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1 Scope

The present document defines the physical channels of the radio sub-system required to support the logical channels. For the Flexible Layer One, it defines the physical channels of the radio sub-system required to support the transport channels. It includes a description of the logical channels, transport channels and the definition of frequency hopping, TDMA frames, timeslots and bursts.

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.
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[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications ".

[2] 3GPP TS 23.003: "Numbering, addressing and identification".

[3] 3GPP TS 23.034: 'High Speed Circuit Switched Data (HSCSD) – Stage 2'.

[4] 3GPP TS 43.052: "GSM Cordless Telephony System (CTS), Phase 1; Lower layers of the CTS Radio Interface; Stage 2".

[5] 3GPP TS 43.059: 'Functional stage 2 description of Location Services (LCS) in GERAN'.

[6] 3GPP TS 43.064: "General Packet Radio Service (GPRS); Overall description of the GPRS Radio Interface; Stage 2".

[7] 3GPP TS 43.246: "Multimedia Broadcast Multicast Service (MBMS) in the GERAN; Stage 2".

[8] 3GPP TS 44.003: "Mobile Station - Base Station System (MS - BSS) interface Channel structures and access capabilities".

[9] 3GPP TS 44.006: "Mobile Station - Base Station System (MS - BSS) interface Data Link (DL) layer specification".

[10] 3GPP TS 44.018: "Mobile radio interface layer 3 specification, Radio Resource Control Protocol".

[11] 3GPP TS 44.060: "General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS interface; Radio Link Control (RLC) and Medium Access Control (MAC) Layer Specification".

[12] 3GPP TS 44.056: "GSM Cordless Telephony System (CTS), Phase 1; CTS radio interface layer 3 specification".

[13] 3GPP TS 45.003: "Channel coding".

[14] 3GPP TS 45.004: "Modulation".

[15] 3GPP TS 45.005: "Radio transmission and reception".

[16] 3GPP TS 45.008: "Radio subsystem link control".

[17] 3GPP TS 45.010: "Radio subsystem synchronization".

[18] 3GPP TS 45.056: "GSM Cordless Telephony System (CTS), Phase 1; CTS-FP radio subsystem".

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[19] 3GPP TR 45.902: 'Flexible Layer One'.

[20] 3GPP TS 46.031: 'Discontinuous Transmission (DTX) for full rate speech traffic channels'.

[21] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols - Stage 3".

[22] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service Description; Stage 2".

1.2 Abbreviations

Abbreviations used in the present document are listed in 3GPP TR 21.905. In addition to abbreviations in 3GPP TR 21.905, the following abbreviations are applied:

BTTI	Basic Transmission Time Interval
FANR	Fast Ack/Nack Reporting
RTTI	Reduced Transmission Time Interval
TTI	Transmission Time Interval

1.3 Restrictions

Independently of what is stated elsewhere in this and other 3GPP specifications, mobile station support for PBCCH and PCCCH is optional for A/Gb-mode of operation. The network shall never enable PBCCH and PCCCH.

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2 General

The radio subsystem is required to support a certain number of logical channels that can be separated into two categories as defined in 3GPP TS 44.003:

i) the traffic channels (TCH's);

ii) the control channels.

More information is given about these logical channels in clause 3 which also defines a number of special channels used by the radio sub-system.

Clause 4 of this document describes the physical resource available to the radio sub-system, clause 5 defines physical channels based on that resource and clause 6 specifies how the logical channels shall be mapped onto physical channels. Figure 1 depicts this process.

With the Flexible Layer One (FLO), the radio subsystem is required to support transport channels (see 3GPP TR 45.902). Clause 8 of this document describes the mapping and multiplexing principles that are specific to FLO. Because FLO offers transport channels instead of logical channels, any reference to logical channels, with the exception of SACCH, does not apply to FLO. Otherwise, and unless otherwise stated, the multiplexing principles described in this document are equally applicable to FLO (e.g. physical resource and physical channels).

3 Logical channels

3.1 General

This subclause describes the logical channels that are supported by the radio subsystem.

