3GPP TR 25.809 V7.0.0 (2006-03)

Technical Report

3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
7.68Mcps TDD option:
Physical layer
(Release 7)

Keywords

UMTS, radio, layer 1

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Contents

Foreword

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1 Scope

The present document captures the agreements related to the physical layer aspects of the 7.68Mcps TDD option. The document acts as a reference point for the changes that are required to specifications including rationales for the required changes.

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 25.895: 'Analysis of higher chip rates for UTRA TDD evolution (Release 6)'.

[2] 3GPP TS 25.202: '7.68Mcps TDD Option; Overall description: Stage 2'.

[3] 3GPP TS 25.221: 'Physical channels and mapping of transport channels onto physical channels (TDD)'.

[4] 3GPP TS25.222: 'Multiplexing and channel coding (TDD)'.

[5] 3GPP TS25.223: 'Spreading and modulation (TDD)'.

[6] 3GPP TS25.224: 'Physical layer procedures (TDD)'.

[7] 3GPP TS25.225: 'Physical layer; Measurements (TDD)'.

[8] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [8] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [8].

(void)

3.2 Symbols

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

(void)

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [8] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [8].

BCH	Broadcast Channel
CCPCH	Common Control Physical Channel
DCH	Dedicated Channel
DPCH	Dedicated Physical Channel
DSCH	Downlink Shared Channel
FACH	Forward Access Channel
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
P-CCPCH	Primary CCPCH
PCH	Paging Channel
PDSCH	Physical Downlink Shared Channel
PI	Paging Indicator (value calculated by higher layers)
PICH	Page Indicator Channel
PRACH	Physical Random Access Channel
PUSCH	Physical Uplink Shared Channel
RACH	Random Access Channel
S-CCPCH	Secondary CCPCH
SCH	Synchronisation Channel
TrCH	Transport Channel
USCH	Uplink Shared Channel

4 Introduction

In RAN#25 plenary meeting a work item was approved for 7.68 Mcps TDD Option [1]. An analysis of the feasibility and potential benefits of higher chip rates for UTRA TDD were presented in [1]. The 7.68Mcps TDD option stage 2 specification exists in [2].

The feasibility study [1] identified the following areas where changes to RAN1 specifications will be required for the support of the 7.68Mcps option:

- Chip duration;
- Support for SF32;
- Midamble construction;
- HSDPA related issues (HS-SCCH signalling of resources, UE capabilities);
- scrambling codes;
- synchronisation codes;
- channelisation code multipliers;
- timing advance (same range in terms of time, but doubled in terms of chips);
- UE capabilities;

There are further changes to specifications that will be required to indicate areas where the 7.68Mcps TDD option is totally aligned with the 3.84Mcps TDD option.

The following table summarises the main expected impacts on RAN1 specifications.

Table 4.1: Impact on specifications

spec	title	impact
25.201	Physical layer - general description	• text stating that there are 3 TDD options
25.221	Physical channels and mapping of transport channels onto physical channels (TDD)	• support of SF32 in uplink and downlink • definition of burst types for higher chip rate based on SF32 • transmission of TFCI / TPC at SF32 • construction of midambles • association between midambles and channelisation codes • definition of number of HS-SCCH associated with a UE
25.222	Multiplexing and channel coding (TDD)	• coding of HS-SCCH to support signalling of greater range of codes and transport block size
25.223	Spreading and modulation (TDD)	• definition of chip rate • channelisation code multipliers for SF32 • definition of scrambling codes • weight factor for SF32 • definition of synchronization codes
25.224	Physical layer procedures (TDD)	• definition of number of timing advance bits • update to cell search procedure
25.225	Physical layer; Measurements (TDD)	• update time difference measurement definitions (measurements should cover the same range in time at the higher chip rate).

This work item is applicable to UTRA TDD only.

5 Physical layer – General description

void

6 Physical channels and mapping of transport channels onto physical channels

6.1 Services offered to higher layers

The 7.68Mcps TDD option supports an identical set of transport channels and indicators to those defined for the 3.84Mcps TDD option defined in section 4 of [3].

6.2 Physical channels for the 7.68 Mcps option

6.2.0 General Aspects

[Description:]

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 6.2.0.1.

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.

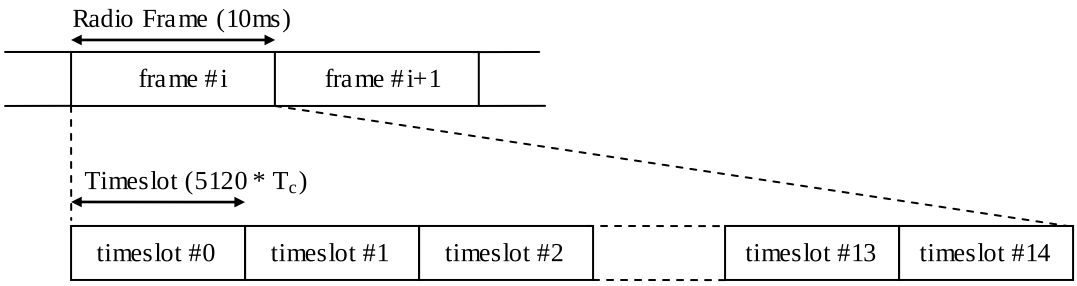


Figure 6.2.0.1: Physical channel signal format

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

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.

[Rationale:]

The general aspects of the 7.68Mcps TDD option are based on those of the 3.84Mcps TDD option (as described in section 5 of [3]. The timeslot duration is the same as at 3.84Mcps in terms of time and hence there are twice as many chips per timeslot at 7.68Mcps as at 3.84Mcps. Support of spreading factors up to 32 keeps the same granularity of resource allocation as at 3.84Mcps and allows coverage at 7.68Mcps to be the same as at 3.84Mcps.

6.2.1 Frame Structure

[Description:]

The 7.68Mcps TDD option frame is of length 10ms and consists of 15 timeslots of duration $5120 * T_c$, where T_c is the chip duration ($T_c = 1 / 7.68 * 10^6 = 130.2$ns). Any timeslot in the frame can be either uplink or downlink. At least one timeslot in the frame is assigned to the uplink and at least one timeslot in the frame is assigned to the downlink. The frame structure is shown in Figure 6.2.1.1.

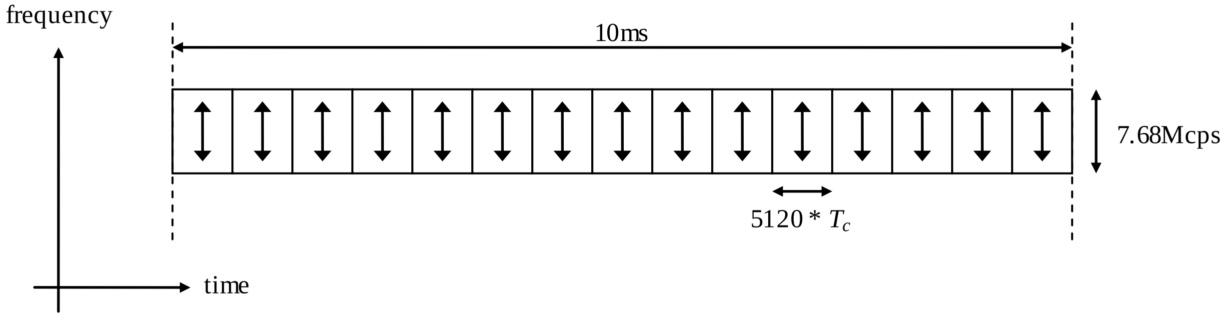


Figure 6.2.1.1: The 7.68Mcps TDD option frame structure

[Rationale:]

The 7.68Mcps TDD option frame structure is aligned with the 3.84Mcps TDD option frame structure. Support of 15 timeslots within the frame allows for the same fraction of the timeslot to be reserved for training sequences and guard periods as at 3.84Mcps (where the time required for training sequences and guard periods depends on propagation conditions and not on chip rate).

6.2.2 Timing Advance for Uplink Physical Channels

Timing advance shall be applied to PUSCH, UL DPCH and HS-SICH physical channels. PRACH shall not be timing advanced.

6.2.3 Spreading

6.2.3.1 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 [5]. These codes with SF =32 are generated as described in section 8.

6.2.3.2 Spreading for Uplink Physical Channels

The range of spreading factor 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 section 8.

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 section 8.

6.2.4 Burst Types

Three 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 6.2.4.1.

Table 6.2.4.1: Number of data symbols (N) for burst type 1, 2, and 3

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

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

6.2.4.1 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 6.2.4.1 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 6.2.4.1. The contents of the burst fields are described in table 6.2.4.2.

Table 6.2.4.2: 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 6.2.4.1		Data symbols
1952-2975	1024	-		Midamble
2976-4927	1952	Cf table 6.2.4.1		Data symbols
4928-5119	192	-		Guard period

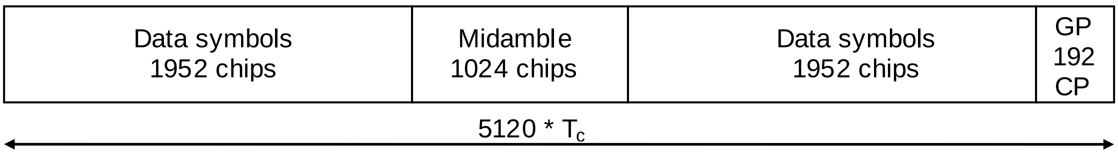


Figure 6.2.4.1: Burst structure of burst type 1. GP denotes the guard period and CP the chip periods

6.2.4.2 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 6.2.4.1 above. The guard period for the burst type 2 is 192 chip periods long. Burst type 2 is shown in Figure 6.2.4.2. The contents of the burst fields are described in table 6.2.4.3.

Table 6.2.4.3: 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 6.2.4.1		Data symbols
2208-2719	512	-		Midamble
2720-4927	2208	cf table 6.2.4.1		Data symbols
4928-5119	192	-		Guard period

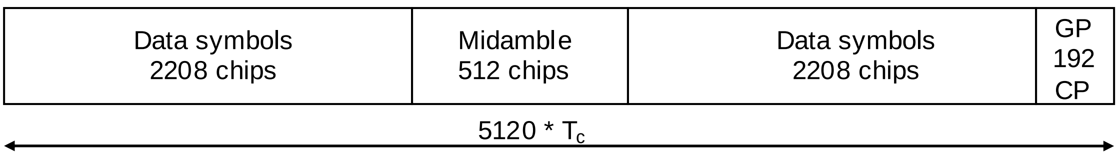


Figure 6.2.4.2: Burst structure of the burst type 2. GP denotes the guard period and CP the chip periods

6.2.4.3 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 6.2.4.1 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 6.2.4.3. The contents of the burst fields are described in table 6.2.4.4.

Table 6.2.4.4: 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 6.2.4.1		Data symbols
1952-2975	1024	-		Midamble
2976-4735	1760	Cf table 6.2.4.1		Data symbols
4736-5119	384	-		Guard period

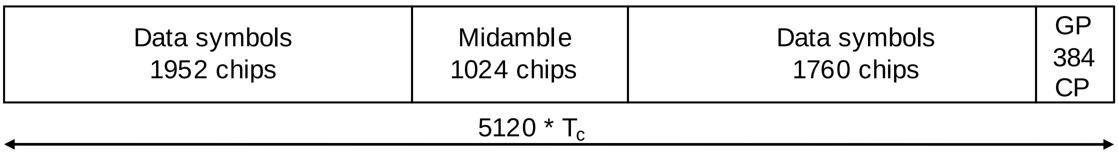


Figure 6.2.4.3: Burst structure of the burst type 3. GP denotes the guard period and CP the chip periods

6.2.4.4 Transmission of TFCI

All burst types 1, 2 and 3 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. 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 [4].

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 [5]. 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 [5]. 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 6.2.4.4.1 shows the position of the TFCI code word in a traffic burst in downlink. Figure 6.2.4.4.2 shows the position of the TFCI code word in a traffic burst in uplink.

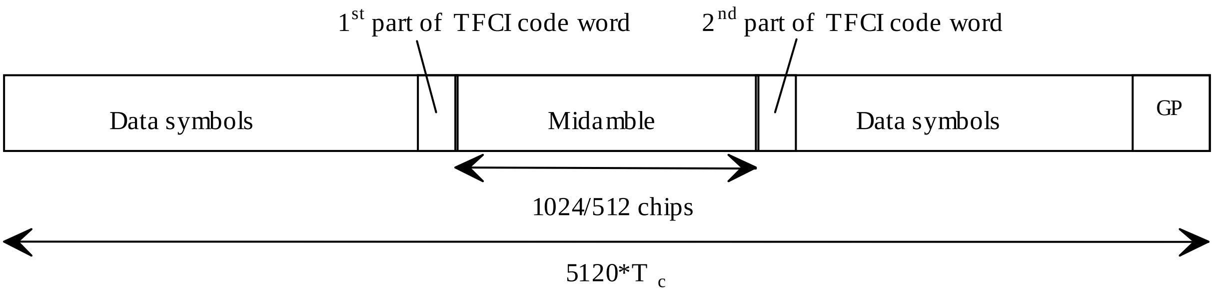


Figure 6.2.4.4.1: Position of the TFCI code word in the traffic burst in case of downlink

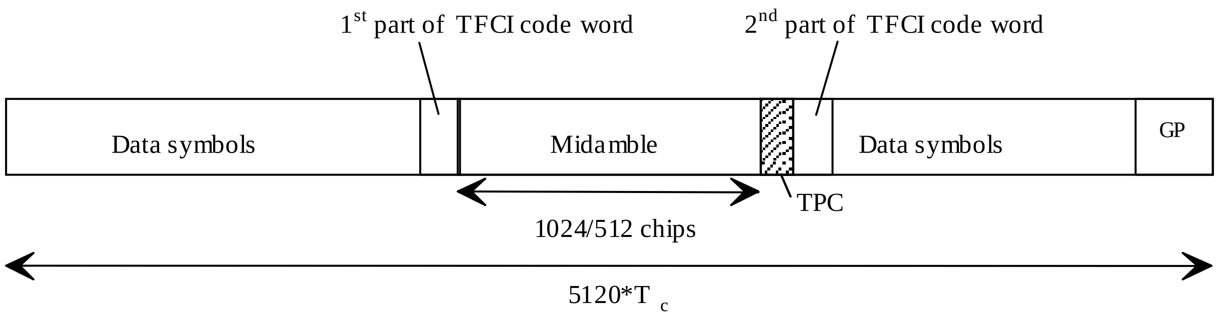


Figure 6.2.4.4.2: Position of the TFCI code word in the traffic burst in case of uplink

Two examples of TFCI transmission in the case of multiple DPCHs used for a connection are given in the Figure 6.2.4.4.3 and Figure 6.2.4.4.4 below. Combinations of the two schemes shown are also applicable.

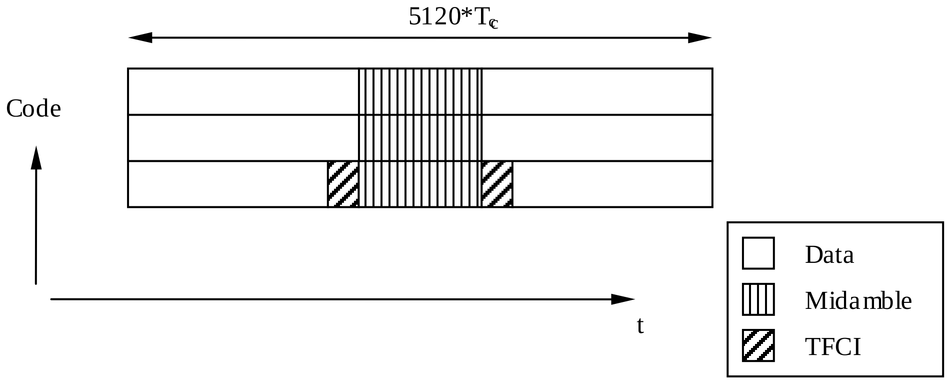


Figure 6.2.4.4.3: Example of TFCI transmission with physical channels multiplexed in code domain

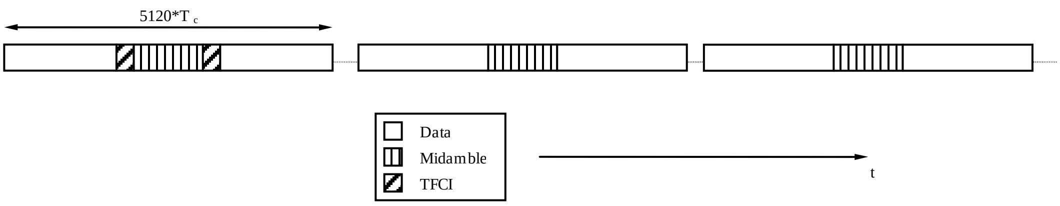


Figure 6.2.4.4.4: Example of TFCI transmission with physical channels multiplexed in time domain

6.2.4.5 Transmission of TPC

All 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. Hence the midamble structure and length is not changed. The TPC information is to be transmitted directly after the midamble. Figure 6.2.4.5.1 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 [4].

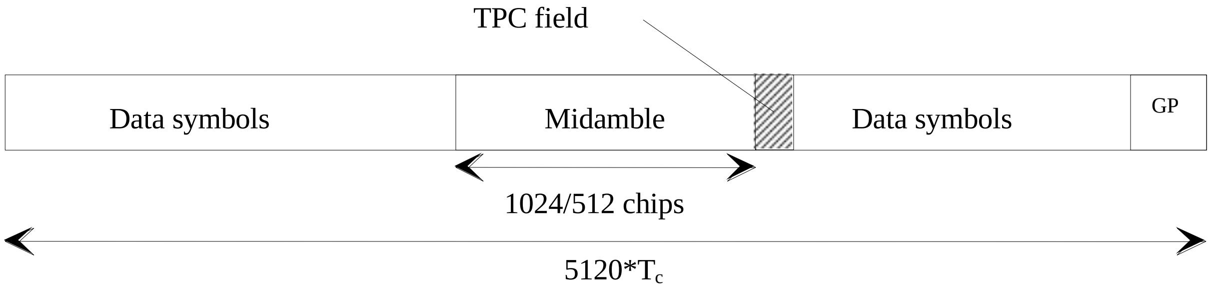


Figure 6.2.4.5.1: Position of TPC information in the traffic burst

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 6.2.4.5.1.

