - SMS.AttMoCS Combined (don't care);
 - SMS.AttMoCS.G GSM;
 - SMS.AttMoCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.1.1.2 Successful CS SMS mobile originating

- a) This measurement provides the number of successful CS SMS mobile originating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the MSC of "RP-ACK" Message (TS 24.011 [10]) to the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMoCS:
 - SMS.SuccMoCS Combined (don't care);
 - SMS.SuccMoCS.G GSM;
 - SMS.SuccMoCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.1.2 CS SMS mobile terminating

5.1.2.1 Attempted CS SMS mobile terminating

- a) This measurement provides the number of CS SMS mobile terminating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the MSC of "RP-DATA" Message (TS 24.011 [10]).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMtCS:
 - SMS.AttMtCS Combined (don't care);
 - SMS.AttMtCS.G GSM;
 - SMS.AttMtCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.1.2.2 Successful CS SMS mobile terminating

- a) This measurement provides the number of successful CS SMS mobile terminating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the MSC of "RP-ACK" Message (TS 24.011 [10]).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMtCS:
 - SMS.SuccMtCS Combined (don't care);
 - SMS.SuccMtCS.G GSM;
 - SMS.SuccMtCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.1.3 CS ms-Present

5.1.3.1 Attempted CS ms-Present

- a) This attribute counts the number of times that a MS (attached to a MSC) send that it is ready to receive SM.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = ms-Present to the HLR from the MSC (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).

- e) SMS.AttMsPresentCS:
 - SMS.AttMsPresentCS Combined (don't care);
 - SMS.AttMsPresentCS.G GSM;
 - SMS.AttMsPresentCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.1.3.2 Successful CS ms-Present

- a) This attribute counts the number of successful times that a MS (attached to a MSC) send that it is ready to receive SM.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) This counter will be increased when a return result is received by the MSC from the HLR in response to the MAP_READY_FOR_SM with reason = "MS present" (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMsPresentCS:
 - SMS.SuccMsPresentCS Combined (don't care);
 - SMS.SuccMsPresentCS.G GSM;
 - SMS.SuccMsPresentCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.1.4 CS "memory available"

5.1.4.1 Attempted CS "memory available"

- a) This attribute counts the number of times that an MS (attached to a MSC) sent an indication of "memory available" to MSC.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = memoryAvailable to the HLR from the MSC (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMemoryAvailableCS:
 - SMS.AttMemoryAvailableCS Combined (don't care);
 - SMS.AttMemoryAvailableCS.G GSM;
 - SMS.AttMemoryAvailableCS.U UMTS.
- f) MscFunction.

- g) Valid for circuit switching.
- h) GSM/UMTS.

5.1.4.2 Successful CS "memory available"

- a) This attribute counts the number of successful times that an MS (attached to a MSC) sent an indication of "memory available" to MSC.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) This counter will be increased when a return result is received by the MSC from the HLR in response to the MAP_READY_FOR_SM with reason = "memory available" (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMemoryAvailableCS:
 - SMS.SuccMemoryAvailableCS Combined (don't care);
 - SMS.SuccMemoryAvailableCS.G GSM;
 - SMS.SuccMemoryAvailableCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.2 SMS in the PS domain (SGSN)

Up to now, no counters are defined for the failure cases FFS.

5.2.1 PS SMS mobile originating

5.2.1.1 Attempted PS SMS mobile originating

- a) This measurement provides the number of PS SMS mobile originating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the SGSN of "RP-DATA" Message (TS 24.011 [10]) from the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMoPS:
 - SMS.AttMoPS Combined (don't care);
 - SMS.AttMoPS.G GSM;
 - SMS.AttMoPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.2.1.2 Successful PS SMS mobile originating

- a) This measurement provides the number of successful PS SMS mobile originating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the SGSN of "RP-ACK" Message (TS 24.011 [10]) to the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMoPS:
 - SMS.SuccMoPS Combined (don't care);
 - SMS.SuccMoPS.G GSM;
 - SMS.SuccMoPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.2.2 PS SMS mobile terminating

5.2.2.1 Attempted PS SMS mobile terminating

- a) This measurement provides the number of PS SMS mobile terminating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the SGSN of "RP-DATA" Message (TS 24.011 [10]).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMtPS:
 - SMS.AttMtPS Combined (don't care);
 - SMS.AttMtPS.G GSM;
 - SMS.AttMtPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.2.2.2 Successful PS SMS mobile terminating

