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*Technical Specification*

**Universal Mobile Telecommunications System (UMTS);
Physical channels and mapping of transport channels
onto physical channels (TDD)
(3GPP TS 25.221 version 7.3.0 Release 7)**

Reference

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# Contents

# Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

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# 1 Scope

The present document describes the characteristics of the physicals channels and the mapping of the transport channels to physical channels in the TDD mode of UTRA.

# 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] 3GPP TS 25.201: "Physical layer - general description".

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[17] 3GPP TS 25.435: "UTRAN $I_{ub}$ Interface User Plane Protocols for Common Transport Channel Data Streams".

[18] 3GPP TS25.308: High Speed Downlink Packet Access (HSDPA); Overall description; Stage 2


# 3 Abbreviations

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

16QAM 16 Quadrature Amplitude Modulation

| | |
|---|---|
| BCH | Broadcast Channel |
| CCPCH | Common Control Physical Channel |
| CCTrCH | Coded Composite Transport Channel |
| CDMA | Code Division Multiple Access |
| CQI | Channel Quality Indicator |
| DCH | Dedicated Channel |
| DL | Downlink |
| DPCH | Dedicated Physical Channel |
| DRX | Discontinuous Reception |
| DSCH | Downlink Shared Channel |
| DTX | Discontinuous Transmission |
| DwPCH | Downlink Pilot Channel |
| DwPTS | Downlink Pilot Time Slot |
| E-AGCH | E-DCH Absolute Grant Channel |
| E-DCH | Enhanced Dedicated Channel |
| E-HICH | E-DCH Hybrid ARQ Indicator Channel |
| E-PUCH | E-DCH Physical Uplink Channel |
| E-RUCCH | E-DCH Random Access Uplink Control Channel |
| E-UCCH | E-DCH Uplink Control Channel |
| FACH | Forward Access Channel |
| FDD | Frequency Division Duplex |
| FEC | Forward Error Correction |
| GP | Guard Period |
| GSM | Global System for Mobile Communication |
| HARQ | Hybrid ARQ |
| HS-DSCH | High Speed Downlink Shared Channel |
| HS-PDSCH | High Speed Physical Downlink Shared Channel |
| HS-SCCH | Shared Control Channel for HS-DSCH |
| HS-SICH | Shared Information Channel for HS-DSCH |
| MBSFN | MBMS over a Single Frequency Network |
| MIB | Master Information Block |
| MICH | MBMS Indicator Channel |
| NI | MBMS Notification Indicator |
| NRT | Non-Real Time |
| OVSF | Orthogonal Variable Spreading Factor |
| P-CCPCH | Primary CCPCH |
| PCH | Paging Channel |
| PDSCH | Physical Downlink Shared Channel |
| PI | Paging Indicator (value calculated by higher layers) |
| PICH | Page Indicator Channel |
| PLCCH | Physical Layer Common Control Channel |
| $P_q$ | Paging Indicator (indicator set by physical layer) |
| PRACH | Physical Random Access Channel |
| PUSCH | Physical Uplink Shared Channel |
| RACH | Random Access Channel |
| RF | Radio Frame |
| RT | Real Time |
| S-CCPCH | Secondary CCPCH |
| SCH | Synchronisation Channel |
| SCTD | Space Code Transmit Diversity |
| SF | Spreading Factor |
| SFN | Cell System Frame Number |
| SS | Synchronisation Shift |
| TCH | Traffic Channel |
| TDD | Time Division Duplex |
| TDMA | Time Division Multiple Access |
| TFC | Transport Format Combination |
| TFCI | Transport Format Combination Indicator |
| TFI | Transport Format Indicator |
| TPC | Transmitter Power Control |
| TrCH | Transport Channel |
| TSTD | Time Switched Transmit Diversity |

| | |
|---|---|
| TTI | Transmission Time Interval |
| UE | User Equipment |
| UL | Uplink |
| UMTS | Universal Mobil Telecommunications System |
| UpPTS | Uplink Pilot Time Slot |
| UpPCH | Uplink Pilot Channel |
| USCH | Uplink Shared Channel |
| UTRAN | UMTS Terrestrial Radio Access Network |

# 4 Services offered to higher layers

## 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].

### 4.1.1 Dedicated transport channels

There exists two types of dedicated transport channel, the Dedicated Channel (DCH) and the Enhanced Dedicated Channel (E-DCH).

#### 4.1.1.1 DCH – Dedicated Channel

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.

#### 4.1.1.2 E-DCH – Enhanced Dedicated Channel

The Enhanced Dedicated Channel (E-DCH) is an uplink transport channel.

### 4.1.2 Common transport channels

There are seven types of common transport channels: BCH, FACH, PCH, RACH, USCH, DSCH, HS-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.

#### 4.1.2.7 HS-DSCH – High Speed Downlink Shared Channel

The High Speed Downlink Shared Channel (HS-DSCH) is a downlink transport channel shared by several UEs. The HS-DSCH is associated with one or several Shared Control Channels (HS-SCCH). The HS-DSCH is transmitted over the entire cell or over only part of the cell using e.g. beam-forming antennas.

## 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 (PI) and MBMS Notification Indicator (NI).

# 5 Physical channels for the 3.84 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 a guard period in every timeslot. The time slots are used in the sense of a TDMA component to separate different user signals in the time domain. The physical channel signal format is presented in figure 1.

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 two data parts, a midamble part 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 parts must use different OVSF channelisation codes, but the same scrambling code. The midamble parts are either identicaly or differently shifted versions of a cell-specific basic midamble code, see section 5.2.3. Note when in MBSFN operation, a midamble is not necessarily cell-specific.

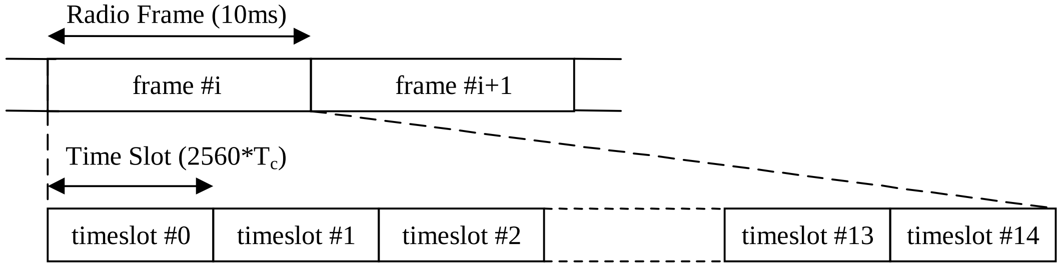



**Figure 1: Physical channel signal format**

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.

The midamble part of the burst can contain two different types of midambles: a short one of length 256 chips, or a long one of 512 chips. The data rate of the physical channel is depending on the used midamble length. Additionally, when in MBSFN operation a midamble of length 320 chips is used.

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.

## 5.1 Frame structure

The TDMA frame has a duration of 10 ms and is subdivided into 15 time slots (TS) of 2560*$T_c$ duration each. A time slot corresponds to 2560 chips. The physical content of the time slots are the bursts of corresponding length as described in subclause 5.2.2.

Each 10 ms frame consists of 15 time slots, each allocated to either the uplink or the downlink (figure 2). With such a flexibility, the TDD mode can be adapted to different environments and deployment scenarios. In any configuration at least one time slot has to be allocated for the downlink and at least one time slot has to be allocated for the uplink with the exception of no uplink timeslots when the entire carrier is dedicted to MBSFN

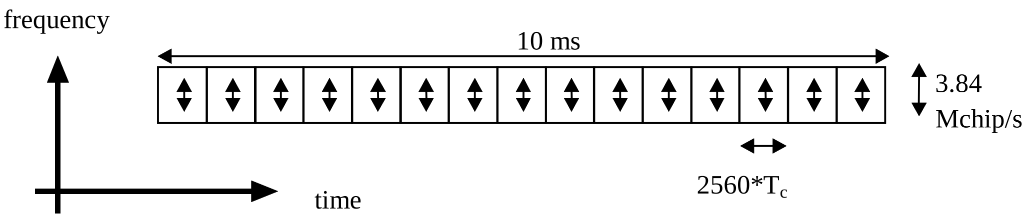
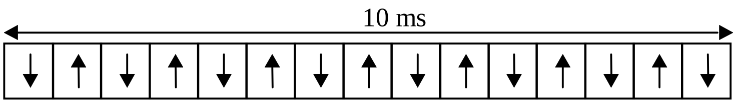
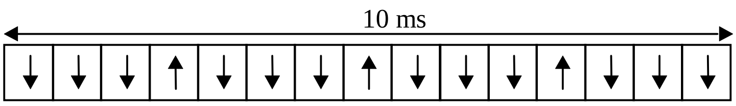



**Figure 2: The TDD frame structure**

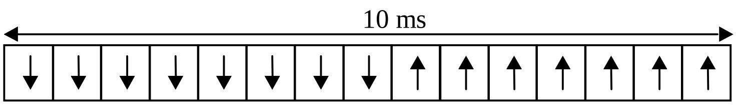
Examples for multiple and single switching point configurations as well as for symmetric and asymmetric UL/DL allocations are given in figure 3.



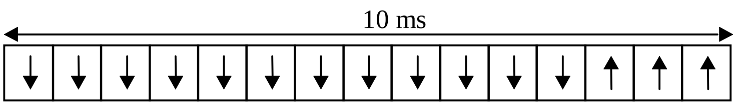

**Multiple-switching-point configuration (symmetric DL/UL allocation)**



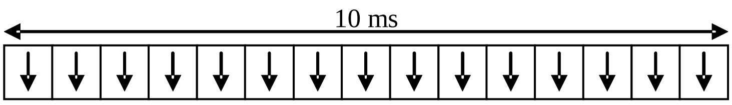

**Multiple-switching-point configuration (asymmetric DL/UL allocation)**




**Single-switching-point configuration (symmetric DL/UL allocation)**




**Single-switching-point configuration (asymmetric DL/UL allocation)**




**Entire carrier dedicated to MBSFN**

**Figure 3: TDD frame structure examples**

## 5.2 Dedicated physical channel (DPCH)

The DCH as described in subclause 4.1.1 is mapped onto the dedicated physical channel.

### 5.2.1 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].

#### 5.2.1.1 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.

#### 5.2.1.2 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 each physical channel an individual minimum spreading factor $SF_{min}$ is transmitted by means of the higher layers. There are two options that are indicated by UTRAN:

1. The UE shall use the spreading factor $SF_{min}$, independent of the current TFC.

2. The UE shall autonomously increase the spreading factor depending on the current TFC.

If the UE autonomously changes the SF, it shall always vary the channelisation code along the branch with the higher code numbering of the allowed OVSF sub tree, as depicted in [8]. In the event that code hopping is configured by higher layers, the allowed OVSF sub-tree is that subtended by the effective allocated OVSF code after the hop sequence has been applied to the allocated OVSF code (see [9]).

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].

### 5.2.2 Burst Types

Four types of bursts for dedicated physical channels are defined. 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 types 1, 2, 3 and 4**

| Spreading factor (SF) | Burst Type 1 | Burst Type 2 | Burst Type 3 | Burst Type 4 |
|---|---|---|---|---|
| 1 | 1952 | 2208 | 1856 | 2112 |
| 2 | 976 | 1104 | 928 | N/A |
| 4 | 488 | 552 | 464 | N/A |
| 8 | 244 | 276 | 232 | N/A |
| 16 | 122 | 138 | 116 | 132 |

The support of burst types 1, 2 and 3 is mandatory for UEs supporting transmit and receive functions. UEs supporting transmit and receive functions and also MBSFN operation must additionally support burst type 4. UEs with receive only capability need only support burst type 4. The four different bursts defined here are well suited for different applications, as described in the following sections.

#### 5.2.2.1 Burst Type 1

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. 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.

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 |

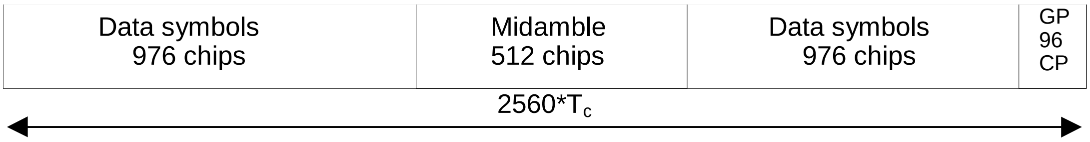



**Figure 4**: **Burst structure of the burst type 1. GP denotes the guard period and CP the chip periods**

### 5.2.2.2 Burst Type 2

The burst type 2 can be used for uplink and downlink. It 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.

The data fields 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. The guard period for the burst type 2 is 96 chip periods long.The burst type 2 is shown in Figure 5. The contents of the burst fields are described in table 3.

**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 |

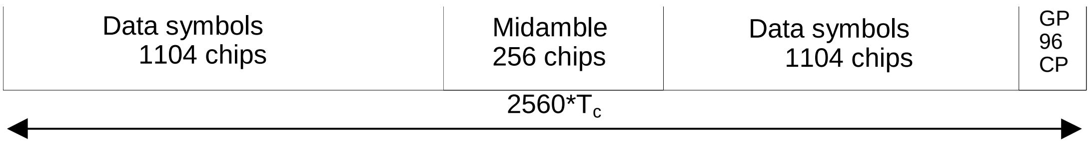



**Figure 5**: **Burst structure of the burst type 2. GP denotes the guard period and CP the chip periods**

### 5.2.2.3 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 |

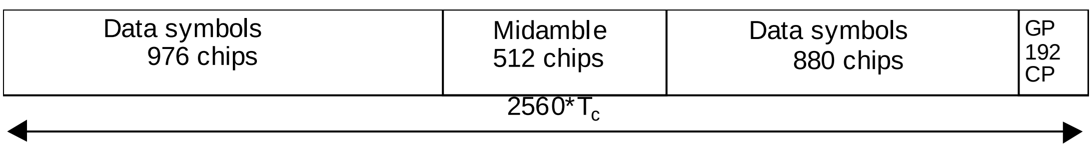



**Figure 6**: **Burst structure of the burst type 3. GP denotes the guard period and CP the chip periods**

### 5.2.2.3A Burst Type 4

The burst type 4 is used for downlink MBSFN operation only and supports a single training sequence.

The data fields of the burst type 4 are 1056 chips long. The corresponding number of symbols is 132 as indicated in table 1 above. The midamble of burst type 4 has a length of 320 chips. The guard period for the burst type 4 is 128 chip periods long. The burst type 4 is shown in Figure 6A. The contents of the burst fields are described in table 4A.

**Table 4A: The contents of the burst type 4 fields**

| Chip number (CN) | Length of field in chips | Length of field in symbols | | Contents of field |
|---|---|---|---|---|
| 0-1055 | 1056 | Cf table 1 | | Data symbols |
| 1056-1375 | 320 | - | | Midamble |
| 1376-2431 | 1056 | Cf table 1 | | Data symbols |
| 2432-2559 | 128 | - | | Guard period |

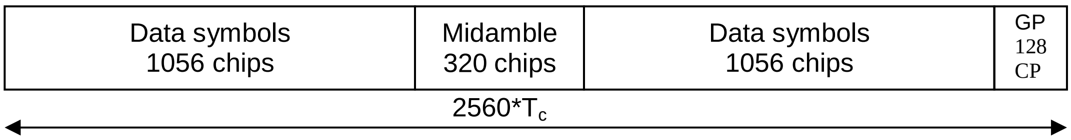



**Figure 6A**: **Burst structure of the burst type 4. GP denotes the guard period and CP the chip periods**

### 5.2.2.4 Transmission of TFCI

All burst types 1, 2, 3 and 4 provide the possibility for transmission of TFCI.

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, except for the MBSFN FACH where the (16,5) bi-orthogonal code is always used for TFCI when TFCI is applied. Additionally for each allocated timeslot it is signalled individually whether that timeslot carries the TFCI or not. The TFCI is always present in the first timeslot in a radio frame for each CCTrCH. If a time slot contains the TFCI, then it is always transmitted using the physical channel with the lowest physical channel sequence number (*p*) in that timeslot. Physical channel sequence numbering is determined by the rate matching function and is described in [7].

The transmission of TFCI is done in the data parts of the respective physical channel. In DL the TFCI code word bits and data bits are subject to the same spreading procedure as depicted in [8]. In DL, the modulation applied to the TFCI code word bits is the same as that applied to the data symbols. In UL, independent of the SF that is applied to the data symbols in the burst, the data in the TFCI field are always spread with SF=16 using the channelisation code in the branch with the highest code numbering of the allowed OVSF sub tree, as depicted in [8]. Hence the midamble structure and length is not changed. The TFCI code word is to be transmitted directly adjacent to the midamble, possibly after the TPC. Figure 7 shows the position of the TFCI code word in a traffic burst in downlink. Figure 8 shows the position of the TFCI code word in a traffic burst in uplink.

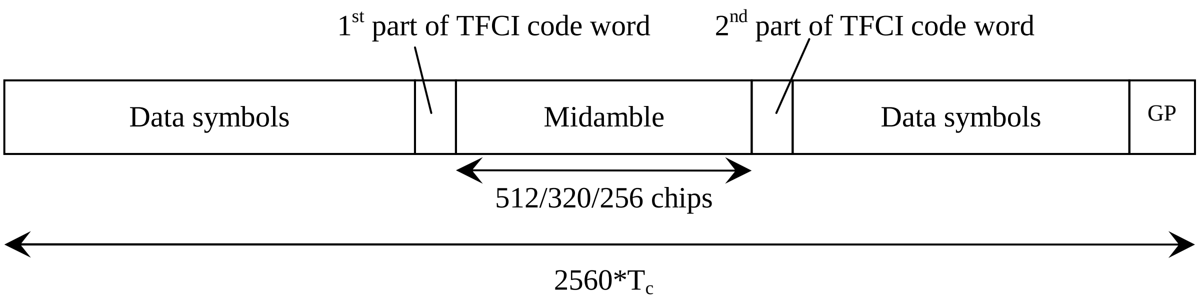



**Figure 7: Position of the TFCI code word in the traffic burst in case of downlink**

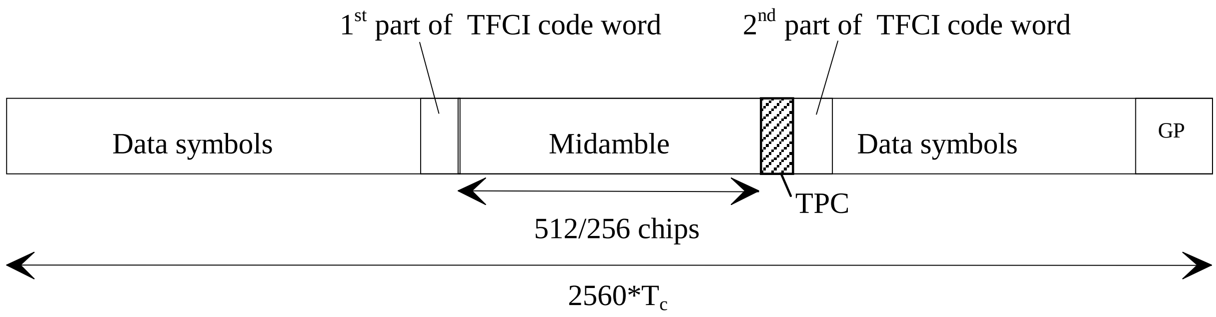



**Figure 8: Position of the TFCI code word in the traffic burst in case of uplink**

Two examples of TFCI transmission in the case of multiple DPCHs used for a connection are given in the Figure 9 and Figure 10 below. Combinations of the two schemes shown are also applicable.

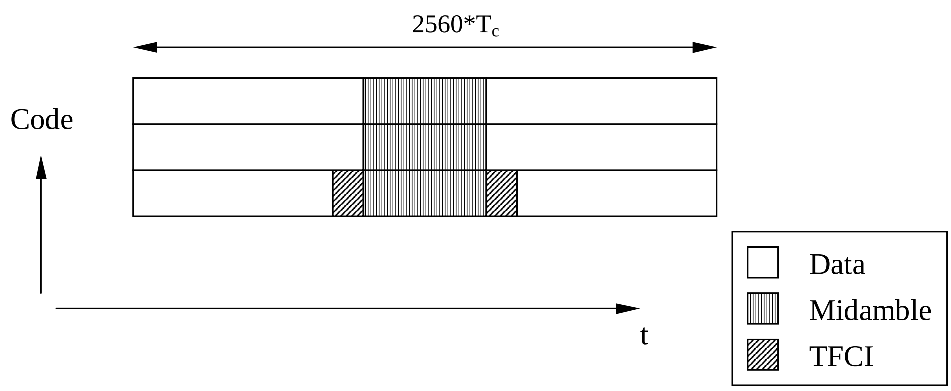



**Figure 9: Example of TFCI transmission with physical channels multiplexed in code domain**

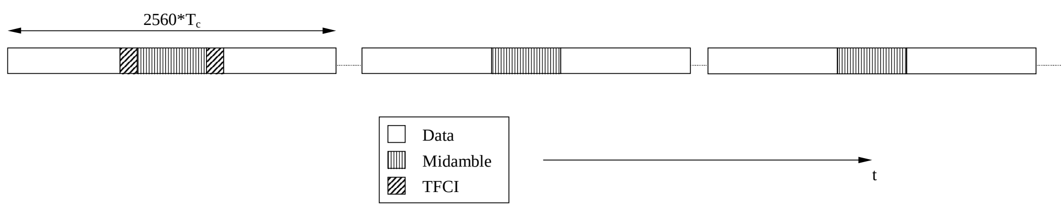



**Figure 10: Example of TFCI transmission with physical channels multiplexed in time domain**

In case the Node B receives an invalid TFI combination on the DCHs mapped to one CCTrCH the procedure described in [16] shall be applied. According to this procedure DTX shall be applied to all DPCHs to which the CCTrCH is mapped to.

### 5.2.2.5 Transmission of TPC

Burst types 1, 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. Independent of the SF that is applied to the data symbols in the burst, the data in the TPC field are always spread with SF=16 using the channelisation code in the branch with the highest code numbering of the allowed OVSF sub tree, as depicted in [8]. Hence the midamble structure and length is not changed. The TPC information is to be transmitted directly after the midamble. Figure 11 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 a TFCI is applied for a CCTrCH, TPC shall be transmitted with the same channelization codes and in the same timeslots as the TFCI. If no TFCI is applied for a CCTrCH, TPC shall be transmitted using the physical channel corresponding to physical channel sequence number $p$=1. Physical channel sequence numbering is determined by the rate matching function and is described in [7].

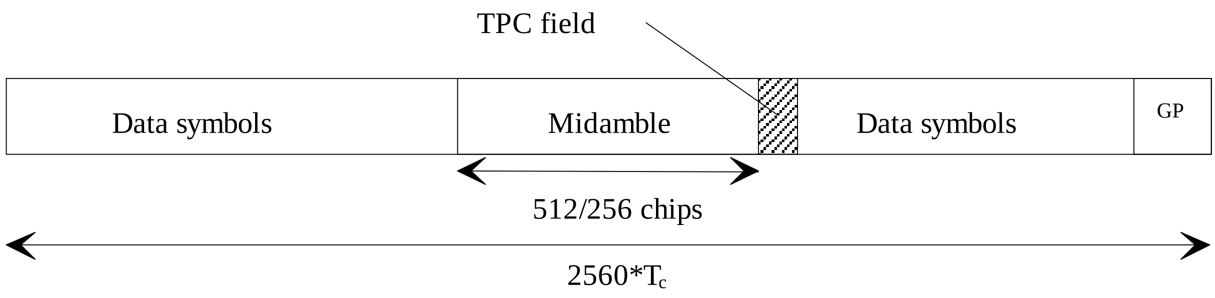



**Figure 11: Position of TPC information in the traffic burst**

The length of the TPC field is $N_{TPC}$ bits. The TPC field is formed via repetition encoding a single bit $b_{TPC}$, $N_{TPC}$ times.

The relationship between $b_{TPC}$ and the TPC command is shown in table 4B.

**Table 4B: TPC bit pattern**

| $b_{TPC}$ | TPC command | Meaning |
|---|---|---|
| 0 | 'Down' | Decrease Tx Power |
| 1 | 'Up' | Increase Tx Power |

### 5.2.2.6 Timeslot formats

#### 5.2.2.6.1 Downlink timeslot formats

The downlink timeslot format depends on the spreading factor, midamble length and on the number of the TFCI code word bits, as depicted in the table 5a. For MBSFN operation the timeslot format also depends upon the symbol modulation scheme used. Slot formats 20-27 are only applicable to MBSFN operation with burst type 4.

**Table 5a: Time slot formats for the Downlink**

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI\ code\ word}$ (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 |
| 20 (QPSK) | 16 | 320 | 0 | 264 | 264 | 132 |
| 21 (QPSK) | 16 | 320 | 16 | 264 | 248 | 124 |
| 22 (16QAM) | 16 | 320 | 0 | 528 | 528 | 264 |
| 23 (16QAM) | 16 | 320 | 16 | 528 | 512 | 256 |
| 24 (QPSK) | 1 | 320 | 0 | 4224 | 4224 | 2112 |
| 25 (QPSK) | 1 | 320 | 16 | 4224 | 4208 | 2104 |
| 26 (16QAM) | 1 | 320 | 0 | 8448 | 8448 | 4224 |
| 27 (16QAM) | 1 | 320 | 16 | 8448 | 8432 | 4216 |

#### 5.2.2.6.2 Uplink timeslot formats

The uplink timeslot format depends on the spreading factor, midamble length, guard period length and on the number of the TFCI code word bits. Due to TPC, different amount of bits are mapped to the two data fields. The timeslot formats are depicted in the table 5b. Note that slot format #90 shall only be used for HS_SICH.

**Table 5b: Timeslot formats for the Uplink**

| Slot Format # | Spreading Factor | Midamble length (chips) | Guard Period (chips) | $N_{TFCI}$ code word (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 |
| 1 | 16 | 512 | 96 | 0 | 2 | 244 | 242 | 122 | 120 |
| 2 | 16 | 512 | 96 | 4 | 2 | 244 | 238 | 120 | 118 |
| 3 | 16 | 512 | 96 | 8 | 2 | 244 | 234 | 118 | 116 |
| 4 | 16 | 512 | 96 | 16 | 2 | 244 | 226 | 114 | 112 |
| 5 | 16 | 512 | 96 | 32 | 2 | 244 | 210 | 106 | 104 |
| 6 | 16 | 256 | 96 | 0 | 0 | 276 | 276 | 138 | 138 |
| 7 | 16 | 256 | 96 | 0 | 2 | 276 | 274 | 138 | 136 |
| 8 | 16 | 256 | 96 | 4 | 2 | 276 | 270 | 136 | 134 |
| 9 | 16 | 256 | 96 | 8 | 2 | 276 | 266 | 134 | 132 |
| 10 | 16 | 256 | 96 | 16 | 2 | 276 | 258 | 130 | 128 |
| 11 | 16 | 256 | 96 | 32 | 2 | 276 | 242 | 122 | 120 |
| 12 | 8 | 512 | 96 | 0 | 0 | 488 | 488 | 244 | 244 |
| 13 | 8 | 512 | 96 | 0 | 2 | 486 | 484 | 244 | 240 |
| 14 | 8 | 512 | 96 | 4 | 2 | 482 | 476 | 240 | 236 |
| 15 | 8 | 512 | 96 | 8 | 2 | 478 | 468 | 236 | 232 |
| 16 | 8 | 512 | 96 | 16 | 2 | 470 | 452 | 228 | 224 |
| 17 | 8 | 512 | 96 | 32 | 2 | 454 | 420 | 212 | 208 |
| 18 | 8 | 256 | 96 | 0 | 0 | 552 | 552 | 276 | 276 |
| 19 | 8 | 256 | 96 | 0 | 2 | 550 | 548 | 276 | 272 |
| 20 | 8 | 256 | 96 | 4 | 2 | 546 | 540 | 272 | 268 |
| 21 | 8 | 256 | 96 | 8 | 2 | 542 | 532 | 268 | 264 |
| 22 | 8 | 256 | 96 | 16 | 2 | 534 | 516 | 260 | 256 |
| 23 | 8 | 256 | 96 | 32 | 2 | 518 | 484 | 244 | 240 |
| 24 | 4 | 512 | 96 | 0 | 0 | 976 | 976 | 488 | 488 |
| 25 | 4 | 512 | 96 | 0 | 2 | 970 | 968 | 488 | 480 |
| 26 | 4 | 512 | 96 | 4 | 2 | 958 | 952 | 480 | 472 |
| 27 | 4 | 512 | 96 | 8 | 2 | 946 | 936 | 472 | 464 |
| 28 | 4 | 512 | 96 | 16 | 2 | 922 | 904 | 456 | 448 |
| 29 | 4 | 512 | 96 | 32 | 2 | 874 | 840 | 424 | 416 |
| 30 | 4 | 256 | 96 | 0 | 0 | 1104 | 1104 | 552 | 552 |
| 31 | 4 | 256 | 96 | 0 | 2 | 1098 | 1096 | 552 | 544 |
| 32 | 4 | 256 | 96 | 4 | 2 | 1086 | 1080 | 544 | 536 |
| 33 | 4 | 256 | 96 | 8 | 2 | 1074 | 1064 | 536 | 528 |
| 34 | 4 | 256 | 96 | 16 | 2 | 1050 | 1032 | 520 | 512 |
| 35 | 4 | 256 | 96 | 32 | 2 | 1002 | 968 | 488 | 480 |
| 36 | 2 | 512 | 96 | 0 | 0 | 1952 | 1952 | 976 | 976 |
| 37 | 2 | 512 | 96 | 0 | 2 | 1938 | 1936 | 976 | 960 |
| 38 | 2 | 512 | 96 | 4 | 2 | 1910 | 1904 | 960 | 944 |
| 39 | 2 | 512 | 96 | 8 | 2 | 1882 | 1872 | 944 | 928 |
| 40 | 2 | 512 | 96 | 16 | 2 | 1826 | 1808 | 912 | 896 |
| 41 | 2 | 512 | 96 | 32 | 2 | 1714 | 1680 | 848 | 832 |
| 42 | 2 | 256 | 96 | 0 | 0 | 2208 | 2208 | 1104 | 1104 |
| 43 | 2 | 256 | 96 | 0 | 2 | 2194 | 2192 | 1104 | 1088 |
| 44 | 2 | 256 | 96 | 4 | 2 | 2166 | 2160 | 1088 | 1072 |
| 45 | 2 | 256 | 96 | 8 | 2 | 2138 | 2128 | 1072 | 1056 |
| 46 | 2 | 256 | 96 | 16 | 2 | 2082 | 2064 | 1040 | 1024 |
| 47 | 2 | 256 | 96 | 32 | 2 | 1970 | 1936 | 976 | 960 |

| Slot Format # | Spreading Factor | Midamble length (chips) | Guard Period (chips) | $N_{TFCI}$ code word (bits) | $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|---|
| 48 | 1 | 512 | 96 | 0 | 0 | 3904 | 3904 | 1952 | 1952 |
| 49 | 1 | 512 | 96 | 0 | 2 | 3874 | 3872 | 1952 | 1920 |
| 50 | 1 | 512 | 96 | 4 | 2 | 3814 | 3808 | 1920 | 1888 |
| 51 | 1 | 512 | 96 | 8 | 2 | 3754 | 3744 | 1888 | 1856 |
| 52 | 1 | 512 | 96 | 16 | 2 | 3634 | 3616 | 1824 | 1792 |
| 53 | 1 | 512 | 96 | 32 | 2 | 3394 | 3360 | 1696 | 1664 |
| 54 | 1 | 256 | 96 | 0 | 0 | 4416 | 4416 | 2208 | 2208 |
| 55 | 1 | 256 | 96 | 0 | 2 | 4386 | 4384 | 2208 | 2176 |
| 56 | 1 | 256 | 96 | 4 | 2 | 4326 | 4320 | 2176 | 2144 |
| 57 | 1 | 256 | 96 | 8 | 2 | 4266 | 4256 | 2144 | 2112 |
| 58 | 1 | 256 | 96 | 16 | 2 | 4146 | 4128 | 2080 | 2048 |
| 59 | 1 | 256 | 96 | 32 | 2 | 3906 | 3872 | 1952 | 1920 |
| 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 | 462 | 460 | 244 | 216 |
| 68 | 8 | 512 | 192 | 4 | 2 | 458 | 452 | 240 | 212 |
| 69 | 8 | 512 | 192 | 8 | 2 | 454 | 444 | 236 | 208 |
| 70 | 8 | 512 | 192 | 16 | 2 | 446 | 428 | 228 | 200 |
| 71 | 8 | 512 | 192 | 32 | 2 | 430 | 396 | 212 | 184 |
| 72 | 4 | 512 | 192 | 0 | 0 | 928 | 928 | 488 | 440 |
| 73 | 4 | 512 | 192 | 0 | 2 | 922 | 920 | 488 | 432 |
| 74 | 4 | 512 | 192 | 4 | 2 | 910 | 904 | 480 | 424 |
| 75 | 4 | 512 | 192 | 8 | 2 | 898 | 888 | 472 | 416 |
| 76 | 4 | 512 | 192 | 16 | 2 | 874 | 856 | 456 | 400 |
| 77 | 4 | 512 | 192 | 32 | 2 | 826 | 792 | 424 | 368 |
| 78 | 2 | 512 | 192 | 0 | 0 | 1856 | 1856 | 976 | 880 |
| 79 | 2 | 512 | 192 | 0 | 2 | 1842 | 1840 | 976 | 864 |
| 80 | 2 | 512 | 192 | 4 | 2 | 1814 | 1808 | 960 | 848 |
| 81 | 2 | 512 | 192 | 8 | 2 | 1786 | 1776 | 944 | 832 |
| 82 | 2 | 512 | 192 | 16 | 2 | 1730 | 1712 | 912 | 800 |
| 83 | 2 | 512 | 192 | 32 | 2 | 1618 | 1584 | 848 | 736 |
| 84 | 1 | 512 | 192 | 0 | 0 | 3712 | 3712 | 1952 | 1760 |
| 85 | 1 | 512 | 192 | 0 | 2 | 3682 | 3680 | 1952 | 1728 |
| 86 | 1 | 512 | 192 | 4 | 2 | 3622 | 3616 | 1920 | 1696 |
| 87 | 1 | 512 | 192 | 8 | 2 | 3562 | 3552 | 1888 | 1664 |
| 88 | 1 | 512 | 192 | 16 | 2 | 3442 | 3424 | 1824 | 1600 |
| 89 | 1 | 512 | 192 | 32 | 2 | 3202 | 3168 | 1696 | 1472 |
| 90 | 16 | 512 | 96 | 0 | 8 | 244 | 236 | 122 | 114 |

### 5.2.3 Training sequences for spread bursts

In this subclause, the training sequences for usage as midambles in burst type 1, 2,3 and 4 (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 cell-specific single basic midamble code. In the case of MBSFN timeslots there is only a single midamble and this is derived from a single basic midamble code which is not necessarily cell-specific. 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 A.2 shows $\mathbf{m}_{PS}$ for burst types 2 and 4. It should be noted that burst type 2 must not be mixed with burst type 1 or 3 in the same timeslot of one cell and furthermore burst type 4 shall not be mixed with any other burst type 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 6 below.

**Table 6: 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 $\mathbf{m}_{\mathrm{P}}$ :

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

According to Annex A.1, the size of this vector $\mathbf{m}_{\mathrm{P}}$ is P=456 for burst types 1 and 3. Annex A.2 is setting P=192 for burst types 2 and 4. As QPSK modulation is used, the training sequences are transformed into a complex form, denoted as the complex vector $\underline{\mathbf{m}}_{\mathrm{P}}$ :

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

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):

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

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

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

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

Notes on equation (4):

- $L_m$: Midamble length
- K': Maximum number of different midamble shifts in a cell, when no intermediate shifts are used. This value depends on the midamble length.

- K: Maximum number of different midamble shifts in a cell, when intermediate shifts are used, K=2K'. This value depends on the midamble length.

  Note that intermediate shifts are not used for burst type 4, i.e K=K'=1 for burst type 4

- W: Shift between the midambles, when the number of midambles is K'.

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

Allowed values for $L_m$, K' and W are given in Annex A.1 and A.2.

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 $\underline{\mathbf{m}}_{\mathrm{P}}$, the following elements repeat the beginning:

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

Using this periodic basic midamble sequence $\underline{\mathbf{m}}$ for each shift k a midamble $\underline{\mathbf{m}}^{(k)}$ of length $L_m$ is derived, which can be written as a shift 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' shifts (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' shifts (k = (K'+1),...,K = (K'+1),...,2K') are generated based on a slight modification of this formula introducing intermediate shifts:

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

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

The number $K_{Cell}$ of midambles that is supported in each cell can be smaller than K, depending on the cell size and the possible delay spreads, see annex A. The number $K_{Cell}$ is signalled by higher layers. The midamble sequences derived according to equations (7) to (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 $\mathbf{m}_{\mathrm{P}}$ according to (1).

## 5.2.4 Beamforming

When DL beamforming is used, at least that user to which beamforming is applied and which has a dedicated channel shall get one individual midamble according to subclause 5.2.3, even in DL. DL beamforming is not applied to timeslots containing burst type 4.

## 5.3 Common physical channels

### 5.3.1 Primary common control physical channel (P-CCPCH)

The BCH as described in subclause 4.1.2 is mapped onto the Primary Common Control Physical Channel (P-CCPCH). The position (time slot / code) of the P-CCPCH is known from the Physical Synchronisation Channel (PSCH), see subclause 5.3.4.

#### 5.3.1.1 P-CCPCH Spreading

The P-CCPCH uses fixed spreading with a spreading factor SF = 16 as described in subclause 5.2.1.1. The P-CCPCH always uses channelisation code $c_{Q=16}^{(k=1)}$.

#### 5.3.1.2 P-CCPCH Burst Types

The burst type 1 as described in subclause 5.2.2 is used for the P-CCPCH unless the entire carrier is dedicated to MBSFN then burst type 4 is used for P-CCPCH. No TFCI is applied for the P-CCPCH.

#### 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.

### 5.3.2 Secondary common control physical channel (S-CCPCH)

PCH and FACH as described in subclause 4.1.2 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.

#### 5.3.2.1 S-CCPCH Spreading

The S-CCPCH uses fixed spreading with a spreading factor SF = 16 as described in subclause 5.2.1.1. When S-CCPCH is used for MBSFN operation the spreading factor may be SF = 16 or SF = 1.

#### 5.3.2.2 S-CCPCH Burst Types

The burst types 1,2 or 4 as described in subclause 5.2.2 are used for the S-CCPCHs. TFCI may be applied for S-CCPCHs.

#### 5.3.2.2A S-CCPCH Modulation

When S-CCPCH is used for MBSFN operation, burst type 4 shall be used and the modulation may be QPSK or 16QAM, see table 5A for slot formats. When S-CCPCH is used for all other purposes the modulation shall be QPSK.

#### 5.3.2.3 S-CCPCH Training sequences

The training sequences, i.e. midambles, as described in subclause 5.2.3 are used for the S-CCPCH.

### 5.3.3 The physical random access channel (PRACH)

The RACH as described in subclause 4.1.2 is mapped onto one uplink physical random access channel (PRACH).

#### 5.3.3.1 PRACH Spreading

The uplink PRACH uses either spreading factor SF=16 or SF=8 as described in subclause 5.2.1.2. 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

The UEs send uplink access bursts of type 3 randomly in the PRACH. TFCI and TPC are not applied for the PRACH.

### 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 for burst type 3 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.

### 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.

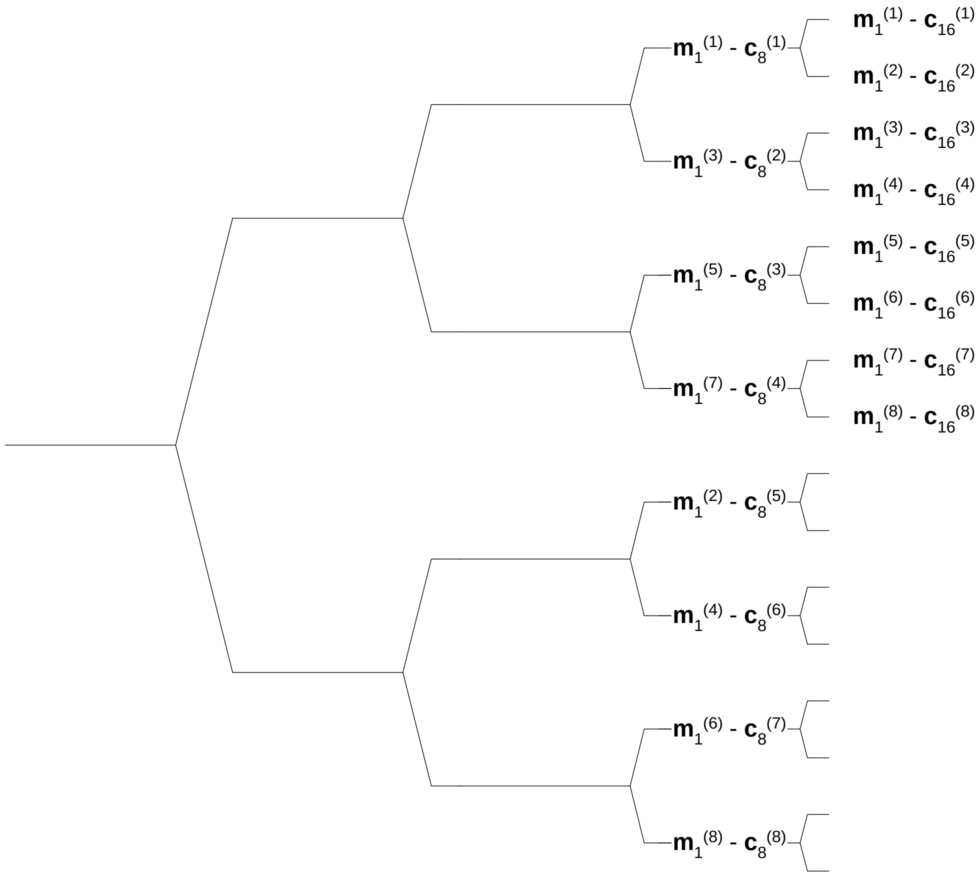



**Figure 12: Association of Midambles to Channelisation Codes in the OVSF tree for all *k***

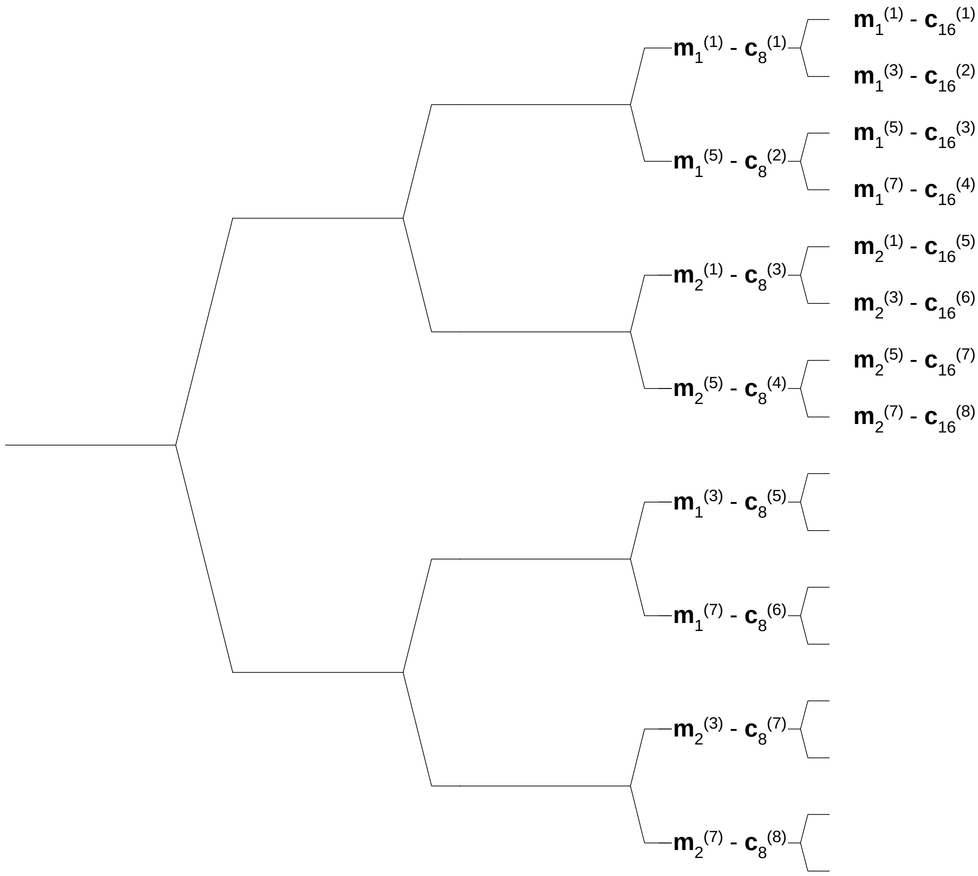



**Figure 13: Association of Midambles to Channelisation Codes in the OVSF tree for odd *k***

## 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:

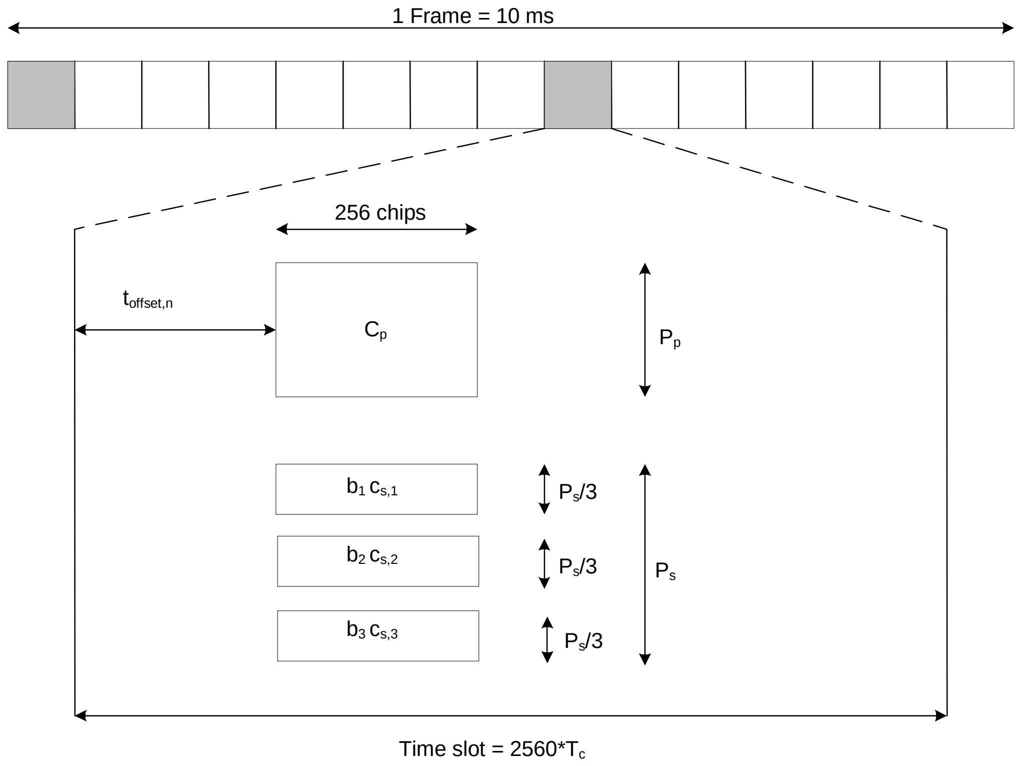
Case 1) SCH and P-CCPCH allocated in TS#k, k=0….14

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.




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

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

As depicted in figure 14, the SCH consists of a primary and three secondary code sequences each 256 chips long. The primary and secondary code sequences are defined in [8] clause 7 'Synchronisation codes for the 3.84 Mcps option'.

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 $t_{offset,n}$ enables the system to overcome the capture effect.

The time offset $t_{offset,n}$ is one of 32 values, depending on the code group of the cell, n, 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 $t_{offset,n}$. The exact value for $t_{offset,n}$, regarding column 'Associated $t_{offset}$' in table 6 in [8] is given by:

$$t_{offset,n} = \begin{cases} n \cdot 48 \cdot T_c & n < 16 \\ (720 + n \cdot 48) T_c & n \geq 16 \end{cases}; \quad n = 0, \ldots, 31$$

## 5.3.5 Physical Uplink Shared Channel (PUSCH)

The USCH as desribed in subclause 4.1.2 is mapped onto one or more physical uplink shared channels (PUSCH). Timing advance, as described in [9], subclause 4.3, is applied to the PUSCH.

### 5.3.5.1 PUSCH Spreading

The spreading factors that can be applied to the PUSCH are SF = 1, 2, 4, 8, 16 as described in subclause 5.2.1.2.

#### 5.3.5.2 PUSCH Burst Types

Burst types 1, 2 or 3 as described in subclause 5.2.2 can be used for PUSCH. TFCI and TPC can be transmitted on the PUSCH.

#### 5.3.5.3 PUSCH Training Sequences

The training sequences as desribed in subclause 5.2.3 are used for the PUSCH.

#### 5.3.5.4 UE Selection

The UE that shall transmit on the PUSCH is selected by higher layer signalling.

### 5.3.6 Physical Downlink Shared Channel (PDSCH)

The DSCH as described in subclause 4.1.2 is mapped onto one or more physical downlink shared channels (PDSCH).

#### 5.3.6.1 PDSCH Spreading

The PDSCH uses either spreading factor SF = 16 or SF = 1 as described in subclause 5.2.1.1.

#### 5.3.6.2 PDSCH Burst Types

Burst types 1 or 2 as described in subclause 5.2.2 can be used for PDSCH. TFCI can be transmitted on the PDSCH.

#### 5.3.6.3 PDSCH Training Sequences

The training sequences as described in subclause 5.2.3 are used for the PDSCH.

#### 5.3.6.4 UE Selection

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 specific midamble allocation method shall be employed (see subclause 5.6), and the UE shall decode the PDSCH if the PDSCH was transmitted with the midamble assigned to the UE by UTRAN. 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 within one TTI.

Note: From the above mentioned signalling methods, only the higher layer signalling method is supported by higher layers in this release.

### 5.3.7 The Paging Indicator Channel (PICH)

The Paging Indicator Channel (PICH) is a physical channel used to carry the paging indicators.

#### 5.3.7.1 Mapping of Paging Indicators to the PICH bits

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 paging 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 $s_{NPIB+1}$,..., $s_{NPIB+4}$ adjacent to the midamble are reserved for possible future use.

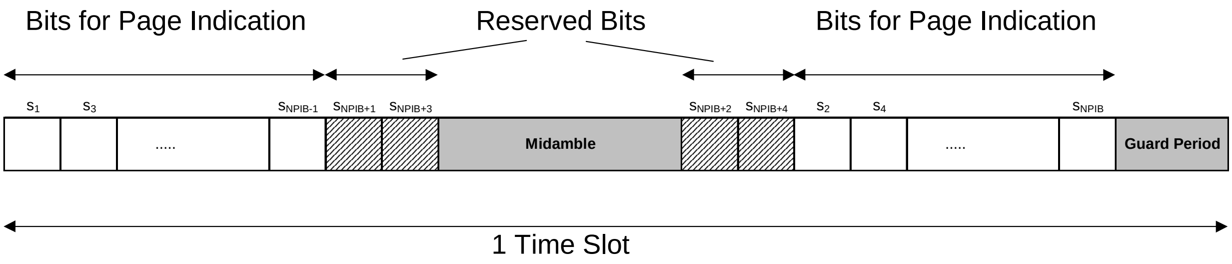



**Figure 15: Transmission and numbering of paging indicator carrying bits in a PICH burst**

Each paging indicator $P_q$ in one time slot is mapped to the bits $\{s_{2L_{pi}*q+1},...,s_{2L_{pi}*(q+1)}\}$ within this time slot. Thus, due to the interleaved transmission of the bits half of the symbols used for each paging indicator are transmitted in the first data part, and the other half of the symbols are transmitted in the second data part, as exemplary shown in figure 16 for a paging indicator length $L_{PI}$ of 4 symbols.

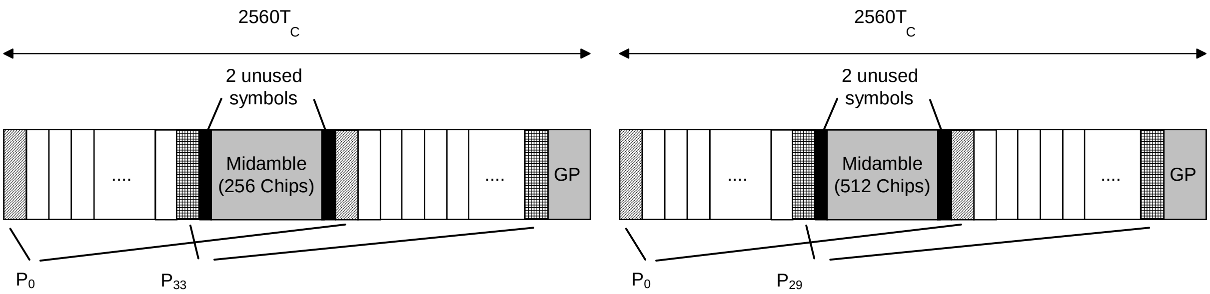



**Figure 16: Example of mapping of paging indicators on PICH bits for $L_{PI}$=4**

The setting of the paging indicators and the corresponding PICH bits (including the reserved ones) is described in [7].

$N_{PI}$ paging indicators of length $L_{PI}$=2, $L_{PI}$=4 or $L_{PI}$=8 symbols are transmitted in each radio frame that contains the PICH. The number of paging indicators $N_{PI}$ per radio frame is given by the paging indicator length and the burst type, which are both known by higher layer signalling. In table 7 this number is shown for the different possibilities of burst types and paging indicator lengths.

**Table 7: Number $N_{PI}$ of paging indicators per time slot for the different burst types and paging indicator lengths $L_{PI}$**

| | $L_{PI}$=2 | $L_{PI}$=4 | $L_{PI}$=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 |

### 5.3.7.2 Structure of the PICH over multiple radio frames

As shown in figure 17, the paging indicators of $N_{PICH}$ consecutive 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.

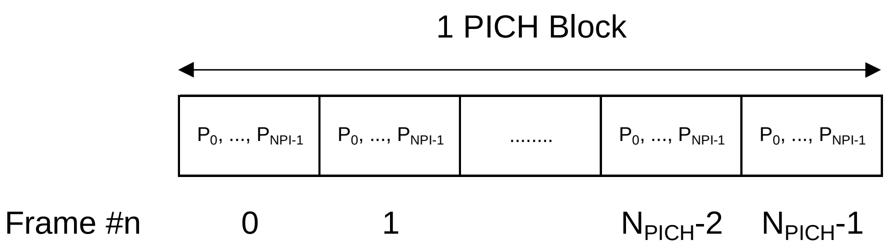



**Figure 17: Structure of a PICH block**

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 nth frame of one PICH block, where q is given by

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

and n is given by

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

The PI bitmap in the PCH data frames over Iub contains indication values for all possible higher layer PI values, see [17]. 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 $P_q$.

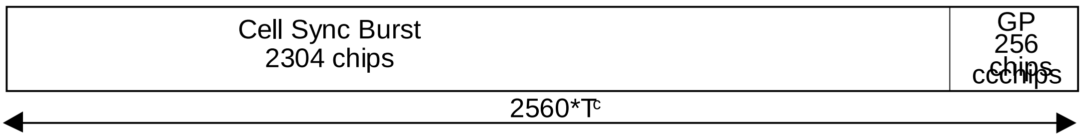
#### 5.3.7.3 PICH Training sequences

The training sequences, i.e. midambles for the PICH.are generated as described in subclause 5.2.3. The allocation of midambles depends on whether SCTD is applied to the PICH.

- If no antenna diversity is applied the PICH the midambles can be allocated as described in subclause 5.6.
- If SCTD antenna diversity is applied to the PICH the allocation of midambles shall be as described in [9].

### 5.3.8 The physical node B synchronisation channel (PNBSCH)

In case cell sync bursts are used for Node B synchronisation the PNBSCH shall be used for the transmission of the cell sync burst [8]. The PNBSCH shall be mapped on the same timeslot as the PRACH acc. to a higher layer schedule. The cell sync burst shall be transmitted at the beginning of a timeslot. In case of Node B synchronisation via the air interface the transmission of a RACH may be prohibited on higher layer command in specified frames and timeslots.




### 5.3.9 High Speed Physical Downlink Shared Channel (HS-PDSCH)

The HS-DSCH as desribed in subclause 4.1.2 is mapped onto one or more high speed physical downlink shared channels (HS-PDSCH).

#### 5.3.9.1 HS-PDSCH Spreading

The HS-PDSCH shall use either spreading factor SF = 16 or SF=1, as described in 5.2.1.1.

#### 5.3.9.2 HS-PDSCH Burst Types

Burst types 1 or 2 as described in subclause 5.2.2 can be used for PDSCH. TFCI shall not be transmitted on the HS-PDSCH. The TF of the HS-DSCH is derived from the associated HS-SCCH.

#### 5.3.9.3 HS-PDSCH Training Sequences

The training sequences as described in subclause 5.2.3 are used for the HS-PDSCH.

#### 5.3.9.4 UE Selection

To indicate to the UE that there is data to decode on the HS-DSCH, the UE id on the associated HS-SCCH shall be used.

#### 5.3.9.5 HS-PDSCH timeslot formats

An HS-PDSCH may use QPSK or 16QAM modulation symbols. The time slot formats are shown in table 7A.

**Table 7A: Time slot formats for the HS-PDSCH**

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI\ code\ word}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field}$ (bits) |
|---|---|---|---|---|---|---|
| 0 (QPSK) | 16 | 512 | 0 | 244 | 244 | 122 |
| 1 (16QAM) | 16 | 512 | 0 | 488 | 488 | 244 |
| 2 (QPSK) | 16 | 256 | 0 | 276 | 276 | 138 |
| 3 (16QAM) | 16 | 256 | 0 | 552 | 552 | 276 |
| 4 (QPSK) | 1 | 512 | 0 | 3904 | 3904 | 1952 |
| 5 (16QAM) | 1 | 512 | 0 | 7808 | 7808 | 3904 |
| 6 (QPSK) | 1 | 256 | 0 | 4416 | 4416 | 2208 |
| 7(16QAM) | 1 | 256 | 0 | 8832 | 8832 | 4416 |

## 5.3.10 Shared Control Channel for HS-DSCH (HS-SCCH)

The HS-SCCH is a DL physical channel that carries higher layer control information for HS-DSCH. The physical layer will process this information according to [7] and will transmit the resulting bits on the HS-SCCH the structure of which is described below.

### 5.3.10.1 HS-SCCH Spreading

The HS-SCCH shall use spreading factor SF = 16, as described in 5.2.1.1.

### 5.3.10.2 HS-SCCH Burst Types

Burst type 1 as described in subclause 5.2.2 can be used for HS-SCCH. TFCI shall not be transmitted on the HS-SCCH.

### 5.3.10.3 HS-SCCH Training Sequences

The training sequences as described in subclause 5.2.3 are used for the HS-SCCH.

### 5.3.10.4 HS-SCCH timeslot formats

The HS-SCCH always uses time slot format #0 from table 5a, see section 5.2.2.6.1.

## 5.3.11 Shared Information Channel for HS-DSCH (HS-SICH)

The HS-SICH is a UL physical channel that carries higher layer control information and the Channel Quality Indicator CQI for HS-DSCH. The physical layer will process this information according to [7] and will transmit the resulting bits on the HS-SICH the structure of which is described below.

### 5.3.11.1 HS-SICH Spreading

The HS-SICH shall use spreading factor SF = 16, as described in 5.2.1.2.

### 5.3.11.2 HS-SICH Burst Types

Burst type 1 as described in subclause 5.2.2 can be used for HS-SICH. TFCI shall not be transmitted on the HS-SICH, however, the HS-SICH shall carry TPC information.

### 5.3.11.3 HS-SICH Training Sequences

The training sequences as described in subclause 5.2.3 are used for the HS-SICH.

#### 5.3.11.4 HS-SICH timeslot formats

The HS-SICH shall use time slot format #90 from table 5b, see section 5.2.2.6.2.

### 5.3.12 The MBMS Indicator Channel (MICH)

The MBMS Indicator Channel (MICH) is a physical channel used to carry the MBMS notification indicators. The UE may use multiple MICH within the MBMS modification period in order to make decisions on individual MBMS notification indicators.

#### 5.3.12.1 Mapping of MBMS Indicators to the MICH bits for burst types 1 and 2

Figure 17a depicts the structure of a MICH burst and the numbering of the bits within the burst. The same burst type is used for the MICH in every cell. $N_{NIB}$ bits in a normal burst of type 1 or 2 are used to carry the MBMS notification indicators, where $N_{NIB}$ depends on the burst type: $N_{NIB}$=240 for burst type 1 and $N_{NIB}$=272 for burst type 2. The bits $s_{NNIB+1}$,..., $s_{NNIB+4}$ adjacent to the midamble are reserved for possible future use.

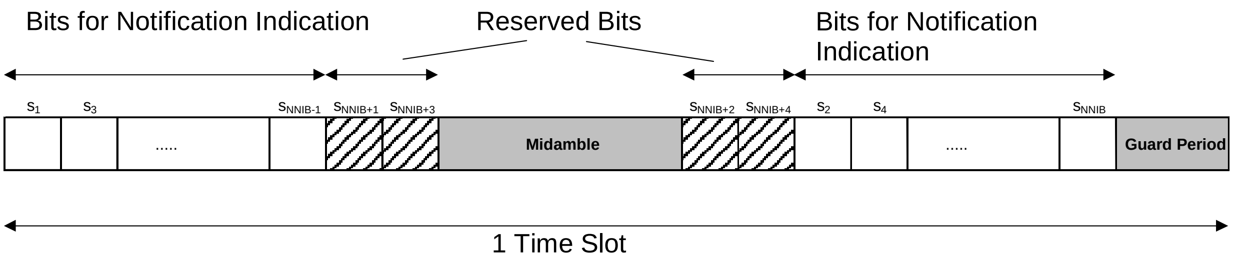



**Figure 17a: Transmission and numbering of MBMS notification indicator carrying bits in a MICH burst using burst types 1 and 2**

Each notification indicator $N_q$ in one time slot is mapped to the bits $\{s_{2LNI*q+1},...,s_{2LNI*(q+1)}\}$ within this time slot. Thus, due to the interleaved transmission of the bits half of the symbols used for each MBMS notification indicator are transmitted in the first data part, and the other half of the symbols are transmitted in the second data part: an example is shown in figure 17b for a MBMS notification indicator length $L_{NI}$ of 4 symbols.

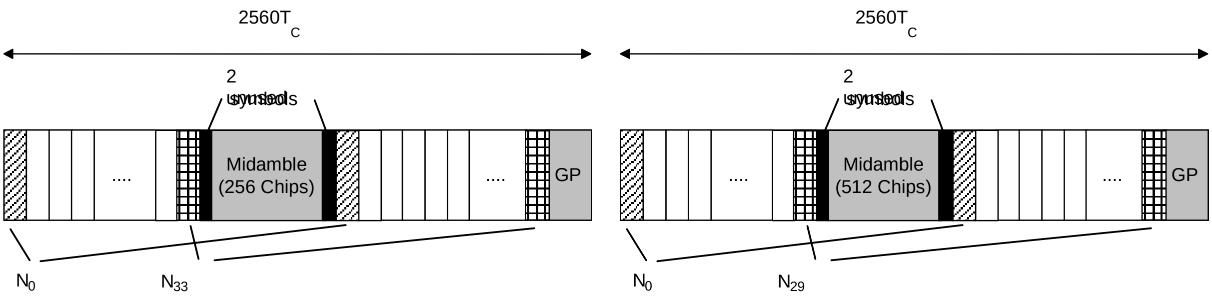



**Figure 17b: Example of mapping of MBMS notification indicators on MICH bits for $L_{NI}$=4 for burst types 2 and 1 respectively**

The setting of the MBMS notification indicators and the corresponding MICH bits (including the reserved ones) is described in [7].

$N_n$ MBMS notification indicators of length $L_{NI}$=2, $L_{NI}$=4 or $L_{NI}$=8 symbols are transmitted in each MICH. The number of MBMS notification indicators $N_n$ per MICH is given by the MBMS notification indicator length and the burst type, which are both known by higher layer signalling. In table 7B this number is shown for burst types 1 and 2 and differing MBMS notification indicator lengths.

