SLOVENSKI STANDARD
SIST ETS 300 938 E1:2003

01-december-2003

Digitalni celiļ ni telekomunikacijski sistem ï Mobilna postaja ï Vmesnik sistema bazne postaje (MS-BSS) ï Specifikacija podatkovne povezovalne plasti (GSM 04.06, razliļ ica 5.0.1)

Digital cellular telecommunications system; Mobile Station - Base Station System (MS - BSS) interface; Data Link (DL) layer specification (GSM 04.06 version 5.0.1)

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Ta slovenski standard je istoveten z: ETS 300 938 Edition 1

ICS:

33.070.50	Globalni sistem za mobilno telekomunikacijo (GSM)	Global System for Mobile Communication (GSM)

SIST ETS 300 938 E1:2003 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 938

April 1997

Source: ETSI TC-SMG

Reference: DE/SMG-030406Q

ICS: 33.020

Key words: Digital cellular telecommunications system, Global System for Mobile communications (GSM)

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ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

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

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Special Mobile Group (SMG) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI).

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

The ETS from which this ETS has evolved is Phase 2 GSM ETS 300 555 (GSM 04.06 version 4.4.0).

The contents of this ETS is subject to continuing work within TC-SMG and may change following formal TC-SMG approval. Should TC-SMG modify the contents of this ETS, it will be resubmitted for OAP by ETSI with an identifying change of release date and an increase in version number as follows:

Version 5.x.y

where:

- y the third digit is incremented when editorial only changes have been incorporated in the specification;

- x the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

The specification from which this ETS has been derived was originally based on CEPT documentation, hence the presentation of this ETS 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.

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Transposition dates	
Date of adoption:	28 March 1997
Date of latest announcement of this ETS (doa):	31 July 1997
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 January 1998
Date of withdrawal of any conflicting National Standard (dow):	31 January 1998

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0 Scope

This European Telecommunication Standard (ETS) defines a data link layer protocol to be used for signalling, and possibly also for other applications, on the MS-BS interface.

0.1 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

[1] GSM 01.04 (ETR 350): "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 (ETS 300 936): "Digital cellular telecommunications system; Layer 1 General requirements".

[5] GSM 04.05 (ETS 300 937): "Digital cellular telecommunications system; Data Link (DL) layer General aspects".

[6] GSM 04.07 (ETS 300 939): "Digital cellular telecommunications system (Phase 2+); Mobile radio interface signalling layer 3; General aspects".

[7] GSM 04.08 (ETS 300 940): "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".

[8] GSM 04.10 (ETS 300 941): "Digital cellular telecommunications system; Mobile radio interface layer 3 Supplementary services specification; General aspects".

[9] GSM 04.12 (ETS 300 943): "Digital cellular telecommunications system (Phase 2+); Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".

[10] GSM 05.02 (ETS 300 908): "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)".

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0.2 Abbreviations

Abbreviations used in this ETS are listed in GSM 01.04.

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1 General

This ETS 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, PCH, FACCH, SACCH and SDCCH as defined in GSM 04.03.

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NOTE 2: AGCH 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.

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NOTE 3: As stated in GSM 04.05, the term "data link layer" is used in the main text of this ETS. 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 ETS 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. Clause 6 summarizes the special protocol operations used mandatorily with SAPI=0 and SAPI=3.

The specification for the random access channel is contained in annex A, even though it is not a LAPDm function. This part of the ETS 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.

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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, Format B is used on DCCHs for frames containing an information field, and format Bbis is used only on BCCH, PCH, 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 and B/Bbis frames are described in the remainder of this ETS.

