



SLOVENSKI STANDARD

SIST EN 300 909 V8.5.1:2003

01-december-2003

8 [[[HJb]`W] b]`h`Y_ca i b]_UW`g_]`g]ghYa `fZuU&ZL`E`?cX]fUb`Y_UbUcj `f} GA
\$) '\$' žfUh`]]WU, ") '%ž]nXUU% - - Ł

Digital cellular telecommunications system (Phase 2+) (GSM); Channel coding (GSM 05.03 version 8.5.1 Release 1999)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: **EN 300 909 Version 8.5.1**

SIST EN 300 909 V8.5.1:2003
<https://standards.iteh.ai/catalog/standards/sist/639152f3-b2c2-42c4-b0a3-3f6072697943/sist-en-300-909-v8-5-1-2003>

ICS:

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

SIST EN 300 909 V8.5.1:2003

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 300 909 V8.5.1:2003](https://standards.iteh.ai/catalog/standards/sist/639f52f3-b2c2-42c4-b0a3-3f6072697943/sist-en-300-909-v8-5-1-2003)

<https://standards.iteh.ai/catalog/standards/sist/639f52f3-b2c2-42c4-b0a3-3f6072697943/sist-en-300-909-v8-5-1-2003>

ETSI EN 300 909 V8.5.1 (2000-11)

European Standard (Telecommunications series)

Digital cellular telecommunications system (Phase 2+); Channel coding (GSM 05.03 version 8.5.1 Release 1999)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

GSM®
GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS

[SIST EN 300 909 V8.5.1:2003](https://standards.iteh.ai/catalog/standards/sist/639f52f3-b2c2-42c4-b0a3-3f6072697943/sist-en-300-909-v8-5-1-2003)

<https://standards.iteh.ai/catalog/standards/sist/639f52f3-b2c2-42c4-b0a3-3f6072697943/sist-en-300-909-v8-5-1-2003>



Reference

REN/SMG-020503Q8R2

KeywordsDigital cellular telecommunications system,
Global System for Mobile communications (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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 300 909 V8.5.1:2003<https://standards.iteh.ai/catalog/standards/sist/639f52f3-b2c2-42c4-b0a3-3f6072697943/sist-en-300-909-v8-5-1-2003>

Important notice

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the 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://www.etsi.org/tb/status/>

If you find errors in the present document, send your comment to:
editor@etsi.fr

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2000.
All rights reserved.

Contents

Intellectual Property Rights	9
Foreword.....	9
1 Scope	10
1.1 References	10
1.2 Abbreviations	11
2 General	11
2.1 General organization	11
2.2 Naming Convention.....	15
3 Traffic Channels (TCH)	17
3.1 Speech channel at full rate (TCH/FS and TCH/EFS).....	17
3.1.1 Preliminary channel coding for EFR only	18
3.1.1.1 CRC calculation	18
3.1.1.2 Repetition bits	18
3.1.1.3 Correspondence between input and output of preliminary channel coding.....	18
3.1.2 Channel coding for FR and EFR.....	19
3.1.2.1 Parity and tailing for a speech frame.....	19
3.1.2.2 Convolutional encoder	19
3.1.3 Interleaving	19
3.1.4 Mapping on a Burst.....	20
3.2 Speech channel at half rate (TCH/HS)	20
3.2.1 Parity and tailing for a speech frame.....	20
3.2.2 Convolutional encoder.....	21
3.2.3 Interleaving	21
3.2.4 Mapping on a burst	22
3.3 Data channel at full rate, 12.0 kbit/s radio interface rate (9.6 kbit/s services (TCH/F9.6)).....	22
3.3.1 Interface with user unit	22
3.3.2 Block code	22
3.3.3 Convolutional encoder.....	22
3.3.4 Interleaving	23
3.3.5 Mapping on a Burst.....	23
3.4 Data channel at full rate, 6.0 kbit/s radio interface rate (4.8 kbit/s services (TCH/F4.8)).....	23
3.4.1 Interface with user unit	23
3.4.2 Block code	23
3.4.3 Convolutional encoder.....	24
3.4.4 Interleaving	24
3.4.5 Mapping on a Burst.....	24
3.5 Data channel at half rate, 6.0 kbit/s radio interface rate (4.8 kbit/s services (TCH/H4.8)).....	24
3.5.1 Interface with user unit	24
3.5.2 Block code	24
3.5.3 Convolutional encoder.....	24
3.5.4 Interleaving	24
3.5.5 Mapping on a Burst.....	25
3.6 Data channel at full rate, 3.6 kbit/s radio interface rate (2.4 kbit/s and less services (TCH/F2.4))	25
3.6.1 Interface with user unit	25
3.6.2 Block code	25
3.6.3 Convolutional encoder.....	25
3.6.4 Interleaving	25
3.6.5 Mapping on a Burst.....	25
3.7 Data channel at half rate, 3.6 kbit/s radio interface rate (2.4 kbit/s and less services (TCH/H2.4)).....	26
3.7.1 Interface with user unit	26
3.7.2 Block code	26
3.7.3 Convolutional encoder.....	26
3.7.4 Interleaving	26
3.7.5 Mapping on a Burst.....	26
3.8 Data channel at full rate, 14.5 kbit/s radio interface rate (14.4 kbit/s services (TCH/F14.4)).....	26

