

# ETSI TS 144 003 V12.0.0 (2014-09)



**Digital cellular telecommunications system (Phase 2+);  
Mobile Station - Base Station System (MS - BSS)  
Interface Channel Structures and Access Capabilities  
(3GPP TS 44.003 version 12.0.0 Release 12)**



---

**Reference**

RTS/TSGG-0244003vc00

---

**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 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

The present document can be downloaded from:

<http://www.etsi.org>

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 only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

[http://portal.etsi.org/chaicor/ETSI\\_support.asp](http://portal.etsi.org/chaicor/ETSI_support.asp)

---

**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.

© European Telecommunications Standards Institute 2014.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**GSM®** and the GSM logo are Trade Marks registered and owned by the GSM Association.

---

## Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is 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 Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, 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.

---

## Foreword

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, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

---

## Modal verbs terminology

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

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

---

# Contents

Intellectual Property Rights .....	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	4
1 Scope .....	5
2 References .....	5
3 Abbreviations .....	5
4 General definitions .....	5
5 Channel types and their use: Traffic channels and user channels .....	6
5.1 User channels .....	6
5.2 Bm Channel.....	6
5.3 Lm Channels .....	6
6 Channel types and their use: Packet data traffic channels.....	7
7 Channel types and their use: Control channels.....	7
7.1 Control channel types.....	7
7.1.1 Broadcast Control Channel.....	7
7.1.2 Common Control Channel.....	8
7.1.3 Dedicated Control Channel (DCCH).....	8
8 BS access capability .....	9
9 Channel configurations.....	10
9.1 Mandatory capabilities .....	11
<b>Annex A (informative): Change History .....</b>	<b>12</b>
History .....	13

---

# Foreword

This Technical Specification has been produced by the 3<sup>rd</sup> 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 defines limited sets of channel types, access capabilities and channel configurations at reference point Um (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.
- 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 22.060: "General Packet Radio Service (GPRS); Service description; Stage 1".
- [3] 3GPP TS 44.060: "General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol".
- [4] 3GPP TS 45.002: "Multiplexing and Multiple Access on the Radio Path".

---

## 3 Abbreviations

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

---

## 4 General definitions

A channel represents a specified portion of the information-carrying capacity of an interface.

Channels are classified by channel types, which have common characteristics. Channel types appearing on the radio interface are specified in clauses 3 and 4.

At a given time, the complete interface between a Base Station and the set of Mobile Stations in relation corresponds to some interface structure. The interface structure may change in time. The number of possible different such interface structures can be large. The BS access capability is a description of all the possible interface structures of the considered BS. BS access capabilities are specified in sub-clause 8.

At a given moment, the channel configuration of a Mobile Station is the interface structure this Mobile Station actually uses to transmit information to or receive information from the Base Station. The channel configuration may change in time. A limited number of channel configurations are identified, and are specified in sub-clause 9.

A Mobile Station access capability is the description of the set of its possible channel configurations. MS access capabilities are specified in sub-clause 8.

---

## 5 Channel types and their use: Traffic channels and user channels

### 5.1 User channels

User channels are intended to carry a wide variety of user information streams. A distinguishing characteristic is that user channels do not carry signalling information for Connection Management (CM), Mobility Management (MM) or Radio Resource (RR) management. This signalling information is carried over other types of channels, namely the control channels.

User channels may be used to provide access to the PLMN and the networks it permits access to.

Different types of user channels are distinguished by their rates.

### 5.2 Bm Channel

A Bm channel is a bi-directional or uni-directional user channel able to carry:

- a 13 kbit/s rate bit stream with an error structure and a transmission delay compatible with some grade of service, intended to carry voice encoded according to Technical Specifications in 3GPP TS 06-series; or
- a bit stream at a rate of 14,5 kbit/s, 12 kbit/s, 6 kbit/s or 3,6 kbit/s, with an error structure and a transmission delay adapted to a wider range of services, including data transmission; or other kinds of bit stream adapted to a wider range of services (for further study).

