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GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

Digital cellular telecommunications system (Phase 2+); Signalling transport mechanism specification for the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface (GSM 08.06)

ETSI

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Contents

Foreword 5

0 Scope 7
0.1 Normative references 7
0.2 Abbreviations 11

1 Field of application 12

2 Functional content 12

3 Message transfer part (MTP) functions 13
3.1 General 13
3.2 Level 1 (CCITT Recommendation Q.702) 13
3.3 Level 2 (CCITT Recommendation Q.703) 14
3.4 Level 3 (CCITT Recommendation Q.704) 15
3.5 Testing and Maintenance (CCITT Recommendation Q.707) 19

4 Interface functions 19

5 SCCP functions 20
5.1 Overview 20
5.2 Primitives (CCITT Recommendation Q.711) 21
5.3 SCCP messages (CCITT Recommendation Q.712) 22
5.4 SCCP formats and codes (CCITT Recommendation Q.713) 23
5.5 SCCP procedures (Q.714) 24

6 Use of the SCCP 26
6.1 Connection establishment 27
6.1.1 Establishment procedure in case i) 29
6.1.2 Establishment procedure in case ii) 29
6.1.3 Establishment procedure in case iii) 30
6.1.4 Establishment procedure in case iv) 30
6.2 Connection release 31
6.3 Transfer of DTAP and BSSMAP data 31
6.3.1 Distribution function 31
6.3.2 Transfer of DTAP messages 32
6.3.3 Transfer of BSSMAP messages 33
6.4 Connectionless services 34

7 Use of the SCCP for operations and maintenance 35
7.1 Connectionless service 35
7.2 Connection oriented services 35
7.3 BSS failure 35

History 36

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Foreword

This Global System for Mobile communications Technical Specification (GTS) has been produced by the Special Mobile Group (SMG) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI).

This GTS provides a mechanism giving reliable transfer of signalling messages within the digital cellular telecommunications system (Phase 2/Phase 2+).

This GTS is a TC-SMG approved GSM technical specification version 5, which contains GSM Phase 2+ enhancements/features to the version 4 GSM technical specification. The ETS from which this Phase 2+ GTS has evolved is Phase 2 GSM ETS 300 589 edition 2 (GSM 08.06 version 4.5.0).

GTS are produced by TC-SMG to enable the GSM Phase 2 + specifications to become publicly available, prior to submission for the formal ETSI standards approval procedure to become European Telecommunications Standards (ETS). This ensures the earliest possible access to GSM Phase 2 + specifications for all Manufacturers, Network operators and implementors of the Global System for Mobile communications.

The contents of this GTS are subject to continuing work within TC-SMG and may change following formal TC-SMG approval. Should TC-SMG modify the contents of this GTS it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 5.x.y

where:

- y the third digit is incremented when editorial only changes have been incorporated in the specification;

- x the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

NOTE: TC-SMG has produced documents which give the technical specifications for the implementation of the digital cellular telecommunications system. Historically, these documents have been identified as GSM Technical Specifications (GSM-TSs). These TSs may have subsequently become I-ETSs (Phase 1), or ETSs/ETSI Technical Reports (ETRs) (Phase 2). TC-SMG has also produced ETSI GSM TSs which give the technical specifications for the implementation of Phase 2+ enhancements of the digital cellular telecommunications system. These version 5.x.x GSM Technical Specifications may be referred to as GTSs.

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0 Scope

This Technical Specification is divided split into two parts, Chapters 1-4 dealing with the MTP and chapters 5-7 dealing with the SCCP and its use.

The MTP provides a mechanism giving reliable transfer of signalling messages. Chapters 1-4 of this Technical Specification deals with the subset of the MTP that can be used between an BSS and an MSC, which is compatible with a full MTP.

The SCCP is used to provide a referencing mechanism to identify a particular transaction relating to for instance a particular call. Chapters 5-7 identify the SCCP subset that should be used between a BSS and an MSC. The SCCP can also be used to enhance the message routing for (for instance) operations and maintenance information.

0.1 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

[1] GSM 01.04 (ETR 100): "Digital cellular telecommunications system (Phase 2); Abbreviations and acronyms".

[2] GSM 02.01 (ETS 300 500): "Digital cellular telecommunications system (Phase 2); Principles of telecommunication services supported by a GSM Public Land Mobile Network (PLMN)".

[3] GSM 02.02 (ETS 300 501): "Digital cellular telecommunications system (Phase 2); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[4] GSM 02.03 (ETS 300 502): "Digital cellular telecommunications system (Phase 2); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[5] GSM 02.04 (ETS 300 503): "Digital cellular telecommunications system (Phase 2); General on supplementary services".

[6] GSM 02.06 (ETS 300 504): "Digital cellular telecommunications system (Phase 2); Types of Mobile Stations (MS)".

[7] GSM 02.07 (ETS 300 505): "Digital cellular telecommunications system (Phase 2); Mobile Station (MS) features".

[8] Not used

[9] GSM 02.09 (ETS 300 506): "Digital cellular telecommunications system (Phase 2); Security aspects".

[10] GSM 02.11 (ETS 300 507): "Digital cellular telecommunications system (Phase 2); Service accessibility".

[11] GSM 02.16 (ETS 300 508): "Digital cellular telecommunications system (Phase 2); International Mobile station Equipment Identities (IMEI)".

[12] GSM 02.17 (ETS 300 509): "Digital cellular telecommunications system (Phase 2); Subscriber identity modules Functional characteristics".

[13] GSM 02.24 (ETS 300 510): "Digital cellular telecommunications system (Phase 2); Description of Charge Advice Information (CAI)".

[14] GSM 02.30 (ETS 300 511): "Digital cellular telecommunications system (Phase 2); Man-Machine Interface (MMI) of the Mobile Station (MS)".

[15] GSM 02.40 (ETS 300 512): "Digital cellular telecommunications system (Phase 2); Procedures for call progress indications".

[16] GSM 02.41 (ETS 300 513): "Digital cellular telecommunications system (Phase 2); Operator determined barring".

[17] GSM 02.81 (ETS 300 514): "Digital cellular telecommunications system (Phase 2); Line identification supplementary services - Stage 1".

