3GPP TSG-T#10
Bangkok, Thailand, 6-8 December 2000

Tdoc TP-000195

Agenda Item: 5.2.3

Source: T2

Title: "Messaging" Change Requests

Document for: Approval

Spec	CR	Rev	Rel	Subject	Cat	Vers-Curr	Vers-New	T2 Tdoc	Workitem
23.038	005		R00	Data coding scheme value for the Icelandic language	B	4.0.0	4.1.0	T2-000726	TEI
23.140	002		R00	High-level description of MMS	B	4.0.0	4.1.0	T2-000791	MMS

3GPP TSG-T2 #11
Shin-Yokohama Japan
November 27th – December 1st

T2-000726

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.038	CR	005	Current Version:	4.0.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	T#10 *list expected approval meeting # here ↑*	for approval	X	strategic		*(for SMG use only)*
		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: T2 **Date:** 9/11/00

Subject: Data coding scheme value for the Icelandic language

Work item: TEI

Category: *(only one category shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in an earlier release	
B	Addition of feature	X
C	Functional modification of feature	
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	
Release 4	X

Reason for change: The Icelandic operators have requested a data coding scheme value for the Icelandic language

Clauses affected: Section 5

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

5 CBS Data Coding Scheme

The CBS Data Coding Scheme indicates the intended handling of the message at the MS, the alphabet/coding, and the language (when applicable). Any reserved codings shall be assumed to be the GSM 7 bit default alphabet (the same as codepoint 00001111) by a receiving entity. The octet is used according to a coding group which is indicated in bits 7..4. The octet is then coded as follows:

Coding Group Bits 7..4	Use of bits 3..0
0000	Language using the GSM 7 bit default alphabet Bits 3..0 indicate the language: 0000 German 0001 English 0010 Italian 0011 French 0100 Spanish 0101 Dutch 0110 Swedish 0111 Danish 1000 Portuguese 1001 Finnish 1010 Norwegian 1011 Greek 1100 Turkish 1101 Hungarian 1110 Polish 1111 Language unspecified
0001	0000 GSM 7 bit default alphabet; message preceded by language indication. The first 3 characters of the message are a two-character representation of the language encoded according to ISO 639 [12], followed by a CR character. The CR character is then followed by 90 characters of text. 0001 UCS2; message preceded by language indication The message starts with a two 7-bit default alphabet character representation of the language encoded according to ISO 639 [12]. This is padded to the octet boundary with two bits set to 0 and then followed by 40 characters of UCS2-encoded message. An MS not supporting UCS2 coding will present the two character language identifier followed by improperly interpreted user data. 0010..1111 Reserved
0010..	0000 Czech 0001 Hebrew 0010 Arabic 0011 Russian 0100 Icelandic 01010..1111 Reserved for other languages using the GSM 7 bit default alphabet, with unspecified handling at the MS
0011	0000..1111 Reserved for other languages using the GSM 7 bit default alphabet, with unspecified handling at the MS

(concluded)

<table>
<tr><td>01xx</td><td>General Data Coding indication
Bits 5..0 indicate the following:

Bit 5, if set to 0, indicates the text is uncompressed
Bit 5, if set to 1, indicates the text is compressed using the compression algorithm defined in 3G TS 23.042 [13]

Bit 4, if set to 0, indicates that bits 1 to 0 are reserved and have no message class meaning
Bit 4, if set to 1, indicates that bits 1 to 0 have a message class meaning:

Bit 1 Bit 0 Message Class:
0 0 Class 0
0 1 Class 1 Default meaning: ME-specific.
1 0 Class 2 (U)SIM specific message.
1 1 Class 3 Default meaning: TE-specific (see 3G TS 27.005 [8])

Bits 3 and 2 indicate the alphabet being used, as follows:
Bit 3 Bit 2 Alphabet:
0 0 GSM 7 bit default alphabet
0 1 8 bit data
1 0 USC2 (16 bit) [10]
1 1 Reserved</td></tr>
<tr><td>1000..1101</td><td>Reserved coding groups</td></tr>
<tr><td>1110</td><td>Defined by the WAP Forum [15]</td></tr>
<tr><td>1111</td><td>Data coding / message handling

Bit 3 is reserved, set to 0.

Bit 2 Message coding:
0 GSM 7 bit default alphabet
1 8 bit data

Bit 1 Bit 0 Message Class:
0 0 No message class.
0 1 Class 1 user defined.
1 0 Class 2 user defined.
1 1 Class 3
default meaning: TE specific
(see 3G TS 27.005 [8])</td></tr>
</table>

These codings may also be used for USSD and MMI/display purposes.
See 3G TS 24.090 [11] for specific coding values applicable to USSD for MS originated USSD messages and MS terminated USSD messages. USSD messages using the default alphabet are coded with the GSM 7-bit default alphabet given in subclause 6.2.1. The message can then consist of up to 182 user characters.
Cell Broadcast messages using the default alphabet are coded with the GSM 7-bit default alphabet given in subclause 6.2.1. The message then consists of 93 user characters.
If the GSM 7 bit default alphabet extension mechanism is used then the number of displayable characters will reduce by one for every instance where the GSM 7 bit default alphabet extension table is usedCell Broadcast messages using 8-bit data have user-defined coding, and will be 82 octets in length.
UCS2 alphabet indicates that the message is coded in UCS2 [10]. The General notes specified in subclause 6.1.1 override any contrary specification in UCS2, so for example even in UCS2 a <CR> character will cause the MS to return to the beginning of the current line and overwrite any existing text with the characters which follow the <CR>. Messages encoded in UCS2 consist of 41 characters.
Class 1 and Class 2 messages may be routed by the ME to user-defined destinations, but the user may override any default meaning and select their own routing.
Class 3 messages will normally be selected for transfer to a TE, in cases where a ME supports an SMS/CBS interface to a TE, and the TE requests "TE-specific" cell broadcast messages (see 3G TS 27.005 [8]). The user may be able to override the default meaning and select their own routing.

3GPP TSG-T2 #11
Shin Yokohama, JAPAN
November 27th - December 1th 2000

T2-000791

CR-Form-v3

CHANGE REQUEST

⌘ **23.140** **CR** **002** ⌘ rev **-** ⌘ Current version: **4.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	High-level description of MMS
Source:	⌘	T2
Work item code:	⌘	MMS
Date:	⌘	30.11.00
Category:	⌘	**B**
Release:	⌘	REL-4

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change: ⌘ During T2#9 it was agreed in principle to add a high-level description of MMS to 3G TS 23.140. The level of detail needed for such a high-level description of MMS was identified to include:

- Multimedia Messaging framework
- Application protocol framework and service primitives
- Technical realisation of MMS service features

Summary of change: ⌘ High-level description of MMS

Consequences if not approved: ⌘ MMS R'4 would not be completely defined which could lead to interoperability problems.

Clauses affected: ⌘ Changes in clauses 1, 2, 5.2, 5.3, 6
addition of chapter 7 and 8
removal of former chapter 7 to an annex B1
insertion of IP-based implementation to an annex B2

Other specs Affected: ⌘
☐ Other core specifications
☐ Test specifications
☐ O&M Specifications
⌘

Other comments: ⌘

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3GPP TSG-T2 #11
Shin Yokohama, JAPAN
November 27th - December 1th 2000

T2-000791

1 Scope

The present document defines the stage 2 and stage 3 description of the non realtime Multimedia Messaging Service, MMS. Stage 2 identifies the functional capabilities and information flows needed to support the service described in stage 1.

The present document includes information applicable to network operators, service providers and terminal, switch and database manufacturers.

The present document contains the core functions for a non realtime Multimedia Messaging Service, MMS, which are sufficient to provide a basicservice.

MMS uses a number of technologies to realise the requirements of the stage 1 description (3G TS 22.140) [1]. The present document describes how the service requirements are realised with the selected technologies. 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.

This specification serves as a foundation for the development of MMS ~~for release 99~~. It describes a new service which has no direct equivalent in the previous ETSI/GSM world or in the fixed network world. In consequence readers may find that certain aspects are not clearly defined or open to misinterpretation. Where any such case is encountered it is essential that the issue is brought to the 3GPP TSG T2 standards body (see page 2 for contact information) for discussion and resolution in order to provide interoperable implementations ~~in release 99~~.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 3G TS 22.140: "Multimedia Messaging Service".

[2] 3G TR 21.905: "Vocabulary for 3GPP Specifications".

[3] "Wireless Application Environment Specification", WAP Forum, April 30th, 1998. URL: http://www.wapforum.org/.

[4] 3G TS 23.057: "Mobile Station Application Execution Environment".

[5] RFC 822 Standard for the format of ARPA Internet text messages, IETF.

[6] RFC 2046 Multipurpose Internet Mail extention (MIME) Part Two: Media Types, IETF.

[7] "The Unicode Standard", Version 2.0, Unicode Consortium, Addision-Wesley Dev. Press, 1996.

[8] US-ASCII: "Coded Character Set 7 Bit; American Standard Code for Information Interchange"; ANSI X3.4, 1986.

[9] ISO-8859-1 (1987): "Information Processing - 8-bit Single-Byte Coded Graphic Character Sets; Part 1: Latin Alphabet No. 1".

[10] RFC 2279, "UTF-8, A Transformation format of ISO 10646", IETF.

[11] 3G TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[12] 3G TS 26.090: "AMR Speech Codec Speech Transcoding Functions". 3G TS 26.093 (V3.1.0): "AMR Speech Codec; Source Controlled Rate Operation".

[13] void

[14] MP3, MPEG1-Audio ISO/IEC 11172-3, MPEG2-Audio ISO/IEC 11172-3.

[15] MIDI SDS, International Midi Association, 5316 West 57th Street, Los Angeles, CA 90056, (415) 321-MIDI.

[16] WAV: Waveform Audio File Format, MIME Sub-type Registration www.ietf.org

[17] JPEG Draft Standard ISO 10918-1 CD.

[18] Graphics Interchange Format (Version 89a), Compuserve, Inc., Columbus, Ohio, 1990.

[19] ISO/IEC 14496-1 (1999): Information Technology - Generic Coding of Audio-Visual Objects - Part 1: Systems. ISO/IEC 14496-2 (1999): Information Technology - Generic Coding of Audio-Visual Objects - Part 2: Visual.

[20] ITU-T Recommendation H.263 (1998): "Video coding for low bit rate communication".

[21] Quick-Time. URL: http://www.apple.com.

[22] RFC 821 "Simple Mail Transfer Protocol", IETF.

[23] "WAP Wireless Session Protocol", WAP Forum, November 1999. URL: http://www.wapforum.org/.

[24] "WAP Push Access Protocol", WAP Forum, November 1999. URL: http://www.wapforum.org/.

[25] "WAP User Agent Profile", WAP Forum, November 1999. URL: http://www.wapforum.org.

[26] "Resource Description Framework (RDF) Model and Syntax Specification", W3C Recommendation, 2/99. URL: http://www.w3c.org/TR/1999/PR-rdf-syntax-19990105.

[27] "WAP Wireless Markup Language 1.2", November 1999. URL: http://www.wapforum.org.

[28] Synchronized Multimedia Integration Language (SMIL) 1.0 Specification - http://www.w3.org/TR/smil-boston/.

[29] "WAP Wireless Transport Layer Security", November 1999. URL: http://www.wapforum.org.

[30] "WAP Identity Module", November 1999. URL: http://www.wapforum.org.

[31] ITU-T Recommendation T.37 (06/98): "Procedures for the transfer of facsimile data via store-and-forward on the Internet".

[32] ITU-T Recommendation T.30 (1996): "Procedures for document facsimile transmission in the general switched telephone network".

[33] RFC 2421 (Sept. 1998): Voice Profile for Internet Mail – version 2, VPIM.

[34] RFC 1957 POP 3.

[35] RFC 1730 (December 1994): Internet Message Access Protocol Version 4, IETF.

[36] Tag Image File Format (TIFF) Version 6: Adobe Systems, http://www.adobe.com.

[37] SMPP Developers' Forum (Oct. 99), Short Message Peer-to-Peer Protocol Specification, v.3.4.

[38] 3G TR 26.911: "Codec(s) for Circuit Switched Multimedia Telephony Service; Terminal Implementor's Guide".

[39] Internet draft " RTP payload format for AMR"; IETF
URL: http://search.ietf.org/internet-drafts/draft-ietf-avt-rtp-amr-00.txt

NOTE: Reference [39] has to be replaced by the appropriate RFC number once the internet draft is approved within the IETF (IETF approval is scheduled to early November 2000).

[40] 3G TS 26.233: "Packet-switched Streaming Service (PSS); General Description".

[41] 3G TS 26.234: "Packet-switched Streaming Service (PSS); Protocols and Codecs".

[42] Internet Draft “A TCP profile for W-CDMA: 3G wireless packet service”; IETF URL: http://search.ietf.org/internet-drafts/draft-inamura-docomo-00.txt

NOTE: Reference [42] has to be replaced by the appropriate RFC number once the internet draft is approved within the IETF.

[43] WAP Wireless profiled TCP, WAP-225-TCP, Draft Version 11-October-2000

NOTE: Reference [43] has to be replaced by the appropriate WAP specification once the specification is approved within the WAP Forum.

[44] RFC 2045, Multipurpose Internet Mail extention (MIME) Part One: Format of Internet Message Bodies, IETF, ftp://ftp.isi.edu/in-notes/rfc2045.txt

[45] RFC, Multipurpose Internet Mail extention (MIME) Part Three: Message Header Extensios for Non-ASCII-Text, IETF, ftp://ftp.isi.edu/in-notes/rfc2047.txt

[46] RFC 2048, Multipurpose Internet Mail extention (MIME) Part Four: Registration Procedures, IETF, ftp://ftp.isi.edu/in-notes/rfc2048.txt

[47] RFC 2049, Multipurpose Internet Mail extention (MIME) Part Five: Conformance Criteria and Examples, IETF, ftp://ftp.isi.edu/in-notes/rfc2049.txt

3 Abbreviations

For the purposes of the present document, the following abbreviations apply in addition to those defined in [1] and [2]:

EMA	Electronic Message Association
E-Mail	Electronic Mail
HTTP	Hypertext Transfer Protocol
IANA	Internet Assigned Numbering Authority
IETF	Internet Engineering Task Force
IMAP4	Internet Message Access Protocol
GW	Gateway
MIME	Multipurpose Internet Mail Extensions
MM	Multimedia Message
MMSE	Multimedia Message Service Environment
MMS	Multimedia Messaging Service
MTA	Mail Transfer Agent
PDU	Protocol Data Unit
POP3	Post Office Protocol Version 3
RDF	Resource Description Format
RFC	Request for Comments
SMIL	Synchronised Multimedia Integration Language
SMPP	Short Message Peer-to-Peer Protocol
SMTP	Simple Mail Transfer Protocol
UA	User Agent
UAProf	User Agent Profile
URI	Uniform Resource Identifiers
VPIM	Voice Profile for Internet Mail
W3C	WWW Consortium
WAP	Wireless Application Protocol
WIM	WAP Identity Module
WML	Wireless Markup Language
WSP	WAP Session Protocol
WTLS	Wireless Transport Layer Security

4 General Architecture

4.1 Overview

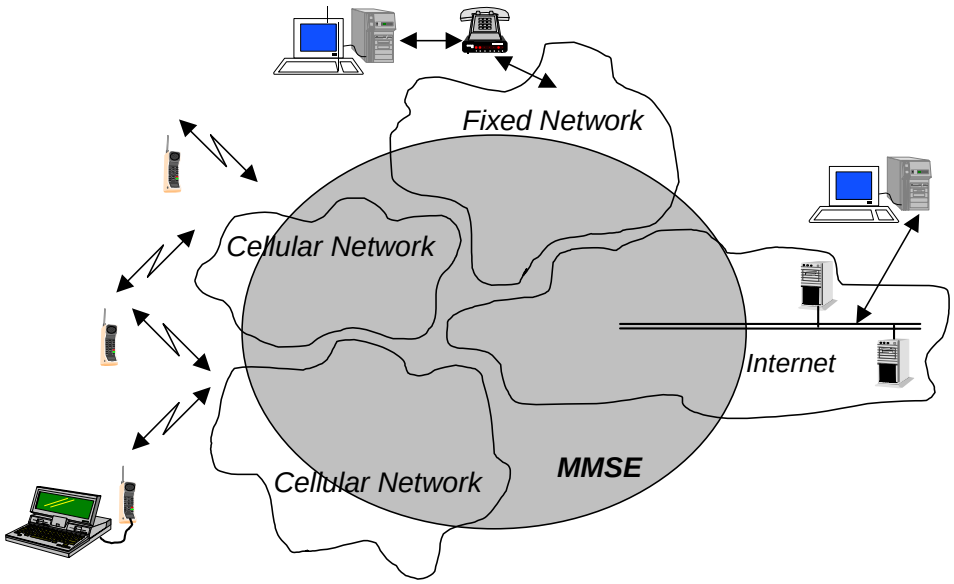

Figure 1: General view of MMS provision within the different networks

Figure 1 shows a generalised view of the Multimedia Message Service architecture for a third generation messaging system. It shall combine different networks and network types and shall integrate messaging systems already existent within these networks. The terminal operates with the Multimedia Messaging Service Environment, MMSE. This environment may comprise 2G and 3G networks, 3G networks with islands of coverage within a 2G network and roamed networks. The MMSE provides all the necessary service elements, e.g. delivery, storage and notification functionality. These service elements may be located within one network or distributed across several networks or network types.

