TSG-RAN Meeting #9 **_RP-000344_**
Hawaii, U.S.A. , 20-22 September 2000

Title: **Agreed CRs to TS 25.221**

Source: **TSG-RAN WG1**

Agenda item: **5.1.3**

No.	R1 T-doc	Spec	CR	Rev	Subject	Cat	Current	New
1	R1-000921	25.221	022	1	Correction to midamble generation in UTRA TDD	F	3.3.0	3.4.0
2	R1-001105	25.221	026	2	Some corrections for TS25.221	F	3.3.0	3.4.0
3	R1-000940	25.221	028	-	Terminology regarding the beacon function	F	3.3.0	3.4.0
4	R1-001000	25.221	030	1	TDD Access Bursts for HOV	F	3.3.0	3.4.0
5	R1-001089	25.221	031	1	Number of codes signalling for the DL common midamble case	F	3.3.0	3.4.0

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Document *R1-00-0921*
e.g. for 3GPP use the format TP-99xxx or for SMG, use the format P-99-xxx

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25.221	**CR**	**022r1**	Current Version:	3.3.0

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

For submission to:	RAN#9	for approval	X	strategic		*(for SMG use only)*
list expected approval meeting # here ↑		for information		non-strategic		

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:	TSG RAN WG1	**Date:**	04/07/2000
Subject:	Correction to midamble generation in UTRA TDD		
Work item:			

Category:	F	Correction	X	**Release:**	Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
(only one category	B	Addition of feature			Release 97	
shall be marked	C	Functional modification of feature			Release 98	
with an X)	D	Editorial modification			Release 99	X
					Release 00	

Reason for change:	The correction is needed in order to align the assumptions on not allowed burst type 1 extended midamble shifts 9 and 10 in beacon timeslots. With the current formula (9) in section 5.2.3, extended midamble shifts 10 and 11 derive those user midambles which should not be allowed. A modification of formula (9) in section 5.2.3 is necessary to derive the user midambles from the extended shifts in the correct order.
Clauses affected:	Section 5.2.3

Other specs affected:	Other 3G core specifications		→ List of CRs:
	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:	

5.2.3 Training sequences for spread bursts

In this subclause, the training sequences for usage as midambles in burst type 1 and burst type 2 (see subclause 5.2.2) are defined. The training sequences, i.e. midambles, of different users active in the same cell and same time slot are cyclically shifted versions of one single basic midamble code. The applicable basic midamble codes are given in Annex A.1 and A.2. As different basic midamble codes are required for different burst formats, the Annex A.1 shows the basic midamble codes $\mathbf{m}_{\mathrm{PL}}$ for burst type 1 and Annex and A.2 shows $\mathbf{m}_{\mathrm{PS}}$ for burst type 2. It should be noted that the different burst types must not be mixed in the same timeslot of one cell.

The basic midamble codes in Annex A.1 and A.2 are listed in hexadecimal notation. The binary form of the basic midamble code shall be derived according to table 5 below.

Table 5: Mapping of 4 binary elements m_i on a single hexadecimal digit

4 binary elements m_i	Mapped on hexadecimal digit
-1 -1 -1 -1	0
-1 -1 -1 1	1
-1 -1 1 –1	2
-1 -1 1 1	3
-1 1 -1 –1	4
-1 1 -1 1	5
-1 1 1 –1	6
-1 1 1 1	7
1 -1 -1 –1	8
1 -1 -1 1	9
1 -1 1 –1	A
1 -1 1 1	B
1 1 -1 –1	C
1 1 -1 1	D
1 1 1 –1	E
1 1 1 1	F

For each particular basic midamble code, its binary representation can be written as a vector $\mathbf{m}_{\mathrm{P}}$:

$$\mathbf{m}_{\mathrm{P}} = \left(m_1, m_2, \ldots, m_P\right) \qquad (1)$$

According to Annex A.1, the size of this vector $\mathbf{m}_{\mathrm{P}}$ is P=456 for burst type 1. Annex A.2 is setting P=192 for burst type 2. As QPSK modulation is used, the training sequences are transformed into a complex form, denoted as the complex vector $\underline{\mathbf{m}}_{\mathrm{P}}$:

$$\underline{\mathbf{m}}_{\mathrm{P}} = \left(\underline{m}_1, \underline{m}_2, \ldots, \underline{m}_P\right) \qquad (2)$$

The elements $\underline{m}_i$ of $\underline{\mathbf{m}}_{\mathrm{P}}$ are derived from elements m_i of $\mathbf{m}_{\mathrm{P}}$ using equation (3):

$$\underline{m}_i = (\mathrm{j})^i \cdot m_i \text{ for all } i = 1, \ldots, P \qquad (3)$$

Hence, the elements $\underline{m}_i$ of the complex basic midamble code are alternating real and imaginary.

To derive the required training sequences, this vector $\underline{\mathbf{m}}_{\mathrm{P}}$ is periodically extended to the size:

$$i_{\max} = L_m + (K'-1)W + \lfloor P/K \rfloor \qquad (4)$$

Notes on equation (4):

- K', W and P taken from Annex A.1 or A.2 according to burst type and thus to length of midamble L_m
- K=2K'

- $\lfloor x \rfloor$ denotes the largest integer smaller or equal to x

So we obtain a new vector $\underline{\mathbf{m}}$ containing the periodic basic midamble sequence:

$$\underline{\mathbf{m}} = \left(\underline{m}_1, \underline{m}_2, ..., \underline{m}_{i_{\max}}\right) = \left(\underline{m}_1, \underline{m}_2, ..., \underline{m}_{L_m+(K'-1)W+\lfloor P/K \rfloor}\right) \qquad (5)$$

The first P elements of this vector $\underline{\mathbf{m}}$ are the same ones as in vector $\underline{\mathbf{m}}_P$, the following elements repeat the beginning:

$$\underline{m}_i = \underline{m}_{i-P} \text{ for the subset } i = (P+1), ..., i_{\max} \qquad (6)$$

Using this periodic basic midamble sequence $\underline{\mathbf{m}}$ for each user k a midamble $\underline{\mathbf{m}}^{(k)}$ of length L_m is derived, which can be written as a user specific vector:

$$\underline{\mathbf{m}}^{(k)} = \left(\underline{m}_1^{(k)}, \underline{m}_2^{(k)}, ..., \underline{m}_{L_m}^{(k)}\right) \qquad (7)$$

The L_m midamble elements $\underline{m}_i^{(k)}$ are generated for each midamble of the first K' users (k = 1,...,K') based on:

$$\underline{m}_i^{(k)} = \underline{m}_{i+(K'-k)W} \text{ with } i = 1, ..., L_m \text{ and } k = 1, ..., K' \qquad (8)$$

The elements of midambles for the second K' users (k = (K'+1),...,K = (K'+1),...,2K') are generated based on a slight modification of this formula introducing intermediate shifts:

$$\cancel{\underline{m}_i^{(k)} = \underline{m}_{i+(K-k)W+\lfloor P/K \rfloor} \text{ with } i = 1, ..., L_m \text{ and } k = K'+1, ..., K \qquad (9)}$$

$$\underline{m}_i^{(k)} = \underline{m}_{i+(K-k-1)W+\lfloor P/K \rfloor} \text{ with } i = 1, ..., L_m \text{ and } k = K'+1, ..., K-1 \qquad (9)$$

$$\underline{m}_i^{(k)} = \underline{m}_{i+(K'-1)W+\lfloor P/K \rfloor} \text{ with } i = 1, ..., L_m \text{ and } k = K \qquad (10)$$

Whether intermediate shifts are allowed in a cell is broadcast on the BCH.

The midamble sequences derived according to equations (7) to (~~9~~10) have complex values and are not subject to channelisation or scrambling process, i.e. the elements $\underline{m}_i^{(k)}$ represent complex chips for usage in the pulse shaping process at modulation.

The term 'a midamble code set' or 'a midamble code family' denotes K specific midamble codes $\underline{\mathbf{m}}^{(k)}$; k=1,...,K, based on a single basic midamble code $\mathbf{m}_P$ according to (1).

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25.221 CR 026r2 Current Version: 3.3.0

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

For submission to: RAN#9 — for approval: X — for information: (blank) — strategic: (blank) — non-strategic: (blank) *(for SMG use only)*

list expected approval meeting # here ↑

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: (U)SIM: (blank) ME: X UTRAN / Radio: X Core Network: (blank)
(at least one should be marked with an X)

Source:	TSG RAN WG1
Date:	22/08/00
Subject:	Some corrections for TS25.221
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:

The following changes are included in this CR:

- Removal of a remaining reference to ODMA
- Correction of the PI to bit mapping and aligning terminology with WG2/WG3
- Alignment with FDD regarding 'Indicator Channel' Terminology
- Extension of Abbreviations and References
- Correction of Multiframe Structures in Annex
- Correction of UL TS format numbering
- Correction of DTrCH mapping
- Correction of a reference to TS25.302
- Modification of SCH figure

Clauses affected: 3; 4; 5.2.2.3.2; 5.3.1.3; 5.3.4; 5.3.7; 5.5.2; 5.6.1; 6; Annex B

Other specs affected:

Other 3G core specifications		→ List of CRs:
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:

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2 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.

[1] 3G TS 25.201: "Physical layer - general description".

[2] 3G TS 25.211: "Physical channels and mapping of transport channels onto physical channels (FDD)".

[3] 3G TS 25.212: "Multiplexing and channel coding (FDD)".

[4] 3G TS 25.213: "Spreading and modulation (FDD)".

[5] 3G TS 25.214: "Physical layer procedures (FDD)".

[6] 3G TS 25.215: "Physical layer – Measurements (FDD)".

[7] 3G TS 25.222: "Multiplexing and channel coding (TDD)".

[8] 3G TS 25.223: "Spreading and modulation (TDD)".

[9] 3G TS 25.224: "Physical layer procedures (TDD)".

[10] 3G TS 25.225: "Physical layer – Measurements (TDD)".

[11] 3G TS 25.301: "Radio Interface Protocol Architecture".

[12] 3G TS 25.302: "Services Provided by the Physical Layer".

[13] 3G TS 25.401: "UTRAN Overall Description".

[14] 3G TS 25.402: "Synchronisation in UTRAN, Stage 2".

[15] 3G TS 25.304: "-UE Procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode".

[16] 3G TS 25.427: "UTRAN Iur and Iub interface user plane protocols for DCH data streams".

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
DRX	Discontinuous Reception
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
OVSF	Orthogonal Variable Spreading Factor
P-CCPCH	Primary CCPCH
PCH	Paging Channel
PDSCH	Physical Downlink Shared Channel
~~PDU~~	~~Protocol Data Unit~~
PI	Paging Indicator (value calculated by higher layers)
PICH	Pag~~e~~ing Indicator Channel
P_q	Paging Indicator (indicator set by physical layer)
PRACH	Physical Random Access 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
TrCH	Transport Channel
UE	User Equipment
USCH	Uplink Shared Channel

4 Services offered to higher layers~~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:

- Dedicated Channels, using inherent addressing of UE
- Common Channels, using explicit addressing of UE if addressing is needed

General concepts about transport channels are described in [12]~~3GPP RAN TS 25.302 (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.

4.1.2 Common transport channels

There are six types of transport channels: BCH, FACH, PCH, RACH, USCH, DSCH

4.1.2.1 BCH - Broadcast Channel

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

4.1.2.2 FACH – Forward Access Channel

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.

4.1.2.3 PCH – Paging Channel

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.

4.1.2.4 RACH – Random Access Channel

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.

4.1.2.5 USCH – Uplink Shared Channel

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

4.1.2.6 DSCH – Downlink Shared Channel

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

4.2 Indicators

Indicators are means of fast low-level signalling entities which are transmitted without using information blocks sent over transport channels. The meaning of indicators is implicit to the receiver.

The indicator(s) defined in the current version of the specifications are: Paging Indicator.

5.2.2.3.2 Uplink timeslot formats

The uplink timeslot format depends on the spreading factor, midamble length and on the number of the TFCI bits. Due to TPC, different amount of bits are mapped to the two data fields. The timeslot formats are depicted in the table 4b.

Table 4b: Timeslot formats for the Uplink

Slot Format #	Spreading Factor	Midamble length (chips)	N_{TFCI} (bits)	N_{TPC} (bits)	Bits/slot	$N_{Data/Slot}$ (bits)	$N_{data/data field(1)}$ (bits)	$N_{data/data field(2)}$ (bits)
0	16	512	0	0	244	244	122	122
~~5~~1	16	512	0	2	244	242	122	120
2~~6~~	16	512	4	2	244	238	120	118
3~~7~~	16	512	8	2	244	234	118	116
4~~8~~	16	512	16	2	244	226	114	112
5~~9~~	16	512	32	2	244	210	106	104
6~~10~~	16	256	0	0	276	276	138	138
7~~15~~	16	256	0	2	276	274	138	136
8~~16~~	16	256	4	2	276	270	136	134
9~~17~~	16	256	8	2	276	266	134	132
10~~8~~	16	256	16	2	276	258	130	128
11~~9~~	16	256	32	2	276	242	122	120
12~~20~~	8	512	0	0	488	488	244	244
13~~25~~	8	512	0	2	488	486	244	242
14~~26~~	8	512	4	2	488	482	242	240
15~~27~~	8	512	8	2	488	478	240	238
16~~28~~	8	512	16	2	488	470	236	234
17~~29~~	8	512	32	2	488	454	228	226
18~~30~~	8	256	0	0	552	552	276	276
19~~35~~	8	256	0	2	552	550	276	274
20~~36~~	8	256	4	2	552	546	274	272
21~~37~~	8	256	8	2	552	542	272	270
22~~38~~	8	256	16	2	552	534	268	266
23~~39~~	8	256	32	2	552	518	260	258
24~~40~~	4	512	0	0	976	976	488	488
25~~45~~	4	512	0	2	976	974	488	486
26~~46~~	4	512	4	2	976	970	486	484
27~~47~~	4	512	8	2	976	966	484	482
28~~48~~	4	512	16	2	976	958	480	478
29~~49~~	4	512	32	2	976	942	472	470
30~~50~~	4	256	0	0	1104	1104	552	552
31~~55~~	4	256	0	2	1104	1102	552	550
32~~56~~	4	256	4	2	1104	1098	550	548
33~~57~~	4	256	8	2	1104	1094	548	546
34~~58~~	4	256	16	2	1104	1086	544	542
35~~59~~	4	256	32	2	1104	1070	536	534
36~~60~~	2	512	0	0	1952	1952	976	976
37~~65~~	2	512	0	2	1952	1950	976	974
38~~66~~	2	512	4	2	1952	1946	974	972
39~~67~~	2	512	8	2	1952	1942	972	970
40~~68~~	2	512	16	2	1952	1934	968	966
41~~69~~	2	512	32	2	1952	1918	960	958
42~~70~~	2	256	0	0	2208	2208	1104	1104
43~~75~~	2	256	0	2	2208	2206	1104	1102
44~~76~~	2	256	4	2	2208	2202	1102	1100
45~~77~~	2	256	8	2	2208	2198	1100	1098
46~~78~~	2	256	16	2	2208	2190	1096	1094
47~~79~~	2	256	32	2	2208	2174	1088	1086

Slot Format #	Spreading Factor	Midamble length (chips)	N_{TFCI} (bits)	N_{TPC} (bits)	Bits/slot	$N_{Data/Slot}$ (bits)	$N_{data/data\ field(1)}$ (bits)	$N_{data/data\ field(2)}$ (bits)
48~~80~~	1	512	0	0	3904	3904	1952	1952
49~~85~~	1	512	0	2	3904	3902	1952	1950
50~~86~~	1	512	4	2	3904	3898	1950	1948
51~~87~~	1	512	8	2	3904	3894	1948	1946
52~~88~~	1	512	16	2	3904	3886	1944	1942
53~~89~~	1	512	32	2	3904	3870	1936	1934
54~~90~~	1	256	0	0	4416	4416	2208	2208
55~~95~~	1	256	0	2	4416	4414	2208	2206
56~~96~~	1	256	4	2	4416	4410	2206	2204
57~~97~~	1	256	8	2	4416	4406	2204	2202
58~~98~~	1	256	16	2	4416	4398	2200	2198
59~~99~~	1	256	32	2	4416	4282	2192	2190

5.3.1.3 P-CCPCH Training sequences

The training sequences, i.e. midambles, as described in subclause 5.2.3 are used for the P-CCPCH. For those timeslots in which the P-CCPCH is transmitted, the midambles $m^{(1)}$ ~~,~~ and $m^{(2)}$~~, $m^{(9)}$ and $m^{(10)}$~~ are reserved for P-CCPCH in order to support Block STTD antenna diversity and the beacon function, see 5.~~-~~4 and 5.5. The use of midambles depends on whether Block STTD is applied to the P-CCPCH:

- If no antenna diversity is applied to P-CCPCH, $m^{(1)}$ is used and $m^{(2)}$ is left unused;
- If Block STTD antenna diversity is applied to P-CCPCH, $m^{(1)}$ is used for the first antenna and $m^{(2)}$ is used for the diversity antenna.

~~The midambles $m^{(9)}$ and $m^{(10)}$ are always left unused in the P-CCPCH time slots.~~

5.3.4 The synchronisation channel (SCH)

In TDD mode code group of a cell can be derived from the synchronisation channel. In order not to limit the uplink/downlink asymmetry the SCH is mapped on one or two downlink slots per frame only.