**Table 7B: Number $N_n$ of MBMS notification indicators per time slot for the different burst types 1 and 2 and differing MBMS notification indicator lengths $L_{NI}$**

| | $L_{NI}$=2 | $L_{NI}$=4 | $L_{NI}$=8 |
|---|---|---|---|
| Burst Type 1 | $N_n$=60 | $N_n$=30 | $N_n$=15 |
| Burst Type 2 | $N_n$=68 | $N_n$=34 | $N_n$=17 |

The value NI (NI = 0, ..., $N_{NI}$-1) calculated by higher layers, is associated to the MBMS notification indicator $N_q$, where q = NI mod $N_n$.

The set of NI passed over the Iub indicates all higher layer NI values for which the notification indicator on MICH should be set to 1 during the corresponding modification period; all other indicators shall be set to 0.

### 5.3.12.1A Mapping of MBMS Indicators to the MICH bits for burst type 4

When an entire carrier is dedicated to MBSFN operation, the MICH shall use burst type 4. In this case $N_{NIB}$=256 and there are 8 reserved/unused bits adjacent to the midamble reserved for possible future use. The transmission and numbering of MBMS notification indicator carrying bits in a MICH burst is similar to that of figure 17a with the exception of 4 reserved bits either side of the midamble as opposed to 2 for burst types 1 and 2. An example mapping is shown in figure 17ba for a MBMS notification indicator length $L_{NI}$ of 4 symbols.

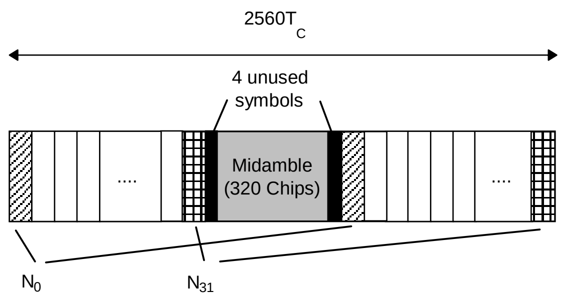



**Figure 17ba: Example of mapping of MBMS notification indicators on MICH bits for $L_{NI}$=4 for burst type 4**

The setting of the MBMS notification indicators and the corresponding MICH bits (including the reserved ones) is described in [7].

$N_n$ MBMS notification indicators of length $L_{NI}$=2, $L_{NI}$=4 or $L_{NI}$=8 symbols are transmitted in each MICH. The number of MBMS notification indicators $N_n$ per MICH is given by the MBMS notification indicator length and the burst type, which are both known by higher layer signalling. In table 7BA this number is shown for the different possibilities of burst types and MBMS notification indicator lengths.

**Table 7BA: Number $N_n$ of MBMS notification indicators per time slot for burst type 4 and differing MBMS notification indicator lengths $L_{NI}$**

| | $L_{NI}$=2 | $L_{NI}$=4 | $L_{NI}$=8 |
|---|---|---|---|
| Burst Type 4 | $N_n$=64 | $N_n$=32 | $N_n$=16 |

The value NI (NI = 0, ..., $N_{NI}$-1) calculated by higher layers, is associated to the MBMS notification indicator $N_q$, where q = NI mod $N_n$.

The set of NI passed over the Iub indicates all higher layer NI values for which the notification indicator on MICH should be set to 1 during the corresponding modification period; all other indicators shall be set to 0.

#### 5.3.12.2 MICH Training sequences

The training sequences, i.e. midambles for the MICH, are generated as described in subclause 5.2.3. The allocation of midambles depends on whether SCTD is applied to the MICH.

- If no antenna diversity is applied the MICH the midambles can be allocated as described in subclause 5.6.
- If SCTD antenna diversity is applied to the MICH the allocation of midambles shall be as described in [9].

Note that when the entire carrier is dedicated to MBSFN operation MICH employs burst type 4 as described in subclause 5.3.12.1A. Burst type 4 supports a single midamble and hence SCTD is precluded from operation in such a scenario.

### 5.3.13 E-DCH Physical Uplink Channel (E-PUCH)

One or more E-PUCH are used to carry the uplink E-DCH transport channel and associated control information (E-UCCH) in each E-DCH TTI. In a timeslot designated by UTRAN for E-PUCH use, up to one E-PUCH may be transmitted by a UE. No other physical channels may be transmitted by a UE in an E-PUCH timeslot.

Timing advance, as described in [9], subclause 4.3, is applied to the E-PUCH.

#### 5.3.13.1 E-UCCH

The E-DCH Uplink Control Channel (E-UCCH) carries uplink control information associated with the E-DCH and is carried within indicator fields mapped to E-PUCH. Depending on the configuration by higher layers, an E-PUCH burst may or may not contain E-UCCH and TPC. When E-PUCH does contain E-UCCH, TPC is also transmitted. When E-PUCH does not contain E-UCCH, TPC is not transmitted.

Higher layers shall indicate the maximum number of timeslots ($N_{E\text{-}UCCH}$) that may contain E-UCCH/TPC in the E-DCH TTI. For an allocation of $n_{TS}$ E-PUCH timeslots, the UE shall transmit E-UCCH and TPC on the first $m$ allocated timeslots of the E-DCH TTI, where $m = \min(n_{TS}, N_{E\text{-}UCCH})$.

The E-UCCH comprises two parts, E-UCCH part 1 and E-UCCH part 2.

E-UCCH part 1:

- is of length 32 physical channel bits
- is mapped to the TFCI field of the E-PUCH (16 bits either side of the midamble)
- is spread at SF=16 using the channelisation code in the branch with the highest code numbering of the allowed OVSF sub tree, as depicted in [8]
- uses QPSK modulation

E-UCCH part 2:

- is of length 32 physical channel bits
- is spread using the same spreading factor as the data payloads
- uses the same modulation as the data payloads

Figures 17c and 17d show the E-PUCH data burst with and without the E-UCCH/TPC fields.

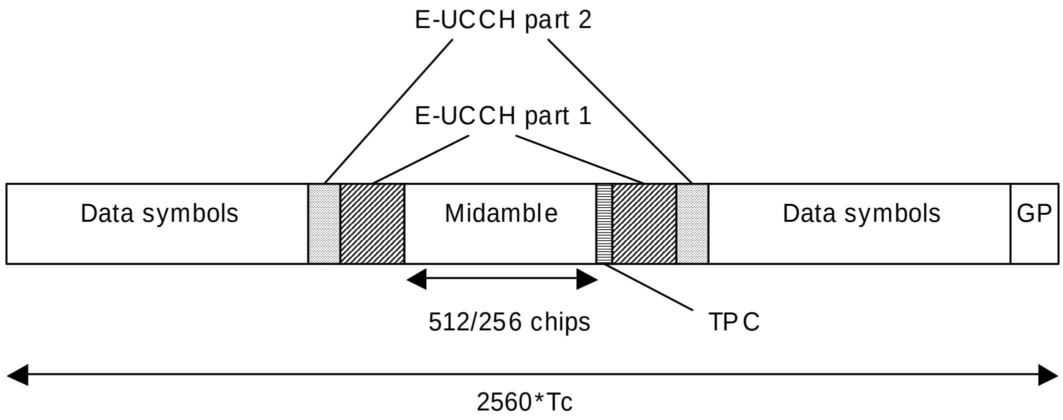



**Figure 17c: Location of E-UCCH part 1, E-UCCH part 2 and TPC in the E-PUCH data burst**

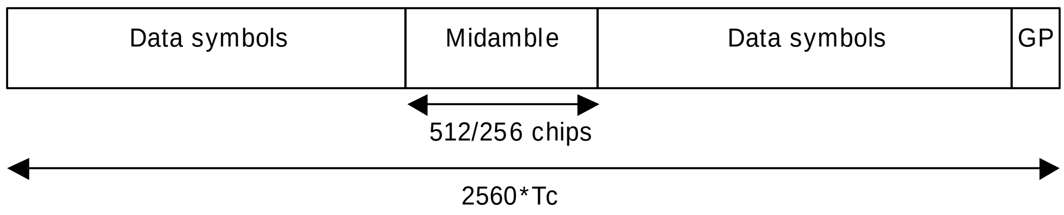



**Figure 17d: E-PUCH data burst without E-UCCH/TPC**

### 5.3.13.2 E-PUCH Spreading

The spreading factors that can be applied to the E-PUCH are SF = 1, 2, 4, 8, 16 as described in subclause 5.2.1.2.

### 5.3.13.3 E-PUCH Burst Types

Burst types 1, 2 or 3 as described in subclause 5.2.2 can be used for E-PUCH. E-UCCH and TPC can be transmitted on the E-PUCH.

### 5.3.13.4 PUSCH Training Sequences

The training sequences as desribed in subclause 5.2.3 are used for the E-PUCH.

### 5.3.13.5 UE Selection

UEs that shall transmit on the E-PUCH are selected by higher layers. The UE id on the associated E-AGCH shall be used for identification.

### 5.3.13.6 E-PUCH timeslot formats

An E-PUCH may use QPSK or 16QAM modulation symbols and may or may not contain E-UCCH/TPC. The time slot formats are shown in table 7c.

**Table 7c: Timeslot formats for E-PUCH**

| slot format # | SF | Midamble Length (chips) | GP (chips) | $N_{EUCCH1}$ (bits) | $N_{EUCCH2}$ (bits) | $N_{TPC}$ (bits) | Bits/slot | $N_{data/slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 (QPSK) | 16 | 512 | 96 | 0 | 0 | 0 | 244 | 244 | 122 | 122 |
| 1 (16QAM) | 16 | 512 | 96 | 0 | 0 | 0 | 488 | 488 | 244 | 244 |
| 2 (QPSK) | 16 | 512 | 96 | 32 | 32 | 2 | 244 | 178 | 90 | 88 |
| 3 (16QAM) | 16 | 512 | 96 | 32 | 32 | 2 | 454 | 388 | 196 | 192 |
| 4 (QPSK) | 16 | 256 | 96 | 0 | 0 | 0 | 276 | 276 | 138 | 138 |
| 5 (16QAM) | 16 | 256 | 96 | 0 | 0 | 0 | 552 | 552 | 276 | 276 |
| 6 (QPSK) | 16 | 256 | 96 | 32 | 32 | 2 | 276 | 210 | 106 | 104 |
| 7 (16QAM) | 16 | 256 | 96 | 32 | 32 | 2 | 518 | 452 | 228 | 224 |
| 8 (QPSK) | 8 | 512 | 96 | 0 | 0 | 0 | 488 | 488 | 244 | 244 |
| 9 (16QAM) | 8 | 512 | 96 | 0 | 0 | 0 | 976 | 976 | 488 | 488 |
| 10 (QPSK) | 8 | 512 | 96 | 32 | 32 | 2 | 454 | 388 | 196 | 192 |
| 11 (16QAM) | 8 | 512 | 96 | 32 | 32 | 2 | 874 | 808 | 408 | 400 |
| 12 (QPSK) | 8 | 256 | 96 | 0 | 0 | 0 | 552 | 552 | 276 | 276 |
| 13 (16QAM) | 8 | 256 | 96 | 0 | 0 | 0 | 1104 | 1104 | 552 | 552 |
| 14 (QPSK) | 8 | 256 | 96 | 32 | 32 | 2 | 518 | 452 | 228 | 224 |
| 15 (16QAM) | 8 | 256 | 96 | 32 | 32 | 2 | 1002 | 936 | 472 | 464 |
| 16 (QPSK) | 4 | 512 | 96 | 0 | 0 | 0 | 976 | 976 | 488 | 488 |
| 17 (16QAM) | 4 | 512 | 96 | 0 | 0 | 0 | 1952 | 1952 | 976 | 976 |
| 18 (QPSK) | 4 | 512 | 96 | 32 | 32 | 2 | 874 | 808 | 408 | 400 |
| 19 (16QAM) | 4 | 512 | 96 | 32 | 32 | 2 | 1714 | 1648 | 832 | 816 |
| 20 (QPSK) | 4 | 256 | 96 | 0 | 0 | 0 | 1104 | 1104 | 552 | 552 |
| 21 (16QAM) | 4 | 256 | 96 | 0 | 0 | 0 | 2208 | 2208 | 1104 | 1104 |
| 22 (QPSK) | 4 | 256 | 96 | 32 | 32 | 2 | 1002 | 936 | 472 | 464 |
| 23 (16QAM) | 4 | 256 | 96 | 32 | 32 | 2 | 1970 | 1904 | 960 | 944 |
| 24 (QPSK) | 2 | 512 | 96 | 0 | 0 | 0 | 1952 | 1952 | 976 | 976 |
| 25 (16QAM) | 2 | 512 | 96 | 0 | 0 | 0 | 3904 | 3904 | 1952 | 1952 |
| 26 (QPSK) | 2 | 512 | 96 | 32 | 32 | 2 | 1714 | 1648 | 832 | 816 |
| 27 (16QAM) | 2 | 512 | 96 | 32 | 32 | 2 | 3394 | 3328 | 1680 | 1648 |
| 28 (QPSK) | 2 | 256 | 96 | 0 | 0 | 0 | 2208 | 2208 | 1104 | 1104 |
| 29 (16QAM) | 2 | 256 | 96 | 0 | 0 | 0 | 4416 | 4416 | 2208 | 2208 |
| 30 (QPSK) | 2 | 256 | 96 | 32 | 32 | 2 | 1970 | 1904 | 960 | 944 |
| 31 (16QAM) | 2 | 256 | 96 | 32 | 32 | 2 | 3906 | 3840 | 1936 | 1904 |
| 32 (QPSK) | 1 | 512 | 96 | 0 | 0 | 0 | 3904 | 3904 | 1952 | 1952 |
| 33 (16QAM) | 1 | 512 | 96 | 0 | 0 | 0 | 7808 | 7808 | 3904 | 3904 |
| 34 (QPSK) | 1 | 512 | 96 | 32 | 32 | 2 | 3394 | 3328 | 1680 | 1648 |
| 35 (16QAM) | 1 | 512 | 96 | 32 | 32 | 2 | 6754 | 6688 | 3376 | 3312 |
| 36 (QPSK) | 1 | 256 | 96 | 0 | 0 | 0 | 4416 | 4416 | 2208 | 2208 |
| 37 (16QAM) | 1 | 256 | 96 | 0 | 0 | 0 | 8832 | 8832 | 4416 | 4416 |
| 38 (QPSK) | 1 | 256 | 96 | 32 | 32 | 2 | 3906 | 3840 | 1936 | 1904 |
| 39 (16QAM) | 1 | 256 | 96 | 32 | 32 | 2 | 7778 | 7712 | 3888 | 3824 |
| 40 (QPSK) | 16 | 512 | 192 | 0 | 0 | 0 | 232 | 232 | 122 | 110 |
| 41 (16QAM) | 16 | 512 | 192 | 0 | 0 | 0 | 464 | 464 | 244 | 220 |
| 42 (QPSK) | 16 | 512 | 192 | 32 | 32 | 2 | 232 | 166 | 90 | 76 |
| 43 (16QAM) | 16 | 512 | 192 | 32 | 32 | 2 | 430 | 364 | 196 | 168 |
| 44 (QPSK) | 8 | 512 | 192 | 0 | 0 | 0 | 464 | 464 | 244 | 220 |
| 45 (16QAM) | 8 | 512 | 192 | 0 | 0 | 0 | 928 | 928 | 488 | 440 |

| slot format # | SF | Midamble Length (chips) | GP (chips) | $N_{EUCCH1}$ (bits) | $N_{EUCCH2}$ (bits) | $N_{TPC}$ (bits) | Bits/slot | $N_{data/slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|---|---|
| 46 (QPSK) | 8 | 512 | 192 | 32 | 32 | 2 | 430 | 364 | 196 | 168 |
| 47 (16QAM) | 8 | 512 | 192 | 32 | 32 | 2 | 826 | 760 | 408 | 352 |
| 48 (QPSK) | 4 | 512 | 192 | 0 | 0 | 0 | 928 | 928 | 488 | 440 |
| 49 (16QAM) | 4 | 512 | 192 | 0 | 0 | 0 | 1856 | 1856 | 976 | 880 |
| 50 (QPSK) | 4 | 512 | 192 | 32 | 32 | 2 | 826 | 760 | 408 | 352 |
| 51 (16QAM) | 4 | 512 | 192 | 32 | 32 | 2 | 1618 | 1552 | 832 | 720 |
| 52 (QPSK) | 2 | 512 | 192 | 0 | 0 | 0 | 1856 | 1856 | 976 | 880 |
| 53 (16QAM) | 2 | 512 | 192 | 0 | 0 | 0 | 3712 | 3712 | 1952 | 1760 |
| 54 (QPSK) | 2 | 512 | 192 | 32 | 32 | 2 | 1618 | 1552 | 832 | 720 |
| 55 (16QAM) | 2 | 512 | 192 | 32 | 32 | 2 | 3202 | 3136 | 1680 | 1456 |
| 56 (QPSK) | 1 | 512 | 192 | 0 | 0 | 0 | 3712 | 3712 | 1952 | 1760 |
| 57 (16QAM) | 1 | 512 | 192 | 0 | 0 | 0 | 7424 | 7424 | 3904 | 3520 |
| 58 (QPSK) | 1 | 512 | 192 | 32 | 32 | 2 | 3202 | 3136 | 1680 | 1456 |
| 59 (16QAM) | 1 | 512 | 192 | 32 | 32 | 2 | 6370 | 6304 | 3376 | 2928 |

## 5.3.14 E-DCH Random Access Uplink Control Channel (E-RUCCH)

The E-RUCCH is used to carry E-DCH-associated uplink control signalling when E-PUCH resources are not available. The characteristics of the E-RUCCH physical channel are identical to those of PRACH (see subclause 5.3.3).

Physical resources available for E-RUCCH are configured by higher layers. E-RUCCH may be mapped to the same physical resources that are assigned for PRACH.

## 5.3.15 E-DCH Absolute Grant Channel (E-AGCH)

The E-DCH Absolute Grant Channel (E-AGCH) is a downlink physical channel carrying the uplink E-DCH absolute grant control information. E-AGCH carries a TPC field (located immediately after the midamble and spread using SF16) which is used to control the E-PUCH power. Figure 17e illustrates the burst structure of the E-AGCH.

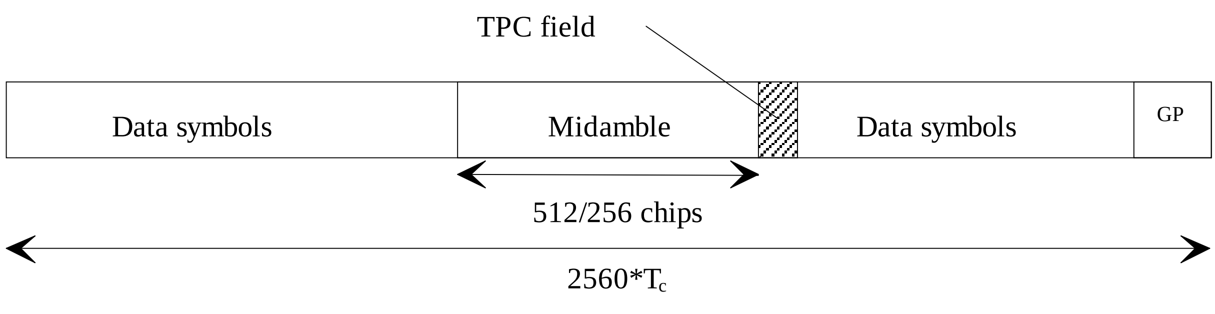



**Figure 17e: Burst structure of E-AGCH**

One E-DCH absolute grant for a UE shall be transmitted over one E-AGCH.

### 5.3.15.1 E-AGCH Spreading

The E-AGCH shall use spreading factor SF = 16, as described in 5.2.1.1.

### 5.3.15.2 E-AGCH Burst Types

Burst types 1 and 2 as described in subclause 5.2.2 can be used for E-AGCH. TPC shall be transmitted on E-AGCH whereas TFCI shall not be transmitted.

#### 5.3.15.3 E-AGCH Training Sequences

The training sequences as described in subclause 5.2.3 are used for the E-AGCH.

#### 5.3.15.4 E-AGCH timeslot formats

The E-AGCH uses the timeslot formats of Table 7d. These augment downlink slot formats 0…19 of table 5a, see subclause 5.2.2.6.1.

**Table 7d: Time slot formats for E-AGCH**

| Slot Format # | SF | Midamble length (chips) | $N_{TFCI\ code\ word}$ (bits) | $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field\ (1)}$ (bits) | $N_{data/data\ field\ (2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|
| 20 | 16 | 512 | 0 | 2 | 244 | 242 | 122 | 120 |
| 21 | 16 | 256 | 0 | 2 | 276 | 274 | 138 | 136 |

### 5.3.16 E-DCH Hybrid ARQ Acknowledgement Indicator Channel (E-HICH)

The E-DCH HARQ Acknowledgement indicator channel (E-HICH) is defined in terms of a SF16 downlink physical channel and a signature sequence. The E-HICH carries the uplink E-DCH hybrid ARQ acknowledgement indicator. Figure 17f illustrates the structure of the E-HICH.

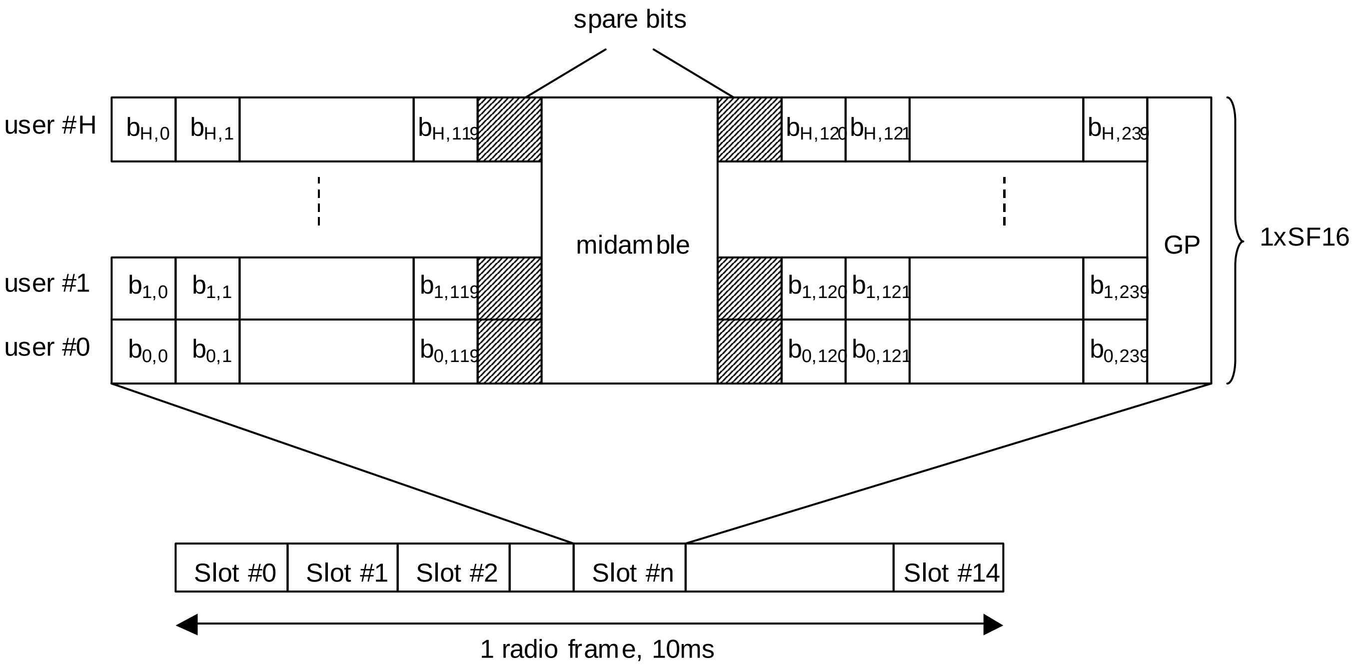



**Figure 17f – E-HICH Structure**

A single channelisation code may carry one or multiple signature sequences. Each signature sequence conveys a HARQ acknowledgement indicator. A maximum of one indicator may be transmitted to a UE. Each acknowledgement indicator is coded to form a signature sequence of 240 bits ($b_0$, $b_1$, … , $b_{239}$) as defined in [7] and is transmitted within a single E-HICH timeslot. The E-HICH also contains *U* spare bit locations, where *U=4* for burst type 1 and *U=36* for burst type 2. The spare bit values are not defined.

#### 5.3.16.1 E-HICH Spreading

Signature sequences (including spare bits inserted) that share the same channelisation code are combined and spread using spreading factor SF=16 as described in [8].

#### 5.3.16.2 E-HICH Burst Types

Burst types 1 and 2 as described in subclause 5.2.2 can be used for E-HICH. Neither TFCI nor TPC shall be transmitted on the E-HICH.

#### 5.3.16.3 E-HICH Training Sequences

The training sequences as described in subclause 5.2.3 are used for the E-HICH.

## 5.4 Transmit Diversity for DL Physical Channels

Table 8 summarizes the different transmit diversity schemes for different downlink physical channel types that are described in [9].

**Table 8: Application of Tx diversity schemes on downlink physical channel types "X" – can be applied, "–" – must not be applied**

| Physical channel type | Open loop TxDiversity | | Closed loop TxDiversity |
|---|---|---|---|
| | TSTD | SCTD(*) | |
| P-CCPCH | – | X(†) | – |
| S-CCPCH | X(**) | X(†) | -- |
| SCH | X | – | – |
| DPCH | – | – | X |
| PDSCH | – | X | X |
| PICH | – | X | – |
| MICH | – | X(†) | – |
| HS-SCCH | -- | X | X |
| HS-PDSCH | -- | X | X |
| E-AGCH | -- | X | X |
| E-HICH | -- | X | -- |

(*) Note: SCTD may only be applied to physical channels when they are allocated to beacon locations.
(**) Note: TSTD may not be applied to S-CCPCH in beacon locations.
(†) Note: that when the entire carrier is dedicated to MBSFN operation SCTD shall not be applied.

## 5.5 Beacon characteristics of physical channels

For the purpose of measurements, common physical channels that are allocated to 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, the only exception is when idle periods are used to support time difference measurements for location services [9]. Then it may be possible that the beacon channels occur in the same frame and time slot as the idle periods. In this case, the beacon channels will not be transmitted in that particular frame and time slot.

### 5.5.1 Location of beacon channels

The beacon locations are determined by the SCH and depend on the SCH allocation case, see subclause 5.3.4:

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

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

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

### 5.5.2 Physical characteristics of beacon channels

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

- are transmitted with reference power;
- are transmitted without beamforming;
- use burst type 1 or burst type 4 when MBSFN is applied to beacon channels;
- 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.

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.

Note that when MBSFN is applied to beacon channels there is a single midamble and hence midamble $m^{(1)}$ is exclusively used in the timeslot.

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

- If SCTD antenna diversity is not applied to beacon channels all the reference power of any beacon channel is allocated to $m^{(1)}$.
- If SCTD antenna diversity is applied to beacon channels, for any beacon channel midambles $m^{(1)}$ and $m^{(2)}$ are each allocated half of the reference power.

## 5.6 Midamble Allocation for Physical Channels

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.

If a midamble is not explicitly assigned and the use of the common midamble allocation scheme is not signalled by higher layers, the midamble shall be 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.

For timeslots employing MBSFN operation burst type 4 is used and hence DL beamforming is not applied, subclause 5.2.4. Furthermore, as this burst type contains only a single midamble, i.e. $K_{Cell}$=1, then all physical channels in such timeslots employ the same midamble and thus default and common midamble allocation amount to the same allocation strategies.

### 5.6.1 Midamble Allocation for DL Physical Channels

Beacon channels shall always use the reserved midambles $m^{(1)}$ and $m^{(2)}$, see 5.5. 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 $K_{Cell}$ =8 midambles. For all other DL physical channels, the midamble is explicitly assigned by higher layers or allocated by layer 1.

### 5.6.1.1 Midamble Allocation by signalling from higher layers

UE specific midambles may be signalled by higher layers to UE's as a part of the physical channel configuration, 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 layer 1

#### 5.6.1.2.1 Default midamble

If a midamble is not explicitly assigned and the use of the common midamble allocation scheme is not signalled by higher layers, the UE shall derive the midambles from the allocated channelisation codes and shall use an individual midamble for each channelisation code group containing one primary and a set of secondary channelisation codes. The association between midambles and channelisation code groups is given in annex A.3. 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. Secondary codes shall only be allocated if the associated primary code is also allocated. If midambles are reserved for the beacon channels, all primary and secondary channelisation codes that are associated with the reserved midambles shall not be used.

Channelisation codes of one channelisation code group shall not be allocated to different UE’s.

In the case that secondary channelisation codes are used, secondary channelisation codes of one channelisation code group shall be allocated in ascending order, with respect to their numbering, and beginning with the lowest code index in this channelisation code group.

The UE shall assume different channel estimates for each of the individual midambles.

The default midamble allocation shall not apply for those downlink channels that are intended for a UE which will be the only UE assigned to a given time slot or slots for the duration of the assigned channel's existence (as in the case of high rate services).

#### 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 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 assigned by higher layers, the UE shall derive the midamble from the channelisation code that is used for the data part (except for TFCI/TPC) of the burst. Note that in the event that code hopping is employed the midamble is derived from the channelisation code actually transmitted (i.e. the code used after the hop sequence has been applied – see [9]). The associations between midamble and channelisation code are the same as for DL physical channels.

## 5.7 Midamble Transmit Power

There shall be no offset between the sum of the powers allocated to all midambles in a timeslot and the sum of the powers allocated to the data symbol fields. The transmit power within a timeslot is hence constant.

The midamble transmit power of beacon channels is equal to the reference power. If SCTD is used for beacon channels, the reference power is equally divided between the midambles $m^{(1)}$ and $m^{(2)}$.

The midamble transmit power of all other physical channels depends on the midamble allocation scheme used. The following rules apply

- In case of Default Midamble Allocation, every midamble is transmitted with the same power as the associated codes.
- In case of Common Midamble Allocation in the downlink, the transmit power of this common midamble is such that there is no power offset between the data parts and the midamble part of the overall transmit signal within one time slot.
- In case of UE Specific Midamble Allocation, the transmit power of the UE specific midamble is such that there is no power offset between the data parts and the midamble part of every user within one time slot.

The following figure 18 depicts the midamble powers for the different channel types and midamble allocation schemes.

Note 1: In figure 18, the codes c(1) to c(16) represent the set of usable codes and not the set of used codes.

Note 2: The common midamble allocation and the midamble allocation by higher layers are not applicable in those beacon time slots, in which the P-CCPCH is located, see section 5.6.1.

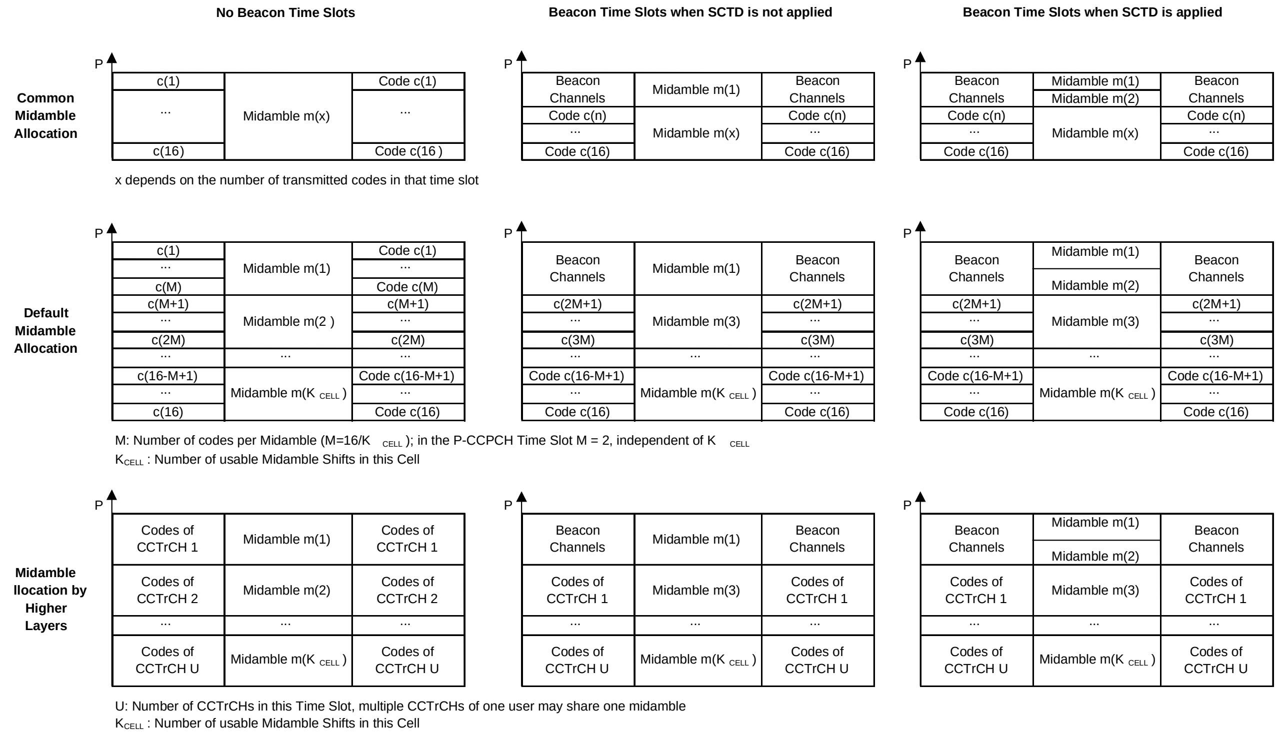



**Figure 18: Midamble powers for the different midamble allocation schemes**

# 5A 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 18A.

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. Note when in MBSFN operation, a midamble is not necessarily cell-specific.

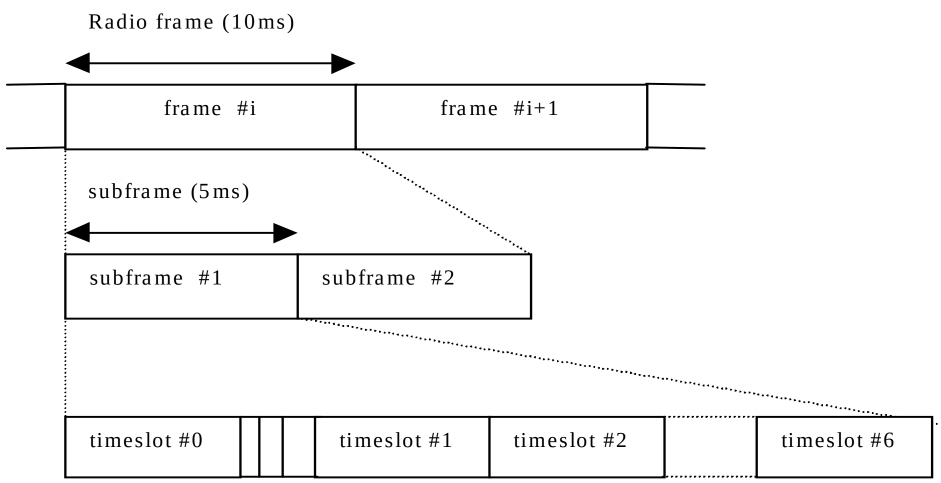



**Figure 18A: Physical channel signal format for 1.28Mcps TDD option**

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.

# 5A.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.

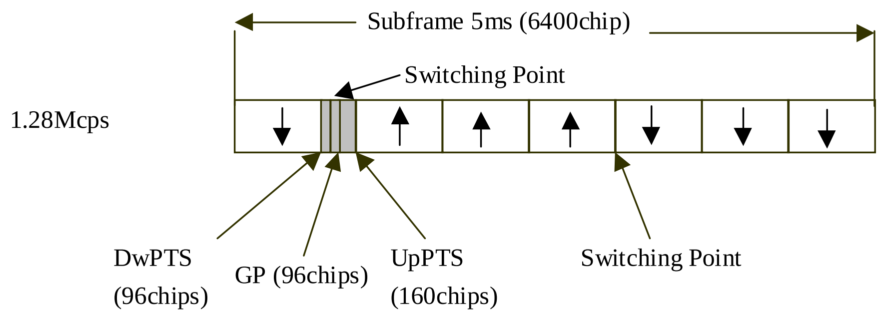



**Figure 18B: Structure of the sub-frame for 1.28Mcps TDD option**

Time slot#n (n from 0 to 6): the $n^{th}$ traffic time slot, 864 chips duration;

DwPTS: downlink pilot time slot, 96 chips duration;

UpPTS: uplink pilot time slot, 160 chips duration;

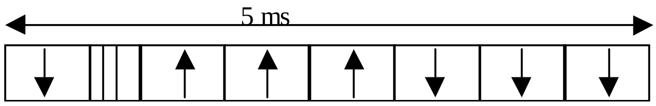
GP: main guard period for TDD operation, 96 chips duration;

In Figure 18B, the total number of traffic time slots for uplink and downlink is 7, and the length for each traffic time slot is 864 chips duration. Among the 7 traffic time slots, 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).

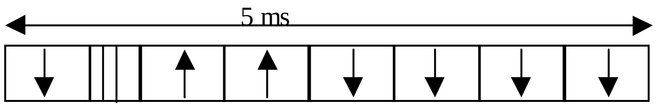
Using the above frame structure, the 1.28Mcps TDD option can operate on both symmetric and asymmetric mode by properly configuring the number of downlink and uplink time slots. In any configuration at least one time slot (time slot#0) has to be allocated for the downlink and at least one time slot has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

In case of entire carrier dedicated to MBSFN, no uplink timeslot is used, and DwPTS and UpPTS are not transmitted.

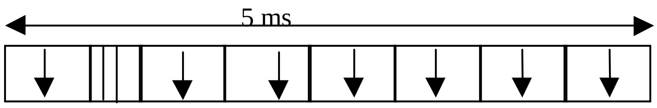
Examples for symmetric and asymmetric UL/DL allocations are given in figure 18C.




**symmetric DL/UL allocation**




**asymmetric DL/UL allocation**




**all DL MBSFN allocation**

**Figure 18C: 1.28Mcps TDD sub-frame structure examples**

# 5A.2 Dedicated physical channel (DPCH)

The DCH as described in subclause 4.1.1 'Dedicated transport channels' is mapped onto the dedicated physical channel.

## 5A.2.1 Spreading

The spreading of physical channels is the same as in 3.84 Mcps TDD (cf. 5.2.1 'Spreading').

## 5A.2.2 Burst Format

A traffic 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 8A below. The guard period is 16 chip periods long.

The burst format is shown in Figure 18D. The contents of the traffic burst fields is described in table 8B.

**Table 8A: number of symbols per data field in a traffic burst**

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

**Table 8B: The contents of the traffic burst format fields**

| Chip number (CN) | Length of field in chips | Length of field in symbols | Contents of field |
|---|---|---|---|
| 0-351 | 352 | cf table 8A | Data symbols |
| 352-495 | 144 | - | Midamble |
| 496-847 | 352 | cf table 8A | Data symbols |
| 848-863 | 16 | - | Guard period |

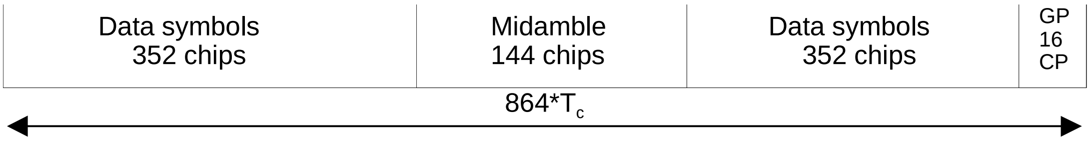



**Figure 18D**: **Burst structure of the traffic burst format (GP denotes the guard period and CP the chip periods)**

### 5A.2.2.1 Transmission of TFCI

The traffic burst format provides the possibility for transmission of TFCI in uplink and downlink.

The transmission of TFCI is configured by higher Layers. 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. The TFCI is always present in the first timeslot in a radio frame for each CCTrCH. If a time slot contains the TFCI, then it is always transmitted using the physical channel with the lowest physical channel sequence number (*p*) in that timeslot. Physical channel sequence numbering is determined by the rate matching function and is described in [7].

The transmission of TFCI is done in the data parts of the respective physical channel, this means that TFCI code word bits 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 code word bits are equally distributed between the two subframes and the respective data fields. The TFCI code word is to be transmitted possibly either directly adjacent to the midamble or after the SS and TPC symbols. Figure 18E shows the position of the TFCI code word in a traffic burst, if neither SS nor TPC are transmitted. Figure 18F shows the position of the TFCI code word in a traffic burst , if SS and TPC are transmitted.

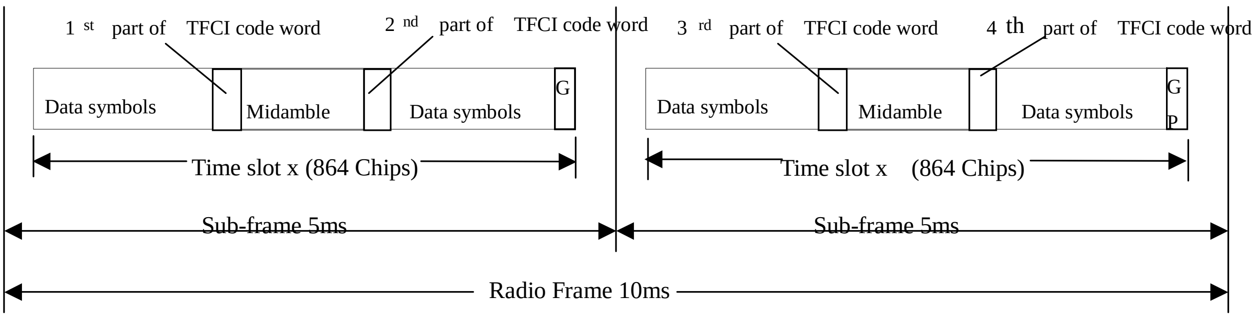



**Figure 18E: Position of the TFCI code word in the traffic burst in case of no TPC and SS in 1.28 Mcps TDD**

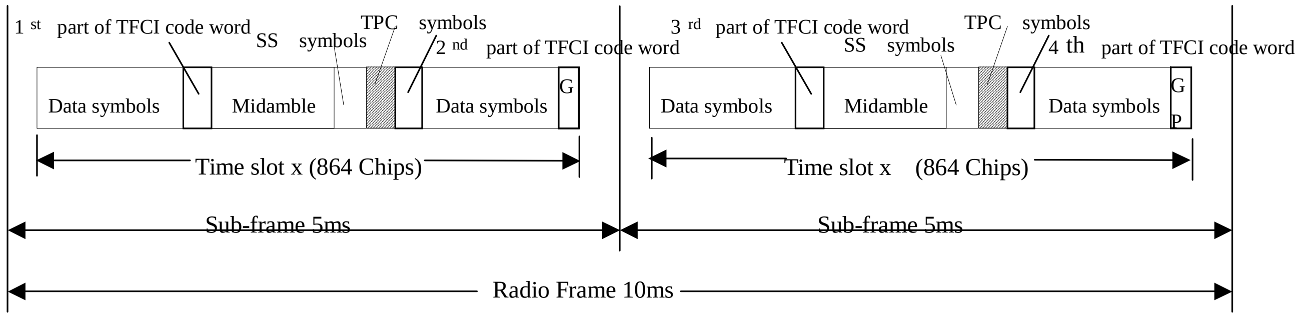



**Figure 18F:Position of the TFCI code word in the traffic burst in case of TPC and SS in 1.28 Mcps TDD**

### 5A.2.2.2 Transmission of TPC

In this section, transmission of TPC over dedicated physical channels is described. Optionally, UTRAN may configure some UL CCTrCH's to be controlled via TPC commands on PLCCH (for example in the case of HS-DSCH operation without an associated downlink DPCH). PLCCH is described in section 5A.3.13.

Within the context of this subclause, only those TPC commands not borne by PLCCH (in the DL case) nor by PLCCH-controlled physical channels (in the UL case) are considered. That is to say that those UL timeslot/CCTrCH pairs controlled by PLCCH and those DL TPC commands mapped to PLCCH are excluded from consideration when deriving the mapping between UL/DL TPC commands and the UL/DL CCTrCH's they control. The association between PLCCH and UL timeslot/CCTrCH pair(s) is signalled by higher layers.

The burst type for dedicated channels provides the possibility for transmission of TPC in uplink and downlink.

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 SS information, which is transmitted after the midamble. Figure 18G shows the position of the TPC command in a traffic burst.

For every user the TPC information is to be transmitted at least once per 5ms sub-frame. For each allocated timeslot it is signalled individually whether that timeslot carries TPC information or not. If applied in a timeslot, transmission of TPC symbols is done in the data parts of the traffic burst and they are transmitted using the physical channel with the lowest physical channel sequence number (*p*) in that timeslot. Physical channel sequence numbering is determined by the rate matching function and is described in [7].

TPC symbols may also be transmitted on more than one physical channel in a time slot. For this purpose, higher layers allocate an additional number of $N_{TPC}$ physical channels, individually for each time slot. The TPC symbols shall then be transmitted using the physical channels with the $N_{TPC}+1$ lowest physical channel sequence numbers (*p*) in that time slot. Physical channel sequence numbering is determined by the rate matching function and is described in [7]. If the rate matching function results in $N_{RM} < N_{TPC}+1$ remaining physical channels in this time slot, TPC symbols shall be transmitted only on the $N_{RM}$ remaining physical channels.

The TPC symbols are spread with the same spreading factor (SF) and spreading code as the data parts of the respective physical channel.

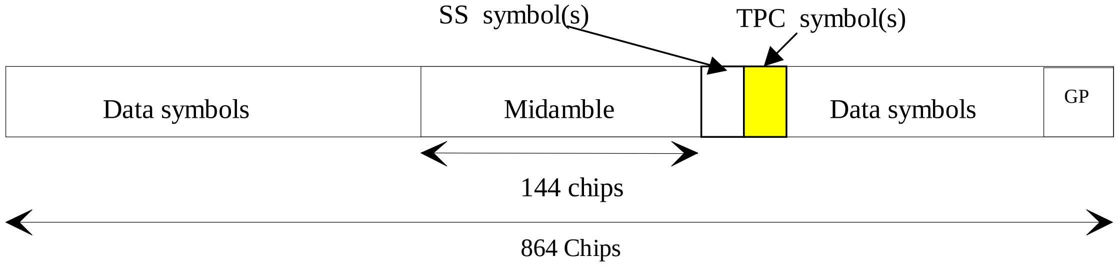



**Figure 18G: Position of TPC information in the traffic burst in downlink and uplink**

For the number of TPC symbols per time slot there are 3 possibilities, that can be configured by higher layers, individually for each timeslot:

1) one TPC symbol

2) no TPC symbols

3) 16/SF TPC symbols

So, in case 3), when SF=1, there are 16 TPC symbols which correspond to 32 bits (for QPSK) and 48 bits (for 8PSK).

In the following the uplink is described only. For the description of the downlink, downlink (DL) and uplink (UL) have to be interchanged.

Each of the TPC symbols for uplink power control in the DL will be associated with an UL time slot and an UL CCTrCH pair. This association varies with

- the number of allocated UL time slots and UL CCTrCHs on these time slots (time slot and CCTrCH pair) and

- the allocated TPC symbols in the DL.

In case a UE has

- more than one channelisation code

and/or

- channelisation codes being of lower spreading factor than 16 and using 16/SF SS and 16/SF TPC symbols,

the TPC commands for each ULtime slot CCTrCH pair (all channelisation codes on that time slot belonging to the same time slot and CCTrCH pair have the same TPC command) will be distributed to the following rules:

1. The ULtime slots and CCTrCH pairs the TPC commands are intended for will be numbered from the first to the last ULtime slot and CCTrCH pair allocated to the regarded UE (starting with 0). The number of a time slot and CCTrCH pair is smaller than the number of another time slot and CCTrCH pair within the same time slot if its spreading code with the lowest SC number according to the following table has a lower SC number than the spreading code with the lowest SC number of the other time slot and CCTrCH pair.

2. The commanding TPC symbols on all DL CCTrCHs allocated to one UE are numbered consecutively starting with zero according to the following rules:

   a) The numbers of the TPC commands of a regarded DL time slot are lower than those of DL time slots being transmitted after that time slot

   b) Within a DL time slot the numbers of the TPC commands of a regarded channelisation code are lower than those of channelisation codes having a higher spreading code number

   The spreading code number is defined by the following table (see[8]):

| SC number | SF (Q) | Walsh code number (k) |
|---|---|---|
| 0 | 16 | $\mathbf{c}_{Q=16}^{(k=1)}$ |
| | ... | |
| 15 | 16 | $\mathbf{c}_{Q=16}^{(k=16)}$ |
| 16 | 8 | $\mathbf{c}_{Q=8}^{(k=1)}$ |
| | … | |
| 23 | 8 | $\mathbf{c}_{Q=8}^{(k=8)}$ |
| 24 | 4 | $\mathbf{c}_{Q=4}^{(k=1)}$ |
| | … | |
| 27 | 4 | $\mathbf{c}_{Q=4}^{(k=4)}$ |
| 28 | 2 | $\mathbf{c}_{Q=2}^{(k=1)}$ |
| 29 | 2 | $\mathbf{c}_{Q=2}^{(k=2)}$ |
| 30 | 1 | $\mathbf{c}_{Q=1}^{(k=1)}$ |

Note: Spreading factors 2-8 are not used in DL

c) Within a channelisation code numbers of the TPC commands are lower than those of TPC commands being transmitted after that time

The following equation is used to determine the UL time slot which is controlled by the regarded TPC symbol in the DL:

$$UL_{pos} = \left(SFN' \cdot N_{UL\_TPCsymbols} + TPC_{DLpos} + \left(\left(SFN' \cdot N_{UL\_TPCsymbols} + TPC_{DLpos}\right) \mathrm{div}\left(N_{ULslot}\right)\right)\right) \mathrm{mod}\left(N_{ULslot}\right),$$

where

$UL_{pos}$ is the number of the controlled uplink time slot and CCTrCH pairs.

SFN' is the system frame number counting the sub-frames. The system frame number of the radio frames (SFN) can be derived from SFN' by

SFN=SFN' div 2, where div is the remainder free division operation.

$N_{UL\_PCsymbols}$ is the number of UL TPC symbols in a sub-frame (excluding those on PLCCH-controlled resources).

$TPC_{DLpos}$ is the number of the regarded UL TPC symbol in the DL within the sub-frame.

$N_{ULslot}$ is the number of UL slots and CCTrCH pairs in a sub-frame (excluding those associated with PLCCH).

When one of the above parameters is changed due to higher layer reconfiguration, the new relationship between TPC symbols and controlled UL time slots shall be valid, beginning with the radio frame, for which the new parameters are set.

In Annex CB two examples of the association of TPC commands to time slots and CCTrCH pairs are shown.

Coding of TPC:

The relationship between the TPC Bits and the transmitter power control command for QPSK is the same as in the 3.84Mcps TDD cf. [5.2.2.5 'Transmission of TPC'].

The relationship between the TPC Bits and the transmitter power control command for 8PSK is given in table 8C

**Table 8C: TPC Bit Pattern for 8PSK**

| TPC Bits | TPC command | Meaning |
|---|---|---|
| 000 | 'Down' | Decrease Tx Power |
| 110 | 'Up' | Increase Tx Power |

### 5A.2.2.3 Transmission of SS

In this section, transmission of SS over dedicated physical channels is described. Optionally, UTRAN may configure some UL CCTrCH's to be controlled via SS commands on PLCCH (for example in the case of HS-DSCH operation without an associated downlink DPCH). PLCCH is described in section 5A.3.13.

Within the context of this subclause, only those SS commands not borne by PLCCH are considered. That is to say that those UL timeslots controlled exclusively by PLCCH and those SS commands carried by PLCCH are excluded from consideration when deriving the mapping between DL SS commands and the UL timeslots they control. The association between PLCCH and UL timeslot/CCTrCH pair(s) is signalled by higher layers.

The burst type for dedicated channels provides the possibility for transmission of uplink synchronisation control (ULSC).

The transmission of ULSC is done in the data parts of the traffic burst. Hence the midamble structure and length is not changed. The ULSC information is to be transmitted directly after the midamble. Figure 18H shows the position of the SS command in a traffic burst.

For every user the ULSC information shall be transmitted at least once per transmitted sub-frame.

For each allocated timeslot it is signalled individually whether that timeslot carries ULSC information or not. If applied in a time slot, transmission of SS symbols is done in the data parts of the traffic burst and they are transmitted using the physical channel with the lowest physical channel sequence number (*p*) in that timeslot. Physical channel sequence numbering is determined by the rate matching function and is described in [7].

SS symbols may also be transmitted on more than one physical channel in a time slot. For this purpose, higher layers allocate an additional number of $N_{SS}$ physical channels, individually for each time slot. The SS symbols shall then be transmitted using the physical channels with the $N_{SS}$+1 lowest physical channel sequence numbers (*p*) in that time slot. Physical channel sequence numbering is determined by the rate matching function and is described in [7]. If the rate matching function results in $N_{RM} < N_{SS}+1$ remaining physical channels in this time slot, SS symbols shall be transmitted only on the $N_{RM}$ remaining physical channels.

The SS symbols are spread with the same spreading factor (SF) and spreading code as the data parts of the respective physical channel.

The SS is utilised to command a timing adjustment by (k/8) Tc each M sub-frames, where Tc is the chip period. The k and M values are signalled by the network. The SS, as one of L1 signals, is to be transmitted once per 5ms sub-frame.

M (1-8) and k (1-8) can be adjusted during call setup or readjusted during the call.

Note: The smallest step for the SS signalled by the UTRAN is 1/8 Tc. For the UE capabilities regarding the SS adjustment of the UE it is suggested to set the tolerance for the executed command to be [1/9;1/7] Tc.

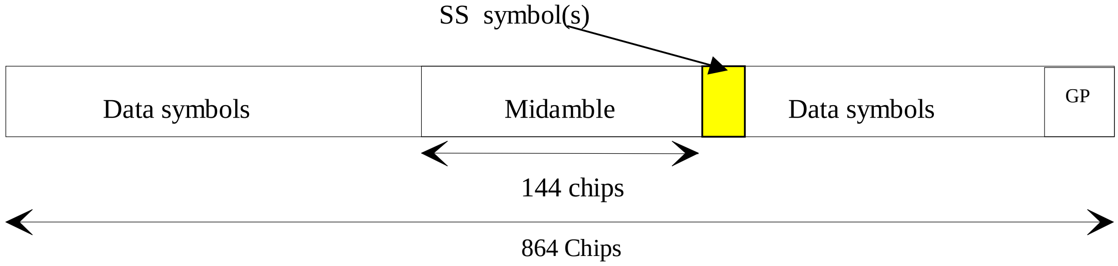



**Figure 18H: Position of ULSC information in the traffic burst (downlink and uplink)**

Note that for the uplink where there is no SS symbol used, the SS symbol space is reserved for future use. This can keep UL and DL slots the same structure.

For the number of SS symbols per time slot there are 3 possibilities, that cn be configured by higher layers individually for each time slot:

- one SS symbol
- no SS symbol
- 16/SF SS symbols

So, in case 3, when SF=1, there are 16 SS symbols which correspond to 32 bits (for QPSK) and 48 bits (for 8PSK).

Each of the SS symbols in the DL will be associated with an UL time slot depending on the allocated UL time slots and the allocated SS symbols in the DL.

Note: Even though the different time slots of the UE are controlled with independent SS commands, the UE is not in need to execute SS commands leading to a deviation of more than [3] chip with respect to the average timing advance applied by the UE.

The synchronisation shift commands for each UL time slot (all channelisation codes on that time slot have the same SS command) will be distributed to the following rules:

1. The UL time slots the SS commands are intended for will be numbered from the first to the last UL time slot occupied by the regarded UE (starting with 0) considering all CCTrCHs allocated to that UE.
2. The commanding SS symbols on all downlink CCTrCHs allocated to one UE are numbered consecutively starting with zero according to the following rules:
   a) The numbers of the SS commands of a regarded DL time slot are lower than those of DL time slots being transmitted after that time slot
   b) Within a DL time slot the numbers of the SS commands of a regarded channelisation code are lower than those of channelisation codes having a bigger spreading code number

   The spreading code number is defined by the following table: (see TS 25.223)

| Spreading code number | SF (Q) | Walsh code number (k) |
|---|---|---|
| 0 | 16 | $\mathbf{c}_{Q=16}^{(k=1)}$ |
| | ... | |
| 15 | 16 | $\mathbf{c}_{Q=16}^{(k=16)}$ |
| | Spreading factors 2-8 are nor used in DL | |
| 30 | 1 | $\mathbf{c}_{Q=1}^{(k=1)}$ |

   c) Within a channelisation code numbers of the SS commands are lower than those of SS commands being transmitted after that time

The following equation is used to determine the UL time slot which is controlled by the regarded SS symbol:

$$UL_{pos} = \left(SFN' \cdot N_{SSsymbols} + SS_{pos} + \left(\left(SFN' \cdot N_{SSsymbols} + SS_{pos}\right) \mathrm{div}\left(N_{ULslot}\right)\right)\right) \mathrm{mod}\left(N_{ULslot}\right),$$

where

$UL_{pos}$ is the number of the controlled uplink time slot.

SFN’ is the system frame number counting the sub-frames. The system frame number of the radio frames (SFN) can be derived from SFN’ by

SFN=SFN’ div 2, where div is the remainder free division operation.

$N_{SSsymbols}$ is the number of SS symbols in a sub-frame (excluding those associated with PLCCH).

$SS_{pos}$ is the number of the regarded SS symbol within the sub-frame.

$N_{ULslot}$ is the number of UL slots in a sub-frame (excluding those slots exclusively controlled by PLCCH).

When one of the above parameters is changed due to higher layer reconfiguration, the new relationship between SS symbols and controlled UL time slots shall be valid, beginning with the radio frame, for which the new parameters are set.

The relationship between the SS Bits and the SS command for QPSK is the given in table 8D:

**Table 8D: Coding of the SS for QPSK**

| SS Bits | SS command | Meaning |
|---|---|---|
| 00 | 'Down' | Decrease synchronisation shift by k/8 Tc |
| 11 | 'Up' | Increase synchronisation shift by k/8 Tc |
| 01 | ‘Do nothing’ | No change |

The relationship between the SS Bits and the SS command for 8PSK is given in table 8E:

**Table 8E: Coding of the SS for 8PSK**

| SS Bits | SS command | Meaning |
|---|---|---|
| 000 | 'Down' | Decrease synchronisation shift by k/8 Tc |
| 110 | 'Up' | Increase synchronisation shift by k/8 Tc |
| 011 | ‘Do nothing’ | No change |

### 5A.2.2.4 Timeslot formats

The timeslot format depends on the spreading factor, the number of the TFCI code word bits, the number of SS and TPC symbols and the applied modulation scheme (QPSK/8PSK) as depicted in the following tables.

#### 5A.2.2.4.1 Timeslot formats for QPSK

##### 5A.2.2.4.1.1 Downlink timeslot formats

**Table 8F : Time slot formats for the Downlink**

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI}$ code word (bits) | $N_{SS}$ & $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|
| 0 | 16 | 144 | 0 | 0 & 0 | 88 | 88 | 44 | 44 |
| 1 | 16 | 144 | 4 | 0 & 0 | 88 | 86 | 42 | 44 |
| 2 | 16 | 144 | 8 | 0 & 0 | 88 | 84 | 42 | 42 |
| 3 | 16 | 144 | 16 | 0 & 0 | 88 | 80 | 40 | 40 |
| 4 | 16 | 144 | 32 | 0 & 0 | 88 | 72 | 36 | 36 |
| 5 | 16 | 144 | 0 | 2 & 2 | 88 | 84 | 44 | 40 |
| 6 | 16 | 144 | 4 | 2 & 2 | 88 | 82 | 42 | 40 |
| 7 | 16 | 144 | 8 | 2 & 2 | 88 | 80 | 42 | 38 |
| 8 | 16 | 144 | 16 | 2 & 2 | 88 | 76 | 40 | 36 |
| 9 | 16 | 144 | 32 | 2 & 2 | 88 | 68 | 36 | 32 |
| 10 | 1 | 144 | 0 | 0 & 0 | 1408 | 1408 | 704 | 704 |
| 11 | 1 | 144 | 4 | 0 & 0 | 1408 | 1406 | 702 | 704 |
| 12 | 1 | 144 | 8 | 0 & 0 | 1408 | 1404 | 702 | 702 |
| 13 | 1 | 144 | 16 | 0 & 0 | 1408 | 1400 | 700 | 700 |
| 14 | 1 | 144 | 32 | 0 & 0 | 1408 | 1392 | 696 | 696 |
| 15 | 1 | 144 | 0 | 2 & 2 | 1408 | 1404 | 704 | 700 |
| 16 | 1 | 144 | 4 | 2 & 2 | 1408 | 1402 | 702 | 700 |
| 17 | 1 | 144 | 8 | 2 & 2 | 1408 | 1400 | 702 | 698 |
| 18 | 1 | 144 | 16 | 2 & 2 | 1408 | 1396 | 700 | 696 |
| 19 | 1 | 144 | 32 | 2 & 2 | 1408 | 1388 | 696 | 692 |
| 20 | 1 | 144 | 0 | 32 & 32 | 1408 | 1344 | 704 | 640 |
| 21 | 1 | 144 | 4 | 32 & 32 | 1408 | 1342 | 702 | 640 |
| 22 | 1 | 144 | 8 | 32 & 32 | 1408 | 1340 | 702 | 638 |
| 23 | 1 | 144 | 16 | 32 & 32 | 1408 | 1336 | 700 | 636 |
| 24 | 1 | 144 | 32 | 32 & 32 | 1408 | 1328 | 696 | 632 |

5A.2.2.4.1.2 Uplink timeslot formats

**Table 8G : Time slot formats for the Uplink**

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI}$ code word (bits) | $N_{SS}$ & $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|
| 0 | 16 | 144 | 0 | 0 & 0 | 88 | 88 | 44 | 44 |
| 1 | 16 | 144 | 4 | 0 & 0 | 88 | 86 | 42 | 44 |
| 2 | 16 | 144 | 8 | 0 & 0 | 88 | 84 | 42 | 42 |
| 3 | 16 | 144 | 16 | 0 & 0 | 88 | 80 | 40 | 40 |
| 4 | 16 | 144 | 32 | 0 & 0 | 88 | 72 | 36 | 36 |
| 5 | 16 | 144 | 0 | 2 & 2 | 88 | 84 | 44 | 40 |
| 6 | 16 | 144 | 4 | 2 & 2 | 88 | 82 | 42 | 40 |
| 7 | 16 | 144 | 8 | 2 & 2 | 88 | 80 | 42 | 38 |
| 8 | 16 | 144 | 16 | 2 & 2 | 88 | 76 | 40 | 36 |
| 9 | 16 | 144 | 32 | 2 & 2 | 88 | 68 | 36 | 32 |
| 10 | 8 | 144 | 0 | 0 & 0 | 176 | 176 | 88 | 88 |
| 11 | 8 | 144 | 4 | 0 & 0 | 176 | 174 | 86 | 88 |
| 12 | 8 | 144 | 8 | 0 & 0 | 176 | 172 | 86 | 86 |
| 13 | 8 | 144 | 16 | 0 & 0 | 176 | 168 | 84 | 84 |
| 14 | 8 | 144 | 32 | 0 & 0 | 176 | 160 | 80 | 80 |
| 15 | 8 | 144 | 0 | 2 & 2 | 176 | 172 | 88 | 84 |
| 16 | 8 | 144 | 4 | 2 & 2 | 176 | 170 | 86 | 84 |
| 17 | 8 | 144 | 8 | 2 & 2 | 176 | 168 | 86 | 82 |
| 18 | 8 | 144 | 16 | 2 & 2 | 176 | 164 | 84 | 80 |
| 19 | 8 | 144 | 32 | 2 & 2 | 176 | 156 | 80 | 76 |
| 20 | 8 | 144 | 0 | 4 & 4 | 176 | 168 | 88 | 80 |
| 21 | 8 | 144 | 4 | 4 & 4 | 176 | 166 | 86 | 80 |
| 22 | 8 | 144 | 8 | 4 & 4 | 176 | 164 | 86 | 78 |
| 23 | 8 | 144 | 16 | 4 & 4 | 176 | 160 | 84 | 76 |
| 24 | 8 | 144 | 32 | 4 & 4 | 176 | 152 | 80 | 72 |
| 25 | 4 | 144 | 0 | 0 & 0 | 352 | 352 | 176 | 176 |
| 26 | 4 | 144 | 4 | 0 & 0 | 352 | 350 | 174 | 176 |
| 27 | 4 | 144 | 8 | 0 & 0 | 352 | 348 | 174 | 174 |
| 28 | 4 | 144 | 16 | 0 & 0 | 352 | 344 | 172 | 172 |
| 29 | 4 | 144 | 32 | 0 & 0 | 352 | 336 | 168 | 168 |
| 30 | 4 | 144 | 0 | 2 & 2 | 352 | 348 | 176 | 172 |
| 31 | 4 | 144 | 4 | 2 & 2 | 352 | 346 | 174 | 172 |
| 32 | 4 | 144 | 8 | 2 & 2 | 352 | 344 | 174 | 170 |
| 33 | 4 | 144 | 16 | 2 & 2 | 352 | 340 | 172 | 168 |
| 34 | 4 | 144 | 32 | 2 & 2 | 352 | 332 | 168 | 164 |
| 35 | 4 | 144 | 0 | 8 & 8 | 352 | 336 | 176 | 160 |
| 36 | 4 | 144 | 4 | 8 & 8 | 352 | 334 | 174 | 160 |
| 37 | 4 | 144 | 8 | 8 & 8 | 352 | 332 | 174 | 158 |
| 38 | 4 | 144 | 16 | 8 & 8 | 352 | 328 | 172 | 156 |
| 39 | 4 | 144 | 32 | 8 & 8 | 352 | 320 | 168 | 152 |
| 40 | 2 | 144 | 0 | 0 & 0 | 704 | 704 | 352 | 352 |
| 41 | 2 | 144 | 4 | 0 & 0 | 704 | 702 | 350 | 352 |
| 42 | 2 | 144 | 8 | 0 & 0 | 704 | 700 | 350 | 350 |
| 43 | 2 | 144 | 16 | 0 & 0 | 704 | 696 | 348 | 348 |
| 44 | 2 | 144 | 32 | 0 & 0 | 704 | 688 | 344 | 344 |
| 45 | 2 | 144 | 0 | 2 & 2 | 704 | 700 | 352 | 348 |
| 46 | 2 | 144 | 4 | 2 & 2 | 704 | 698 | 350 | 348 |

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI}$ code word (bits) | $N_{SS}$ & $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|
| 47 | 2 | 144 | 8 | 2 & 2 | 704 | 696 | 350 | 346 |
| 48 | 2 | 144 | 16 | 2 & 2 | 704 | 692 | 348 | 344 |
| 49 | 2 | 144 | 32 | 2 & 2 | 704 | 684 | 344 | 340 |
| 50 | 2 | 144 | 0 | 16 & 16 | 704 | 672 | 352 | 320 |
| 51 | 2 | 144 | 4 | 16 & 16 | 704 | 670 | 350 | 320 |
| 52 | 2 | 144 | 8 | 16 & 16 | 704 | 668 | 350 | 318 |
| 53 | 2 | 144 | 16 | 16 & 16 | 704 | 664 | 348 | 316 |
| 54 | 2 | 144 | 32 | 16 & 16 | 704 | 656 | 344 | 312 |
| 55 | 1 | 144 | 0 | 0 & 0 | 1408 | 1408 | 704 | 704 |
| 56 | 1 | 144 | 4 | 0 & 0 | 1408 | 1406 | 702 | 704 |
| 57 | 1 | 144 | 8 | 0 & 0 | 1408 | 1404 | 702 | 702 |
| 58 | 1 | 144 | 16 | 0 & 0 | 1408 | 1400 | 700 | 700 |
| 59 | 1 | 144 | 32 | 0 & 0 | 1408 | 1392 | 696 | 696 |
| 60 | 1 | 144 | 0 | 2 & 2 | 1408 | 1404 | 704 | 700 |
| 61 | 1 | 144 | 4 | 2 & 2 | 1408 | 1402 | 702 | 700 |
| 62 | 1 | 144 | 8 | 2 & 2 | 1408 | 1400 | 702 | 698 |
| 63 | 1 | 144 | 16 | 2 & 2 | 1408 | 1396 | 700 | 696 |
| 64 | 1 | 144 | 32 | 2 & 2 | 1408 | 1388 | 696 | 692 |
| 65 | 1 | 144 | 0 | 32 & 32 | 1408 | 1344 | 704 | 640 |
| 66 | 1 | 144 | 4 | 32 & 32 | 1408 | 1342 | 702 | 640 |
| 67 | 1 | 144 | 8 | 32 & 32 | 1408 | 1340 | 702 | 638 |
| 68 | 1 | 144 | 16 | 32 & 32 | 1408 | 1336 | 700 | 636 |
| 69 | 1 | 144 | 32 | 32 & 32 | 1408 | 1328 | 696 | 632 |

### 5A.2.2.4.2 Time slot formats for 8PSK

The Downlink and the Uplink timeslot formats are described together in the following table.

