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3rd Generation Partnership Project;

Technical Specification Group Core Network and Terminals;

Signalling System No. 7 (SS7) signalling transport   
in core network;   
Stage 3

(Release 16)



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# Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

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

# 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

|  |
| --- |
| MTP3-User |
| MTP3 |
| MTP2 |
| MTP1 |

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

|  |
| --- |
| MTP3-User |
| M3UA |
| SCTP |
| IP |

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

|  |
| --- |
| MTP3 |
| M2PA |
| SCTP |
| IP |

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.

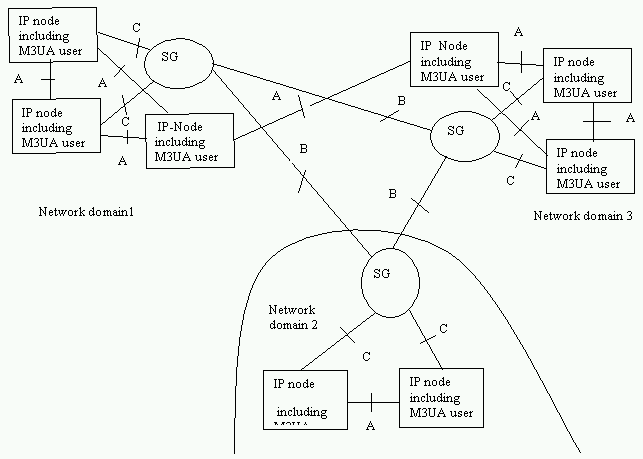


Figure 1: Use of M3UA in 3GPP core network

# 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:

- 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 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 |
| 3.2 Variable Length Parameter Format Common Parameters: | The values are classified as follows  0x0000-- 0x0003, 0x0005, 0x0008, 0x000a, 0x000e, 0x000f, 0x0010 0x0014—0x01ff Excluded  0x0007, 0x0009, 0x000c and 0x0012 Mandatory  0x0004 optional (INFO String) if received and not supported the message is processed but the optional information element is silently discarded,    0x0006 optional (Routing Context if received and not supported the message is processed but the optional information element is silently discarded,  0x000b optional (Traffic Mode Type) if received and not supported the message is processed but the optional information element is silently discarded,  0x0011 (ASP Identifier) if received and not supported the message is processed but the optional information element is silently discarded,  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.  0x0013 (Correlation ID) if received and not supported the message is processed but the optional information element is silently discarded, |
| 3.2 Variable Length Parameter Format M3UA Specific Parameters | The values are classified as follows  0x0201, 0x0202, 0x0203, 0x0211, 0x020d and 0x0214 to 0xffff Excluded    0x0204--0x0205, 0x0210 Mandatory  0x0200 optional (Network Appearance) if received and not supported the message is processed but the optional information element is silently discarded,  0x0206 Optinal (Concerned Destination). If received and not supported the message is processed but the optional information element is silently discarded.  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. |
| 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. |
| 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. |
| 4.3.1 ASP States | Mandatory |
| 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 | 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.  Note: The registration procedure is optional.  A received ASP Up must be acknowledged by an ASP Up Ack message, if no restriction applies e.g. maintenance. |
| 4.3.4.1.1 M3UA Version Control | This procedure is mandatory at the interfaces A and C. |
| 4.3.4.1.2 IPSP Considerations  (Asp Up) | This procedure is mandatory at the interface A.  All comments applicable for section 4.3.4.1 and 4.3.4.2 are also applicable for this section. |
| 4.3.4.2 ASP-Down Procedure | 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.  A received ASP Down message must be acknowledged by an ASP Down Ack message, if no restriction applies eg maintenance reason. |
| 4.3.4.3 ASP Active Procedure | 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.  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.  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.    A received ASP Active must be acknowledged by an ASP Active Ack message, if no restriction applies e.g. maintenance reason.  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.  Note: This is a deviation to RFC 4666. |
| 4.3.4.3.1 IPSP Considerations (ASP Active) | This procedure is mandatory at the interface A.  All comments applicable for section 4.3.4.3 are also applicable for this section. |
| 4.3.4.4 ASP Inactive Procedures | 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.  Configuration data defines which AS an ASP is a member of.  It is optional to send several ASP Active Ack messages in response to a single ASP Active message.  A received ASP Inactive must be acknowledged by an ASP Inactive Ack message, if no restriction applies e.g. maintenance.  The sending of Notify message is mandatory if the As state is changed. |
| 4.3.4.4.1 IPSP Considerations (ASP Inactive) | This procedure is mandatory at the interface A.  All comments applicable for section 4.3.4.4 are also applicable for this section. |
| 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 | Note: The use of Transfer restricted message is a national option and is about the scope of this specification.    If the SG knows that the ASP support s 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. |
| 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 | Only the part related to international use in Q.704 is inside the scope of this annex. |
| 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. |
| 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. |
| 5.3.X Normal Withdrawal of the ASP from an Application Server (1+1 sparing) loadsharing and Teardown of Association | The figure is added for clarification. |
| 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 quering 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 |
| 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. | Descriptive text. |

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.

