ETSI/TC SMG
Released by : ETSI/PT 12
Release date: February 1992

RELEASE NOTE

Recommendation GSM 08.56

BSC - BTS Layer 2 Specification

Previously distributed version : 3.1.0 (Updated Release 1/90)
New Released version February 92 : 3.1.1 (Release 92, Phase 1)

1. Reason for changes

Only pagenumbering/layout/etc. has been changed since the previously distributed version.

This page is left blank intentionally

ETSI-GSM
Technical
Specification

GSM 08.56

Version 3.1.1

UDC: 621.396.21

Key words: European Digital Cellular Telecommunications System, Global System for Mobile Communications (GSM)

BSC - BTS
Layer 2
Specification

ETSI

European Telecommunications Standards Institute

ETSI Secretariat: B.P.152 . F - 06561 Valbonne Cedex . France

TP. + 33 92 94 42 00 TF. + 33 93 65 47 16 Tx. 47 00 40 F

PREFATORY NOTE

ETSI has constituted stable and consistent documents which give specifications for the implementation of the European Cellular Telecommunications System. Historically, these documents have been identified as "GSM recommendations".

Some of these recommendations may subsequently become Interim European Telecommunications Standards (I-ETSs) or European Telecommunications Standards (ETSs), whilst some continue with the status of ETSI-GSM Technical Specifications. These ETSI-GSM Technical Specifications are for editorial reasons still referred to as GSM recommendations in some current GSM documents.

The numbering and version control system is the same for ETSI-GSM Technical Specifications as for "GSM recommendations".

ETSI/GSM

GSM Recommendation 08.56

Title : BSC-BTS Layer 2 Specification

Date : February 1992

List of contents:

Original Language: English

Number of Pages : 11

0. SCOPE

GSM recommendation 08.56 specifies the link layer used for signalling on the A-bis interface between BSC and BTS.
The use and general aspects of the A-bis interface are described in Rec. 08.51 and the interface aspects in Rec. 08.52.

The Link Access Procedure on the D-channel (LAPD) specification used on the A-bis interface in the GSM PLMN is a subset of the CEPT recommendation T/S 46-20 which in turn has less options than the CCITT recommendation Q 921.

This description contains first the protocol definitions and second the services provided by the layer 2 to the layer 3.

1. GENERAL DESCRIPTION

The following information categories are supported by the procedures of this layer 2 recommendation:
- Signalling (including Short Message Service information)
- Operation and maintenance
- Layer 2 management

For each of these categories the BSC may have one or more layer 2 links to every TRX and BCF.

The signalling links over the A-bis interface are addressed to the different units by Terminal Endpoint Identifiers, TEI.

The same unit will normally have more than one functional entity. The logical links between different functional entities are identified by functional addresses, the Service Access Points, SAPI.

The figure 1/GSM 08.56 shows the architectural model with different layer 2 links.

A number of logical links may be multiplexed on each physical link. The same layer 2 logical link may not be distributed over more than one physical link.

