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Technical Specification

**Universal Mobile Telecommunications System (UMTS);
Signalling System No. 7 (SS7)
signalling transport in core network;
Stage 3
(3GPP TS 29.202 version 10.0.0 Release 10)**



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1 Scope

The present document defines the possible protocol architectures for transport of SS7 signalling protocols in Core Network.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

2.1 Normative references

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] ITU-T Recommendation Q.701: "Functional description of the message transfer part (MTP) of signalling system No. 7".
- [3] ITU-T Recommendation Q.702: "Signalling data link".
- [4] ITU-T Recommendation Q.703: "Signalling link".
- [5] ITU-T Recommendation Q.704: "Signalling network functions and messages".
- [6] ITU-T Recommendation Q.705: "Signalling network structure".
- [7] ITU-T Recommendation Q.706: "Message transfer part signalling performance".
- [8] RFC 2960: "Stream Control Transmission Protocol".
- [9] ITU-T Recommendation G.804: "ATM cell mapping into Plesiochronous Digital Hierarchy (PDH)".
- [10] ITU-T Recommendation I.112: "Vocabulary of terms for ISDNs".
- [11] ITU-T Recommendation I.361: "B-ISDN ATM layer specification".
- [12] ITU-T Recommendation I.363.5: "B-ISDN ATM Adaptation Layer specification: Type 5 AAL".
- [13] ITU-T Recommendation Q.2110: "B-ISDN ATM adaptation layer - Service specific connection oriented protocol (SSCOP)".
- [14] ITU-T Recommendation Q.2140: "B-ISDN ATM adaptation layer - Service specific coordination function for signalling at the network node interface (SSCF at NNI)".
- [15] ITU-T Recommendation Q.2210: "Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140".
- [17] RFC 3309: "SCTP Checksum Change".
- [18] RFC 4666: "Signaling System 7 (SS7) Message Transfer Part 3 (MTP3) - User Adaptation Layer (M3UA)".

- [19] RFC 4165: Signaling System 7 (SS7) Message Transfer Part 2 (MTP2) -User Peer-to-Peer Adaptation Layer (M2PA)".

2.2 Informative references

- [16] RFC 2719: "Framework Architecture for Signalling Transport".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

(no further terms defined)

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

AAL5	ATM Adaptation Layer type 5
ATM	Asynchronous Transfer Mode
IP	Internet Protocol
MTP	Message Transfer Part
MTP1	Message Transfer Part layer 1
MTP2	Message Transfer Part layer 2
MTP3	Message Transfer Part layer 3
M2PA	Message Transfer Part 2 -User Peer-to-Peer Adaptation Layer
M3UA	MTP3-User Adaptation
PDH	Plesiochronous Digital Hierarchy
SSCF	Service Specific Coordination Function
SSCOP	Service Specific Connection Oriented Protocol
SCCP	Signalling Connection Control Part
SCTP	Stream Control Transmission Protocol
SDH	Synchronous Digital Hierarchy
TCAP	Transaction Capabilities Application Part

4 Introduction

The Core Network enables the transport of SS7 signalling protocols between two entities by means of different underlying networks (e.g. MTP-based, IP-based or ATM-based).

The transport of SS7 signalling protocol messages of any protocol layer that is identified by the MTP level 3 layer, in SS7 terms, as a user part (MTP3-user) shall be accomplished in accordance with the protocol architecture defined in the following sub-clauses. The list of these protocol layers includes, but is not limited to, Signalling Connection Control Part (SCCP).

The transport of protocols which can be identified as SCCP-users, like for example TCAP, and in turn the transport of TCAP-users like MAP and CAP, shall also be accomplished in accordance with the defined protocol architectures, since their protocol messages are transferred as SCCP payload.

5 Protocol architectures

5.1 Protocol architecture in the case of MTP-based SS7 signalling transport network

The transport of an MTP3-user signalling messages shall be accomplished in accordance with the relevant ITU-T Recommendations [2], [3], [4], [5], [6], [7].

The protocol architecture applicable in the case of MTP-based SS7 signalling transport network is shown in Figure 5.1/1

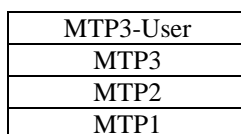


Figure 5.1/1: Protocol architecture in the case of MTP-based SS7 signalling transport network

5.2 Protocol architecture in the case of IP-based SS7 signalling transport network

5.2.1 M3UA

The transport of an MTP3-user signalling messages shall be accomplished in accordance with the architecture defined by the "Framework Architecture for Signalling Transport" [16], by "Stream Control Transmission Protocol"[8] and by the IETF document available in Annex A. An implementation of SCTP to this document shall use the checksum method specified in RFC 3309 [17] instead of the method specified in RFC 2960 [8].

The M3UA protocol architecture applicable in the case of IP-based SS7 signalling transport network is shown in Figure 5.2/1

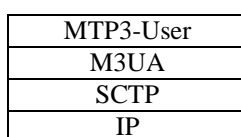


Figure 5.2/1: M3UA architecture in the case of IP-based SS7 signalling transport network

The definition of the use of M3UA in 3GPP core network is provided in Annex A to this specification.

5.2.2 MTP3-M2PA

An MTP3 signalling message can also be transported by M2PA, which shall be accomplished in accordance with IETF RFC 4165[19].

The M2PA protocol architecture applicable in the case of IP-based SS7 signalling transport network is shown in Figure 5.2/2

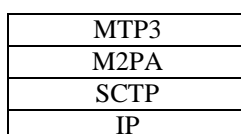


Figure 5.2/2: M2PA architecture in the case of IP-based SS7 signalling transport network

The definition of the use of M2PA in 3GPP core network is provided in Annex B to this specification.