Table 6.2.4.5.1: TPC bit pattern

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

6.2.4.6 Timeslot formats

6.2.4.6.1 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 6.2.4.6-1.

Table 6.2.4.6-1: 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

Slot Format #	Spreading Factor	Midamble length (chips)	$N_{TFCI\ code\ word}$ (bits)	Bits/slot	$N_{Data/Slot}$ (bits)	$N_{data/data\ field}$ (bits)
17	1	512	8	8832	8824	4412
18	1	512	16	8832	8816	4408
19	1	512	32	8832	8800	4400

6.2.4.6.2 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 6.2.4.6-2. Note that slot format #90 shall only be used for HS_SICH.

Table 6.2.4.6-2: 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
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

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)
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
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

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)
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

6.2.5 Spreading and Burst Types Applied to Physical Channels

6.2.5.1 Dedicated Physical Channel (DPCH)

The range of spreading factors defined in sections 6.2.3.1 and 6.2.3.2 can be applied to the DPCH. Burst types 1, 2 or 3, as described in subclause 6.2.4 can be applied to the DPCH.

6.2.5.2 Primary common control physical channel (P-CCPCH)

The P-CCPCH uses fixed spreading with a spreading factor SF = 32 as described in subclause 6.2.3.1. The P-CCPCH always uses channelisation code $c_{Q=32}^{(k=1)}$.

Burst type 1 as described in subclause 6.2.4.1 is used for the P-CCPCH.

6.2.5.3 Secondary common control physical channel (S-CCPCH)

The S-CCPCH uses fixed spreading with a spreading factor SF = 32 as described in subclause 6.2.3.1.

Burst types 1 or 2 as described in subclause 6.2.4 are used for the S-CCPCH.

6.2.5.4 Physical random access channel (PRACH)

The uplink PRACH uses either spreading factor SF=32 or SF=16 as described in subclause 6.2.3.2. 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).

The UEs send uplink access bursts of type 3 randomly in the PRACH.

6.2.5.5 Physical uplink shared channel (PUSCH)

The spreading factors that can be applied to the PUSCH are SF = 1, 2, 4, 8, 16 or 32 as described in subclause 6.2.3.2.

Burst types 1, 2 or 3 as described in subclause 6.2.4 can be used for PUSCH.

6.2.5.6 Physical downlink shared channel (PDSCH)

The PDSCH uses either spreading factor SF = 32 or SF = 1 as described in subclause 6.2.3.1.

Burst types 1 or 2 as described in subclause 6.2.4 can be used for PDSCH.

6.2.5.7 High speed physical downlink shared channel (HS-PDSCH)

The HS-PDSCH uses either spreading factor SF = 32 or SF = 1 as described in subclause 6.2.3.1.

Burst types 1 or 2 as described in subclause 6.2.4 can be used for HS-PDSCH.

An HS-PDSCH may use QPSK or 16QAM modulation symbols. The timeslot formats are shown in Table 6.2.5.1.

Table 6.2.5.1: 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

6.2.5.8 Shared control channel for HS-DSCH (HS-SCCH)

The HS-SCCH shall use SF=32 as described in subclause 6.2.3.1.

Burst types 1 or 2 as described in subclause 6.2.4 can be used for HS-SCCH.

6.2.5.9 Shared information channel for HS-DSCH (HS-SICH)

The HS-SICH shall use SF=32 as described in subclause 6.2.3.2.

Burst types 1 or 2 as described in subclause 6.2.4 can be used for HS-SICH.

6.2.5.10 Paging Indicator Channel (PICH)

The PICH shall use SF=32 as described in subclause 6.2.3.1.

Burst types 1 or 2 as described in subclause 6.2.4 can be used for PICH.

6.2.6 Indicator Channels

6.2.6.1 Paging Indicator Channel (PICH)

6.2.6.1.1 Mapping of Paging Indicators to the PICH bits

[Description:]

Figure 6.2.6.1 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.

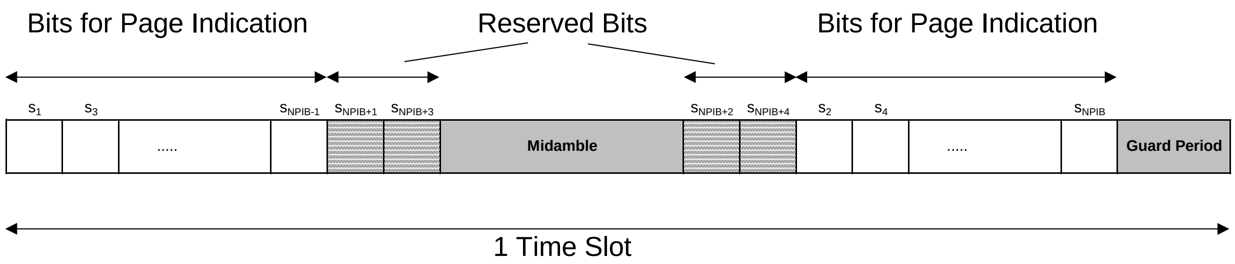


Figure 6.2.6.1: Transmission and numbering of paging indicator carrying bits in a PICH burst

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 6.2.6.2 for a paging indicator length L_{PI} of 4 symbols.

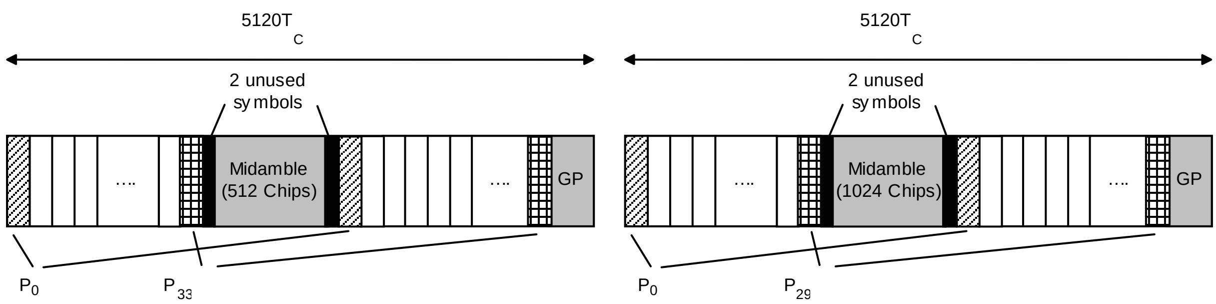


Figure 6.2.6.2: Example of mapping of paging indicators on PICH bits for L_{PI}=4

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 6.2.6.1 this number is shown for the different possibilities of burst types and paging indicator lengths.

Table 6.2.6.1: 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

[Rationale:]

Mapping of paging indicators to PICH is the same as 3.84Mcps TDD. More paging indicators may be supported at 7.68Mcps by increasing the range of N_{PICH}.

6.2.6.1.2 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 [3].

6.2.6.1.3 PICH training sequences

Allocation of midambles to PICH is based on the method applied in 3.84Mcps TDD [3].

6.2.6.2 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.

6.2.6.2.1 Mapping of MBMS Indicators to the MICH bits

Figure 6.2.6.2.1-1 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.

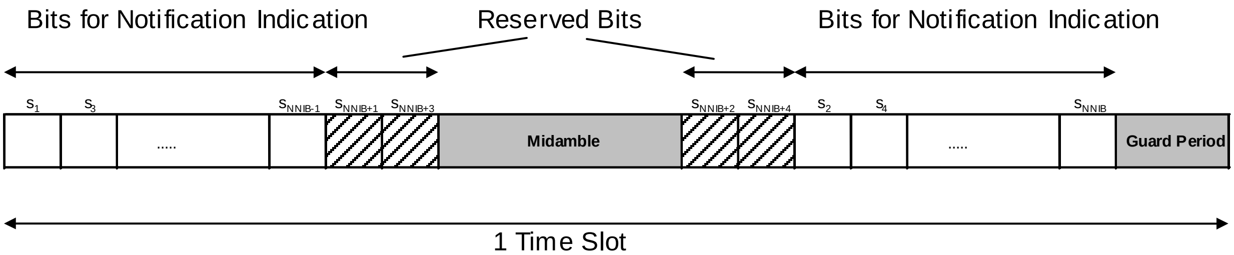


Figure 6.2.6.2.1-1: Transmission and numbering of MBMS notification indicator carrying bits in a MICH burst

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 6.2.6.2.1-2 for a MBMS notification indicator length L_{NI} of 4 symbols.

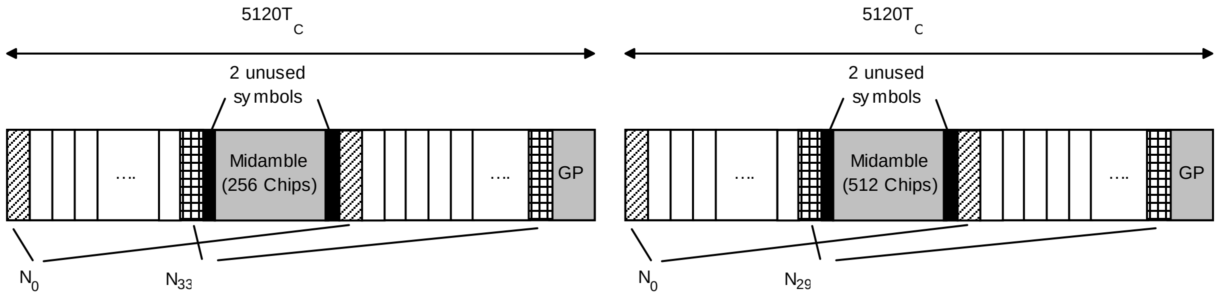


Figure 6.2.6.2.1-2: Example of mapping of MBMS notification indicators on MICH bits for L_{NI}=4

The setting of the MBMS notification indicators and the corresponding MICH bits (including the reserved ones) is described in section 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 6.2.6.2.1 this number is shown for the different possibilities of burst types and MBMS notification indicator lengths.

Table 6.2.6.2.1: Number N_n of MBMS notification indicators per time slot for the different burst types and 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.

6.2.6.2.2 MICH Training sequences

The training sequences, i.e. midambles for the MICH, are generated as described in subclause 6.4. 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 6.4.1.3.
- If SCTD antenna diversity is applied to the MICH the allocation of midambles shall be as described in [6].

6.2.7 The synchronization 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:

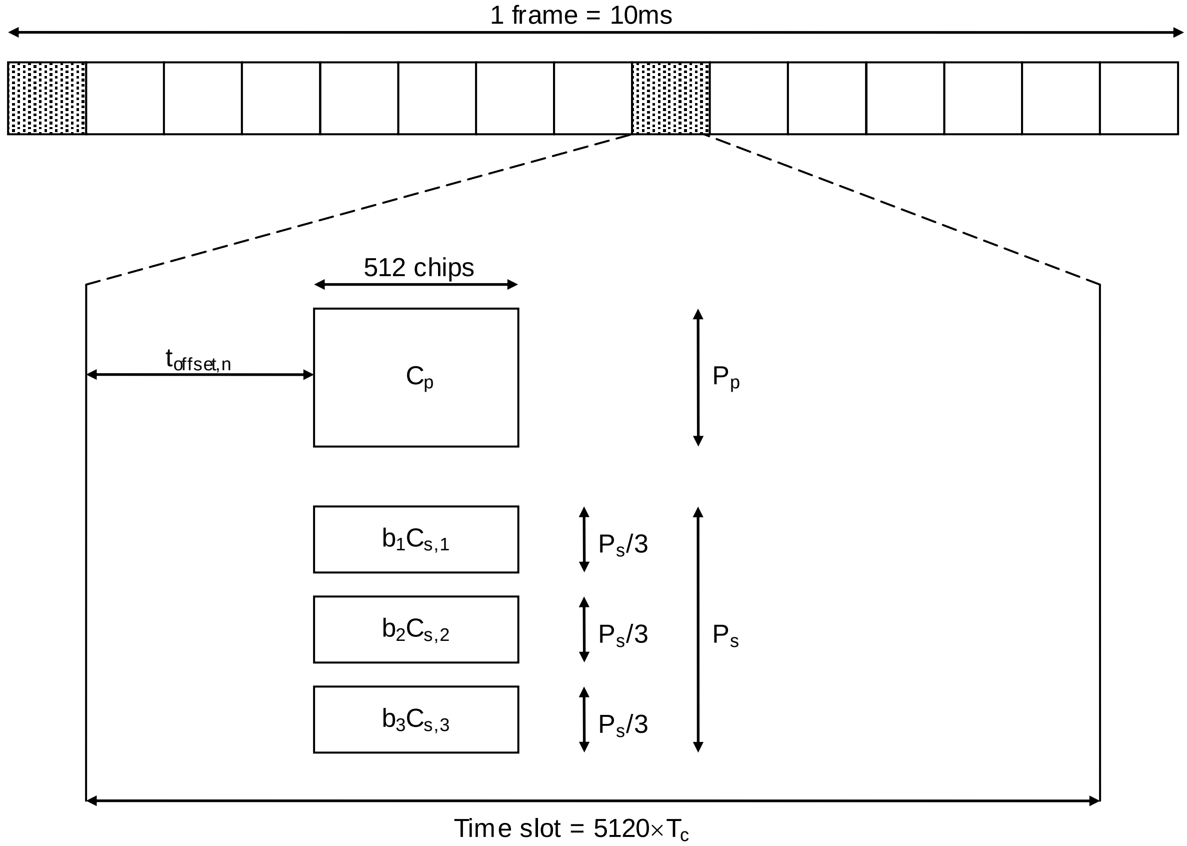
Case 1) SCH and P-CCPCH allocated in TS#k, k=0….14

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



$b_i \in \{\pm1, \pm j\}$, $C_{s,i} \in \{C_0, C_1, C_3, C_4, C_5, C_6, C_8, C_{10}, C_{12}, C_{13}, C_{14}, C_{15}\}$, i = 1,2,3; see section 8.4

Figure 6.2.7.1: 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 6.2.7.1, the SCH consists of a primary and three secondary code sequences each 512 chips long. The primary and secondary code sequences are defined in section 8.4.

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, (section 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:

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

6.2.8 Beamforming

Support for beamforming is the same as that for the 3.84 Mcps TDD option.

6.2.9 Transmit Diversity

Support for transmit diversity is the same as that for the 3.84 Mcps TDD option.

6.2.10 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 [6]. 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.

6.2.10.1 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 $C_{Q=32}^{(k=1)}$ 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.

6.2.10.2 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;
- 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 6.4.1.3. Thus, midambles $m^{(9)}$ and $m^{(10)}$ are always left unused in this time slot.

The reference power corresponds to the sum of the power allocated to both midambles $m^{(1)}$ 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.

6.3 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 6.3.1.

Transport Channels	Physical Channels
DCH	Dedicated Physical Channel (DPCH)
BCH	Primary Common Control Physical Channel (P-CCPCH)
FACH	Secondary Common Control Physical Channel (S-CCPCH)
PCH	
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)
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)

Figure 6.3.1: Transport channel to physical channel mapping

6.3.1 Dedicated Transport Channels

Mapping of dedicated transport channels to physical channels is identical to 3.84Mcps TDD [3 section 6.1].

6.3.2 Common Transport Channels

6.3.2.1 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.

6.3.2.2 The Paging Channel (PCH)

[Description:]

Mapping of the paging channel (PCH) to physical channels is identical to 3.84Mcps TDD [3].

[Rationale:]

An identical mapping increases commonality. More sub-channels may be supported at 7.68Mcps by increasing the range of N_{PCH}.

6.3.2.3 The Forward Access 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.

6.3.2.4 The Random Access Channel (RACH)

The RACH has timeslot related 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.

6.3.2.5 The Uplink Shared Channel (USCH)

The uplink shared channel is mapped on one or several PUSCH, see subclause 6.2.5.5.

6.3.2.6 The Downlink Shared Channel (DSCH)

The downlink shared channel is mapped on one or several PDSCH, see subclause 6.2.5.6.

6.3.2.7 The High Speed Downlink Shared Channel (HS-DSCH)

The high speed downlink shared channel is mapped on one or several HS-PDSCH, see subclause 6.2.5.7.

6.3.2.7.1 HS-DSCH/HS-SCCH Association and Timing

The HS-DSCH/HS-SCCH association and timing is identical to 3.84Mcps TDD [3 section 6.2.7.1] 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).

6.3.2.7.2 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 [3 section 6.2.7.2]

6.4 Midambles

6.4.1 Training Sequences

6.4.1.1 Training Sequences for non-PRACH physical channels

In this subclause, the training sequences for usage as midambles in burst type 1, 2 and 3 (see subclause 6.2.4) 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. The applicable basic midamble codes are given in section 6.4.2.1 and 6.4.2.2. As different basic midamble codes are required for different burst formats, section 6.4.2.1 shows the basic midamble codes $\mathbf{m}_{\mathrm{PL}}$ for burst type 1 and 3, and section 6.4.2.2 shows $\mathbf{m}_{\mathrm{PS}}$ for burst type 2. 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.

The basic midamble codes in section 6.4.2.1 and 6.4.2.2 are listed in hexadecimal notation. The binary form of the basic midamble code shall be derived according to table 6.4.1.1 below.

