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Multimedia Messaging Service;

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Stage 3

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MM10 INTERFACE BASED ON DIAMETER PROTOCOL
STAGE 3

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FOREWORD

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1 Introduction

The present document defines the procedures and the transport protocol for use in the Multimedia Messaging Service (MMS) based on Diameter.

The present document is applicable to:

- The MM10 interface between an MMS Relay/Server and the MSCF.

Whenever it is possible this document specifies the requirements for this protocol by reference to specifications produced by the IETF within the scope of Diameter. Where this is not possible, extensions to Diameter are defined within this document.

2 References

2.1 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this Specification. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

- [1] 3GPP2 X.S0016-200-A MMS Stage 2, Functional Specifications, Revision A.
<http://www.3gpp2.org/>
- [2] void
- [3] IETF RFC 2960 "Stream Control Transmission Protocol"
- [4] IETF RFC 3588 "Diameter Base Protocol"
- [5] IETF RFC 2234 "Augmented BNF for syntax specifications"
- [6] Open Mobile Alliance; OMA-MMS-ENC-v1_2-20030915-C; Multimedia Messaging Service; Encapsulation Protocol, Version 1.2
- [7] 3GPP2 X.S0013-006 "Cx interface based on the Diameter protocol; Protocol details"
<http://www.3gpp2.org/>
- [8] 3GPP2 X.S0004-550-E MAP Parameters Signalling Protocol <http://www.3gpp2.org/>
- [9] 3GPP2 X.S0013-011 "Sh Interface based on Diameter Protocols, Protocol Details"
<http://www.3gpp2.org/>
- [10] IETF RFC 3309 "Stream Control Transmission Protocol (SCTP) Checksum Change"

3 Definitions, Symbols and Abbreviations

This section contains definitions, symbols and abbreviations that are used throughout the document.

3.1 Definitions

Refer to IETF RFC 3588 [4] for the definitions of some terms used in this document.

For the purposes of the present document, the following terms and definitions apply.

Messaging Service Control Function: Network element hosting network operator specific services enhancing the capabilities of the MMS.

3.1.1 Symbols and Abbreviations

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

AAA	Authentication, Authorization and Accounting
AS	Application Server
ABNF	Augmented Backus-Naur Form
AVP	Attribute-Value Pair
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
MSCF	Messaging Service Control Function
RFC	Request For Comment
SCTP	Stream Control Transport Protocol
UCS	Universal Character Set
URL	Uniform Resource Locator
UTF	UCS Transformation Formats

4 Procedure Description

In the tables that describe the information elements transported by each command, each Information Element is marked as (M) Mandatory, (C) Conditional or (O) Optional. A mandatory information element shall always be present. A conditional information shall be present if certain conditions are fulfilled; if those conditions are not fulfilled it shall be absent. An optional information element may be present or absent in the command, at the discretion of the application at the sending entity.

The classification of information elements on application level is provided in [1]. The present document provides the classification on protocol level, which may differ from the application requirements.

4.1. MM10 Interrogation Procedure

This procedure is used between the MMS Relay/Server and the MSCF. This procedure is invoked by the MMS Relay/Server and is used to request processing of addressing information related to a multimedia message (see [1]).

This procedure is mapped to the commands Message-Process-Request/Answer in the Diameter application specified in section 6.1. Tables 4.1.1.1 and 4.1.1.2 detail the involved information elements.