**Table 8H: Timeslot formats for 8PSK modulation**

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI}$ code word (bits) | $N_{SS}$ & $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 144 | 0 | 0 & 0 | 2112 | 2112 | 1056 | 1056 |
| 1 | 1 | 144 | 6 | 0 & 0 | 2112 | 2109 | 1053 | 1056 |
| 2 | 1 | 144 | 12 | 0 & 0 | 2112 | 2106 | 1053 | 1053 |
| 3 | 1 | 144 | 24 | 0 & 0 | 2112 | 2100 | 1050 | 1050 |
| 4 | 1 | 144 | 48 | 0 & 0 | 2112 | 2088 | 1044 | 1044 |
| 5 | 1 | 144 | 0 | 3 & 3 | 2112 | 2106 | 1056 | 1050 |
| 6 | 1 | 144 | 6 | 3 & 3 | 2112 | 2103 | 1053 | 1050 |
| 7 | 1 | 144 | 12 | 3 & 3 | 2112 | 2100 | 1053 | 1047 |
| 8 | 1 | 144 | 24 | 3 & 3 | 2112 | 2094 | 1050 | 1044 |
| 9 | 1 | 144 | 48 | 3 & 3 | 2112 | 2082 | 1044 | 1038 |
| 10 | 1 | 144 | 0 | 48 & 48 | 2112 | 2016 | 1056 | 960 |
| 11 | 1 | 144 | 6 | 48 & 48 | 2112 | 2013 | 1053 | 960 |
| 12 | 1 | 144 | 12 | 48 & 48 | 2112 | 2010 | 1053 | 957 |
| 13 | 1 | 144 | 24 | 48 & 48 | 2112 | 2004 | 1050 | 954 |
| 14 | 1 | 144 | 48 | 48 & 48 | 2112 | 1992 | 1044 | 948 |
| 15 | 16 | 144 | 0 | 0 & 0 | 132 | 132 | 66 | 66 |
| 16 | 16 | 144 | 6 | 0 & 0 | 132 | 129 | 63 | 66 |
| 17 | 16 | 144 | 12 | 0 & 0 | 132 | 126 | 63 | 63 |
| 18 | 16 | 144 | 24 | 0 & 0 | 132 | 120 | 60 | 60 |
| 19 | 16 | 144 | 48 | 0 & 0 | 132 | 108 | 54 | 54 |
| 20 | 16 | 144 | 0 | 3 & 3 | 132 | 126 | 66 | 60 |
| 21 | 16 | 144 | 6 | 3 & 3 | 132 | 123 | 63 | 60 |
| 22 | 16 | 144 | 12 | 3 & 3 | 132 | 120 | 63 | 57 |
| 23 | 16 | 144 | 24 | 3 & 3 | 132 | 114 | 60 | 54 |
| 24 | 16 | 144 | 48 | 3 & 3 | 132 | 102 | 54 | 48 |

### 5A.2.2.4.3 Time slot formats for 16QAM

Downlink timeslot formats using 16QAM modulation is dedicated for MBSFN operation and is described in the following table.

**Table 8Ha : Time slot formats for 16QAM**

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI}$ code word (bits) | $N_{SS}$ & $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|
| 0 | 16 | 144 | 0 | 0 & 0 | 176 | 176 | 88 | 88 |
| 1 | 16 | 144 | 8 | 0 & 0 | 176 | 172 | 84 | 88 |
| 2 | 1 | 144 | 0 | 0 & 0 | 2816 | 2816 | 1408 | 1408 |
| 3 | 1 | 144 | 8 | 0 & 0 | 2816 | 2812 | 1404 | 1408 |

### 5A.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. In the case of MBSFN timeslots there is only a single midamble and this is derived from a single basic midamble code which is not necessarily cell-specific. The applicable basic midamble codes are given in Annex AA.1.

The basic midamble codes in Annex AA.1 are listed in hexadecimal notation. The binary form of the basic midamble code shall be derived according to table 8I below.

**Table 8I: 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 $\mathbf{m}_P$ :

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

According to Annex AA.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 $\underline{\mathbf{m}}_P$ :

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

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

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

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 $\underline{\mathbf{m}}_P$ 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 AA.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:

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

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:

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

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

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

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 $\mathbf{m}_{\mathrm{P}}$ according to (1).

#### 5A.2.4 Beamforming

Beamforming is same as that of the 3.84Mcps TDD, cf. [ 5.2.4 Beamforming ].

Beamforming is not applicable to DL time slots with MBSFN transmission.

## 5A.3 Common physical channels

### 5A.3.1 Primary common control physical channel (P-CCPCH)

The BCH as described in section 4.1.2 '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. The P-CCPCH is always transmitted with an antenna pattern configuration that provides whole cell coverage.

#### 5A.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.

#### 5A.3.1.2 P-CCPCH Burst Format

The burst format as described in section 5A.2.2 is used for the P-CCPCH. No TFCI is applied for the P-CCPCH.

#### 5A.3.1.3 P-CCPCH Training sequences

The training sequences, i.e. midambles, as described in subclause 5A.2.3 are used for the P-CCPCH.

### 5A.3.2 Secondary common control physical channel (S-CCPCH)

PCH and FACH as described in subclause 4.1.2 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.

#### 5A.3.2.1 S-CCPCH Spreading

Except for physical channels in MBSFN time slot, the S-CCPCH uses fixed spreading with a spreading factor SF = 16. as described in subclause 5A.2.1. And the S-CCPCH in MBSFN time slot may use spreading with spreading factor SF =1,2 or 16.

Note: SF=2 is only used on dedicated MBSFN frequency.

#### 5A.3.2.2 S-CCPCH Burst Format

The burst format as described in section 5A.2.2 is used for the S-CCPCH. TFCI may be applied for S-CCPCHs.

#### 5A.3.2.3 S-CCPCH Training sequences

The training sequences, i.e. midambles, as described in the subclause 5A.2.3 are also used for the S-CCPCH.

### 5A.3.3 Fast Physical Access CHannel (FPACH)

The Fast Physical Access CHannel (FPACH) is used by the Node B to carry, in a single burst, the acknowledgement of a detected signature with timing and power level adjustment indication to a user equipment. FPACH makes use of one code with spreading factor 16, so that its burst is composed by 44 symbols. The spreading code, training sequence and time slot position are configured by the network and signalled on the BCH.

#### 5A.3.3.1 FPACH burst

The FPACH burst contains 32 information bits. Table 8J reports the content description of the FPACH information bits and their priority order:

**Table 8J: FPACH information bits description**

| Information field | Length (in bits) |
|---|---|
| Signature Reference Number | 3 (MSB) |
| Relative Sub-Frame Number | 2 |
| Received starting position of the UpPCH ($UpPCH_{POS}$) | 11 |
| Transmit Power Level Command for RACH message | 7 |
| Reserved bits (default value: 0) | 9 (LSB) |

The use and generation of the information fields is explained in [9].

##### 5A.3.3.1.1 Signature Reference Number

The reported number corresponds to the numbering principle for the cell signatures as described in [8].

The Signature Reference Number value range is 0 – 7 coded in 3 bits such that:

bit sequence(0 0 0) corresponds to the first signature of the cell; …; bit sequence (1 1 1) corresponds to the $8^{th}$ signature of the cell.

##### 5A.3.3.1.2 Relative Sub-Frame Number

The Relative Sub-Frame Number value range is 0 – 3 coded such that:

bit sequence (0 0) indicates one sub-frame difference; …; bit sequence (1 1) indicates 4 sub-frame difference.

##### 5A.3.3.1.3 Received starting position of the UpPCH ($UpPCH_{POS}$)

The received starting position of the UpPCH value range is 0 – 2047 coded such that:

bit sequence (0 0 … 0 0 0) indicates the received starting position zero chip; …; bit sequence (1 1 … 1 1 1) indicates the received starting position 2047*1/8 chip.

##### 5A.3.3.1.4 Transmit Power Level Command for the RACH message

The transmit power level command is transmitted in 7 bits.

#### 5A.3.3.2 FPACH Spreading

The FPACH uses only spreading factor SF=16 as described in subclause 5A.3.3. The set of admissible spreading codes for use on the FPACH is broadcast on the BCH.

#### 5A.3.3.3 FPACH Burst Format

The burst format as described in section 5A.2.2 is used for the FPACH.

#### 5A.3.3.4 FPACH Training sequences

The training sequences, i.e. midambles, as described in subclause 5A.2.3 are used for FPACH.

#### 5A.3.3.5 FPACH timeslot formats

The FPACH uses slot format #0 of the DL time slot formats given in subclause 5A.2.2.4.1.1.

### 5A.3.4 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.

#### 5A.3.4.1 PRACH Spreading

The uplink PRACH uses either spreading factor SF=16, SF=8 or SF=4 as described in subclause 5A.2.1. 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).

#### 5A.3.4.2 PRACH Burst Format

The burst format as described in section 5A.2.2 is used for the PRACH.

#### 5A.3.4.3 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 5A.2.3 are used for PRACH.

#### 5A.3.4.4 PRACH timeslot formats

The PRACH uses the following time slot formats taken from the uplink timeslot formats described in sub-clause 5A.2.2.4.1.2:

| Spreading Factor | Slot Format # |
|---|---|
| 16 | 0 |
| 8 | 10 |
| 4 | 25 |

#### 5A.3.4.5 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.

### 5A.3.5 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. The DwPCH is used for the down link synchronisation and the UpPCH is used for the uplink synchronisation.

The position and the contents of the DwPCH are equal to the DwPTS as described in the subclause 5A.1., 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 18I.

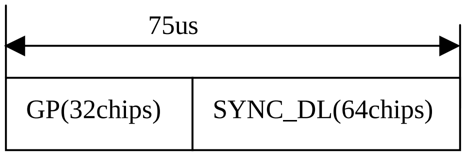



**Figure 18I: burst structure of the DwPCH ( DwPTS)**

Note: 'GP' for 'Guard Period'

The burst structure of the UpPCH ( UpPTS) is described in the figure 18J.

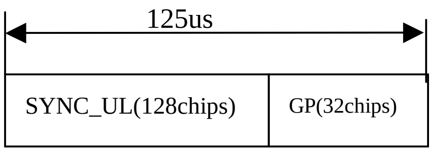



**Figure 18J: burst structure of the UpPCH ( UpPTS)**

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 [8].

### 5A.3.6 Physical Uplink Shared Channel (PUSCH)

For Physical Uplink Shared Channel (PUSCH) the burst structure of DPCH as described in subclause 5A.2 and the training sequences as described in subclause 5A.2.3 shall be used. PUSCH provides the possibility for transmission of TFCI, SS, and TPC in uplink.

The PUSCH is common with 3.84 Mcps TDD with respect to Spreading and UE selection, cf. [5.3.5 Physical Uplink Shared Channel (PUSCH)].

### 5A.3.7 Physical Downlink Shared Channel (PDSCH)

For Physical Downlink Shared Channel (PDSCH) the burst structure of DPCH as described in subclause 5A.2 and the training sequences as described in subclause 5A.2.3 shall be used. PDSCH provides the possibility for transmission of TFCI, SS, and TPC in downlink.

The PDSCH is common with 3.84 Mcps TDD with respect to Spreading and UE selection, cf. [5.3.6 Physical Downlink Shared Channel (PDSCH)].

## 5A.3.8 The Page Indicator Channel (PICH)

The Paging Indicator Channel (PICH) is a physical channel used to carry the paging indicators.

### 5A.3.8.1 Mapping of Paging Indicators to the PICH bits

Figure 18K depicts the structure of a PICH transmission and the numbering of the bits within the bursts. The burst type as described in [5A.2.2 'Burst Format'] is used for the PICH. $N_{PIB}$ bits are used to carry the paging indicators, where $N_{PIB}$=352.

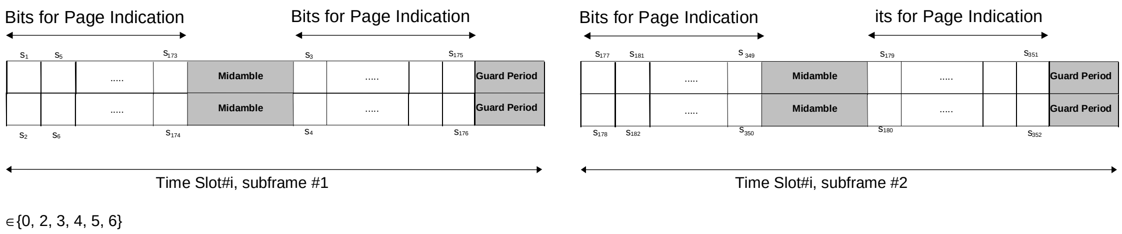



**Figure 18K: Transmission and numbering of paging indicator carrying bits in the PICH bursts**

Each paging indicator $P_q$ (where $P_q$, $q$ = 0, ..., $N_{PI}$-1, $P_q \in \{0, 1\}$) in one radio frame is mapped to the bits $\{s_{2L_{PI}*q+1},...,s_{2L_{PI}*(q+1)}\}$ in subframe #1 or subframe #2.

The setting of the paging indicators and the corresponding PICH bits is described in [7].

$N_{PI}$ paging indicators of length $L_{PI}$=2, $L_{PI}$=4 or $L_{PI}$=8 symbols are transmitted in each radio frame that contains the PICH. The number of paging indicators $N_{PI}$ per radio frame is given by the paging indicator length, which signalled by higher layers. In table 8K this number is shown for the different possibilities of paging indicator lengths.

**Table 8K: Number $N_{PI}$ of paging indicators per radio frame for different paging indicator lengths $L_{PI}$**

| | $L_{PI}$=2 | $L_{PI}$=4 | $L_{PI}$=8 |
|---|---|---|---|
| $N_{PI}$ per radio frame | 88 | 44 | 22 |

### 5A.3.8.2 Structure of the PICH over multiple radio frames

The structure of the PICH over multiple radio frames is common with 3.84 Mcps TDD, cf. [5.3.7.2 Structure of the PICH over multiple radio frames]

## 5A.3.9 High Speed Physical Downlink Shared Channel (HS-PDSCH)

The HS-DSCH as described in subclause 4.1.2 is mapped onto one or more high speed physical downlink shared channels (HS-PDSCH).

### 5A.3.9.1 HS-PDSCH Spreading

Spreading of the HS-PDSCH is common with 3.84 Mcps TDD, cf. [5.3.9.1HS-PDSCH Spreading]

### 5A.3.9.2 HS-PDSCH Burst Format

The burst format as described in section 5A.2.2 shall be used for the HS-PDSCH.

### 5A.3.9.3 HS-PDSCH Training Sequences

The training sequences as described in subclause 5A.2.3 are used for the HS-PDSCH.

### 5A.3.9.4 UE Selection

UE selection is common with 3.84 Mcps TDD, cf. [5.3.9.4 UE selection].

### 5A.3.9.5 HS-PDSCH timeslot formats

An HS-PDSCH may use QPSK or 16QAM modulation symbols. The time slot formats are shown in table 8KA.

**Table 8KA: Time slot formats for the HS-PDSCH**

| Slot Format # | SF | Midamble length (chips) | $N_{TFCI}$ code word (bits) | $N_{SS}$ & $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data field(1)}$ (bits) | $N_{data/data field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|
| 0 (QPSK) | 16 | 144 | 0 | 0 & 0 | 88 | 88 | 44 | 44 |
| 1 (16QAM) | 16 | 144 | 0 | 0 & 0 | 176 | 176 | 88 | 88 |
| 2 (QPSK) | 1 | 144 | 0 | 0 & 0 | 1408 | 1408 | 704 | 704 |
| 3 (16QAM) | 1 | 144 | 0 | 0 & 0 | 2816 | 2816 | 1408 | 1408 |

## 5A.3.10 Shared Control Channel for HS-DSCH (HS-SCCH)

The HS-SCCH is a DL physical channel that carries higher layer control information for HS-DSCH. The physical layer will process this information according to [7] and will transmit the resulting bits on the HS-SCCH the structure of which is described below.

The information on the HS-SCCH is carried by two separate physical channels (HS-SCCH1 and HS-SCCH2). The term HS-SCCH refers to the ensemble of these physical channels.

### 5A.3.10.1 HS-SCCH Spreading

Spreading of the HS-SCCH is common with 3.84 Mcps TDD, cf. [5.3.10.1 HS-SCCH Spreading].

### 5A.3.10.2 HS-SCCH Burst Format

The burst format as described in section 5A.2.2 shall be used for the HS-SCCH.

### 5A.3.10.3 HS-SCCH Training Sequences

The training sequences as described in subclause 5A.2.3 are used for the HS-SCCH.

### 5A.3.10.4 HS-SCCH timeslot formats

HS-SCCH1 shall use time slot format #5 and HS-SCCH2 shall use time slot format #0 from table 8F, see section 5A.2.2.4.1.1, i.e. HS-SCCH shall carry TPC and SS but no TFCI.

## 5A.3.11 Shared Information Channel for HS-DSCH (HS-SICH)

The HS-SICH is a UL physical channel that carries higher layer control information and the Channel Quality Indicator CQI for HS-DSCH. The physical layer will process this information according to [7] and will transmit the resulting bits on the HS-SICH the structure of which is described below.

### 5A.3.11.1 HS-SICH Spreading

Spreading of the HS-SICH is common with 3.84 Mcps TDD, cf. [5.3.11.1 HS-SICH Spreading].

#### 5A.3.11.2 HS-SICH Burst Format

The burst format as described in section 5A.2.2 shall be used for the HS-SICH.

#### 5A.3.11.3 HS-SICH Training Sequences

The training sequences as described in subclause 5A.2.3 are used for the HS-SICH.

#### 5A.3.11.4 HS-SICH timeslot formats

The HS-SICH shall use time slot format #5 from table 8G, see section 5A.2.2.4.1.2, i.e., it shall carry TPC and SS but no TFCI.

### 5A.3.12 The MBMS Indicator Channel (MICH)

The MBMS Indicator Channel (MICH) is a physical channel used to carry the MBMS notification indicators. The UE may use multiple MICH within the MBMS modification period in order to make decisions on individual MBMS notification indicators.

#### 5A.3.12.1 Mapping of MBMS Indicators to the MICH bits

Figure 18L depicts the structure of a MICH transmission and the numbering of the bits within the bursts. The burst type as described in [5A.2.2 'Burst Format'] is used for the MICH. $N_{NIB}$ bits are used to carry the MBMS notification indicators, where $N_{NIB}$=352.

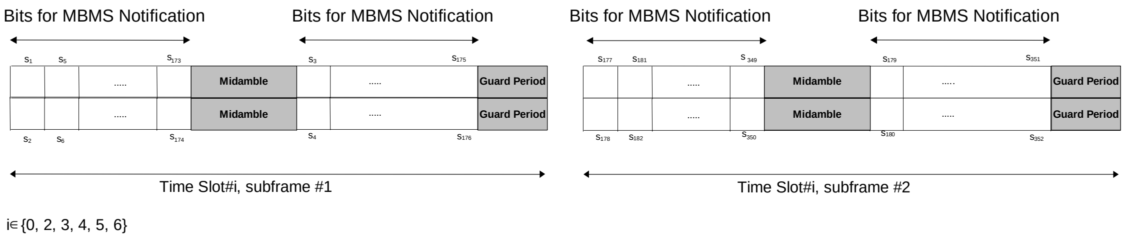



**Figure 18L: Transmission and numbering of MBMS notification indicator carrying bits in a MICH burst**

Each notification indicator $N_q$ (where $N_q$, $q = 0, ..., N_n-1$, $N_q \in \{0, 1\}$) in one radio frame is mapped to the bits $\{s_{2L_{NI}*q+1},...,s_{2L_{NI}*(q+1)}\}$ in subframe #1 or subframe #2.

The setting of the MBMS notification indicators and the corresponding MICH bits is described in [7].

$N_n$ MBMS notification indicators of length $L_{NI}$=2, $L_{NI}$=4 or $L_{NI}$=8 symbols are transmitted in each radio frame that contains the MICH. The number of MBMS notification indicators $N_{NI}$ per radio frame is given by the MBMS notification indicator length, which is signalled by higher layers. In table 8KB this number is shown for the different possibilities of MBMS notification indicator lengths.

**Table 8KB: Number $N_{NI}$ of MBMS notification indicators per radio frame for different MBMS notification indicator lengths $L_{NI}$**

| | $L_{NI}$=2 | $L_{NI}$=4 | $L_{NI}$=8 |
|---|---|---|---|
| $N_n$per radio frame | 88 | 44 | 22 |

The value NI (NI = 0, ..., $N_{NI}$-1) calculated by higher layers, is associated to the MBMS notification indicator $N_q$, where q = NI mod $N_n$.

The set of NI passed over the Iub indicates all higher layer NI values for which the notification indicator on MICH should be set to 1 during the corresponding modification period; all other indicators shall be set to 0.

### 5A.3.13 Physical Layer Common Control Channel (PLCCH)

The Physical Layer Common Control Channel (PLCCH) is a Node B terminated channel which may be used to carry dedicated (UE-specific) TPC and SS information to multiple UEs. The PLCCH carries TPC and SS information only. No higher layer data is mapped to PLCCH. Each uplink CCTrCH is controlled either by PLCCH or by other appropriate downlink physical channels, under the control of higher layer signalling.

#### 5A.3.13.1 PLCCH Spreading

The PLCCH uses only spreading factor SF=16 as described in subclause 5A.2.1. The spreading codes for use on the PLCCH are indicated by higher layers.

#### 5A.3.13.2 PLCCH Burst Type

The burst format as described in section 5A2.2 is used for the PLCCH.

#### 5A.3.13.3 PLCCH Training Sequence

The training sequences as described in subclause 5A.2.3 are used for PLCCH.

#### 5A.3.13.4 PLCCH timeslot formats

The PLCCH shall use time slot format #0 from table 8G, see section 5A.2.2.4.1.2.

### 5A.3.14 E-DCH Physical Uplink Channel

One or more E-PUCH are used to carry the uplink E-DCH transport channel and associated control information (E-UCCH) in each E-DCH TTI. In a timeslot designated by UTRAN for E-PUCH use, up to one E-PUCH may be transmitted by a UE.No other physical channels may be transmitted by a UE in an E-PUCH timeslot.

#### 5A.3.14.1 E-UCCH

The E-DCH Uplink Control Channel (E-UCCH) carries uplink control information associated with the E-DCH and is mapped to E-PUCH. Depending on the configuration by higher layers, an E-PUCH burst may or may not contain E-UCCH and TPC. When E-PUCH does contain E-UCCH, TPC is also transmitted. When E-PUCH does not contain E-UCCH, TPC is not transmitted.

One E-UCCH instance :

- is of length 32 physical channel bits
- is mapped to the data field of the E-PUCH
- is spread at SF appointed by CRRI
- uses QPSK modulation

There shall be at least one E-UCCH and TPC in every E-DCH TTI. Multiple instances of the same E-UCCH information and TPC can be transmitted within an E-DCH TTI, the detailed number of instances can be set by NodeB MAC-e for scheduled transmissions and signalled by higher layers for non-scheduled transmissions. When an E-DCH data block is transmitted on multiple (N) timeslots in one TTI, there will be multiple E-PUCH timeslots. All repetitions of E-UCCH and TPC are evenly distributed on multiple E-PUCH timeslots. N is the number of timeslots of the E-PUCH, M is the number of E-UCCH and TPC instances in one TTI; K is the integral part of M/N; L is the residue of M/N. S is the number of E-UCCHs and TPCs in one E-PUCH timeslot. S equals K+1 for the first L E-PUCH timeslots and equals K for the last (N-L) E-PUCH timeslots.

The burst composition of the E-UCCH information and the E-DCH data is shown in figure 18M.

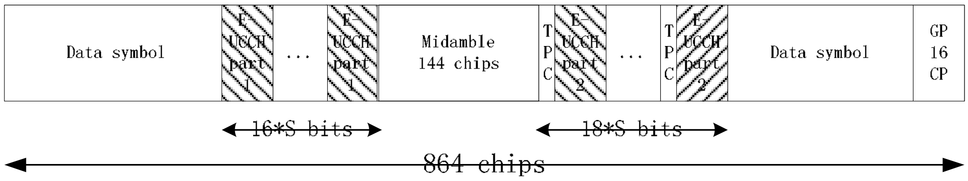



Figure 18M: Multiplexing structure of E-DCH and E-UCCH

An E-UCCH is composed of 32 bits: $k_0$, $k_1$… $k_{31}$. It is segmented evenly into two parts shown in figure 18N.

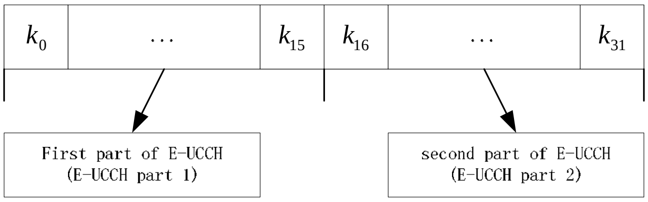



Figure 18N: E-UCCH code composition

Figures 18O and 18P show the E-PUCH data burst with and without the E-UCCH/TPC fields.

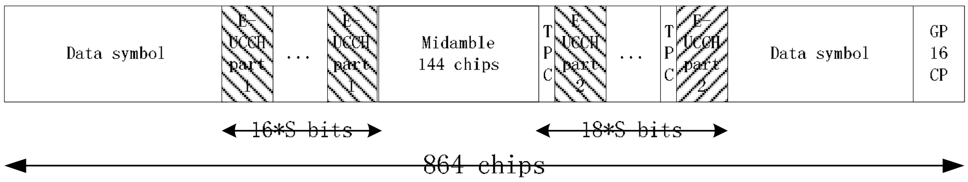



Figure 18O: E-PUCH data burst with E-UCCH/TPC

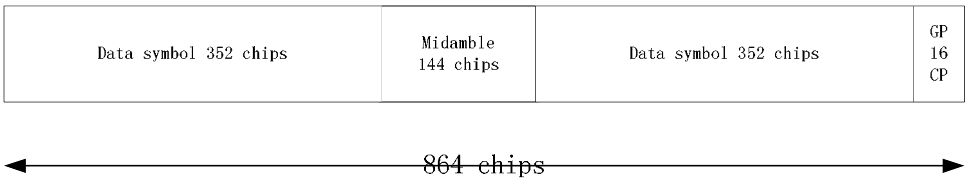



Figure 18P: E-PUCH data burst without E-UCCH/TPC

### 5A.3.14.2 E-PUCH Spreading

The spreading factors that can be applied to the E-PUCH are SF = 1, 2, 4, 8, 16 as described in subclause 5A.2.1. All E-PUCH use the same spreading factor within an E-DCH TTI. For scheduled transmissions, E-PUCHs use the spreading factor indicated by CRRI on E-AGCH.

### 5A.3.14.3 E-PUCH Burst Types

The burst types as described in subclause 5A.2.2 can be used for E-PUCH. E-UCCH and TPC can be transmitted on the E-PUCH.

### 5A.3.14.4 E-PUCH Training Sequences

The training sequences as desribed in subclause 5A.2.3 are used for the E-PUCH.

### 5A.3.14.5 UE Selection

UEs that shall transmit on the E-PUCH are selected by higher layers. The UE id on the associated E-AGCH shall be used for identification.

#### 5A.3.14.6 E-PUCH timeslot formats

An E-PUCH may use QPSK or 16QAM modulation symbols and may or may not contain E-UCCH/TPC. The time slot formats are shown in table 8KC.

**Table 8KC: Time slot formats for the E-PUCH**

| Slot Format # | 0 (QPSK) | 1 (16QAM) | 2 (QPSK) | 3 (16QAM) | 4 (QPSK) | 5 (16QAM) | 6 (QPSK) | 7 (16QAM) | 8 (QPSK) | 9 (16QAM) | 10 (QPSK) | 11 (16QAM) | 12 (QPSK) | 13 (16QAM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Spreading Factor** | 16 | 16 | 16 | 16 | 16 | 16 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| **Midamble length (chips)** | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 |
| **Bits/slot** | 88 | 176 | 88 | 176 | 88 | 176 | 176 | 352 | 176 | 352 | 176 | 352 | 176 | 352 |
| $N_{Data/Slot}$ **(bits)** | 88 | 176 | 54 | 108 | 20 | 40 | 176 | 352 | 142 | 284 | 108 | 216 | 74 | 148 |
| $N_{data/data\ field(1)}$ **(bits)** | 44 | 88 | 28 | 56 | 12 | 24 | 88 | 176 | 72 | 144 | 56 | 112 | 40 | 80 |
| $N_{EUCCH8\_part1}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH7\_part1}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH6\_part1}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH5\_part1}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH4\_part1}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH3\_part1}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 |
| $N_{EUCCH2\_part1}$**(bits)** | 0 | 0 | 0 | 0 | 16 | 16 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 |
| $N_{EUCCH1\_part1}$**(bits)** | 0 | 0 | 16 | 16 | 16 | 16 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 |
| $N_{TPC1}$**(bits)** | 0 | 0 | 2 | 2 | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| $N_{EUCCH1\_part2}$**(bits)** | 0 | 0 | 16 | 16 | 16 | 16 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 |
| $N_{TPC2}$**(bits)** | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 |
| $N_{EUCCH2\_part2}$**(bits)** | 0 | 0 | 0 | 0 | 16 | 16 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 |
| $N_{TPC3}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| $N_{EUCCH3\_part2}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 |
| $N_{TPC4}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH4\_part2}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{TPC5}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH5\_part2}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{TPC6}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH6\_part2}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{TPC7}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH7\_part2}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{TPC8}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH8\_part2}$**(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{data/data\ field(2)}$ | 44 | 88 | 26 | 52 | 8 | 16 | 88 | 176 | 70 | 140 | 52 | 104 | 34 | 68 |

| Slot Format # | 0 (QPSK) | 1 (16QAM) | 2 (QPSK) | 3 (16QAM) | 4 (QPSK) | 5 (16QAM) | 6 (QPSK) | 7 (16QAM) | 8 (QPSK) | 9 (16QAM) | 10 (QPSK) | 11 (16QAM) | 12 (QPSK) | 13 (16QAM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **(bits)** | | | | | | | | | | | | | | |

| Slot Format # | 14 (QPSK) | 15 (16QAM) | 16 (QPSK) | 17 (16QAM) | 18 (QPSK) | 19 (16QAM) | 20 (QPSK) | 21 (16QAM) | 22 (QPSK) | 23 (16QAM) | 24 (QPSK) | 25 (16QAM) | 26 (QPSK) | 27 (16QAM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Spreading Factor** | 8 | 8 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Midamble length (chips)** | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 |
| **Bits/slot** | 176 | 352 | 352 | 704 | 352 | 704 | 352 | 704 | 352 | 704 | 352 | 704 | 352 | 704 |
| **$N_{Data/Slot}$ (bits)** | 40 | 80 | 352 | 704 | 318 | 636 | 284 | 568 | 250 | 500 | 216 | 432 | 182 | 364 |
| **$N_{data/data\ field(1)}$ (bits)** | 24 | 48 | 176 | 352 | 160 | 320 | 144 | 288 | 128 | 256 | 112 | 224 | 96 | 192 |
| **$N_{EUCCH8\_part1}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **$N_{EUCCH7\_part1}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **$N_{EUCCH6\_part1}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **$N_{EUCCH5\_part1}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 |
| **$N_{EUCCH4\_part1}$(bits)** | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 |
| **$N_{EUCCH3\_part1}$(bits)** | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{EUCCH2\_part1}$(bits)** | 16 | 16 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{EUCCH1\_part1}$(bits)** | 16 | 16 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC1}$(bits)** | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **$N_{EUCCH1\_part2}$(bits)** | 16 | 16 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC2}$(bits)** | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **$N_{EUCCH2\_part2}$(bits)** | 16 | 16 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC3}$(bits)** | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| **$N_{EUCCH3\_part2}$(bits)** | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC4}$(bits)** | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 |
| **$N_{EUCCH4\_part2}$(bits)** | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 |
| **$N_{TPC5}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| **$N_{EUCCH5\_part2}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 |
| **$N_{TPC6}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **$N_{EUCCH6\_part2}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **$N_{TPC7}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **$N_{EUCCH7\_part2}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Slot Format # | 14 (QPSK) | 15 (16QAM) | 16 (QPSK) | 17 (16QAM) | 18 (QPSK) | 19 (16QAM) | 20 (QPSK) | 21 (16QAM) | 22 (QPSK) | 23 (16QAM) | 24 (QPSK) | 25 (16QAM) | 26 (QPSK) | 27 (16QAM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{TPC8}$(bits) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH8\_part2}$(bits) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{data/data\ field(2)}$ (bits) | 16 | 32 | 176 | 352 | 158 | 316 | 140 | 280 | 122 | 244 | 104 | 208 | 86 | 172 |

| Slot Format # | 28 (QPSK) | 29 (16QAM) | 30 (QPSK) | 31 (16QAM) | 32 (QPSK) | 33 (16QAM) | 34 (QPSK) | 35 (16QAM) | 36 (QPSK) | 37 (16QAM) | 38 (QPSK) | 39 (16QAM) | 40 (QPSK) | 41 (16QAM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Spreading Factor | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Midamble length (chips) | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 |
| Bits/slot | 352 | 704 | 352 | 704 | 352 | 704 | 704 | 1408 | 704 | 1408 | 704 | 1408 | 704 | 1408 |
| $N_{Data/Slot}$ (bits) | 148 | 296 | 114 | 228 | 80 | 160 | 704 | 1408 | 670 | 1340 | 636 | 1272 | 602 | 1204 |
| $N_{data/data\ field(1)}$ (bits) | 80 | 160 | 64 | 128 | 48 | 96 | 352 | 704 | 336 | 672 | 320 | 640 | 304 | 608 |
| $N_{EUCCH8\_part1}$(bits) | 0 | 0 | 0 | 0 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH7\_part1}$(bits) | 0 | 0 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH6\_part1}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH5\_part1}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH4\_part1}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH3\_part1}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 |
| $N_{EUCCH2\_part1}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 |
| $N_{EUCCH1\_part1}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 |
| $N_{TPC1}$(bits) | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| $N_{EUCCH1\_part2}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 |
| $N_{TPC2}$(bits) | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 |
| $N_{EUCCH2\_part2}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 |
| $N_{TPC3}$(bits) | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| $N_{EUCCH3\_part2}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 |
| $N_{TPC4}$(bits) | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH4\_part2}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{TPC5}$(bits) | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH5\_part2}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{TPC6}$(bits) | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Slot Format # | 28 (QPSK) | 29 (16QAM) | 30 (QPSK) | 31 (16QAM) | 32 (QPSK) | 33 (16QAM) | 34 (QPSK) | 35 (16QAM) | 36 (QPSK) | 37 (16QAM) | 38 (QPSK) | 39 (16QAM) | 40 (QPSK) | 41 (16QAM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{EUCCH6\_part2}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{TPC7}$(bits) | 0 | 0 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH7\_part2}$(bits) | 0 | 0 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{TPC8}$(bits) | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{EUCCH8\_part2}$(bits) | 0 | 0 | 0 | 0 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{data/data\ field(2)}$ (bits) | 68 | 136 | 50 | 100 | 32 | 64 | 352 | 704 | 334 | 668 | 316 | 632 | 298 | 596 |

| Slot Format # | 42 (QPSK) | 43 (16QAM) | 44 (QPSK) | 45 (16QAM) | 46 (QPSK) | 47 (16QAM) | 48 (QPSK) | 49 (16QAM) | 50 (QPSK) | 51 (16QAM) | 52 (QPSK) | 53 (16QAM) | 54 (QPSK) | 55 (16QAM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Spreading Factor | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| Midamble length (chips) | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 |
| Bits/slot | 704 | 1408 | 704 | 1408 | 704 | 1408 | 704 | 1408 | 704 | 1408 | 1408 | 2816 | 1408 | 2816 |
| $N_{Data/Slot}$ (bits) | 568 | 1136 | 534 | 1068 | 500 | 1000 | 466 | 932 | 432 | 864 | 1408 | 2816 | 1374 | 2748 |
| $N_{data/data\ field(1)}$ (bits) | 288 | 576 | 272 | 544 | 256 | 512 | 240 | 480 | 224 | 448 | 704 | 1408 | 688 | 1376 |
| $N_{EUCCH8\_part1}$(bits) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 0 | 0 | 0 | 0 |
| $N_{EUCCH7\_part1}$(bits) | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| $N_{EUCCH6\_part1}$(bits) | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| $N_{EUCCH5\_part1}$(bits) | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| $N_{EUCCH4\_part1}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| $N_{EUCCH3\_part1}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| $N_{EUCCH2\_part1}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| $N_{EUCCH1\_part1}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 16 | 16 |
| $N_{TPC1}$(bits) | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 2 | 2 |
| $N_{EUCCH1\_part2}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 16 | 16 |
| $N_{TPC2}$(bits) | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| $N_{EUCCH2\_part2}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| $N_{TPC3}$(bits) | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| $N_{EUCCH3\_part2}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| $N_{TPC4}$(bits) | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| $N_{EUCCH4\_part2}$(bits) | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |

| **Slot Format #** | 42 (QPSK) | 43 (16QAM) | 44 (QPSK) | 45 (16QAM) | 46 (QPSK) | 47 (16QAM) | 48 (QPSK) | 49 (16QAM) | 50 (QPSK) | 51 (16QAM) | 52 (QPSK) | 53 (16QAM) | 54 (QPSK) | 55 (16QAM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **$N_{TPC5}$(bits)** | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| **$N_{EUCCH5\_part2}$(bits)** | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| **$N_{TPC6}$(bits)** | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| **$N_{EUCCH6\_part2}$(bits)** | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| **$N_{TPC7}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| **$N_{EUCCH7\_part2}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 0 | 0 | 0 | 0 |
| **$N_{TPC8}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |
| **$N_{EUCCH8\_part2}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 0 | 0 | 0 | 0 |
| **$N_{data/data\ field(2)}$ (bits)** | 280 | 560 | 262 | 524 | 244 | 488 | 226 | 452 | 208 | 416 | 704 | 1408 | 686 | 1372 |

| **Slot Format #** | 56 (QPSK) | 57 (16QAM) | 58 (QPSK) | 59 (16QAM) | 60 (QPSK) | 61 (16QAM) | 62 (QPSK) | 63 (16QAM) | 64 (QPSK) | 65 (16QAM) | 66 (QPSK) | 67 (16QAM) | 68 (QPSK) | 69 (16QAM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Spreading Factor** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Midamble length (chips)** | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 |
| **Bits/slot** | 1408 | 2816 | 1408 | 2816 | 1408 | 2816 | 1408 | 2816 | 1408 | 2816 | 1408 | 2816 | 1408 | 2816 |
| **$N_{Data/Slot}$ (bits)** | 1340 | 2680 | 1306 | 2612 | 1272 | 2544 | 1238 | 2476 | 1204 | 2408 | 1170 | 2340 | 1136 | 2272 |
| **$N_{data/data\ field(1)}$ (bits)** | 672 | 1344 | 656 | 1312 | 640 | 1280 | 624 | 1248 | 608 | 1216 | 592 | 1184 | 576 | 1152 |
| **$N_{EUCCH8\_part1}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 |
| **$N_{EUCCH7\_part1}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 |
| **$N_{EUCCH6\_part1}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{EUCCH5\_part1}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{EUCCH4\_part1}$(bits)** | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{EUCCH3\_part1}$(bits)** | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{EUCCH2\_part1}$(bits)** | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{EUCCH1\_part1}$(bits)** | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC1}$(bits)** | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **$N_{EUCCH1\_part2}$(bits)** | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC2}$(bits)** | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **$N_{EUCCH2\_part2}$(bits)** | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC3}$(bits)** | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

| **Slot Format #** | 56 (QPSK) | 57 (16QAM) | 58 (QPSK) | 59 (16QAM) | 60 (QPSK) | 61 (16QAM) | 62 (QPSK) | 63 (16QAM) | 64 (QPSK) | 65 (16QAM) | 66 (QPSK) | 67 (16QAM) | 68 (QPSK) | 69 (16QAM) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **$N_{EUCCH3\_part2}$(bits)** | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC4}$(bits)** | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **$N_{EUCCH4\_part2}$(bits)** | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC5}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **$N_{EUCCH5\_part2}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC6}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| **$N_{EUCCH6\_part2}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 | 16 | 16 |
| **$N_{TPC7}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 |
| **$N_{EUCCH7\_part2}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 16 | 16 |
| **$N_{TPC8}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| **$N_{EUCCH8\_part2}$(bits)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 16 |
| **$N_{data/data\ field(2)}$ (bits)** | 668 | 1336 | 650 | 1300 | 632 | 1264 | 614 | 1228 | 596 | 1192 | 578 | 1156 | 560 | 1120 |

### 5A.3.15 E-DCH Random Access Uplink Control Channel (E-RUCCH)

The E-RUCCH is used to carry E-DCH-associated uplink control signalling when E-PUCH resources are not available. It shall be mapped to the same random access physical resources defined by UTRAN.

#### 5A.3.15.1 E-RUCCH Spreading

The E-RUCCH uses spreading factor SF=16 or SF=8 as described in subclause 5A.2.1. The set of admissible spreading codes used on the E-RUCCH are based on the spreading codes of PRACH.

#### 5A.3.15.2 E-RUCCH Burst Format

The burst format as described in section 5A.2.2 is used for the E-RUCCH.

#### 5A.3.15.3 E-RUCCH Training sequences

The training sequences, i.e. midambles, as described in subclause 5A.2.3 are used for E-RUCCH.

#### 5A.3.15.4 E-RUCCH timeslot formats

The timeslot format depends on the spreading factor of the E-RUCCH:

| Spreading Factor | Slot Format # |
|---|---|
| 16 | 0 |
| 8 | 10 |

### 5A.3.16 E-DCH Absolute Grant Channel (E-AGCH)

The E-DCH Absolute Grant Channel (E-AGCH) is a downlink physical channel carrying the uplink E-DCH absolute grant control information. The E-AGCH uses two separate physical channels (E-AGCH1 and E-AGCH2). The term E-AGCH refers to the ensemble of these physical channels.

#### 5A.3.16.1 E-AGCH Spreading

Spreading of the E-AGCH is common with 3.84Mcps TDD, cf. [5.3.15.1 E-AGCH Spreading].

#### 5A.3.16.2 E-AGCH Burst Types

The burst structures for E-AGCH1 and E-AGCH2 are shown in figure 18Q and 18R.

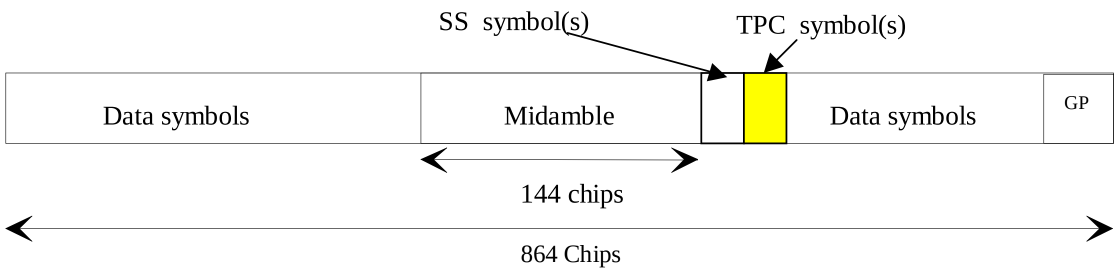



**Figure 18Q: E-AGCH1 burst structure**

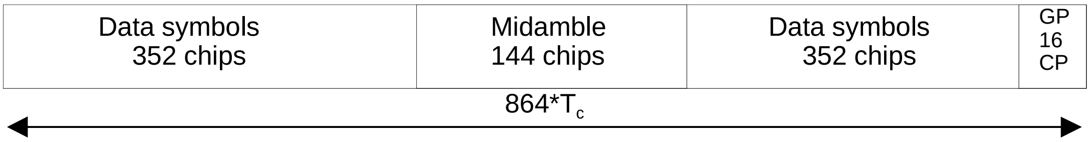



**Figure 18R: E-AGCH2 burst structure**

### 5A.3.16.3 E-AGCH Training Sequences

The training sequences as described in subclause 5A.2.3 are used for the E-AGCH.

### 5A.3.16.4 E-AGCH timeslot formats

E-AGCH1 shall use time slot format #5 and E-AGCH2 shall use time slot format #0 from table 8F, see section 5A.2.2.4.1.1, i.e. E-AGCH shall carry TPC and SS for E-PUCH power control and synchronization but no TFCI.

**Table 8KD: Timeslot formats for the E-AGCH**

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI\ code\ word}$ (bits) | $N_{SS}$&$N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|
| 0 | 16 | 144 | 0 | 0&0 | 88 | 88 | 44 | 44 |
| 5 | 16 | 144 | 0 | 2&2 | 88 | 84 | 44 | 40 |

## 5A.3.17 E-DCH Hybrid ARQ Acknowledgement Indicator Channel (E-HICH)

The E-DCH HARQ Acknowledgement indicator channel (E-HICH) is defined in terms of a SF16 downlink physical channel and a signature sequence.

The E-HICH carries one or multiple users' acknowledgement indicator. Figure 18S illustrates the structure of the E-HICH. The E-HICH contains 8 spare bit locations. The spare bit values are undefined. The power of each user's acknowledgement indicator may be set independently by the Node-B. The number of E-HICHs in a cell is configured by the system. Scheduled traffic's and non-scheduled traffic's acknowledgement indicators are transmitted on different E-HICHs.

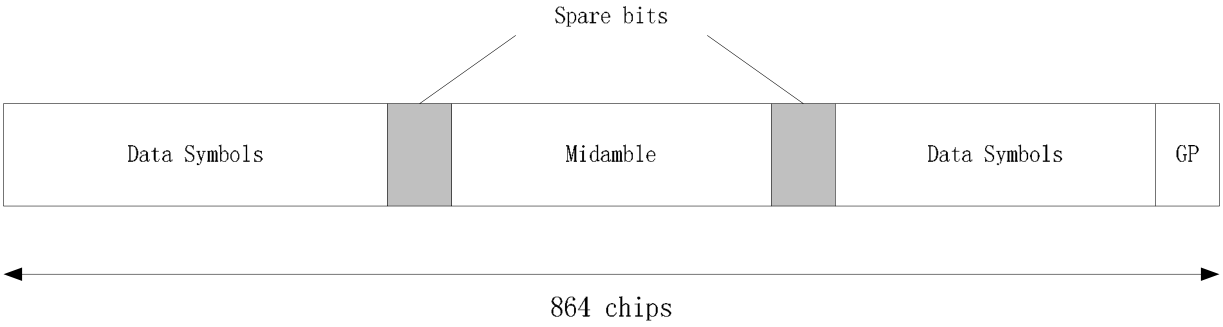



**Figure 18S: E-HICH Structure**

For Scheduled transmissions, at most four E-HICHs can be configured for one user's scheduled transmission. Which E-HICH is used to convey the HARQ acknowledgment indicator is indicated by the 2-bit E-HICH indicator on E-AGCH. A single E-HICH may carry one or multiple HARQ acknowledgement indicator(s) which are decided by the Node-B.

For Non-Scheduled transmissions, E-HICHs carry not only the HARQ acknowledgement indicators but also TPC and SS commands. The 80 signature sequences are divided into 20 groups while each group includes 4 sequences. Every non-scheduled user is assigned only one group which are signalled by higher layer. Among the 4 sequences, the first one is used to indicate ACK/NACK, and the other three are used to indicate the TPC/SS commands. The three sequences and their three reverse sequences are the six possible sequences used to indicate the TPC/SS combination state. The reverse sequence is constructed by reverse every bit of the sequence from 0 to 1 or from 1 to 0. The mapping between the index and the TPC/SS command is shown in table 8KE . The index is calculated according to the equation: index=2*A+B, (A=0,1,2; B=0,1). A is the relative index of the selected sequence among the three assigned sequences and B equals to 1 when the reverse sequence is chosen, otherwise, B equals to 0. The power of the sequence used for TPC/SS indication can be set differently from the one used to indicate ACK/NACK.

**Table 8KE: Mapping between the index and TPC/SS command**

| index | TPC command | SS command |
|---|---|---|
| 0 | 'DOWN' | 'DOWN' |
| 1 | 'UP' | 'DOWN' |
| 2 | 'DOWN' | 'UP' |
| 3 | 'UP' | 'UP' |
| 4 | 'DOWN' | 'Do Nothing' |
| 5 | 'UP' | 'Do Nothing' |

The acknowledgement inidicator for an E-DCH transmission in TTI "N" is carried by the E-HICH in TTI "N+[$T_A$]"($T_A$ is determined according to the value of $n_{E\text{-}HICH}$). The E-HICH is thus synchronously related to those E-DCH transmissions for which it carries acknowledgement information.

### 5A.3.17.1 E-HICH Spreading

Multiple users' signature sequences (including the inserted spare bits) sharing the same channelisation code are combined and spread using spreading factor SF=16 as described in [8].

### 5A.3.17.2 E-HICH Burst Types

The burst structures for E-HICH are shown in figure 18D.

### 5A.3.17.3 E-HICH Training Sequences

The training sequences as described in subclause 5A.2.3 are used for the E-HICH.

### 5A.3.17.4 E-HICH timeslot formats

E-HICH shall use time slot format #0 from table 8F.

## 5A.4 Transmit Diversity for DL Physical Channels

Table 8L summarizes the different transmit diversity schemes for different downlink physical channel types in 1.28Mcps TDD that are described in [9].

**Table 8L: 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 | SCTD | |
| P-CCPCH | X(†) | X(†) | – |
| S-CCPCH | X(†) | X(†) | – |
| DwPCH | X | – | – |
| DPCH | X | – | X |
| PDSCH | X | X | X |
| PICH | X | X | - |
| MICH | X(†) | X(†) | - |
| PLCCH | X | X | - |
| HS-SCCH | - | X | X |
| HS-PDSCH | - | - | X |
| E-AGCH | -- | X | X |
| E-HICH | -- | X | -- |

(*) Note: SCTD may only be applied to physical channels when they are allocated to beacon locations.
(†) Note: that when the entire carrier is dedicated to MBSFN operation, TSTD and SCTD shall not be applied.

## 5A.5 Beacon characteristics of physical channels

For the purpose of measurements, common physical channels that are allocated to 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.

### 5A.5.1 Location of beacon channels

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.

### 5A.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 SCTD antenna diversity is not applied to beacon channels, all the reference power of any beacon channel is allocated to $m^{(1)}$.
- If SCTD antenna diversity is applied to beacon channels, for any beacon channel midambles $m^{(1)}$ and $m^{(2)}$ are each allocated half of the reference power.

# 5A.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 AA.2 [Association between Midambles and channelisation Codes] and BA [Signalling of the number of channelisation codes for the DL common midamble case for 1.28Mcps TDD] respectively.

However, for timeslots employing MBSFN operation there is no single midamble restriction per MBSFN timeslot, i.e. $K_{Cell} \geq 1$, whilst this does not undermine the specification that all physical channels in such timeslots employ the same midamble(s) and thus default and common midamble allocation amount to the same allocation strategies.

## 5A.6.1 Midamble Allocation for DL Physical Channels

Beacon channels shall always use the reserved midambles $m^{(1)}$ and $m^{(2)}$, see 5A.5. For the other DL physical channels that are located in timeslot #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.

### 5A.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]

### 5A.6.1.2 Midamble Allocation by layer 1

#### 5A.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 AA.2 [Association between Midambles and channelisation Codes].

#### 5A.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 BA [Signalling of the number of channelisation codes for the DL common midamble case for 1.28 Mcps TDD].

## 5A.6.2 Midamble Allocation for UL Physical Channels

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

# 5A.7 Midamble Transmit Power

The setting of the midamble transmit power is done as in the 3.84 Mcps TDD option cf. 5.7 ‘Midamble Transmit Power’

# 5B Physical channels for the 7.68 Mcps option

## 5B.1 General

All physical channels take a three-layer structure with respect to timeslots, radio frames and system frame numbering (SFN). Depending on the resource allocation, the configuration of radio frames or timeslots becomes different. All physical channels need a guard period in every timeslot. The time slots are used in the sense of a TDMA component to separate different user signals in the time domain. The physical channel signal format is presented in figure 18AA.

A physical channel in the 7.68Mcps TDD option 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 two data parts, a midamble part 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 parts must use different OVSF channelisation codes, but the same scrambling code. The midamble parts are either identically or differently shifted versions of a cell-specific basic midamble code, see section 5B.3.3. Note when in MBSFN operation, a midamble is not necessarily cell-specific.

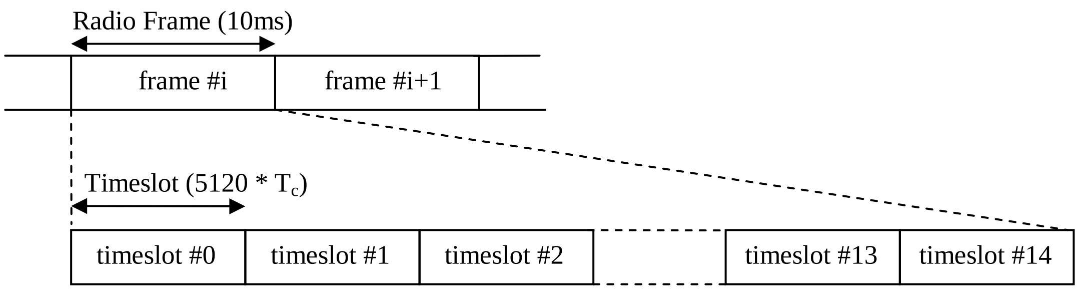



**Figure 18AA: Physical channel signal format**

The data part of the burst is spread with a combination of channelisation code and scrambling code. The channelisation code is an OVSF code, that can have a spreading factor of 1, 2, 4, 8, 16 or 32. The data rate of the physical channel depends on the used spreading factor of the used OVSF code.

The midamble part of the burst can contain two different types of midambles: a short one of length 512 chips, or a long one of length 1024 chips. The data rate of the physical channel depends on the used midamble length. Additionally, when in MBSFN operation a midamble of length 640 chips is used.

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 of a duration defined by allocation.

## 5B.2 Frame structure

The TDMA frame has a duration of 10 ms and is subdivided into 15 time slots (TS) of 5120*$T_c$ duration each. A time slot corresponds to 5120 chips. The physical content of the time slots are the bursts of corresponding length as described in subclause 5B.3.2.

Each 10 ms frame consists of 15 time slots, each allocated to either the uplink or the downlink (figure 18AB). With such a flexibility, the TDD mode can be adapted to different environments and deployment scenarios. In any configuration at least one time slot has to be allocated for the downlink and at least one time slot has to be allocated for the uplink with the exception of no uplink timeslots when the entire carrier is dedicated to MBSFN.

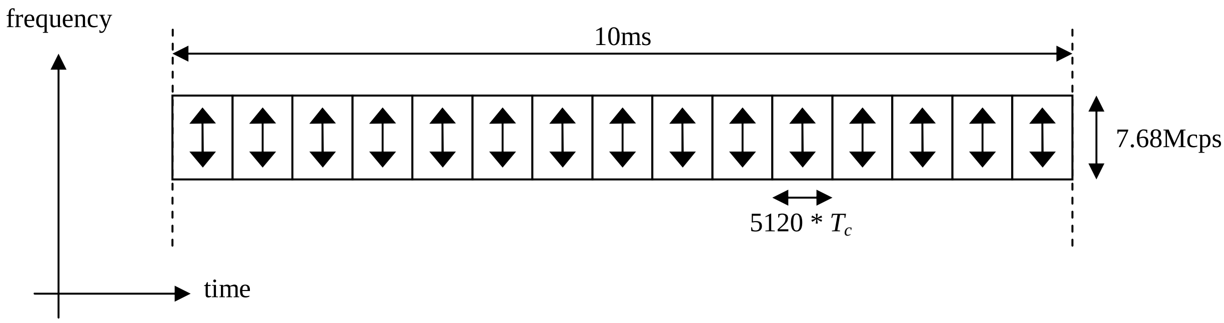



**Figure 18AB: The TDD frame structure**

Examples for multiple and single switching point configurations as well as for symmetric and asymmetric UL/DL allocations are given in figure 3.

# 5B.3 Dedicated physical channel (DPCH)

The DCH as described in subclause 4.1.1 is mapped onto the dedicated physical channel.

## 5B.3.1 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].

### 5B.3.1.1 Spreading for Downlink Physical Channels

Downlink physical channels shall use SF=32 or SF=1.

Multiple parallel physical channels can be used to support higher data rates. Within a timeslot, parallel physical channels shall be transmitted using different channelisation codes, see [8]. These codes with SF =32 are generated as described in [8].

### 5B.3.1.2 Spreading for Uplink Physical Channels

The range of spreading factors that may be used for uplink physical channels shall range from 32 down to 1. For each physical channel an individual minimum spreading factor $SF_{min}$ is transmitted by means of the higher layers. There are two options that are indicated by UTRAN:

1. The UE shall use the spreading factor $SF_{min}$, independent of the current TFC.

2. The UE shall autonomously increase the spreading factor depending on the current TFC.

If the UE autonomously changes the SF, it shall always vary the channelisation code along the branch with the higher code numbering of the allowed OVSF sub tree, as depicted in [8]. In the event that code hopping is configured by higher layers, the allowed OVSF sub-tree is that subtended by the effective allocated OVSF code after the hop sequence has been applied to the allocated OVSF code (see [9]).

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].

## 5B.3.2 Burst Types

Four types of bursts are defined. 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 8AA.

**Table 8AA: Number of data symbols (N) for burst type 1, 2, 3 and 4**

| Spreading factor (SF) | Burst Type 1 | Burst Type 2 | Burst Type 3 | Burst Type 4 |
|---|---|---|---|---|
| 1 | 3904 | 4416 | 3712 | 4224 |
| 2 | 1952 | 2208 | 1856 | N/A |
| 4 | 976 | 1104 | 928 | N/A |
| 8 | 488 | 552 | 464 | N/A |
| 16 | 244 | 276 | 232 | N/A |
| 32 | 122 | 138 | 116 | 132 |

The support of burst types 1, 2 and 3 is mandatory for UEs supporting transmit and receive functions.  UEs supporting transmit and receive functions and also MBSFN operation must additionally support burst type 4.  UEs with receive only capability need only support burst type 4.. The three different bursts defined here are well suited for different applications, as described in the following sections.

### 5B.3.2.1 Burst Type 1

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. The maximum number of training sequences depends on the cell configuration. For burst type 1 this number may be 4, 8, or 16.

The data fields of burst type 1 are 1952 chips long. The corresponding number of symbols depends on the spreading factor, as indicated in table 8AA above. The midamble of burst type 1 has a length of 1024 chips. The guard period for the burst type 1 is 192 chip periods long. Burst type 1 is shown in Figure 18AC. The contents of the burst fields are described in table 8AB.

**Table 8AB: The contents of burst type 1 fields**

| Chip number (CN) | Length of field in chips | Length of field in symbols | | Contents of field |
|---|---|---|---|---|
| 0-1951 | 1952 | Cf table 8AA | | Data symbols |
| 1952-2975 | 1024 | - | | Midamble |
| 2976-4927 | 1952 | Cf table 8AA | | Data symbols |
| 4928-5119 | 192 | - | | Guard period |

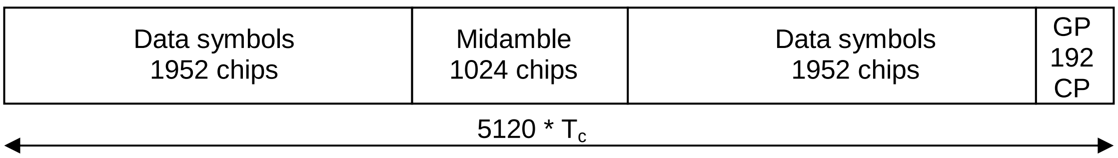



**Figure 18AC: Burst structure of burst type 1. GP denotes the guard period and CP the chip periods**

### 5B.3.2.2 Burst Type 2

Burst type 2 can be used for uplink and downlink. It offers a longer data field than burst type 1 at the cost of a shorter midamble. Due to the shorter midamble field the burst type 2 supports a maximum number of training sequences of 4 or 8 only, depending on the cell configuration.

