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**Digital cellular telecommunications system (Phase 2+) (GSM);
Base Station Controller -
Base Transceiver Station (BSC - BTS) Interface;
Layer 3 specification
(3GPP TS 48.058 version 17.0.0 Release 17)**

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Contents

Foreword

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

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z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies the general structure of layer 3 and traffic management procedures and messages used on the A-bis interface to support signalling procedures as defined in 3GPP TS 24.008 and 3GPP TS 44.018. Support for Location Services (LCS) related signalling, as defined in 3GPP TS 23.071, is also included. 3GPP TS 23.071 identifies new A-bis signalling to support BTS-embedded Type B LMUs as well as standalone, Type B LMUs. The standalone Type B LMU supports the layer 1 and 2 signalling for the A-bis as well as the Location Service message defined in the present document.

The use and general aspects of the Base Station Controller (BSC) to Base Station Transceiver (BTS) interface (the A-bis interface) are given in 3GPP TS 48.051.

Network management procedures and messages for the A-bis interface are defined in 3GPP TS 08.59.

The functional split between BSC and BTS is defined in 3GPP TS 48.052. The procedures and messages required to support this split are defined in detail in the present document.

1.1 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.
- 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 43.020: "Security related network functions".

[2a] 3GPP TS 23.071: "Location Services; Functional description – Stage 2".

[3] 3GPP TS 44.004: "Layer 1 General requirements".

[4] 3GPP TS 44.005: "Data Link (DL) layer General aspects".

[5] 3GPP TS 44.006: "Mobile Station - Base Station System (MS - BSS) interface Data Link (DL) layer specification".

[6] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols; Stage 3".

[7] 3GPP TS 44.012: "Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".

[7a] 3GPP TS 44.071: "Mobile radio interface layer 3 Location Services (LCS) specification".

[8] 3GPP TS 45.002: "Multiplexing and multiple access on the radio path".

[9] 3GPP TS 45.005: "Radio transmission and reception".

[10] 3GPP TS 45.008: "Radio subsystem link control".

[11] 3GPP TS 45.009: "Link Adaptation".

[12] 3GPP TS 45.010: "Radio subsystem synchronization".

[13] 3GPP TS 48.006: "Signaling transport specification mechanism for the Base Station System – Mobile-services Switching Centre (BSS - MSC) interface".

[14] 3GPP TS 48.008: "Mobile-services Switching Centre – Base Station System (MSC-BSS) interface; Layer 3 specification".

[15] 3GPP TS 48.051: "Base Station Controller - Base Transceiver Station (BSC - BTS) interface; General aspects".

[16] 3GPP TS 48.052: "Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Interface principles".

[17] 3GPP TS 48.056: "Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 2 specification".

[18] 3GPP TS 26.103: "Speech Codec List for GSM and UMTS".

[19] 3GPP TS 44.018: "Radio Resource Control Protocol".

1.2 Abbreviations

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

2 Protocol model

A model for L3 can be found in figure 2.1.

L2 addressing is made to TRX (or BCF) using the TEI of LAPD. Different L2 links are used for traffic management messages (RSL, Radio Signalling Link), network management messages (OML, Operation & Maintenance Link) and L2 management messages (L2ML, Layer 2 Management Link).

For traffic management, two types of signalling messages have been defined:

Transparent Messages: Messages which are forwarded by BTS without interpretation or changes.

Non-Transparent Messages: Messages which are sent only between BSC and BTS and which BTS is acting upon or which are the results of BTS actions.

In addition, the messages have been grouped into four main groups: Radio Link Layer Management, Dedicated Channel Management, Common Channel Management and TRX Management messages.

Discrimination between these types and groups is based on the Message Discriminator which is sent as the first octet in all messages. Transparent and non-transparent messages are discriminated by a transparency flag (T-bit) in the Message Discriminator. Transparent messages are merely forwarded to L2 on the radio interface.