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

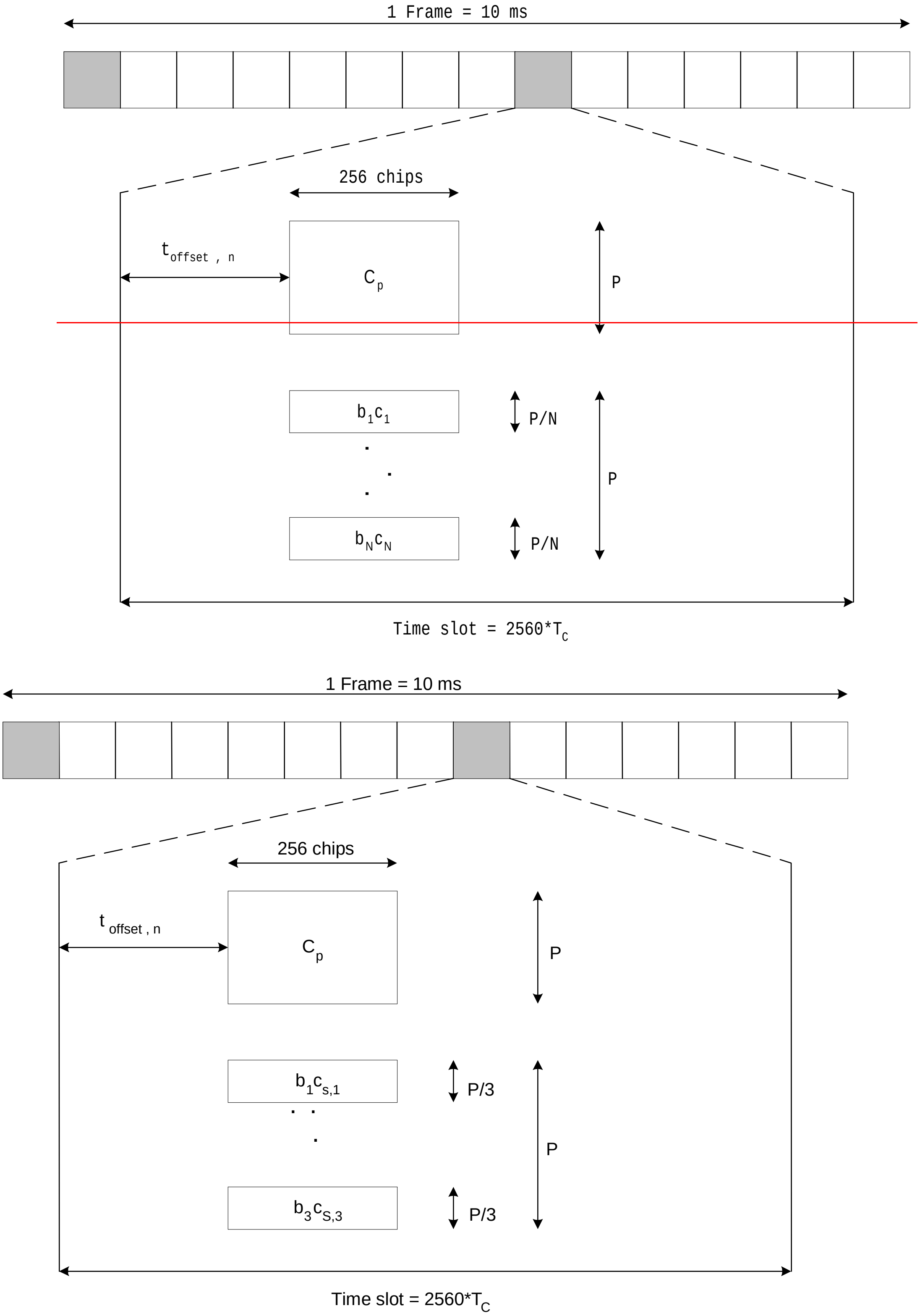
Case 1) SCH and P-CCPCH allocated in TS#k, k=0….14

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

The position of SCH (value of k) in frame can change on a long term basis in any case.

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

Figure 14 is an example for transmission of SCH, k=0, of Case 2.



$C_{s,i} \in \{C_0, C_1, C_3, C_4, C_5, C_6, C_8, C_{10}, C_{12}, C_{13}, C_{14}, C_{15}\}$, i=1,2,3; see [8]

Figure 14: Scheme for Synchronisation channel SCH consisting of one primary sequence C_p and ~~N=~~3 parallel secondary sequences $C_{s,i}$ in slot k and k+8 (example for k=0 in Case 2)

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

As depicted in figure 14, the SCH consists of a primary and three secondary code sequences with 256 chips length. The primary and secondary code sequences are defined in [8] clause 7 'Synchronisation codes'.

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 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 6 Mapping scheme for Cell Parameters, Code Groups, Scrambling Codes, Midambles and t_{offset}' in [8]. Note that the cell parameter will change from frame to frame, cf. 'Table 7 Alignment of cell parameter cycling and system frame number' in [8], but the cell will belong to only one code group and thus have one time offset t_{offset}.The exact value for t_{offset}, regarding column 'Associated t_{offset}' in table 6 in [8] is given by:

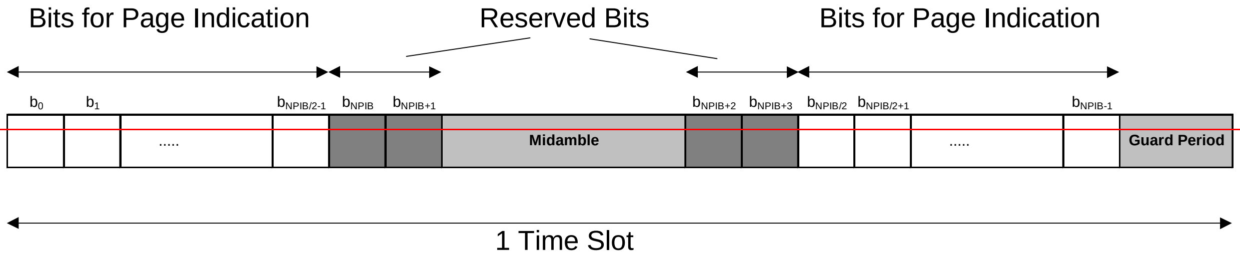
$$\begin{aligned} t_{offset,n} &= n \cdot T_c \left\lfloor \frac{2560 - 96 - 256}{31} \right\rfloor \\ &= n \cdot 71 T_c \; ; \quad n = 0, \ldots, 31 \end{aligned}$$

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

5.3.7 The Paging~~e~~ Indicator Channel (PICH)

The Paging~~e~~ Indicator Channel (PICH) is a physical channel used to carry the ~~P~~paging~~e~~ i~~I~~ndicators ~~(PI)~~. The PICH is always transmitted at the same reference power level as the P-CCPCH.

Figure 15 depicts the structure of a PICH burst and the numbering of the bits within the burst. The same burst type is used for the PICH in every cell. N_{PIB} bits in a normal burst of type 1 or 2 are used to carry the ~~P~~paging ~~I~~indicators, where N_{PIB} depends on the burst type: N_{PIB}=240 for burst type 1 and N_{PIB}=272 for burst type 2. The bits b_{NPIB},..., b_{NPIB+3} adjacent to the midamble are reserved for possible future use. They shall be set to 0 and transmitted with the same power as the ~~P~~paging ~~I~~indicator carrying bits.



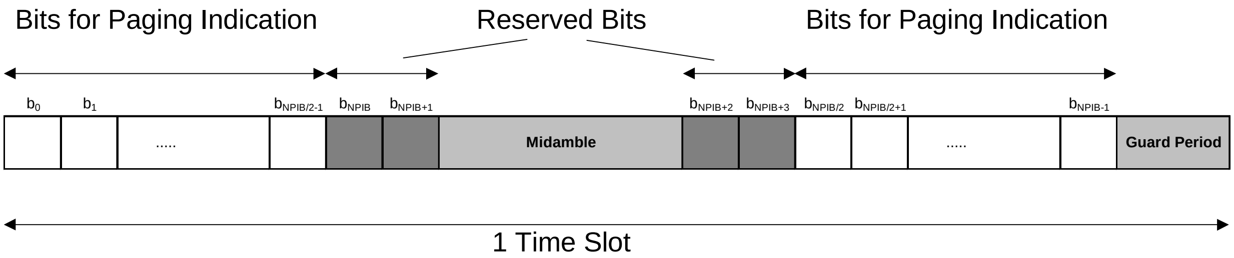


Figure 15: Transmission and n~~N~~umbering of ~~P~~paging ~~I~~indicator carrying b~~B~~its in a PICH burst

In each time slot, N_{PI} paging~~e~~ indicators are transmitted, using ~~of length~~ L_{PI}=~~4~~2, L_{PI}=~~8~~ 4 or L_{PI}=~~16~~ 8 ~~bits~~ symbols~~are transmitted in one time slot~~. L_{PI} is called the paging indicator length. The number of paging~~e~~ indicators N_{PI} per time slot is given by the paging indicator length ~~the number L_{PI} of bits for the page indicators~~ and the burst type, which are both known by higher layer signalling. In table 8 this number is shown for the different possibilities of burst types and paging indicator~~PI~~ lengths.

Table 8: Number N_{PI} of paging indicators~~PI~~ per time slot for the different burst types and paging indicator~~PI~~ lengths L_{PI}

	L_{PI}=~~4~~2	L_{PI}=~~8~~4	L_{PI}=~~16~~8
Burst Type 1	N_{PI}=60	N_{PI}=30	N_{PI}=15
Burst Type 2	N_{PI}=68	N_{PI}=34	N_{PI}=17

As shown in figure 16, the ~~P~~paging~~e~~ ~~I~~indicators of N_{PICH} consecutive frames form a PICH block, N_{PICH} is configured by higher layers. Thus, N_P=N_{PICH}*N_{PI} ~~P~~paging~~e~~ i~~I~~ndicators are transmitted in each PICH block.

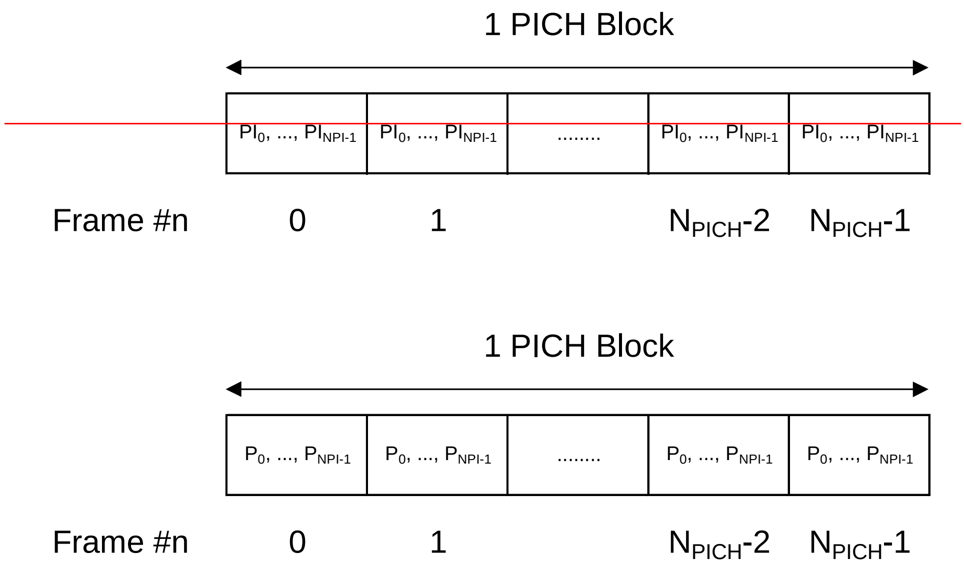


Figure 16: Structure of a PICH block

The value PI (PI = 0, ..., N_P-1) calculated by higher layers for use for a certain UE, see [15], is associated ~~mapped~~ to the ~~P~~paginge ~~I~~indicator P~~I~~$_{\cancel{p}q}$ in the nth frame of one PICH block, where ~~p~~q is given by

$\cancel{p}\ q$ = PI mod N_{PI}

and n is given by

n = PI div N_{PI}.

The PI bitmap in the PCH data frames over Iub contains indication values for all possible higher layer PI values, see [16]. Each bit in the bitmap indicates if the paging indicator P_q associated with that particular PI shall be set to 0 or 1. Hence, the calculation in the formulas above is to be performed in Node B to make the association between PI and P_q.

The p~~P~~aginge i~~I~~ndicator P~~I~~$_{\cancel{p}q}$ in one time slot is mapped to the bits $\{b_{L_{pi}*\cancel{p}q},\dots,b_{L_{pi}*\cancel{p}q+L_{pi}-1},b_{N_{PIB}/2+L_{pi}*\cancel{p}q},\dots,b_{N_{PIB}/2+L_{pi}*\cancel{p}q+L_{pi}-1}\}$ within this time slot, as exemplary shown in figure 17. Thus, half of the L_{PI} symbols used for each paging indicator are transmitted in the first data part, and the other half of the L_{PI} symbols are transmitted in the second data part.

The coding of the paging indicator P_q is given in [7].

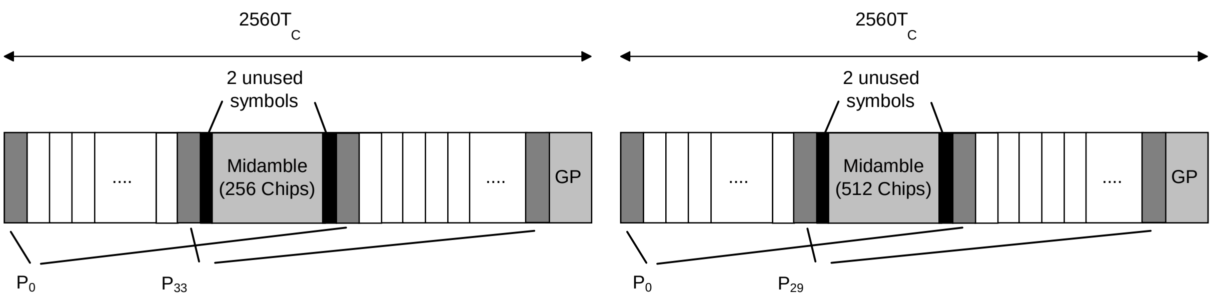


Figure 17: Example of mapping of paging indicators on PICH bits for L_{PI}=4

5.5.2 Physical characteristics of the beacon function

The physical channels providing the beacon function:

- are transmitted with reference power;
- are transmitted without beamforming;
- use burst type 1;
- use midamble m ~~m~~$^{(1)}$ and $m^{(2)}$ exclusively in this time slot; and
- midambles m~~m~~$^{(9)}$ and $m^{(10)}$ are always left unused in this time slot, if 16 midambles are allowed in that cell.

Note that in the time slot where the P-CCPCH is transmitted only the midambles $m^{(1)}$ to $m^{(8)}$ shall be used, see 5.6.1. Thus, midambles $m^{(9)}$ and $m^{(10)}$ are always left unused in this time slot.

The reference power corresponds to the sum of the power allocated to both midambles m~~m~~$^{(1)}$ and $m^{(2)}$. Two possibilities exist:

- If no Block STTD antenna diversity is applied to P-CCPCH, all the reference power of any physical channel providing the beacon function is allocated to $m^{(1)}$.
- If Block STTD antenna diversity is applied to P-CCPCH, for any physical channel providing the beacon function midambles $m^{(1)}$ and $m^{(2)}$ are each allocated half of the reference power. Midamble $m^{(1)}$ is used for the first antenna and $m^{(2)}$ is used for the diversity antenna. Block STTD encoding is used for the data in P-CCPCH, see [9]; for all other physical channels identical data sequences are transmitted on both antennas.

5.6.1 Midamble Allocation for DL Physical Channels

Physical channels providing the beacon function shall always use the reserved midambles $m^{(1)}$ and $m^{(2)}$, see 5.4. For all other DL physical channels the midamble allocation is signalled or given by default.

6 Mapping of transport channels to physical channels

This clause describes the way in which transport channels are mapped onto physical resources, see figure 18~~7~~.

Transport Channels	**Physical Channels**
DCH	Dedicated Physical Channel (DPCH)
BCH	Primary Common Control Physical Channel (P-CCPCH)
FACH PCH	Secondary Common Control Physical Channel (S-CCPCH)
RACH ~~ORACH*~~	Physical Random Access Channel (PRACH)
USCH	Physical Uplink Shared Channel (PUSCH)
DSCH	Physical Downlink Shared Channel (PDSCH)
	Paging~~e~~ Indicator Channel (PICH)
	Synchronisation Channel (SCH)

~~Figure 17~~Figure 18: Transport channel to physical channel mapping

6.1 Dedicated Transport Channels

A dedicated transport channel is mapped onto one or more physical channels. An interleaving period is associated with each allocation. The frame is subdivided into slots that are available for uplink and downlink information transfer. The mapping of transport blocks on physical channels is described in TS 25.222 ("multiplexing and channel coding").

