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## **Digital cellular telecommunications system; Base Station Controller - Base Transceiver Station (BSC - BTS) interface; General aspects (GSM 08.51)**

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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 defines the general aspects Base Station Controller (BSC) to Base Transceiver Station (BTS) interface 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) is an introduction to the 08.5x - 08.6x series of GSM Technical Specifications and deals with the definition of the Base Station Controller (BSC) to Base Transceiver Station (BTS) interface defined inside the base station system (BSS) for the GSM system. These Technical Specifications define the basic interface with some identified options requiring further elaboration. The BSC-BTS interface is mandatory within GSM only if the BSC and the BTS are not collocated.

### 1.1 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 03.50 (ETS 300 903): "Digital cellular telecommunications system (Phase 2+); Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system".
- [3] GSM 08.08: "Digital cellular telecommunications system (Phase 2+); Mobile Switching Centre - Base Station System (MSC - BSS) interface; Layer 3 specification".
- [5] GSM 08.52: "Digital cellular telecommunications system; Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Interface principles".
- [6] GSM 08.54: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 1 structure of physical circuits".
- [7] GSM 08.56: "Digital cellular telecommunications system; Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 2 specification".
- [8] GSM 08.58: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 3 specification".
- [9] GSM 08.60 (ETS 300 737): "Digital cellular telecommunications system (Phase 2+); Inband control of remote transcoders and rate adaptors for Enhanced Full Rate (EFR) and full rate traffic channels".
- [10] GSM 08.61 (ETS 300 979): "Digital cellular telecommunications system; In-band control of remote transcoders and rate adaptors for half rate traffic channels".
- [11] GSM 12.00 (ETS 300 612-1): "Digital cellular telecommunications system (Phase 2); Objectives and structure of Network Management (NM)".
- [12] GSM 12.01 (ETS 300 612-2): "Digital cellular telecommunications system (Phase 2); Common aspects of GSM Network Management (NM)".
- [13] GSM 12.07 (ETS 300 612-3): "Digital cellular telecommunications system (Phase 2); Operations and performance management".
- [14] GSM 12.02 (ETS 300 613): "Digital cellular telecommunications system (Phase 2); Subscriber, Mobile Equipment (ME) and services data administration".

- [15] GSM 12.03 (ETS 300 614): "Digital cellular telecommunications system (Phase 2); Security management".
- [16] GSM 12.04 (ETS 300 615): "Digital cellular telecommunications system (Phase 2); Performance data measurements".
- [17] GSM 12.05 (ETS 300 616): "Digital cellular telecommunications system (Phase 2); Subscriber related event and call data".
- [18] GSM 12.06 (ETS 300 617): "Digital cellular telecommunications system (Phase 2); GSM Network change control".
- [19] GSM 12.11 (ETS 300 619): "Digital cellular telecommunications system (Phase 2); Maintenance of the Base Station System (BSS)".
- [20] GSM 12.20 (ETS 300 622): "Digital cellular telecommunications system (Phase 2); Network Management (NM) procedures and messages".
- [21] GSM 12.21 (ETS 300 623): "Digital cellular telecommunications system (Phase 2); Network Management (NM) procedures and message on the A-bis interface".
- [22] 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)".
- [23] CCITT Recommendation Q.920: "ISDN user-network interface data link layer - General aspects".
- [24] CCITT Recommendation Q.921: "ISDN user-network interface - Data link layer specification".

## 1.2 Abbreviations

Abbreviations used in this specification are listed in GSM 01.04.

## 2 Interface capabilities

The BSC-BTS interface shall be capable of supporting all the services offered to the GSM users and subscribers. In addition it shall also allow control of the radio equipment and radio frequency allocation in the BTS.

## 3 Interface specification objectives

The BSC to BTS interface specifications should allow the following:

- (i) Connection of various manufacturers BTS/TRX to the same BSC, according to the location of the transcoder.
- (ii) The use of several manufacturers BSC to the same type of BTS/TRX, according to the location of the transcoder.
- (iii) The use of the same BTS/TRX in any PLMN, according to the location of the transcoder.
- (iv) The use of the same BSC in any PLMN.
- (v) Separate evolution of BSC and BTS/TRX technology.
- (vi) Separate evolution of O & M facilities.
- (vii) Sub-multiplexing of speech channels on a 64 kbit circuit.