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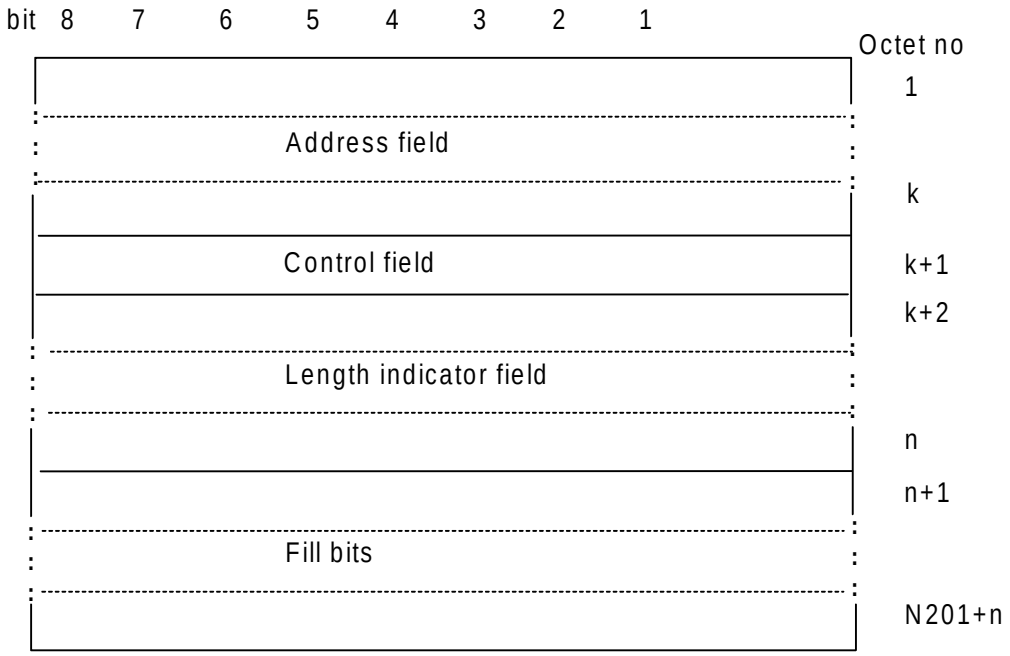
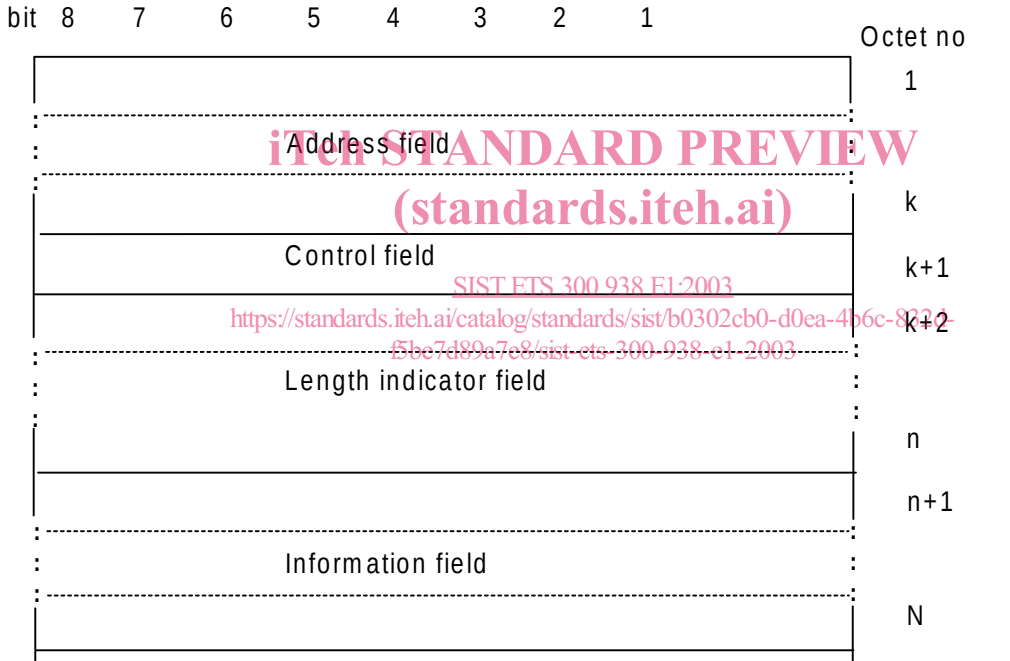


Format type A



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Format type B

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

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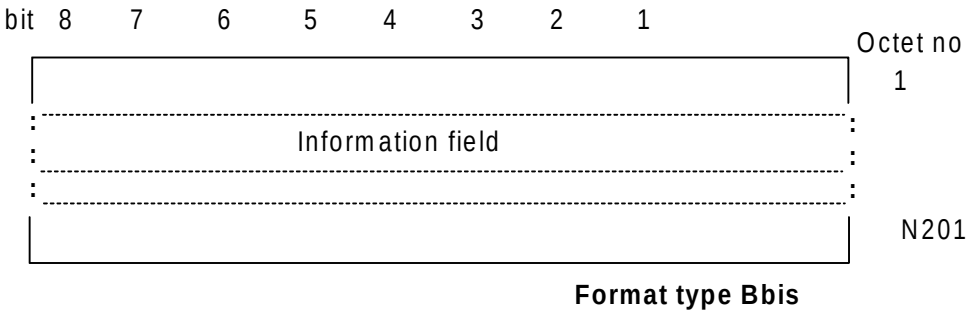

Figure 1/GSM 04.06 (sheet 2 of 2): General frame formats

The parameter N201 takes a fixed value for each type of channel, see subclause 5.8.3, and determines the maximum number of octets in the information field of a frame.

2.2 Frame delimitation and fill bits

Frame delimitation is provided by the physical layer:

- in format type A and B frames at the beginning of the frame for determining the start of the first octet in the address 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.

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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.

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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.

2.6 Information field

The information field of a frame, when present, follows the length indicator field (see subclause 2.5).

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