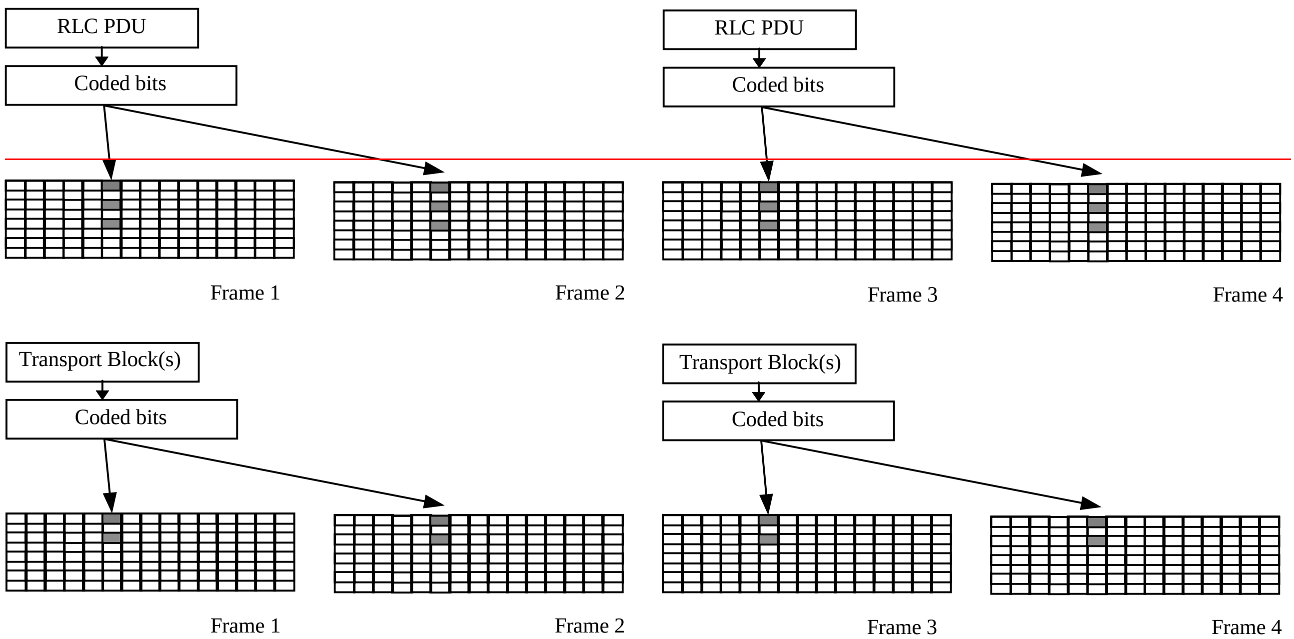


Figure 19~~8~~: Mapping of Transport Blocks~~PDU~~ onto the physical bearer

For NRT packet data services, shared channels (USCH and DSCH) can be used to allow efficient allocations for a short period of time.

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 PCH blocks, each of which comprising N_{PCH} paging sub-channels. N_{PCH} is configured by higher layers. Each paging sub-channel is mapped onto 2 consecutive PCH frames within one PCH block. Layer 3 information to a particular UE is transmitted only in the paging sub-channel, that is assigned to the UE by higher layers, see [15]. The assignment of UEs to paging sub-channels is independent of the assignment of UEs to page indicators.

6.2.2.1 PCH/PICH Association

As depicted in figure 20~~19~~, a paging block consists of one PICH block and one PCH block. If a p~~P~~aging~~e~~ i~~I~~ndicator in a certain PICH block is set to '1' it is an indication that UEs associated with this p~~P~~aging~~e~~ i~~I~~ndicator shall read their corresponding paging sub-channel within the same paging block. The value N_{GAP}>0 of frames between the end of the PICH block and the beginning of the PCH block is configured by higher layers.

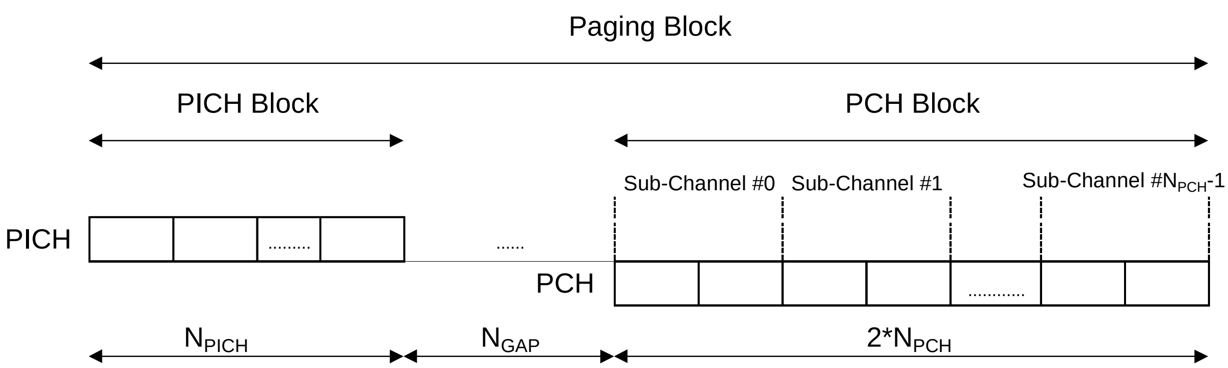


Figure 20~~19~~: Paging Sub-Channels and Association of PICH and PCH blocks

Annex B (Informative): CCPCH Multiframe Structure

In the following figures B.1 to B.3 some examples for Multiframe Structures on Primary and Secondary CCPCH are given. The figures show the placement of Common Transport Channels on the Common Control Physical Channels. Additional S-CCPCH capacity can be allocated on other codes and timeslots of course, e.g. FACH capacity is related to overall cell capacity and can be configured according to the actual needs. Channel capacities in the annex are derived using bursts with long midambles (Burst format 1). Every TrCH-box in the figures is assumed to be valid for two frames (see row 'Frame #'), i.e. the transport channels in CCPCHs have an interleaving time of 20msec.

The actual CCPCH Multiframe Scheme used in the cell is described and broadcast on BCH. Thus the system information structure has its roots in this particular transport channel and allocations of other Common Channels can be handled this way, i.e. by pointing from BCH.

~~Frame #~~	~~0 1~~	~~2 3~~	~~4 5~~	~~6 7~~	~~8 9~~	~~10 11~~	~~12 13~~	~~14 15~~	~~16 17~~	~~18 19~~	~~20 21~~	~~22 23~~	~~24 25~~	~~26 27~~	~~28 29~~	~~30 31~~	~~32 33~~	~~34 35~~	~~36 37~~	~~38 39~~	~~40 41~~	~~42 43~~	~~44 45~~	~~46 47~~	~~48 49~~	~~50 41~~	~~52 53~~	~~54 55~~	~~56 57~~	~~58 59~~	~~60 61~~	~~62 63~~	~~64 65~~	~~66 67~~	~~68 69~~	~~70 71~~
~~CCPCHs in TS k, Code 0~~																																				
~~CCPCHs in TS k+8, Co 0~~																																				

	~~BCH transporting BCCH 2,71 kbps~~		~~FACH transporting BCCH 2,71 kbps~~		~~PCH 13,5kbps~~		~~PICH 2,71 kbps~~		~~FACH 27,1 kbps~~

~~Figure B.1: Example for a multiframe structure for CCPCHs that is repeated every 72th frame~~

~~Frame #~~	~~0 1~~	~~2 3~~	~~4 5~~	~~6 7~~	~~8 9~~	~~10 11~~	~~12 13~~	~~14 15~~	~~16 17~~	~~18 19~~	~~20 21~~	~~22 23~~	~~24 25~~	~~26 27~~	~~28 29~~	~~30 31~~	~~32 33~~	~~34 35~~	~~36 37~~	~~38 39~~	~~40 41~~	~~42 43~~	~~44 45~~	~~46 47~~	~~48 49~~	~~50 41~~	~~52 53~~	~~54 55~~	~~56 57~~	~~58 59~~	~~60 61~~	~~62 63~~	~~64 65~~	~~66 67~~	~~68 69~~	~~70 71~~
~~CCPCHs in TS k, Code 0~~																																				
~~CCPCHs in TS k, Code n~~																																				
~~CCPCHs in TS k+8, Co 0~~																																				

	~~BCH transporting BCCH 2,71 kbps~~		~~FACH transporting BCCH 2,71 kbps~~		~~PCH 13,5kbps~~		~~PICH 2,71 kbps~~		~~FACH 51,5 kbps~~

~~Figure B.2: Example for a multiframe structure for CCPCHs that is repeated every 72th frame, n=1…7~~

~~Frame #~~	~~0 1~~	~~2 3~~	~~4 5~~	~~6 7~~	~~8 9~~	~~10 11~~	~~12 13~~	~~14 15~~	~~16 17~~	~~18 19~~	~~20 21~~	~~22 23~~	~~24 25~~	~~26 27~~	~~28 29~~	~~30 31~~	~~32 33~~	~~34 35~~	~~36 37~~	~~38 39~~	~~40 41~~	~~42 43~~	~~44 45~~	~~46 47~~	~~48 49~~	~~50 41~~	~~52 53~~	~~54 55~~	~~56 57~~	~~58 59~~	~~60 61~~	~~62 63~~	~~64 65~~	~~66 67~~	~~68 69~~	~~70 71~~
~~CCPCHs in TS k, Code 0~~																																				
~~CCPCHs in TS k+8, Co 0~~																																				

	~~BCH transporting BCCH 2,71 kbps~~		~~FACH transporting BCCH 1,355 kbps~~		~~PCH 13,5kbps~~		~~PICH 2,71 kbps~~		~~FACH 28,5 kbps~~

~~Figure B.3: Example for a multiframe structure for CCPCHs that is repeated every 72th frame~~

Frame #	0 1	2 3	4 5	6 7	8 9	10 11	12 13	14 15	16 17	18 19	20 21	22 23	24 25	26 27	28 29	30 31	32 33	34 35	36 37	38 39	40 41	42 43	44 45	46 47	48 49	50 41	52 53	54 55	56 57	58 59	60 61	62 63
CCPCHs in TS k, Code 0																																
CCPCHs in TS k+8, Code 0																																

BCH 12,2 kbps	FACH 25,93 kbps	PCH 9,15 kbps	PICH 1,53 kbps

Figure B.1: Example for a multiframe structure for CCPCHs and PICH that is repeated every 64th frame

Frame #	0 1	2 3	4 5	6 7	8 9	10 11	12 13	14 15	16 17	18 19	20 21	22 23	24 25	26 27	28 29	30 31	32 33	34 35	36 37	38 39	40 41	42 43	44 45	46 47	48 49	50 41	52 53	54 55	56 57	58 59	60 61	62 63
CCPCHs in TS k, Code 0																																
CCPCHs in TS k+8, Code 0																																
CCPCHs in TS k+8, Code n																																

BCH 22,88 kbps	FACH 36,6 kbps	PCH 12,2 kbps	PICH 1,53 kbps

Figure B.2: Example for a multiframe structure for CCPCHs and PICH that is repeated every 64th frame, n=1…7

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Document *R1-00-0940*

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

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25.221 CR 028 Current Version: 3.3.0

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

For submission to: RAN#9	for approval	X	strategic		(for SMG
list expected approval meeting # here ↑	for information		non-strategic		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: (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG RAN WG1 **Date:** 00-07-04

Subject: Terminology regarding the beacon function

Work item:

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

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:

Currently, there are different terms in connection with the beacon function that may lead to some misunderstanding:

- ‚Physical Channels providing the Beacon Function'
- ‚Physical Channels with Beacon Function'
- ‚Beacon Channels'

This CR tries to make the terminology more consistent in such a sense that

- Physical Channels have Beacon Characteristics
- Physical Channels with Beacon Characteristics are called Beacon Channels
- The ensemble of Beacon Channels provide the Beacon Function

Clauses affected: 5.5; 5.6.1

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	CR224-025, CR225-015
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:

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

5.5 Beacon characteristics~~function~~ of physical channels

For the purpose of measurements, ~~a beacon function shall be provided by particular~~ physical channels at particular locations (time slot, code) shall have particular physical characteristics, called beacon characteristics. Physical channels with beacon characteristics are called beacon channels. The locations of the beacon channels are called beacon locations. The ensemble of beacon channels shall provide the beacon function, i.e. a reference power level at the beacon locations, regularly existing in each radio frame. Thus, beacon channels must be present in each radio frame.

5.5.1 Location of beacon ~~physical~~ channels ~~with beacon function~~

The beacon locations ~~of the physical channels with beacon function is~~are determined by the SCH and depend~~s~~ on the SCH allocation case, see 5.3.4:

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

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

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

5.5.2 Physical characteristics of ~~the~~ beacon channels~~function~~

The beacon ~~physical~~ channels shall have the following physical characteristics. They~~providing the beacon function~~:

- are transmitted with reference power;
- are transmitted without beamforming;
- use burst type 1;
- use midamble $m^{(1)}$ and $m^{(2)}$ exclusively in this time slot; and
- midambles $m^{(9)}$ and $m^{(10)}$ are always left unused in this time slot, if 16 midambles are allowed in that cell.

The reference power corresponds to the sum of the power allocated to both midambles $m^{(1)}$ and $m^{(2)}$. Two possibilities exist:

- If no Block STTD antenna diversity is applied to P-CCPCH, all the reference power of any beacon ~~physical~~ channel ~~providing the beacon function~~ is allocated to $m^{(1)}$.
- If Block STTD antenna diversity is applied to P-CCPCH, for any beacon~~physical~~ channel ~~providing the beacon function~~ midambles $m^{(1)}$ and $m^{(2)}$ are each allocated half of the reference power. Midamble $m^{(1)}$ is used for the first antenna and $m^{(2)}$ is used for the diversity antenna. Block STTD encoding is used for the data in P-CCPCH, see [9]; for all other beacon ~~physical~~ channels identical data sequences are transmitted on both antennas.

5.6 Midamble Allocation for Physical Channels

In general, midambles are part of the physical channel configuration which is performed by higher layers.

Optionally, if no midamble is allocated by higher layers, a default midamble allocation shall be used. This default midamble allocation is given by a fixed association between midambles and channelisation codes, see clause A.3, and shall be applied individually to all channelisation codes within one time slot. Different associations apply for different burst types and cell configurations with respect to the maximum number of midambles.

5.6.1 Midamble Allocation for DL Physical Channels

Beacon~~Physical~~ channels ~~providing the beacon function~~ shall always use the reserved midambles, see 5.4. For all other DL physical channels the midamble allocation is signalled or given by default.

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25.221 CR 030r1 Current Version: 3.3.0

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

For submission to: RAN#9
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for approval	X	strategic		*(for SMG use only)*
for information		non-strategic		

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

Source: TSG RAN WG1 **Date:** 2000-08-23

Subject: TDD Access Bursts for HOV

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: This CR enables the usage of access bursts (burst type 3) for HOV purposes in case oh non-synchronised cells.

Clauses affected: 5.2.2, 5.2.3, 5.3.3, annex A

Other specs affected:

Other 3G core specifications		→ List of CRs:
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:

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5.2.2 Burst Types

Three~~wo~~ types of bursts for dedicated physical channels are defined. ~~: The burst type 1 and the burst type 2. Both~~ All of them consist of two data symbol fields, a midamble and a guard period~~.~~, the lengths of which are different for the individual burst types. Thus, the number of data symbols in a burst depends on the SF and the burst type, as depicted in table 1.

Table 1: Number of data symbols (N) for burst type 1, 2, and 3

Spreading factor (SF)	Burst Type 1	Burst Type 2	Burst Type 3
1	1952	2208	1856
2	976	1104	928
4	488	552	464
8	244	276	232
16	122	138	116

The support of all three burst types is mandatory for the UE. The three different bursts defined here are well suited for different applications, as described in the following sections.

~~The bursts type 1 has a longer midamble of 512 chips than the burst type 2 with a midamble of 256 chips. Sample sets of midambles are given in subclause 5.2.3.1.~~

~~Because of the longer midamble, the burst type 1 is suited for the uplink, where up to 16 different channel impulse responses can be estimated. The burst type 2 can be used for the downlink and, if the bursts within a time slot are allocated to less than four users, also for the uplink.~~

5.2.2.1 Burst Type 1

~~Thus t~~The burst type 1 can be used for uplink and downlink. Due to its longer midamble field this burst type supports the construction of a larger number of training sequences, see 5.2.3, which shall be used to estimate the different channels for different UEs in UL and, in case of TxDiversity or Beamforming, also in DL. The maximum number of training sequences depend on the cell configuration, see annex A. For the burst type 1 this number may be 4, 8, or 16.

- ~~uplink, independent of the number of active users in one time slot;~~
- ~~downlink, independent of the number of active users in one time slot.~~

The data fields of the burst type 1 are 976 chips long. The corresponding number of symbols depends on the spreading factor, as indicated in table 1 above. The midamble of burst type 1 has a length of 512 chips. The guard period for the burst type 1 is 96 chip periods long. The burst type 1 is shown in Figure 4. The contents of the burst fields are described in table 2.

Table 2: The contents of the burst type 1 fields

Chip number (CN)	Length of field in chips	Length of field in symbols		Contents of field
0-975	976	Cf table 1		Data symbols
976-1487	512	-		Midamble
1488-2463	976	Cf table 1		Data symbols
2464-2559	96	-		Guard period

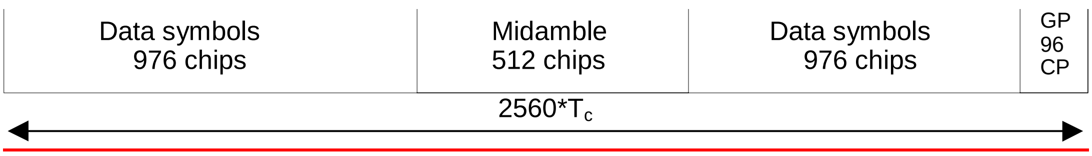


Figure 4: Burst structure of the burst type 1. GP denotes the guard period and CP the chip periods

5.2.2.2 Burst Type 2

The burst type 2 offers a longer data field than burst type 1 on the cost of a shorter midamble. Due to the shorter midamble field the burst type 2 supports a maximum number of training sequences of 3 or 6 only, depending on the cell configuration, see annex A.~~can be used for~~

- ~~uplink, if the bursts within a time slot are allocated to less than four users;~~
- ~~downlink, independent of the number of active users in one time slot.~~

The data fields of the ~~burst type 1 are 976 chips long, whereas the data fields length of the~~ burst type 2 are 1104 chips long. The corresponding number of symbols depends on the spreading factor, as indicated in table 1 above~~below~~. The guard period for the burst ~~type 1and~~ type 2 is 96 chip periods long.