- a) This measurement provides the number of successful PS SMS mobile terminating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the SGSN of "RP-ACK" Message (TS 24.011 [10]).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMtPS:

- SMS.SuccMtPS Combined (don't care);
 - SMS.SuccMtPS.G GSM;
 - SMS.SuccMtPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.2.3 PS ms-Present

5.2.3.1 Attempted PS ms-Present

- a) This attribute counts the number of times that a MS (attached to a SGSN) send that it is ready to receive SM. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = ms-Present to the HLR from the SGSN (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMsPresentPS:
- SMS.AttMsPresentPS Combined (don't care);
 - SMS.AttMsPresentPS.G GSM;
 - SMS.AttMsPresentPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.2.3.2 Successful PS ms-Present

- a) This attribute counts the number of successful times that a MS (attached to a SGSN) send that it is ready to receive SM. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) This counter will be increased when a return result is received by the SGSN from the HLR in response to the MAP_READY_FOR_SM with reason = "MS present" (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMsPresentPS:
- SMS.SuccMsPresentPS Combined (don't care);
 - SMS.SuccMsPresentPS.G GSM;
 - SMS.SuccMsPresentPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.2.4 PS "memory available"

5.2.4.1 Attempted PS "memory available"

- a) This attribute counts the number of times that an MS (attached to a SGSN) sent an indication of "memory available" to SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = memoryAvailable to the HLR from the SGSN (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMemoryAvailablePS:
 - SMS.AttMemoryAvailablePS Combined (don't care);
 - SMS.AttMemoryAvailablePS.G GSM;
 - SMS.AttMemoryAvailablePS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.2.4.2 Successful PS "memory available"

- a) This attribute counts the number of successful times that an MS (attached to a SGSN) sent an indication of "memory available" to SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) This counter will be increased when a return result is received by the SGSN from the HLR in response to the MAP_READY_FOR_SM with reason = "memory available" (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMemoryAvailablePS:
 - SMS.SuccMemoryAvailablePS Combined (don't care);
 - SMS.SuccMemoryAvailablePS.G GSM;
 - SMS.SuccMemoryAvailablePS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.3 SMS in the CS/PS domain (MSC/SGSN)

Unlike the measurements in previous clauses, the measurements in this subclause do not differentiate between the PS and the CS domain, and deliver one total count.

Up to now, no counters are defined for the failure cases FFS.

5.3.1 SMS mobile originating

5.3.1.1 Attempted SMS mobile originating

- a) This measurement provides the number of SMS mobile originating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the MSC/SGSN of "RP-DATA" Message (TS 24.011 [10]) from the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMo:
 - SMS.AttMo Combined (don't care);
 - SMS.AttMo.G GSM;
 - SMS.AttMo.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.3.1.2 Successful SMS mobile originating

- a) This measurement provides the number of successful SMS mobile originating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the MSC/SGSN of "RP-ACK" Message (TS 24.011 [10]) to the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMo:
 - SMS.SuccMo Combined (don't care);
 - SMS.SuccMo.G GSM;
 - SMS.SuccMo.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.3.2 SMS mobile terminating

5.3.2.1 Attempted SMS mobile terminating

- a) This measurement provides the number of SMS mobile terminating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the MSC/SGSN of "RP-DATA" Message (TS 24.011 [10]).
- d) A single integer value per measurement type defined in e).

- e) SMS.AttMt:
 - SMS.AttMt Combined (don't care);
 - SMS.AttMt.G GSM;
 - SMS.AttMt.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.3.2.2 Successful SMS mobile terminating

- a) This measurement provides the number of successful SMS mobile terminating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the MSC/SGSN of "RP-ACK" Message (TS 24.011 [10]).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMt:
 - SMS.SuccMt Combined (don't care);
 - SMS.SuccMt.G GSM;
 - SMS.SuccMt.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.3.3 Ms-Present

5.3.3.1 Attempted ms-Present

- a) This attribute counts the number of times that a MS (attached to a MSC/SGSN) send that it is ready to receive SM. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = ms-Present to the HLR from the MSC/SGSN (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMsPresent:
 - SMS.AttMsPresent Combined (don't care);
 - SMS.AttMsPresent.G GSM;
 - SMS.AttMsPresent.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.

