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25.221	CR	xxx	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#10 <small>list expected approval meeting # here</small> ↑	for approval for information	<input checked="" type="checkbox"/> <input type="checkbox"/>	strategic <input type="checkbox"/> non-strategic <input type="checkbox"/> <small>(for SMG use only)</small>

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

Source: CWTS **Date:**

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

Work item: Low Chip Rate TDD option, Physical Layer

Category: <small>(only one category shall be marked with an X)</small>	F Correction <input type="checkbox"/> A Corresponds to a correction in an earlier release <input type="checkbox"/> B Addition of feature <input checked="" type="checkbox"/> C Functional modification of feature <input type="checkbox"/> D Editorial modification <input type="checkbox"/>	Release:	Phase 2 <input type="checkbox"/> Release 96 <input type="checkbox"/> Release 97 <input type="checkbox"/> Release 98 <input type="checkbox"/> Release 99 <input type="checkbox"/> Release 00 <input checked="" type="checkbox"/>
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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 <input type="checkbox"/> → List of CRs: Other GSM core specifications <input type="checkbox"/> → List of CRs: MS test specifications <input type="checkbox"/> → List of CRs: BSS test specifications <input type="checkbox"/> → List of CRs: O&M specifications <input type="checkbox"/> → List of CRs:
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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.



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

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

<For clarity, this chapter will currently collect only the abbreviations 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.>

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.

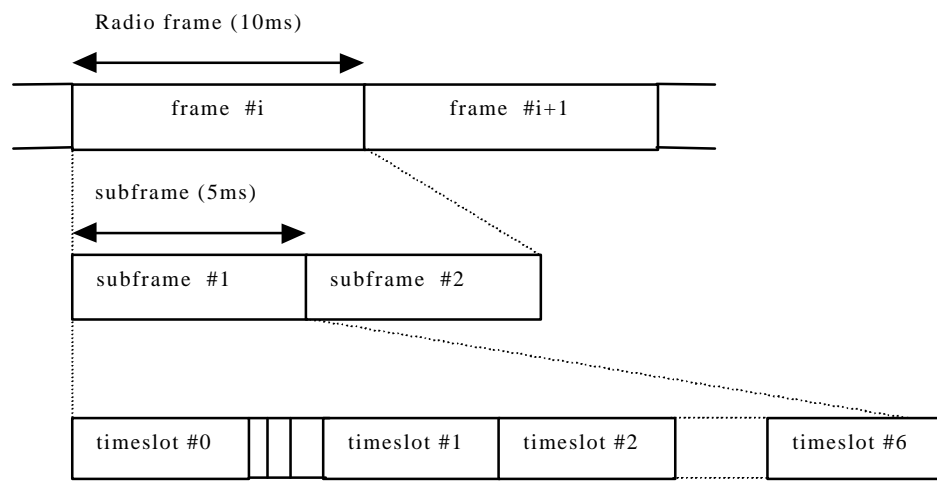


Figure [X1]: Physical channel signal format for 1.28Mcps TDD option

The data part of the burst is spread with a combination of channelisation code and scrambling code. The channelisation code is a OVFSF 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 OVFSF 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.

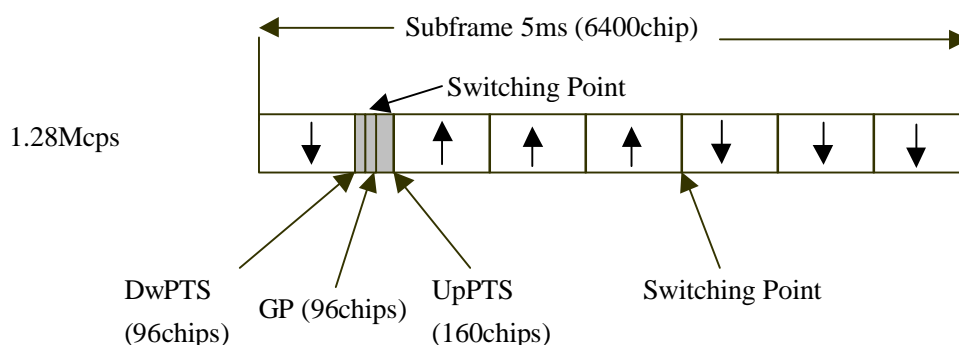


Figure [X2]: Structure of the sub-frame for 1.28Mcps TDD option

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].

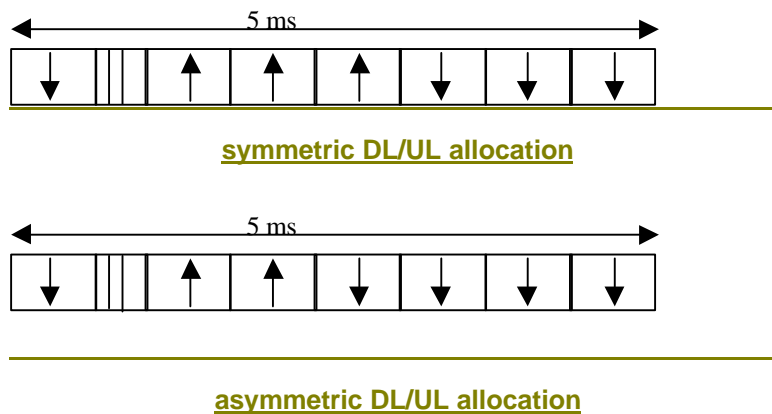


Figure [X3]: 1.28Mcps TDD sub-frame structure examples

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 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 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 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