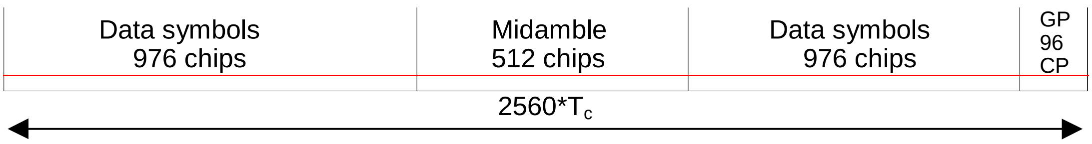
The burst~~s~~ type~~1 and type~~ 2 is~~are~~ shown in ~~Figure 4 and~~ Figure 5. The contents of the burst fields are described in ~~table 2 and~~ table 3.

~~Table 1: number of symbols per data field in bursts 1 and 2~~

~~Spreading factor (Q)~~	~~Number of symbols (N) per data field in Burst 1~~	~~Number of symbols (N) per data field in Burst 2~~
~~1~~	~~976~~	~~1104~~
~~2~~	~~488~~	~~552~~
~~4~~	~~244~~	~~276~~
~~8~~	~~122~~	~~138~~
~~16~~	~~61~~	~~69~~

~~Table 2: The contents of the burst type 1 fields~~

~~Chip number (CN)~~	~~Length of field in chips~~	~~Length of field in symbols~~		~~Contents of field~~
~~0-975~~	~~976~~	~~cf table 1~~		~~Data symbols~~
~~976-1487~~	~~512~~	~~-~~		~~Midamble~~
~~1488-2463~~	~~976~~	~~cf table 1~~		~~Data symbols~~
~~2464-2559~~	~~96~~	~~-~~		~~Guard period~~



~~Figure 4: Burst structure of the burst type 1. GP denotes the guard period and CP the chip periods~~

Table 3: The contents of the burst type 2 fields

Chip number (CN)	Length of field in chips	Length of field in symbols		Contents of field
0-1103	1104	cf table 1		Data symbols
1104-1359	256	-		Midamble
1360-2463	1104	cf table 1		Data symbols
2464-2559	96	-		Guard period

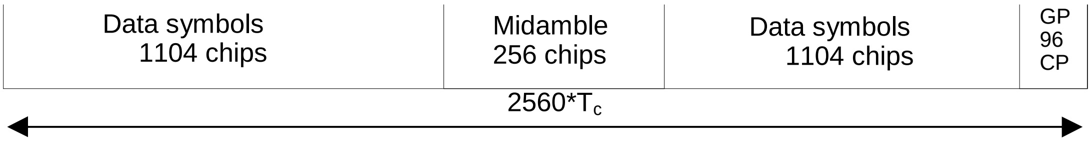


Figure 5: Burst structure of the burst type 2. GP denotes the guard period and CP the chip periods

5.2.2.1 Burst Type 3

The burst type 3 is used for uplink only. Due to the longer guard period it is suitable for initial access or access to a new cell after handover. It offers the same number of training sequences as burst type 1.

The data fields of the burst type 3 have a length of 976 chips and 880 chips, respectively. The corresponding number of symbols depends on the spreading factor, as indicated in table 1 above. The midamble of burst type 3 has a length of 512 chips. The guard period for the burst type 3 is 192 chip periods long. The burst type 3 is shown in Figure 6. The contents of the burst fields are described in table 4.

Table 4: The contents of the burst type 3 fields

Chip number (CN)	Length of field in chips	Length of field in symbols		Contents of field
0-975	976	Cf table 1		Data symbols
976-1487	512	-		Midamble
1488-2367	880	Cf table 1		Data symbols
2368-2559	192	-		Guard period

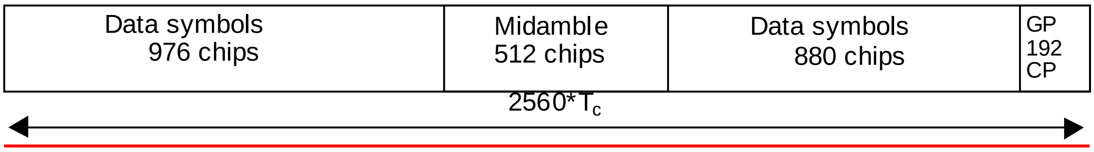


Figure 6: Burst structure of the burst type 3. GP denotes the guard period and CP the chip periods

~~The two different bursts defined here are well suited for the different applications mentioned above. It may be possible to further optimise the burst structure for specific applications, for instance for unlicensed operation.~~

5.2.2.1 Transmission of TFCI

All~~Both~~ burst types 1, ~~and~~ 2 and 3 provide the possibility for transmission of TFCI ~~both in up- and downlink~~.

The transmission of TFCI is negotiated at call setup and can be re-negotiated during the call. For each CCTrCH it is indicated by higher layer signalling, which TFCI format is applied. Additionally for each allocated timeslot it is signalled individually whether that timeslot carries the TFCI or not. If a time slot contains the TFCI, then it is always transmitted using the first allocated channelisation code in the timeslot, according to the order in the higher layer allocation message.

The transmission of TFCI is done in the data parts of the respective physical channel, this means TFCI and data bits are subject to the same spreading procedure as depicted in [8]. Hence the midamble structure and length is not changed. The TFCI information is to be transmitted directly adjacent to the midamble, possibly after the TPC. Figure 6 shows the position of the TFCI in a traffic burst in downlink. Figure 7 shows the position of the TFCI in a traffic burst in uplink.

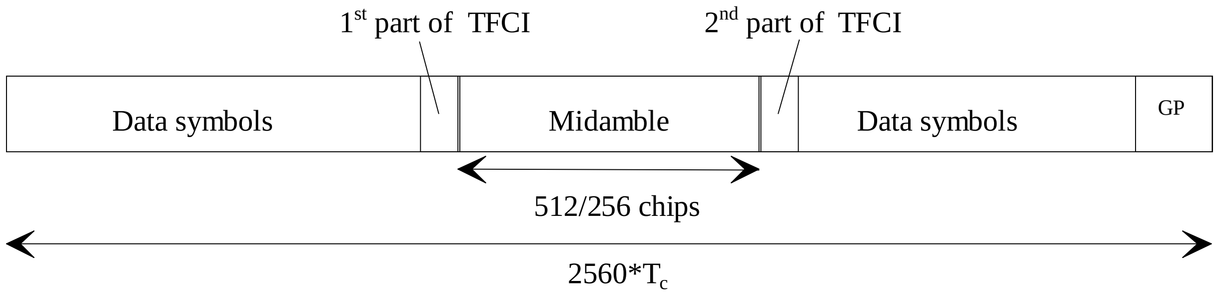


Figure ~~6~~7: Position of TFCI information in the traffic burst in case of downlink

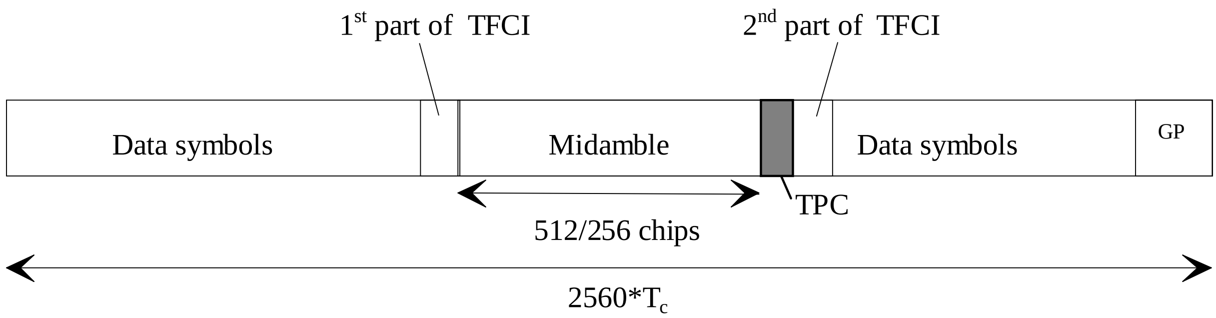


Figure ~~7~~8: Position of TFCI information in the traffic burst in case of uplink

Two examples of TFCI transmission in the case of multiple DPCHs used for a connection are given in the Figure 8 and Figure 9 below. Combinations of the two schemes shown are also applicable. It should be noted that the SF can vary for the DPCHs not carrying TFCI information.

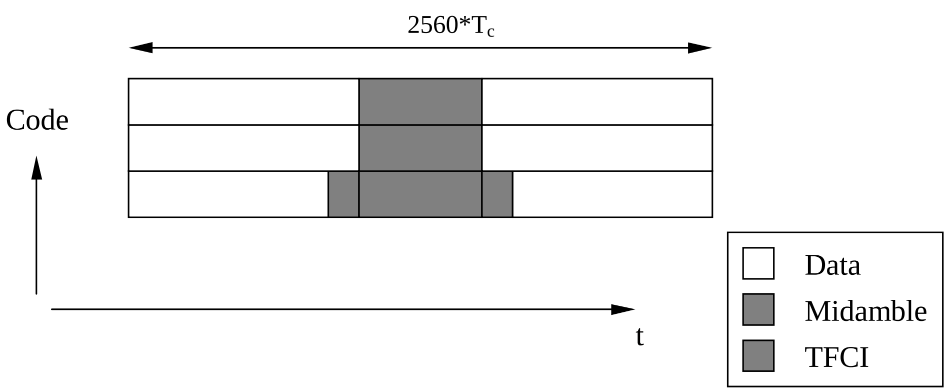


Figure ~~8~~9: Example of TFCI transmission with physical channels multiplexed in code domain

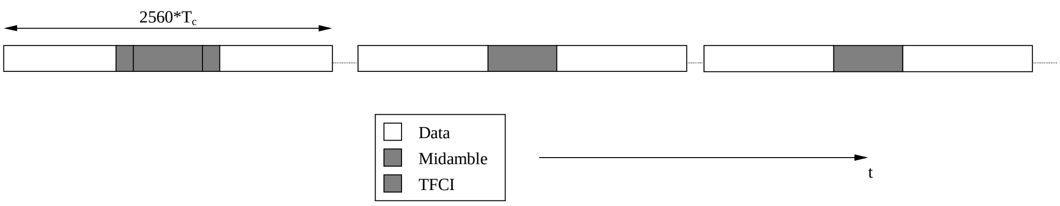


Figure 10~~9~~: Example of TFCI transmission with physical channels multiplexed in time domain

5.2.2.2 Transmission of TPC

All ~~Both~~ burst types 1, ~~and~~ 2 and 3 for dedicated channels provide the possibility for transmission of TPC in uplink.

The transmission of TPC is done in the data parts of the traffic burst. Hence the midamble structure and length is not changed. The TPC information is to be transmitted directly after the midamble. Figure 10 shows the position of the TPC in a traffic burst.

For every user the TPC information shall be transmitted at least once per transmitted frame. If TFCI is applied for a CCTrCH, TPC shall be transmitted with the same channelization codes and in the same timeslots as TFCI. If no TFCI is applied for a CCTrCH, TPC shall be transmitted using the first allocated channelisation code and the first allocated timeslot, according to the order in the higher layer allocation message. The TPC is spread with the same spreading factor (SF) and spreading code as the data parts of the respective physical channel.

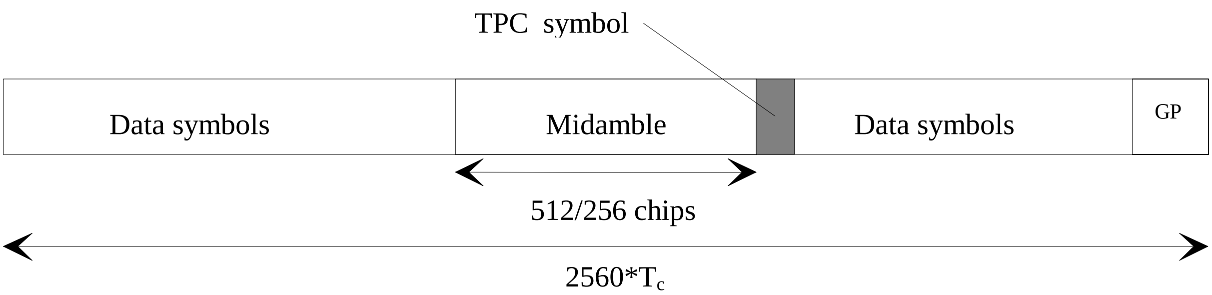


Figure 11~~0~~: Position of TPC information in the traffic burst

5.2.2.3 Timeslot formats

5.2.2.3.1 Downlink timeslot formats

The downlink timeslot format depends on the spreading factor, midamble length and on the number of the TFCI bits, as depicted in the table 4a.

Table 45a: Time slot formats for the Downlink

Slot Format #	Spreading Factor	Midamble length (chips)	N_{TFCI} (bits)	Bits/slot	$N_{Data/Slot}$ (bits)	$N_{data/data\ field}$ (bits)
0	16	512	0	244	244	122
1	16	512	4	244	240	120
2	16	512	8	244	236	118
3	16	512	16	244	228	114
4	16	512	32	244	212	106
5	16	256	0	276	276	138
6	16	256	4	276	272	136
7	16	256	8	276	268	134
8	16	256	16	276	260	130
9	16	256	32	276	244	122
10	1	512	0	3904	3904	1952
11	1	512	4	3904	3900	1950
12	1	512	8	3904	3896	1948
13	1	512	16	3904	3888	1944
14	1	512	32	3904	3872	1936
15	1	256	0	4416	4416	2208
16	1	256	4	4416	4412	2206
17	1	256	8	4416	4408	2204
18	1	256	16	4416	4400	2200
19	1	256	32	4416	4384	2192

5.2.2.3.2 Uplink timeslot formats

The uplink timeslot format depends on the spreading factor, midamble length, guard period length and on the number of the TFCI bits. Due to TPC, different amount of bits are mapped to the two data fields. The timeslot formats are depicted in the table 4b.

Table 54b: Timeslot formats for the Uplink

Slot Format #	Spreading Factor	Midamble length (chips)	Guard Period (chips)	N_{TFCI} (bits)	N_{TPC} (bits)	Bits/slot	$N_{Data/Slot}$ (bits)	$N_{data/data field(1)}$ (bits)	$N_{data/data field(2)}$ (bits)
0	16	512	96	0	0	244	244	122	122
5	16	512	96	0	2	244	242	122	120
6	16	512	96	4	2	244	238	120	118
7	16	512	96	8	2	244	234	118	116
8	16	512	96	16	2	244	226	114	112
9	16	512	96	32	2	244	210	106	104
10	16	256	96	0	0	276	276	138	138
15	16	256	96	0	2	276	274	138	136
16	16	256	96	4	2	276	270	136	134
17	16	256	96	8	2	276	266	134	132
18	16	256	96	16	2	276	258	130	128
19	16	256	96	32	2	276	242	122	120
20	8	512	96	0	0	488	488	244	244
25	8	512	96	0	2	488	486	244	242
26	8	512	96	4	2	488	482	242	240
27	8	512	96	8	2	488	478	240	238
28	8	512	96	16	2	488	470	236	234
29	8	512	96	32	2	488	454	228	226
30	8	256	96	0	0	552	552	276	276
35	8	256	96	0	2	552	550	276	274
36	8	256	96	4	2	552	546	274	272
37	8	256	96	8	2	552	542	272	270
38	8	256	96	16	2	552	534	268	266
39	8	256	96	32	2	552	518	260	258
40	4	512	96	0	0	976	976	488	488
45	4	512	96	0	2	976	974	488	486
46	4	512	96	4	2	976	970	486	484
47	4	512	96	8	2	976	966	484	482
48	4	512	96	16	2	976	958	480	478
49	4	512	96	32	2	976	942	472	470
50	4	256	96	0	0	1104	1104	552	552
55	4	256	96	0	2	1104	1102	552	550
56	4	256	96	4	2	1104	1098	550	548
57	4	256	96	8	2	1104	1094	548	546
58	4	256	96	16	2	1104	1086	544	542
59	4	256	96	32	2	1104	1070	536	534
60	2	512	96	0	0	1952	1952	976	976
65	2	512	96	0	2	1952	1950	976	974
66	2	512	96	4	2	1952	1946	974	972
67	2	512	96	8	2	1952	1942	972	970
68	2	512	96	16	2	1952	1934	968	966
69	2	512	96	32	2	1952	1918	960	958
70	2	256	96	0	0	2208	2208	1104	1104
75	2	256	96	0	2	2208	2206	1104	1102
76	2	256	96	4	2	2208	2202	1102	1100
77	2	256	96	8	2	2208	2198	1100	1098
78	2	256	96	16	2	2208	2190	1096	1094
79	2	256	96	32	2	2208	2174	1088	1086

Slot Format #	Spreading Factor	Midamble length (chips)	Guard Period (chips)	N_{TFCI} (bits)	N_{TPC} (bits)	Bits/slot	$N_{Data/Slot}$ (bits)	$N_{data/data\ field(1)}$ (bits)	$N_{data/data\ field(2)}$ (bits)
80	1	512	96	0	0	3904	3904	1952	1952
85	1	512	96	0	2	3904	3902	1952	1950
86	1	512	96	4	2	3904	3898	1950	1948
87	1	512	96	8	2	3904	3894	1948	1946
88	1	512	96	16	2	3904	3886	1944	1942
89	1	512	96	32	2	3904	3870	1936	1934
90	1	256	96	0	0	4416	4416	2208	2208
95	1	256	96	0	2	4416	4414	2208	2206
96	1	256	96	4	2	4416	4410	2206	2204
97	1	256	96	8	2	4416	4406	2204	2202
98	1	256	96	16	2	4416	4398	2200	2198
99	1	256	96	32	2	4416	4282	2192	2190
60	16	512	192	0	0	232	232	122	110
61	16	512	192	0	2	232	230	122	108
62	16	512	192	4	2	232	226	120	106
63	16	512	192	8	2	232	222	118	104
64	16	512	192	16	2	232	214	114	100
65	16	512	192	32	2	232	198	106	92
66	8	512	192	0	0	464	464	244	220
67	8	512	192	0	2	464	462	244	218
68	8	512	192	4	2	464	458	242	216
69	8	512	192	8	2	464	454	240	214
70	8	512	192	16	2	464	446	236	210
71	8	512	192	32	2	464	430	228	202
72	4	512	192	0	0	928	928	488	440
73	4	512	192	0	2	928	926	488	438
74	4	512	192	4	2	928	922	486	436
75	4	512	192	8	2	928	918	484	434
76	4	512	192	16	2	928	910	480	430
77	4	512	192	32	2	928	894	472	422
78	2	512	192	0	0	1856	1856	976	880
79	2	512	192	0	2	1856	1854	976	878
80	2	512	192	4	2	1856	1850	974	876
81	2	512	192	8	2	1856	1846	972	874
82	2	512	192	16	2	1856	1838	968	870
83	2	512	192	32	2	1856	1822	960	862
84	1	512	192	0	0	3712	3712	1952	1760
85	1	512	192	0	2	3712	3710	1952	1758
86	1	512	192	4	2	3712	3706	1950	1756
87	1	512	192	8	2	3712	3702	1948	1754
88	1	512	192	16	2	3712	3694	1944	1750
89	1	512	192	32	2	3712	3678	1936	1742

5.2.3 Training sequences for spread bursts

In this subclause, the training sequences for usage as midambles in burst type 1, 2 and 3 ~~and burst type 2~~ (see subclause 5.2.2) are defined. The training sequences, i.e. midambles, of different users active in the same cell and same time slot are cyclically shifted versions of one single basic midamble code. The applicable basic midamble codes are given in

Annex A.1 and A.2. As different basic midamble codes are required for different burst formats, the Annex A.1 shows the basic midamble codes $\mathbf{m}_{PL}$ for burst type 1 and 3, and Annex and A.2 shows $\mathbf{m}_{PS}$ for burst type 2. It should be noted that burst type 2 ~~the different burst types~~ must not be mixed with burst type 1 or 3 in the same timeslot of one cell.