5.3 Protocol architecture in the case of ATM-based SS7 signalling transport network

The transport of an MTP3-user signalling messages shall be accomplished in accordance with the relevant ITU-T Recommendations [9], [10], [11], [12], [13], [14], [15]

The protocol architectures applicable in the case of ATM-based SS7 signalling transport network are shown in Figure 5.3/1.

ATM over SDH

MTP3-User
MTP3 B
SSCF
SSCOP
AAL5
ATM

ATM over PDH

MTP3-User
MTP3 B
SSCF
SSCOP
AAL5
G.804

Figure 5.3/1: Protocol architectures in the case of ATM-based SS7 signalling transport network

Annex A (Normative): The use of M3UA in 3GPP networks

A.1 Scope

This annex defines the application of M3UA in 3GPP core networks. The purpose of the Annex is to ensure the interoperability of different implementations of M3UAs used by different operators and vendors. This is achieved by:

- Clarifying certain concepts which are used in RFC 4666;
- Defining those features in RFC 4666 for which support is mandatory;
- Defining those features in the RFC 4666 for which support is optional;
- Defining those features in RFC 4666 which shall not be used;

The specification is intended for interfaces between network domains, however, it can also be used inside one network domain, and constitutes a minimum set of M3UA requirements to be supported between IP nodes and between IP nodes and SGW nodes in a 3GPP network.

A.2 Introduction

M3UA may be used on a number of interfaces in a 3GPP core network. The annex is intended for the interface called A and C in figure 1. A is the Interface between two IP nodes that are equipped with SCTP, M3UA and a M3UA user. Examples of M3UA user are BICC, H.248, SCCP and ISUP. The interface can be used inside one network domain but also to interconnect network domains. Interface B can be used between network domains and inside network domains. Interface B is not in the scope for this annex, however, use of Q.701-Q.705 or Q.2210 on interface B is already standardised; in addition, M2PA is also endorsed for interface B in accordance with Annex B. Interface C is the interface between a node including SCTP, M3UA and a M3UA user and a node including SCTP, M3UA and M3UAsignalling gateway functions.. This interface is inside one network domain.

Interfaces A and C are similar. The main difference is that interface C shall also allow for interworking with the SS 7 network and therefore provides functions for the interworking.

The signalling gateways in this picture are pure MTP3/3B-M3UA signaling gateways. They do not include any M3UA users. Still there could be a node including an M3UA user (e.g. SCCP functions) and a M3UA signalling gateway functions. In that case, the node will support all the interfaces A, B and C.

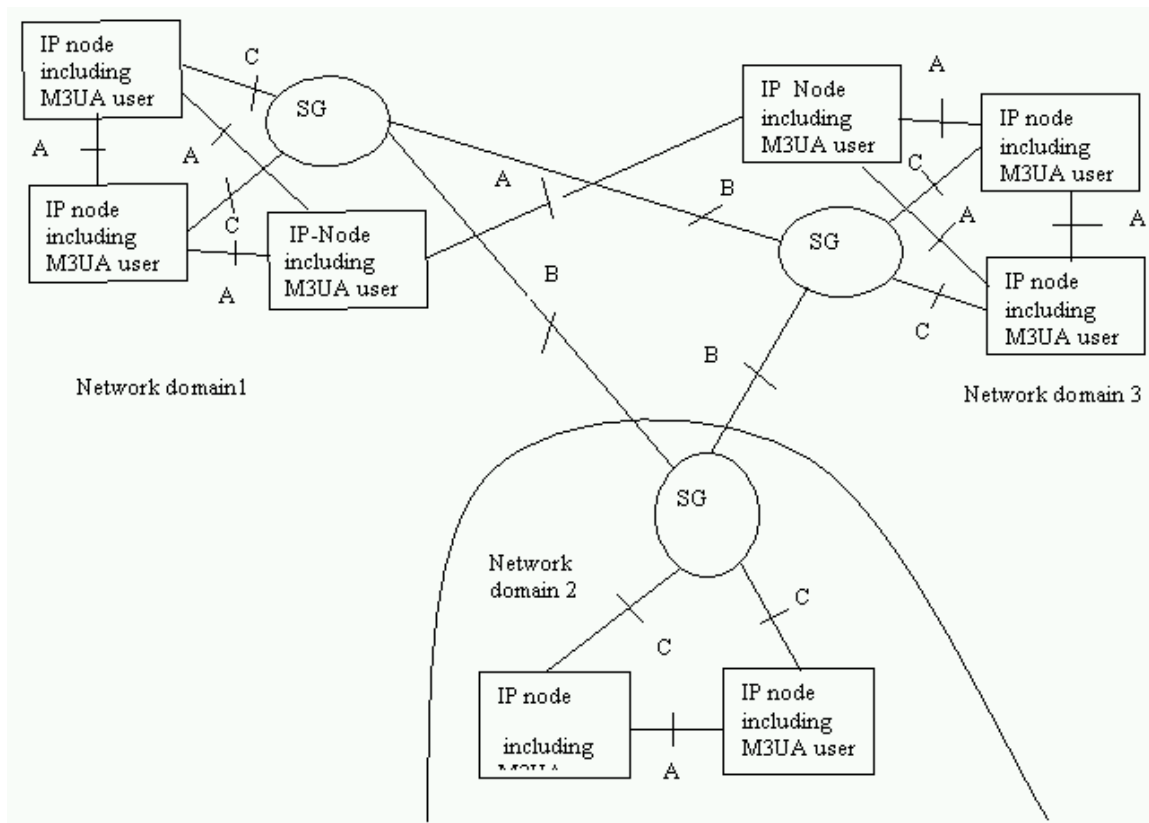


Figure 1: Use of M3UA in 3GPP core network

A.3 Protocol conformance to RFC 4666

A minimum implementation shall support sections marked mandatory in the table below. It shall be possible to configure all implementations to interoperate (no error messages returned) with the minimum set.

