

1 3GPP2 S.R0064-0
2 Version 1.0
3 Version Date: 30 October 2002



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10 **Multimedia Messaging Services (MMS)**

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12 *Stage 1 Requirements*

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9 **REVISION HISTORY**

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| REVISION HISTORY | | |
|-------------------------|------------------------|------------------------|
| Ver. 1.0 | <i>Initial Release</i> | <i>30 October 2002</i> |

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1 1 INTRODUCTION AND SCOPE

2 This document defines the stage one description of the non real-time
 3 Multimedia Messaging Service (MMS). MMS will allow users to send and receive
 4 messages exploiting the whole array of media types available today, e.g. text,
 5 images, audio, and video, while also making it possible to support new content
 6 types as they become popular. A multimedia message (MM), as observed by the
 7 user, is a combination of one or more different media elements in a multimedia
 8 presentation, that can be transferred without the requirements for the need to
 9 be transferred in real-time. The multimedia messaging service shall be capable
 10 of supporting current and future multimedia types, and exploit the advances
 11 being made in the multimedia technology, with additional mobile requirements.
 12 Stage one is the set of requirements seen primarily from the subscriber's and
 13 service providers' points of view. It includes information of relevance to network
 14 operators, media content suppliers, service providers, and terminal and
 15 network manufacturers.

16 It contains core requirements for the Multimedia Messaging Service, sufficient
 17 to provide a complete service.

18 Additional functionality not documented in this Technical Specification (TS),
 19 and outside its scope, may apply. Such additional functionality may have
 20 network-wide scope; nation-wide scope; or it may be particular to a group of
 21 users. Any such additional functionality shall not compromise conformance to
 22 the core requirements of the MMS.

23 This document defines the requirements for the MMS as a framework enabling
 24 non real-time transmission of different types of media content, including:

- 25 ▪ Multiple media elements per single message
- 26 ▪ Individual handling of message elements
- 27 ▪ Different delivery methods for each message element
- 28 ▪ Negotiation or accommodation of different terminal and network MM
- 29 capabilities
- 30 ▪ Notification and acknowledgement of MM related events (e.g. delivery,
- 31 deletion, ...)
- 32 ▪ Handling of undeliverable MM
- 33 ▪ Personalized MMS configuration
- 34 ▪ Flexible charging

35

36 2 REFERENCES

37 The document references applicable to this specification include:

- 38 [1] **RFC-2045** Freed, N., and N. Borenstein, "Multipurpose Internet
 39 Mail Extensions (MIME) Part One: Format of Internet Message
 40 Bodies", RFC 2045, Innosoft, First Virtual Holdings, November
 41 1996

- 1 **[2] RFC-2046** Freed, N., and N. Borenstein, "Multipurpose Internet
2 Mail Extensions (MIME) Part Two: Media Types", RFC 2046,
3 Innosoft, First Virtual Holdings, November 1996
- 4 **[3] RFC-2047** Moore, K., "Multipurpose Internet Mail Extensions
5 (MIME) Part Three: Representation of Non-ASCII Text in Internet
6 Message Headers", RFC 2047, University of Tennessee, November
7 1996
- 8 **[4] RFC-2048** Freed, N., Klensin, J., and J. Postel, "Multipurpose
9 Internet Mail Extensions (MIME) Part Four: MIME Registration
10 Procedures", RFC 2048, Innosoft, MCI, ISI, November 1996
- 11 **[5] RFC-2049** Freed, N. and N. Borenstein, "Multipurpose Internet
12 Mail Extensions (MIME) Part Five: Conformance Criteria and
13 Examples", RFC 2049 (this document), Innosoft, First Virtual
14 Holdings, November 1996
- 15 **[6] ITU-T E.164 (1997):** "The International Public
16 Telecommunications Numbering Plan".
- 17 **[7] IETF; SDT 0011 (RFC 2822):** "Internet Message Format", URL:
18 <http://www.ietf.org/rfc/rfc2822.txt>.