In order to address the relevant radio channel, a Channel Number element is included to support the distribution of messages to relevant physical channels on the TRX. A Link Identifier element supports the distribution on logical links/channels on the radio interface (compare the DLCI element of the A interface, 3GPP TS 48.006).

All messages in this GTS are to be transmitted on the A-bis interface using the I format of LAPD, except for MEASUREMENT RESULT which is sent in UI format.

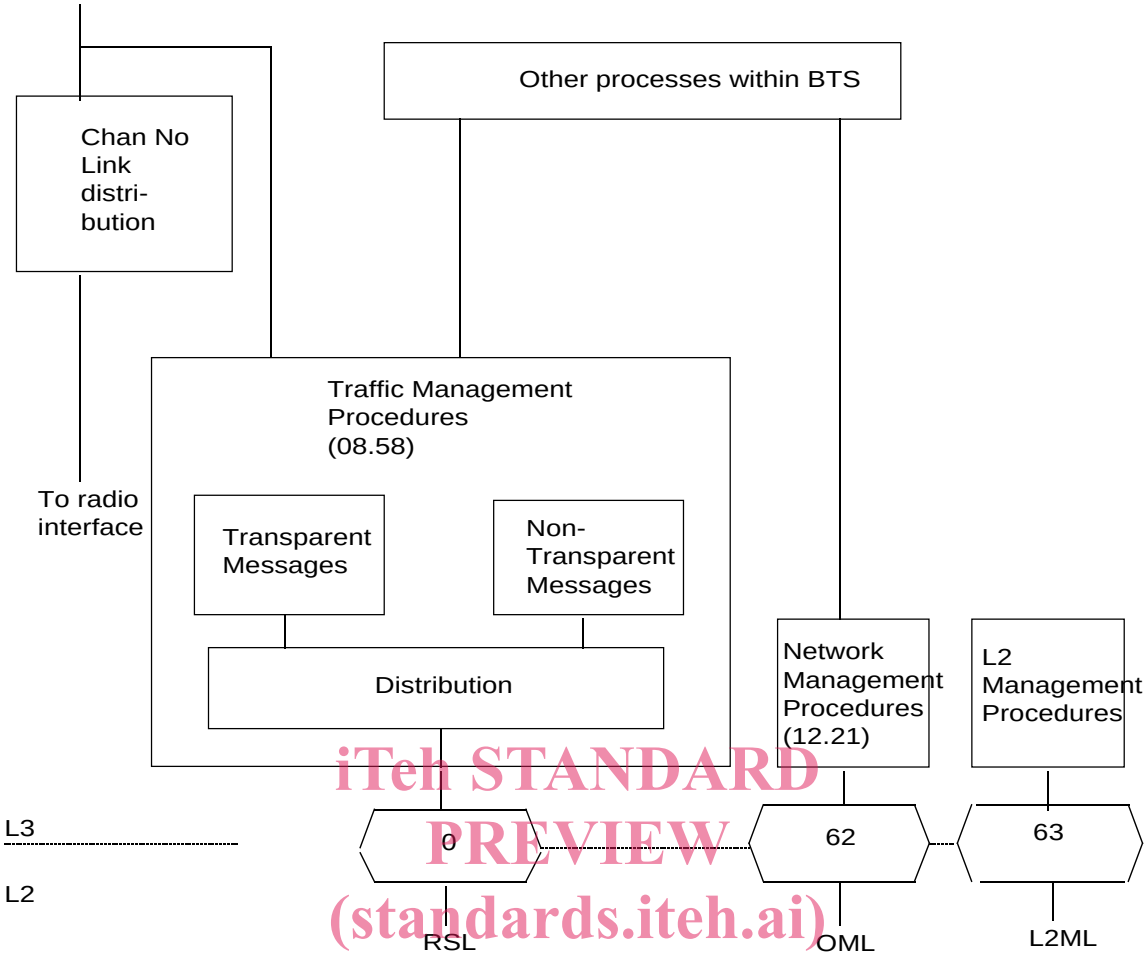


Figure 2.1/48.058: L3 model

3 Radio Link Layer Management Procedures

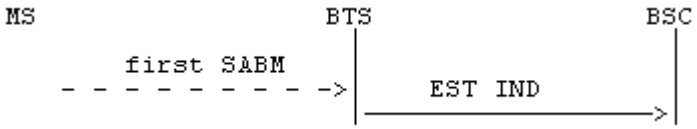
This sub-clause describes procedures related to the management of a link layer connection on the radio path.

