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Technical Specification

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Foreword

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

The present document provides a mechanism giving reliable transfer of signalling messages between the Serving GPRS Support Node (SGSN) and the data base of a Visitors Location Register (VLR) for co-ordination between GSM circuit switched services and GSM packet data services within the 3GPP system.

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   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 specification;

Introduction

The present document specifies or references the necessary information to provide a reliable transfer of signalling messages between the Serving GPRS Support Node (SGSN) and the Visitors Location Register (VLR). This reliable transfer of messages is provided by the Network Service Part (NSP) of the Signalling System No 7 (SS7). This documents specifies or references the subset of MTP and SCCP to be used in the Gs interface.

1 Scope

The present document specifies or references the subset of MTP and SCCP which is used for the reliable transport of BSSAP+ messages in the Gs interface. The present document references the 3GPP TS 29.202 which specifies alternative transport layers that can be applied instead of the MTP. The present document also specifies the SCCP addressing capabilities to be provided in the Gs interface.

The present document is divided into two main parts, clause 5 dealing with the use of MTP and clauses 6 and 7 dealing with the use of SCCP.

Clause 5 of the present document deals with the subset of the MTP that is required between an SGSN and a VLR. It is intended that this implementation of MTP is compatible with a full MTP implementation. Clause 4 references the 3GPP TS 29.202 which specifies alternatives to the MTP.

The SCCP is used to provide message routing between the SGSN and the VLR. The SCCP routing principles specified in the present document allow to connect one SGSN to several VLR. No segmentation at SCCP level is needed on the Gs interface. Only SCCP class 0 is used on the Gs interface. Clauses 6 and 7 identify the SCCP subset that should be used between an SGSN and an VLR.

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] Void.

[1a] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.060: "General Packet Radio Service (GPRS); Service description; Stage 1".

[3] 3GPP TS 23.003: "Numbering, addressing and identification".

[4] 3GPP TS 43.022: "Functions related to Mobile Station (MS) in idle mode and group receive mode".

[5] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

[6] 3GPP TS 48.006: "Signalling transport mechanism specification for the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[7] 3GPP TS 48.008: "Mobile-services Switching Centre - Base Station System (MSC - BSS) interface; Layer 3 specification".

[8] 3GPP TS 48.018: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS Protocol (BSSGP)".

[9] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[10] 3GPP TS 49.008: "Application of the Base Station System Application Part (BSSAP) on the E-interface".

[11] 3GPP TS 29.018: "General Packet Radio Service (GPRS); Serving GPRS Support Node (SGSN) - Visitors Location Register (VLR); Gs interface Layer 3 specification".

[12] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[13] ITU-T Recommendation Q.711: "Functional description of the signalling connection control part".

[14] ITU-T Recommendation Q.712: "Definition and function of signalling connection control part messages".

[15] ITU-T Recommendation Q.713: "Signalling connection control part formats and codes".

[16] ITU-T Recommendation Q.714: "Signalling connection control part procedures".

[17] ITU-T Recommendation Q.702: "Signalling data link".

[18] ITU-T Recommendation Q.703: "Signalling link".

[19] ITU-T Recommendation Q.704: "Signalling network functions and messages".

[20] ITU-T Recommendation Q.707: "Testing and maintenance".

[21] ANSI T1.111 (1996):"Signalling System No. 7 (SS7); Message Transfer Part".

[22] ANSI T1.112 (1996): "Signalling System No. 7 (SS7); Signalling Connection Control Part Functional Description".

[41] 3GPP TS 29.202: "Signalling System No. 7 (SS7) signalling transport in core network; Stage 3".

2.2 Informative references

[23] 3GPP TS 22.001: "Principles of telecommunication services supported by a GSM Public Land Mobile Network (PLMN)".

[24] 3GPP TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

[25] 3GPP TS 22.003: "Circuit Teleservices supported by a Public Land Mobile Network (PLMN)".

[26] Void.

[27] Void.

[28] 3GPP TS 43.064: "Overall description of the GPRS Radio interface; Stage 2".

[29] 3GPP TS 24.002: "GSM - UMTS Public Land Mobile Network (PLMN) access reference configuration".

[30] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[31] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core network protocols; Stage 3".

[32] 3GPP TS 44.065: "Mobile Station (MS) - Serving GPRS Support Node (SGSN); Subnetwork Dependent Convergence Protocol (SNDCP)".

[33] 3GPP TS 48.060: "Inband control of remote transcoders and rate adaptors for Enhanced Full Rate (EFR) and full rate traffic channels."

[34] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp Interface".

[35] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting Packet Based services and Packet Data Networks (PDN)".

[36]   Void.

[37]   Void.

[38]   Void.

[39]   Void.

[40]   Void.