Table 6.4.1.1: 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 $\mathbf{m}_{\mathrm{P}}$:

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

According to section 6.4.2.1, the size of this vector $\mathbf{m}_{\mathrm{P}}$ is P=912 for burst type 1 and 3. According to section 6.4.2.2, the size of this vector $\mathbf{m}_{\mathrm{P}}$ is P=456 for burst type 2. As QPSK modulation is used, the training sequences are transformed into a complex form, denoted as the complex vector $\underline{\mathbf{m}}_{\mathrm{P}}$:

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

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

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

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

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

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

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.
- 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 section 6.4.2.1 and 6.4.2.2.

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 $\mathbf{m}_P$, the following elements repeat the beginning:

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

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 section 6.4.2. 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).

6.4.1.2 Training Sequences for PRACH physical channels

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 section 6.4.2. 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.

6.4.1.3 Midamble allocation for physical channels

Midamble allocation for physical channels is identical to 3.84Mcps TDD [3 section 5.6]. The association between midambles and channelisation codes is given in section 6.4.3.

6.4.1.4 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 6.4.1.4 depicts the midamble powers for the different channel types and midamble allocation schemes.

Note 1: In figure 6.4.1.4, 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 6.4.1.3.

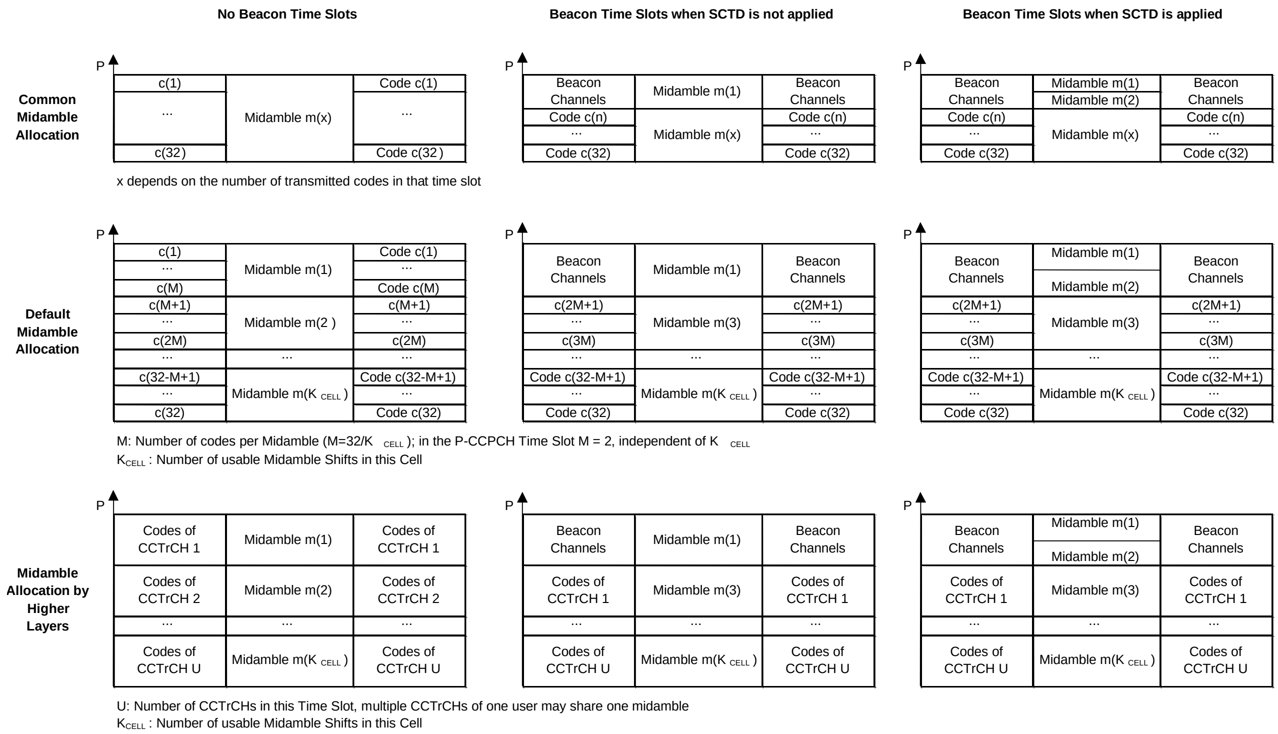


Figure 6.4.1.4: Midamble powers for the different midamble allocation schemes

6.4.2 Basic Midamble Codes

6.4.2.1 Basic Midamble Codes for Burst Type 1 and 3

In the case of burst type 1 or 3 (see subclause 6.2.4) 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 6.4.2.1 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.

Table 6.4.2.1: Basic Midamble Codes $\mathbf{m}_P$ according to equation (5) from subclause 6.4.1 for the case of burst types 1 and 3

Code ID	Basic Midamble Codes m_P of length P=912
m_{P0}	9E57CC4EFF411BC3A56568FCBECB53005A3A19CA729C922826FB5E2F55D4A0C6D57335B055 188F2274154ED0F61107BD34023FDC3887072689755E733FABEED9B7967C46E9452F78E0CBE 97CAFB92DD44C90E40E3CFE9DB4054AC45EB8F260FDF8CFB5C3C23733F7344633F26CB092 AC89F4
m_{P1}	3AC41CCDCEB89F45AA67884536D0B796A5E048D76D2F9531E2E31516496B3B76196D68FB7F6 CFD8C5EA232B5C012953FFCF4C1CA7A2BDEB236426E422FD4F050C4022188D8068F47441FC 31B005F8F53452DB8D72839DF021A45D8BC51D1CF440A665D1F751145D2F04CA352BF2C0BC F589E
m_{P2}	4241DBD18BB9C42E335530533B27F0411A0588156421FA0F306C2598CD9C2D3F7D954C64E4E EC699B2414356F1D47E2A3D09A56EA850ED4319AFE7AF07538A9499206DD943AE990F43FA33 FAB6CA8E6B3615D16D17B7FF914377BC59870C269E851B4E012B107EF92542B3A2B458E10DA 709
m_{P3}	CCF886D4B65C6CEC0E3F8D8186F6CEA1FCFFEE878506F22EF69AAD6F51FDF2071B34E4ACB CD2545866C36B31C3235DD38361403E53DE6CD4FB1DC91752BF5F6C3AB442E292A90471F2A 5B9FE7599CEB4651D235D505052C22F54F868C18AB14205FD41FD468375B661BE35F0AA67E5 F33693
m_{P4}	F95E0D6F5101D3D7BBB354646818EAED147E3E4CB0249F696738B3F3A65192F5F012868C190 BCB967DEB112D907A85F33161C68B9E425A3F5EA26022F6C40ED01B8DE7FF6A6F75F313FAC 3DCD47C7EAAC32A9AE47D633CA6F47AAB8EA282B467D8CE21B1352FFCD36966F0A9B2EDE 0DF6252
m_{P5}	6FCD348CB614E6C68534737B6AB3F693A7256A85D5C28C6A77DBEA1ED62E1813E7CC88AE99 0BE4432387ED43C60FBA6556C5DBD7111B1B53FF5FBAFAF86CB761F15EE2782C7616C816A1 C77E27F197DAE6BCBD028F37E5DA7906198C98F72207A0A8FF108EAA66C84D976049E4BA42 E0C27D
m_{P6}	94503C230B52660711010625B04D9B98ABD0872DE470F3323F1D4120F46518715929FFF471421 2C26EC813F9B0601B573A3B38F8833BBCB57390D8E16A8561C54E6FEF9D8A64B2E06C07E417 B426671CDFAC9C7FA20D15B556CB39FADF128560A57D26B0C9354C1CFA5334A7C5F96B9528 1A
m_{P7}	92B52AE0D72D7559C4A277EC57995B7B8BF3CBDA1DF8FA7D6A96DD02F93B28F84C18E6F905 D87A12D923E38C4DD659819F1CECFDB48DB8EB129DD472A2718045ACDE58C35A273FECA71 365FA35130215FD801BFA471D27ECBA3A8CA946E83060465BFA9A1F3C8888133D22BF43E1C8 9F26F2
m_{P8}	BD71D9BF8F8250A64EC5131043F2B0E7424A365508E4E268A4A9857BAE4E3360058B8AF6FB4 A10B3C2BFAD8ED116229056B01F7E59E3D9D4120089EB213106B920925EB2422196AF8FA999 8389664E80DA294E1B4B7D6807FF3743EAE53276AB634EA1B080FD55425C318B1EF670E9783 EF0
m_{P9}	D61ABD7705BAB371765DE3FD732D2C5A51D5DA1BA0BF789170F01936183A55CD1693685BD1 BEC7BF691144BE24A8B74D7FCF1830425997806FE10C49E98F73BBE07835ACE5F2E6E083294 BA4048D8AD59A4E6EFE538B6D1991C21BD130D25555985D5E8AC1623FAC93663C5E1CCC77 A2B3FA
m_{P10}	652DE6FBD477D92AFC5424953C64A722EAA5D5CB0E6A04CB43273841F71525016D8DD83708 11E3F38851E973D8EC2CEF3180D1462E6530623B004813C1E154B6CF790BE4C712573ED7348 9BC2952048A5C17F51A25604A6CA660EA480618F8DA78470580CA9B987BE33F3EC6485AF440 ADC3
m_{P11}	49AADFAED5D1C27455F2FE9D2C66B31E3792F088E20562C3B6DB2E4F2C67445690164E34043 B5C98819236020C15264BAD09CD75608EE4BF2F62D3671611443D541DA129FF475E26214AFE 00419D12EDFDC443A4F7A6DD38B2BF62F64294A80937969E9920FC3A33DE7B131C61F20C195 621
m_{P12}	6D408E783793B8F8B438F512CC4AA7F94B296885D9F59505F339C5C1F7FDB8F2567866B876F1 6614BB6E3788E1B237DD8BB955341911ABADD6E7D3276F7068DCAD08737243631C42CB77CC CFF7FD7A03B52D5D4C73F8716A83B6094827098095F19F136491EB1405992E3ADB80B685FEC B2A
m_{P13}	349BA9F2D6B07CC41DDBDBB446F844D77A86E96C9C2F191F1BA42D0402754B40DFE76BAF4 DBEF3DFC28E426ACCEA6327FA51C4DAD1B6F2A9082332FA4E0BC21FCF10CA9822CDDEAEC 38760194855253E3E3D46C8565CE9EE86761B7E28BBF5C4958A3EE709B8FE9CDD0CF9560A1 DAF6CF971
m_{P14}	033E68B1E9D433BC88119CCAB47004E20B6E1B8F0E4C2756DD549EBDBC5243BC898694426A 3EDECEAAF00A7AD02D4AD1F0189A1E99B0B1D796E8BB8C5EE977280408DA0F772EA3A1AD7 44CC0C78C39070BFD324269BF86D67916D157A9BE63D9E94B76F69005036815086719 8BD0A6 8031CA
m_{P15}	C08FA672B545FA416E4856DF87BA5CBFBBD64EC62A2A294427A563F691A28EF5610A0CCA37 ABA21BD98535B4BC3F0C009CAA962384B5004063D16083C93D1A7C6002BD1D51A27B671EBB C4860092DF3B3C389A0E909E664FC4B99E5B1A39B7250033549137 2956E1782EDC5330CBEAB

Code ID	Basic Midamble Codes m_P of length *P*=912
	7A636
m_{P16}	F8AB480C79497D13EF846E58F4D6A0B52CF2A71AB1236661B0D84D8CCA603B157BC07C0000 306487C41A7CFC6A3A58C1276E8BBB592F9341C298E17886E3A2AA2A08576FA2380C710422F CC0B1AB50B13D6B676EA102B6A035449A77652524F3D79B05F9EB24C286D7A8E4AFA1596788 C987
m_{P17}	53F0FFAEB51656B7DC819B749FB5DF94E4A9545B669AFA52F385C5869C4D9A2F3BB5FC874B 9DE055EAD1159C47E7BAE8F08C7F3A202D18AF084CB9DA377C3BF8F9B710F9262855E5E04F 9C92C11E4B03DCBDFDF06311DFB839969036DD115654AD90E2096862B37338272506327E3D3 9D189
m_{P18}	BA58B8BE4FB00B6122DA4EB61BFB9B775811B88EE9444BD8400CC9866193AD636A86A23588 F59E176DA8A18B856E8FFB41A8D7E91A9E874AB50B89E971AB36050058BC70C84220ED0D568 1F7CD84CD493A65B41B42E10D38B18598C63F73163EAAC1C93CF3A3CAA3BDFB29D02521777 14756
m_{P19}	0C0769A781CC98EDFB93319AC2BEB03C8475C874CA1AFF16BEDE90B07D5C6EA8ECB401916 B5688AD4C0D97DF085CB0A16CA4D678A0AC1E00F9737B4CAA93A163F827B39AFF1AFB831C EDB26EF565102DB24ECC2B6BAF72B44FF5EB88574B38ACF3EEFD87E4F6173846B151271DD1 E1466DC4
m_{P20}	132C03285553D9205AA3746EAF108D92461B3DBA03866E70A2F47360DF17502559E5AFAA2EE 6C7DC800D8F620A3294A3E2B1FFFC17AA6634D6B7F3353A652CB0825A4E13A3CE5E91F7225 181A0678F53B3D038BACAFE214FD4BB4C2D80EF35D42A2F19B69CA2162E30543BE9BD85481 85D0D
m_{P21}	C2E92D3AA8981AE97C3325B1FC1843CB0E8C5E394C201981A8DD8D1BEBF8F649166508A5A1 7819D02EB0A8EF797D8C51DADBCA9A66D949A4C7E6B37ACCE1A2E578469D1B9D8D1A47E7 BEA9DD0002FF7D64BF6519A63D9084C0841A8841E183973644DF590AD107E852F3357A70A2A 5637E22
m_{P22}	9BEF2F948ABC4CAC809972EA52EFE03907142A44F3053F970445B1EDF5D1FC9F03B6EE30F7 CD74C04B68389D5826E85E763653ED75D1469A240E406B3989EDA065BD84E34F790D74D2D17 D7ABCEC25CF7FF130C4BDA979BB5A9133CF3E79B3558E921EAF013A0CC4B87C5FDCA4AA9 F245E15
m_{P23}	6DE4817165AAC324EA17347B78FB4E1D642F74E15F292880975C42F405D440B1FB101E64DBF 0A0ABDDCDDDB388672248D2BE9431F7BD77CEF1583F04680865B315E8551A232547A807CEF C742E529CCE892EE7FB2F312E96EF7372AB4F7310F87912793FCF2BAE5DC0E6DE2CE9FB40F 53513
m_{P24}	FF5034A2747FF78F34664125AD31AB2ADD077839D8CC44372D13589649381A2198631F1454BC 450ECD0AC8D8695034CA8130B5E5DABB9EDF7A4AFC0738D82B7BAC7086FE813289092AF218 F5D04BCBCF98A07F4C2E0F8BC9C52F45C5813A693EF555A2B1EF308908FC993B2266B2AA09 C3DA
m_{P25}	FE1DBAC430C3B1815990B234583A86EB45EDCB32A38C92C3502B5611819701B1F545410092C AD7E962D3D6E232059CF0C9E8DEA6F7DA21D89F611EFE129D854C5B957FC810E0730EA0C56 03B035DD9D19686BD7BD8FF0C9979C900E955A649616DA71D0FAFF079176E541F1AA27F024E 669E
m_{P26}	8C0A6F60BEF5DA92E8702CEF3563B50B8C1C2D29DC82B97FDEFBE322024205726A0E5B9E6C BE0F9F02FEFB264E62FF99955B536091CEFE5C6986957149C2954E0EC43C73650855376E0A8 A4ED9873AA8AED98D10579ADFB05A8713C37851692C3B4405D9D86E6BDA0EA9A4BD0CEB7C 79E6FD
m_{P27}	205BB79C6DEFF102C2FEDA5301BC5B6D62957A3A02B486DD6BEB878558827499DFC1DC79E C55241B208599E32B99959F9589624E2C0AAF11E3C8CCCFA7EB88AE7B844B483BE360CF3441 1EF739BF073AAAF3F84E516CFA10992D606789A20F15686F54CBCE8A1305BEBF7EFE8EBA95 F723B5
m_{P28}	F32AE20D70B2FDB523682A5AE7A83307F740DFAAE0DBB58F828DF0ED20AC79C85E2FCAE3E C342E79F0EC8054231A541952736CFFED94A4F44FB7DF473C476FFB3CC87BF18A0938AC776 A26DEB32BF906D2C90F57ED192BC33F1312746B143AF383C972A2B61AD8D46F3C4E56026150 6CC87B
m_{P29}	8F6A99C81370432B4D05459359C92D87DC3D10E82454B911EAD9E80AF07F26B198C6ED71E72 F608118B67C61E8C64EA654B7BB0ED91A3DAB2B77C5CCF92AEEA8D6DB9E9AFC142F6FA9D 2E79E443DD42D0F66BFE92D9BAE58113B8811E50FF8796E13C43BB210076AE2F8FD0A1FDF3 D5B2AFE
m_{P30}	3BE3E2BD5546AFE1933CDBEA679EC8FBAB69C0ACFD5B2DF9A72CC5B4132123D6EFE9F907 CB187DB647C6C7E59F71E830DB84472B40C011CB418DACED36025BEF7289FA803D1E32FA2 D35F667D2AF8B78985D469532B5FA8336072B7FC74A515B8700CAEFCB625AC212AE335E6EB C37207FA3
m_{P31}	2642A80A8DD998C3198E6EF691B68257560C5E875A32F8C101478B24F9150883476B03F26B6A 137E117057B525F37E3749D1C1DFFC2BD059C6F4FBA8765D58493C87894E819EBC1172A62D D6F3DFF2B18A5987B0841FE85BC85575B0B1048A9138E6C9181017A501CBE76337926BD9AC7 78F