The table below makes comment to the sections in RFC 4666. In the comment column the following terms are used:

- Mandatory: When support of text in a section is marked mandatory:
 - o On an information element, message or message class, it means that a receiver shall understand the information element, message or message class and carry out the requested action.
 - o For a procedure, it means that the procedure is mandatory to be carried out by the involved network elements.
- Optional: When support of the text in a section is marked optional the feature involved is only guaranteed to work between peer entities which are subject to a bilateral agreement between operators of those entities. If one end uses an optional message or information element and the other does not support it, then either a silent discard takes place of an information element as a part of the message or the message is discarded and an error message is returned. This is described as part of the handling of the optionality in the table.
- Excluded: This means that the feature shall not be used in a 3GPP environment

Descriptive text means that the section does not include any requirements for this specification.

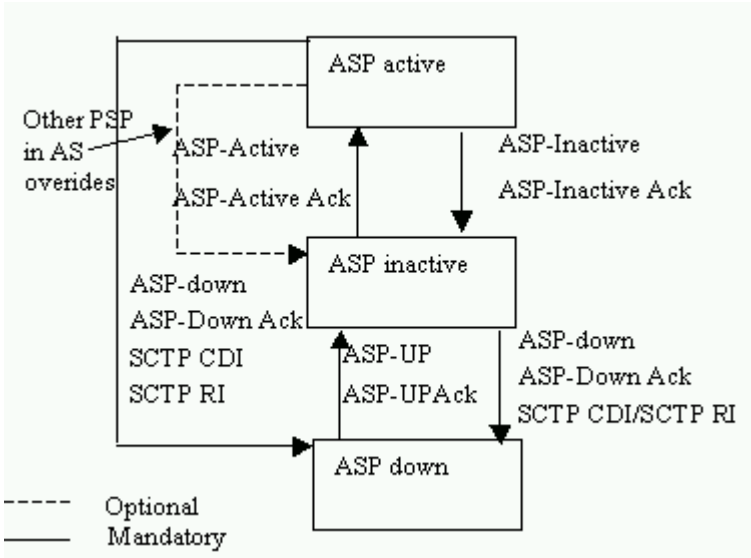
Note: The word "heading" means that the section consists only of subordinate sections.

The comments column also defines the behaviour of a minimum implementation if it does not support a message or an information element in a mandatory message.

Section number in M3UA RFC	Comments
Abstract	Descriptive text
1.Introduction	Descriptive text
1.1 Scope	Descriptive text
1.2 Terminology	Descriptive text.
1.3 M3UA overview	Descriptive text.
1.4 Functional area	Descriptive text.
1.5 Sample Configurations	Descriptive text
1.6 Definition of M3UA Boundaries	Descriptive text
2 Conventions	Descriptive text
3. M3UA Protocol Elements	Mandatory
3.1 Common message header	Mandatory
3.1.1 M3UA Protocol Version:	The version number field shall be set to 1
3.1.2 Message classes and types	The values are classified as follow 0-4 Mandatory 5-8 Excluded 9 Optional (Routing Key Management (RKM) Messages) 10 to 255 Excluded
3.1.2 (Management (MGMT) message)	The values are classified as follow 0 Mandatory 1 Optional (Notify). When received and not supported the message maybe silently discarded. 2-255 Excluded
3.1.2 (Transfer messages)	The values are classified as follow 0 Excluded 1 Mandatory 2 to 255 Excluded
3.1.2 (Signalling network management (SSNM) messages)	The values are classified as follow 0 Excluded 1-6 Mandatory 7- 255 Excluded.
3.1.2 (ASP State Maintenance (ASPSM) Messages)	The values are classified as follow 0 Excluded 1-6 Mandatory 7-255 Excluded
3.1.2 (ASP Traffic Maintenance (ASPTM) Messages)	The values are classified as follow 0 Excluded 1-4 Mandatory 5 to 255 Excluded
3.1.2 (Routing key management (RKM) messages)	Optional If any of these messages is received and not supported an error message with the error code 0x04 (Unsupported message type) shall be sent
3.1.3 Reserved	Mandatory
3.1.4 Message length	Mandatory