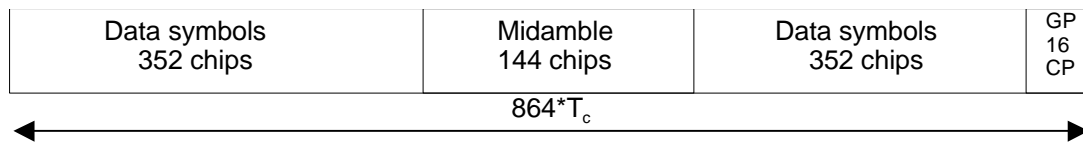


Figure X1: Burst structure of the normal burst type (GP denotes the guard period and CP the chip periods)

6.2.2.1 Transmission of TFCI

The normal burst type 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 midamble or 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.

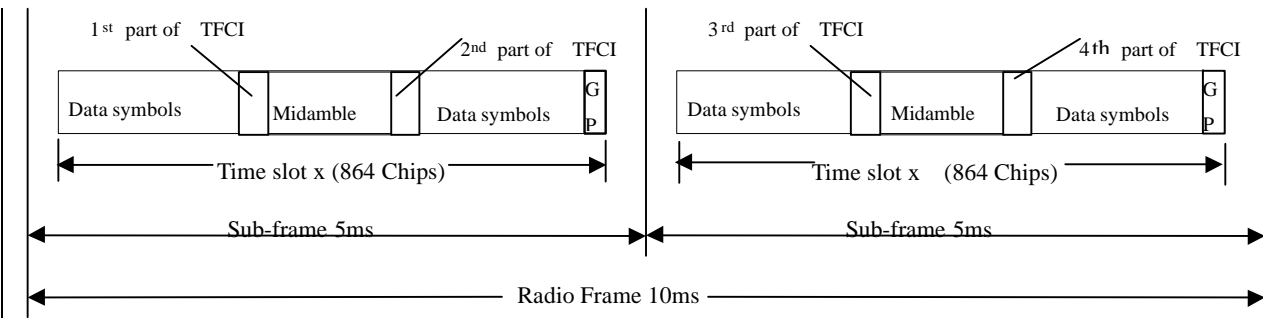


Figure X: Position of TFCI information in the traffic burst in case of no TPC and SS in 1.28 Mcps TDD

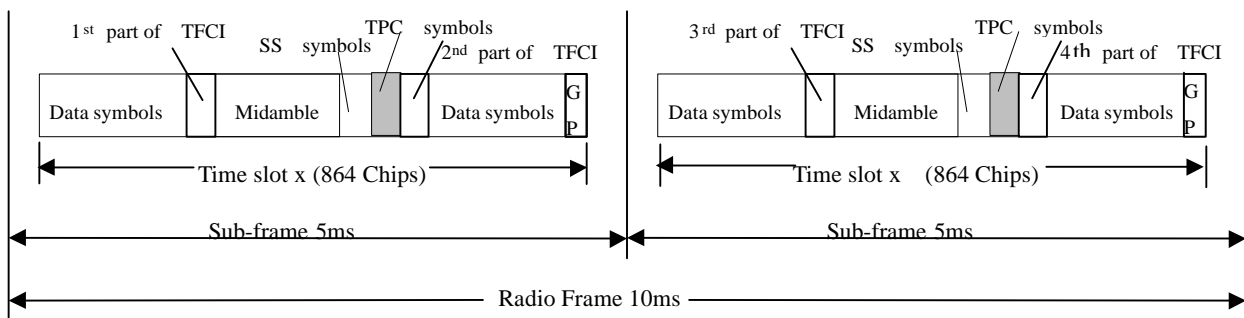


Figure Y: Position of TFCI information in the traffic burst in case of TPC and SS in 1.28 Mcps TDD

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
<u>-1 -1 -1 -1</u>	<u>0</u>
<u>-1 -1 -1 1</u>	<u>1</u>
<u>-1 -1 1 -1</u>	<u>2</u>
<u>-1 -1 1 1</u>	<u>3</u>
<u>-1 1 -1 -1</u>	<u>4</u>
<u>-1 1 -1 1</u>	<u>5</u>
<u>-1 1 1 -1</u>	<u>6</u>
<u>-1 1 1 1</u>	<u>7</u>
<u>1 -1 -1 -1</u>	<u>8</u>
<u>1 -1 -1 1</u>	<u>9</u>
<u>1 -1 1 -1</u>	<u>A</u>
<u>1 -1 1 1</u>	<u>B</u>
<u>1 1 -1 -1</u>	<u>C</u>
<u>1 1 -1 1</u>	<u>D</u>
<u>1 1 1 -1</u>	<u>E</u>
<u>1 1 1 1</u>	<u>F</u>

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

$$\mathbf{m}_p = (m_1, m_2, \dots, m_p) \quad (1)$$

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 $\underline{\mathbf{m}}_p$:

$$\underline{\mathbf{m}}_p = (m_1, m_2, \dots, m_p) \quad (2)$$

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

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

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:

$$\underline{i}_{\max} = L_m + (K - 1)W \quad (4)$$

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:

$$\underline{\mathbf{m}} = (m_1, m_2, \dots, m_{i_{\max}}) = (m_1, m_2, \dots, m_{L_m + (K-1)W}) \quad (5)$$

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:

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

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:

$$\underline{\mathbf{m}}^{(k)} = (m_1^{(k)}, m_2^{(k)}, \dots, m_{L_m}^{(k)}) \quad (7)$$

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

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

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 $\underline{\mathbf{m}}^{(k)}$; $k=1, \dots, K$, based on a single basic midamble code $\underline{\mathbf{m}}_p$ 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

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

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

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)

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.