The data fields of the burst type 2 are 2208 chips long. The corresponding number of symbols depends on the spreading factor, as indicated in table 8AA above. The guard period for the burst type 2 is 192 chip periods long. Burst type 2 is shown in Figure 18AD. The contents of the burst fields are described in table 8AC.

**Table 8AC: The contents of burst type 2 fields**

| Chip number (CN) | Length of field in chips | Length of field in symbols | | Contents of field |
|---|---|---|---|---|
| 0-2207 | 2208 | cf table 8AA | | Data symbols |
| 2208-2719 | 512 | - | | Midamble |
| 2720-4927 | 2208 | cf table 8AA | | Data symbols |
| 4928-5119 | 192 | - | | Guard period |

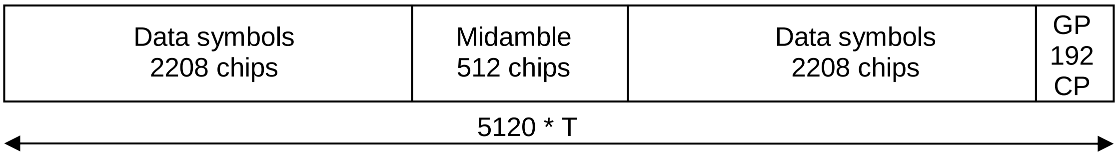



**Figure 18AD: Burst structure of the burst type 2. GP denotes the guard period and CP the chip periods**

## 5B.3.2.3 Burst Type 3

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 1952 chips and 1760 chips, respectively. The corresponding number of symbols depends on the spreading factor, as indicated in table 8AA above. The midamble of burst type 3 has a length of 1024 chips. The guard period for the burst type 3 is 384 chip periods long. Burst type 3 is shown in Figure 18AE. The contents of the burst fields are described in table 8AD.

**Table 8AD: The contents of burst type 3 fields**

| Chip number (CN) | Length of field in chips | Length of field in symbols | | Contents of field |
|---|---|---|---|---|
| 0-1951 | 1952 | Cf table 8AA | | Data symbols |
| 1952-2975 | 1024 | - | | Midamble |
| 2976-4735 | 1760 | Cf table 8AA | | Data symbols |
| 4736-5119 | 384 | - | | Guard period |

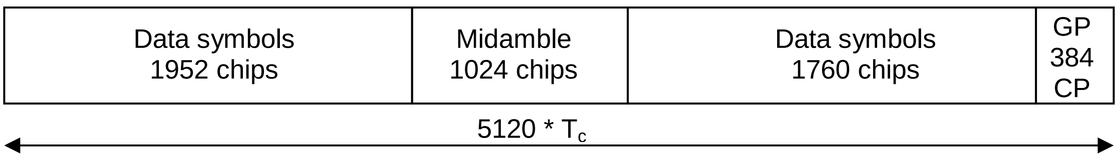



**Figure 18AE: Burst structure of the burst type 3. GP denotes the guard period and CP the chip periods**

## 5B.3.2.3A Burst Type 4

The burst type 4 is used for downlink MBSFN operation only and supports a single training sequence.

The data fields of the burst type 4 are 2112 chips long. The corresponding number of symbols is 132 as indicated in table 8AA above. The midamble of burst type 4 has a length of 640 chips. The guard period for the burst type 4 is 256 chip periods long. The burst type 4 is shown in Figure 18AEA. The contents of the burst fields are described in table 8ADA.

**Table 8ADA: The contents of burst type 4 fields**

| Chip number (CN) | Length of field in chips | Length of field in symbols | | Contents of field |
|---|---|---|---|---|
| 0-2111 | 2112 | Cf table 8AA | | Data symbols |
| 2112-2751 | 640 | - | | Midamble |
| 2752-4863 | 2112 | Cf table 8AA | | Data symbols |
| 4864-5119 | 256 | - | | Guard period |

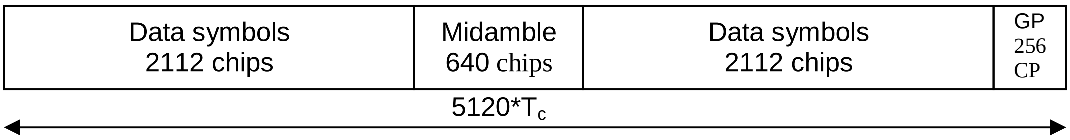



Figure 18AEA: Burst structure of the burst type 4. GP denotes the guard period and CP the chip periods

### 5B.3.2.4 Transmission of TFCI

All burst types 1, 2, 3 and 4 provide the possibility for transmission of TFCI.

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, except for the MBSFN FACH where the (16,5) bi-orthogonal code is always used for TFCI when TFCI is applied . Additionally for each allocated timeslot it is signalled individually whether that timeslot carries the TFCI or not. The TFCI is always present in the first timeslot in a radio frame for each CCTrCH. If a time slot contains the TFCI, then it is always transmitted using the physical channel with the lowest physical channel sequence number (*p*) in that timeslot. Physical channel sequence numbering is determined by the rate matching function and is described in [7].

The transmission of TFCI is done in the data parts of the respective physical channel. In DL the TFCI code word bits and data bits are subject to the same spreading procedure as depicted in [8]. In DL, the modulation applied to the TFCI code word bits is the same as that applied to the data symbols. In UL, independent of the SF that is applied to the data symbols in the burst, the data in the TFCI field are always spread with SF=32 using the channelisation code in the branch with the highest code numbering of the allowed OVSF sub tree, as depicted in [8]. Hence the midamble structure and length is not changed. The TFCI code word is to be transmitted directly adjacent to the midamble, possibly after the TPC. Figure 18AF shows the position of the TFCI code word in a traffic burst in downlink. Figure 18AG shows the position of the TFCI code word in a traffic burst in uplink.

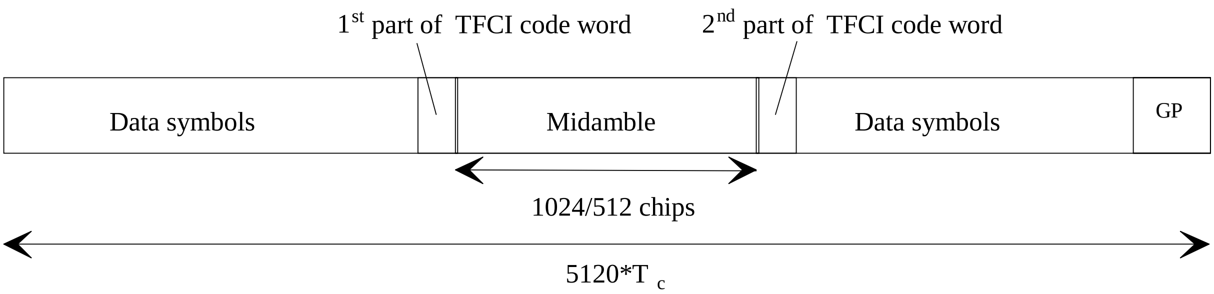



**Figure 18AF: Position of the TFCI code word in the traffic burst in case of downlink**

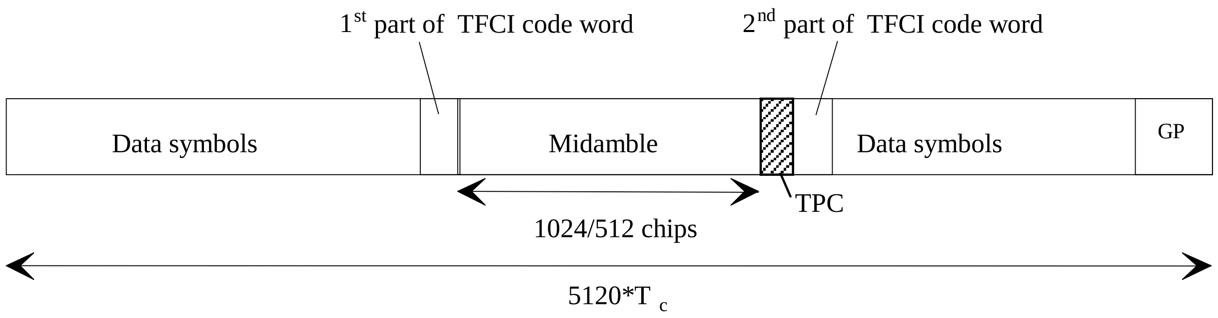



**Figure 18AG: Position of the TFCI code word in the traffic burst in case of uplink**

Two examples of TFCI transmission in the case of multiple DPCHs used for a connection are given in the Figure 18AH and Figure 18AI below. Combinations of the two schemes shown are also applicable.

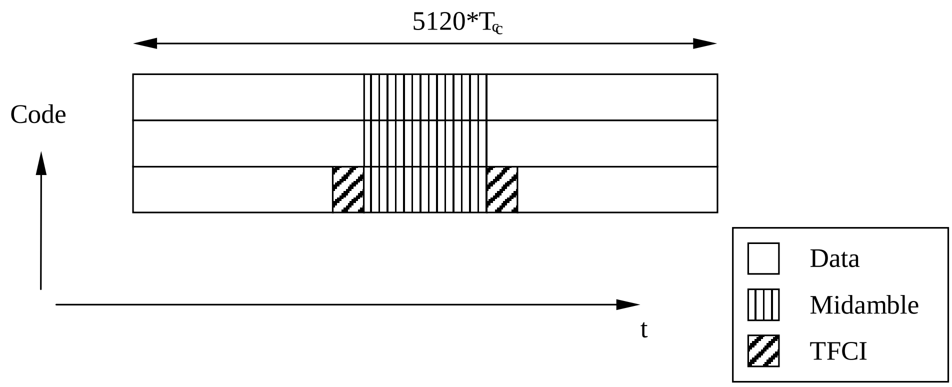



**Figure 18AH: Example of TFCI transmission with physical channels multiplexed in code domain**

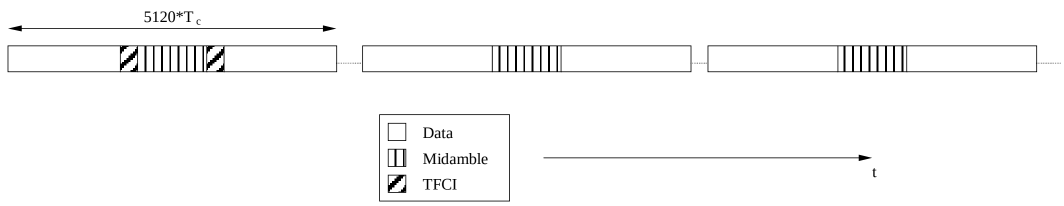



**Figure 18AI: Example of TFCI transmission with physical channels multiplexed in time domain**

## 5B.3.2.5 Transmission of TPC

Burst types 1, 2 and 3 for dedicated and shared channels provide the possibility for transmission of TPC in uplink.

The transmission of TPC is done in the data parts of the traffic burst. Independent of the SF that is applied to the data symbols in the burst, the data in the TPC field are always spread with SF=32 using the channelisation code in the branch with the highest code numbering of the allowed OVSF sub tree, as depicted in [8]. Hence the midamble structure and length is not changed. The TPC information is to be transmitted directly after the midamble. Figure 18AJ 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 a TFCI is applied for a CCTrCH, TPC shall be transmitted with the same channelization codes and in the same timeslots as the TFCI. If no TFCI is applied for a CCTrCH, TPC shall be transmitted using the physical channel corresponding to physical channel sequence number $p$=1. Physical channel sequence numbering is determined by the rate matching function and is described in [7].

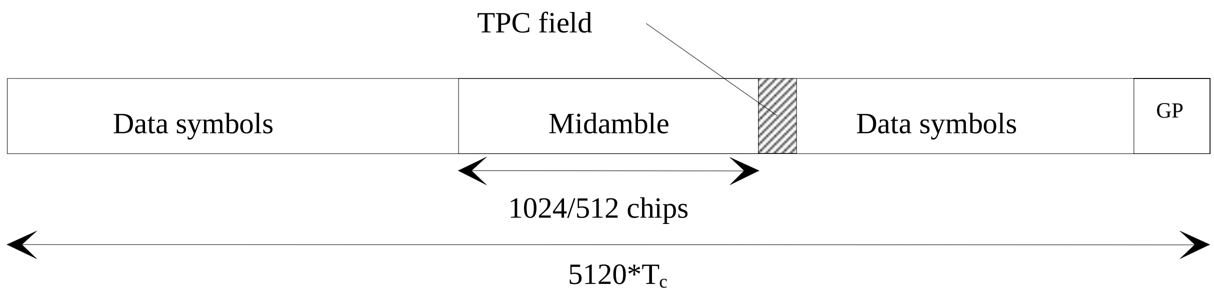



**Figure 18AJ: Position of TPC information in the traffic burst**

The length of the TPC field is $N_{TPC}$ bits. The TPC field is formed via repetition encoding a single bit $b_{TPC}$, $N_{TPC}$ times.

The relationship between $b_{TPC}$ and the TPC command is shown in table 8AE.

**Table 8AE: TPC bit pattern**

| $b_{TPC}$ | TPC command | Meaning |
|---|---|---|
| 0 | 'Down' | Decrease Tx Power |
| 1 | 'Up' | Increase Tx Power |

## 5B.3.2.6 Timeslot formats

### 5B.3.2.6.1 Downlink timeslot formats

The downlink timeslot format depends on the spreading factor, midamble length and on the number of TFCI code word bits, as depicted in the table 8AF. For MBSFN operation the timeslot format also depends upon the symbol modulation scheme used. Slot formats 20-27 are only applicable to MBSFN operation with burst type 4.

**Table 8AF: Time slot formats for the Downlink**

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI\ code\ word}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field}$ (bits) |
|---|---|---|---|---|---|---|
| 0 | 32 | 1024 | 0 | 244 | 244 | 122 |
| 1 | 32 | 1024 | 4 | 244 | 240 | 120 |
| 2 | 32 | 1024 | 8 | 244 | 236 | 118 |
| 3 | 32 | 1024 | 16 | 244 | 228 | 114 |
| 4 | 32 | 1024 | 32 | 244 | 212 | 106 |
| 5 | 32 | 512 | 0 | 276 | 276 | 138 |
| 6 | 32 | 512 | 4 | 276 | 272 | 136 |
| 7 | 32 | 512 | 8 | 276 | 268 | 134 |
| 8 | 32 | 512 | 16 | 276 | 260 | 130 |
| 9 | 32 | 512 | 32 | 276 | 244 | 122 |
| 10 | 1 | 1024 | 0 | 7808 | 7808 | 3904 |
| 11 | 1 | 1024 | 4 | 7808 | 7804 | 3902 |
| 12 | 1 | 1024 | 8 | 7808 | 7800 | 3900 |
| 13 | 1 | 1024 | 16 | 7808 | 7792 | 3896 |
| 14 | 1 | 1024 | 32 | 7808 | 7776 | 3888 |
| 15 | 1 | 512 | 0 | 8832 | 8832 | 4416 |
| 16 | 1 | 512 | 4 | 8832 | 8828 | 4414 |
| 17 | 1 | 512 | 8 | 8832 | 8824 | 4412 |

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI\ code\ word}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field}$ (bits) |
|---|---|---|---|---|---|---|
| 18 | 1 | 512 | 16 | 8832 | 8816 | 4408 |
| 19 | 1 | 512 | 32 | 8832 | 8800 | 4400 |
| 20 (QPSK) | 32 | 640 | 0 | 264 | 264 | 132 |
| 21 (QPSK) | 32 | 640 | 16 | 264 | 248 | 124 |
| 22 (16QAM) | 32 | 640 | 0 | 528 | 528 | 264 |
| 23 (16QAM) | 32 | 640 | 16 | 528 | 512 | 256 |
| 24 (QPSK) | 1 | 640 | 0 | 8448 | 8448 | 4224 |
| 25 (QPSK) | 1 | 640 | 16 | 8448 | 8432 | 4216 |
| 26 (16QAM) | 1 | 640 | 0 | 16896 | 16896 | 8448 |
| 27 (16QAM) | 1 | 640 | 16 | 16896 | 16880 | 8440 |

### 5B.3.2.6.2 Uplink timeslot formats

The uplink timeslot format depends on the spreading factor, midamble length, guard period length and on the number of TFCI code word bits. Due to TPC, different amount of bits are mapped to the two data fields. The timeslot formats are depicted in the table 8AG. Note that slot format #90 shall only be used for HS_SICH.

**Table 8AG: Time slot formats for the Uplink**

| Slot Format # | Spreading Factor | Midamble length (chips) | Guard Period (chips) | $N_{TFCI\ code\ word}$ (bits) | $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 32 | 1024 | 192 | 0 | 0 | 244 | 244 | 122 | 122 |
| 1 | 32 | 1024 | 192 | 0 | 2 | 244 | 242 | 122 | 120 |
| 2 | 32 | 1024 | 192 | 4 | 2 | 244 | 238 | 120 | 118 |
| 3 | 32 | 1024 | 192 | 8 | 2 | 244 | 234 | 118 | 116 |
| 4 | 32 | 1024 | 192 | 16 | 2 | 244 | 226 | 114 | 112 |
| 5 | 32 | 1024 | 192 | 32 | 2 | 244 | 210 | 106 | 104 |
| 6 | 32 | 512 | 192 | 0 | 0 | 276 | 276 | 138 | 138 |
| 7 | 32 | 512 | 192 | 0 | 2 | 276 | 274 | 138 | 136 |
| 8 | 32 | 512 | 192 | 4 | 2 | 276 | 270 | 136 | 134 |
| 9 | 32 | 512 | 192 | 8 | 2 | 276 | 266 | 134 | 132 |
| 10 | 32 | 512 | 192 | 16 | 2 | 276 | 258 | 130 | 128 |
| 11 | 32 | 512 | 192 | 32 | 2 | 276 | 242 | 122 | 120 |
| 12 | 16 | 1024 | 192 | 0 | 0 | 488 | 488 | 244 | 244 |
| 13 | 16 | 1024 | 192 | 0 | 2 | 486 | 484 | 244 | 240 |
| 14 | 16 | 1024 | 192 | 4 | 2 | 482 | 476 | 240 | 236 |
| 15 | 16 | 1024 | 192 | 8 | 2 | 478 | 468 | 236 | 232 |
| 16 | 16 | 1024 | 192 | 16 | 2 | 470 | 452 | 228 | 224 |
| 17 | 16 | 1024 | 192 | 32 | 2 | 454 | 420 | 212 | 208 |
| 18 | 16 | 512 | 192 | 0 | 0 | 552 | 552 | 276 | 276 |
| 19 | 16 | 512 | 192 | 0 | 2 | 550 | 548 | 276 | 272 |
| 20 | 16 | 512 | 192 | 4 | 2 | 546 | 540 | 272 | 268 |
| 21 | 16 | 512 | 192 | 8 | 2 | 542 | 532 | 268 | 264 |
| 22 | 16 | 512 | 192 | 16 | 2 | 534 | 516 | 260 | 256 |
| 23 | 16 | 512 | 192 | 32 | 2 | 518 | 484 | 244 | 240 |
| 24 | 8 | 1024 | 192 | 0 | 0 | 976 | 976 | 488 | 488 |
| 25 | 8 | 1024 | 192 | 0 | 2 | 970 | 968 | 488 | 480 |
| 26 | 8 | 1024 | 192 | 4 | 2 | 958 | 952 | 480 | 472 |
| 27 | 8 | 1024 | 192 | 8 | 2 | 946 | 936 | 472 | 464 |

| Slot Format # | Spreading Factor | Midamble length (chips) | Guard Period (chips) | $N_{TFCI\ code\ word}$ (bits) | $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|---|
| 28 | 8 | 1024 | 192 | 16 | 2 | 922 | 904 | 456 | 448 |
| 29 | 8 | 1024 | 192 | 32 | 2 | 874 | 840 | 424 | 416 |
| 30 | 8 | 512 | 192 | 0 | 0 | 1104 | 1104 | 552 | 552 |
| 31 | 8 | 512 | 192 | 0 | 2 | 1098 | 1096 | 552 | 544 |
| 32 | 8 | 512 | 192 | 4 | 2 | 1086 | 1080 | 544 | 536 |
| 33 | 8 | 512 | 192 | 8 | 2 | 1074 | 1064 | 536 | 528 |
| 34 | 8 | 512 | 192 | 16 | 2 | 1050 | 1032 | 520 | 512 |
| 35 | 8 | 512 | 192 | 32 | 2 | 1002 | 968 | 488 | 480 |
| 36 | 4 | 1024 | 192 | 0 | 0 | 1952 | 1952 | 976 | 976 |
| 37 | 4 | 1024 | 192 | 0 | 2 | 1938 | 1936 | 976 | 960 |
| 38 | 4 | 1024 | 192 | 4 | 2 | 1910 | 1904 | 960 | 944 |
| 39 | 4 | 1024 | 192 | 8 | 2 | 1882 | 1872 | 944 | 928 |
| 40 | 4 | 1024 | 192 | 16 | 2 | 1826 | 1808 | 912 | 896 |
| 41 | 4 | 1024 | 192 | 32 | 2 | 1714 | 1680 | 848 | 832 |
| 42 | 4 | 512 | 192 | 0 | 0 | 2208 | 2208 | 1104 | 1104 |
| 43 | 4 | 512 | 192 | 0 | 2 | 2194 | 2192 | 1104 | 1088 |
| 44 | 4 | 512 | 192 | 4 | 2 | 2166 | 2160 | 1088 | 1072 |
| 45 | 4 | 512 | 192 | 8 | 2 | 2138 | 2128 | 1072 | 1056 |
| 46 | 4 | 512 | 192 | 16 | 2 | 2082 | 2064 | 1040 | 1024 |
| 47 | 4 | 512 | 192 | 32 | 2 | 1970 | 1936 | 976 | 960 |
| 48 | 2 | 1024 | 192 | 0 | 0 | 3904 | 3904 | 1952 | 1952 |
| 49 | 2 | 1024 | 192 | 0 | 2 | 3874 | 3872 | 1952 | 1920 |
| 50 | 2 | 1024 | 192 | 4 | 2 | 3814 | 3808 | 1920 | 1888 |
| 51 | 2 | 1024 | 192 | 8 | 2 | 3754 | 3744 | 1888 | 1856 |
| 52 | 2 | 1024 | 192 | 16 | 2 | 3634 | 3616 | 1824 | 1792 |
| 53 | 2 | 1024 | 192 | 32 | 2 | 3394 | 3360 | 1696 | 1664 |
| 54 | 2 | 512 | 192 | 0 | 0 | 4416 | 4416 | 2208 | 2208 |
| 55 | 2 | 512 | 192 | 0 | 2 | 4386 | 4384 | 2208 | 2176 |
| 56 | 2 | 512 | 192 | 4 | 2 | 4326 | 4320 | 2176 | 2144 |
| 57 | 2 | 512 | 192 | 8 | 2 | 4266 | 4256 | 2144 | 2112 |
| 58 | 2 | 512 | 192 | 16 | 2 | 4146 | 4128 | 2080 | 2048 |
| 59 | 2 | 512 | 192 | 32 | 2 | 3906 | 3872 | 1952 | 1920 |
| 59a | 1 | 1024 | 192 | 0 | 0 | 7808 | 7808 | 3904 | 3904 |
| 59b | 1 | 1024 | 192 | 0 | 2 | 7746 | 7744 | 3904 | 3840 |
| 59c | 1 | 1024 | 192 | 4 | 2 | 7622 | 7616 | 3840 | 3776 |
| 59d | 1 | 1024 | 192 | 8 | 2 | 7498 | 7488 | 3776 | 3712 |
| 59e | 1 | 1024 | 192 | 16 | 2 | 7250 | 7232 | 3648 | 3584 |
| 59f | 1 | 1024 | 192 | 32 | 2 | 6754 | 6720 | 3392 | 3328 |
| 59g | 1 | 512 | 192 | 0 | 0 | 8832 | 8832 | 4416 | 4416 |
| 59h | 1 | 512 | 192 | 0 | 2 | 8770 | 8768 | 4416 | 4352 |
| 59i | 1 | 512 | 192 | 4 | 2 | 8646 | 8640 | 4352 | 4288 |
| 59j | 1 | 512 | 192 | 8 | 2 | 8522 | 8512 | 4288 | 4224 |
| 59k | 1 | 512 | 192 | 16 | 2 | 8274 | 8256 | 4160 | 4096 |
| 59l | 1 | 512 | 192 | 32 | 2 | 7778 | 7744 | 3904 | 3840 |
| 60 | 32 | 1024 | 384 | 0 | 0 | 232 | 232 | 122 | 110 |
| 61 | 32 | 1024 | 384 | 0 | 2 | 232 | 230 | 122 | 108 |
| 62 | 32 | 1024 | 384 | 4 | 2 | 232 | 226 | 120 | 106 |
| 63 | 32 | 1024 | 384 | 8 | 2 | 232 | 222 | 118 | 104 |
| 64 | 32 | 1024 | 384 | 16 | 2 | 232 | 214 | 114 | 100 |

| Slot Format # | Spreading Factor | Midamble length (chips) | Guard Period (chips) | $N_{TFCI\ code\ word}$ (bits) | $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|---|
| 65 | 32 | 1024 | 384 | 32 | 2 | 232 | 198 | 106 | 92 |
| 66 | 16 | 1024 | 384 | 0 | 0 | 464 | 464 | 244 | 220 |
| 67 | 16 | 1024 | 384 | 0 | 2 | 462 | 460 | 244 | 216 |
| 68 | 16 | 1024 | 384 | 4 | 2 | 458 | 452 | 240 | 212 |
| 69 | 16 | 1024 | 384 | 8 | 2 | 454 | 444 | 236 | 208 |
| 70 | 16 | 1024 | 384 | 16 | 2 | 446 | 428 | 228 | 200 |
| 71 | 16 | 1024 | 384 | 32 | 2 | 430 | 396 | 212 | 184 |
| 72 | 8 | 1024 | 384 | 0 | 0 | 928 | 928 | 488 | 440 |
| 73 | 8 | 1024 | 384 | 0 | 2 | 922 | 920 | 488 | 432 |
| 74 | 8 | 1024 | 384 | 4 | 2 | 910 | 904 | 480 | 424 |
| 75 | 8 | 1024 | 384 | 8 | 2 | 898 | 888 | 472 | 416 |
| 76 | 8 | 1024 | 384 | 16 | 2 | 874 | 856 | 456 | 400 |
| 77 | 8 | 1024 | 384 | 32 | 2 | 826 | 792 | 424 | 368 |
| 78 | 4 | 1024 | 384 | 0 | 0 | 1856 | 1856 | 976 | 880 |
| 79 | 4 | 1024 | 384 | 0 | 2 | 1842 | 1840 | 976 | 864 |
| 80 | 4 | 1024 | 384 | 4 | 2 | 1814 | 1808 | 960 | 848 |
| 81 | 4 | 1024 | 384 | 8 | 2 | 1786 | 1776 | 944 | 832 |
| 82 | 4 | 1024 | 384 | 16 | 2 | 1730 | 1712 | 912 | 800 |
| 83 | 4 | 1024 | 384 | 32 | 2 | 1618 | 1584 | 848 | 736 |
| 84 | 2 | 1024 | 384 | 0 | 0 | 3712 | 3712 | 1952 | 1760 |
| 85 | 2 | 1024 | 384 | 0 | 2 | 3682 | 3680 | 1952 | 1728 |
| 86 | 2 | 1024 | 384 | 4 | 2 | 3622 | 3616 | 1920 | 1696 |
| 87 | 2 | 1024 | 384 | 8 | 2 | 3562 | 3552 | 1888 | 1664 |
| 88 | 2 | 1024 | 384 | 16 | 2 | 3442 | 3424 | 1824 | 1600 |
| 89 | 2 | 1024 | 384 | 32 | 2 | 3202 | 3168 | 1696 | 1472 |
| 89a | 1 | 1024 | 384 | 0 | 0 | 7424 | 7424 | 3904 | 3520 |
| 89b | 1 | 1024 | 384 | 0 | 2 | 7362 | 7360 | 3904 | 3456 |
| 89c | 1 | 1024 | 384 | 4 | 2 | 7238 | 7232 | 3840 | 3392 |
| 89d | 1 | 1024 | 384 | 8 | 2 | 7114 | 7104 | 3776 | 3328 |
| 89e | 1 | 1024 | 384 | 16 | 2 | 6866 | 6848 | 3648 | 3200 |
| 89f | 1 | 1024 | 384 | 32 | 2 | 6370 | 6336 | 3392 | 2944 |
| 90 | 32 | 1024 | 192 | 0 | 8 | 244 | 236 | 122 | 114 |

## 5B.3.3 Training sequences for spread bursts

In this subclause, the training sequences for usage as midambles in burst type 1, 2, 3 and 4 (see subclause 5B.3.2) 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 cell-specific single basic midamble code. In the case of MBSFN timeslots there is only a single midamble and this is derived from a single basic midamble code which is not necessarily cell-specific. The applicable basic midamble codes are given in Annex AB.1, Annex AB.2 and Annex AB.2A. As different basic midamble codes are required for different burst formats, Annex AB.1 shows the basic midamble codes $\mathbf{m}_P$ for burst type 1 and 3, Annex AB.2 shows $\mathbf{m}_{PS}$ for burst type 2 and Annex AB.2A shows $\mathbf{m}_P$ for burst type 4. It should be noted that burst type 2 must not be mixed with burst type 1 or 3 in the same timeslot of one cell and furthermore burst type 4 shall not be mixed with any other burst type in the same timeslot of one cell.

The basic midamble codes in Annex AB.1, Annex AB.2 and Annex AB.2A are listed in hexadecimal notation. The binary form of the basic midamble code shall be derived according to table 6 (section 5.2.3).

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

$$\mathbf{m}_{\mathrm{P}} = (m_1, m_2, ..., m_P) \quad (1)$$

According to Annex AB.1, the size of this vector $\mathbf{m}_{\mathrm{P}}$ is P=912 for burst type 1 and 3. According to Annex AB.2, the size of this vector $\mathbf{m}_{\mathrm{P}}$ is P=456 for burst type 2. According to Annex AB.2A, the size of vector $\mathbf{m}_{\mathrm{P}}$ is P=384 for burst type 4. As QPSK modulation is used, the training sequences are transformed into a complex form, denoted as the complex vector $\underline{\mathbf{m}}_{\mathrm{P}}$ :

$$\underline{\mathbf{m}}_{\mathrm{P}} = (\underline{m}_1, \underline{m}_2, ..., \underline{m}_P) \quad (2)$$

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):

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

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

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

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

Notes on equation (4):

- $L_m$: Midamble length
- K': Maximum number of different midamble shifts in a cell, when no intermediate shifts are used. This value depends on the midamble length.
- K: Maximum number of different midamble shifts in a cell, when intermediate shifts are used, K=2K'. This value depends on the midamble length.

  Note that intermediate shifts are not used for burst type 4, i.e. K=K'=1 for burst type 4.
- W: Shift between the midambles, when the number of midambles is K'.
- $\lfloor x \rfloor$ denotes the largest integer smaller or equal to x

Allowed values for $L_m$, K' and W are given in Annex AB.1, Annex AB.2 and Annex AB.2A.

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

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

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:

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

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

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

The $L_m$ midamble elements $\underline{m}_i^{(k)}$ are generated for each midamble of the first K' shifts (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' shifts (k = (K'+1),...,K = (K'+1),...,2K') are generated based on a slight modification of this formula introducing intermediate shifts:

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

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

The number $K_{Cell}$ of midambles that is supported in each cell can be smaller than K, depending on the cell size and the possible delay spreads, see Annex AB. The number $K_{Cell}$ is signalled by higher layers. The midamble sequences derived according to equations (7) to (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).

### 5B.3.4 Beamforming

Support for beamforming is identical to 3.84Mcps TDD cf. [5.2.4 Beamforming].

## 5B.4 Common physical channels

### 5B.4.1 Primary common control physical channel (P-CCPCH)

The BCH as described in subclause 4.1.2 is mapped onto the Primary Common Control Physical Channel (P-CCPCH). The position (time slot / code) of the P-CCPCH is known from the Physical Synchronisation Channel (PSCH), see subclause 5B.4.4.

#### 5B.4.1.1 P-CCPCH Spreading

The P-CCPCH uses fixed spreading with a spreading factor SF = 32 as described in subclause 5B.3.1.1. The P-CCPCH always uses channelisation code $c_{Q=32}^{(k=1)}$.

#### 5B.4.1.2 P-CCPCH Burst Types

Burst type 1 as described in subclause 5B.2.2 is used for the P-CCPCH unless the entire carrier is dedicated to MBSFN then burst type 4 is used for P-CCPCH. No TFCI is applied for the P-CCPCH.

#### 5B.4.1.3 P-CCPCH Training sequences

The training sequences, i.e. midambles, as described in subclause 5B.3.3 are used for the P-CCPCH.

### 5B.4.2 Secondary common control physical channel (S-CCPCH)

PCH and FACH as described in subclause 4.1.2 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.

#### 5B.4.2.1 S-CCPCH Spreading

The S-CCPCH uses fixed spreading with a spreading factor SF = 32 as described in subclause 5B.3.1.1. When S-CCPCH is used for MBSFN operation the spreading factor may be SF = 32 or SF = 1.

#### 5B.4.2.2 S-CCPCH Burst Types

Burst types 1, 2 or 4 as described in subclause 5B.3.2 are used for the S-CCPCHs. TFCI may be applied for S-CCPCHs.

#### 5B.4.2.2A S-CCPCH Modulation

When S-CCPCH is used for MBSFN operation, burst type 4 shall be used and the modulation may be QPSK or 16QAM, see table 8AF for slot formats. When S-CCPCH is used for all other purposes the modulation shall be QPSK.

#### 5B.4.2.3 S-CCPCH Training sequences

The training sequences, i.e. midambles, as described in subclause 5B.3.3 are used for the S-CCPCH.

### 5B.4.3 The physical random access channel (PRACH)

The RACH as described in subclause 4.1.2 is mapped onto one uplink physical random access channel (PRACH).

#### 5B.4.3.1 PRACH Spreading

The uplink PRACH uses either spreading factor SF=32 or SF=16 as described in subclause 5B.3.1.2. 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).

#### 5B.4.3.2 PRACH Burst Type

The UEs send uplink access bursts of type 3 randomly in the PRACH. TFCI and TPC are not applied for the PRACH.

#### 5B.4.3.3 PRACH Training sequences

The training sequences, i.e. midambles, of different users active in the same time slot are time shifted versions of a basic midamble code, $m_1$, or a second basic midamble code, $m_2$, which is a time inverted version of the basic midamble code $m_1$. The basic midamble codes for burst type 3 are shown in Annex AB. The necessary time shifts are obtained by choosing all k=1,2,3...,K'. Different cells use different periodic basic codes, i.e. different midamble sets.

#### 5B.4.3.4 PRACH timeslot formats

For the PRACH the timeslot format is only spreading factor dependent. The timeslot formats 60 and 66 of table 8AG are applicable for the PRACH.

#### 5B.4.3.5 Association between Training Sequences and Channelisation Codes

For the PRACH the fixed association between a training sequence and associated channelisation code is defined in figure 18AK. In this figure, midamble $\mathbf{m}_j^{(k)}$ is formed from the $k^{\text{th}}$ shift of the original basic midamble code ($j$=1) or of the time-inverted basic midamble code ($j$=2).

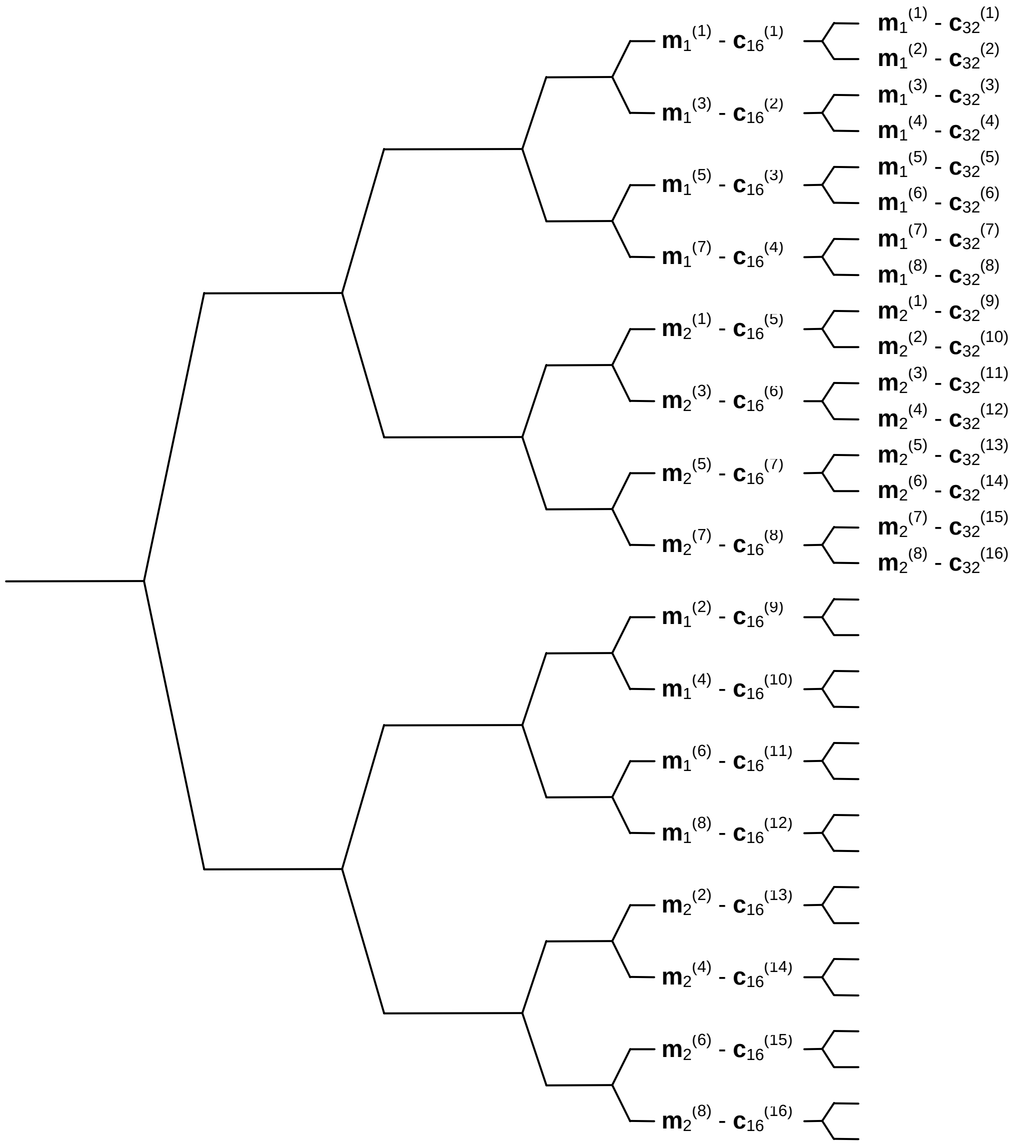



**Figure 18AK: Association of midambles to channelisation codes for PRACH in the OVSF tree**

## 5B.4.4 The synchronisation channel (SCH)

The code group of a cell can be derived from the synchronisation channel. In order not to limit 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:

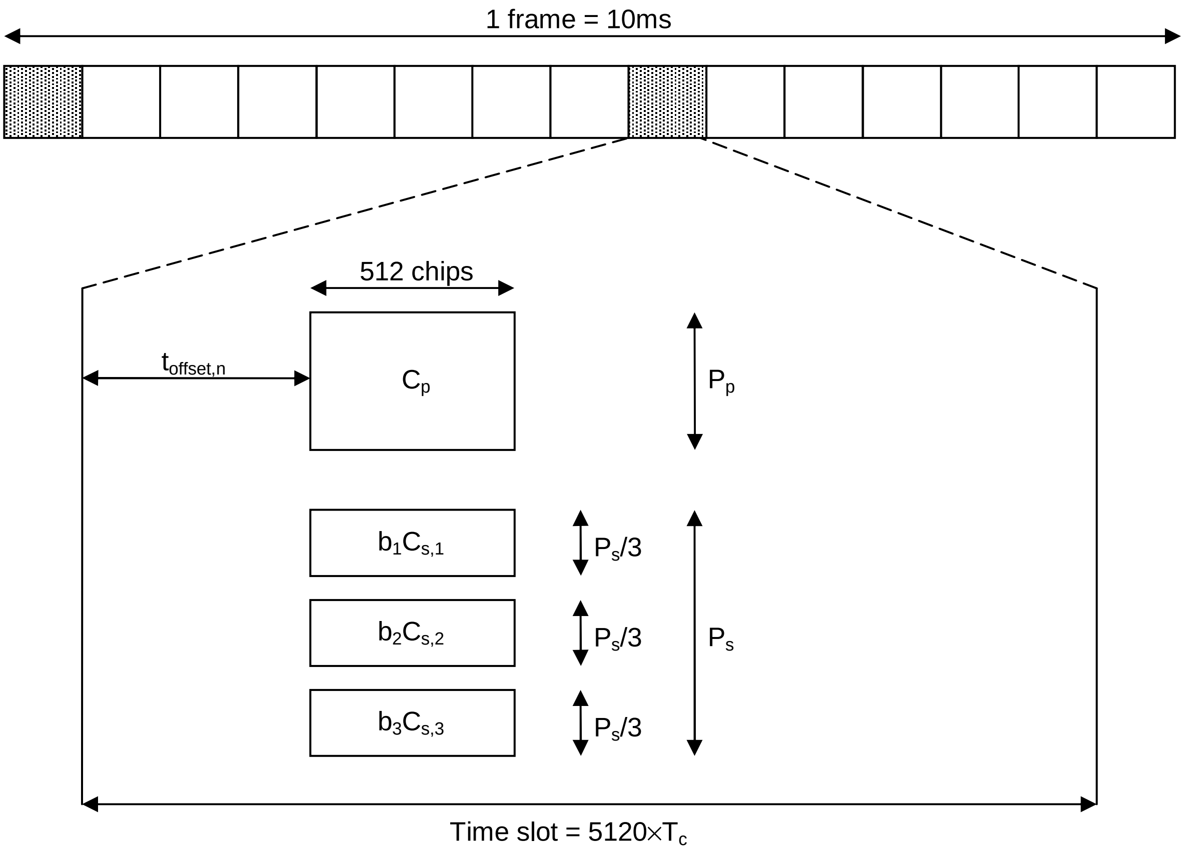
Case 1) SCH and P-CCPCH allocated in TS#k, k=0….14

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 the 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 18AL is an example for transmission of SCH, k=0, of Case 2.




$b_i \in \{\pm 1, \pm j\}$, $C_{s,i} \in \{C_0, C_1, C_3, C_4, C_5, C_6, C_8, C_{10}, C_{12}, C_{13}, C_{14}, C_{15}\}$, i = 1,2,3; see section 8.4

**Figure 18AL: Scheme for Synchronisation channel SCH consisting of one primary sequence $C_p$ and 3 parallel secondary sequences $C_{s,i}$ in slot k and k+8 (example for k=0 in Case 2)**

As depicted in figure 18AL, the SCH consists of a primary and three secondary code sequences each 512 chips long. The primary and secondary code sequences are defined in [8].

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 $t_{offset,n}$ enables the system to overcome the capture effect.

The time offset $t_{offset,n}$ is one of 32 values, depending on the code group of the cell, n, [8]. Note that the cell parameter will change from frame to frame, but the cell will belong to only one code group and thus have one time offset $t_{offset,n}$. The exact value for $t_{offset,n}$, is given by:

$$t_{offset,n} = \begin{cases} n \cdot 96 \cdot T_c & n < 16 \\ (1440 + n \cdot 96) \cdot T_c & n \geq 16 \end{cases}; \qquad n = 0,...,31$$

## 5B.4.5 Physical Uplink Shared Channel (PUSCH)

The USCH as desribed in subclause 4.1.2 is mapped onto one or more physical uplink shared channels (PUSCH). Timing advance, as described in [9], is applied to the PUSCH.

### 5B.4.5.1 PUSCH Spreading

The spreading factors that can be applied to the PUSCH are SF = 1, 2, 4, 8, 16 or 32 as described in subclause 5B.3.1.2.

#### 5B.4.5.2 PUSCH Burst Types

Burst types 1, 2 or 3 as described in subclause 5B.3.2 can be used for PUSCH. TFCI and TPC can be transmitted on the PUSCH.

#### 5B.4.5.3 PUSCH Training Sequences

The training sequences as desribed in subclause 5B.3.3 are used for the PUSCH.

#### 5B.4.5.4 UE Selection

The UE that shall transmit on the PUSCH is selected by higher layer signalling.

### 5B.4.6 Physical Downlink Shared Channel (PDSCH)

The DSCH as described in subclause 4.1.2 is mapped onto one or more physical downlink shared channels (PDSCH).

#### 5B.4.6.1 PDSCH Spreading

The PDSCH uses either spreading factor SF = 32 or SF = 1 as described in subclause 5B.3.1.1.

#### 5B.4.6.2 PDSCH Burst Types

Burst types 1 or 2 as described in subclause 5B.3.2 can be used for PDSCH. TFCI can be transmitted on the PDSCH.

#### 5B.4.6.3 PDSCH Training Sequences

The training sequences as described in subclause 5B.3.3 are used for the PDSCH.

#### 5B.4.6.4 UE Selection

To indicate to the UE that there is data to decode on the DSCH, higher layer signalling is used.

### 5B.4.7 The Paging Indicator Channel (PICH)

The Paging Indicator Channel (PICH) is a physical channel used to carry the paging indicators.

#### 5B.4.7.1 Mapping of Paging Indicators to the PICH bits

Figure 18AM 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 paging 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 $s_{NPIB+1}$,..., $s_{NPIB+4}$ adjacent to the midamble are reserved for possible future use.

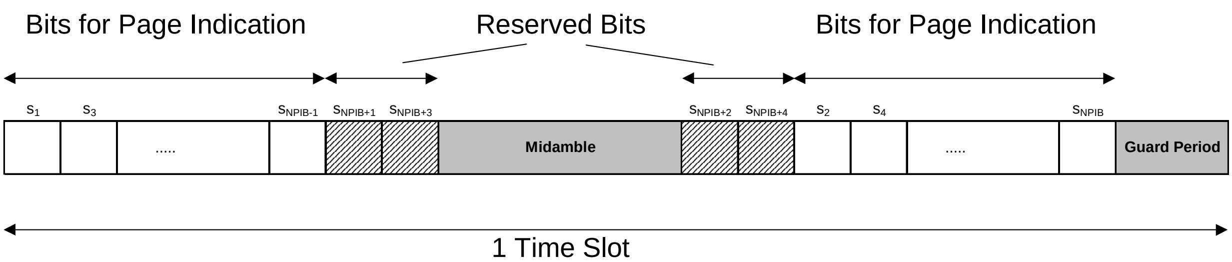



**Figure 18AM: Transmission and numbering of paging indicator carrying bits in a PICH burst**

Each paging indicator $P_q$ in one time slot is mapped to the bits $\{s_{2Lpi*q+1},...,s_{2Lpi*(q+1)}\}$ within this time slot. Thus, due to the interleaved transmission of the bits half of the symbols used for each paging indicator are transmitted in the first data part, and the other half of the symbols are transmitted in the second data part; an example is shown in figure 18AN for a paging indicator length $L_{PI}$ of 4 symbols.

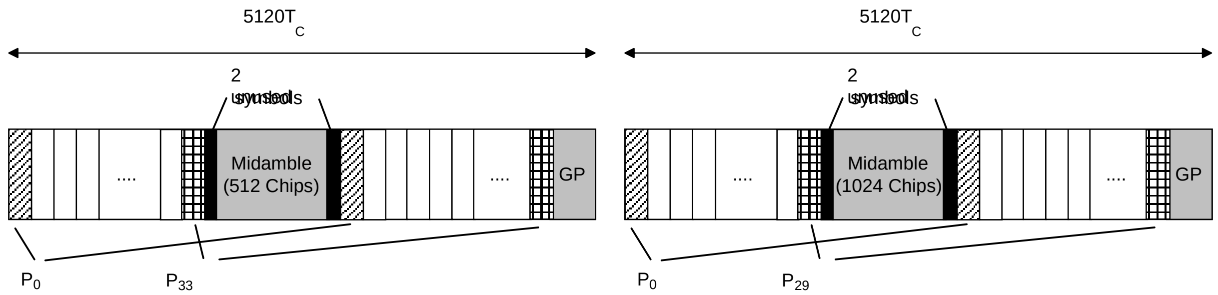



**Figure 18AN: Example of mapping of paging indicators on PICH bits for $L_{PI}$=4**

The setting of the paging indicators and the corresponding PICH bits (including the reserved ones) is described in [4].

$N_{PI}$ paging indicators of length $L_{PI}$=2, $L_{PI}$=4 or $L_{PI}$=8 symbols are transmitted in each radio frame that contains the PICH. The number of paging indicators $N_{PI}$ per radio frame is given by the paging indicator length and the burst type, which are both known by higher layer signalling. In table 8AH this number is shown for the different possibilities of burst types and paging indicator lengths.

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

| | $L_{PI}$=2 | $L_{PI}$=4 | $L_{PI}$=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 |

### 5B.4.7.2 Structure of the PICH over multiple radio frames

The structure of PICH over multiple radio frames is identical to the structure of PICH in 3.84Mcps TDD cf [section 5.3.7.2].

### 5B.4.7.3 PICH Training sequences

The training sequences, i.e. midambles for the PICH.are generated as described in subclause 5B.3.3. The allocation of midambles depends on whether SCTD is applied to the PICH.

- If no antenna diversity is applied the PICH the midambles can be allocated as described in subclause 5B.7.
- If SCTD antenna diversity is applied to the PICH the allocation of midambles shall be as described in [9].

## 5B.4.8 High Speed Physical Downlink Shared Channel (HS-PDSCH)

The HS-DSCH as desribed in subclause 4.1.2 is mapped onto one or more high speed physical downlink shared channels (HS-PDSCH).

### 5B.4.8.1 HS-PDSCH Spreading

The HS-PDSCH shall use either spreading factor SF = 32 or SF=1, as described in 5B.3.1.1.

### 5B.4.8.2 HS-PDSCH Burst Types

Burst types 1 or 2 as described in subclause 5B.3.2 can be used for PDSCH. TFCI shall not be transmitted on the HS-PDSCH. The TF of the HS-DSCH is derived from the associated HS-SCCH.

#### 5B.4.8.3 HS-PDSCH Training Sequences

The training sequences as described in subclause 5B.3.3 are used for the HS-PDSCH.

#### 5B.4.8.4 UE Selection

To indicate to the UE that there is data to decode on the HS-DSCH, the UE id on the associated HS-SCCH shall be used.

#### 5B.4.8.5 HS-PDSCH timeslot formats

An HS-PDSCH may use QPSK or 16QAM modulation symbols. The time slot formats are shown in table 8AI.

**Table 8AI: Time slot formats for the HS-PDSCH**

| Slot Format # | Spreading Factor | Midamble length (chips) | $N_{TFCI\ code\ word}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field}$ (bits) |
|---|---|---|---|---|---|---|
| 0 (QPSK) | 32 | 1024 | 0 | 244 | 244 | 122 |
| 1 (16QAM) | 32 | 1024 | 0 | 488 | 488 | 244 |
| 2 (QPSK) | 32 | 512 | 0 | 276 | 276 | 138 |
| 3 (16QAM) | 32 | 512 | 0 | 552 | 552 | 276 |
| 4 (QPSK) | 1 | 1024 | 0 | 7808 | 7808 | 3904 |
| 5 (16QAM) | 1 | 1024 | 0 | 15616 | 15616 | 7808 |
| 6 (QPSK) | 1 | 512 | 0 | 8832 | 8832 | 4416 |
| 7(16QAM) | 1 | 512 | 0 | 17664 | 17664 | 8832 |

### 5B.4.9 Shared Control Channel for HS-DSCH (HS-SCCH)

The HS-SCCH is a DL physical channel that carries higher layer control information for HS-DSCH. The physical layer will process this information according to [7] and will transmit the resulting bits on the HS-SCCH the structure of which is described below.

#### 5B.4.9.1 HS-SCCH Spreading

The HS-SCCH shall use spreading factor SF = 32, as described in 5B.3.1.1.

#### 5B.4.9.2 HS-SCCH Burst Types

Burst type 1 as described in subclause 5B.3.2 can be used for HS-SCCH. TFCI shall not be transmitted on the HS-SCCH.

#### 5B.4.9.3 HS-SCCH Training Sequences

The training sequences as described in subclause 5B.3.3 are used for the HS-SCCH.

#### 5B.4.9.4 HS-SCCH timeslot formats

The HS-SCCH always uses time slot format #0 from table 8AF, see section 5B.3.2.6.1.

## 5B.4.10 Shared Information Channel for HS-DSCH (HS-SICH)

The HS-SICH is a UL physical channel that carries higher layer control information and the Channel Quality Indicator CQI for HS-DSCH. The physical layer will process this information according to [7] and will transmit the resulting bits on the HS-SICH the structure of which is described below.

### 5B.4.10.1 HS-SICH Spreading

The HS-SICH shall use spreading factor SF = 32, as described in 5B.3.1.2.

### 5B.4.10.2 HS-SICH Burst Types

Burst type 1 as described in subclause 5B.3.2 can be used for HS-SICH. TFCI shall not be transmitted on the HS-SICH, however, the HS-SICH shall carry TPC information.

### 5B.4.10.3 HS-SICH Training Sequences

The training sequences as described in subclause 5B.3.3 are used for the HS-SICH.

### 5B.4.10.4 HS-SICH timeslot formats

The HS-SICH shall use time slot format #90 from table 8AF, see section 5B.3.2.6.2.

## 5B.4.11 The MBMS Indicator Channel (MICH)

The MBMS Indicator Channel (MICH) is a physical channel used to carry the MBMS notification indicators. The UE may use multiple MICH within the MBMS modification period in order to make decisions on individual MBMS notification indicators.

### 5B.4.11.1 Mapping of MBMS Indicators to the MICH bits for burst types 1 and 2

Figure 18AO depicts the structure of a MICH burst and the numbering of the bits within the burst. The same burst type is used for the MICH in every cell. $N_{NIB}$ bits in a normal burst of type 1 or 2 are used to carry the MBMS notification indicators, where $N_{NIB}$ depends on the burst type: $N_{NIB}$=240 for burst type 1 and $N_{NIB}$=272 for burst type 2. The bits $s_{NNIB+1}$,..., $s_{NNIB+4}$ adjacent to the midamble are reserved for possible future use.

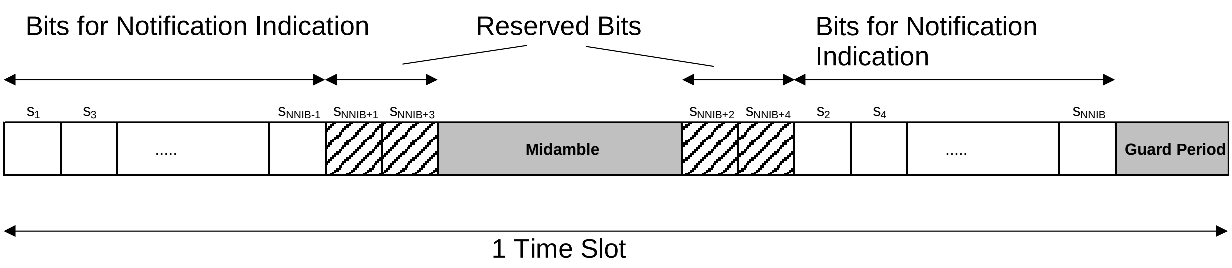



**Figure 18AO: Transmission and numbering of MBMS notification indicator carrying bits in a MICH burst using burst types 1 and 2**

Each notification indicator $N_q$ in one time slot is mapped to the bits $\{s_{2LNI*q+1},...,s_{2LNI*(q+1)}\}$ within this time slot. Thus, due to the interleaved transmission of the bits half of the symbols used for each MBMS notification indicator are transmitted in the first data part, and the other half of the symbols are transmitted in the second data part: an example is shown in figure 18AP for a MBMS notification indicator length $L_{NI}$ of 4 symbols.

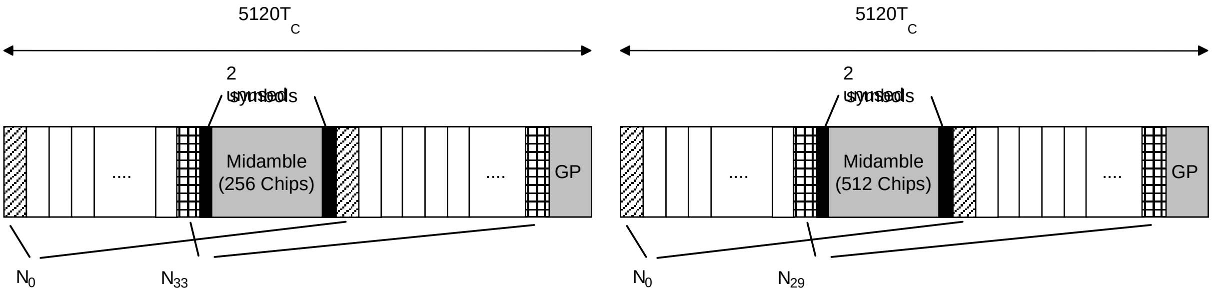



**Figure 18AP: Example of mapping of MBMS notification indicators on MICH bits for $L_{NI}$=4 for burst types 2 and 1 respectively**

The setting of the MBMS notification indicators and the corresponding MICH bits (including the reserved ones) is described in [7].

$N_n$ MBMS notification indicators of length $L_{NI}$=2, $L_{NI}$=4 or $L_{NI}$=8 symbols are transmitted in each MICH. The number of MBMS notification indicators $N_n$ per MICH is given by the MBMS notification indicator length and the burst type, which are both known by higher layer signalling. In table 18AJ this number is shown for burst types 1 and 2 and differing MBMS notification indicator lengths.

**Table 18AJ: Number $N_n$ of MBMS notification indicators per time slot for burst types 1 and 2 and differing MBMS notification indicator lengths $L_{NI}$**

| | $L_{NI}$=2 | $L_{NI}$=4 | $L_{NI}$=8 |
|---|---|---|---|
| Burst Type 1 | $N_n$=60 | $N_n$=30 | $N_n$=15 |
| Burst Type 2 | $N_n$=68 | $N_n$=34 | $N_n$=17 |

The value NI (NI = 0, ..., $N_{NI}$-1) calculated by higher layers, is associated to the MBMS notification indicator $N_q$, where q = NI mod $N_n$.

The set of NI passed over the Iub indicates all higher layer NI values for which the notification indicator on MICH should be set to 1 during the corresponding modification period; all other indicators shall be set to 0.

## 5B.4.11.1A Mapping of MBMS Indicators to the MICH bits for burst type 4

When an entire carrier is dedicated to MBSFN operation, the MICH shall use burst type 4. In this case $N_{NIB}$=256 and there are 8 reserved/unused bits adjacent to the midamble reserved for possible future use. The transmission and numbering of MBMS notification indicator carrying bits in a MICH burst is similar to that of figure 18AO with the exception of 4 reserved bits either side of the midamble as opposed to 2 for burst types 1 and 2. An example mapping is shown in figure 18AP.1 for a MBMS notification indicator length $L_{NI}$ of 4 symbols.

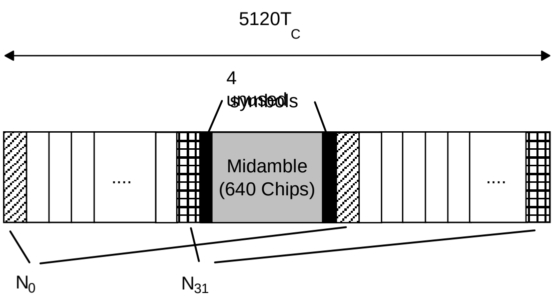



**Figure 18AP.1: Example of mapping of MBMS notification indicators on MICH bits for $L_{NI}$=4 for burst type 4**

The setting of the MBMS notification indicators and the corresponding MICH bits (including the reserved ones) is described in [7].

$N_n$ MBMS notification indicators of length $L_{NI}$=2, $L_{NI}$=4 or $L_{NI}$=8 symbols are transmitted in each MICH. The number of MBMS notification indicators $N_n$ per MICH is given by the MBMS notification indicator length and the burst type, which are both known by higher layer signalling. In table 18AK this number is shown for the different possibilities of burst types and MBMS notification indicator lengths.

**Table 18AK: Number $N_n$ of MBMS notification indicators per time slot for burst type 4 and differing MBMS notification indicator lengths $L_{NI}$**

| | $L_{NI}$=2 | $L_{NI}$=4 | $L_{NI}$=8 |
|---|---|---|---|
| Burst Type 4 | $N_n$=64 | $N_n$=32 | $N_n$=16 |

The value NI (NI = 0, ..., $N_{NI}$-1) calculated by higher layers, is associated to the MBMS notification indicator $N_q$, where q = NI mod $N_n$.

The set of NI passed over the Iub indicates all higher layer NI values for which the notification indicator on MICH should be set to 1 during the corresponding modification period; all other indicators shall be set to 0.

### 5B.4.11.2 MICH Training sequences

The training sequences, i.e. midambles for the MICH, are generated as described in subclause 5B.3.3. The allocation of midambles depends on whether SCTD is applied to the MICH.

- If no antenna diversity is applied the MICH the midambles can be allocated as described in subclause 5B.7.
- If SCTD antenna diversity is applied to the MICH the allocation of midambles shall be as described in [9].

Note that when the entire carrier is dedicated to MBSFN operation MICH employs burst type 4 as described in subclause 5B.4.11.1A. Burst type 4 supports a single midamble and hence SCTD is precluded from operation in such a scenario.

## 5B.4.12 E-DCH Physical Uplink Channel (E-PUCH)

One or more E-PUCH are used to carry the uplink E-DCH transport channel and associated control information (E-UCCH) in each E-DCH TTI. In a timeslot designated by UTRAN for E-PUCH use, up to one E-PUCH may be transmitted by a UE. No other physical channels may be transmitted by a UE in an E-PUCH timeslot.

Timing advance, as described in [9], subclause 4.3, is applied to the E-PUCH.

### 5B.4.12.1 E-UCCH

The E-DCH Uplink Control Channel (E-UCCH) carries uplink control information associated with the E-DCH and is carried within indicator fields mapped to E-PUCH. Depending on the configuration by higher layers, an E-PUCH burst may or may not contain E-UCCH and TPC. When E-PUCH does contain E-UCCH, TPC is also transmitted. When E-PUCH does not contain E-UCCH, TPC is not transmitted.

Higher layers shall indicate the maximum number of timeslots ($N_{E\text{-}UCCH}$) that may contain E-UCCH/TPC in the E-DCH TTI. For an allocation of $n_{TS}$ E-PUCH timeslots, the UE shall transmit E-UCCH and TPC on the first $m$ allocated timeslots of the E-DCH TTI, where $m = \min(n_{TS}, N_{E\text{-}UCCH})$.

The E-UCCH comprises two parts, E-UCCH part 1 and E-UCCH part 2.

E-UCCH part 1:

- is of length 32 physical channel bits
- is mapped to the TFCI field of the E-PUCH (16 bits either side of the midamble)
- is spread at SF=32 using the channelisation code in the branch with the highest code numbering of the allowed OVSF sub tree, as depicted in [8]
- uses QPSK modulation

E-UCCH part 2:

- is of length 32 physical channel bits
- is spread using the same spreading factor as the data payloads
- uses the same modulation as the data payloads

Figures 18APA and 18APB show the E-PUCH data burst with and without the E-UCCH/TPC fields.