3.8.1	Interface with user unit	26
3.8.2	Block code	26
3.8.3	Convolutional encoder	27
3.8.4	Interleaving	27
3.8.5	Mapping on a Burst	27
3.9	Adaptive multi rate speech channel at full rate (TCH/AFS)	27
3.9.1	SID_UPDATE	28
3.9.1.1	Coding of in-band data	28
3.9.1.2	Parity and convolutional encoding for the comfort noise parameters	28
3.9.1.3	Identification marker	29
3.9.1.4	Interleaving	29
3.9.1.5	Mapping on a Burst	29
3.9.2	SID_FIRST	29
3.9.2.1	Coding of in-band data	29
3.9.2.2	Identification marker	30
3.9.2.3	Interleaving	30
3.9.2.4	Mapping on a Burst	30
3.9.3	ONSET	30
3.9.3.1	Coding of in-band data	30
3.9.3.2	Interleaving	30
3.9.3.3	Mapping on a Burst	31
3.9.4	SPEECH	31
3.9.4.1	Coding of the in-band data	31
3.9.4.2	Ordering according to subjective importance	31
3.9.4.3	Parity for speech frames	32
3.9.4.4	Convolutional encoder	33
3.9.4.5	Interleaving	40
3.9.4.6	Mapping on a Burst	40
3.9.5	RATSCCH	40
3.9.5.1	Coding of in-band data	40
3.9.5.2	Parity and convolutional encoding for the RATSCCH message	40
3.9.5.3	Identification marker	41
3.9.5.4	Interleaving	41
3.9.5.5	Mapping on a Burst	41
3.10	Adaptive multi rate speech channel at half rate (TCH/AHS)	41
3.10.1	SID_UPDATE	42
3.10.1.1	Coding of in-band data	42
3.10.1.2	Parity and convolutional encoding for the comfort noise parameters	42
3.10.1.3	Identification marker	43
3.10.1.4	Interleaving	43
3.10.1.5	Mapping on a Burst	44
3.10.2	SID_UPDATE_INH	44
3.10.2.1	Coding of in-band data	44
3.10.2.2	Identification marker	44
3.10.2.3	Interleaving	44
3.10.2.4	Mapping on a Burst	45
3.10.3	SID_FIRST_P1	45
3.10.3.1	Coding of in-band data	45
3.10.3.2	Identification marker	45
3.10.3.3	Interleaving	45
3.10.3.4	Mapping on a Burst	45
3.10.4	SID_FIRST_P2	45
3.10.4.1	Coding of in-band data	45
3.10.4.2	Interleaving	46
3.10.4.3	Mapping on a Burst	46
3.10.5	SID_FIRST_INH	46
3.10.5.1	Coding of in-band data	46
3.10.5.2	Identification marker	46
3.10.5.3	Interleaving	46
3.10.5.4	Mapping on a Burst	46
3.10.6	ONSET	47
3.10.6.1	Coding of in-band data	47