19 **3 DEFINITIONS AND ABBREVIATIONS**

20 The terms and abbreviations used within this specification are defined as
21 follows:

22 **3.1 Definitions**

| | |
|------------------------------|---|
| EMS | Enhanced Messaging Service provides additional features of mail services |
| Media Formats | Within one media type different Media Formats are applicable for the media presentation, e.g. a picture can be GIF or JPEG format |
| Media Types | Form of presenting information to a user e.g. voice or fax |
| Message Element | Part of an MM consisting of only one media type |
| Message Qualification | Message qualification is a set of values that describe the Multimedia Message and are provided to the receiver. These values describe the message in ways meaningful to the receiver, and assist the receiver in deciding whether to take delivery of the Multimedia Message or to open the Message. Possible message qualifiers include: subject, originator's priority, message size, media |

| | |
|-----------------------------------|---|
| | types, etc. |
| Multimedia Messaging | Message composed of one or more message elements |
| Multimedia Message Service | Telecommunication Service allowing transfer of multimedia messages between users without the requirement for the transfer to occur in real-time |
| Network | Cellular network and any additional elements (e.g., fixed, Internet and multimedia technology elements), in support of MM functionality |
| Recipient | Entity to which an MM is sent |
| Sender | Entity that sends an MM |
| SMS | Short Message Service that supports short text based messages |
| User | MM sender or MM recipient |
| VASP | Value Added Service Provider. Provides services other than basic telecommunications services for which additional charges may be incurred. |

1 3.2 Abbreviations

| | |
|------|----------------------------------|
| EMS | Enhanced Messaging Service |
| GIF | Graphics Interface Format |
| JPEG | Joint Photographic Experts Group |
| MPEG | Moving Pictures Expert Group |
| SMS | Short Message Service |
| VASP | Value Added Service Provider |

2

3 4 GENERAL FEATURE DESCRIPTION

4 The Multimedia Messaging Services provide non-real-time enhanced
5 messaging capable of transmitting message elements in various types of
6 media. These high level requirements are independent of the user's
7 perception of the service.

8 The MMS Message Elements are encoded using Internet
9 technologies that describe Multipurpose Internet Mail Extension
10 (MIME) objects, per References [1], [2], [3], [4], and [5].

1 **4.1 Forward Compatibility**

2 The MMS mechanisms shall provide the capability to support current
3 and evolving multimedia messaging by re-using existing standards as far
4 as possible and proposing extensions (as necessary) to the existing
5 standards (i.e. the multimedia messaging service shall support the
6 evolution of multimedia messaging technologies).

7 **4.2 Consistency**

8 Regardless of the message type or format, the MMS should be capable of
9 supporting integration of all types of messaging (e.g., fax, SMS, EMS,
10 Multimedia, voicemail, e-mail, etc.) in a consistent and transparent
11 manner.

12 **4.3 Universality of Access**

13 The user shall be capable of accessing their own multimedia messages
14 through a number of different access technologies, e.g., 3G and 2G
15 networks, fixed networks, the Internet, etc.

16 **4.4 Interoperability**

17 The MMS shall support a minimum set of functionality and message
18 formats to ensure interoperability. (e.g., deletion of MM, standardized
19 message notification, message media types and message content
20 formats).

21 The MMS shall support version management.

22 **5 DETAILED FUNCTIONALITY REQUIREMENTS**

23 The MMS shall be supported in the network in a manner that allows
24 operators to deploy different configurations depending on the multitude
25 of their differing requirements. Thus, a specific set of functionality and
26 formats shall be standardized to ensure interoperability across networks
27 and terminals.

28 The following sub-clauses use the term "*The MMS shall support a request*
29 *for...*" and similar phrases to allow different network models and
30 business requirements, permitting flexible architectures while ensuring
31 MMS interoperability. These requirements are considered intrinsic to the
32 MMS and their support is mandatory.

33 The following sub-clauses use the term "*This requirement shall be*
34 *supported at the application layer in the terminal (and/or the network), and*
35 *will not be further elaborated.*" and similar phrases to identify those
36 service requirements that shall be supported by the MMS but do not
37 require standardization. While the support of these requirements is
38 essential for a viable MMS, they are not considered intrinsic to it, rather
39 they may be implementation-specific.

1 The criterion for distinguishing between these two types of requirements
2 is as follows:

3 If the requirement corresponds to an interaction and/or command
4 between the terminal and the network applications from the same
5 Service Provider (e.g. between the recipient's terminal resident messaging
6 application and the recipient's network resident application; likewise for
7 the sender), then this requirement shall be supported by the MMS but
8 does not require standardization.