3   Definitions, symbols and abbreviations

Unless listed below, the definitions, symbols and abbreviations are listed in 3GPP TR 21.905 and 3GPP TS 23.060.

4   Configuration of the Gs interface

The Gs interface connects the Serving GPRS Support Node (SGSN) to the Visitors Location Register (VLR). This interface is defined in the 64 kbit/s for E1 interface and for 64 kbit/s or 56 kbit/s for T1 interface boundary of an SGSN to a VLR or of a VLR to an SGSN. The configuration of the Gs interface shall not impose any restriction on the number of VLRs or SGSNs to be connected by the Gs interface. The Gs interface definition shall support an early implementation of GPRS when one SGSN may be connected to several VLRs or a more mature implementation when several SGSNs may be connected to one VLR. Therefore the interface shall support the use of an STP.

The level of resilience in the Gs interface is determined by the operator, however it is recommended that the operator considers the use of more than one multiplex system between the SGSN and the VLR. Each multiplex system should be used to carry one signalling link and routing diversity should be provided among the signalling links to increase the resilience of the system.

4.1   Use of Protocol Stacks

BSSAP+ shall be transported over SCCP and the transport layers specified in 3GPP TS 29.202. The protocol stack is shown in figure 4.1.

When MTP is used to transport BSSAP+ then the conformance rules specified in clause 5 shall apply.

| BSSAP+ |
| SCCP |
| Transport layers as specified in 3GPP TS 29.202 |
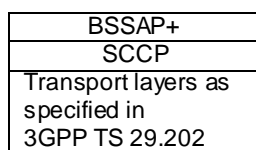
Figure 4.1: Protocol stack for the transportation of BSSAP+

5   Conformance to message transfer part (MTP)

5.1   General

The MTP functions as specified in ITU-T Recommendations Q.702, Q.703, Q.704 and Q.707 for E1 interface and ANSI T1.111 Recommendations for the T1 interface are applicable. However, the following subclauses provide a minimum set of MTP requirements that shall be implemented at a SGSN or VLR to support the functionality required by the BSSAP+ protocol in the Gs interface. The set of exceptions and modifications to those recommendations maintain compatibility with the implementation of a full specification of the MTP. The ITU-T recommendations for E1 interface and ANSI recommendation for T1 interface concerning the MTP shall be taken as requirements unless covered by a statement in the present document.

5.2 MTP Level 1

The MTP level 1 exceptions and modifications to ITU-T Recommendation Q.702 and ANSI T1.111 Recommendation can be found in 3GPP TS 48.006 subclause 3.2.

5.3 MTP Level 2

5.3.1 MTP Level 2 for E1 Interface

The MTP level 2 exceptions and modifications to ITU-T Recommendation Q.703 are listed below.

- ITU-T Recommendation Q.703, subclause 1.4:

  - Only the basic error correction protocol is required.

- ITU-T Recommendation Q.703, clause 6:

  - Not applicable, only basic error correction is required.

- ITU-T Recommendation Q.703, clause 7:

  - Both the SGSN and the VLR may apply the emergency proving period or the normal proving period in the initial alignment procedure. If all the signalling links between the two entities are unavailable then the SGSN or the VLR shall apply the emergency proving period until one signalling link becomes available.

- ITU-T Recommendation Q.703, clause 8:

  - The processor outage status indicator shall be recognised at the SGSN and the VLR and the procedures defined in ITU-T Recommendation Q.703 clause 8 supported. The SGSN and the VLR should support the generation of the processor outage indication towards the peer entity if this is appropriate.

5.3.2 MTP Level 2 for T1 Interface

The MTP level 2 exceptions and modifications to ANSI T1.111.3 are listed below.

- ANSI T1.111.3, subclause 1.4:

  - Only the basic error correction protocol is required (subclause 1.4.3 is not required).

- ANSI T1.111.3, clause 6:

  - Not applicable, only basic error correction is required.

- ANSI T1.111.3, clause 7:

  - Both the SGSN and the VLR may apply the emergency proving period or the normal proving period in the initial alignment procedure. If all the signalling links between the two entities are unavailable the SGSN or the VLR shall apply the emergency proving period until one signalling link becomes available.

- ANSI T1.111.3, clause 8:

  - The processor outage status indicator shall be recognised at the SGSN and the procedures defined in ANSI T1.111.3 clause 8 supported. The SGSN and the VLR shall support the generation of the processor outage indication towards the peer entity if this is appropriate.

5.4 MTP Level 3

5.4.1 MTP Level 3 for E1 Interface

The Gs interface may be configured as a point to point interface or may use an intermediate SS7 network. In this last case an SGSN or a VLR may act always as end points of the Gs interface (SP functionality) or may be configured to act

as an transfer point between a VLR and an SGSN (SP and STP functionality). The MTP level 3 exceptions and modifications to ITU-T Recommendation Q.704 are listed regarding whether the SGSN and the VLR are connected by a point to point link or are configured to act as SPs in an SS7 network or if they support STP functionality.

