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## Digital cellular telecommunications system; Application of the Base Station System Application Part (BSSAP) on the E-interface (GSM 09.08)

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## Contents

Foreword .....	5
1 Scope .....	7
2 Normative references .....	7
3 Abbreviations.....	7
4 Principles for the use of BSSAP on the E-interface .....	8
4.1 General .....	8
4.2 Transfer of DTAP and BSSMAP layer 3 messages on the E-interface .....	8
4.3 Roles of MSC-A, MSC-I and MSC-T .....	8
5 Use of the BSSAP on the E-interface.....	9
5.1 DTAP .....	9
5.2 Assignment .....	9
5.3 Handover resource allocation .....	9
5.4 Handover execution .....	10
5.5 Internal handover indication.....	10
5.6 Release due to BSS generated reasons.....	10
5.7 Classmark handling .....	10
5.8 Cipher mode control .....	10
5.9 Trace invocation.....	10
5.10 Queuing indication .....	11
5.11 Data link control SAPI not equal to "0".....	11
6 BSSMAP messages transferred on the E-interface.....	11
7 Exceptions for BSSMAP message contents and information element coding when transferred on the E-interface .....	12
7.1 Message contents.....	12
7.2 Information element coding .....	13
8 BSSAP message error handling when transferred on the E-interface .....	13
History.....	14

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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 describes the subset of Base Station System Application Part (BSSAP) messages and procedures within the digital cellular telecommunications system.

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.

The specification from which this GTS has been derived was originally based on CEPT documentation, hence the presentation of this GTS may not be entirely in accordance with the ETSI/PNE Rules.

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## 1 Scope

This Global System for Mobile communications Technical Specification (GTS) describes the subset of Base Station System Application Part (BSSAP) messages and procedures, defined in GSM 08.06 and GSM 08.08, which is used on the E-interface. A general description can be found in GSM 03.02 and GSM 03.09.

For the initiation and execution of handover between MSCs a subset of BSSMAP procedures are used. For the subsequent control of resources allocated to the Mobile Station (MS) BSSMAP procedures are used. DTAP is used for the transfer of connection management and mobility management messages between the MS and the controlling MSC.

## 2 Normative references

This GTS 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 GTS 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 350): "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 03.09: "Digital cellular telecommunications system (Phase 2+); Handover procedures".
- [3] GSM 08.06: "Digital cellular telecommunications system; Signalling transport mechanism specification for the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".
- [4] GSM 08.08: "Digital cellular telecommunications system (Phase 2+); Mobile Switching Centre - Base Station System (MSC - BSS) interface; Layer 3 specification".
- [5] GSM 09.02 (ETS 300 974): "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".
- [6] GSM 09.10: "Digital cellular telecommunications system (Phase 2+); Information element mapping between Mobile Station - Base Station System and BSS - Mobile-services Switching Centre (MS - BSS - MSC); Signalling procedures and the Mobile Application Part (MAP)".

## 3 Abbreviations

For the purposes of this GTS, the following abbreviations apply:

BSS	Base Station System
BSSAP	Base Station System Application Part
BSSMAP	Base Station System Management Application Part
CCCH	Common Control CHannel
DLCI	Data Link Connection Identifier
DTAP	Direct Transfer Application Part
MSC	Mobile-services Switching Centre
MSC-A	Mobile-services Switching Centre, Anchor (Anchor MSC)
MSC-I	Mobile-services Switching Centre, Intermediate (Intermediate MSC)
MSC-T	Mobile-services Switching Centre, Target (Target MSC)
SAPI	Service Access Point Identifier
SCCP	Signalling Connection Control Part
TCAP	Transaction Capabilities Application Part

Other abbreviation used in the GSM specifications are listed in GSM 01.04.

## **4 Principles for the use of BSSAP on the E-interface**

### **4.1 General**

The mechanisms for the transfer of the BSSAP messages on the E-interface is defined in GSM 09.02. The operation of the handover procedures between MSCs and the use of the BSSMAP messages for those procedures is described in GSM 03.09 and GSM 09.10.

In the same way as a SCCP signalling connection is used for the messages relating to one MS on the MSC-BSS interface a TCAP dialogue is used on the E-interface for messages relating to one MS. As no correspondence to the connectionless service on the MSC-BSS interface is used on the E-interface none of the global procedures (see GSM 08.08 subclause 3.1) are applicable.