The basic midamble codes in Annex A.1 and A.2 are listed in hexadecimal notation. The binary form of the basic midamble code shall be derived according to table 5 below.

Table ~~6~~5: Mapping of 4 binary elements m_i on a single hexadecimal digit

4 binary elements m_i	Mapped on hexadecimal digit
-1 -1 -1 -1	0
-1 -1 -1 1	1
-1 -1 1 –1	2
-1 -1 1 1	3
-1 1 -1 –1	4
-1 1 -1 1	5
-1 1 1 –1	6
-1 1 1 1	7
1 -1 -1 –1	8
1 -1 -1 1	9
1 -1 1 –1	A
1 -1 1 1	B
1 1 -1 –1	C
1 1 -1 1	D
1 1 1 –1	E
1 1 1 1	F

For each particular basic midamble code, its binary representation can be written as a vector $\mathbf{m}_P$:

$$\mathbf{m}_P = (m_1, m_2, ..., m_P) \tag{1}$$

According to Annex A.1, the size of this vector $\mathbf{m}_P$ is P=456 for burst type 1 and 3. Annex A.2 is setting P=192 for burst type 2. As QPSK modulation is used, the training sequences are transformed into a complex form, denoted as the complex vector $\underline{\mathbf{m}}_P$:

$$\underline{\mathbf{m}}_P = (\underline{m}_1, \underline{m}_2, ..., \underline{m}_P) \tag{2}$$

The elements $\underline{m}_i$ of $\underline{\mathbf{m}}_P$ are derived from elements m_i of $\mathbf{m}_P$ using equation (3):

$$\underline{m}_i = (\mathrm{j})^i \cdot m_i \text{ for all } i = 1, ..., P \tag{3}$$

Hence, the elements $\underline{m}_i$ of the complex basic midamble code are alternating real and imaginary.

To derive the required training sequences, this vector $\underline{\mathbf{m}}_P$ is periodically extended to the size:

$$i_{\max} = L_m + (K'-1)W + \lfloor P/K \rfloor \tag{4}$$

Notes on equation (4):

- K', W and P taken from Annex A.1 or A.2 according to burst type and thus to length of midamble L_m
- K=2K'
- $\lfloor x \rfloor$ denotes the largest integer smaller or equal to x

So we obtain a new vector $\underline{\mathbf{m}}$ containing the periodic basic midamble sequence:

$$\underline{\mathbf{m}} = \left(\underline{m}_1, \underline{m}_2, ..., \underline{m}_{i_{\max}}\right) = \left(\underline{m}_1, \underline{m}_2, ..., \underline{m}_{L_m + (K'-1)W + \lfloor P/K \rfloor}\right) \quad (5)$$

The first P elements of this vector $\underline{\mathbf{m}}$ are the same ones as in vector $\mathbf{m}_\mathrm{P}$, the following elements repeat the beginning:

$$\underline{m}_i = \underline{m}_{i-P} \text{ for the subset } i = (P+1), ..., i_{\max} \quad (6)$$

Using this periodic basic midamble sequence $\underline{\mathbf{m}}$ for each user k a midamble $\underline{\mathbf{m}}^{(k)}$ of length L_m is derived, which can be written as a user specific vector:

$$\underline{\mathbf{m}}^{(k)} = \left(\underline{m}_1^{(k)}, \underline{m}_2^{(k)}, ..., \underline{m}_{L_m}^{(k)}\right) \quad (7)$$

The L_m midamble elements $\underline{m}_i^{(k)}$ are generated for each midamble of the first K' users (k = 1,...,K') based on:

$$\underline{m}_i^{(k)} = \underline{m}_{i+(K'-k)W} \text{ with } i = 1, ..., L_m \text{ and } k = 1, ..., K' \quad (8)$$

The elements of midambles for the second K' users (k = (K'+1),...,K = (K'+1),...,2K') are generated based on a slight modification of this formula introducing intermediate shifts:

$$\underline{m}_i^{(k)} = \underline{m}_{i+(K-k)W + \lfloor P/K \rfloor} \text{ with } i = 1, ..., L_m \text{ and } k = K'+1, ..., K \quad (9)$$

Whether intermediate shifts are allowed in a cell is broadcast on the BCH.

The midamble sequences derived according to equations (7) to (9) have complex values and are not subject to channelisation or scrambling process, i.e. the elements $\underline{m}_i^{(k)}$ represent complex chips for usage in the pulse shaping process at modulation.

The term 'a midamble code set' or 'a midamble code family' denotes K specific midamble codes $\underline{\mathbf{m}}^{(k)}$; k=1,...,K, based on a single basic midamble code $\mathbf{m}_\mathrm{P}$ according to (1).

5.3.3 The physical random access channel (PRACH)

The RACH as described in subclause 4.1.2 is mapped onto one or more uplink physical random access channels (PRACH). In such a way the capacity of RACH can be flexibly scaled depending on the operators need.

This description of the physical properties of the PRACH also applies to bursts carrying other signaling or user traffic if they are scheduled on a time slot which is (partly) allocated to the RACH.

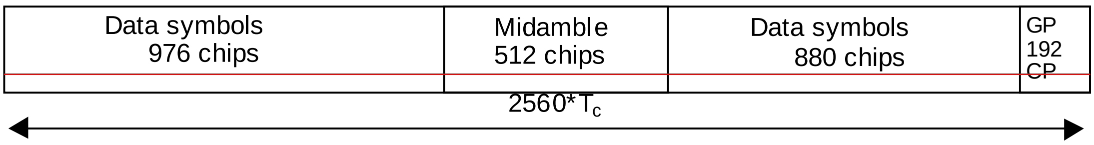
5.3.3.1 PRACH Spreading

The uplink PRACH uses either spreading factor SF=16 or SF=8 as described in subclause 5.2.1.1. The set of admissible spreading codes for use on the PRACH and the associated spreading factors are broadcast on the BCH (within the RACH configuration parameters on the BCH).

5.3.3.2 PRACH Burst Type~~s~~

The ~~mobile station~~UEs send ~~the~~ uplink access bursts of type 3 randomly in the PRACH. TFCI and TPC are not applied for the PRACH. ~~The PRACH burst consists of two data symbol fields, a midamble and a guard period. The second data symbol field is shorter than the first symbol data field by 96 chips in order to provide additional guard time at the end of the PRACH time slot.~~

~~The precise number of collision groups depends on the spreading codes (i.e. the selected RACH configuration. The access burst is depicted in figure 11, the contents of the access burst fields are listed in table 6 and table 7.~~



~~**Figure 11: PRACH burst, GP denotes the guard period**~~

~~**Table 6: number of symbols per data field in PRACH burst**~~

~~Spreading factor (Q)~~	~~Number of symbols in data field 1~~	~~Number of symbols in data field 2~~
~~8~~	~~122~~	~~110~~
~~16~~	~~61~~	~~55~~

~~**Table 7: The contents of the PRACH burst field**~~

~~Chip number (CN)~~	~~Length of field in chips~~	~~Length of field in symbols~~	~~Contents of field~~
~~0-975~~	~~976~~	~~cf table 1~~	~~Data symbols~~
~~976-1487~~	~~512~~	~~-~~	~~Midamble~~
~~1488-2367~~	~~880~~	~~cf table 1~~	~~Data symbols~~
~~2368-2559~~	~~192~~	~~-~~	~~Guard period~~

5.3.3.3 PRACH Training sequences

The training sequences, i.e. midambles, of different users active in the same time slot are time shifted versions of a single periodic basic code. The basic midamble codes ~~used for PRACH bursts are the same as~~ for burst type 3~~1~~ ~~and~~ are shown in Annex A. The necessary time shifts are obtained by choosing either *all* k=1,2,3...,K' (for cells with small radius) or *uneven* k=1,3,5,...≤K' (for cells with large radius). Different cells use different periodic basic codes, i.e. different midamble sets.

For cells with large radius additional midambles may be derived from the time-inverted Basic Midamble Sequence. Thus, the second Basic Midamble Code m_2 is the time inverted version of Basic Midamble Code m_1.

In this way, a joint channel estimation for the channel impulse responses of all active users within one time slot can be performed by a maximum of two cyclic correlations (in cells with small radius, a single cyclic correlator suffices). The different user specific channel impulse response estimates are obtained sequentially in time at the output of the cyclic correlators.

5.3.3.4 PRACH timeslot formats

For the PRACH the timeslot format is only spreading factor dependent. The timeslot formats 60 and 66 of table 5b are applicable for the PRACH. ~~Burst type 1 midamble is always used. The two data fields contain a different number of bits.~~

~~Table 4c: Timeslot formats for the RACH~~

~~Slot Format #~~	~~Spreading Factor~~	~~Midamble length (chips)~~	~~Bits/slot~~	~~$N_{Data/Slot}$ (bits)~~	~~$N_{data/data\ field(1)}$ (bits)~~	~~$N_{data/data\ field(2)}$ (bits)~~
~~0~~	~~16~~	~~512~~	~~232~~	~~232~~	~~122~~	~~110~~
~~1~~	~~8~~	~~512~~	~~464~~	~~464~~	~~244~~	~~220~~

5.3.3.5 Association between Training Sequences and Channelisation Codes

For the PRACH there exists a fixed association between the training sequence and the channelisation code. The generic rule to define this association is based on the order of the channelisation codes $\mathbf{c}_Q^{(k)}$ given by k and the order of the midambles $\mathbf{m}_j^{(k)}$ given by k, firstly, and j, secondly, with the constraint that the midamble for a spreading factor Q is the same as in the upper branch for the spreading factor $2Q$. The index $j=1$ *or* 2 indicates whether the original Basic Midamble Sequence (j=1) or the time-inverted Basic Midamble Sequence is used (j=2).

- For the case that all k are allowed and only one periodic basic code m_1 is available for the RACH, the association depicted in figure 12 is straightforward.
- For the case that only odd k are allowed the principle of the association is shown in figure 13. This association is applied for one and two basic periodic codes.

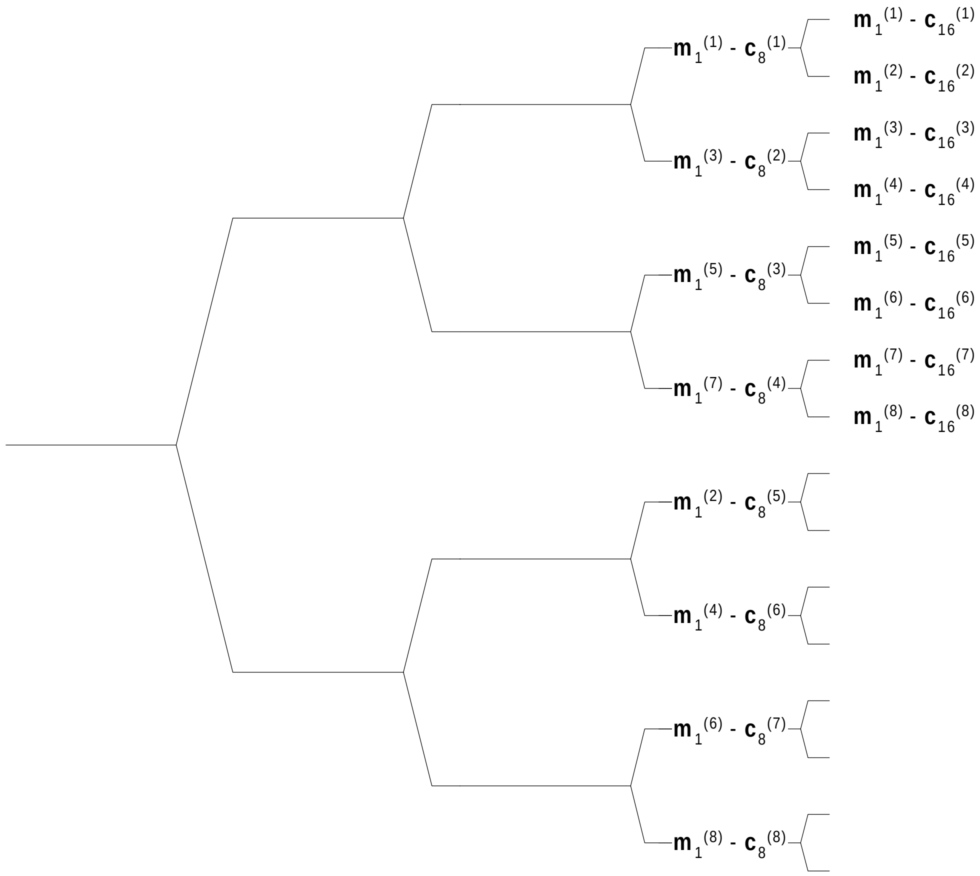


Figure 1~~2~~3: Association of Midambles to Channelisation Codes in the OVSF tree for all *k*

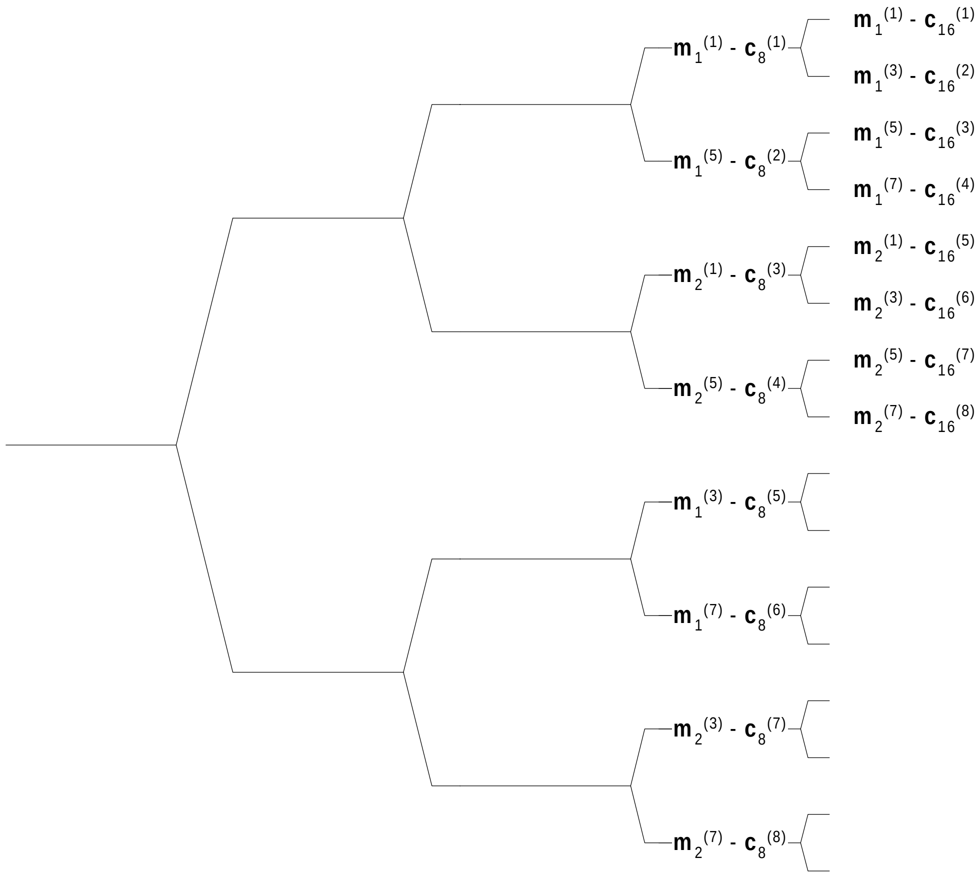


Figure 1~~3~~4: Association of Midambles to Channelisation Codes in the OVSF tree for odd *k*

Annex A (normative): Basic Midamble Codes

A.1 Basic Midamble Codes for Burst Type 1 and 3~~PRACH Burst Type~~

In the case of burst type 1 or 3 (see subclause 5.2.2) ~~or in the case of PRACH burst~~ the midamble has a length of Lm=512, which is corresponding to:

K'=8; W=57; P=456.

