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**Digital cellular telecommunications system (Phase 2+);
Base Station Controller - Base Transceiver Station (BSC - BTS) interface;
Interface principles
(3GPP TS 48.052 version 13.0.0 Release 13)**

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS
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Contents

Foreword

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1 Scope

The use and general aspects of the A-bis interface are given in 3GPP TS 48.051.

The present document gives the principle basis for the rest of the specifications specifying the interface between the Base Station Controller, BSC, and the Base Transceiver Station, BTS, with its transceivers, TRX. These components together form the Base Station System, BSS. (The interface between MSC and the BSS is specified in 3GPP TS 48.001 and 3GPP TS 48.020).

The intention with this interface is to get a unified way of connecting remotely located BTSs/TRXs to a BSC allowing for the interconnection of BSCs and BTSs/TRXs from different manufacturers.

In order to keep the BTS as simple as possible, BTS contains only those functions which have to recide close to the radio interface.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
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- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

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

[2] 3GPP TS 48.001: "Base Station System - Mobile services Switching Centre (BSS - MSC) interface; General aspects".

[3] 3GPP TS 48.002: "Base Station System - Mobile-services Switching Centre (BSS - MSC) interface Interface principles".

[4] Void.

[5] 3GPP TS 48.006: "Signalling transport mechanism specification for the Base Station System - Mobile-services Switching Centre (BSS-MSC) interface".

[6] Void.

[7] 3GPP TS 48.020: "Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS-MSC) interface".

[8] 3GPP TS 48.051: "Base Station Controller - Base Transceiver Station (BSC-BTS) interface; General aspects".

[9] 3GPP TS 48.058: "Base Station Controller - Base Transceiver Station (BSC-BTS) interface; Layer 3 specification".

[10] 3GPP TS 48.060: "Inband control of remote transcoders and rate adaptors for full rate traffic channels".

[11] 3GPP TS 48.061: "Inband control of remote transcoders and rate adaptors for half rate traffic channels".

[12] Void.

[13] 3GPP TS 23.002: "Network Architecture".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Base Station System (BSS): system of base station equipment (transceivers, controllers, etc..) which is viewed by the MSC through a single interface as defined by the 3GPP TS 48.0xx series of recommendations, as being the entity responsible for communicating with Mobile Stations in a certain area. The radio equipment of a BSS may cover one or more cells. A BSS may consist of one or more base stations. If an internal interface according to the 3GPP TS 48.05x series at recommendations is implemented, then the BSS shall consist of one Base Station Controller (BSC) and several Base Transceiver Stations (BTSs).

NOTE: The functionality is described in 3GPP TS 48.001.

Base Station Controller (BSC): network component in the PLMN with the functions for control of one or more Base Transceiver Stations (BTSs).

Base Transceiver Station (BTS): network component which serves one cell, and is controlled by a Base Station Controller. The BTS can consist of one or more TRXs with or without common control equipment.

Cell: See 3GPP TS 23.002.

Transceiver (TRX): in the GSM PLMN is the functional entity which supports the 8 basic radio channels of the same TDMA-frame.

Base Control Function (BCF): functional entity which handles common control functions within a BTS, e.g. frequency hopping sequences etc.
At a multi BTS site, one of the BCFs can also be choosen to perform functions common to the site (e.g. external alarms, power supply, time base).

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 apply.

4 General

3GPP TS 48.001 and 3GPP TS 48.020 specify the functional split and interface between MSC and the Base Station System, BSS, the A- interface.

The BSS can be further subdivided into one BSC controlling one or more BTSs, each consisting of one or more TRXs. The interface treated by the present document is the interface between a BSC and a BTS. It is denoted the A-bis-interface.

The A-bis-interface is capable of supporting three different internal BTS configurations:

- one single TRX;
- a collection of TRXs where all are served by a common physical connection;
- a collection of TRXs, each served by its own physical connection.

Figure 4.1 shows some possible configurations.