User information streams are carried on the Bm channel on a dedicated, alternate (within one call or as separate calls), or simultaneous basis, consistent with the Bm channel carrying capability. The following are samples of user information streams:

- i) voice encoded at 13 kbit/s according to Technical Specifications in 3GPP TS 06-series; and
- ii) data information corresponding to circuit switching user classes of services at bit rates compatible with the channel capability.

A Bi-directional Bm Channel uses the radio resources referred to as TCH/F. Bi-directional downlink Bm Channel uses the radio resources referred to as TCH/FD. The Uni-directional Bm Channel is only defined in downlink direction. Traffic channels (TCH) are fixed physical gross rate channels, accompanied with timing (see 3GPP TS 45.002).

### 5.3 Lm Channels

A Lm channel is a user channel with a carrying capability lower than a Bm channel.

A Lm channel is a user channel able to carry:

- some bit stream to be defined with an error structure and a transmission delay compatible with some grade of service, intended to carry voice encoded according to a method to be defined;
- a bit stream at a rate of 6 kbit/s or 3,6 kbit/s, with an error structure and a transmission delay adapted to a wider range of services, including data transmission; or
- other kinds of bit stream adapted to a wider range of services (for further study).

User information streams are carried on a Lm channel on a dedicated, alternate (within one call or as separate calls), or simultaneous basis, consistent with the TCH/H channel carrying capability. The following are samples of user information streams:

- i) voice encoded at some rate according to a method to be specified in the future; and
- ii) data information corresponding to circuit switching user classes of services at bit rates compatible with the channel capability.

A Lm Channel uses the radio resources referred to as TCH/H. Traffic channels (TCH) are fixed physical gross rate channels, accompanied with timing (see 3GPP TS 45.002).

---

## 6 Channel types and their use: Packet data traffic channels

Packet data traffic channels are used to carry a wide variety of information streams, including user information and signalling information for, e.g. Session Management (SM) and Mobility Management (MM) in packet mode. A distinguishing characteristic is that a packet data traffic channel allows a plurality of information streams, associated with different users, to be multiplexed in a pre-emptive and dynamic fashion. Signalling functions between the MS and the BSS are carried out over other types of channels, namely the control channels.

Uni-directional information streams are carried on the packet data traffic channel on an alternate, or simultaneous basis, consistent with the packet data traffic channel carrying capability. The packet data traffic channel uses the radio resources referred to as PDTCH (see 3GPP TS 45.002).

---

## 7 Channel types and their use: Control channels

**NOTE:** The term "Dm channel" may be used to refer to the controls channels used by a Mobile Station at a given moment, independently of their type. (The term "Dm channel" in conjunction with the packet control channels shall be avoided.)

Control channels are used to provide all active Mobile Stations with a continuous frame oriented means of communication across the MS-BS interface.

A Mobile Station Channel Configuration contains one or more control channels. These control channels may change in time, with the channel configuration. Access management signalling functions are used to insure the continuity when a change in the control channels occurs.

Control channels are classified by control channel types, which have common characteristics. These control channel types are specified in sub-clause 7.1.

The control channels are primarily intended to carry signalling information for Connection Management (CM), Mobility Management (MM) and Radio Resource (RR) management.

In addition to signalling information control channels may also be used to carry other data, including those relating to Short Message Services (SMS).

### 7.1 Control channel types

#### 7.1.1 Broadcast Control Channel

A broadcast control channel is a point-to-multipoint uni-directional control channel, from the fixed sub-system to the Mobile Stations. Broadcast control channels are physically sub-divided into the Broadcast Control CHannel (BCCH), Packet Broadcast Control CHannel (PBCCH), and Compact Packet Broadcast cControl CHannel (CPBCCH).

BCCH, PBCCH, and CPBCCH are intended to broadcast a variety of information to MSs, including information necessary for MS to register in the system (e.g. synchronization data).



BCCH, PBCCH, and CPBCCCH use a protocol specified in Technical Specifications in 3GPP TS 04-Series.

## 7.1.2 Common Control Channel

A common control channel is a point-to-multipoint bi-directional control channel. Common control channels are physically sub-divided into the Common Control CHannel (CCCH), the Packet Common Control CHannel (PCCCH), and the Compact Packet Common Control CHannel (CPCCCH).

