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25.221 CR xxx Current Version: 3.4.0

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

For submission to: RAN#10	for approval	X	strategic		(for SMG use only)
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Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME	X	UTRAN / Radio	X	Core Network	

Source: CWTS **Date:**

Subject: CR for TS25.221 regarding the 1.28 Mcps TDD

Work item: Low Chip Rate TDD option, Physical Layer

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

Reason for change: This CR collects the principally agreed wording of the changes necessary for introducing the feature 'Low Chip Rate TDD option' in the TS25.221. In its last revision it should be editorially changed to reflect the correct changes needed for the latest approved version of this specification.

Clauses affected:

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: In this first version, a proposed structure has been included in this CR. The structure was copied from TS25.221 vers. 3.3.0. The sections on 'physical channels' and 'mapping of TrCH to physical channels' were duplicated to distinguish between the different chip rate options. In addition to that the proposals that were agreed in principle from WG1#14 to WG1#15 were included in this CR.

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2 References

<For clarity, this chapter will currently collect only the references that are needed in addition to the already existing abbreviations. In its last version this chapter has to be modified, so that it includes the revisions with respect to the latest versions of TS25.221.>

3 Abbreviations

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MIB Master Information Block

UpPTS Uplink Pilot Time Slot

UpPCH Uplink Pilot Channel

DwPTS Downlink Pilot Time Slot

DwPCH Downlink Pilot Channel

4 Transport channels

<This section is included in the working CR for completeness only. No changes will be made in this chapter. This chapter can be removed from the CR in its final version.>

5 Physical channels for the 3.84 Mcps option

<No changes will be made in this chapter in this CR, only the title has to be changed. >

6 Physical channels for the 1.28 Mcps option

All physical channels take three-layer structure with respect to timeslots, radio frames and system frame numbering (SFN), see [14]. Depending on the resource allocation, the configuration of radio frames or timeslots becomes different. All physical channels need guard symbols in every timeslot. The time slots are used in the sense of a TDMA component to separate different user signals in the time and the code domain. The physical channel signal format for 1.28Mcps TDD is presented in figure [X1].

A physical channel in TDD is a burst, which is transmitted in a particular timeslot within allocated Radio Frames. The allocation can be continuous, i.e. the time slot in every frame is allocated to the physical channel or discontinuous, i.e. the time slot in a subset of all frames is allocated only. A burst is the combination of a data part, a midamble and a guard period. The duration of a burst is one time slot. Several bursts can be transmitted at the same time from one transmitter. In this case, the data part must use different OVSF channelisation codes, but the same scrambling code. The midamble part has to use the same basic midamble code, but can use different midambles.

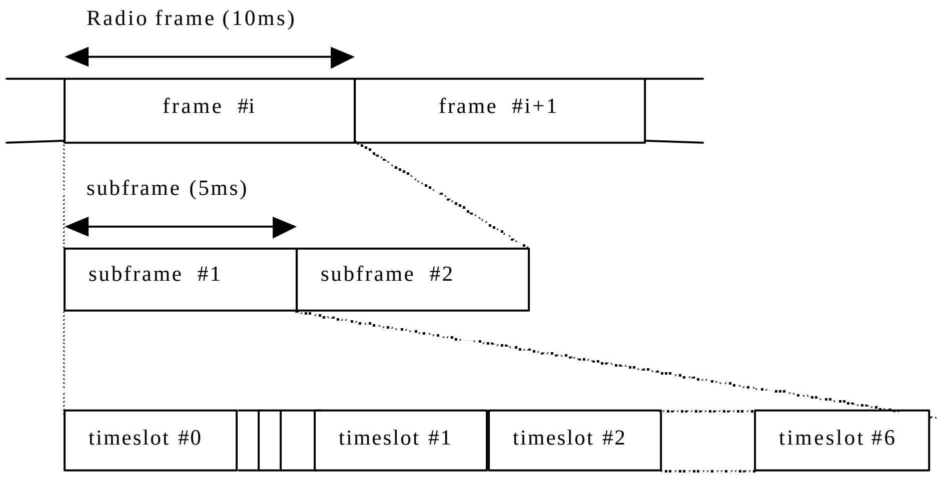


Figure [X1]: Physical channel signal format for 1.28Mcps TDD option

The data part of the burst is spread with a combination of channelisation code and scrambling code. The channelisation code is a OVSF code, that can have a spreading factor of 1, 2, 4, 8, or 16. The data rate of the physical channel is depending on the used spreading factor of the used OVSF code.

So a physical channel is defined by frequency, timeslot, channelisation code, burst type and Radio Frame allocation The scrambling code and the basic midamble code are broadcast and may be constant within a cell. When a physical channel is established, a start frame is given. The physical channels can either be of infinite duration, or a duration for the allocation can be defined.

6.1 Frame structure

The TDMA frame has a duration of 10 ms and is divided into 2 sub-frames of 5ms. The frame structure for each sub-frame in the 10ms frame length is the same.

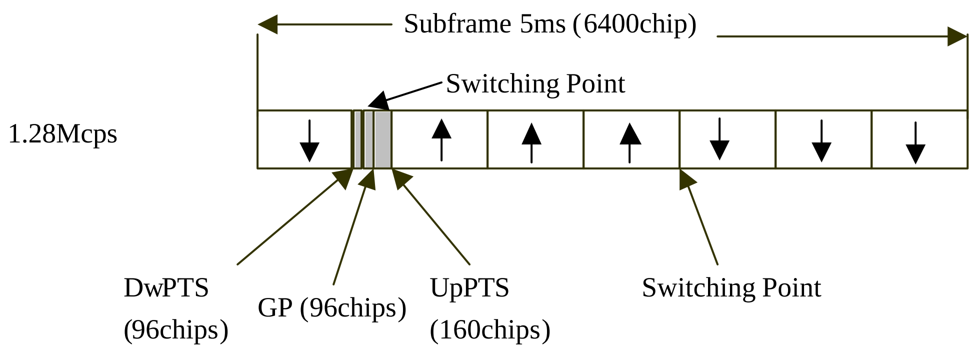


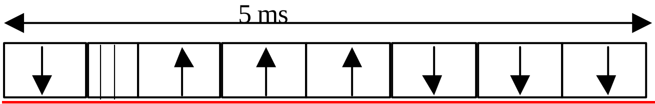
Figure [X2]: Structure of the sub-frame for 1.28Mcps TDD option

Time slot#n (n from 0 to 6): the nth normal time slot, 864 chips duration;
DwPTS: downlink pilot time slot, 96 chips duration;
UpPTS: uplink pilot time slot, 160 chips duration;
GP: main guard period for TDD operation, 96 chips duration;

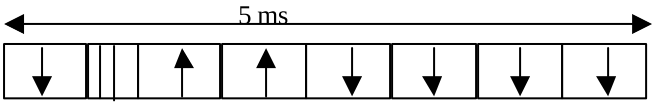
In Figure [X2], the total number of normal time slot for uplink and downlink is 7, and the length for each normal time slot is 864 chips duration. Among the 7 normal time slot, time slot#0 is always allocated as downlink while time slot#1 is always allocated as uplink. The time slots for the uplink and the downlink are separated by switching points. Between the downlink time slots and uplink time slots, the special period is the switching point to separate the uplink and downlink. In each sub-frame of 5ms for 1.28Mcps option, there are two switching points (uplink to downlink and vice versa).

Using the above frame structure, the 1.28Mcps TDD option can operate on both symmetric and asymmetric mode by properly configuring the number of downlink and uplink time slots. In any configuration at least one time slot (time slot#0) has to be allocated for the downlink and at least one time slot has to be allocated for the uplink (time slot#1).