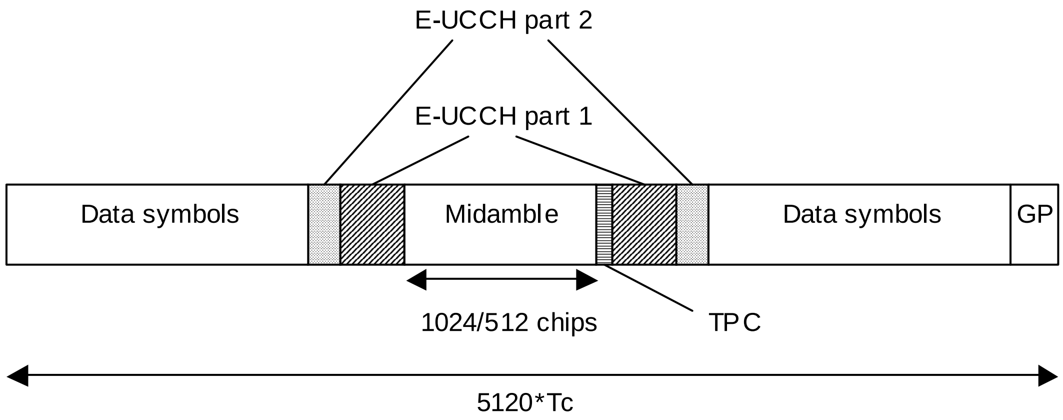



**Figure 18APA: Location of E-UCCH part 1, E-UCCH part 2 and TPC in the E-PUCH data burst**

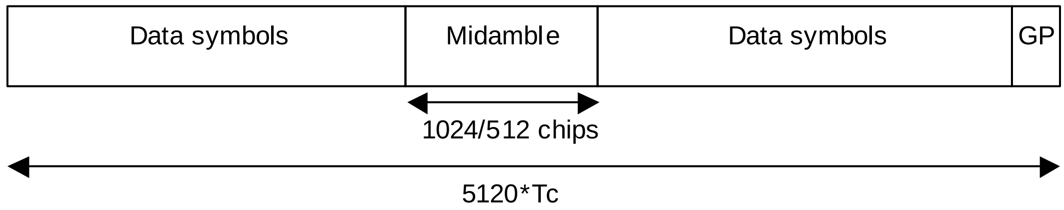



**Figure 18APB: E-PUCH data burst without E-UCCH/TPC**

### 5B.4.12.2 E-PUCH Spreading

The spreading factors that can be applied to the E-PUCH are SF = 1, 2, 4, 8, 16, 32 as described in subclause 5B.3.1.2.

### 5B.4.12.3 E-PUCH Burst Types

Burst types 1, 2 or 3 as described in subclause 5B.3.2 can be used for E-PUCH. E-UCCH and TPC can be transmitted on the E-PUCH.

### 5B.4.12.4 PUSCH Training Sequences

The training sequences as desribed in subclause 5B.3.3 are used for the E-PUCH.

### 5B.4.12.5 UE Selection

UEs that shall transmit on the E-PUCH are selected by higher layers. The UE id on the associated E-AGCH shall be used for identification.

### 5B.4.12.6 E-PUCH timeslot formats

An E-PUCH may use QPSK or 16QAM modulation symbols and may or may not contain E-UCCH/TPC. The time slot formats are shown in table 19.

**Table 19: Timeslot formats for E-PUCH**

| slot format # | SF | Midamble Length (chips) | GP (chips) | $N_{EUCCH1}$ (bits) | $N_{EUCCH2}$ (bits) | $N_{TPC}$ (bits) | Bits/slot | $N_{data/slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 (QPSK) | 32 | 1024 | 192 | 0 | 0 | 0 | 244 | 244 | 122 | 122 |
| 1 (16QAM) | 32 | 1024 | 192 | 0 | 0 | 0 | 488 | 488 | 244 | 244 |
| 2 (QPSK) | 32 | 1024 | 192 | 32 | 32 | 2 | 244 | 178 | 90 | 88 |
| 3 (16QAM) | 32 | 1024 | 192 | 32 | 32 | 2 | 454 | 388 | 196 | 192 |
| 4 (QPSK) | 32 | 512 | 192 | 0 | 0 | 0 | 276 | 276 | 138 | 138 |
| 5 (16QAM) | 32 | 512 | 192 | 0 | 0 | 0 | 552 | 552 | 276 | 276 |
| 6 (QPSK) | 32 | 512 | 192 | 32 | 32 | 2 | 276 | 210 | 106 | 104 |
| 7 (16QAM) | 32 | 512 | 192 | 32 | 32 | 2 | 518 | 452 | 228 | 224 |
| 8 (QPSK) | 16 | 1024 | 192 | 0 | 0 | 0 | 488 | 488 | 244 | 244 |
| 9 (16QAM) | 16 | 1024 | 192 | 0 | 0 | 0 | 976 | 976 | 488 | 488 |
| 10 (QPSK) | 16 | 1024 | 192 | 32 | 32 | 2 | 454 | 388 | 196 | 192 |
| 11 (16QAM) | 16 | 1024 | 192 | 32 | 32 | 2 | 874 | 808 | 408 | 400 |
| 12 (QPSK) | 16 | 512 | 192 | 0 | 0 | 0 | 552 | 552 | 276 | 276 |
| 13 (16QAM) | 16 | 512 | 192 | 0 | 0 | 0 | 1104 | 1104 | 552 | 552 |
| 14 (QPSK) | 16 | 512 | 192 | 32 | 32 | 2 | 518 | 452 | 228 | 224 |
| 15 (16QAM) | 16 | 512 | 192 | 32 | 32 | 2 | 1002 | 936 | 472 | 464 |
| 16 (QPSK) | 8 | 1024 | 192 | 0 | 0 | 0 | 976 | 976 | 488 | 488 |
| 17 (16QAM) | 8 | 1024 | 192 | 0 | 0 | 0 | 1952 | 1952 | 976 | 976 |
| 18 (QPSK) | 8 | 1024 | 192 | 32 | 32 | 2 | 874 | 808 | 408 | 400 |
| 19 (16QAM) | 8 | 1024 | 192 | 32 | 32 | 2 | 1714 | 1648 | 832 | 816 |
| 20 (QPSK) | 8 | 512 | 192 | 0 | 0 | 0 | 1104 | 1104 | 552 | 552 |
| 21 (16QAM) | 8 | 512 | 192 | 0 | 0 | 0 | 2208 | 2208 | 1104 | 1104 |
| 22 (QPSK) | 8 | 512 | 192 | 32 | 32 | 2 | 1002 | 936 | 472 | 464 |
| 23 (16QAM) | 8 | 512 | 192 | 32 | 32 | 2 | 1970 | 1904 | 960 | 944 |
| 24 (QPSK) | 4 | 1024 | 192 | 0 | 0 | 0 | 1952 | 1952 | 976 | 976 |
| 25 (16QAM) | 4 | 1024 | 192 | 0 | 0 | 0 | 3904 | 3904 | 1952 | 1952 |
| 26 (QPSK) | 4 | 1024 | 192 | 32 | 32 | 2 | 1714 | 1648 | 832 | 816 |
| 27 (16QAM) | 4 | 1024 | 192 | 32 | 32 | 2 | 3394 | 3328 | 1680 | 1648 |
| 28 (QPSK) | 4 | 512 | 192 | 0 | 0 | 0 | 2208 | 2208 | 1104 | 1104 |
| 29 (16QAM) | 4 | 512 | 192 | 0 | 0 | 0 | 4416 | 4416 | 2208 | 2208 |
| 30 (QPSK) | 4 | 512 | 192 | 32 | 32 | 2 | 1970 | 1904 | 960 | 944 |
| 31 (16QAM) | 4 | 512 | 192 | 32 | 32 | 2 | 3906 | 3840 | 1936 | 1904 |
| 32 (QPSK) | 2 | 1024 | 192 | 0 | 0 | 0 | 3904 | 3904 | 1952 | 1952 |
| 33 (16QAM) | 2 | 1024 | 192 | 0 | 0 | 0 | 7808 | 7808 | 3904 | 3904 |
| 34 (QPSK) | 2 | 1024 | 192 | 32 | 32 | 2 | 3394 | 3328 | 1680 | 1648 |
| 35 (16QAM) | 2 | 1024 | 192 | 32 | 32 | 2 | 6754 | 6688 | 3376 | 3312 |
| 36 (QPSK) | 2 | 512 | 192 | 0 | 0 | 0 | 4416 | 4416 | 2208 | 2208 |
| 37 (16QAM) | 2 | 512 | 192 | 0 | 0 | 0 | 8832 | 8832 | 4416 | 4416 |
| 38 (QPSK) | 2 | 512 | 192 | 32 | 32 | 2 | 3906 | 3840 | 1936 | 1904 |
| 39 (16QAM) | 2 | 512 | 192 | 32 | 32 | 2 | 7778 | 7712 | 3888 | 3824 |
| 40 (QPSK) | 1 | 1024 | 192 | 0 | 0 | 0 | 7808 | 7808 | 3904 | 3904 |
| 41 (16QAM) | 1 | 1024 | 192 | 0 | 0 | 0 | 15616 | 15616 | 7808 | 7808 |

| slot format # | SF | Midamble Length (chips) | GP (chips) | $N_{EUCCH1}$ (bits) | $N_{EUCCH2}$ (bits) | $N_{TPC}$ (bits) | Bits/slot | $N_{data/slot}$ (bits) | $N_{data/data\ field(1)}$ (bits) | $N_{data/data\ field(2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|---|---|
| 42 (QPSK) | 1 | 1024 | 192 | 32 | 32 | 2 | 6754 | 6688 | 3376 | 3312 |
| 43 (16QAM) | 1 | 1024 | 192 | 32 | 32 | 2 | 13474 | 13408 | 6768 | 6640 |
| 44 (QPSK) | 1 | 512 | 192 | 0 | 0 | 0 | 8832 | 8832 | 4416 | 4416 |
| 45 (16QAM) | 1 | 512 | 192 | 0 | 0 | 0 | 17664 | 17664 | 8832 | 8832 |
| 46 (QPSK) | 1 | 512 | 192 | 32 | 32 | 2 | 7778 | 7712 | 3888 | 3824 |
| 47 (16QAM) | 1 | 512 | 192 | 32 | 32 | 2 | 15522 | 15456 | 7792 | 7664 |
| 48 (QPSK) | 32 | 1024 | 384 | 0 | 0 | 0 | 232 | 232 | 122 | 110 |
| 49 (16QAM) | 32 | 1024 | 384 | 0 | 0 | 0 | 464 | 464 | 244 | 220 |
| 50 (QPSK) | 32 | 1024 | 384 | 32 | 32 | 2 | 232 | 166 | 90 | 76 |
| 51 (16QAM) | 32 | 1024 | 384 | 32 | 32 | 2 | 430 | 364 | 196 | 168 |
| 52 (QPSK) | 16 | 1024 | 384 | 0 | 0 | 0 | 464 | 464 | 244 | 220 |
| 53 (16QAM) | 16 | 1024 | 384 | 0 | 0 | 0 | 928 | 928 | 488 | 440 |
| 54 (QPSK) | 16 | 1024 | 384 | 32 | 32 | 2 | 430 | 364 | 196 | 168 |
| 55 (16QAM) | 16 | 1024 | 384 | 32 | 32 | 2 | 826 | 760 | 408 | 352 |
| 56 (QPSK) | 8 | 1024 | 384 | 0 | 0 | 0 | 928 | 928 | 488 | 440 |
| 57 (16QAM) | 8 | 1024 | 384 | 0 | 0 | 0 | 1856 | 1856 | 976 | 880 |
| 58 (QPSK) | 8 | 1024 | 384 | 32 | 32 | 2 | 826 | 760 | 408 | 352 |
| 59 (16QAM) | 8 | 1024 | 384 | 32 | 32 | 2 | 1618 | 1552 | 832 | 720 |
| 60 (QPSK) | 4 | 1024 | 384 | 0 | 0 | 0 | 1856 | 1856 | 976 | 880 |
| 61 (16QAM) | 4 | 1024 | 384 | 0 | 0 | 0 | 3712 | 3712 | 1952 | 1760 |
| 62 (QPSK) | 4 | 1024 | 384 | 32 | 32 | 2 | 1618 | 1552 | 832 | 720 |
| 63 (16QAM) | 4 | 1024 | 384 | 32 | 32 | 2 | 3202 | 3136 | 1680 | 1456 |
| 64 (QPSK) | 2 | 1024 | 384 | 0 | 0 | 0 | 3712 | 3712 | 1952 | 1760 |
| 65 (16QAM) | 2 | 1024 | 384 | 0 | 0 | 0 | 7424 | 7424 | 3904 | 3520 |
| 66 (QPSK) | 2 | 1024 | 384 | 32 | 32 | 2 | 3202 | 3136 | 1680 | 1456 |
| 67 (16QAM) | 2 | 1024 | 384 | 32 | 32 | 2 | 6370 | 6304 | 3376 | 2928 |
| 68 (QPSK) | 1 | 1024 | 384 | 0 | 0 | 0 | 7424 | 7424 | 3904 | 3520 |
| 69 (16QAM) | 1 | 1024 | 384 | 0 | 0 | 0 | 14848 | 14848 | 7808 | 7040 |
| 70 (QPSK) | 1 | 1024 | 384 | 32 | 32 | 2 | 6370 | 6304 | 3376 | 2928 |
| 71 (16QAM) | 1 | 1024 | 384 | 32 | 32 | 2 | 12706 | 12640 | 6768 | 5872 |

## 5B.4.13 E-DCH Random Access Uplink Control Channel (E-RUCCH)

The E-RUCCH is used to carry E-DCH-associated uplink control signalling when E-PUCH resources are not available. The characteristics of the E-RUCCH physical channel are identical to those of PRACH (see subclause 5B.4.3).

Physical resources available for E-RUCCH are configured by higher layers. E-RUCCH may be mapped to the same physical resources that are assigned for PRACH.

## 5B.4.14 E-DCH Absolute Grant Channel (E-AGCH)

The E-DCH Absolute Grant Channel (E-AGCH) is a downlink physical channel carrying the uplink E-DCH absolute grant control information. Unlike other downlink physical channel types, E-AGCH also carries a TPC field (located immediately after the midamble and spread using SF32) which is used to control the E-PUCH power. Figure 18APC illustrates the burst structure of the E-AGCH.

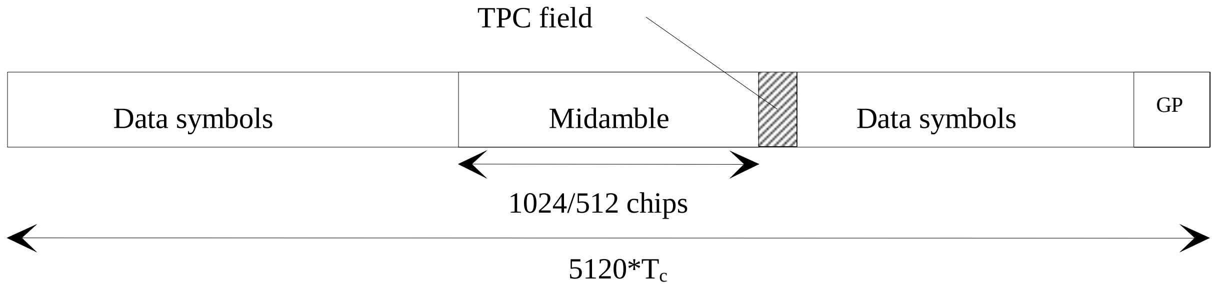



**Figure 18APC: Burst structure of E-AGCH**

One E-DCH absolute grant for a UE shall be transmitted over one E-AGCH.

#### 5B.4.14.1 E-AGCH Spreading

The E-AGCH shall use spreading factor SF = 32, as described in 5B.3.1.1.

#### 5B.4.14.2 E-AGCH Burst Types

Burst types 1 and 2 as described in subclause 5B.3.2 can be used for E-AGCH. TPC shall be transmitted on E-AGCH whereas TFCI shall not be transmitted.

#### 5B.4.14.3 E-AGCH Training Sequences

The training sequences as described in subclause 5B.3.3 are used for the E-AGCH.

#### 5B.4.15.4 E-AGCH timeslot formats

The E-AGCH uses the timeslot formats of Table 20. These augment downlink slot formats 0…19 of table 8AF, see subclause 5B.3.2.6.1.

**Table 20: Time slot formats for E-AGCH**

| Slot Format # | SF | Midamble length (chips) | $N_{TFCI\ code\ word}$ (bits) | $N_{TPC}$ (bits) | Bits/slot | $N_{Data/Slot}$ (bits) | $N_{data/data\ field\ (1)}$ (bits) | $N_{data/data\ field\ (2)}$ (bits) |
|---|---|---|---|---|---|---|---|---|
| 20 | 32 | 1024 | 0 | 2 | 244 | 242 | 122 | 120 |
| 21 | 32 | 512 | 0 | 2 | 276 | 274 | 138 | 136 |

### 5B.4.15 E-DCH Hybrid ARQ Acknowledgement Indicator Channel (E-HICH)

The E-DCH HARQ Acknowledgement indicator channel (E-HICH) is defined in terms of a SF32 downlink physical channel and a signature sequence. The E-HICH carries the uplink E-DCH hybrid ARQ acknowledgement indicator. Figure 18APD illustrates the structure of the E-HICH.

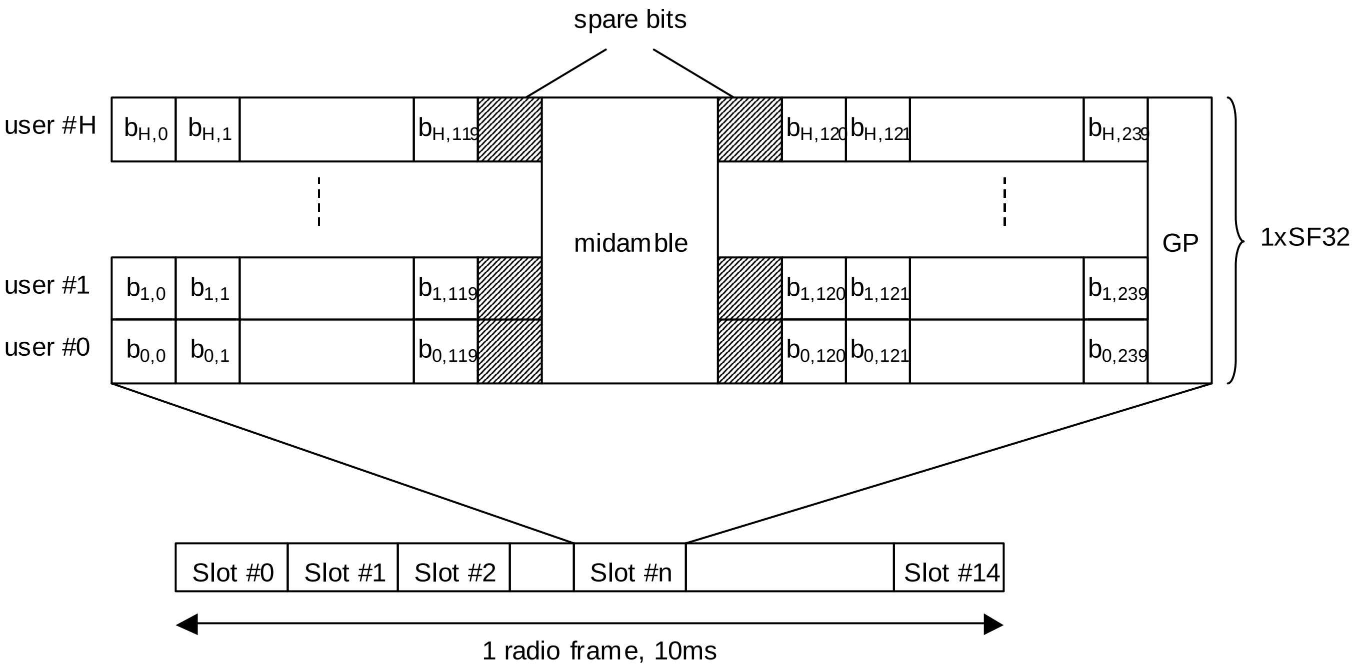



**Figure 18APD – E-HICH Structure**

A single channelisation code may carry one or multiple signature sequences. Each signature sequence conveys a HARQ acknowledgement indicator. A maximum of one indicator may be transmitted to a UE. Each acknowledgement indicator is coded to form a signature sequence of 240 bits ($b_0$, $b_1$, … , $b_{239}$) as defined in [7] and is transmitted within a single E-HICH timeslot. The E-HICH also contains *U* spare bit locations, where *U=4* for burst type 1 and *U=36* for burst type 2. The spare bit values are not defined.

### 5B.4.15.1 E-HICH Spreading

Signature sequences (including spare bits inserted) that share the same channelisation code are combined and spread using spreading factor SF=32 as described in [8].

### 5B.4.15.2 E-HICH Burst Types

Burst types 1 and 2 as described in subclause 5B.3.2 can be used for E-HICH. Neither TFCI nor TPC shall be transmitted on the E-HICH.

### 5B.4.15.3 E-HICH Training Sequences

The training sequences as described in subclause 5B.3.3 are used for the E-HICH.

## 5B.5 Transmit Diversity for DL Physical Channels

Support for transmit diversity is the same as that for the 3.84 Mcps TDD option cf. [5.4 Transmit Diversity]..

## 5B.6 Beacon characteristics of physical channels

For the purpose of measurements, common physical channels that are allocated to 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, the only exception is when idle periods are used to support time difference measurements for location services [9]. Then it may be possible that the beacon channels occur in the same frame and time slot as the idle periods. In this case, the beacon channels will not be transmitted in that particular frame and time slot.

### 5B.6.1 Location of beacon channels

The beacon locations are determined by the SCH and depend on the SCH allocation case, see subclause 5B.4.4:

Case 1) The beacon function shall be provided by the physical channels that are allocated to channelisation code $C_{Q=32}^{(k=1)}$ and to TS#k, k=0,…,14.

Case 2) The beacon function shall be provided by the physical channels that are allocated to channelisation code $C_{Q=32}^{(k=1)}$ and to TS#k and TS#k+8, k=0,…,6.

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

### 5B.6.2 Physical characteristics of beacon channels

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

- are transmitted with reference power;
- are transmitted without beamforming;
- use burst type 1 or burst type 4 when MBSFN is applied to beacon channels;
- 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.

Note that in the time slot where the P-CCPCH is transmitted only the midambles $m^{(1)}$ to $m^{(8)}$ shall be used, see 5B.7.1. Thus, midambles $m^{(9)}$ and $m^{(10)}$ are always left unused in this time slot.

Note that when MBSFN is applied to beacon channels there is a single midamble and hence midamble $m^{(1)}$ is exclusively used in the timeslot.

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

- If SCTD antenna diversity is not applied to beacon channels all the reference power of any beacon channel is allocated to $m^{(1)}$.
- If SCTD antenna diversity is applied to beacon channels, for any beacon channel midambles $m^{(1)}$ and $m^{(2)}$ are each allocated half of the reference power.

## 5B.7 Midamble Allocation for Physical Channels

Midamble allocation for physical channels is identical to 3.84Mcps TDD [section 5.6]. The association between midambles and channelisation codes is given in Annex AB.3.

## 5B.8 Midamble Transmit Power

There shall be no offset between the sum of the powers allocated to all midambles in a timeslot and the sum of the powers allocated to the data symbol fields. The transmit power within a timeslot is hence constant.

The midamble transmit power of beacon channels is equal to the reference power. If SCTD is used for beacon channels, the reference power is equally divided between the midambles $m^{(1)}$ and $m^{(2)}$.

The midamble transmit power of all other physical channels depends on the midamble allocation scheme used. The following rules apply

- In case of Default Midamble Allocation, every midamble is transmitted with the same power as the associated codes.

- In case of Common Midamble Allocation in the downlink, the transmit power of this common midamble is such that there is no power offset between the data parts and the midamble part of the overall transmit signal within one time slot.

- In case of UE Specific Midamble Allocation, the transmit power of the UE specific midamble is such that there is no power offset between the data parts and the midamble part of every user within one time slot.

The following figure 18AQ depicts the midamble powers for the different channel types and midamble allocation schemes.

Note 1: In figure 18AQ, the codes c(1) to c(32) represent the set of usable codes and not the set of used codes.

Note 2: The common midamble allocation and the midamble allocation by higher layers are not applicable in those beacon time slots, in which the P-CCPCH is located, see section 5B.7.

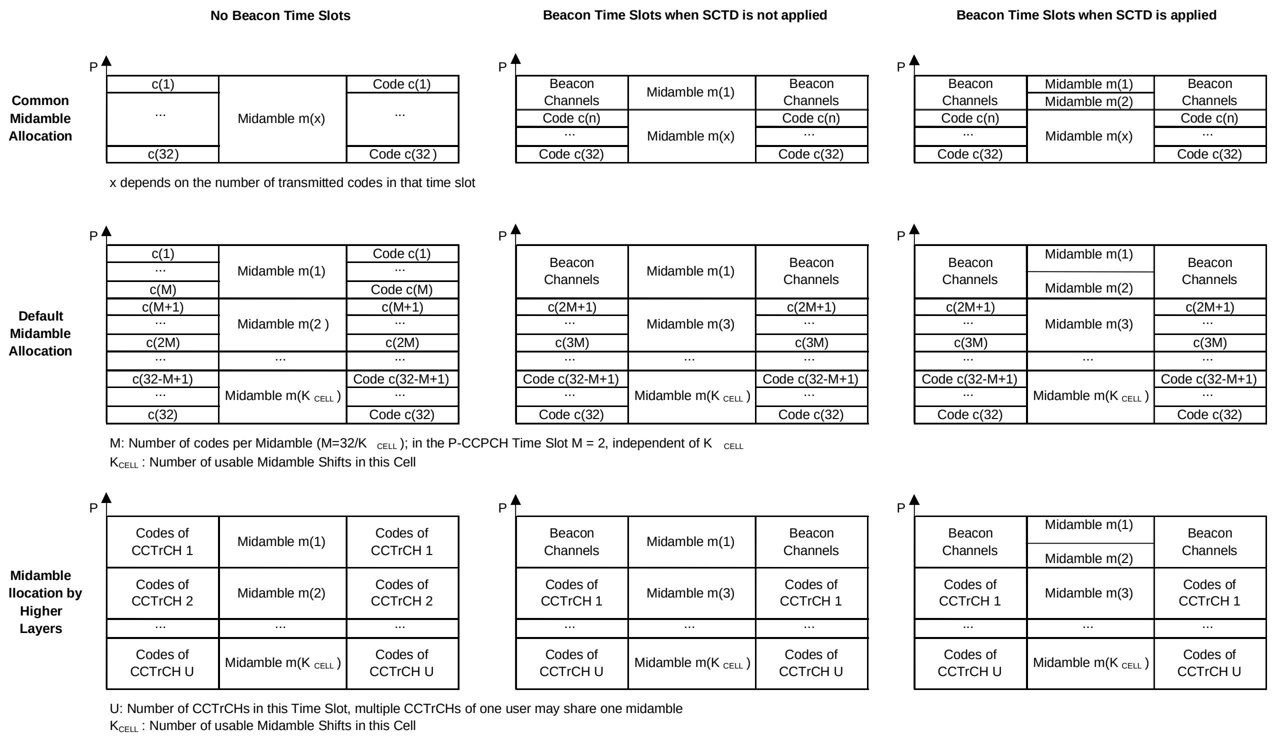



**Figure 18AQ: Midamble powers for the different midamble allocation schemes**

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

This clause describes the way in which transport channels are mapped onto physical resources, see figure 19.

| Transport Channels | Physical Channels |
|---|---|
| DCH | Dedicated Physical Channel (DPCH) |
| BCH | Primary Common Control Physical Channel (P-CCPCH) |
| FACH<br>PCH | Secondary Common Control Physical Channel (S-CCPCH) |
| RACH | Physical Random Access Channel (PRACH) |
| USCH | Physical Uplink Shared Channel (PUSCH) |
| DSCH | Physical Downlink Shared Channel (PDSCH) |
| | Paging Indicator Channel (PICH) |
| | MBMS Indication Channel (MICH) |
| | Synchronisation Channel (SCH) |
| | Physical Node B Synchronisation Channel (PNBSCH) |
| HS-DSCH | High Speed Physical Downlink Shared Channel (HS-PDSCH) |
| | Shared Control Channel for HS-DSCH (HS-SCCH) |
| | Shared Information Channel for HS-DSCH (HS-SICH) |
| E-DCH | E-DCH Physical Uplink Channel (E-PUCH) |
| | E-DCH Random Access Uplink Control Channel (E-RUCCH) |
| | E-DCH Absolute Grant Channel (E-AGCH) |
| | E-DCH Hybrid ARQ Indicator Channel (E-HICH) |

**Figure 19: Transport channel to physical channel mapping**

## 6.1 Dedicated Transport Channels

### 6.1.1 The Dedicated Channel (DCH)

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").

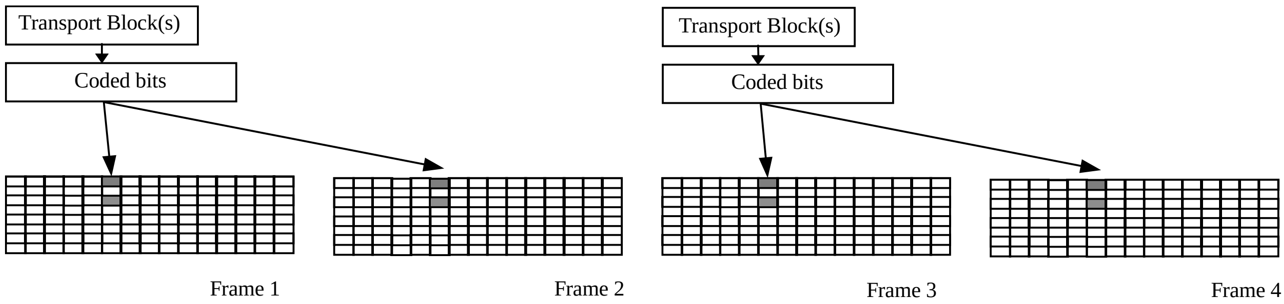



**Figure 20: Mapping of Transport Blocks onto the physical bearer**

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

## 6.1.2 The Enhanced Uplink Dedicated Channel (E-DCH)

The enhanced uplink dedicated channel is mapped on one or several E-PUCH, see subclause 5.3.13.

### 6.1.2.1 E-DCH/E-AGCH Association and Timing

The E-DCH is always associated with a number of E-DCH Absolute Grant Channels (E-AGCH) and one hybrid ARQ indicator channel (E-HICH). A grant of E-DCH transmission resources may be transmitted to the UE on any one of the associated E-AGCH. All relevant Layer 1 control information related to an E-DCH TTI is transmitted in the associated E-AGCH and E-HICH.

The E-DCH related time slot information that is carried on the E-AGCH refers to the next valid E-PUCH allocation, which is given by the following limitation: There shall be an offset of $n_{E\text{-}AGCH} \geq 6$ time slots between the E-AGCH carrying the E-DCH related information and the first indicated E-PUCH (in time) for a given UE. The E-DCH related time slot information shall not refer to two subsequent radio frames but shall always refer to either the same or the following radio frame, as illustrated in figure 20a. Note that the figure only shows the E-AGCH that carries the E-DCH related information for the given UE.

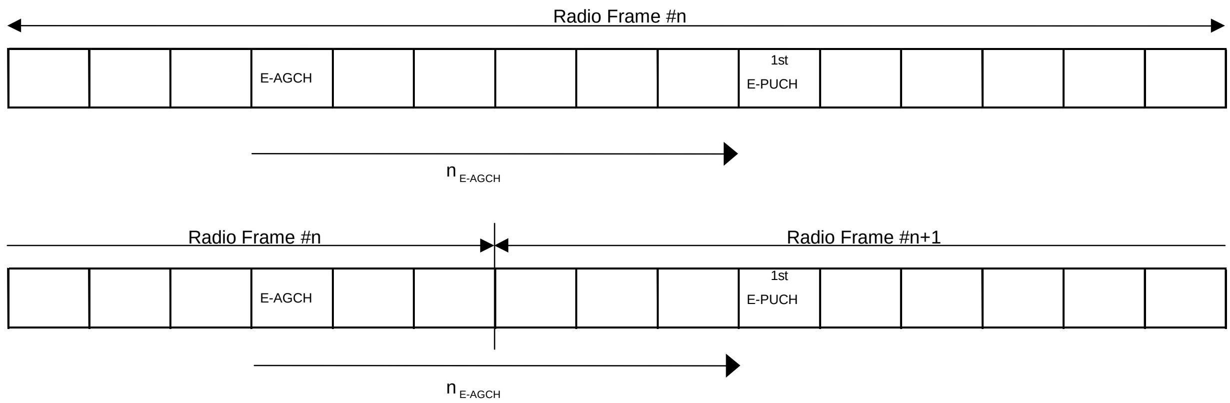



**Figure 20a: Timing for E-AGCH and E-DCH for different radio frame configurations for a given UE**

### 6.1.2.2 E-DCH/E-HICH Association and Timing

All E-DCH operations within the cell are associated with the same E-HICH channelisation code. A single E-HICH channelisation code exists in the cell per E-DCH TTI (10ms). For a given UE, a HARQ acknowledgement indicator is synchronously linked with the E-DCH TTI transmission to which it relates. There is thus a one-to-one association between an E-DCH TTI transmission and its respective HARQ acknowledgment indicator on the associated E-HICH.

The associated E-HICH shall reside on the first instance of the E-HICH channelisation code to occur after $n_{E\text{-}HICH}$ timeslots have elapsed since the start of the last E-PUCH of the corresponding E-DCH TTI (see examples of figure 20b). The value of $n_{E\text{-}HICH}$ is configurable by higher layers within the range 4 to 44 timeslots.

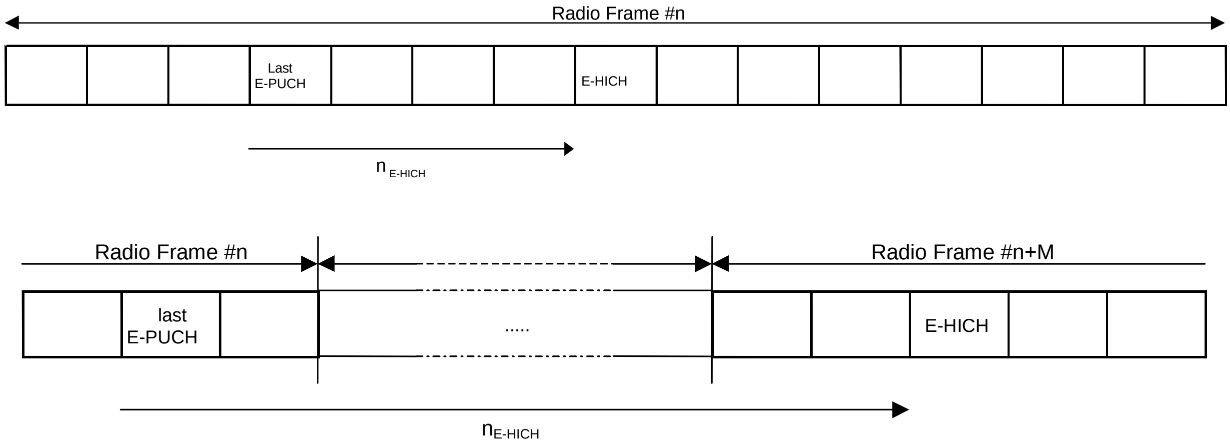



**Figure 20b: Timing for E-DCH and E-HICH for a given UE**

The HARQ acknowledgement indicator associated with an E-DCH transmission is transmitted using one of 240 signature sequences carried by the associated E-HICH channelisation code. Which signature sequence $r = 0, 1, 2,\ldots 239$ is used is calculated for each E-DCH resource allocation using the information signalled on the associated E-AGCH as follows:

$$r = 16(t_0 - 1) + (q_0 - 1)\frac{16}{Q_0}$$

- where:

  - $t_0$ is the bit position ($1\ldots n_{TRRI}$) of the first active timeslot in the timeslot resource related information bitmap (see [7]) on E-AGCH and where bit position 1 corresponds to the lowest-numbered timeslot
  - $q_0$ is the allocated channelisation code index ($1,2,3,\ldots Q_0$)
  - $Q_0$ is the spreading factor of the allocated uplink channelisation code

# 6.2 Common Transport Channels

## 6.2.1 The Broadcast Channel (BCH)

The BCH is mapped onto the P-CCPCH. The secondary SCH codes indicate in which timeslot a mobile can find the P-CCPCH containing BCH.

## 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 21, a paging block consists of one PICH block and one PCH block. If a paging indicator in a certain PICH block is set to '1' it is an indication that UEs associated with this paging indicator 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.

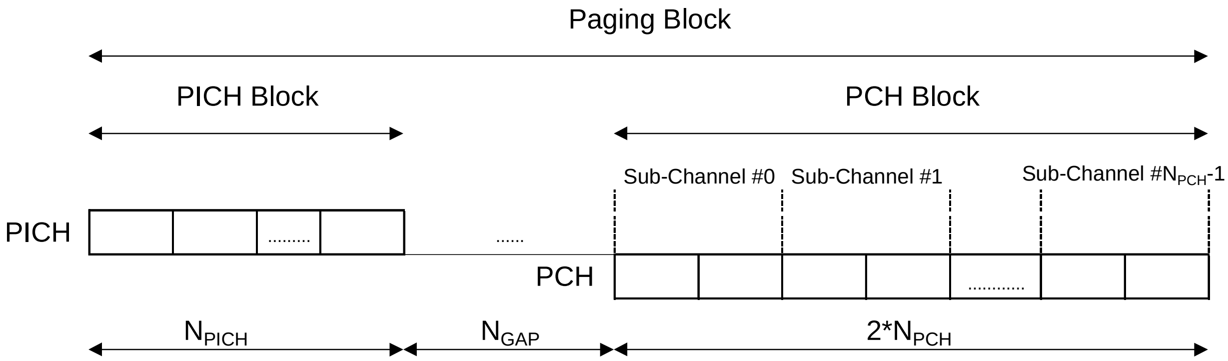



**Figure 21: Paging Sub-Channels and Association of PICH and PCH blocks**

### 6.2.3 The Forward Channel (FACH)

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

### 6.2.4 The Random Access Channel (RACH)

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

### 6.2.5 The Uplink Shared Channel (USCH)

The uplink shared channel is mapped on one or several PUSCH, see subclause 5.3.5.

### 6.2.6 The Downlink Shared Channel (DSCH)

The downlink shared channel is mapped on one or several PDSCH, see subclause 5.3.6.

### 6.2.7 The High Speed Downlink Shared Channel (HS-DSCH)

The high speed downlink shared channel is mapped on one or several HS-PDSCH, see subclause 5.3.9.

#### 6.2.7.1 HS-DSCH/HS-SCCH Association and Timing

The HS-DSCH is always associated with a number of High Speed Shared Control Channels (HS-SCCH). The number of HS-SCCHs that are associated with an HS-DSCH for one UE can range from a minimum of one HS-SCCH (M=1) to a maximum of four HS-SCCH (M=4). All relevant Layer 1 control information is transmitted in the associated HS-SCCH i.e. the HS-PDSCH does not carry any Layer 1 control information.

The HS-DSCH related time slot information that is carried on the HS-SCCH refers to the next valid HS-PDSCH allocation, which is given by the following limitation: There shall be an offset of $n_{HS\text{-}SCCH} \geq 4$ time slots between the HS-SCCH carrying the HS-DSCH related information and the first indicated HS-PDSCH (in time) for a given UE. The HS-DSCH related time slot information shall not refer to two subsequent radio frames but shall always refer to either the same or the following radio frame, as illustrated in figure 21A. Note that the figure only shows the HS-SCCH that carries the HS-DSCH related information for the given UE.

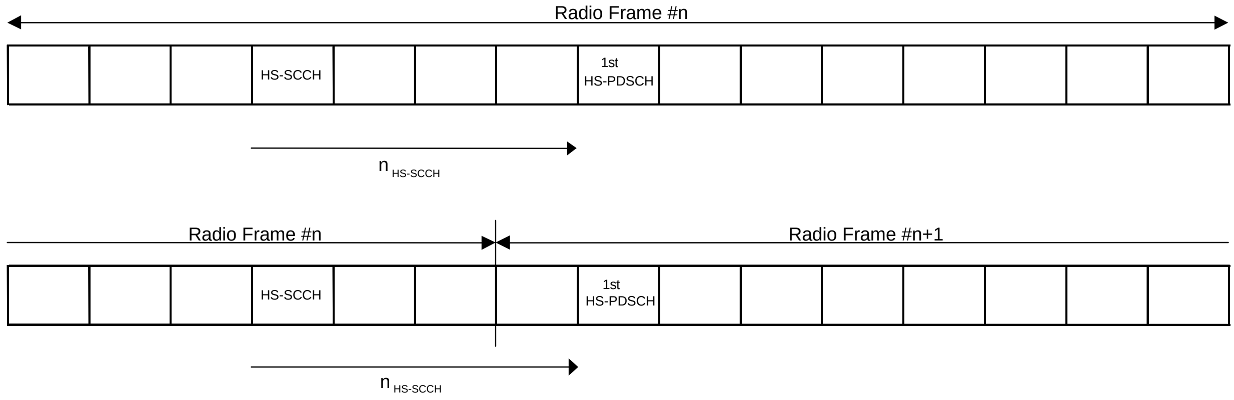



**Figure 21A: Timing for HS-SCCH and HS-DSCH for different radio frame configurations for a given UE**

## 6.2.7.2 HS-SCCH/HS-DSCH/HS-SICH Association and Timing

The HS-SCCH is always associated with one HS-SICH. The association between the HS-SCCH in DL and HS-SICH in UL shall be pre-defined by higher layers and is common for all UEs.

The UE shall transmit the HS-DSCH related ACK / NACK on the next available associated HS-SICH with the following limitation: There shall be an offset of $n_{HS\text{-}SICH} \geq 17$ time slots between the last allocated HS-PDSCH (in time) and the HS-SICH for the given UE. Hence, the HS-SICH transmission shall be made in the next or next but one radio frame, following the HS-DSCH transmission, as illustrated in figure 21B. Note that the figure only shows the HS-SICH that carries the HS-DSCH related ACK / NACK for the given UE.

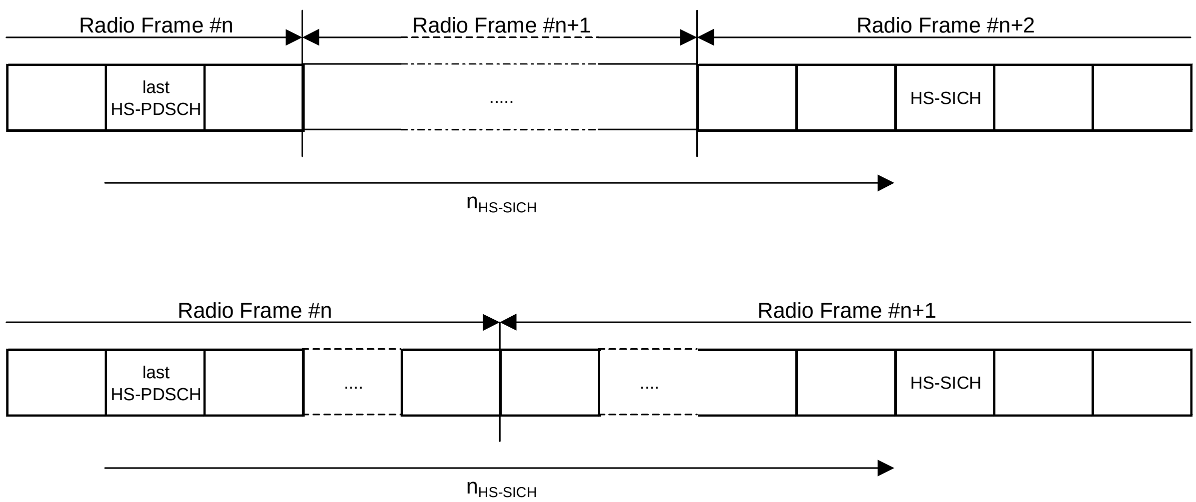



**Figure 21B: Timing for HS-DSCH and HS-SICH for different radio frame configurations for a given UE**

# 7 Mapping of transport channels to physical channels for the 1.28 Mcps option

This clause describes the way in which the transport channels are mapped onto physical resources, see figure 22.

| 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 |
| | MICH |
| | PLCCH |
| 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 |
| HS-DSCH | High Speed Physical Downlink Shared Channel (HS-PDSCH) |
| | Shared Control Channel for HS-DSCH (HS-SCCH) |
| | Shared Information Channel for HS-DSCH (HS-SICH) |
| E-DCH | E-DCH Physical Uplink Channel (E-PUCH) |
| | E-DCH Random Access Uplink Control Channel (E-RUCCH) |
| | E-DCH Absolute Grant Channel (E-AGCH) |
| | E-DCH Hybrid ARQ Indicator Channel (E-HICH) |

**Figure 22: Transport channel to physical channel mapping for 1.28Mcps TDD**

## 7.1 Dedicated Transport Channels

### 7.1.1 The Dedicated Channel (DCH)

The mapping of transport blocks to physical bearers is in principle the same as in 3.84 Mcps TDD but due to the subframe structure the coded bits are mapped onto each of the subframes within the given TTI.

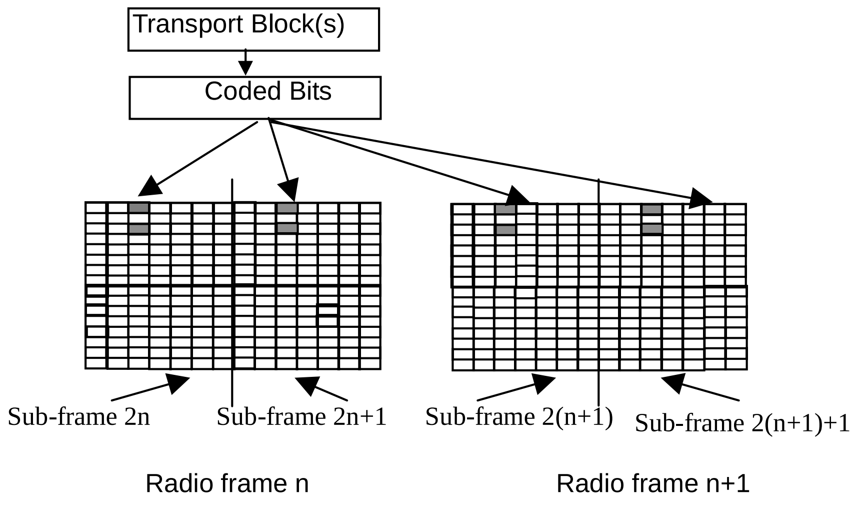



**Figure 23 : Mapping of Transport Blocks onto the physical bearer ( TTI= 20ms )**

### 7.1.2 The Enhanced Uplink Dedicated Channel (E-DCH)

The enhanced uplink dedicated channel is mapped on one or several E-PUCH, see subclause 5A.3.14.

#### 7.1.2.1 E-DCH/E-AGCH Association and Timing

The E-DCH is always associated with a number of E-DCH Absolute Grant Channels (E-AGCH) and up to four hybrid ARQ Indicator Channel (E-HICH). A grant of E-DCH transmission resources may be transmitted to the UE on any one of the associated E-AGCH. All relevant Layer 1 control information related to an E-DCH TTI is transmitted in the associated E-AGCH and E-HICH.

The E-DCH related timeslot information that is carried on the E-AGCH refers to the next valid E-PUCH allocation, which is given by the following limitation: There shall be an offset of $n_{E\text{-}AGCH} \geq 6$ time slots between the E-AGCH carrying the E-DCH related information and the first indicated E-PUCH (in time) for a given UE. DwPTS and UpPTS shall not be taken into account in this limitation as illustrated in figure 23A. Note that the figure only shows the E-AGCH that carries the E-DCH related information for the given UE and that DwPTS and UpPTS are not considered in this figure.

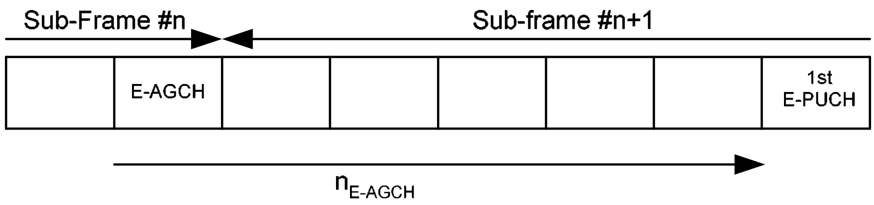



**Figure 23A: Timing for E-AGCH and E-PUCH for different radio frame configurations for a given UE**

#### 7.1.2.2 E-DCH/E-HICH Association and Timing

For a given UE, a HARQ acknowledgement indicator (E-HICH) is synchronously linked with the E-DCH TTI transmission to which it relates.

The associated E-HICH shall reside on the first E-HICH instance of the E-HICH channelisation code to occur after $n_{E\text{-}HICH}$ timeslots have elapsed since the start of the last E-PUCH of the corresponding E-DCH TTI (see examples of figure 23B). DwPTS and UpPTS are not considered in the figure. The value of $n_{E\text{-}HICH}$ is configurable by higher layers within the range 4 to 15 timeslots. DwPTS and UpPTS shall not be taken into account in this limitation.

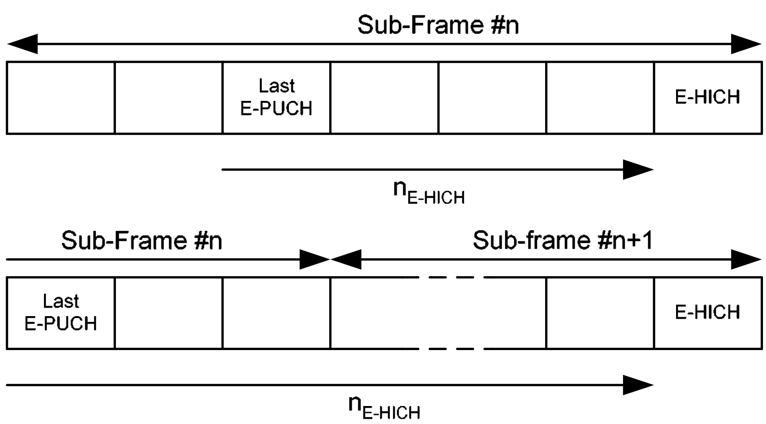



**Figure 23B: Timing for E-DCH and E-HICH for a given UE**

## 7.2 Common Transport Channels

### 7.2.1 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 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 P-CCPCH in the multi-frame and the start position of the interleaving period.

### 7.2.2 The Paging Channel (PCH)

The mapping of Paging Channels onto S-CCPCHs and the association between PCHs and Paging Indicator Channels is the same as in the 3.84 Mcps TDD option, cf. 6.2.2 'The paging Channel' and 6.2.2.1 'PCH/PICH Association' respectively.

### 7.2.3 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.

### 7.2.4 The Random Access Channel (RACH)

The RACH 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 on the BCH. On the PRACH, both power control and uplink synchronisation control are used.

### 7.2.5 The Uplink Shared Channel (USCH)

The uplink shared channel is mapped onto one or several PUSCH, see subclause 5A.3.6 ‘Physical Uplink Shared Channel (PUSCH)’

### 7.2.6 The Downlink Shared Channel (DSCH)

The downlink shared channel is mapped onto one or several PDSCH, see subclause 5A.3.7 ‘Physical Downlink Shared Channel (PDSCH)’

### 7.2.7 The High Speed Downlink Shared Channel (HS-DSCH)

The high speed downlink shared channel is mapped on one or several HS-PDSCH, see subclause 5A.3.9.

#### 7.2.7.1 HS-DSCH/HS-SCCH Association and Timing

The HS-DSCH is always associated with one DL DPCH and a number of High Speed Shared Control Channels (HS-SCCH). The number of HS-SCCHs that are associated with an HS-DSCH for one UE can range from a minimum of one HS-SCCH (M=1) to a maximum of four HS-SCCH (M=4). All relevant Layer 1 control information is transmitted in the associated HS-SCCH i.e. the HS-PDSCH does not carry any Layer 1 control information.

The HS-DSCH related time slot information that is carried on the HS-SCCH refers to the next valid HS-PDSCH allocation, which is given by the following limitation: There shall be an offset of $n_{HS\text{-}SCCH} \geq 3$ time slots between the HS-SCCH carrying the HS-DSCH related information and the first indicated HS-PDSCH (in time) for a given UE. DwPTS and UpPTS shall not be taken into account in this limitation. The HS-DSCH related time slot information shall not refer to two subsequent sub-frames but shall always refer to either the same or the following sub-frame, as illustrated in figure 24. Note that the figure only shows the HS-SCCH that carries the HS-DSCH related information for the given UE and that DwPTS and UpPTS are not considered in this figure.

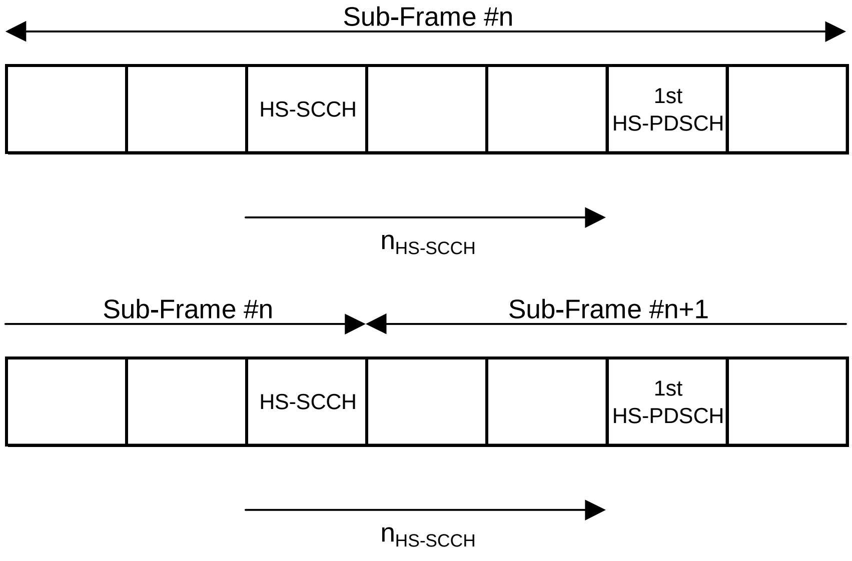



**Figure 24: Timing for HS-SCCH and HS-DSCH for different radio frame configurations for a given UE**

### 7.2.7.2 HS-SCCH/HS-DSCH/HS-SICH Association and Timing

The HS-SCCH is always associated with one HS-SICH, carrying the ACK/NACK and Channel Quality information (CQI). The association between the HS-SCCH in DL and HS-SICH in UL shall be pre-defined by higher layers and is common for all UEs.

The UE shall transmit the HS-DSCH related ACK / NACK on the next available associated HS-SICH with the following limitation: There shall be an offset of $n_{HS-SICH} \geq 9$ time slots between the last allocated HS-PDSCH (in time) and the HS-SICH for the given UE. DwPTS and UpPTS shall not be taken into account in this limitation. Hence, the HS-SICH transmission shall always be made in the next but one sub-frame, following the HS-DSCH transmission, as illustrated in figure 25. Note that the figure only shows the HS-SICH that carries the HS-DSCH related ACK / NACK for the given UE and that DwPTS and UpPTS are not considered in this figure.

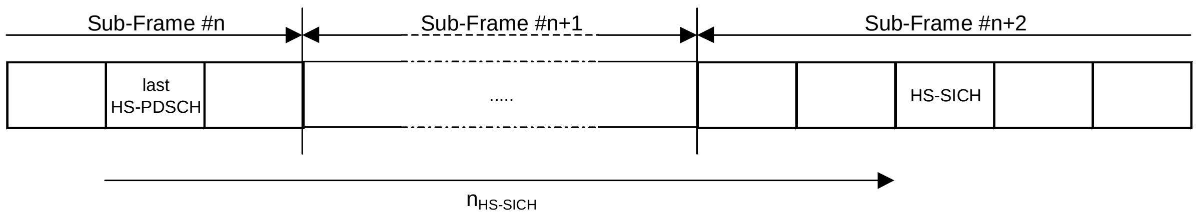



**Figure 25: Timing for HS-DSCH and HS-SICH for different radio frame configurations for a given UE**

# 8 Mapping of transport channels to physical channels for the 7.68 Mcps option

This clause describes the way in which transport channels are mapped onto physical resources, see figure 26.

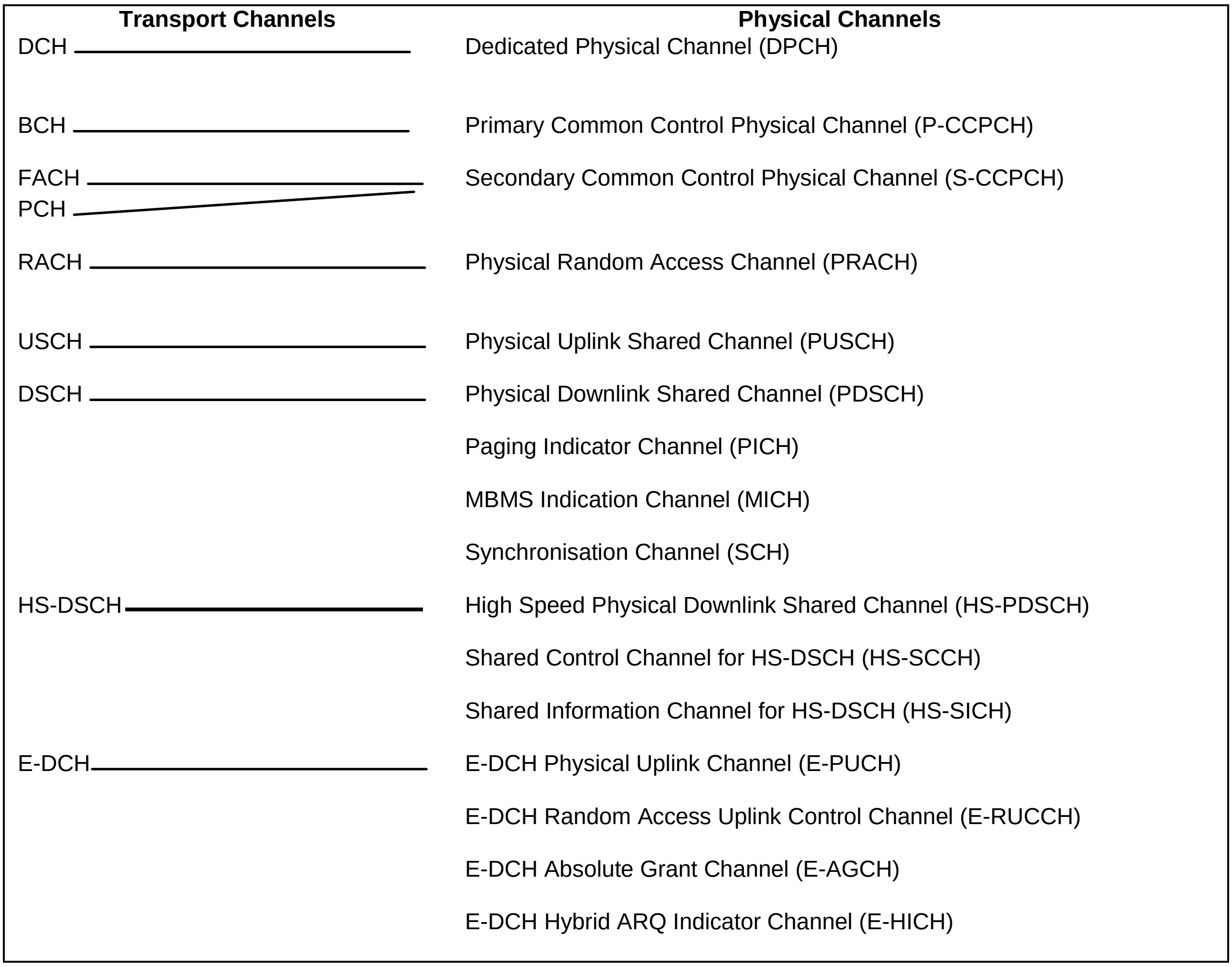



**Figure 26: Transport channel to physical channel mapping**

## 8.1 Dedicated Transport Channels

### 8.1.1 The Dedicated Channel (DCH)

Mapping of dedicated transport channels to physical channels is identical to 3.84Mcps TDD cf. [6.1 Dedicated Transport Channels].

### 8.1.2 The Enhanced Uplink Dedicated Channel (E-DCH)

The enhanced uplink dedicated channel is mapped on one or several E-PUCH, see subclause 5B.4.12.

#### 8.1.2.1 E-DCH/E-AGCH Association and Timing

The E-DCH is always associated with a number of E-DCH Absolute Grant Channels (E-AGCH) and with one or two hybrid ARQ indicator channels (E-HICH). A grant of E-DCH transmission resources may be transmitted to the UE on any one of the associated E-AGCH. All relevant Layer 1 control information related to an E-DCH TTI is transmitted in the associated E-AGCH and one of the E-HICHs.

The E-DCH related time slot information that is carried on the E-AGCH refers to the next valid E-PUCH allocation, which is given by the following limitation: There shall be an offset of $n_{E\text{-}AGCH} \geq 6$ time slots between the E-AGCH carrying the E-DCH related information and the first indicated E-PUCH (in time) for a given UE. The E-DCH related time slot information shall not refer to two subsequent radio frames but shall always refer to either the same or the following radio frame, as illustrated in figure 27. Note that the figure only shows the E-AGCH that carries the E-DCH related information for the given UE.

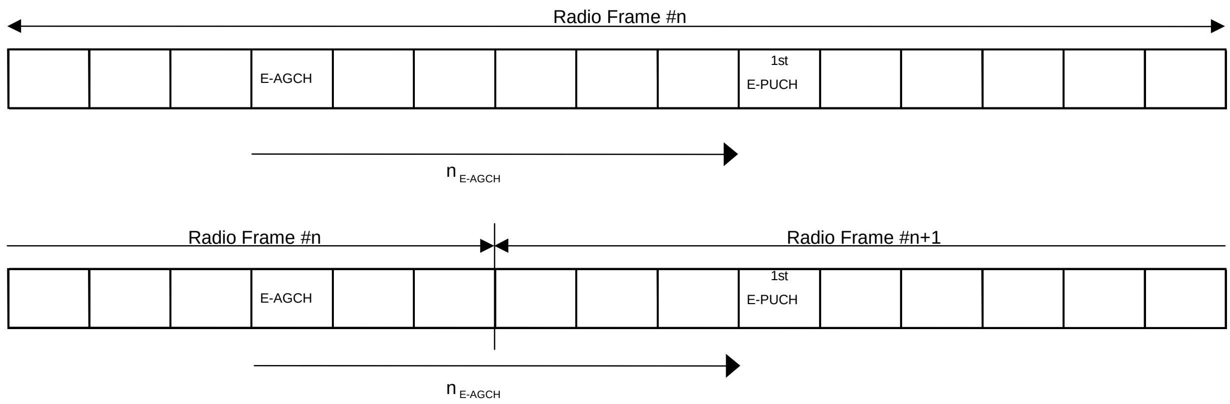



**Figure 27: Timing for E-AGCH and E-DCH for different radio frame configurations for a given UE**

### 8.1.2.2 E-DCH/E-HICH Association and Timing

E-DCH operations within the cell are associated with one or two channelisation codes carrying E-HICH ($E\text{-}HICH_1$ and $E\text{-}HICH_2$). If the number of timeslots configured for E-DCH use is 7 or more (this corresponds to the length of the timeslot resource related information field on E-AGCH – see [7]), both $E\text{-}HICH_1$ and $E\text{-}HICH_2$ channelisation codes shall be configured by higher layers, otherwise only the channelisation code $E\text{-}HICH_1$ is configured.

A single instance of $E\text{-}HICH_1$ (and $E\text{-}HICH_2$ if configured) channelisation codes exist in the cell per E-DCH TTI (10ms). For a given UE, a HARQ acknowledgement indicator is synchronously linked with the E-DCH TTI transmission to which it relates. There is thus a one-to-one association between an E-DCH TTI transmission and its respective HARQ acknowledgment indicator on one of the associated E-HICHs.

