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

Foreword

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

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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

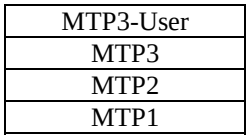

Figure 5.1/1: Protocol architecture in the case of MTP-based SS7 signalling transport network

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

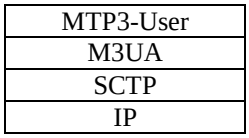

Figure 5.2/1: M3UA architecture in the case of IP-based SS7 signalling transport network

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

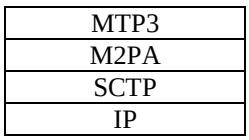

Figure 5.2/2: M2PA architecture in the case of IP-based SS7 signalling transport network

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.