Examples for symmetric and asymmetric UL/DL allocations are given in figure [X3].



symmetric DL/UL allocation



asymmetric DL/UL allocation

Figure [X3]: 1.28Mcps TDD sub-frame structure examples

6.2 Dedicated physical channel (DPCH)

The DCH as described in subclause 4.1 'Dedicated transport channels' is mapped onto the dedicated physical channel.

6.2.1 Spreading

Spreading is applied to the data part of the physical channels and consists of two operations. The first is the channelisation operation, which transforms every data symbol into a number of chips, thus increasing the bandwidth of the signal. The number of chips per data symbol is called the Spreading Factor (SF). The second operation is the scrambling operation, where a scrambling code is applied to the spread signal. Details on channelisation and scrambling operation can be found in [8].

6.2.1.1 Spreading for Downlink Physical Channels

Downlink physical channels shall use SF =16. Multiple parallel physical channels can be used to support higher data rates. These parallel physical channels shall be transmitted using different channelisation codes, see [8]. These codes with SF =16 are generated as described in [8].

Operation with a single code with spreading factor 1 is possible for the downlink physical channels.

6.2.1.2 Spreading for Uplink Physical Channels

The range of spreading factor that may be used for uplink physical channels shall range from 16 down to 1.

For multicode transmission a UE shall use a maximum of two physical channels per timeslot simultaneously. These two parallel physical channels shall be transmitted using different channelisation codes, see [8].

6.2.2 Burst Format~~Types~~

A normal burst consists of two data symbol fields, a midamble of 144 chips and a guard period. The data fields of the burst are 352 chips long. The corresponding number of symbols depends on the spreading factor, as indicated in table X1 below. The guard period is 16 chip periods long.

The burst ~~type~~format is shown in Figure X1. The contents of the normal burst fields is described in table X2.

Table X1: number of symbols per data field in a normal burst

Spreading factor (Q)	Number of symbols (N) per data field in Burst
1	352
2	176
4	88
8	44
16	22

Table X2: The contents of the normal burst ~~type~~format fields

Chip number (CN)	Length of field in chips	Length of field in symbols	Contents of field
0-351	352	cf table 1	Data symbols
352-495	144	-	Midamble
496-847	352	cf table 1	Data symbols
848-863	16	-	Guard period

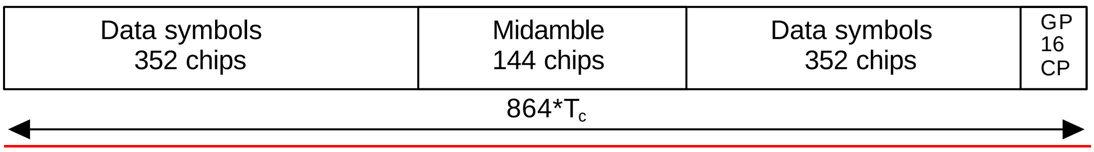


Figure X1: Burst structure of the normal burst ~~type~~format (GP denotes the guard period and CP the chip periods)

6.2.2.1 Transmission of TFCI

The normal burst ~~type~~format provides the possibility for transmission of TFCI in uplink 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 encoded TFCI symbols are equally distributed between the two subframes and the respective data fields. The TFCI information is to be transmitted possibly either directly adjacent to the midambleor after the SS and TPC symbols. Figure [X] shows the position of the TFCI in a traffic burst, if neither SS nor TPC are transmitted. Figure [Y] shows the position of the TFCI in a traffic burst , if SS and TPC are transmitted.

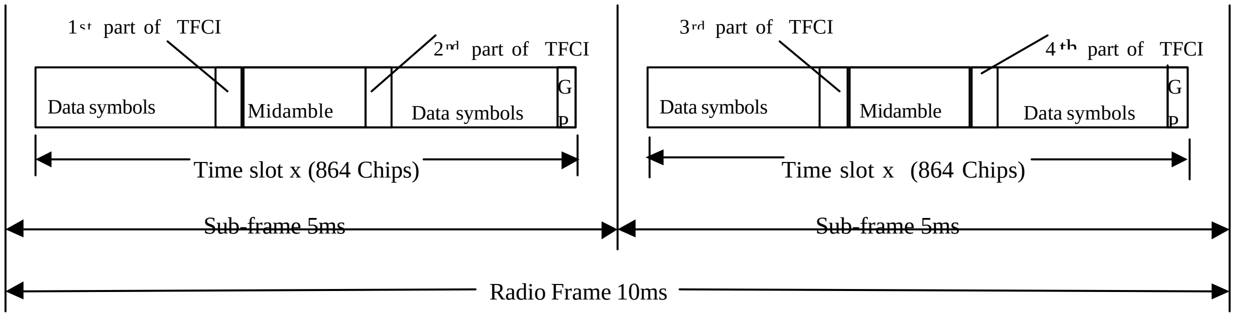


Figure X: Position of TFCI information in the traffic burst in case of no TPC and SS in 1.28 Mcps TDD

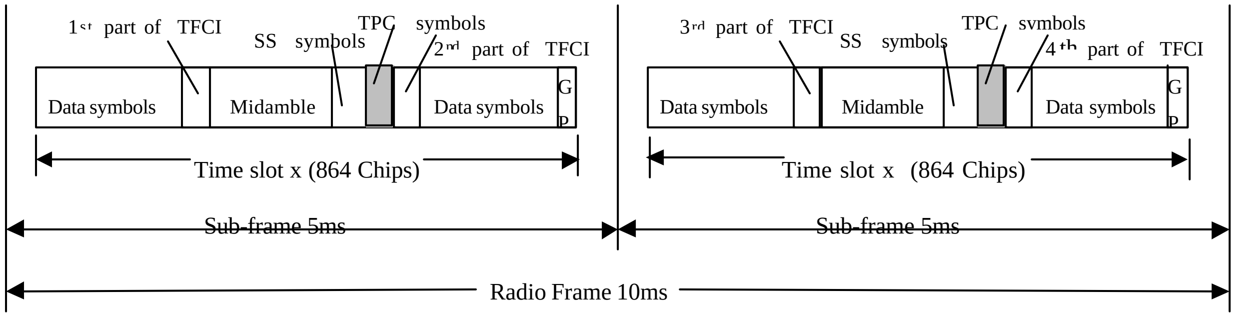


Figure Y:Position of TFCI information in the traffic burst in case of TPC and SS in 1.28 Mcps TDD

6.2.2.2 Transmission of TPC

6.2.2.3 Transmission of SS

6.2.2.4 Timeslot formats

6.2.2.4.1 time slot formats for QPSK

6.2.2.4.1.1 Downlink timeslot formats

6.2.2.4.1.2 Uplink timeslot formats

6.2.2.4.2 Time slot formats for 8PSK

6.2.2.4.2.1 Downlink timeslot formats

6.2.2.4.2.2 Uplink timeslot formats

6.2.3 Training sequences for spread bursts

In this subclause, the training sequences for usage as midambles 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 C.1.

The basic midamble codes in Annex C.1 are listed in hexadecimal notation. The binary form of the basic midamble code shall be derived according to table [XX] below.

Table [XX]: 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 $\mathbf{m}_P$:

$$\mathbf{m}_P = (m_1, m_2, \ldots, m_P) \qquad (1)$$

According to Annex C.1, the size of this vector $\mathbf{m}_P$ is P=128. As QPSK modulation is used, the training sequences are transformed into a complex form, denoted as the complex vector $\underline{\mathbf{m}}_P$:

$$\underline{\mathbf{m}}_P = (\underline{m}_1, \underline{m}_2, \ldots, \underline{m}_P) \qquad (2)$$

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

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

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:

$$i_{\max} \ ? \ L_m \ ? \ (K \ ? \ 1)W \qquad (4)$$

Notes on equation (4):

K and W are taken from Annex C.1

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

$$\underline{\mathbf{m}} \ ? \ (\underline{m}_1, \underline{m}_2, ..., \underline{m}_{i_{\max}}) \ ? \ (\underline{m}_1, \underline{m}_2, ..., \underline{m}_{L_m ? (K ? 1)W}) \qquad (5)$$

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

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

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:

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

The L_m midamble elements $\underline{m}_i^{(k)}$ are generated for each midamble of the 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 midamble sequences derived according to equations (7) to (8) 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 $\underline{\mathbf{m}}_{\mathrm{P}}$ according to (1).