Code ID	Basic Midamble Codes m_P of length P=912
m_{P32}	362817D18ED89453CFAAB83B0D182FC12F3E90C124514F404743D223487FD2A2026603D3CEC04AADB26D2DD8123B2D18C4ADFA6FA95260FC8055D29B0EC561FC355BEA5E97CA030B0187773B726299C2CB91CD7E0EE28B89C63EBE333F316DB6209B012A230FAAA29C52D41F9DBC6B66F7BF
m_{P33}	6E92DBCC6445EDBDAE1D566F99C4FA5AD9823981B71A883BCD14967C2358711A59B856EC4890697E030009682A332D0F7CD85FA7E509CB2538BF395306603EE229C950D749D3A4EC4172F8400B1E1BA5479098A79F48F3F977C400D54135F75DBC6CF97019E30954AAA550D95ED4E08FC2AE
m_{P34}	82B02C0023B142BFFF4C2EAC7E5F83D3C76A7A18EAC7B621A0F9B65152E475C8F8E2A30479EC3EE9263F73426722E9A96DC53EC42D7C0BC50A643E66E9B8C0BDE8E893A7562CA33856D4219A5A59F599590164B4015BB9EDCD26904B9716449FD02CA7380C6A50CE22A40E0CDB787D109122
m_{P35}	CF2673929413ED857B0DC9894D8AE460C19CEEA9CBEDB810388C0ED13E11FB7201ED5A6865ADA459DC8E5023C73FC13D159A7A540F64FBF586A2504C18843F42714D4699DF6591944AB44126A4A83D175E8C41EFB28D34048E2EBEF454150F4878F6A02A874B1BE46CCBF8577A5EBF377578
m_{P36}	E0FAEF096093575ADD91187D72DDB6E6401BC189A5014D6149E092146BF879450EFC3E504C306D0151ED465840ED503FF3BF92CE33E411A17AA7DADB365731D271791B8C21BED3557892C4D0B3795A24EB61566C3143A54797B8BF25194A9F8CE20C5C991FA29BBA64211B4807066A45B9E8
m_{P37}	234F19C1B17B1C403171712FDB575CB8FCBFE15B39F548E682452117597AB24B8E7E51834F222508ADF3260AEC2246AE84359DC0130229580F98275BD036F82BCCACBFDA34391C556EE7E4C90A2C67252C2614175A2D0C37D5C861A0D735DA8E05D2E7712332C0BC0B33FDFED4FD90A61D2F
m_{P38}	415B84B33D1F23316B8C7DE312EBDA1091AA5BA44319C7289C78701DD437028F8CBCA30C534FFF1875A230EF762F1293A9C9BFB32856DBE06EE915D1AD66417474A705B7BFF4EC8DD448834789AE9BBBA1D2D99080CF03841DA0242E0204D3B80680C1AA6935F3F6E9F0AA2B51E5A7A227D0
m_{P39}	FF16F0619F5A297CC40FC2F97DA2A92A9D144C2D1C1043F53DA05909FB7F23DD82ECE70545330C327A097FBB2F93A0E7970DC64768F76FCA0E5D255B4116550E838664791055B8D24A5837B6DE3CA65C522A50CC25284D68C3BF61440DEA011345F3127A802234B66E5FCB893830BD39C6E3
m_{P40}	E9EF50791AEFDCEA8D5FCE9398C3FD7A8AFBB50F2268234F62FD799FCA3BE94285C92BEE044A546DBC29319E983C6FDA5431BCB78AED499872F24F228FA4782FEBEB6AA13606239E56F7D19107CFA441C2004192386AD0BB6DB381ECACE4D153DD844F9179263E899DB195F16D9581248259
m_{P41}	C310A1E57CDA2246752056F432E5808F423AE04F5757F6B3D2E798FBCAF12517BA77CACCDF11B18D6A04CB37D80A077C8F90FDED0D33F8739312401B6889E16B8665ACA75075210424AB7BB2516828B2CAF89ADD0B8CD223FA9850B170D465125723D43C5DCFB7264F4247B4C0F5D3283C15
m_{P42}	DF2A1C8FF69CFDEB8D36F67744F0C94A6028C7FFC376E4F32AE818557C2F017F040D88096141C90B1F4F55A22AC386BC40ED96EA1B7BFAC91AA0BF97E36F60E225E167D926536AA22BB1CE36BB9B42C53CD1A56B2354F23807B350BDCE7C9B01CE6AC7AF212C050F8E827CBC3AFF71D50E97
m_{P43}	88F8ED04165EA0D34E412F8C7175D3C387A9B18E0316E00DB2F6BB74CB24BA74EDDA374036FA0A4224F6434752B67462C8445EA3E51884BB5C079A862E7711AAEBE14C50DA149B032066C88E38CD0FA85AA6213F28E5BB2D67BB1E000E16B6330BDDB9796AFA27EEBB6A0A7A1395DFFF1588
m_{P44}	5439C5FF080A258601EDAB8A0B54F51AC7C66B6D8165AEA5BE1E15AD85DFAAE4F908AC8404DA4CAEB3FA93AD698C835F3B60205DCDE971BE63D570267B04CC26A8CF3D5051B22D9B0F4099CA151A89508E1838185F90D7BE73161CA5CC3950E2E848B26F85B98331398AFFEFEB9A046A5A3E
m_{P45}	9D26B1376B5C4F5F586486CF35762FF481842D6353D6006AC191D1157CC39678F0B4D31A1668AF65E2B78B57D7ADDB45621DAE6A3E4B0322FE0D5713485234392040C32551461A0749B53627F0364A998A18CC02EE708732DCA8189E523D588EF5D3CF70E87EA5140007BF84AEC5BC1BB391
m_{P46}	89530DB4E7FEC9DB64622E6FB8F0879B24F3D023C83AD69D674189910F1EE52BED4FCCC501EA81E122E8336A89D209FACD7F6A89F65611A470C16B12CFCB84AE475E6B82895CDA52F564DA7726210D073B38342F6BAA22014A7D0EAFD6202DE5B03CAACA0610884223E4C787E06F84A8CBFB
m_{P47}	A9E83B98E0C2ED7950FEB892BCAC4ECD503CBDB193D143BD03F2459DC6895A81314861930CBD9ECFF114865CFECFBF025075D3FD471558FB7C6A6CEF8547E937CF52DA324E4EA04319B78376D2F4BFFE8E467DD8C29DD0D44135ADF1D179886A82320FC35AABE4957641C9762F7C3AA7D970
m_{P48}	E113DC0ACF1E85730EA81E964487D1D8263A186C5B627B8F96D95244284FAF1E9D8351D1DD7957D205C15F26F3919B34196FBEDED8E88D96C00441A438D27B215AB448B6F6D9DA895FFF1

Code ID	Basic Midamble Codes m_P of length *P*=912
	0EB3D4FEB44468F21E77CE64757F6D8A627C4A2BF0DD9D67684F80F3C1BDDADAD192EF32BAE5479
m_{P49}	687C6FAAB36FF9C20DDBCF1CBB7AE82F334E48CC6C10B988D8154DA5D18746F3E9153A5510C2B026F5CC7B6A7562644E5936CEF2A023F40BF239A1F2A6DC75782F2D056174E8A904A7A11D3E301C0842F8BEAAA3D36C86F240309635A90E10E766FD8149844F8B42A9C4A59FE4863AD0E285
m_{P50}	FFDBD37063D55715CEC274D716DB7DEDAB90ED8808952BEDA0E75599D5A29C13C483FB97D3A0822F46F2E1F4ABB756A7FD4710DE7333B488203F7152FE1D1DECBE5AB17EDB806681DEDC8CC12C11753418E2B2A5C95D60FD2DC9970DF38C84CE7864833B69046AD039D261DC1C14CF056DC8
m_{P51}	F1748076429321CABC98153CA2C18D3ECD24CAF8B22CD97C1674F6A3EE26C016CC1B8E8C3D0BBB98482D09ADB2B06CAAAFD73FEA2203F8A2B791ADE9C14A5DA7015A442392535CC10A10399B2F80D818DF180707211A8D858ADD9DB1EE10BBD6F92F2DA9CC03512EAAE5BE18F7AA87573FDC
m_{P52}	81DDF8E2BBAD0D040EF4796A5EA19DFA9C0CA8067068909896A83C2E1E239D83D2B858E0864A7BDD2962AD001EB19665E4414BE81FBA6D7BBB1787AEDB0C81913D5C86E3905B20DBA6C9DAC555B4BA05574F3120FE8F3326B336B61BBC2068BCE2788641CD59032731BFA73E58869A11E4B7
m_{P53}	0F59625A8BBF1E83A906E5EB9E5E1CF85DADC7BCF7736DC02DDEADC8736F7399E4CE10601DD832D32AEA53AC895EB92DF5FFB409985EED5BC9C775C7A655102E644435ED2EB84DDF30130F101FBF2A93FE65D473593FF3A4134A41C4C7EA6A50448F8B2FE1F91F1E9E84C95818D2CA340C59
m_{P54}	3AA62BAC2BB34A4B7D06A968E20E16A1C79D865C1F87DCA2B3DE6F3D49D962175B4D7FACE8EB162E9E0FFF9FABD6F57305051838A7D5A370DB79F9246B3ABF10719EF9EFD86664DEC9B06137911903AFE43D00DC992F9F8FAD1C017CBB7591E1A02BDE56B75B2F82FE61234ADCE34AFA8017
m_{P55}	1682757D7852076B78872B235412EA5CE2AA997BD66C8689DB605F04779E70F61A4E5AB75C65F1BD3D9948C2442D9AF89EEAEC6609E7E1DFC95294C318AAE8FB0C2E025713BE5B38A08F8A8463D12081EF250C482A2DD9803628B07C9076CACFFEF49EDD6A3440A6952C73493E0DEA0DB112
m_{P56}	016B428AAA41A03CB6BAEB518F27D34CD9F4E0A7F0C149D3B8F35B9481274E4258C01E6D1F0EF01256E48B00C7D4F9FFC242273890A4D5BF9338A1F5D74F01BF56EB2E5DE461AD46F78446DC2B56667E8732E73E95768CC05615752A8D2C88DF077277F026CA1A1057DA0C15D10CD6093DAA
m_{P57}	68C2F3594AD2A41BFD7BBF60702C5581B3F75E54CE7D1B3A598400306FAA22783335DAC415AF939C4596A104724F53953BB51239BEB77D2574FDC37CA1B07C5E7AAC2774DC35DFD6B83DCCEFC3C0A9B3EACE9A6052C44E8C327B24D173A760BF9535EF8095F35D9DA3E289F636521ED06584
m_{P58}	BC27B7917AA3ECA9ACE1F94A1A917FE1CE6754E906AD4645719CB3818FC58A48F8CBBF32938D18D68203507A4D2205C049AA7741E089777205F1EDA69439984BA8DFFE45C210253D528305BFAD36FCC90683801A0F19022923E45DD0A52F6E2E3F9A49333250F76A8BA8C325A39B362D9F2F
m_{P59}	057CA87F217E30182A60109027005CEF36F98571B1C11A6525308632CD39232853177DB25A639192FB65EA70A70D90CCAA34FBF7C2E6233A362F46345F15CC5B2565DD7537010E1BCC22AADD2C7BB05EB6BC05A5DF289A8AE249EAC10F21666C742A09462FE8F1D38B5860CDEFCAE2FEBDB0
m_{P60}	A2AD4999053CFAA50A1093DB07AEABCF6F80C293E00D8ECCB12B56CE7FBA3F62D686C15B3E1A941AB480ADD6F2176C537686F770D73ED366086E67F2C46B8AC06B870880AAA2D9B444217504ED74C7B90390485AFC46A63F15CAD9251C638278707D46A384DB62A7BA27245A5E16D6231908
m_{P61}	A196D99A227C44C27BF2BB0B6029557118925061AC9ECE965EA7AC380CFE1C0C33E5B7567E4FB77B7AC7DF34E4557545366A943D375E4D8A211CF03FB7F37620E9EE47267D78ED1D0A2478A353D2217AD5AD76892388EE7F0144ECD69CE3B5B04928CFA6A68C9FD0FE817942FF143D9C2DD3
m_{P62}	2968ADAE21E52DC8AE811AD840AB7600A5C6FACB2F3BF707D0DE018178B5FF73BB31F5C88E9B6C02C54B8D7B1A049E39CD7960F7109AA5EE9A18E9C3E9F0E8359952E144169870381391E3761E3137204CA71CCC4DB38CE4394068303F088A2497FD49DF4864CBEFA1675AAA895068577AD0
m_{P63}	AF21B04CE4B418B9A0AD80221A9C47978750483A83E9096D9F09069C3065E8F6F1FA68EAD50B78736311BDD70F72D97290C06888ACDEA4FBCA3B25FFBC5C8E91676C4384EC68C5D3C40CCD5AC3E75116CDC28C05F08B479A73E2AF7D380F69CEDA810A60B6FD6609CFB8A7D4E98DE0596C4A
m_{P64}	56BC72E0F1CB9DA84FBABFF84FA635E1AF9B60BEA6C22F8953156C90691F44D2B4078EBD8EA8BF6760BCE5217E2B0C2E19D4470D3321083486339AFD6D57FF66E21C149B40FCFC5CDAC80F7B6ED2AE576F3ECD4D14A5C56DCE7CD04147F9D725A783D9915D2E7A036FC854CC373EE8333305

Code ID	Basic Midamble Codes m_P of length *P*=912
m_{P65}	EDF8D061318EC3126958D38D4E0A0C71460B5F46E16CB7FD7A4084D174F900BC8A79C672C612E46E2AECDFCF3C744F40510FB20D15FD9C2E696F8FCCFBF80FA6A435369889E17A612EB222D50A6B88BA06408DE022EBF4EA74295F5B921AE86029D376E2D51250B79053EB3AA58B4C6F3199
m_{P66}	B86E98A32DEB7FB6F9A120725EC9C07CF1864670A9D5082D7DB7FC7656AEA8EFA05D661E63A06D436DEA5CB02E5F29F4B3D364701B1481BCACF306804FC14EE48A19CB8095F9C456502B39A08593AE258DBC12B358D6918C3EB8546F9F3E36646282E08142CFA309CECC823549E02946606A
m_{P67}	070850FC776EF3F88456CC9841604D144CDD4B58247B2938AA074009F128682E25FE0E6DF2C3991A5029A7E4EECA22C5718D6C457F3B529702EF34C7CBE96B6EC2A2391DD6079A21941855B5BAE1729CEDE009BFE8CBA54C25E7F0960990B004755A647D568D290A645C4C3B8E7262C347B5
m_{P68}	D96CD3FAF18CE3B8D470CCA2567E54544F4F9FC471F02F6441AB5F786DC9099E16C9482468A2BF0DD84C87E36C8A7D39500538FECCF76B03086065EBF38819530458E0D4B3ADF3C66C066A0651D3E8A84BBF6A4697C05DE066B112A8B6118977923DC3A01F43014B02C525663748B4F65E79
m_{P69}	F660B66151AC70269D9405C9A987C3FF25DFB65AEA14E5EB2A699BFA335AB16974D0011206212F3A3FEA6F0A6971FB3C6F4D73A6D44543FF1FA0775D57D13AEF2E470177C55F1D823299B1DCFE4CA851D7E9075CE9B8D6344B47354DA209DCE4EA6C0EB1F43ED231C04DBB510C68B2D2F336
m_{P70}	88C9890A01B550D44B635B0D4C01C20AEC17B0EA42389FFFB0D70386CC2BAD4D5A8E021A228BBD4059FD12854187F2F0DB1D6CF7AB654AEC2877D2B1A3A8C508CD9329A096F161B8DE72866C2C99BB67024C9261A24AFCAFF3A483E8D71BA7AD985E9DD0CEC2A4B31E088A7CCB7C4F39CDC8
m_{P71}	1309529E28E71D99D501350D9662F3BF5E3D54AC16408117F0083FBA22F1AAD9CC29552590B051B725B81B56E33E36C72F8EEFDA5F3EEF4629885BF827E05A4B918B831FCFDACC9656FC41D30FAC255D2C931D3E090897C3E75CCA520061DE330C60AFA9545148B27A1377300B0643897976
m_{P72}	AAB7E27B83CD46F2EF18B91FFE9D9C69BB92327B0DDE3664C8974EF7BCBC77234772C02007B344BB99DDF344F7E5A6C3CA3F01B0F28DCD566BE913C274F296F056A74CEDD7680CA7969A34CD785597008543208DFC63DB6C847BD364BAFE11751515287B210554A5610D7035A374E0243E72
m_{P73}	7972CD5FFC6AF3780BB7A88BD4BF9799AC403D1976D8B4ABEAEF4888BF0C269C96572D81B3BB55E33D30900CBEAAF1969F08E4EFC7CFE7F99DB9A184869DCB18A3D143AC725E46F01B11EEF3940932A7AFA30E87E156428EA927872FB64CFD072106F00811359CB146C957C15C3E920DA96B
m_{P74}	D62ABF2E9F79492FD2A22FF60CAA94DBEC39C380F12290B133DE53F18B1914DB0555BF6AAF47539337FDFEADC58B320D67644408C4F5105F8907F2254731D319FC3CA221974D5E9006979BCA2BD89C04F2D1E1FF2D4C51F3BBF2CA5BB2FE8FD34CF05AB45599BCD6DCE5C2BC53E114A723DC
m_{P75}	A0D97790B621153CF61E6DF09D07FABB17CD0EDFD030E300ADB777FE3569C35F747E4DD1566196305DA32BDE5BF26E395D6836254BFF3DAC9FE2BBACC4A5900A14E2E72E0D4D05D09A7A3BCF211D1E2F7E36CA379B52BC21D937BC628D6686F59171C5DC4A223D9AB1B8F89019FDD50683ED
m_{P76}	A133814EC7D9BA19C3BF38946484310280B2333E631F2A29137230EF8B8F9A30A958D8AEE03A5578EA40ADC014AB6D8204C396AD7EAB3C17B1325D7D55FFE946525ADD5CBE28F3DA392D8873C82C6CB6CB65760DB5B0D985786A7B04237C0D0C5F43C903E9CC3126AEBF3BC5CD4349FE2602
m_{P77}	89D74B62E35F853EC718FE7A32C7B39AFCA27A41C87CA9BC76FF6640DA6ADADA997562B010AA1841DB918E947989291BDCB50C9F40FFF623CCB0336FAAF878FD49BE092804AA73A3A41907D5CD32A375C898373D93FCC4C9EA84A2DB9802521FD5376F9635EE1D0C3E8DC34849369A757F5C
m_{P78}	2DDE87087BDB66B5DF7744CB16AE7164D2E5AA7B7B2CD8BB46C6A602DC9A108752DB6967F1728B12FEEEB1FCB681DDC48ED7C1C3DA5536AD84CFD9F5E94E6148F4DD3D9CF3C830F3B6401C8206B0ADF952AD505B96C74C615FC6F70381949B2E6E25F42D3E6563041FA5F501CAAAA93C519D
m_{P79}	ACD35DB85397D81E1124B62A60CE35E4E8214318527F96F273AB6718822971BA76448B3A6E662FAFF4D37BB2176934F80AFB3E03FF494AEE2F7C5B1D0B723E316AC0D67AE53A1C0637E155729422E7F78F5FE19BB9DCF674D13157B2F8994C5DC03780B6EEC2AA0E57FB7F8A6FC0EC81AF87
m_{P80}	43FCF00452F2E93D9A4110003601467549D08A20E4DE27F025843FAE54D9E2E5820D890558C7541FC771CDDECEA6648984D63183ADD8E5BA52F6E56956B6F1CBCD93374F34F4709DBB812D155528403D364CA2E54BF1F6828FB342B3D378185A6E3E8572B2F28EF6AB194C184ACF4FC409FC
m_{P81}	B130A5C2EC864C8FF71CFDC347DB4CEE38259F34A8F9CBD143763AA9DE869CA25E1A6A49D7A6FE1DC029DB9076FB6F111351C6FDBF0D1C1DDE412B835FCF0B97ADEEE7AE09241C2FD6