The management of the terrestrial circuits between the MSCs is outside the scope of the E-interface (see GSM 03.09), therefore all procedures, messages and information elements relating to terrestrial circuits are also excluded from the BSSMAP procedures and messages used on the E-interface.

### **4.2 Transfer of DTAP and BSSMAP layer 3 messages on the E-interface**

The BSSAP data which on the MSC-BSS interface is contained in the user data field of the exchanged SCCP frames (see GSM 08.06) is on the E-interface transferred as the contents of the signalling info in a BSS-APDU parameter as described in GSM 09.02.

The BSSAP data consists of a BSSAP header and a DTAP or BSSMAP layer 3 message. The BSSAP header contains, as specified in GSM 08.06 (subclauses 6.3.1, 6.3.2 and 6.3.3), of a discrimination parameter, possibly a Data Link Connection Identification (DLCI) parameter, and a length indicator.

### **4.3 Roles of MSC-A, MSC-I and MSC-T**

For the description in this ETS, the MSC's functionality related to the handover between MSCs has been split into three logical parts, MSC-A, MSC-T and MSC-I. The different roles need not necessarily be performed by different MSCs.

MSC-A is the call/connection controlling part of the MSC where the call/connection was originally established and the switching point for handover between MSCs. (This corresponds to MSC-A as defined in GSM 03.09 and 09.02). The MSC that is the MSC-A will not be changed during the duration of a call/connection.

MSC-T is the part relating to the transitory state during the handover for the MSC to which the MS is handed over when Basic handover or Subsequent handover (see GSM 03.09) take place. (This corresponds, depending on the type of handover to MSC-A, MSC-B or MSC-B' in GSM 03.09 and 09.02).

MSC-I is the part of an MSC through which the MSC-A, via an E-interface (or an internal interface) is in contact with the MS. (This corresponds, depending on the type of handover to MSC-A, MSC-B or MSC-B' in GSM 03.09 and 09.02).

The MSC that is the MSC-A can also have the role of either the MSC-I or the MSC-T during a period of the call/connection.

The following is applicable for the involved MSCs concerning the exchange of BSSAP data on an E-interface before and after a successful inter MSC handover:

- 1) At Basic handover, two MSCs are involved, one MSC being MSC-A and one being MSC-T. When this handover has been performed, the two MSCs interworking on the E-interface have the roles of MSC-A and MSC-I respectively, i.e. the MSC that is the MSC-T during the handover is now the MSC-I.
- 2) At Subsequent handover back to MSC-A, two MSCs are involved. The MSC having the role of MSC-A has also the role of MSC-T. The other MSC involved has the role of MSC-I. When this handover has been completed, there is no exchange of BSS data on the E-interface, i.e. the MSC being the MSC-I before and during the handover is now no longer taking part.

- 3) At subsequent handover to an MSC not being MSC-A, three MSCs are involved. The roles of these MSCs are MSC-A, MSC-I, and MSC-T respectively. When this handover has been performed, the two MSCs interworking on an E-interface have the roles of MSC-A and MSC-I respectively, i.e. the MSC that is the MSC-T during the handover is now the MSC-I and the MSC being MSC-I during the handover is now no longer taking part.

## 5 Use of the BSSAP on the E-interface

DTAP is used on the E-interface for the transfer of messages between the MSC-A and the MS.

The dedicated BSSMAP procedures (GSM 08.08 subclause 3.1) used on the E-interface to some extent are:

- assignment;
- handover resource allocation;
- handover execution;
- internal handover indication;
- release due to BSS generated reasons;
- classmark handling;
- cipher mode control;
- trace invocation;
- queuing indication;
- data link control SAPI not equal to "0".

### 5.1 DTAP

For the exchange of the DTAP messages (GSM 08.08 subclause 2.2), the involved MSCs shall act according to the following:

- the MSC-A acts as the MSC;
- the MSC-I acts as the BSS.

### 5.2 Assignment

The Assignment procedure (GSM 08.08 subclause 3.1.1) is applied on the E-interface with following conditions:

- the MSC-A acts as the MSC;
- the MSC-I acts as the BSS.

The handling of terrestrial resources is not applicable.