[18] GSM 02.82 (ETS 300 515): "Digital cellular telecommunications system (Phase 2); Call Forwarding (CF) supplementary services - Stage 1".

[19] GSM 02.83 (ETS 300 516): "Digital cellular telecommunications system (Phase 2); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[20] GSM 02.84 (ETS 300 517): "Digital cellular telecommunications system (Phase 2); MultiParty (MPTY) supplementary services - Stage 1".

[21] GSM 02.85 (ETS 300 518): "Digital cellular telecommunications system (Phase 2); Closed User Group (CUG) supplementary services - Stage 1".

[22] GSM 02.86 (ETS 300 519): "Digital cellular telecommunications system (Phase 2); Advice of charge (AoC) supplementary services - Stage 1

[23] GSM 02.88 (ETS 300 520): "Digital cellular telecommunications system (Phase 2); Call Barring (CB) supplementary services - Stage 1".

[24] GSM 04.01 (ETS 300 550): "Digital cellular telecommunications system (Phase 2); Mobile Station - Base Station System (MS - BSS) interface General aspects and principles".

[25] GSM 04.02 (ETS 300 551): "Digital cellular telecommunications system (Phase 2); GSM Public Land Mobile Network (PLMN) access reference configuration".

[26] GSM 04.03 (ETS 300 552): "Digital cellular telecommunications system (Phase 2); Mobile Station - Base Station System (MS - BSS) interface Channel structures and access capabilities".

[27] GSM 04.04 (ETS 300 553): "Digital cellular telecommunications system (Phase 2); layer 1 General requirements".

[28] GSM 04.05 (ETS 300 554): "Digital cellular telecommunications system (Phase 2); Data Link (DL) layer General aspects".

[29] GSM 04.06 (ETS 300 555): "Digital cellular telecommunications system (Phase 2); Mobile Station - Base Station System (MS - BSS) interface Data Link (DL) layer specification".

[30] GSM 04.07 (ETS 300 556): "Digital cellular telecommunications system (Phase 2); Mobile radio interface signalling layer 3 General aspects".

[31] GSM 04.08 (ETS 300 557): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3 specification".

[32] GSM 04.10 (ETS 300 558): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3 Supplementary services specification General aspects".

[33] GSM 04.11 (ETS 300 559): "Digital cellular telecommunications system (Phase 2); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[34] GSM 04.12 (ETS 300 560): "Digital cellular telecommunications system (Phase 2); Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".

[35] GSM 04.13 (ETS 300 561): "Digital cellular telecommunications system (Phase 2); Performance requirements on mobile radio interface".

[36] GSM 04.21 (ETS 300 562): "Digital cellular telecommunications system (Phase 2); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".

[37] GSM 04.22 (ETS 300 563): "Digital cellular telecommunications system (Phase 2); Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[38] GSM 04.80 (ETS 300 564): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3 supplementary services specification Formats and coding".

[39] GSM 04.81 (ETS 300 565): "Digital cellular telecommunications system (Phase 2); Line identification supplementary services - Stage 3".

[40] GSM 04.82 (ETS 300 566): "Digital cellular telecommunications system (Phase 2); Call Forwarding (CF) supplementary services - Stage 3".

[41] GSM 04.83 (ETS 300 567): "Digital cellular telecommunications system (Phase 2); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 3".

[42] GSM 04.84 (ETS 300 568): "Digital cellular telecommunications system (Phase 2); MultiParty (MPTY) supplementary services - Stage 3".

[43] GSM 04.85 (ETS 300 569): "Digital cellular telecommunications system (Phase 2); Closed User Group (CUG) supplementary services - Stage 3".

[44] GSM 04.86 (ETS 300 570): "Digital cellular telecommunications system (Phase 2); Advice of Charge (AoC) supplementary services - Stage 3".

[45] GSM 04.88 (ETS 300 571): "Digital cellular telecommunications system (Phase 2); Call Barring (CB) supplementary services - Stage 3".

[46] GSM 04.90 (ETS 300 572): "Digital cellular telecommunications system (Phase 2); Unstructured supplementary services operation - Stage 3".

[47] GSM 08.08 (ETS 300 590): "Digital cellular telecommunications system (Phase 2); Mobile Switching Centre - Base Station System (MSC - BSS) interface Layer 3 specification".

[48] GSM 12.00 (ETS 300 612-1): "Digital cellular telecommunications system (Phase 2); Objectives and structure of Network Management (NM)".

[49] GSM 12.01 (ETS 300 612-2): "Digital cellular telecommunications system (Phase 2); Common aspects of GSM Network Management (NM)".

[50] Not used

[51] GSM 12.02 (ETS 300 613): "Digital cellular telecommunications system (Phase 2); Subscriber, Mobile Equipment (ME) and services data administration".

[52] GSM 12.03 (ETS 300 614): "Digital cellular telecommunications system (Phase 2); Security management".

[53] GSM 12.04 (ETS 300 615): "Digital cellular telecommunications system (Phase 2); Performance data measurements".

[54] GSM 12.05 (ETS 300 616): "Digital cellular telecommunications system (Phase 2); Subscriber related event and call data".

[55] GSM 12.06 (ETS 300 617): "Digital cellular telecommunications system (Phase 2); GSM Network change control".

[56] Not used

[57] GSM 12.11 (ETS 300 619): "Digital cellular telecommunications system (Phase 2); Maintenance of the Base Station System (BSS)".

[58] Not used

[59] Not used

[60] GSM 12.20 (ETS 300 622): "Digital cellular telecommunications system (Phase 2); Network Management (NM) procedures and messages".

[61] GSM 12.21 (ETS 300 623): "Digital cellular telecommunications system (Phase 2); Network Management (NM) procedures and message on the A-bis interface".

[62] GSM 12.22 (ETS 300 624): "Digital cellular telecommunications system (Phase 2); Interworking of GSM Network Management (NM) procedures and messages at the Base Station Controller (BSC)".

[63] CCITT Recommendation Q.702: "Specifications of Signalling System No. 7 - Signalling data link".

[64] CCITT Recommendation Q.703: "Signalling link".

[65] CCITT Recommendation Q.704: "Signalling network functions and messages".