3.2 Traffic channels

3.2.1 General

Traffic channels (TCH's) are intended to carry either encoded speech or user data in circuit switched mode. Five general forms of traffic channel are defined:

i) Full rate traffic channel (TCH/F). This channel carries information at a gross rate of 22,8 kbit/s.

ii) Half rate traffic channel (TCH/H). This channel carries information at a gross rate of 11,4 kbit/s.

iii) Enhanced circuit switched full rate traffic channel (E-TCH/F). This channel carries information at a gross rate of 69,6 kbit/s including the stealing symbols.

iv) 8-PSK full rate traffic channel (O-TCH/F). This channel carries information at a gross rate of 68,4 kbit/s.

v) 8-PSK half rate traffic channel (O-TCH/H). This channel carries information at a gross rate of 34,2 kbit/s.

Packet data traffic channels (PDTCH's) are intended to carry user data in packet switched mode. For the purpose of this EN, any reference to traffic channel does not apply to PDTCH unless explicitly stated.

All traffic channels are bi-directional unless otherwise stated. Unidirectional downlink full rate channels, TCH/FD, are defined as the downlink part of the corresponding TCH/F.

Multiple full rate channels can be assigned to the same MS. This is referred to as multislot configurations, which is defined in subclause 6.4.2.1.

Multiple packet data traffic channels can be assigned to the same MS or, in the case of point-to-multipoint transmission, a group of MSs. This is referred to as multislot packet configurations, as defined in subclause 6.4.2.2 and subclause 6.4.2.3a.

A combination of a half rate traffic channel and a half rate packet data traffic channel on the same basic physical channel can be assigned to the same MS as defined in subclause 6.4.2.3.

A combination of a traffic channel and one or more full rate packet data traffic channels can be assigned to the same MS.

A pair of speech traffic channels along with their associated control channels sharing the same timeslot number (see subclause 4.3), ARFCN (see subclause 6.2.3) and TDMA frame number (see subclause 4.3) is referred to as a *VAMOS pair*. The speech traffic channels along with their associated control channels in a *VAMOS pair* are said to be in *VAMOS mode* and are referred to as *VAMOS subchannels*.

In case of speech traffic channels in *VAMOS mode*, up to 4 speech traffic channels can be mapped on the same basic physical channel both in downlink and uplink (see subclause 6.4.1).

The specific traffic channels available in the categories of speech and user data are defined in the subclauses following.

3.2.2 Speech traffic channels

The following traffic channels are defined to carry encoded speech:

i) full rate traffic channel for speech (TCH/FS);

ii)half rate traffic channel for speech (TCH/HS);

iii) enhanced full rate traffic channel for speech (TCH/EFS);

iv) adaptive full rate traffic channel for speech (TCH/AFS);

v)adaptive half rate traffic channel for speech (TCH/AHS);

vi) adaptive full rate traffic channel for wideband speech (TCH/WFS);

vii) adaptive half rate 8PSK traffic channel for speech (O-TCH/AHS);

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viii) adaptive full rate 8PSK traffic channel for wideband speech (O-TCH/WFS);

ix) adaptive half rate 8PSK traffic channel for wideband speech (O-TCH/WHS).

3.2.3 Circuit switched data traffic channels

The following traffic channels are defined to carry user data:

i) full rate traffic channel for 9,6 kbit/s user data (TCH/F9.6);

ii) full rate traffic channel for 4,8 kbit/s user data (TCH/F4.8);

iii) half rate traffic channel for 4,8 kbit/s user data (TCH/H4.8);

iv) half rate traffic channel for ≤ 2,4 kbit/s user data (TCH/H2.4);

v) full rate traffic channel for ≤ 2,4 kbit/s user data (TCH/F2.4);

vi) full rate traffic channel for 14,4 kbit/s user data (TCH/F14.4);

vii) enhanced circuit switched full rate traffic channel for 28,8 kbit/s user data (E-TCH/F28.8);

viii) enhanced circuit switched full rate traffic channel for 32,0 kbit/s user data (E-TCH/F32.0);

ix) enhanced circuit switched full rate traffic channel for 43.2 kbit/s user data (E-TCH/F43.2).

