

# SS7 MTP-L3 and M3UA IETF IETF RFC 4666

## Statement of Compliance

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### STATEMENT OF COMPLIANCE

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# 1 General

## 1.1 Introduction

This document details how the Ericsson SS7 MTPL3& M3UA IETF (M3-IETF) signaling component conforms with the IETF RFC 4666 Reference [1] . Conformance is considered on a per-section basis. The M3-IETF signaling component is compliant with a section provided it conforms with everything in the section, irrespective of requirement level (that is irrespective of the keywords "MAY", "MUST", "SHOULD" so on.)

Note that the Ericsson SS7 M3-IETF signaling component comprises the functionality of both the MTP-L3 and the M3UA protocols, however, this document considers only the M3UA protocol.

## 1.2 Concept

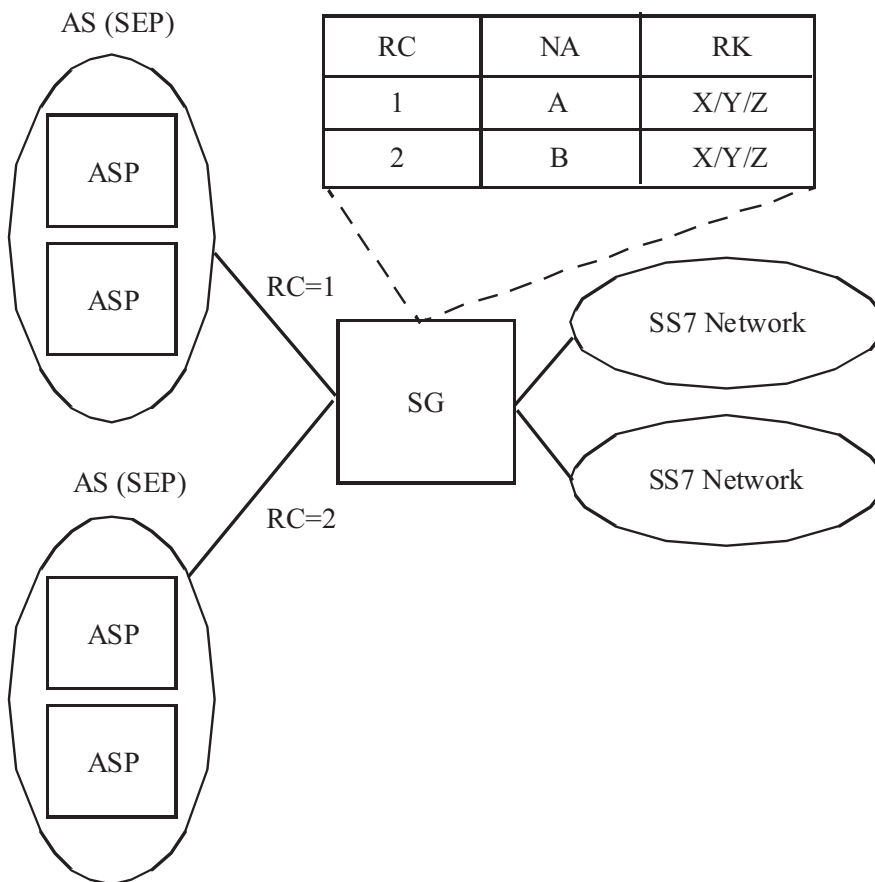
This section will explain the different concepts that will be used in the compliance lists. The terms that are used are:

<b>C</b>	The Ericsson signaling component complies with the specified section in the standard.
<b>N</b>	The Ericsson signaling component does not comply with the specified section in the standard.
<b>P</b>	The Ericsson signaling component complies partly with the specified section in the standard.
<b>-</b>	There is nothing to implement in the referred section (always placed in column C).

## 1.3 Concepts

Figure 1 illustrates how routing is performed according to the IETF M3UA standard. A RK describes a set of SS7 parameter values (for example a RK could consist of the tuple DPC/SI/SSN) that uniquely defines the range of signaling traffic to be handled by a particular Application Server (AS).

Sometimes as it is shown in Figure 1 two or more SS7 networks are connected to the same Signaling Gateway (SG), a Network Appearance (NA) is appended to the RK to make the RK unique. There is a relationship between NA in M3UA part and local NodeId in MTPL3 part. This relationship is defined by means of configuration file.