3.10.6.2	Interleaving	47
3.10.6.3	Mapping on a Burst	47
3.10.7	SPEECH	47
3.10.7.1	Coding of the in-band data	47
3.10.7.2	Ordering according to subjective importance.....	47
3.10.7.3	Parity for speech frames	48
3.10.7.4	Convolutional encoder	49
3.10.7.5	Interleaving	54
3.10.7.6	Mapping on a Burst	54
3.10.8	RATSCCH_MARKER	54
3.10.8.1	Coding of in-band data	54
3.10.8.2	Identification marker	54
3.10.8.3	Interleaving	54
3.10.8.4	Mapping on a Burst	54
3.10.9	RATSCCH_DATA	54
3.10.9.1	Coding of in-band data	54
3.10.9.2	Parity and convolutional encoding for the RATSCCH message.....	54
3.10.9.3	Interleaving	55
3.10.9.4	Mapping on a Burst	55
3.11	Data channel for ECSD at full rate, 29.0 kbit/s radio interface rate (28.8 kbit/s services (E-TCH/F28.8))	55
3.11.1	Interface with user unit	55
3.11.2	Block code	56
3.11.2.1	Repetition bits	56
3.11.2.2	Reed Solomon encoder.....	56
3.11.3	Convolutional encoder	57
3.11.3.1	Tailing bits for a data frame	57
3.11.3.2	Convolutional encoding for a data frame	57
3.11.4	Interleaving	58
3.11.5	Mapping on a Burst.....	58
3.12	Data channel for ECSD at full rate, 32.0 kbit/s radio interface rate (32.0 kbit/s services (E-TCH/F32.0))	59
3.12.1	Interface with user unit	59
3.12.2	Block code	59
3.12.3	Convolutional encoder	60
3.12.3.1	Tailing bits for a data frame	60
3.12.3.2	Convolutional encoding for a data frame	60
3.12.4	Interleaving	61
3.12.5	Mapping on a Burst.....	61
3.13	Data channel for ECSD at full rate, 43.5 kbit/s radio interface rate (43.2 kbit/s services (E-TCH/F43.2))	61
3.13.1	Interface with user unit	61
3.13.2	Convolutional encoder	61
3.13.2.1	Tailing bits for a data frame	61
3.13.2.2	Convolutional encoding for a data frame	61
3.13.3	Interleaving	61
3.13.4	Mapping on a Burst.....	61
4	Control Channels	62
4.1	Slow associated control channel (SACCH).....	62
4.1.1	Block constitution	62
4.1.2	Block code	62
4.1.3	Convolutional encoder	62
4.1.4	Interleaving	62
4.1.5	Mapping on a Burst.....	63
4.2	Fast associated control channel at full rate (FACCH/F).....	63
4.2.1	Block constitution	63
4.2.2	Block code	63
4.2.3	Convolutional encoder	63
4.2.4	Interleaving	63
4.2.5	Mapping on a Burst.....	63
4.3	Fast associated control channel at half rate (FACCH/H).....	64
4.3.1	Block constitution	64
4.3.2	Block code	64
4.3.3	Convolutional encoder	64

4.3.4	Interleaving	64
4.3.5	Mapping on a Burst.....	65
4.4	Broadcast control, Paging, Access grant, Notification and Cell broadcast channels (BCCH, PCH, AGCH, NCH, CBCH), CTS Paging and Access grant channels (CTSPCH, CTSAGCH).....	65
4.5	Stand-alone dedicated control channel (SDCCH)	65
4.6	Random access channel (RACH)	65
4.7	Synchronization channel (SCH), Compact synchronization channel (CSCH), CTS Beacon and Access request channels (CTSBCH-SB, CTSARCH)	66
4.8	Access Burst on circuit switched channels other than RACH.....	67
4.9	Access Bursts for uplink access on a channel used for VGCS	67
4.10	Fast associated control channel at ECSD E-TCH/F (E-FACCH/F)	67
4.10.1	Block constitution	67
4.10.2	Block code	67
4.10.3	Convolutional encoder	67
4.10.4	Interleaving	67
4.10.5	Mapping on a Burst.....	67
5	Packet Switched Channels.....	68
5.1	Packet data traffic channel (PDTCH).....	68
5.1.1	Packet data block type 1 (CS-1).....	68
5.1.2	Packet data block type 2 (CS-2).....	68
5.1.2.1	Block constitution	68
5.1.2.2	Block code.....	68
5.1.2.3	Convolutional encoder	69
5.1.2.4	Interleaving	69
5.1.2.5	Mapping on a burst.....	69
5.1.3	Packet data block type 3 (CS-3).....	70
5.1.3.1	Block constitution	70
5.1.3.2	Block code.....	70
5.1.3.3	Convolutional encoder	70
5.1.3.4	Interleaving	70
5.1.3.5	Mapping on a burst.....	71
5.1.4	Packet data block type 4 (CS-4).....	71
5.1.4.1	Block constitution	71
5.1.4.2	Block code.....	71
5.1.4.3	Convolutional encoder	71
5.1.4.4	Interleaving	72
5.1.4.5	Mapping on a burst.....	72
5.1.5	Packet data block type 5 (MCS-1)	72
5.1.5.1	Downlink (MCS-1 DL)	72
5.1.5.1.1	Block constitution.....	72
5.1.5.1.2	USF precoding.....	72
5.1.5.1.3	Header coding.....	72
5.1.5.1.4	Data coding.....	73
5.1.5.1.5	Interleaving.....	74
5.1.5.1.6	Mapping on a burst.....	74
5.1.5.2	Uplink (MCS-1 UL).....	74
5.1.5.2.1	Block constitution.....	74
5.1.5.2.2	Header coding.....	75
5.1.5.2.3	Data coding.....	75
5.1.5.2.4	Interleaving.....	75
5.1.5.2.5	Mapping on a burst.....	76
5.1.6	Packet data block type 6 (MCS-2)	76
5.1.6.1	Downlink (MCS-2 DL)	76
5.1.6.1.1	Block constitution.....	76
5.1.6.1.2	USF precoding.....	76
5.1.6.1.3	Header coding.....	76
5.1.6.1.4	Data coding.....	76
5.1.6.1.5	Interleaving.....	77
5.1.6.1.6	Mapping on a burst.....	77
5.1.6.2	Uplink (MCS-2 UL).....	77
5.1.6.2.1	Block constitution.....	77