- h) GSM/UMTS.

5.3.3.2 Successful ms-Present

- a) This attribute counts the number of successful times that a MS (attached to a MSC/SGSN) send that it is ready to receive SM.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) This counter will be increased when a return result is received by the MSC/SGSN from the HLR in response to the MAP_READY_FOR_SM with reason = "MS present" (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMsPresent:
- | | |
|-----------------------|------------------------|
| - SMS.SuccMsPresent | Combined (don't care); |
| - SMS.SuccMsPresent.G | GSM; |
| - SMS.SuccMsPresent.U | UMTS. |
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.3.4 "Memory available"

5.3.4.1 Attempted "memory available"

- a) This attribute counts the number of times that an MS (attached to a MSC/SGSN) sent an indication of "memory available" to MSC/SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = memoryAvailable to the HLR from the MSC/SGSN (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMemoryAvailable:
- | | |
|----------------------------|------------------------|
| - SMS.AttMemoryAvailable | Combined (don't care); |
| - SMS.AttMemoryAvailable.G | GSM; |
| - SMS.AttMemoryAvailable.U | UMTS. |
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.3.4.2 Successful "memory available"

- a) This attribute counts the number of successful times that an MS (attached to a MSC/SGSN) sent an indication of "memory available" to MSC/SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.

- c) This counter will be increased when a return result is received by the MSC/SGSN from the HLR in response to the MAP_READY_FOR_SM with reason = "memory available" (TS 29.002 [9]).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMemoryAvailable:
 - SMS.SuccMemoryAvailable Combined (don't care);
 - SMS.SuccMemoryAvailable.G GSM;
 - SMS.SuccMemoryAvailable.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

6 Measurements related to CS data calls

6.1 Attempted UE originating CS data calls

- a) This measurement provides the number of attempted UE originating CS data calls. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) On receipt by the MSC-S of a "Setup" message from the UE and the Information Transfer Capability in the Bearer Capability IE is set to either unrestricted digital information or 3.1 kHz audio, ex PLMN or facsimile group 3 or Other ITC. (3GPP TS 24.008 [7]).
- d) A single integer value per measurement type in e)
- e) CSD.attUEOrig Combined(don't care)
 CSD.attUEOrig.G GSM
 CSD.attUEOrig.U UMTS
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

6.2 Successful UE originating CS data calls

- a) This measurement provides the number of successful UE originating CS data calls. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) On transmission of an "Alerting" message for the CS data service from the MSC-S to the Calling Party (3GPP TS 24.008 [7]).
- d) A single integer value per measurement type defined in e).
- e) CSD.succUEOrig Combined(don't care)
 CSD.succUEOrig.G GSM
 CSD.succUEOrig.U UMTS
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

6.3 Answered UE originating CS data calls

- a) This measurement provides the number of answered UE originating CS data calls. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) On reception of an "ACK" message for the CS data service from the MSC-S from the Calling Party (3GPP TS 24.008 [7]).
- d) A single integer value per measurement type defined in e).

- e) CSD.ansUEOrig Combined(don't care)
 - CSD.ansUEOrig.G GSM
 - CSD.ansUEOrig.U UMTS
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

6.4 Attempted incoming CS data calls

- a) This measurement provides the number of attempted incoming CS data calls.
- b) CC.
- c) On receipt by the MSC-S of an "IAM" message and the transmission medium requirement is set to other value than speech.(ITU-T Q.1902, ITU-T Q.764)
- d) A single integer value.
- e) CSD.attIncCall
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

6.5 Successful incoming CS data calls

- a) This measurement provides the number of successful incoming CS data calls.
- b) CC.
- c) On transmission by the MSC-S of an "ACM" or "CON" message for the CS data service.(ITU-T Q.1902)
- d) A single integer value.
- e) CSD.succIncCall
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

6.6 Answered incoming CS data calls

- a) This measurement provides the number of answered incoming CS data calls.
- b) CC.
- c) On transmission by the MSC-S of a "CON" message for the CS data service (ITU-T Q.1902)
- d) A single integer value.
- e) CSD.ansIncCall
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.

h) GSM/UMTS.