**Figure 1** Routing According to the IETF M3UA Standard

To obtain redundancy in IETF\_M3UA an AS may comprise several process instances - so called Application Server Processes (ASP). Commonly, these ASPs are configured to work in a primary/backup relationship, that is only one of the ASPs is active at anyone time, the rest are in standby, ready to take over in case the active ASP fails, see Figure 1.



## 2 Compliance Lists

### 2.1 RFC 4666

Table 1

References		C	N	P	Comments
Section	Title				
-	Abstract	X			
1.0	Introduction	-			
1.1	Scope	X			
1.2	Terminology	X			
1.3	M3UA Overview	-			
1.3.1	Protocol Architecture	X			
1.3.2	Services Provided by the M3UA Layer	X			
1.3.2.1	Support for the Transport of MTP3-User Messages	X			
1.3.2.2	Native Management Functions	X			
1.3.2.3	Inter-working with MTP3 Network Management Functions	X			
1.3.2.4	Support for the Management of SCTP associations between the SG and ASPs	X			
1.3.2.5	Support for the Management of Connections to Multiple SGs	X			
1.4	Functional Areas	-			
1.4.1	Signaling Point Code Representation	X			
1.4.2	Routing Contexts and Routing Keys	-			
1.4.2.1	Overview	X			Note 17 on Page 13
1.4.2.2	Routing Key Limitations	X			

Table 1

References		C	N	P	Comments
Section	Title				
1.4.2.3	Managing Routing Contexts and Routing Keys			X	Dynamic registration of Routing Keys is not supported
1.4.2.4	Message Distribution at the SGP	X			
1.4.2.5	Message Distribution at the ASP	X			
1.4.3	SS7 and M3UA Interworking	X			
1.4.3.1	Signaling Gateway SS7 Layers	X			
1.4.3.2	SS7 and M3UA Interworking at the SG	X			
1.4.3.3	Application Server	X			
1.4.3.4	IPSP Considerations	X			
1.4.4	Redundancy Models	-			
1.4.4.1	Application Server Redundancy	X			
1.4.5	Flow Control	X			
1.4.6	Congestion Management	X			Note 1 on Page 11
1.4.7	SCTP Stream Mapping	X			Note 2 on Page 11
1.4.8	Client/Server Model			X	Note 3 on Page 11
1.5	Sample Configurations	-			
1.5.1	Example 1: ISUP message transport	X			
1.5.2	Example 2: SCCP Transport between IPSPs	X			
1.5.3	Example 3: SG resident SCCP layer, with remote ASP	X			
1.6	Definition of M3UA Boundaries	X			
1.6.1	Definition of the Boundary between M3UA and an MTP3-User	X			
1.6.2	Definition of the Boundary between M3UA and SCTP	-			





Table 1

References		C	N	P	Comments
Section	Title				
1.6.3	Definition of the Boundary between M3UA and Layer Management			X	Note 5 on Page 12, Note 6 on Page 12
2.0	Conventions	-			
3.0	M3UA Protocol Elements	X			
3.1	Common Message Header	X			Note 16 on Page 13
3.1.1	M3UA Protocol Version: 8 bits (unsigned integer)	X			
3.1.2	Message Classes and Types			X	RKM messages are not supported.
3.1.3	Reserved: 8 Bits	X			
3.1.4	Message Length: 32-Bits (Unsigned Integer)	X			
3.2	Variable-Length Parameter Format	X			
3.3	Transfer Messages	-			
3.3.1	Payload Data Message (DATA)	X			Note 7 on Page 12 Note 18 on Page 13
3.4	SS7 Signaling Network management (SSNM) Messages	-			
3.4.1	Destination Unavailable (DUNA)	X			Note 18 on Page 13
3.4.2	Destination Available (DAVA)	X			Note 18 on Page 13
3.4.3	Destination State Audit (DAUD)	X			Note 18 on Page 13
3.4.4	SS7 Network Congestion (SCON)	X			Note 18 on Page 13
3.4.5	Destination User Part Unavailable (DUPU)	X			Note 8 on Page 12, Note 13 on Page 13 Note 18 on Page 13
3.4.6	Destination Restricted (DRST)	X			Note 18 on Page 13