9 The scenario of an MS acting as a proxy (e.g., MS acting on behalf of a
10 service in a laptop PC) is not addressed in this release of the MMS Stage
11 1 requirements and is considered "for further study".

12 **5.1 Detailed Feature Characteristics and Requirements**

13 Following is the detailed list of MMS characteristics and requirements
14 with a brief description of each.

15 **5.1.1 Terminal Sensitive MM Management**

16 The MMS shall support terminal and network capability in a way
17 that it takes into account any limitations that may exist in user
18 terminal capability. For example, delivery of MM notification shall
19 be in a manner compatible with the terminal's capability.

20 **5.1.2 User Status Sensitive MM Management**

21 The MMS shall support the capability of the terminal and the
22 network to take into account the availability, and changes of the
23 state of availability of the user (e.g., store messages if the recipient
24 is not available).

25 **5.1.3 MMS Service Provider Control**

26 The MMS shall support a request from the MMS service provider to
27 enable/disable MM delivery and submission. MMS service provider
28 may or may not be the same as cellular network operator.

29 **5.1.4 MMS User Control**

30 The MMS shall support a request from the user to enable/disable
31 MM delivery and submission. This requirement shall be supported
32 at the application layer in the terminal, and will not be further
33 elaborated.

34 The MMS shall support a user profile or the capability to control
35 the amount of data the user will accept and submit. The limit may
36 be defined as a number of bytes per message, a number of bytes
37 per time period or aggregate amount. An unlimited amount of data
38 should also be allowed.

1 The User agent may be notified if a message was rejected due to
2 exceeding data amount limit, but this shall be supported at the
3 application layer in the terminal, and will not be further
4 elaborated.

6 **5.1.5 Personalized Multimedia Messaging**

7 The MMS shall support a request by the user to manage the MMS
8 Service Preferences of his/her MMS User Service Profile. It should
9 be possible to customize user MM environment with respect to the
10 capabilities of the terminal, the network and MM application.
11 Personalization could be unconditional or conditional (e.g. it may
12 depend on roaming conditions or operator restrictions).

13 User shall be able to set MMS Preferences of his/her User Service
14 Profile. It shall be possible for a user to interrogate status of
15 his/her MMS Profile.

16 **5.1.6 MM Creation**

17 The MMS shall support the request to create a MM by the user or
18 an application.

19 This requirement shall be supported at the application layer in the
20 terminal and/or in the network, and will not be further elaborated.

21 **5.1.7 MM Time-Stamping**

22 The MMS shall be able to support the request to include a reliable
23 time value in an MM, a notification and an acknowledgement as
24 appropriate.

26 **5.1.8 MM Cancellation**

27 The MMS shall support the request to cancel a MM once submitted
28 (i.e. recall a message) if the following conditions exist:

- 29 • MM type and MMS application are conducive to message
30 cancellation
- 31 • MM cancellation is supported by the underlying cellular
32 network
- 33 • MM cancellation is supported by the mobile station

34 The MMS shall be able to support a request by a VASP to delete a
35 MM that had been previously sent from the VASP but not yet
36 delivered to the recipient's terminal.

1 **5.1.9 Multiple Media**

2 Multimedia messages may be composed of either a single medium
3 (e.g. voice) or multimedia (e.g., voice and video). Multiple media
4 elements within a single MM may be of the same media type or
5 different media types. The MMS shall support a request for media
6 synchronization / sequencing.

7 **5.1.10 Media Types**

8 The MMS shall be able to support the following media types: voice,
9 text, image, video, and audio. Specific formats and standards for
10 these media types is left for stage 2 and stage 3 documents.

11 **5.1.11 Media Type Conversion**

12 The MMS shall support conversion between media types (e.g. Fax
13 to image).

14 The MMS shall be able to support an indication from a VASP that
15 VASP originated content of an MM should not be converted or
16 changed by the MMS service provider before it is delivered to the
17 recipient.

18 This requirement shall be supported at the application layer in the
19 network, and will not be further elaborated.

20 **5.1.12 Media Format Conversion**

21 The MMS shall support conversion between MM media formats
22 (e.g. JPEG to GIF).

23 This requirement shall be supported at the application layer in the
24 terminal and/or in the network, and will not be further elaborated.