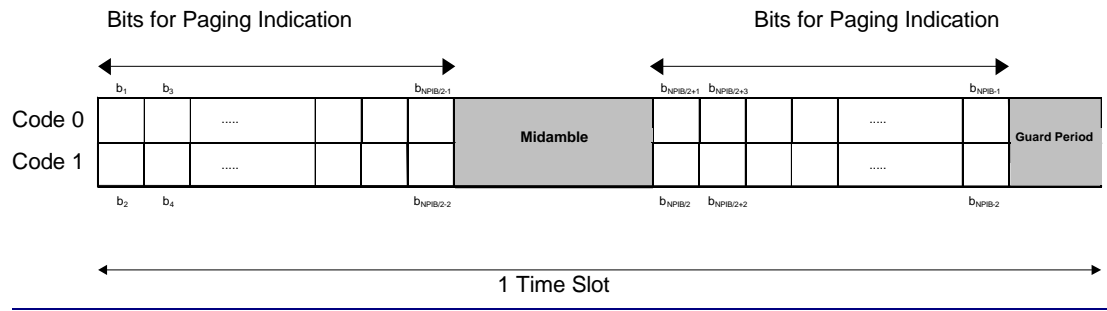


Figure: Transmission and numbering of paging indicators carrying bits on the PICH burst

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, $N_P=N_{PICH} \cdot N_{PI}$ paging indicators are transmitted in each PICH block.

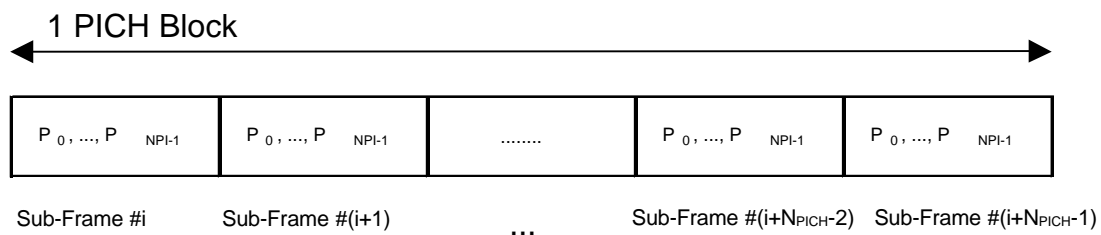


Figure [XX]: Structure of a PICH block

The value PI ($PI = 0, \dots, N_{PI}-1$) 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

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

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

The PI bitmap in the PCH data frames over I_{ub} 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

6.5 Beacon function of physical channels

6.5.1 Location of physical channels with beacon function

6.5.2 Physical characteristics of the beacon function

6.6 Midamble Allocation for Physical Channels

6.6.1 Midamble Allocation for DL Physical Channels

6.6.1.1 Midamble Allocation by signalling

6.6.1.1.1 Common Midamble

6.6.1.1.2 UE specific Midamble

6.6.1.2 Midamble Allocation by default

6.6.2 Midamble Allocation for UL Physical Channels

67 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.](#)

<u>Transport channels</u>	<u>Physical channels</u>
<u>DCH</u>	<u>Dedicated Physical Channel (DPCH)</u>
<u>BCH</u>	<u>Primary Common Control Physical Channels (P-CCPCH)</u>
<u>PCH</u>	<u>Secondary Common Control Physical Channels(S-CCPCH)</u>
<u>FACH</u>	<u>Secondary Common Control Physical Channels(S-CCPCH)</u>
	<u>PICH</u>
<u>RACH</u>	<u>Physical Random Access Channel (PRACH)</u>
<u>USCH</u>	<u>Physical Uplink Shared Channel (PUSCH)</u>

<u>DSCH</u>	<u>Physical Downlink Shared Channel (PDSCH)</u>
	<u>Down link Pilot Channel (DwPCH)</u>
	<u>Up link Pilot Channel (UpPCH)</u>
	<u>FPACH</u>