For each channelisation code carrying E-HICH, the associated instance shall be the first instance of that channelisation code to occur after $n_{E\text{-}HICH}$ timeslots have elapsed since the start of the last E-PUCH of the corresponding E-DCH TTI (see examples of figure 28). The value of $n_{E\text{-}HICH}$ is configurable by higher layers within the range 4 to 44 timeslots.

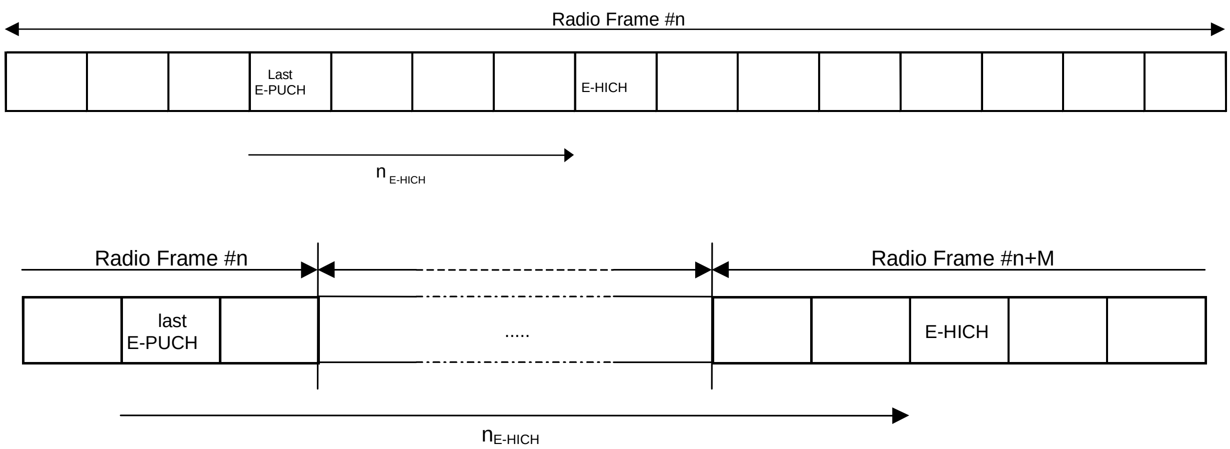


**Figure 28: Timing for E-DCH and E-HICH for a given UE**

The HARQ acknowledgement indicator associated with an E-DCH transmission is transmitted using one of 240 signature sequences carried by one of the associated E-HICH channelisation codes. Which signature sequence *r = 0, 1, 2,…239* and (in the case that two channelisation codes are configured for E-HICH) which channelisation code is used are calculated for each E-DCH resource allocation using the following information signalled on the associated E_AGCH:

- $t_0$ is the bit position ($1 \ldots n_{TRRI}$) of the first active timeslot in the timeslot resource related information bitmap (see [7]) on E-AGCH and where bit position 1 corresponds to the lowest-numbered timeslot
- $q_0$ is the allocated channelisation code index ($1,2,3,\ldots Q_0$)
- $Q_0$ is the spreading factor of the allocated uplink channelisation code

The value *r'* is first calculated as:

$$r' = 32(t_0 - 1) + (q_0 - 1)\frac{32}{Q_0}$$

Then:

- if $r' \leq 239$, $r = r'$ and channelisation code E-HICH$_1$ is used
- if $r' > 239$, $r = (r'-240)$ and channelisation code E-HICH$_2$ is used.

# 8.2 Common Transport Channels

## 8.2.1 The Broadcast Channel (BCH)

The mapping of the broadcast channel (BCH) to physical channels is identical to 3.84Mcps TDD cf. [6.2.1 The Broadcast Channel (BCH)].

## 8.2.2 The Paging Channel (PCH)

The mapping of the paging channel (PCH) to physical channels is identical to 3.84Mcps TDD cf. [6.2.2 The Paging Channel (PCH)].

## 8.2.3 The Forward Channel (FACH)

The mapping of the forward access channel (FACH) to physical channels is identical to 3.84Mcps TDD cf. [6.2.3 The Forward Access Channel (FACH)].

## 8.2.4 The Random Access Channel (RACH)

The mapping of the random access channel (RACH) to physical channels is identical to 3.84Mcps TDD cf. [6.2.4 The Random Access Channel (RACH)].

## 8.2.5 The Uplink Shared Channel (USCH)

The mapping of the uplink shared channel (USCH) to physical channels is identical to 3.84Mcps TDD cf. [6.2.5 The Uplink Shared Channel (USCH)].

### 8.2.6 The Downlink Shared Channel (DSCH)

The mapping of the downlink shared channel (DSCH) to physical channels is identical to 3.84Mcps TDD cf. [6.2.6 The Downlink Shared Channel (DSCH)].

### 8.2.7 The High Speed Downlink Shared Channel (HS-DSCH)

The high speed downlink shared channel is mapped on one or several HS-PDSCH, see subclause 5B.4.8.

#### 8.2.7.1 HS-DSCH/HS-SCCH Association and Timing

The HS-DSCH/HS-SCCH association and timing is identical to 3.84Mcps TDD cf. [section 6.2.7.1 HS-DSCH/HS-SCCH Association and Timing] with the exception that the number of HS-SCCHs that are associated with an HS-DSCH for one UE can range from a minimum of one HS-SCCH (M=1) to a maximum of eight HS-SCCH (M=8).

#### 8.2.7.2 HS-SCCH/HS-DSCH/HS-SICH Association and Timing

The HS-SCCH/HS-DSCH/HS-SICH association and timing is identical to 3.84Mcps TDD cf. [6.2.7.2 HS-SCCH/HS-DSCH/HS-SICH Association and Timing].

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

## A.1 Basic Midamble Codes for Burst Type 1 and 3

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

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

Depending on the possible delay spread timeslots are configured to use $K_{Cell}$ 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.

In the beacon slot #k, where the P-CCPCH is located, the number of midambles $K_{Cell}$=8 (cf section 5.6.1). In all of the other timeslots that use burst type 1 or 3, $K_{Cell}$ is individually configured from higher layers.

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 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 |
|---|---|
| $m_{PL0}$ | 8DF65B01E4650910A4BF89992E48F43860B07FE55FA0028E454EDCD1F0A09A6F029668F55427<br>253FB8A71E5EF2EF360E539C489584413C6DC4 |
| $m_{PL1}$ | 4C63F9BC3FD7B655D5401653BE75E1018DC26D271AADA1CF13FD348386759506270F2F953E9<br>3A44468E0A76605EAE8526225903B1201077602 |
| $m_{PL2}$ | 8522611FFCAEB55A5F07D966036C852E7B15B893B3ABA9672C327380283D168564B8E1200F0E<br>2205AF1BB23A58679899785CFA2A6C131CFDC4 |
| $m_{PL3}$ | F58107E6B777C221999BDE9340E192DC6C31AB8AE85E70AA9BBEB39727435412A5A27C0EF7<br>3AB453ED0D28E5B032B94306EC1304736C91E922 |
| $m_{PL4}$ | 89670985013DFD2223164B68A63BD58C7867E97316742D3ABD6CBDA4FC4E08C0B0CBE44451<br>575C72F887507956BD1F27C466681800B4B016EE |
| $m_{PL5}$ | FCDEF63500D6745CDB962594AF171740241E982E9210FC238C4DD85541F08C1A010F7B3161A<br>7F4DF19BAD916FD308AB1CED2A32538C184E92C |
| $m_{PL6}$ | DB04CE77A5BA7C0E09B6D3551072B11A7A43B6A355C1D6FDCF725D587874999895748DD098<br>32ABC35CEC3008338249612E6FE5005E13B03103 |
| $m_{PL7}$ | D2F61A622D0BA9E448CD29587D398EF8CDC3B6582B6CDD50E9E20BF5FE2B3258041E14D608<br>21DC6725132C22D787CD5D497780D4241E3B420D |
| $m_{PL8}$ | 7318524E62D806FA149ECC5435058A2B74111524B84727FE9A7923B4A1F0D8FCD89208F34BE<br>E5CADEB90130F9954BB30605A98C11045FF173D |
| $m_{PL9}$ | 8E832B4FA1A11E0BF318E84F54725C8052E0D099EF0AF54BC342BEE44976C9F38DE701623C7<br>BF6474DF90D2E2222A4915C8080E7CD3EC84DAC |
| $m_{PL10}$ | CFA5BAC90780876C417933C43103B55699A8AD51164E590AF9DA6AF0C18804E1F74862F00CE<br>7ECC899C85B6ABB0CAD5E50836AD7A39878FE2F |
| $m_{PL11}$ | AD539094A19858A75458F1B98E286A4F7DC3A117083D04724CBE83F34102817C5531329CDB43<br>7FFF712241B644BDF0C1FEC8598A63C2F21BD7 |
| $m_{PL12}$ | BEB8483139529BDE23E42DA6AB8170DD0BFBB30CE28A4502FAF3C8EDA219B9A6D5B849D9C<br>9E4451F74E2408EA046061201E0C1D69CF48F3A94 |
| $m_{PL13}$ | C482462CA7846266060D21688BA00B72E1EC84A3D5B7194C8DA39E21A3CE12BF512C8AAB6A<br>7079F73C0D3E4F40AC555A4BCC453F1DFE3F6C82 |

| Code ID | Basic Midamble Codes $m_{PL}$ of length *P*=456 |
|---|---|
| $m_{PL14}$ | 9663373935FD5C213AC58C0670206683D579D2526C05B0A81030DDF61A221D8A68EAD8D6F7A<br>A0D662C07C6DCD0115A54D39F03F7122B0675AC |
| $m_{PL15}$ | 387397AE5CD3F2B3912C26B8F87CE82CEFEC55507DB08FB0C4CF2FD6858896201ACA726428<br>1D0298440DD3481E5E9DDB24C16F30EB7A22948A |
| $m_{PL16}$ | AFE9266843C892571B6230D808788C63B9065EA3BDFF687B92B8734A8D7099559FEA22C94165<br>76D0C087EB4503E87E356471B330182A24A3E6 |
| $m_{PL17}$ | 6E6C550A4CB74010F6C3E0328651DF421C456D9A5E8AE9D3946C10189D72B579184552EE3E7<br>99970969C870FE8A37B6C4BA890992103486DC0 |
| $m_{PL18}$ | D803CA71B6F99CFB3105D40F4695D61EB0B62E803F79302EE3D2A6BF12EA70D304B181E8B3<br>8B3B74F5022B67EB8109808C62532688C563D4BE |
| $m_{PL19}$ | E599ED48D01772055DBE9D343A4EA5EABE643DA38F06904FC7523B08C4101F021B199AF759A<br>00D9AC298881D79413A77470992A75C771492D0 |
| $m_{PL20}$ | 9F30AC4162CE5D185953705F3D45F026F38E9B5721AEFE07370214D526A2C4B344B508B57BF<br>B2492320C05903C79CBEE08C6E7F218B57E14D6 |
| $m_{PL21}$ | B5971060DA84685B4D042ED0189FAF13C961B2EF61CC164E363B22AAB14AC8AF607906C1C6<br>E04F2054C687AA6741A9E70639857DA02B6FFFFA |
| $m_{PL22}$ | 97135FC2226C4B4A5CBA5FCA3732763B87455F73A1148006F3DF214BD4C936D061E04045160<br>E2CE33B9CD09D08FDE2A37F4E998322B4401D27 |
| $m_{PL23}$ | 4D256D57C861B9791151A78D5299C56D116B6178B2A2D04BB95FB76540AF28341DC6EC4E7E<br>D3BF9E508478D9C8F44914805DA82429E1CF320E |
| $m_{PL24}$ | 858EF5C84CE32D18D9ABA110EEA7474CF0CD70254D2928C3F4DFF6BB3A518587CADA190290<br>78AC90A8336C8178203BE3289E601F07D089CB64 |
| $m_{PL25}$ | 920A8796A511650AEF32F93DD3C39C624E07AE03CE8C96139973F54DCB9803C5164ADB502D<br>4FF561564D607037FCD172921F1982B102C3312C |
| $m_{PL26}$ | 485C5DAE76B360A9C56E20B8422EA3E6ACF07CB093B5587CB0E6A5498A4714081EA98DBCD<br>B0482B26E0D097C03444473D233BEF3C8E440DEBF |
| $m_{PL27}$ | 565A9D54EA789892B024F97E728E8EE112411942C48BD0C5BC8AA457D8DC9941F0F7424B386<br>43FFE6521CD306FBC56FE10F1428D4C245B5606 |
| $m_{PL28}$ | 5AEF2C0C2C378179A1AC36242E6B3EDB72C42D3624437674F8D51260C0898C201837CBA14E9<br>E23D1EF6451C4ACF27AB031F457A8A1BFD148AE |
| $m_{PL29}$ | 87D8FE685417822A23D925307E6C11081ADAC4702BCCD9BE448E78984D109B50DEF5B7C58B<br>C71EA1F0A6826BA8AD1978843E7697F3E416AADA |

| Code ID | Basic Midamble Codes $m_{PL}$ of length $P$=456 |
|---|---|
| $m_{PL30}$ | 84802B72AF27B5BE724D1FB629E0E627BDB0D9061292562F98350C1D0C9D4B9D8E2BF71123C82EBB161003AE9829E07244D78F19926F8847A2 |
| $m_{PL31}$ | 8CCB5128238BCB088E30972D62792AEF02B9BBDDCAD68C9916C00BF91CBE788B0F03851FAAF88605534FD73436C259D270B1013CB14226F658 |
| $m_{PL32}$ | 62F4E6FAC2BF1979CE6854AA2D33534BFB2F946519101A6589131C3640707D40E67ED804AF8736AD213CAF593574190061967E8285C27E34C |
| $m_{PL33}$ | 4095E5B4EEAFCDF68A34B267EEA28D8444FA533900F41499E260D2E65C256A52E1DD5861F5227C98E00687D107233F51A1167BCF72FB184654 |
| $m_{PL34}$ | 5630E9A79FCAD303404D9E5A802299162657AAC734761C6E90DA8BCE4F61A763E0BB48D3FEB3F78468C828ABA4828DAD06E0F904CFD40421DC |
| $m_{PL35}$ | CD12B24C0BCA8AAC1FCBF0500A3BC684A180E863D888F2506B48C68ECF17F76CB285991FBA18EB6397211FAD002F482D57A258CD45DE3FF1A6 |
| $m_{PL36}$ | AFCF2A50877286CD3405442730C45514F082D9EC296B367C0F64F04C4E0007DCA9E50BEED5C102126E319ACBC64F1729272F2F72C9397029FE |
| $m_{PL37}$ | 18F89EE8589D20882A72A44DCCDF0050F0A3D88DBA6531614973D26905FDF41E3F779FF0648E8AF1540928511BCF4C25D9C64AF34AC31B8965 |
| $m_{PL38}$ | F890D550F33F032ECDA3A51FED427D634F64EB29AF1332A23CD961258E4BAED040E7B336918E250EC272A12816B9EBFFA1E0AE401185F08C10 |
| $m_{PL39}$ | ACE5DD61506047E80FB7D41BD3992DF4D7F18EB46CC145C0E9105428C2F8F299141F5D66691904A7DC2513A3B83994ACB1292246B32818FE9D |
| $m_{PL40}$ | 150680FF900C9B46E1E24D54BE2238CB950A934E5CCDE9BC3939EB51CB0AE202B7D339EEC2018B33A0AB9B63DA5D512D64FB58C0E51A1C82C2 |
| $m_{PL41}$ | 51A579EED2663A002D32D10A0753173612F4D5BA167D1807C61F25C4D42C063682E8E9DD019F79D446A046EB3F75E50FEB228DC52F08E694B6 |
| $m_{PL42}$ | CDC644FE4C0C6897604F9D14D714123BF16FFF0E49F35F674908CA60653702FE27BCCA2A47098453AF8661055C8C549EB6A951A8396AD4B94D |
| $m_{PL43}$ | 750A10366C595373C5001CA3E4239764B1409D602CF6052B39BC6A3255A15FE06C782C4C5F847026A7E79838A2933A61C77BB6CBF5915B2DA5 |
| $m_{PL44}$ | B7490686D78E409082C4C48FE18D4C35429C20AADF96076B92FC4E85490664753DB0891A0B27FD849BB7FCA99E3B38F22F8C662852C0D35AA6 |
| $m_{PL45}$ | D86E1B575B47D23DA811806A54C231281F03317830E7BD305D3CAA7D6382A5233104CFD54D22DF9F34535E5B390D9040CF1375FEA44CEC29E2 |
| $m_{PL46}$ | 828655960C026EC67B683480992AC2ED2C43ABC606F5220C2945F373470BE7ED5BCCF7C1AA0986BBCCC84F11F1658AA568FAA0A60C5F0B5BFA |
| $m_{PL47}$ | D76230E02C8533653AAB99B288AA2ADE25A1C1BF28516C04239240EAF1EFC0B98974B51F886861D8A1E9F5D62CFFEC309F071A9716B325101B |
| $m_{PL48}$ | EA207662865B8A07D69648964DED818EE474A90B94473408871880E63EF0596B9FCFEC3C06B86EA6AD2B06C91672EFB33C70241A5450B59B8A |
| $m_{PL49}$ | 9CB5459549909835FAB22F0D99298C120ACF479F814CCE749079D40688F28101037762F125C776DA9C5FA1FCE0E76E452F8185354FDCDE94E2 |
| $m_{PL50}$ | 227506304AEC1D6F93569B51FDC3405A0F38194F65BE17163A3CB9827A35AECEA757D020FE249377ECD561428A38FEED004EC859C272563185 |
| $m_{PL51}$ | 96B9AEC9938910F0E533422A3977519B05CD4AD3909BC15A7502D48D49C124FA192A8E57027CFEB11DF542010603CE5C9FDF8E626D4FBF8CF4 |
| $m_{PL52}$ | A6AAD06E095A9BE0BD9F8A2ED40C3CBDBAE91C700CBB778C8696CC06F3A675C16BDB2918E5F2111005A8727206DC6A9684E05655185C398EEB |
| $m_{PL53}$ | CD168D384A78DA172991AD333EE2A9880905AFE59E2A2A4AC4414C40F82874F98A3CBE7B44F4C7F4710B35FD88AFC0399FAEB070EB9CA4D30A |
| $m_{PL54}$ | 22016CA87AD1549174A8699DD65599697871091457E83E0912E7E77A06531C209394D283D18A38662B73681DD9C5BF330FED978BDA7D487CA8 |
| $m_{PL55}$ | B9401B0843AA6F7827A13BD66C922287E8886C31EB5B90B82B472CCD6DA3D8D4FBF78B8F8496DFA8252B06429D5DD17142F1C908ACCD70EA0C |
| $m_{PL56}$ | E42B9EFDC5D09AC27B3C7DA28D02493A70521223B9D7A76A9D13E9C171017964D16A70C08EAD02C3DC948889C23E365AFCF01BF20B89B0BF5C |
| $m_{PL57}$ | 9DA0180168DB915E9F3597B59312198E1B5CC00D743C2ECB0DBAADA3E35A2465ED1EAA9D74734D49A313CE4DFF020D0760E3153DC485603943 |
| $m_{PL58}$ | B6C966619ECB98191D719C187C07BD503425650CAA3A2D1F2DF5212B1441D7A0C1D36A4C9C2550240AD17CA43BB3943DFFFBF1E283D81299CC |
| $m_{PL59}$ | DB0E8C41F08A03D477C1AA548799274C4BF3EB68F2636166FDC8D4B1E7132539930297E228BA232BB5C279FA5ECA3AC10E24361AF050A453B8 |
| $m_{PL60}$ | 89BCE2DE2974EEBA833CF32F224C85A2891484478527DB48FA6ECEA84C5E288CC3914CB54ADA0476278750187F68FBEA41017E1E58DF1A5A3D |
| $m_{PL61}$ | 70A457D1314A278625443EEB52520815EC92CEF17417B97440DCB531BC1CE83212F63270418D0FBDE71F6DB9E0EA88772E1E4535B6633E4425 |

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

| Code ID | Basic Midamble Codes $m_{PL}$ of length $P$=456 |
|---|---|
| $m_{PL94}$ | 00556D35649F7610AB24A43C4F16D6AC0571FD126F11880C5CD72100D730E4E4D6BB73C33F8<br>37FAF1072743B249ADA2E09598B1EB23F1180A7 |
| $m_{PL95}$ | 7A0CC9F21BD69CF3023E944545C2176EF0D4F450B765C28359FB8A32137D043D0E5713E67B3<br>F61320985D2C6106605081F87D2296321468A2F |
| $m_{PL96}$ | DA669880995B0671201172BABFF141D5854A245E211879EF3038A7C84170DADBD368455F2465<br>3161E7886E15B253F93E3A3C568EFB17CDEB1A |
| $m_{PL97}$ | 4E294E53D1661C1F6F748302A7723DA951C00FDB8BEBBF67A68710BA0F1A255DFB1627059D4<br>1A23D3961726DE6FEB10E5D209CC4505B209812 |
| $m_{PL98}$ | 73385DF701414E144768A67EF72924B1653479E962FB1554B7E54BC5284D9B3E41C0C133F878<br>97223072191 8AA425501B920B204FECE0C7F8A |
| $m_{PL99}$ | F4492160805F258CE592DF4D1200566F81D173458D78EA3ABED79A14AF88170DB1D4A9A5931<br>D2B80C58C27FE17D806E3E6A66CDAAD09F118D4 |
| $m_{PL100}$ | 44D562D9012D8B07B8F44596467C11A163982BB7EAEAC184078B6B8CE46B5D7E17C39CEF57<br>6A025491183017FA09931D070B307B86524B03FF |
| $m_{PL101}$ | FCAEEFCC49A13B4FFA12C0CC6A2B90CF4F57D78B1E98294B04675C2F0991661FDC61A452A2<br>47F8C29E0284AA21026F368307375AA2C3F1E12C |
| $m_{PL102}$ | C486DF0510DCAD5AB86E178A686D398E11A0ECFAC5A326C10129257E5456B22FB8E147E919<br>0D9929A5DFFE44715FA47D62F04CFC9B1C201414 |
| $m_{PL103}$ | C10AF383DC708E257E15A8AB337BCE684A2F4AC7A22DC2C25C277F8E8D0858E79317CDDD9<br>AA2EA6CBE604D24AC0945026103E7B4126FD361A4 |
| $m_{PL104}$ | A5C60A181148D9A931B2DDDB9D169648BA54F366B4EFAE88F6861909EE0F07C037EE349D0E<br>C59A823286E366CA3943589EEA7F828C3728085F |
| $m_{PL105}$ | 96136AEBD5E28462B0421DF292BA899FFA660D80EA01620D2C7490E5347127884AA3C3D1FF4<br>4BCEEF6C29EC589CDEF200C5742C5964F8B2B52 |
| $m_{PL106}$ | 40F63C04ACAD986255D1E16B769A6D4C11A1D075E804BDC0AC61923E9A67F5D741775632807<br>2455F6E22B1C64E06F367D1B0808295C2D90E22 |
| $m_{PL107}$ | F4B82D413578C4888C5F002CF6D0E03778134A860436551FD57537E4CED334B3C9CEBACE615<br>238271717AA762448B86FA53D2074BCE35658A7 |
| $m_{PL108}$ | BCCC92D72C920E685530591FC351743D1E23DE044BF81D32650406113E23ECC757FDE4E386<br>B6E2E7195EE4969717A7BD0812AC312B33A54308 |
| $m_{PL109}$ | 6ED59DE0D44370A861CE2B42CF5E578E764A682AB5777905EE027D7160490EDC6C28989B238<br>05AA697FCD215CB401BC5E4D430624C01B16192 |
| $m_{PL110}$ | DE80C0E273B92CC3C5034F7A20DB3914643C430B425C8B9249EAF73ACE8C3BCF17957242CF<br>534D87A67D4DC0252275262E737F4095450CFA14 |
| $m_{PL111}$ | 9505C4FEF2A397D5059F4729D013292A8321FFFA929ACB0A210D0A13E13061227C44A68FBD8<br>CE6B66CE3D783363CD039AB35EE52603E09B758 |
| $m_{PL112}$ | E8BE90D7F954B14D8002A4CAC20765ABEED80634498C836D79B0F9338DBC17B28F05CF4E79<br>136779E1C55AA30B6215F890882887B3B53C23E2 |
| $m_{PL113}$ | 9F4B622C1358AE5468DC31E4B2CA320E5E20458C1DE5405BF4F9AD7D45A5BCAA39EC0626FF<br>FC698C16A009CCCB7A18A64E85E70BA71731BA24 |
| $m_{PL114}$ | B91B2624843CF48299AFC2B1442570B41F28F578530D1E322E0B54282372131C71ACB924E707<br>68A243EEC3200E7A5EBFA77111D9FB07FEA8AE |
| $m_{PL115}$ | 965F42DDA3A4650FE2F5103932B68F166FA424B9F0F7045311D962C2A9F66B9BC6C66FB480F<br>9800354E0C54A72251071422CF1DFC44F94C00C |
| $m_{PL116}$ | 08ADCE48699FC30FA0788073BDAADB9177BBB4C1CED41F93085218364B8BAD8488561EF0FE<br>1B0DDAA403C602494CB35697D62AA0A2B93A64CF |
| $m_{PL117}$ | 9A313BED80B1220D77C8ADA4B2E0B3D284A5120A94B741380923C78D3AD32BC3E71EC6EEA<br>520E9D447D8727697598BB987F17506F482003ABD |
| $m_{PL118}$ | 24C9AD4C14EFEC002A3473FCAB04E492F2E269161A2960BA8AF09FD710B444A40C4E8B1384<br>18E62301E91FBA97AFDC58759A76D00F676736C7 |
| $m_{PL119}$ | 6514C7733711CE4942CD2123AB37186EB7FECB7E78ABB28744864942FCF4C0F810054AF55B1<br>042EB53064F0857C61D85B2CF0D2DC5826AF22F |
| $m_{PL120}$ | B2C80CDC83E48C36BC6FDAB8661208EAD392F3A0571BE41DFAD765E744932ADEA50061E66<br>C05498A5381B2A1F1B446587089DC4E4A2DF03D82 |
| $m_{PL121}$ | 639368BA75CC709A3D9F28EDA237E32C2017A9BF1E382045B9426AEE0A4049DCB4E1D7EBE4<br>647B855212824557497CFA039885A3BA42F98F63 |
| $m_{PL122}$ | 6A70DDC17D0C8024B1C853F0C1948561EF32510151BE0C63BCA9171F20217891D1021EE7258<br>6CAFF557F8973336913A94A2A699B8740B054B8 |
| $m_{PL123}$ | 2E32E3A35CCD001172CE310B63B4E406126045A0FA3795BE3E3D9B56F72405FC94FD8994681<br>8BAECD24A61BABBBE2D23052AB01EF73CA0CF4A |
| $m_{PL124}$ | 829395C35205A480AC1351C25E234BF52D384A3DE1C5138A650A6F82F739757D812D9C38231<br>AB9FD81AA0648B11F6F6113F9312C57624FC746 |
| $m_{PL125}$ | D98FFE19C0AAAAB0571A9075ECDFD3E7373F5255DC669116A8C6913F0123E598F930934C5F6<br>A601C37C529C371A0C391B59AC5A9E286D04011 |

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

# A.2 Basic Midamble Codes for Burst Type 2 and 4

In the case of burst type 2 (see subclause 5.2.2) the midamble has a length of Lm=256, which is corresponding to:

K'=3; W=64; P=192.

Depending on the possible delay spread timeslots are configured to use $K_{Cell}$ midambles which are generated from the Basic Midamble Codes (see table A.2)

- for all k=1,2,...,K; K=2K' or
- for k=1,2,...,K', only.

In all timeslots that use burst type 2, $K_{Cell}$ is individually configured from higher layers.

In the case of burst type 4 (see subclause 5.2.2) the midamble has a length of $L_m$=320, which corresponds to:

K=K'=1; W=128; P=192.

Thus for burst type 4, $K_{Cell}$ shall have a value of 1 and the midamble is generated from the Basic Midamble Codes (see table A.2).

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

**Table A.2: Basic Midamble Codes $\mathbf{m}_P$ according to equation (5) from subclause 5A.2.3 for case of burst types 2 and 4**

| Code ID | Basic Midamble Codes $m_{PS}$ of length *P*=192 |
|---|---|
| $m_{PS0}$ | 5D253744435A24EF0ECC21F43AA5B8144FBDB348C746080C |
| $m_{PS1}$ | 9D7174187201B5CE0136B7A6D85D39A9DD8D4B00E23835E4 |
| $m_{PS2}$ | AE90B477C294E55D28467476C6011029CDE29B7325DF0683 |
| $m_{PS3}$ | BC8A44125F823E51E568641EC12A6C68EAFDFA2350E3233C |
| $m_{PS4}$ | 898B7317B830D207C9BC7B521D5715680824DC08347B2943 |
| $m_{PS5}$ | 466C7482C8827655BC13F479C7C1417290679A9841297C4A |
| $m_{PS6}$ | AC0734C27C7DC1B818A8492744290DFE866B0EBA62B0B56E |
| $m_{PS7}$ | 0A92106325B15A8C15FC3764724CE67A5056D50A77F9360E |
| $m_{PS8}$ | AE69F62E23035083E6094B89493D33E06FDB6532D473A280 |
| $m_{PS9}$ | B485D4E3614C9C373EA1365FA6FA890E9844084EBA90EB0C |
| $m_{PS10}$ | 66182885E2D28360D2FEAB842C65304FFC956CE8DC8A90C7 |
| $m_{PS11}$ | CC30A9B0A742FCC1E9A408415368391F1299AEA3CB6509FE |
| $m_{PS12}$ | 673928915886947F464FDDAAD29A07D182328EBC5839089A |
| $m_{PS13}$ | 4418861C14D62B46EE6D70D4BF05A3ED801A01BD6CDC5235 |
| $m_{PS14}$ | DAD62DC88F52F2D140062C2330BE6540E6F86192322AFB04 |
| $m_{PS15}$ | A2122BAF24529CEA9855FB43CE40923E7CA7B30D92E40702 |
| $m_{PS16}$ | 6C44AB41E11F54B0929DF65673BD231F92A380132D9F1712 |
| $m_{PS17}$ | 1DC2742E756CDA6421340D0087DD087A615E4B8688CB2F75 |
| $m_{PS18}$ | 2E0105328B56E9E07D9B5A62F38B08AF8D8C2817B54F3302 |
| $m_{PS19}$ | 88315EC30A94CA4EDB2C77079D9BD810A2E280B50DABB213 |
| $m_{PS20}$ | 440E0093D28CB2B2B0A95D18CEB4AB934C33FA45C1CFC7B0 |
| $m_{PS21}$ | CC9BF85D41A96A6EC314F9611D5E1C0672556C8850801BB4 |
| $m_{PS22}$ | 1ABEA04C99BC26972715F01957C0B6B959CC71CD88120817 |
| $m_{PS23}$ | EC5A33DA0BA4470442C5CB324A8E47B0A9F7968FC8108EE8 |
| $m_{PS24}$ | F82086290271DB446B5B1DC15D9BE96414B19B3D5E0F540C |
| $m_{PS25}$ | 11A1A790D6958FD3A9157DF1E05D1378248CA201EBCC7592 |
| $m_{PS26}$ | AA8564882231907BCE78092DC6C9DD4F5A0E4A34AFCFB809 |

| Code ID | Basic Midamble Codes $m_{PS}$ of length $P$=192 |
|---|---|
| $m_{PS27}$ | 912EE2238212F87BC7CDA7F30441ED184A6AA954EC4D20C8 |
| $m_{PS28}$ | 2D200D8B8891B804673E380A1AF5AB875986E29D37D3FDC9 |
| $m_{PS29}$ | 75E086B6C818423491BF9D6365C52FD1C5E42A576E268170 |
| $m_{PS30}$ | 50ADBF27DA2A3701470186B699118E16DDB0D10F705607B1 |
| $m_{PS31}$ | 656C0692B4E22023590A906D2A74DFD471C883A7B1E0B3A2 |
| $m_{PS32}$ | C21FDACD09A3CDCE74C4794010A3E45769B142505C56A0E6 |
| $m_{PS33}$ | CD9392A87C2D4D7CE5801CDDA8A76339B6F900F008B290E2 |
| $m_{PS34}$ | 956426FEFD8B8D52073E87984E10C4D255064E1372C04A24 |
| $m_{PS35}$ | C4F4D6DF1B754AD6063FD10C331C1428ABB27B0700134B94 |
| $m_{PS36}$ | B65548082B34E9FAF43F33C4070F79099758CFD41B491A11 |
| $m_{PS37}$ | C8317EA111A82B04E78B88B864B1EF5D711BBEB4A0527036 |
| $m_{PS38}$ | 8FB7AD1188E8D1A5219845013672560FD38904E70537403B |
| $m_{PS39}$ | B41A324E0D80AA0598A8D391C1D7FFC82B4A075218E98EC3 |
| $m_{PS40}$ | 49A6350A62E208B011E86528B9A481A0E76D723F6675FF82 |
| $m_{PS41}$ | C344C8C23C42A7B7442E6022E95AE4B08A4BFA786F35F911 |
| $m_{PS42}$ | 28F430CF67D69C9DF60E25656413BC5F932A022DB1406C44 |
| $m_{PS43}$ | 2FA5D70CF0FED4213F32116051450391C2A627D9B670C428 |
| $m_{PS44}$ | 959537D988FDD4F1360B4E84701AE5409229C30EDF8BC404 |
| $m_{PS45}$ | CDD2E0450F9EC12F81391AD4633CB29F315B4A0A890A9A22 |
| $m_{PS46}$ | 158776A20B4B82C563EC08F086830EA66DBD2DCCB4DF6026 |
| $m_{PS47}$ | 431FCACBE48208975950342709D11F19AD5FB047F3B440C9 |
| $m_{PS48}$ | 86B141AC571BA6B42653B12FF04D4F0E6C81F3EB608660A2 |
| $m_{PS49}$ | 86D297ABD34E8510F6CDB0EA617F1F1051C8799117B02211 |
| $m_{PS50}$ | 80B2D9530B34E781311D95CFA3857F277CC07014D324AF5A |
| $m_{PS51}$ | 2B607B93FD8B45601C1E574E14CFC6912C22AEC1045ADC49 |
| $m_{PS52}$ | D234C5C45E105A837E6DD74BC4E534523A20317BA0625A29 |
| $m_{PS53}$ | 768CCDB3E2A7A2B863128382590946B25472BE2BFFC40641 |
| $m_{PS54}$ | 3DA38212E0A987EE1F665D4E13C2AA4446E00A76C948A073 |
| $m_{PS55}$ | 09173135E4A2CFC8F2678750AB5257110906F013587BDE82 |
| $m_{PS56}$ | 522E070B266F35E99C1F3C42D2017F8E415550492B72F086 |
| $m_{PS57}$ | D63E4BD805262A3DEF05C7D86C422E5048921E5531784132 |
| $m_{PS58}$ | 564AF806E28131611E5F884229265D446A50E1E488EAFBBA |
| $m_{PS59}$ | A2603E009D3D30147727B750C35C62299AF754D3E4A54E1C |
| $m_{PS60}$ | 938504B02599D33E28246E4271C375AE81A3BBE8D3F8A920 |
| $m_{PS61}$ | 461516B2CAC6FC42A4B707CC6073BBE573C014892C811776 |
| $m_{PS62}$ | 29186DE4CCAAB2CD0100BB19EA595879D63F0F0CFA881AA5 |
| $m_{PS63}$ | A064B449CB784A91B803369CDC5EF61A670AAAC044BA3E68 |
| $m_{PS64}$ | 8719C454D88FF5149DB943CB6CADA01D0B9664B357A18203 |
| $m_{PS65}$ | A27EC68720F00A714AA2C45A7EF232286984D7B193F5C916 |
| $m_{PS66}$ | AC8361676AB424E48F0789082B0CD2EFB8D2E627D041DD66 |
| $m_{PS67}$ | ABA1BEB0064733A0620906BF2B29C95883F069D7E4C35D39 |
| $m_{PS68}$ | 9E22EEDED47D92CA1D0B7530EC6062287BD83A04874AE00C |
| $m_{PS69}$ | 0BADEF288B20F5686C5DE3A71219AC2172054326BE831696 |
| $m_{PS70}$ | 953801EB2AF58C2F80E49A6CC46085CB554243E3B3BBEC8C |
| $m_{PS71}$ | 333A504C51C8FAC5025994565C3F600F154F64FAEF4EA484 |
| $m_{PS72}$ | A6583E19647662005474153A6F8DD88A473853E94B720CE7 |
| $m_{PS73}$ | 90ACAF707D18AF34F5848C58166830AF620ACDC1B2DFDDA8 |
| $m_{PS74}$ | 39C5C598A374EA82F3F83378258248DAD3808812DD0E74BB |
| $m_{PS75}$ | F79525DE694629346D73F6256CC0F140F82603197AAA1844 |
| $m_{PS76}$ | B8C2A8F139097699A693022E78588D4058DB0A65FF52F813 |
| $m_{PS77}$ | 449B50C2A52996FA5A828A907F30F9F460EE3D99930DF890 |
| $m_{PS78}$ | 62CEC9574D30184BCB4F94EECF0CC23D2D2A8D0003F0AA33 |
| $m_{PS79}$ | B56D258889703F76A0738EE3A7D355994159A4851833E198 |
| $m_{PS80}$ | 65894AA54C0F6C9A206521C9FC379A8AAF6E621C03CF849C |
| $m_{PS81}$ | 2D47F3414E30CC02C6835D95C9BA204488F0FFCB4852677D |
| $m_{PS82}$ | 12BE4DD8B906B584010F8A330AB67B278E8642FA33D51B68 |
| $m_{PS83}$ | BC928A90A4B10906CAEE638BF768E08542F48F1676006DF0 |
| $m_{PS84}$ | 30C544E437C8ADA143566CD1BC4E9E7BA84139A08505C2F4 |
| $m_{PS85}$ | 84FD5B05506192B753FBA2C719B584E0EDA01814999867D2 |
| $m_{PS86}$ | 191F14DD00034E03AB5BB4342F1138B2CD33784E60CFD75A |
| $m_{PS87}$ | B8ACE7990B6A98A80A61162C4D2D5F88F24E8F7DE4207590 |
| $m_{PS88}$ | EC1DBE72E8EED0C61054FC2695422AC0AD2D888265B21AB0 |
| $m_{PS89}$ | 9A1B4CA467AB7E082AF4278E44D177EA78424508C23E8B08 |

| Code ID | Basic Midamble Codes $m_{PS}$ of length *P*=192 |
|---|---|
| $m_{PS90}$ | 999EE541C608164AC975214F3A37A677FC2CA03E2C2A4B20 |
| $m_{PS91}$ | 1BDCC20265031432917A2EB828FB356A22DF9CB609C0F8F3 |
| $m_{PS92}$ | EB4A81859C93338B8A1B87C02C815AE09D765F6F2249B958 |
| $m_{PS93}$ | E6A5D1629F4CF09A1F280DE0C480D4C73B26ADE321A50AEE |
| $m_{PS94}$ | BAAB7286DD24C80B15A7958039B904F1CA83C310C8C7AFF2 |
| $m_{PS95}$ | 12220F72619E983717C68FFE1C4148F2354B7B1955B65620 |
| $m_{PS96}$ | A198706E24FAA08BD09EE392414816038E667BB34307D6B2 |
| $m_{PS97}$ | 30B3493B4C035881A7A722E4546527AAE787FA2C0893AC46 |
| $m_{PS98}$ | 5A7318126522843DCB7F00A2D9F9BA8F88963E4152BC923C |
| $m_{PS99}$ | 844844B0CACAB702C332CE2692B4166F4B0C63E62BF151BF |
| $m_{PS100}$ | B8297389526410313692F861DC60DA86A23607F7DDE24755 |
| $m_{PS101}$ | 6C1144CF8BC01538D655D29ED62DE6E74A3180EC905BF1E0 |
| $m_{PS102}$ | E9DB3221FACFC5C88691A7013EF09672A130D52C3413AAE2 |
| $m_{PS103}$ | 2FD0508615EC4CD4BF18ADD46D777078869130C8921A4F0E |
| $m_{PS104}$ | 40911B4E0525AC874228F6EF642E59154730CB187C7E417A |
| $m_{PS105}$ | 2034C6A027D4D850F5184AA64C3153231F4651B616BBFCF9 |
| $m_{PS106}$ | 57833235451525A1DFA213FCE0B419B6494BC7B99F488410 |
| $m_{PS107}$ | 6DC3D57F2E39158D036825F8804810D77CA1ECA610ECD894 |
| $m_{PS108}$ | F5C50DE43AA7B731CAB7683524021701F97650499A7070E4 |
| $m_{PS109}$ | F2184D2699785442E09FA22CC2D60A5A13FFF22AE660A470 |
| $m_{PS110}$ | EF0029DE0D79207205458CF4D7328E81A93518D93C9A74BD |
| $m_{PS111}$ | 9D6D8992482FB885AA5E878C3BA2045538B09886C23CDC2D |
| $m_{PS112}$ | C0A5AB67D1CEA126F6476C75443F0A11CBE749412EF03104 |
| $m_{PS113}$ | 1853A5C20CDF968C5A180D8EB5E72BF15517D06680D98412 |
| $m_{PS114}$ | 8CEA1223227ADF37D0DAAB320906E1C79029F480D25181A7 |
| $m_{PS115}$ | 5561038E96A658EF3EC665612FF92B064065D1ACC1F54812 |
| $m_{PS116}$ | C55A6263F08D664A1E53584560DFF5E611640D8281D9A843 |
| $m_{PS117}$ | 4386A8EA59124D043F29056A4598735A4FC7BC11119B90C1 |
| $m_{PS118}$ | D6571B20668BED50BD7C80388C162632BCB069AA67C7FC22 |
| $m_{PS119}$ | 4F9F09ABBC1391EC2CCA5359FB52250E533BF04324154106 |
| $m_{PS120}$ | 662659F42188C9453F6E6DF00C579627045DA1461A3A0EA5 |
| $m_{PS121}$ | 8DCC9274C0C2A9BA6096BF27FACA542CD01CA8653D60A80F |
| $m_{PS122}$ | 5C1210A1E50E505F6B73C90156C9D9F19AE2310BBD820DF0 |
| $m_{PS123}$ | B1E0A7CE26202E223D4FC06D5C9BBA4E5F6D98204D2D5286 |
| $m_{PS124}$ | DB506776958E34552F7E60E4B400D836153218F918E22FA6 |
| $m_{PS125}$ | ECAA60300439B2360B2AC3C43FB6241ACDE5055B295FA71C |
| $m_{PS126}$ | BF1E6D9AA9CA4AC092BE60500C77D0DC7A6A236520F86722 |
| $m_{PS127}$ | 051C5FA122845A30B4EC306B38016B45667C7754F92F13A0 |

# 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 $K_{Cell}$ =16 Midambles

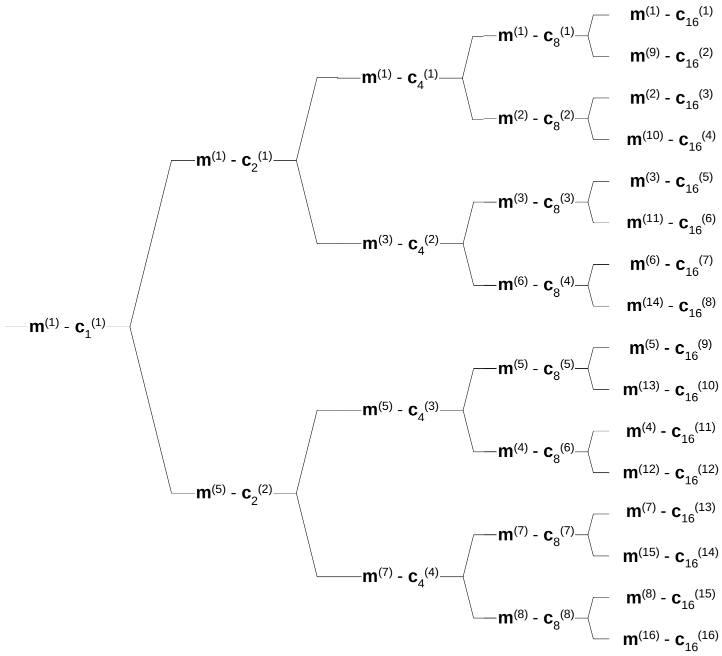



**Figure A.1: Association of Midambles to Spreading Codes for Burst Type 1/3 and $K_{Cell}$ =16**

## A.3.2 Association for Burst Type 1/3 and $K_{Cell}$ =8 Midambles

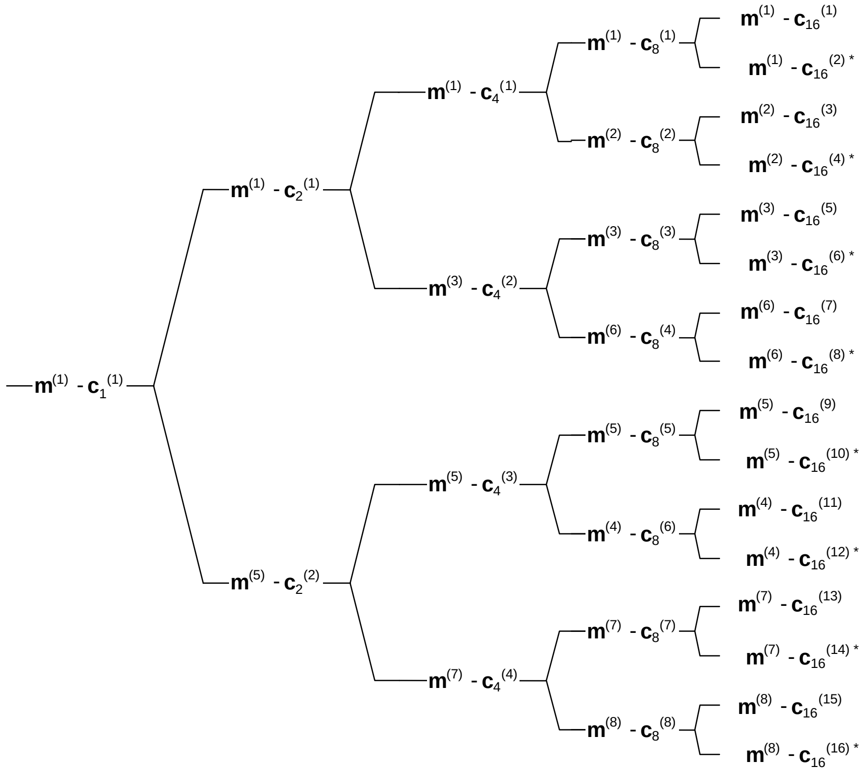



**Figure A.2: Association of Midambles to Spreading Codes for Burst Type 1/3 and $K_{Cell}$ =8**

## A.3.3 Association for Burst Type 1/3 and $K_{Cell}$ =4 Midambles

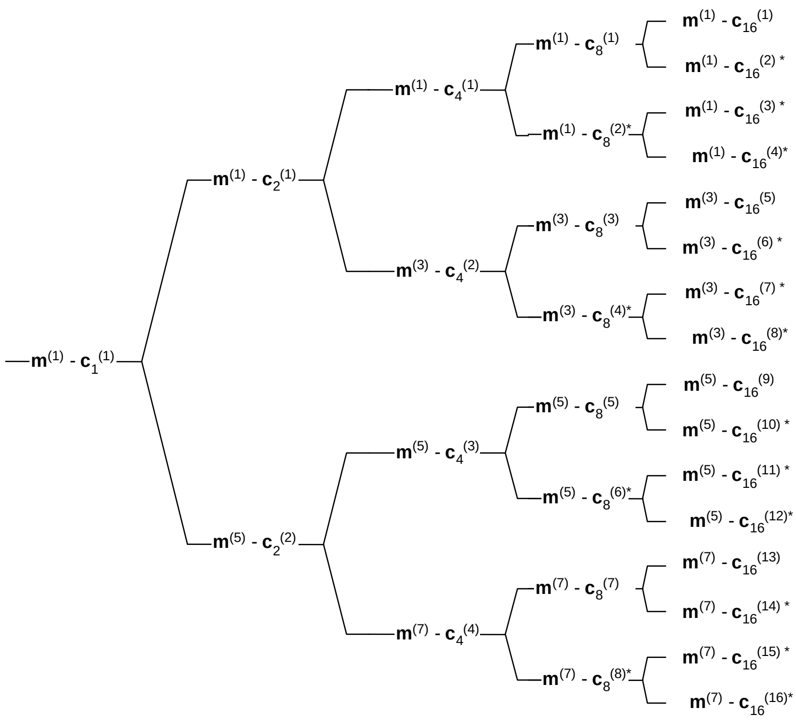



**Figure A.3: Association of Midambles to Spreading Codes for Burst Type 1/3 and $K_{Cell}$ =4**

## A.3.4 Association for Burst Type 2 and $K_{Cell}$ =6 Midambles

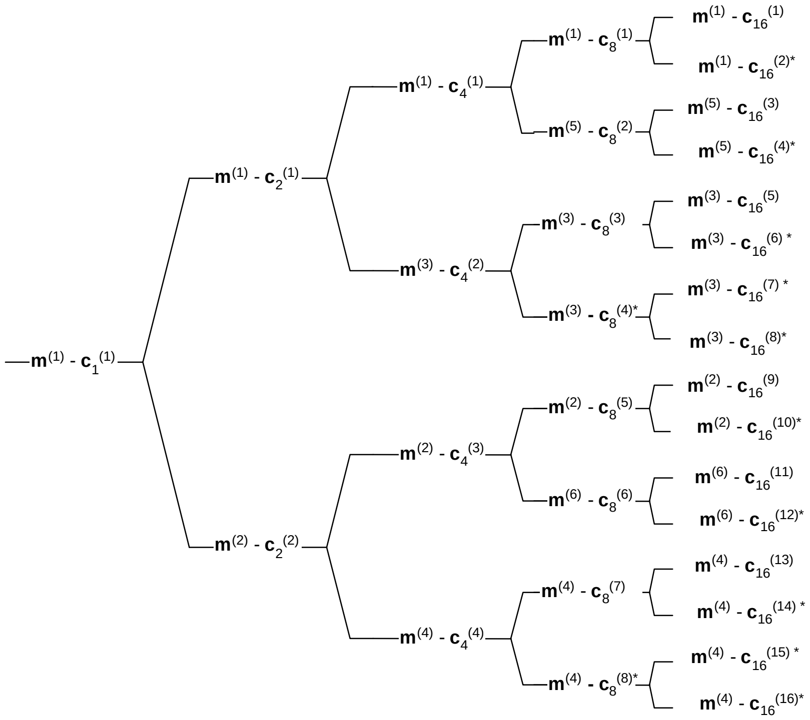



**Figure A.4: Association of Midambles to Spreading Codes for Burst Type 2 and $K_{Cell}$ =6**

## A.3.5 Association for Burst Type 2 and $K_{Cell}$ =3 Midambles

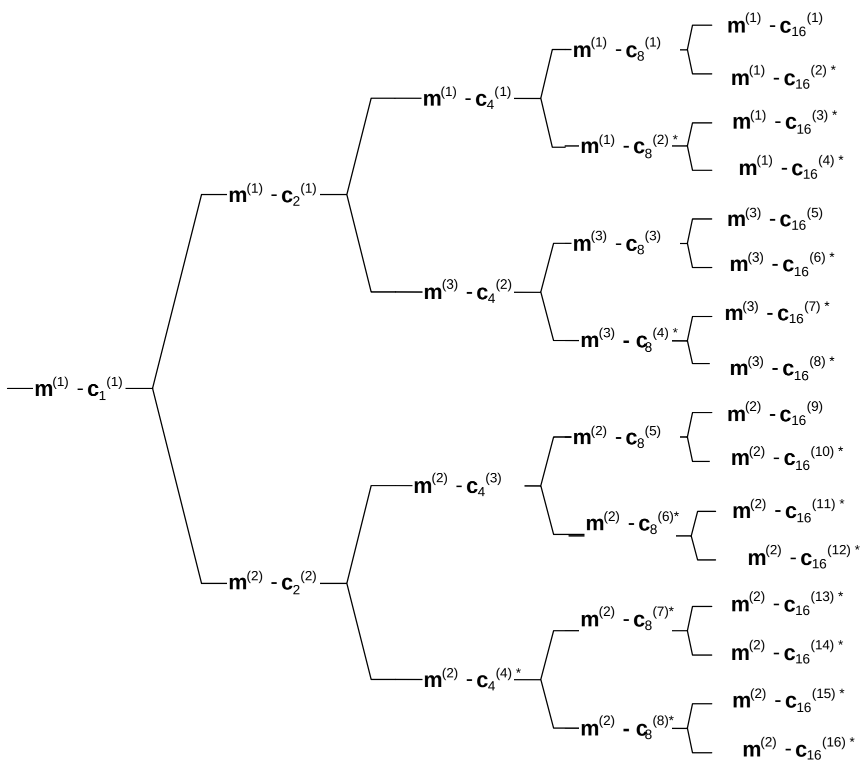



**Figure A.5: Association of Midambles to Spreading Codes for Burst Type 2 and $K_{Cell}$ =3**

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) | - | - |

## A.3.6 Association for Burst Type 4 and $K_{Cell}$ =1 Midamble

For burst type 4 there is only a single midamble defined, thus all channelisation codes are associated with the same midamble.

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

## AA.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 timeslots are configured to use K midambles. In timeslot 0 the number of midambles K=8 (cf section 6.6.1). In all of the other timeslots, K is individually configured from higher layers.

The K midambles are generated from one of the basic midamble codes shown in table AA.1.

The mapping of these Basic Midamble Codes to Cell Parameters is shown in [8].

**Table AA.1: Basic Midamble Codes $m_p$ according to equation (5) from subclause 5A.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 |
| $m_{P16}$ | 797661553820310 3D4DBCC219B16A9E1 |
| $m_{P17}$ | 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 |
| $m_{P12}1$ | F0B7942D43BB6F38446442EB8126AB80 |
| $m_{P122}$ | 83DB9534EAD6238FA8968798CDF04848 |
| $m_{P123}$ | EB9663CDDC2B291690703125BABCB800 |
| $m_{P124}$ | 84D547225D4BBD20DEF1A583240C6E0F |

| | |
|---|---|
| $m_{P125}$ | B51F6A771838BE934724AEA6A2669802 |
| $m_{P126}$ | D92AC05E10496794BBDC115233B1C068 |
| $m_{P127}$ | D3ACF0078EDA9856BBB0AF8651132103 |

# AA.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.

## AA.2.1 Association for K=16 Midambles

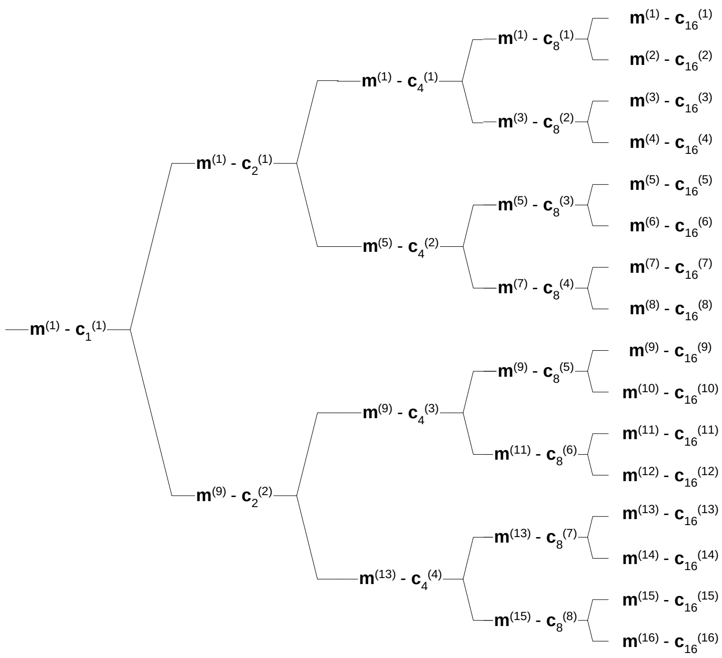



**Figure AA.1: Association of Midambles to Spreading Codes for K=16**

## AA.2.2 Association for K=14 Midambles

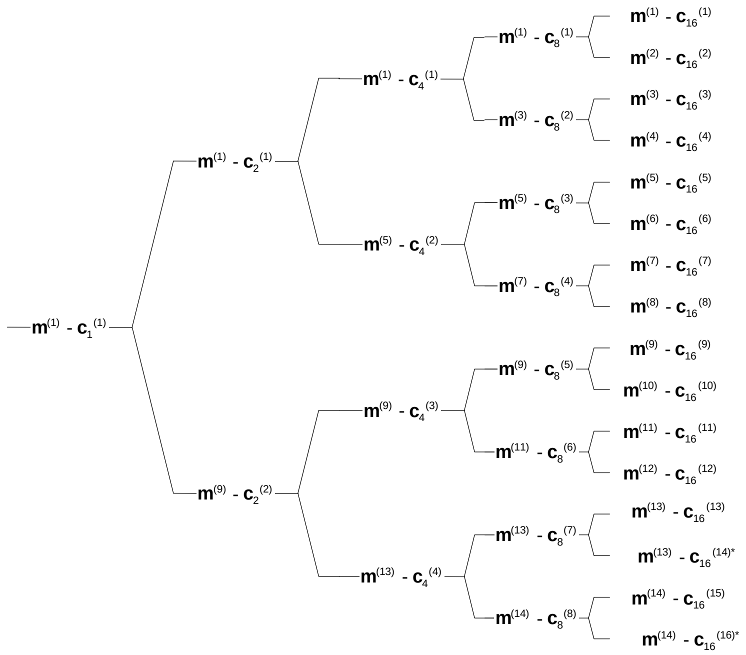



**Figure AA.2: Association of Midambles to Spreading Codes for K=14**

## AA.2.3 Association for K=12 Midambles

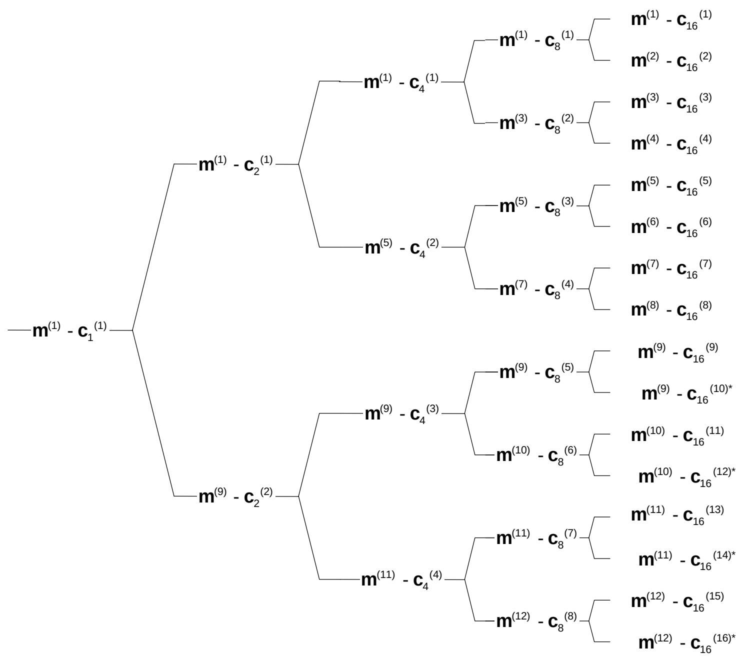



**Figure AA.3: Association of Midambles to Spreading Codes for K=12**

# AA.2.4 Association for K=10 Midambles

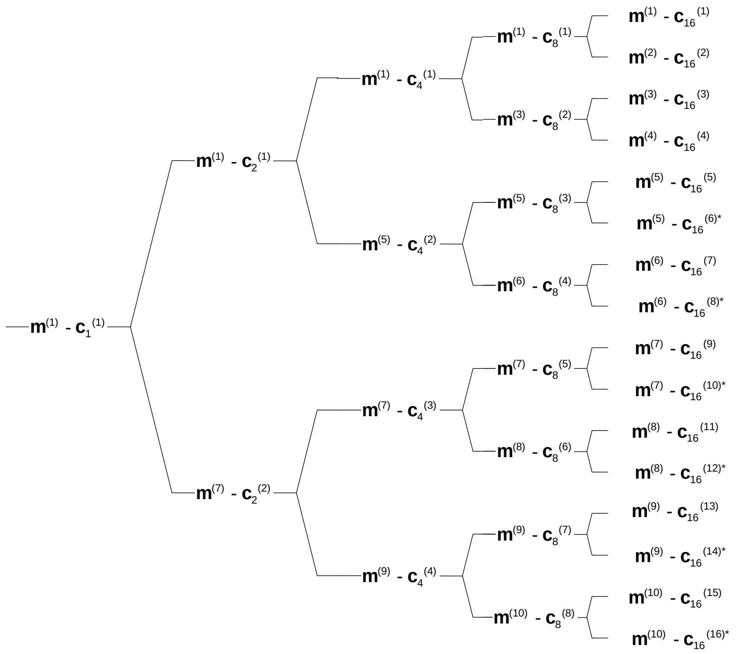



**Figure AA.4: Association of Midambles to Spreading Codes for K=10**

# AA.2.5 Association for K=8 Midambles

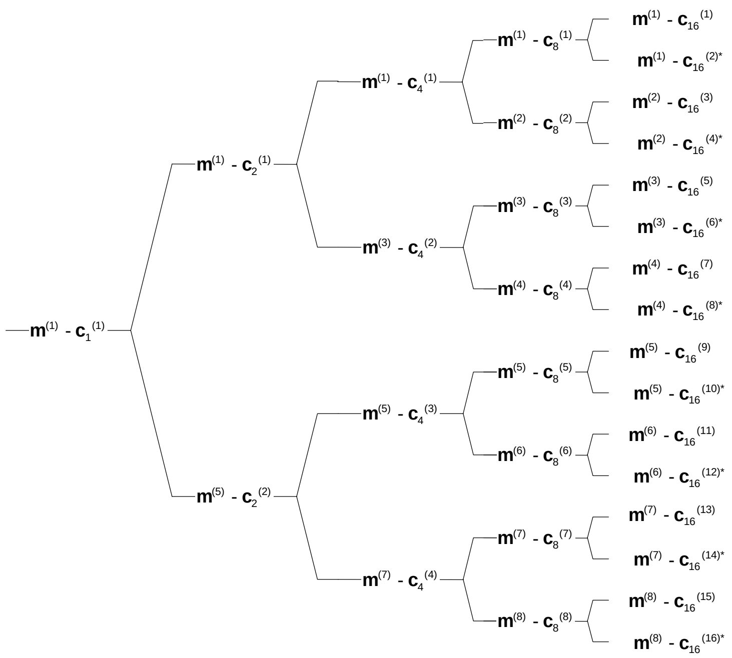



**Figure AA.5: Association of Midambles to Spreading Codes for K=8**

# AA.2.6 Association for K=6 Midambles

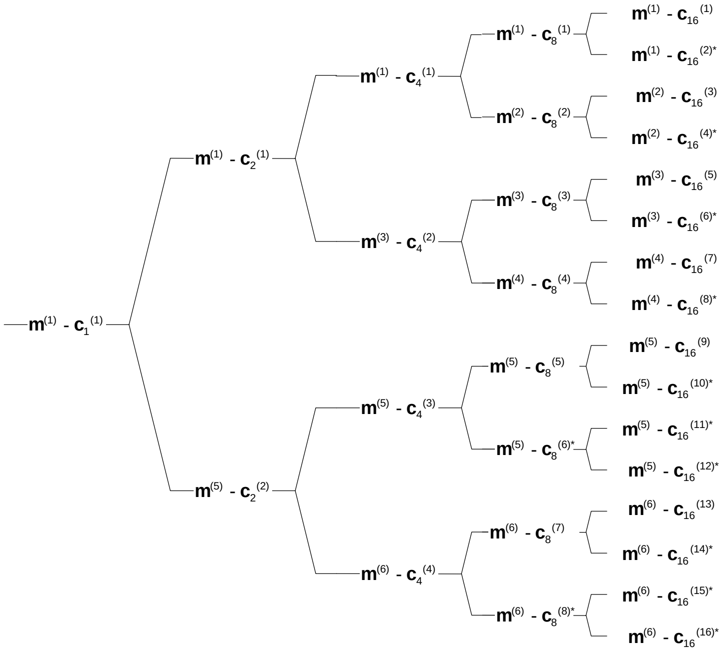



**Figure AA.6: Association of Midambles to Spreading Codes for K=6**

# AA.2.7 Association for K=4 Midambles

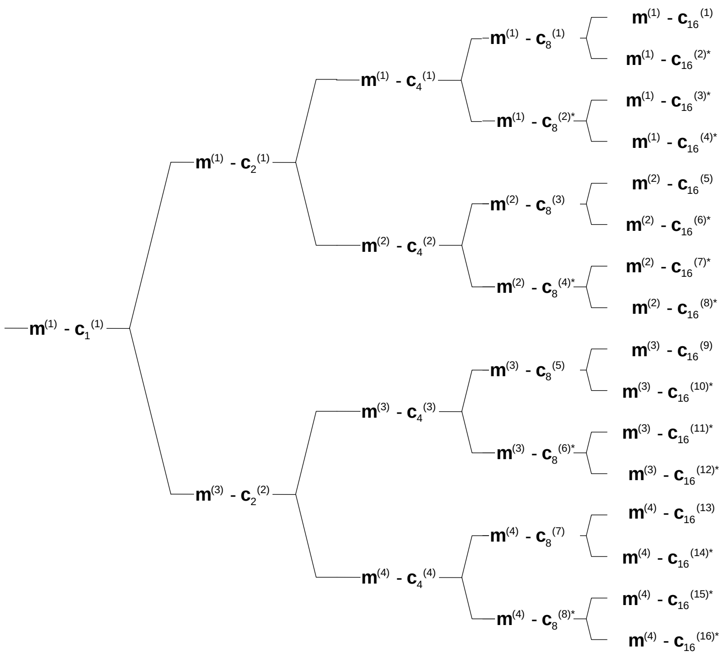



**Figure AA.7: Association of Midambles to Spreading Codes for K=4**

# AA.2.8 Association for K=2 Midambles

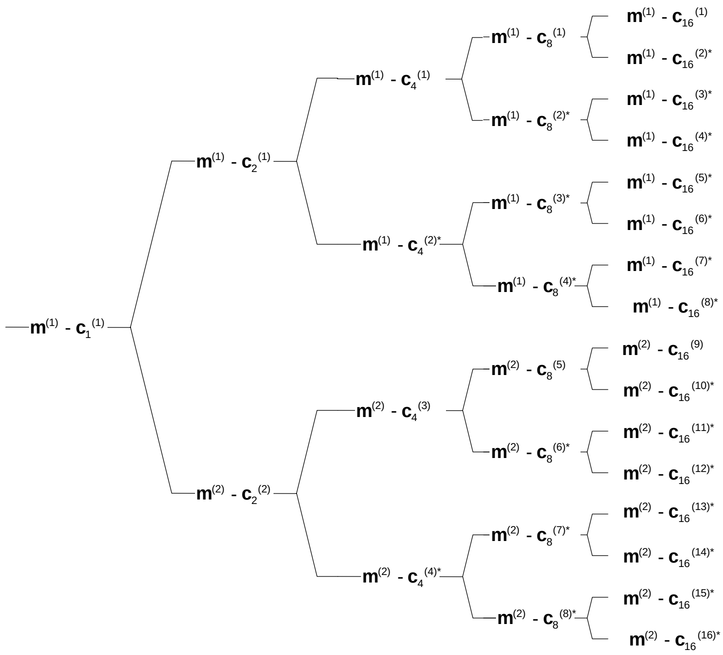



**Figure AA.8: Association of Midambles to Spreading Codes for K=2**

# Annex AB (normative): Basic Midamble Codes for the 7.68 Mcps option

# AB.1 Basic Midamble Codes for Burst Type 1 and 3

In the case of burst type 1 or 3 (see subclause 5B.3.2) the midamble has a length of Lm=1024, which corresponds to:

K'=8; W=114; P=912.