7 Measurements related to CS multimedia calls

For the traffic model and call flow diagrams see TS 32.407.

7.1 Attempted UE originating CS multimedia calls

- a) This measurement provides the number of attempted UE originated CS multimedia calls.
- b) CC.
- c) On receipt by the MSC-S of a "Setup" message with the 'other rate adaptation' field of Bearer Capability IE is set to H.223 & H.245 (3GPP TS 24.008 [7], 22.002 [8]).
- d) A single integer value.
- e) MMC.attOrig
- f) MSCserverFunction
- g) Valid for circuit switched traffic.
- h) UMTS.

7.2 Successful UE originating CS multimedia calls

- a) This measurement provides the number of successful UE originated CS multimedia calls.
- b) CC.
- c) On transmission of an "Alerting" message for the multimedia service from the MSC-S to the Calling Party (3GPP TS 24.008 [7]).
- d) A single integer value.
- e) MMC.succOrig
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.3 Answered UE originating CS multimedia calls

- a) This measurement provides the number of answered UE originated CS multimedia calls.
- b) CC.
- c) On reception of a "CONNECT ACKNOWLEDGE" message for the multimedia service from the MSC-S to the Calling Party (3GPP TS 24.008 [7]).
- d) A single integer value.
- e) MMC.ansOrig
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.4 Attempted UE terminating CS multimedia calls

- a) This measurement provides the number of UE terminating CS multimedia call attempts.
- b) CC.
- c) On transmission of a "SETUP" message or on the reception of "CALL CONFIRMED" message and the "other rate adaption" field of Bearer Capability IE is set to H.223 & H.245 (3GPP TS 24.008 [7], 22.002 [8]). Note the trigger is the call confirmed if the nature of the call cannot be decided in the SETUP message (i.e. Bearer capability IE is not included in the Setup message).
- d) A single integer value.
- e) MMC.attTerm
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.5 Successful UE terminating CS multimedia calls

- a) This measurement provides the number of answered UE terminating CS multimedia calls.
- b) CC.
- c) On reception of an "ALERTING" message for the multimedia service. (3GPP TS 24.008[7]).
- d) A single integer value.
- e) MMC.succTermi
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.6 Answered UE terminating CS multimedia calls

- a) This measurement provides the number of answered UE terminating CS multimedia calls.
- b) CC.
- c) On reception of a "CONNECT ACKNOWLEDGE" message for the multimedia service (3GPP TS 24.008 [7]).
- d) A single integer value.
- e) MMC.ansTerm
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.7 Attempted incoming CS multimedia calls

- a) This measurement provides the number of attempted incoming CS multimedia calls.
- b) CC.

- c) On receipt by the MSC-S of an "IAM" or "IAI" message and the ISDN BC IE indicates multimedia calls (ITU-T Rec. Q.723 [6], ITU-T Q.763 [5], 3GPP 24.008 [7], 22.002 [8]).
- d) A single integer value.
- e) MMC.attInc
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.8 Successful incoming CS multimedia calls

- a) This measurement provides the number of successful incoming CS multimedia calls.
- b) CC.
- c) On transmission by the MSC-S of an "ACM" or "CON" message for the multimedia service (ITU-T Rec. Q.723 [6], ITU-T Q.763 [5]).
- d) A single integer value.
- e) MMC.succInc
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.9 Answered incoming CS multimedia calls

- a) This measurement provides the number of answered incoming CS multimedia calls.
- b) CC.
- c) On transmission by the MSC-S of an "ANM", "ANC", "CON" or "ANN" message for the multimedia service (ITU-T Rec. Q.723 [6], ITU-T Q.763 [5]).
- d) A single integer value.
- e) MMC.AnsInc
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.10 Attempted outgoing CS multimedia calls

- a) This measurement provides the number of outgoing CS multimedia call attempts.
- b) CC.
- c) On transmission of an "IAM" or "IAI" message for the multimedia service and the ISDN BC IE indicates multimedia call service (ITU-T Rec. Q.723 [6], ITU-T Q.763 [5], 3GPP 24.008 [7]).
- d) A single integer value.
- e) MMC.attOut

- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.11 Successful outgoing CS multimedia calls