Depending on the possible delay spread cells are configured to use midambles which are generated from the Basic Midamble Codes (see table A-1)

- for all k=1,2,...,K; K=2K' or
- for k=1,2,...,K', only, or
- for odd k=1,3,5,...,≤ K', only.

Depending on the cell size midambles for PRACH are generated from the Basic Midamble Codes (see table A-1)

- for k=1,2,...,K' or
- for odd k=1,3,5,...,≤ K', only.

The cell configuration is broadcast on BCH.

The mapping of these Basic Midamble Codes to Cell Parameters is shown in TS 25.223.

Table A-1: Basic Midamble Codes $\mathbf{m}_{P}$ according to equation (5) from subclause 5.2.3 for case of burst type 1 and 3

Code ID	Basic Midamble Codes m_{PL} of length P=456
m_{PL0}	8DF65B01E4650910A4BF89992E48F43860B07FE55FA0028E454EDCD1F0A09A6F029668F55427253FB8A71E5EF2EF360E539C489584413C6DC4
m_{PL1}	4C63F9BC3FD7B655D5401653BE75E1018DC26D271AADA1CF13FD348386759506270F2F953E93A44468E0A76605EAE8526225903B1201077602
m_{PL2}	8522611FFCAEB55A5F07D966036C852E7B15B893B3ABA9672C327380283D168564B8E1200F0E2205AF1BB23A58679899785CFA2A6C131CFDC4
m_{PL3}	F58107E6B777C221999BDE9340E192DC6C31AB8AE85E70AA9BBEB39727435412A5A27C0EF73AB453ED0D28E5B032B94306EC1304736C91E922
m_{PL4}	89670985013DFD2223164B68A63BD58C7867E97316742D3ABD6CBDA4FC4E08C0B0CBE44451575C72F887507956BD1F27C466681800B4B016EE
m_{PL5}	FCDEF63500D6745CDB962594AF171740241E982E9210FC238C4DD85541F08C1A010F7B3161A7F4DF19BAD916FD308AB1CED2A32538C184E92C
m_{PL6}	DB04CE77A5BA7C0E09B6D3551072B11A7A43B6A355C1D6FDCF725D587874999895748DD09832ABC35CEC3008338249612E6FE5005E13B03103
m_{PL7}	D2F61A622D0BA9E448CD29587D398EF8CDC3B6582B6CDD50E9E20BF5FE2B3258041E14D60821DC6725132C22D787CD5D497780D4241E3B420D
m_{PL8}	7318524E62D806FA149ECC5435058A2B74111524B84727FE9A7923B4A1F0D8FCD89208F34BEE5CADEB90130F9954BB30605A98C11045FF173D
m_{PL9}	8E832B4FA1A11E0BF318E84F54725C8052E0D099EF0AF54BC342BEE44976C9F38DE701623C7BF6474DF90D2E2222A4915C8080E7CD3EC84DAC
m_{PL10}	CFA5BAC90780876C417933C43103B55699A8AD51164E590AF9DA6AF0C18804E1F74862F00CE7ECC899C85B6ABB0CAD5E50836AD7A39878FE2F
m_{PL11}	AD539094A19858A75458F1B98E286A4F7DC3A117083D04724CBE83F34102817C5531329CDB437FFF712241B644BDF0C1FEC8598A63C2F21BD7
m_{PL12}	BEB8483139529BDE23E42DA6AB8170DD0BFBB30CE28A4502FAF3C8EDA219B9A6D5B849D9C9E4451F74E2408EA046061201E0C1D69CF48F3A94
m_{PL13}	C482462CA7846266060D21688BA00B72E1EC84A3D5B7194C8DA39E21A3CE12BF512C8AAB6A7079F73C0D3E4F40AC555A4BCC453F1DFE3F6C82
m_{PL14}	9663373935FD5C213AC58C0670206683D579D2526C05B0A81030DDF61A221D8A68EAD8D6F7AA0D662C07C6DCD0115A54D39F03F7122B0675AC
m_{PL15}	387397AE5CD3F2B3912C26B8F87CE82CEFEC55507DB08FB0C4CF2FD6858896201ACA7264281D0298440DD3481E5E9DDB24C16F30EB7A22948A
m_{PL16}	AFE9266843C892571B6230D808788C63B9065EA3BDFF687B92B8734A8D7099559FEA22C9416576D0C087EB4503E87E356471B330182A24A3E6
m_{PL17}	6E6C550A4CB74010F6C3E0328651DF421C456D9A5E8AE9D3946C10189D72B579184552EE3E799970969C870FE8A37B6C4BA890992103486DC0
m_{PL18}	D803CA71B6F99CFB3105D40F4695D61EB0B62E803F79302EE3D2A6BF12EA70D304B181E8B38B3B74F5022B67EB8109808C62532688C563D4BE
m_{PL19}	E599ED48D01772055DBE9D343A4EA5EABE643DA38F06904FC7523B08C4101F021B199AF759A00D9AC298881D79413A77470992A75C771492D0
m_{PL20}	9F30AC4162CE5D185953705F3D45F026F38E9B5721AEFE07370214D526A2C4B344B508B57BFB2492320C05903C79CBEE08C6E7F218B57E14D6
m_{PL21}	B5971060DA84685B4D042ED0189FAF13C961B2EF61CC164E363B22AAB14AC8AF607906C1C6E04F2054C687AA6741A9E70639857DA02B6FFFFA
m_{PL22}	97135FC2226C4B4A5CBA5FCA3732763B87455F73A1148006F3DF214BD4C936D061E04045160E2CE33B9CD09D08FDE2A37F4E998322B4401D27
m_{PL23}	4D256D57C861B9791151A78D5299C56D116B6178B2A2D04BB95FB76540AF28341DC6EC4E7ED3BF9E508478D9C8F44914805DA82429E1CF320E
m_{PL24}	858EF5C84CE32D18D9ABA110EEA7474CF0CD70254D2928C3F4DFF6BB3A518587CADA19029078AC90A8336C8178203BE3289E601F07D089CB64
m_{PL25}	920A8796A511650AEF32F93DD3C39C624E07AE03CE8C96139973F54DCB9803C5164ADB502D4FF561564D607037FCD172921F1982B102C3312C
m_{PL26}	485C5DAE76B360A9C56E20B8422EA3E6ACF07CB093B5587CB0E6A5498A4714081EA98DBCDB0482B26E0D097C03444473D233BEF3C8E440DEBF
m_{PL27}	565A9D54EA789892B024F97E728E8EE112411942C48BD0C5BC8AA457D8DC9941F0F7424B38643FFE6521CD306FBC56FE10F1428D4C245B5606
m_{PL28}	5AEF2C0C2C378179A1AC36242E6B3EDB72C42D3624437674F8D51260C0898C201837CBA14E9E23D1EF6451C4ACF27AB031F457A8A1BFD148AE
m_{PL29}	87D8FE685417822A23D925307E6C11081ADAC4702BCCD9BE448E78984D109B50DEF5B7C58BC71EA1F0A6826BA8AD1978843E7697F3E416AADA

Code ID	Basic Midamble Codes m_{PL} of length P=456
m_{PL30}	84802B72AF27B5BE724D1FB629E0E627BDB0D9061292562F98350C1D0C9D4B9D8E2BF71123C 82EBB161003AE9829E07244D78F19926F8847A2
m_{PL31}	8CCB5128238BCB088E30972D62792AEF02B9BBDDCAD68C9916C00BF91CBE788B0F03851FA AF88605534FD73436C259D270B1013CB14226F658
m_{PL32}	62F4E6FAC2BF1979CE6854AA2D33534BFB2F946519101A6589131C3640707D40E67ED804AF8 736AD213CAF5935741900061967E8285C27E34C
m_{PL33}	4095E5B4EEAFCDF68A34B267EEA28D8444FA533900F41499E260D2E65C256A52E1DD5861F52 27C98E00687D107233F51A1167BCF72FB184654
m_{PL34}	5630E9A79FCAD303404D9E5A802299162657AAC734761C6E90DA8BCE4F61A763E0BB48D3FE B3F78468C828ABA4828DAD06E0F904CFD40421DC
m_{PL35}	CD12B24C0BCA8AAC1FCBF0500A3BC684A180E863D888F2506B48C68ECF17F76CB285991FB A18EB6397211FAD002F482D57A258CD45DE3FF1A6
m_{PL36}	AFCF2A50877286CD3405442730C45514F082D9EC296B367C0F64F04C4E0007DCA9E50BEED5 C102126E319ACBC64F1729272F2F72C9397029FE
m_{PL37}	18F89EE8589D20882A72A44DCCDF0050F0A3D88DBA6531614973D26905FDF41E3F779FF0648 E8AF1540928511BCF4C25D9C64AF34AC31B8965
m_{PL38}	F890D550F33F032ECDA3A51FED427D634F64EB29AF1332A23CD961258E4BAED040E7B33691 8E250EC272A12816B9EBFFA1E0AE401185F08C10
m_{PL39}	ACE5DD61506047E80FB7D41BD3992DF4D7F18EB46CC145C0E9105428C2F8F299141F5D6669 1904A7DC2513A3B83994ACB1292246B32818FE9D
m_{PL40}	150680FF900C9B46E1E24D54BE2238CB950A934E5CCDE9BC3939EB51CB0AE202B7D339EEC 2018B33A0AB9B63DA5D512D64FB58C0E51A1C82C2
m_{PL41}	51A579EED2663A002D32D10A0753173612F4D5BA167D1807C61F25C4D42C063682E8E9DD019 F79D446A046EB3F75E50FEB228DC52F08E694B6
m_{PL42}	CDC644FE4C0C6897604F9D14D714123BF16FFF0E49F35F674908CA60653702FE27BCCA2A470 98453AF8661055C8C549EB6A951A8396AD4B94D
m_{PL43}	750A10366C595373C5001CA3E4239764B1409D602CF6052B39BC6A3255A15FE06C782C4C5F8 47026A7E79838A2933A61C77BB6CBF5915B2DA5
m_{PL44}	B7490686D78E409082C4C48FE18D4C35429C20AADF96076B92FC4E85490664753DB0891A0B2 7FD849BB7FCA99E3B38F22F8C662852C0D35AA6
m_{PL45}	D86E1B575B47D23DA811806A54C231281F03317830E7BD305D3CAA7D6382A5233104CFD54D2 2DF9F34535E5B390D9040CF1375FEA44CEC29E2
m_{PL46}	828655960C026EC67B683480992AC2ED2C43ABC606F5220C2945F373470BE7ED5BCCF7C1AA 0986BBCCC84F11F1658AA568FAA0A60C5F0B5BFA
m_{PL47}	D76230E02C8533653AAB99B288AA2ADE25A1C1BF28516C04239240EAF1EFC0B98974B51F886 861D8A1E9F5D62CFFEC309F071A9716B325101B
m_{PL48}	EA207662865B8A07D69648964DED818EE474A90B94473408871880E63EF0596B9FCFEC3C06B 86EA6AD2B06C91672EFB33C70241A5450B59B8A
m_{PL49}	9CB5459549909835FAB22F0D99298C120ACF479F814CCE749079D40688F28101037762F125C7 76DA9C5FA1FCE0E76E452F8185354FDCDE94E2
m_{PL50}	227506304AEC1D6F93569B51FDC3405A0F38194F65BE17163A3CB9827A35AECEA757D020FE2 49377ECD561428A38FEED004EC859C272563185
m_{PL51}	96B9AEC9938910F0E533422A3977519B05CD4AD3909BC15A7502D48D49C124FA192A8E57027 CFEB11DF542010603CE5C9FDF8E626D4FBF8CF4
m_{PL52}	A6AAD06E095A9BE0BD9F8A2ED40C3CBDBAE91C700CBB778C8696CC06F3A675C16BDB2918 E5F2111005A8727206DC6A9684E05655185C398EEB
m_{PL53}	CD168D384A78DA172991AD333EE2A9880905AFE59E2A2A4AC4414C40F82874F98A3CBE7B44 F4C7F4710B35FD88AFC0399FAEB070EB9CA4D30A
m_{PL54}	22016CA87AD1549174A8699DD65599697871091457E83E0912E7E77A06531C209394D283D18A 38662B73681DD9C5BF330FED978BDA7D487CA8
m_{PL55}	B9401B0843AA6F7827A13BD66C922287E8886C31EB5B90B82B472CCD6DA3D8D4FBF78B8F84 96DFA8252B06429D5DD17142F1C908ACCD70EA0C
m_{PL56}	E42B9EFDC5D09AC27B3C7DA28D02493A70521223B9D7A76A9D13E9C171017964D16A70C08E AD02C3DC948889C23E365AFCF01BF20B89B0BF5C
m_{PL57}	9DA0180168DB915E9F3597B59312198E1B5CC00D743C2ECB0DBAADA3E35A2465ED1EAA9D7 4734D49A313CE4DFF020D0760E3153DC485603943
m_{PL58}	B6C966619ECB98191D719C187C07BD503425650CAA3A2D1F2DF5212B1441D7A0C1D36A4C9C 2550240AD17CA43BB3943DFFFBF1E283D81299CC
m_{PL59}	DB0E8C41F08A03D477C1AA548799274C4BF3EB68F2636166FDC8D4B1E7132539930297E228B A232BB5C279FA5ECA3AC10E24361AF050A453B8
m_{PL60}	89BCE2DE2974EEBA833CF32F224C85A2891484478527DB48FA6ECEA84C5E288CC3914CB54A DA0476278750187F68FBEA41017E1E58DF1A5A3D
m_{PL61}	70A457D1314A278625443EEB52520815EC92CEF17417B97440DCB531BC1CE83212F63270418 D0FBDE71F6DB9E0EA88772E1E4535B6633E4425

Code ID	Basic Midamble Codes m_{PL} of length *P*=456
m_{PL62}	C388460AD54B36C4452CF0433BD347100ACCC24C79C535AD3E1F23FE0425E93A044C553BFA 116E09AA4BB32F13CFA76FBA1BC17520F45EFD44
m_{PL63}	0BAFCADCDF9AA2846681782CD3B90CA036A863C78EE1507620BC394D0C6804B4C97A15BC9 C0D7B79E6892EA1BFF1A0DD9573A9213AB140D0D2
m_{PL64}	833B0226789A62882FCD27A30885E67872B1A1C2FA484AD498011599DD57E8E2A07A560B4716 7AA5F60EF47177DBB1632D5387A2896348640B
m_{PL65}	8F52820323ABA5E6C6B465821B621600B980E59F53A599DA5646BA103214336836CF17E3386C E4FB2BC5F25CCB30CF7F500546828EC8786B8E
m_{PL66}	E2E9A29C3C8207B9A4508FD2F667A159F068EEE8D00686F46EA904C3692C1D79DFF1B32E510 3720D47B4B58AC35384A26087027E141B3126A8
m_{PL67}	70E7C39FD2D3AE1DCE341699A544D801A8688A6EE47C5CB3630022147DDC06241FC5337A34 8A462B2472DEC5E104DD520ADA5114DB065D4B0D
m_{PL68}	9E3483CAB164BD053C4971D4D87494CC689033D589EF80E5453376E4A8DCC02183B98C36B0 FF7DDC0AD07FCE8B4D5164371BD03A2110AD1247
m_{PL69}	04DA1C649B0608938DAADD3FE920A4F681690C54505429DBDCDCF10067AB5714BCDDFE1F2 8692710F794765781C1D233344E119BEE8A8416DC
m_{PL70}	7A18D6D30BDF44410714C3DCA27D8F9EA8A542D87122205640B98313C91AD9A0B993A5A7BC 3E035F93B88BBE6D4204BC82A9FA8D4C1A7618CF
m_{PL71}	EB9525E10265A48733C8E0E77E459310112A71DCA680F68AC044B64BC0A31D02EEA0F7ACAA AB7F1E574E94FEA2D1301CB14B03263DA8122B76
m_{PL72}	E706C6ED2D6F89153835079BE0C6D45310845EF2F9F6C6AE91B7419810508BA501C0148BF09 955BAD90D6391BA8EBA5CEFBD23221CC75143D7
m_{PL73}	DF071A10AC4120CD1431590BEDCFF9483CA7047B19590D035D309240BDB4264E9A3A2761402 EC97FD8BC51B4AF32E37FBC47162A2357D18751
m_{PL74}	F0F952B2238139F46D8254D1A2C1C22A16BA71EC0C0C900ED1442452D7F44C798BC65FF4067 1B88074BA0B74C6510996EEAC495C5B49C37DEB
m_{PL75}	1C86BD82EDA81FD65418D3837B5552A853791456D93B06C62C650D86CFBEC269AFFD772763 064062C03751B9428C6DA2E60383025F9E404B70
m_{PL76}	B390978DD2552C88AABA7838489A6F5A8E9C41E95FFA2215819BF8A5BFE39C8A706CC658E5 49E966611B843A1468406C41C09D1560BEDA4F1B
m_{PL77}	1A69EC9D053C7E84BAE7A48CCC71857D0C6B06D1065E3EA4633B133AA022B8104F6EE7C69B 6184B746C8822958B0A16686F27C8A0E3B4EFEAD
m_{PL78}	C95B2070816DC97C6D8DD2583263E73F9AAAFD13F0548D2EBD835824418F11E54111005FB71 3AB234BE412347358281C7DE331EDD21B8BEA52
m_{PL79}	56D6408399F23C2ED85EE0F68111D69A91A3AD9A732AC57CA08F86CC28B3CF4E4B02EBBA0 BCE5CAE5BACC4D52004070797C04093A84BB18DBA
m_{PL80}	E662E7043867BE250764DA0596D34A582A619B408B505E6211DD6286E93A37F95B1EA680C0C 5F3E777E3F71E8D75495D59043217FC0E222E16
m_{PL81}	27D5E681C222297AD478A079EF12F1A98F744B66335303322EF8880B931FEBF8322F4302944E 80BED468A0A516D410B183D863795992DA7DDB
m_{PL82}	5100336C05F9E5BF35201906C1C588858E0DAF56130DF5554B9AB21CA15311A90290624CD63 E03F5EDA49DB7A0C32AB5F1CA427A2D5635FDA5
m_{PL83}	C696DC993BFAEA9A61B781B9C5C3F5CFAA4C8339D8B03A9B0387883D0482A41AC78D652242 5959846E561D26A30FF79A205C801A85889736B2
m_{PL84}	D562297561AFF42D3168296C1153E4E39BE7B2EB0348BC704625AA08391235075EE0DE0A79A B03222FEDB27218C56F96EAC2F91CC8FCE64B12
m_{PL85}	DD0B6768FC01CC0A551F8ACC36907129623E975AB8B3FF58037F1859E2FA8C62C2D9D1E850 6916029A2C3F8CAD9A26AE2CC652F48800859F5C
m_{PL86}	923920696EB3AB413786C41854822282BB83F6900D33A232D470BE198BBF086067B72613300C 593B74251E2F079857ADBBCD86583A9DCAA6DC
m_{PL87}	B8EF30C797D8D2C4EF11244F137D806E556A436626D0115A621C92C34D166A68BCEDFA0040 DA8FD6F987B1CD5C2AA1C1B045E64475F0F8DABD
m_{PL88}	E1887001D414405ED6419E9EE1D1D346D924ED57ADF04B31B7948099976B2D1501A60DFFB28 7AD44C8783DF0C1EA5AA5D273D1389C8EA22DCC
m_{PL89}	8C2E379A58AA96748141CA84C35987905F984A49D3AD9BFF7807AC244C16C1DF74343C2E1F2 5514F5A0954CFBB3C92E25EF783136844998AC5
m_{PL90}	78F8A99E0A54E27F51C0726FE7A11EB26B1E29FE65F55AC8AC58011465900B958488A90F6DF 614A58431DC8B6C6B9A6F032EE0E0B1306EC4B4
m_{PL91}	88F7A31B7B20E0F05CA26E729B4F8A1933962D7BD7BE3E1EB130B28C794C0B4D01CADE0900 6FF97E80117509733F3A9DC225413A0AE08CA662
m_{PL92}	BE4DFCEAC18905AC8D5DA27A794F88A4D3058D2EFA3B075A819DEAE688EAF8940A653ED71 04E7B403D490F0A9030264E1F12B8922C75775E61
m_{PL93}	5BA4B79FC4550234D8922963BF3537485E3C8745A5DB90D3E2E454B30FF61112F508155B7C2B 3C4C628AF846240C2021ACDE547E5A41F666B8