6.2.3.1 Midamble Transmit Power

If in the downlink all users in one time slot have a common midamble, the transmit power of this common midamble is such that there is no power offset between the data part and the midamble part of the transmit signal within the time slot.

In the case of user specific midambles, the transmit power of the user specific midamble is such that there is no power offset between the data parts and the midamble part for this user within one slot.

6.2.4 Beamforming

6.3 Common physical channels

6.3.1 Primary common control physical channel (P-CCPCH)

The BCH as described in subclause 'Common Transport Channels' is mapped onto the Primary Common Control Physical Channels (P-CCPCH1 and P-CCPCH2). The position (time slot / code) of the P-CCPCHs is fixed in the 1.28Mcps TDD. The P-CCPCHs are mapped onto the first two code channels of timeslot#0 with spreading factor of 16, see subclause 'Common Transport Channels'. The P-CCPCH is always transmitted with an antenna pattern configuration that provides whole cell coverage.

6.3.1.1 P-CCPCH Spreading

The P-CCPCH uses fixed spreading with a spreading factor SF = 16. The P-CCPCH1 and P-CCPCH2 always use channelisation code $c_{Q?16}^{(k?1)}$ and $c_{Q?16}^{(k?2)}$ respectively.

6.3.1.2 P-CCPCH Burst ~~Types~~Format

The burst format as described in section 6.2.2 is used for the P-CCPCH. No TFCI is applied for the P-CCPCH.

6.3.1.3 P-CCPCH Training sequences

The training sequences, i.e. midambles, as described in the subclause on midamble generation are used for the P-CCPCH. The basic midamble code $m^{(1)}$ is used for P-CCPCHs as training sequence.

6.3.2 Secondary common control physical channel (S-CCPCH)

PCH and FACH are mapped onto one or more secondary common control physical channels (S-CCPCH). In this way the capacity of PCH and FACH can be adapted to the different requirements. The time slot and codes used for the S-CCPCH are broadcast on the BCH.

6.3.2.1 S-CCPCH Spreading

The S-CCPCH uses fixed spreading with a spreading factor SF = 16. The S-CCPCHs (S-CCPCH 1 and S-CCPCH 2) are always used in pairs, mapped onto two code channels with spreading factor 16. There can be more than one pair of S-CCPCHs in use in one cell.

6.3.2.2 S-CCPCH Burst ~~Types~~Format

The burst format as described in section 6.2.2 is used for the S-CCPCH. TFCI may be applied for S-CCPCHs.

6.3.2.3 S-CCPCH Training sequences

The training sequences, i.e. midambles, as described in the subclause on midamble generation, are also used for the S-CCPCH.

6.3.3 The physical random access channel (PRACH)

The RACH 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.

6.3.3.1 PRACH Spreading

The uplink PRACH uses either spreading factor SF=16 or SF=8 as described in subclause 6.2.1.1. 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).

The uplink PRACH uses either spreading factor SF=16 or SF=8 as described in subclause of 'The Random Access Channel (RACH)'. The PRACH configuration (time slot number and assigned spreading codes) is broadcast through the BCH.

6.3.3.2 PRACH Burst ~~Types~~Format

The burst format as described in section 6.2.2 is used for the PRACH.

6.3.3.3 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 as described in subclause about midamble generation are used for PRACH.

6.3.3.4 RACH timeslot formats

6.3.3.5 Association between Training Sequences and Channelisation Codes

The association between training sequences and channelisation codes of PRACH in the 1.28McpsTDD is same as that of the DPCH.

6.3.4 The synchronisation channels (DwPCH, UpPCH)

There are two dedicated physical synchronisation channels —DwPCH and UpPCH in each 5ms sub-frame of the 1.28Mcps TDD. DwPCH is used for the down link synchronisation and UpPCH is used for the up link synchronisation.

The position and the contents of the DwPCH are equal to the DwPTS as described in the subclause of the 'frame structure'. While the position and the contents of the UpPCH are equal to the UpPTS.

The DwPCH is transmitted at each sub-frame with an antenna pattern configuration which provides whole cell coverage. Furthermore it is transmitted with a constant power level which is signalled by higher layers.

The burst structure of the DwPCH (DwPTS) is described in the figure X1.

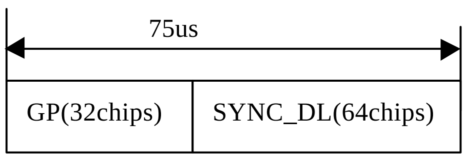


Figure X1: burst structure of the DwPCH (DwPTS)

Note:' GP' for 'Guard Period'

The burst structure of the UpPCH (UpPTS) is described in the figure X2.

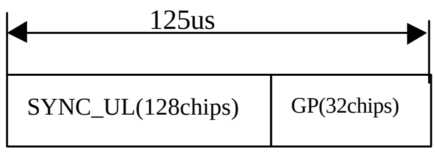


Figure X2: burst structure of the UpPCH (UpPTS)

The SYNC_DL code in DwPCH and the SYNC_UL code in UpPCH are not spreaded. The details about the SYNC_DL and SYNC_UL code are described in the corresponding subclause and annex in TS25.223.

6.3.5 Physical Uplink Shared Channel (PUSCH)

For Physical Uplink Shared Channel (PUSCH) the burst structure of DPCH as described in subclause 6.2 shall be used. User specific physical layer parameters like power control, timing advance or directive antenna settings are derived from the associated channel (FACH or DCH). PUSCH provides the possibility for transmission of TFCI in uplink.

6.3.6 Physical Downlink Shared Channel (PDSCH)

For Physical Downlink Shared Channel (PDSCH) the burst structure of DPCH as described in subclause 6.2 shall be used. User specific physical layer parameters like power control or directive antenna settings are derived from the associated channel (FACH or DCH). PDSCH provides the possibility for transmission of TFCI in downlink.

To indicate to the UE that there is data to decode on the DSCH, three signalling methods are available:

1) using the TFCI field of the associated channel or PDSCH;

2) using on the DSCH user specific midamble derived from the set of midambles used for that cell;

3) using higher layer signalling.

When the midamble based method is used, the UE shall decode the PDSCH if the PDSCH was transmitted with the midamble assigned to the UE by UTRAN, see 6.6.1.1.2 . For this method no other physical channels may use the same time slot as the PDSCH and only one UE may share the PDSCH time slot at the same time.

6.3.7 The Page Indicator Channel (PICH)

The Paging Indicator Channel (PICH) is a physical channel used to carry the Paging Indicators. The PICH is always transmitted at the same reference power level and with the same antenna pattern configuration as the P-CCPCH.

There are always two codes with SF=16 used for PICH. Figure [XX] depicts the PICH structure and the numbering order of the transported bits, N_{PIB}, where N_{PIB} is equal to 176 bits.

