

ETSI TS 145 001 V14.2.0 (2017-08)



**Digital cellular telecommunications system (Phase 2+) (GSM);
GSM/EDGE Physical layer on the radio path;
General description
(3GPP TS 45.001 version 14.2.0 Release 14)**



Reference

RTS/TSGR-0645001ve20

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/standards-search>

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

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

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

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

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.

© ETSI 2017.

All rights reserved.

DECT™, PLUGTESTS™, UMTS™ and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

3GPP™ and LTE™ are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

oneM2M logo is protected for the benefit of its Members.

GSM® and the GSM logo are trademarks 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 (<https://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**", "**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.....	5
1 Scope	6
1.1 References	6
1.2 Abbreviations	7
1.2a Definitions	7
1.3 Restrictions.....	7
2 Set of channels	7
3 Reference configuration	10
4 The block structures	12
5 Multiple access and timeslot structure	17
5.1 Hyperframes, superframes and multiframe.....	17
5.2 Time slots and bursts.....	18
5.2a Training sequences	22
5.2a.1 General.....	22
5.2a.2 VAMOS	22
5.2a.3 Extended TSC Sets	22
5.2a.4 EC-GSM-IoT	22
5.3 Channel organization.....	23
6 Frequency hopping capability	31
7 Coding and interleaving	32
7.1 General	32
7.2 Packet Traffic and Control Channels.....	38
7.2.1 Channel coding for PDTCH.....	39
7.2.1.1 Channel coding for GPRS PDTCH.....	39
7.2.1.2 Channel coding for EGPRS and EGPRS2 PDTCH	39
7.2.2 Channel coding for PACCH, PBCCH, PAGCH, PPCH, CPBCCCH, CPAGCH, CPPCH, and CSCH.....	45
7.2.3 Channel Coding for the PRACH and MPRACH	45
7.2.4 Channel coding for EC-PDTCH, EC-PACCH, EC-AGCH, EC-PCH, EC-BCCH and EC-SCH.....	45
7.2.5 Channel Coding for EC-RACH	45
8 Modulations.....	45
9 Transmission and reception.....	45
10 Other layer 1 functions	48
11 Performance	48
12 Flexible layer one	49
12.1 Set of transport channels	49
12.2 Transport block structure.....	49
12.3 Channel organisation.....	49
12.4 Transport channel coding/multiplexing for FLO.....	49
13 Voice services over Adaptive Multi-user Channels on One Slot (VAMOS).....	50
13.1 General	50
13.2 Network and MS Support for VAMOS.....	51
13.3 Downlink Functionality.....	52
13.3.1 Modulation.....	52
13.3.1.1 Selection of modulation format.....	52
13.3.2 Burst Format	53

13.3.3	Associated Control Channels	53
13.3.3.1	FACCH	53
13.3.3.2	SACCH	53
13.4	Uplink Functionality.....	53
13.4.1	Modulation, Burst Format and Training Sequence	53
13.4.2	Associated Control Channels	53
13.4.2.1	FACCH	53
13.4.2.2	SACCH	53
13.5	Channel Mode Adaptation.....	53
Annex A (informative):	Reference configuration	54
Annex B (informative):	Relations between specification	55
Annex C (informative):	Change history	56
History		59

Foreword

This Technical Specification has been produced by the 3rd 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 is an introduction to the 45 series of the digital cellular telecommunications systems GSM technical specifications. It is not of a mandatory nature, but consists of a general description of the organization of the physical layer with reference to the technical specifications where each part is specified in detail. It introduces furthermore, the reference configuration that will be used throughout this series of technical specifications.

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 TR 23.003: "Numbering, Addressing and Identification".
- [3] 3GPP TS 23.034: "High Speed Circuit Switched Data (HSCSD); Stage 2".
- [4] 3GPP TS 43.020: "Security-related Networks Functions".
- [5] 3GPP TS 43.022: "Functions related to Mobile Station (MS) in idle mode and group receive mode".
- [6] 3GPP TR 43.030: "Radio network planning aspects"
- [7] 3GPP TS 43.052: "Lower layers of the GSM Cordless Telephony System (CTS) radio interface; Stage 2".
- [8] 3GPP TS 43.064: "Overall description of the GPRS radio interface; Stage 2".
- [9] 3GPP TS 44.003: "Mobile Station - Base Station System (MS - BSS) Interface Channel Structures and Access Capabilities".
- [10] 3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control Protocol"
- [11] 3GPP TS 44.021: "Rate Adaption on the Mobile Station - Base Station System (MS-BSS) Interface"
- [12] 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".
- [13] 3GPP TS 45.002: "Multiplexing and multiple access on the radio path".
- [14] 3GPP TS 45.003: "Channel coding".
- [15] 3GPP TS 45.004: "Modulation".
- [16] 3GPP TS 45.005: "Radio transmission and reception".
- [17] 3GPP TS 45.008: "Radio subsystem link control".
- [18] 3GPP TS 45.009: "Link adaptation".
- [19] 3GPP TS 45.010: "Radio subsystem synchronization".
- [20] 3GPP TS 45.056: "GSM Cordless Telephony System (CTS); Phase 1; CTS-FP Radio subsystem".