[66] CCITT Recommendation Q.707: "Specifications of Signalling System No. 7 - Testing and maintenance".

[67] CCITT Recommendation Q.711: "Functional description of the signalling connection control part".

[68] CCITT Recommendation Q.712: "Definition and function of SCCP messages".

[69] CCITT Recommendation Q.713: "SCCP formats and codes".

[70] CCITT Recommendation Q.714: "Signalling connection control part procedures".

0.2 Abbreviations

Abbreviations used in this specification are listed in GSM 01.04

1 Field of application

a) This Technical Specification is applicable to the signalling between radio subsystems (BSS) and mobile switching centres (MSCs) in GSM PLMNs. It provides a minimum set of MTP requirements that may be implemented at a BSS or MSC, whilst maintaining compatibility with the implementation of a full specification of the MTP.

b) The Technical Specification defines the interface at the 64 k/bit boundary to the BSS or MSC and applies primarily for digital access arrangements, the use of analogue arrangements is a national concern.

c) The security of signalling links is a national concern, however it is recommended that in the case where more than one multiplex system is required and security reasons dictate the use of a multiple link linkset, then each signalling link should be assigned in a different multiplex system. It is however noted that this is of little benefit if diversity of routing of the multiplexes is not used.

d) For initial implementations only the associated mode of signalling may be applicable at the BSS. Future evolution or economic reasons applicable to the interface may however make the use of STP working at the BSS attractive, in which case some of the simplifications in this paper will not apply.

e) A variety of information types may be supported by the signalling system, e.g. relating to circuit switched call control and packet communication. These are fully defined in the service series of Technical Specifications (the GSM 02.xx series).

f) The CCITT recommendations concerning the MTP shall be taken as being requirements unless covered by a statement in this Technical Specification.

2 Functional content

The functional requirements are as follows:

a) The network call control functions are as specified in Technical Specifications GSM 08.08, 04.08.

b) The minimum set of Message Transfer Part functions are specified in Blue Book CCITT Recommendations Q.702, Q.703, Q.704 and Q.707, with the qualifications specified in this Technical Specification.

c) The additional interface functions required for the proper operation of the layer 3 control functions in combination with the Message Transfer Part functions, is specified in clause 4 of this Technical Specification.

3 Message transfer part (MTP) functions

3.1 General

The MTP functions as specified in CCITT Recommendations Q.702, Q.703, Q.704 and Q.707 are applicable. However, the following exceptions and modifications to those Recommendations may be applied for the MSC to BSS signalling, see subclauses 3.2 to 3.4.

Some form of policing could be included at the MSC in order to ensure that no signalling messages received from the BSS can be routed further than the MSC if an administration requires. This is necessary to prevent fraudulent use of the signalling network for implementations of the GSM system. The manner in which this is achieved will be dependent on national circumstances and system implementations.

Where load sharing is used, all messages to do with a given SCCP connection should be passed down a given link.

3.2 Level 1 (CCITT Recommendation Q.702)

Q.702 fig 2

These figures should be treated as for information only. For the standard application of GSM, interface point C is appropriate.

Q.702 subclause 1.4

The use of analogue circuits to support the signalling link is a national matter.

Q.702 clause 2

A signalling rate of 64kbits/s is assumed. Lower rates (e.g. using analogue bearers) are a national concern.

Q.702 clause 3

Error characteristics and availability are a national concern. Care should be taken as excessive errors could lead to inefficient use of the signalling links.

Q.702 clause 5

The standard arrangement will be to derive the signalling link from a 2048 kbits/s digital path.

Q.702 clause 6

Only digital signalling data links are relevant.

The use of analogue bearers to support this interface is considered a national concern. However it should be noted that there will be potential problems with the following areas:

- The signalling load may exceed that which can be carried by a single low rate analogue link, this may lead to an excessive number of signalling links and more complex changeover/changebackprocedures.

- The performance of the analogue lines used to carry the signalling link will have a major impact on the throughput of signalling information that can be achieved.

- Message delay may degrade the quality of service.

3.3 Level 2 (CCITT Recommendation Q.703)

Q.703 subclause 1.4

Only the basic error correction protocol is required.

Q.703 subclause 1.7

Only the emergency proving period and status indications should be used by the BSS.

Q.703 clause 6

Not applicable, only basic error correction is required.

Q.703 clause 7

In the initial alignment procedure specified in CCITT Recommendation Q.703, only the emergency proving is applicable for the BSS. Thus, in states 02 and 03 of the initial alignment procedure status indication "N" is not sent from the BSS. The BSS should be capable of recognising status indication "N" if received in order for the alignment procedure to complete.

Q.703 clause 8

The processor outage status indicator shall be recognised at the BSS and the procedures defined in CCITT Recommendation Q.703 clause 8 supported.

The BSS shall support the generation of the processor outage indication towards the MSC if this is appropriate.

Q.703 clause 10

Only the emergency alignment procedures are required.

3.4 Level 3 (CCITT Recommendation Q.704)

Q.704 subclause 1.1.2.

If the BSS is only implemented as the end point of a signalling link, IE it does not support STP working, then there will be no signalling transfer point network management features which need to be considered.

Q.704 subclause 1.3

Signalling link management is required. Load sharing is required, and changeover/back between links within a single linkset are required.

Q.704 clause 2

Since STP working is not required the discrimination and routing functions of the MTP used for GSM application can be significantly simplified.

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

Q.704 subclause 2.2 Routing label

Load sharing will be performed on BSS s with more than one signalling link by means of the signalling link selection field (SLS).

Q.704 subclause 2.3 Message routing function

Load sharing between linksets is not required since there will only be one linkset between BSS and MSC.

Q.704 subclause 2.3.5.

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

Q.704 subclause 2.4 Message discrimination

At the BSS 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.

At an MSC (which has the capability of acting as an STP) an administration may decide that each message received from a BSS signalling link is passed through a "screening function" that checks that the DPC of the message is the same as the SP code of the exchange. If that is the case, the message is sent to the normal MTP message handling functions. Otherwise, the message is discarded and an incident report is made.

The signalling point code for an BSS may be included in the national signalling point code scheme or in a separate signalling network. In the case where the signalling point code is in the nationalnetwork the MSC need have only one point code, in the case where the signalling point code is in a separate "PLMN" signalling network, the MSC will be required to have two signalling point codes, one for each network.