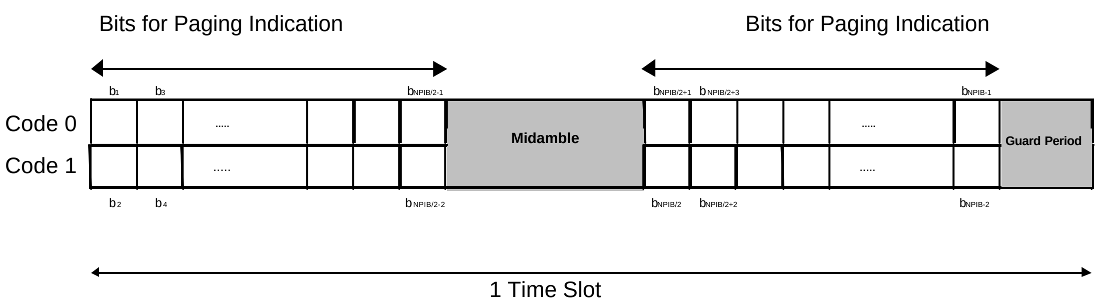


Figure: Transmission and numbering of paging indicators carrying bits on the PICH burst

In each PICH burst, N_{PI} paging indicators are transmitted, using $L_{PI}=2$, $L_{PI}=4$ or $L_{PI}=8$ symbols. L_{PI} is called the paging indicator length. The number of paging indicators N_{PI} per PICH burst is given by the paging indicator length, which are both known by higher layer signalling. In table [XX] this number is shown for the different possibilities of burst types and paging indicator lengths.

Table [XX] : Number N_{PI} of paging indicators in a PICH burst for the different paging indicator lengths (L_{PI})

	L_{PI} = 2	L_{PI} = 4	L_{PI} = 8
Number of PI per timeslot	N_{PI}=44	N_{PI}=22	N_{PI}=11

As shown in figure [XX], the paging indicators of N_{PICH} consecutive sub-frames form a PICH block, N_{PICH} is configured by higher layers. Thus, $N_P = N_{PICH} * N_{PI}$ paging indicators are transmitted in each PICH block.

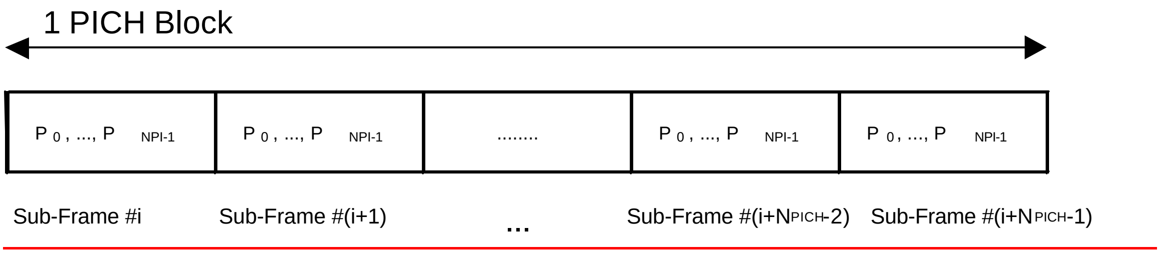


Figure [XX]: Structure of a PICH block

The value PI (PI = 0, ..., N_P-1) calculated by higher layers for use for a certain UE, see [15], is associated to the paging indicator P_q in the n^{th} frame of one PICH block, where q is given by

$q = PI \bmod N_{PI}$;

$n = PI \operatorname{div} N_{PI}$.

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.

6.4 Transmit Diversity for DL Physical Channels

Table X1 summarizes the different transmit diversity schemes for different downlink physical channel types in 1.28Mcps TDD that are described in [9].

Table X1: Application of Tx diversity schemes on downlink physical channel types in 1.28Mcps TDD "X" – can be applied, "–" – must not be applied

Physical channel type	Open loop TxDiversity		Closed loop TxDiversity
	TSTD	Block STTD	
P-CCPCH	-	X	–
DwPCH	X	–	–
FPACH	-	-	X
DPCH	-	–	X

Note: Closed loop transmit diversity for the FPACH makes use of the UpPCH

6.5 Beacon **characteristics**~~function~~ of physical channels

For the purpose of measurements, 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 location of the beacon channels is called beacon location. The beacon channels shall provide the beacon function, i.e. a reference power level at the beacon location, regularly existing in each subframe. Thus, beacon channels must be present in each subframe.

6.5.1 Location of physical channels with beacon function

The beacon location is described as follows :

The beacon function shall be provided by the physical channels that are allocated to channelisation code $c_{Q?16}^{(k?1)}$ and $c_{Q?16}^{(k?2)}$ in Timeslot#0.

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

6.5.2 Physical characteristics of the beacon function

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

- are transmitted with reference power;
- are transmitted without beamforming;
- use midamble $m^{(1)}$ and $m^{(2)}$ exclusively in this time slot

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 channel is allocated to $m^{(1)}$.

- If Block STTD antenna diversity is applied to P-CCPCH, for any beacon channel 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 channels identical data sequences are transmitted on both antennas.

6.6 Midamble Allocation for Physical Channels

The midamble allocation schemes for physical channels are the same as in the 3.84Mcps TDD option. The associations between channelisation codes and midambles for the default and common midamble allocation differ from the 3.84 Mcps TDD option. The associations are given in Annex C.2 [Association between Midambles and channelisation Codes] and D [Signalling of the number of channelisation codes for the DL common midamble case for 1.28Mcps TDD] respectively

6.6.1 Midamble Allocation for DL Physical Channels

Beacon channels shall always use the reserved midambles $m^{(1)}$ and $m^{(2)}$, see 6.5. For the other DL physical channels that are located in time slot 0, midambles shall be allocated based on the default midamble allocation scheme, using the association for K=8 midambles. For all other DL physical channels, the midamble is explicitly assigned by higher layers or allocated by layer 1.

6.6.1.1 Midamble Allocation by signalling from higher layers

The midamble allocation by signalling is the same like in the 3.84 Mcps TDD cf. [5.6.1.1 Midamble allocation by signalling from higher layers]

~~6.6.1.1.1 Common Midamble~~

~~6.6.1.1.2 UE specific Midamble~~

6.6.1.2 Midamble Allocation by ~~default~~layer 1

6.6.1.2.1 Default midamble

The default midamble allocation by layer 1 is the same like in the 3.84 Mcps TDD cf. [5.6.1.2.1 Default midamble]. The associations between midambles and channelisation codes are given in Annex C.2 [Association between Midambles and channelisation Codes].

6.6.1.2.2 Common Midamble

The common midamble allocation by layer 1 is the same like in the 3.84 Mcps TDD cf. [5.6.1.2.2 Common midamble]. The respective associations are given in Annex D [Signalling of the number of channelisation codes for the DL common midamble case for 1.28 Mcps TDD].

6.6.2 Midamble Allocation for UL Physical Channels

The midamble allocation for UL Physical Channels is the same like in the 3.84 Mcps TDD cf. [5.6.2 Midamble allocation for UL Physical Channels]

~~6~~7 Mapping of transport channels to physical channels for the 3.84 Mcps option

<No changes will be made in this chapter in this CR, only the title and the section numbering have to be changed. >

8 Mapping of transport channels to physical channels for the 1.28 Mcps option

This clause describes how the transport channels are mapped onto physical resources in 1.28Mcps TDD, see figure X1.