- a) This measurement provides the number of successful outgoing CS multimedia calls.
- b) CC.
- c) On reception of an "ACM" or "CON" message for the multimedia service (ITU-T Rec. Q.723 [6], ITU-T Q.763 [5], 3GPP 24.008 [7]).
- d) A single integer value.
- e) MMC.succOut
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.12 Answered outgoing CS multimedia calls

- a) This measurement provides the number of answered outgoing CS multimedia calls.
- b) CC.
- c) On transmission of a "ANM", "ANN" or "CON" message for the multimedia service (ITU-T Rec. Q.723 [6], ITU-T Q.763 [5], 3GPP 24.008 [7]).
- d) A single integer value.
- e) MMC.ansOut
- f) MSCserverFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

7.13 Attempted user initiated service change requests from CS multimedia to speech

- a) This measurement provides the number of attempted user initiated service change requests for a CS multimedia call to speech.
- b) CC
- c) On reception of a "MODIFY" message from the UE and it contains a speech BCIE, which means that the 'Information transfer capability' set to speech or alternate speech/facsimile group 3 - starting with speech in the Bearer Capability IE (TS 23.172) [4].
- d) A single integer value
- e) MMC.attUserInitSCMMtoVce
- f) MSCServerFunction
- g) Valid for circuit switched traffic

h) UMTS

7.14 Successful user initiated service change requests from CS multimedia to speech

- a) This measurement provides the number of successful user initiated service change requests for a CS multimedia call to speech.
- b) CC
- c) On sending of a "MODIFY COMPLETE" message to the UE and it contains a speech BCIE, which means that the 'Information transfer capability' set to speech or alternate speech/facsimile group 3 - starting with speech in the Bearer Capability IE (TS 23.172) [4].
- d) A single integer value
- e) MMC.succUserInitSCMMtoVce
- f) MSCServerFunction
- g) Valid for circuit switched traffic
- h) UMTS

7.15 Attempted user initiated service change requests from speech to CS multimedia

- a) This measurement provides the number of attempted user initiated service change requests for a speech call to CS multimedia
- b) CC
- c) On reception of a "MODIFY" message from the UE and it contains a MM BCIE, which means that the 'other rate adaptation' field of Bearer Capability IE is set to H.223 & H.245 (TS 23.172 [4]).
- d) A single integer value
- e) MMC.attUserInitSCVcetoMM
- f) MSCServerFunction
- g) Valid for circuit switched traffic
- h) UMTS

7.16 Successful user initiated service change requests from speech to CS multimedia

- a) This measurement provides the number of successful user initiated service change requests for a speech call to CS multimedia.
- b) CC
- c) On sending of a "MODIFY COMPLETE" message to the UE and it contains a MM BCIE, which means that the 'other rate adaptation' field of Bearer Capability IE is set to H.223 & H.245. (TS 23.172 [4])
- d) A single integer value
- e) MMC.succUserInitSCVcetoMM
- f) MSCServerFunction

- g) Valid for circuit switched traffic
- h) UMTS

7.17 Attempted network initiated service change requests from CS multimedia to speech

- a) This measurement provides the number of attempted network initiated service change requests for a CS multimedia call to speech.
- b) CC
- c) On sending a "MODIFY" message to the UE and it contains a speech BCIE, which means that the 'Information transfer capability' set to speech or alternate speech/facsimile group 3 - starting with speech in the Bearer Capability IE and the Network-initiated Service Upgrade indicator IE is included in the message. (TS 23.172 [4] TS 24.008 [7])
- d) A single integer value
- e) MMC.attNetwInitSCMMtoVce
- f) MSCServerFunction
- g) Valid for circuit switched traffic
- h) UMTS

7.18 Successful network initiated service change requests from CS multimedia to speech

- a) This measurement provides the number of successful network initiated service change requests for a CS multimedia call to speech.
- b) CC
- c) On reception a "MODIFY COMPLETE" message from the UE and it contains a speech BCIE, which means that the 'Information transfer capability' set to speech or alternate speech/facsimile group 3 - starting with speech in the Bearer Capability IE (TS 23.172 [4], TS 24.008 [7]) and the MODIFY COMPLETE is an answer to the MODIFY message, which indicates network initiated service change.
- d) A single integer value
- e) MMC.SuccNetwInitSCMMtoVce
- f) MSCServerFunction
- g) Valid for circuit switched traffic
- h) UMTS