4.1.1 Information Elements

Table 4.1.1.1: MM10 Interrogation Request

Information element name	Mapping to Diameter AVP	Cat.	Description
Message Type	Diameter Command Code	M	Identification of the MM10 message.
Trigger Event	Trigger-Event	M	Identification of the event leading to invocation of the MM10 interrogation
Served User Identity	Served-User-Identity	M	This information element contains the identification of the served user identity.
Served User IMSI	Served-User-IMSI	C	This information element contains the identity of the mobile subscriber (IMSI). This element shall be present if received via the access.
Initial Recipient Address	Initial-Recipient-Address	M	This information element contains the recipients of a multimedia message as requested by the sender. In case of multiple recipients multiple occurrences of this information element shall apply.
Originating Interface	Origination Interface	M	This information element identifies the interface the multimedia message has been received on.
Service Key	Service Key	C	This information element contains identification of the application on the MSCF. It shall be present if the MMS Relay/Server trigger configuration contains this information
Sender Address	Sender-Address	C	This information element contains the identity of the sender to be presented to the recipient. This information element shall be available if contained in the multimedia message.
Delivery Report	Delivery-Report	C	This information contains information about the users request for delivery reports. This information element shall be present if the request has been received in the multimedia message.
Read Reply	Read-Reply	C	This information contains information about the users request for read reply reports. This information element shall be present if the request has been received in the multimedia message.
Sender Visibility	Sender-Visibility	C	This information element contains information about the users request to hide the own identity. This information element shall be present if the request has been received in the multimedia message.

Table 4.1.1.2 : MM10 Interrogation Response

Information element name	Mapping to Diameter AVP	Cat.	Description
Message Type	Diameter Command Code	M	Identification of the MM10 message.
Result Code	Result-Code / Experimental-Result	M	This information request contains the result of the operation.
	Status	O	This information element contains message status information to notify the served user about the outcome of the message processing.
	Status-Text	O	This information element contains a response status text to qualify the outcome of the message processing.
Result Address	Result-Recipient-Address	C	This information element contains the recipient address information resulting from the MSCF processing. This information element shall be available if a success result code is contained.
Delivery Report	Delivery-Report	O	This information element contains the delivery report request information resulting from the MSCF processing.
Sender Visibility	Sender-Visibility	O	This information element contains the sender visibility request information resulting from the MSCF processing.
Read Reply	Read-Reply	O	This information element contains the read reply request information resulting from the MSCF processing.
CDR Information	Billing-Information	O	This information element contains transparent billing data resulting from the MSCF processing.

4.1.2 Normal Operation

The MMS Relay/Server sends MM10 interrogation request to the MSCF after it has detected that a multimedia message is subject to processing in the MSCF. The MM10 interrogation request contains the message data as received from the served user.

A MM10 interrogation response received from the MSCF may be composed as follows:

If the MM10 interrogation response contains a `DIAMETER_SUCCESS` result code, then the MSCF has authorised the message request unconditionally. The MMS Relay/Server shall continue to process the multimedia message unmodified

If the MM10 interrogation response contains a `DIAMETER_LIMITED_SUCCESS` result code, then the MSCF has requested some modifications to the message. The MMS Relay/Server shall continue message processing with the updated data received from the MSCF.

If the MM10 interrogation contains a `DIAMETER_AUTHORIZATION_REJECTED` result code, then the message attempt is not authorised. The MMS Relay/Server shall reject the message request. If a status information is received from the MSCF, this shall be used to notify the sender about the outcome.

5 Use of the Diameter base protocol

The Diameter Base Protocol as specified in IETF RFC 3588 [4] shall apply except as modified by the defined support of the methods and the defined support of the commands and AVPs, result and event codes specified in clause 6 of this specification. Unless otherwise specified, the procedures (including error handling and unrecognised information handling) are unmodified.

5.1 Securing Diameter Messages

For secure transport of Diameter messages, see [4].

5.2 Accounting functionality

Accounting functionality (Accounting Session State Machine, related command codes and AVPs) is not used on the MM10 interface.

5.3 Use of sessions

Diameter sessions are implicitly terminated between the MMS Relay/Server and the MSCF. An implicitly terminated session is one for which the server does not maintain state information. The client does not need to send any re-authorization or session termination requests to the server.

The Diameter base protocol includes the Auth-Session-State AVP as the mechanism for the implementation of implicitly terminated sessions.

The client (server) shall include in its requests (responses) the Auth-Session-State AVP set to the value NO_STATE_MAINTAINED (1), as described in IETF RFC 3588 [4]. As a consequence, the server does not maintain any state information about this session and the client does not need to send any session termination request. Neither the Authorization-Lifetime AVP nor the Session-Timeout AVP shall be present in requests or responses.