25 **5.1.13 Message Forwarding**

26 It shall be possible to initiate MM forward before or after MM
27 download to the user terminal.

28 **5.1.14 Message Reply**

29 The MMS shall support a request to reply to a MM without having
30 to first download the MM to the terminal.

31

32 **5.1.15 Storage of Multimedia Messages**

33 The MMS shall support a request for multimedia messages or
34 message elements to be stored until delivered to the recipient's
35 terminal, until the message delivery timers expire, or until the user
36 deletes them. Conditions for the treatment of stored messages
37 shall be fully configurable by the operator. The MMS shall support
38 requests to manage all MMs in a network-based depository.

1 The MMS shall support requests to store MMs in a network-based
2 depository, on the mobile terminal, or on both.

3 NOTE: There is no requirement for the MMS to be responsible for
4 the processing/presentation of the MM, after it has been delivered
5 to the terminal.

6 **5.1.16 Message Qualification**

7 The MMS shall be capable of sending message qualifier values to
8 the terminal device.

9 **5.1.17 Message Priority**

10 The MMS shall support a request for MM prioritization (e.g., sender
11 may request to prioritize importance of the multimedia message).

12 Sender shall be able to set MM priority status of a submitted
13 message. MM priority status shall be presented to the recipient.

14 This requirement shall be supported at the application layer in the
15 MMS and in the terminal, and will not be further elaborated at this
16 time.

17 **5.1.18 Message Screening**

18 The MMS shall support a MM screening capability. (E.g.,
19 automatically delete “junk mail” or anonymous messages without
20 delivery to the recipient’s terminal).

21 This requirement shall be supported at the application layer in the
22 MS or the network, and will not be further elaborated.

23 **5.1.19 Validity Period**

24 The MMS shall support a request by originator of the message to
25 define validity periods (earliest and latest desire time) for message
26 delivery. If a message cannot be delivered within a certain time, it
27 will be automatically deleted. The MMS provider shall be able to set
28 the maximum allowable validity period for any message.

29 If the MM is not delivered within the validity period, the MMS shall
30 support the capability to send an indication to the MM originator
31 with the appropriate reason or cause code.

32 **5.1.20 Multimedia Messaging Processing by a VASP**

33 The MMS shall be able to support a request for messages to be
34 processed by a VASP. An example of such processing may be
35 where a MM is sent to a VASP before delivery to a recipient so that
36 the VASP can add multimedia element(s) to the original message.

1 5.1.21 Replacing MM

2 The MMS shall be able to support a request by the originator to
3 replace a previously sent MM with a second, newer MM, if the
4 previous MM has not been delivered.

5 5.1.22 Delivery and Retrieval

6 The MMS shall support the delivery of MM to the recipient's
7 terminal. MMs shall be considered delivered to the terminal upon
8 receipt of an acknowledgement from the terminal by the MMS
9 System.

10 The terminal shall not make MM available to the recipient for
11 display or playback unless and until MM Delivery is complete.

12 If the recipient's terminal is incapable of receiving the MM, the
13 MMS may send an indication to the intended MM recipient with
14 the appropriate reason or cause code.

15 The recipient may have the capability to cancel message retrieval at
16 any time during transmission.

17 The MMS shall support automatic MM delivery to the recipient's
18 terminal without the recipient's intervention.

19 The MMS shall support a request for MMs to be delivered to the
20 recipient's terminal on request by the recipient.

21 5.1.23 Concurrency

22 The MMS shall support MM delivery to and submission from the
23 user's terminal during the time the terminal is engaged in another
24 active service (e.g., voice call or a data session) subject to terminal
25 and network capabilities.

26 5.1.24 Upload/Download

27 The MMS shall support MM Upload (terminal to network) and
28 Download (network to terminal) between the MMS Server and the
29 user terminal. MMS Upload or Download is a process where the
30 entire content must be delivered before the application layer can
31 act upon that content.

32 5.1.25 MM Submission

33 The MMS shall support the ability for the terminal to submit MMs
34 to the network for delivery to a recipient.

35 5.1.26 Streaming

36 The MMS shall have the capability to include a link to a
37 multimedia source and shall also be able to start the multimedia
38 streaming across this link upon user request.

1 The MMS shall be able to support streaming for MM delivery from
2 the MMS System to the terminal as specified in S.R0021
3 Multimedia Streaming.

4 MMS Streaming is a process where the application layer can act
5 upon the content before delivery of the entire content is completed.