4.2 Involved MMS Elements

Figure 2 shows that multimedia messaging may encompass many different network types. The basis of connectivity between these different networks shall be provided by the Internet protocol and its associated set of messaging protocols. This approach enables messaging in 2G and 3G wireless networks to be compatible with messaging systems found on the Internet.

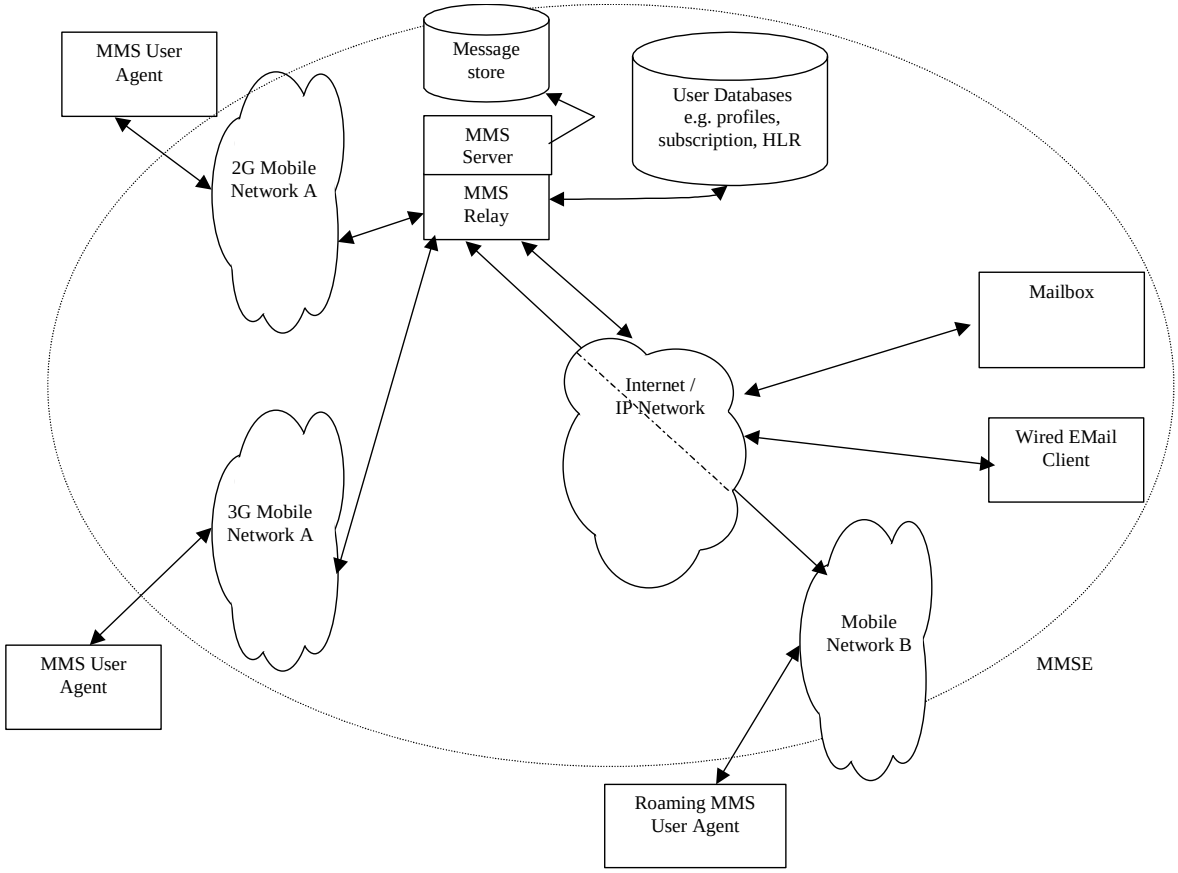

Figure 2: MMS Architectural Elements

MMSE

The Multimedia Message Service Environment encompasses all the various elements that provide a complete MMS to a user. In the case of roaming the visited network is considered a part of that user's MMSE. However, subscribers to the mobile network B are considered to be a part of a separate MMSE.

MMS Relay and MMS Server

The MMS Server is responsible for storage and handling of incoming and outgoing messages. Associated with the MMS Server, is the MMS Relay which is responsible for the transfer of messages between different messaging systems. Depending on the business model, the MMS Server and the MMS Relay may be combined, separate or distributed across different domains.

The MMS Relay should be able to generate charging data (CDR) when receiving MMs or when delivering MMs to the MMS User Agent or to another MMSE.

MMS User Databases

This element may be comprised of one or more entities that contain user related information such as subscription and configuration (e.g. user profile, HLR).

MMS User Agent

The User Agent resides on a UE or on an external device connected to a UE. It is an application layer function that provides the users with the ability to view, compose and handle MMs (e.g. sending, receiving, deleting of MMs).

4.3 Protocol Framework

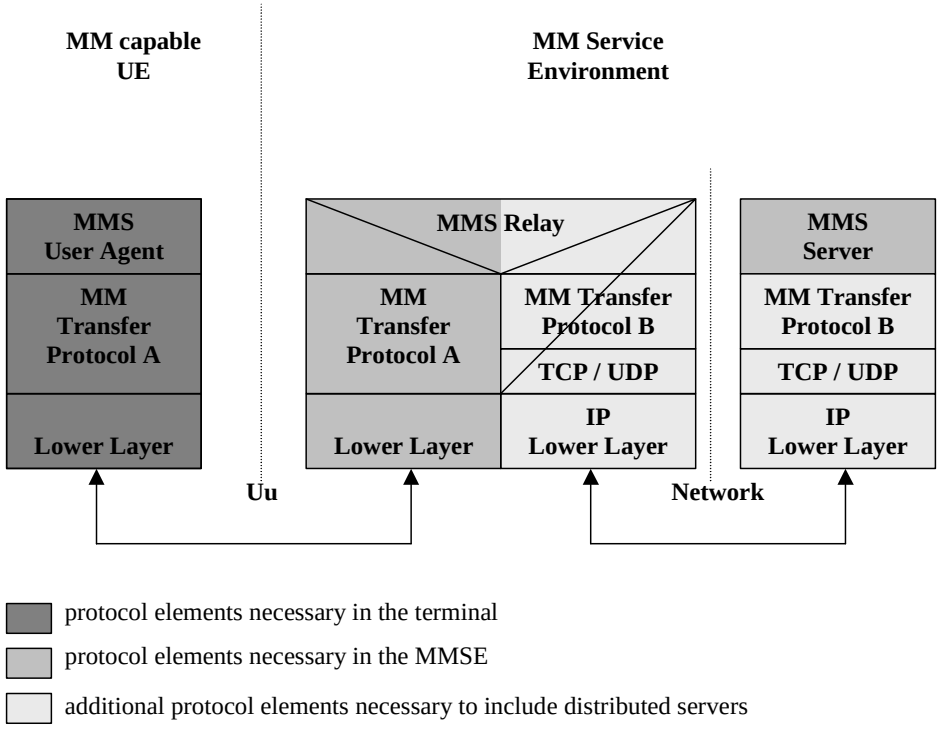

Figure 3: Protocol Framework to provide MMS

To provide implementation flexibility, integration of existing and new services together with interoperability across different networks and terminals, the MMS shall make use of the protocol framework outlined in figure 3. In this framework the MMS User agent communicates through the MMS Relay with the MMS Server. This MMS Relay shall provide convergence functionality between server and MMS user agent and thus enabling the integration of different server types across different networks. It should be possible to combine Server and Relay functionality.

Details for implementation of the MM transfer protocol A using WAP [3] or applications conforming to MExE [4] (e.g. Java and TCP/IP) are elaborated within this specification. The WAP implementation option is described in clause 7. Implementations based on applications using MExE may be defined in detail in future releases. Other implementations (e.g. using other standardised Internet protocols) are not defined in this specification in this release.

4.4 Addressing

MMS shall support the use of E-Mail addresses (RFC 822) [5]or MSISDN to address the recipient of a MM. In the case of E-Mail addresses standard internet message routing should be used.

The usage of MSISDN for addressing a recipient in a different MMS service providers domain shall be possible. For that the need of MSISDN translation to a routable address has been identified. The mapping for the MSISDN to the correct recipient's MMS Relay or Server is left for standardisation in future releases. In the mean time, it is expected that MMS service providers or network operators will develop solutions for their particular needs which may include static tables or other look-up methods.

Extensibility of the addressing framework is the goal and the specific mechanism is left for future releases.

5 Functional Description of Involved MMS Elements

5.1 MMS User Agent

5.1.1 MMS User Agent operations

The MMS User Agent shall provide the following application layer functionalities:-

- the MM composition;
- the MM presentation;
- the presentation of notifications to the user;
- the retrieval of MMs (initiate MM delivery to the User Agent).

The MMS User Agent may provide additional application layer functionalities such as:-

- the signing of an MM on an end-user to end-user basis;
- the decryption and encryption of a MM on an end-user to end-user basis;
- all aspects of storing MMs on the terminal and/or USIM;
- the handling of external devices;
- the user profile management.

This optional list of additional functionalities of the MMS User Agent is not exhaustive.

5.1.2 Minimum set of supported formats

Multiple media elements shall be combined into a composite single MM using MIME multipart format as defined in RFC 2046 [6]. The media type of a single MM element shall be identified by its appropriate MIME type whereas the media format shall be indicated by its appropriate MIME subtype.

In order to guarantee a minimum support and compatibility between multimedia messaging capable terminals, the following media formats shall be at least supported.

Minimum set of supported media type Text formats:-

- plain text. Any character encoding (charset) that contains a subset of the logical characters in Unicode [7] shall be used (e.g. US-ASCII [8], ISO-8859-1[9], UTF-8[10], Shift_JIS, etc.).

Unrecognised subtypes of "text" shall be treated as subtype "plain" as long as the MIME implementation knows how to handle the charset. Any other unrecognised subtype and unrecognised charset shall be treated as "application/octet - stream".

In order to guarantee SMS interoperability, SMS 3G TS 24.011 [11] RP-DATA RPDU encapsulation defined in subclause 7.3.1 shall be supported. MIME type application/x-sms shall be used for this purpose.

NOTE: SMS MIME type shall be used as soon as the MIME registration has been completed.

Minimum set of supported media formats or codecs for MMS User Agents supporting media type Audio:-

- AMR [12]; organised in the format specified in chapter 7.2 of [39]

Minimum set of supported media formats or codecs for MMS User Agents supporting media type Image:-

- Baseline JPEG [17].

To ensure interoperability with formats widely used e.g. in the internet community the support of the following formats or codecs is suggested:-

Suggested formats or codecs for media type Audio:-

- MP3 [14]

- MIDI [15]
- WAV [16]

Suggested formats or codecs for media type Image:-

- GIF 89a [18].

Suggested formats or codecs for media type Video:-

- MPEG 4 (Visual Simple Profile, Level 1) [19] according to the restrictions specified in 3G TS 26.911 [38].
- ITU-T H.263 [20].
- Quicktime [21].

5.2 MMS Server

The MMS Server is responsible for storage and handling of messages. Several Servers can be included within an MMSE, e.g. MMS-Server for MM storage purpose, E-Mail Server, SMS Server (SMSC), Fax.

NOTE: Several Eexamples can be found in Annex A.

NOTE: A more detailed description of the MMS Server's functionality needs to be developed.

5.3 MMS Relay

This MMS Relay shall provide convergence functionality between server and user agent and thus enable the integration of different server types across different networks. It should be possible to combine Server and Relay functionality.

The MMS Relay is responsible for the following functions:-

- receiving and sending MM;
- enabling/disabling MMS function;
- personalising MMS based on user profile information;
- MM deletion based on user profile or filtering information;
- media type conversion;
- media format conversion;
- conversion of messages arriving at the MMSE from legacy messaging systems to MM format (e.g. facsimile to MM)
- conversion of MMs leaving the MMSE to legacy messaging systems to the appropriate message format (e.g. MM to internet email)
- message content retrieval;
- MM forwarding;
- screening of MM;
- negotiation of terminal capabilities;
- checking terminal availability;
- MM notification to the MMS User Agent;
- generating charging data records (CDR);
- address translation.

- managing the message properties on servers (e.g. voicemail or email server) integrated in the MMSE (consistency)

NOTE: Further discussion on the functionality of the MMS Relay is needed whether or not the MMS Relay is the central point of control or the MMS Relay just supports the messaging (addressing, routing and managing the user profile only, not the message properties)

- ensuring that messages are not lost until successfully delivered to another MMSE element

5.4 MMS User databases

The MMS User databases may consist of e.g. user profile database, subscription database, HLR.

The MMS User databases shall provide:-

- MMS user subscription information;
- information for the control of access to the MMS;
- information for the control of the extent of available service capability (e.g. server storage space);
- a set of rules how to handle incoming messages and their delivery;
- information of the current capabilities of the users terminal.

NOTE: The location of the User Databases and the access to them are outside ~~of~~ the scope of this release. ~~of Release 99~~.

6 MMS Service Behaviour Description

6.1 MMS services offered

6.1.1 Sending of a Multimedia Message

When a user intends to send an MM to one or several destinations the MM shall be submitted to the originator's MMS Relay.

The support for sending of MMs is optional for MMS User Agents. If a MMS User Agent supports sending of MMs the MMS User Agent shall be able to:

- Set the earliest desired time of delivery for the message
- Set the desired time of expiry for the message
- Set further message qualifications (e.g. priority, message class, subject)
- Request her address being hidden from the recipient MMS User Agent.