Code ID	Basic Midamble Codes m_P of length P=912
	20D63F894BB09E839021D4D81932BE52926A33AC9C81AB3D9586AD2E8AE53CFEDB55D43965 CA9EE422
m_{P82}	7AE9E0D3F5D0295917B116C28DC20E9B305296A3FF02339C1BBA86CD3D566D0C8948839C2D 4751730DB66179EEDF5B04404B7D867219715C87F9A18408284F0C0894E1864A55596DB9851D 0DB68B8AF7EEBAC5C01DA3284E6B42F7FCE8877AF04713C98274FB93FC8C8D421B0B572B5 DD1F0
m_{P83}	9737D9C29C179CA57976D04DF9597432A763D93B69B799EC14FFEF6F84A2F56EA0EAFD13FD 6D2C69462FFB551A58C17B06E32C59E605C34CA287EF8EA38F99C45D93A922C50B19FD02B1 30F5E704BF435A8998BE97F76181B64C56760D8A5B0043F290C1637783FBE77E9D113955431B 6F21
m_{P84}	29FE9F4CB903F8BFFB5134A5D8A2B3D7A8936A3311BB1905D9ADBA1E3467AC5D3F5F6A7758 130E4445856422CE094D85B620611E7D8F5B3C0CF386490214FB6DED5CF761BD2BC87CBB0F 4171B566FA32761C9CF11147417F50C47BD1986AFB9EC129CDA74EB0947C06B935F5A175D22 E2E35
m_{P85}	50D3795F988F865B3A9739FB23047D301913B7BDA5F87D0A3EAC478002A20C571D553EA1903 93D404E1718BDE3C780D26BC9FB48EB555A9228C323036F000CEC60AF43E23F734B104A4998 B4662D1770B46B1643EE6A9B4D8D9308F4410821FDB39403652D53952D5CDE7903BEB66FDA2 596
m_{P86}	F84F4D2894AFF4B26CF0FB72DE03D5C43D98F7A13C95FCAFA16D9AD2DEE38EBA7CE7CCD5 1F02DDEA932436451B6AF185E2C27173FC5DC4D52172E0451F4864933F7D829691994CD982D 2D7D7B302333F13CAE7DAF6EC9E67188955207AC461AC2AC124FF94ABD2705560E5DCFC6F9 8C8AF0E
m_{P87}	058C6EE106A2DCE93EF5220D1BDFDF725CBC4DB869698A72F89A886AD38A0F42ABEDC4966 FADF33AD0C39388055421F2D4D22FF5E698C4B1F002633C051582D899A9CC51973000BC3D43 E64BB0E080F392DAA65ED11D081DB55BAA3AE3EF2B5B135136E2BBBF81F17A926D9293233C 08F58A
m_{P88}	600EE81F7C9864F1B8C7337A7C1582B1A038B8461F5381276E514C27A86B1C96F61A3DFC489 0023AA73A8F8FAD7750B3A632BF745881704C91198D40F0C6DE51293656203E4545EC660659E FDE97CB52C4540AD7E6942B475BF5C8C2047E38E3F79731AB972F64B519B4DF44BF25254FB2 8A
m_{P89}	FDDF8C811955AA732713A5973F621C8A763E4057047D3CE2791D20A49250C5BCAB0FC702FA6 563274372D03275D6B3FDFB4E981D7D35A7EEA2D99F607E88CB38D7D4B35A40934EA67B3EC 9E7FE2ABFED68969E0534FC6720346D8C07CDEFC5173554F14E05BD81DCA647C355AB8379B EE206
m_{P90}	624518F8749EFD5DCF5729A3D5BF4AB67A5854398C8D6A2CCB07F2BE0D676221F764716E0A EF70515873645A9F438C1250072FA65A167AEB30CF099AFC2C2504E129D7FF2BDB28B78A36A 0D621F74FDD36D5EEC9BC4625EFEC4AF6CDCDC496B747134E6D94D87F7141481DEEB83B84 1C0E33
m_{P91}	F8DF107B028097DB928CF7A03F0157BC3B50EACC30063934EE28413D7764CDDA46D17EF91C A7205516B76933B3D50D385D871357AEFA2E34D1E3E929FCD08B940AD54762D21B73B0C144 C4C2309A26AD3EBEDBDBDCBB0B1A49AF796DC5D8F62F479A6CC739D6B391D97C39FA017E F2D85855
m_{P92}	A45FCBE0688A55D051B057C34508507010F607661BA244DB1A7CE599CB4ABC6F3575A765E41 C2EB8B5BC49E61162478CEB07461787B0EB6AD14CEAC878DC9257E48418C2F3292BD087FF3 B4CB7758B00BC5380427E620776FFF7128254CAEF743129B317B8C21D0ED02B3B94785048B3 B274
m_{P93}	432250D31BCDC883439F92FFA76470DE1B6689465A0FBD3A12AB4D165012AB32B7EDEBC859 68CB1BA84C24321CDDCAADB0175DC6C2FE2EBA78EB788E049F8ED34A3AF1F42519957C748 96872C3BC6C0A7A210E8438EC84085A3C4E3884E8B79AA57F85937D815C493C044B80519F76 EAC075
m_{P94}	4E3834426643F2C419007C48053C6B7AEA54D231D68631D5CE305FC33C155405B2566ADF0BC 3E4D70B498B3CB2981425D610559C2EB63213F07AAF3E240653230436ABF9D823799A05D78D 4D5A45A67F6637C9D9A4BEF410BC0290BCFB47E206A64FB6EADA1CCFC9B77023EC705670A 9439C
m_{P95}	B655DDE80717690057C86FB8C2F94A922D4965624E527B42C080EDC3114472B5D58E3076EE6 06A6513515FF6FE1F5C6CC4F6A34AD865C7EAFA03558BDDA4A96A838B1D13543B87E382A4C EC3383E4F2EC960D9707CC52624905326B32B0F6C8F3CB3FE7D912B8040518E61C0C1D0BE6 135F4
m_{P96}	D3817A6FD2936F4738A55F19CFBD1EE3801CB86F9B9656D39BB4CCE5EC930CB801BA371A05 876F63F2A9919BF8E769F14033817616943930984 1D43FC304EED8D80164D2EFABDE83DBBAE A927748597DC553E6A2EC52E3D7340FFBEAF817484A7558B59753BD8661596C940CA6F16570 D6F3
m_{P97}	0CCD1503DBC6DB746E369372930B18BEC1C972C30D3BAC9547590AA432AA5280492851CF89 35F74A5431E97169A3322586719FD703B122B70A0394D784A010D6B9BCA2A9C7284B8368127F 2C00BB31CFC8EC1B3A31EF6EE148114BC0867C1182A742FA26A2EF1F62F948762C3FC6DF7E 1E4C

Code ID	Basic Midamble Codes m_P of length *P*=912
m_{P98}	68AD9382C2FB0471F415D72240613B24F019FD981423501796E76898F2D423801EA8321E01CF EB9DCE4AADE7CBDF0C10F94F98E6C9A561204D4051487E5326173030FBE760C28D8BE6815F CE78805E9C55CF7994AC8482B6A13254CE7FD3ACCD6D96CC35913962F57965D2BA905D50F4 F7F4
m_{P99}	965AD6AFCF7A822E2D0A7F3F8B23BDDB9DA7667882789C85A010B0CD095E2BD43919DD6BC 8F290FD5FB7B1F0A4F8C47C348EEC37F483B75721352856568DFCFC16AA1168E1D948E9861A 5E693AA0AC4F26225CC888DF6F326DF4D5014C892ED9A6A8E99C4140BAF7C03873532F0CB1 EDB7EF
m_{P100}	11514B31D4E01ABB0202CD8B26B4F3610886058BA519EF4C9701EDF8ED2E935F65AFC454C0 B672B14B06672BB742640EA5BDBDA47FA5F87BE583F65331E2A30CD850B4619637DD7B84646 06F10236714131E1D2AB4EC55654D05A93050E6F8748B4DC83C6202B7FD63CA1FC0EA00DBD 48538
m_{P101}	F6FE8BDAEBB7FAA334EC95ADC619F8A04171707C84C79A7C96F973392176EB7AC5626FB24D 0F88EE8D5FC99DA5F03C381A93ED455B13DAAA4DA3EF7A092D114316F6D25F319473BFA8EF 025438B0A510DB7F4E8436A38B16606150D2B35B2872DC206AFB17732FD16219BA58CBA1CE4 02B9A
m_{P102}	912FF3C82D2B7FDA4703DAE6E349E1844212B4672DB02A4D0D4465220C1A4CF0E7D56C945A DA538D465A76C7DC3AE272BCBBAA4FB9D9925EC41FAE0735380C1126E36EBEE55270F99A0 D851FEB280B103E3F51080B99496B2E3027F6EC16D91EF42C58E4089AAE68CE075D323C4A2 D409CE0
m_{P103}	4789D7468124CE0AB731772154704A07BDD14C319DAA60E9E3B55E30D61616301AC560BB31B 6341FA629F630204D057A74B8226EDE4A4696159DF3BC7DC3597072A1A95464142AF23103CB7 C28AA69A7D2CB990967427F9EADF3EB65FB95DD72CEA804DEEE0924307794D99FF406F0AC4 0F6
m_{P104}	9A5C8700EF68ECFC28CD6552C267515F58593EA84FD48BB5D63EA028DA77F92787FECA4FED AAC04591502198A10725B62AA7361C932B58C6F4D431103A56AF5A8400E8DE5AD26788F28526 387908EE52B030B639DEBA260A321B09BD60E7BF3C54E1D8264A04B0F65D81F9473622CC05C 3AC
m_{P105}	9F6A2D1D54D09A6A3AF7BF514DC754301A164602D531807186D9930FCFAF112D40F72D17DC E9C40E9EEE8FD2E5D1D3BA4543ED609DAF163CED9BD0074D3E5F7E17F5AC7B4FC4CA0690 977DA3533AFDBA5BD328BA079BF2335364035D68673B98330B92AF5E3C26A9AB596986EFE96 65219F8
m_{P106}	FFEDAA9F3DC1F267C121D6303743286B1AB1094A1790B58B1E4DDA9D16303A3289BC4440987 775D6491383589C96181AE093289D42230FD88BA098F3575FC393246726C9EAFC6955EF135EF 07E862915734A5994D2CA7301FE844DE7B4BA9417CF10045BEF5F4D4C5BC044A347E5C9E998 21
m_{P107}	644CA39E3F93C4AC795EFCD5B8BD90228E2638BAE24CF4C3DE75697823DF4AEDD3253E980 81C4BD215DC64A9E6BC0115027F6BA4E4FE2A93FC726DBA4D9D21DACDBC76B45377B68863 F9FD426E4F89625657EF97C03D277C373E15D21EB721AFEAD246ADF1A0A2A0CEA730BCA98 CDD4CB808
m_{P108}	AF16DD60C5458A3D27E36850281E401B10116D5B0BCEA1B159C97487584652047981333D5573 686F4C0A063E1186306FD02DEFE2C61722C5BBED60249AA2D9260ACDF870B3B5F5CFD75815 80DE486D8D9F332A6C6B6464AB0E9D54159CCCD03D6F9CA12C13DE34145B34FA40703FDC7 6AEE7
m_{P109}	33FC7C9D9FF74A2FF009240C3AF398937D078012219BA54C6B0B0D9448391CD1D4017CBDB5 4AA59355EF05A9712779D71761D96F650EE10546C39694938AEE89F7CE6FCCF4BF987D0E9DD 584992F2732D5838A92E537559EDE2FCEE82302D7FD8B1C9CF8215B67BE61D4EF4523EF9032 B1E2
m_{P110}	DDAC8DB73BF5A8FD9A74561DE805959C2ADC755274740993616B3771D10C6F5B0B8E4939A4 44F280B39CFD29EA0F562FEE0405451D8D9DAEFB8B1E0C8D69CBEDD6D23D8A56A3A9B87B D6EDE46FBCCC135D70B8FD4619C35F9A72E93E8954FA787B8452347E4B209013736D0EC059 A243803B
m_{P111}	516913696CB4D961C939529F64585F08C42D1FD1DCDC78F16DFD5BCE287434ED251FA1AABF 676006D75FC455DDE30C8840BE6AEAD10F8A12C641800C35B8CECC9BB54037AB1075190EE3 D2D8D81F675898FC442A57B3A7B18B0AF90528DA8019245182E920B926AE569D656E3BB03A9 75CD9
m_{P112}	B2419222199441C48BB085E7982DCFC0FAEB16D39DBFD22270AB8EA6A802DF3580ED6A68A9 0E3AF03281B48ED3FAA2DC45371E3733539E70B137ED82D5A2CCC2031BE3D6A4786EE9D9A9 153658EA0B483EDD49F9D1E189F3D418B73825CAF3B4D05A805F80FCCC5949704252390DD3 E86EF6
m_{P113}	04D96F94A767AB70BE85D6EBFF3831E2825595CAF1583CAF2B75010816DF65757F4BB4BC58E 011FC5CC50F220EC72ABF672E8C9A29821D4A106603187276492C366618C68CECF60AA6D4B4 F03505EE0BEB591336E130EF4593C5C11749CC3D2974B1AACD0DF19672F9330457241E201DB 7CC
m_{P114}	12CE52D22E8BDFC665F49D86AC6C488C9012088FA091E5EE13B7C45A9A5CB156F147D6ACB FF87C4817350AD15C5FC3773F3C58FD0D3B88242CC46DD43A5288933ABE5A6055FD67B1159