Code ID	Basic Midamble Codes m_{PL} of length P=456
m_{PL94}	00556D35649F7610AB24A43C4F16D6AC0571FD126F11880C5CD72100D730E4E4D6BB73C33F8 37FAF1072743B249ADA2E09598B1EB23F1180A7
m_{PL95}	7A0CC9F21BD69CF3023E944545C2176EF0D4F450B765C28359FB8A32137D043D0E5713E67B3 F61320985D2C6106605081F87D2296321468A2F
m_{PL96}	DA669880995B0671201172BABFF141D5854A245E211879EF3038A7C84170DADBD368455F2465 3161E7886E15B253F93E3A3C568EFB17CDEB1A
m_{PL97}	4E294E53D1661C1F6F748302A7723DA951C00FDB8BEBBF67A68710BA0F1A255DFB1627059D4 1A23D3961726DE6FEB10E5D209CC4505B209812
m_{PL98}	73385DF701414E144768A67EF72924B1653479E962FB1554B7E54BC5284D9B3E41C0C133F878 972230721918AA425501B920B204FECE0C7F8A
m_{PL99}	F4492160805F258CE592DF4D1200566F81D173458D78EA3ABED79A14AF88170DB1D4A9A5931 D2B80C58C27FE17D806E3E6A66CDAAD09F118D4
m_{PL100}	44D562D9012D8B07B8F44596467C11A163982BB7EAEAC184078B6B8CE46B5D7E17C39CEF57 6A025491183017FA09931D070B307B86524B03FF
m_{PL101}	FCAEEFCC49A13B4FFA12C0CC6A2B90CF4F57D78B1E98294B04675C2F0991661FDC61A452A2 47F8C29E0284AA21026F368307375AA2C3F1E12C
m_{PL102}	C486DF0510DCAD5AB86E178A686D398E11A0ECFAC5A326C10129257E5456B22FB8E147E919 0D9929A5DFFE44715FA47D62F04CFC9B1C201414
m_{PL103}	C10AF383DC708E257E15A8AB337BCE684A2F4AC7A22DC2C25C277F8E8D0858E79317CDDD9 AA2EA6CBE604D24AC0945026103E7B4126FD361A4
m_{PL104}	A5C60A181148D9A931B2DDDB9D169648BA54F366B4EFAE88F6861909EE0F07C037EE349D0E C59A823286E366CA3943589EEA7F828C3728085F
m_{PL105}	96136AEBD5E28462B0421DF292BA899FFA660D80EA01620D2C7490E5347127884AA3C3D1FF4 4BCEEF6C29EC589CDEF200C5742C5964F8B2B52
m_{PL106}	40F63C04ACAD986255D1E16B769A6D4C11A1D075E804BDC0AC61923E9A67F5D741775632807 2455F6E22B1C64E06F367D1B0808295C2D90E22
m_{PL107}	F4B82D413578C4888C5F002CF6D0E03778134A860436551FD57537E4CED334B3C9CEBACE615 238271717AA762448B86FA53D2074BCE35658A7
m_{PL108}	BCCC92D72C920E685530591FC351743D1E23DE044BF81D32650406113E23ECC757FDE4E386 B6E2E7195EE4969717A7BD0812AC312B33A54308
m_{PL109}	6ED59DE0D44370A861CE2B42CF5E578E764A682AB5777905EE027D7160490EDC6C28989B238 05AA697FCD215CB401BC5E4D430624C01B16192
m_{PL110}	DE80C0E273B92CC3C5034F7A20DB3914643C430B425C8B9249EAF73ACE8C3BCF17957242CF 534D87A67D4DC0252275262E737F4095450CFA14
m_{PL111}	9505C4FEF2A397D5059F4729D013292A8321FFFA929ACB0A210D0A13E13061227C44A68FBD8 CE6B66CE3D783363CD039AB35EE52603E09B758
m_{PL112}	E8BE90D7F954B14D8002A4CAC20765ABEED80634498C836D79B0F9338DBC17B28F05CF4E79 136779E1C55AA30B6215F890882887B3B53C23E2
m_{PL113}	9F4B622C1358AE5468DC31E4B2CA320E5E20458C1DE5405BF4F9AD7D45A5BCAA39EC0626FF FC698C16A009CCCB7A18A64E85E70BA71731BA24
m_{PL114}	B91B2624843CF48299AFC2B1442570B41F28F578530D1E322E0B54282372131C71ACB924E707 68A243EEC3200E7A5EBFA77111D9FB07FEA8AE
m_{PL115}	965F42DDA3A4650FE2F5103932B68F166FA424B9F0F7045311D962C2A9F66B9BC6C66FB480F 9800354E0C54A72251071422CF1DFC44F94C00C
m_{PL116}	08ADCE48699FC30FA0788073BDAADB9177BBB4C1CED41F93085218364B8BAD8488561EF0FE 1B0DDAA403C602494CB35697D62AA0A2B93A64CF
m_{PL117}	9A313BED80B1220D77C8ADA4B2E0B3D284A5120A94B741380923C78D3AD32BC3E71EC6EEA 520E9D447D8727697598BB987F17506F482003ABD
m_{PL118}	24C9AD4C14EFEC002A3473FCAB04E492F2E269161A2960BA8AF09FD710B444A40C4E8B1384 18E62301E91FBA97AFDC58759A76D00F676736C7
m_{PL119}	6514C7733711CE4942CD2123AB37186EB7FECB7E78ABB28744864942FCF4C0F810054AF55B1 042EB53064F0857C61D85B2CF0D2DC5826AF22F
m_{PL120}	B2C80CDC83E48C36BC6FDAB8661208EAD392F3A0571BE41DFAD765E744932ADEA50061E66 C05498A5381B2A1F1B446587089DC4E4A2DF03D82
m_{PL121}	639368BA75CC709A3D9F28EDA237E32C2017A9BF1E382045B9426AEE0A4049DCB4E1D7EBE4 647B855212824557497CFA039885A3BA42F98F63
m_{PL122}	6A70DDC17D0C8024B1C853F0C1948561EF32510151BE0C63BCA9171F20217891D1021EE7258 6CAFF557F8973336913A94A2A699B8740B054B8
m_{PL123}	2E32E3A35CCD001172CE310B63B4E406126045A0FA3795BE3E3D9B56F72405FC94FD8994681 8BAECD24A61BABBBE2D23052AB01EF73CA0CF4A
m_{PL124}	829395C35205A480AC1351C25E234BF52D384A3DE1C5138A650A6F82F739757D812D9C38231 AB9FD81AA0648B11F6F6113F9312C57624FC746
m_{PL125}	D98FFE19C0AAAAB0571A9075ECDFD3E7373F5255DC669116A8C6913F0123E598F930934C5F6 A601C37C529C371A0C391B59AC5A9E286D04011

Code ID	Basic Midamble Codes m_{PL} of length P=456
m_{PL126}	C1A108192BCE96C2430A63C189BB33856BE6B8B524703FCB205DAEF37EF544CD43CA09B618 1B417398083FF2F781BA4AE89A5CA291DB928D71
m_{PL127}	42568DF9F61849BF9E7DEE750604BE2E0BC16CC464B1CDE15015E01D6498E9F3E6D6950E58 24651F212BA0057CE9529B9CCAB88D8136B8545E

A.3 Association between Midambles and Channelisation Codes

The following mapping schemes apply for the association between midambles and channelisation codes if no midamble is allocated by higher layers. Secondary channelisation codes are marked with a (*). These associations apply both for UL and DL.

A.3.1 Association for Burst Type 1/3 and K=16 Midambles

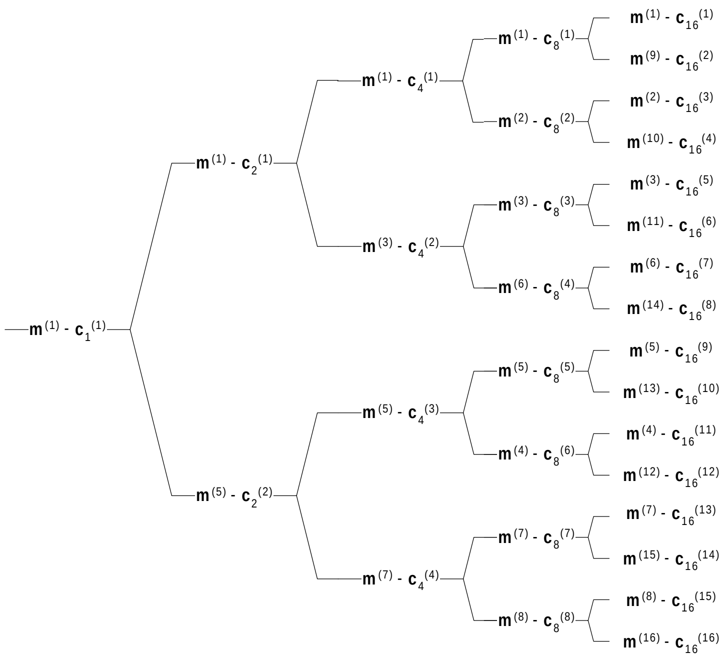


Figure A-1: Association of Midambles to Spreading Codes for Burst Type 1/3 and K=16

A.3.2 Association for Burst Type 1/3 and K=8 Midambles

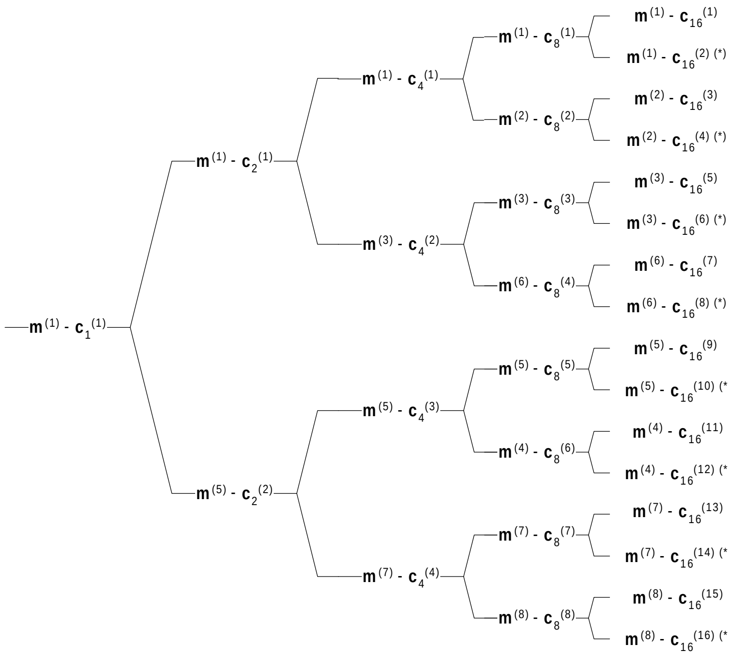


Figure A-2: Association of Midambles to Spreading Codes for Burst Type 1/3 and K=8

A.3.3 Association for Burst Type 1/3 and K=4 Midambles

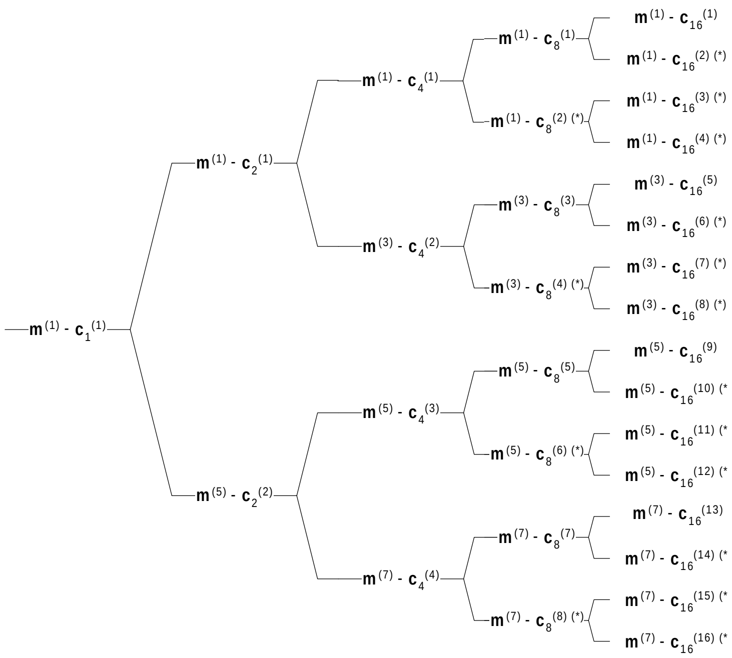


Figure A-3: Association of Midambles to Spreading Codes for Burst Type 1/3 and K=4

A.3.4 Association for Burst Type 2 and K=6 Midambles

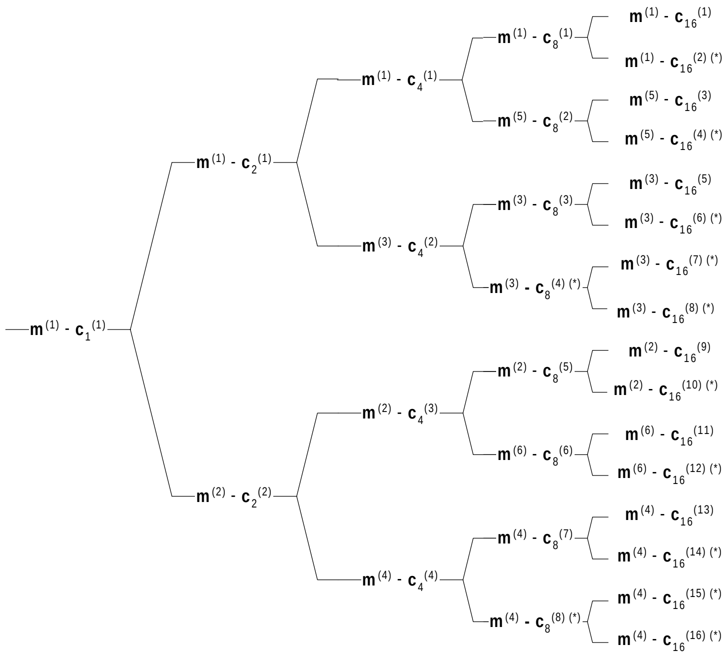


Figure A-4: Association of Midambles to Spreading Codes for Burst Type 2 and K=6

A.3.5 Association for Burst Type 2 and K=3 Midambles

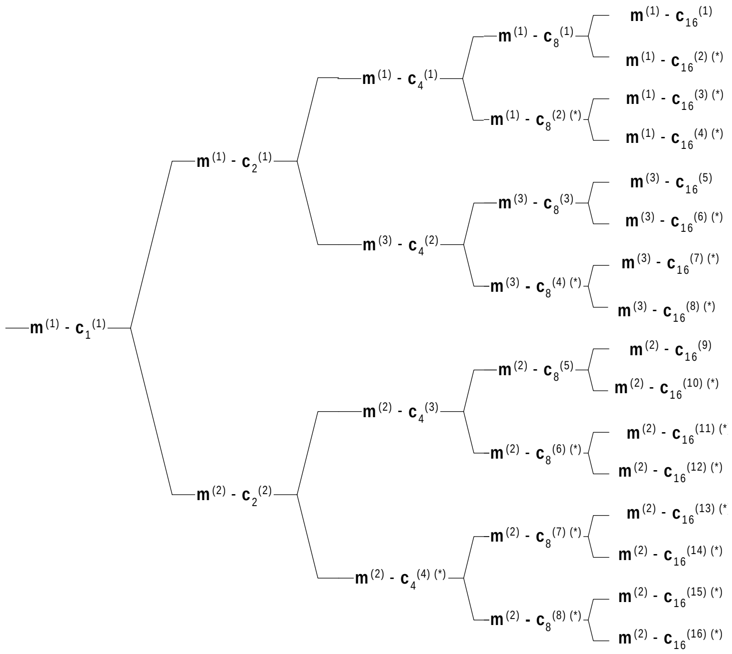


Figure A-5: Association of Midambles to Spreading Codes for Burst Type 2 and K=3

Note that the association for burst type 2 can be derived from the association for burst type 1 and 3, using the following table:

Burst Type 1/3	m(1)	m(2)	m(3)	m(4)	m(5)	m(6)	m(7)	m(8)
Burst Type 2	m(1)	m(5)	m(3)	m(6)	m(2)	m(4)	-	-

3GPP TSG RAN Meeting #9
Hawaii, USA, 20-22 September 2000

Document *R1-00-1089*
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**	**031r1**	Current Version:	3.3.0

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

For submission to: RAN#9	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑	for information		non-strategic		

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:	TSG RAN WG1	**Date:**	22/08/2000
Subject:	Number of codes signalling for the DL common midamble case		
Work item:			

Category:	F	Correction	X	**Release:**	Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
(only one category	B	Addition of feature			Release 97	
shall be marked	C	Functional modification of feature			Release 98	
with an X)	D	Editorial modification			Release 99	X
					Release 00	

Reason for change:

- By using variable shifts instead of a fixed shift to derive the common midamble for the UE's present in a timeslot, the number of simultaneously employed channelisation codes can be encoded and signalled to all UE's. The knowledge of the number of channelisation codes in turn simplifies the implementation of multiuser detection techniques in the UE, e.g. in the DL.
- Section 5.6 in TS25.221 on midamble allocation in UL and DL is proposed to be revised for more clarity.

