3GPP TSG RAN WG1 Meeting #11
San Diego, USA, 29 Feb – 3 Mar 2000

Document R1-000376
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.221	CR	014r1	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: RAN#7 *list expected approval meeting # here ↑*

for approval [X]
for information [ ]

Strategic [ ]
non-strategic [ ]
(for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]

Source: Siemens AG **Date:** 2000-03-01

Subject: Removal of Synchronisation Case 3 in TDD

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	[X]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[ ]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change: Performance of SCH acquisition is too low with synchronisation case 3.

Clauses affected: 3, 4.1.2, 5.3.4, 5.4.1, 6, 6.2

Other specs affected:

Other 3G core specifications	[X]	→ List of CRs: CR005-223, CR011-224
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BCH	Broadcast Channel
CCPCH	Common Control Physical Channel
CCTrCH	Coded Composite Transport Channel
CDMA	Code Division Multiple Access
DPCH	Dedicated Physical Channel
DSCH	Downlink Shared Channel
FACH	Forward Access Channel
FDD	Frequency Division Duplex
FEC	Forward Error Correction
GP	Guard Period
GSM	Global System for Mobile Communication
NRT	Non-Real Time
ODCH	ODMA Dedicated Transport Channel
ODMA	Opportunity Driven Multiple Access
ORACH	ODMA Random Access Channel
OVSF	Orthogonal Variable Spreading Factor
P-CCPCH	Primary CCPCH
PCH	Paging Channel
PDSCH	Physical Downlink Shared Channel
PDU	Protocol Data Unit
PICH	Page Indicator Channel
PRACH	Physical Random Access Channel
~~PSCH~~	~~Physical Synchronisation Channel~~
PUSCH	Physical Uplink Shared Channel
RACH	Random Access Channel
RLC	Radio Link Control
RF	Radio Frame
RT	Real Time
S-CCPCH	Secondary CCPCH
SCH	Synchronisation Channel
SFN	Cell System Frame Number
TCH	Traffic Channel
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
USCH	Uplink Shared Channel

4 Transport channels

4.1 Transport channels

Transport channels are the services offered by layer 1 to the higher layers. A transport channel is defined by how and with what characteristics data is transferred over the air interface. A general classification of transport channels is into two groups:

- common channels (where there is a need for in-band identification of the UEs when particular UEs are addressed) and

- dedicated channels (where the UEs are identified by the physical channel)

General concepts about transport channels are described in 3GPP RAN TS25.302 (L2 specification).

4.1.1 Dedicated transport channels

The Dedicated Channel (DCH) is an up- or downlink transport channel that is used to carry user or control information between the UTRAN and a UE.

Two types of dedicated transport channels have been identified:

1) Dedicated Channel (DCH)
2) ODMA Dedicated Transport Channel (ODCH)

4.1.2 Common transport channels

Common transport channels are:

1) Broadcast Channel (BCH)

   The Broadcast Channel (BCH) is a downlink transport channel that is used to broadcast system- and cell-specific information.

2) Paging Channel (PCH)

   The Paging Channel (PCH) is a downlink transport channel that is used to carry control information to a mobile station when the system does not know the location cell of the mobile station.

3) Forward Access Channel(s) (FACH)

   The Forward Access Channel (FACH) is a downlink transport channel that is used to carry control information to a mobile station when the system knows the location cell of the mobile station. The FACH may also carry short user packets.

4) Random Access Channel(s) (RACH)

   The Random Access Channel (RACH) is an up link transport channel that is used to carry control information from mobile station. The RACH may also carry short user packets.

5) ODMA Random Access Channel (ORACH)

~~6) Synchronisation Channel (SCH)~~

~~7~~6) Uplink Shared Channel (USCH)

   The uplink shared channel (USCH) is a uplink transport channel shared by several UEs carrying dedicated control or traffic data.

~~8~~7) Downlink Shared Channel (DSCH)

   The downlink shared channel (DSCH) is a downlink transport channel shared by several UEs carrying dedicated control or traffic data.