Transport channels	**Physical channels**
DCH	Dedicated Physical Channel (DPCH)
BCH	Primary Common Control Physical Channels (P-CCPCH)
PCH	Secondary Common Control Physical Channels(S-CCPCH)
FACH	Secondary Common Control Physical Channels(S-CCPCH)
	PICH
RACH	Physical Random Access Channel (PRACH)
USCH	Physical Uplink Shared Channel (PUSCH)
DSCH	Physical Downlink Shared Channel (PDSCH)
	Down link Pilot Channel (DwPCH)

	Up link Pilot Channel (UpPCH)
	FPACH

Figure X1: Transport channel to physical channel mapping for 1.28Mcps TDD

8.1 Dedicated Transport Channels

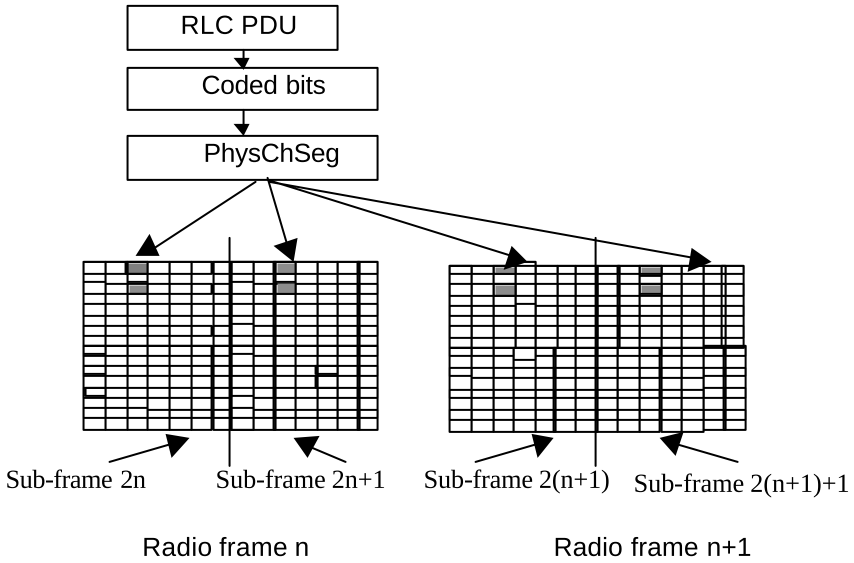


Figure : Mapping of PDU onto the physical bearer(TTI= 20ms)

8.2 Common Transport Channels

8.2.1 The Broadcast Channel (BCH)

There are two P-CCPCHs, P-CCPCH 1 and P-CCPCH 2 which are mapped onto timeslot#0 using the channelisation codes $c_{Q?16}^{(k?1)}$ and $c_{Q?16}^{(k?2)}$ with spreading factor 16. The BCH is mapped onto the P-CCPCH1+P-CCPCH2.

The position of the MIB of the BCH in the P-CCPCHs is indicated by the relative phases of the bursts in the DwPTS with respect to the P-CCPCHs midamble sequences , see [8]. One special combination of the phase differences of the burst in the DwPTS with respect to the P-CCPCH midamble indicates the position of the MIB in the multi-frame and the start position of the interleaving period.

8.2.2 The Paging Channel (PCH)

8.2.2.1 PCH/PICH Association

8.2.3 The Forward Channel (FACH)

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

8.2.4 The Random Access Channel (RACH)

The RACH has intraslot interleaving only and is mapped onto PRACH. More than one slot per frame may be administered for the PRACH. The location of slots allocated to PRACH is broadcast on the BCH. The uplink sync codes (SYNC-UL sequences) used by the UEs for UL synchronisation have a well known association with the P-RACHs, as broadcast by the BCH. On the P-RACH, both power control and uplink synchronisation control are used. The burst type used on the P-RACH is the same as that for a dedicated physical channel.

8.2.5 The Uplink Shared Channel (USCH)

8.2.6 The Downlink Shared Channel (DSCH)

Annex A (normative): Basic Midamble Codes for the 3.84 Mcps option

<No changes will be made in this chapter in this CR, only the title has to be changed. >

Annex B (Informative): CCPCH Multiframe Structure for the 3.84 Mcps option

<No changes will be made in this chapter in this CR, only the title has to be changed. >

Annex C (normative): Basic Midamble Codes for the 1.28 Mcps option

C.1 Basic Midamble Codes

The midamble has a length of L_m=144, which is corresponding to:

K=2, 4, 6, 8, 10, 12, 14, 16, $W = \left\lfloor \frac{P}{K} \right\rfloor$, P=128

Note: that $\lfloor x \rfloor$ denotes the largest integer number less or equal to *x*.

Depending on the possible delay spread cells are configured to use midambles which are generated from the Basic Midamble Codes (see table C.1). The cell configuration is broadcast on BCH.

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

Table C.1: Basic Midamble Codes m_P according to equation (5) from subclause 6.2.3

Code ID	Basic Midamble Codes m_P of length P=128
m_{P0}	B2AC420F7C8DEBFA69505981BCD028C3
m_{P1}	0C2E988E0DBA046643F57B0EA6A435E2
m_{P2}	D5CEC680C36A4454135F86DD37043962
m_{P3}	E150D08CAC2A00FF9B32592A631CF85B
m_{P4}	E0A9C3A8F6E40329B2F2943246003D44
m_{P5}	FE22658100A3A683EA759018739BD690
m_{P6}	B46062F89BB2A1139D76A1EF32450DA0
m_{P7}	EE63D75CC099092579400D956A90C3E0
m_{P8}	D9C0E040756D427A2611DAA35E6CD614
m_{P9}	EB56D03A498EC4FEC98AE220BC390450
m_{P10}	F598703DB0838112ED0BABB98642B665
m_{P11}	A0BC26A992D4558B9918986C14861EFF
m_{P12}	541350D109F1DD68099796637B824F88
m_{P13}	892D344A962314662F01F9455F7BC302

m_{P14}	49F270E29CCD742A40480DD4215E1632
m_{P15}	6A5C0410C6C39AA04E77423C355926DE
m_{P16}	79766155382031O3D4DBCC219B16A9E1
m_{P17}	A6C3C3175845400BD2B738C43EE2645F
m_{P18}	A0FD56258D228642C6F641851C3751ED
m_{P19}	EFA48C3FC84AC625783C6C9510A2269A
m_{P20}	62A8EB1A420334B23396E8D76BC19740
m_{P21}	9E96235699D5D41C9816C921023BC741
m_{P22}	4362AE4CAE0DCC32D60A3FED1341A848
m_{P23}	454C068E6C4F190942E0904B95D61DFB
m_{P24}	607FEEA6E2E99206718A49C0D6A25034
m_{P25}	E1D1BCDA39A09095B5C81645103A077C
m_{P26}	994B445E558344DE211C8286DDD3D1A3
m_{P27}	C15233273581417638906ADB61FDCA3C
m_{P28}	8B79A274D542F096FB1388098230F8A1
m_{P29}	DF58AC1C5F44B2A40266385CE1DA5640
m_{P30}	B5949A1CC69962C464401D05FF5C1A7A
m_{P31}	85AC489841ED3EAA2D83BBB0039CC707
m_{P32}	AE371CC144BC95923CA8108D8B49FE82
m_{P33}	7F188484A649D1C22BDA1F09D49B5117
m_{P34}	ADAA3C657089DEF7C0284903A491C9B0
m_{P35}	C3F96893C7504DC3B51488604AF64F4C
m_{P36}	B4002F5AE0CE8623AC979D368E9148C1
m_{P37}	0EEBCC0C795C02A106C24ABB36D08C6E
m_{P38}	4B0F537E384A893F58971580D9894433
m_{P39}	08E0035AB29B7ECC53C15DAA0687CC8F
m_{P40}	8611ACBC4C82781D77654EE862506D60
m_{P41}	63315261A8F1CB02549802DBFD197C07
m_{P42}	9A2609A434F43E7DCADC0E22B2EF4012
m_{P43}	F4C9F0A127A88461209ABF8C69CE4D00
m_{P44}	C79124EE3FFC28C5C4524D2B01670D42
m_{P45}	C91985C4FED53D09361914354BA80E79
m_{P46}	82AA517260779ECFF26212C1A10BDC29