Section number in M3UA RFC	Comments
3.2 Variable Length Parameter Format Common Parameters:	<p>The values are classified as follows</p> <p>0x0000-- 0x0003, 0x0005, 0x0008, 0x000a, 0x000e, 0x000f, 0x0010 0x0014—0x01ff Excluded</p> <p>0x0007, 0x0009, 0x000c and 0x0012 Mandatory</p> <p>0x0004 optional (INFO String) if received and not supported the message is processed but the optional information element is silently discarded,</p> <p>0x0006 optional (Routing Context if received and not supported the message is processed but the optional information element is silently discarded,</p> <p>0x000b optional (Traffic Mode Type) if received and not supported the message is processed but the optional information element is silently discarded,</p> <p>0x0011 (ASP Identifier) if received and not supported the message is processed but the optional information element is silently discarded,</p> <p>0x0012 Affected point code is mandatory. The support of value 0 in the mask field is mandatory. All other values is outside the scope of this annex.</p> <p>0x0013 (Correlation ID) if received and not supported the message is processed but the optional information element is silently discarded,</p>
3.2 Variable Length Parameter Format M3UA Specific Parameters	<p>The values are classified as follows</p> <p>0x0201, 0x0202, 0x0203, 0x0211, 0x020d and 0x0214 to 0xffff Excluded</p> <p>0x0204--0x0205, 0x0210 Mandatory</p> <p>0x0200 optional (Network Appearance) if received and not supported the message is processed but the optional information element is silently discarded,</p> <p>0x0206 Optinal (Concerned Destination). If received and not supported the message is processed but the optional information element is silently discarded.</p> <p>0x0207 (Routing Key), 0x0208 (Registration Result), 0x0209 (Deregistration Result) 0x020a (Local Routing Key Identifier), 0x020b (Destination Point Code), 0x020c (Service Indicators) 0x020d (Subsystem Numbers), 0x020e (Originating Point Code List), 0x020f (Circuit Range), 0x0212 (Registration Status), 0x0213 (Deregistration Status) are parameters in optional message, and therefore no action is specified.</p>
3.3 Transfer messages	These messages are mandatory at the interfaces A and C.
3.3.1 Payload Data Message (DATA)	The parameters Network Appearance, Routing Context, Correlation ID are optional The parameter Protocol data is mandatory.
3.4 SS7 signalling network management messages	Heading
3.4.1 Destination Unavailable (DUNA)	The message is mandatory at the interface C. The parameters Network Appearance, Routing Context, and INFO String are optional The parameter Affected Point Code is mandatory
3.4.2 Destination Available (DAVA)	The message is mandatory at the interface C The parameters Network Appearance, Routing Context, and INFO String are optional. The parameter Affected Point Code is mandatory
3.4.3 Destination State Audit (DAUD)	The message is mandatory at the interface C The parameters Network Appearance, Routing Context, and INFO String are optional. The parameter Affected Point Code is mandatory
3.4.4 Signalling Congestion (SCON)	The message is mandatory at the interface C The parameters Network Appearance, Routing Context, Congestion Indications and INFO String are optional The parameter Affected point code is mandatory.

Section number in M3UA RFC	Comments
3.4.5 Destination User Part Unavailable (DUPU)	The message is mandatory at the interfaces A and C. The parameters Network Appearance, Routing Context, and INFO String are optional. The parameters Affected point code and User/Cause are mandatory
3.4.6 Destination Restricted (DRST) message	This message is mandatory.
3.5 ASP State Maintenance (ASPSM) Messages	These messages are mandatory at the interfaces A and C.
3.5.1 ASP Up message	The ASP Identifier and Info String parameters are optional
3.5.2 ASP Up Acknowledgement Message	The Info String parameter is optional.
3.5.3 ASP Down message	The Info String parameter is optional.
3.5.4 ASP Down Acknowledgement message	The Info String parameter is optional.
3.5.5 Heartbeat message	The message is mandatory.
3.5.6 Heartbeat Acknowledgement message	The message is mandatory
3.6 Routing Key Management messages	These messages are optional at the interfaces A and C.
3.7 ASP Traffic Maintenance (ASPTM) Messages	These messages are mandatory at the interfaces A and C.
3.7.1 ASP Active message	The parameters Traffic Mode Type, Routing Context and INFO String are optional.
3.7.2 ASP Active Acknowledgement message	The Traffic Mode Type, Routing Context and INFO String are optional.
3.7.3 ASP inactive message	The parameters Routing Context and INFO String are optional.
3.7.4 ASP Inactive Acknowledgement	The parameters Routing Context INFO String are optional.
3.8 Management (MGMT) Messages	Heading
3.8.1 Error message	The message is mandatory at the interfaces A and C
3.8.2 Notify message	The message is optional at the interfaces A and C
4 Procedure	The application of a particular procedure at a certain interface is detailed in the following sections
4.1 Procedures to Support the M3UA-User	Heading
4.1.1 Receipt of Primitives from the M3UA-User	The procedure is mandatory at the interfaces A and C.
4.1.2 Receipt of Primitives from the Layer Management	This section is outside the scope of this annex.
4.2 Procedures to Support the Management of SCTP Associations	The procedures are mandatory at the interfaces A and C
4.2.1 Receipt of M3UA Peer Management Messages	The two first paragraphs are outside the scope of this annex. Last paragraph is mandatory.
4.3 AS and ASP State Maintenance	The procedure is mandatory at the interfaces A and C.

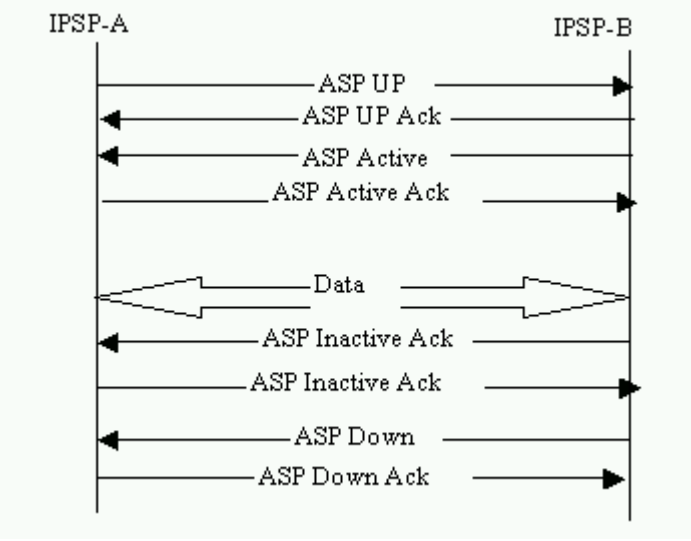
Section number in M3UA RFC	Comments
4.3.1 ASP States	<p>Replace figure in section 4.3.1 in "RFC 4666" with the one below, which is based on figure 4 in draft-ietf-sigtran-m3ua-implementors-guide-01</p>  <pre> stateDiagram-v2 state ASP_active as ASP active state ASP_inactive as ASP inactive state ASP_down as ASP down ASP_active --> ASP_active : ASP-Active (Optional) ASP_active --> ASP_inactive : ASP-Inactive (Mandatory) ASP_active --> ASP_down : ASP-down (Mandatory) ASP_inactive --> ASP_active : ASP-Active Ack (Optional) ASP_inactive --> ASP_inactive : ASP-Inactive Ack (Optional) ASP_inactive --> ASP_down : ASP-down (Mandatory) ASP_down --> ASP_inactive : ASP-UP (Mandatory) ASP_down --> ASP_down : ASP-Down (Mandatory) ASP_down --> ASP_active : ASP-UP Ack (Optional) ASP_down --> ASP_inactive : ASP-Down Ack (Optional) ASP_down --> ASP_down : SCTP CDI/SCTP RI (Optional) ASP_active -.-> ASP_active : Other PSP in AS overrides ASP_active -.-> ASP_inactive : ASP-Active Ack ASP_inactive -.-> ASP_active : ASP-Active </pre> <p>Legend: - - - Optional — Mandatory</p>
4.3.2 AS States	Mandatory
4.3.3 M3UA Management Procedures for Primitives	This section is outside the scope of this annex.
4.3.4 ASPM Procedures for Peer-to-Peer Messages	Heading
4.3.4.1 ASP Up Procedure	<p>This procedure is mandatory at the interface C and is a subset of the procedure used at interface A. See also 4.3.4.1.2.</p> <p>Note: The registration procedure is optional.</p> <p>A received ASP Up must be acknowledged by an ASP Up Ack message, if no restriction applies e.g. maintenance.</p>
4.3.4.1.1 M3UA Version Control	This procedure is mandatory at the interfaces A and C.