3.1 Link establishment indication

This procedure is used by BTS to indicate to BSC that a layer 2 link on the radio path has been established in multi-frame mode at the initiative of an MS. BSC can use this indication to set up an SCCP connection to MSC.

Upon reception of a SABM frame on a link on an active channel, the BTS sends an ESTablish INDication message to BSC. The message contains the contents of the information field of the SABM frame if present.

The procedure is used in all establishment cases, for all channels and all SAPIs.

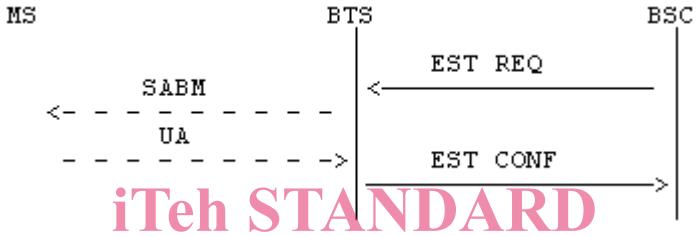


3.2 Link establishment request

This procedure is used by BSC to request the establishment of a link layer connection in multi-frame mode on the radio path.

The procedure is started by BSC sending an ESTablish REQuest message to BTS. BTS then establishes the link by sending an SABM frame. Upon reception of the acknowledgement (UA-frame) from MS, BTS sends an ESTablish CONFirm message to BSC.

In case of a failure, BTS sends a RELease INDication and an ERRor INDication message to BSC (cf. 3GPP TS 44.006).

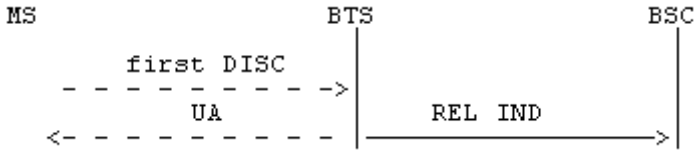


3.3 Link release indication

This procedure is used by BTS to indicate to BSC that a link layer connection on the radio path has been released at the initiative of an MS.

When receiving a DISC frame on a link layer connection in multi-frame mode, BTS sends a RELease INDication message to BSC. (If the link layer is in idle mode, BTS will send a DM frame to MS but does not notify BSC.)

Collision cases are treated as specified in 3GPP TS 44.006.



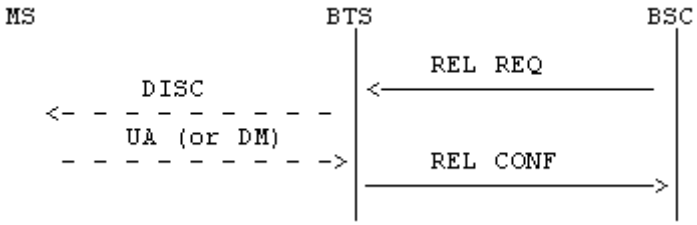
3.4 Link release request

This procedure is used by BSC to request the release of a link layer connection on the radio path.

The procedure is started by BSC sending a RELease REQuest message to BTS. BTS then sends a DISC frame to MS. When it has received the acknowledgement (UA or DM frame), BTS sends a RELease CONFirm message to BSC.

Collision cases are treated as specified in 3GPP TS 44.006.