Clauses affected: Section 5.6; Insertion of a new annex B, previous annex B moved to annex C, previous annex C moved to annex D

Other specs affected:	Other 3G core specifications	X	→ List of CRs:	CR480 to TS25.331 CR169 to TS25.423 CR199 to TS25.433
	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:

5.6 Midamble Allocation for Physical Channels

~~In general, m~~Midambles are part of the physical channel configuration which is performed by higher layers. Three different midamble allocation schemes exist:

- UE specific midamble allocation: A UE specific midamble for DL or UL is explicitly assigned by higher layers.
- Default midamble allocation: The midamble for DL or UL is allocated by layer 1 depending on the associated channelisation code.
- Common midamble allocation: The midamble for the DL is allocated by layer 1 depending on the number of channelisation codes currently being present in the DL time slot.

~~Optionally, i~~If ~~no~~ a midamble is not explicitly ~~allocated~~assigned ~~by higher layers~~and the use of the common midamble allocation scheme is not signalled by higher layers, ~~a default~~ the midamble ~~allocation~~ shall be ~~used~~allocated by layer 1, based on the default midamble allocation scheme. This default midamble allocation scheme is given by a fixed association between midambles and channelisation codes, see clause A.3, and shall be applied individually to all channelisation codes within one time slot. Different associations apply for different burst types and cell configurations with respect to the maximum number of midambles.

5.6.1 Midamble Allocation for DL Physical Channels

Physical channels providing the beacon function shall always use the reserved midambles, see 5.~~4~~5. For DL physical channels that are located in the same time slot as the P-CCPCH, midambles shall be allocated based on the default midamble allocation scheme, using the association for burst type 1 and K=8 midambles. For all other DL physical channels, the midamble ~~allocation~~ is explicitly ~~signalled~~ assigned by higher layers or ~~given by default~~ allocated by layer 1.

5.6.1.1 Midamble Allocation by signalling from higher layers

~~Either a common or a~~ UE specific midambles ~~shall~~ may be signalled by higher layers to ~~the~~ UE's as a part of the physical channel configuration~~.~~, ~~Common or UE specific midambles may be applied only if the conditions in subclauses 5.6.1.1.1 and subclause 5.6.1.1.2 hold respectively. If the midamble is not signalled as a part of the physical channel configuration, midamble allocation by default shall be used.~~

~~5.6.1.1.1 Common Midamble~~

~~A common midamble may be assigned to all physical channels in one time slot, if:~~

- ~~a single UE uses all physical channels in one time slot (as in the case of high rate service);~~

~~or~~

- ~~multiple UEs use the physical channels in one time slot; and~~
- ~~no beamforming is applied to any of these DL physical channels; and~~
- ~~no closed loop TxDiversity is applied to any of these DL physical channels; and~~
- ~~midambles are not used for PDSCH physical layer signalling.~~

~~5.6.1.1.2 UE specific Midamble~~

~~An individual midamble may be assigned to each of the UEs in one time slot,~~ if:

- multiple UEs use the physical channels in one DL time slot; and
- beamforming is applied to all of these DL physical channels; and
- no closed loop TxDiversity is applied to any of these DL physical channels;

or

- PDSCH physical layer signalling based on the midamble is used.

5.6.1.2 Midamble Allocation by ~~default~~layer 1

5.6.1.2.1 Default midamble

If ~~no~~a midamble is not explicitly ~~allocated~~assigned and the use of the common midamble allocation scheme is not signalled by higher layers~~by signalling~~, the UE shall derive the midamble from the associated channelisation code and shall use an individual midamble for each channelisation code. For each association between midambles and channelisation codes in annex A.3, there is one primary channelisation code associated to each midamble. A set of secondary channelisation codes is associated to each primary channelisation code. All the secondary channelisation codes within a set use the same midamble as the primary channelisation code to which they are associated.

Higher layers shall allocate the channelisation codes in a particular order. Primary channelisation codes shall be allocated prior to associated secondary channelisation codes. If midambles are reserved for the beacon ~~function~~channels, all primary and secondary channelisation codes that are associated with the reserved midambles shall not be used.

Primary and its associated secondary channelisation codes shall not be allocated to different UE's.

In the case that secondary channelisation codes are used, secondary channelisation codes of one set shall be allocated in ascending order, with respect to their numbering.

5.6.1.2.2 Common Midamble

The use of the common midamble allocation scheme is signalled to the UE by higher layers as a part of the physical channel configuration. A common midamble may be assigned by layer 1 to all physical channels in one DL time slot, if:

- a single UE uses all physical channels in one DL time slot (as in the case of high rate service);

or

- multiple UEs use the physical channels in one DL time slot; and
- no beamforming is applied to any of these DL physical channels; and
- no closed loop TxDiversity is applied to any of these DL physical channels; and
- midambles are not used for PDSCH physical layer signalling.

The number of channelisation codes currently employed in the DL time slot is associated with the use of a particular common midamble. Different associations apply for different burst types and cell configurations with respect to the maximum number of midambles, see annex B.

5.6.2 Midamble Allocation for UL Physical Channels

If the midamble is ~~part of the physical channel configuration~~explicitly assigned by higher layers, an individual midamble shall be assigned to all UE's in one UL time slot.

If no midamble is explicitly ~~allocated~~ assigned by higher layers, the UE shall derive the midamble from the assigned channelisation code as for DL physical channels. If the UE changes the SF according to the data rate, it shall always vary the channelisation code along the lower branch of the OVSF tree.

Annex B (normative) Signalling of the number of channelisation codes for the DL common midamble case

The following mapping schemes shall apply for the association between the number of channelisation codes employed in a timeslot and the use of a particular midamble shift in the DL common midamble case. In the following tables the presence of a particular midamble shift is indicated by '1'. Midamble shifts marked with '0' are left unused. Mapping schemes B.3 and B.4 are not applicable to beacon timeslots where a P-CCPCH is present, because the default midamble allocation scheme is applied to these timeslots. Note that in mapping schemes B.3 and B.4, the fixed and pre-allocated channelisation code for the beacon channel is included into the number of indicated channelisation codes.

B.1 Mapping scheme for Burst Type 1 and K=16 Midambles.

m1	**m2**	**m3**	**m4**	**m5**	**m6**	**m7**	**M8**	**m9**	**m10**	**m11**	**m12**	**m13**	**m14**	**m15**	**m16**	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 code
0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2 codes
0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	3 codes
0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	4 codes
0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	5 codes
0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	6 codes
0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	7 codes
0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	8 codes
0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	9 codes
0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	10 codes
0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	11 codes
0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	12 codes
0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	13 codes
0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	14 codes
0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	15 codes
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	16 codes

B.2 Mapping scheme for Burst Type 1 and K=8 Midambles.

M1	**m2**	**m3**	**m4**	**m5**	**m6**	**m7**	**m8**	
1	0	0	0	0	0	0	0	1 code or 9 codes
0	**1**	0	0	0	0	0	0	2 codes or 10 codes

0	0	**1**	0	0	0	0	0	3 codes or 11 codes
0	0	0	**1**	0	0	0	0	4 codes or 12 codes
0	0	0	0	**1**	0	0	0	5 codes or 13 codes
0	0	0	0	0	**1**	0	0	6 codes or 14 codes
0	0	0	0	0	0	**1**	0	7 codes or 15 codes
0	0	0	0	0	0	0	**1**	8 codes or 16 codes

B.3 Mapping scheme for beacon timeslots and K=16 Midambles.

m1	**m2**	**m3**	**M4**	**m5**	**m6**	**m7**	**M8**	**m9**	**m10**	**m11**	**M12**	**m13**	**m14**	**m15**	**m16**	
1	x(*)	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	1 codes or 13 codes
1	x(*)	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	2 codes or 14 codes
1	x(*)	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	3 codes or 15 codes
1	x(*)	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	4 codes or 16 codes
1	x(*)	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	5 codes
1	x(*)	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	6 codes
1	x(*)	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	7 codes
1	x(*)	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	8 codes
1	x(*)	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	9 codes
1	x(*)	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	10 codes
1	x(*)	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	11 codes
1	x(*)	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	12 codes

(*) In case of Block-STTD encoding for the P-CCPCH, midamble shift 2 is used by the diversity antenna

B.4 Mapping scheme for beacon timeslots and K=8 Midambles.

m1	**m2**	**m3**	**m4**	**m5**	**m6**	**m7**	**M8**	
1	x(*)	**1**	0	0	0	0	0	1 or 7 or 13 codes
1	x(*)	0	**1**	0	0	0	0	2 or 8 or 14 codes
1	x(*)	0	0	**1**	0	0	0	3 or 9 or 15 codes
1	x(*)	0	0	0	**1**	0	0	4 or 10 or 16 codes
1	x(*)	0	0	0	0	**1**	0	5 codes or 11 codes
1	x(*)	0	0	0	0	0	**1**	6 codes or 12 codes

(*) In case of Block-STTD encoding for the P-CCPCH, midamble shift 2 is used by the diversity antenna

B.5 Mapping scheme for Burst Type 2 and K=6 Midambles.

m1	m2	m3	m4	m5	m6	
1	0	0	0	0	0	1 or 7 or 13 codes
0	**1**	0	0	0	0	2 or 8 or 14 codes
0	0	**1**	0	0	0	3 or 9 or 15 codes
0	0	0	**1**	0	0	4 or 10 or 16 codes
0	0	0	0	**1**	0	5 or 11 codes
0	0	0	0	0	**1**	6 or 12 codes

B.6 Mapping scheme for Burst Type 2 and K=3 Midambles.

m1	m2	m3	
1	0	0	1 or 4 or 7 or 10 or 13 or 16 codes
0	**1**	0	2 or 5 or 8 or 11 or 14 codes
0	0	**1**	3 or 6 or 9 or 12 or 15 codes

Annex ~~B~~C (Informative): CCPCH Multiframe Structure

In the following figures B.1 to B.3 some examples for Multiframe Structures on Primary and Secondary CCPCH are given. The figures show the placement of Common Transport Channels on the Common Control Physical Channels. Additional S-CCPCH capacity can be allocated on other codes and timeslots of course, e.g. FACH capacity is related to overall cell capacity and can be configured according to the actual needs. Channel capacities in the annex are derived using bursts with long midambles (Burst format 1). Every TrCH-box in the figures is assumed to be valid for two frames (see row ‘Frame #’), i.e. the transport channels in CCPCHs have an interleaving time of 20msec.

The actual CCPCH Multiframe Scheme used in the cell is described and broadcast on BCH. Thus the system information structure has its roots in this particular transport channel and allocations of other Common Channels can be handled this way, i.e. by pointing from BCH.

Frame #	0 1	2 3	4 5	6 7	8 9	10 11	12 13	14 15	16 17	18 19	20 21	22 23	24 25	26 27	28 29	30 31	32 33	34 35	36 37	38 39	40 41	42 43	44 45	46 47	48 49	50 41	52 53	54 55	56 57	58 59	60 61	62 63	64 65	66 67	68 69	70 71
CCPCHs in TS k, Code 0																																				
CCPCHs in TS k+8, Co 0																																				

	BCH transporting BCCH 2,71 kbps		FACH transporting BCCH 2,71 kbps		PCH 13,5kbps		PICH 2,71 kbps		FACH 27,1 kbps

Figure B.1: Example for a multiframe structure for CCPCHs that is repeated every 72th frame

Frame #	0 1	2 3	4 5	6 7	8 9	10 11	12 13	14 15	16 17	18 19	20 21	22 23	24 25	26 27	28 29	30 31	32 33	34 35	36 37	38 39	40 41	42 43	44 45	46 47	48 49	50 41	52 53	54 55	56 57	58 59	60 61	62 63	64 65	66 67	68 69	70 71
CCPCHs in TS k, Code 0																																				
CCPCHs in TS k, Code n																																				
CCPCHs in TS k+8, Co 0																																				

	BCH transporting BCCH 2,71 kbps		FACH transporting BCCH 2,71 kbps		PCH 13,5kbps		PICH 2,71 kbps		FACH 51,5 kbps

Figure B.2: Example for a multiframe structure for CCPCHs that is repeated every 72th frame, n=1…7

Frame #	0 1	2 3	4 5	6 7	8 9	10 11	12 13	14 15	16 17	18 19	20 21	22 23	24 25	26 27	28 29	30 31	32 33	34 35	36 37	38 39	40 41	42 43	44 45	46 47	48 49	50 41	52 53	54 55	56 57	58 59	60 61	62 63	64 65	66 67	68 69	70 71
CCPCHs in TS k, Code 0																																				
CCPCHs in TS k+8, Co 0																																				

	BCH transporting BCCH 2,71 kbps		FACH transporting BCCH 1,355 kbps		PCH 13,5kbps		PICH 2,71 kbps		FACH 28,5 kbps

Figure B.3: Example for a multiframe structure for CCPCHs that is repeated every 72th frame

Annex ~~C~~D (informative): Change history

Change history								
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**	
14/01/00	RAN_05	RP-99591	-		Approved at TSG RAN #5 and placed under Change Control	-	3.0.0	
14/01/00	RAN_06	RP-99691	001	02	Primary and Secondary CCPCH in TDD	3.0.0	3.1.0	
14/01/00	RAN_06	RP-99691	002	02	Removal of Superframe for TDD	3.0.0	3.1.0	
14/01/00	RAN_06	RP-99691	006	-	Corrections to TS25.221	3.0.0	3.1.0	
14/01/00	RAN_06	RP-99691	007	1	Clarifications for Spreading in UTRA TDD	3.0.0	3.1.0	
14/01/00	RAN_06	RP-99691	008	-	Transmission of TFCI bits for TDD	3.0.0	3.1.0	
14/01/00	RAN_06	RP-99691	009	-	Midamble Allocation in UTRA TDD	3.0.0	3.1.0	
14/01/00	RAN_06	RP-99690	010	-	Introduction of the timeslot formats to the TDD specifications	3.0.0	3.1.0	
14/01/00	-	-	-		Change history was added by the editor	3.1.0	3.1.1	
31/03/00	RAN_07	RP-000067	003	2	Cycling of cell parameters	3.1.1	3.2.0	
31/03/00	RAN_07	RP-000067	011	-	Correction of Midamble Definition for TDD	3.1.1	3.2.0	
31/03/00	RAN_07	RP-000067	012	-	Introduction of the timeslot formats for RACH to the TDD specifications	3.1.1	3.2.0	
31/03/00	RAN_07	RP-000067	013	-	Paging Indicator Channel reference power	3.1.1	3.2.0	
31/03/00	RAN_07	RP-000067	014	1	Removal of Synchronisation Case 3 in TDD	3.1.1	3.2.0	
31/03/00	RAN_07	RP-000067	015	1	Signal Point Constellation	3.1.1	3.2.0	
31/03/00	RAN_07	RP-000067	016	-	Association between Midambles and Channelisation Codes	3.1.1	3.2.0	
31/03/00	RAN_07	RP-000067	017	-	Removal of ODMA from the TDD specifications	3.1.1	3.2.0	
26/06/00	RAN_08	RP-000271	018	1	Removal of the reference to ODMA	3.2.0	3.3.0	
26/06/00	RAN_08	RP-000271	019	-	Editorial changes in transport channels section	3.2.0	3.3.0	
26/06/00	RAN_08	RP-000271	020	1	TPC transmission for TDD	3.2.0	3.3.0	
26/06/00	RAN_08	RP-000271	021	-	Editorial modification of 25.221	3.2.0	3.3.0	
26/06/00	RAN_08	RP-000271	023	-	Clarifications on TxDiversity for UTRA TDD	3.2.0	3.3.0	
26/06/00	RAN_08	RP-000271	024	-	Clarifications on PCH and PICH in UTRA TDD	3.2.0	3.3.0	