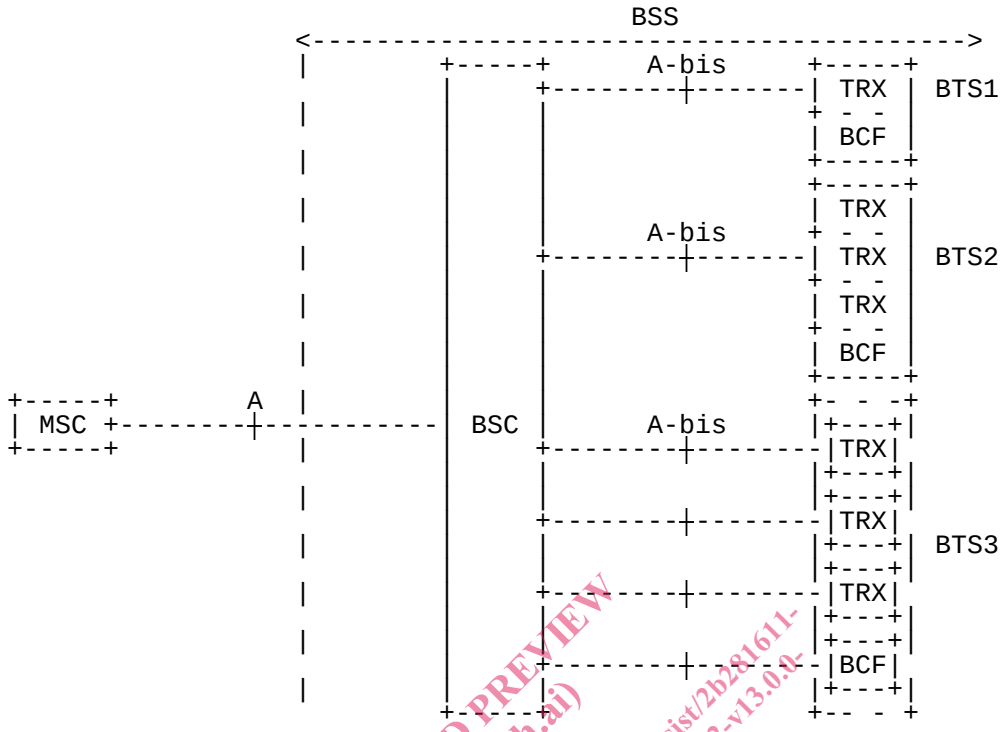

Figure 4.1: BSS Subdivision and Interfaces

The present document is based on the use of digital transmission system interfaces, either at 2 048 kbit/s or at 64 kbit/s. Furthermore, the use of a subrate of 16 kbit/s and/or 8 kbit/s is supported for coded speech or rate adapted data.

This interface will support the transcoder positioned either inside or outside BTS. In the latter case, remote control (synchronisation) of the transcoder is used.

5 Functional division between BSC and BTS

5.1 General

In Technical Specification 3GPP TS 48.001 the functional division between MSC and BSS is described. This clause describes the further subdivision of functions between BSC and BTS/TRX required for the A-bis interface. A summary can be found in table 5.1. Some general requirements on the functionality of the A-bis interface are also specified.

5.2 Terrestrial channel management

There is a unique mapping from traffic channels on the radio path to the terrestrial traffic channels. BSC makes the choice of radio channel and thereby also of the terrestrial channel for a call.

5.3 Radio channel management

5.3.1 Channel configuration management

The channel configuration is controlled between the BSC and OMC. Current configuration is downloaded from OMC to BSC which then controls the use of the radio channels (TDMA time slots for BCCH/CCCH, TCHs, SDCCHs etc).

5.3.2 SDCCH (Stand alone DCCH) and TCH management

5.3.2.1 Frequency hopping management

The hopping sequences for each BTS (cell) is downloaded from OMC to BSC. It is then the responsibility of BSC to download this information to each BTS and also to send the corresponding BCCH information to be transmitted in the BCCH time slots.

5.3.2.2 Channel selection, link supervision and channel release

These functions are controlled by BSC. For channel selection BSC has to have information on blocked radio channels and also on interference level on idle channels.

In the assignment messages to MS (Immediate Assign, Assign Command and Handover Command), a Starting Time parameter is included. This starting time is based on the frame number on the (new) BTS. Before sending the assign message to MS, BSC has to be informed on the current frame number in BTS.

When assigning a channel, BSC shall inform BTS on relevant parameters, e.g. channel type, channel coding, rate adaption, starting time.

5.3.2.3 Power control

The ordered MS power level is sent in the 16 bit L1-header of SACCH- blocks on the downlink and the actual power level used by MS is reported in the corresponding L1-header on the uplink. This header is inserted (downlink) and extracted (uplink) by BTS/TRX.

The determination of required power level in MS is based on uplink radio measurements made by BTS/TRX and reported to BSC. The basic control of this power is performed by BSC and the dynamic regulation is performed by BSC or optionally by BTS. If BTS supports dynamic MS power regulation, BSC can indicate whether BTS is to regulate the MS power and if so, also the parameters required by BTS.

The required TRX transmission power level on a channel is based on reported measurements performed by MS. The dynamic control of this power is optional. If supported, the basic control is performed by BSC and the dynamic regulation is performed by BSC or optionally by BTS. If BTS supports dynamic TRX transmission power regulation, BSC can indicate whether BTS is to regulate the transmission power and if so, also the parameters required by BTS.

5.3.2.4 Idle channel observation

Idle channels are monitored by BTS.

5.3.3 BCCH/CCCH management

TRX knows the timing of BCCH/CCCH slots (not known by BSC). The actual timing of BCCH/CCCH blocks therefore has to be made by BTS/TRX, including the scheduling of Paging Request messages on paging sub-channels.

BCCH information is downloaded to BTS.

5.3.4 Random access

Detection of a random access attempt has to be made by TRX which then sends a message to BSC containing the required timing advance, the frame number of the access attempt and the 8 bit Channel Request message sent by MS in the access burst. This information is then included by BSC in the following Immediate Assign message sent to MS.

5.3.5 Channel coding/decoding

The error protection coding and decoding is made by BTS/TRX.

Different coding and interleaving schemes are used for speech and data calls. This information has to be signalled from BSC to BTS on a per call basis.