5.1.6.2.2	Header coding	77
5.1.6.2.3	Data coding	77
5.1.6.2.4	Interleaving	77
5.1.6.2.5	Mapping on a burst	77
5.1.7	Packet data block type 7 (MCS-3)	78
5.1.7.1	Downlink (MCS-3 DL)	78
5.1.7.1.1	Block constitution	78
5.1.7.1.2	USF precoding	78
5.1.7.1.3	Header coding	78
5.1.7.1.4	Data coding	78
5.1.7.1.5	Interleaving	79
5.1.7.1.6	Mapping on a burst	79
5.1.7.2	Uplink (MCS-3 UL)	79
5.1.7.2.1	Block constitution	79
5.1.7.2.2	Header coding	79
5.1.7.2.3	Data coding	79
5.1.7.2.4	Interleaving	79
5.1.7.2.5	Mapping on a burst	79
5.1.8	Packet data block type 8 (MCS-4)	79
5.1.8.1	Downlink (MCS-4 DL)	79
5.1.8.1.1	Block constitution	79
5.1.8.1.2	USF precoding	79
5.1.8.1.3	Header coding	80
5.1.8.1.4	Data coding	80
5.1.8.1.5	Interleaving	80
5.1.8.1.6	Mapping on a burst	80
5.1.8.2	Uplink (MCS-4 UL)	81
5.1.8.2.1	Block constitution	81
5.1.8.2.2	Header coding	81
5.1.8.2.3	Data coding	81
5.1.8.2.4	Interleaving	81
5.1.8.2.5	Mapping on a burst	81
5.1.9	Packet data block type 9 (MCS-5)	81
5.1.9.1	Downlink (MCS-5 DL)	81
5.1.9.1.1	Block constitution	81
5.1.9.1.2	USF precoding	81
5.1.9.1.3	Header coding	81
5.1.9.1.4	Data coding	82
5.1.9.1.5	Interleaving	83
5.1.9.1.6	Mapping on a burst	84
5.1.9.2	Uplink (MCS-5 UL)	84
5.1.9.2.1	Block constitution	84
5.1.9.2.2	Header coding	85
5.1.9.2.3	Data coding	85
5.1.9.2.4	Interleaving	85
5.1.9.2.5	Mapping on a burst	86
5.1.10	Packet data block type 10 (MCS-6)	86
5.1.10.1	Downlink (MCS-6 DL)	86
5.1.10.1.1	Block constitution	86
5.1.10.1.2	USF precoding	86
5.1.10.1.3	Header coding	86
5.1.10.1.4	Data coding	86
5.1.10.1.5	Interleaving	87
5.1.10.1.6	Mapping on a burst	87
5.1.10.2	Uplink (MCS-6 UL)	87
5.1.10.2.1	Block constitution	87
5.1.10.2.2	Header coding	87
5.1.10.2.3	Data coding	88
5.1.10.2.4	Interleaving	88
5.1.10.2.5	Mapping on a burst	88
5.1.11	Packet data block type 11 (MCS-7)	88
5.1.11.1	Downlink (MCS-7 DL)	88