Q.704 subclause 3.1.3 c)

There is no requirement for signalling route management.

Q.704 subclause 3.3.1.3

There is no requirement for signalling route management.

Q.704 subclause 3.3.2.3

There is no requirement for signalling route management.

Q.704 subclause 3.3.3.3

There is no requirement for signalling route management.

Q.704 subclause 3.3.4.3

There is no requirement for signalling route management.

Q.704 subclause 3.3.5.2

There is no requirement for signalling route management or signalling link blocking initiated by a management system.

Q.704 subclause 3.3.6.2

There is no requirement for signalling route management or signalling link unblocking initiated by a management system.

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.

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.

Q.704 subclause 3.4.3

Not applicable.

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 CCITT Recommendation Q.704 subclause 10.2.1.

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 CCITT Recommendation Q.704 subclause 10.2.2.

Q.704 subclause 3.5.3

Not applicable.

Q.704 subclause 3.8.2

There are two acceptable methods of congestion control defined in CCITT Recommendation Q.704, in subclauses 3.6.2.1 a) and b). The most appropriate method is dependent on national CCITT No. 7 implementations. Each administration should specify its congestion threshold setting algorithm and nodal congestion abatement procedures at system procurement.

Q.704 subclause 3.8.5.2

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

Q.704 subclause 4.1.2

Signalling routes are not applicable.

Q.704 subclause 4.2

The normal routing situation will be that there are 1 or more signalling links available between a BSS and MSC, 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.

Q.704 subclause 4.3.3.

There will be no alternative linkset.

Q.704 subclause 4.4.3.

Not applicable.

Q.704 subclause 4.5.

Not applicable.

Q.704 subclause 4.6.

Not applicable.

Q.704 subclause 4.7

Not applicable.

Q.704 clause 5 Changeover

Changeover between link sets is not applicable.

Q.704 clause 6 Changeback

Changeback between link sets is not applicable.

Q.704 clause 7

Forced re-routing is not applicable since there is only one signalling route existing between BSS and MSC.

Q.704 clause 8

Not applicable since there is only one signalling route existing between BSS and MSC.

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.

Q.704 clause 12 Signalling link management

Only basic link management procedures are applicable.

Q.704 subclause 12.3.4 Link set activation

Link set normal activation defined in subclause 11.2.4.1 is not applicable. Link set emergency restart at the BSS is used in all cases.

Q.704 subclause 13.2 Transfer prohibited

The transfer prohibited function is not applicable. At the reception of a TFP message, no action should be taken at the BSS.

Q.704 subclause 13.3 Transfer allowed

The transfer allowed function is not applicable. At the reception of a TFA-message, no action should be taken at the BSS.

Q.704 subclause 13.4 Transfer restricted

The transfer restricted function is not applicable. At the reception of the TFR message no action is taken by the BSS.

Q.704 subclause 13.5 Signalling-route-set-test

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

Q.704 subclauses 13.6, 13.7, 13.8 Transfer controlled

The transfer controlled function is not applicable. At the reception of TFC message, no action is taken by BSS.

Q.704 subclause 13.9 Signalling route-set-congestion-test

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 BSS.

Q.704 subclause 14.2.1

Since all messages are passed using the SCCP, the service indicator will be:

bits	D	C	B	A
	0	0	1	1

Q.704 subclause 14.2.2

The sub service field will always be set to one of the following values:

bits	D	C
	1	0 national network
	1	1 local network

Q.704 subclause 14.3

This information for SCCP is defined in CCITT Recommendation Q.713.

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.

3.5 Testing and Maintenance (CCITT Recommendation Q.707)

Q.707 subclause 2.2

The MSC and the BSS shall be capable of responding with an acknowledgement message to a SLTM received at any time as specified in CCITT Recommendation Q.707 subclause 2.2.

4 Interface functions

The method of interfacing to the higher layers will be by the primitives defined in CCITT Recommendation Q.701 clause 8 of the Blue Book.

The primitives defined are:

MTP Pause indication;
MTP Resume indication;
MTP Status indication;
MTP Transfer request;
MTP Transfer indication.

5 SCCP functions

5.1 Overview

The purpose of this section is to identify the subset of the SCCP functions which are necessary to achieve the management of the MS references in the BSS to MSC interface, and to provide addressing facilities. If this subset of SCCP functions is implemented, compatibility with a full CCITT SCCP must be maintained. Only the needs of the BSSAP are taken into account in section 5: the operations and maintenance requirements about SCCP functions are discussed in section 7.

These simplifications are applicable to the signalling between BSS and MSC in GSM PLMNs.

In order to limit the complexity of the procedures, a BSS exchanges signalling messages only with its MSC, where a protocol conversion may be needed in some cases. Therefore no SCCP translation function is required in the MSC between the national and the local MTP. The Destination Point Code and Subsystem Number allow direct routing by the local SCCP and MTP within the MSC area.

Several functions of the SCCP are not used on the MSC/BSS interface: error detection, receipt confirmation, flow control.

The segmenting/reassembling function shall be used if the total message length exceeds the maximum allowed message length that can be carried by the MTP.

The minimum set of SCCP functions which apply are specified in the Blue Book CCITT Recommendations Q.711, Q.712, Q.713 and Q.714, with the qualifications specified in this Recommendation.

5.2 Primitives (CCITT Recommendation Q.711)

Q.711/Table 1

Three primitives of the table 1/Q.711 are not used:

- N-EXPEDITED DATA
- N-DATA ACKNOWLEDGE
- N-RESET

Q.711/Table 2

The following parameters of the N-CONNECT primitive are not used:

- Responding address
- Receipt confirmation selection
- Expedited data selection

Q.711/Table 3

The following parameter of the N-DATA primitive is not used:

- Confirmation request

Q.711/Table 6

The following parameter of the N-DISCONNECT primitive is not used:

- Responding address

Q.711 subclause 2.1.2

Permanent signalling connections: not applicable

Q.711/Table 9

The primitive N-NOTICE is not used.