m_{P47}	561DE2040ACB458E0DBD354E43E111D9
m_{P48}	2E58C7202D17392BC1235782CEFABB09
m_{P49}	C4FAA121C698047650F6503126A577C1
m_{P50}	E7B75206A9B410E44346E0DAE842A23C
m_{P51}	3F8B1C32682B28D098D3805ED130EA7F
m_{P52}	8D5FC2C1C6715F824B401434C8D4BB82
m_{P53}	0B2A43453ACC028FE6EB6E1CB0740B59
m_{P54}	BC56948FC700BA4883262EE73E12D82A
m_{P55}	558D136710272912FA4F183D1189A7FD
m_{P56}	5709E7F82DC6500B7B12A3072D182645
m_{P57}	86D4F161C844AE5E20EE39FD5493B044
m_{P58}	8729B6EDC382B152185885F013DAE222
m_{P59}	154C45B50720F4C362C14C77FE8335A1
m_{P60}	C6A0962890351F4EB802DE43A7662C9E
m_{P61}	D19D69D6B380B4B22457CB80033519F0
m_{P62}	C7D89509FB0DAE9255998E0A00C2B262
m_{P63}	DFD481C652C0C905D61D66F1732C4AA2
m_{P64}	06C848619AF1D6C910A8EAC4B622FC06
m_{P65}	0635E29D4E7AC8ABC189890241F45ECA
m_{P66}	B272B020586AAD7B093AC2F459076638
m_{P67}	B608ACE46E1A6BC96181EEDD88B54140
m_{P68}	0A516092B3ED7849B168AFE223B8670E
m_{P69}	D1A658C5009E04D0D7D5E9205EE663E8
m_{P70}	AC316DC39B91EB60B1AABD8280740432
m_{P71}	E3F06825476A026CD287625E514519FC
m_{P72}	A56D092080DDE8994F387C175CC56833
m_{P73}	15EA799DE587C506D0CD99A408217B05
m_{P74}	A59C020BAB9AF6D3F813C391CA244CD2
m_{P75}	74B0101EB9F3167434B94BABC8378882
m_{P76}	CE752975C8DA9B0100386DB82A8C3D20
m_{P77}	BBB38DCDB1E9118570AC147DC05241A4
m_{P78}	944ABBF0866098101F6971731AB2E986
m_{P79}	2BB147B2A30C68B4853F90481A166EB6

m_{P80}	444840ACCF3F23C45B56D7704BF18283
m_{P81}	87604F7450D1AD188C452981A5C7FC9B
m_{P82}	8C3842EBC948A65BC4C8B387F11B7090
m_{P83}	10B4767D071CF5DB2288E4029576135A
m_{P84}	6F07AAB697CD0089572C6B062E2018E4
m_{P85}	D3D65B442057E613A8655060C8D29E27
m_{P86}	5EDA330514C604BF4E0894E09EC57A74
m_{P87}	B0899CD094060724DED82AE85F18A43A
m_{P88}	B2D999B86DF902BC25015CAE3A0823C4
m_{P89}	C23CD40F04242B92D46EED82CD9A9A18
m_{P90}	D22DDCC5CB82960125DD24655F3C8788
m_{P91}	54987218FBD99AE4340FD4C9458E9850
m_{P92}	BE4341822997A7B11EA1E8A1A2767005
m_{P93}	255200FBA6EE48E6DE0A82B0461B8D0F
m_{P94}	6FBD58A663932423503690CF9C171701
m_{P95}	D215033A4AA87EC1C232BAC7EDA09370
m_{P96}	CA0959B01AE48E80204F1E4A3F29CE55
m_{P97}	582043413B9B825903E3A3545ED59463
m_{P98}	5016541922971C703D16E284CBDF633B
m_{P99}	7347EF160A1733CA98D43608A83A920B
m_{P100}	908B22AD433CCA00B3FD47C691F1A290
m_{P101}	BB22A272FC6923DF1B43BA4118806570
m_{P102}	0FA75C87474836B47DC7624D61193802
m_{P103}	A22EBA0658A4D0FF1E9CA5030A65CC06
m_{P104}	6C9C51CA15F1F4981F4C46180A6A6697
m_{P105}	4C847ACF8BC15359C405322851C9BDE2
m_{P106}	C1D29499C0082C9DE473ED15B14D63E0
m_{P107}	7E85ECC98AC761005076C5572869A431
m_{P108}	D8F11121595B8F49F78A7039E44126A0
m_{P109}	1A0BC814445FD71C8E5B1A9163ED2059
m_{P110}	A7591F27F8B0C00C68CC41697954FA04
m_{P111}	6CA2CE595E7406D79C4840183D41B9D0
m_{P112}	C093D3CC701FC20E66F5AB22516C5460

m_{P113}	D0E0CDE9B595546B96C4F8066B469020
m_{P114}	E99F743A451431C8B427054A4E6F2007
m_{P115}	C0D21A344A2C07DF2A6EBE6250C7B91E
m_{P116}	F031223E282CF7A4D8EF174A908668AE
m_{P117}	E4BD244AC16C55C7137FB068FD44280C
m_{P118}	C44920DE2028F19FC2AAB36A0DCFDAD0
m_{P119}	3FA7054E77135250699E6C8A11600742
m_{P120}	D5740B4D8870C1C5B5A214C4266FC537
m_{P121}	F0B7942D43BB6F38446442EB8126AB80
m_{P122}	83DB9534EAD6238FA8968798CDF04848
m_{P123}	EB9663CDDC2B291690703125BABCB800
m_{P124}	84D547225D4BBD20DEF1A583240C6E0F
m_{P125}	B51F6A771838BE934724AEA6A2669802
m_{P126}	D92AC05E10496794BBDC115233B1C068
m_{P127}	D3ACF0078EDA9856BBB0AF8651132103

C.2 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 (*). These associations apply for both UL and DL.

