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MS-BSS Interface : Channel Structures and Access Capabilities

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MS - BSS Interface: Channel Structures and Access Capabilities

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PREFATORY NOTE

ETSI has constituted stable and consistent documents which give specifications for the implementation of the European Cellular Telecommunications System. Historically, these documents have been identified as "GSM recommendations".

Some of these recommendations may subsequently become Interim European Telecommunications Standards (I-ETSs) or European Telecommunications Standards (ETSs), whilst some continue with the status of ETSI-GSM Technical Specifications. These ETSI-GSM Technical Specifications are for editorial reasons still referred to as GSM recommendations in some current GSM documents.

The numbering and version control system is the same for ETSI-GSM Technical Specifications as for "GSM recommendations".

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RECOMMENDATION GSM 04.03

Version 3.0.3

Title : MS-BS interface - Channel structures and access capabilities

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1 SCOPE

This Recommendation defines limited sets of channel types, access capabilities and channel configurations at reference point Um (radio interface).

2 DEFINITIONS

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

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

2.3 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 section 5.

2.4 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 section 6.

2.5 A Mobile Station access capability is the description of the set of its possible channel configurations. MS access capabilities are specified in section 7.

3 CHANNEL TYPES AND THEIR USE: TRAFFIC CHANNELS

3.1 Traffic channels (TCH) are fixed physical gross rate channels, accompanied with timing.

Traffic channels are intended to carry a wide variety of user information streams. A distinguishing characteristic is that traffic channels do not carry signalling information for circuit switching, mobile management or channel configuration management. This signalling information is carried over other types of channels, e.g. control channels.

3.2 Traffic channels may be used to provide access to a variety of communication modes within the PLMN and the networks it permits access to. Examples of these modes are :

i) circuit switching; and

ii) packet switching, supporting packet-mode terminals.

In case i), the PLMN can provide either a transparent connection, or a connection specifically suited to a particular service, such as telephony.

In case ii), the traffic channel will carry protocols at layers 2 and 3 according to Recommendation X.25 or other packet-mode standardised protocols.

3.3 Different types of traffic channels are distinguished by their rates.

3.4 Bm Channel

3.4.1 A Bm channel is a traffic 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 GSM Recommendation series 06;

or

a bit stream at a rate of 12, 6 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, including data transmission (for further study).

3.4.2 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 GSM Recommendation series 06; and

ii) data information corresponding to circuit or packet switching user classes of services at bit rates compatible with the channel capability.

3.4.3 In the circuit switching communication mode, a Bm channel is used to provide either a non transparent connection specifically suited to telephony, or to provide a transparent connection.

3.5 Lm Channels

3.5.1 Lm channels are traffic channels with a carrying capability lower than a Bm channel.

Only one kind of Lm channel is defined. Other kinds are possible as future evolution. The remaining of section 3.5 addresses only the unique Lm channel.

A Lm channel is a traffic 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 in the future as system evolution;

- a bit stream at a rate of 6 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, including data transmission (for further study).

3.5.2 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 Lm 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 (this is not foreseen to be implemented at system introduction time); and

ii) data information corresponding to circuit or packet switching user classes of services at bit rates compatible with the channel capability.

4 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.

4.1 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 section 4.3.

The control channels are primarily intended to carry signalling information for circuit switching, mobility management and access management.

4.2 In addition to signalling information control channels may also be used to carry packet-switched data, including those relating to Short Message Services.

4.3 Control channel types

4.3.1 Broadcast Control Channel

4.3.1.1 A broadcast control channel (BCCH) is a point-to-multipoint unidirectionnal control channel, from the fixed sub-system to the Mobile Stations.

A BCCH is intended to broadcast a variety of informations to MSs, including informations necessary for MS to register in the system (e.g. synchronisation data).

A BCCH uses a protocol specified in GSM Recommendation Series 04.

4.3.2 Common Control Channel

4.3.2.1 A common control channel (CCCH) is a point-to-multipoint bidirectionnal control channel.

A CCCH is primarily intended to carry signalling information necessary for access management functions (e.g. allocation of dedicated channels). The CCCH can be used for other signalling purposes.

A CCCH uses a layered protocol according to GSM Recommendation Series 04. 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 AGCH (Access Grant Channel) is the part of the downlink (network to MS) part of the CCCH reserved for assignment messages.
- The PCH (Paging Channel) is the remaining part.

4.3.3 Dedicated Control Channel

4.3.3.1 A dedicated control channel (DCCH) is a point-to-point bidirectionnal 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 DCCH whose allocation is not linked to the allocation of a TCH. SDCCHs exist with bit rates of 781 107/153, 4600 or 9200 bit/s.

A FACCH (Fast Associated DCCH) is a DCCH obtained by preemptive dynamic multiplexing on respectively a Bm or a Lm channel. The allocation of a FACCH is obviously linked to the allocation of a TCH. The bit rate of a FACCH is 9200 or 4600 bit/s.

A SACCH (Slow Associated DCCH) is a DCCH of rate 115/300 or 299/765 kbit/s. A independant SACCH is always allocated together with a TCH or a SDCCH.

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 of bit rate 598/765 kbit/s together with the co-allocated SACCH when the contexts avoids any ambiguities.

4.3.3.2 The DCCHs use a layered protocol according to GSM Recommendations Series 04 and 05.

5 BS ACCESS CAPABILITY

5.1 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 accomodate

i) n1 (Bm + FACCH + SACCH)

ii) 2n2 (Lm + FACCH + SACCH)

iii) n3 (SDCCH of rate 9200 bit/s + SACCH)

iv) 2n4 (SDCCH of rate 4600 bit/s + SACCH)
and
v) 8n5 (SDCCH of rate 598/765 kbit/s + SACCH)

with the constraint

n1 + n2 + n3 + n4 + n5

lower than some value characterising the BS capability.

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

6 CHANNEL CONFIGURATIONS

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

6.2 Different channel configurations are :

i) BCCH ;
ii) CCCH ;
iii) CCCH + BCCH ;
iv) SDCCH + SACCH;
v) Bm + FACCH + SACCH;
vi) Lm + FACCH + SACCH;
vii) Lm + Lm + FACCH + SACCH.

Configuration i) is 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.

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

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