Depending on the possible delay spread cells are configured to use $K_{Cell}$ midambles which are generated from the Basic Midamble Codes of length 912 defined in table AB.1 below

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

In the beacon slot #k, where the P-CCPCH is located, the number of midambles $K_{Cell}$=8 (cf section 5B.7). In all of the other timeslots that use burst type 1 or 3, $K_{Cell}$ is individually configured from higher layers.

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

**Table AB.1: Basic Midamble Codes $\mathbf{m}_P$ according to equation (5) from subclause 5B.3.3 for case of burst type 1 and 3**

| Code ID | Basic Midamble Codes $m_P$ of length $P$=912 |
|---|---|
| $m_{P0}$ | 9E57CC4EFF411BC3A56568FCBECB53005A3A19CA729C922826FB5E2F55D4A0C6D57335B055<br>188F2274154ED0F61107BD34023FDC3887072689755E733FABEED9B7967C46E9452F78E0CBE<br>97CAFB92DD44C90E40E3CFE9DB4054AC45EB8F260FDF8CFB5C3C23733F7344633F26CB092<br>AC89F4 |
| $m_{P1}$ | 3AC41CCDCEB89F45AA67884536D0B796A5E048D76D2F9531E2E31516496B3B76196D68FB7F6<br>CFD8C5EA232B5C012953FFCF4C1CA7A2BDEB236426E422FD4F050C4022188D8068F47441FC<br>31B005F8F53452DB8D72839DF021A45D8BC51D1CF440A665D1F751145D2F04CA352BF2C0BC<br>F589E |
| $m_{P2}$ | 4241DBD18BB9C42E335530533B27F0411A0588156421FA0F306C2598CD9C2D3F7D954C64E4E<br>EC699B2414356F1D47E2A3D09A56EA850ED4319AFE7AF07538A9499206DD943AE990F43FA33<br>FAB6CA8E6B3615D16D17B7FF914377BC59870C269E851B4E012B107EF92542B3A2B458E10DA<br>709 |
| $m_{P3}$ | CCF886D4B65C6CEC0E3F8D8186F6CEA1FCFFEE878506F22EF69AAD6F51FDF2071B34E4ACB<br>CD2545866C36B31C3235DD38361403E53DE6CD4FB1DC91752BF5F6C3AB442E292A90471F2A<br>5B9FE7599CEB4651D235D505052C22F54F868C18AB14205FD41FD468375B661BE35F0AA67E5<br>F33693 |
| $m_{P4}$ | F95E0D6F5101D3D7BBB354646818EAED147E3E4CB0249F696738B3F3A65192F5F012868C190<br>BCB967DEB112D907A85F33161C68B9E425A3F5EA26022F6C40ED01B8DE7FF6A6F75F313FAC<br>3DCD47C7EAAC32A9AE47D633CA6F47AAB8EA282B467D8CE21B1352FFCD36966F0A9B2EDE<br>0DF6252 |
| $m_{P5}$ | 6FCD348CB614E6C68534737B6AB3F693A7256A85D5C28C6A77DBEA1ED62E1813E7CC88AE99<br>0BE4432387ED43C60FBA6556C5DBD7111B1B53FF5FBAFAF86CB761F15EE2782C7616C816A1<br>C77E27F197DAE6BCBD028F37E5DA7906198C98F72207A0A8FF108EAA66C84D976049E4BA42<br>E0C27D |
| $m_{P6}$ | 94503C230B52660711010625B04D9B98ABD0872DE470F3323F1D4120F46518715929FFF471421<br>2C26EC813F9B0601B573A3B38F8833BBCB57390D8E16A8561C54E6FEF9D8A64B2E06C07E417<br>B426671CDFAC9C7FA20D15B556CB39FADF128560A57D26B0C9354C1CFA5334A7C5F96B9528<br>1A |
| $m_{P7}$ | 92B52AE0D72D7559C4A277EC57995B7B8BF3CBDA1DF8FA7D6A96DD02F93B28F84C18E6F905<br>D87A12D923E38C4DD659819F1CECFDB48DB8EB129DD472A2718045ACDE58C35A273FECA71<br>365FA35130215FD801BFA471D27ECBA3A8CA946E83060465BFA9A1F3C8888133D22BF43E1C8<br>9F26F2 |
| $m_{P8}$ | BD71D9BF8F8250A64EC5131043F2B0E7424A365508E4E268A4A9857BAE4E3360058B8AF6FB4<br>A10B3C2BFAD8ED116229056B01F7E59E3D9D4120089EB213106B920925EB2422196AF8FA999<br>8389664E80DA294E1B4B7D6807FF3743EAE53276AB634EA1B080FD55425C318B1EF670E9783<br>EF0 |
| $m_{P9}$ | D61ABD7705BAB371765DE3FD732D2C5A51D5DA1BA0BF789170F01936183A55CD1693685BD1<br>BEC7BF691144BE24A8B74D7FCF1830425997806FE10C49E98F73BBE07835ACE5F2E6E083294<br>BA4048D8AD59A4E6EFE538B6D1991C21BD130D25555985D5E8AC1623FAC93663C5E1CCC77<br>A2B3FA |
| $m_{P10}$ | 652DE6FBD477D92AFC5424953C64A722EAA5D5CB0E6A04CB43273841F71525016D8DD83708<br>11E3F38851E973D8EC2CEF3180D1462E6530623B004813C1E154B6CF790BE4C712573ED7348<br>9BC2952048A5C17F51A25604A6CA660EA480618F8DA78470580CA9B987BE33F3EC6485AF440<br>ADC3 |
| $m_{P11}$ | 49AADFAED5D1C27455F2FE9D2C66B31E3792F088E20562C3B6DB2E4F2C67445690164E34043<br>B5C98819236020C15264BAD09CD75608EE4BF2F62D3671611443D541DA129FF475E26214AFE<br>00419D12EDFDC443A4F7A6DD38B2BF62F64294A80937969E9920FC3A33DE7B131C61F20C195<br>621 |
| $m_{P12}$ | 6D408E783793B8F8B438F512CC4AA7F94B296885D9F59505F339C5C1F7FDB8F2567866B876F1<br>6614BB6E3788E1B237DD8BB955341911ABADD6E7D3276F7068DCAD08737243631C42CB77CC<br>CFF7FD7A03B52D5D4C73F8716A83B6094827098095F19F136491EB1405992E3ADB80B685FEC<br>B2A |
| $m_{P13}$ | 349BA9F2D6B07CC41DDBDBB446F844D77A86E96C9C2F191F1BA42D0402754B40DFE76BAF4<br>DBEF3DFC28E426ACCEA6327FA51C4DAD1B6F2A9082332FA4E0BC21FCF10CA9822CDDEAEC<br>38760194855253E3E3D46C8565CE9EE86761B7E28BBF5C4958A3EE709B8FE9CDD0CF9560A1<br>DAF6CF971 |
| $m_{P14}$ | 033E68B1E9D433BC88119CCAB47004E20B6E1B8F0E4C2756DD549EBDBC5243BC898694426A<br>3EDECEAAF00A7AD02D4AD1F0189A1E99B0B1D796E8BB8C5EE977280408DA0F772EA3A1AD7<br>44CC0C78C39070BFD324269BF86D67916D157A9BE63D9E94B76F69005036815O867198BD0A6<br>8031CA |

| Code ID | Basic Midamble Codes $m_P$ of length *P*=912 |
|---|---|
| $m_{P15}$ | C08FA672B545FA416E4856DF87BA5CBFBBD64EC62A2A294427A563F691A28EF5610A0CCA37<br>ABA21BD98535B4BC3F0C009CAA962384B5004063D16083C93D1A7C6002BD1D51A27B671EBB<br>C4860092DF3B3C389A0E909E664FC4B99E5B1A39B72500335491372956E1782EDC5330CBEAB<br>7A636 |
| $m_{P16}$ | F8AB480C79497D13EF846E58F4D6A0B52CF2A71AB1236661B0D84D8CCA603B157BC07C0000<br>306487C41A7CFC6A3A58C1276E8BBB592F9341C298E17886E3A2AA2A08576FA2380C710422F<br>CC0B1AB50B13D6B676EA102B6A035449A77652524F3D79B05F9EB24C286D7A8E4AFA1596788<br>C987 |
| $m_{P17}$ | 53F0FFAEB51656B7DC819B749FB5DF94E4A9545B669AFA52F385C5869C4D9A2F3BB5FC874B<br>9DE055EAD1159C47E7BAE8F08C7F3A202D18AF084CB9DA377C3BF8F9B710F9262855E5E04F<br>9C92C11E4B03DCBDFDF06311DFB839969036DD115654AD90E2096862B37338272506327E3D3<br>9D189 |
| $m_{P18}$ | BA58B8BE4FB00B6122DA4EB61BFB9B775811B88EE9444BD8400CC9866193AD636A86A23588<br>F59E176DA8A18B856E8FFB41A8D7E91A9E874AB50B89E971AB36050058BC70C84220ED0D568<br>1F7CD84CD493A65B41B42E10D38B18598C63F73163EAAC1C93CF3A3CAA3BDFB29D02521777<br>14756 |
| $m_{P19}$ | 0C0769A781CC98EDFB93319AC2BEB03C8475C874CA1AFF16BEDE90B07D5C6EA8ECB401916<br>B5688AD4C0D97DF085CB0A16CA4D678A0AC1E00F9737B4CAA93A163F827B39AFF1AFB831C<br>EDB26EF565102DB24ECC2B6BAF72B44FF5EB88574B38ACF3EEFD87E4F6173846B151271DD1<br>E1466DC4 |
| $m_{P20}$ | 132C03285553D9205AA3746EAF108D92461B3DBA03866E70A2F47360DF17502559E5AFAA2EE<br>6C7DC800D8F620A3294A3E2B1FFFC17AA6634D6B7F3353A652CB0825A4E13A3CE5E91F7225<br>181A0678F53B3D038BACAFE214FD4BB4C2D80EF35D42A2F19B69CA2162E30543BE9BD85481<br>85D0D |
| $m_{P21}$ | C2E92D3AA8981AE97C3325B1FC1843CB0E8C5E394C201981A8DD8D1BEBF8F649166508A5A1<br>7819D02EB0A8EF797D8C51DADBCA9A66D949A4C7E6B37ACCE1A2E578469D1B9D8D1A47E7<br>BEA9DD0002FF7D64BF6519A63D9084C0841A8841E183973644DF590AD107E852F3357A70A2A<br>5637E22 |
| $m_{P22}$ | 9BEF2F948ABC4CAC809972EA52EFE03907142A44F3053F970445B1EDF5D1FC9F03B6EE30F7<br>CD74C04B68389D5826E85E763653ED75D1469A240E406B3989EDA065BD84E34F790D74D2D17<br>D7ABCEC25CF7FF130C4BDA979BB5A9133CF3E79B3558E921EAF013A0CC4B87C5FDCA4AA9<br>F245E15 |
| $m_{P23}$ | 6DE4817165AAC324EA17347B78FB4E1D642F74E15F292880975C42F405D440B1FB101E64DBF<br>0A0ABDDCDDDB388672248D2BE9431F7BD77CEF1583F04680865B315E8551A232547A807CEF<br>C742E529CCE892EE7FB2F312E96EF7372AB4F7310F87912793FCF2BAE5DC0E6DE2CE9FB40F<br>53513 |
| $m_{P24}$ | FF5034A2747FF78F34664125AD31AB2ADD077839D8CC44372D13589649381A2198631F1454BC<br>450ECD0AC8D8695034CA8130B5E5DABB9EDF7A4AFC0738D82B7BAC7086FE813289092AF218<br>F5D04BCBCF98A07F4C2E0F8BC9C52F45C5813A693EF555A2B1EF308908FC993B2266B2AA09<br>C3DA |
| $m_{P25}$ | FE1DBAC430C3B1815990B234583A86EB45EDCB32A38C92C3502B5611819701B1F545410092C<br>AD7E962D3D6E232059CF0C9E8DEA6F7DA21D89F611EFE129D854C5B957FC810E0730EA0C56<br>03B035DD9D19686BD7BD8FF0C9979C900E955A649616DA71D0FAFF079176E541F1AA27F024E<br>669E |
| $m_{P26}$ | 8C0A6F60BEF5DA92E8702CEF3563B50B8C1C2D29DC82B97FDEFBE322024205726A0E5B9E6C<br>BE0F9F02FEFB264E62FF99955B536091CEFE5C6986957149C2954E0EC43C73650855376E0A8<br>A4ED9873AA8AED98D10579ADFB05A8713C37851692C3B4405D9D86E6BDA0EA9A4BD0CEB7C<br>79E6FD |
| $m_{P27}$ | 205BB79C6DEFF102C2FEDA5301BC5B6D62957A3A02B486DD6BEB878558827499DFC1DC79E<br>C55241B208599E32B99959F9589624E2C0AAF11E3C8CCCFA7EB88AE7B844B483BE360CF3441<br>1EF739BF073AAAF3F84E516CFA10992D606789A20F15686F54CBCE8A1305BEBF7EFE8EBA95<br>F723B5 |
| $m_{P28}$ | F32AE20D70B2FDB523682A5AE7A83307F740DFAAE0DBB58F828DF0ED20AC79C85E2FCAE3E<br>C342E79F0EC8054231A541952736CFFED94A4F44FB7DF473C476FFB3CC87BF18A0938AC776<br>A26DEB32BF906D2C90F57ED192BC33F1312746B143AF383C972A2B61AD8D46F3C4E56026150<br>6CC87B |
| $m_{P29}$ | 8F6A99C81370432B4D05459359C92D87DC3D10E82454B911EAD9E80AF07F26B198C6ED71E72<br>F608118B67C61E8C64EA654B7BB0ED91A3DAB2B77C5CCF92AEEA8D6DB9E9AFC142F6FA9D<br>2E79E443DD42D0F66BFE92D9BAE58113B8811E50FF8796E13C43BB210076AE2F8FD0A1FDF3<br>D5B2AFE |
| $m_{P30}$ | 3BE3E2BD5546AFE1933CDBEA679EC8FBAB69C0ACFD5B2DF9A72CC5B4132123D6EFE9F907<br>CB187DB647C6C7E59F71E830DB84472B40C011CB418DACED36025BEF7289FA803D1E32FA2<br>D35F667D2AF8B78985D469532B5FA8336072B7FC74A515B8700CAEFCB625AC212AE335E6EB<br>C37207FA3 |
| $m_{P31}$ | 2642A80A8DD998C3198E6EF691B68257560C5E875A32F8C101478B24F9150883476B03F26B6A<br>137E117057B525F37E3749D1C1DFFC2BD059C6F4FBA8765D58493C87894E819EBC1172A62D |

| Code ID | Basic Midamble Codes $m_P$ of length $P$=912 |
|---|---|
| | D6F3DFF2B18A5987B0841FE85BC85575B0B1048A9138E6C9181017A501CBE76337926BD9AC7<br>78F |
| $m_{P32}$ | 362817D18ED89453CFAAB83B0D182FC12F3E90C124514F404743D223487FD2A2026603D3CEC<br>04AADB26D2DD8123B2D18C4ADFA6FA95260FC8055D29B0EC561FC355BEA5E97CA030B0187<br>773B726299C2CB91CD7E0EE28B89C63EBE333F316DB6209B012A230FAAA29C52D41F9DBC6B<br>66F7BF |
| $m_{P33}$ | 6E92DBCC6445EDBDAE1D566F99C4FA5AD9823981B71A883BCD14967C2358711A59B856EC48<br>90697E030009682A332D0F7CD85FA7E509CB2538BF395306603EE229C950D749D3A4EC4172F<br>8400B1E1BA5479098A79F48F3F977C400D54135F75DBC6CF97019E30954AAA550D95ED4E08F<br>C2AE |
| $m_{P34}$ | 82B02C0023B142BFFF4C2EAC7E5F83D3C76A7A18EAC7B621A0F9B65152E475C8F8E2A30479<br>EC3EE9263F73426722E9A96DC53EC42D7C0BC50A643E66E9B8C0BDE8E893A7562CA33856D4<br>219A5A59F599590164B4015BB9EDCD26904B9716449FD02CA7380C6A50CE22A40E0CDB787D<br>109122 |
| $m_{P35}$ | CF2673929413ED857B0DC9894D8AE460C19CEEA9CBEDB810388C0ED13E11FB7201ED5A686<br>5ADA459DC8E5023C73FC13D159A7A540F64FBF586A2504C18843F42714D4699DF6591944AB4<br>4126A4A83D175E8C41EFB28D34048E2EBEF454150F4878F6A02A874B1BE46CCBF8577A5EBF3<br>77578 |
| $m_{P36}$ | E0FAEF096093575ADD91187D72DDB6E6401BC189A5014D6149E092146BF879450EFC3E504C3<br>06D0151ED465840ED503FF3BF92CE33E411A17AA7DADB365731D271791B8C21BED3557892C<br>4D0B3795A24EB61566C3143A54797B8BF25194A9F8CE20C5C991FA29BBA64211B4807066A45<br>B9E8 |
| $m_{P37}$ | 234F19C1B17B1C403171712FDB575CB8FCBFE15B39F548E682452117597AB24B8E7E51834F22<br>2508ADF3260AEC2246AE84359DC0130229580F98275BD036F82BCCACBFDA34391C556EE7E4<br>C90A2C67252C2614175A2D0C37D5C861A0D735DA8E05D2E7712332C0BC0B33FDFED4FD90A<br>61D2F |
| $m_{P38}$ | 415B84B33D1F23316B8C7DE312EBDA1091AA5BA44319C7289C78701DD437028F8CBCA30C53<br>4FFF1875A230EF762F1293A9C9BFB32856DBE06EE915D1AD66417474A705B7BFF4EC8DD4488<br>34789AE9BBBA1D2D99080CF03841DA0242E0204D3B80680C1AA6935F3F6E9F0AA2B51E5A7A<br>227D0 |
| $m_{P39}$ | FF16F0619F5A297CC40FC2F97DA2A92A9D144C2D1C1043F53DA05909FB7F23DD82ECE70545<br>330C327A097FBB2F93A0E7970DC64768F76FCA0E5D255B4116550E838664791055B8D24A5837<br>B6DE3CA65C522A50CC25284D68C3BF61440DEA011345F3127A802234B66E5FCB893830BD39<br>C6E3 |
| $m_{P40}$ | E9EF50791AEFDCEA8D5FCE9398C3FD7A8AFBB50F2268234F62FD799FCA3BE94285C92BEE0<br>44A546DBC29319E983C6FDA5431BCB78AED499872F24F228FA4782FEBEB6AA13606239E56F7<br>D19107CFA441C2004192386AD0BB6DB381ECACE4D153DD844F9179263E899DB195F16D9581<br>248259 |
| $m_{P41}$ | C310A1E57CDA2246752056F432E5808F423AE04F5757F6B3D2E798FBCAF12517BA77CACCDF<br>11B18D6A04CB37D80A077C8F90FDED0D33F8739312401B6889E16B8665ACA75075210424AB7<br>BB2516828B2CAF89ADD0B8CD223FA9850B170D465125723D43C5DCFB7264F4247B4C0F5D32<br>83C15 |
| $m_{P42}$ | DF2A1C8FF69CFDEB8D36F67744F0C94A6028C7FFC376E4F32AE818557C2F017F040D8809614<br>1C90B1F4F55A22AC386BC40ED96EA1B7BFAC91AA0BF97E36F60E225E167D926536AA22BB1C<br>E36BB9B42C53CD1A56B2354F23807B350BDCE7C9B01CE6AC7AF212C050F8E827CBC3AFF71<br>D50E97 |
| $m_{P43}$ | 88F8ED04165EA0D34E412F8C7175D3C387A9B18E0316E00DB2F6BB74CB24BA74EDDA374036<br>FA0A4224F6434752B67462C8445EA3E51884BB5C079A862E7711AAEBE14C50DA149B032066C<br>88E38CD0FA85AA6213F28E5BB2D67BB1E000E16B6330BDDB9796AFA27EEBB6A0A7A1395DF<br>FF1588 |
| $m_{P44}$ | 5439C5FF080A258601EDAB8A0B54F51AC7C66B6D8165AEA5BE1E15AD85DFAAE4F908AC8404<br>DA4CAEB3FA93AD698C835F3B60205DCDE971BE63D570267B04CC26A8CF3D5051B22D9B0F4<br>099CA151A89508E1838185F90D7BE73161CA5CC3950E2E848B26F85B98331398AFFEFEB9A04<br>6A5A3E |
| $m_{P45}$ | 9D26B1376B5C4F5F586486CF35762FF481842D6353D6006AC191D1157CC39678F0B4D31A1668<br>AF65E2B78B57D7ADDB45621DAE6A3E4B0322FE0D5713485234392040C32551461A0749B5362<br>7F0364A998A18CC02EE708732DCA8189E523D588EF5D3CF70E87EA5140007BF84AEC5BC1BB<br>391 |
| $m_{P46}$ | 89530DB4E7FEC9DB64622E6FB8F0879B24F3D023C83AD69D674189910F1EE52BED4FCCC501<br>EA81E122E8336A89D209FACD7F6A89F65611A470C16B12CFCB84AE475E6B82895CDA52F564<br>DA7726210D073B38342F6BAA22014A7D0EAFD6202DE5B03CAACA0610884223E4C787E06F84<br>A8CBFB |
| $m_{P47}$ | A9E83B98E0C2ED7950FEB892BCAC4ECD503CBDB193D143BD03F2459DC6895A81314861930<br>CBD9ECFF114865CFECFBF025075D3FD471558FB7C6A6CEF8547E937CF52DA324E4EA04319<br>B78376D2F4BFFE8E467DD8C29DD0D44135ADF1D179886A82320FC35AABE4957641C9762F7C<br>3AA7D970 |

| Code ID | Basic Midamble Codes $m_P$ of length *P*=912 |
|---|---|
| $m_{P48}$ | E113DC0ACF1E85730EA81E964487D1D8263A186C5B627B8F96D95244284FAF1E9D8351D1DD<br>7957D205C15F26F3919B34196FBEDED8E88D96C00441A438D27B215AB448B6F6D9DA895FFF1<br>0EB3D4FEB44468F21E77CE64757F6D8A627C4A2BF0DD9D67684F80F3C1BDDADAD192EF32B<br>AE5479 |
| $m_{P49}$ | 687C6FAAB36FF9C20DDBCF1CBB7AE82F334E48CC6C10B988D8154DA5D18746F3E9153A551<br>0C2B026F5CC7B6A7562644E5936CEF2A023F40BF239A1F2A6DC75782F2D056174E8A904A7A1<br>1D3E301C0842F8BEAAA3D36C86F240309635A90E10E766FD8149844F8B42A9C4A59FE4863AD<br>0E285 |
| $m_{P50}$ | FFDBD37063D55715CEC274D716DB7DEDAB90ED8808952BEDA0E75599D5A29C13C483FB97D<br>3A0822F46F2E1F4ABB756A7FD4710DE7333B488203F7152FE1D1DECBE5AB17EDB806681DED<br>C8CC12C11753418E2B2A5C95D60FD2DC9970DF38C84CE7864833B69046AD039D261DC1C14<br>CF056DC8 |
| $m_{P51}$ | F1748076429321CABC98153CA2C18D3ECD24CAF8B22CD97C1674F6A3EE26C016CC1B8E8C3<br>D0BBB98482D09ADB2B06CAAAFD73FEA2203F8A2B791ADE9C14A5DA7015A442392535CC10A<br>10399B2F80D818DF180707211A8D858ADD9DB1EE10BBD6F92F2DA9CC03512EAAE5BE18F7A<br>A87573FDC |
| $m_{P52}$ | 81DDF8E2BBAD0D040EF4796A5EA19DFA9C0CA8067068909896A83C2E1E239D83D2B858E086<br>4A7BDD2962AD001EB19665E4414BE81FBA6D7BBB1787AEDB0C81913D5C86E3905B20DBA6C<br>9DAC555B4BA05574F3120FE8F3326B336B61BBC2068BCE2788641CD59032731BFA73E58869A<br>11E4B7 |
| $m_{P53}$ | 0F59625A8BBF1E83A906E5EB9E5E1CF85DADC7BCF7736DC02DDEADC8736F7399E4CE10601<br>DD832D32AEA53AC895EB92DF5FFB409985EED5BC9C775C7A655102E644435ED2EB84DDF30<br>130F101FBF2A93FE65D473593FF3A4134A41C4C7EA6A50448F8B2FE1F91F1E9E84C95818D2C<br>A340C59 |
| $m_{P54}$ | 3AA62BAC2BB34A4B7D06A968E20E16A1C79D865C1F87DCA2B3DE6F3D49D962175B4D7FACE<br>8EB162E9E0FFF9FABD6F57305051838A7D5A370DB79F9246B3ABF10719EF9EFD86664DEC9B<br>06137911903AFE43D00DC992F9F8FAD1C017CBB7591E1A02BDE56B75B2F82FE61234ADCE34<br>AFA8017 |
| $m_{P55}$ | 1682757D7852076B78872B235412EA5CE2AA997BD66C8689DB605F04779E70F61A4E5AB75C6<br>5F1BD3D9948C2442D9AF89EEAEC6609E7E1DFC95294C318AAE8FB0C2E025713BE5B38A08F8<br>A8463D12081EF250C482A2DD9803628B07C9076CACFFEF49EDD6A3440A6952C73493E0DEA0<br>DB112 |
| $m_{P56}$ | 016B428AAA41A03CB6BAEB518F27D34CD9F4E0A7F0C149D3B8F35B9481274E4258C01E6D1F<br>0EF01256E48B00C7D4F9FFC242273890A4D5BF9338A1F5D74F01BF56EB2E5DE461AD46F7844<br>6DC2B56667E8732E73E95768CC05615752A8D2C88DF077277F026CA1A1057DA0C15D10CD609<br>3DAA |
| $m_{P57}$ | 68C2F3594AD2A41BFD7BBF60702C5581B3F75E54CE7D1B3A598400306FAA22783335DAC415A<br>F939C4596A104724F53953BB51239BEB77D2574FDC37CA1B07C5E7AAC2774DC35DFD6B83DC<br>CEFC3C0A9B3EACE9A6052C44E8C327B24D173A760BF9535EF8095F35D9DA3E289F636521ED<br>06584 |
| $m_{P58}$ | BC27B7917AA3ECA9ACE1F94A1A917FE1CE6754E906AD4645719CB3818FC58A48F8CBBF3293<br>8D18D68203507A4D2205C049AA7741E089777205F1EDA69439984BA8DFFE45C210253D528305<br>BFAD36FCC90683801A0F19022923E45DD0A52F6E2E3F9A49333250F76A8BA8C325A39B362D9<br>F2F |
| $m_{P59}$ | 057CA87F217E30182A60109027005CEF36F98571B1C11A6525308632CD39232853177DB25A639<br>192FB65EA70A70D90CCAA34FBF7C2E6233A362F46345F15CC5B2565DD7537010E1BCC22AAD<br>D2C7BB05EB6BC05A5DF289A8AE249EAC10F21666C742A09462FE8F1D38B5860CDEFCAE2FE<br>BDB0 |
| $m_{P60}$ | A2AD4999053CFAA50A1093DB07AEABCF6F80C293E00D8ECCB12B56CE7FBA3F62D686C15B3<br>E1A941AB480ADD6F2176C537686F770D73ED366086E67F2C46B8AC06B870880AAA2D9B44421<br>7504ED74C7B90390485AFC46A63F15CAD9251C638278707D46A384DB62A7BA27245A5E16D62<br>31908 |
| $m_{P61}$ | A196D99A227C44C27BF2BB0B6029557118925061AC9ECE965EA7AC380CFE1C0C33E5B7567E<br>4FB77B7AC7DF34E4557545366A943D375E4D8A211CF03FB7F37620E9EE47267D78ED1D0A247<br>8A353D2217AD5AD76892388EE7F0144ECD69CE3B5B04928CFA6A68C9FD0FE817942FF143D9<br>C2DD3 |
| $m_{P62}$ | 2968ADAE21E52DC8AE811AD840AB7600A5C6FACB2F3BF707D0DE018178B5FF73BB31F5C88<br>E9B6C02C54B8D7B1A049E39CD7960F7109AA5EE9A18E9C3E9F0E8359952E144169870381391<br>E3761E3137204CA71CCC4DB38CE4394068303F088A2497FD49DF4864CBEFA1675AAA8950685<br>77AD0 |
| $m_{P63}$ | AF21B04CE4B418B9A0AD80221A9C47978750483A83E9096D9F09069C3065E8F6F1FA68EAD50<br>B78736311BDD70F72D97290C06888ACDEA4FBCA3B25FFBC5C8E91676C4384EC68C5D3C40C<br>CD5AC3E75116CDC28C05F08B479A73E2AF7D380F69CEDA810A60B6FD6609CFB8A7D4E98DE<br>0596C4A |
| $m_{P64}$ | 56BC72E0F1CB9DA84FBABFF84FA635E1AF9B60BEA6C22F8953156C90691F44D2B4078EBD8E<br>A8BF6760BCE5217E2B0C2E19D4470D3321083486339AFD6D57FF66E21C149B40FCFC5CDAC8 |

| Code ID | Basic Midamble Codes $m_P$ of length *P*=912 |
|---|---|
| | 0F7B6ED2AE576F3ECD4D14A5C56DCE7CD04147F9D725A783D9915D2E7A036FC854CC373EE<br>8333305 |
| $m_{P65}$ | EDF8D061318EC3126958D38D4E0A0C71460B5F46E16CB7FD7A4084D174F900BC8A79C672C6<br>12E46E2AECDFCF3C744F40510FB20D15FD9C2E696F8FCCFBF80FA6A435369889E17A612EB2<br>22D50A6B88BA06408DE022EBF4EA74295F5B921AE86029D376E2D51250B79053EB3AA58B4C6<br>F3199 |
| $m_{P66}$ | B86E98A32DEB7FB6F9A120725EC9C07CF1864670A9D5082D7DB7FC7656AEA8EFA05D661E63<br>A06D436DEA5CB02E5F29F4B3D364701B1481BCACF306804FC14EE48A19CB8095F9C456502B<br>39A08593AE258DBC12B358D6918C3EB8546F9F3E36646282E08142CFA309CECC823549E0294<br>6606A |
| $m_{P67}$ | 070850FC776EF3F88456CC9841604D144CDD4B58247B2938AA074009F128682E25FE0E6DF2C<br>3991A5029A7E4EECA22C5718D6C457F3B529702EF34C7CBE96B6EC2A2391DD6079A21941855<br>B5BAE1729CEDE009BFE8CBA54C25E7F0960990B004755A647D568D290A645C4C3B8E7262C3<br>47B5 |
| $m_{P68}$ | D96CD3FAF18CE3B8D470CCA2567E54544F4F9FC471F02F6441AB5F786DC9099E16C9482468<br>A2BF0DD84C87E36C8A7D39500538FECCF76B03086065EBF38819530458E0D4B3ADF3C66C06<br>6A0651D3E8A84BBF6A4697C05DE066B112A8B6118977923DC3A01F43014B02C525663748B4F6<br>5E79 |
| $m_{P69}$ | F660B66151AC70269D9405C9A987C3FF25DFB65AEA14E5EB2A699BFA335AB16974D00112062<br>12F3A3FEA6F0A6971FB3C6F4D73A6D44543FF1FA0775D57D13AEF2E470177C55F1D823299B1<br>DCFE4CA851D7E9075CE9B8D6344B47354DA209DCE4EA6C0EB1F43ED231C04DBB510C68B2<br>D2F336 |
| $m_{P70}$ | 88C9890A01B550D44B635B0D4C01C20AEC17B0EA42389FFFB0D70386CC2BAD4D5A8E021A22<br>8BBD4059FD12854187F2F0DB1D6CF7AB654AEC2877D2B1A3A8C508CD9329A096F161B8DE72<br>866C2C99BB67024C9261A24AFCAFF3A483E8D71BA7AD985E9DD0CEC2A4B31E088A7CCB7C4<br>F39CDC8 |
| $m_{P71}$ | 1309529E28E71D99D501350D9662F3BF5E3D54AC16408117F0083FBA22F1AAD9CC29552590B<br>051B725B81B56E33E36C72F8EEFDA5F3EEF4629885BF827E05A4B918B831FCFDACC9656FC4<br>1D30FAC255D2C931D3E090897C3E75CCA520061DE330C60AFA9545148B27A1377300B064389<br>7976 |
| $m_{P72}$ | AAB7E27B83CD46F2EF18B91FFE9D9C69BB92327B0DDE3664C8974EF7BCBC77234772C02007<br>B344BB99DDF344F7E5A6C3CA3F01B0F28DCD566BE913C274F296F056A74CEDD7680CA7969<br>A34CD785597008543208DFC63DB6C847BD364BAFE11751515287B210554A5610D7035A374E02<br>43E72 |
| $m_{P73}$ | 7972CD5FFC6AF3780BB7A88BD4BF9799AC403D1976D8B4ABEAEF4888BF0C269C96572D81B3<br>BB55E33D30900CBEAAF1969F08E4EFC7CFE7F99DB9A184869DCB18A3D143AC725E46F01B11<br>EEF3940932A7AFA30E87E156428EA927872FB64CFD072106F00811359CB146C957C15C3E920<br>DA96B |
| $m_{P74}$ | D62ABF2E9F79492FD2A22FF60CAA94DBEC39C380F12290B133DE53F18B1914DB0555BF6AAF<br>47539337FDFEADC58B320D67644408C4F5105F8907F2254731D319FC3CA221974D5E9006979B<br>CA2BD89C04F2D1E1FF2D4C51F3BBF2CA5BB2FE8FD34CF05AB45599BCD6DCE5C2BC53E114<br>A723DC |
| $m_{P75}$ | A0D97790B621153CF61E6DF09D07FABB17CD0EDFD030E300ADB777FE3569C35F747E4DD156<br>6196305DA32BDE5BF26E395D6836254BFF3DAC9FE2BBACC4A5900A14E2E72E0D4D05D09A7<br>A3BCF211D1E2F7E36CA379B52BC21D937BC628D6686F59171C5DC4A223D9AB1B8F89019FD<br>D50683ED |
| $m_{P76}$ | A133814EC7D9BA19C3BF38946484310280B2333E631F2A29137230EF8B8F9A30A958D8AEE03<br>A5578EA40ADC014AB6D8204C396AD7EAB3C17B1325D7D55FFE946525ADD5CBE28F3DA392D<br>8873C82C6CB6CB65760DB5B0D985786A7B04237C0D0C5F43C903E9CC3126AEBF3BC5CD434<br>9FE2602 |
| $m_{P77}$ | 89D74B62E35F853EC718FE7A32C7B39AFCA27A41C87CA9BC76FF6640DA6ADADA997562B010<br>AA1841DB918E947989291BDCB50C9F40FFF623CCB0336FAAF878FD49BE092804AA73A3A419<br>07D5CD32A375C898373D93FCC4C9EA84A2DB9802521FD5376F9635EE1D0C3E8DC34849369A<br>757F5C |
| $m_{P78}$ | 2DDE87087BDB66B5DF7744CB16AE7164D2E5AA7B7B2CD8BB46C6A602DC9A108752DB6967F<br>1728B12FEEEB1FCB681DDC48ED7C1C3DA5536AD84CFD9F5E94E6148F4DD3D9CF3C830F3B<br>6401C8206B0ADF952AD505B96C74C615FC6F70381949B2E6E25F42D3E6563041FA5F501CAAA<br>A93C519D |
| $m_{P79}$ | ACD35DB85397D81E1124B62A60CE35E4E8214318527F96F273AB6718822971BA76448B3A6E66<br>2FAFF4D37BB2176934F80AFB3E03FF494AEE2F7C5B1D0B723E316AC0D67AE53A1C0637E155<br>729422E7F78F5FE19BB9DCF674D13157B2F8994C5DC03780B6EEC2AA0E57FB7F8A6FC0EC81<br>AF87 |
| $m_{P80}$ | 43FCF00452F2E93D9A4110003601467549D08A20E4DE27F025843FAE54D9E2E5820D890558C7<br>541FC771CDDECEA6648984D63183ADD8E5BA52F6E56956B6F1CBCD93374F34F4709DBB812<br>D155528403D364CA2E54BF1F6828FB342B3D378185A6E3E8572B2F28EF6AB194C184ACF4FC4<br>09FC |

| Code ID | Basic Midamble Codes $m_P$ of length $P$=912 |
|---|---|
| $m_{P81}$ | B130A5C2EC864C8FF71CFDC347DB4CEE38259F34A8F9CBD143763AA9DE869CA25E1A6A49D7A6FE1DC029DB9076FB6F111351C6FDBF0D1C1DDE412B835FCF0B97ADEEE7AE09241C2FD620D63F894BB09E839021D4D81932BE52926A33AC9C81AB3D9586AD2E8AE53CFEDB55D43965CA9EE422 |
| $m_{P82}$ | 7AE9E0D3F5D0295917B116C28DC20E9B305296A3FF02339C1BBA86CD3D566D0C8948839C2D4751730DB66179EEDF5B04404B7D867219715C87F9A18408284F0C0894E1864A55596DB9851D0DB68B8AF7EEBAC5C01DA3284E6B42F7FCE8877AF04713C98274FB93FC8C8D421B0B572B5DD1F0 |
| $m_{P83}$ | 9737D9C29C179CA57976D04DF9597432A763D93B69B799EC14FFEF6F84A2F56EA0EAFD13FD6D2C69462FFB551A58C17B06E32C59E605C34CA287EF8EA38F99C45D93A922C50B19FD02B130F5E704BF435A8998BE97F76181B64C56760D8A5B0043F290C1637783FBE77E9D113955431B6F21 |
| $m_{P84}$ | 29FE9F4CB903F8BFFB5134A5D8A2B3D7A8936A3311BB1905D9ADBA1E3467AC5D3F5F6A7758130E4445856422CE094D85B620611E7D8F5B3C0CF386490214FB6DED5CF761BD2BC87CBB0F4171B566FA32761C9CF11147417F50C47BD1986AFB9EC129CDA74EB0947C06B935F5A175D22E2E35 |
| $m_{P85}$ | 50D3795F988F865B3A9739FB23047D301913B7BDA5F87D0A3EAC478002A20C571D553EA190393D404E1718BDE3C780D26BC9FB48EB555A9228C323036F000CEC60AF43E23F734B104A4998B4662D1770B46B1643EE6A9B4D8D9308F4410821FDB39403652D53952D5CDE7903BEB66FDA2596 |
| $m_{P86}$ | F84F4D2894AFF4B26CF0FB72DE03D5C43D98F7A13C95FCAFA16D9AD2DEE38EBA7CE7CCD51F02DDEA932436451B6AF185E2C27173FC5DC4D52172E0451F4864933F7D829691994CD982D2D7D7B302333F13CAE7DAF6EC9E67188955207AC461AC2AC124FF94ABD2705560E5DCFC6F98C8AF0E |
| $m_{P87}$ | 058C6EE106A2DCE93EF5220D1BDFDF725CBC4DB869698A72F89A886AD38A0F42ABEDC4966FADF33AD0C39388055421F2D4D22FF5E698C4B1F002633C051582D899A9CC51973000BC3D43E64BB0E080F392DAA65ED11D081DB55BAA3AE3EF2B5B135136E2BBBF81F17A926D9293233C08F58A |
| $m_{P88}$ | 600EE81F7C9864F1B8C7337A7C1582B1A038B8461F5381276E514C27A86B1C96F61A3DFC4890023AA73A8F8FAD7750B3A632BF745881704C91198D40F0C6DE51293656203E4545EC660659EFDE97CB52C4540AD7E6942B475BF5C8C2047E38E3F79731AB972F64B519B4DF44BF25254FB28A |
| $m_{P89}$ | FDDF8C811955AA732713A5973F621C8A763E4057047D3CE2791D20A49250C5BCAB0FC702FA6563274372D03275D6B3FDFB4E981D7D35A7EEA2D99F607E88CB38D7D4B35A40934EA67B3EC9E7FE2ABFED68969E0534FC6720346D8C07CDEFC5173554F14E05BD81DCA647C355AB8379BEE206 |
| $m_{P90}$ | 624518F8749EFD5DCF5729A3D5BF4AB67A5854398C8D6A2CCB07F2BE0D676221F764716E0AEF70515873645A9F438C1250072FA65A167AEB30CF099AFC2C2504E129D7FF2BDB28B78A36A0D621F74FDD36D5EEC9BC4625EFEC4AF6CDCDC496B747134E6D94D87F7141481DEEB83B841C0E33 |
| $m_{P91}$ | F8DF107B028097DB928CF7A03F0157BC3B50EACC30063934EE28413D7764CDDA46D17EF91CA7205516B76933B3D50D385D871357AEFA2E34D1E3E929FCD08B940AD54762D21B73B0C144C4C2309A26AD3EBEDBDBDCBB0B1A49AF796DC5D8F62F479A6CC739D6B391D97C39FA017EF2D85855 |
| $m_{P92}$ | A45FCBE0688A55D051B057C34508507010F607661BA244DB1A7CE599CB4ABC6F3575A765E41C2EB8B5BC49E61162478CEB07461787B0EB6AD14CEAC878DC9257E48418C2F3292BD087FF3B4CB7758B00BC5380427E620776FFF7128254CAEF743129B317B8C21D0ED02B3B94785048B3B274 |
| $m_{P93}$ | 432250D31BCDC883439F92FFA76470DE1B6689465A0FBD3A12AB4D165012AB32B7EDEBC85968CB1BA84C24321CDDCAADB0175DC6C2FE2EBA78EB788E049F8ED34A3AF1F42519957C74896872C3BC6C0A7A210E8438EC84085A3C4E3884E8B79AA57F85937D815C493C044B80519F76EAC075 |
| $m_{P94}$ | 4E3834426643F2C419007C48053C6B7AEA54D231D68631D5CE305FC33C155405B2566ADF0BC3E4D70B498B3CB2981425D610559C2EB63213F07AAF3E240653230436ABF9D823799A05D78D4D5A45A67F6637C9D9A4BEF410BC0290BCFB47E206A64FB6EADA1CCFC9B77023EC705670A9439C |
| $m_{P95}$ | B655DDE80717690057C86FB8C2F94A922D4965624E527B42C080EDC3114472B5D58E3076EE606A6513515FF6FE1F5C6CC4F6A34AD865C7EAFA03558BDDA4A96A838B1D13543B87E382A4CEC3383E4F2EC960D9707CC52624905326B32B0F6C8F3CB3FE7D912B8040518E61C0C1D0BE6135F4 |
| $m_{P96}$ | D3817A6FD2936F4738A55F19CFBD1EE3801CB86F9B9656D39BB4CCE5EC930CB801BA371A05876F63F2A9919BF8E769F140338176169439309841D43FC304EED8D80164D2EFABDE83DBBAEA927748597DC553E6A2EC52E3D7340FFBEAF817484A7558B59753BD8661596C940CA6F16570D6F3 |
| $m_{P97}$ | 0CCD1503DBC6DB746E369372930B18BEC1C972C30D3BAC9547590AA432AA5280492851CF8935F74A5431E97169A3322586719FD703B122B70A0394D784A010D6B9BCA2A9C7284B8368127F |

| Code ID | Basic Midamble Codes $m_P$ of length *P*=912 |
|---|---|
| | 2C00BB31CFC8EC1B3A31EF6EE148114BC0867C1182A742FA26A2EF1F62F948762C3FC6DF7E1E4C |
| $m_{P98}$ | 68AD9382C2FB0471F415D72240613B24F019FD981423501796E76898F2D423801EA8321E01CFEB9DCE4AADE7CBDF0C10F94F98E6C9A561204D4051487E5326173030FBE760C28D8BE6815FCE78805E9C55CF7994AC8482B6A13254CE7FD3ACCD6D96CC35913962F57965D2BA905D50F4F7F4 |
| $m_{P99}$ | 965AD6AFCF7A822E2D0A7F3F8B23BDDB9DA7667882789C85A010B0CD095E2BD43919DD6BC8F290FD5FB7B1F0A4F8C47C348EEC37F483B7572135285656 8DFCFC16AA1168E1D948E9861A5E693AA0AC4F26225CC888DF6F326DF4D5014C892ED9A6A8E99C4140BAF7C03873532F0CB1EDB7EF |
| $m_{P100}$ | 11514B31D4E01ABB0202CD8B26B4F3610886058BA519EF4C9701EDF8ED2E935F65AFC454C0B672B14B06672BB742640EA5BDBDA47FA5F87BE583F65331E2A30CD850B4619637DD7B8464606F10236714131E1D2AB4EC55654D05A93050E6F8748B4DC83C6202B7FD63CA1FC0EA00DBD48538 |
| $m_{P101}$ | F6FE8BDAEBB7FAA334EC95ADC619F8A04171707C84C79A7C96F973392176EB7AC5626FB24D0F88EE8D5FC99DA5F03C381A93ED455B13DAAA4DA3EF7A092D114316F6D25F319473BFA8EF025438B0A510DB7F4E8436A38B16606150D2B35B2872DC206AFB17732FD16219BA58CBA1CE402B9A |
| $m_{P102}$ | 912FF3C82D2B7FDA4703DAE6E349E1844212B4672DB02A4D0D4465220C1A4CF0E7D56C945ADA538D465A76C7DC3AE272BCBBAA4FB9D9925EC41FAE0735380C1126E36EBEE55270F99A0D851FEB280B103E3F51080B99496B2E3027F6EC16D91EF42C58E4089AAE68CE075D323C4A2D409CE0 |
| $m_{P103}$ | 4789D7468124CE0AB731772154704A07BDD14C319DAA60E9E3B55E30D61616301AC560BB31B6341FA629F630204D057A74B8226EDE4A4696159DF3BC7DC3597072A1A95464142AF23103CB7C28AA69A7D2CB990967427F9EADF3EB65FB95DD72CEA804DEEE0924307794D99FF406F0AC40F6 |
| $m_{P104}$ | 9A5C8700EF68ECFC28CD6552C267515F58593EA84FD48BB5D63EA028DA77F92787FECA4FEDAAC04591502198A10725B62AA7361C932B58C6F4D431103A56AF5A8400E8DE5AD26788F28526387908EE52B030B639DEBA260A321B09BD60E7BF3C54E1D8264A04B0F65D81F9473622CC05C3AC |
| $m_{P105}$ | 9F6A2D1D54D09A6A3AF7BF514DC754301A164602D531807186D9930FCFAF112D40F72D17DCE9C40E9EEE8FD2E5D1D3BA4543ED609DAF163CED9BD0074D3E5F7E17F5AC7B4FC4CA0690977DA3533AFDBA5BD328BA079BF2335364035D68673B98330B92AF5E3C26A9AB596986EFE9665219F8 |
| $m_{P106}$ | FFEDAA9F3DC1F267C121D6303743286B1AB1094A1790B58B1E4DDA9D16303A3289BC4440987775D6491383589C96181AE093289D42230FD88BA098F3575FC393246726C9EAFC6955EF135EF07E862915734A5994D2CA7301FE844DE7B4BA9417CF10045BEF5F4D4C5BC044A347E5C9E99821 |
| $m_{P107}$ | 644CA39E3F93C4AC795EFCD5B8BD90228E2638BAE24CF4C3DE75697823DF4AEDD3253E98081C4BD215DC64A9E6BC0115027F6BA4E4FE2A93FC726DBA4D9D21DACDBC76B45377B68863F9FD426E4F89625657EF97C03D277C373E15D21EB721AFEAD246ADF1A0A2A0CEA730BCA98CDD4CB808 |
| $m_{P108}$ | AF16DD60C5458A3D27E36850281E401B10116D5B0BCEA1B159C97487584652047981333D5573686F4C0A063E1186306FD02DEFE2C61722C5BBED60249AA2D9260ACDF870B3B5F5CFD7581580DE486D8D9F332A6C6B6464AB0E9D54159CCCD03D6F9CA12C13DE34145B34FA40703FDC76AEE7 |
| $m_{P109}$ | 33FC7C9D9FF74A2FF009240C3AF398937D078012219BA54C6B0B0D9448391CD1D4017CBDB54AA59355EF05A9712779D71761D96F650EE10546C39694938AEE89F7CE6FCCF4BF987D0E9DD584992F2732D5838A92E537559EDE2FCEE82302D7FD8B1C9CF8215B67BE61D4EF4523EF9032B1E2 |
| $m_{P110}$ | DDAC8DB73BF5A8FD9A74561DE805959C2ADC755274740993616B3771D10C6F5B0B8E4939A444F280B39CFD29EA0F562FEE0405451D8D9DAEFB8B1E0C8D69CBEDD6D23D8A56A3A9B87BD6EDE46FBCCC135D70B8FD4619C35F9A72E93E8954FA787B8452347E4B209013736D0EC059A243803B |
| $m_{P111}$ | 516913696CB4D961C939529F64585F08C42D1FD1DCDC78F16DFD5BCE287434ED251FA1AABF676006D75FC455DDE30C8840BE6AEAD10F8A12C641800C35B8CECC9BB54037AB1075190EE3D2D8D81F675898FC442A57B3A7B18B0AF90528DA8019245182E920B926AE569D656E3BB03A975CD9 |
| $m_{P112}$ | B2419222199441C48BB085E7982DCFC0FAEB16D39DBFD22270AB8EA6A802DF3580ED6A68A90E3AF03281B48ED3FAA2DC45371E3733539E70B137ED82D5A2CCC2031BE3D6A4786EE9D9A9153658EA0B483EDD49F9D1E189F3D418B73825CAF3B4D05A805F80FCCC5949704252390DD3E86EF6 |
| $m_{P113}$ | 04D96F94A767AB70BE85D6EBFF3831E2825595CAF1583CAF2B75010816DF65757F4BB4BC58E011FC5CC50F220EC72ABF672E8C9A29821D4A106603187276492C366618C68CECF60AA6D4B4F03505EE0BEB591336E130EF4593C5C11749CC3D2974B1AACD0DF19672F9330457241E201DB7CC |

| Code ID | Basic Midamble Codes $m_P$ of length *P*=912 |
|---|---|
| $m_{P114}$ | 12CE52D22E8BDFC665F49D86AC6C488C9012088FA091E5EE13B7C45A9A5CB156F147D6ACB<br>FF87C4817350AD15C5FC3773F3C58FD0D3B88242CC46DD43A5288933ABE5A6055FD67B1159<br>3C900A9654D82BE40200E38C7A9643BF25419861A2D674B84995301121FB34389CC5AC83E94<br>CCC738 |
| $m_{P115}$ | 3831B0AED8C54E6F5F348C22351E35AB1099C47149117A40521B30D005DB13A81337A7EF75B<br>0A6FDEE2012E394935C2D61C0BAED3B65D4FC768C30F654E97BD33A54F49A2753915CAA137<br>F8B99861872F00F6C019DA1A27277E1FD648608CC108EFA2D85490980F7570C37619D5F4785E<br>A45 |
| $m_{P116}$ | 2D7BDCD4C93F3175F441994A9B188976A7F4F714A80AF693139FBB757C1D0D71274167EEF2C<br>36F891612ABF8B3504FB2A1F0BC1DF24186A6C2B79A4EF118F67FF477AFD650F6BD208599D3<br>31C3B5ECFBD173C25D7CBB9A0C9D4E0F455509A8BEFD805201429E3192D82477E4E85D606C<br>53AC |
| $m_{P117}$ | 01E085F900F58E7769F8C8A24DCA26984EE56F2D8CF0A0726508094A20ACAEF0703351EBF8E<br>DDC1C59012F9A3032B11D5BB260FAD321280BE48642CE84C0D3681E57784332A87DA3C06C2<br>CCF0993A6EC2BE1A979414EFADEEF3CEC8E12C41F55DE52D48F0B851EA968C159B9CB2D51<br>4CF4C5 |
| $m_{P118}$ | 32814E789480CDAF8D0E09BF65DC4863B99B8542F0693D77ADAF6F32D0173110789E26F1BB8<br>F9A8A71D09DAB03FD52935945D7A4EC68C8B043B27AA81200CCA1DA23A9833217CFCAB5D6<br>2E0C488EA2DA2C73DB031F205D7F960E9D8918A5C652C1501EE93204D273464BEF438A94DF<br>4496AE |
| $m_{P119}$ | 15DD44EF0204B908795A090C32188643FBE7366EBF30DADCFB2C41953A854FEE39EAA7E9E4<br>E58E30B45409B72AD05B43BAE11095FB1D20FB2A73E04448DEC973926BD7BA0EC291A29AA7<br>EBDA5783A2A253649F036962A0E4525A07C66653394116352439A2520891F8E18D2CD360FFE0<br>B111 |
| $m_{P120}$ | 89217691E99FDDE0598092D7413C6946390C718299455B5B455CFDE3E2E15CAE056389BE60C<br>836B500053044568990C9EE40582F6978F91EE5ABD501408EFD805F4F64FCE2FAA5607976AC0<br>16633E12FED435EDC627548B79898DE3B5FA8B246196CB2F4289A0E3FBC7A4A911274D4CCC<br>980 |
| $m_{P121}$ | B3047C6EC9C960702C122202B7BA48D54A1015C1F9CA22D879FF5435C6EF930FC5EF8FD811<br>3B48BE47D794B87E5194F8E7B4525B4CEE45FF5D0D70CCC00C67496943EBDC878DE4F9BC8<br>849A24CFB05282B117F140A4B1967B8F4E38A0637A4E8C916914CFAC15D399174B1AA65C86D<br>A472EA |
| $m_{P122}$ | CED19A2B452FB08A4E677AE137AD75601BD7824CE59E4FA627A3C5AD101920FFD89328B3A9<br>17782F05781BA0292EEB18193BC1C3C02B48D272D449F381CA20B12B1C27A480C628A33AC47<br>2F2EBEEB775D3D3681A365C728DB9476CBF8744D84448FC6303BDD28BC38413277F6B61CCD<br>4A913 |
| $m_{P123}$ | EA7FD3D0732484865089964AFD0181F0A64E0B9BF58C20C3F34D45739C01ECDD11681E3B4D<br>175D237A19C2800C8024FB7D3A14DDDA53180B10E8F1C569DD9CE06FF19EC958989AE43ED2<br>6E96DCA2E954BCBB6EB502F0C269EA75F5CF002BF49B383A00159C0D39AC71D502B5571636<br>16B66E |
| $m_{P124}$ | D08DC6EE2CB2EB2D3890230CF7411F51F71024C8F05CDA7F958CBCB81B12C0CF27342431C<br>CD1BBF61DEF50298E87ECB4A98C489D3CABDB55CE95EEAFF850BA13C0F772CD9F2943F961<br>227078A05FA3AEE18E61657D04AA37B7F98BF5B6DDEF0F87ACAA5B4D1D2CE0622DF6B8816<br>EFAA2F448 |
| $m_{P125}$ | 70C1FC8BAE04C07CD256269A02056B79CD0014D188197B4BE89AF8A460026EA8FBC7C13A77<br>93F2822A94A4A7234727516D44A5BA521E3E28C34396C69BEC8233FD0D82FA8D5B2C4F12F92<br>84962A6F19C2E655AC44BA85F064E8D134F28F9EC479FDBFBA74223466D185CA34C7188C6E7<br>E515 |
| $m_{P126}$ | 82323B03B81937932EF44D0BB2A22DF5F8803080618940A4F1DED2778230FBE3D04545B86B1A<br>AC4AFD43A90DA09148456DD81684F7C143C48C710076ED7A60BD6128BB9C4717DB97331CFB<br>667E9EC1D4B03191B3A218B12CC957A3F5182A452694FDE1A4241B1410DD104BE1551F1E85F<br>8A5 |
| $m_{P127}$ | BE616513AE32C4143C92A7CECDB56F082F7907098FF61403161D95CA3767AAF7F46A8D60D66<br>C6195D27F25FC5D0D840F7DDDD67A3E492FD9FB85A805CA0438F822BDE583BC11B74C760E<br>D2FBC9DAC6F361EDF71B17B96B065D5E2E43A9A87A7CD561FC8F4BC809F474D68E6C4B6A7<br>542065A |

# AB.2 Basic Midamble Codes for Burst Type 2

In the case of burst type 2 (see subclause 5B.3.2) the midamble has a length of Lm=512, which corresponds to:

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

Depending on the possible delay spread cells are configured to use $K_{Cell}$ midambles which are generated from the Basic Midamble Codes of length P defined in Annex A.1.

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

# AB.2A Basic Midamble Codes for Burst Type 4

In the case of burst type 4 (see subclause 5B.3.2.3A) the midamble has a length of Lm=640, which corresponds to:

K=K'=1; W=256; P=384.

Thus for burst type 4, $K_{Cell}$ shall have a value of 1 and the midamble is generated from the Basic Midamble Codes (see table AB.2).