Q.711/Table 10

The following parameter of the N-UNITDATA is not used:

- Return option

Q.711 subclause 4.1.2

Functions for permanent signalling connections: not applicable

5.3 SCCP messages (CCITT Recommendation Q.712)

Q.712 subclause 1.4

The Data Acknowledgement (AK) message is not used.

Q.712 subclause 1.6

The Data Form 2 (DT2) message is not used.

Q.712 subclause 1.7

The Expedited Data (ED) message is not used.

Q.712 subclause 1.8

The Expedited Data Acknowledgement (EA) message is not used.

Q.712 subclause 1.10

The Protocol Data Unit Error (ERR) message is not used: the inconsistent messages of the SCCP protocol are discarded.

Q.712 subclause 1.13

The Reset Confirm (RSC) message is not used.

Q.712 subclause 1.14

The Reset Request (RSR) message is not used.

Q.712 subclause 1.16

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

Q.712 subclause 1.17

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

Q.712 subclause 1.21

The Unitdata Service (UDTS) message is not used.

Q.712 subclause 2.4

The "credit" parameter field is not used for protocol class 2. However the parameter must still be included in the IT message for syntax reasons.

Q.712 subclause 2.7

The "error cause" parameter field is not used.

Q.712 subclause 2.11

The "receive sequence number" parameter is not used.

Q.712 subclause 2.14

The "reset cause" parameter field should not be used.

Q.712 subclause 2.16

The "sequencing/segmenting" parameter field is not used for protocol class 2. However the parameter must still be included in the IT message for syntax reasons.

5.4 SCCP formats and codes (CCITT Recommendation Q.713)

Q.713 subclause 3.4

For point-to-point network structures (i.e. direct connections between MSC and BSS) the called party address may consist of the single element:

- sub-system number.

No global title is used. The signalling point code which is coded in the MTP routing label and the subsystem number in the called party address allow the routing of the message.

Then the following encoding of the address indicator may be chosen: X1000010.

If a non point-to-point network structure is used then the global title may be required. This is a national concern.

Q.713 subclause 3.4.2.2

SSN values:

11111110 BSSAP
11111101 O&M

Use of alternative values is a national concern.

Q.713 subclause 3.4.2.3

Global title: refer to CCITT Recommendation Q.713 subclause 3.4.

Q.713 subclause 3.6

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

Q.713 subclauses 3.8, 3.9, 3.10, 3.13, 3.14

Parameters not used.

Q.713 subclauses 4.8, 4.9, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16

Messages not used.

Q.713 subclause 5.1.1

SOR and SOG not needed.

5.5 SCCP procedures (Q.714)

Q.714 subclauses 1.1.2.2, 1.1.2.4

Protocol classes 1 and 3 not used.

Q.714 subclause 1.1.3

A signalling connection consists of a single connection section. No intermediate nodes are defined in the MSC/BSS protocol.

The use of multiple connection sections is a national concern.

Q.714 subclause 1.2.1 (b)

Not applicable for single connections.

Q.714 subclause 2.1 (1.)

Global title not used for single connections.

Q.714 subclause 2.2.1

Subsystem (SSN) only is present in the called party address for single connections.

Q.714 subclause 2.2.2

The addressing information may take the following form in the N-CONNECT request primitive: DPC+SSN (for single connections).

Q.714 subclause 2.2.2.2

No SCCP translation function is required for single connections.

Q.714 subclause 2.3.1 (3)

Not applicable for single connections.

Q.714 subclause 2.3.2 (4)

Not applicable for single connections.

Q.714 subclause 3.1.3

Not applicable: no protocol class and flow control negotiations.

Q.714 subclause 3.1.5

Not applicable.

Q.714 subclause 3.2.2

Not applicable.

Q.714 subclause 3.3.4

Not applicable.

Q.714 subclause 3.5.1.2

Not applicable.

Q.714 subclause 3.5.2

Not applicable.

Q.714 subclauses 3.6, 3.7, 3.9, 3.10

Not applicable.

Q.714 subclause 4.2

Message return not applicable.

Q.714 clause 5

Only those messages and procedures relating to non-replicated subystems or nodes are required. At the BSS the concerned point will be the parent MSC. The subsystems involved are the BSSAP and the OMAP.

6 Use of the SCCP

The MTP and the SCCP are used to support signalling messages between the MSC and the BSS. One user function of the SCCP, called BSS Application Part (BSSAP) is defined. In the case of point-to-point calls the BSSAP uses one signalling connection per active Mobile Station having one or more active transactions for the transfer of layer 3 messages. In the case of a voice group or broadcast call there is always one connection per cell involved in the call and one additional connection per BSS for the transmission of layer 3 messages. There is an additional connection for the speaker in a broadcast call or the first speaker in a voice group call up to the point at which the network decides to transfer them to a common channel. Additional connections may also be required for any mobile stations in the voice group or broadcast call which the network decides to place on a dedicated connection. The BSSAP user function is further subdivided into two separate functions:

- The Direct Transfer Application sub-Part (DTAP) is used to transfer messages between the MSC and the MS; the layer-3 information in these messages is not interpreted by the BSS. The descriptions of the layer 3 protocols for the MS-MSC information exchange are contained in the 04-series of GSM Technical Specifications.

- The BSS Management Application sub-Part (BSSMAP) supports other procedures between the MSC and the BSS related to the MS (resource management, handover control), or to a cell within the BSS, or to the whole BSS. The description of the layer 3 protocol for the BSSMAP information exchange is contained in Recommendation GSM 08.08.

Both connectionless and connection-oriented procedures are used to support the BSSMAP. Rec. GSM 08.08 explains whether connection oriented or connectionless services should be used for each layer 3 procedure. Connection oriented procedures are used to support the DTAP. Section 6.4 deals with the use of connectionless services of the SCCP.

A distribution function located in BSSAP, which is reflected in the protocol specification by the layer 3 header defined in section 6.3, performs the discrimination between the data related to those two subparts, as illustrated in Recommendation GSM 08.08 figure 1.

The error handling for the BSSAP header is specified in TS GSM 08.08.

This section describes the use of SCCP connections for MS transactions. Section 6.1 describes the connection establishment procedures. Section 6.2 describes the connection release procedures. Section 6.3 describes the distribution between BSSMAP and DTAP messages and the data transfer over a SCCP connection. The structure of the user data field in the SCCP message is described in sections 6.3 and 6.4 and in figure 3.