Code ID	Basic Midamble Codes m_P of length *P*=912
	3C900A9654D82BE40200E38C7A9643BF25419861A2D674B84995301121FB34389CC5AC83E94 CCC738
m_{P115}	3831B0AED8C54E6F5F348C22351E35AB1099C47149117A40521B30D005DB13A81337A7EF75B 0A6FDEE2012E394935C2D61C0BAED3B65D4FC768C30F654E97BD33A54F49A2753915CAA137 F8B99861872F00F6C019DA1A27277E1FD648608CC108EFA2D85490980F7570C37619D5F4785E A45
m_{P116}	2D7BDCD4C93F3175F441994A9B188976A7F4F714A80AF693139FBB757C1D0D71274167EEF2C 36F891612ABF8B3504FB2A1F0BC1DF24186A6C2B79A4EF118F67FF477AFD650F6BD208599D3 31C3B5ECFBD173C25D7CBB9A0C9D4E0F455509A8BEFD805201429E3192D82477E4E85D606C 53AC
m_{P117}	01E085F900F58E7769F8C8A24DCA26984EE56F2D8CF0A0726508094A20ACAEF0703351EBF8E DDC1C59012F9A3032B11D5BB260FAD321280BE48642CE84C0D3681E57784332A87DA3C06C2 CCF0993A6EC2BE1A979414EFADEEF3CEC8E12C41F55DE52D48F0B851EA968C159B9CB2D51 4CF4C5
m_{P118}	32814E789480CDAF8D0E09BF65DC4863B99B8542F0693D77ADAF6F32D0173110789E26F1BB8 F9A8A71D09DAB03FD52935945D7A4EC68C8B043B27AA81200CCA1DA23A9833217CFCAB5D6 2E0C488EA2DA2C73DB031F205D7F960E9D8918A5C652C1501EE93204D273464BEF438A94DF 4496AE
m_{P119}	15DD44EF0204B908795A090C32188643FBE7366EBF30DADCFB2C41953A854FEE39EAA7E9E4 E58E30B45409B72AD05B43BAE11095FB1D20FB2A73E04448DEC973926BD7BA0EC291A29AA7 EBDA5783A2A253649F036962A0E4525A07C66653394116352439A2520891F8E18D2CD360FFE0 B111
m_{P120}	89217691E99FDDE0598092D7413C6946390C718299455B5B455CFDE3E2E15CAE056389BE60C 836B500053044568990C9EE40582F6978F91EE5ABD501408EFD805F4F64FCE2FAA5607976AC0 16633E12FED435EDC627548B79898DE3B5FA8B246196CB2F4289A0E3FBC7A4A911274D4CCC 980
m_{P121}	B3047C6EC9C960702C122202B7BA48D54A1015C1F9CA22D879FF5435C6EF930FC5EF8FD811 3B48BE47D794B87E5194F8E7B4525B4CEE45FF5D0D70CCC00C67496943EBDC878DE4F9BC8 849A24CFB05282B117F140A4B1967B8F4E38A0637A4E8C916914CFAC15D399174B1AA65C86D A472EA
m_{P122}	CED19A2B452FB08A4E677AE137AD75601BD7824CE59E4FA627A3C5AD101920FFD89328B3A9 17782F05781BA0292EEB18193BC1C3C02B48D272D449F381CA20B12B1C27A480C628A33AC47 2F2EBEEB775D3D3681A365C728DB9476CBF8744D84448FC6303BDD28BC38413277F6B61CCD 4A913
m_{P123}	EA7FD3D0732484865089964AFD0181F0A64E0B9BF58C20C3F34D45739C01ECDD11681E3B4D 175D237A19C2800C8024FB7D3A14DDDA53180B10E8F1C569DD9CE06FF19EC958989AE43ED2 6E96DCA2E954BCBB6EB502F0C269EA75F5CF002BF49B383A00159C0D39AC71D502B5571636 16B66E
m_{P124}	D08DC6EE2CB2EB2D3890230CF7411F51F71024C8F05CDA7F958CBCB81B12C0CF27342431C CD1BBF61DEF50298E87ECB4A98C489D3CABDB55CE95EEAFF850BA13C0F772CD9F2943F961 227078A05FA3AEE18E61657D04AA37B7F98BF5B6DDEF0F87ACAA5B4D1D2CE0622DF6B8816 EFAA2F448
m_{P125}	70C1FC8BAE04C07CD256269A02056B79CD0014D188197B4BE89AF8A460026EA8FBC7C13A77 93F2822A94A4A7234727516D44A5BA521E3E28C34396C69BEC8233FD0D82FA8D5B2C4F12F92 84962A6F19C2E655AC44BA85F064E8D134F28F9EC479FDBFBA74223466D185CA34C7188C6E7 E515
m_{P126}	82323B03B81937932EF44D0BB2A22DF5F8803080618940A4F1DED2778230FBE3D04545B86B1A AC4AFD43A90DA09148456DD81684F7C143C48C710076ED7A60BD6128BB9C4717DB97331CFB 667E9EC1D4B03191B3A218B12CC957A3F5182A452694FDE1A4241B1410DD104BE1551F1E85F 8A5
m_{P127}	BE616513AE32C4143C92A7CECDB56F082F7907098FF61403161D95CA3767AAF7F46A8D60D66 C6195D27F25FC5D0D840F7DDDD67A3E492FD9FB85A805CA0438F822BDE583BC11B74C760E D2FBC9DAC6F361EDF71B17B96B065D5E2E43A9A87A7CD561FC8F4BC809F474D68E6C4B6A7 542065A

6.4.2.2 Basic Midamble Codes for Burst Type 2

In the case of burst type 2 (see subclause 6.2.4) 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 of TS 25.221

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

6.4.3 Association between midambles and channelisation codes

6.4.3.1 Association for non-PRACH physical channels

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.

6.4.3.1.1 Association for KCell = 16 Midambles

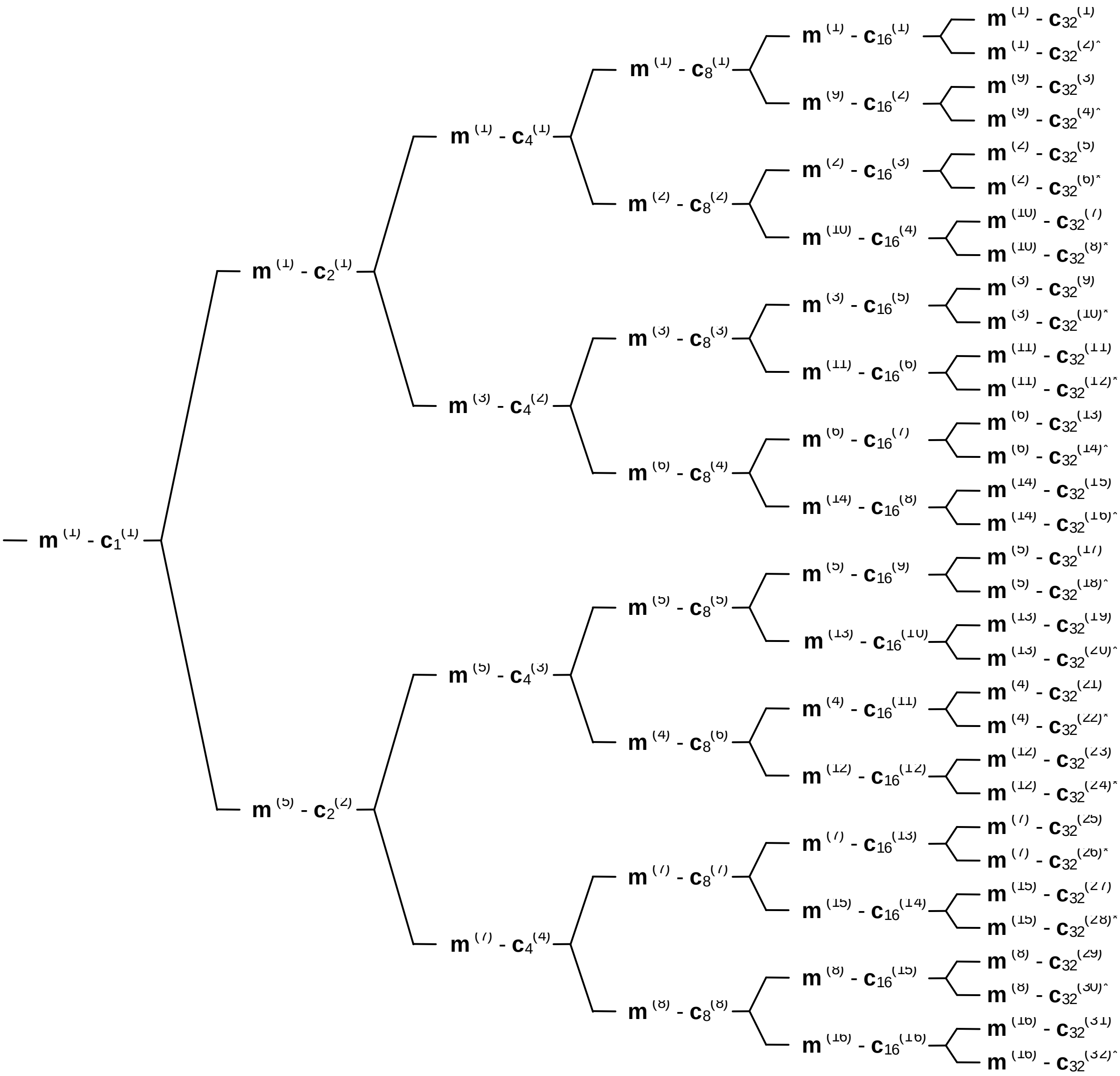


Figure 6.4.3.1.1: Association of Midambles to Spreading Codes for K_{Cell} = 16

6.4.3.1.2 Association for KCell = 8 Midambles

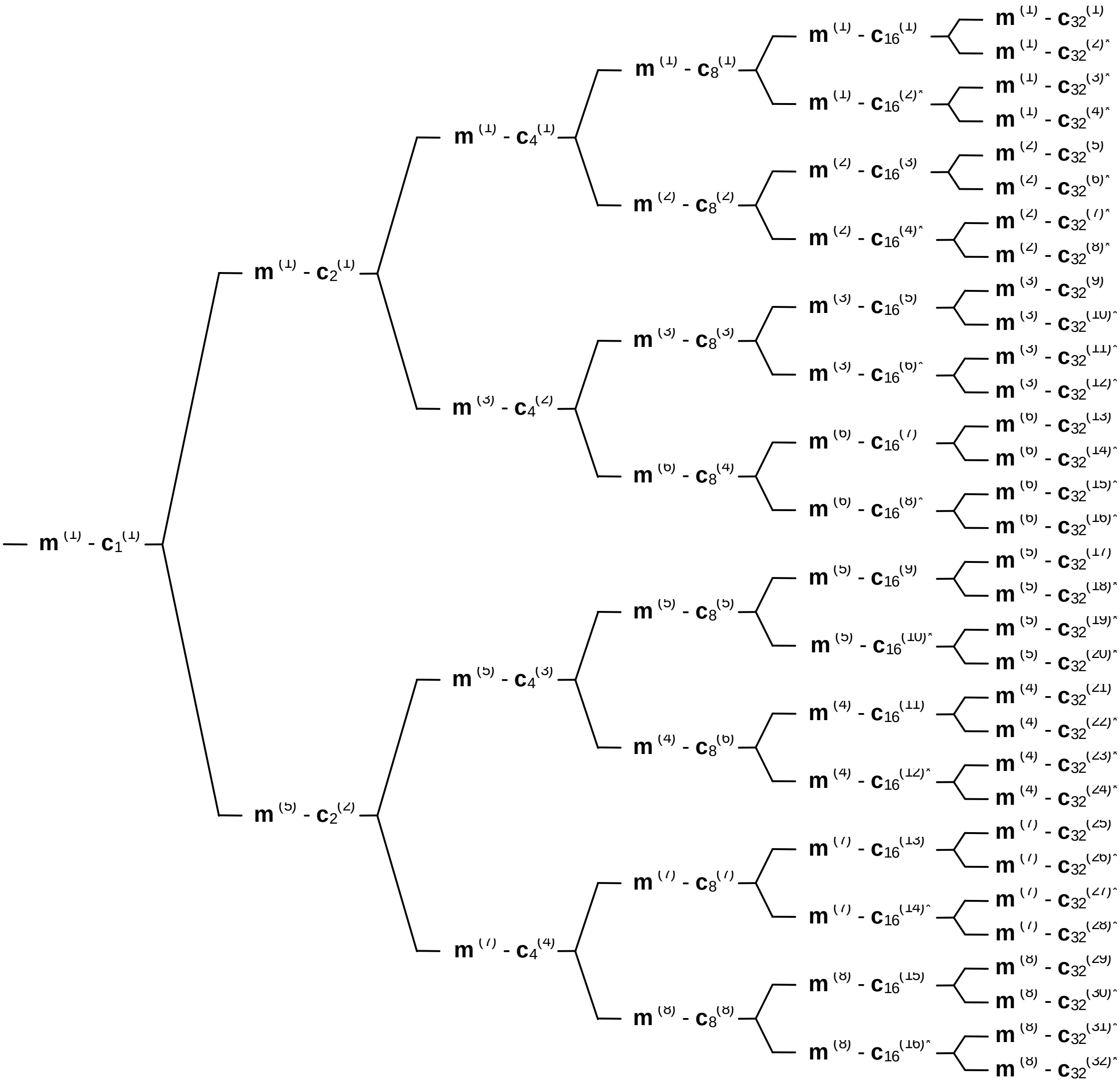


Figure 6.4.3.1.2: Association of Midambles to Spreading Codes for K_{Cell} = 8

6.4.3.1.3 Association for KCell = 4 Midambles

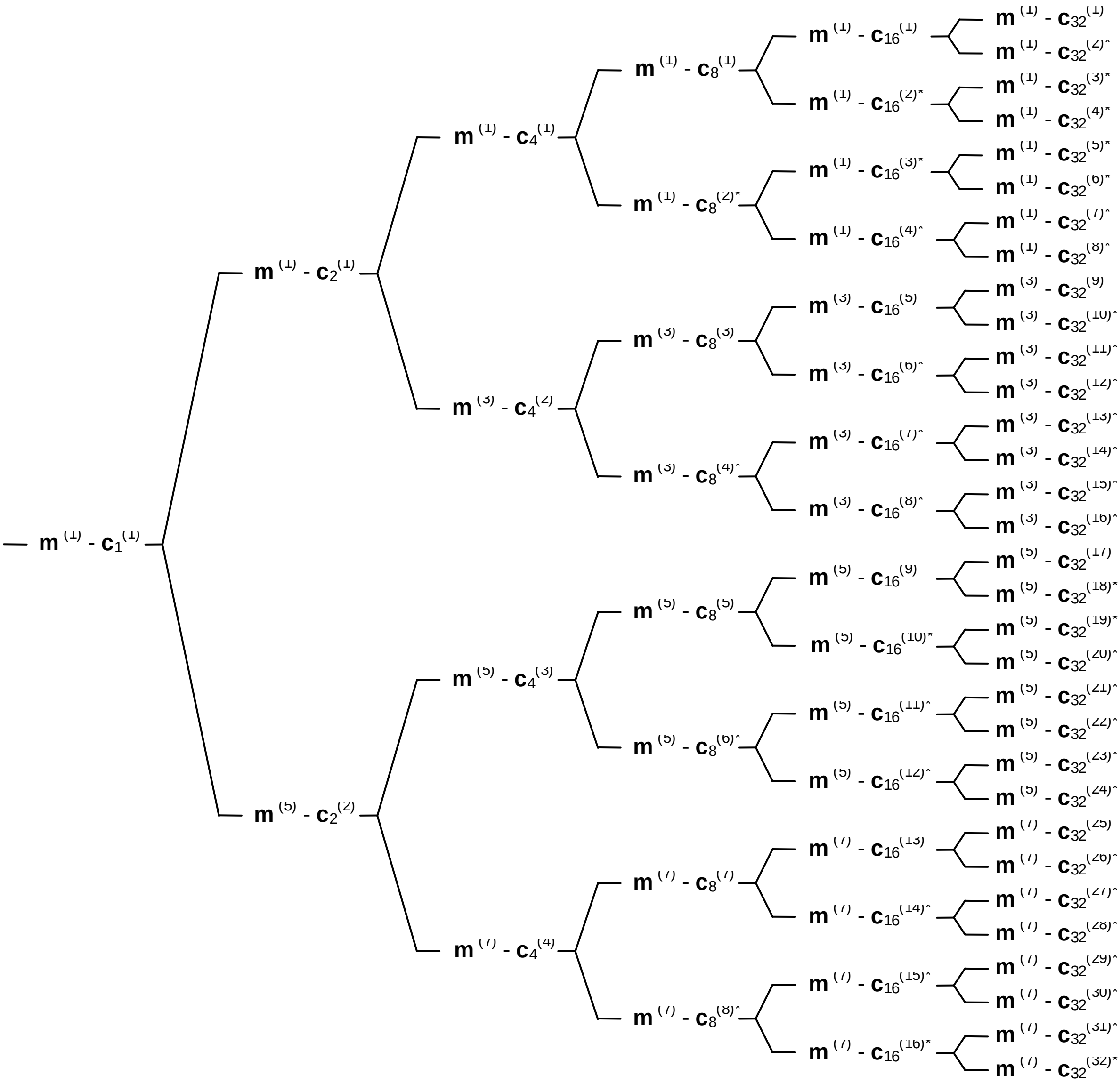


Figure 6.4.3.1.3: Association of Midambles to Spreading Codes for K_{Cell} = 4

6.4.3.2 Association for PRACH physical channels

For the PRACH the fixed association between a training sequence and associated channelisation code is defined in figure 6.4.3.1.1. In this figure, midamble $\mathbf{m}_j^{(k)}$ is formed from the k^{th} shift of the original basic midamble code (j=1) or of the time-inverted basic midamble code (j=2).