7.19 Attempted network initiated service change requests from speech to CS multimedia

- a) This measurement provides the number of attempted network initiated service change requests for a speech call to CS multimedia.
- b) CC
- c) On sending a "MODIFY" message to the UE and it contains a MM BCIE, which means that the 'other rate adaptation' field of Bearer Capability IE is set to H.223 & H.245 and the Network-initiated Service Upgrade indicator IE is included in the message. (TS 23.172 [4], TS 24.008 [7])

- d) A single integer value
- e) MMC.attNetwInitSCVcetoMM
- f) MSCServerFunction
- g) Valid for circuit switched traffic
- h) UMTS

7.20 Successful network initiated service change requests from speech to CS multimedia

- a) This measurement provides the number of successful network initiated service change requests for a speech call to CS multimedia.
- b) CC
- c) On reception a "MODIFY COMPLETE" message from the UE and it contains a MM BCIE, which means that the 'other rate adaptation' field of Bearer Capability IE is set to H.223 & H.245. (TS 23.172 [4], TS 24.008 [7]) and the MODIFY COMPLETE is an answer to the MODIFY message, which indicates network initiated service change.
- d) A single integer value
- e) MMC.succNetwInitSCVcetoMM
- f) MSCServerFunction
- g) Valid for circuit switched traffic
- h) UMTS

7.21 UE originating CS multimedia call fallback to speech

- a) This measurement provides the number of UE originating fallback where the preferred service is CS multimedia, but the call is established as a speech, which is the less preferred service.
- b) CC
- c) On sending the Call Proceeding message to the UE with the less preferred service's BCIE, which is speech, which means that the 'Information transfer capability' set to speech or alternate speech/facsimile group 3 - starting with speech in the Bearer Capability IE.
- d) A single integer value
- e) MMC.origiFBtoVce
- f) MSCServerFunction
- g) Valid for circuit switched traffic
- h) UMTS

7.22 UE terminating CS multimedia call fallback to speech

- a) This measurement provides the number of UE terminating fallback where the preferred service is CS multimedia, but the call is established as a speech, which is the less preferred service.
- b) CC

- c) On reception of Call Confirmed message from the UE with the less preferred service's BCIE, which is speech, which means that the 'Information transfer capability' set to speech or alternate speech/facsimile group 3 - starting with speech in the Bearer Capability IE.
- d) A single integer value
- e) MMC.termFBtoVce
- f) MSCServerFunction
- g) Valid for circuit switched traffic
- h) UMTS

8 Measurements related to the voice calls

8.1 Attempted UE originating voice calls

- a) This measurement provides the number of attempted UE originated voice calls. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) On receipt by the MSC-S of a "Setup" message with the 'Information transfer capability' set to speech or alternate speech/facsimile group 3 - starting with speech in the Bearer Capability IE from Calling Party (see [7] 3GPP TS 24.008).
- d) A single integer value per measurement type defined in e).
- e)

VSC.attOrigCallVce	Combined(don't care)
VSC.attOrigCallVce.G	GSM
VSC.attOrigCallVce.U	UMTS
- f) MscServerFunction.
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

8.2 Successful UE originating voice calls

- a) This measurement provides the number of successful UE originated voice calls. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) On transmission of an "Alerting" message for the voice service from the MSC-S to the Calling Party (see [7] 3GPP TS 24.008).
- d) A single integer value per measurement type defined in e).
- e)

VSC.succOrigCallVce	Combined(don't care)
VSC.succOrigCallVce.G	GSM
VSC.succOrigCallVce.U	UMTS
- f) MscServerFunction
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

8.3 Answered UE originating voice calls

- a) This measurement provides the number of answered UE originated voice calls. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) On reception of a "Connect ACK" message for the voice service from the Calling Party to the MSC-S (see [7] 3GPP TS 24.008).
- d) A single integer value per measurement type defined in e).