6 **5.1.27 Preferred Bearer**

7 It shall be possible to define a list of precedence for bearers in the
8 configuration parameters for delivery and submission of MM (e.g.,
9 IP bearer, CSD, SMS, etc.). The terminal shall be able to support
10 automatic bearer selection (i.e., without user intervention) based
11 on the order of precedence defined in a list of bearers. The user
12 shall be able to enable or disable automatic bearer selection. When
13 disabled, manual bearer selection shall be available from the list of
14 bearers.

15 **5.1.28 User Profile Management**

16 The MMS shall support the ability to create, update, modify, store,
17 transfer, interrogate, and retrieve a user's multimedia messaging
18 profiles.

19 The multimedia messaging profiles shall allow the user to configure
20 and personalize user's multimedia messaging environment with
21 the multimedia messaging profiles (e.g., which media types and
22 notifications shall be delivered to the recipient, such as voice only
23 or text only).

24 The MMS profile shall support the user preference for message
25 delivery (see section 5.1.23 Delivery and Retrieval).

26 The data that the user is allowed to personalize shall be managed
27 and controlled by the MMS. This requirement shall be supported at
28 the application layer in the terminal and service, and will not be
29 further elaborated.

30 **5.1.29 Security**

31 The user shall be able to use and access MM in a secure manner.
32 It shall be possible for the contents of an MM to be read only by
33 the intended recipient(s). A recipient shall be reliably informed of
34 the identity of the sender in case the sender has authorized his
35 identity to be transmitted.

36 The integrity of MMs during transit shall be assured to the extent
37 of the network capabilities.

38 The MMS shall be resistant to attempts of malicious or fraudulent
39 use.

1 The MMS shall have the ability to authenticate the user regardless
2 of access technology.

3 The MMS shall support data transport in a secure manner between
4 the user and MMS.

5 The MMS authentication scheme shall use access specific
6 information.

7 **5.1.30 Addressing**

8 The MMS shall support different addressing formats to identify the
9 sender and recipient. It shall be possible to submit one message to
10 multiple recipients.

11 The MMS shall support the capability for both Mobile Directory
12 Number (MDN) [6] and e-mail addressing schemes [7] to be used,
13 and the user may use either form of addressing to send a message.

14 The MMS shall be able to support the request to hide the sender's
15 address from the recipient.

16 **5.1.31 MMS Charge**

17 The MMS System shall support prepaid and postpaid charging
18 methods.

19 **5.1.32 Terminal Status Sensitive MM Management**

20 The MMS shall be able to support the capability for the terminal
21 and network to take account of the availability and changes in
22 availability of the user (e.g., store messages if the recipient is not
23 available).

24 **5.1.33 MMS Operator Control**

25 The MMS shall be able to support a request from the operator to
26 enable/disable MM delivery and submission.

27 This requirement shall be supported at the application layer in the
28 network, and will not be further elaborated.

31 **5.1.34 Configuration Information**

32 It shall be possible to store a number of sets of configuration
33 information to allow access to MMS services. One of these sets of
34 configuration information is preset by the network operator. Such
35 preset configuration information set shall only be configurable by
36 the network operator.

37 The preset configuration information is selected unless otherwise
38 specified by the user.

1 For devices that support R-UIM, it shall be possible to retain the
2 configuration information when the R-UIM is used in different
3 terminals.

4

5 **5.2 Notifications and Acknowledgements**

6 The MMS shall support generic notification and acknowledgement
7 capability informing the user of MMS events. Examples may include:

8 ▪ Notify recipient about received messages (including description of
9 message, e.g. content, size, type).

10 ▪ Acknowledge the sender about successful or failed MM or storage of a
11 MM.

12 ▪ Acknowledge the sender about successful or failed MM submission.

13 ▪ Acknowledge the sender about successful or failed MM delivery to the
14 recipient terminal.

15 ▪ Acknowledge the sender about successful or failed MM recall.

16 ▪ Acknowledge the sender, upon request, about the status of a submitted
17 MM (e.g. delivered / not delivered).

18 **5.3 Normal Procedures with Successful Outcome**

19 **5.3.1 Authorization**

20 Multimedia Messaging Services may be made generally available to
21 all users, or it may be provided after pre-arrangement with the
22 service provider.

23 **5.3.2 Real-Time Authorization**

24 Upon users' request or operators' offer, a real-time flexible MMS
25 access authorization scheme shall be made available through
26 either pre-paid or post-paid arrangements.