C.2.1 Association for K=16 Midambles

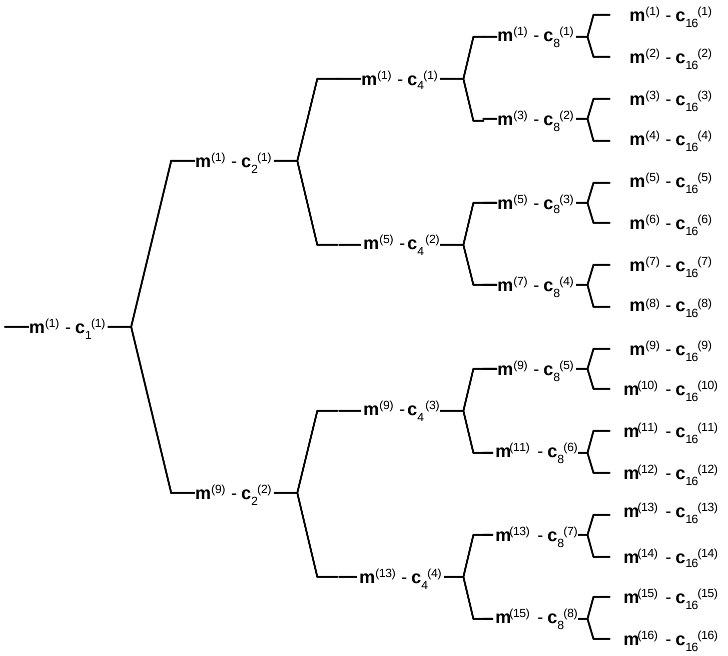


Figure C.2.1: Association of Midambles to Spreading Codes for K=16

C.2.2 Association for K=14 Midambles

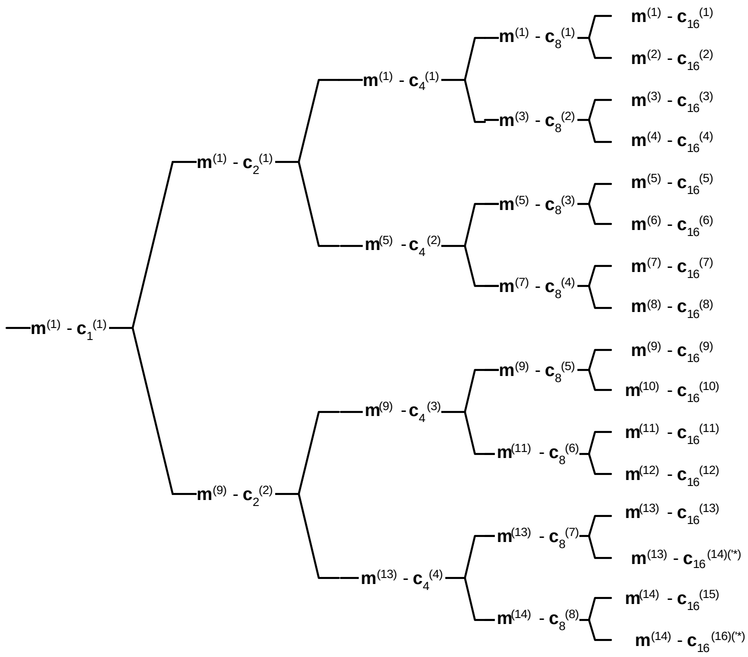


Figure C.2.2: Association of Midambles to Spreading Codes for K=14

C.2.3 Association for K=12 Midambles

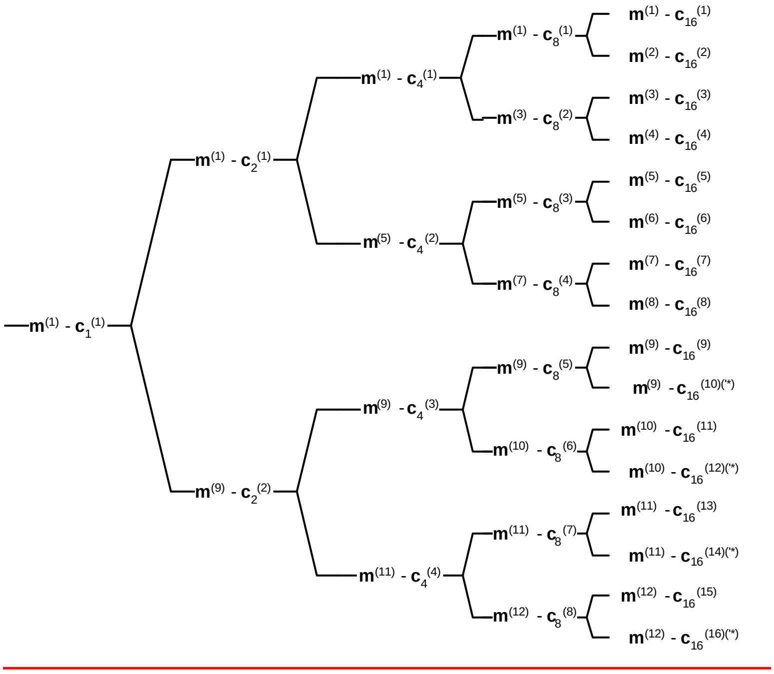


Figure C.2.3: Association of Midambles to Spreading Codes for K=12

C.2.4 Association for K=10 Midambles

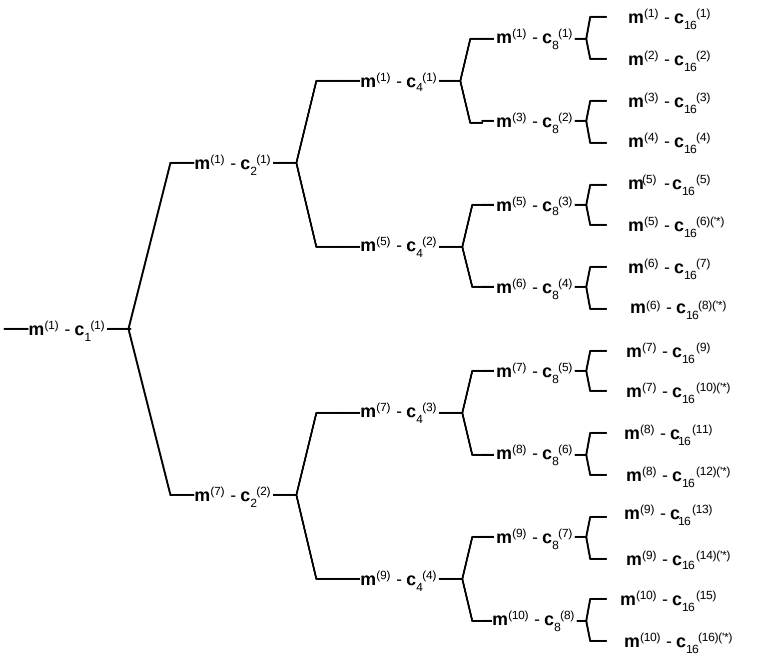


Figure C.2.4: Association of Midambles to Spreading Codes for K=10

C.2.5 Association for K=8 Midambles

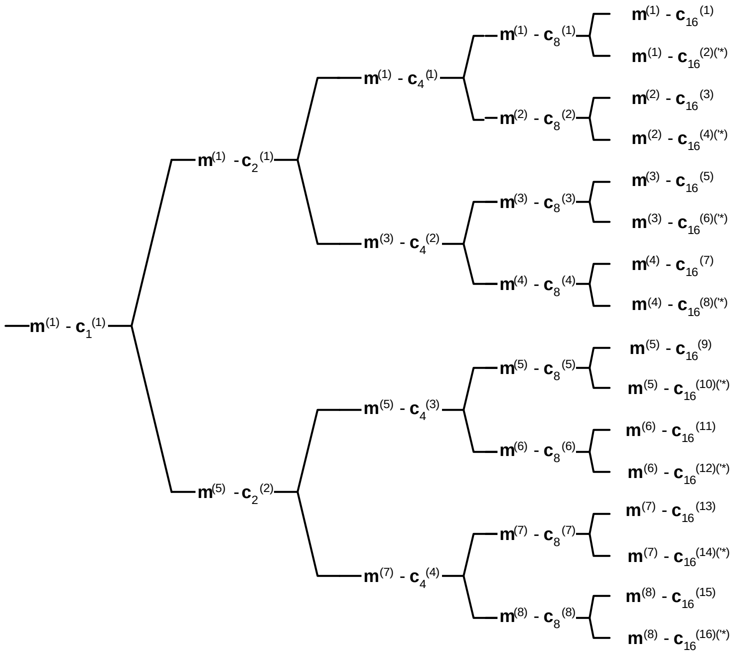


Figure C.2.5: Association of Midambles to Spreading Codes for K=8

C.2.6 Association for K=6 Midambles

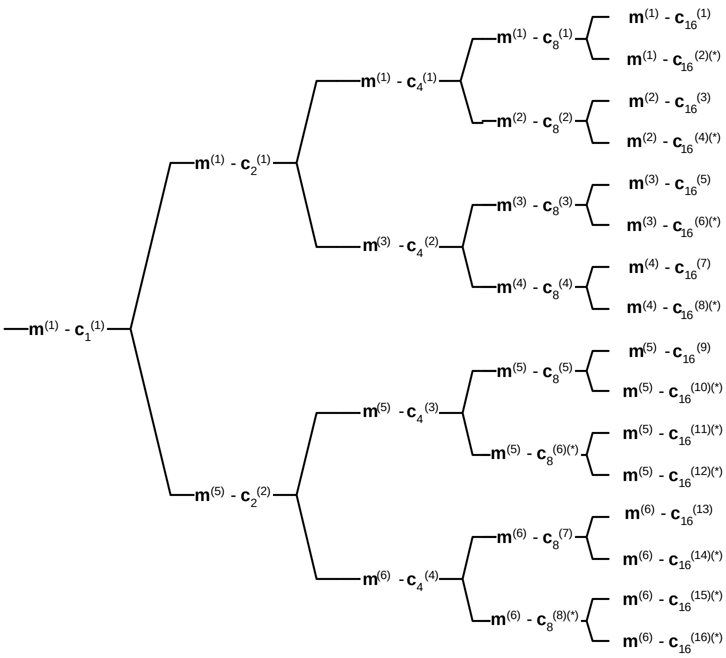


Figure C.2.6: Association of Midambles to Spreading Codes for K=6

C.2.7 Association for K=4 Midambles

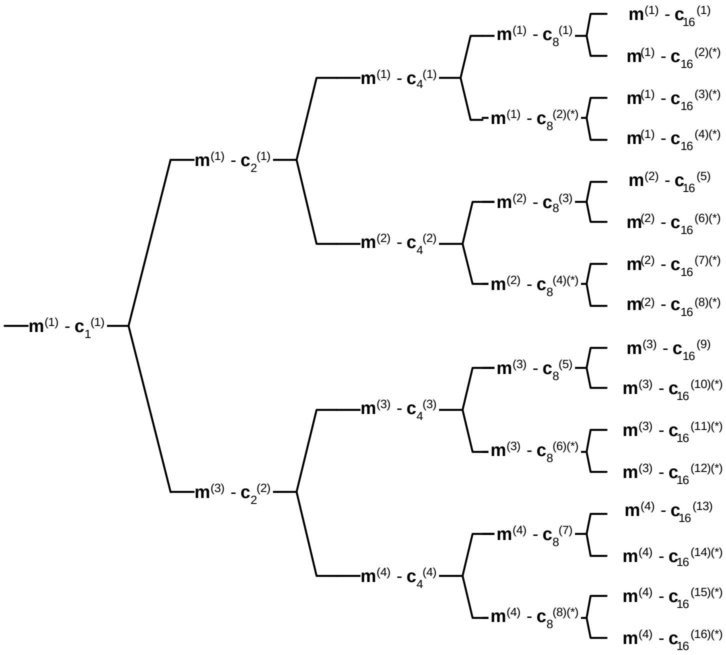


Figure C.2.7: Association of Midambles to Spreading Codes for K=4

C.2.8 Association for K=2 Midambles

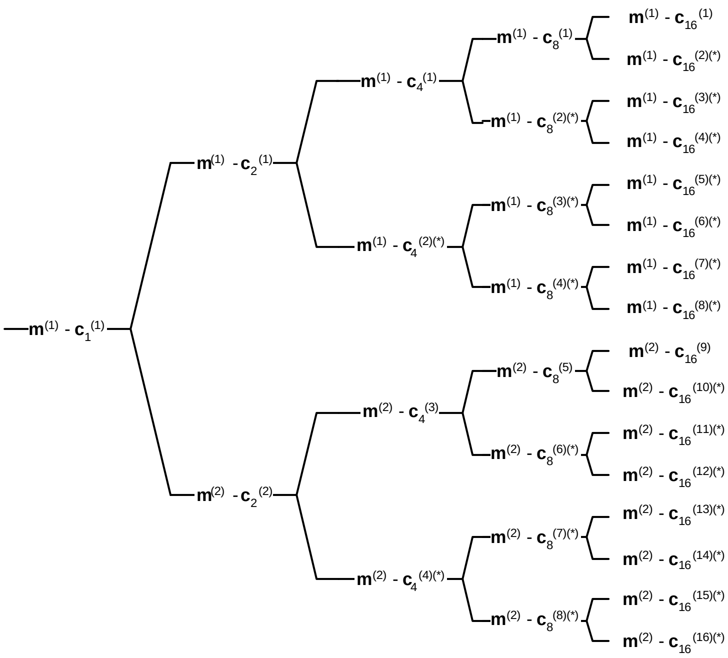


Figure C.2.8: Association of Midambles to Spreading Codes for K=2

Annex D (normative) Signalling of the number of channelisation codes for the DL common midamble case for 1.28Mcps TDD

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.

D.1 Mapping scheme for 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

D.2 Mapping scheme for K=14 Midambles

m1	m2	m3	m4	m5	m6	M7	M8	m9	m10	m11	m12	M13	m14	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	1 or 15 code(s)
0	1	0	0	0	0	0	0	0	0	0	0	0	0	2 or 16 codes
0	0	1	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	4 codes
0	0	0	0	1	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	6 codes
0	0	0	0	0	0	1	0	0	0	0	0	0	0	7 codes
0	0	0	0	0	0	0	1	0	0	0	0	0	0	8 codes
0	0	0	0	0	0	0	0	1	0	0	0	0	0	9 codes
0	0	0	0	0	0	0	0	0	1	0	0	0	0	10 codes
0	0	0	0	0	0	0	0	0	0	1	0	0	0	11 codes
0	0	0	0	0	0	0	0	0	0	0	1	0	0	12 codes