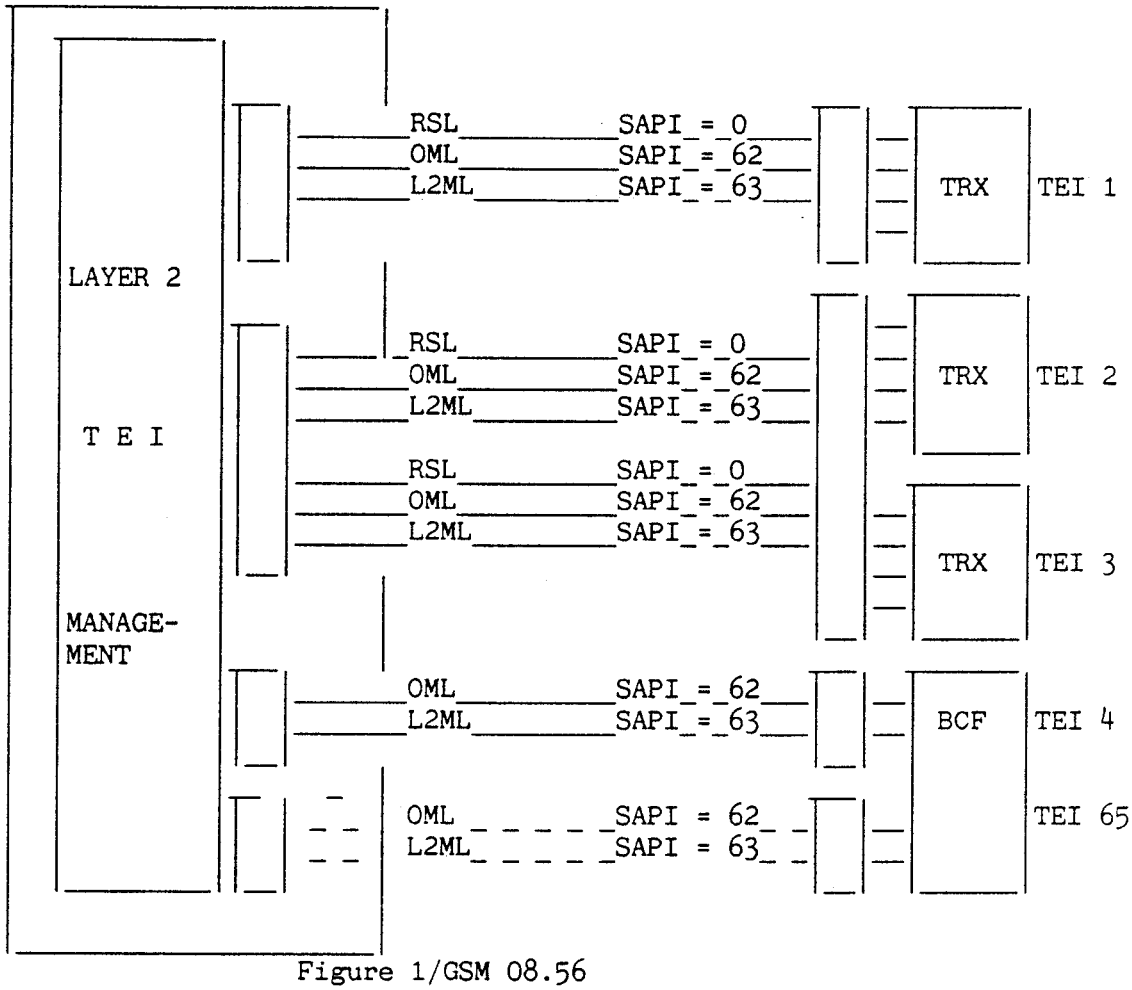

Figure 1/GSM 08.56

An example of Logical Layer 2 links supported by three permanent and one semipermanent links.

2. FUNCTIONAL CONTENTS

The basic functional content of the layer 2 protocol is:

- Transparent layer 2 links and time fill
- Point-to-point dedicated layer 2 links addressing both physical entities and functional entities.
- Point-to-multipoint addressed links used for layer 2 management
- Basic functions for TEI assignment and management
- Basic priority functions
- Basic supervision of links when not carrying traffic
- Sequence control
- Transmission error control
- Control of errors not recoverable by retransmission

3. LAPD FUNCTIONS

The LAPD functions as specified in recommendation CEPT T/S 46-20 are applicable. However, the exceptions and modifications listed in section 4.2 shall be used.

3.1 Exceptions_and_modifications

The following references are to the CEPT chapter no. and headlines:

- T/S 46-20 3.3.2 Command/Response field bit(C/R) In GSM PLMN's BSC represents the network side and TRX/BCF the user side of the interface.

- T/S 46-20 3.3.3 Service access point identifier (SAPI) The SAPI values for the A-bis interface are as listed in Table 1/08.56

Table 1/08.56

SAPI value	Related layer 3 or layer management entity
0	Radio signalling procedures
1	Reserved for packet mode communications using Q.931 call control procedures (Not used in GSM PLMN)
16	Reserved for packet communication conforming to X.25 level 3 procedures (Not used in GSM PLMN)
62	Operation and maintenance procedures
63	Layer 2 management procedures
All others	Reserved for future standardization

T/S 46-20 3.3.4.2 TEI for point-to-point data link connection

The remaining TEI values are used for the point-to-point data link connections associated with the addressed Service Access Point, SAP. The range of TEI values shall be allocated as shown in Table 2/08.56.