6.1 Connection establishment

A new SCCP connection is established when information related to the communication between an MS and the network on a dedicated radio resource has to be exchanged between BSS and MSC, and no such SCCP connection exists between the MSC and the BSS involved for the concerned mobile station. A new SCCP connection for each cell, an additional connection for each BSS, and optionally connections for particular participants in a voice group or broadcast call are established when a voice group or broadcast call is established. A new SCCP connection is also established in the case of an external handover between the cells of one BSS for a point-to-point call, or for participants in a voice group or broadcast call who are supported on a dedicated channel.

Various SCCP connection establishment cases have to be distinguished:

i) Following an Access Request made by the MS on the Random Access Channel, a dedicated radio resource has been successfully allocated and a layer-2 connection has been established on the allocated resource. The SCCP connection establishment is then initiated by the BSS.

ii) The MSC decides to perform an external handover and a new dedicated radio resource has to be reserved in the new BSS. The SCCP connection establishment is then initiated by the MSC. (Note that the old BSS and the new BSS may be the same.)

iii) Following a request for a voice group or broadcast call received at a MSC, SCCP connections are established between the MSC and BSS for each cell in the group call area and the MSC and BSS for each BSS in the group call area. This is initiated by the MSC. Note that a SCCP connection for the originator has already been established via case i).

iv) During a voice group or broadcast call the network may decide to place some participants on a dedicated channel and will perform SCCP connection establishment to support this channel. Such a decision will normally be based on responses received to notification messages in the case where the notification messages do not contain details of the location of the group or broadcast call channel.

The above cases are the only cases currently identified for SCCP connection establishment. Others may emerge in the future.

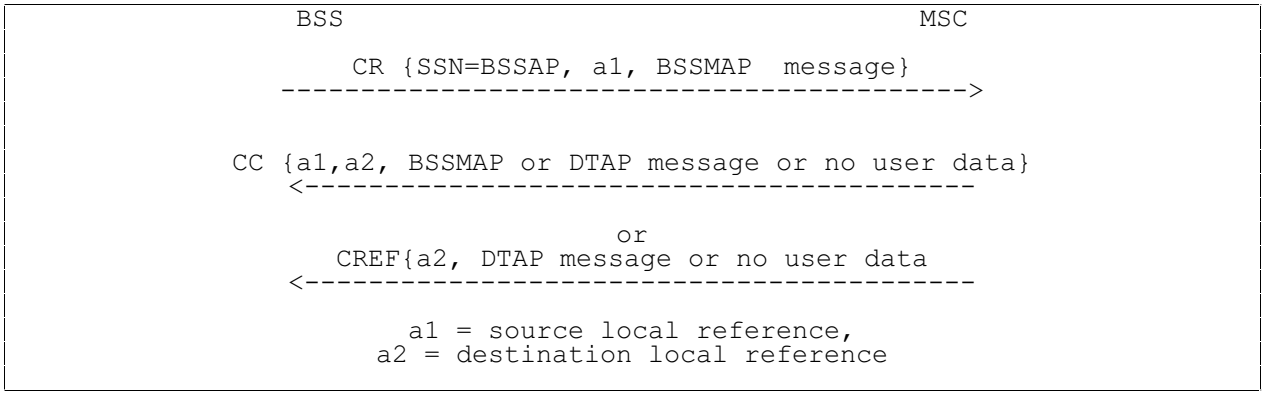

Figure 1/08.06
Set-up of SCCP connections on the first BSS/MSC interface

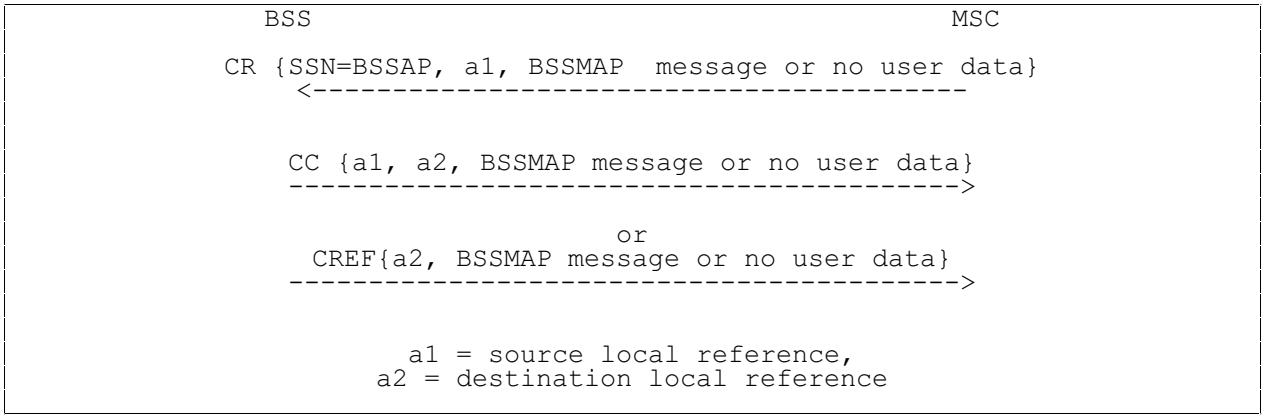

Figure 2/08.06
Set-up of SCCP connections on a new BSS/MSC (handover) interface or for a voice group or broadcast call initiation

6.1.1 Establishment procedure in case i)

In this case, the connection establishment is performed at the reception by the BSS of the first layer-3 message from the MS (piggybacked on the SABM frame). This message (LOCATION UPDATING REQUEST, CM-SERVICE REQUEST, CM REESTABLISHMENT REQUEST, IMSI DETACH or PAGING RESPONSE) which contains the identity of the MS is transferred to the MSC together with a cell identification, in a BSSMAP message (COMPLETE L3 INFORMATION) included in the user data field of the SCCP Connection Request message (see figure 1).