5.1.11.1.1	Block constitution.....	88
5.1.11.1.2	USF precoding.....	88
5.1.11.1.3	Header coding.....	88
5.1.11.1.4	Data coding.....	89
5.1.11.1.5	Interleaving.....	90
5.1.11.1.6	Mapping on a burst.....	90
5.1.11.2	Uplink (MCS-7 UL).....	91
5.1.11.2.1	Block constitution.....	91
5.1.11.2.2	Header coding.....	91
5.1.11.2.3	Data coding.....	92
5.1.11.2.4	Interleaving.....	92
5.1.11.2.5	Mapping on a burst.....	92
5.1.12	Packet data block type 12 (MCS-8).....	92
5.1.12.1	Downlink (MCS-8 DL).....	92
5.1.12.1.1	Block constitution.....	92
5.1.12.1.2	USF precoding.....	92
5.1.12.1.3	Header coding.....	92
5.1.12.1.4	Data coding.....	93
5.1.12.1.5	Interleaving.....	93
5.1.12.1.6	Mapping on a burst.....	94
5.1.12.2	Uplink (MCS-8 UL).....	94
5.1.12.2.1	Block constitution.....	94
5.1.12.2.2	Header coding.....	94
5.1.12.2.3	Data coding.....	94
5.1.12.2.4	Interleaving.....	94
5.1.12.2.5	Mapping on a burst.....	94
5.1.13	Packet data block type 13 (MCS-9).....	94
5.1.13.1	Downlink (MCS-9 DL).....	94
5.1.13.1.1	Block constitution.....	94
5.1.13.1.2	USF precoding.....	95
5.1.13.1.3	Header coding.....	95
5.1.13.1.4	Data coding.....	95
5.1.13.1.5	Interleaving.....	96
5.1.13.1.6	Mapping on a burst.....	96
5.1.13.2	Uplink (MCS-9 UL).....	96
5.1.13.2.1	Block constitution.....	96
5.1.13.2.2	Header coding.....	96
5.1.13.2.3	Data coding.....	96
5.1.13.2.4	Interleaving.....	96
5.1.13.2.5	Mapping on a burst.....	96
5.2	Packet control channels (PACCH, PBCCH, PAGCH, PPCH, PNCH, PTCCH, CPBCCCH, CPAGCH, CPPCH, and CPNCH).....	96
5.3	Packet random access channel (PRACH and CPRACH).....	96
5.3.1	Packet Access Burst.....	96
5.3.2	Extended Packet Access Burst.....	97
5.4	Access Burst on packet switched channels other than PRACH and CPRACH.....	97
Annex A (informative):	Summary of Channel Types.....	113
Annex B (informative):	Summary of Polynomials Used for Convolutional Codes	115
Annex C (informative):	Change control history	116
History		117

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://www.etsi.org/ipr>).

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

The present document specifies the data blocks given to the encryption unit. It includes the specification of encoding, reordering, interleaving and the stealing flag within the digital cellular telecommunications system (Phase 2+).

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

Version 8.x.y

where:

- 8 GSM Phase 2+ Release 1999. [SIST EN 300 909 V8.5.1:2003](https://standards.iteh.ai/catalog/standards/sist/639f52f3-b2c2-42c4-b0a3-3f6072697943/sist-en-300-909-v8-5-1-2003)
- x the second digit is incremented for 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.

National transposition dates

Date of adoption of this EN:	17 November 2000
Date of latest announcement of this EN (doa):	28 February 2001
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2001
Date of withdrawal of any conflicting National Standard (dow):	31 August 2001

1 Scope

A reference configuration of the transmission chain is shown in GSM 05.01 [4]. According to this reference configuration, the present document specifies the data blocks given to the encryption unit.

It includes the specification of encoding, reordering, interleaving and the stealing flag. It does not specify the channel decoding method.

The definition is given for each kind of logical channel, starting from the data provided to the channel encoder by the speech coder, the data terminal equipment, or the controller of the Mobile Station (MS) or Base Transceiver Station (BTS). The definitions of the logical channel types used in this technical specification are given in GSM 05.02 [5], a summary is in annex A.