- e) VSC.ansOrigCallVce Combined(don't care)
 VSC.ansOrigCallVce.G GSM
 VSC.ansOrigCallVce.U UMTS
- f) MscServerFunction.
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

8.4 Attempted incoming voice calls

- a) This measurement provides the number of attempted incoming voice calls. In case of TUP signalling this measurement is not needed.
- b) CC.
- c) On receipt by the MSC-S of an "IAM" message with 'Transmission medium requirement' parameter set to speech (see [11] ITU-T Q.1902).
- d) A single integer value.
- e) VSC.attIncCallVce
- f) MscServerFunction
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

8.5 Successful incoming voice calls

- a) This measurement provides the number of successful incoming voice calls. In case of TUP signalling this measurement is not needed.
- b) CC.
- c) On transmission by the MSC-S of an "ACM" with "Called party's status indicator = subscriber free" or a "CPG" with "Event Information = ALERTING" (ITU-T Rec. Q.762, Q.763). For the voice service see [11] ITU-T Q.1902).
- d) A single integer value.
- e) VSC.succIncCallVce
- f) MscServerFunction
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

8.6 Answered incoming voice calls

- a) This measurement provides the number of answered incoming voice calls. In case of TUP signalling this measurement is not needed.
- b) CC.
- c) On transmission by the MSC-S of an "ANM" or "CON" message for the voice service (see [11] ITU-T Q.1902).
- d) A single integer value.

- e) VSC.ansIncCallVce
- f) MscServerFunction
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

9 Measurements related to the IN service calls

9.1 Attempted UE terminated intelligent service calls

- a) This measurement provides the number of attempted UE terminated intelligent service calls.
- b) CC.
- c) After sending the "SETUP" message (3GPP TS 24.008 [7]) to the terminating UE and the SSF sent the "IDP" message to the SCP from either of the following CSI: T-CSI or VT-CSI (see 3GPP TS 23.078 [12]).
- d) A single integer value.
- e) IN.attUETermi
- f) MscServerFunction
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

9.2 Successful UE terminated intelligent service calls

- a) This measurement provides the number of successful UE terminated intelligent service calls.
- b) CC.
- c) On receipt of "ALERTING" message (3GPP TS 24.008 [7]) in the MSC Server and the CAMEL dialogue has been finished successfully for either of T-CSI or VT-CSI, which means that the call segment in the SSF has reached the IDLE state without any error (see 3GPP TS 23.078 [12]).
- d) A single integer value.
- e) IN.succUETermi
- f) MscServerFunction.
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

9.3 Answered UE terminated intelligent service calls

- a) This measurement provides the number of answered UE terminated intelligent service calls.
- b) CC.
- c) On receipt of "CONNECT ACK" message (3GPP TS 24.008 [7]) and there was a successfully finished CAMEL dialogue for either of T-CSI or VT-CSI, which means that the call segment in the SSF has reached the IDLE state without any error (see 3GPP TS 23.078 [12]).
- d) A single integer value.

- e) IN.ansUETermi
- f) MscServerFunction.
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

9.4 Attempted UE originated intelligent service calls

- a) This measurement provides the number of attempted UE originated intelligent service calls.
- b) CC.
- c) After the reception of the "CM_SERVICE_REQUEST" message (3GPP TS 24.008 [7]) the SSF has sent the "IDP" message to the SCP for O-CSI, D-CSI or N-CSI (see 3GPP TS 23.078 [12]).
- d) A single integer value.
- e) IN.attUEOrig
- f) MscServerFunction
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

9.5 Successful UE originated intelligent service calls

- a) This measurement provides the number of successful UE originated intelligent service calls.
- b) CC.
- c) On sending of "Alerting" message (3GPP TS 24.008 [7]) and there was a successfully finished CAMEL dialogue for O-CSI or for D-CSI or for N-CSI, which means that the call segment in the SSF has reached the IDLE state without any error (see 3GPP TS 23.078 [12]).
- d) A single integer value.
- e) IN.succUEOrig
- f) MscServerFunction
- g) Valid for circuit switched traffic.
- h) GSMUMTS.

9.6 Answered UE originated intelligent service calls

- a) This measurement provides the number of answered UE originated intelligent service calls.
- b) CC.
- c) On receipt of "CONNECT ACK" message (3GPP TS 24.008 [7]) and there was a successfully finished CAMEL dialogue for O-CSI or for D-CSI or for N-CSI, which means that the call segment in the SSF has reached the IDLE state without any error (see 3GPP TS 23.078 [12]).
- d) A single integer value.
- e) IN.ansUEOrig
- f) MscServerFunction
- g) Valid for circuit switched traffic.

