



# SLOVENSKI STANDARD

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Digital cellular telecommunications system (Phase 2+) (GSM); Mobile Station - Base Station System (MS - BSS) interface; Data Link (DL) layer specification (GSM 04.06 version 8.0.1 Release 1999)

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# ETSI EN 300 938 V8.0.1 (2000-09)

*European Standard (Telecommunications series)*

**Digital cellular telecommunications system (Phase 2+);  
Mobile Station - Base Station System (MS - BSS) interface;  
Data Link (DL) layer specification  
(GSM 04.06 version 8.0.1 Release 1999)**

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## Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Special Mobile Group (SMG).

The present document defines the data link layer protocol of the Mobile Station - Base Station System (MS - BSS) interface within the digital cellular telecommunications system.

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

Version 8.x.y

where:

- 8 indicates Release 1999 of GSM Phase 2+.
- x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- y the third digit is incremented when editorial only changes have been incorporated in the specification.

The specification from which the present document has been derived was originally based on CEPT documentation, hence the presentation of the present document may not be entirely in accordance with the ETSI drafting rules.

Annexes B to F were deleted from the original specification, however, for referencing purposes the annex numbering has been maintained.

### National transposition dates

Date of adoption of this EN:	25 August 2000
Date of latest announcement of this EN (doa):	30 November 2000
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 May 2001
Date of withdrawal of any conflicting National Standard (dow):	31 May 2001

## 0 Scope

The present document defines a data link layer protocol to be used for signalling, and possibly also for other applications, on the MS-BS interface.

### 0.1 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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1999 document, references to GSM documents are for Release 1999 versions (version 8.x.y).

- [1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 04.01: "Digital cellular telecommunications system; Mobile Station - Base Station System (MS - BSS) interface; General aspects and principles".
- [3] GSM 04.03: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface; Channel structures and access capabilities".
- [4] GSM 04.04: "Digital cellular telecommunications system; Layer 1 General requirements".
- [5] GSM 04.05: "Digital cellular telecommunications system; Data Link (DL) layer General aspects".
- [6] GSM 04.07: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface signalling layer 3; General aspects".
- [7] GSM 04.08: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".
- [8] GSM 04.10: "Digital cellular telecommunications system; Mobile radio interface layer 3 Supplementary services specification; General aspects".
- [9] GSM 04.12: "Digital cellular telecommunications system (Phase 2+); Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".
- [10] GSM 05.02: "Digital cellular telecommunications system (Phase 2+); Multiplexing and multiple access on the radio path".
- [11] GSM 08.56: "Digital cellular telecommunications system; Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 2 specification".
- [12] GSM 08.58: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 3 specification".
- [13] CCITT Recommendation Z.100: "Specification and description language (SDL)".

### 0.2 Abbreviations

Abbreviations used in the present document are listed in GSM 01.04.

# 1 General

The present document describes the frame structure, elements of procedure, format of fields and procedures for the proper operation of the Link Access Procedure on the Dm channel, LAPDm.

NOTE 1: The term Dm channel is used for convenience to designate the collection of all the various signalling channels required in the GSM system. See also GSM 04.03.

The concepts, terminology, overview description of LAPDm functions and procedures, and the relationship with other Technical Specifications are described in general terms in GSM 04.05.

The frame formats defined for LAPDm are based on those defined for LAPD. However, there are important differences between LAPDm and LAPD, in particular with regard to frame delimitation methods and transparency mechanisms. These differences are necessary for operation within the constraints set by the radio path.

LAPDm supports two modes of operation:

- unacknowledged operation using UI frames;
- acknowledged operation using the multiple frame procedure.

As a choice of implementation, the two modes of operation may be implemented independently of each other. This is possible since there is no interactions between the two modes, other than queuing at the transmitter, even when they coexist on the same physical channel. For BCCHs and CCCHs only the unacknowledged mode of operation needs to be implemented.

LAPDm is used for information sent on the control channels BCCH, AGCH, NCH, PCH, FACCH, SACCH and SDCCH as defined in GSM 04.03.

NOTE 2: AGCH, NCH and PCH are sometimes referred to by the collective name CCCH and FACCH, SACCH and SDCCH are, similarly, referred to by the collective name DCCH.

LAPDm may also be used on other types of channel.