### 5.3 Handover resource allocation

At Basic Inter-MSC Handover (GSM 03.09) the Handover resource allocation procedure (GSM 08.08 subclause 3.1.5.2) is applied on the E-interface with the following conditions:

- the MSC-A acts as the MSC;
- the MSC-T acts as the target BSS.

At Subsequent Inter-MSC Handover (GSM 03.09) the Handover resource allocation procedure (GSM 08.08 subclause 3.1.5.2) is applied on the E-interface with the following conditions:

- the MSC-I acts as the MSC;
- the MSC-T acts as the BSS;
- if the MSC that is the MSC-A is not also the MSC-T, then this MSC shall act as the target BSS towards the MSC-I and as the MSC towards the MSC-T.

The handling of terrestrial resources is not applicable.

#### **5.4 Handover execution**

For the Handover execution procedure (GSM 08.08 subclause 3.1.5.3) the applicable parts on the E-interface are the transfer of HANOVER DETECT, HANOVER COMPLETE and HANOVER FAILURE messages at inter MSC handover. For those parts, the involved MSCs shall act according to the following:

- the MSC that is the MSC-A, acts as the MSC;
- the MSC that is the MSC-I, if it is not also the MSC-A, acts as the serving BSS;
- the MSC that is the MSC-T, if it is not also the MSC-A, acts as the target BSS.

#### **5.5 Internal handover indication**

For the Internal handover indication (GSM 08.08 subclause 3.1.6 and 3.1.7), the involved MSCs shall act according to the following:

- the MSC-A acts as the MSC;
- the MSC-I acts as the BSS.

MSC internal handovers (inter-BSS and intra-BSS handover) at the MSC-I are decided and executed autonomously by that MSC together with the connected BSSs. At completion of the handover execution the MSC-I initiates the internal handover indication procedure.

#### **5.6 Release due to BSS generated reasons**

For the Release due to BSS generated reasons procedure (GSM 08.08 subclause 3.1.9.2) the involved MSCs shall act according to the following:

- the MSC-I acts as the BSS;
- no further action is taken by the MSC-A.

#### **5.7 Classmark handling**

For the Classmark handling (GSM 08.08 subclause 3.1.13), the involved MSCs shall act according to the following:

- the MSC-A acts as the MSC;
- the MSC-I acts as the BSS.

#### **5.8 Cipher mode control**

For the Cipher mode control (GSM 08.08 subclause 3.1.14), the involved MSCs shall act according to the following:

- the MSC-A acts as the MSC;
- the MSC-I acts as the BSS.

#### **5.9 Trace invocation**

For the Trace invocation (GSM 08.08 subclause 3.1.11), the involved MSCs shall act according to the following:

- the MSC-A acts as the MSC;
- the MSC-I acts as the BSS.

## 5.10 Queuing indication

For the Queuing Indication (GSM 08.08 subclause 3.1.17), the involved MSCs shall act according to the following:

- at Assignment and at Basic Inter-MSC handover:
  - the MSC-A acts as the MSC;
  - the MSC-I acts as the BSS.
- at Subsequent Inter-MSC handover:
  - the MSC-I acts as the MSC;
  - the MSC-T acts as the BSS;
  - if the MSC that is the MSC-A is not also the MSC-T, then this MSC acts as the target BSS towards the MSC-I and as the MSC towards the MSC-T.

## 5.11 Data link control SAPI not equal to "0"

For the Data Link Control SAPI not Equal to "0" (GSM 08.08 subclause 3.1.18), the involved MSCs shall act according to the following:

- the MSC-A acts as the MSC;
- the MSC-I acts as the BSS.

## 6 BSSMAP messages transferred on the E-interface

The following BSSMAP messages, defined in GSM 08.08 subclause 3.2.1, are transferred on the E-interface:

ASSIGNMENT REQUEST	(MSC-A -> MSC-I)
	Excluded information element: CIRCUIT IDENTITY CODE
ASSIGNMENT COMPLETE	(MSC-I -> MSC-A)
	Excluded information element: CIRCUIT POOL, CIRCUIT IDENTITY CODE
ASSIGNMENT FAILURE	(MSC-I -> MSC-A)
	Excluded information elements: CIRCUIT POOL, CIRCUIT POOL LIST
*	HANDOVER REQUEST (MSC-A -> MSC-T and MSC-I -> MSC-A)
	Excluded information element: CIRCUIT IDENTITY CODE
*	HANDOVER REQUEST ACKNOWLEDGE (MSC-T -> MSC-A and MSC-A -> MSC-I)
	Excluded information element: CIRCUIT POOL, CIRCUIT IDENTITY CODE
*	HANDOVER COMPLETE (MSC-T -> MSC-A)
*	HANDOVER FAILURE (MSC-T -> MSC-A and MSC-I -> MSC-A)
	Excluded information elements: CIRCUIT POOL, CIRCUIT POOL LIST
*	HANDOVER PERFORMED (MSC-I -> MSC-A)
*	HANDOVER DETECT (MSC-T -> MSC-A)
	CLEAR REQUEST (MSC-I -> MSC-A)
SAPI "n" REJECT	(MSC-I -> MSC-A)
CONFUSION	(MSC-T -> MSC-A, MSC-A -> MSC-T, MSC-I -> MSC-A and MSC-A -> MSC-I)
#	MSC INVOKE TRACE (MSC-A -> MSC-I)
#	BSS INVOKE TRACE (MSC-I -> MSC-A and MSC-A -> MSC-T)
	CIPHER MODE COMMAND (MSC-A -> MSC-I)
	CIPHER MODE COMPLETE (MSC-I -> MSC-A)
	CIPHER MODE REJECT (MSC-I -> MSC-A)
**	QUEUING INDICATION (MSC-T -> MSC-A, MSC-I -> MSC-A, and MSC-A -> MSC-I)
	CLASSMARK UPDATE (MSC-I -> MSC-A and MSC-A -> MSC-T)
	CLASSMARK REQUEST (MSC-A -> MSC-I)

All other BSSMAP messages shall be considered as non-existent on the E-interface.

Some of the messages above are qualified by \*, \*\* or #. This signifies whether the message, when sent on the E-interface, is considered as:

- handover related message (\*);
- handover related when sent as a response to HANOVER REQUEST (\*\*); or
- trace related message (#).

## **7 Exceptions for BSSMAP message contents and information element coding when transferred on the E-interface**

### **7.1 Message contents**

For the applicable BSSMAP messages transferred on the E-interface the following exceptions to the descriptions in GSM 08.08 subclause 3.2.1 are valid:

Assignment request message:

- excluded information element:
  - circuit identity code.
- if received, the information element shall be treated as an information element with an unrecognizable identifier.

Assignment complete message:

- excluded information element:
  - circuit pool;
  - circuit identity code.
- if received, the information element shall be treated as an information element with an unrecognizable identifier.

Assignment failure message:

- excluded information elements:
  - circuit pool;
  - circuit pool list.
- if received, the information element shall be treated as an information element with an unrecognizable identifier.

Handover request message:

- excluded information element:
  - circuit identity code.
- if received, the information element shall be treated as an information element with an unrecognizable identifier.

Handover request acknowledge message:

- excluded information element:
  - circuit pool;
  - circuit identity code.

- if received, the information element shall be treated as an information element with an unrecognizable identifier.

Handover failure message:

- excluded information elements:
  - circuit pool;
  - circuit pool list.
- if received, the information element shall be treated as an information element with an unrecognizable identifier.

## 7.2 Information element coding

For the applicable BSSMAP information elements transferred on the E-interface the following exceptions to the description in GSM 08.08 subclause 3.2.2 are valid:

Cause information element:

- excluded causes:
  - call control;
  - CCCH overload;
  - handover successful;
  - requested terrestrial resource unavailable;
  - terrestrial circuit already allocated;
  - circuit pool mismatch;
  - switch circuit pool.

The corresponding cause values shall be considered as reserved for national use.

Cell identifier information element:

- excluded format:
  - Cell Identity.

The corresponding cell identification discriminator value shall be considered as reserved.

## 8 BSSAP message error handling when transferred on the E-interface

The handling of abnormal events related to the BSSAP header (GSM 08.08 subclause 2.4) and the BSSMAP error handling (GSM 08.08 subclause 3.1.19) are applicable with exception of the following:

- the handling of faults concerning the use of SCCP is not applicable.

The BSSMAP error messages sent on the E-interface shall only be sent as response to BSSAP messages received on the same interface.

## **History**

<b>Document history</b>	
December 1996	Publication of GSM 09.08 Version 5.0.0
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