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

8.1 Dedicated Transport Channels

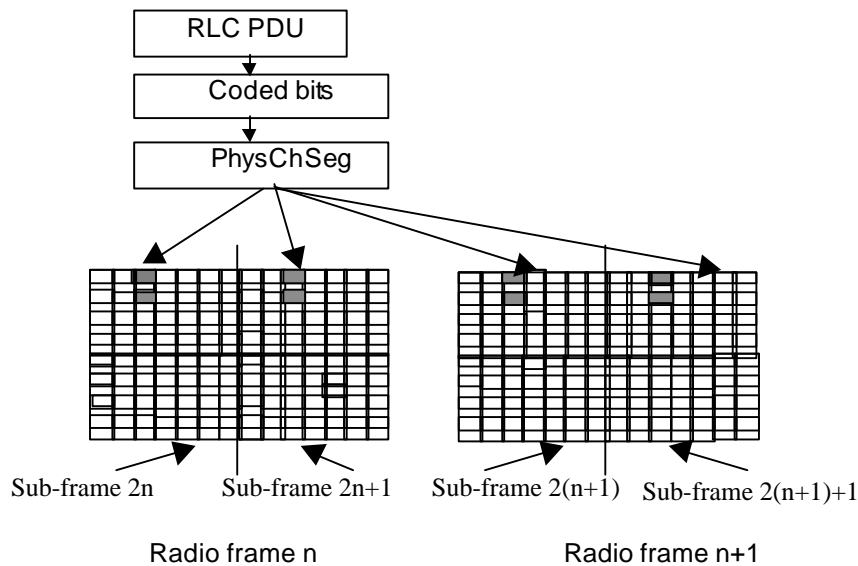


Figure : Mapping of PDU onto the physical bearer(TTI= 20ms)

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].

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:

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

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

<u>mP14</u>	<u>49F270E29CCD742A40480DD4215E1632</u>
<u>mP15</u>	<u>6A5C0410C6C39AA04E77423C355926DE</u>
<u>mP16</u>	<u>7976615538203103D4DBCC219B16A9E1</u>
<u>mP17</u>	<u>A6C3C3175845400BD2B738C43EE2645F</u>
<u>mP18</u>	<u>A0FD56258D228642C6F641851C3751ED</u>
<u>mP19</u>	<u>EFA48C3FC84AC625783C6C9510A2269A</u>
<u>mP20</u>	<u>62A8EB1A420334B23396E8D76BC19740</u>
<u>mP21</u>	<u>9E96235699D5D41C9816C921023BC741</u>
<u>mP22</u>	<u>4362AE4CAE0DCC32D60A3FED1341A848</u>
<u>mP23</u>	<u>454C068E6C4F190942E0904B95D61DFB</u>
<u>mP24</u>	<u>607FEEA6E2E99206718A49C0D6A25034</u>
<u>mP25</u>	<u>E1D1BCDA39A09095B5C81645103A077C</u>
<u>mP26</u>	<u>994B445E558344DE211C8286DDD3D1A3</u>
<u>mP27</u>	<u>C15233273581417638906ADB61FDCA3C</u>
<u>mP28</u>	<u>8B79A274D542F096FB1388098230F8A1</u>
<u>mP29</u>	<u>DF58AC1C5F44B2A40266385CE1DA5640</u>
<u>mP30</u>	<u>B5949A1CC69962C464401D05FF5C1A7A</u>
<u>mP31</u>	<u>85AC489841ED3EAA2D83BBB0039CC707</u>
<u>mP32</u>	<u>AE371CC144BC95923CA8108D8B49FE82</u>
<u>mP33</u>	<u>7F188484A649D1C22BDA1F09D49B5117</u>
<u>mP34</u>	<u>ADAA3C657089DEF7C0284903A491C9B0</u>
<u>mP35</u>	<u>C3F96893C7504DC3B51488604AF64F4C</u>
<u>mP36</u>	<u>B4002F5AE0CE8623AC979D368E9148C1</u>
<u>mP37</u>	<u>0EEBCC0C795C02A106C24ABB36D08C6E</u>
<u>mP38</u>	<u>4B0F537E384A893F58971580D9894433</u>
<u>mP39</u>	<u>08E0035AB29B7ECC53C15DAA0687CC8F</u>
<u>mP40</u>	<u>8611ACBC4C82781D77654EE862506D60</u>
<u>mP41</u>	<u>63315261A8F1CB02549802DBFD197C07</u>
<u>mP42</u>	<u>9A2609A434F43E7DCADC0E22B2EF4012</u>
<u>mP43</u>	<u>F4C9F0A127A88461209ABF8C69CE4D00</u>
<u>mP44</u>	<u>C79124EE3FFC28C5C4524D2B01670D42</u>
<u>mP45</u>	<u>C91985C4FED53D09361914354BA80E79</u>
<u>mP46</u>	<u>82AA517260779ECFF26212C1A10BDC29</u>