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.
- 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).

- iTech STANDARD PREVIEW
(standards.iteh.ai)
- SIST EN 300 909 V8.5.1:2003
<https://standards.iteh.ai/catalog/standards/sist/65915215-b2c2-42c4-b0a5-3f6072697943/sist-en-300-909-v8-5-1-2003>
- [1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
 - [2] GSM 04.08: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".
 - [3] GSM 04.21: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".
 - [4] GSM 05.01: "Digital cellular telecommunications system (Phase 2+); Physical layer on the radio path General description".
 - [5] GSM 05.02: "Digital cellular telecommunications system (Phase 2+); Multiplexing and multiple access on the radio path".
 - [6] GSM 05.05: "Digital cellular telecommunications system (Phase 2+); Radio Transmission and Reception".
 - [7] GSM 05.09: "Digital cellular telecommunications system (Phase 2+); Link adaptation".
 - [8] GSM 06.10: "Digital cellular telecommunications system; Full rate speech transcoding".
 - [9] GSM 06.20: "Digital cellular telecommunications system; Half rate speech transcoding".
 - [10] GSM 06.60: "Digital cellular telecommunications system; Enhanced Full Rate (EFR) speech transcoding".
 - [11] GSM 06.90: "Digital cellular telecommunications system; Adaptive Multi-Rate speech transcoding".
 - [12] GSM 06.93: "Digital cellular telecommunications system; Discontinuous transmission (DTX) for Adaptive Multi-Rate speech traffic channels".

- [13] GSM 03.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the GPRS Radio Interface; Stage 2".
- [14] GSM 03.52: "Digital cellular telecommunications system (Phase 2+); GSM Cordless Telephony System (CTS), Phase 1; Lower layers of the CTS Radio Interface; Stage 2".

1.2 Abbreviations

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

2 General

2.1 General organization

Each channel has its own coding and interleaving scheme. However, the channel coding and interleaving is organized in such a way as to allow, as much as possible, a unified decoder structure.

Each channel uses the following sequence and order of operations:

- the information bits are coded with a systematic block code, building words of information + parity bits;
- these information + parity bits are encoded with a convolutional code, building the coded bits;
- reordering and interleaving the coded bits, and adding a stealing flag, gives the interleaved bits.

All these operations are made block by block, the size of which depends on the channel. However, most of the channels use a block of 456 coded bits which is interleaved and mapped onto bursts in a very similar way for all of them. Figures 1a and 1b give a diagram showing the general structure of the channel coding.

This block of 456 coded bits is the basic structure of the channel coding scheme. In the case of full rate speech TCH, this block carries the information of one speech frame. In case of control channels, it carries one message.

In the case of half rate speech TCH, the information of one speech frame is carried in a block of 228 coded bits.

In the case of the Enhanced full rate speech the information bits coming out of the source codec first go through a preliminary channel coding. then the channel coding as described above takes place.

In the case of a packet switched channel the block of 456 or 1384 coded bits carries one radio block.

In the case of an enhanced circuit switched channel the block of 1368 coded bits (456 coded symbols) carries one radio block.

In the case of FACCH, a coded message block of 456 bits is divided into eight sub-blocks. The first four sub-blocks are sent by stealing the even numbered bits of four timeslots in consecutive frames used for the TCH. The other four sub-blocks are sent by stealing the odd numbered bits of the relevant timeslot in four consecutive used frames delayed 2 or 4 frames relative to the first frame. Along with each block of 456 coded bits there is, in addition, a stealing flag (8 bits), indicating whether the block belongs to the TCH or to the FACCH. In the case of SACCH, BCCH, CCCH or CTSCCH, this stealing flag is dummy. In the case of a packet switched channel, these bits are used to indicate the coding scheme used.

In the case of E-FACCH/F, a coded message block of 456 bits is divided into four sub-blocks. The four sub-blocks are sent by stealing all symbols of four timeslots in consecutive frames used for the E-TCH and using GMSK modulation. The indication of the E-FACCH/F is based on the identification of the modulation. Along with each block of 456 coded bits there is, in addition, a stealing flag (8 bits), indicating whether the block belongs to the E-FACCH, FACCH or TCH.