5.3.4 The ~~physical~~ synchronisation channel (~~P~~SCH)

In TDD mode code group of a cell can be derived from the synchronisation channel. ~~Additional information, received from higher layers on SCH transport channel, is also transmitted to the UE in PSCH in case 3 from below.~~ In order not to limit the uplink/downlink asymmetry the ~~P~~SCH is mapped on one or two downlink slots per frame only.

There are two~~three~~ cases of ~~P~~SCH and P-CCPCH allocation as follows:

Case 1) ~~P~~SCH and P-CCPCH allocated in TS#k, k=0….14

Case 2) ~~P~~SCH allocated in two TS: TS#k and TS#k+8, k=0…6; P-CCPCH allocated in TS#k.

~~Case 3) PSCH allocated in two TS, TS#k and TS#k+8, k=0…6, and the P-CCPCH allocated in TS#i, i=0…6, pointed by PSCH. Pointing is determined via the SCH from the higher layers.~~

~~These three cases are addressed by higher layers using the SCCH in TDD Mode.~~ The position of ~~P~~SCH (value of k) in frame can change on a long term basis in any case.

Due to this ~~P~~SCH scheme, the position of P-CCPCH is known from the ~~P~~SCH.

Figure 15 is an example for transmission of ~~P~~SCH, k=0, of Case 2 ~~or Case 3~~.

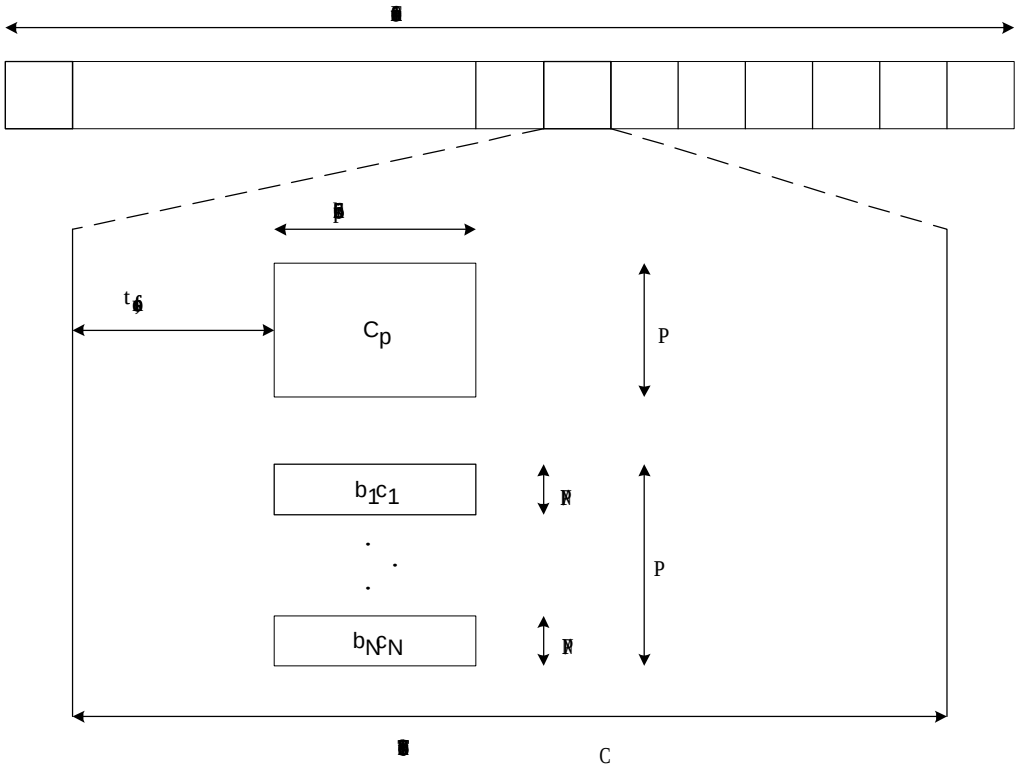

Figure 15: Scheme for ~~Physical~~ Synchronisation channel ~~P~~SCH consisting of one primary sequence C_p and N=3 parallel secondary sequences in slot k and k+8

(example for k=0 in Case 2 ~~or Case 3~~)

As depicted in figure 15, the ~~P~~SCH consists of a primary and three secondary code sequences with 256 chips length. The primary and secondary code sequences are defined in [8] chapter 7 'Synchronisation codes'. The secondary codes are transmitted either in the I channel or the Q channel, depending on the code group.