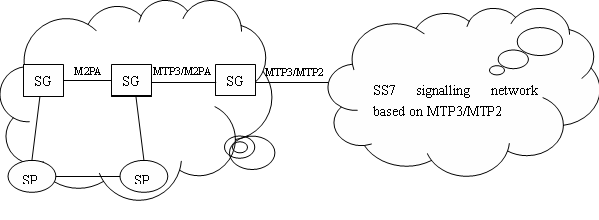


Figure B2.1: Use of M2PA in 3GPP core networks

# 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. |
| 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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **New** |
| Feb 2001 |  |  |  |  | Initial draft | 0.0.2 |
| Feb 2001 |  |  |  |  | Second draft | 0.1.0 |
| Feb 2001 |  |  |  |  | Contributions and comments from TSG-CN WG4#6.1 Madrid Ad Hoc incorporated | 0.2.0 |
| Feb 2001 |  |  |  |  | Contributions and comments from TSG-CN WG4#6.1 Madrid Ad Hoc incorporated and draft further elaborated | 2.0.0 |
| Mar 2001 |  |  |  |  | Comments from TSG-CN WG4#7 incorporated. | 2.1.0 |
| Mar 2001 | CN#11 | NP-010079 |  |  | Annex A: M3UA updated to the latest available version 6  Approved in CN#11 | 4.0.0 |
| May 2001 |  |  |  |  | Foreword added | 4.0.1 |
| Sep 2001 | CN#13 | NP-010452 | 001 |  | Change of M 3UA version | 4.1.0 |
| Sep 2001 | CN#13 |  |  |  | Editorial clean up | 4.1.0 |
| Jun 2002 | CN#16 |  |  |  | Corrupted Figure 5.3/1 fixed | 4.1.1 |
| Jun 2002 | CN#16 |  |  |  | Rel-5 created after CN#16 | 5.0.0 |
| Sep 2002 | CN#17 | NP-020445 | 003 | 1 | Add reference to new IETF RFC on SCTP Checksum | 5.1.0 |
| Dec 2002 | CN#18 | NP-020585 | 007 | 2 | M3UA for 3GPP networks | 5.2.0 |
| Dec 2002 | CN#18 | NP-020585 | 009 |  | IETF RFC reference for M3UA | 5.2.0 |
| Dec 2004 | CN#26 |  |  |  | Rel-6 created after CN#26 | 6.0.0 |
| Jun 2007 | CT#36 |  |  |  | Upgraded unchanged from Rel-6 | 7.0.0 |
| Jun 2007 | CT#36 | CP-070330 | 0013 | 3 | Use of M2PA in 3GPP core network signalling system | 8.0.0 |
| Sep 2007 | CT#37 | CP-070545 | 0014 | 2 | Protocol conformance to RFC4165(M2PA) | 8.1.0 |
| Sep 2007 | CT#37 | CP-070545 | 0015 | 2 | Change of protocol conformance to M3UA | 8.1.0 |
| Dec 2008 | CT#42 |  |  |  | Copyright Notification updated | 8.1.1 |
| 2009-12 | - | - | - | - | Update to Rel-9 version (MCC) | 9.0.0 |
| 2011-03 | - | - | - | - | Update to Rel-10 version (MCC) | 10.0.0 |
| 2011-03 | CT#52 | CP-110371 | 0016 |  | Removing reference to draft-ietf-sigtran-m3ua-implementors-guide-01 | 10.1.0 |
| 2012-09 | - | - | - | - | Update to Rel-11 version (MCC) | 11.0.0 |
| 2014-09 | - | - | - | - | Update to Rel-12 version (MCC) | 12.0.0 |
| 2015-12 | CT#70 | - | - | - | Update to Rel-13 version (MCC) | 13.0.0 |
| 2017-03 | CT#75 | - | - | - | Update to Rel-14 version (MCC) | 14.0.0 |
| 2018-06 | CT#80 | - | - | - | Update to Rel-15 version (MCC) | 15.0.0 |
| 2020-07 | CT#88e | - | - | - | Update to Rel-16 version (MCC) | 16.0.0 |