<u>mP47</u>	<u>561DE2040ACB458E0DBD354E43E111D9</u>
<u>mP48</u>	<u>2E58C7202D17392BC1235782CEFABB09</u>
<u>mP49</u>	<u>C4FAA121C698047650F6503126A577C1</u>
<u>mP50</u>	<u>E7B75206A9B410E44346E0DAE842A23C</u>
<u>mP51</u>	<u>3F8B1C32682B28D098D3805ED130EA7F</u>
<u>mP52</u>	<u>8D5FC2C1C6715F824B401434C8D4BB82</u>
<u>mP53</u>	<u>0B2A43453ACC028FE6EB6E1CB0740B59</u>
<u>mP54</u>	<u>BC56948FC700BA4883262EE73E12D82A</u>
<u>mP55</u>	<u>558D136710272912FA4F183D1189A7FD</u>
<u>mP56</u>	<u>5709E7F82DC6500B7B12A3072D182645</u>
<u>mP57</u>	<u>86D4F161C844AE5E20EE39FD5493B044</u>
<u>mP58</u>	<u>8729B6EDC382B152185885F013DAE222</u>
<u>mP59</u>	<u>154C45B50720F4C362C14C77FE8335A1</u>
<u>mP60</u>	<u>C6A0962890351F4EB802DE43A7662C9E</u>
<u>mP61</u>	<u>D19D69D6B380B4B22457CB80033519F0</u>
<u>mP62</u>	<u>C7D89509FB0DAE9255998E0A00C2B262</u>
<u>mP63</u>	<u>DFD481C652C0C905D61D66F1732C4AA2</u>
<u>mP64</u>	<u>06C848619AF1D6C910A8EAC4B622FC06</u>
<u>mP65</u>	<u>0635E29D4E7AC8ABC189890241F45ECA</u>
<u>mP66</u>	<u>B272B020586AAD7B093AC2F459076638</u>
<u>mP67</u>	<u>B608ACE46E1A6BC96181EEDD88B54140</u>
<u>mP68</u>	<u>0A516092B3ED7849B168AFE223B8670E</u>
<u>mP69</u>	<u>D1A658C5009E04D0D7D5E9205EE663E8</u>
<u>mP70</u>	<u>AC316DC39B91EB60B1AABD8280740432</u>
<u>mP71</u>	<u>E3F06825476A026CD287625E514519FC</u>
<u>mP72</u>	<u>A56D092080DDE8994F387C175CC56833</u>
<u>mP73</u>	<u>15EA799DE587C506D0CD99A408217B05</u>
<u>mP74</u>	<u>A59C020BAB9AF6D3F813C391CA244CD2</u>
<u>mP75</u>	<u>74B0101EB9F3167434B94BABC8378882</u>
<u>mP76</u>	<u>CE752975C8DA9B0100386DB82A8C3D20</u>
<u>mP77</u>	<u>BBB38DCDB1E9118570AC147DC05241A4</u>
<u>mP78</u>	<u>944ABBF0866098101F6971731AB2E986</u>
<u>mP79</u>	<u>2BB147B2A30C68B4853F90481A166EB6</u>

<u>mP80</u>	<u>444840ACCF3F23C45B56D7704BF18283</u>
<u>mP81</u>	<u>87604F7450D1AD188C452981A5C7FC9B</u>
<u>mP82</u>	<u>8C3842EBC948A65BC4C8B387F11B7090</u>
<u>mP83</u>	<u>10B4767D071CF5DB2288E4029576135A</u>
<u>mP84</u>	<u>6F07AAB697CD0089572C6B062E2018E4</u>
<u>mP85</u>	<u>D3D65B442057E613A8655060C8D29E27</u>
<u>mP86</u>	<u>5EDA330514C604BF4E0894E09EC57A74</u>
<u>mP87</u>	<u>B0899CD094060724DED82AE85F18A43A</u>
<u>mP88</u>	<u>B2D999B86DF902BC25015CAE3A0823C4</u>
<u>mP89</u>	<u>C23CD40F04242B92D46EED82CD9A9A18</u>
<u>mP90</u>	<u>D22DDCC5CB82960125DD24655F3C8788</u>
<u>mP91</u>	<u>54987218FBD99AE4340FD4C9458E9850</u>
<u>mP92</u>	<u>BE4341822997A7B11EA1E8A1A2767005</u>
<u>mP93</u>	<u>255200FBA6EE48E6DE0A82B0461B8D0F</u>
<u>mP94</u>	<u>6FBD58A663932423503690CF9C171701</u>
<u>mP95</u>	<u>D215033A4AA87EC1C232BAC7EDA09370</u>
<u>mP96</u>	<u>CA0959B01AE48E80204F1E4A3F29CE55</u>
<u>mP97</u>	<u>582043413B9B825903E3A3545ED59463</u>
<u>mP98</u>	<u>5016541922971C703D16E284CBDF633B</u>
<u>mP99</u>	<u>7347EF160A1733CA98D43608A83A920B</u>
<u>mP100</u>	<u>908B22AD433CCA00B3FD47C691F1A290</u>
<u>mP101</u>	<u>BB22A272FC6923DF1B43BA4118806570</u>
<u>mP102</u>	<u>0FA75C87474836B47DC7624D61193802</u>
<u>mP103</u>	<u>A22EBA0658A4D0FF1E9CA5030A65CC06</u>
<u>mP104</u>	<u>6C9C51CA15F1F4981F4C46180A6A6697</u>
<u>mP105</u>	<u>4C847ACF8BC15359C405322851C9BDE2</u>
<u>mP106</u>	<u>C1D29499C0082C9DE473ED15B14D63E0</u>
<u>mP107</u>	<u>7E85ECC98AC761005076C5572869A431</u>
<u>mP108</u>	<u>D8F11121595B8F49F78A7039E44126A0</u>
<u>mP109</u>	<u>1A0BC814445FD71C8E5B1A9163ED2059</u>
<u>mP110</u>	<u>A7591F27F8B0C00C68CC41697954FA04</u>
<u>mP111</u>	<u>6CA2CE595E7406D79C4840183D41B9D0</u>
<u>mP112</u>	<u>C093D3CC701FC20E66F5AB22516C5460</u>