Subclause 5.4.1.1 applies to all configurations of the Gs interface. In subclause 5.4.1.2 the exceptions and modifications to ITU-T Recommendation Q.704 are listed depending upon the configuration of the Gs interface, whether it is a point to point interface or the SGSN and VLR act as an SP only or as SP and STP. Subclause 5.4.1.3 provides points of clarification about the ITU-T Recommendation Q.704.

5.4.1.1 General clauses

The MTP level 3 exceptions and modifications to ITU-T Recommendation Q.704 regardless of whether the SGSN supports STP functionality are listed below.

- ITU-T Recommendation Q.704, subclause 2.3.5:

    - Either of the two methods of congestion control is acceptable. The most appropriate method is dependent on national ITU-T No. 7 implementations.

- ITU-T Recommendation Q.704, subclause 2.4:

    - The signalling point code for an SGSN may be included in the national signalling point code scheme or in a separate signalling network.

- ITU-T Recommendation Q.704, subclause 3.8.2:

    - There are two acceptable methods of congestion control defined in ITU-T Recommendation Q.704, in subclauses 3.8.2.1 a) and b). The most appropriate method is dependent on national ITU-T No. 7 implementations. Each administration should specify its congestion threshold setting algorithm and nodal congestion abatement procedures at system procurement.

- ITU-T Recommendation Q.704, clause 12:

    - Only basic link management procedures are required.

- ITU-T Recommendation Q.704, subclause 14.2.1:

    - Since all messages are passed using the SCCP, the service indicator for Gs interface operation will be:

        bits   D   C   B   A

             0   0   1   1

- ITU-T Recommendation Q.704, subclause 14.2.2:

    - The sub service field for Gs interface operation will always be set to one of the following values:

        bits   D C

             1 0 national network

             1 1 local network

- ITU-T Recommendation Q.704, clause 15:

    - The formats and codes listed are only relevant to the messages that are required, i.e. those not excluded in the rest of this recommendation.

5.4.1.2 Configuration dependent clauses

The MTP level 3 exceptions and modifications to ITU-T Recommendation Q.704 are permitted if the SGSN or the VLR does not support STP functionality are listed below.

- ITU-T Recommendation Q.704, subclause 1.1.2:

- If the Gs interface is configured as a point to point interface, then there will be no signalling network management features which need to be considered.

- ITU-T Recommendation Q.704, clause 2:

  - If STP functionality is not required the discrimination function of the MTP used for GPRS application can be significantly simplified.

NOTE: If the implementation of this interface is for point to point application the routing function within the MTP will be present to select the point code appropriate to the parent VLR.

- ITU-T Recommendation Q.704, subclause 2.3:

  - If the implementation of the Gs interface is point to point, load sharing between linksets is not required since there will only be one linkset between SGSN and VLR.

- ITU-T Recommendation Q.704, subclause 2.4:

  - At an SGSN or VLR that does not implement STP functionality, only messages with a correctly checking DPC will be accepted. Others will be discarded. It is recommended that discarding a message because of an incorrectly set point code causes an incident report to be generated.

- ITU-T Recommendation Q.704, subclause 3.1.3 c):

  - In a point to point configuration there is no requirement for signalling route management.

- ITU-T Recommendation Q.704, subclause 3.3.2.3:

  - In a point to point configuration there is no requirement for signalling route management.

- ITU-T Recommendation Q.704, subclause 3.3.3.3:

  - In a point to point configuration there is no requirement for signalling route management.

- ITU-T Recommendation Q.704, subclause 3.3.4.3:

  - In a point to point configuration there is no requirement for signalling route management.

- ITU-T Recommendation Q.704, subclause 3.4.3:

  - Not applicable if no STP functionality is implemented by the SGSN or the VLR.

- ITU-T Recommendation Q.704, subclause 3.5.3:

  - Not applicable if no STP functionality is implemented by the SGSN or the VLR.

- ITU-T Recommendation Q.704, subclause 3.8.5.2:

  - The signalling-route-set-congestion-test procedure is not required.

- ITU-T Recommendation Q.704, subclause 4.1.2:

  - In a point to point configuration signalling routes are not applicable.

- ITU-T Recommendation Q.704, subclause 4.2:

  - The normal routing situation in a point to point configuration will be that there are 1 or more signalling links available between a SGSN and VLR, these will constitute a link set. They will be run in a load sharing mode and changeover, changeback procedures will be supported between these signalling links.

  - The normal routing situation if more than one route is available between the SGSN and the VLR will be that the load sharing, changeover and changeback procedures would be provided between signalling links within the same signalling linkset and between signalling linksets.