27 **5.3.3 De-Authorization**

28 Multimedia Messaging Services may be withdrawn at the
29 subscriber's request or for administrative reasons.

30 **5.3.4 Registration**

31 Multimedia Messaging Services has no registration.

32 **5.3.5 Deregistration**

33 Multimedia Messaging Services has no de-registration.

34 **5.3.6 Activation**

35 Multimedia Messaging Services shall be activated upon
36 authorization.

1 **5.3.7 Deactivation**

2 Multimedia Messaging Services shall be de-activated upon de-
3 authorization.

4 **5.3.8 Invocation**

5 Multimedia Messaging Services may be invoked in each of the
6 following instances (non-exhaustive list):

- 7 • MM submission by a subscriber;
- 8 • MM arrival to the network (e.g., to the MMS server) from an
9 outside source (e.g., Internet);
- 10 • MMS delivery attempt of a stored message to an activated
11 recipient (e.g., upon recipient registration on the cellular
12 network);
- 13 • Notification of change of subscriber availability status;
- 14 • Any MMS management actions (e.g., MM delivery control);
- 15 • MM creation by an application residing either in the terminal
16 or in the network;
- 17 • Activation or de-activation procedure invocation;
- 18 • Service Provider control action invocation;

19 **5.3.9 Normal Operation with Successful Outcome**

20 Invocation of MMS in each of the specific instances identified above
21 should result in normal operation with successful outcome as
22 outlined herein.

23 MM submission from a subscriber should result in:

- 24 • Transmission of the MM from the subscriber terminal to the
25 network;
- 26 • Deposition of the MM in the network, where it is stored
27 awaiting delivery;

28 MM arrival to the network from an external network (e.g. Internet,
29 voice mail system, etc.) should result in its deposition in the
30 network, where it is stored awaiting delivery.

31 Delivery attempt of a stored message may be triggered by various
32 events. Example given herein is when recipient registration on the
33 cellular network triggers MMS to notify the recipient of stored MMs
34 awaiting delivery. If there are MMs that use automatic MM
35 delivery, these MMs are queued for delivery according to priority
36 and sequential order.

1 Notification that subscriber has become available should cause the
 2 MMS to examine if there are any MMS in the MMS depository
 3 awaiting delivery, appropriately notifying the subscriber of any
 4 such messages, and delivering those messages that use Push
 5 mechanism. Notification that subscriber has become unavailable
 6 should cause the MMS to suspend delivery of further messages
 7 and message notifications.

8 MMS management actions, such as delivery control options,
 9 should result in the appropriate changes to the subscriber MMS
 10 profile.

11 Invocations of activation or deactivation procedures, or service
 12 provider control actions, are part of MMS management actions
 13 already discussed.

14 15 **5.3.10 Accounting Record**

16 The MMS shall be able to support various charging models, for
 17 example:

- 18 ○ Sender pays;
- 19 ○ Recipient pays;
- 20 ○ both Sender and Recipient pay their respective charges for
 21 message delivery;
- 22 ○ Recipient pays for receipt of solicited messages from trusted
 23 sources;
- 24 ○ Sender pays for reply message on a per message basis.

25 The following parameters should be considered for accounting
 26 records creation:

- 27 ▪ Message types, length, storage time in the network, etc,
- 28 ▪ Message Size,
- 29 ▪ Time of delivery, upload / download method,
- 30 ▪ MM-sender / -recipient,
- 31 ▪ Number of messages sent,
- 32 ▪ Number of messages received,
- 33 ▪ Roaming conditions,
- 34 ▪ Location conditions,
- 35 ▪ Notification/Acknowledgement method used.
- 36 ▪ Billed party,
- 37 ▪ Indication of charging (The MMS indicates to the recipient prior
 38 to the recipient downloading a multi media message whether
 39 the sender has paid or the recipient is expected to pay for the
 40 message.)

- 1 ▪ Prepaid subscriptions
- 2 ▪ Dropped, Denied, Undeliverable delivery status

3 The MMS should record call detail information for the following:

- 4 • All message submittals, with time of occurrence, message
5 type, number of message elements, size of each element,
6 source, notification method and destination address;
- 7 • All message deliveries, with time of occurrence, message
8 type, number of message elements, size of each element,
9 storage time in the network, source, acknowledgement
10 method and destination address;
- 11 • All other invocation instances not associated with MM
12 handling, with source of invocation, time of occurrence, and
13 type of activity;
- 14 • Support prepaid charging (e.g., the MMS should be able to
15 query a prepaid server, etc.) and post-paid charging.