NOTE 3: As stated in GSM 04.05, the term "data link layer" is used in the main text of this Technical Specification. However, mainly in figures and tables, the terms "layer 2" and "L2" are used as abbreviations. Furthermore, in accordance with GSM 04.07 and GSM 04.08, the term "layer 3" is used to indicate the layer above the data link layer.

This Technical Specification is organized as follows:

The frame structure for peer-to-peer communication is given in clause 2. The elements of procedure and formats of fields are given in clause 3. The elements of layer-to-layer communication are contained in clause 4. The details of the peer-to-peer procedures are given in clause 5. Section 6 summarizes the special protocol operations used mandatorily with SAPI=0 and SAP = 3.

The specification for the random access channel is contained in annex A, even though it is not a LAPDm function. The present document is descriptive and does not constrain the implementation of the random access function. The procedure is used for CHANNEL REQUEST on the RACH and HANDOVER ACCESS on the main DCCH.

(Annexes B to F are deleted).

Annex G gives an overview of actions taken on frames containing parameter errors.

## 1.1 Options

Support of short L2 header type 1 is an option in both the mobile station and the network; under certain conditions the support is mandatory, as specified in other Specifications. A layer 2 protocol entity not implementing short L2 header type 1 shall diagnose an E/A bit error and proceed as defined in annex G.2.3.

## 2 Frame structure for peer-to-peer communication

### 2.1 General

All data link layer peer-to-peer exchanges are in frames conforming to one of the formats shown in figure 1. Several format types are shown in the figure:

- Format A is used on DCCHs for frames where there is no information field.
- Formats B, Bter and B4 are used on DCCHs for frames containing an information field:
  - format Bter is used on request of higher layers if and only if short L2 header type 1 is supported and a UI command is to be transmitted on SAPI 0;
  - format B4 is used for UI frames transmitted by the network on SACCH;
  - format B is applied in all other cases.
- Format Bbis is used only on BCCH, PCH, NCH, and AGCH.
- In addition there is a Format C for transmission of random access signals.

Format C frames are described in annex A. Format A, B, Bbis, Bter and B4 frames are described in the remainder of the present document.

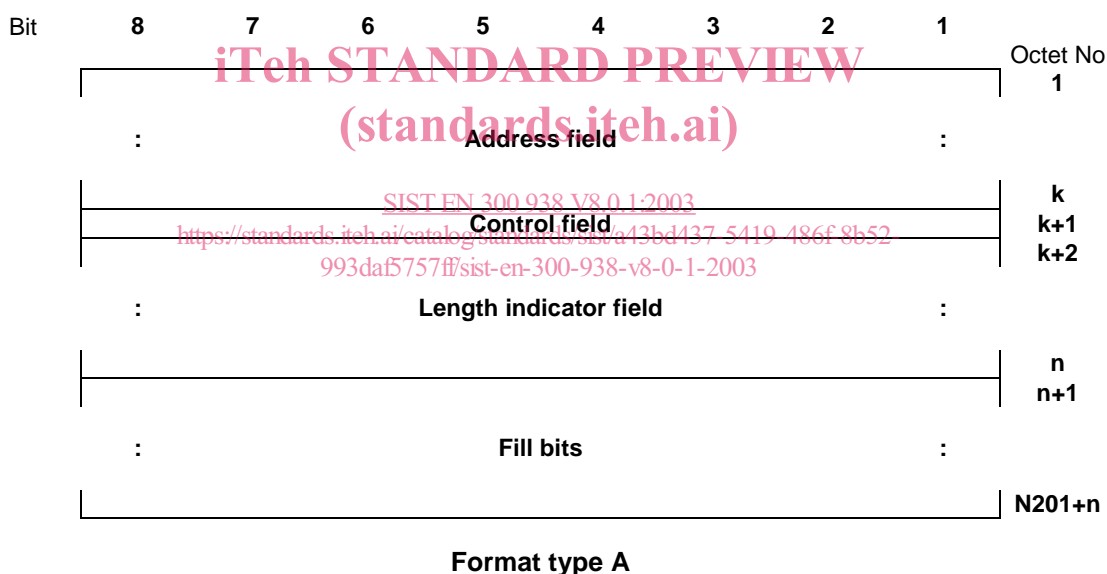
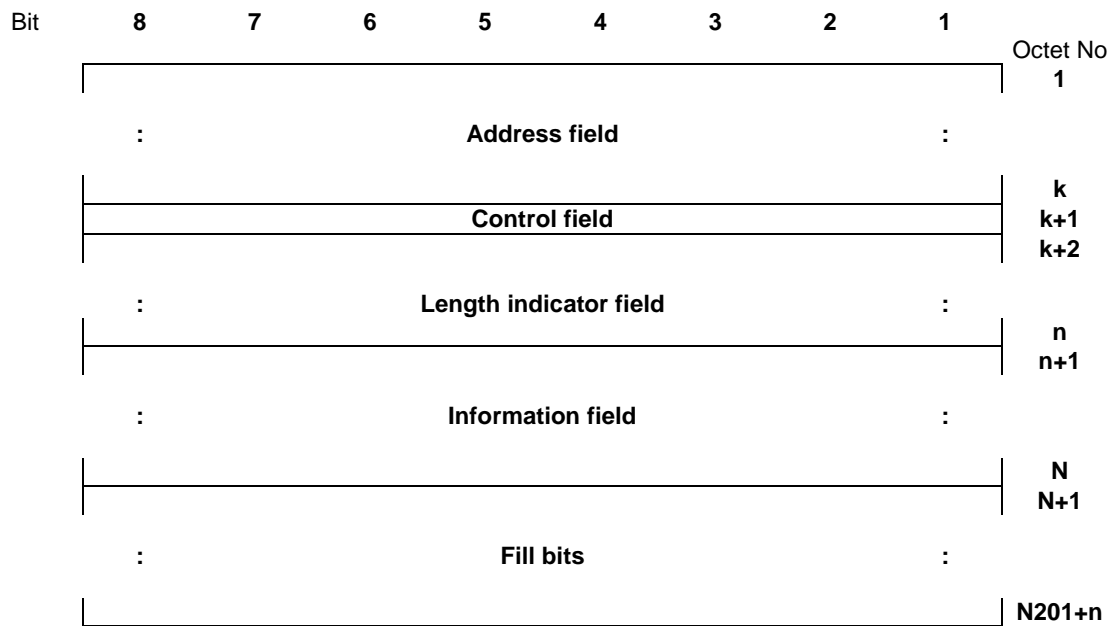