- ITU-T Recommendation Q.704, subclause 4.3.3:

  - There will be no alternative linkset in a point to point configuration of the Gs interface.

- ITU-T Recommendation Q.704, subclause 4.4.3:

  - Not applicable in a point to point configuration of the Gs interface.

- ITU-T Recommendation Q.704, subclause 4.5:

  - Not applicable in a point to point configuration of the Gs interface.

- ITU-T Recommendation Q.704, subclause 4.6:

  - Not applicable in a point to point configuration of the Gs interface.

- ITU-T Recommendation Q.704, subclause 4.7:

  - Not applicable in a point to point configuration of the Gs interface.

- ITU-T Recommendation Q.704, clause 5:

  - Changeover between link sets is not applicable in a point to point configuration of the Gs interface.

- ITU-T Recommendation Q.704, clause 6:

  - Changeback between link sets is not applicable in a point to point configuration of the Gs interface.

- ITU-T Recommendation Q.704, clause 7:

  - Forced re-routing is not applicable if there is only one signalling route existing between SGSN and VLR in a point to point configuration of the Gs interface.

- ITU-T Recommendation Q.704, clause 8:

  - Not applicable if there is only one signalling route existing between SGSN and VLR in a point to point configuration of the Gs interface.

- ITU-T Recommendation Q.704, subclause 13.2:

  - The transfer prohibited function is not applicable if the SGSN or the VLR does not support STP functionality. At the reception of a TFP message, the SGSN or VLR acting as SP shall process the message.

- ITU-T Recommendation Q.704, subclause 13.3:

  - The transfer allowed function is not applicable if the SGSN or the VLR does not support STP functionality. At the reception of a TFA-message, the SGSN or VLR acting as SP shall process the message.

- ITU-T Recommendation Q.704, subclause 13.4:

  - The transfer restricted function is not applicable if the SGSN or the VLR does not support STP functionality. At the reception of the TFR message, the SGSN or VLR acting as SP shall process the message.

- ITU-T Recommendation Q.704, subclause 13.5:

  - The signalling-route-set-test procedure is not applicable.

- ITU-T Recommendation Q.704, subclauses 13.6, 13.7 and 13.8:

  - The transfer controlled function is not applicable if the SGSN or the VLR does not support STP functionality. At the reception of TFC message, the SGSN or VLR acting as SP shall process the message.

- ITU-T Recommendation Q.704, subclause 13.9:

  - The signalling route-set-congestion-test function is not required.

  - At the reception of signalling-route-set-congestion-test message no action is required by the receiving entity.

5.4.1.3   Informative clauses

A list of clarifications to ITU-T Recommendation Q.704 are listed below.

- ITU-T Recommendation Q.704, subclause 2.3.4:

  - The load sharing procedures shall allow any value of the SLC field in the MTP3 network management messages that are not related to a specific signalling link. This allows compatibility between blue book implementations where only the 0000 value is used and white book implementations where load sharing may be applicable to network management messages

- ITU-T Recommendation Q.704, subclause 3.4.1:

  - It should be noted that for point to point working, the signalling route will become unavailable when the associated link set fails.

- ITU-T Recommendation Q.704, subclause 3.4.2:

  - It should be noted that for point to point working, the signalling route will become available when the associated link set is restored.

- ITU-T Recommendation Q.704, subclause 3.5.1:

  - It should be noted that for point to point working the procedures used in connection with signalling route unavailability will be those specified for signalling route set unavailability in ITU-T Recommendation Q.704 subclause 11.2.1.

- ITU-T Recommendation Q.704, subclause 3.5.2:

  - It should be noted that for point to point interworking the procedures used in connection with signalling route availability will be those specified for signalling route set availability in ITU-T Recommendation Q.704 subclause 11.2.2.

- ITU-T Recommendation Q.704, clause 9:

  - The SGSN and the MSC/VLR shall implement the restart procedures specified in ITU-T Recommendation Q.704 (03/1993) MTP3. The restart procedure specified in ITU-T Recommendation Q.704 (11/1988) MTP3 shall not be used.

- ITU-T Recommendation Q.704, clause 11:

  - It should be noted that for point to point working the signalling route set will consist of one associated signalling route only.

5.4.2 MTP Level 3 for T1 Interface

The Gs interface may be configured as a point to point interface or may use an intermediate SS7 network. In this last case an SGSN or a VLR may act always as end points of the Gs interface (SP functionality) or may be configured to act as an transfer point between a VLR and an SGSN (SP and STP functionality). The MTP level 3 exceptions and modifications to ANSI T1.111.4 are listed regarding whether the SGSN and the VLR are connected by a point to point link or are configured to act as SPs in an SS7 network or if they support STP functionality.