5.4 Transport protocol

Diameter messages over the MM10 interface shall make use of SCTP IETF RFC 2960 [3] and shall utilise the new SCTP checksum method specified in RFC 3309 [10].

5.5 Routing considerations

This section specifies the use of the Diameter routing AVPs Destination-Realm and Destination-Host.

The MMS Relay/Server shall derive the address/name of the MSCF for a certain user or use case from the MMS user profile or from the MMS Relay/Server configuration. The MMS Relay/Server shall present both the Destination-Realm and Destination-Host AVPs in the request. Consequently, the Destination-Host AVP is declared as mandatory in the ABNF for all requests initiated by the MMS Relay/Server.

Requests initiated by the MSCF towards MMS Relay/Server shall include both Destination-Host and Destination-Realm AVPs. The MSCF obtains the Destination-Host AVP to use in requests towards an MMS Relay/Server, from the Origin-Host AVP received in previous requests from the MMS Relay/Server. Consequently, the Destination-Host AVP is declared as mandatory in the ABNF for all requests initiated by the MSCF.

5.6 Advertising Application Support

The MMS Relay/Server and MSCF shall advertise support of the Diameter MM10 Interface Application by including the value of the Application Identifier (see section 6) in the Auth-Application-Id AVP within the Vendor-Specific-Application-Id grouped AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands .

The vendor identifier value of 3GPP (10415) shall be included in the Supported-Vendor-Id AVP in the Vendor-Id AVP within the Vendor-Specific-Application-Id grouped AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands

6 Diameter application for MM10 interface

This section specifies a Diameter application that allows a Diameter client and a Diameter server:

- to indicate that a submission or delivery request for a multimedia message has been received. The Diameter client provides the message data and additional data qualifying the messaging event to the server.
- to request in result to continue the processing of the multimedia message with the original or modified information or to reject the multimedia message.

The MM10 interface protocol is defined as an IETF vendor specific Diameter application, where the vendor is 3GPP. The vendor identifier assigned by IANA to 3GPP (<http://www.iana.org/assignments/enterprise-numbers>) is 10415.

The Diameter application identifier assigned to the MM10 interface application is 16777226 (allocated by IANA).

6.1 Command-Code values

This section defines Command-Code values for this Diameter application.

Every command is defined by means of the ABNF syntax (as defined in RFC 2234 [5]), according to the rules in IETF RFC 3588 [4]. Whenever the definition and use of an AVP is not specified in this document, what is stated in IETF RFC 3588 [4] shall apply.

The command codes for the MM10 interface application are taken from the range allocated by IANA as assigned in this specification. For these commands, the Application-ID field shall be set to 16777226 (application identifier of the MM10 interface application, allocated by IANA).

The following Command Codes are defined in this specification:

Table 6.1.1: Command-Code values

Command-Name	Abbreviation	Code	Section
Message-Process-Request	MPR	311	6.1.1
Message-Process-Answer	MPA	311	6.1.2

6.1.1 Message-Process-Request (MPR) Command

The Message-Process-Request (MPR) command, indicated by the Command-Code field set to 311 and the ‘R’ bit set in the Command Flags field, is sent by a Diameter client to a Diameter server in order to request the processing of a multimedia message.

Message Format

```

<Message-Process-Request> ::= < Diameter Header: 311, REQ, PXY, 16777226 >
                                < Session-Id >
                                { Vendor-Specific-Application-Id }
                                { Auth-Session-State }
                                { Origin-Host }
                                { Origin-Realm }
                                { Destination-Host }
                                { Destination-Realm }
                                { Event-Timestamp }
                                { Trigger-Event }
                                { Served-User-Identity }
                                [ Served-User-IMSI ]
                                [ Sender-Address ]
                                *[ Initial-Recipient-Address ]
                                { Originating-Interface }
                                [Service-Key]
                                [ Delivery-Report ]
                                [ Read-Reply ]
                                [ Sender-Visibility ]
                                *[ AVP ]
                                *[ Proxy-Info ]
                                *[ Route-Record ]

```

6.1.2 Message-Process-Answer (MPA) Command

The Message-Process-Answer (MPA) command, indicated by the Command-Code field set to 311 and the ‘R’ bit cleared in the Command Flags field, is sent by the Diameter server in response to the Message-Process-Request command. The Result-Code or Experimental-Result AVP may contain one of the values defined in section 6.2 in addition to the values defined in RFC 3588 [4].