Some cases do not fit in the general organization, and use short blocks of coded bits which are sent completely in one timeslot. They are the random access messages of:

- the RACH;
- or PRACH and CPRACH;

on uplink and the synchronization information broadcast on the SCH or CSCH on the downlink. In CTS, they are the access request message of the CTSARCH on uplink and the information broadcast on the CTSBCH-SB on downlink.

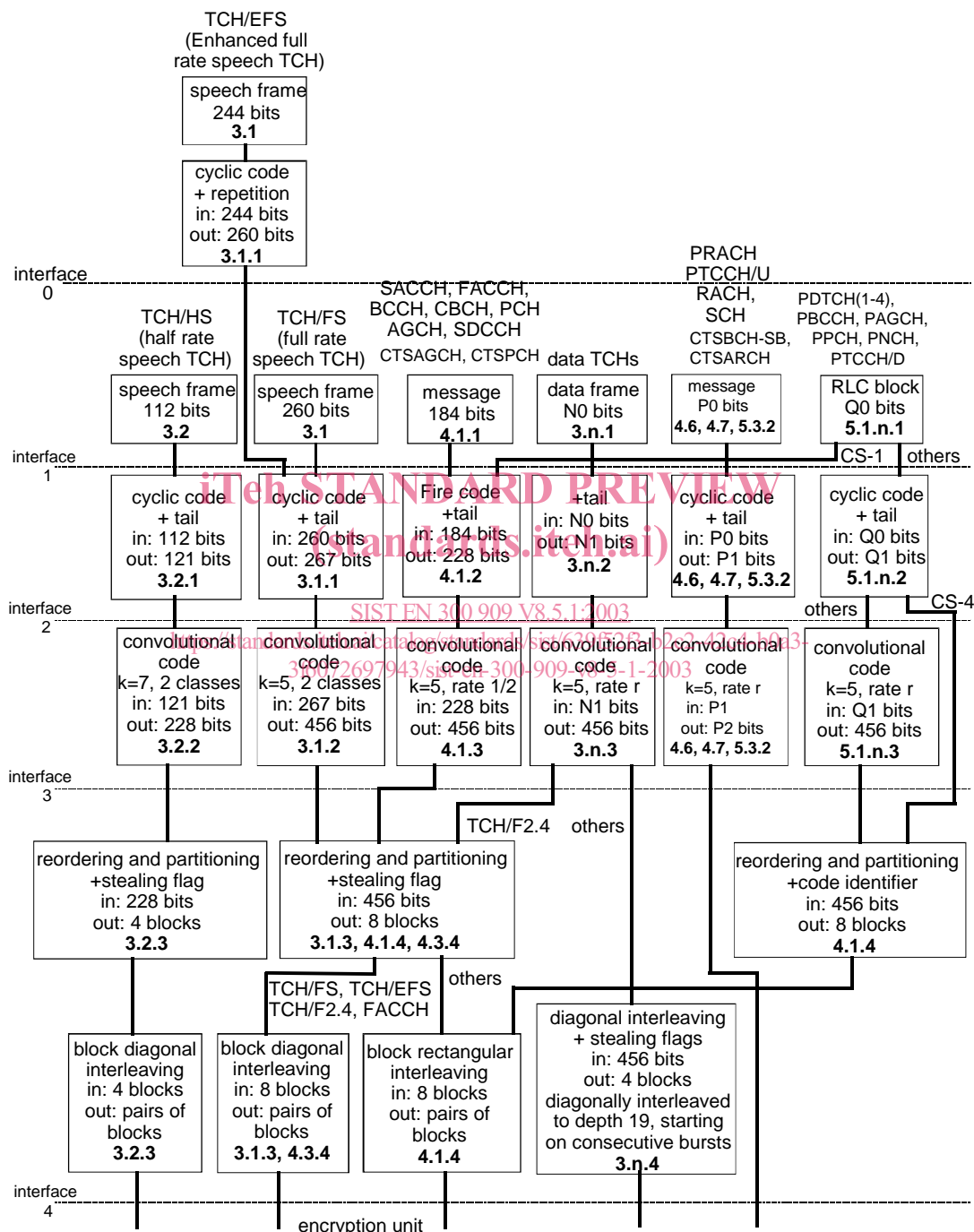


Figure 1a: Channel Coding and Interleaving Organization

In each box, the last line indicates the clause defining the function. In the case of RACH, P0 = 8 and P1 = 18; in the case of SCH, CSCH, CTSBCH-SB and CTSARCH, P0 = 25 and P1 = 39. In the case of data TCHs, N0, N1 and n depend on the type of data TCH.