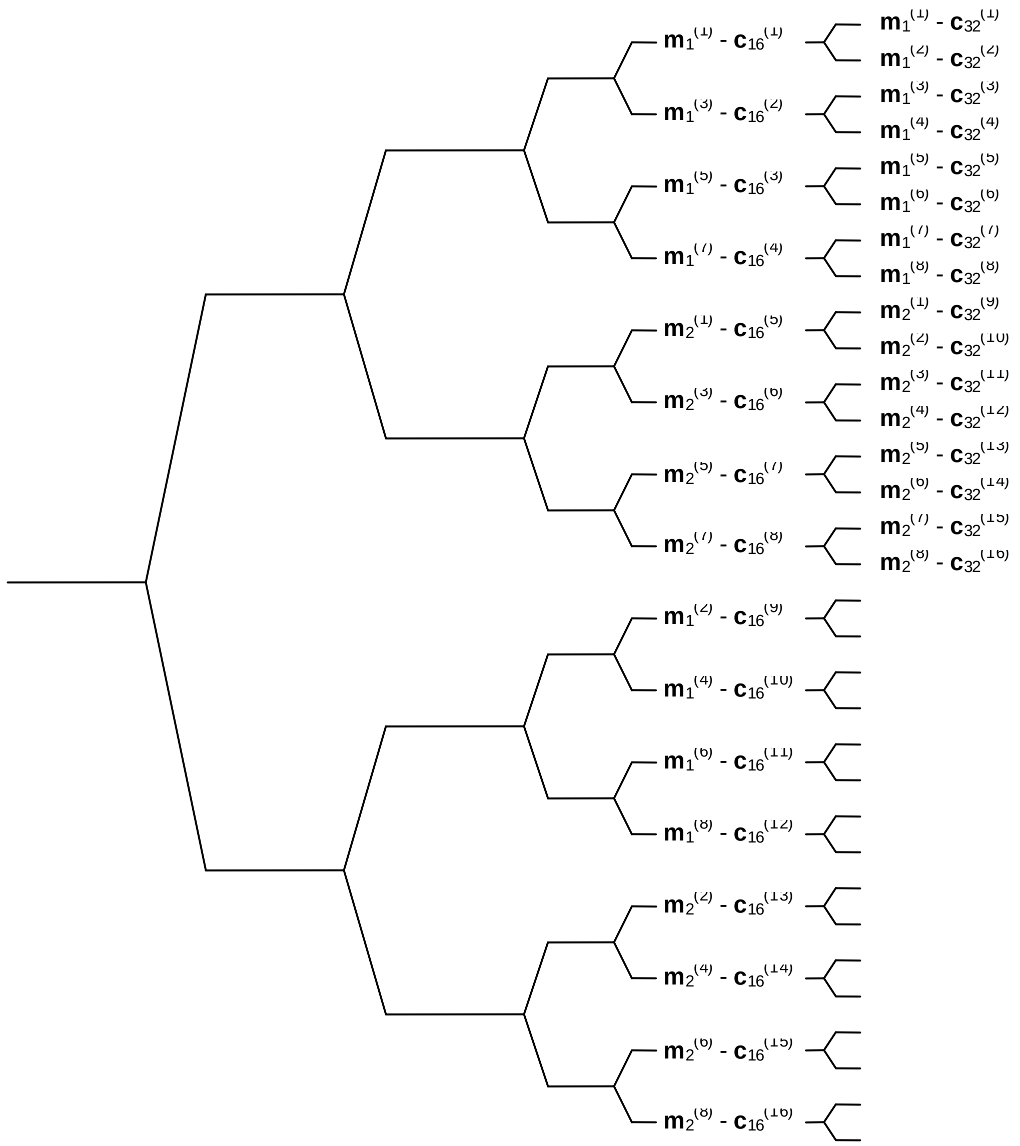


Figure 6.4.3.1.1: Association of midambles to channelisation codes for PRACH in the OVSF tree

6.4.4 Signalling of the number of channelisation codes for the DL common midamble case

The following mapping schemes shall apply for the association between the number of channelisation codes employed in a timeslot and the use of a particular midamble shift in the DL common midamble case. In the following tables the presence of a particular midamble shift is indicated by '1'. Midamble shifts marked with '0' are left unused. Mapping schemes in section 6.4.4.4, 6.4.4.5 and 6.4.4.6 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 6.4.4.4, 6.4.4.5 and 6.4.4.6, the fixed and pre-allocated channelisation code for the beacon channel is included into the number of indicated channelisation codes.

6.4.4.1 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 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

6.4.4.2 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 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

6.4.4.3 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 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

6.4.4.4 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.

6.4.4.5 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.

6.4.4.6 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.

7 Multiplexing and channel coding

Multiplexing and channel coding is aligned with 3.84Mcps TDD with the exception that physical channel sequence numbering and the coding of the channelisation code set information on HS-SCCH shall account for the support of SF32 at 7.68Mcps.

7.1 Signalling of channelisation code set information on HS-SCCH

HS-PDSCH channelisation codes are allocated contiguously from a signalled start code to a signalled stop code, and the allocation includes both the start and stop code. The start code k_{start} is signalled by the bits $x_{ccs,1}$, $x_{ccs,2}$, $x_{ccs,3}$, $x_{ccs,4}$, $x_{ccs,5}$ and the stop code k_{stop} by the bits $x_{ccs,6}$, $x_{ccs,7}$, $x_{ccs,8}$, $x_{ccs,9}$, $x_{ccs,10}$. The mapping in Table 7.1-1 below applies.

Table 7.1-1: Channelisation code set information mapping for 7.68Mcps TDD

k_{start}	$x_{ccs,1}$	$x_{ccs,2}$	$x_{ccs,3}$	$x_{ccs,4}$	$x_{ccs,5}$	k_{stop}	$x_{ccs,6}$	$x_{ccs,7}$	$x_{ccs,8}$	$x_{ccs,9}$	$x_{ccs,10}$
1	0	0	0	0	0	1	0	0	0	0	0
2	0	0	0	0	1	2	0	0	0	0	1
3	0	0	0	1	0	3	0	0	0	1	0
4	0	0	0	1	1	4	0	0	0	1	1
5	0	0	1	0	0	5	0	0	1	0	0
6	0	0	1	0	1	6	0	0	1	0	1
7	0	0	1	1	0	7	0	0	1	1	0
8	0	0	1	1	1	8	0	0	1	1	1
9	0	1	0	0	0	9	0	1	0	0	0
10	0	1	0	0	1	10	0	1	0	0	1
11	0	1	0	1	0	11	0	1	0	1	0
12	0	1	0	1	1	12	0	1	0	1	1
13	0	1	1	0	0	13	0	1	1	0	0
14	0	1	1	0	1	14	0	1	1	0	1
15	0	1	1	1	0	15	0	1	1	1	0
16	0	1	1	1	1	16	0	1	1	1	1
17	1	0	0	0	0	17	1	0	0	0	0
18	1	0	0	0	1	18	1	0	0	0	1
19	1	0	0	1	0	19	1	0	0	1	0
20	1	0	0	1	1	20	1	0	0	1	1
21	1	0	1	0	0	21	1	0	1	0	0
22	1	0	1	0	1	22	1	0	1	0	1
23	1	0	1	1	0	23	1	0	1	1	0
24	1	0	1	1	1	24	1	0	1	1	1
25	1	1	0	0	0	25	1	1	0	0	0
26	1	1	0	0	1	26	1	1	0	0	1
27	1	1	0	1	0	27	1	1	0	1	0
28	1	1	0	1	1	28	1	1	0	1	1
29	1	1	1	0	0	29	1	1	1	0	0
30	1	1	1	0	1	30	1	1	1	0	1
31	1	1	1	1	0	31	1	1	1	1	0
32	1	1	1	1	1	32	1	1	1	1	1

If a value of $k_{start} = 32$ and $k_{stop} = 1$ is signalled, a spreading factor of SF=1 shall be used for the HS-PDSCH resources. Other than this case, $k_{start} > k_{stop}$ shall be treated as an error by the UE.

8 Spreading and modulation

8.1 General

The basic modulation parameters for the 7.68Mcps TDD option are as shown in Table 8.1-1.

Table 8.1-1: Basic modulation parameters

Chip rate	7.68 Mchip/s
Data modulation	QPSK,16QAM (HS-PDSCH only)
Spreading characteristics	Orthogonal Q chips/symbol, where Q = 2^p, 0 <= p <= 5

8.2 Data Modulation for the 7.68Mcps option

Data modulation for the 7.68Mcps TDD option is identical to that for the 3.84Mcps TDD option as described in section 5 of [5] with the exception that SF=32 is supported in the 7.68Mcps TDD option and for burst type 3, the number of data symbols in the second data block is reduced by $\frac{192}{Q_k}$ symbols.

8.3 Spreading modulation

8.3.1 Basic spreading parameters

Spreading of data consists of two operations: Channelisation and Scrambling. Firstly, each complex valued data symbol is spread with a real valued channelisation code $\mathbf{c}^{(k)}$ of length Q_k, $Q_k \in \{1,2,4,8,16,32\}$. The resulting sequence is then scrambled by a complex sequence $\underline{\mathbf{v}}$ of length 32.

8.3.2 Channelisation codes

Channelisation codes for the 7.68Mcps TDD option are constructed in the same manner as for the 3.84Mcps TDD option. Channelisation codes of length 32 are supported in the 7.68Mcps TDD option.

8.3.3 Channelisation Code Specific Multiplier

Associated with each channelisation code is a multiplier $w_{Q_k}^{(k)}$ taking values from the set $\left\{e^{j\pi/2 \cdot p_k}\right\}$, where p_k is a permutation of the integer set {0, ..., Q_k -1} and Q_k denotes the spreading factor. The multiplier is applied to the data sequence modulating each channelisation code. The values of the multiplier for each channelisation code are given in the table below:

Table 8.3-1: Channelisation code specific multipliers

k	$w_{Q=1}^{(k)}$	$w_{Q=2}^{(k)}$	$w_{Q=4}^{(k)}$	$w_{Q=8}^{(k)}$	$w_{Q=16}^{(k)}$	$w_{Q=32}^{(k)}$
1	1	1	-j	1	-1	-j
2		+j	1	+j	-j	-1
3			+j	+j	1	-1
4			-1	-1	1	1
5				-j	+j	-1
6				-1	-1	-j
7				-j	-1	j
8				1	1	1
9					-j	-1
10					+j	1
11					1	1
12					+j	-j
13					-j	j
14					-j	-1
15					+j	j
16					-1	-j
17						-j
18						-j
19						1
20						j
21						-1
22						-j
23						-j
24						-j
25						-1
26						-1
27						j
28						-1
29						-j
30						1
31						-1
32						-1

8.4 Synchronisation codes for the 7.68Mcps option

8.4.1 Code Generation

The primary synchronisation code (PSC), C_p , is constructed as a so-called generalised hierarchical Golay sequence. The PSC is furthermore chosen to have good aperiodic auto correlation properties.

Define a = < x_1, x_2, x_3, …, x_{16} > = < 1, 1, 1, 1, 1, 1, -1, -1, 1, -1, 1, -1, 1, -1, -1, 1 >

The PSC of length 512 chips is generated by repetition coding and repeating the sequence 'a' modulated by a Golay complementary sequence and creating a complex-valued sequence with identical real and imaginary components.

The PSC, C_p , is defined as C_p = < y(0),y(0),y(1),y(1),y(2),y(2)...,y(255),y(255) >

where $y = (1+\mathrm{j}) \times < a, a, a, -a, -a, a, -a, -a, a, a, a, -a, a, -a, a, a >$

and the left most index corresponds to the chip transmitted first in time.

The 12 secondary synchronization codes, {C_0, C_1, C_3, C_4, C_5, C_6, C_8, C_{10}, C_{12}, C_{13}, C_{14}, C_{15} } are complex valued with identical real and imaginary components, and are constructed from repetition coding of the position wise multiplication of a Hadamard sequence and a sequence z, defined as

z = $< b, b, b, -b, b, b, -b, -b, b, -b, b, -b, -b, -b, -b, -b >$, where

b = $< x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, -x_9, -x_{10}, -x_{11}, -x_{12}, -x_{13}, -x_{14}, -x_{15}, -x_{16} >$

and x_1, x_2, x_3, …, x_{16} are the same as in the definition of the sequence 'a' above.

The Hadamard sequences are obtained as the rows in a matrix H_8 constructed recursively by:

$$H_0 = (1)$$
$$H_k = \begin{pmatrix} H_{k-1} & H_{k-1} \\ H_{k-1} & -H_{k-1} \end{pmatrix}, \quad k \geq 1$$

The rows are numbered from the top starting with row *0* (the all ones sequence).

Denote the *n*:th Hadamard sequence h_n as a row of H_8 numbered from the top, n = 0, 1, 2, …, 255, in the sequel.

Furthermore, let $h_m(l)$ and $z(l)$ denote the *l*th symbol of the sequence h_m and *z*, respectively where l = 0, 1, 2, …, 255 and l = 0 corresponds to the leftmost symbol.

The i:th secondary SCH code word, C_i, i = 0, 1, 3, 4, 5, 6, 8, 10, 12, 13, 14, 15 is of length 512 chips and is then defined as

$C_i = (1 + j) \times <h_m(0) \times z(0), h_m(0) \times z(0), h_m(1) \times z(1), h_m(1) \times z(1), \ldots, h_m(255) \times z(255), h_m(255) \times z(255)>$,

where $m = (16 \times i)$ and the leftmost chip in the sequence corresponds to the chip transmitted first in time.

8.4.2 Code Allocation

Three secondary SCH codes are QPSK modulated and transmitted in parallel with the primary synchronization code. The QPSK modulation carries the following information:

- the code group that the base station belongs to (32 code groups:5 bits; Cases 1, 2);
- the position of the frame within an interleaving period of 20 msec (2 frames:1 bit, Cases 1, 2);
- the position of the SCH slot(s) within the frame (2 SCH slots:1 bit, Case 2).

The QPSK modulation sequences for the 7.68Mcps TDD option are unique to the modulation sequences for the 3.84Mcps TDD option.

The modulated secondary SCH codes are also constructed such that their cyclic-shifts are unique, i.e. a non-zero cyclic shift less than 2 (Case 1) and 4 (Case 2) of any of the sequences is not equivalent to some cyclic shift of any other of the sequences. Also, a non-zero cyclic shift less than 2 (Case 1) and 4 (Case 2) of any of the sequences is not equivalent to itself with any other cyclic shift less than 8. The secondary synchronization codes are partitioned into two code sets for Case 1 and four code sets for Case 2. The set is used to provide the following information:

Case 1:

Table 8.4.1: Code Set Allocation for Case 1

Code Set	Code Group
1	0-15
2	16-31

The code group and frame position information is provided by modulating the secondary codes in the code set.

Case 2:

Table 8.4.2: Code Set Allocation for Case 2

Code Set	Code Group
1	0-7
2	8-15
3	16-23
4	24-31

The slot timing and frame position information is provided by the comma free property of the code word and the Code group is provided by modulating some of the secondary codes in the code set.

The following SCH codes are allocated for each code set:

Case 1

Code set 1: C_1, C_3, $C_{5.}$

Code set 2: C_{10}, C_{13}, $C_{14.}$

Case 2

Code set 1: C_1, C_3, $C_{5.}$

Code set 2: C_{10}, C_{13}, $C_{14.}$

Code set 3: C_0, C_6, $C_{12.}$

Code set 4: C_4, C_8, $C_{15.}$

The following subclauses 8.4.2.1 to 8.4.2.2 refer to the two cases of SCH/P-CCPCH usage as described in [3].

Note that in the tables 8.4.3 and 8.4.4 corresponding to Cases 1 and 2, respectively, Frame 1 implies the frame with an odd SFN and Frame 2 implies the frame with an even SFN.

8.4.2.1 Code allocation for Case 1

Table 8.4.3: Code Allocation for Case 1

Code Group	Code Set	Frame 1			Frame 2			Associated t_{offset}
0	1	C_1	C_3	jC_5	C_1	C_3	$-jC_5$	t_0
1	1	C_1	$-C_3$	jC_5	C_1	$-C_3$	$-jC_5$	t_1
2	1	$-C_1$	C_3	jC_5	$-C_1$	C_3	$-jC_5$	t_2
3	1	$-C_1$	$-C_3$	jC_5	$-C_1$	$-C_3$	$-jC_5$	t_3
4	1	jC_1	jC_3	jC_5	jC_1	jC_3	$-jC_5$	t_4
5	1	jC_1	$-jC_3$	jC_5	jC_1	$-jC_3$	$-jC_5$	t_5
6	1	$-jC_1$	jC_3	jC_5	$-jC_1$	jC_3	$-jC_5$	t_6
7	1	$-jC_1$	$-jC_3$	jC_5	$-jC_1$	$-jC_3$	$-jC_5$	t_7
8	1	jC_1	C_5	C_3	jC_1	C_5	$-C_3$	t_8
9	1	jC_1	$-C_5$	C_3	jC_1	$-C_5$	$-C_3$	t_9
10	1	$-jC_1$	C_5	C_3	$-jC_1$	C_5	$-C_3$	t_{10}
11	1	$-jC_1$	$-C_5$	C_3	$-jC_1$	$-C_5$	$-C_3$	t_{11}
12	1	jC_3	C_5	C_1	jC_3	C_5	$-C_1$	t_{12}
13	1	jC_3	$-C_5$	C_1	jC_3	$-C_5$	$-C_1$	t_{13}
14	1	$-jC_3$	C_5	C_1	$-jC_3$	C_5	$-C_1$	t_{14}
15	1	$-jC_3$	$-C_5$	C_1	$-jC_3$	$-C_5$	$-C_1$	t_{15}
16	2	C_{10}	C_{13}	jC_{14}	C_{10}	C_{13}	$-jC_{14}$	t_{16}
17	2	C_{10}	$-C_{13}$	jC_{14}	C_{10}	$-C_{13}$	$-jC_{14}$	t_{17}
…	…	…	…	…	…	…	…	…
20	2	jC_{10}	jC_{13}	jC_{14}	jC_{10}	jC_{13}	$-jC_{14}$	t_{20}
…	…	…	…	…	…	…	…	…
24	2	jC_{10}	C_{14}	C_{13}	jC_{10}	C_{14}	$-C_{13}$	t_{24}
…	…	…	…	…	…	…	…	…
31	2	$-jC_{13}$	$-C_{14}$	C_{10}	$-jC_{13}$	$-C_{14}$	$-C_{10}$	t_{31}

NOTE: The code construction for code groups 0 to 15 using only the SCH codes from code set 1 is shown. The construction for code groups 16 to 31 using the SCH codes from code set 2 is done in the same way.