Message Format

```

<User-Data-Answer> ::= < Diameter Header: 311: PXY, 16777226 >
                        < Session-Id >
                        { Vendor-Specific-Application-Id }
                        [ Result-Code ]

```

1
 2 [Experimental-Result]
 3 { Auth-Session-State }
 4 { Origin-Host }
 5 { Origin-Realm }
 6 [Status]
 7 *[Result-Recipient-Address]
 8 [Delivery-Report]
 9 [Read-Reply]
 10 [Billing-Information]
 11 *[AVP]
 12 *[Proxy-Info]
 13 *[Route-Record]
 14
 15
 16
 17
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 21
 22
 23
 24

6.2 Result-Code AVP values

25
 26 This section defines new result code values that must be supported by all Diameter implementations that
 27 conform to this specification. When one of the result codes defined here is included in a response, it shall be
 28 inside an Experimental-Result AVP and Result-Code AVP shall be absent.
 29

6.2.1 Success

30
 31 Errors that fall within the Success category are used to inform a peer that a request has been successfully
 32 completed.
 33

34
 35 No errors within this category have been defined in this release.
 36

6.2.2 Permanent Failures

37
 38 Errors that fall within the Permanent Failures category are used to inform the peer that the request failed, and
 39 should not be attempted again.
 40

41
 42 No errors within this category have been defined in this release.
 43

6.2.3 Transient Failures

44
 45 Errors that fall within the transient failures category are those used to inform a peer that the request could not be
 46 satisfied at the time that it was received. The request may be able to be satisfied in the future.
 47

48
 49 No errors within this category have been defined in this release.
 50

6.3 AVPs

51
 52 The following table describes the Diameter AVPs defined for the MM10 interface protocol, their AVP Code
 53 values, types, possible flag values and whether the AVP may or not be encrypted.
 54
 55
 56
 57
 58

Table 6.3.1: Diameter MM10 Application AVPs

Attribute Name	AVP Code	Section defined	Value Type	AVP Flag rules				
				Must	May	Should not	Must not	May Encr.
Served-User-Identity	1100	6.3.1	Grouped	M, V				N
MSISDN	701	6.3.2	OctetString	M, V				N
VASP-ID	1101	6.3.3	UTF8String	M, V				N
VAS-ID	1102	6.3.4	UTF8String	M, V				N
Trigger-Event	1103	6.3.5	Enumerated	M, V				N
Served-User-IMSI	1	6.3.6	OctetString	M, V				N
Sender-Address	1104	6.3.7	UTF8String	M, V				N
Initial-Recipient-Address	1105	6.3.8	Grouped	M, V				N
Result-Recipient-Address	1106	6.3.9	Grouped	M, V				N
Sequence-Number	1107	6.3.10	Unsigned32	M, V				N
Recipient-Address	1108	6.3.11	UTF8String	M, V				N
Routeing-Address	1109	6.3.12	UTF8String	M, V				N
Originating-Interface	1110	6.3.13	Enumerated	M, V				N
Delivery-Report	1111	6.3.14	Enumerated	M, V				N
Read-Reply	1112	6.3.15	Enumerated	M, V				N
Sender-Visibility	1113	6.3.16	Enumerated	M, V				N
Service-Key	1114	6.3.17	UTF8String	M, V				N
Billing-Information	1115	6.3.18	UTF8String	M, V				N
Status	1116	6.3.19	Grouped	M, V				N
Status-Code	1117	6.3.20		M, V				N

Status-Text	1118	6.3.21	UTF8String	M, V				N
NOTE 1: The AVP header bit denoted as 'M', indicates whether support of the AVP is required. The AVP header bit denoted as 'V', indicates whether the optional Vendor-ID field is present in the AVP header. For further details, see IETF RFC 3588.								