0	0	0	0	0	0	0	0	0	0	0	0	1	0	13 codes
0	0	0	0	0	0	0	0	0	0	0	0	0	1	14 codes

D.3 Mapping scheme for K=12 Midambles

m1	m2	m3	m4	m5	m6	M7	M8	m9	m10	m11	m12	
1	0	0	0	0	0	0	0	0	0	0	0	1 or 13 code(s)
0	**1**	0	0	0	0	0	0	0	0	0	0	2 or 14 codes
0	0	**1**	0	0	0	0	0	0	0	0	0	3 or 15 codes
0	0	0	**1**	0	0	0	0	0	0	0	0	4 or 16 codes
0	0	0	0	**1**	0	0	0	0	0	0	0	5 codes
0	0	0	0	0	**1**	0	0	0	0	0	0	6 codes
0	0	0	0	0	0	**1**	0	0	0	0	0	7 codes
0	0	0	0	0	0	0	**1**	0	0	0	0	8 codes
0	0	0	0	0	0	0	0	**1**	0	0	0	9 codes
0	0	0	0	0	0	0	0	0	**1**	0	0	10 codes
0	0	0	0	0	0	0	0	0	0	**1**	0	11 codes
0	0	0	0	0	0	0	0	0	0	0	**1**	12 codes

D.4 Mapping scheme for K=10 Midambles

m1	m2	m3	m4	m5	m6	M7	M8	m9	m10	
1	0	0	0	0	0	0	0	0	0	1 or 11 code(s)
0	**1**	0	0	0	0	0	0	0	0	2 or 12 codes
0	0	**1**	0	0	0	0	0	0	0	3 or 13codes
0	0	0	**1**	0	0	0	0	0	0	4 or 14 codes
0	0	0	0	**1**	0	0	0	0	0	5 or 15 codes
0	0	0	0	0	**1**	0	0	0	0	6 or 16 codes
0	0	0	0	0	0	**1**	0	0	0	7 codes
0	0	0	0	0	0	0	**1**	0	0	8 codes
0	0	0	0	0	0	0	0	**1**	0	9 codes
0	0	0	0	0	0	0	0	0	**1**	10 codes

D.5 Mapping scheme for K=8 Midambles

m1	m2	m3	m4	m5	m6	m7	m8	
1	0	0	0	0	0	0	0	1 or 9 code(s)
0	**1**	0	0	0	0	0	0	2 or 10 codes
0	0	**1**	0	0	0	0	0	3 or 11 codes
0	0	0	**1**	0	0	0	0	4 or 12 codes
0	0	0	0	**1**	0	0	0	5 or 13 codes
0	0	0	0	0	**1**	0	0	6 or 14 codes
0	0	0	0	0	0	**1**	0	7 or 15 codes
0	0	0	0	0	0	0	**1**	8 or 16 codes

D.6 Mapping scheme for K=6 Midambles

m1	m2	m3	m4	m5	m6	
1	0	0	0	0	0	1 or 7 or 13 code(s)
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

D.7 Mapping scheme for K=4 Midambles

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

D.8 Mapping scheme for K=2 Midambles

m1	m2	
1	0	1 or 3 or 5 or 7 or 9 or 11 or 13 or 15 code(s)
0	1	2 or 4 or 6 or 8 or 10 or 12 or 14 or 16 codes

Annex ~~D~~E (Informative):
CCPCH Multiframe Structure for the 1.28 Mcps option

Annex ~~C~~ ~~E~~F (informative):
Change history

<No changes will be made in this chapter in this CR, only the numbering has to be changed. >