Figure 1/GSM 04.06 (sheet 1 of 3): General frame formats

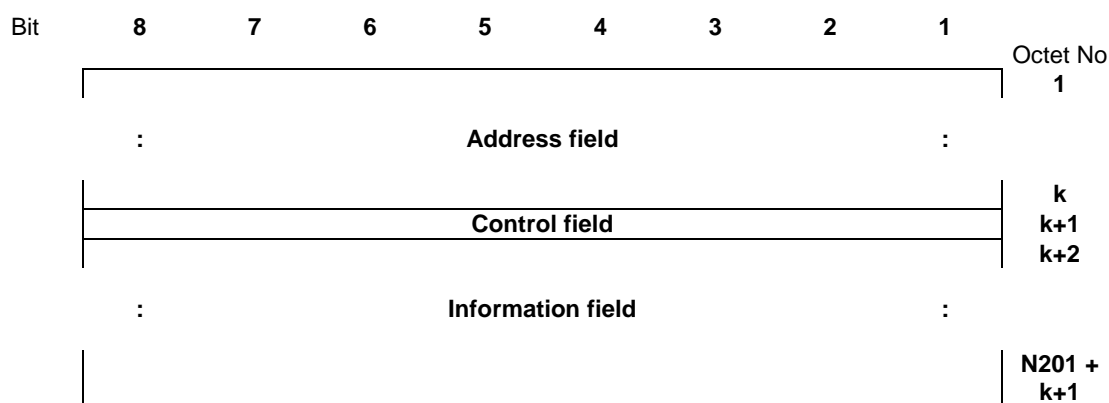


**Format type B**

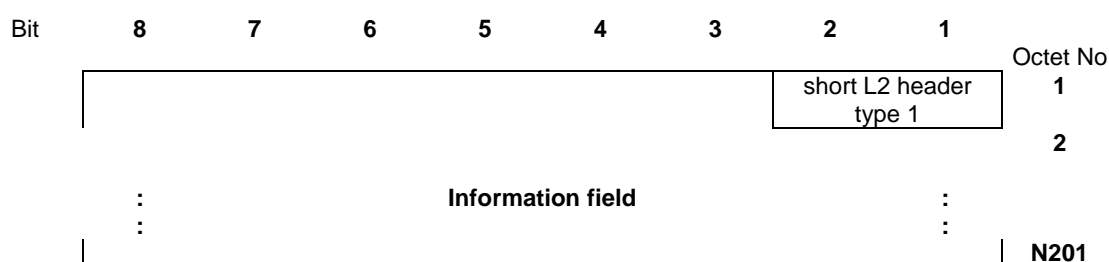


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 Format type Bbis

**Figure 1/GSM 04.06 (sheet 2 of 3): General frame formats**



#### Format type B4



#### Format type Bter

Figure 1/GSM 04.06 (sheet 3 of 3): General frame formats

The parameter N201 is the maximum number of octets which are partially or entirely available for the information field of a frame. It depends on the type of channel and the format, see subclause 5.8.3.

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## 2.2 Frame delimitation and fill bits

Frame delimitation is provided by the physical layer:

- in format type A, B and B4 frames at the beginning of the frame for determining the start of the first octet in the address field, in format type Bter frames for determining the start of the octet containing the short L2 header type 1 (which is also the first octet used for the information field), and in format type Bbis frames for determining the start of the first octet for the information field;
- at the end of the frame for determining the last bit of the frame.

The end of the useful part of the frame, i.e. the end of the length indicator field in type A frames and the end of the information field in type B frames, is determined by a length indicator contained in the length indicator field. The useful part of a Bbis frames takes all N201 octets of that frame. The useful part of a Bter frame takes all N201 octets of that frame except those bits of octet 1 which contain the short L2 header type 1. The useful part of a B4 frame takes all N201 octets of that frame except those octets which contain the address field and the control field.

If a frame contains a length indicator has a value less than N201, the frame contains fill bits. Octets containing fill bits shall take the binary value "00101011", when sent by the network. Octets containing fill bits shall take the value "00101011" or "11111111", when sent by the mobile station.

NOTE: The value "00101011" is chosen due to the modulation and interleaving scheme used in the GSM system.