6.3.1 Served-User-Identity AVP

The User-Identity AVP (AVP Code 1100) is of type Grouped. This AVP contains identity of the served subscriber for whom a messaging processing is requested.

AVP format

User-Identity ::= <AVP header: 1100 10415>

[MSISDN]

[VASP-Code]

[VAS-Code]

*[AVP]

6.3.2 MSISDN AVP

The MSISDN AVP contains MSISDN. For the definition of this AVP refer to [9]

6.3.3 VASP-ID AVP

The VASP-ID AVP (AVP Code 1101) is of type UTF8String. This AVP contains the identification of a Value Added Service Provider.

6.3.4 VAS-ID AVP

The VAS-ID AVP (AVP Code 1102) is of type UTF8String. This AVP contains the identification of a Value Added Service.

6.3.5 Trigger-Event AVP

The Trigger-Event AVP (AVP code 1103) is of type Enumerated. It indicates the type of the event that triggered the Message-Process-Request.

MM1 Message Submission, Profile based (0)

MM1 Message Submission, Address based (1)

MM1 Message Delivery (2)

MM7 Message Submission, Profile based (3)

MM7 Message Submission, Address based (4)

6.3.6 Served-User-IMSI

The Served-User-IMSI AVP (AVP Code 1) is of type OctetString. This AVP contains an IMSI as described in [8] encoded as a TBCD-string, i.e. digits from 0 through 9 are encoded 0000 to 1001; 1111 is used as a filler

when there is an odd number of digits; bits 8 to 5 of octet n encode digit 2n; bits 4 to 1 of octet n encode digit 2(n-1)+1.

6.3.7 Sender-Address AVP

The Sender-Address AVP (AVP code 1104) is of type UTF8String. This AVP contains the identification of a multimedia message sender to be provided to the multimedia message recipient.

6.3.8 Initial-Recipient-Address AVP

The Initial-Recipient-Address AVP (AVP code 1105) is of type grouped. It contains recipient address information sent to the MSCF.

```
Result-Recipient-Address ::= <AVP header: 1105 10415>
    [Sequence-Number]
    [Recipient-Address]
    *[AVP]
```

6.3.9 Result-Recipient-Address AVP

The Result-Recipient-Address AVP (AVP code 1106) is of type grouped. It contains recipient address information as returned from the MSCF.

```
Result-Recipient-Address ::= <AVP header: 1106 10415>
    [Sequence-Number]
    [Recipient-Address]
    [Routeing-Address]
    [Sender-Address]
    [Sender-Visibility]
    *[AVP]
```

6.3.10 Sequence-Number AVP

The Sequence-Number AVP (AVP code 1107) is of type unsigned32. It contains the unique identification (counter) of a recipient address group.

6.3.11 Recipient-Address AVP

The Recipient-Address AVP (AVP code 1108) is of type UTF8String. It contains the Recipient address of a multimedia message. The UTF8String identifying the Recipient shall be represented according to the following ABNF definition:

```
Recipient-Address = {Sequence-Number} {recipient type} {recipient}
```

```
Recipient Type = ( "To:" / "Cc:" / "Bcc:" )
```

Recipient = address ; address is coded according to the MMS addressing model defined in [6].

6.3.12 Routeing-Address AVP

The Routeing-Address AVP (AVP code 1109) is of type UTF8String. It contains the Recipient address for routing of a multimedia message. The UTF8String identifying the Recipient shall be represented according to the following ABNF definition:

1 Routeing-Address = [Recipient-Type] [Recipient]

2 Recipient-Type = ("To:" / "Cc:" / "Bcc:")

3 Recipient = (Address / MM4-Address)

4 Address; it is coded according to the MMS addressing model defined in [6].

5 MM4-Address; it is coded according to the MM4 address encoding model on SMTP protocol level defined in [1]

6.3.13 Originating-Interface AVP

6 The Originating-Interface-AVP (AVP code 1110) is of type Enumerated. It indicates the interface a multimedia Message has been received on.