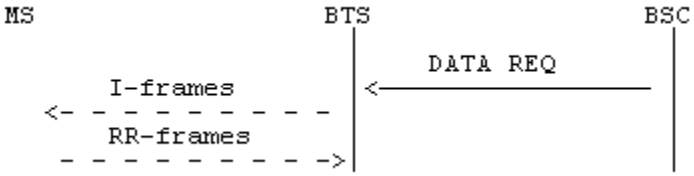
If BTS has repeated the DISC frame N200 times, BTS sends a RELease INDication and an ERRor INDication message to BSC (cf. 3GPP TS 44.006).



3.5 Transmission of a transparent L3-Message in acknowledged mode

This procedure is used by BSC to request the sending of a L3 message to MS in acknowledged mode.

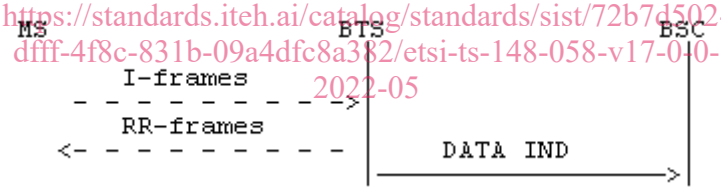
BSC sends a DATA REQuest message to BTS. The message contains the complete L3 message to be sent in acknowledged mode.



3.6 Reception of a transparent L3-Message in acknowledged mode

This procedure is used by BTS to indicate the reception of a L3 message in acknowledged mode.

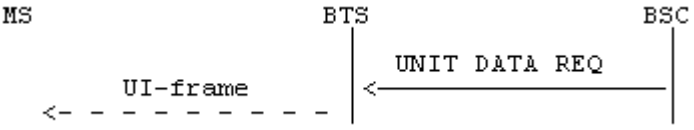
BTS sends a DATA INDication message to BSC. The message contains the received L3 message.



3.7 Transmission of a transparent L3-Message in unacknowledged mode

This procedure is used by BSC to request the sending of a L3 message to MS in unacknowledged mode.

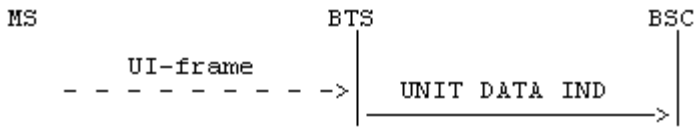
BSC sends a UNIT DATA REQuest message to BTS. The message contains the L3 message to be sent to MS in unacknowledged mode.



3.8 Reception of a transparent L3-Message in unacknowledged mode

This procedure is used by BTS to indicate the reception of a L3 message in unacknowledged mode.

BTS sends a UNIT DATA INDication message to BSC. The message contains the received L3 message.



3.9 Link error indication

This procedure is used by BTS to indicate an abnormal case such as the following.

- a protocol error as specified in 3GPP TS 44.006;
- a link layer failure, i.e. the repetition of an I-frame N200 times without an acknowledgement;
- the repetition of an SABM or DISC frame N200 times without an acknowledgement;
- the reception of an SABM frame in multi-frame established state.

When such an event has occurred, BTS notifies BSC by sending an ERROR INDication message containing the relevant cause information.

A BTS that supports enhanced power control (EPC) shall activate a channel in EPC mode if so ordered by the BSC in the CHANNEL ACTIVATION message. Further, it shall use enhanced power control procedures as defined in 3GPP TS 45.008 for MS (uplink) power control and/or BS (downlink) power control if so ordered by the BSC in the CHANNEL ACTIVATION message (or the BS POWER CONTROL or MS POWER CONTROL messages).

Dedicated channel management procedures

4.1 Channel activation

This procedure is used to activate a channel at the BTS for an MS which later will be commanded to this channel by an IMMediate ASSIGN, an ASSIGN CoMmanD, an ADDitional ASSIGNment; a NOTIFICATION, a CHANNEL RELEASE (with a Channel description) a HANDOver CoMmanD or a CONFiguration CHange CoMmanD message.