After the reception of the Connection Request message, the MSC may check, based on the received identity, whether another association already exists for the same Mobile Subscriber. Two options among others are described hereafter:

- after the reception of the Connection Request message, the MSC sends a Connection Confirm message and checks based on the received identity, whether another connection already exists for the same Mobile Subscriber. If another connection exists for the same Mobile Subscriber, the resources assigned for this previous connection are released after the identity of the Mobile Subscriber using the new connection has been successfully checked, e.g. by authentication or by ciphering procedure;

- If such an association exists, the connection establishment is refused by sending a Connection Refused message.

NOTE: The first option allows the new establishments and the reestablishments.

- When the SCCP connection is to be established, a Connection Confirm message is sent back to the BSS. This message may optionally contain a BSSMAP or DTAP message in the user data field.

If the connection establishment is refused for any reason, a SCCP Connection Refused message is sent back to the BSS. This message may optionally contain, in the user data field, a DTAP message which is forwarded to the MS.

The procedures in case of connection establishment failure are specified in Recommendation GSM 08.08.

6.1.2 Establishment procedure in case ii)

In this case, the connection establishment is undertaken by the MSC as soon as the MSC decides to perform an external handover to a new cell for a point-to-point call or for participants in a voice group or broadcast call who are supported on a dedicated channel.

A Connection Request message is sent to the BSS. The user data field of this message may contain the BSSMAP HANDOVER REQUEST message (see figure 2). It is preferable to transfer the layer 3 messages in the user data field of the Connection Request in order to complete the establishment of the relation between the radio channel requested and the SCCP connection as soon as possible.

When receiving the Connection Request message, containing the BSSMAP HANDOVER REQUEST message, the BSS allocates the necessary resources for the requested handover. A Connection Confirm message is also returned to the MSC and may contain the BSSMAP HANDOVER REQUEST ACKNOWLEDGEMENT or QUEUEING INDICATION message in the user data field.

If the handover resource allocation fails (see TS GSM 08.08) before the SCCP connection is established then the SCCP Connection Refused message may contain the BSSMAP HANDOVER FAILURE message in the user data field.

The procedures in case of connection establishment failure are specified in Recommendation GSM 08.08.

6.1.3 Establishment procedure in case iii)

In this case connection establishment is undertaken by the MSC on the reception of a voice group or broadcast call initiation request.

At the reception of the voice group or broadcast call establishment request message, the MSC will determine that a voice group or broadcast call is required and retrieve the required information concerning, inter alia, the affected cells. SCCP connections are then established by the MSC to the BSS for each of these cells. A separate connection is established by the MSC to each affected BSS.

A Connection Request message for each cell in the call and for each BSS in the call is sent to the BSS. The user data field of this message may contain the GROUP CALL ESTABLISHMENT REQUEST message (see figure 2). It is preferable to transfer the layer 3 messages in the user data field of the Connection Request in order to complete the establishment of the relation between the radio channel requested and the SCCP connection as soon as possible.

When receiving the Connection Request message, containing the GROUP CALL ESTABLISHMENT REQUEST message, the BSS allocates the necessary resources for the requested call. A Connection Confirm message is also returned to the MSC and may contain the GROUP CALL ESTABLISHMENT REQUEST ACKNOWLEDGEMENT or QUEUEING INDICATION message in the user data field.

If the resource allocation fails (see GSM 08.08) before the SCCP connection is established then the SCCP Connection Refused message may contain the GROUP CALL ESTABLISHMENT FAILURE message in the user data field.

The procedures in case of connection establishment failure are specified in GSM 08.08.

6.1.4 Establishment procedure in case iv)

In this case, the connection establishment may be performed at the request of the BSS or MSC. It will normally be as a result of a response to a notification message for a voice group or broadcast call which is received by the BSS.

At the reception of the Connection Request message, the MSC may check, based on the received identity, whether another association already exists for the same MS. If it is not a CM REESTABLISHMENT and such an association exists, the connection establishment is refused. If such an association exists but the new SCCP CR is for a CM REESTABLISHMENT then the old SCCP connection shall be released. When the SCCP connection is to be established, a Connection Confirm message is sent back to the BSS. This message may optionally contain a BSSMAP or DTAP message in the user data field.

If the connection establishment is refused for any reason, a SCCP Connection Refused message is sent back to the BSS. This message may optionally contain, in the user data field, a DTAP message which is forwarded to the MS.

The procedures in case of connection establishment failure are specified in GSM 08.08.

6.2 Connection release

This procedure is always initiated at the MSC side.

A connection is released when the MSC realizes that a given signalling connection is no longer required. That may occur, in normal cases:

- when a BSSAP release procedure is terminated;

- when a handover resource allocation procedure has failed and a signalling connection was established.

The MSC sends a SCCP released message. This message shall not contain any user data field.

Abnormal cases: a connection failure may be detected by the connection supervision service provided by SCCP. The procedures in that case are specified in Recommendation GSM 08.08.

6.3 Transfer of DTAP and BSSMAP data

The DTAP and BSSMAP Layer 3 messages between the MSC and the BSS are contained in the user data field of the exchanged SCCP frames. This field is optional for the Connection Request (CR) (except for BSS originated connections, see section 6.1); Connection Confirm (CC) and Connection Refused (CREF). The use of this field in such frames in the various establishment cases, which allows reduction n in delay and improves efficiency, is described in sections 6.1. The user data field is a mandatory parameter of the Data frames (DT); the user data field always contains either a DTAP or a BSSMAP message.

6.3.1 Distribution function

The distribution of messages between the BSSMAP and DTAP functions and the distribution/multiplexing of DTAP messages to/from the various radio link layer 2 access points are performed in an intermediate layer of protocol between SCCP and Layer 3 later referred as the distribution sublayer.

The protocol for this sublayer simply consists of the management of a one or two octet Distribution Data Unit. Each SCCP User Data field necessarily contains such a distribution Data Unit as a header, followed by the length indicator and the actual Layer 3 BSSMAP or DTAP message.

6.3.2 Transfer of DTAP messages

The DTAP function is in charge of transferring layer 3 messages from the MS (resp from the MSC) to the MSC (resp to the MS) without any analysis of the message contents. The interworking between the layer 2 protocol on the radio side and signalling system 7 at the landside is based on the use of individual SCCP connections for each MS and on the distribution function.

The structure of the user data field is given in figure 3. The user data field contains a distribution data unit, a length indicator, and the actual layer 3 message.