Table 1

References		C	N	P	Comments
Section	Title				
3.5	Application Server Process Maintenance Messages	-			
3.5.1	ASP Up	X			Note 12 on Page 12
3.5.2	ASP Up Acknowledgement (ASP Up Ack)	X			
3.5.3	ASP Down	X			Note 12 on Page 12
3.5.4	ASP Down Acknowledgement (ASP Down Ack)	X			
3.5.5	Heartbeat (BEAT)	X			
3.5.6	Heartbeat Ack (Beat-Ack)	X			
3.6	Routing Key Management (RKM) Messages [Optional]	-			
3.6.1	Registration Request (REG REQ)		X		Message is not implemented
3.6.2	Registration Response (REG RSP)		X		Message is not implemented
3.6.3	Deregistration Request (DEREG REQ)		X		Message is not implemented
3.6.4	Deregistration Response (DEREG RSP)		X		Message is not implemented
3.7	ASP Traffic Maintenance (ASPTM) Messages	-			
3.7.1	ASP Active			X	Note 9 on Page 12, Note 12 on Page 12
3.7.2	ASP Active Acknowledgement (ASP Active Ack)	X			
3.7.3	ASP Inactive	X			Note 12 on Page 12
3.7.4	ASP Inactive Acknowledgement (ASP Inactive Ack)	X			
3.8	Management Messages	-			
3.8.1	Error	X			
3.8.2	Notify	X			
4.0	Procedures	-			
4.1	Procedures to Support the Services of the M3UA Layer	-			



Table 1

References		C	N	P	Comments
Section	Title				
4.1.1	Receipt of Primitives from the M3UA-User	X			
4.2	Receipt of Primitives from the Layer Management	X			
4.2.1	Receipt of M3UA Peer Management Messages	X			
4.3	AS and ASP/IPSP State Maintenance	X			
4.3.1	ASP/IPSP States	X			Note 10 on Page 12
4.3.2	AS States	X			
4.3.3	M3UA Management Procedures for Primitives	X			
4.3.4	M3UA Management Procedures for Peer-to-Peer Messages	-			
4.3.4.1	ASP-Up Procedures	X			
4.3.4.2	ASP-Down Procedures	X			
4.3.4.3	ASP-Active Procedures	X			
4.3.4.4	ASP Inactive Procedures	X			
4.3.4.5	Notify Procedures	X			
4.3.4.6	Heartbeat Procedures	X			
4.4	Routing Key Management Procedures [Optional]	-			
4.4.1	Registration		X		No dynamic registration procedure is implemented
4.4.2	Deregistration		X		No dynamic deregistration procedure is implemented
4.4.3	IPSP Considerations (REG/DEREG)		X		This implementation does not support dynamic registration /deregistration of RK
4.5	Procedures to Support the Availability or Congestion Status of SS7 Destination	-			

Table 1

References		C	N	P	Comments
Section	Title				
4.5.1	At an SGP	X			
4.5.2	At an ASP	-			
4.5.2.1	Single SG Configurations	X			
4.5.2.2	Multiple SG Configurations	X			
4.5.3	ASP Auditing	X			
4.6	MTP3 Restart	X			
4.7	NIF Not Available	-			Note 4 on Page 12
4.8	M3UA Version Control	X			
4.9	M3UA Termination	X			
5.0	Examples of M3UA Procedures	-			
5.1	Establishment of Association and Traffic between SGs and ASPs	-			
5.1.1	Single ASP in an Application Server ("1+0" sparing), No Registration	-			
5.1.1.1	Single ASP in an Application Server ("1+0" Sparing), No Registration	X			
5.1.1.2	Single ASP in Application Server ("1+0" Sparing), Dynamic Registration		X		Dynamic registration of RK is not supported
5.1.1.3	Single ASP in Multiple Application Servers (Each with "1+0" Sparing), Dynamic Registration (Case 1 - Multiple Registration Requests)		X		Dynamic registration of RK is not supported
5.1.1.4	Single ASP in Multiple Application Servers (each with "1+0" sparing), Dynamic Registration (Case 2 - Single Registration Request)		X		Dynamic registration of RK is not supported
5.1.2	Two ASPs in Application Server ("1+1" Sparing)	X			