If a MMS User Agent supports sending of MMs the MMS User Agent may be able to:

- Request a delivery report for the message
- Request a read-reply report for the message

Upon reception of an MM from an originator MMS User Agent the originator MMSE

a.) shall assign a Message Identification to the MM and immediately provide the originator MMS User Agent with this Message Identification

b.) is responsible for retaining the MM until the earliest desired time of delivery, if the optional feature of earliest time of delivery is supported by the originator MMSE. If this feature is not supported then the MM is immediately routed forward.

c.) may provide a time stamp, i.e. it may also override the MMS User Agent's time stamp,

d.) shall insert the originator's address into the MM if not yet provided if the peer entity is known to be a MMSE

e.) may override the address provided by the originator in the MM (subject to MMS service provider's preferences)

f.) should override the address provided by the originator in the MM to an "anonymous" address if the peer entity is unknown to the originator MMSE and address hiding has been requested by the originator MMS User Agent

g.) is responsible for resolving the recipient's address(es),

h.) is responsible to route the MM towards the recipients.

i.) shall pass the indication whether or not a delivery report is requested unaltered when routing the MM towards the recipients

j.) shall generate a delivery report indicating "indeterminate" status of the MM's delivery if a delivery report was requested by the originator MMS User Agent and if the peer entity the MM is routed forward to is not know by the originator MMS Relay.

Note: The status value "indeterminate" is not yet covered in the current WAP specifications. The corresponding bullet item is subject to changes after further discussions on MM4 took place.

Note: A special case is where the recipient MMSE is also the originator MMSE. In this case the MM does not have to be routed forward.

6.1.2 Reception of a Multimedia Message in the recipient MMSE

Upon reception of an MM the recipient MMSE

a.) may verify the recipient's user profile(s)

b.) shall store the MM at least until

- the associated time of expiry is reached,
- the MM is delivered,
- the recipient MMS User Agent requests the MM to be routed forward or
- the MM is rejected.

Note: The term "associated time of expiry " refers to either the desired time of expiry set by the originator MMS User Agent or a MMSE time of expiry setting.

c.) shall generate a notification to the recipient MMS User Agent.

Note: Incoming messages from legacy systems may be expected to be converted to MMs.

6.1.2.1 Multimedia Message Notification

With the MM notification the recipient MMS User Agent shall receive a message reference that can be used for retrieving the MM from the recipient MMSE. The message reference that is conveyed in a notification shall at least be valid throughout the message expiry period, till the successful retrieval of the MM or until the MM was rejected.

With the MM notification the recipient MMS User Agent may receive additional information on the MM.

In a response to the notification the MMS User Agent shall be able to

- reject the MM or
- retrieve the MM.

In a response to the notification the MMS User Agent may be able to

- request the MM to be forwarded.

Note: The feature for “request the MM to be forwarded” in a response to a notification needs further elaboration with respect to its impact on charging, delivery report, read-reply and the forwarded message content etc.

6.1.3 Retrieval of a Multimedia Message

The recipient MMS User Agent shall be able to request delivery of an MM from the recipient MMSE based on the information received in the notification.

Upon delivery request the recipient MMSE

- shall deliver the MM to the recipient
- may perform data adaptation based on user profile and/or MMS User Agent capabilities
- shall not provide the originator’s address to the recipient if the originator MMS User Agent requested its address to be hidden from the recipient
- shall provide the originator’s address to the recipient if the originator MMS User Agent did not request its address to be hidden from the recipient
- shall give an indication to the recipient MMS User Agent that a delivery report is requested if such a delivery report has been requested by the originator
- shall be responsible for the storage of messages in the network until the user becomes reachable (e.g. moves back into coverage, switches MMS User Agent on) until the MM expires.

6.1.4 Delivery Report

The MMSE shall support the delivery reporting service.

The originator MMS User Agent may be able to request a delivery report for a specific MM. Delivery report shall neither be generated for other read-reply reports nor for delivery reports.

Upon MM retrieval the recipient MMS User Agent receives an indication that a delivery report is requested for the MM.

After MM retrieval the recipient MMS User Agent may deny the generation of a delivery report in which case a delivery report should not be generated.* Also in the case, that the originator MMS User Agent requested its address to be hidden from the recipient, no delivery report shall be generated.

* Note: Whether the MMSE shall generate a delivery report based upon receipt of the notification response or upon receipt of the retrieval acknowledgement from the recipient MMS User Agent needs further elaboration. The outcome of this elaboration has a direct impact on the interpretation of the status value “retrieved“ in the delivery report. In the first case it means “delivered to the inbox and notified to the recipient MMS User Agent”, in the latter case it means “delivered to the MMS User Agent”.

The originator MMS User Agent, i.e. the MMS User Agent receiving the delivery report, may match the delivery report to the sent MM by retaining the message identification of the sent MM and comparing it to the received delivery report, which shall contain the message identification of the original MM. In case of multiple recipients, it is necessary for the originator MMS User Agent to retain the recipient addresses as well, to match the delivery report to the sent MM.

If a delivery report has been requested by the originator MMS User Agent, if the recipient MMS User Agent did not deny its creation and if the originator MMS User Agent did not request its address to be hidden from the recipient, the recipient MMSE

- shall generate the delivery report
- shall deliver the delivery report to the originator MMSE.
- shall provide the originator's address to the originator MMSE.
- shall provide the recipient's address to the originator MMSE.
- shall provide the identification of the original MM for which the delivery report has been generated to the originator MMSE.
- shall provide status information how the MM was handled (e.g. expired, rejected, delivered, forwarded or indeterminate**) to the originator MMSE
- shall provide a time stamp when the MM was handled to the originator MMSE
- shall be responsible for the storage of delivery reports in the network until the recipient MMSE becomes reachable or until the delivery report expires

** Note: The status value "indeterminate" is not yet covered in the current WAP specifications and is thus subject to changes after further discussions on MM4 took place.

For each recipient of the original MM for which the delivery report has been generated the originator MMSE

- shall deliver the delivery report to the originator MMS User Agent (i.e. the recipient of the delivery report).
- shall provide the recipient's address to the originator.
- shall provide the identification of the original MM for which the delivery report has been generated to the originator.
- shall be responsible for the storage of delivery reports in the network until the user becomes reachable (e.g. moves back into coverage, switches MMS User Agent on) or until the delivery report expires

6.1.5 Read-Reply Report

The MMSE shall support the read-reply reporting service.

The originator UA may be able to request a read-reply report for a specific MM. Read-reply report shall neither be generated for other read-reply reports nor for delivery reports.

Upon MM retrieval the recipient MMS User Agent receives an indication that a read-reply report is requested for the MM.

After having handled/rendered the MM the recipient MMS User Agent may generate a read-reply report if requested by the originator MMS User Agent.

The originator User Agent, i.e. the User Agent receiving the read-reply report, may match the read-reply report to the sent MM by retaining the message identification of the sent MM and comparing it to the received read-reply report, which shall contain the message identification of the original MM. In case of multiple recipients, it is necessary for the originator MMS User Agent to retain the recipient addresses as well to match the read-reply report to the sent MM.

Note: Cross-checking is needed whether or not the requirement for the original MM ID is compatible with version 1 of the WAP specifications of MMS.

If a read-reply report has been requested by the originator MMS UA and if the recipient allows its creation the recipient MMS User Agent may submit the read-reply report to the recipient MMSE at the earliest opportunity.

Note: Since the recipient has the right to deny this service and so not receiving a read-reply report does not mean the message has not been rendered.

A read-reply report:

- shall contain the originator's address
- shall contain the recipient's address
- shall contain the message identification of the original MM for which the read-reply report has been generated.
- shall provide status information how the MM was rendered (e.g. read, deleted without being read)
- shall provide a time stamp when the MM was rendered

The recipient MMS User Agent shall be responsible for the storage of read-reply reports in the UE until the recipient MMSE becomes reachable (subject to support of the read-reply reporting service by the recipient MMS User Agent and storage place being available).

Upon reception of a read-reply report from an recipient MMS User Agent the recipient MMSE

a.) may provide a time stamp, i.e. it may also override the MMS User Agent's time stamp,

b.) shall insert the originator's address into the MM if not yet provided if the peer entity is known to be a MMSE

c.) may override the address provided by the recipient in the MM (subject to MMS service provider's preferences)

d.) is responsible for resolving the original MM originator's address,

e.) is responsible to route the MM towards the originator of the original MM.

Note: A special case is where the recipient MMSE is also the originator MMSE. In this case the MM does not have to be routed forward.

Note: Billing aspects of read-reply report need further elaboration.

6.1.6 Support for Streaming in MMS

MMS supports streaming for downloading MM contents. The use of streaming for downloading MM contents is independent of the media up-loading. The download streaming process depends on the configuration and the capability of the recipient MMS User Agent, the recipient MMS Relay and the associated MMS Server, where the streamable MM content is finally stored. The recipient MMS Relay decides whether to use streaming in downloading the content based on capability negotiation and/or user settings/preferences. The streaming-specific protocols, codecs, presentation, session negotiation, streaming control and security are according to [40] and [41].

In the download streaming, the MMS Relay associated with the MMS Server (where the MM content is finally stored) shall send a Notification to the recipient MMS User Agent. The Notification abstract message carries the required information (at least, a URI to indicate the streaming protocol, the address of the server and the reference for the content, which is known as "Message Reference" in abstract messages) to initiate the streaming process by the recipient MMS User Agent to retrieve MM content.

After the successful reception of the streaming notification, the recipient MMS User Agent may initiate a streaming process to retrieve the MM contents depending on the information in the Notification . All other actions associated with the streaming notification shall be according to the normal MMS framework.

76 MMSE Interfaces

This chapter defines the Multimedia Messaging framework. The application protocol framework by service primitives and the technical realisation of MMS service features are defined in chapter 7.

76.1 MMS Reference ArchitectureInvolved MMSE Interfaces

Figure 4 shows the MMS Reference ArchitectureInvolved MMSE Interfaces and identifies reference points within an MMSE that are further described below. Abstract messages are indicated in chapter 7 that describe the logical message exchange on these reference points on a high-level basis.

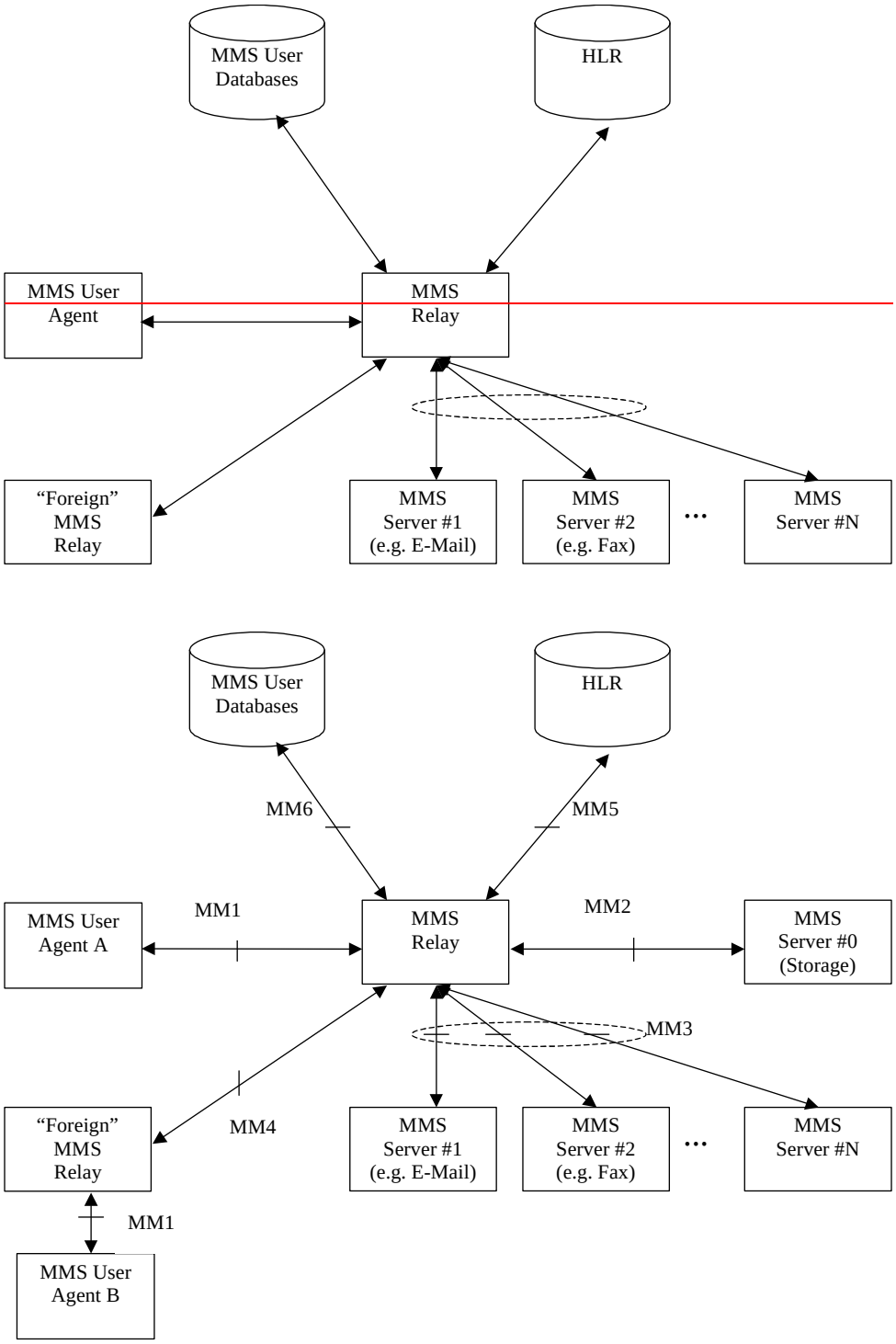

Figure 4: MMS~~E Interfaces~~ Reference Architecture

7~~6~~.2 MM1: MMS Relay – MMS User Agent

Reference point MM1 is used to submit Multimedia Messages from UA to Relay, to let the UA pull ~~query the delivery of~~ MMs from the Relay, let the Relay push MMs to the UA and to exchange notifications and delivery reports between MMS Relay and MMS User Agents.

Details for implementation of the MM transfer protocol A using WAP [3] or applications conforming to MExE [4] (e.g. Java and TCP/IP) are elaborated within this specification. The WAP implementation option is described in clause 7. Implementations based on applications using MExE may be defined in detail in future releases. Other implementations (e.g. using other standardised Internet protocols) are not defined in this specification in this release.

76.3 MM2: MMS Relay – MMS Server (Storage)

Reference point MM2 is used by the MMS Relay to upload incoming Multimedia Messages to an MMS Server for storage and to fetch stored MMs from the MMS Server for delivery. Based on the user's preferences the latter is performed either automatically or on demand.

The realisation of t~~T~~his ~~interface~~ reference point shall be based upon existing standards e.g. HTTP or SMTP. An ~~Several~~ example~~s~~ of reference point MM2 between the MMS Relay and MMS Server (Storage) ~~interfaces~~ can be found in Annex A.

Where the MMS-Relay and MMS-Server are wholly integrated then the ~~interface~~ reference point is outside the scope of the specification.

NOTE: In future releases that separation of MMS Relay and MMS Server from a functional prospective may be defined. At that time architectural and protocol information is to be provided.

7.4 MM3: MMS Relay – Legacy Servers

Reference point MM3 is used by the MMS Relay to send Multimedia Messages to and retrieve MMs from MMS Servers of legacy messaging systems that are incorporated into the service provider's MMSE.

NOTE: The realisation of abstract messages defined for reference point MM3 depends on the type of legacy messaging service the MMS Relay is connected to.

This reference point shall be based upon existing standards e.g. HTTP or SMTP. Several examples of realisations of reference point MM3 between the MMS Relay and MMS Servers of legacy messaging services can be found in Annex A.

76.54 MM6: MMS Relay – MMS User Databases

This ~~interface~~ reference point is outside the scope of this specification.

76.65 MM5: MMS Relay – HLR

Reference point MM5 ~~This interface~~ may be used to provide information to the MMS Relay about the subscriber. If this ~~interface~~ reference point is provisioned then it shall use existing MAP operations (e.g. procedures for determining the location of the mobile, procedures for alerting SMS service centres). Future releases may elaborate this area further.