The Distribution Data Unit consists of two parameters: the Discrimination parameter and the Data Link Connection Identification (DLCI) parameter.

The Discrimination parameter, which is set to the "Transparent" value, is coded on one octet, as follows:

8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	D

The discrimination bit D is set to the "Transparent" value 1.

The DLCI parameter is used for MSC to BSS messages to indicate the type of data link connection to be used over the radio interface. In the direction BSS to MSC the DLCI parameter is used to indicate the type of originating data link connection over the radio interface. The DLCI parameter is coded in one octet, as follows:

8	7	6	5	4	3	2	1
C2	C1	0	0	0	S3	S2	S1

C2 C1 represents the control channel identification

C2=0; C1=0 idicates that the control channel is not further specified;

C2=1; C1=0 represents the FACCH or the SDCCH;

C2=1; C1=1 represents the SACCH;

other values are reserved.

S3 S2 S1 represents the SAPI value used on the radio link, which coding is specified in Recommendation GSM 04.06.

Bits 4, 5 and 6 are spare.

The length indicator is coded in one octet, and is the binary representation of the number of octets of the subsequent layer 3 message parameter.

6.3.3 Transfer of BSSMAP messages

The transfer of BSSMAP messages over a SCCP connection allows the BSSMAP functions in both the MSC and the BSS to identify to which particular Mobile Station association the exchanged message (e.g. assign, handover request, etc..) applies.

The structure of the user data field is given in figure 3. The user data field contains a distribution data unit, a length indicator, and the actual layer 3 message.

The Distribution Data Unit only consists of the Discrimination parameter, which is set to the "Not Transparent" value.

This parameter is coded on one octet, as follows:

8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	D

The discrimination bit D is set to the "Not Transparent" value 0.

The length indicator is coded in one octet, and is the binary representation of the number of octets of the subsequent layer 3 message parameter.

The coding of the BSSMAP layer 3 messages is specified in Recommendation GSM 08.08.

6.4 Connectionless services

Some BSSMAP procedures described in Recommendation GSM 08.08 use the connectionless services of the SCCP.

The structure of the user data field of the unit data message (UDT) is given in figure 3. The user data field contains a distribution data unit, a length indicator, and the actual layer 3 message.

The Distribution Data Unit only consists of the Discrimination parameter, which is set to the "Not Transparent" value.

This parameter is coded on one octet, as follows:

8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	D

The discrimination bit D is set to the "Not Transparent" value 0.

The length indicator is coded in one octet, and is the binary representation of the number of octets of the subsequent layer 3 message parameter.

The coding of the BSSMAP layer 3 messages is specified in Recommendation GSM 08.08.

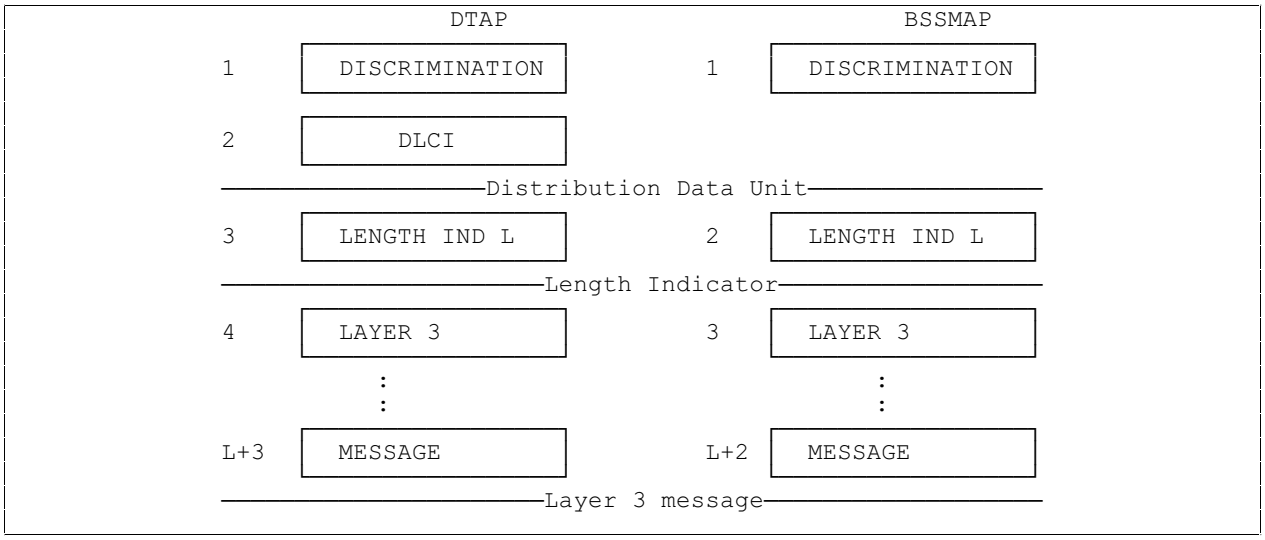

Figure 3/08.06
Structure of the User Data Field

7 Use of the SCCP for operations and maintenance

O&M messages have to be passed between the O&M functions and the BSS.

If the O&M functions use the MSC-BSS interface to transport messages to the BSS, then the SCCP of No.7 should be used.

X25 may also be used for the transfer of O&M messages between BSS and OMC, this is not further considered in this Technical Specification.

7.1 Connectionless service

The connectionless service of the SCCP is supported at the BSS for management purposes and can be used for the transport of O&M information. Addressing should be decided by the operator and manufacturer (e.g. by E164 number, this may require additional addressing capability at the BSS).

Further information is given concerning the coding of the higher levels of the O&M information in the GSM 12 series of Technical Specifications.

7.2 Connection oriented services

Connection oriented services are also supported by the BSS for management and call control. Connection oriented services can also be used for the transport of O&M information. In order to set up the connection additional addressing capability may be required at the BSS. To use a signalling connection between the BSS and the OMC via the MSC requires the same BSSOMAP-SCCP interface at both the BSS and the OMC.

7.3 BSS failure

If a system failure at the BSS occurs then sufficient MTP functions to allow message transmission and reception should be maintained.

History

Document history	
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