Subclause 5.4.2.1 applies to all configurations of the Gs interface. In subclause 5.4.2.2 the exceptions and modifications to ANSI T1.111.4 are listed depending upon the configuration of the Gs interface, whether it is a point to point interface or the SGSN and VLR act as an SP only or SP and STP. Subclause 5.4.2.3 provides points of clarification about the ANSI T1.111.4.

5.4.2.1 General clauses

The MTP level 3 exceptions and modifications to ANSI T1.111.4 regardless of whether the SGSN supports STP functionality are listed below.

- ANSI T1.111.4, subclause 2.3.5:

  - Support of ANSI specific Signalling Link Congestion Control as specified in this subclause is required.

- ANSI T1.111.4, subclause 2.4:

- The signalling point code for an SGSN may be included in the national signalling point code scheme or in a separate signalling network.

- ANSI T1.111.4, subclause 3.8.2:

    - Support of ANSI specific Network Congestion as defined in this subclause is required.

- ANSI T1.111.4, clause 12:

    - Only basic link management procedures are required.

- ANSI T1.111.4, subclause 14.2.1:

    - Since all messages are passed using the SCCP, the service indicator for Gs interface operation will be:

        bits   D   C   B   A

              0   0   1   1

- ANSI T1.111.4, subclause 14.2.2:

    - The sub service field for Gs interface operation will always be set to one of the following values:

        bits   D C

              1 0 national network

- ANSI T1.111.4, clause 15:

    - The formats and codes listed are only relevant to the messages that are required.

5.4.2.2   Configuration dependent clauses

The MTP level 3 exceptions and modifications to ANSI T1.111.4 are permitted if the SGSN or the VLR does not support STP functionality are listed below.

- ANSI T1.111.4, subclause 1.1.2:

    - If the Gs interface is configured as point to point interface, i.e., it does not support STP function, then the signalling transfer point network management features are not required.

- ANSI T1.111.4, clause 2:

    - If STP function is not required, then the discrimination functions of the MTP used for GPRS application can be significantly simplified.

NOTE: If the implementation of this interface is for point to point application the routing function within the MTP will be present to select the point code appropriate to the parent VLR.

- ANSI T1.1114, subclause 2.3:

    - If the implementation of the Gs interface is point to point, load sharing between linksets is not required since there will only be one linkset between SGSN and VLR.

- ANSI T1.111.4, subclause 2.4:

    - At the SGSN or VLR that does not implement STP functionality, only messages with a correctly checking DPC will be accepted. Other messages will be discarded. It is recommended that when messages are discarded because of an incorrectly set point code, an incident report should be generated.

- ANSI T1.111.4, subclause 3.1.3 (3):

    - In a point to point configuration, there is no requirement for signalling route management.

- ANSI T1.111.4, subclause 3.3.2.3:

    - In a point to point configuration, there is no requirement for signalling route management.

- ANSI T1.111.4, subclause 3.3.3.3:

    - In a point to point configuration, there is no requirement for signalling route management.

- ANSI T1.111.4, subclause 3.3.4.3:

    - In a point to point configuration, there is no requirement for signalling route management.

- ANSI T1.111.4, subclause 3.4.3:

    - Not applicable if no STP functionality is implemented in SGSN or VLR.

- ANSI T1.111.4, subclause 3.5.3:

    - Not applicable if no STP functionality is implemented in SGSN or VLR.

- ANSI T1.111.4, subclause 3.8.5.2:

    - The signalling-route-set-congestion-test procedure is not required.

- ANSI T1.111.4, subclause 4.1.2:

    - In a point to point configuration signalling routes are not applicable.

- ANSI T1.111.4, subclause 4.2:

    - The normal routing situation in a point to point configuration will be that there are 1 or more signalling links available between a SGSN and VLR, these will constitute a link set. They will run in a load sharing mode and changeover, changeback procedures will be supported between these signalling links.

    - The normal routing situation if more then one route is available between the SGSN and the VLR will be that the load sharing, changeover and changeback procedures would be provided between signalling links within the same signalling linkset and between signalling linksets.

- ANSI T1.111.4, subclause 4.3.3:

    - There will be no alternative linkset in a point to point configuration of the Gs interface.

- ANSI T1.111.4, subclause 4.4.3:

    - Not applicable in a point to point configuration of the Gs interface.

- ANSI T1.111.4, subclause 4.5:

    - Not applicable in a point to point configuration of the Gs interface.

- ANSI T1.111.4, subclause 4.6:

    - Not applicable in a point to point configuration of the Gs interface.

- ANSI T1.111.4, subclause 4.7:

    - Not applicable in a point to point configuration of the Gs interface.

- ANSI T1.111.4, clause 5:

    - Changeover between link sets is not applicable in a point to point configuration of the Gs interface.