16 **5.4 Exception Procedures or Unsuccessful Outcome**

17 **5.4.1 Authorization**

18 None identified.

19 **5.4.2 De-Authorization**

20 None identified.

21 **5.4.3 Registration**

22 N/A

23 **5.4.4 De-registration**

24 N/A

25 **5.4.5 Activation**

26 None identified.

27 **5.4.6 Deactivation**

28 None identified.

29 **5.4.7 Invocation**

30 The following non-exhaustive exception procedures that may result
31 in unsuccessful outcome are required from the MMS as a
32 minimum:

- 33 • If an MM submission is not successful due to network
34 limitation (e.g. storage exhaustion, network element
35 congestion condition, network element lack of availability,
36 activity timeout), the entity submitting the MM should be
37 notified, and the appropriate cause code returned;

- 1 • If an MMS delivery attempt fails, the failure cause should be
- 2 returned to the sender (e.g. subscription not active, recipient
- 3 not available, delivery timeout, storage overflow, etc.);
- 4 • For MMs requiring automatic MM delivery, delivery retries
- 5 should be considered by the MMS. Number of retries, their
- 6 spacing in time, and retry reporting requirements may be
- 7 application dependent, and is not subject to standardization.
- 8 • If notification of change of subscriber availability status
- 9 results in failure, the subscriber should be notified;
- 10 • If a failure occurs in activation or de-activation procedure
- 11 invocation, the entity invoking the procedure should be
- 12 notified.

13 **5.4.8 Exceptions While Roaming**

14 None identified.

15 **5.4.9 Exceptions During Intersystem Handoff**

16 None identified.

17 **5.5 Alternate Procedures**

18 None identified.

19 **5.6 Interactions with Other Wireless Services**

20 **5.6.1 Answer Hold (AH)**

21 None identified.

22 **5.6.2 Call Delivery (CD)**

23 None identified.

24 **5.6.3 Call Forwarding—Busy (CFB)**

25 None identified.

26 **5.6.4 Call Forwarding—Default (CFD)**

27 None identified.

28 **5.6.5 Call Forwarding—No Answer (CFNA)**

29 None identified.

30 **5.6.6 Call Forwarding—Unconditional (CFU)**

31 None identified.

32 **5.6.7 Call Transfer (CT)**

33 None identified.

34 **5.6.8 Call Waiting (CW)**

35 None identified.

- 1 **5.6.9 Calling Name Presentation (CNAP)**
- 2 None identified.
- 3 **5.6.10 Calling Name Restriction (CNAR)**
- 4 None identified.
- 5 **5.6.11 Calling Number Identification Presentation (CNIP)**
- 6 None identified.
- 7 **5.6.12 Calling Number Identification Restriction (CNIR)**
- 8 None identified.
- 9 **5.6.13 Conference Calling (CC)**
- 10 None identified.
- 11 **5.6.14 Do Not Disturb (DND)**
- 12 None identified.
- 13 **5.6.15 Emergency Services**
- 14 None identified.
- 15 **5.6.16 Flexible Alerting (FA)**
- 16 None identified.
- 17 **5.6.17 Message Waiting Notification (MWN)**
- 18 None identified.
- 19 **5.6.18 Mobile Access Hunting (MAH)**
- 20 None identified.
- 21 **5.6.19 Password Call Acceptance (PCA)**
- 22 None identified.
- 23 **5.6.20 Preferred Language (PL)**
- 24 None identified.
- 25 **5.6.21 Priority Access Channel Assignment (PACA)**
- 26 None identified.
- 27 **5.6.22 Remote Feature Control (RFC)**
- 28 None identified.
- 29 **5.6.23 Selective Call Acceptance (SCA)**
- 30 None identified.
- 31 **5.6.24 Subscriber PIN Access (SPINA)**
- 32 None identified.