Section number in M3UA RFC	Comments
4.3.4.1.2 IPSP Considerations (Asp Up)	<p>This procedure is mandatory at the interface A.</p> <p>The present section 4.3.4.1.2 in RFC 4666 is replaced by: "An IPSP may be considered in the ASP-INACTIVE state after an ASP Up or ASP Up Ack has been received from it. An IPSP can be considered in the ASP-DOWN state after an ASP Down or ASP Down Ack has been received from it".</p> <p>The IPSP may inform Layer Management of the change in state of the remote IPSP using M-ASP_UP or M-ASP_DN indication or confirmation primitives.</p> <p>If for any local reason (e.g., management lockout) an IPSP cannot respond to an ASP Up message with an ASP Up Ack message, it responds to an ASP Up message with an Error message with reason "Refused - Management Blocking" and leaves the remote IPSP in the ASP-DOWN state."</p> <p>The paragraphs above are in accordance with changes included in Draft-ietf-sigran-m3ua-implementors-guide-01</p> <p>All comments applicable for section 4.3.4.1 and 4.3.4.2 are also applicable for this section.</p>
4.3.4.2 ASP-Down Procedure	<p>This procedure is mandatory at the interface C and is a subset of the procedure used at interface A. See also 4.3.4.1.2.</p> <p>A received ASP Down message must be acknowledged by an ASP Down Ack message, if no restriction applies eg maintenance reason.</p>
4.3.4.3 ASP Active Procedure	<p>This procedure is mandatory at interface C and is a subset of the procedure used at interface A. See also 4.3.4.3.1.</p> <p>Configuration data define which AS an ASP is a member of. The ASP Active message does not contain a Routing Context parameter. Consequently, the ASP Active Ack message does not include any Routing Context(s) parameter.</p> <p>The traffic state an ASP has, is configured within the associated Application Server. If more than one physical entity (ASPs, SGPs or IPSPs) implements a logical entity (SG, AS) then loadshare with 1+k is the mandatory traffic mode.</p> <p>A received ASP Active must be acknowledged by an ASP Active Ack message, if no restriction applies e.g. maintenance reason.</p> <p>If a Routing Context parameter is included in the ASP Active message it is not needed to include the Routing Context parameter in the ASP Active Ack message.</p> <p>Note: This is a deviation to RFC 4666.</p>
4.3.4.3.1 IPSP Considerations (ASP Active)	<p>This procedure is mandatory at the interface A.</p> <p>Section 4.3.4.3.1 in RFC 4666 is replaced by:</p> <p>"Either of the IPSPs can initiate communication. When an IPSP receives an ASP Active, it should mark the peer as ASP-ACTIVE and return an ASP Active Ack message. An ASP receiving an ASP Active Ack message may mark the peer as ASP-Active, if it is not already in the ASP-ACTIVE state."</p> <p>The paragraph above is in accordance with changes included in Draft-ietf-sigran-m3ua-implementors-guide-01</p> <p>All comments applicable for section 4.3.4.3 are also applicable for this section.</p>