7 MM1 (0)

8 MM3 (1)

9 MM4 (2)

10 MM7 (3)

6.3.14 Delivery-Report AVP

11 The Delivery-Report AVP (AVP code 1111) is of type enumerated. It indicates whether an delivery report is requested.

12 No Delivery Report Requested (0)

13 Delivery Report Requested (1)

14 If the Delivery-Report AVP is not present, then the default "No Delivery Report Requested" shall be assumed.

6.3.15 Read-Reply AVP

15 The Read-Reply AVP (AVP code 1112) is of type enumerated. It indicates whether a delivery report is requested.

16 No Read Reply Requested (0)

17 Read Reply Requested (1)

18 If the Read-Reply AVP is not present, then the default "No Read Reply Requested" shall be assumed.

6.3.16 Sender-Visibility AVP

19 The Sender-Visibility AVP (AVP code 1113) is of type enumerated. It indicates whether the sender identification is requested to be hidden or not.

20 Sender Identification requested not to be hidden (0)

21 Sender Identification requested to be hidden (1)

22 If the Sender-Visibility AVP is not present, then the default "Sender Identification requested not to be hidden" shall be assumed.

6.3.17 Service-Key AVP

23 The Service-Key AVP (AVP code 1114) is of type UTF8String. It identifies an application of the target MSCF.

6.3.18 Billing-Information AVP

The Billing-Information AVP (AVP code 1115) is of type UTF8String. It contains transparent information to be forwarded to the billing system.

6.3.19 Status AVP

The Status AVP (AVP code 1116) is of type grouped. It contains message status information to allow notification of the served user..

```
Result-Recipient-Address ::= <AVP header: 1116 10415>
[Status-Code]
[Status-Text]
```

6.3.20 Status-Code AVP

The Status-Code AVP (AVP code 1117) is of type UTF8String. It contains the trigger event specific response code to qualify the outcome of the message processing. The UTF8String identifying the Status-Code shall be represented according to the following ABNF definition:

Status-Code = (Response-status-value / Retrieve-status-value / StatusCode)

Response-status-value; it contains the numerical octet value of the M-send.conf X-Mms-Response-Status header defined in [6]. This Status-Code value shall be used by the MSCF if the Trigger-Event of the Message-Process-Request referred to MM1 Message Submission.

Retrieve-status-value; it contains the numerical octet value of the M-Retrieve.conf X-Mms-Retrieve-Status header defined in [6]. This Status-Code value shall be used by the MSCF if the Trigger-Event of the Message-Process-Request referred to MM1 Message Delivery.

StatusCode; it contains the numerical value of the MM7_submit.RES StatusCode element defined in [1]. This Status-Code value shall be used by the MSCF if the Trigger-Event of the Message-Process-Request referred to MM7 Message Submission.

6.3.21 Status-Text AVP

The Status-Code AVP (AVP code 1118) is of type UTF8String. It contains a response status text to qualify the outcome of the message processing.

6.4 Use of namespaces

This clause contains the namespaces that have either been created in this specification, or the values assigned to existing namespaces managed by IANA.

6.4.1 AVP codes

This specification assigns the values 1100-1199 from the AVP Code namespace managed by 3GPP for its Diameter vendor-specific applications. See section 6.3 for the assignment of the namespace in this specification.

6.4.2 Experimental-Result-Code AVP values

This specification assigns no Experimental-Result-Code AVP values in this release

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6.4.3 Command Code values

This specification assigns the value 311 from the range allocated by IANA to 3GPP.

6.4.4 Application-ID value

IANA has allocated the value 16777226 for the 3GPP MM10 interface application.

7 Special Requirements

7.1 Version Control

The same mechanisms specified in [6] apply to this specification