Table 2/08.56

TEI value	User type
0 - 63	TEI assignment for fixed TRX and BCF addresses.
64 - 126	TEI assignment for additional, TRX or BCF addresses.

Note: A BCF is given a separate layer 2 link only if it is not integrated with a TRX.

- T/S 46-203.6.1 Commands and responses The XID command and responses are not used.
- T/S 46-20 3.6.12 Exchange identification (XID) command/response: Not used.
- T/S 46-204.1.1.9 MDL-XID: Not used.
- T/S 46-204.1.1.10-4.1.1.15: Not relevant.

- T/S 46-204.1.3.1 Priority indicator

The different SAPIs are given the following priority classes when contending (with priority one as the highest):

SAPI	Link	Priority	Procedures
0	RSL	2	Signalling
62	OML	1	Operation and maintenance
63	L2ML	1	Layer 2 management

- T/S 46-20 5.3 Terminal Endpoint Identifier (TEI) management procedures

Due to the special assignment functions needed on the A-bis interface (See Rec. 08.63) there are modifications and additions to the assignment procedures. The rest of CEPT T/S 46-20 chapter 5.3 is kept if not stated otherwise.

- T/S 46-20 5.3.1 General

TEI management for A-bis interface is based on the following procedural means:

- A Subset of the TEI assignment procedures
- The TEI check procedures
- The TEI remove procedures
- An additional TEI assignment procedure

The TEI management needs procedures to check the used TEI values and procedures for reaction in situation where more than one TRX equipment uses the same TEI value. In addition to the fixed values it shall be possible to use additional TEI value to the same TRX equipment and thus encrease the signalling capacity.

- T/S 46-20 5.3.2 TEI assignment procedure

The TEI assignment procedure used on the A-bis interface has some additions to the CEPT T/S 46-20 automatic TEI assignment procedure.

To facilitate the configuration control in the BSC each TRX will have a fixed TEI and possibly get access to one or more additional TEIs assigning physical channels/layer 2 links.

The layer 2 links may all be turned on and off according to the normal automatic TEI assignment scheme but the TRX may only request identified TEI values which is (semi-) permanently programmed or programmed by operation and maintenance messages.

In GSM the reference number Ri is not used. It is only misoperation situations resulting from double failures that could be prevented/ solved faster by this parameter. The marginal advantage is not supposed to motivate the application of a random generator and the checking procedure.

The subset of the automatic assignment procedure applicable for the first layer 2 link to a TRX shall have the following modifications to T/S 46-20:

The identity request shall have an Ai value in the range 0-63 identifying the TEI value which is requested for activation.

On reception of the identity request message the BSC will check that the requested TEI may be used from the configurations aspects (Ref. 08.63) and then perform a normal TEI check prosedure to prevent a double assignment.

If the TEI request is accepted an identity assigned message with the requested TEI number is received by TRX before the expiry of timer T202.

A successful assignment procedure is shown in figure 2/08.56:

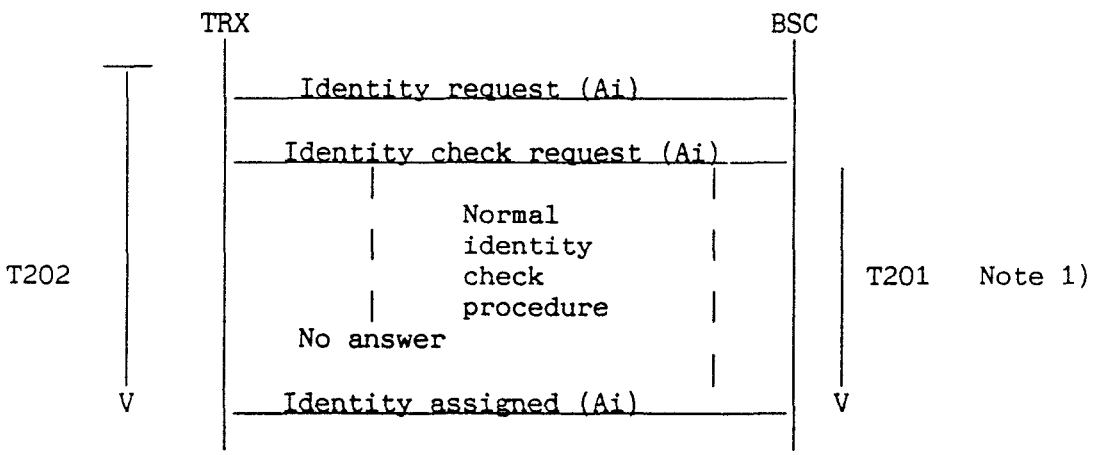

Figure 2/08.56 A successful assignment procedure

If timer T202 expires the assignment procedure did not succeed, and the TRX will take further actions in accordance with the T/R 46-20 procedures.

If within the assignment procedure an identity check response is received, then the requested TEI value is already in use. There shall be no answer to the requesting TRX and an error indication shall be sent to O&M.

An example of a non-successful assignment procedure is shown in figure 3/08.56:

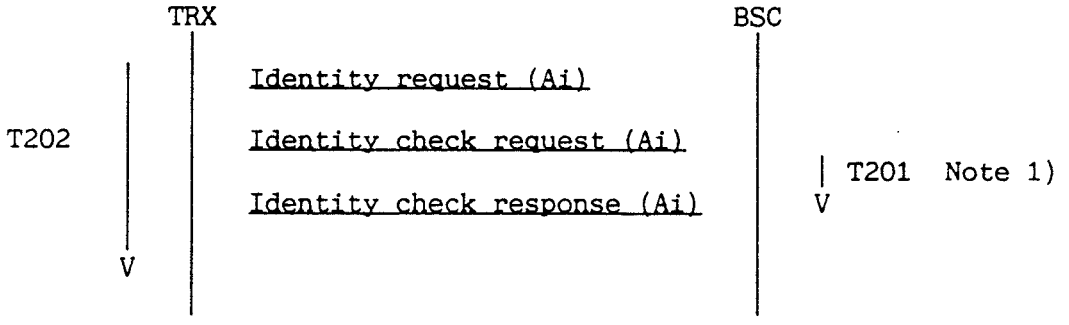

Figure 3/08.56 An example of assignment in error case (TEI value already in use)

The additional TEI assignment procedure is equivalent to the normal one with two exceptions:

- The TEI value is in the range: 64-126
- The TEI value and the identification of which physical link it shall operate on is transmitted to the TRX from BSC in an operation and maintenance message. This layer 3 O&M message is transfered on an already assigned layer 2 link. (See Rec. 08.59)

The successful additional assignment procedure is shown in figure 4/08.56:

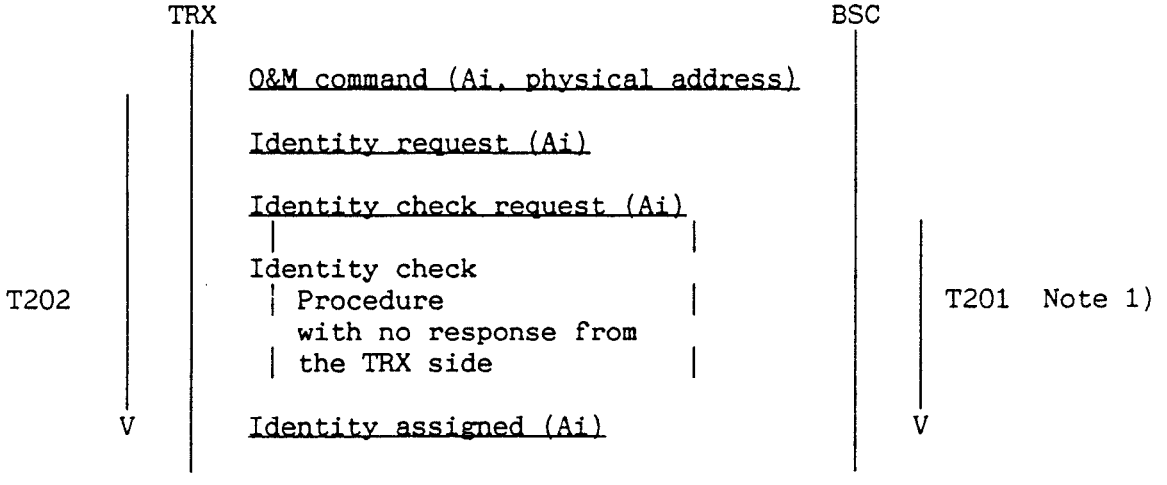

Figure 4/08.56 The procedure for assigning an additional TEI to a TRX or BCF.