Table 1

References		C	N	P	Comments
Section	Title				
5.1.3	Two ASPs in an Application Server ("1+1" Sparing, Loadsharing Case)	X			
5.1.4	Three ASPs in an Application Server ("n+k" Sparing, Loadsharing Case)	X			
5.2	ASP traffic Failover Examples	-			
5.2.1	1+1 Sparing, Withdrawal of ASP, Backup Override	X			
5.2.2	1+1 Sparing, Backup Override	X			
5.2.3	n+k Sparing, Loadsharing Case, Withdrawal of ASP	X			
5.3	Normal Withdrawal of an ASP from an Application Server	X			
5.4	Auditing Examples	-			
5.4.1	SG State: Uncongested/Available	X			SCON is always sent in answer to DAUD
5.4.2	SG State: Congested (Congestion Level=2) /Available	X			
5.4.3	SG State: Unknown/Available	X			
5.4.4	SG State: Unavailable	X			
5.5	M3UA/MTP3-User Boundary Examples	X			
5.5.1	5.5.1 At an ASP	-			
5.5.1.1	Support for MTP-TRANSFER Primitives at the ASP	X			
5.5.2	At an SGP	-			
5.5.2.1	Support for MTP-TRANSFER Request Primitive at the SGP	X			Note 14 on Page 13, Note 11 on Page 12

Table 1

References		C	N	P	Comments
Section	Title				
5.5.2.2	Support for MTP-TRANSFER Indication Primitive at the SGP	X			Note 14 on Page 13
5.5.2.3	Support for MTP-PAUSE, MTP-RESUME, MTP-STATUS Indication Primitives	X			
5.6	Examples for IPSP Communication	-			
5.6.1	Single Exchange	X			
5.6.2	Double Exchange	X			
6.0	Security Considerations		X		
7.0	IANA Considerations	-			
7.1	SCTP Payload Protocol Identifier	X			
7.2	M3UA Port Number	X			
7.3	M3UA Protocol Extensions		X		Note 15 on Page 13
7.3.1	IETF-Defined Message Classes	-			
7.3.2	IETF Defined Message Types		X		Note 15 on Page 13
7.3.3	IETF-Defined Parameter Extension		X		Note 15 on Page 13
8.0	Acknowledgements	-			
9.0	Document Contributors	-			
10.0	References	-			
10.1	Normative References	-			
10.2	Informative References	-			
-	Appendix A	-			
A.1	Signaling Network Architecture	X			
A.2	Redundancy Models	-			



Table 1

References		C	N	P	Comments
Section	Title				
A.2.1	Application Server Redundancy	X			
A.2.2	Signaling Gateway Redundancy	X			

## 2.2 Notes and Comments

### Note 1

M3-IETF supports three types of congestion management: Signaling of congestion in International Networks, in National Networks which uses multiple congestion levels and which employ congestion priorities, and finally, signaling of congestion in National Networks which uses multiple congestion levels, but which do not employ congestion priorities. If M3-IETF resides in a SG and an SCON message is received which is destined to an SS7SEP, the SCON message triggers the generation of a TFC message. Conversely, if M3-IETF resides in a SG and a TFC message is received which is destined to a IPSEP, the TFC message triggers an SCON message to be sent. Except for the translation between TFC and SCON messages, the congestion management of M3UA part of M3-IETF works essentially in the same way as the MTP-L3 congestion management in National networks with multiple congestion levels. However, it should be noted that even though M3UA part of M3-IETF supports multiple congestion levels, SCTP is only able to signal congestion onset and congestion abatement. Thus, when an SCON message is triggered by congestion on a link in the IP network, M3-IETF will only signal congestion onset and congestion abatement. In National Networks with multiple congestion levels, M3-IETF will set the congestion level of the triggered SCON message to the highest defined congestion level. Typically, this means a congestion level of 3.

### Note 2

Within an SCTP association, a stream is selected using the SLS. See Reference [3], Chapter 4.8 for the details.