<u>m_{p113}</u>	<u>D0E0CDE9B595546B96C4F8066B469020</u>
<u>m_{p114}</u>	<u>E99F743A451431C8B427054A4E6F2007</u>
<u>m_{p115}</u>	<u>C0D21A344A2C07DF2A6EBE6250C7B91E</u>
<u>m_{p116}</u>	<u>F031223E282CF7A4D8EF174A908668AE</u>
<u>m_{p117}</u>	<u>E4BD244AC16C55C7137FB068FD44280C</u>
<u>m_{p118}</u>	<u>C44920DE2028F19FC2AAB36A0DCFDAD0</u>
<u>m_{p119}</u>	<u>3FA7054E77135250699E6C8A11600742</u>
<u>m_{p120}</u>	<u>D5740B4D8870C1C5B5A214C4266FC537</u>
<u>m_{p121}</u>	<u>F0B7942D43BB6F38446442EB8126AB80</u>
<u>m_{p122}</u>	<u>83DB9534EAD6238FA8968798CDF04848</u>
<u>m_{p123}</u>	<u>EB9663CDDC2B291690703125BABC800</u>
<u>m_{p124}</u>	<u>84D547225D4BBD20DEF1A583240C6E0F</u>
<u>m_{p125}</u>	<u>B51F6A771838BE934724AEA6A2669802</u>
<u>m_{p126}</u>	<u>D92AC05E10496794BBDC115233B1C068</u>
<u>m_{p127}</u>	<u>D3ACF0078EDA9856BBB0AF8651132103</u>