Due to mobile to mobile interference, it is mandatory for public TDD systems to keep synchronisation between base stations. As a consequence of this, a capture effect concerning ~~P~~SCH can arise. The time offset t_{offset} enables the system to overcome the capture effect.

The time offset t_{offset} is one of 32 values, depending on the cell parameter, thus on the code group of the cell, cf. 'table 7 Mapping scheme for Cell Parameters, Code Groups, Scrambling Codes, Midambles and t_{offset}' in [8]. The exact value for t_{offset}, regarding column 'Associated t_{offset}' in table 7 in [8] is given by:

$$t_{offset,n} = n \cdot T_c \left\lfloor \frac{2560 - 96 - 256}{31} \right\rfloor$$
$$= n \cdot 71 T_c \; ; \quad n = 0,\ldots,31$$

Please note that $\lfloor x \rfloor$ denotes the largest integer number less or equal to x and that T_c denotes the chip duration.

5.4.1 Location of physical channels with beacon function

The location of the physical channels with beacon function is determined by the ~~P~~SCH and depends on the ~~P~~SCH allocation case, see 5.3.4:

Case 1) All physical channels that are allocated to channelisation code $a_{Q=16}^{(k=1)}$ and in TS#k, k=0….14 shall provide the beacon function.

Case 2) All physical channels that are allocated to channelisation code $a_{Q=16}^{(k=1)}$ and in TS#k and TS#k+8, k=0…6, shall provide the beacon function.

~~Case 3) All physical channels that are allocated to channelisation code $a_{Q=16}^{(k=1)}$ and in TS#i and TS#i+8, i=0…6, pointed by PSCH, shall provide the beacon function.~~

Note that by this definition the P-CCPCH always provides the beacon function.

6 Mapping of transport channels to physical channels

This section describes the way in which transport channels are mapped onto physical resources, see figure 17.