- Note 3** All process types (ASP, SGP and IPSP) are able to act as client or server. As an option the endpoint can also be configured to work at the same time as client and server, i.e. to take role of client or server for initiating SCTP associations. In current implementation the role on SCTP layer is combined with the role on M3UA layer so that SCTP client will as well start ASPSM and ASPTM procedures whether it be ASP, SGP or IPSP. One of the consequences is that IPSP Double Exchange scenario can only be activated correctly in client/peer relationsheep.
- Note 4** The NIF component are part of the Ericsson SS7 MTPL3& M3UA IETF signaling component.
- Note 5** The following messages are not supported by M3-IETF: see Table 2.
- Note 6** M3-IETF interface supports to a large extent the same functionality as the IETF M3UA interface. The Page 14 summarizes the compliance of the M3-IETF interface with respect to the IETF M3UA interface. Following TLV parameters are supported by M3-IETF: see Table 4.
- Note 7** The optional parameter "Correlation Id" is never sent by M3-IETF. If received, this parameter is discarded without prior notification to the UP.
- Note 8** The optional parameter "Concerned Destination" can optionally be included in DUPU message in those cases the DUPU message is triggered by an UPU message. The OPC specified in the UPU becomes the "Concerned Destination" in the DUPU message.
- Note 9** Broadcast traffic mode is not supported.
- Note 10** The two primitives SCTP CDI and SCTP RI are not supported by M3-IETF, instead these primitives essentially corresponds to the primitives SCTP\_COMM\_LOST\_ind and SCTP\_ASSOC\_RESTART\_ind, respectively.
- Note 11** The concept NA is used by M3-IETF to discriminate the traffic between different local nodes on SGP. There is mapping table in SGP which defines NA for every local NodeId. When routing DATA messages on SGP RC is used first while determining NodeId. If RC is absent or useless NA is used.





- Note 12** ASPUP, ASPAC, ASIA and ASPDN message can be sent not only by ASP and IPSP but also by SGP. Roles in ASPSM/ASPTM messaging are governed by “ASP messaging” configuration parameter.
- Note 13** As a configuration option DUPU message can also be used by ASP to answer a DATA message destined to unavailable user.
- Note 14** It is possible to have a local User at an SGW. This User can communicate with both SS7 and IP networks as a common user at an SS7SEP or IPSEP correspondingly.
- Note 15** As an extension to RFC4666 in this implementation DUPU message can be sent in ASP to SGP direction. Also an optional “Concerned Destination” parameter can be put into DUPU message. These extensions have not been registered through IANA.
- Note 16** When M3-IETF sends any message over SCTP it provides to SCTP parameter “Protocol Id”. This parameter isn't coded in network byte order. It is not violation of RFC4666 because “Protocol Id” is not part of the M3UA message it is part of the SCTP message.
- Note 17** It is possible to configure not RFC compliant behavior of RC supporting. The parameter “RC Handling” for remote SP determines which of the behaviors will be used: RFC compliant or E-Sigtran compliant. This allows M3-IETF to communicate with E-Sigtran compliant implementation of M3UA even when more than one AS is served by remote SP. In this case M3-IETF handles MGMT, ASPTM and DATA messages without RC even if RC is a mandatory parameter according to RFC4666. M3-IETF also sends such messages without RC. In addition to E-Sigtran compliant behavior the parameter “RC Handling” determines the ability to ignore Routing Context parameter from an incoming message. In this case M3-IETF will process the message as if it did not contain RC.
- Note 18** It is possible to configure not RFC compliant behavior of including NA into DATA and SSNM messages. The Bit 1 of the parameter “Remote SP Extended Options” for remote SP determines which of the behaviors will be used: whether NA should be mandatory parameter for these messages or not. If Bit 1 is set to 1, NA parameter should always be included into messages whether it is configured for this remote SP or not.

Table 2

Message Class	Message Type	Comment
RKM	REG REQ	(1)
	REG RSP	(1)
	DEREG REQ	(1)
	DEREG RSP	(1)

(1) Message never sent by M3-IETF, and when received, M3-IETF responds by sending an ERROR message with error code 0x03 (Unsupported Message Class).