- T/S 46-20 5.3.5 TEI identity verify procedure: Not used.

Note 1: If timer T201 expires the request shall be repeated once and timer T201 restarted.

- T/S 46-20 5.3.6 Formats and codes

All messages except Identity verify and Identity denied are used. The Ai is used as described in the modification to CEPT T/S 46-20 chapter 5.3.2. The Ri parameter is not used and will always be coded 0000 0000.

The coding of each field of the various messages is specified in Table 3/08.56.

Table 3/08.56

Codes for messages concerning TEI management procedures

Message name	Layer management entity identifier	Reference number Ri	Message type	Action indicator Ai
Identity request (user to network)	0000 1111	Not used (coded 0)	0000 0001	Ai = 0-126
Identity assigned (network to user)	0000 1111	Not used (coded 0)	0000 0010	Ai = 0-126 Assigned TEI value
Identity check request (network to user)	0000 1111	Not used (coded 0)	0000 0100	Ai = 127 Check all TEI values --- Ai = 0-126 TEI value to be checked
Identity check response (user to network)	0000 1111	Not used (coded 0)	0000 0101	Ai = 0-126 TEI value in use
Identity remove (network to user)	0000 1111	Not used (coded 0)	0000 0110	Ai = 127 Request for removal of all TEI values --- Ai = 0-126 TEI value to be removed

- T/S 46-20 5.4 Automatic negotiation of data link layer parameters

The procedures are described in Appendix IV. The procedures are not supported.

- T/S 46-20 5.5.1.2 Establishment procedures

The timer T203 shall be implemented in the equipment on both sides of interface A-bis.

- T/S 46-20 5.8.1 N(S) sequence error

The optional procedure for retransmission as described in Appendix I is not supported by CEPT.

- T/S 46-20 5.9 List of parameter values

All the default values are listed.

- T/S 46-20 5.9.1 Timer T200

The default value of timer T200 is 240 ms starting from the end of a transmitted frame.

Note: This timer depends on the timer values used for supervising the message flow between the MS and the network. The proper operation of the procedure requires that timer T200 bbe greater than the maximum time between transmision of command frames and the reception of their corresponding response or acknowledgement frames and shorter than the shortest layer 3 timer used for supervising this message flow.

- T/S 46-20 5.9.2 Maximum number of retransmissions (N200)

The default value of (N200) is 3.

- T/S 46-20 5.9.3 Maximum number of octets in an information field (N201)

The default and maximum value of (N201) is 260 octets for all SAPI values.

- T/S 46-20 5.9.4 Maximum number of transmission of the TEI identity request message (N202):

Not used (i.e. equivalent to infinity).

- T/S 46-20 5.9.5 Maximum number of outstanding frames (K)

For the SAPI value 0 identifying radio signalling the default (K) value shall be 2. For all other SAPIs the value shall be set to the fixed value of 1.

Note: the value of K for SAPI value 0 shall always be greater than the k value for the other SAPIs.

- T/S 46-20 5.9.6 Timer T201

Timer T201 shall have the default value 1 sec.

- T/S 46-20 5.9.7 Timer T202

The minimum time between the transmission of TEI Identity request messages is a system paramenter (T202) which shall be set to 15 sec.

- T/S 46-20 5.9.8 Timer T203

The timer T203 represents the maximum time allowed without frames being exchanged for each TEI. The value of timer T203 shall be 10 sec.

- T/S 46-20 5.10 Data link layer monitor function

The supervisory function will be used in the equipment on both sides of interface A-bis.

- T/S 46-20 Appendix I-V: Not used.