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

**Table AB.2: Basic Midamble Codes $\mathbf{m}_P$ according to equation (5) from subclause 5B.3.3 for the case of burst type 4**

| Code ID | Basic Midamble Codes $m_P$ of length *P*=384 |
|---|---|
| $m_{P0}$ | A88E403803494ACD25F9E40A2DCDD572F13461ABE91E3931AE9BAA94CB6250B33216EC49AE028C3BBC10389C97F8652F |
| $m_{P1}$ | CC81718FE2E076D4CF6787847831AAD28E7B131136D8F6BA65B6F32240918434A3F445405562FB1449F10E152DAF8E57 |
| $m_{P2}$ | F40249685685DC493F2F7B8FA91E3373C9CC902C0BD54963EB4661355AE6F0CAA345E3043FD5943520360E136708D755 |
| $m_{P3}$ | 7699416BBFC40E597656AB7B319EBEA4B6B898BA357DC20BF01A36A2FCBBC1191012836E532F0F16EDF1B1CEF8C8B8CF |
| $m_{P4}$ | FAEFD4A1EAB45332B43D34DD877032192973A4D6F3DF1394E26FCB2FE608A777FBACAFB87B8598AFEC0387456274D828 |
| $m_{P5}$ | D7E24FEBBDEE2558FD4B77BE0F9C79D86192A829A93A8B8B4D93322B1ED2C5D8408D9F64E75390B7FA9E471EE94503C8 |
| $m_{P6}$ | 419C96CBF5D07CF7E8CA5F0F768F635EDB2AC91013955685FC464F533BC0A7258D1F820E79FB4E3D64AAC88DCDBB3089 |
| $m_{P7}$ | E3A9C7C56BD042B22E63B7A593F95A82FF67F59F50DF76D419022A69C986F86F98C0D3981B3297BA8844BB0E9CFD7C81 |
| $m_{P8}$ | 6D15CF45BA384523320B323033CAD89B6738F7AB22D252DC51AE9EE06F290819C6BE3F7F9A07DE5BB70E57E8F878BDE4 |
| $m_{P9}$ | D8EEF2FB18D658B7C0BB3A1186FCCB4F5EFC5768F6989946D7858A678EE850D90BBF2520B92A7131143B9F7EB9F92E8A |
| $m_{P10}$ | 13C613CF8AB1ADBB998FA7E415710C87FB2C4C64B040E153FD2A8FD05DB395B4BC4BBF5611855AD3F354DB99F1A7364C |
| $m_{P11}$ | 64B93D117F33C1FB4BDCF82823C977CD7F749512ED50B51D9399EEDEADF57C39B1EEFD1823272C26121F74967803ADD4 |
| $m_{P12}$ | E9757EF85FFC178DD991A01C81AE8A36E47B1450E6DA60C96967E798E47B43C3BABE4AE7FEF186B305E6AEDDC8D0A4A2 |
| $m_{P13}$ | D83562B863CAECEB41458179A04E4D90DA7B6F15C627A81480ACF210A3403E7E60506E859665EB6AE94BB2079988DBCF |
| $m_{P14}$ | 54D018301703F6E38A1DB4496DB91650AA4715A51D4D1807401CEC4AFEB6368B9AD50A15FBB7238935963FB0987671C8 |
| $m_{P15}$ | 20176660D98A8C4D0442BDF1F0EE3FB4D1684B7A93684FA4395B784D1CA8838A238F28AFE9003C4D3EC0562C5E79DEA6 |
| $m_{P16}$ | C5771FEDE124CE07C75F48321D8B0EEF34275CFFDD49F7D59685CCA298D09D36A558C903E2EE5C74A20EB02E50FFBF9A |
| $m_{P17}$ | 7B2AD0AA898419CE863FA812CF47B32F369C9A404A936648F0DBBFBF521E822635E7A87B17C138E2357E957737F4D67F |
| $m_{P18}$ | 0005E4C456A52687FB8C38217E39A6CBCD18EC8AC6951F7482CC19BACE70BA1E6E116AA6A5780F656C72B49EAFCD0312 |
| $m_{P19}$ | F7561674AA43738CC1EFE9434061CF17B8FC55792BFFBEEA2B61F5E1A46BB14B19926DC98BD4B747166044BC0F652693 |
| $m_{P20}$ | C1F98B595BFB89F7F40B1D84965981E7035455112C337DA389E04D8146B6F40D83352895247E53142A8D7BF7063A0E88 |
| $m_{P21}$ | 2374B1EB35DE57B4114DA547D25C39887663800D53E7C0A4A8A97525E7E364FA011B23A113A4C1067763DA770E58CAEC |
| $m_{P22}$ | D3E5382DF383595C983C2CC2369703A5867C84AB2EBD9C72044EDD8CD5683BDF4CDF10ED04D4DEB1D3D459020247A206 |
| $m_{P23}$ | 7344E4A74618745A817E7036FF6535629AF647E852129F6F70887CEAA8393DC859725FC7BD52CDF241B31FA7BEDF9BD4 |
| $m_{P24}$ | E1EAA999935A9C04CE360B3077241EF63FE1103A3C15AFB1CFB7AEEFB93CCD5357B0068E70F28EDA990B6906AAFFA4D2 |
| $m_{P25}$ | 39BF69ED889CD875DA83108FEF691ACD1FFAD5B5E76218318EB45DEAB2022D82455B592C1FC550FE197165A07E346D5D |
| $m_{P26}$ | B817C216E9A0A224D8E5A4DF3F68D53BBB89B156261C5FD877FA96352A073B6B0E53BCF0765093DB7AF0C6E13AD98BE8 |
| $m_{P27}$ | 075DCFDE008B110F56C59A61219770846DAA58B896D4914047EF786F03E13F985B03BBE4FB3B352A19548163C5144B69 |
| $m_{P28}$ | 913AFDAD21CDAB1D363C8FFEE158E9EB5EB699D54DE5E65770A963D349744BC935C4ED0C49903CFA0F13EEFEE3BDD511 |
| $m_{P29}$ | B6C348E72A210714B90035C905F22D6777849F28C0922E3356DF84F655896C2E8E8DAD0C1AA |

| Code ID | Basic Midamble Codes $m_P$ of length *P*=384 |
|---|---|
| | BD7CC81633CEA68E8AC47 |
| $m_{P30}$ | 51813E8CB9F2259B52C62FA1955034D0BD52B39C108EC46D3AFF6F8F8C3BDD1ACB3725345C<br>E83C0AD7DCDBEC4547FC96 |
| $m_{P31}$ | CD1DDE061856436714BEDDE2EE9DE7A9A2D795125FBE023A13AE1DE727EAF0B6265AAD72B<br>A3BF4C40C82996F486A50EE |
| $m_{P32}$ | 1690CBF556A6D9268773D5840033E9DF832FFBE2BD0F09D93DFC18E92340EF9CFD11BB6331<br>D7D572D7D17CECAC6D2D23 |
| $m_{P33}$ | 244048BA6D32A3793E12532E670BAA42EE28BF58116F67B9EDD184E1861476D928447A874A1<br>EB0A6A43F1760EB19B83C |
| $m_{P34}$ | 81FE8B4F56FC4BCB5E1366CF41E6C559FC109846FFF538636862AA52A5F12E1F974B656D381<br>1C882A30D56CF2775E473 |
| $m_{P35}$ | 921F5B3F5FC92ECE95B09141BAFC214696D1E534E711856E327FD1D8823D4854C510E6C381B<br>ABC0B29C600B193F9130A |
| $m_{P36}$ | 50A3DF0CC1B0A1BB8573F7F973106FBC94504D86DFDA067C119072D8745FA8D6A263D07DAD<br>DA3723ADB439BDE5DB539E |
| $m_{P37}$ | C3C0412A03C79A6A77AE17DFD4C56963BB56550C3745C9A5DF8E68855CCB60290CDC0F314E<br>260AFF330194A62CD4DB44 |
| $m_{P38}$ | 66B2C238B87005022F58273AFA04E2C590C6D710ADE4549E735E99E17D1170A1244AED82D51<br>465FF3FB6416C179C246C |
| $m_{P39}$ | CC0D235E5D80947EB754EFC63F6EECA6F0B9D9197C24C7A14CD72CAAB26A8F5386A231B77<br>A3AE0D204369C57DF0D8E6B |
| $m_{P40}$ | 6CBC1D14CFB4B14362940B67BFFE9B3C333F1DD8A97D9F947292EC91A3D01BE0FCED3529F<br>78AFA2A2F74213B87218E6C |
| $m_{P41}$ | C3119C5FF33FC2CB957EBB2E9B993A85BD70BB99E3A6CDA07E4343ED282293A5F4E7F9C9E<br>D356B322C38259FE10EEFD4 |
| $m_{P42}$ | B684A2F64D90CAB23140481057AED62E36315FD5759ED05747E4A149E784C78C52FC09EF812<br>32BD1C1647C95CE10CCC3 |
| $m_{P43}$ | A70B5E173176C74A6CD11BA10D026B8C86BB44814CD7C27C0A03137CAB8725AF6CE05F7A6B<br>2BA9BCFB1072A8152843A6 |
| $m_{P44}$ | 9257486C5A5AEA7B21B9D736FA20C34C22AA3FBC1EC9B66CAB8F8625DE7F4522DDFD8D7A5<br>22F6AC31AD7B03463310C1E |
| $m_{P45}$ | 1FAEF03FD59EC8BF1FA57595018F1F7EF9F4517CD0F1AC5B82FED8877AD34E7333F06C3D5B<br>CB3592B2B1084036664A51 |
| $m_{P46}$ | F838C88284898DDA2EBE40972DA884AFE7912367CBCF5453894E639EA54A053653E888038530<br>BC516737C43786A5F2C0 |
| $m_{P47}$ | 1171FDFE14B8A432BAA6401868CEA05A02572C83FFA26E16444B0AD21C67B3F190D9C3A61C<br>3F123523266BD232BC4BB5 |
| $m_{P48}$ | 6055579BEFD3E751073BE2EF913BE962643CA37C14A172E607C7A8A8C57B521D34B121ACF6<br>AFE419DC7E4DE665239251 |
| $m_{P49}$ | 5D9DA3875FF37C084F7917873538EB73E66B62B74B82EF127855AAF990DF7D2D06FEFB33168<br>1846B928BDE429E01551C |
| $m_{P50}$ | 24A63008BB9355A32892C8BB5F50D6B1B0007563BB7E2526DF1C9D4C2439630E9EA3E8FC6FF<br>A34E297324EF00AD1D063 |
| $m_{P51}$ | 2E64310629FBDD2F27B3487A7882789B23B833273D1E7AF4E7DF99E26555DA45AAA7BAD244F<br>A71B00B6155C0CA50EFE9 |
| $m_{P52}$ | E47949C3577D92C3635CB7A96E8D63A778815DB1324053579BA12560B46E7EF7B935183E3DE<br>0A79FE88FF857B90DF2A8 |
| $m_{P53}$ | D11CD2FCD449E3504A3CB8A92650B9376A927F882231507D9FC7A851AF31AD0977E1DBD594<br>52532C0E841E82501CF8B1 |
| $m_{P54}$ | D9173DEB459627122EB6F6E27B11FFFF944AD65E9F2729FD0F340486AA4F2E58CA7647C25DE<br>C30FF55530922C46314F9 |
| $m_{P55}$ | 70ED8ABA76E26BC7C9E8748930944691EC16B7F702042733306D10824DA33E8A2EF190FA80E<br>D616212F2926A8457C7DC |
| $m_{P56}$ | D7CB3386C837EF00E8E56C07A3620AA239E182929956B9423B364E3117D2E6165EDE6FAF13A<br>009C4304AF6F3A5154ECA |
| $m_{P57}$ | E1671C07DDCF6CF5DF9A9E0CD9E6FE5C56E21CBF48028EEF2DC57993E44A46C1D32B0DAF<br>DA39695EEB5D8AE603315355 |
| $m_{P58}$ | 036B1806C6F2E9C263C0470BCDE197D43C8B9A2046A26B8FDAAC49FFA1E6096A7E87229574<br>A67B7BB7FBBEB9754A7EDB |
| $m_{P59}$ | BE3B978749D105923F6B5D8FB00F96D7C9B6C50989513D7197FE2C5DF74BEF6B328B9E884C6<br>BF848A9C57D0C42613CE5 |
| $m_{P60}$ | 54195927E67F3D1A28EA929625B6FD934EBF60662A37D64B2BCCFD8A3C806E5EDEBE9BCFC<br>37F7EEA5026E071C2F10CEB |
| $m_{P61}$ | 088C7E3F08322F71C5234A2DC35A19E385FE21BEE0CC9C2E6DF7E9F4BE424B86A583F64A9C |

| Code ID | Basic Midamble Codes $m_P$ of length *P*=384 |
|---|---|
| | EABA6FE76E0A9D9DAC9545 |
| $m_{P62}$ | 2BD321E1A7ABFAAC6CF26EE71D2EC4373C05FA907BFDD3C929446FCE9714F98A89A0F41260<br>E658C8BDEEA291EDF5ED3F |
| $m_{P63}$ | 0CACCF6119FFB876DC319D3F95AB34899FEA7DA7C264A8B897087F5D58776F4978D9F4A8DF<br>40E0858655C82E7974F3C0 |
| $m_{P64}$ | 370B1A0FA2DA6E5F8B79D567C59404BB5DCF7584C3193BD37CBF1CFE465FC28EF6F15634E4<br>6B7620CC3AFE5482ADCD40 |
| $m_{P65}$ | C4EF59CE4C46245B85E50AAEBDA987F51614860DBF05A0BF66706D08B2CBEF9306A9A3A811<br>7682CD40A02C394DA8563B |
| $m_{P66}$ | 3C77FF11EA6861254F844E393C6D8856939780A8A1F86148AE88E8C09320627CE6176936FF96<br>ED6642AE7E33A82C5599 |
| $m_{P67}$ | A5AD10EFCF9DE41D6436B38590FFF5C582B9AA60ED65FE5596DE566CED7E8E41C11156B541<br>8926875F06DBA319CCDA1A |
| $m_{P68}$ | 82B543431DDF83D2647C3778A41BCAD41295CDDD0A496D133E2F5F4577582F7D377AB993CF<br>18516298EADFB3BE01AE7B |
| $m_{P69}$ | 027F6793D64483CF5569FEF03190B2190CD0A210AAED5C13D8A726433660F8095A6A46715276<br>050C77B2FBA0DCF5A3C5 |
| $m_{P70}$ | B37EECA1A844DA19736EF3C5FDC6E3571BC7E04FB0A1E2522D1A39E21A0BF2D1D066BB9C0<br>B99F6CA0D3A82FB7561272E |
| $m_{P71}$ | AB07BD3A4F83028263156FF5E307FD5D253689D76A8AE789691F339258EE9BD1EED8DF3C3E<br>625E325B28A96A467FA181 |
| $m_{P72}$ | 2A7DA74C4C39B7BEE0CFC2C9F22E00910EC527B3515F486A767FD63B4C72C24F87EEAA337E<br>3357B868D6B88C6A19FE2D |
| $m_{P73}$ | 21008CAA6C91705013C5753F1400B994BB1F197327B09D0E7DC7DA0A6436DEB19835E26A949<br>051EF75DAE4BF7864250F |
| $m_{P74}$ | 3CB53B21CF1908B000B5675EA9FDC8DD3501FD7C5CB77A3C48C6EDA3F4D6133E9EC68374E<br>708978B296CCD708C75DFDA |
| $m_{P75}$ | 6F9CF0F9C735DAEEE85F6EEB096A163D18DFB7D165F2A9BBECBE152C8CEEBFA32CEA5816<br>A4966469DDC92CC095728360 |
| $m_{P76}$ | 597EC8A534D095769B15D0337343CCDCA78E696E9C7F18E7BE1C4C474FCFFCBA2E4EB257C<br>04012BD7094ABAC47842FB5 |
| $m_{P77}$ | 333D73827842A2203FEB548072C28C290492A2B355EDD78C1B65E0ED270680E67B98929EE5C<br>89743A78FC342CCD00AFE |
| $m_{P78}$ | 5BF3C14AB0643D1DBAE821BACFFD1A47A6FE901F2338162624331AFC25A2A66E38EA958114<br>398D13E4FB4699A4051AC2 |
| $m_{P79}$ | C99275C3D2108C1C9BAFD62AD68C51DC57ACBBE8B263A18868F4A1A89823C914FE19C85B4<br>163B4B10177A2B0513FBC2C |
| $m_{P80}$ | 4C66765966E60CB0B1D25566FFD085EBE34571B31C820D42F30A53BA4BB2C3C220DB0B717C<br>7D3961DED7902B25FFF67D |
| $m_{P81}$ | 1602E7FB6ADDE8FE385D43E33322D734D8E7B920CFAD9F71ACAD855C71A57B8B40CEC5ACA<br>32E073B642E070B6BA6A2AC |
| $m_{P82}$ | 5B43BD325ECE4E2DFAE4DB8C861F5A7445897406EBCC625E075184D18440B395DC4EDABBC<br>20E29518A41F7F1652003A9 |
| $m_{P83}$ | 3FF81A8A1493C202BB1062C49D88395F74DAF53A69BA63896571383099CA5F8B915E0670867C<br>61EC8A794FAAC0A44A17 |
| $m_{P84}$ | FF8DBBA2E6C93F02CA775F8510E975E825AF2F43D3818746BB4BF930D54E84EF5E34B447CC<br>375DE50CF61436C62DDDCD |
| $m_{P85}$ | 40D95EFAD7A7D2B1E00839BD4892ADB5CD1F93B8BAF7CFE528BAB563AF711CE5A6A4C1C90<br>19FC705FE07A8364B9BC866 |
| $m_{P86}$ | 531F4E313FB8FAF0B40B70B65DD7414C4CD9028D34CE27730690B5BF05FA3C7E5F0FDE11AE<br>A05A450BB358433FFABAF3 |
| $m_{P87}$ | A2FF0392249EB69A3EE41A07D50AAB42B1786988D5C3569D31238B86320529825A03432995CC<br>F599561A6E728C1077FE |
| $m_{P88}$ | 6FDB10A9B40B83D1D5335E99DFDCA540CB0AF54157145634F60AD3690EDED4688BFFBB1C36<br>F38D95ECAFFC363D1C32DC |
| $m_{P89}$ | 92E6BBCDAD4D50572520D0FA4D6957A844180CE6B56814CDAC0D01FCD45973860CCF95D04<br>38D2E99740EB6247F362BBF |
| $m_{P90}$ | 64F199A6673EEBEE362837001ED5CB04C787CA34B5812D1EB9ACDFC26BD8CF7D6837A3E17<br>5776E47EA7BA8A185BAEE02 |
| $m_{P91}$ | 677B0CDD0AA2362F9FE396A86105F98DF40DA2F6F9056BEC59D4F58FDF9F8B3C96CB756912<br>29298B087CECCE960FF58A |
| $m_{P92}$ | DEF9FAEEDEFE2419FA4B449D1B89B5682E2737893D73861E8896751C98EDB97FE420C49B47<br>BD5C613C6FA4975D45C9E1 |
| $m_{P93}$ | 1726AFC63875C59FE90AAC65B025B474391B5260DC7CE6BB922B02ECBFA91C53B9110C02AA |

| Code ID | Basic Midamble Codes $m_P$ of length *P*=384 |
|---|---|
| | 5251ACF6E8C1360B26A00E |
| $m_{P94}$ | 35312E77E51F7B5DE09F130BB39C8EAF2CEB52F25D1E212FF6ED76A1FF24B777C40887143C8<br>A62794595D0B1D0BF2CD8 |
| $m_{P95}$ | 5D24F5A606D43E707271201EFA13E6895BA4F2902A20A40D58E238E601644ADA7CD86D9E99C<br>5656ABF1202B6CC8E43B1 |
| $m_{P96}$ | F80DF53DF2589FF24B7B328D55FC7F0D48FB86C29C29621C6A430B08AAFB7D5AA85198373A<br>77F7B12892E881C3926E7A |
| $m_{P97}$ | D052486802107E23E728599BB13AF620978666D0D7754F5865C0D22E9360DA73D581D8C4438E<br>BC5C2C3D56C74222297D |
| $m_{P98}$ | C31DC3517E333297B221A9F7CE515A937E73E7CA83267C2E9F5EBEAE1B2560FE08ACEDF23F<br>36BC3ADE463F2D54D20846 |
| $m_{P99}$ | 88A39E4C76F47734449643EEDA50D53FF03257408630A124DF37A3E1CEE6CE99774A8D4F4BB<br>C051610E8678D178102C1 |
| $m_{P100}$ | F97DF22FC49643368615CF1AE6D533DF665526FF687D6700FDABAE8508387A0F3C8CC570095<br>33C6CB4E6BE4745BD79D9 |
| $m_{P101}$ | CA8B772CF3F8D8DDA7F6F150055AC969C3DD65E9877C874BF8FF647059C4F72A73571B46913<br>EC206CAC682EDDCB01563 |
| $m_{P102}$ | 211E6E505E3B7C4BDC9DFAF1EB0457627847593C0557E1426A1DA992CDF40CCADA7C9FA6D<br>ECDF1D3CCB9C23DFCFCA6B1 |
| $m_{P103}$ | 548D9792FE5C5707FB28B1277DB9735FA78847F0DA1D6C153EC719BBDD5187C496F72579E6<br>C74405859C218A03B9FEA3 |
| $m_{P104}$ | 49FCBC2408159269EE42A32A5F0F44D1D30DC91756E274E573DF961E7B05DA1C532AF3036B<br>B31BFE77AEBC37051FC96A |
| $m_{P105}$ | 09C767858FB0AA0BCFBA1FE6BBEBEC75765BDA2456959A84FE9161E2E5F4260666D3FEBA71<br>924E26447BAD5B92E58E79 |
| $m_{P106}$ | 622AF5FCD674D2C2D87205243E19B1C65726D78513C8FB88945A5F38D1C6400411753F63402F<br>6280CF702ECD6852E4BD |
| $m_{P107}$ | B53353D78D382A74373C16B36888D56575DD25E5701E7F8C8619DB360B422632E7002905B16B<br>1B6D9BD5023B815C2C6C |
| $m_{P108}$ | E183A082E8344992730B23036E315AED6E156FA27045DF86B067A99FB68D2DFA3201205457D3<br>BD31A88F0BD88BF8C32D |
| $m_{P109}$ | 9AB97BB759FDDE364A61F5158E6938AE346A03F6D073D0C4ED838015ECF56477D736A487650<br>670FDD6D0AB1245EB60FC |
| $m_{P110}$ | 08C36A4F926400AF9A17D43CAF2613A9D639549C94EED7CD6FF00E60D985DAFC394AB8BA4<br>CCC9EBFC7939D5C3AB27FEA |
| $m_{P111}$ | 9881A3B723E688515287243A605FA52838AE13E94BFBF4D97D6E04530C2EE43906F7F81019E8<br>6AE4B32504A92F399AA1 |
| $m_{P112}$ | 2807EC91A1E3CC4847A758D16EAFE7E3AB0DB5180A978BFF7450F06778DA79CAA15E467B1B<br>CCBF6992DEC69AE88D89D3 |
| $m_{P113}$ | 9E9A5527723F3A4F339E828920D2556D21CD5E6FDC89B6575AF9FFA38233BBC05E8F2AE7052<br>AC7DBF622BF369A76F0E2 |
| $m_{P114}$ | 71812CEECEAC08C71C633D4C815AD805555A6ED7A778FD5F4D4810E5D92DA662B6836015E8<br>F9303A79798493E4166CC0 |
| $m_{P115}$ | 4147CB2F5C019034CADC1EBB6331B3DE37197611A6635B0784B4BF0DBBF12AEEAEA3D2E794<br>B9C1B6BB97FCC9D408DAAF |
| $m_{P116}$ | 445499D892AE276B0C2CE2BD81924E91B6A8D072EA3E63503F2287EB5F5E639EDE88082C164<br>18FC294E08D069F4CC127 |
| $m_{P117}$ | 66EE0C821076D702D1D5C35D37F25F0DCE3C8692B9CB65C4CEA5579F5AC3EF25CB06691B7<br>6DE6D972AF370A27F1415EC |
| $m_{P118}$ | D60A097019B8C9171A344854DDDCF6472F39DE9B9447956F78B60763A80EF6CF93B650E7B0A<br>81D59DD4B0FCBCD25FB0E |
| $m_{P119}$ | 7244FEEA50F90D284132D7DFE7E93C0EF16DA1A10765118691471255518CB76C44AE6B274C0<br>D3BC5C143B06AEE07615B |
| $m_{P120}$ | 8D6B45351ABE278271368F0E2DA5EE5BD014746202478243DAC30EB011326BF99845BDAAF74<br>3D54214C193A2DF54F991 |
| $m_{P121}$ | 42B80322CDB54071258B9B6911523E063CFC88AF918ACBBADDFE89EB7C261003E32931C3FC<br>BA525A48553A533458E872 |
| $m_{P122}$ | 3E1A4867271132EB25B853FEB3B44F80F69D57BF796D71F53C46D598E5BD2D22F8347B64559<br>1FAC08AFCFDFE5C838317 |
| $m_{P123}$ | 91AB7E8D6CB2EBCB099F275B1BA0C7D8D18E8A6FA2EFF169100AE4FF0ECB94F79FDDDA7F5<br>AD42EAC766741C96E608D6F |
| $m_{P124}$ | E16CC4455F92D7F7AAC7D83A63E94A286AE4B9CFDBC3181FFB94CC26CFDB43DCA63A169A<br>20BE959E65062A5524DCCB86 |
| $m_{P125}$ | 9E1BEC0CB9835F5FAFEB3C4A27D32A982346ADC4215F5A7237C4D1009CB2DECB9C1C486DD |

| Code ID | Basic Midamble Codes $m_P$ of length $P$=384 |
|---|---|
| | ACDADEAE123F958666B0EE7 |
| $m_{P126}$ | CB04C57E4069E0CF9D4AD9D71567C2D243A9FB0DEDEECBA8D77EBF02CCFA77B4C491915B039FE851A4B8D9197D577A16 |
| $m_{P127}$ | 7CB3DEC05A1E73C703BF610AC8914E2F4D63329FEFB69E1B35E86F92AB87EB27EEBC098B5B1119CC8BD1B149B2A01946 |

# AB.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. These mapping schemes apply for all burst types 1,2 and 3. Secondary channelisation codes are marked with a *. These associations apply both for UL and DL.

## AB.3.1 Association for $K_{Cell}$ = 16 Midambles

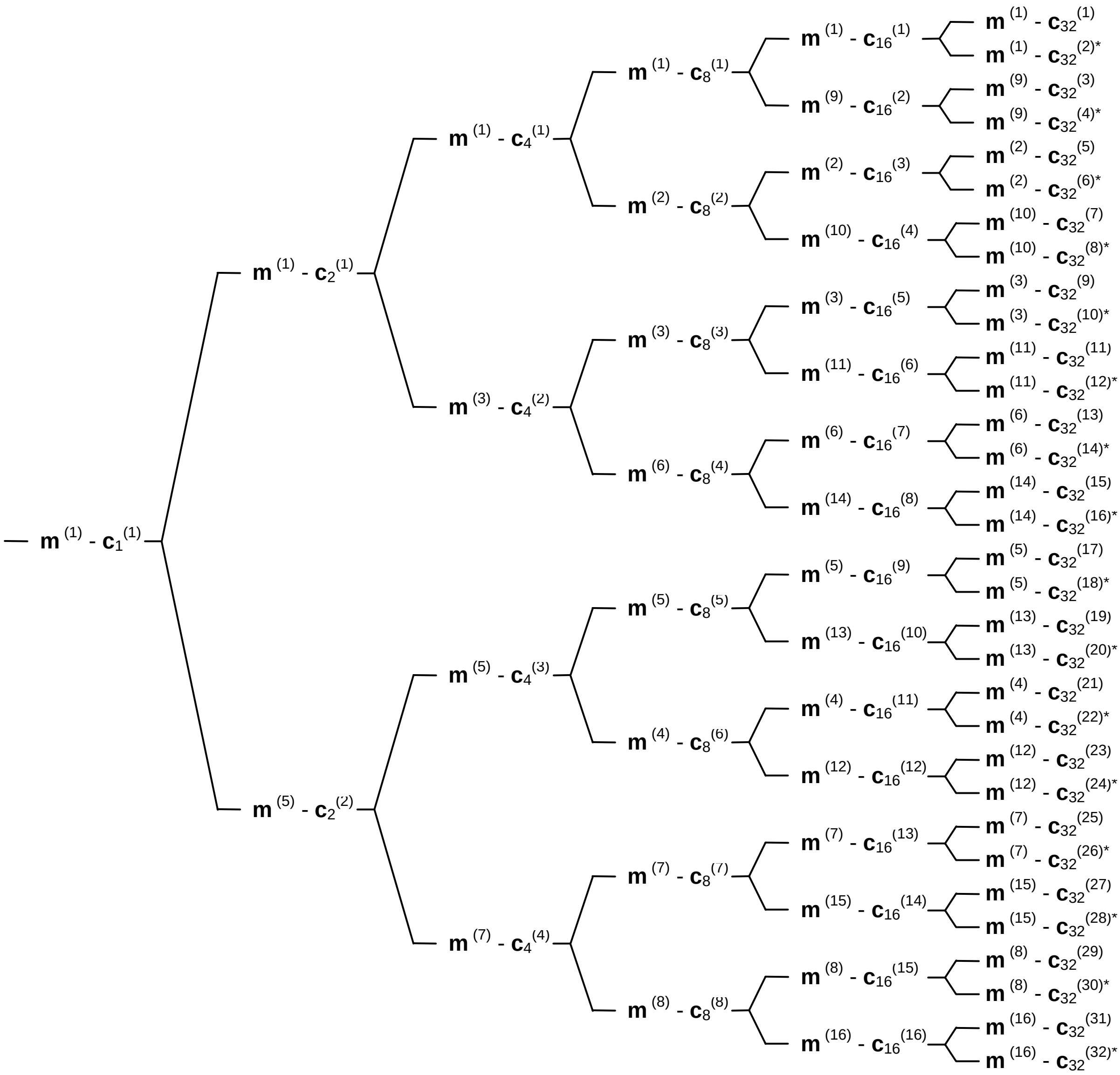



**Figure AB.1: Association of Midambles to Spreading Codes for $K_{Cell}$ = 16**

## AB.3.2 Association for $K_{Cell}$ = 8 Midambles

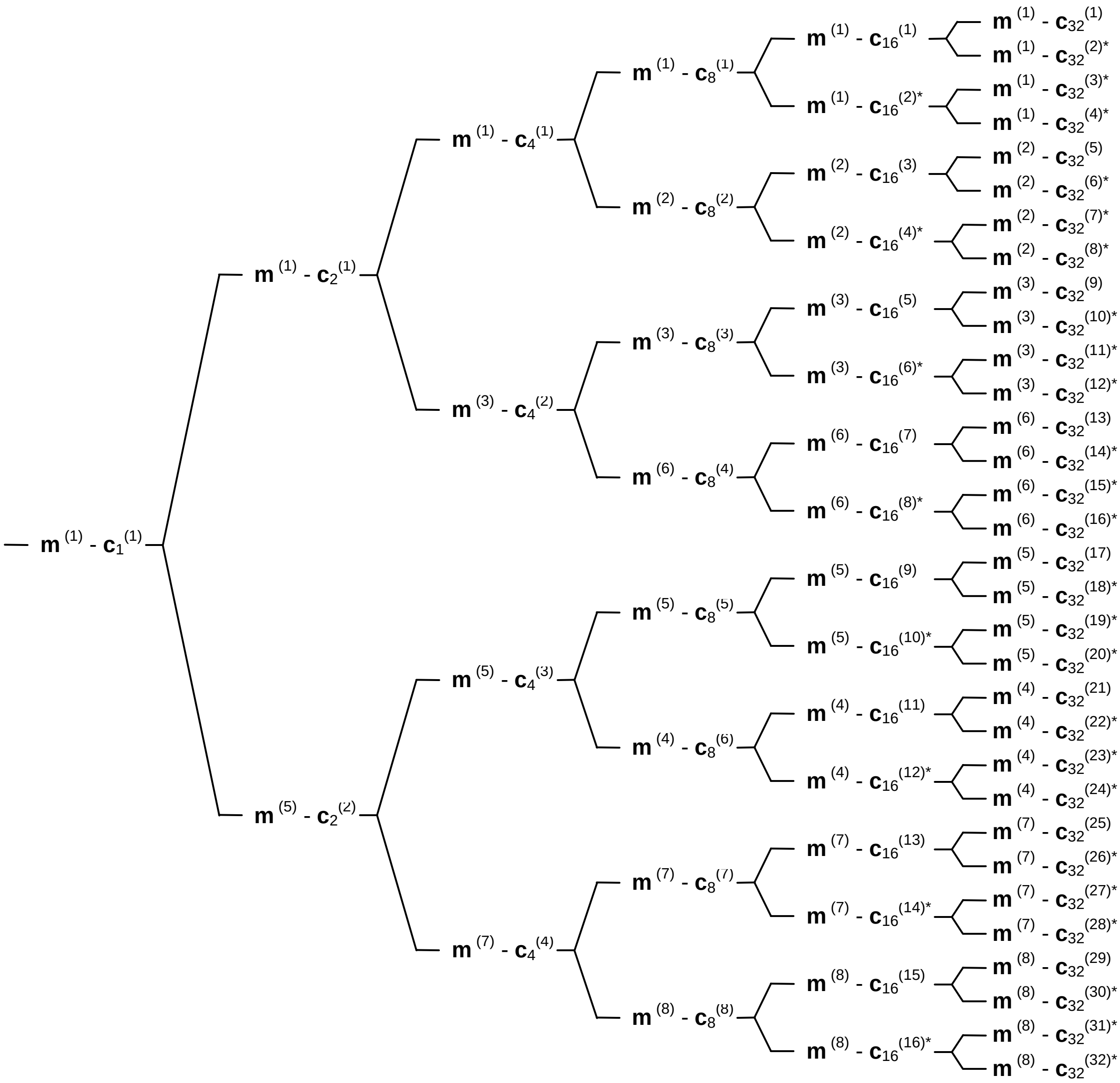



**Figure AB.2: Association of Midambles to Spreading Codes for $K_{Cell}$ = 8**

## AB.3.3 Association for $K_{Cell}$ = 4 Midambles

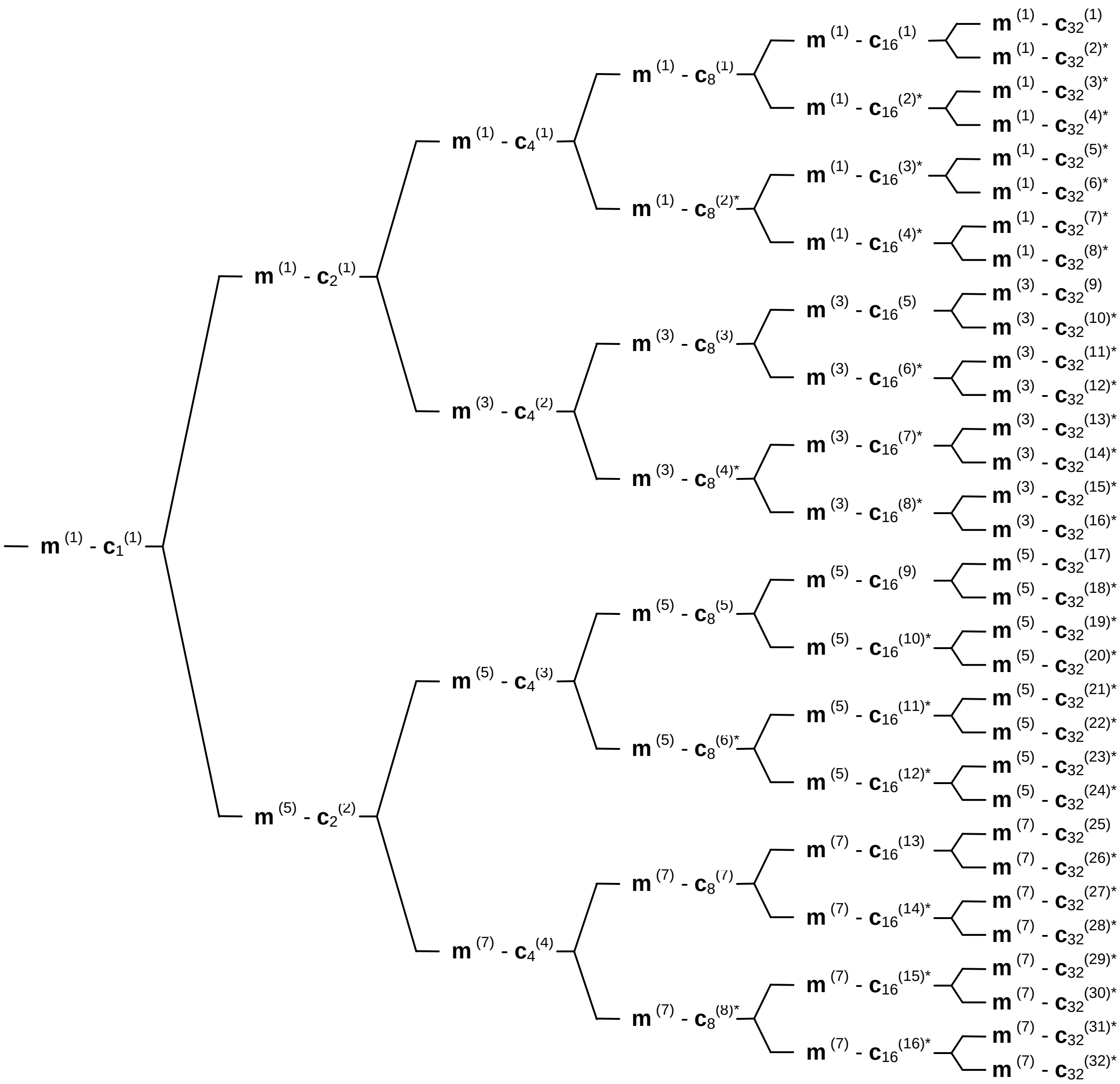



**Figure AB.3: Association of Midambles to Spreading Codes for $K_{Cell}$ = 4**

## AB.3.4 Association for Burst Types 4 and $K_{Cell}$ =1 Midamble

For burst type 4 there is only a single midamble defined, thus all channelisation codes are associated with the same midamble.

# Annex B (normative): Signalling of the number of channelisation codes for the DL common midamble case for 3.84Mcps 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. Mapping schemes B.4, B.5 and B.6 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.4, B.5 and B.6, 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 $K_{Cell}$ =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 $K_{Cell}$ =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 Burst Type 1 and $K_{Cell}$ =4 Midambles

| m1 | m3 | m5 | m7 | |
|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 1 or 5 or 9 or 13 codes |
| 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 |

# B.4 Mapping scheme for beacon timeslots and $K_{Cell}$ =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 (see note 1) |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 codes (SCTD applied to beacon in this time slot, see note 2) |
| 1 | x$^{(*)}$ | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 codes |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 codes (SCTD not applied to beacon in this time slot) 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 |

$^{(*)}$ For the case of SCTD applied to beacon, midamble shift 2 is used by the diversity antenna.

Note 1: If only one code is present in a beacon time slot, this code is a beacon channel and the beacon channel is the only channel in this slot, by default. Therefore, only the beacon midamble(s) shall be used.

Note 2: If SCTD is applied to the beacon and only two codes are present in a beacon time slot, the beacon channel is the only channel in this slot, by default. Therefore, only the beacon midambles shall be used.

# B.5 Mapping scheme for beacon timeslots and $K_{Cell}$ =8 Midambles

| m1 | m2 | m3 | m4 | m5 | m6 | m7 | M8 | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 code (see note 1) |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 codes (SCTD applied to beacon in this time slot, see note 2) |
| 1 | x(*) | 1 | 0 | 0 | 0 | 0 | 0 | 7 or 13 codes |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 (SCTD not applied to beacon in this time slot) 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 |

(*) For the case of SCTD applied to beacon, midamble shift 2 is used by the diversity antenna.

Note 1: If only one code is present in a beacon time slot, this code is a beacon channel and the beacon channel is the only channel in this slot, by default. Therefore, only the beacon midamble(s) shall be used.

Note 2: If SCTD is applied to beacon and only two codes are present in a beacon time slot, the beacon channel is the only channel in this slot, by default. Therefore, only the beacon midambles shall be used.

# B.6 Mapping scheme for beacon timeslots and $K_{Cell}$ =4 Midambles

| m1 | m3 | m5 | m7 | |
|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 1code (see note 1) |
| 1 | 1 | 0 | 0 | 4 or 7 or 10 or 13 or 16 codes |
| 1 | 0 | 1 | 0 | 2 or 5 or 8 or 11 or 14 codes |
| 1 | 0 | 0 | 1 | 3 or 6 or 9 or 12 or 15 codes |

Note 1: If only one code is present in a beacon time slot, this code is a beacon channel and the beacon channel is the only channel in this slot, by default. Therefore, only the beacon midamble shall be used.

# B.7 Mapping scheme for Burst Type 2 and $K_{Cell}$ =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.8 Mapping scheme for Burst Type 2 and $K_{Cell}$ =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 |

# B.9 Mapping scheme for Burst Type 4 and $K_{Cell}$ =1 Midamble

| m1 | |
|---|---|
| **1** | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 or 16 codes |

# Annex BA (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.

## BA.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 |

## BA.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 |

# BA.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 |

# BA.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 |

# BA.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 |

# BA.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 |

# BA.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 |

# BA.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 BB (normative): Signalling of the number of channelisation codes for the DL common midamble case for 7.68Mcps 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. Mapping schemes in section BB.4, BB.5 and BB.6 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 the mapping schemes of sections BB.4, BB.5 and BB.6, the fixed and pre-allocated channelisation code for the beacon channel is included into the number of indicated channelisation codes.

## BB.1 Mapping scheme for $K_{Cell}$ =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 or 17 code |
| 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 or 18 codes |
| 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 or 19 codes |
| 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 or 20 codes |
| 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 or 21 codes |
| 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 or 22 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 or 23 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 or 24 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 or 25 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 10 or 26 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 11 or 27 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 12 or 28 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 13 or 29 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 14 or 30 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 15 or 31 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 16 or 32 codes |

## BB.2 Mapping scheme for $K_{Cell}$ =8 Midambles

| M1 | m2 | m3 | m4 | m5 | m6 | m7 | m8 | |
|---|---|---|---|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 or 9 or 17 or 25 codes |
| 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 2 or 10 or 18 or 26 codes |
| 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 3 or 11 or 19 or 27 codes |
| 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 4 or 12 or 20 or 28 codes |
| 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 5 or 13 or 21 or 29 codes |
| 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 6 or 14 or 22 or 30 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 7 or 15 or 23 or 31 codes |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 8 or 16 or 24 or 32 codes |

# BB.3 Mapping scheme for $K_{Cell}$ =4 Midambles

| m1 | m3 | m5 | m7 | |
|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 1 or 5 or 9 or 13 or 17 or 21 or 25 or 29 codes |
| 0 | **1** | 0 | 0 | 2 or 6 or 10 or 14 or 18 or 22 or 26 or 30 codes |
| 0 | 0 | **1** | 0 | 3 or 7 or 11 or 15 or 19 or 23 or 27 or 31 codes |
| 0 | 0 | 0 | **1** | 4 or 8 or 12 or 16 or 20 or 24 or 28 or 32 codes |

# BB.4 Mapping scheme for beacon timeslots and $K_{Cell}$ =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 (see note 1) |
| **1** | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 codes (SCTD applied to beacon in this time slot, see note 2) |
| **1** | x(*) | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 or 25 codes |
| **1** | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 codes (SCTD not applied to beacon in this time slot) or 14 or 26 codes |
| **1** | x(*) | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 or 15 or 27 codes |
| **1** | x(*) | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 or 16 or 28 codes |
| **1** | x(*) | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 or 17 or 29 codes |
| **1** | x(*) | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 or 18 or 30 codes |
| **1** | x(*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 7 or 19 or 31 codes |
| **1** | x(*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 8 or 20 or 32 codes |
| **1** | x(*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 9 or 21 codes |
| **1** | x(*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 10 or 22 codes |
| **1** | x(*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 11 or 23 codes |
| **1** | x(*) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 12 or 24 codes |

(*) For the case of SCTD applied to beacon, midamble shift 2 is used by the diversity antenna.

Note 1: If only one code is present in a beacon time slot, this code is a beacon channel and the beacon channel is the only channel in this slot, by default. Therefore, only the beacon midamble(s) shall be used.

Note 2: If SCTD is applied to the beacon and only two codes are present in a beacon time slot, the beacon channel is the only channel in this slot, by default. Therefore, only the beacon midambles shall be used.

# BB.5 Mapping scheme for beacon timeslots and $K_{Cell}$ =8 Midambles

| m1 | m2 | m3 | m4 | m5 | m6 | m7 | M8 | |
|---|---|---|---|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 code (see note 1) |
| **1** | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 2 codes (SCTD applied to beacon in this time slot, see note 2) |
| **1** | x(*) | **1** | 0 | 0 | 0 | 0 | 0 | 7 or 13 or 19 or 25 or 31 codes |
| **1** | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 2 (SCTD not applied to beacon in this time slot) or 8 or 14 or 20 or 26 or 32 codes |
| **1** | x(*) | 0 | 0 | **1** | 0 | 0 | 0 | 3 or 9 or 15 or 21 or 27 codes |
| **1** | x(*) | 0 | 0 | 0 | **1** | 0 | 0 | 4 or 10 or 16 or 22 or 28 codes |
| **1** | x(*) | 0 | 0 | 0 | 0 | **1** | 0 | 5 or 11 or 17 or 23 or 29 codes |
| **1** | x(*) | 0 | 0 | 0 | 0 | 0 | **1** | 6 or 12 or 18 or 24 or 30 codes |

(*) For the case of SCTD applied to beacon, midamble shift 2 is used by the diversity antenna.

Note 1: If only one code is present in a beacon time slot, this code is a beacon channel and the beacon channel is the only channel in this slot, by default. Therefore, only the beacon midamble(s) shall be used.

Note 2: If SCTD is applied to beacon and only two codes are present in a beacon time slot, the beacon channel is the only channel in this slot, by default. Therefore, only the beacon midambles shall be used.

# BB.6 Mapping scheme for beacon timeslots and $K_{Cell}$ =4 Midambles

| m1 | m3 | m5 | m7 | |
|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 1code (see note 1) |
| **1** | **1** | 0 | 0 | 4 or 7 or 10 or 13 or 16 or 19 or 22 or 25 or 28 or 31 codes |
| **1** | 0 | **1** | 0 | 2 or 5 or 8 or 11 or 14 or 17 or 20 or 23 or 26 or 29 or 32 codes |
| **1** | 0 | 0 | **1** | 3 or 6 or 9 or 12 or 15 or 18 or 21 or 24 or 27 or 30 codes |

Note 1: If only one code is present in a beacon time slot, this code is a beacon channel and the beacon channel is the only channel in this slot, by default. Therefore, only the beacon midamble shall be used.

# BB.7 Mapping scheme for Burst Type 4 and $K_{Cell}$ =1 Midamble

| m1 | |
|---|---|
| **1** | 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 or 32 codes |

# Annex C (informative): CCPCH Multiframe Structure for the 3.84 Mcps option

In the following figures C.1 to C.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.

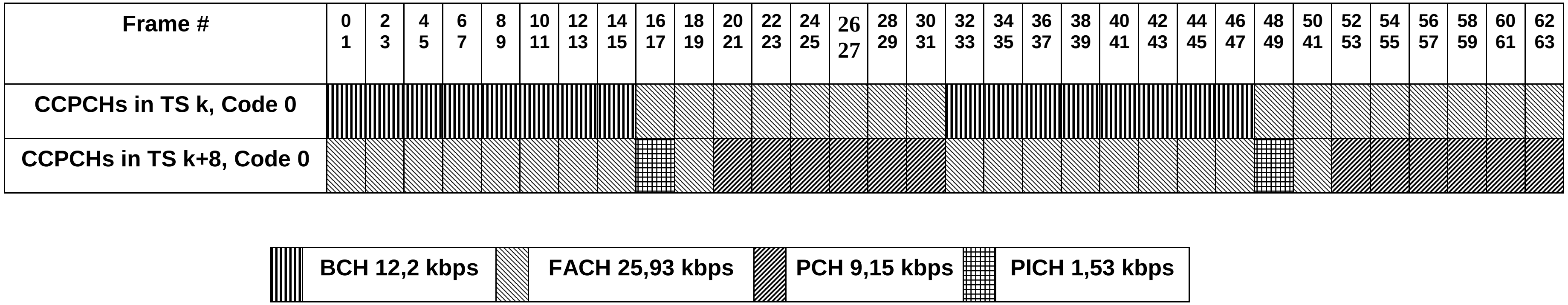



**Figure C.1: Example for a multiframe structure for CCPCHs and PICH that is repeated every 64th frame**

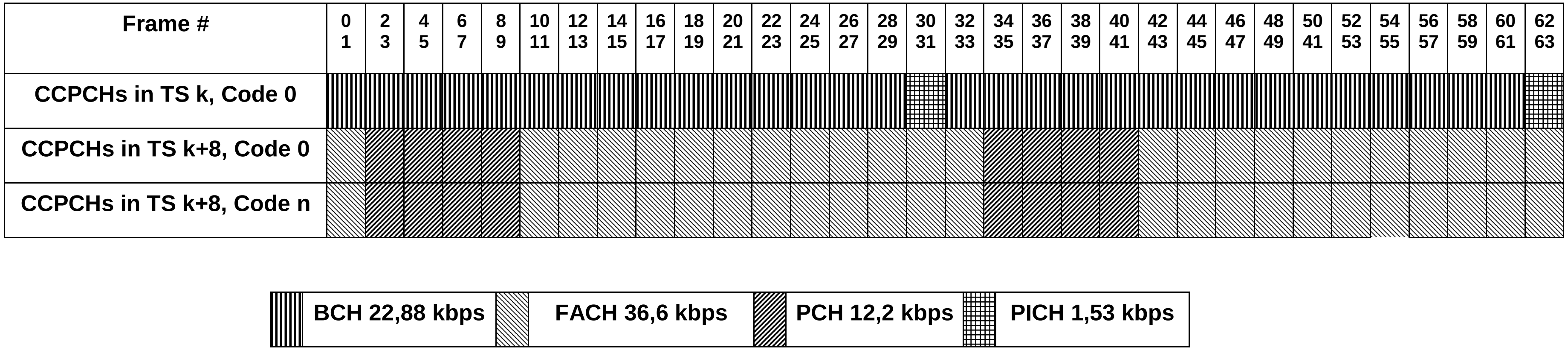



**Figure C.2: Example for a multiframe structure for CCPCHs and PICH that is repeated every 64th frame, n=1…7**

# Annex CA (informative): CCPCH Multiframe Structure for the 1.28 Mcps option

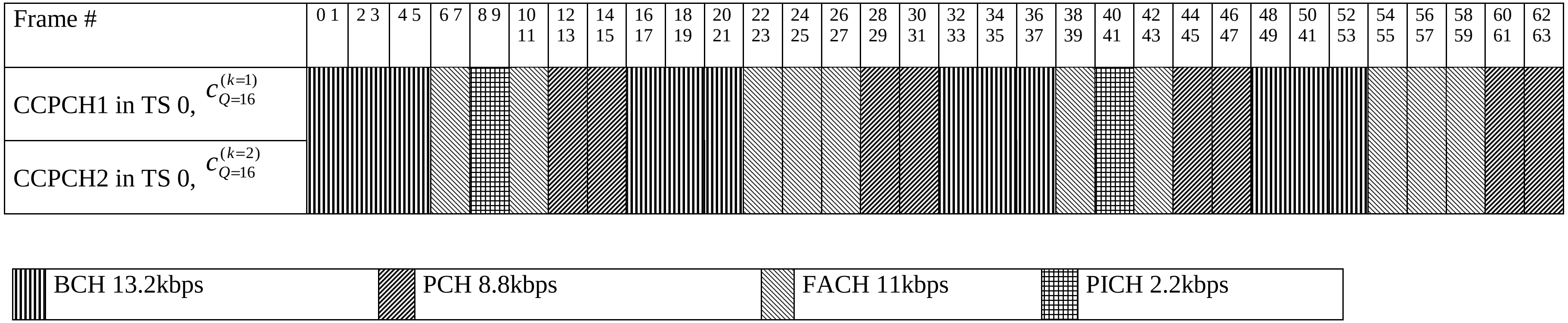



**Figure CA.1: Example for a multiframe structure for CCPCHs and PICH that is repeated every 64th frame (128 sub-frame)**

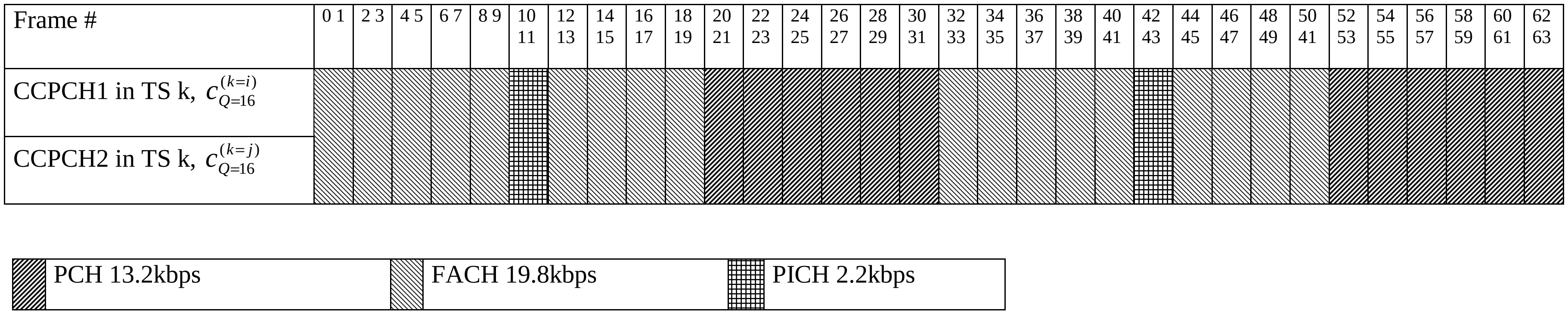



**Figure CA.2: Example for a multiframe structure for S-CCPCHs and PICH that is repeated every 64th frame, i,j=1…16 (i≠j),k≠0, 1,(128 sub-frame)**

# Annex CB (informative): Examples of the association of UL TPC commands to UL uplink time slots and CCTrCH pairs for 1.28 Mcps TDD

In the following two examples of the association of UL TPC commands to UL time slots and CCTrCHs are shown (see 5A.2.2.2):

**Table CB.1 Two examples of the association of UL TPC commands to UL uplink time slots and CCTrCH pairs with NULslot=3**

Case 1: $N_{UL\_TPCsymbols}$=2; Case 2: $N_{UL\_TPCsymbols}$=4

| Sub-Frame Number | Case 1 (2 UL TPC symbols) The order of UL TPC symbols | | The order of the served UL time slot and CCTrCH pairs (UL time slot and CCTrCH number) | Case 2 (4 UL TPC symbols) The order of UL TPC symbols | |
|---|---|---|---|---|---|
| SFN'=0 | (1st $UL_{pos}$=0) | 0 | 0 (TS3) | 0 | (1st $UL_{pos}$=0) |
| | | 1 | 1 (TS4) | 1 | |
| | | | 2 (TS5) | 2 | |
| | | | 1 (TS4) | 3 | |
| SFN'=1 | (1st $UL_{pos}$=2) | 0 | 0 (TS3) | 0 | (1st $UL_{pos}$=2) |
| | | 1 | 1 (TS4) | 1 | |
| | | | 2 (TS5) | 2 | |
| | | | 0 (TS3) | 3 | |
| | | | 1 (TS4) | | |
| SFN'=2 | (1st $UL_{pos}$=2) | 0 | 0 (TS3) | 0 | (1st $UL_{pos}$=1) |
| | | 1 | 1 (TS4) | 1 | |
| | | | 2 (TS5) | 2 | |
| | | | 0 (TS3) | 3 | |
| | | | 1 (TS4) | | |
| | | | 2 (TS5) | | |
| ... | ... | | ... | ... | |

# Annex CC (informative): Examples of the association of UL SS commands to UL uplink time slots

In the following two examples of the association of UL SS commands to UL uplink time slots are shown (see 5A.2.2.3):

**Table CC.1 Two examples of the association of UL SS commands to UL uplink time slots with $N_{ULslot}$=3**

Case 1: $N_{SSsymbols}$=2; Case 2: $N_{SSsymbols}$=4

| Sub-Frame Number | Case 1 (2 UL SS symbols) The order of UL SS symbols | | The order of the served UL time slot (UL time slot number) | Case 2 (4 UL SS symbols) The order of UL SS symbols | |
|---|---|---|---|---|---|
| SFN'=0 | (1st $UL_{pos}$=0) | 0 | 0 (TS3) | 0 | (1st $UL_{pos}$=0) |
| | | 1 | 1 (TS4) | 1 | |
| | | | 2 (TS5) | 2 | |
| | | | 1 (TS4) | 3 | |
| SFN'=1 | (1st $UL_{pos}$=2) | 0 | 0 (TS3) | 0 | (1st $UL_{pos}$=2) |
| | | 1 | 1 (TS4) | 1 | |
| | | | 2 (TS5) | 2 | |
| | | | 0 (TS3) | 3 | |
| | | | 1 (TS4) | | |
| SFN'=2 | (1st $UL_{pos}$=2) | 0 | 0 (TS3) | 0 | (1st $UL_{pos}$=1) |
| | | 1 | 1 (TS4) | 1 | |
| | | | 2 (TS5) | 2 | |
| | | | 0 (TS3) | 3 | |
| | | | 1 (TS4) | | |
| | | | 2 (TS5) | | |
| … | … | … | … | … | … |

# Annex 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 |
| 23/0900 | RAN_09 | RP-000344 | 022 | 1 | Correction to midamble generation in UTRA TDD | 3.3.0 | 3.4.0 |
| 23/0900 | RAN_09 | RP-000344 | 026 | 2 | Some corrections for TS25.221 | 3.3.0 | 3.4.0 |
| 23/0900 | RAN_09 | RP-000344 | 028 | - | Terminology regarding the beacon function | 3.3.0 | 3.4.0 |
| 23/0900 | RAN_09 | RP-000344 | 030 | 1 | TDD Access Bursts for HOV | 3.3.0 | 3.4.0 |
| 23/0900 | RAN_09 | RP-000344 | 031 | 1 | Number of codes signalling for the DL common midamble case | 3.3.0 | 3.4.0 |
| 15/12/00 | RAN_10 | RP-000542 | 034 | - | Correction on TFCI & TPC Transmission | 3.4.0 | 3.5.0 |
| 15/12/00 | RAN_10 | RP-000542 | 035 | 1 | Clarifications on Midamble Associations | 3.4.0 | 3.5.0 |
| 15/12/00 | RAN_10 | RP-000542 | 036 | - | Clarification on PICH power setting | 3.4.0 | 3.5.0 |
| 16/03/01 | RAN_11 | - | - | | Approved as Release 4 specification (v4.0.0) at TSG RAN #11 | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010062 | 033 | 2 | Correction to SCH section | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010062 | 037 | 1 | Bit Scrambling for TDD | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010062 | 039 | 1 | Corrections of PUSCH and PDSCH | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010062 | 040 | - | Alteration of SCH offsets to avoid overlapping Midamble | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010062 | 041 | - | Clarifications & Corrections for TS25.221 | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010062 | 045 | 1 | Corrections on the PRACH and clarifications on the midamble generation and the behaviour in case of an invalid TFI combination on the DCHs | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010062 | 046 | - | Clarification of TFCI transmission | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010062 | 048 | - | Corrections to Table 5.b "Timeslot formats for the Uplink" | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010073 | 042 | 2 | Introduction of the Physical Node B Synchronization Channel | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010071 | 043 | 1 | Inclusion of 1.28Mcps TDD in TS 25.221 | 3.5.0 | 4.0.0 |
| 16/03/01 | RAN_11 | RP-010072 | 044 | - | Correction of beacon characteristics due to IPDLs | 3.5.0 | 4.0.0 |
| 15/06/01 | RAN_12 | RP-010336 | 051 | - | Clarification of Midamble Usage in TS25.221 | 4.0.0 | 4.1.0 |
| 15/06/01 | RAN_12 | RP-010336 | 053 | - | Addition to the abbreviation list, correction of references to tables and figures | 4.0.0 | 4.1.0 |
| 15/06/01 | RAN_12 | RP-010342 | 049 | - | Correction of spelling in definition of beacon characteristics | 4.0.0 | 4.1.0 |
| 15/06/01 | RAN_12 | RP-010342 | 055 | - | Correction of Note for PDSCH signalling methods | 4.0.0 | 4.1.0 |
| 21/09/01 | RAN_13 | RP-010522 | 057 | - | TFCI Terminology | 4.1.0 | 4.2.0 |
| 21/09/01 | RAN_13 | RP-010522 | 063 | - | Clarification of notations in TS25.221 and TS25.223 | 4.1.0 | 4.2.0 |
| 21/09/01 | RAN_13 | RP-010522 | 062 | - | Addition and correction of the reference | 4.1.0 | 4.2.0 |
| 21/09/01 | RAN_13 | RP-010528 | 058 | 1 | Corrections for TS 25.221 | 4.1.0 | 4.2.0 |
| 14/12/01 | RAN_14 | RP-010741 | 065 | 1 | Transmit Diversity for P-CCPCH and PICH | 4.2.0 | 4.3.0 |
| 14/12/01 | RAN_14 | RP-010741 | 067 | - | Clarification of midamble transmit power in TS25.221 | 4.2.0 | 4.3.0 |
| 14/12/01 | RAN_14 | RP-010746 | 059 | - | Bit Scrambling for 1.28 Mcps TDD | 4.2.0 | 4.3.0 |
| 14/12/01 | RAN_14 | RP-010746 | 068 | - | Transmit Diversity for P-CCPCH and PICH | 4.2.0 | 4.3.0 |
| 14/12/01 | RAN_14 | RP-010746 | 069 | - | Corrections of reference numbers in TS 25.221 | 4.2.0 | 4.3.0 |
| 08/03/02 | RAN_15 | RP-020049 | 071 | 2 | Clarification of spreading for UL physical channels | 4.3.0 | 4.4.0 |
| 08/03/02 | RAN_15 | RP-020049 | 073 | 1 | Common midamble allocation for beacon time slot | 4.3.0 | 4.4.0 |
| 08/03/02 | RAN_15 | RP-020049 | 075 | 3 | Correction to a transmission of paging indicators bits | 4.3.0 | 4.4.0 |

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 08/03/02 | RAN_15 | RP-020058 | 076 | 1 | CR to include HSDPA in TS25.221 | 4.3.0 | 5.0.0 |
| 07/06/02 | RAN_16 | RP-020434 | 080 | 2 | Clarification of shared channel functionality for TDD | 5.0.0 | 5.1.0 |
| 07/06/02 | RAN_16 | RP-020313 | 082 | - | Clarification of shared channel functionality for TDD | 5.0.0 | 5.1.0 |
| 07/06/02 | RAN_16 | RP-020317 | 081 | - | TxDiversity for HSDPA in TDD | 5.0.0 | 5.1.0 |
| 19/09/02 | RAN_17 | RP-020559 | 092 | 1 | Corrections to channelisation code mapping for 1.28 Mcps TDD | 5.1.0 | 5.2.0 |
| 19/09/02 | RAN_17 | RP-020576 | 094 | - | Correction to S-CCPCH description for 1.28 Mcps TDD | 5.1.0 | 5.2.0 |
| 19/09/02 | RAN_17 | RP-020579 | 104 | 2 | Corrections to transmit diversity mode for TDD beacon-function physical channels | 5.1.0 | 5.2.0 |
| 19/09/02 | RAN_17 | RP-020569 | 090 | 1 | Corrections to channelisation code mappings for 3.84 Mcps TDD | 5.1.0 | 5.2.0 |
| 19/09/02 | RAN_17 | RP-020572 | 097 | 2 | Corrections to transmit diversity mode for TDD beacon-function physical channels | 5.1.0 | 5.2.0 |
| 21/12/02 | RAN_18 | RP-020848 | 105 | - | Correction of the number of transport channels in clause 4.1 | 5.2.0 | 5.3.0 |
| 21/12/02 | RAN_18 | RP-020852 | 107 | - | Editorial modification to the section numberings | 5.2.0 | 5.3.0 |
| 26/03/03 | RAN_19 | RP-030138 | 109 | 3 | Clarification of number of midamble shifts in different time slots | 5.3.0 | 5.4.0 |
| 26/03/03 | RAN_19 | RP-030138 | 110 | 1 | Correction to applicable HS-SICH burst types and timeslot formats | 5.3.0 | 5.4.0 |
| 26/03/03 | RAN_19 | RP-030138 | 111 | - | Correction to HS-SCCH minimum timing requirement for UTRA TDD (3.84 Mcps Option) | 5.3.0 | 5.4.0 |
| 26/03/03 | RAN_19 | RP-030138 | 112 | 3 | Miscellaneous Corrections | 5.3.0 | 5.4.0 |
| 26/03/03 | RAN_19 | RP-030138 | 113 | - | HSDPA timing requirements | 5.3.0 | 5.4.0 |
| 24/06/03 | RAN_20 | RP-030275 | 114 | 1 | Corrections to field coding of TPC for support of HS-SICH (3.84Mcps TDD) | 5.4.0 | 5.5.0 |
| 13/01/04 | RAN_22 | - | - | - | Created for M.1457 update | 5.5.0 | 6.0.0 |
| 09/06/04 | RAN_24 | RP-040235 | 116 | 2 | Addition of TSTD for S-CCPCH in 3.84Mcps TDD | 6.0.0 | 6.1.0 |
| 13/12/04 | RAN_26 | RP-040451 | 117 | - | Introduction of MICH | 6.1.0 | 6.2.0 |
| 14/03/05 | RAN_27 | RP-050089 | 118 | - | Release 6 HS-DSCH operation without a DL DPCH for 3.84Mcps TDD | 6.2.0 | 6.3.0 |
| 16/06/05 | RAN_28 | RP-050240 | 124 | 1 | Correction to transmission of SS for 1.28Mcps TDD | 6.3.0 | 6.4.0 |
| 16/06/05 | RAN_28 | RP-050255 | 127 | 1 | Correction to the examples of the association of UL SS commands to UL uplink time slots | 6.3.0 | 6.4.0 |
| 16/06/05 | RAN_28 | RP-050239 | 130 | 1 | Correction to transmission of TPC for 1.28Mcps TDD | 6.3.0 | 6.4.0 |
| 16/06/05 | RAN_28 | RP-050255 | 133 | 1 | Correction to the examples of the association of UL TPC commands to UL uplink time slot and CCTrCH pairs | 6.3.0 | 6.4.0 |
| 29/06/05 | - | - | - | - | Editorial revision to the incorrect implementation of CR127r1 and CR133r1 | 6.4.0 | 6.4.1 |
| 26/09/05 | RAN_29 | RP-050448 | 0134 | - | Change of burst type to burst format | 6.4.1 | 6.5.0 |
| 20/03/06 | RAN_31 | RP-060078 | 0135 | - | Introduction of the Physical Layer Common Control Channel (PLCCH) | 6.5.0 | 7.0.0 |
| 20/03/06 | RAN_31 | RP-060079 | 0136 | - | Introduction of 7.68Mcps TDD option | 6.5.0 | 7.0.0 |
| 29/09/06 | RAN_33 | RP-060492 | 0138 | - | Introduction of E-DCH for 3.84Mcps and 7.68Mcps TDD | 7.0.0 | 7.1.0 |
| 09/03/07 | RAN_35 | RP-070118 | 0139 | 2 | Introduction of E-DCH for 1.28Mcps TDD | 7.1.0 | 7.2.0 |
| 30/05/07 | RAN_36 | RP-070385 | 0140 | 2 | Support for MBSFN operation | 72.0 | 7.3.0 |
| 30/05/07 | RAN_36 | RP-070386 | 0142 | - | Support for LCR TDD MBSFN operation | 72.0 | 7.3.0 |
| 30/05/07 | RAN_36 | RP-070386 | 0143 | - | Addition of spreading factor 2 for MBSFN time slot for 1.28Mcps TDD | 72.0 | 7.3.0 |

# History

| Document history | | |
|---|---|---|
| V7.0.0 | March 2006 | Publication |
| V7.1.0 | September 2006 | Publication |
| V7.2.0 | March 2007 | Publication |
| V7.3.0 | May 2007 | Publication |
| | | |