

ETSI TS 102 142 V1.1.1 (2003-05)

Technical Specification

**Services and Protocols for Advanced Networks (SPAN);
MTP/SCCP/SSCOP and SIGTRAN (Message of SS7 over IP);
Message transfer part 3 User Adaptation layer (M3UA)**

[Endorsement of RFC 3332 (2002), modified]



Reference

DTS/SPAN-130263

Keywords

M3UA, MTP, SCCP, SIGTRAN, SS7,
endorsement

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

Endorsement notice

The Elements of the Internet Engineering Task Force Request for Comments RFC 3332 [1] apply, with the following modifications.

Introduction

The present document records the changes to the Internet Engineering Task Force (IETF) RFC 3332 [1]. This RFC specifies an Internet standard track protocol for the transport of Signalling Systems No.7 (SS7) information over IP using the Stream Control Transmission Protocol.

1 Scope

The present document specifies the requirements for the MTP3 User Adaptation layer (M3UA), when used in conjunction with the Stream Control Transmission Protocol (SCTP) for the transport of the Signalling System No.7 Message Transport Part 3 (MTP3) information over the Internet Protocol (IP). The document endorses and constrains where relevant the SIGTRAN (IETF) RFC 3332 [1] of M3UA.

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

- [1] IETF RFC 3332 (2002): "Signaling System 7 (SS7) Message Transfer Part 3 (MTP3) - User Adaptation Layer (M3UA)", G. Sidebottom, K. Morneault, J. Pastor-Balbas.
 - [2] ETSI TS 102 144: "Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN; SCTP [Endorsement of RFC 2960 and RFC 3309 , modified]".
 - [3] ETSI EN 300 008-1: "Integrated Services Digital Network (ISDN); Signalling System No.7; Message Transfer Part (MTP) to support international interconnection; Part 1: Protocol specification [ITU-T Recommendations Q.701, Q.702, Q.703, Q.704, Q.705, Q.706, Q.707 and Q.708 modified]".
 - [4] ITU-T Recommendation Q.704: "Specifications of Signalling System No. 7, Message Transfer Part, Signalling network functions and messages".
 - [5] ETSI EG 201 693: "Integrated Services Digital Network (ISDN); Signalling System No.7; Master list of codepoints".
 - [6] ETSI TS 102 141: "Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN (Transport of SS7 over IP); Message transfer part 2 User Adaptation layer (M2UA) [Endorsement of RFC 3331 (2002), modified]".
 - [7] ETSI TS 102 143: "Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN (Transport of SS7 over IP); Signalling connection control part User Adaptation layer (SUA) [Endorsement of SIGTRAN-SUA-14 (December 2002), modified]".
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3 Definitions and abbreviations

3.1 Definitions

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

example 1: text used to clarify abstract rules by applying them literally

3.2 Abbreviations

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

AS	Application Server
ASP	AS Process
BEAT	heartBEAT
BEAT Ack	heartBEAT Acknowledgement
DAUD	Destination state AUDit
DRST	Destination ReSTricted
DUNA	Destination UNAvailable
DUPU	Destination User Part Unavailable
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
IP	Internet Protocol
RFC	Request For Comment
SCTP	Stream Control Transmission Protocol
SG	Signalling Gateway
SGP	SG Process
SS7	Signalling System Number 7
TCP	Transmission Control Protocol

4 General considerations applicable to transport of Signalling System No. 7 over IP

The elements of SIGTRAN adaptation layers apply with the following exceptions and restrictions. The considerations in this clause are common to TS 102 141 [6], the present document and TS 102 143 [7].

4.1 Transport protocol

The protocol underlying the adaptation layer for transport of SS No.7 signalling information in IP networks shall be SCTP.

4.2 SCTP considerations

The SCTP used shall conform to TS 102 144 [2].

The SCTP payload protocol identifier for messages pertaining to an adaptation layer shall be the one assigned by IANA for that layer. Adaptation layer messages received with neither the IANA payload protocol identifier nor payload protocol identifier equal to 0 shall be silently discarded.

Unordered user messages shall not be used.

4.3 National options

No national options excluded by ETSI standards shall apply to the present document.

4.4 Application Server mode

The Broadcast mode shall not be used.

4.5 Application Server state handling

If multiple Application Server Processes (ASPs) are used within the AS, the AS shall be considered active when the first ASP becomes active, and shall remain active until the last ASP becomes inactive.

4.6 Dynamic registration

Dynamic registration shall not be used for configuration management. The configuration of the system shall be modified only by the management system, and not by the protocol itself.