In case of using SMS as the bearer for notification this ~~interface~~ reference point is not necessary.

76.76 MM4: Interworking of different MMSEs

Reference point MM4 between ~~The~~ MMS Relays belonging to different MMSEs ~~MMS Relay interface~~ is used to transfer MMs between different MMSEs. Interworking between different MMSEs shall be based on SMTP according to RFC 821 [22] as depicted in figure 5.

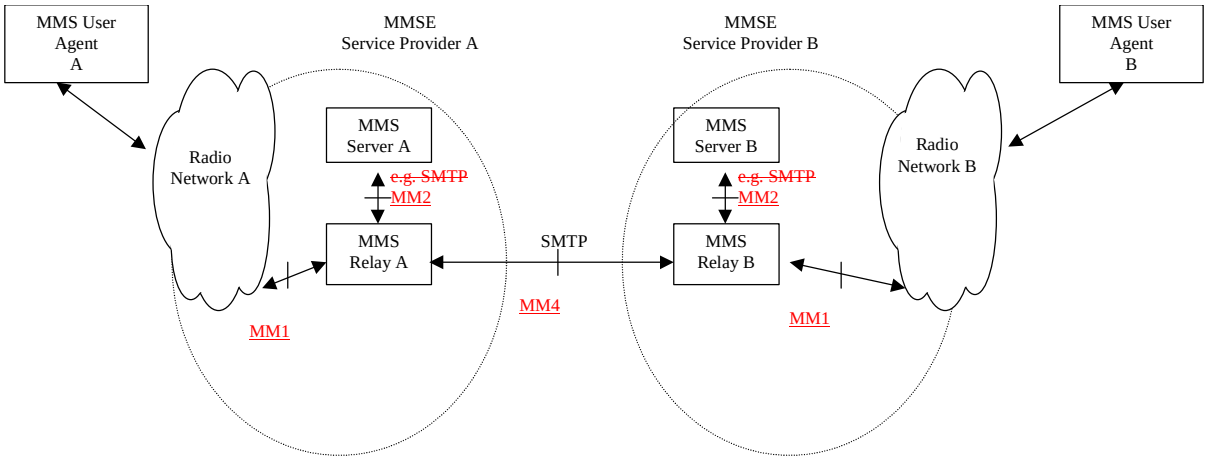

Figure 5: Interworking of different MMSEs

All elements of an MM shall be included within a single SMTP message which shall be organised as MIME type application/multipart. All MM elements shall be of standard MIME content types including the MMS header.

This MMS header shall be of registered MIME application class content type. It shall be sent as a distinct part of the SMTP message. In addition to this all header fields but the MMS specific header fields shall be copied into the SMTP message's header fields.

When conveying an MM the MMS header part shall not be the primary part in the MIME so that non-MMS-aware readers can view this part as merely an attachment. This will minimise problems with presentations of the MM data by these readers.

NOTE: Content type application/mmsheader is subject to registration within IANA. In the mean time content type application/x-mmsheader shall be used to indicate the MMS header.

NOTE: Private agreements may utilise additional connection and security (e.g. IPSec) methods. Such methods are out of the scope of standardisation for this releaseR'99.

8 MMS Application Protocol Framework and Technical Realisation of MMS Service Features

This chapter defines the application protocol framework and describes the technical realisation of MMS service features in terms of abstract messages.

Depending on the MMS Implementation (WAP etc.), more than one abstract messages may be mapped to a single lower layer PDU or a single abstract message may be mapped to multiple lower layer PDUs, if the information carried in the PDU(s) serve the purpose of required information in the subjected abstract message(s).

Note: A definition for the terms “recipient MMS ...”, “originator MMS...” and “original MM” is needed at the definitions section of this specification.

Note: A definition of “conditional” as a presence value of information elements is needed.

8.1 Technical realization of MMS on reference point MM1

8.1.1 Sending of Multimedia Message

This part of MMS service covers the sending of an MM. For sending purposes a terminal-originated MM shall always be submitted from the ~~originating~~originator MMS User Agent to the corresponding MMS Relay. Involved abstract messages are outlined in Table 1 from type and direction points of view.

Abstract messages	Type	Direction
MM1_send.REQ	Request	MMS UA -> MMS Relay
MM1_send.RES	Response	MMS Relay -> MMS UA

Table 1: Abstract messages for sending of MM in MMS

8.1.1.1 Normal operation

The ~~originating~~originator MMS User Agent shall submit a terminal-originated MM to the originator MMS Relay using the MM1_send.REQ, which contains MMS control information and the MM content. The MMS Relay shall respond with an MM1_send.RES, which provides the status of the request. The MM1_send.RES shall unambiguously refer to the corresponding MM1_send.REQ. Support for MM1_send.REQ is optional for the MMS UA, support for MM1_send.RES is mandatory for the MMS Relay.

8.1.1.2 Abnormal Operation

In this case the originator MMS relay shall respond with a MM1_send.RES encapsulating a status which indicates the reason the multimedia message was not accepted, e.g. no subscription, corrupt message structure, service not available.

If the MMS Relay does not provide the MM1_send.RES the MMS User Agent should be able to recover.

8.1.1.3 Features

Addressing: One or several recipients of a submitted MM shall be indicated in the addressing-relevant information field(s) of the MM1_send.REQ. The originator of a submitted MM may be indicated in addressing-relevant information field(s) of the MM1_send.REQ. The ~~originating~~originator MMS User Agent may request to hide its identity from the recipient.

Time stamping: The ~~originating~~originator MMS User Agent ~~or the MMS Relay~~ may time stamp the MM~~message~~.

Time constraints: The ~~originating~~originator MMS User Agent may also request an earliest desired time of delivery of the MM. The ~~originating~~originator MMS User Agent may request a time of expiry for the ~~message~~MM.

Message class, priority and subject: The ~~message~~MM may be qualified further by adding a message class, priority and/or subject to the MM in the MM1_send.REQ. Additional qualifiers may be added.

Reporting: The ~~originating~~originator MMS User Agent may request a delivery report for the MM. In addition, the ~~originating~~originator MMS User Agent may request a read-reply report when the user has viewed the MM.

Identification: The originator MMS Relay shall always provide a message identification for an MM, which it has accepted for submission in the MM1_send.RES.

Content: The type of the multimedia content shall always be identified in the MM1_send.REQ.

Version: The MMS protocol shall provide unique means to identify the current version in the particular protocol environment

8.1.1.4 Information Elements

Information element	Presence	Description
Recipient address	Mandatory	The address of the recipient MMS User Agent. Multiple addresses are possible.
Content type	Mandatory	The content type of the ~~multimedia~~MM's content.
Sender address	Optional	The address of the ~~originating~~originator MMS User Agent.
Message class	Optional	The class of the MM (e.g., personal, advertisement, information service)
Date and time	Optional	The time and date of the sending of the MM.
Time of Expiry	Optional	The desired time of expiry for the MM.
Earliest delivery time	Optional	~~An indication of t~~The earliest desired time of delivery of the ~~message~~ MM to the recipient.
Delivery report	Optional	A request for delivery report.
Priority	Optional	The priority (importance) of the message.
Sender visibility	Optional	A request to show or hide the sender's identity when the message is delivered to the recipient.
Read reply	Optional	A request for read reply report.
Subject	Optional	The title of the whole multimedia message.

Table 2. Information elements in the MM1_send.REQ.

Information element	Presence	Description
Status	Mandatory	The status of the ~~message~~MM delivery request.
Message ID	Mandatory	The identification of the MM~~message ID of the message~~ given to an accepted ~~message~~MM.

Table 3. Information elements in the MM1_send.RES.

The order, possible values and encoding of the information elements will be dictated by the protocol environment.

8.1.2 Multimedia Message Notification

This part of the MMS service covers the notification about MM from the recipient MMS Relay to the corresponding recipient MMS User Agent and involving abstract messages are outlined in Table 4 from type, and direction points of view.

Abstract message	Type	Direction
MM1_notification.REQ	Request	MMS Relay -> MMS UA
MM1_notification.RES	Response	MMS UA -> MMS Relay

Table 4: abstract messages for notification of MM in MMS

8.1.2.1 Normal Operation

Upon receiving the MM1_notification.REQ, the recipient MMS User Agent shall respond with the MM1_notification.RES to the recipient MMS ~~r~~Relay to acknowledge the successful reception of the MM1_notification.REQ.

The MM1_notification.RES shall unambiguously refer to the corresponding MM1_notification.REQ.

8.1.2.2 Abnormal Operation

In this case the MMS UA shall respond with a MM1_notification.RES encapsulating a status which indicates the reason the notification could not be processed. If the MMS UA does not provide the MM1_notification.RES the MMS Relay should be able to retransmit the notification at a later state.

8.1.2.3 Features

Addressing: The originator address may be provided to recipient MMS User Agent in the MM1_notification.REQ.

Time constraints: The recipient MMS User Agent shall be provided a time of expiry of the MM.

~~m~~Message class, message size and subject: The ~~message~~ MM shall be qualified further by adding a message class and an approximate size to the MM in the MM1_notification.REQ. The ~~message~~ MM may be qualified further by adding a subject to the MM. Additional qualifiers may be added.

Reporting: The recipient MMS User Agent may indicate in the MM1_notification.RES that it would not wish a delivery report to be created.

Message Reference: The recipient MMS Relay shall always provide a reference, e.g., URI, for the MM in the MM1_notification.REQ.

Status: The recipient MMS User Agent may indicate in the MM1_notification.RES how it intends the MM to be handled, e.g. the immediate rejection of the MM, the immediate diversion of the MM to dynamically specified destination(s)*.

8.1.2.4 Information Elements

Information element	Presence	Description
Message class	Mandatory	The class of the MM (e.g., personal, advertisement, information service)
Message size	Mandatory	The approximate size of the MM
Time of expiry	Mandatory	The time of expiry for the MM.
Message Reference	Mandatory	a reference, e.g., URI, for the MM
Subject	Optional	The title of the whole ~~multimedia message~~MM.

Sender address	Optional	The address of the ~~originating~~originator MMS User Agent.

Table 5. Information elements in the MM1_notification.REQ.

Information element	Presence	Description
Status	Optional	The status of the ~~message~~ MM's retrieval
Report allowed**	Optional	The acceptance or denial of delivery report
Recipient address*	Optional	The address of the recipient. Multiple addresses are possible. The presence of the recipient address indicates that immediate diversion of the message is requested.

Table 6. Information elements in the MM1_notification.RES.

* Note: The feature for dynamic message diversion (similar to call deflection of speech calls) needs further elaboration with respect to its impact on charging, delivery report, read-reply and the forwarded message content etc.

** Note: The information element "Report allowed-" is in the MM1_notification.RES although there is no indication of whether or not a delivery report has been requested by the originator UA. This needs further elaboration.

~~should be used in case of the MM being rejected by the user without being retrieved.~~

8.1.3 Retrieval of Multimedia Message

This part of MMS service covers the retrieval of an MM. For retrieval purposes an MM shall always be retrieved by the recipient MMS User Agent from the recipient MMS Relay. Involved abstract messages are outlined in Table 7 from type and direction points of view.

Abstract messages	Type	Direction
MM1_retrieve.REQ	Request	MMS UA -> MMS Relay
MM1_retrieve.RES	Response	MMS Relay -> MMS UA
MM1_acknowledgement.REQ	Request~~spons~~ ~~e~~	MMS UA -> MMS Relay

Table 7: Abstract messages for retrieval of MM in MMS

8.1.3.1 Normal Operation

The recipient MMS User Agent shall issue an MM1_retrieve.REQ to the ~~corresponding~~ recipient MMS R~~r~~elay to initiate the retrieval process. The MMS relay shall respond with an MM1_retrieve.RES, which contains MMs control information and the MM content.

After receiving the MM1_retrieve.RES, the recipient MMS User Agent shall send an MM1_acknowledgement.REQ to the corresponding MMS Relay, if requested by the MMS Relay. The MM1_acknowledgement.REQ shall unambiguously refer to the corresponding MM1_retrieve.RES.

8.1.3.2 Abnormal Operation

If the recipient MMS R~~r~~elay can not process the MM1_retrieve.REQ, for example due to invalid content location or expiration of the message, the recipient MMS R~~r~~elay shall respond with either an MM1_retrieve.RES or a lower protocol layer error message encapsulating a status which indicates the reason to the MMS User Agent the multimedia message was not delivered.

If the MMS Relay does not provide the MM1_retrieve.RES or the lower protocol layer error message the MMS User Agent should be able to recover.

8.1.3.3 Features

Message Reference: The recipient MMS User Agent shall always provide a reference, e.g., URI, for the MM in the MM1_retrieve.REQ.

Addressing: The originator address may be provided to the recipient MMS User Agent in the ~~in the~~ addressing-relevant information field~~(s)~~ of MM1_retrieve.RES. One or several address(es) of the recipient MMS User Agent(s) may be provided to the recipient MMS User Agent in ~~in~~ the addressing-relevant information field(s) of the MM1_retrieve.RES.

Time stamping: The MM1_retrieve.RES shall carry the time and date of sending the MM.

Message class, priority and subject: Information about class, priority, subject of the MM shall be included in the MM1_retrieve.RES according to their presence and value received at the MMS Relay. Information about additional end-to-end qualifiers of the MM should be included in the MM1_retrieve.RES according to their presence and value received at the MMS Relay.

Reporting: If the originator requests to have a read-reply report, the recipient MMS Relay shall convey this information in the MM1_retrieve.RES. If the originator has requested~~s~~ to have a delivery report, the recipient MMS Relay may convey this information to the recipient MMS User Agent in the MM1_retrieve.RES. If a request for a delivery report is included in the MM1_retrieve.RES the recipient MMS User Agent shall convey the information whether it accepts or denies the sending of a delivery report to the originator in MM1_acknowledgement.REQ. If a delivery report is not requested, it is up to the recipient MMS User Agent to include this information in MM1_acknowledgement.REQ or not.

Identification: The MMS R~~r~~elay shall provide a message identification for a message, which it has accepted for delivery in the MM1_retrieve.RES.

Content: The type of the ~~multimedia~~ MM's content shall always be identified in the MM1_retrieve.RES.

Version: The MMS protocol shall provide unique means to identify the current version in the particular protocol environment

8.1.3.4 Information Elements

Information element	Presence	Description
Message Reference	Mandatory	Location of the content of the MM to be retrieved.

Table 8. Information elements in the MM1_retrieve.REQ .

Information element	Presence	Description
Message ID	Optional	The message ID of the MM.
Sender address	Optional	The address of the originator of MM.
Content type	Mandatory	The content type of the ~~multimedia~~ MM's content.
Recipient address	Optional	The address of the recipient MMS User Agent. Multiple addresses are possible.

		addresses are possible.
Message class	Optional	The class of the message (e.g., personal, advertisement, information service)
Date and time	Mandatory	The time and date of the sending of the MM
Delivery report	Optional	A request for delivery report.
Priority	Optional	The priority (importance) of the message.
Read reply	Optional	A request for read-reply report.
Subject	Optional	The title of the whole multimedia message.

Table 9. Information elements in the MM1_retrieve.RES .

Information element	Presence	Description
Report allowed	Optional	Acceptance or denial of delivery report to the originator MMS User Agent

Table 10. Information elements in the MM1_acknowledgement.REQ .

8.1.4 Delivery Report

This part of MMS service covers the sending of delivery report from originator MMS Relay to the originator MMS User Agent. The involved abstract message is outlined in Table 11 from type and direction points of view.