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

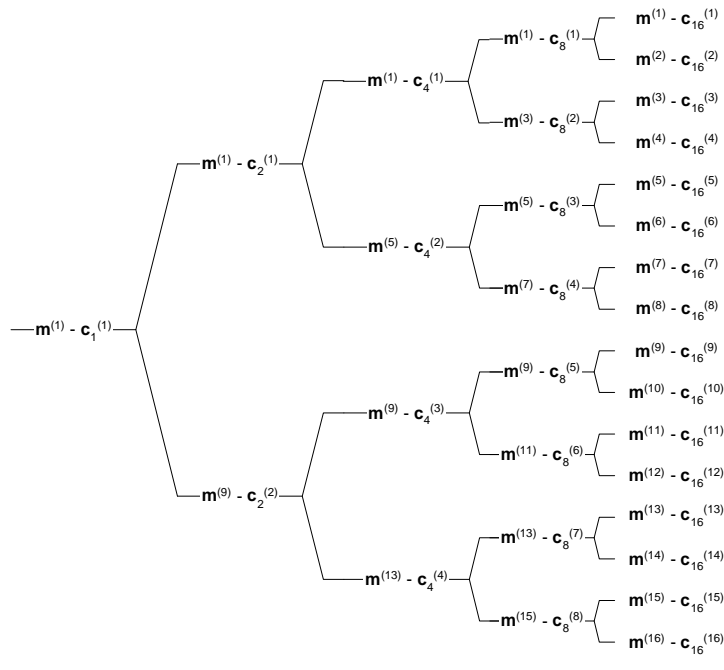


Figure C.2.1: Association of Midambles to Spreading Codes for K=16

C.2.2 Association for K=14 Midambles

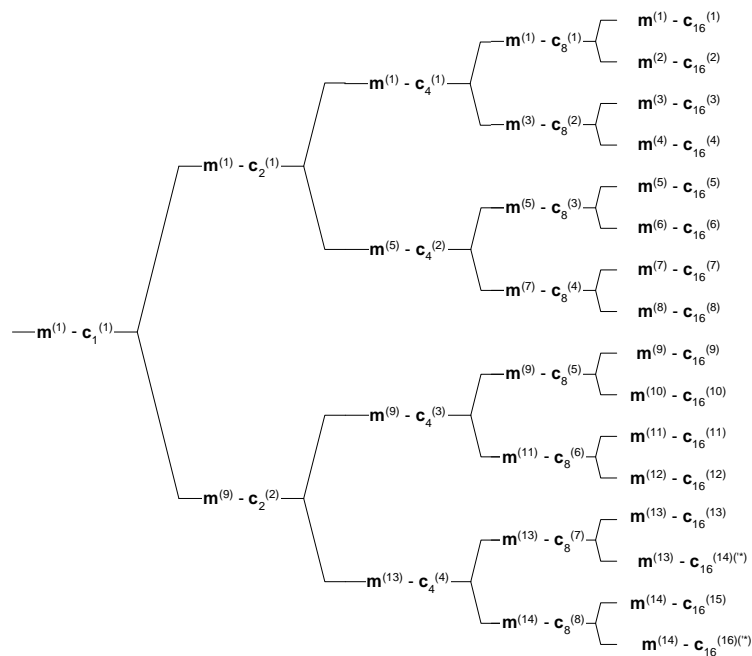


Figure C.2.2: Association of Midambles to Spreading Codes for K=14

C.2.3 Association for K=12 Midambles

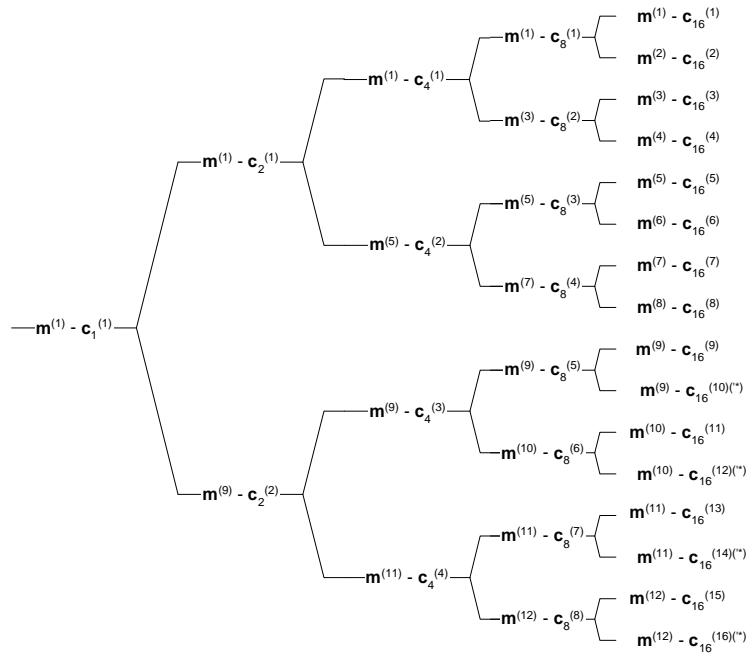


Figure C.2.3: Association of Midambles to Spreading Codes for K=12

C.2.4 Association for K=10 Midambles

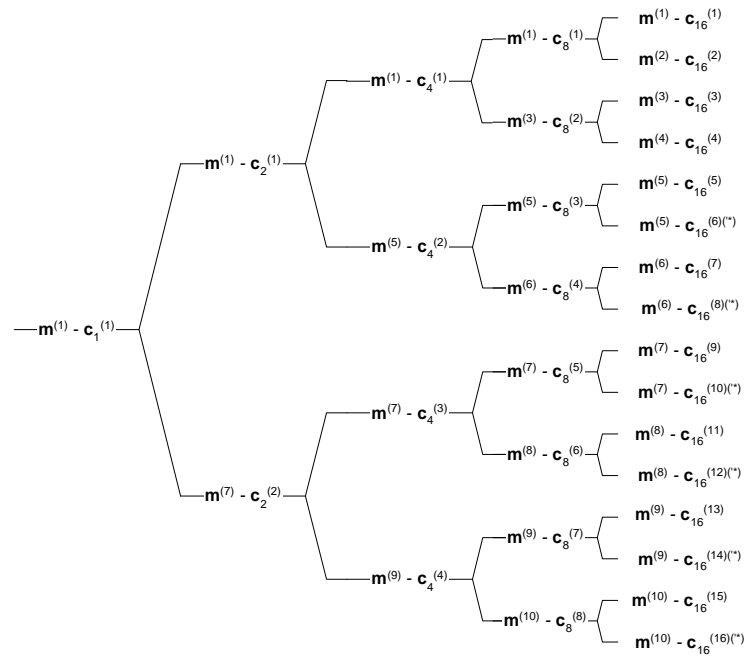


Figure C.2.4: Association of Midambles to Spreading Codes for K=10

C.2.5 Association for K=8 Midambles

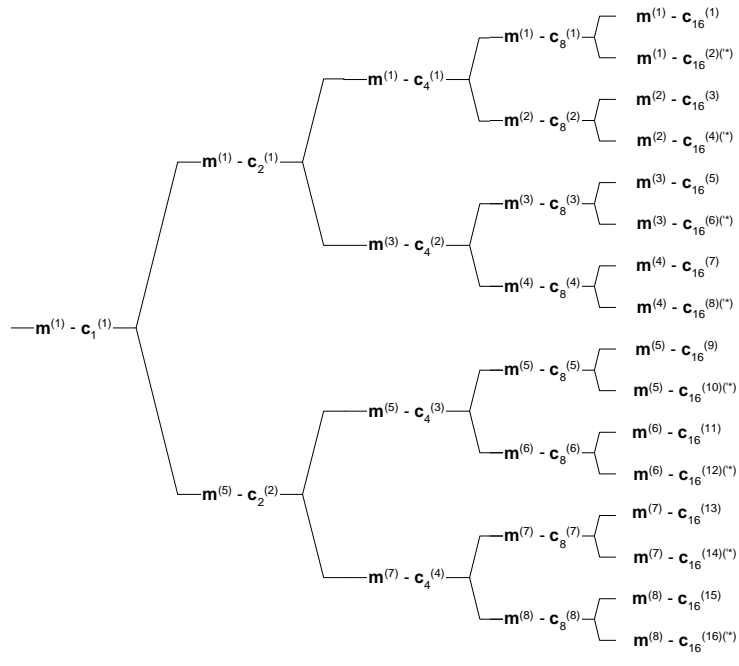