Table 3

IETF M3UA Primitive	M3-IETF
M-SCTP_ESTABLISH request	Supported.
M-SCTP_ESTABLISH confirm	Supported.
M-SCTP_ESTABLISH indication	Supported.
M-SCTP_RELEASE request	Supported.
M-SCTP_RELEASE confirm	Supported.
M-SCTP_RESTART indication	Supported.
M-SCTP_STATUS request	Supported.
M-SCTP_STATUS confirm	Supported.
M-SCTP_STATUS indication	Supported.
M-ASP_STATUS request	Supported.
M-ASP_STATUS confirm	Supported.
M-AS_STATUS request	Supported.
M-AS_STATUS confirm	Supported.
M-NOTIFY indication	Supported.
M-ERROR indication	Supported.
M-ASP_UP request	Supported.
M-ASP_UP confirm	Supported.
M-ASP_UP indication	Supported.
M-ASP_DOWN request	Supported.
M-ASP_DOWN indication	Supported.
M-ASP_ACTIVE request	Supported.
M-ASP_ACTIVE confirm	Supported.



Table 3

<b>IETF M3UA Primitive</b>	<b>M3-IETF</b>
M-ASP_ACTIVE indication	Supported.
M-ASP_INACTIVE request	Supported.
M-ASP_INACTIVE confirm	Supported.
M-ASP_INACTIVE indication	Supported.
M-AS_ACTIVE indication	Supported.
M-AS_INACTIVE indication	Supported.
M-AS_DOWN indication	Supported.
M-RK_REG request	Not supported.
M-RK_REG confirm	Not supported.
M-RK_DEREG request	Not supported.
M-RK_DEREG confirm	Not supported.
M-RK_DEREG indication	Not supported.

Table 4

<b>TLV Parameter</b>	<b>Parameter ID</b>
Info String	0x0004
Routing Context	0x0006
Diagnostic Information	0x0007
Heartbeat Data	0x0009
Traffic Mode Type	0x000b
Error Code	0x000c
Status	0x000d
ASP Identifier	0x0011
Affected Point Code	0x0012
Network Appearance	0x0200
User/Cause	0x0204
Congestion Indications	0x0205
Concerned Destination	0x0206
Local Routing Key Identifier	0x020a
Protocol Data	0x0210





# Glossary

**AS**

Application Server

**ASP**

Application Server Process

**ASPSM**

Application Server Process State Maintenance

**ASPTM**

Application Server Process Traffic Maintenance

**DAUD**

Destination State Audit

**DAVA**

Destination Available

**DPC**

Destination Point Code

**DRST**

Destination Restricted

**DUNA**

Destination Unavailable

**DUPU**

Destination User Part Unavailable

**E-M3UA**

Ericsson SS7 MTPL3&M3UA Signaling Component

**IANA**

Internet Assigned Number Authority

**IETF**

Internet Engineering Task Force

**IP**

Internet Protocol

**IPSP**

IP Server Process

**ITU**

International Telecommunications Union

**LFU**

Link Forced Uninhibit

**M3**

SS7 MTP-L3 & M3UA

**M3-IETF**

SS7 MTP-L3 & M3UA-IETF

**M3UA**

MTPL3 User Adaptation Layer

**MTP3**

Message Transfer Part Level 3

**MTP-L3**

Message Transfer Part Level 3

**NA**

Network Appearance

**NI**

Network Indicator

**OPC**

Originating Point Code

**RC**

Routing Context

**RK**

Routing Key

**RKM**

Routing Key Management

**SCON**

Signaling Congestion

**SCTP**

Stream Control Transmission Protocol

**SEP**

Signaling Endpoint



**SG**

Signaling Gateway (M3UA)

**SGP**

Signaling Gateway Process

**SI**

Service Indicator

**SP**

Signaling Point

**SPMC**

Signaling Point Management Cluster

**SS7**

Signaling System No. 7

**SS7SEP**

Signaling Endpoint in an SS7 network

**SSN**

Subsystem Number

**SSNM**

SS7 Signaling Network Management Messages

**STP**

Signaling Transfer Point

**TFC**

TransFer Control signal

**UP**

User Part



## Reference List

### IETF Standard

- [1] *K. Morneault, J. Pastor-Balbas eds., Signaling System 7 (SS7) Message Transfer Part 3 (MTP3) - User Adaptation Layer (M3UA), RFC 4666, September 2006.*

### ITU Standard

- [2] *Signaling network functions and messages, ITU-T, Q.704.*

### M3-IETF FS

- [3] *Function Specification for MTPL3 & M3UA IETF, 155 17-CAA 901 1817 Uen.*