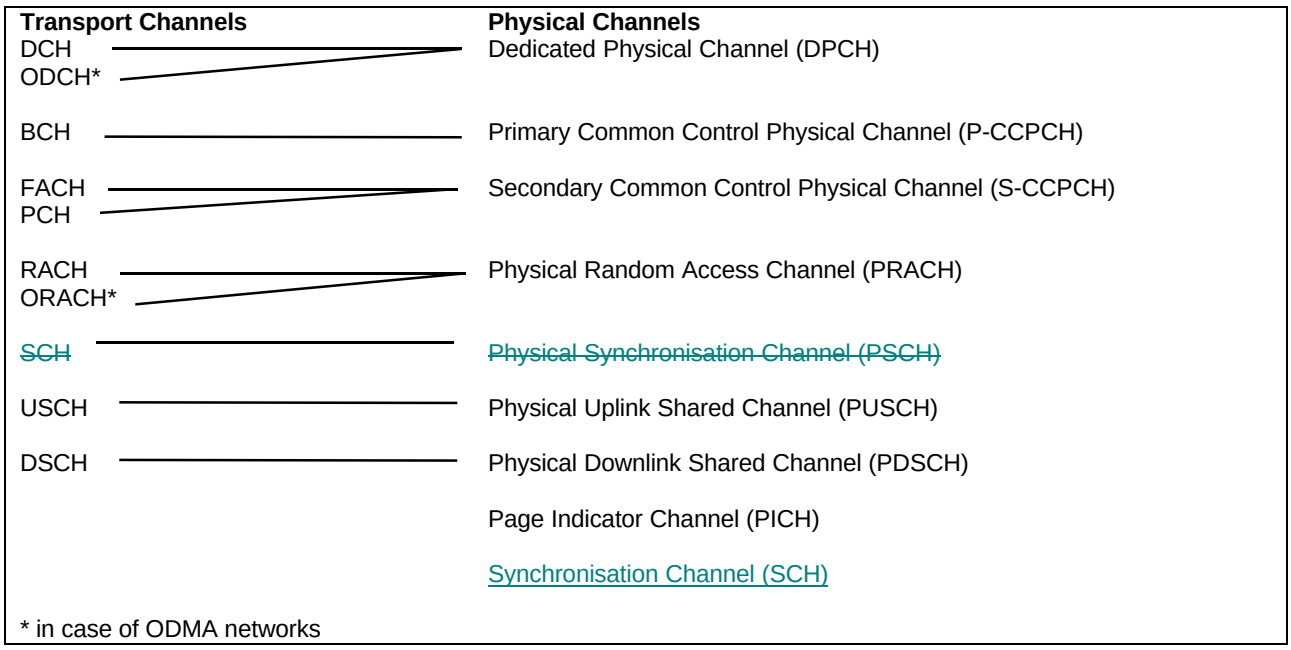

Figure 17: Transport channel to physical channel mapping

6.2 Common Transport Channels

6.2.1 The Broadcast Channel (BCH)

The BCH is mapped onto the P-CCPCH. The secondary SCH indicates in which timeslot a mobile can find the P-CCPCH containing BCH. If the broadcast information requires more resources than provided by the P-CCPCH, the BCH in P-CCPCH will comprise a pointer to additional S-CCPCH resources for FACH in which this additional broadcast information shall be sent.

6.2.2 The Paging Channel (PCH)

The PCH is mapped onto one or several S-CCPCHs so that capacity can be matched to requirements. The location of the PCH is indicated on the BCH. It is always transmitted at a reference power level.

To allow an efficient DRX, the PCH is divided into several paging sub-channels within the allocated multiframe structure. Examples of multiframe structures are given in the Annex B of this document. Each paging sub-channel is mapped onto 2 consecutive frames that are allocated to the PCH on the same S-CCPCH. Layer 3 information to a particular paging group is transmitted only in the associated paging sub-channel. The assignment of UEs to paging groups is independent of the assignment of UEs to page indicators.

6.2.3 The Forward Channel (FACH)

The FACH is mapped onto one or several S-CCPCHs. The location of the FACH is indicated on the BCH and both, capacity and location can be changed, if required. FACH may or may not be power controlled.

6.2.4 The Random Access Channel (RACH)

The RACH has intraslot interleaving only and is mapped onto PRACH. The same slot may be used for PRACH by more than one cell. Multiple transmissions using different spreading codes may be received in parallel. More than one slot per frame may be administered for the PRACH. The location of slots allocated to PRACH is broadcast on the BCH. The PRACH uses open loop power control. The details of the employed open loop power control algorithm may be different from the corresponding algorithm on other channels.

~~6.2.5 The Synchronisation Channel (SCH)~~

~~The SCH is mapped onto the PSCH as described in section 5.4.~~

6.2.6 Common Transport Channels for ODMA networks

The ORACH is used to transfer short probes or short protocol data units (PDU) between one or more nodes for routing and resource allocation control.

To limit the transmission time of short probe PDUs on the ORACH then this data should be transmitted as one burst on one code. That is, one probe burst should be transmitted on one $2560*T_c$ timeslot (which as described in section 5.1 would be configured as an ORACH slot).

Since the ORACH is a common control channel used to transfer probes between one or more nodes a common fixed spreading factor should be adopted.

6.2.7 The Uplink Shared Channel (USCH)

The uplink shared channel is mapped on one or several PUSCH, see section 5.5.

6.2.8 The Downlink Shared Channel (DSCH)

The downlink shared channel is mapped on one or several PDSCH, see section 5.6.