4.7 Message distribution to the Application Server

The key to enable messages to be distributed to the appropriate AS shall have a granularity no smaller than is allowed by the network management messages appropriate to that layer.

4.8 Receipt of unrecognized messages

If a message with an unrecognized message class is received, a Management Error message shall be returned with Error Code "Unsupported Message Class".

5 Considerations applicable to M3UA

5.1 National options

No national options excluded by EN 300 008-1 [3] shall apply to the present document.

5.2 Dynamic registration

Dynamic registration of Routing Keys shall not be used for configuration management. The configuration of the system shall be modified only by the management system, and not by the protocol itself.

5.3 Message distribution to the Application Server

The Routing Key to enable messages to be distributed to the appropriate AS shall have a granularity no smaller than Point Code.

5.4 M3UA procedures

The M3UA procedures shall be as defined in RFC 3332 [1] augmented by ITU-T Recommendation Q.704 [4] as modified by EN 300 008-1 [3], except where otherwise defined below.

6 Modifications to RFC 3332

Modifications to RFC 3332 [1] are listed according to the sections and subsections of RFC 3332 [1].

Subsection 1.3.1 Protocol Architecture

SCTP shall be used as the transport protocol for M3UA. TCP shall not be used as the transport protocol for M3UA.

Subsection 1.3.2.1 Support for the Transport of MTP3-User Messages

The maximum signalling information field size shall be 272 octets.

Subsection 1.3.2.3 Interworking with MTP3 Network Management Functions

M3UA at the ASP shall be enabled to initiate audit of availability of remote SS7 destinations. Restricted or congested states should not be audited.

M3UA at the ASP shall be enabled to indicate to SG that the M3UA layer itself or the ASP or the ASP's host is congested.

Subsection 1.4.1 Signalling Point Code Representation

M3UA shall not allow a single point code to represent both the SG and an application server. Alias point codes are not required. Signalling links between mated SGs are outside the scope of this specification.

Subsection 1.4.2.1 Overview

An ASP can belong to one or more application server.

Subsection 1.4.2.4 Message Distribution at the ASP

The behaviour if no active ASP is available is a nodal function.

The default treatment if no matching routing key entry is found for incoming SS7 message is implementation dependent, but layer management shall be informed if the received message is discarded.

Subsection 1.4.6 Congestion Management

How M3UA layer is informed of local and IP network congestion is implementation dependent. However, it is mandatory that the M3UA layer is informed.

When a SG determines that the transport of SS7 messages to a signalling point is encountering congestion, the SG shall trigger SS7 MTP3 TFC management messages to originating SS7 nodes, per the congestion procedures of EN 300 008-1 [3] and ITU-T Recommendation Q.704 [4].

Triggering of SS7 MTP3 management messages from a SG is mandatory. The means of doing this is implementation dependent.

The M3UA layer at an ASP shall indicate local congestion to an M3UA peer via an implementation dependent method.

When the SG receives an SCON from an ASP and determines that a SP is encountering congestion, it shall trigger SS7 MTP3 TFC messages to concerned SS7 destinations according to congestion procedures of EN 300 008-1 [3] and ITU-T Recommendation Q.704 [4]. The receiving node shall be able to detect local congestion and inform the transmitting node of this, by whatever means.

Subsection 1.4.7 SCTP Stream Mapping

SCTP stream mapping is implementation dependent, but any MSUs requiring sequenced delivery with respect to each other, shall be sent over the same stream.

Subsection 1.4.8 Client/Server Model

The SGP shall be able to support SCTP server operation and the ASP shall be able to support SCTP client operation. Support of both SCTP client and SCTP server operation at the ASP or SGP is optional.

Subsection 3.4.1 Destination Unavailable (DUNA)

The SG may suppress the sending of subsequent "response" DUNA messages regarding a certain unreachable SS7 destination for T8 period to give the remote side time to react. See ITU-T Recommendation Q.704 [4] for T8.

It is optional to send an affected point code parameter with more than one affected DPC in it, but the ability to receive this is mandatory.

Subsection 3.4.3 Destination state Audit (DAUD)

Destination state Audit (DAUD), shall be sent from ASP to SGP to audit the availability of SS7 routes from SG to one or more affected destinations. The frequency of the route test messages shall be as described for T10. See ITU-T Recommendation Q.704 [4] for T10. DAUD shall not be sent to audit the congestion or restricted state.