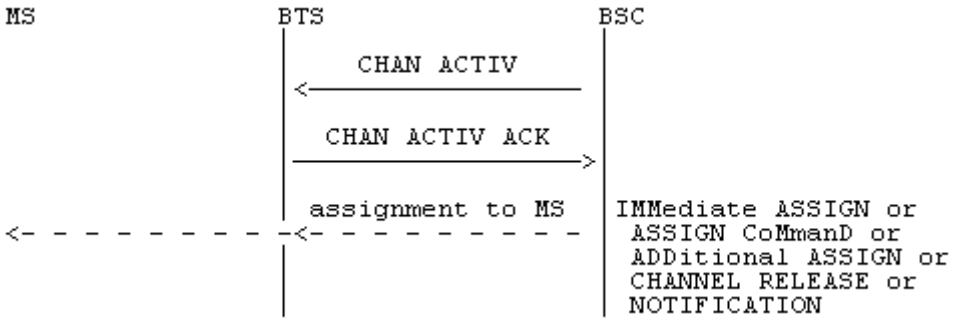
In the handover case, the procedure is used between the target BSC and the target BTS to activate a channel for a subsequent handover from the old BTS.

4.1.1 Signalling Procedure

BSC determines what channel shall be used and starts up that channel at BTS by sending a CHANnel ACTIVation message to the relevant TRX. This message contains the reason for the activation (immediate assignment, assignment, asynchronous/synchronous handover, additional assignment, activation of a secondary channel in a multislot configuration), the identification of the channel to be used (channel no) and a complete description of the channel (full/half rate, speech/data, coding/rate adaption, hopping sequence, encryption key etc.).

If the Encryption Information field is present, the activation is done with ciphering active. If the Encryption Information element is not present, activation is done without ciphering.

After activating the channel as requested, TRX responds with the CHANnel ACTIVation ACKnowledge message. This message contains the current frame number at BTS. The frame number is used by BSC to determine the Starting Time parameter to be included in the following assignment message to MS. (A suitable number has to be added to current frame number to take all possible signalling delays into account).



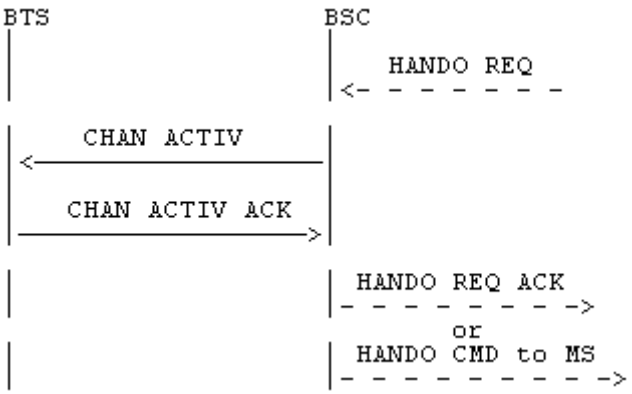
If the TRX for some reason cannot activate the resource as requested by the CHANnel Activation message, the TRX shall return a CHANnel ACTIVation Negative ACKnowledge message with the most appropriate cause value.

Possible cause values may be:

- O&M intervention (e.g. channel blocked);
- resource not available (e.g. speech coder, encryption device);
- equipment failure;
- channel already activated;
- etc.

In the handover case, the procedure is initiated by the target BSC when this receives the HANDOver REQuest message from MSC (or autonomously by BSC for BSC internal handover). The BSC sends a CHANnel ACTIVation message to the relevant TRX. The message contains the Handover Reference value which can be used by the BTS to check the Handover Access from MS. After activation of the channel TRX responds with a CHANnel ACTIVation ACKnowledge message containing the current frame number at BTS.

The BSC can then determine the Starting Time parameter to be included in the HANDOver REQuest ACKnowledge message to MSC (and the HANDOver CoMmanD message to MS).



4.1.2 Activation for Intra-Cell Channel Change

This activation precedes the Immediate Assignment, Assignment or Additional assignment procedures. The Timing Advance element must be included in the CHANNEL ACTIVATION message.