Abstract Message	Type	Direction
MM1_delivery_report.REQ	Request	MMS Relay -> MMS UA

Table 11: abstract message for sending delivery reports in MMS

8.1.4.1 Normal Operation

The originator MMS Relay shall (subject to user, MMS service provider and/or operator preferences) create the MM1_delivery_report.REQ and send it to the originator MMS User Agent when the appropriate information for the creation of a delivery report is available. Support for MM1_delivery_report.REQ is optional for the MMS UA but mandatory for the MMS Relay.

8.1.4.2 Abnormal Condition

The MMS protocol framework does not provide mechanisms to cover and handle the unsuccessful delivery of MM1_delivery_report.REQ. The underlying protocols shall provide reliable transport of MM1_delivery_report.REQ ~~message~~.

8.1.4.3 Features

Identification: In the MM1_delivery_report.REQ the MMS Relay shall always provide the original message identification of the MM that the delivery report corresponds to.

Addressing: The recipient MMS User Agent address shall be provided to the originator MMS User Agent in the addressing-relevant information field~~(s)~~ of MM1_delivery_report.REQ.

Time stamping: The MM1_delivery_report.REQ shall carry the time and date of handling of the MM (e.g. retrieval, expiry, rejection).

Status: The MM1_delivery_report.REQ shall carry the status of the MM delivery, e.g. retrieved, rejected, expired or indeterminate.

Note: The status value "indeterminate" is not yet covered in the current WAP specifications.

8.1.4.4 Information Elements

Information element	Presence	Description
Message ID	Mandatory	The ~~message ID~~ identification of the original MM.
Recipient address	Mandatory	The address of the recipient MMS User Agent of the original MM.
Event Date	Mandatory	Date and time the MM was handled (retrieved, expired, rejected, etc.)
Status	Mandatory	Status of the MM, e.g. retrieved, expired, rejected

Table 12. Information elements in the MM1_delivery_report.REQ.

8.1.5 Read-Reply Report

Note: Cross-checking is needed whether or not the following definitions are compatible with version 1 of the WAP specifications of MMS.

This part of MMS service covers the sending of read report from the receiving MMS User Agent to the recipient MMS Relay and the sending of read report from the originator MMS Relay to the originator MMS User Agent. The involved abstract messages are outlined in Table 11 from type and direction points of view.

Abstract messages	Type	Direction
MM1_read_reply.REQ	Request	MMS UA -> MMS Relay
MM1_read_reply_propagated.REQ	Request	MMS Relay -> MMS UA

Table 13: Abstract messages for sending and receiving read-reply report in MMS

8.1.5.1 Normal Operation

If a read-reply report is requested for an MM and the recipient MMS User Agent allows the sending of a read-reply report, the recipient MMS User Agent may create the MM1_read_reply.REQ and send it to the recipient MMS Relay.

The originator MMS Relay shall (subject to user, MMS service provider and/or operator preferences) create the MM1_read_reply_propagated.REQ and send it to the originator MMS User Agent when the appropriate information for the creation of a read-reply report is available.

Support for MM1_read_reply.REQ and MM1_read_reply_propagated.REQ is optional for the MMS User Agent but mandatory for the MMS Relay.

8.1.5.2 Abnormal Operation

The MMS protocol framework does not provide mechanisms to cover and handle the unsuccessful delivery of MM1_read_reply.REQ and MM1_read_reply_propagated.REQ .

8.1.5.3 Features

Identification: In the MM1_read_reply.REQ the recipient MMS User Agent shall provide the original message identification of the MM that the read-reply report corresponds to. In the MM1_read_reply_propagated.REQ the originator MMS Relay shall provide the original message identification of the MM that the read-reply report corresponds to.

Addressing: Both the recipient and originator MMS User Agent addresses shall be provided in the addressing-relevant information field(s) of both, MM1_read_reply.REQ and MM1_read_reply_propagated.REQ.

Time stamping: The MM1_read_reply.REQ may carry the time and date of user handling the MM depending on the status of the MM. The MM1_read_reply_propagated.REQ shall carry the time-stamp from the corresponding MM1_read_reply.REQ if available. If this time-stamp is not available the MM1_read_reply_propagated.REQ shall carry the time-stamp set by the recipient MMS Relay.

Status: Both the MM1_read_reply.REQ and MM1_read_reply_propagated.REQ shall carry the status of the MM retrieval, e.g. read or without being read.

8.1.5.4 Information Elements

Information element	Presence	Description
Recipient address	Mandatory	The address of the recipient MMS User Agent of the original MM.
Originator address	Mandatory	The address of the originator MMS User Agent of the original MM.
Message-ID	Mandatory	The message ID of the original MM.
Event Date	Optional	Date and time the MM was handled (read, deleted without being read, etc.)
Status	Mandatory	Status of the MM, e.g. Read, Deleted without being read

Table 14. Information elements in the MM1_read_reply.REQ.

Information element	Presence	Description
Recipient address	Mandatory	The address of the recipient MMS User Agent of the original MM.
Originator address	Mandatory	The address of the originator MMS User Agent of the original MM.
Message-ID	Mandatory	The message ID of the original MM.
Event Date	Mandatory	Date and time the MM was handled (read, deleted without being read, etc.)
Status	Mandatory	Status of the MM, e.g. Read, Deleted without being read

Table 15. Information elements in the MM1_read_reply_propagated.REQ.

8.2 Technical realization of MMS on reference point MM2

t.b.d.

8.3 Technical realization of MMS on reference point MM3

t.b.d.

8.4 Technical realization of MMS on reference point MM4

NOTE: The following three sections 7.4.1, 7.4.2 and 7.4.3 reflect the very basic functionality of MM4 only. Other functionality such as discovery of a peer MMSE etc. might need further elaboration. The working assumption is that at least different abstract messages are to be defined for the cases were

- an MM is forwarded to a peer MMSE
- a delivery report is forwarded to a peer MMSE
- a read-reply report is forwarded to a peer MMSE.

8.4.1 Forwarding of Multimedia Message

This part of MMS service covers the forwarding of an MM from an originator MMS Relay to a recipient MMS Relay of different MMSEs. Involved abstract messages are outlined in Table 14 from type and direction points of view.

Abstract messages	Type	Direction
MM4_forward.REQ	Request	Originator MMS Relay -> recipient MMS Relay
MM4_forward.RES	Response	Recipient MMS Relay -> originator MMS Relay

Table 16: Abstract messages for forwarding of MM in MMS

8.4.1.1 Normal operation

After successful discovery of its peer entity the ~~originating~~originator MMS Relay shall forward a MM to the recipient MMS Relay using the MM4_forward.REQ, which contains MMS control information and the MM content. The recipient MMS Relay shall respond with a MM4_forward.RES, which provides the status of the request if an MM4_forward.RES was requested. The MM4_forward.RES shall unambiguously refer to the corresponding MM4_forward.REQ. Support for MM4_forward.REQ and MM4_forward.RES is mandatory for the MMS Relay.

8.4.1.2 Abnormal Operation

In this case the recipient MMS relay shall respond with a MM4_forward.RES encapsulating a status which indicates the reason the multimedia message was not accepted, e.g. no subscription if an MM4_forward.RES was requested.

8.4.1.3 Features

Addressing: The recipient(s) of a forwarded MM shall be indicated in the addressing-relevant information field(s) of the MM4_forward.REQ. If the addresses of several recipients of the MM are associated with a single MMSE then more than one recipient may be indicated in the addressing-relevant information field(s) of the

MM4_forward.REQ. Addresses of all recipients of the MM (including those that are not associated with the MMSE the MM is forwarded to) shall be conveyed in the MM4_forward.REQ for the recipient's informational purposes.

The originator of a forwarded MM shall be indicated in addressing-relevant information field(s) of the MM4_forward.REQ. If the ~~originating~~originator MMS User Agent requested to hide its identity from the recipient then the information about this request shall also be conveyed in the MM4_forward.REQ.

Time stamping: The MM4_forward.REQ shall carry the time-stamp associated with the MM.

Time constraints: If the originator MMS User Agent requested a time of expiry for the MM then this information shall be conveyed in the MM4_forward.REQ.

Message class, priority and subject: If the MM is qualified further by message class, priority, subject and/or additional qualifiers then this information shall be conveyed in the MM4_forward.REQ.

Reporting: If the originator MMS User Agent requested a delivery report for the MM then the information about this request shall be conveyed in the MM4_forward.REQ. If, in addition, the originator MMS User Agent requested a read-reply report then the information about this request shall be conveyed in the MM4_forward.REQ.

Identification: The originator MMS Relay shall always provide a message identification for an MM, which it forwards to a peer MMS Relay in the MM4_forward.REQ.

Content: The type of the multimedia content shall always be identified in the MM4_forward.REQ.

Version: The MMS protocol shall provide unique means to identify the current version in the particular protocol environment.

NOTE: Whether there is a need for additional (e.g. charging) information needs further elaboration.

NOTE: Whether there is a need for additional information due to the "MM diversion" needs further elaboration.

8.4.1.4 Information Elements

Information element	Presence	Description
Message ID	Mandatory	The ~~message ID~~ identification of the MM.
Recipient(s) address	Mandatory	The address(es) of the recipient(s) MMS User Agent. Multiple addresses are possible.
Sender address	Mandatory	The address of the ~~originating~~originator MMS User Agent.
Content type	Mandatory	The content type of the ~~multimedia~~ MM's content.
Message class	Conditional	The class of the MM (e.g., personal, advertisement, information service)
Date and time	Mandatory	The time and date of the sending.
Time of Expiry	Conditional	The desired time of expiry for the MM.
Delivery report	Conditional	A request for delivery report.
Priority	Conditional	The priority (importance) of the message.
Sender visibility	Conditional	A request to show or hide the sender's identity when the message is delivered to the recipient.
Read reply	Conditional	A request for read reply report.
Subject	Conditional	The title of the whole ~~multimedia message~~MM.

Request for ack/nack	optional	Request for MM4_forward.RES

Table 17. Information elements in the MM4_forward.REQ.

Information element	Presence	Description
Status	Mandatory	The status of the message delivery request.

Table 18. Information elements in the MM4_forward.RES.

NOTE: The following questions need further elaboration:

Do we assume SMTP to be the only implementation for the MM4 Reference point ?
To what level of detail do we need to define the message format for MM4 inter relay service level definition with special regard to different implementations.
Who is going to define it ? Should we use RFC822 – should we refer to the textual message format (which would include all MIME encoding formats). WAP has specified specific WSP binary encoding mechanisms for multipart.

8.4.2 Forwarding of a Delivery Report

t.b.d.

8.4.3 Forwarding of a Read-Reply Report

t.b.d.

8.5 Technical realization of MMS on reference point MM5

t.b.d.

8.6 Technical realization of MMS on reference point MM6

t.b.d.

~~7 WAP Implementation of MMS~~

~~WAP provides significant support for MMS, both in direct service specification and in the underlying technologies. While the WAP MMS service specification work is new and is therefore unavailable for direct reference, its basic approach and limitations are based on WAP documents describing MMS architecture and message encapsulation. This should be done based on the underlying WAP technologies that have been published, and can therefore be referenced.~~

~~7.1 WAP Protocol Framework~~

~~In reference to subclause 4.3, the protocol framework applied to WAP implementation of MMS is provided in figure 6.~~

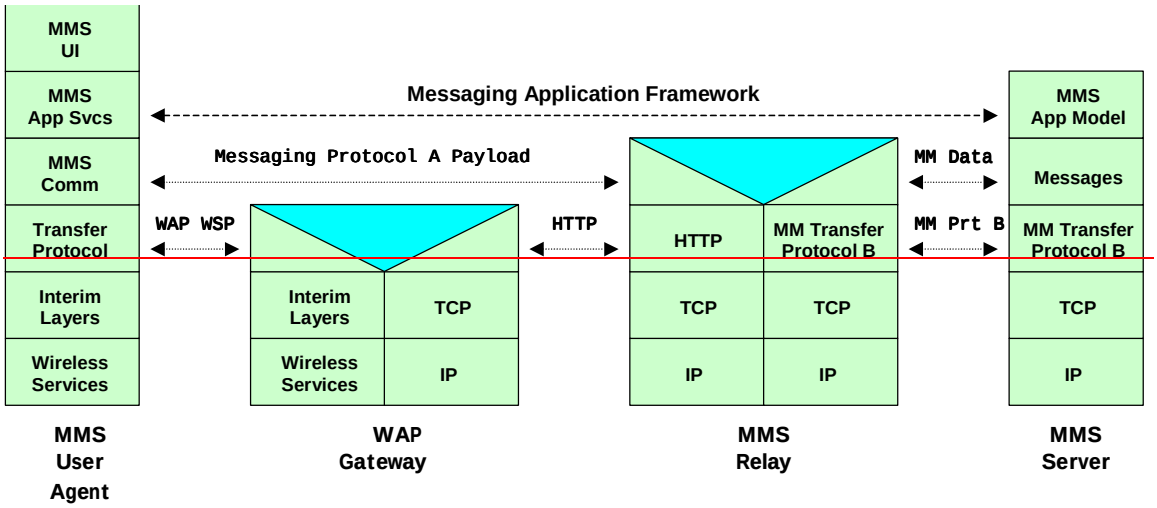

Figure 6: Protocol Framework applied to WAP implementation of MMS

7.2 WAP Architectural Support for MMS

WAP support for MMS is based upon the services of its supporting technology. Therefore, the scope of WAP, as it addresses MMS, is as shown in figure 7. It does not cover activities or network elements beyond those shown and no such dependencies or expectations should be inferred or implied.

Figure 7 shows an MMS Relay which in the WAP architecture's terminology is referred to as an MMS Server. The WAP architecture also refers to the MMS User Agent as an MM Client. These cover equivalent functionalities.

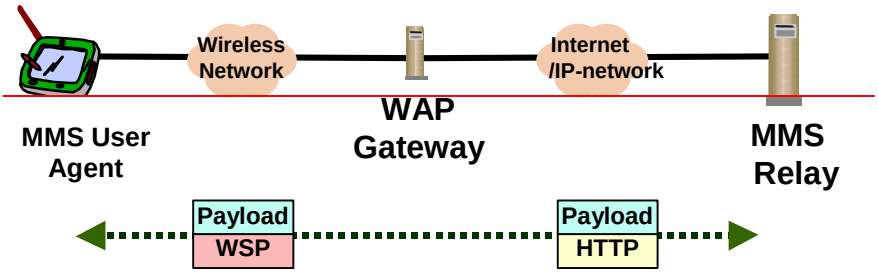

Figure 7: Scope of WAP Support for MMS

Figure 7 shows two links. The first, between the wireless MMS User Agent and the WAP Gateway, is where the "WAP Stack" is used to provide a common set of services over a variety of wireless bearers. For application oriented services, like MMS, the interest is primarily in services offered by WAP Session Protocol (WSP) [23].

The second link connects the WAP Gateway and the MMS Relay. In the WAP architecture the MMS Relay is considered an Origin Server. These entities are connected over an IP network such as the Internet or a local Intranet. HTTP is used for data transfer and data can be originated from either entity.

End-to-end connectivity, for the MMS application, between the wireless MMS User Agent and the MMS Relay is accomplished by sending data over WSP and HTTP. This is accomplished using the WSP/HTTP POST method for data originating at the wireless MMS User Agent and by using the WAP Push Access Protocol [24] in the other direction.

The WAP Gateway, which enables the needed interworking, should not modify the data transfer via these transactions.

The WAP view of MMS is constrained to the interactions between the MMS User Agent and the MMS Relay. It makes no representations as to services that are provided to or required of any other network elements.

7.3 WAP Transaction Flows Supporting MMS

NOTE: The WAP MMS work is ongoing and the descriptions in this section are based upon preliminary material that is expected to remain stable.