Interfaces:

- 1) information bits (d);
- 2) information + parity + tail bits (u);
- 3) coded bits (c);
- 4) interleaved bits (e).

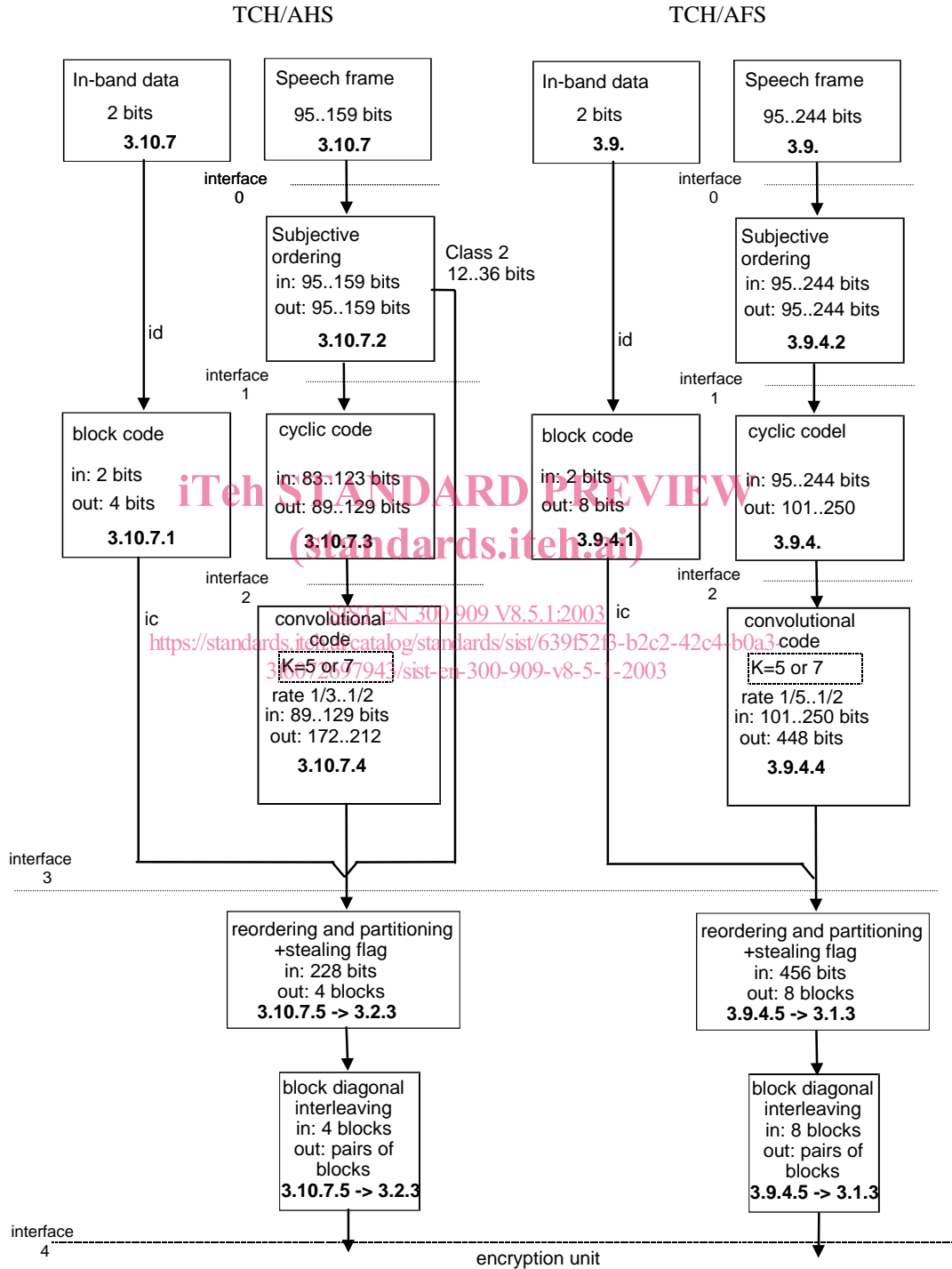


Figure 1b: Channel Coding and Interleaving Organization, adaptive multi-rate speech

In each box, the last line indicates the clause defining the function.