- h) GSM/UMTS.

9.7 Attempted intelligent service calls for both the Calling Party and the Called Party are intelligent service user

- a) This measurement provides the number of attempted intelligent service calls for both the Calling Party and the Called Party are intelligent service user.
- b) CC.
- c) The MSC Server has received the "CM SERVICE REQUEST" message (3GPP TS 24.008 [7]) and the SSF sends the "IDP" message to the SCP from either of O_CSI, D_CSI or N_CSI and the SSF sends another IDP message to SCP from T_CSI or from VT_CSI (see 3GPP TS 23.078 [12]).
- d) A single integer value.
- e) IN.attINtoIN
- f) MscServerFunction
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

9.8 Successful intelligent service calls for both the Calling Party and the Called Party are intelligent service user

- a) This measurement provides the number of successful intelligent service calls for both the Calling Party and the Called Party are intelligent service user.
- b) CC.
- c) The MSC Server sends the "ALERTING" message (3GPP TS 24.008 [7]) to the originating UE and there was a successful CAMEL dialogue from the O_CSI, D_CSI or N_CSI and there was another successful CAMEL Dialogue from the VT_CSI or T_CSI. Successful CAMEL dialogue means that the call segment in the SSF has reached the IDLE state without any error (see 3GPP TS 23.078 [12]).
- d) A single integer value.
- e) IN.succINtoIN
- f) MscServerFunction
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

9.9 Answered intelligent service calls for both the Calling Party and the Called Party are intelligent service user

- a) This measurement provides the number of answered intelligent service calls.
- b) CC.
- c) The MSC Server has received the "CONNECT ACK" message (3GPP TS 24.008 [7]) from Originating UE and there was a successful CAMEL dialogue from the O_CSI, D_CSI or N_CSI and there was another successful CAMEL Dialogue from the VT_CSI or T_CSI. Successful CAMEL dialogue means that the call segment in the SSF has reached the IDLE state without any error (see 3GPP TS 23.078 [12]).
- d) A single integer value.

- e) IN.ansINtoIN
- f) MscServerFunction
- g) Valid for circuit switched traffic.
- h) GSM/UMTS.

Annex A (informative): Change history

Change history								
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Cat	Old	New
2006-03	SA_31	SP-060110	--	--	Split of 32.403-710 into four new TSs 32.404, 32.405, 32.406, 32.408. Submitted to TSG SA #31 for Approval.	--	1.0.0	7.0.0
2006-06	SA_32	SP-060260	0001	--	Move SMS related Measurements from 32.406 into 32.408	F	7.0.0	7.1.0
2006-06	SA_32	SP-060260	0002	--	Add CS-Multimedia call service related measurements	B	7.0.0	7.1.0
2006-06	SA_32	SP-060260	0003	--	Add CSD service related measurements in 32.408	B	7.0.0	7.1.0
2006-09	SA_33	SP-060551	0004	--	Add voice service related measurements	B	7.1.0	7.2.0
2006-09	SA_33	SP-060551	0005	--	Add IN service related measurements	B	7.1.0	7.2.0
2008-12	SA_42	--	--	--	Upgrade to Release 8	--	7.2.0	8.0.0
2008-12	SA_46	--	--	--	Upgrade to Release 9	--	8.0.0	9.0.0
2011-03	-	-	-	-	Update to Rel-10 version (MCC)		9.0.0	10.0.0
2012-09	-	-	-	-	Update to Rel-11 version (MCC)		10.0.0	11.0.0
2014-10	-	-	-	-	Update to Rel-12 version (MCC)		11.0.0	12.0.0
2016-01	-	-	-	-	Update to Rel-13 version (MCC)		12.0.0	13.0.0
2017-04	-	SA#75	-	-	Promotion to Release 14 without technical change		13.0.0	14.0.0

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2018-06						Update to Rel-15 version (MCC)	15.0.0
2020-07	-	-	-	-	-	Update to Rel-16 version (MCC)	SA#109
2022-04	-	-	-	-	-	Update to Rel-17 version (MCC)	SA#109
2024-04	-	-	-	-	-	Update to Rel-18 version (MCC)	SA#109
2025-09	SA#109	-	-	-	-	Update to Rel-19 version (MCC)	SA#109

History

Document history		
V19.0.0	October 2025	Publication