ETSI TS 148 051 V19.0.0 (2025-10)



Digital cellular telecommunications system (Phase 2+) (GSM);
Base Station Controller - Base Transceiver Station (BSC - BTS)
interface;
General aspects

(3GPP TS 48.051 version 19.0.0 Release 19)



Reference RTS/TSGR-0048051vj00 Keywords GSM

ETSI

650 Route des Lucioles F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B Association à but non lucratif enregistrée à la Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from the ETSI Search & Browse Standards application.

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format on ETSI deliver repository.

Users should be aware that the present document may be revised or have its status changed, this information is available in the Milestones listing.

If you find errors in the present document, please send your comments to the relevant service listed under <u>Committee Support Staff</u>.

If you find a security vulnerability in the present document, please report it through our Coordinated Vulnerability Disclosure (CVD) program.

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2025. All rights reserved.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards", which is available from the ETSI Secretariat. Latest updates are available on the ETSI IPR online database.

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECTTM, **PLUGTESTS**TM, **UMTS**TM and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP**TM, **LTE**TM and **5G**TM logo are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M**TM logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM**[®] and the GSM logo are trademarks registered and owned by the GSM Association.

Legal Notice

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found at 3GPP to ETSI numbering cross-referencing.

Modal verbs terminology

In the present document "shall", "shall not", "should", "should not", "may", "need not", "will", "will not", "can" and "cannot" are to be interpreted as described in clause 3.2 of the <u>ETSI Drafting Rules</u> (Verbal forms for the expression of provisions).

"must" and "must not" are NOT allowed in ETSI deliverables except when used in direct citation.

Contents

Intell	lectual Property Rights	2
Lega	l Notice	2
Mod	al verbs terminology	2
	word	
1	Scope	5
2	References	5
3	Abbreviations	6
4	Interface capabilities	6
5	Interface specification objectives	6
6	Interface characteristics	7
7	Other technical specifications on the BSC-BTS interface	7
7.1	3GPP TS 48.052 BSC-BTS Interface Principles	
7.2	3GPP TS 48.054 BSC-BTS Layer 1 Specification	
7.3	3GPP TS 48.056 BSC-BTS Layer 2 Specification	
7.4	3GPP TS 48.058 BSC-BTS Layer 3 Specification	
7.5	3GPP TS 12.21 BSC-BTS Operation/Maintenance Signalling	
7.6	3GPP TS 48.060 Inband Control of Remote Transcoders and Rate Adaptors	8
7.7	3GPP TS 48.061 Inband Control of Remote Transcoders and Rate Adaptors for Half Rate Traffic Channels	8
Anno	ex A (informative): Change History	9
	ory	

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document is an introduction to the 48.5xx - 48.6xx series of 3GPP 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 colocated.

2 References

[17]

Void.

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.
- For a specific reference, subsequent revisions do not apply.
- 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 43.050: "Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system".
[3]	3GPP TS 48.008: "Mobile Switching Centre - Base Station System (MSC-BSS) interface; Layer 3 specification".
[4]	Void.
[5]	3GPP TS 48.052: "Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Interface principles".
[6]	3GPP TS 48.054: "Base Station Controller - Base Transceiver Station (BSC - BTS) interface Layer 1 structure of physical circuits".
[7]	3GPP TS 48.056: "Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 2 specification".
[8]	3GPP TS 48.058: "Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 3 specification".
[9]	3GPP TS 48.060: "Inband control of remote transcoders and rate adaptors for full rate traffic channels".
[10]	3GPP TS 48.061: "Inband control of remote transcoders and rate adaptors for half rate traffic channels".
[11]	Void.
[12]	Void.
[13]	Void.
[14]	Void.
[15]	Void.
[16]	Void.
5 4 - 3	

[18]	l	Void.
[19]	I	Void.
[20]	I	Void.
[21]	I	Void.
[22]	I	Void.
[23]	I	Void.
[24]	I	3GPP TS 12.21: "Network Management (NM) procedures and messages on the A-bis interface".
[25]	I	Void.
[26]	I	ITU-T Recommendation Q.920: "ISDN user-network interface data link layer - General aspects".
[27]	I	ITU-T Recommendation Q.921: "ISDN user-network interface - Data link layer specification".

3 Abbreviations

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

4 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.

5 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 3GPP TS 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.

6 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 Technical Specification 3GPP TS 48.008 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/s with a frame structure of 32 x 64 kbit/s time slots or at a rate of 64 kbit/s) 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 Technical Specification 3GPP TS 43.050.

7 Other technical specifications on the BSC-BTS interface

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

7.1 3GPP TS 48.052 BSC-BTS Interface Principles

3GPP TS 48.052 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.

7.2 3GPP TS 48.054 BSC-BTS Layer 1 Specification

3GPP TS 48.054 defines the structure of the physical layer at the BSC - BTS interface. The physical interface is either chosen as 2.048 kbit/s or as 64 kbit/s, both according to standard ITU-T recommendations.

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

7.3 3GPP TS 48.056 BSC-BTS Layer 2 Specification

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

7.4 3GPP TS 48.058 BSC-BTS Layer 3 Specification

3GPP TS 48.058 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 Technical Specification 3GPP TS 48.052.

7.5 3GPP TS 12.21 BSC-BTS Operation/Maintenance Signalling

3GPP TS 12.21 defines the transport mechanism for O&M messages over the Abis interface. O&M procedures and messages are defined in 3GPP TS 12 series.

7.6 3GPP TS 48.060 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.

3GPP TS 48.060 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.

7.7 3GPP TS 48.061 Inband Control of Remote Transcoders and Rate Adaptors for Half Rate Traffic Channels

3GPP TS 48.061 describes the protocol which carries the half rate speech and data frames between the transcoder and the radio link codec across a 16 kbit/s or an 8 kbit/s 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.

Annex A (informative): Change History

TSG#	TSG Doc.	CR	Rev	Subject/Comment	New
January 2016	-	-	-	Rel-13 version created based on v12.0.0	13.0.0

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-03	RP-75					Version for Release 14 (frozen at TSG-75)	14.0.0
2018-06	RP-80	-	-	-	-	Update to Rel-15 version (MCC)	15.0.0
2020-07	RP-88e	-	-	-	-	Upgrade to Rel-16 version without technical change	16.0.0
2022-03	RP-95e	-	-	-	-	Upgrade to Rel-17 version without technical change	17.0.0
2024-03	RP-103	-	-	-	-	Upgrade to Rel-18 version without technical change	18.0.0
2025-09	RP-109	-	-	-	-	Upgrade to Rel-19 version without technical change	19.0.0

History

Document history					
V19.0.0 October 2025 Publication					