CCCH, PCCCH, and CPCCCH are primarily intended to carry signalling information necessary for access management functions (e.g., allocation of dedicated channels or radio resource on a packet data traffic channel). The CCCH can be used for other signalling purposes.

CCCH, PCCCH, and CPCCCH use a layered protocol according to Technical Specifications in 3GPP TS 04-Series. In particular the multipoint to point management is achieved through random access techniques.

The following terms may be used when the context requires it:

- The RACH (Random Access CHannel) is the uplink (MS to network) part of the CCCH.
- The PRACH (Packet Random Access CHannel) is the uplink part of the PCCCH.
- The CPRACH (Compact Packet Random Access CHannel) is the uplink part of the CPCCCH.
- The AGCH (Access Grant CHannel) is the part of the downlink (network to MS) part of the CCCH reserved for assignment messages.
- The PAGCH (Packet Access Grant CHannel) is the part of the downlink part of the PCCCH used for assignment messages.
- The CPAGCH (Compact Packet Access Grant CHannel) is the part of the downlink part of the CPCCCH used for assignment messages.
- The NCH (Notification CHannel) is the part of the downlink part of the CCCH reserved for voice group and/or voice broadcast calls notification messages.
- PCH (Paging CHannel) is the remaining part of the downlink part of the CCCH.
- PPCH (Packet Paging CHannel) is the remaining part of the downlink part of the PCCCH.
- CPPCH (Compact Packet Paging CHannel) is the remaining part of the downlink part of the CPCCCH.

## 7.1.3 Dedicated Control Channel (DCCH)

A Dedicated Control CHannel (DCCH) is a point-to-point bi-directional or uni-directional control channel.

DCCHs exist with a variety of bit rates.

DCCHs are further classified as follows according to some technical particularities:

A SDCCH (Stand-alone DCCH) is a bi-directional DCCH whose allocation is not linked to the allocation of a TCH. The bit rate of a SDCCH is 598/765 kbit/s.

A FACCH (Fast Associated DCCH) is a bi-directional DCCH obtained by pre-emptive dynamic multiplexing on respectively a TCH/F or a TCH/H channel. The allocation of a FACCH is obviously linked to the allocation of a TCH. The bit rate of a FACCH is 9 200 bit/s or 4 600 bit/s.

A SACCH (Slow Associated DCCH) is either a bi-directional or uni-directional DCCH of rate 115/300 kbit/s or a bi-directional DCCH of rate 299/765 kbit/s. An independent SACCH is always allocated together with a TCH or a SDCCH. The co-allocated TCH and SACCH shall be either both bi-directional or both uni-directional.

NOTE 1: A Multislot Configuration (described in sub-clause 9) is an example of a case where uni-directional SACCHs may be used.

The terms Bm, or Bm + ACCHs can be used to refer to a Bm channel together with the corresponding FACCH and the co-allocated SACCH when the context avoids any ambiguities. Similar remarks apply to the terms Lm, Lm + ACCHs,

Lm + Lm, Lm + Lm + ACCHs. The term SDCCH can be used to refer specifically to a SDCCH together with the co-allocated SACCH when the contexts avoids any ambiguities.

NOTE 2: TCH/F is sometimes used to designate Bm associated with its control channel (FACCH and SACCH).  
TCH/H is sometime used to designate Lm associated with its control channel (FACCH and SACCH).

A PACCH (Packet Associated Control CHannel) is a bi-directional DCCH obtained by pre-emptive dynamic multiplexing on a PDTCH.

A PTCCH (Packet Timing Control CHannel) is a bi-directional DCCH carrying synchronization data for a group of up to 16 MSs in packet transfer state (see 3GPP TS 44.060).

The DCCHs use a layered protocol according to Technical Specifications in 3GPP TS 04- and 05-series.

## 8 BS access capability

The BS access capability is composed of:

one BCCH;

one CCCH physically related to the BCCH;

{ {0 to 3 additional CCCHs; and a global resource.