Section number in M3UA RFC	Comments
4.3.4.4 ASP Inactive Procedures	<p>This procedure is mandatory at the interface C and is a subset of the procedure used at interface A. See also 4.3.4.4.1.</p> <p>Configuration data defines which AS an ASP is a member of.</p> <p>It is optional to send several ASP Active Ack messages in response to a single ASP Active message.</p> <p>A received ASP Inactive must be acknowledged by an ASP Inactive Ack message, if no restriction applies e.g. maintenance.</p> <p>The sending of Notify message is mandatory if the As state is changed.</p>
4.3.4.4.1 IPSP Considerations (ASP Inactive)	<p>This procedure is mandatory at the interface A.</p> <p>Section 4.3.4.4.1 in RFC 4666 is replaced by: "An IPSP may be considered in the ASP-INACTIVE state by a remote IPSP after an ASP Inactive or ASP Inactive Ack message has been received from it."</p> <p>The paragraph above is in accordance with changes included in Draft-ietf-sigtran-m3ua-implementors-guide-01</p> <p>All comments applicable for section 4.3.4.4 are also applicable for this section.</p>
4.3.4.5 Notify Procedures	The procedure is mandatory at the interfaces A and C to reflect an AS state change.
4.3.4.6 Heartbeat Procedures	The procedure is optional.
4.4 Routing Key management procedure	The procedure is optional.
4.5 Procedures to Support the Availability or Congestion Status of SS7 Destination	Heading
4.5.1 At an SGP	<p>Note: The use of Transfer restricted message is a national option and is about the scope of this specification.</p> <p>If the SG knows that the ASP supports DRST, then SG shall Send a DRST message, if the SG does not know whether the ASP supports the DRST message the SGW shall send a DAVA message if the destination earlier was unavailable. If the destination was available then no action is required.</p>
4.5.2 At an ASP	Heading
4.5.2.1 Single SG Configurations	It is mandatory for an ASP to interoperate with one Signaling Gateway.
4.5.2.2 Multiple SG Configurations	It shall be possible to configure an ASP to handle at least a configuration consisting of two Signalling Gateways.
4.5.3 ASP Auditing	<p>Only the part related to international use in Q.704 is inside the scope of this annex.</p> <p>Add the following paragraph to the corresponding section in RFC 4666</p> <p>"Where the SGP does not maintain the congestion status of the SS7 destination (ITU international networks), the response to a DAUD message should always be only a DAVA, or DUNA message as appropriate."</p> <p>The paragraph above is an extract from "draft-ietf-sigtran-m3ua-implementors-guide-01".</p>
4.6 MTP 3 restart	The procedure is mandatory.
5. Examples of M3UA Procedures	Descriptive text
5.1. Establishment of Association and Traffic between SGPs and ASPs	Note The procedures defined in the sub-sections to 5.1 are a subset of the procedures defined in section 5.5.

Section number in M3UA RFC	Comments
5.1.1 Single ASP in an Application Server ("1+0" sparing)	Descriptive text
5.1.1.1 Single ASP in an Application Server ("1+0" sparing), No Registration	The use of RCn is optional.
5.1.1.2 Single ASP in Application Server ("1+0" sparing), Dynamic Registration	The use of dynamic registration is optional.
5.1.1.3 Single ASP in Multiple Application Servers (each with "1+0" sparing), Dynamic Registration (Case 1 - Multiple Registration Requests)	The use of dynamic registration is optional.
5.1.1.4 Single ASP in Multiple Application Servers (each with "1+0" sparing), Dynamic Registration (Case 2 - Single Registration Request)	The use of dynamic registration is optional.
5.1.2 Two ASPs in Application Server ("1+1" sparing)	This procedure is optional.
5.1.3 Two ASPs in an Application Server ("1+1" sparing, loadsharing case).	The traffic mode parameter is optional in ASP-Active message
5.1.4 Three ASPs in an Application Server ("n+k" sparing, loadsharing case)	The procedure is optional.
5.2 ASP Traffic Failover Examples	Heading
5.2.1 (1+1 Sparing, Withdrawal of ASP, Backup Override)	The use of the procedure "backup override" is optional.
5.2.2 (1+1 Sparing, Backup Override)	The use of the procedure "backup override" is optional.
5.2.3 (n+k Sparing, Loadsharing case, Withdrawal of ASP)	The procedure is optional
5.3 Normal Withdrawal of an ASP from an Application Server and Teardown of an Association	The registration procedure is optional. Routing Contexts (RC) is optional.

Section number in M3UA RFC	Comments
5.3.X Normal Withdrawal of the ASP from an Application Server (1+1 sparing) loadsharing and Teardown of Association	<pre> sequenceDiagram participant SGP participant ASP2 as ASP 2 participant ASP1 as ASP 1 SGP->>ASP2: ASP Inactive ASP2->>SGP: ASP Inactive Ack SGP->>ASP1: ASP Inactive ASP1->>SGP: ASP Inactive Ack SGP->>ASP1: Notify ASP1->>ASP2: Notify ASP2->>SGP: ASP Down SGP->>ASP2: ASP Down Ack SGP->>ASP1: ASP Down ASP1->>SGP: ASP Down Ack </pre> <p>The figure is added for clarification.</p>
5.4. Auditing Examples	Heading
5.4.1. SG State: Uncongested/Available	Descriptive text.
5.4.2. SG State: Congested (Congestion Level=2) /Available	Descriptive text.
5.4.3. SG State: Unknown/Available	Descriptive text.
5.4.4. SG State: Unavailable	Descriptive text.
5.5 M3UA/MTP3-User Boundary Examples	Heading
5.5.1 At an ASP	Heading
5.5.1.1 Support for MTP-TRANSFER Primitives at the ASP	Heading
5.5.1.1.1 Support for MTP-TRANSFER Request Primitive	The procedure is mandatory at the interface A and C. This description is also applicable for an IPSP, so replace the abbreviation ASP with ASP/IPSP and SGP with SGP/IPSP
5.5.1.1.2 Support for the MTP-TRANSFER Indication Primitive	The support is mandatory at the interface A and C. This description is also applicable for an IPSP, so replace the abbreviation ASP with ASP/IPSP and SGP with SGP/IPSP.
5.5.1.1.3 Support for ASP Querying of SS7 Destination States	This procedure is mandatory at the interface C. The querying of congestion states is an optional national procedure and outside the scope of this annex.
5.5.2 At an SGP	Heading
5.5.2.1 Support for MTP-TRANSFER Request Primitive at the SGP	The procedure is mandatory at the interface C. Network Appearance is optional.
5.5.2.2 Support for MTP-TRANSFER Indication Primitive at the SGP	The procedure is mandatory at the interface C