Subsection 3.4.4 Signalling Congestion

The SCON message can be sent from an SGP to all concerned ASPs to indicate that a SG has determined that there is congestion in the SS7 network to one or more destinations. The receiving node shall be able to detect local congestion and inform the transmitting node of this, by whatever means. An SCON can be sent to ASP in response to DATA message, as appropriate. Multiple congestion levels are not supported. SCONs may be sent from the M3UA layer on ASP to M3UA peer indicating that the M3UA layer or ASP is congested.

The sending of an SCON message shall not be delayed in order to collect a number of affected DPCs. Multiple affected DPCs may be included, as long as this does not delay the sending of the SCON message.

Subsection 3.4.5 Destination User Part Unavailable (DUPU)

The values here shall align with the MTP3 User Part Unavailable message and service indicator. Additional service indicator values may also be required. See EG 201 693 [5].

Subsection 3.4.6 Destination Restricted (DRST)

Destination Restricted (DRST), shall not be sent. If DRST is received, it shall be discarded.

Subsection 3.5.5 Heartbeat (BEAT)

M3UA BEAT shall not be used.

Subsection 3.5.6 Heartbeat Acknowledgement (BEAT Ack)

M3UA shall return a BEAT ACK, if a BEAT is received.

Subsection 3.8.1 Error

An "unexpected message" error cause may be sent if a defined and recognized message is received that is not expected. The ASP may optionally discard the message and not send an error message. An "unsupported message class" error shall be sent if a message with an unexpected or unsupported Message Class is received. For a "destination status unknown error", Destination Unavailable (DUNA) shall be used. An error message is not required.

Subsection 4.1.1 Receipt of Primitives from the M3UA-User

The default treatment if no matching routing key entry is found for an incoming SS7 message is implementation dependent, but layer management shall be informed if the received message is discarded.

Subsection 4.2.1 Receipt of M3UA Peer Management Messages

ASPTM message may be sent on a stream used to carry data traffic related to the routing context.

The BEAT ACK shall be sent.

Subsection 4.3.4.1 ASP UP Procedures

ASPTM messages shall only be sent after receipt of ASP-UP ACK.

Subsection 4.3.4.3 ASP Active Procedures

Once an ASP has received ASP-UP-ACK, it shall send ASP_Active message to SGP indicating ASP is ready to start processing traffic. The SGP shall only accept SS7 messages when ASP_Active is received.

Multiple ASP_Active messages may be used to activate Application servers independently, or sets of Application servers, within SCTP limits.

If SGP receives any data messages before ASP_Active message is received, it may discard them. M3UA Transfer and SSNM messages shall only be sent by an ASP after receipt of ASP-Active-Ack.

Where an unexpected ASP_Active message is received the message may be silently discarded, as long as there is no disruption to traffic.

If traffic handling mode of application server is not already known via configuration data, then the traffic handling mode in the received ASP active message shall be used to set the mode.

Subsection 4.3.4.4 ASP Inactive Procedures

For loadshare mode AS, when ASP inactive results in "insufficient ASP resources active in AS", a notify message shall be sent to all inactive ASPs.

Multiple ASP Inactive Ack messages may be used in response to an ASP Inactive message containing multiple routing contexts, within SCTP limits.

Subsection 4.3.4.6 Heartbeat Procedures

A heartbeat echo is mandatory, if M3UA heartbeat is received.

Subsection 4.5.1 At an SGP

DUPU and DAUD shall not be sent unsequenced.

Subsection 4.5.3 ASP Auditing

An ASP shall initiate an audit procedure to enquire of an SGP the availability of SS7 destination(s) every T10 s after a DPC becomes unavailable. It shall not initiate an audit procedure for congested or restricted status of SS7 destination(s). A DAUD shall not be sent unsequenced and shall be sent periodic (via T10) or in case of isolation (ASP newly active/inactive). A DUNA or DAVA in response to a DAUD shall contain 1 or a list of affected point codes. The maximum number of affected DPCs that can be included shall be in line with the SCTP limits. A SG may discard the received request, or it may respond with a DUNA, if the ASP is not authorized to receive availability information of the concerned PC(s).

Subsection 4.6 MTP3 Restart

The ASP shall audit the availability of unavailable destinations by sending DAUD messages.

Section 6 Security Considerations

Security is out of scope of the present document.

Section 7 IANA Considerations

It is recommended that for server operation the IANA registered port number for M3UA is set to 2905. SGPs may also use statically configured SCTP port numbers. The payload protocol ID (3), for M3UA, shall be used. If an unrecognizable payload protocol ID (i.e. neither 0 nor 3) is received, the message shall be silently discarded.

History

Document history		
V1.1.1	May 2003	Publication