8.4.2.2 Code allocation for Case 2

Table 8.4.4: Code Allocation for Case 2

Code Group	Code Set	Frame 1						Frame 2						Associated t_{offset}
		Slot k			Slot k+8			Slot k			Slot k+8			
0	1	C_1	C_3	jC_5	C_1	C_3	$-jC_5$	$-C_1$	$-C_3$	jC_5	$-C_1$	$-C_3$	$-jC_5$	t_0
1	1	C_1	$-C_3$	jC_5	C_1	$-C_3$	$-jC_5$	$-C_1$	C_3	jC_5	$-C_1$	C_3	$-jC_5$	t_1
2	1	jC_1	jC_3	jC_5	jC_1	jC_3	$-jC_5$	$-jC_1$	$-jC_3$	jC_5	$-jC_1$	$-jC_3$	$-jC_5$	t_2
3	1	jC_1	$-jC_3$	jC_5	jC_1	$-jC_3$	$-jC_5$	$-jC_1$	jC_3	jC_5	$-jC_1$	jC_3	$-jC_5$	t_3
4	1	jC_1	C_5	C_3	jC_1	C_5	$-C_3$	$-jC_1$	$-C_5$	C_3	$-jC_1$	$-C_5$	$-C_3$	t_4
5	1	jC_1	$-C_5$	C_3	jC_1	$-C_5$	$-C_3$	$-jC_1$	C_5	C_3	$-jC_1$	C_5	$-C_3$	t_5
6	1	jC_3	C_5	C_1	jC_3	C_5	$-C_1$	$-jC_3$	$-C_5$	C_1	$-jC_3$	$-C_5$	$-C_1$	t_6
7	1	jC_3	$-C_5$	C_1	jC_3	$-C_5$	$-C_1$	$-jC_3$	C_5	C_1	$-jC_3$	C_5	$-C_1$	t_7
8	2	C_{10}	C_{13}	jC_{14}	C_{10}	C_{13}	$-jC_{14}$	$-C_{10}$	$-C_{13}$	jC_{14}	$-C_{10}$	$-C_{13}$	$-jC_{14}$	t_8
9	2	C_{10}	$-C_{13}$	jC_{14}	C_{10}	$-C_{13}$	$-jC_{14}$	$-C_{10}$	C_{13}	jC_{14}	$-C_{10}$	C_{13}	$-jC_{14}$	t_9
10	2	jC_{10}	jC_{13}	jC_{14}	jC_{10}	jC_{13}	$-jC_{14}$	$-jC_{10}$	$-jC_{13}$	jC_{14}	$-jC_{10}$	$-jC_{13}$	$-jC_{14}$	t_{10}
11	2	jC_{10}	$-jC_{13}$	jC_{14}	jC_{10}	$-jC_{13}$	$-jC_{14}$	$-jC_{10}$	jC_{13}	jC_{14}	$-jC_{10}$	jC_{13}	$-jC_{14}$	t_{11}
12	2	jC_{10}	C_{14}	C_{13}	jC_{10}	C_{14}	$-C_{13}$	$-jC_{10}$	$-C_{14}$	C_{13}	$-jC_{10}$	$-C_{14}$	$-C_{13}$	t_{12}
13	2	jC_{10}	$-C_{14}$	C_{13}	jC_{10}	$-C_{14}$	$-C_{13}$	$-jC_{10}$	C_{14}	C_{13}	$-jC_{10}$	C_{14}	$-C_{13}$	t_{13}
14	2	jC_{13}	C_{14}	C_{10}	jC_{13}	C_{14}	$-C_{10}$	$-jC_{13}$	$-C_{14}$	C_{10}	$-jC_{13}$	$-C_{14}$	$-C_{10}$	t_{14}
15	2	jC_{13}	$-C_{14}$	C_{10}	jC_{13}	$-C_{14}$	$-C_{10}$	$-jC_{13}$	C_{14}	C_{10}	$-jC_{13}$	C_{14}	$-C_{10}$	t_{15}
16	3	C_0	C_6	jC_{12}	C_0	C_6	$-jC_{12}$	$-C_0$	$-C_6$	jC_{12}	$-C_0$	$-C_6$	$-jC_{12}$	t_{16}
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
23	3	jC_6	$-C_{12}$	C_0	jC_6	$-C_{12}$	$-C_0$	$-jC_6$	C_{12}	C_0	$-jC_6$	C_{12}	$-C_0$	t_{20}
24	4	C_4	C_8	jC_{15}	C_4	C_8	$-jC_{15}$	$-C_4$	$-C_8$	jC_{15}	$-C_4$	$-C_8$	$-jC_{15}$	t_{24}
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
31	4	jC_8	$-C_{15}$	C_4	jC_8	$-C_{15}$	$-C_4$	$-jC_8$	C_{15}	C_4	$-jC_8$	C_{15}	$-C_4$	t_{31}

NOTE: The code construction for code groups 0 to 15 using the SCH codes from code sets 1 and 2 is shown. The construction for code groups 16 to 31 using the SCH codes from code sets 3 and 4 is done in the same way.

8.4.3 Evaluation of synchronisation codes

The evaluation of information transmitted in SCH on code group and frame timing is shown in table 8.4.5, where the 32 code groups are listed. Each code group contains 4 specific scrambling codes, each scrambling code associated with a specific short and long basic midamble code.

Each code group is additionally linked to a specific t_{Offset}, thus to a specific frame timing. By using this scheme, the UE can derive the position of the frame border due to the position of the SCH sequence and the knowledge of t_{Offset}. The complete mapping of Code Group to Scrambling Code, Midamble Codes and t_{Offset} is depicted in table 8.4.5.

Table 8.4.5: Mapping scheme for Cell Parameters, Code Groups, Scrambling Codes, Midambles and t_{Offset}

CELL PARA-METER	Code Group	Associated Codes			Associated t_{Offset}
		Scrambling Code	Long Basic Midamble Code	Short Basic Midamble Code	
0	Group 0	Code 0	m_{PL0}	m_{SL0}	t_0
1		Code 1	m_{PL1}	m_{SL1}	
2		Code 2	m_{PL2}	m_{SL2}	
3		Code 3	m_{PL3}	m_{SL3}	
4	Group 1	Code 4	m_{PL4}	m_{SL4}	t_1
5		Code 5	m_{PL5}	m_{SL5}	
6		Code 6	m_{PL6}	m_{SL6}	
7		Code 7	m_{PL7}	m_{SL7}	
. . . .					
124	Group 31	Code 124	m_{PL124}	m_{SL124}	t_{31}
125		Code 125	m_{PL125}	m_{SL125}	
126		Code 126	m_{PL126}	m_{SL126}	
127		Code 127	m_{PL127}	m_{SL127}	

Each cell shall cycle through two sets of cell parameters in a code group with the cell parameters changing each frame. Table 8.4.6 shows how the cell parameters are cycled according to the SFN.

Table 8.4.6: Alignment of cell parameter cycling and SFN

Initial Cell Parameter Assignment	Code Group	Cell Parameter used when SFN mod 2 = 0	Cell Parameter used when SFN mod 2 = 1
0	Group 0	0	1
1		1	0
2		2	3
3		3	2
4	Group 1	4	5
5		5	4
6		6	7
7		7	6
. . . .			
124	Group 31	124	125
125		125	124
126		126	127
127		127	126

8.5 Scrambling codes

The spreading of data by a real valued channelisation code $\mathbf{c}^{(k)}$ of length Q_k is followed by a cell specific complex scrambling sequence $\underline{v} = (\underline{v}_1, \underline{v}_2, ...\underline{v}_{32})$. The elements $\underline{v}_i; i = 1,...,32$ of the complex valued scrambling codes shall be taken from the complex set

$$\underline{V}_{\underline{v}} = \{1, j, -1, -j\} \qquad (8.5\text{-}1)$$

In equation 8.5-1, the letter j denotes the imaginary unit. A complex scrambling code $\underline{\mathbf{v}}$ is generated from the binary scrambling codes $v = (v_1, v_2, ...v_{32})$ of length 32 that are generated according to the method described in section 8.5.1. The relation between the elements $\underline{\mathbf{v}}$ and $\mathbf{v}$ is given by:

$$\underline{v}_i = (j)^i \cdot v_i \quad v_i \in \{1, -1\}, \quad i = 1,...,32 \qquad (8.5\text{-}2)$$

Hence, the elements $\underline{v}_i$ of the complex scrambling code $\underline{\mathbf{v}}$ are alternating real and imaginary.

The length matching is obtained by concatenating Q_{MAX}/Q_k spread words before the scrambling.

8.5.1 Generation of binary scrambling codes

The binary scrambling code, $c_{7.68}^{n}$, for cell parameter *n* in the 7.68Mcps TDD option is formed from the concatenation of the binary scrambling codes $c_{3.84}^{n}$ and $c_{3.84}^{(n+2)\mathrm{mod}128}$ shown in Annex A of [5]:

$$v = (v_1, v_2, ...v_{32}) = c_{7.68}^{n} = \{c_{3.84}^{n}, c_{3.84}^{(n+2)\mathrm{mod}128}\}.$$

9 Physical layer procedures

9.1 Timing Advance

[Description:]

The timing advance procedure shall be based on that described in section 4.3 of [7] with the exception that the required timing advance, 'UL Timing Advance' TA_{ul} will be represented as a 7 bit number (0-127).

The ‘UL Timing Advance’ is signalled to the UE by RRC signalling

The signalled timing advance ‘UL Timing Advance’ shall be the multiplier of 4 chips which is nearest to the required timing advance.

[Rationale:]

The timing advance procedure is based on that of 3.84Mcps. In order to cover the same timing advance in terms of time (assuming the same propagation delay can be tolerated at 7.68Mcps as at 3.84Mcps) and to maintain the same granularity of signalled timing advance in terms of number of chips, the number of bits required to signal timing advance is 7 bits.

9.2 Transmitter Power Control

Transmitter power control, both on the uplink and downlink, is aligned with that of 3.84Mcps TDD.

9.3 Synchronisation Procedure

The synchronization procedure is aligned with that of 3.84Mcps TDD.

9.4 Discontinuous transmission (DTX) Procedure

The discontinuous transmission (DTX) procedure is aligned with that of 3.84Mcps TDD.

9.5 Downlink Transmit Diversity Procedure

9.5.1 Non-beacon channels

The downlink transmit diversity procedures for non-beacon channels are aligned with those of 3.84Mcps TDD.

9.5.2 Beacon channels

Space Code Transmit Diversity (SCTD) for beacon channels may be employed optionally in the UTRAN. The support is mandatory in the UE. The use of SCTD will be indicated by higher layers. If SCTD is active within a cell :-

- SCTD shall be applied to any beacon channel, and
- the maximum number K_{Cell} of midambles for burst type 1 that are supported in this cell may be 8 or 16, see section 6. The case of K_{Cell} = 4 midambles is not allowed for this burst type.

9.5.2.1 SCTD Transmission Scheme

The open loop downlink transmit diversity scheme for beacon channels is shown in figure 9.5.2.1. Channel coding, rate matching, interleaving and bit-to-symbol mapping are performed as in the non-diversity mode. In Space Code Transmit Diversity mode the data sequence is spread with the channelisation codes $c_{32}^{(k=1)}$ and $c_{32}^{(k=2)}$ and scrambled with the cell specific scrambling code. The spread sequence on code $c_{32}^{(k=2)}$ is then transmitted on the diversity antenna. The power applied to each antenna shall be equal.

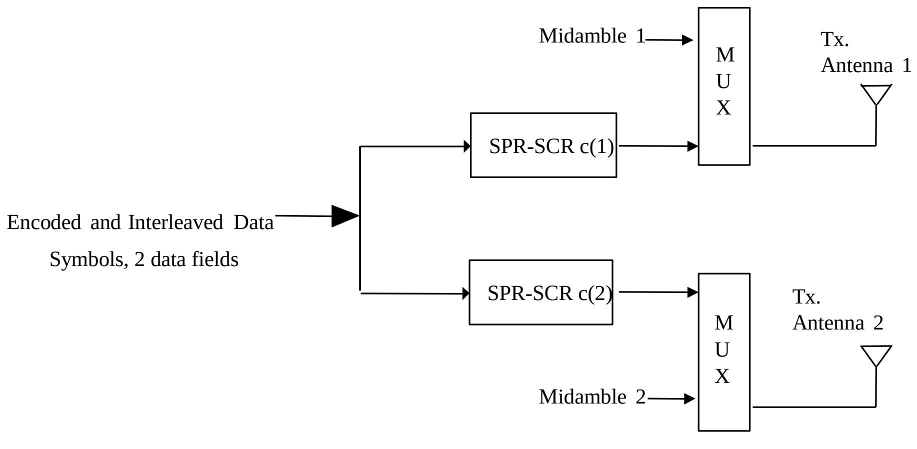


Figure 9.5.2.1: Block Diagram of the transmitter SCTD

9.6 Random Access Procedure

The random access procedure is aligned with that of 3.84Mcps TDD. However, the use of higher layer signaling to indicate that in some frames a timeslot shall be blocked for RACH uplink transmission is not supported.

9.7 DSCH Procedure

Higher layer signaling is used to indicate to the UE the need for PDSCH detection.

9.8 HS-DSCH Procedure

The HS-DSCH procedure is aligned with that of 3.84Mcps TDD. However, in the link adaptation procedure:

- If timeslot information on HS-SCCH indicates a single timeslot and this timeslot comprises a beacon channel then:
    - The Node-B shall not indicate SF=1 for any HS-PDSCH resource.
    - The set of HS-PDSCH resources allocated by the Node-B to a UE shall exclusively comprise either beacon function or non-beacon function physical channels. The Node B shall therefore not allocate both beacon function and non-beacon function physical channels within the beacon timeslot to the UE. If the HS-DSCH for a specific HS-DSCH TTI is mapped to the beacon channel, this shall be signalled using k_{start} = 1 and k_{stop} = 1. For a definition of the first and last allocated channelisation code indices k_{start} and k_{stop} on HS-SCCH refer to [9].
    - When SCTD antenna diversity is applied to the beacon channel, then the presence of channelisation code $c_{32}^{(k=1)}$ within the channelisation code set information on HS-SCCH shall implicitly indicate the presence of channelisation code $c_{32}^{(k=2)}$.

9.9 Macrodiversity Procedure

The macrodiversity procedure is aligned with that of 3.84Mcps TDD.

9.10 Idle Periods for IPDL location method

The IPDL procedure is aligned with that of 3.84Mcps TDD.

10 Measurements

10.1 Control of UE/UTRAN measurements

10.2 Measurement abilities for UTRA TDD

10.2.1 UE measurement abilities

Table 10.2.2.1 defines the UE measurement abilities supported.

Table 10.2.2.1: UE measurement abilities

Measurement ability	Notes
[…]	
[…]	

10.2.2 UTRAN measurement abilities

Table 10.2.2.2 defines the UTRAN measurement abilities supported.

Table 10.2.2.2: UTRAN measurement abilities

Measurement ability	Notes
[…]	
RX Timing deviation	Defined as per section 5.2.8 of TS25.225. Note that in order to express the same deviation in time, an extra bit will be required to express the 'Rx Timing Deviation' for the 7.68Mcps TDD option.
[…]	

11 Associated change requests

(void)

Annex A: Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2005-04	RAN1#40 bis	R1-050343			Frame Structure for 7.68Mcps TDD Option	0.1.0	0.1.1
2005-04	RAN1#40 bis	R1-050344			Timing Advance for 7.68Mcps TDD Option	0.1.0	0.1.1
2005-05	RAN1#41				V0.1.1 approved by RAN1.	0.1.1	0.2.0
2005-08	RAN1#41	R1-050455			Services offered to higher layers by 7.68Mcps TDD option	0.2.0	0.2.1
2005-08	RAN1#41	R1-050556			Spreading factors and burst types for 7.68Mcps TDD option	0.2.0	0.2.1
2005-09	RAN1#42	R1-050973			V0.2.1 approved by RAN1	0.2.1	0.3.0
2005-09	RAN1#42	R1-050858			7.68Mcps TDD: Mapping of transport channels to physical channels	0.3.0	0.3.1
2005-09	RAN1#42	R1-050859			7.68Mcps TDD: Paging aspects	0.3.0	0.3.1
2005-09	RAN1#42	R1-050860			7.68Mcps TDD: PRACH aspects	0.3.0	0.3.1
2005-09	RAN1#42	R1-050861			7.68Mcps TDD: midamble aspects	0.3.0	0.3.1
2005-09	RAN1#42	R1-050862			7.68Mcps TDD: transmission of TPC and TFCI	0.3.0	0.3.1
2005-09	RAN1#42	R1-050930			Synchronisation aspects for 7.68Mcps TDD Option	0.3.0	0.3.1
2005-09	RAN1#42	R1-050931			7.68Mcps TDD: transmitter pow er control	0.3.0	0.3.1
2005-10	RAN1#42 bis	R1-051221			V0.3.1 approved by RAN1	0.3.1	0.4.0
2005-10	RAN1#42 bis	R1-051223			7.68Mcps TDD option: HSDPA aspects of TS25.221	0.4.0	0.4.1
2005-10	RAN1#42 bis	R1-051224			SCH channel definition for the 7.68Mcps TDD option	0.4.0	0.4.1
2005-10	RAN1#42 bis	R1-051226			Physical layer procedures for the 7.68Mcps TDD option	0.4.0	0.4.1
2005-10	RAN1#42 bis	R1-051228			Tx diversity for the 7.68Mcps TDD option	0.4.0	0.4.1
2005-10	RAN1#42 bis	R1-051230			7.68Mcps TDD option: beacon channel aspects	0.4.0	0.4.1
2005-11	RAN1#43	R1-051518			V0.4.1 approved by RAN1	0.4.1	0.5.0
2005-11	RAN1#43	R1-051520			Transport channel processing for the 7.68Mcps TDD option	0.5.0	0.5.1
2005-11	RAN1#43	R1-051521			Timeslot formats for the 7.68Mcps TDD option	0.5.0	0.5.1
2005-11	RAN1#43	R1-051522			Spreading and modulation for the 7.68Mcps TDD option	0.5.0	0.5.1
2005-11	RAN1#43	R1-051311			Basic midamble codes for 7.68Mcps TDD option	0.5.1	0.5.2
2005-11	TSG-RAN#30	RP-050828			v1.0.0 created for presentation to RAN plenary for information	0.5.2	1.0.0
2006-02	RAN1#44	R1-060628			MICH Aspects for the 7.68Mcps TDD option	1.0.0	1.0.1
2006-02	RAN1#44	R1-060629			IPDL Aspects for the 7.68Mcps TDD option	1.0.0	1.0.1
2006-02	RAN1#44	R1-060701			V1.0.1 approved by RAN1	1.0.1	2.0.0
20/03/06	RAN_31	RP-060116	-	-	Approved as v7.0.0 to put under change control	2.0.0	7.0.0