Section number in M3UA RFC	Comments
5.5.2.3 Support for MTP-PAUSE, MTP-RESUME, MTP-STATUS Indication Primitives	Heading
5.5.2.3.1 Destination Unavailable	The procedure is mandatory at the interface C
5.5.2.3.2 Destination Available	The procedure is mandatory at the interface C
5.5.2.3.3 SS7 Network Congestion	The procedure is mandatory at the interface C
5.5.2.3.4 Destination User Part Unavailable	The procedure is mandatory at the interface C and optional at the interface A.
5.6 Examples for IPSP communication.	<p>Replace the section in RFC 3332 with the paragraph below</p> <p>This scenario shows a basic example for IPSP communication for the three phases of the connection (establishment, data exchange, disconnection). It is assumed that the SCTP association is already set up.</p>  <pre> sequenceDiagram participant IPSP-A participant IPSP-B IPSP-A->>IPSP-B: ASP UP IPSP-B-->>IPSP-A: ASP UP Ack IPSP-A->>IPSP-B: ASP Active IPSP-B-->>IPSP-A: ASP Active Ack IPSP-A->>IPSP-B: Data IPSP-B-->>IPSP-A: ASP Inactive Ack IPSP-A->>IPSP-B: ASP Inactive Ack IPSP-A->>IPSP-B: ASP Down IPSP-B-->>IPSP-A: ASP Down Ack </pre> <p>The paragraph above is in accordance with changes included in Draft-ietf-sigtran-m3ua-implementors-guide-01</p>

Annex B (Informative): The use of M2PA in 3GPP networks

B.1 Scope

This annex defines the application of M2PA in 3GPP core networks as an option on interface B. The purpose of the Annex is to ensure the interoperability of different implementations of M2PA as used by different operators and vendors. This is achieved by:

- Clarifying certain concepts which are used in RFC 4165;
- Defining those features in RFC 4165 for which support is mandatory;
- Defining those features in the RFC 4165 for which support is optional;
- Defining those features in RFC 4165 which shall not be used;

This specification is intended for interfaces between network domains. However, it can also be used inside one network domain, and constitutes, in that case, a minimum set of M2PA requirements to be supported between IP nodes and between SRP nodes in a 3GPP network.

B.2 Introduction

M2PA may be used between SRPs, i.e. interface B (refer to Figure 1 of Annex A).

Figure 2 recommends how M2PA is used in a 3GPP IP based signalling network.

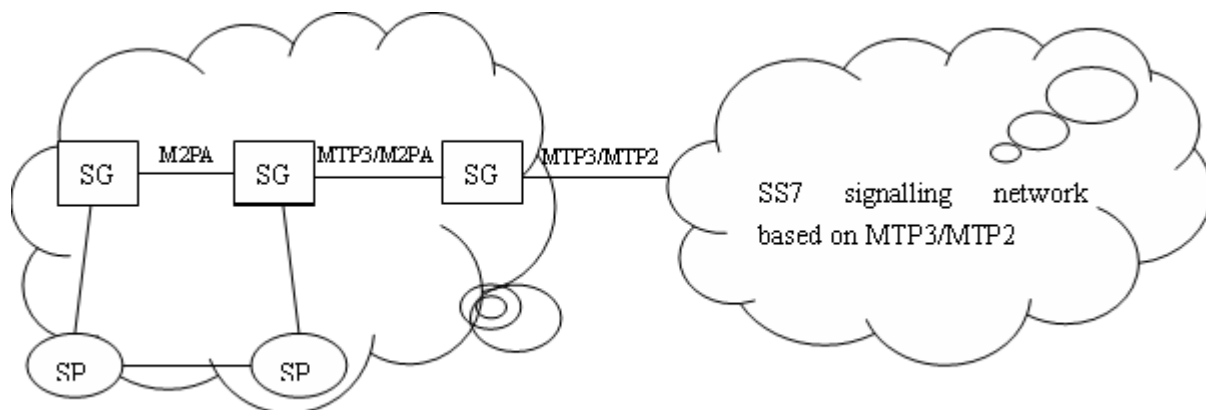


Figure B2.1: Use of M2PA in 3GPP core networks

B.3 Protocol conformance to RFC 4165

A minimum implementation shall support sections marked mandatory in the table below. It shall be possible to configure all implementations to interoperate (no error messages returned) with the minimum set.

The table below makes comment to the sections in RFC 4165. In the comment column the following terms are used:

- Mandatory: When support of text in a section is marked mandatory:

- On an information element, message or message class, it means that a receiver shall understand the information element, message or message class and carry out the requested action.
- For a procedure, it means that the procedure is mandatory to be carried out by the involved network elements.
- Optional: When support of the text in a section is marked optional the feature involved is only guaranteed to work between peer entities which are subject to a bilateral agreement between operators of those entities. If one end uses an optional information element and the other does not support it, then a silent discard takes place of an information element as a part of the message. This is described as part of the handling of the optionality in the table.
- Excluded: This means that the feature shall not be used in a 3GPP environment

Descriptive text means that the section does not include any requirements for this specification.

Note: The word "heading" means that the section consists only of subordinate sections.

The comments column also defines the behaviour of a minimum implementation if it does not support a message or an information element in a mandatory message.