- (viii) Evolution towards lower speech coding rates.
- (ix) Location of transcoders either in BSC or in BTS.
- (x) Support of all services defined in the 02 series of GSM Technical Specifications.
- (xi) A stepwise expansion of capacity in a BTS.
- (xii) Different physical solution of the various equipment in the BTS.
- (xiii) Support of a single TRX forming a BTS.
- (xiv) Support of a set of TRX'S forming a BTS.
- (xv) Support of a BTS as one entity.

#### **4 Interface characteristics**

The interface is defined to be at the terrestrial link of a remote BTS connected to the BSC.

The BSC to BTS interface is specified by a set of characteristics, including:

- a) physical and electrical parameters;
- b) channel structures;
- c) signalling transfer procedures;
- d) configuration and control procedures;
- e) operation and maintenance information support.

The definition of the BSC to BTS/TRX interface follows a layered approach similar to the ISDN. Layer 3 is for the most part based on GSM 08.08 with additional procedures for control of radio resources. Layer 2 is based on the LAPD protocol. Layer 1 is either digital (at a rate 2 048 kbit/sec with a frame structure of 32 x 64 kbit/sec time slots or at a rate of 64 kbit/sec.) or analogue with the data being passed by the use of modems (this latter case is a national option).

In the case that the transcoder is positioned outside the BTS, the overall one way propagation delay between the Point Of Interconnection to PSTN/ISDN and the MS is limited to 1,5 ms (approximately 300 km). With the transcoder in the BTS, the limit is 6,5 ms (approximately 1 300 km). These limits may be subject to increase resulting from savings made in the overall network. See also GSM 03.50.

#### **5 Other technical specifications on the BSC-BTS interface**

The full structure of the Technical Specifications specifying the BSC to BTS interface are as follows:

##### **5.1 GSM 08.52 BSC-BTS Interface Principles**

This specification gives the principle basis for the rest of the specifications specifying the interface between the base station controller and the base transceiver station. It gives the functional split between these two entities.

##### **5.2 GSM 08.54 BSC-BTS Layer 1 Specification**

This specification defines the structure of the physical layer at the BSC - BTS interface. The physical interface is either chosen as 2 048 kbit/sec or as 64 kbit/sec, both according to standard CCITT recommendations.

Depending on location of transcoders, speech is standard A-law or it is 16 kbit/sec remote control protocol multiplexed or rate adapted to 64 kbit/sec in the same way as data.

### **5.3 GSM 08.56 BSC-BTS Layer 2 Specification**

At layer 2 the signalling information is passed by a standard LAPD protocol mechanism in accordance with the CCITT Recommendations Q.920 and Q.921.

### **5.4 GSM 08.58 BSC-BTS Layer 3 Specification**

This specification specifies the layer 3 procedures used on the BSC-BTS interface for control of the GSM services. The functional split between BSC and BTS is defined in GSM 08.52.

### **5.5 GSM 12.21 BSC-BTS Operation/Maintenance Signalling**

This specification defines the transport mechanism for O&M messages over the Abis-interface. O&M procedures and messages are defined in GSM 12 series.

### **5.6 GSM 08.60 Inband Control of Remote Transcoders and Rate Adaptors**

The transcoder is a part of the BSS and may optionally be located outside the BTS (e.g. at MSC-site or at BSC-site) in order to make it possible to multiplex speech and data channels on the links within the BSS and on the BSC-BTS link.

This specification describes the protocol which carries the full rate speech and data frames between the transcoder and the radio link codec across a 16 kbit/sec interface. Both full rate speech and full rate data services are covered. It also defines the signals needed for remote controlling the timing of the transcoder in accordance to the transmission time at the radio link. It also addresses the signals for voice activity and comfort noise. It interfaces the 06- series to the 05-series.

### **5.7 GSM 08.61 Inband Control of Remote Transcoders and Rate Adaptors for Half Rate Traffic Channels**

This Technical Specification describes the protocol which carries the half rate speech and data frames between the transcoder and the radio link codec across a 16 kbit/sec or an 8 kbit/sec interface. Both half rate speech and half rate data services are covered. It also defines the signals needed for remote controlling the timing of the transcoder in accordance to the transmission time at the radio link. It also addresses the signals for voice activity and comfort noise.

## History

Document history	
December 1996	Publication of GSM 08.51 version 5.0.0