OR:

BCCH, CCCH plus 4 SDCCHs and a global resource. } }

The global resource can be used to accommodate:

- i) n1 (Bm + FACCH + SACCH);
- ii) 2n2 (Lm + FACCH + SACCH);
- iii) 8n3 (SDCCH of rate 598/765 kbit/s + SACCH);
- iv) n4 (Bm + SACCH);
- v) n5 (PBCCH + PCCCH + PDTCH + PACCH + PTCCH);
- vi) n6 (PCCCH + PDTCH + PACCH + PTCCH);
- vii) n7 (PBCCH + PCCCH); and
- viii) n8 (PDTCH + PACCH + PTCCH);

with the constraints: n5 = 0 or 1;

n5 > 0 implies that n7 = 0;

n7 > 0 implies that n5 = 0 and n6 = 0; and

n1 + n2 + n3 + n4 + n5 + n6 + n7 + n8 lower than some value characterizing the BS access capability.

The exact use of the global resource may vary in time.

For Compact, the BS access capability is composed of:

CPBCCH;

CPCCCH physically related to the CPBCCH;

{ {and a global resource. } }

The global resource can be used to accommodate:

i)  $n_9$  (PDTCH + PACCH + PTCCH);

$n_9$  lower than some value characterizing the BS access capability.

The exact use of the global resources may vary in time.

---

## 9 Channel configurations

At a given moment, a Mobile Station accesses only a limited number of channels appearing on its radio interface. Different compositions for the accessed channels set are identified, and specified below.

Different channel configurations are:

- i) BCCH;
- ii) CCCH;
- iii) CCCH + BCCH;
- iv) SDCCH + SACCH;
- v)  $B_m$  + FACCH + SACCH;
- vi)  $L_m$  + FACCH + SACCH;
- vii)  $L_m$  +  $L_m$  + FACCH + SACCH;
- viii)  $(n + m) B_m$  + FACCH +  $(n + m) SACCH$ ;

where  $n$  is the number of bi-directional channels and  $m$  is the number of uni-directional channels ( $n = 1..8$ ,  $m = 0..7$ ,  $n + m = 1..i$ );

- ix) PCCCH + PBCCH;
- x)  $(n + m) PDTCH + PACCH + PTCCH$

where  $n$  is the number of channel allowing information streams in both directions and  $m$  is the number of channels allowing information streams in one direction ( $n = 0..8$ ,  $m = 0..8$ ,  $n + m = 1..8$ ).

- xi) CPBCCH;
- xii) CPCCCH;
- xiii) CPCCCH + CPBCCH

Configurations i) and xi) are normally used only in the phase when the physical connection is not set (i.e. just after switch-on, or after a too long interruption of the physical connection due to poor propagation conditions).

Configurations ii) or iii) are used by active but idle MS or MS in packet wait state (see GSM 44.060).

Configurations iv) is used in phases when only a dedicated control channel is needed.

Configurations v) to viii) are used in particular when a circuit-switched communication is in progress.

Configuration viii) is a Multislot Configuration. Possible combinations of bi- and uni-directional channels are defined in 3GPP TS 45.002.

Configurations ix), xii), and xiii) are used by MS in packet wait state.

Configuration x) is a Multislot Configuration on packet data traffic channels. Possible combinations of bi- and uni-directional channels are defined in 3GPP TS 45.002.

In addition, a MS of GPRS MS class A (see 3GPP TS 22.060) may combine one of the configurations i) to viii) (to support GSM circuit switched services and SMS) with one of the configurations ii), iii), ix), or x) (to support GSM GPRS services).

## 9.1 Mandatory capabilities

The following access capabilities are mandatory for all MSs.

- All MSs supporting circuit-switched services shall support SDCCH.
- If a given service is supported by an MS on a TCH/H, this MS shall support this service on a TCH/F (but not necessarily vice versa).
- An MS supporting a service on TCH/F shall support the signalling only mode on TCH/F as well as the signalling modes associated with the TCH/F.
- An MS supporting a service on TCH/H shall support the signalling only mode on TCH/F as well as the signalling modes associated with the TCH/H.

---

## Annex A (informative): Change History

<b>TSG #</b>	<b>TSG Doc.</b>	<b>CR</b>	<b>Rev</b>	<b>Subject/Comment</b>	<b>New</b>
September 2014	-	-	-	Release 12 version based on version 11.0.0	12.0.0

---

# History

<b>Document history</b>		
V12.0.0	September 2014	Publication