1 **5.6.25 Subscriber PIN Intercept (SPINI)**

2 None identified.

3 **5.6.26 Three-Way Calling (3WC)**

4 None identified.

5 **5.6.27 User Selective Call Forwarding (USCF)**

6 None identified.

7 **5.6.28 Voice Message Retrieval (VMR)**

8 None identified.

9 **5.6.29 Voice Privacy (VP)**

10 None identified.

11 **6 HIGH LEVEL SYSTEM DESIGN**

12 From a high-level system perspective, the MMS shall be designed with
13 the support from the following entities:

14 **6.1 Air Interface Support**

15 Multimedia Messaging Services will require the following support from
16 the air interface:

- 17 ▪ None identified.

18 **6.2 RAN Support**

19 Multimedia Messaging Services will require the following support from
20 the RAN:

- 21 ▪ None identified.

22 **6.3 Intersystem Interface Support**

23 Multimedia Messaging Services will require the following support:

- 24 ▪ External interfaces for controlling and delivering MM between the
25 terminal and an external device, e.g., portable computer, should be
26 supported.

27 **6.4 Actions Across System Interfaces**

28 Multimedia Messaging Services will require the following support:

29 **6.4.1 Open Interfaces**

30 The standard shall permit interworking with other or existing
31 messaging technologies, messaging services, intelligent network
32 services, and supplementary services, either located within or
33 outside cellular network, 3rd party service providers. In
34 consideration of Internet as the universal packet-based
35 communication standard, MMS should have maximum level of
36 compatibility with IETF defined messaging technologies.

6.4.2 MMS System Architecture Flexibility

Network operators may wish to design and configure networks in different ways (see Figure 1). Detailed Functionality Requirements herein are identified to allow flexibility in how the MMS functionality is supported. For example, some network operators may wish to implement the MMS functionality within the core network (e.g., Scenarios 1 and 2), whereas other may wish to place the MMS functionality on the periphery of the core network (e.g., Scenario 3 as a centralized network model instead of a distributed architecture). Further, some network operators may wish to support a limited set of MMS functionality, while others may require extensive and elaborate MMS support according to their business models (e.g., basic MMS instead of advanced MMS, Scenario 4). And still, some network operators may wish to allow a 3rd Party MMS Provider to use their networks for provisioning MMS (e.g., Scenario 5). Interoperability shall always be maintained within this flexible architecture.

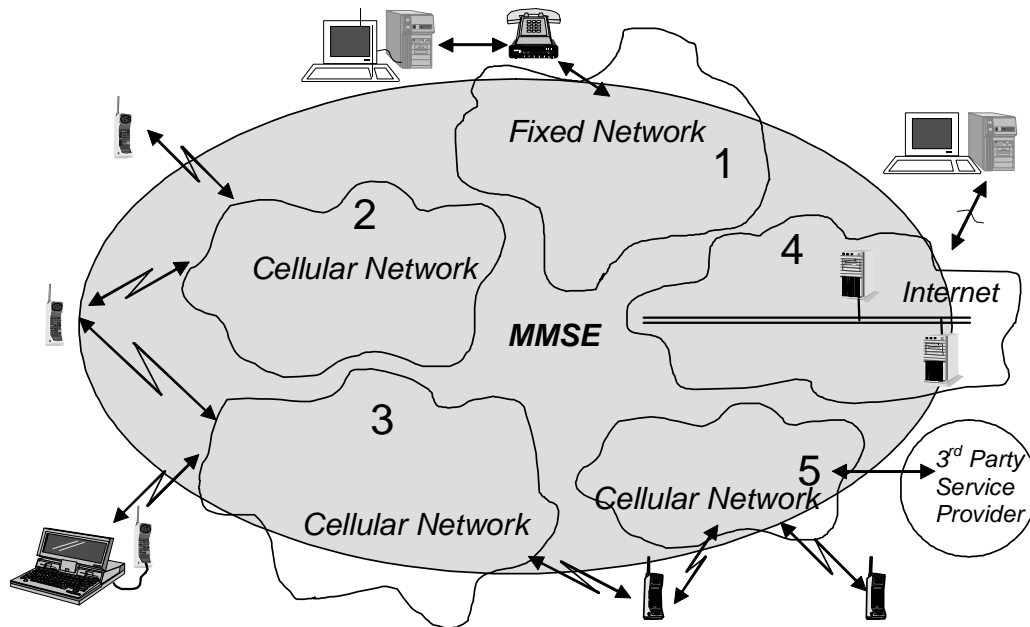


Figure 1 MMS Environment Architecture

Figure 1 MMS Environment Architecture 19