Figure C.2.5: Association of Midambles to Spreading Codes for K=8

C.2.6 Association for K=6 Midambles

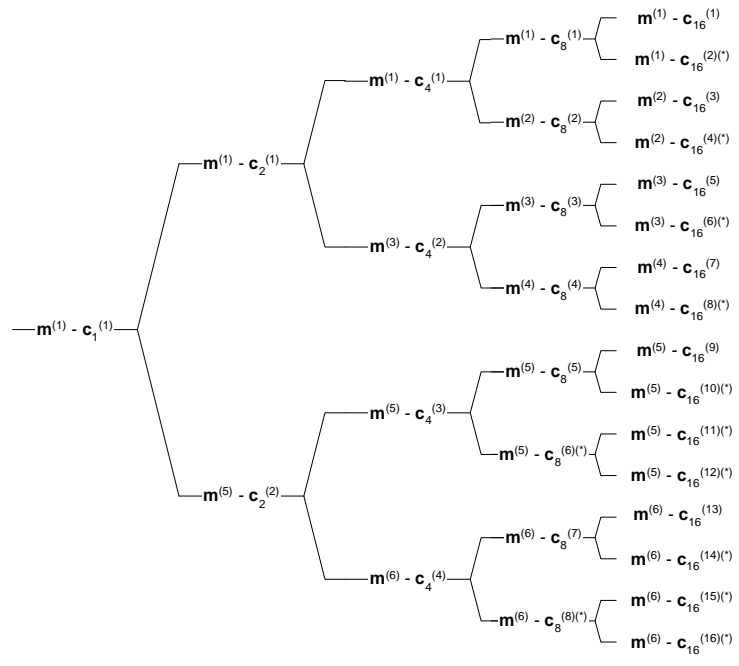


Figure C.2.6: Association of Midambles to Spreading Codes for K=6

C.2.7 Association for K=4 Midambles

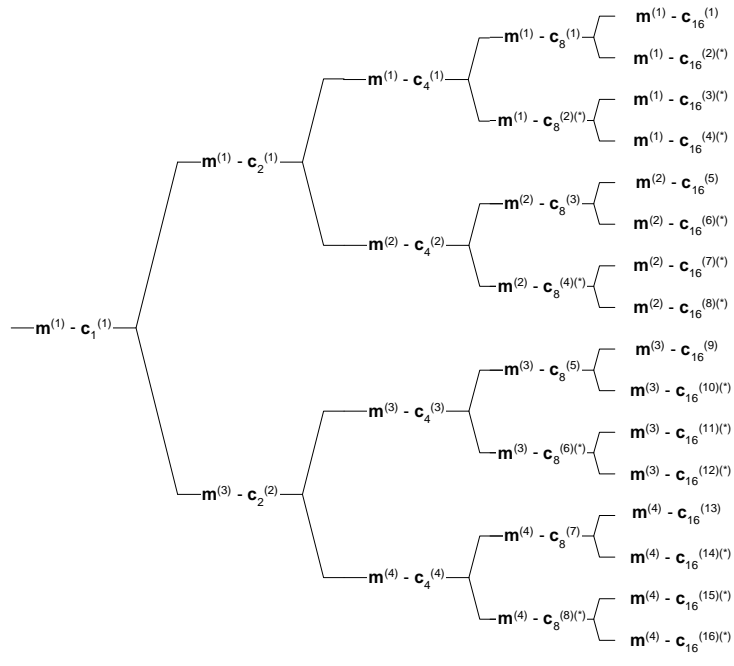


Figure C.2.7: Association of Midambles to Spreading Codes for K=4

C.2.8 Association for K=2 Midambles

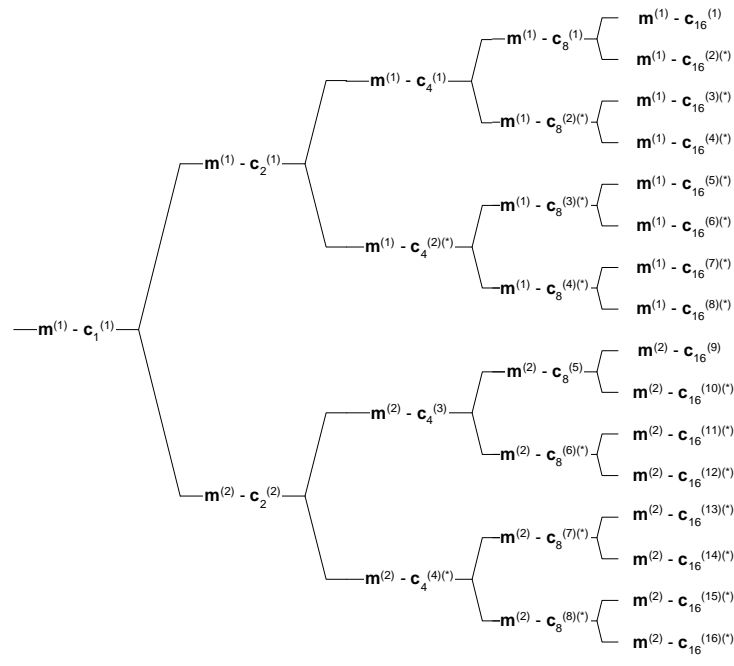


Figure C.2.8: Association of Midambles to Spreading Codes for K=2

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

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

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