3.2.4 Packet data traffic channels (PDTCH)

A PDTCH/F corresponds to the resource assigned to a single MS or, in the case of point-to-multipoint transmission, to multiple MSs for user data transmission. In BTTI configuration, a PDTCH/F is mapped onto one physical channel (see subclause 6.3.2.1). Due to the dynamic multiplexing onto the same physical channel of different logical channels (see subclause 6.3.2), a PDTCH/F in BTTI configuration carries information at an instantaneous bit rate ranging from 0 to a maximum value dependent on the modulation and on the symbol rate, as given in the following table.

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Modulation	Maximum instantaneous bit rate (kbit/s) when using the normal symbol rate (see 3GPP TS 45.004)	Maximum instantaneous bit rate (kbit/s) when using the higher symbol rate (see 3GPP TS 45.004)
GMSK	22,8	-
QPSK	-	55,2
8-PSK	69,6	-
16QAM	92,8	110,4
32QAM	116,0	138,0

In RTTI configuration, a PDTCH/F is mapped onto two physical channels, i.e. a PDCH-pair (see subclause 6.3.2.1). A PDTCH/F in RTTI configuration carries information at an instantaneous bit rate ranging from 0 to a maximum value which is double the corresponding value for that modulation and the symbol rate.

A PDTCH/H corresponds to the resource assigned to a single MS on half a physical channel for user data transmission. The maximum instantaneous bit rate for a PDTCH/H is half that for a PDTCH/F. A PDTCH/H is only possible in BTTI configuration if FANR is not activated (see 3GPP TS 44.060).

All packet data traffic channels are uni-directional, either uplink (PDTCH/U), for a mobile originated packet transfer or downlink (PDTCH/D) for a mobile terminated packet transfer.

In the case of point-to-multipoint transmission, a PDTCH/D can be used for communication with multiple MSs.

3.3 Control channels

3.3.1 General

Control channels are intended to carry signalling or synchronization data. Four categories of control channel are defined: broadcast, common, dedicated and CTS control channels. Specific channels within these categories are defined in the subclauses following.

3.3.2 Broadcast channels

3.3.2.1 Frequency correction channels (FCCH and CFCCH)

The frequency correction channel carries information for frequency correction of the mobile station. It is required only for the operation of the radio sub-system. Different mapping is used for FCCH and COMPACT CFCCH (see clause 7).

3.3.2.2 Synchronization channels

The synchronization channel carries information for frame synchronization of the mobile station and identification of a base transceiver station. It is required only for the operation of the radio sub-system. Different channels are used for SCH and COMPACT CSCH.

3.3.2.2.1 Synchronization channel (SCH)

Specifically the synchronization channel (SCH) shall contain two encoded parameters:

a) Base transceiver station identity code (BSIC): 6 bits (before channel coding) consists of 3 bits of PLMN colour code with range 0 to 7 and 3 bits of BS colour code with range 0 to 7 as defined in 3GPP TS 23.003.

b) Reduced TDMA frame number (RFN): 19 bits (before channel coding) =

T1 (11 bits) range 0 to 2047 = FN div (26 x 51)

T2 (5 bits) range 0 to 25 = FN mod 26

T3 ' (3 bits) range 0 to 4 = (T3 - 1) div 10

where

T3 (6 bits) range 0 to 50 = FN mod 51

and

FN = TDMA frame number as defined in subclause 4.3.3.

3GPP TS 44.006 and 3GPP TS 44.018 specify the precise bit ordering, 3GPP TS 45.003 the channel coding of the above parameters and 3GPP TS 45.010 defines how the TDMA frame number can be calculated from T1, T2, and T3'.

3.3.2.2.2 COMPACT synchronization channel (CSCH)

The COMPACT packet synchronization channel CSCH shall contain two encoded parameters:

a) Base transceiver station identity code (BSIC): 6 bits (before channel coding) consists of 3 bits of PLMN colour code with range 0 to 7 and 3 bits BS colour code with range 0 to 7 as defined in 3GPP TS 23.003.

b) Reduced TDMA frame number (RFN): 19 bits (before channel coding) =

R1 (10 bits) range 0 to 1023 = FN div (51 x 52)

R2 (6 bits) range 0 to 50 = (FN div 52) mod 51

TG(2 bits) range 0 to 3

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/563d4eec-b10a-4e91-9c0b-ca405baadaf/etsi-ts-145-002-v13.0.0-2016-01