## 2.3 Address field

The address field may consist of a variable number of octets. However, for applications on control channels the field consists of only one octet. The address field identifies the SAP for which a command frame is intended and the SAP transmitting a response frame. The format of the address field is defined in subclause 3.2.

## 2.4 Control field

The control field consists of one octet. The format of the control field is defined in subclause 3.4.

## 2.5 Length indicator field

The length indicator field may consist of a variable number of octets. However, for applications on control channels the field consists of only one octet. The format of the field is defined in subclause 3.6.

### 2.5a Short L2 header type 1

The short L2 header type 1 consists of two bits. Its contents are defined in subclause 3.4a.

## 2.6 Information field

The information field of a frame, when present, has the position in the frame defined in 2.1.

The maximum number of octets in the information field (N201) is defined in subclause 5.8.3.

## 2.7 Transparency

Because of the frame delimitation technique used (see subclause 2.2), the frame can include any possible sequence of bits without the need for additional transparency mechanisms.

## 2.8 Format convention

### 2.8.1 Numbering convention

The basic convention used in this Technical Specification is illustrated in figure 2. The bits are grouped into octets.

The bits of an octet are shown horizontally and are numbered from 1 to 8. Multiple octets are shown vertically and are numbered from 1 to n.

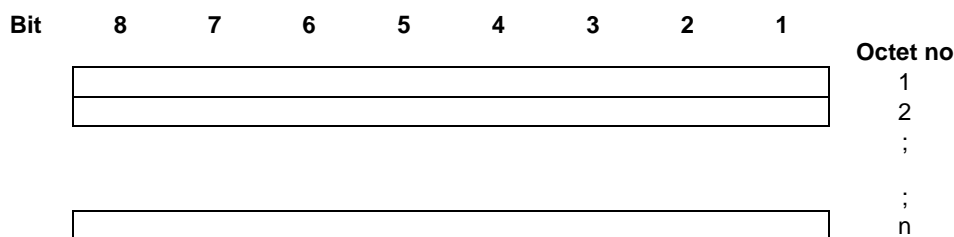


Figure 2/GSM 04.06: Format convention

### 2.8.2 Order of bit transmission

The order of bit transmission is defined in GSM 04.04.

### 2.8.3 Field mapping convention

When a field is contained within a single octet, the lowest bit number of the field represents the lowest order value.

When a field spans more than one octet, the order of bit values within each octet progressively decreases as the octet number increases. In that part of the field contained in a given octet the lowest bit number represents the lowest order value.