- ANSI T1.111.4, clause 6:

    - Changeback between link sets is not applicable in a point to point configuration of the Gs interface.

- ANSI T1.111.4, clause 7:

    - Forced re-routing is not applicable since there is only one signalling route existing between SGSN and VLR in a point to point configuration of the Gs interface.

- ANSI T1.111.4 ,clause 8:

- Not applicable since there is only one signalling route existing between SGSN and VLR in a point to point configuration of the Gs interface.

- ANSI T1.111.4, subclause 13.2:

    - The transfer prohibited function is not applicable if the SGSN does not support STP functionality. At the reception of a TFP message, the SGSN or VLR acting as SP shall process the message.

- ANSI T1.111.4, subclause 13.3:

    - The transfer allowed function is not applicable if the SGSN does not support STP functionality. At the reception of a TFA-message, the SGSN or VLR acting as SP shall process the message.

- ANSI T1.111.4, subclause 13.4:

    - The transfer restricted function is not applicable if the SGSN does not support STP functionality. At the reception of the TFR message the SGSN or VLR acting as SP shall process the message.

- ANSI T1.111.4, subclause 13.5:

    - The signalling-route-set-test procedure is not applicable.

- ANSI T1.111.4, subclauses 13.6, 13.7 and 13.8:

    - The transfer controlled function is not applicable if the SGSN does not support STP functionality. At the reception of TFC message, the SGSN or VLR acting as SP shall process the message.

- ANSI T1.111.4, subclause 13.9:

    - The signalling route-set-congestion-test function is not applicable. At the reception of signalling-route-set-congestion-test message no action is taken by the receiving entity.

5.4.2.3 Informative clauses

A list of clarifications to ANSI Recommendation T1.111.4 are listed below.

- ANSI T1.111.4, subclause 2.3.4:

    - The load sharing procedures shall allow any value of the SLS field in the MTP3 network management messages that are not related to a specific signalling link or a default value of 00000000 should be used.

- ANSI T1.111.4, subclause 3.4.1:

    - For point to point working, the signalling route will become unavailable when the associated link set fails.

- ANSI T1.111.4, subclause 3.4.2:

    - For point to point working, the signalling route will become available when the associated link set is restored.

- ANSI T1.111.4, subclause 3.5.1:

    - For point to point working, the procedures used in connection with signalling route unavailability will be those specified for signalling route set unavailability in ANSI Recommendation T1.111.4 subclause 11.2.1.

- ANSI T1.111.4, subclause 3.5.2:

    - For point to point working, the procedures used in connection with signalling route availability will be those specified for signalling route set availability in ANSI Recommendation T1.111.4 subclause 11.2.2.

- ANSI T1.111.4, clause 9:

    - The SGSN and the MSC/VLR shall implement the restart procedures specified in ANSI T1.111.4.

- ANSI T1.111.4, clause 11:

    - For point to point working, the signalling route set will consist of one associated signalling route only.

6 Conformance to SCCP

6.1 Overview

The purpose of this clause is to identify the subset of the SCCP functions which are necessary to provide addressing, error detection and segmentation facilities in the Gs interface. If this subset of SCCP functions is implemented, compatibility with a full ITU-T or ANSI SCCP shall be maintained. Only the needs of the user of SCCP (refer to 3GPP TS 29.018) are taken into account in this clause: the operations and maintenance requirements about SCCP functions are outside the scope of the present document.

No SCCP translation function is required in the VLR or the SGSN between the national and the local MTP. The Destination Point Code and Subsystem Number would allow direct routing by the local SCCP and MTP. Global Title addressing is supported on the Gs interface to provide flexibility in the addressing scheme implementation (note that the SGSN is assigned a global title in order to communicate with an HLR across an inter PLMN boundary).

Only connectionless class 0 SCCP services are used on the Gs interface. These simplifications are applicable to the signalling between an SGSN and a VLR in GSM PLMNs.

The minimum set of SCCP functions which apply are specified in the ITU-T Recommendations Q.711, Q.712, Q.713 and Q.714, for E1 interface and ANSI T1.112 for T1 interface with the qualifications specified in this Recommendation.

6.2 SCCP Primitives

6.2.1 SCCP Primitives for E1 Interface (ITU Recommendation Q.711)

- ITU-T Recommendation Q.711, clause 1:

    - No SCCP connection-oriented services are used.

- ITU-T Recommendation Q.711, clause 2:

    - No SCCP connection-oriented services are used. Only connectionless class 0 is used.

- ITU-T Recommendation Q.711, subclause 2.1:

    - Not applicable.

- ITU-T Recommendation Q.711, subclause 4.1:

    - Connection-oriented functions are not applicable

6.2.2 SCCP Primitives for T1 Interface (ANSI Standards T1.112.1)

- ANSI T1.112.1, clause 1:

    - No SCCP connection-oriented services are used.