The WAP MMS work describes the end-to-end transactions that occur between the MMS User Agent and the MMS Relay. These transactions accomplish the following services:

- MMS User Agent originates a Multimedia Message (MM).
- MMS Relay notification to an MMS User Agent about an available MM.
- MMS User Agent retrieving an MM.
- MMS User Agent support for retrieval acknowledgement to MMS Relay.
- MMS Relay sending delivery report to MMS User Agent.

Figure 8 shows an example transaction flow illustrating a message origination, delivery and delivery report.

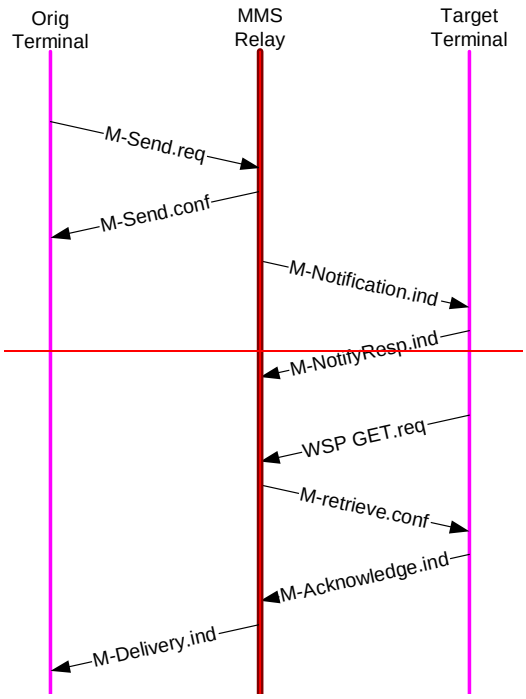

Figure 8: Example MMS Transactional Flow in WAP

The transactions utilise a variety of transport schemes. For example, the MMS User Agent originates an MM by sending a M-Send.req to the MMS Relay by use of a WSP/HTTP POST method. This operation transmits the required data from the MMS User Agent to the MMS Relay as well as provides a transactional context for the resulting M-Send.conf response.

The MMS Relay uses WAP PUSH technology to send the M-Notification.ind to the MMS User Agent. This is how the MMS User Agent is informed of MMs available for retrieval. Included, as a data component, is the URI of the MM that the MMS User Agent is to use for the retrieval.

The retrieval activity is performed by the MMS User Agent using the WSP/HTTP GET method on the URI provided. The fetch of the URI returns the M-retrieve.conf which contains the actual MM to be presented to the user.

The MMS Relay may request information that would permit to know that the MM was actually received by the MMS User Agent. One approach would be for a distinct M-Acknowledge.ind to be passed from the MMS User Agent to the MMS Relay.

The MMS Relay is responsible for supporting an optional delivery report back to the originating MMS User Agent. Based upon possible delivery outcomes, the MMS Relay would again utilise WAP PUSH technology to inform the MMS User Agent with the M_Delivery.ind message.

7.4 Terminal Capability Negotiation

WAP provides a mechanism to inform an origin server, such as the MMS Relay, of the capabilities of the MMS User Agent. This is known as User Agent Profile (UAProf) [25]. It provides information about the characteristics of the display (e.g. size, color support, bit depth), supported content types and network limitations (e.g. max message size).

The UAProf data is encoded in an RDF [26] data description language. It is conveyed, possibly indirectly, when the MMS User Agent performs a WSP/HTTP operation, such as a GET, to an origin server. It is up to the origin server to decode the RDF data, extracting any needed device characteristics, to guide the content generation or filtering operation it performs before returning data to the MMS User Agent.

For MMS, the MMS Relay should be able to utilise the capability information to make adjustments to the delivered MM contents. For example, an MMS Relay may delete a message component if the content type was not supported by the terminal. Alternatively, the MMS Relay may adapt an unsupported content type to adjust the size, color depth or encoding format. WAP makes no requirements to the handling of this data or of any notifications that may be made to the user concerning such adjustments.

7.5 MMS Message Contents

The WAP work on MMS is defining a message encapsulation scheme to convey the data between the MMS User Agent and the MMS Relay.

7.5.1 Multimedia Messages

The MIME multipart technique is standard Internet technique to combine the email body and the attachments together. The WAP has a binary equivalent to this, referenced in [23] which can be used to combine multimedia objects in the multimedia messages together. This approach shall be used for messages between the MMS Relay and MMS User Agent which also include MM components. This includes the message send and retrieve.

The use of the WAP binary multipart structure allows easy conversion between binary format and the Internet MIME multipart. In addition, the binary format allows efficient handling of the message especially in cases when some multimedia objects must be taken out of the structure.

A special, application specific part should contain the MMS header information. This header information is used to provide the message type information as well as message specific information. The proposed content type for this part is application/mmsheader and until registration within IANA, the interim content type shall be application/x-mmsheader.

7.5.2 Other Messages

Other MMS transactional messages utilise additional PDUs for multimedia message notification, acknowledgements and delivery reports. These messages are conveyed with messages that just utilise a content type proposed to be application/mmsheader. Until registration within IANA, the interim content type shall be application/x-mmsheader.

7.6 MMS Presentation

The rendering of an MM for a user is the ultimate objective of the MMS. This rendering operation is known as presentation. Various types of data may be used to drive the presentation. For example, the MM presentation may be based on a WML deck [27] or Synchronised Multimedia Integration Language (SMIL) [28] which includes links to other component elements in the multipart message. Other presentation models may include a simple text body with image attachments. WAP has not specified any specific requirements on MMS presentations. UAProf [25] content negotiation methods should be used for presentation method selection.

NOTE: In the future, it will be desirable to consider mobile optimised presentation technologies. For example, WAP Forum and W3C have initiated work on a mobile optimised version of SMIL that would be suitable for use in an MMS environment.

7.7 MMS Security Model between MMS User Agent and MMS Relay

No MMS-specific requirements are in place within the WAP Forum to support security mechanisms in the transactions between the MMS Relay and MMS User Agent. Existing schemes such as WTLS [29] and WIM [30] are available and other end-to-end techniques are under development.

Annex A (Informative): Examples of MMS architectural implementations

A.1 Introduction

This informative annex is intended to provide architectural examples based on the general architecture as outlined in clause 4 to show implementations for different business models. The focus is upon the various MMS Relay - MMS Server scenarios, whereas the MMS Relay - MMS User Agent interface is assumed to be as stated in subclause 6.2. Each of the following subsubclauses provides only one possible scenario, however a combination could be feasible. Please note that each functional element should be understood as a logical entity and may be combined due to implementation reasons.

A.2 Example of combined MMS-Relay/MMS-Server

This scenario shows the case where the two logical entities, MMS Relay and MMS Server, are combined into a single physical entity.

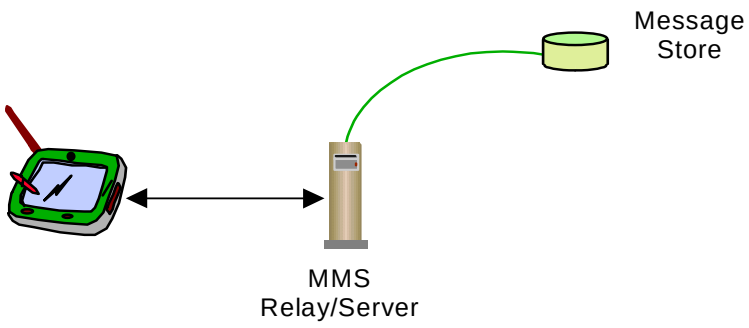

Figure 9: Example of combined MMS-Relay/Server

A.3 Example of non-combined MMS-Relay and MMS-Server

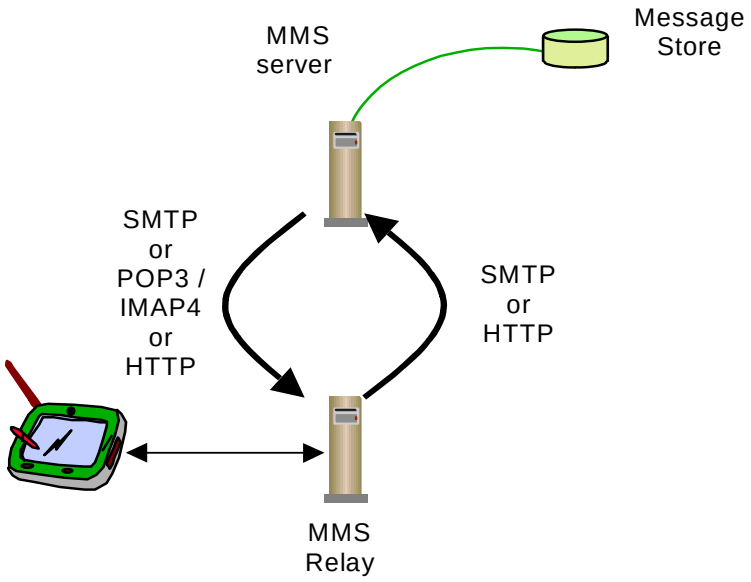

Figure 10: Example of non-combined MMS-Relay and MMS-Server

For the transfer of MMs between an MMS-Relay and an MMS-Server the use of SMTP and POP3[34]/IMAP4[35] or HTTP as illustrated in Figure 10 is identified as appropriate.

If the protocol is SMTP for up- and download of MMs to the server, then it is identical to the one used between different MMS-Relays as specified in the subclause 6.6.

A.4 Example of MMS interaction with T.30 Facsimile Services

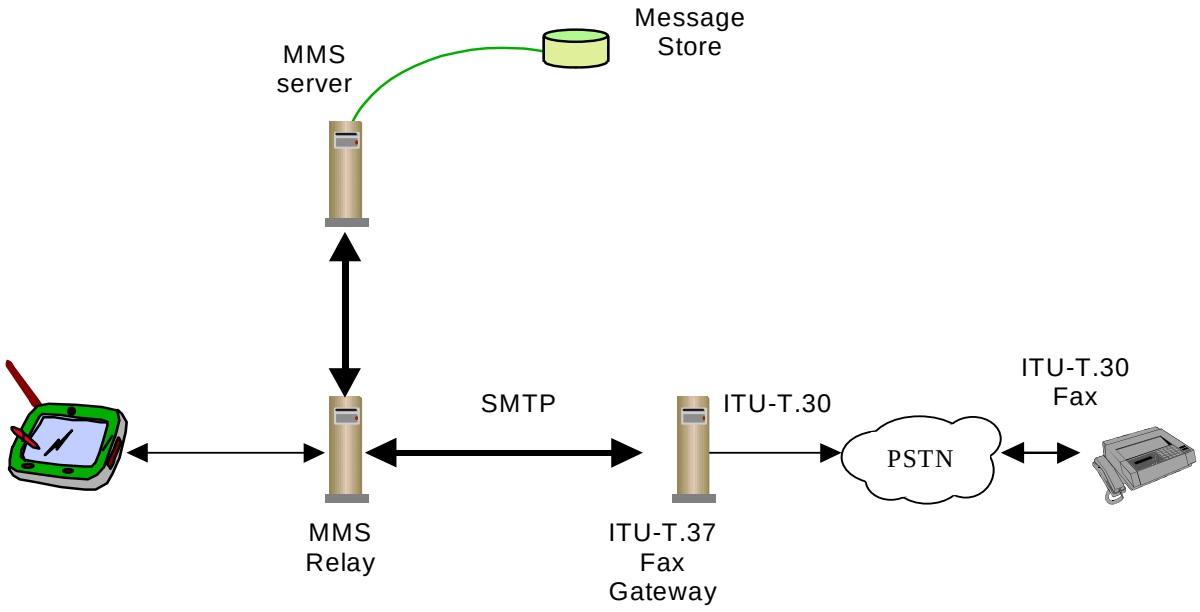

Figure 11: Example of MMS interaction with Facsimile Services based on ITU-T.37

For the transfer of facsimile data via store-and-forward mechanisms ITU-T.37 [31] procedures have been standardised. These are identified as appropriate in the MMS environment for the interworking with T.30 [32] facsimile services. What the relevant MMSE parts are supposed to look like for a T.37 approach is depicted in figure 11. The MMS Relay interfaces with a T.37 Fax Gateway. For the Gateway's communication with the MMS Relay the appropriate protocol is SMTP. I.e., the protocol to be used on the interface between MMS-Relay and the Fax GW is identical to the one used between different MMS-Relays as specified in subclause 6.6.

NOTE: The MMS Relay – MMS Server interface is not in the scope of this subclause but described in A.3.

Towards the PSTN the Fax-GW terminates the T.30 facsimile protocol. Mobile terminated fax data will be converted into TIFF[36] image format and forwarded to the MMS Relay as an attachment in an IETF internet email. In case of mobile originated fax messages the Fax-GW receives a written email provided with the receiver's fax number from the MMS Relay. Depending on the functions of the Fax-GW this email may contain plain text only or additional attachments, too. Although T.37 requires only TIFF format support there are Fax-GWs out on the market that permit many different formats to be included.

A.5 Example of MMS interaction with 2G/3G Voice Mailboxes

MMS interaction with voice mailbox systems should be performed on a non-realtime basis. Figure 12 illustrates an example architecture for the incorporation of voice mailboxes.

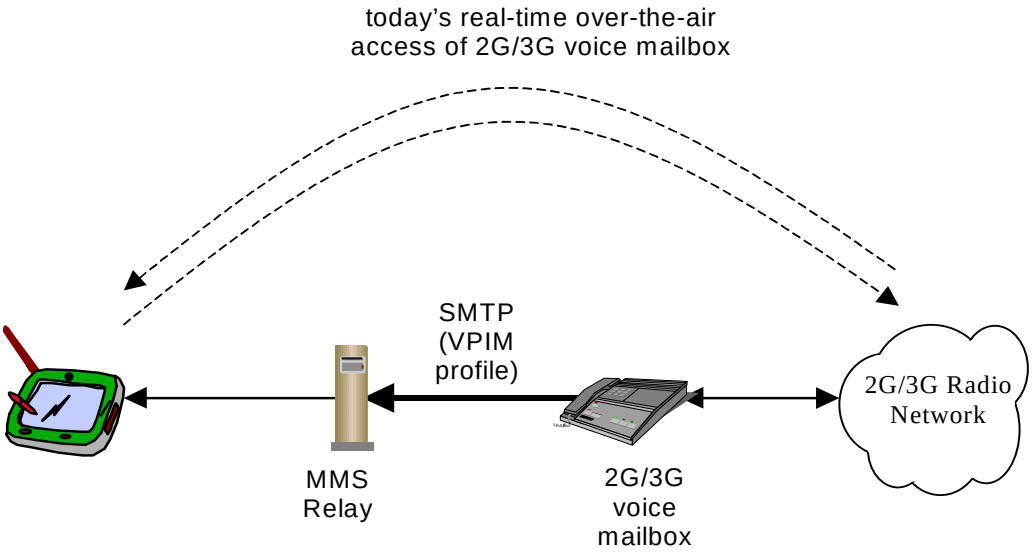

Figure 12: First Example of MMS interaction with 2G/3G Voice Mailbox based on VPIM

The Voice Profile for Internet Mail Version 2, VPIMv2, provides format extensions for MIME supporting the transmission of voice messages over standard Internet E-Mail systems. The VPIM concept was developed by the Electronic Messaging Association (EMA). After VPIMv2 had been reviewed by the IETF it became RFC 2421 [33].

The VPIM specification allows voice records to be MIME encapsulated and sent as Internet mail attachments via SMTP or retrieved as Internet mail attachments via POP3 [34] or IMAP4[35]. The MIME type used for voice messages is "audio/*".

For the interaction of MMS with voice mailboxes, either the voice mailbox forwards received voice records as VPIM messages via SMTP to the MMS relay. This implies that voice messages' download is always done via the MMS service. In this case the protocol to be used on the interface between MMS-Relay and the voice mailbox is SMTP and thus identical to the one used between different MMS-Relays as specified in subclause 6.6.