Section number in M2PA RFC	Comments
Abstract	Descriptive text
1.Introduction	Descriptive text
1.1 Scope	Descriptive text
1.2 Terminology	Descriptive text.
1.3 Abbreviations	Descriptive text.
1.4 Conventions	Descriptive text.
1.5. Signaling Transport Architecture	Descriptive text
1.5.1 Point Code Representation	Mandatory
1.6 Services Provided by M2PA	Descriptive text
1.6.1 Support for MTP Level 2 / MTP Level 3 Interface Boundary	Mandatory
1.6.2 Support for Peer-to-Peer Communication	Mandatory
1.7. Functions Provided by M2PA	Heading
1.7.1 MTP2 Functionality	Descriptive text
1.7.2 Mapping of SS7 and IP Entities	Mandatory
1.7.3 SCTP Association Management	Mandatory
1.7.4 Retention of MTP3 in the SS7 Network	Descriptive text
1.8. Definition of the M2PA Boundaries	Heading
1.8.1 Definition of the M2PA/MTP Level3 Boundaries	Descriptive text
1.8.2 Definition of the Lower Layer Boundary between M2PA and SCTP	Descriptive text
1.9. Differences Between M2PA and M2UA	Descriptive text
2. Protocol Elements	Mandatory
2.1 Common message header	Mandatory
2.1.1 Version:	Mandatory
2.1.2 Spare	Mandatory
2.1.3 Message class	Mandatory
2.1.4 Message Type	Mandatory
2.1.5 Message Length	Mandatory
2.2 M2PA Header	Mandatory
2.2.1 Backward Sequence Number (BSN)	Mandatory
2.2.2 Forward Sequence Number (FSN)	Mandatory
2.3 M2PA Messages	Mandatory
2.3.1 User Data	Mandatory
2.3.2 Link Status	Mandatory
2.3.2.1 Link Status Proving	Mandatory
3 State Control	Heading
3.1 SCTP Association State Control	Descriptive text
3.2 M2PA Link State Control	Descriptive text
4 Procedures	Mandatory
4.1 Procedures to Support MTP2 Feature	Heading
4.1.1 Signal Unit Format, Delimitation, Acceptance	Descriptive text
4.1.2 MTP and SCTP Entities	The content about how M2PA relates MTP and SCTP entities is Descriptive text. The relationship between the streams of SCTP and M2PA Messages is mandatory.
4.1.3 Link Alignment	The procedure is Mandatory.
4.1.4 Processor Outage	Mandatory
4.1.5 Level 2 Flow Control	Mandatory
4.1.6 Link Out of Service	Mandatory
4.1.7 SCTP Association Problems	Mandatory
4.1.8 Transmission and Reception Priorities	Mandatory
4.1.9 M2PA Version Control	Mandatory
4.2. Procedures to Support the MTP3/MTP2 Interface	Heading
4.2.1 Sending and Receiving Messages	Mandatory
4.2.2 MTP3 Signaling Link Congestion	Mandatory
4.2.3 Changeover	Mandatory
4.2.3.1 Multiple User Data Streams and Changeover	Descriptive text
4.3 SCTP Considerations	Descriptive text
4.3.1 SCTP Slow Start	Descriptive text Avoiding the negative effects of slow start is Mandatory.

Section number in M2PA RFC	Comments
5 Examples of M2PA Procedures	Descriptive text
5.1 Link Initialization (Alignment)	Descriptive text
5.2 Message Transmission and Reception	Descriptive text
5.3 Link Status Indication	Descriptive text
5.4 Link Status Message (Processor Outage)	Descriptive text
5.5 Level 2 Flow Control	Descriptive text
5.6 MTP3 Signaling Link Congestion	Descriptive text
5.7. Link Deactivation	Descriptive text
5.8 Link Changeover	Descriptive text

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	R e v	Subject/Comment	Old	New
Feb 2001					Initial draft	0.0.1	0.0.2
Feb 2001					Second draft	0.0.2	0.1.0
Feb 2001					Contributions and comments from TSG-CN WG4#6.1 Madrid Ad Hoc incorporated	0.1.0	0.2.0
Feb 2001					Contributions and comments from TSG-CN WG4#6.1 Madrid Ad Hoc incorporated and draft further elaborated	0.2.0	2.0.0
Mar 2001					Comments from TSG-CN WG4#7 incorporated.	2.0.0	2.1.0
Mar 2001	CN#11	NP-010079			Annex A: M3UA updated to the latest available version 6 Approved in CN#11	2.1.0	4.0.0
May 2001					Foreword added	4.0.0	4.0.1
Sep 2001	CN#13	NP-010452	001		Change of M 3UA version	4.0.1	4.1.0
Sep 2001	CN#13				Editorial clean up	4.0.1	4.1.0
Jun 2002	CN#16				Corrupted Figure 5.3/1 fixed	4.1.0	4.1.1
Jun 2002	CN#16				Rel-5 created after CN#16	4.1.1	5.0.0
Sep 2002	CN#17	NP-020445	003	1	Add reference to new IETF RFC on SCTP Checksum	5.0.0	5.1.0
Dec 2002	CN#18	NP-020585	007	2	M3UA for 3GPP networks	5.1.0	5.2.0
Dec 2002	CN#18	NP-020585	009		IETF RFC reference for M3UA	5.1.0	5.2.0
Dec 2004	CN#26				Rel-6 created after CN#26	5.2.0	6.0.0
Jun 2007	CT#36				Upgraded unchanged from Rel-6	6.0.0	7.0.0
Jun 2007	CT#36	CP-070330	0013	3	Use of M2PA in 3GPP core network signalling system	7.0.0	8.0.0
Sep 2007	CT#37	CP-070545	0014	2	Protocol conformance to RFC4165(M2PA)	8.0.0	8.1.0
Sep 2007	CT#37	CP-070545	0015	2	Change of protocol conformance to M3UA	8.0.0	8.1.0
Dec 2008	CT#42				Copyright Notification updated	8.1.0	8.1.1
2009-12	-	-	-	-	Update to Rel-9 version (MCC)	8.1.1	9.0.0
2011-03	-	-	-	-	Update to Rel-10 version (MCC)	9.0.0	10.0.0

History

Document history		
V10.0.0	May 2011	Publication