- ANSI T1.112.1, clause 2:

    - No SCCP connection-oriented services are used. Only connectionless class 0.

- ANSI T1.112.1, subclause 2.1:

    - Not applicable.

- ANSI T1.112.1, subclause 4.1:

    - Connection-oriented functions are not applicable.

6.3   SCCP messages

6.3.1   SCCP messages for E1 Interface (ITU Recommendation Q.712)

-   ITU-T Recommendation Q.712, subclauses 1.1 to 1.14:

    -   Messages not used.

-   ITU-T Recommendation Q.712, subclause 1.16:

    -   The Subsystem-Out-Of-Service-Grant (SOG) message is not used.

-   ITU-T Recommendation Q.712, subclause 1.17:

    -   The Subsystem-Out-Of-Service-Request (SOR) message is not used.

-   ITU-T Recommendation Q.712, subclauses 2.4, 2.6, 2.7, 2.9, 2.11, 2.12, 2.13, 2.14, 2.16 and 2.17:

    -   Parameters not used.

6.3.2   SCCP messages for T1 Interface (ANSI Standards T1.112.2)

-   ANSI T1.112.2, subclauses 2.1 to 2.14:

    -   Messages not used.

-   ANSI T1.112.2, subclause 3.4:

    -   The Subsystem-Out-Of-Service-Request (SOR) message is not used.

-   ANSI T1.112.2, subclause 3.5:

    -   The Subsystem-Out-Of-Service-Grant (SOG) message is not used.

-   ANSI T1.112.2, subclause 3.6:

    -   The Subsystem-Backup Routing (SBR) (Optional) message is not used.

-   ANSI T1.112.2, subclause 3.7:

    -   The Subsystem-Normal Routing (SNR) (Optional) message is not used.

-   ANSI T1.112.2, subclause 3.8:

    -   The Subsystem-Routing Status Test (SRT) (Optional) message is not used.

-   ANSI T1.112.2, subclauses 4.2, 4.4, 4.6, 4.7, 4.10, 4.11, 4.12, 4.13, 4.15, 4.16, 4.17, 4.18 and 4.19:

    -   Parameters not used.

6.4 SCCP formats and codes

6.4.1 SCCP format and codes for E1 Interface (ITU Recommendation Q.713)

- ITU-T Recommendation Q.713, subclause 3.4:

  - The called party address shall include the appropriate sub system number. All other aspects of SCCP addressing are network specific.

- ITU-T Recommendation Q.713, subclause 3.4.2.2:

  - SSN value:

    - This is a national network concern. Different SSN values can be allocated for SGSN and VLR.

- ITU-T Recommendation Q.713, subclause 3.5:

  - The calling party address shall include the appropriate sub system number. All other aspects of SCCP addressing are network specific.

- ITU-T Recommendation Q.713, subclause 3.6:

  - Protocol class: the classes 1, 2 and 3 are not used.

- ITU-T Recommendation Q.713, subclauses 3.7 3.8, 3.9, 3.10, 3.11, 3.13, 3.14 and 3.15:

  - Parameters not used.

- ITU-T Recommendation Q.713, subclauses 4.2 to 4.9 and 4.12 to 4.17:

  - Messages not used.

- ITU-T Recommendation Q.713, subclause 5.1.1:

  - SOR and SOG not needed.

6.4.2 SCCP format and codes for T1 Interface (ANSI Standards T1.112.3)

- ANSI T1.112.3, subclause 3.4:

  - The called party address shall include the appropriate sub system number. All other aspects of SCCP addressing are network specific.

- ANSI T1.112.3, subclause 3.4.2.1:

  - The SSN values are a national network concern. Different SSN values can be allocated for SGSN and VLR.

- ANSI T1.112.3, subclause 3.5:

  - The calling party address shall include the appropriate sub-system number. All other aspects of SCCP addressing are network specific.

- ANSI T1.112.3, subclause 3.6:

  - Protocol class: the classes 2 and 3 are not used.

- ANSI T1.112.3, subclauses 3.7, 3.8, 3.9, 3.10, 3.11, 3.13, 3.14 and 3.15:

  - Parameters not used.

- ANSI T1.112.3, subclauses 4.2 to 4.9 and 4.12 to 4.17:

  - Messages not used.

- ANSI T1.112.3, subclause 5.1.1:

    - SOR, SNR, SRT, SBR, and SOG not needed.

6.5 SCCP procedures

6.5.1 SCCP procedures for E1 Interface (ITU Recommendation Q.714)

- ITU-T Recommendation Q.714, subclauses 1.1.2 and 1.1.3:

    - Protocol classes 2 and 3 not used.

    - Connection-oriented services are not used.

- ITU-T Recommendation Q.714, subclause 1.2:

    - Connection-oriented services are not used.