Alternatively, the MMS Relay may poll the voice mailbox via POP3 or IMAP4 for new messages received. Messages the user wants to retrieve via the MMS service can then be downloaded via POP3/IMAP4 from the voice mailbox to the MMS Relay from where they are delivered to the MMS User Agent. This enables the user to do both, retrieve voice messages via today's realtime voice mail services or as an MM. In any case it is expected that the voice mailbox is still the owner of the message and as a consequence responsible for the storage.

As an alternative the MMS interworking with a 2G/3G Voice Mailbox System could be envisaged via an HTTP interface as depicted in figure 13.

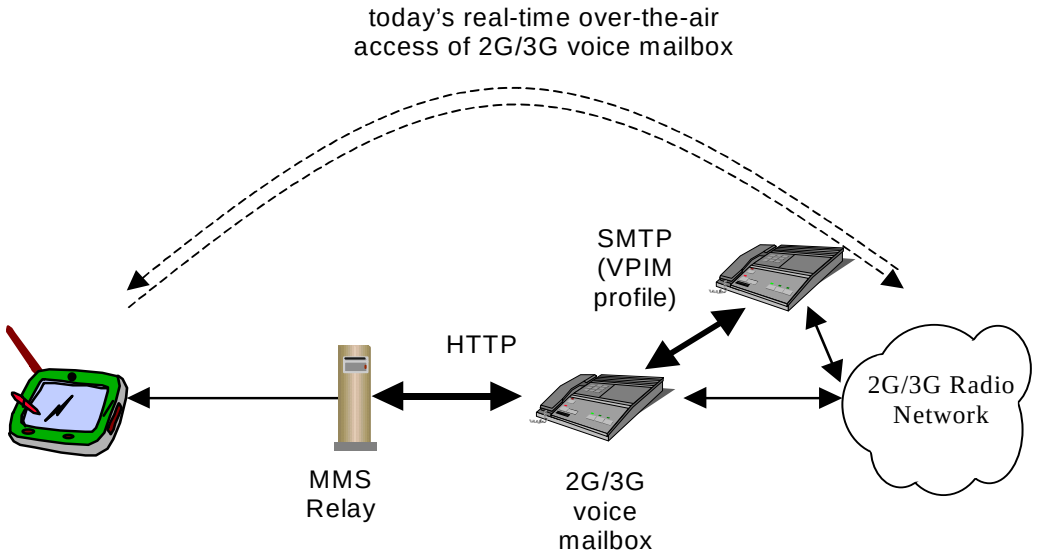

Figure 13: Second example of MMS interaction with 2G/3G Voice Mailbox based on HTTP

A.6 Example of interaction with Internet E-Mail Messaging

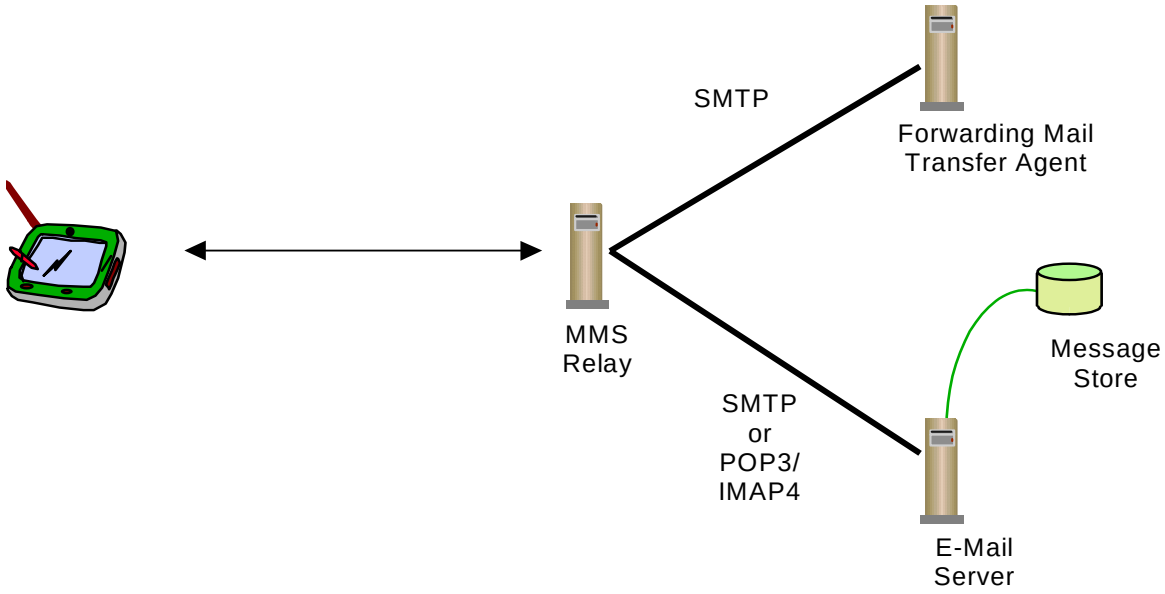

Figure 14: Example of interaction with Internet E-Mail messaging

In this architecture the server will be an E-Mail server providing post office services which are accessible e.g. via POP3 [34] or IMAP[35] for Internet E-Mail retrieval in the MMSE or are accessible to the Relay using SMTP. The MMS Relay will sent MMs that are to be transmitted as Internet E-Mail via SMTP.

In the case of retrieval and sending of MMs from and to the Internet Email service is done via SMTP, the protocol to be used on the interface between MMS-Relay and the Mail Transfer Agent, MTA/Email Server is identical to the one used between different MMS-Relays as specified in subclause 6.6.

A.7 Example of interaction with Short Message Service, SMS

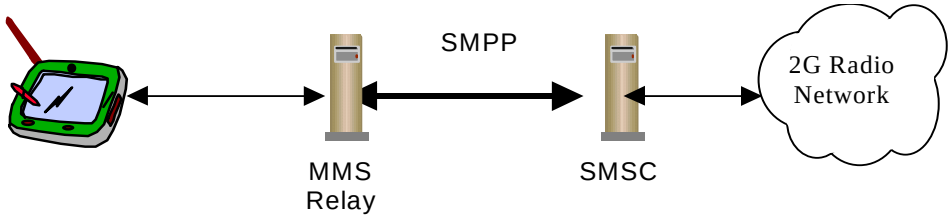

Figure 15: Example of MMS interaction with SMS based on SMPP

In the light of the WAP standardisation the SMPP Developer's Forum has defined a common standard for sending and receiving Short Messages via an SMSC, the Short Message Peer-to-Peer Protocol, SMPP [37].

Depending on the SMSC manufacturer the MMS Relay either can be directly connected to the SMSC (as shown in figure 15) or an additional SMS-Gateway has to be added. In the latter case the SMS-GW has to be located between the MMS Relay and the SMSC and provides the mapping of SMPP to the manufacturer's proprietary SMSC access protocol.

Annex B (Informative):

This annex contains examples of protocols which support MMS at the interface between the MMS Relay and the UA

B1 WAP Implementation of MMS

This informative annex shows how MMS will be implemented using the WAP MMS specifications suite. The WAP Forum has created MMS specifications in response to a request from 3GPP to include MMS as part of WAP. At the time of writing, the WAP MMS specifications are still under development in the WAP forum.

It is not expected that implementations of MMS based upon WAP will be realised until the WAP MMS specifications are approved and published by the WAP forum.

WAP provides significant support for MMS, both in direct service specification and in the underlying technologies. While the WAP MMS service specification work is new and is therefore unavailable for direct reference, its basic approach and limitations are based on WAP documents describing MMS architecture and message encapsulation. This should be done based on the underlying WAP technologies that have been published, and can therefore be referenced.

B1.1 Protocol Framework

In reference to subclause 4.3, the protocol framework applied to WAP implementation of MMS is provided in figure 1.

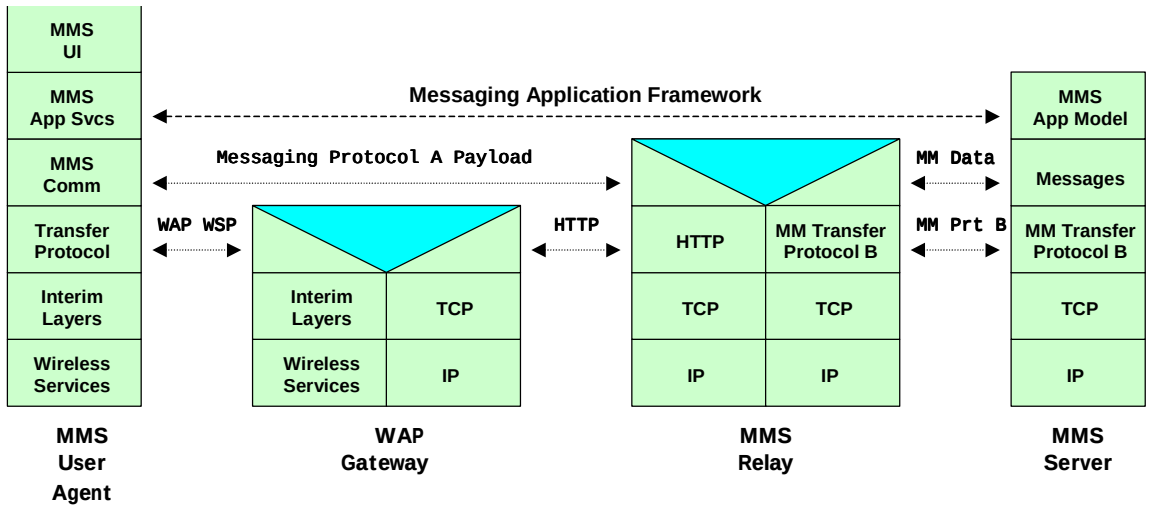

Figure 1: Protocol Framework applied to WAP implementation of MMS

B1.2 Architectural Support for MMS

WAP support for MMS is based upon the services of its supporting technology. Therefore, the scope of WAP, as it addresses MMS, is as shown in figure 2. It does not cover activities or network elements beyond those shown and no such dependencies or expectations should be inferred or implied.

Figure 2 shows an MMS Relay which in the WAP architecture's terminology is referred to as an MMS Server. The WAP architecture also refers to the MMS User Agent as an MM Client. These cover equivalent functionalities.

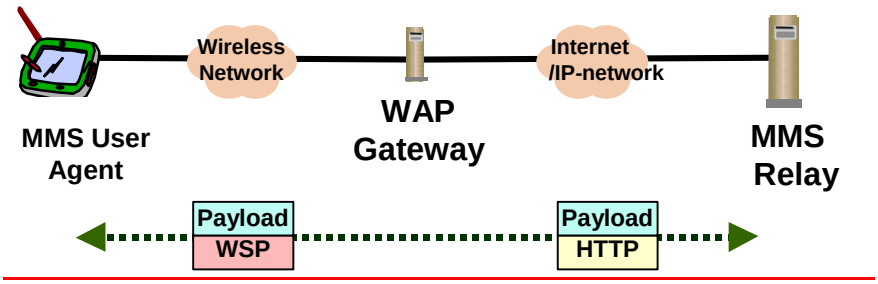

Figure 2: Scope of WAP Support for MMS

Figure 2 shows two links. The first, between the wireless MMS User Agent and the WAP Gateway, is where the "WAP Stack" is used to provide a common set of services over a variety of wireless bearers. For application oriented services, like MMS, the interest is primarily in services offered by WAP Session Protocol (WSP) [23].

The second link connects the WAP Gateway and the MMS Relay. In the WAP architecture the MMS Relay is considered an Origin Server. These entities are connected over an IP network such as the Internet or a local Intranet. HTTP is used for data transfer and data can be originated from either entity.

End-to-end connectivity, for the MMS application, between the wireless MMS User Agent and the MMS Relay is accomplished by sending data over WSP and HTTP. This is accomplished using the WSP/HTTP POST method for data originating at the wireless MMS User Agent and by using the WAP Push Access Protocol [24] in the other direction.

The WAP Gateway, which enables the needed interworking, should not modify the data transfer via these transactions.

The WAP view of MMS is constrained to the interactions between the MMS User Agent and the MMS Relay. It makes no representations as to services that are provided to or required of any other network elements.

B1.3 Transaction Flows Supporting MMS

NOTE: The WAP MMS work is ongoing and the descriptions in this section are based upon preliminary material that is expected to remain stable.

The WAP MMS work describes the end-to-end transactions that occur between the MMS User Agent and the MMS Relay. These transactions accomplish the following services:

- MMS User Agent originates a Multimedia Message (MM).
- MMS Relay notification to an MMS User Agent about an available MM.
- MMS User Agent retrieving an MM.
- MMS User Agent support for retrieval acknowledgement to MMS Relay.
- MMS Relay sending delivery report to MMS User Agent.

Figure 3 shows an example transaction flow illustrating a message origination, delivery and delivery report.

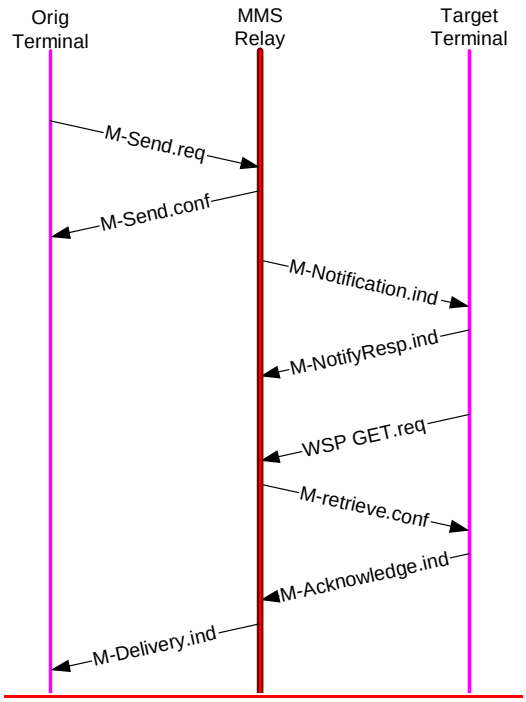

Figure 3: Example MMS Transactional Flow in WAP

The transactions utilise a variety of transport schemes. For example, the MMS User Agent originates an MM by sending a M-Send.req to the MMS Relay by use of a WSP/HTTP POST method. This operation transmits the required data from the MMS User Agent to the MMS Relay as well as provides a transactional context for the resulting M-Send.conf response.

The MMS Relay uses WAP PUSH technology to send the M-Notification.ind to the MMS User Agent. This is how the MMS User Agent is informed of MMs available for retrieval. Included, as a data component, is the URI of the MM that the MMS User Agent is to use for the retrieval.

The retrieval activity is performed by the MMS User Agent using the WSP/HTTP GET method on the URI provided. The fetch of the URI returns the M-retrieve.conf which contains the actual MM to be presented to the user.

The MMS Relay may request information that would permit to know that the MM was actually received by the MMS User Agent. One approach would be for a distinct M-Acknowledge.ind to be passed from the MMS User Agent to the MMS Relay.

The MMS Relay is responsible for supporting an optional delivery report back to the ~~originating~~originator MMS User Agent. Based upon possible delivery outcomes, the MMS Relay would again utilise WAP PUSH technology to inform the MMS User Agent with the M-Delivery.ind message.

B1.4 Terminal Capability Negotiation

WAP provides a mechanism to inform an origin server, such as the MMS Relay, of the capabilities of the MMS User Agent. This is known as User Agent Profile (UAProf) [25]. It provides information about the characteristics of the display (e.g. size, color support, bit depth), supported content types and network limitations (e.g. max message size).