- ITU-T Recommendation Q.714, subclause 1.3:

    - Protocol class 1 not used.

- ITU-T Recommendation Q.714, subclause 2.1:

    - The two basic categories of addresses for conectionless messages are used.

- ITU-T Recommendation Q.714, subclause 2.2 and 2.3:

    - No connection-oriented message is used.

- ITU-T Recommendation Q.714, clause 3:

    - Connection-oriented procedures are not used.

- ITU-T Recommendation Q.714, clause 5:

    - Only those messages and procedures relating to non-replicated subsystems or nodes are required.

6.5.2 SCCP procedures for T1 Interface (ANSI Standards T1.112.4)

- ANSI T1.112.4, subclauses 1.1.2 and 1.1.3:

    - Protocol classes 2 and 3 not used.

    - Connection-oriented services are not used.

- ANSI T1.112.4, subclause 1.2:

    - Connection-oriented services are not used.

- ANSI T1.112.4, subclause 1.3:

    - Protocol class 1 is not used.

- ANSI T1.112.4, subclause 2.1:

    - The two basic categories of addresses for connectionless messages are used.

- ANSI T1.112.4, subclause 2.2 and 2.3:

    - No connection-oriented message is used.

- ANSI T1.112.4, clause 3:

    - Connection-oriented procedures not used.

- ANSI T1.112.4, clause 5:

    - Only those messages and procedures relating to non-replicated subsystems or nodes are required.

7 Use of the SCCP (E1/T1 Interface)

The underlying transport stack and the SCCP are used to support signalling messages between the SGSN and the MSC. The BSSAP+ protocol specified in 3GPP TS 29.018 is the user of the SCCP. 3GPP TS 29.018 only uses the services of the class 0 of the SCCP.

The Gs interface connects an SGSN to a VLR within the same PLMN. The use of point codes or global titles is allowed for routing of SCCP messages.

The format and coding of address parameters carried by the SCCP for routing purpose shall comply with ITU-T Recommendation Q.713 for E1 interface and ANSI T1.112.3 T1 interface with the following restrictions:

- The called party address shall include:

    - an SSN (see subclause 6.4.1 E1 interface and subclause 6.4.2 for T1 interface);

    - all other aspects of the SCCP signalling are specified in 3GPP TS 29.002.

- The calling party address shall include:

    - an SSN (see subclause 6.4.1 E1 interface and subclause 6.4.2 for T1 interface);

    - all other aspects of the SCCP signalling are specified in 3GPP TS 29.002.

When an SCCP message is sent, the Called Party Address is derived from the Called Address of the N-UNITDATA-REQUEST primitive issued by the local SCCP user.

When an SCCP message is received, the Calling Address within the N-UNITDATA-INDICATION primitive is derived from the Calling Party Address of the SCCP UNITDATA message received.

Only address information belonging to the E.164 numbering plan is allowed to be included as Global Title in the Called and Calling Party Address. The SGSN and the VLR store the address of the other entity using the format received in the Calling Party Address field or the address information received in the application part of the message.

Annex A (informative):
Change history

Change history							
TSG CN#	**Spec**	**Version**	**CR**	**<Phase>**	**New Version**	**Subject/Comment**	
Apr 1999	GSM 09.16	7.0.0				Transferred to 3GPP CN1	
CN#03	29.016				3.0.0	Approved at CN#03	

TSG Meet-ing	TSG Doc number	TSG WG doc number	CR	Rev	Ph	Cat	Vers Old	Vers New	Subject	Date
NP-09	NP-000441	N1-001017	004	1	R99	F	3.0.0	3.1.0	Different SSNs for SGSN and VLR	09-2000
NP-11	NP-0100150	N1-010459	005	1	Rel-4	C	3.1.0	4.0.0	BSSAP+ over IP according to SIGTRAN	03-2001
NP-16	NP-020224	N1-021326	006		Rel-4	F	4.0.0	4.1.0	Various clean-up of wrong references	06-2002
NP-16					Rel-5		4.1.0	5.0.0	CN plenary decision to make this 3GPP TS 29.016 also for Release 5.	06-2002
NP-26					Rel-6		5.0.0	6.0.0	Rel-6 published after CN#26	12-2004
					Rel-7		6.0.0	7.0.0	CN plenary decision to make this 3GPP TS 29.016 also for Release 7.	06-2007
					Rel-8		7.0.0	8.0.0	Upgrade to Rel-8 (CT#42)	12-2008
					Rel-9		8.0.0	9.0.0	Upgrade to Rel-9 (CT#46)	12-2009
					Rel-10		9.0.0	10.0.0	Upgrade to Rel-10 (CT#51)	03-2011
					Rel-11		10.0.0	11.0.0	Upgrade to Rel-11 (CT#57)	09-2012