The UAProf data is encoded in an RDF [26] data description language. It is conveyed, possibly indirectly, when the MMS User Agent performs a WSP/HTTP operation, such as a GET, to an origin server. It is up to the origin server to decode the RDF data, extracting any needed device characteristics, to guide the content generation or filtering operation it performs before returning data to the MMS User Agent.

For MMS, the MMS Relay should be able to utilise the capability information to make adjustments to the delivered MM contents. For example, an MMS Relay may delete a message component if the content type was not supported by the terminal. Alternatively, the MMS Relay may adapt an unsupported content type to adjust the size, color depth or encoding format. WAP makes no requirements to the handling of this data or of any notifications that may be made to the user concerning such adjustments.

B1.5 MMS Message Contents

The WAP work on MMS is defining a message encapsulation scheme to convey the data between the MMS User Agent and the MMS Relay.

B1.5.1 Multimedia Messages

The MIME multipart technique is standard Internet technique to combine the email body and the attachments together. The WAP has a binary equivalent to this, referenced in [23] which can be used to combine multimedia objects in the multimedia messages together. This approach shall be used for messages between the MMS Relay and MMS User Agent which also include MM components. This includes the message send and retrieve.

The use of the WAP binary multipart structure allows easy conversion between binary format and the Internet MIME multipart. In addition, the binary format allows efficient handling of the message especially in cases when some multimedia objects must be taken out of the structure.

A special, application specific part should contain the MMS header information. This header information is used to provide the message type information as well as message-specific information. The proposed content type for this part is application/mmsheader and until registration within IANA, the interim content type shall be application/x-mmsheader.

B1.5.2 Other Messages

Other MMS transactional messages utilise additional PDUs for multimedia message notification, acknowledgements and delivery reports. These messages are conveyed with messages that just utilise a content type proposed to be application/mmsheader. Until registration within IANA, the interim content type shall be application/x-mmsheader.

B1.6 MMS Presentation

The rendering of an MM for a user is the ultimate objective of the MMS. This rendering operation is known as presentation. Various types of data may be used to drive the presentation. For example, the MM presentation may be based on a WML deck [27] or Synchronised Multimedia Integration Language (SMIL) [28] which includes links to other component elements in the multipart message. Other presentation models may include a simple text body with image attachments. WAP has not specified any specific requirements on MMS presentations. UAProf [25] content negotiation methods should be used for presentation method selection.

NOTE: In the future, it will be desirable to consider mobile-optimised presentation technologies. For example, WAP Forum and W3C have initiated work on a mobile-optimised version of SMIL that would be suitable for use in an MMS environment.

B1.7 MMS Security Model between MMS User Agent and MMS Relay

No MMS-specific requirements are in place within the WAP Forum to support security mechanisms in the transactions between the MMS Relay and MMS User Agent. Existing schemes such as WTLS [29] and WIM [30] are available and other end-to-end techniques are under development.

B2 IP Based Implementation of MMS for future releases

This informative annex conceptually demonstrates how IP based MMS would be fulfilled using standard internet transport and email protocols.

It is not expected that fully featured implementations of MMS will be realised using existing IETF protocols until additional capabilities are included to support all aspects of MMS. It is anticipated that in due course, these new capabilities will be standardised by appropriate standards organisations and will be described in a future release of this specification

B2.1 Protocol Framework

The following figure 1 is an example of the protocol framework definition for IP Based Implementation in 3GPP MMS.

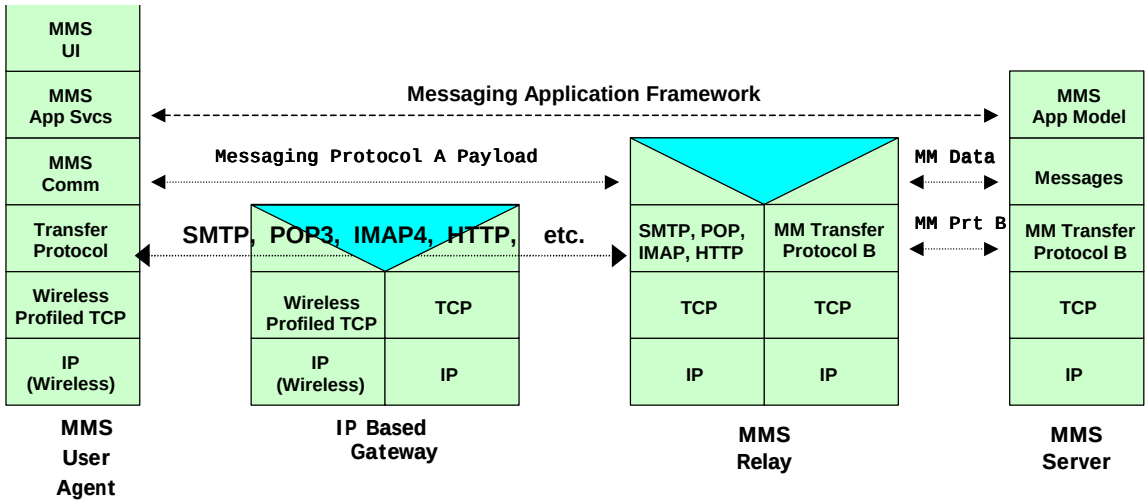

Figure 1: Example of Protocol Framework Definition for IP Based Implementation in 3GPP MMS

The protocols of IP Based Implementation would be based on the Internet standards that have been standardized by IETF. Wireless profiled TCP, which tunes up the wireless network, would be used for the transmission control protocol. What kind of wireless tuned TCP could be used, would be defined by a profile.

The Transfer Protocol between MMS User Agent and MMS Relay would be SMTP, POP3, IMAP4, HTTP, etc., depending on the services.

The notification services and the other needed services between MMS User Agent and MMS Relay would be supported by using the appropriate protocol.

Note: The appropriate protocol would be used as soon as the standardization would have been completed.

B2.2 Architectural Support for MMS

The following figure 2 is an example of the architecture definition for IP Based Implementation in 3GPP MMS.

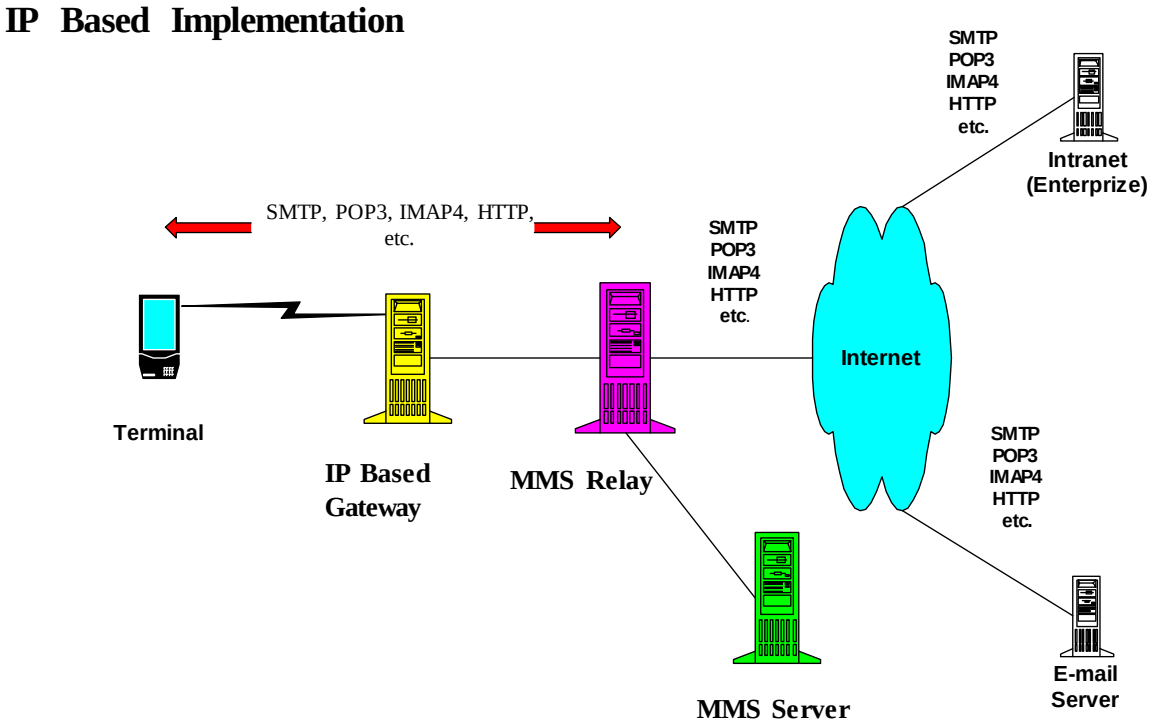

Figure 2: Architectural example of IP Based Implementation for 3GPP MMS

The communication between a terminal and the IP Based Gateway would use the appropriate IP Based protocol like SMTP, POP3, IMAP4, HTTP, etc. on wireless profiled TCP to provide services.

The communication between the IP Based Gateway and the MMS Relay would use the appropriate IP Based protocol like SMTP, POP3, IMAP4, HTTP, etc. on TCP to provide services. Wireless profiled TCP would be translated to normal TCP in the IP Based Gateway.

B2.3 Transaction Flows Supporting MMS

The following figure 3 is an example of transaction flows for IP Based Implementation in 3GPP MMS.

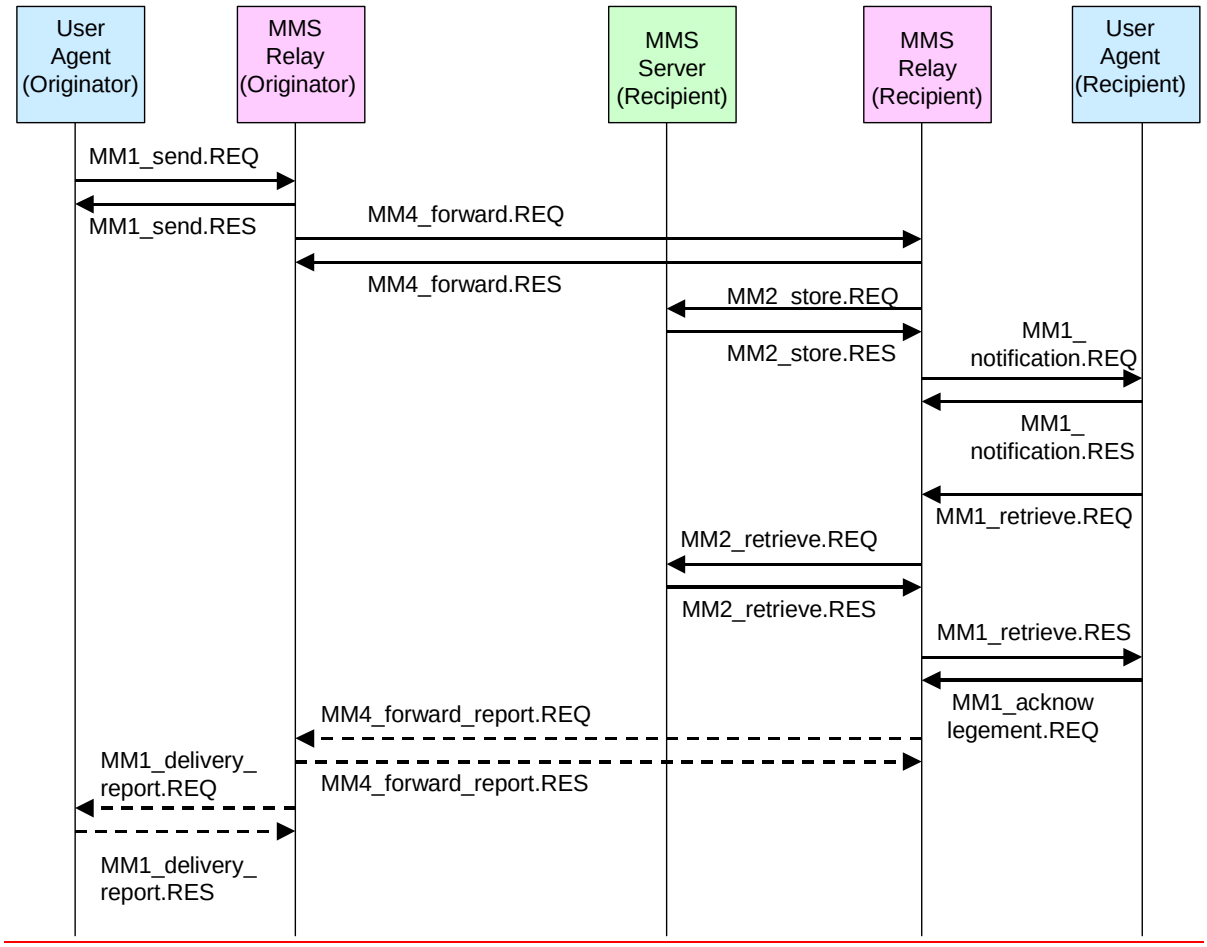

Figure 3: Example of transaction flows for IP Based Implementation in 3GPP MMS

For example;

1. MMS User Agent (Originator) would send a Multimedia Message (MM) by sending MM1_Send.REQ to MMS Relay by use of a SMTP or HTTP POST method. There could be MM1_Send.RES response by use of HTTP.

2. MMS Relay (Originator) would forward the MM sending MM4_forward.REQ to MMS Relay (Recipient) by use of SMTP. There could be MM4_forward.RES response by use of HTTP.

3. MMS Relay (Recipient) would store the MM sending MM2_store.REQ to MMS Server (Recipient) by use of SMTP or HTTP POST method. There could be MM2_store.RES response by use of HTTP.

4. MMS Relay (Recipient) would use IP based PUSH technology to send MM1_notification.REQ to MMS User Agent (Recipient) by use of HTTP POST method or the other appropriate way. There could be MM1_notification.RES response by use of HTTP.

5. MMS User Agent (Recipient) would retrieve the MM from MMS Server, by using MM1_retrieve.REQ to MMS Relay and MM2_retrieve.REQ to MMS Server, by use of a POP3, IMAP4 or HTTP GET method.

The MMS Relay might request information that would permit to know that the MM was actually received by the MMS User Agent. One approach would be sending MM1_acknowledgement.REQ from the MMS User Agent to the MMS Relay.

As an option, MMS Relay (Recipient) might forward a message by using MM4_forward_report.REQ to MMS Relay (Originator) by using SMTP or HTTP. There could be MM4_forward_report.RES response by use of SMTP or HTTP.

The MMS Relay is responsible for supporting an optional delivery report back to the ~~originating~~originator MMS User Agent. Based upon possible delivery outcomes, the MMS Relay would again utilize IP based PUSH technology to inform the MMS User Agent with the MM1_delivery_report.REQ message.

Note: The appropriate transaction flows for IP Based Implementation would be applied when the drafting for the standardization would have been completed.

B2.4 Terminal Capability Negotiation

The Terminal Capability Negotiation would be based on the Internet standard (e.g. CC/PP).

B2.5 MMS Message Contents

The MMS Message Contents would be video mail, audio mail, image mail, text mail and so on.

B2.5.1 Multimedia Messages

The Multimedia Messages would be based on RFC822 (Standard for the format of ARPA Internet text messages) and MIME (Multipurpose Internet Mail Extensions, RFC 2045 - 2049).

B2.6 MMS Presentation

The MMS Presentation would be based on MIME (Multipurpose Internet Mail Extensions, RFC 2045 - 2049) and Internet standard.

B2.7 MMS Security Model between MMS User Agent and MMS Relay

What kind of security mechanism could be used, would be defined by a profile.

Annex CB (Informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
15/03/00	T#7	TP-000028			New	2.0.0	3.0.0
					Editorial change by MCC	3.0.0	3.0.1
22/09/00	T#9	TP-000144	001		Set of mandatory media formats for MMS	3.0.1	4.0.0