# ETSI TS 125 223 V3.2.0 (2000-03)

*Technical Specification*

## Universal Mobile Telecommunications System (UMTS); Spreading and modulation (TDD) (3G TS 25.223 version 3.2.0 Release 1999)

Reference

RTS/TSGR-0125223UR1

Keywords

UMTS

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# Contents

# Foreword

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

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# 1 Scope

The present document describes multiplexing, channel coding and interleaving for UTRA Physical Layer TDD mode.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.


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

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

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

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

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

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

[7] 3G TS 25.221: "Physical channels and mapping of transport channels onto physical channels (TDD)".

[8] 3G TS 25.222: "Multiplexing and channel coding (TDD)".

[9] 3G TS 25.223: "Spreading and modulation (TDD)".

[10] 3G TS 25.224: "Physical layer procedures (TDD)".

[11] 3G TS 25.225: "Physical layer – Measurements (TDD)".


# 3 Abbreviations

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

| | |
|---|---|
| CDMA | Code Division Multiple Access |
| P-CCPCH | Primary Common Control Physical Channel |
| PN | Pseudo Noise |
| QPSK | Quadrature Phase Shift Keying |
| RACH | Random Access Channel |
| SCH | Synchronisation Channel |

# 4 General

In the following, a separation between the data modulation and the spreading modulation has been made. The data modulation is defined in clause 5 and the spreading modulation in clause 6.

**Table 1: Basic modulation parameters**

| | | |
|---|---|---|
| Chip rate | same as FDD basic chiprate: 3.84 Mchip/s | Low chiprate: 1.28 Mchip/s |
| Data modulation | QPSK | QPSK |
| Spreading characteristics | Orthogonal Q chips/symbol, where $Q = 2^p$, 0 <= p <= 4 | Orthogonal Q chips/symbol, where $Q = 2^p$, 0 <= p <= 4 |

# 5 Data modulation

## 5.1 Symbol rate

The symbol duration $T_S$ depends on the spreading factor Q and the chip duration $T_C$: $T_s = Q \times T_c$, where $T_c = \frac{1}{chiprate}$.

## 5.2 Mapping of bits onto signal point constellation

### 5.2.1 Mapping for burst type 1 and 2

The data modulation is performed to the bits from the output of the physical channel mapping procedure in [8] and combines always 2 consecutive binary bits to a complex valued data symbol. Each user burst has two data carrying parts, termed data blocks:

$$\underline{\mathbf{d}}^{(k,i)} = (\underline{d}_1^{(k,i)}, \underline{d}_2^{(k,i)}, ..., \underline{d}_{N_k}^{(k,i)})^{\mathrm{T}} \quad \mathrm{i} = 1, 2; \mathrm{k} = 1,..., \mathrm{K}. \tag{1}$$

$N_k$ is the number of symbols per data field for the user k. This number is linked to the spreading factor $Q_k$ as described in table 1 of [7].

Data block $\underline{\mathbf{d}}^{(k,1)}$ is transmitted before the midamble and data block $\underline{\mathbf{d}}^{(k,2)}$ after the midamble. Each of the $N_k$ data symbols $\underline{d}_n^{(k,i)}$; i=1, 2; k=1,...,K; n=1,...,$N_k$; of equation 1 has the symbol duration $T_s^{(k)} = Q_k.T_c$ as already given.

The data modulation is QPSK, thus the data symbols $\underline{d}_n^{(k,i)}$ are generated from two consecutive data bits from the output of the physical channel mapping procedure in [8]:

$$b_{l,n}^{(k,i)} \in \{0,1\} \qquad l = 1,2;\ k = 1,\ldots K;\ n = 1,\ldots, N_k;\ i = 1,2 \tag{2}$$

using the following mapping to complex symbols:

| consecutive binary bit pattern | complex symbol |
|---|---|
| $^{(k,i)}_{1,n}$ $^{(k,i)}_{2,n}$ | $\underline{d}_n^{(k,i)}$ |
| 00 | +j |
| 01 | +1 |
| 10 | -1 |
| 11 | -j |

The mapping corresponds to a QPSK modulation of the interleaved and encoded data bits $b_{l,n}^{(k,i)}$ of equation 2.

### 5.2.2 Mapping for PRACH burst type

In case of PRACH burst type, the definitions in subclause 5.2.1 apply with a modified number of symbols in the second data block. For the PRACH burst type, the number of symbols in the second data block $\underline{\mathbf{d}}^{(k,2)}$ is decreased by $\frac{96}{Q_K}$ symbols.

# 6 Spreading modulation

## 6.1 Basic spreading parameters

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

## 6.2 Channelisation codes

The elements $c_q^{(k)}$; k=1,...,K; q=1,...,$Q_k$; of the real valued channelisation codes

$$\mathbf{c}^{(k)}=(c_1^{(k)},c_2^{(k)},...,c_{Q_k}^{(k)})\text{; k=1,...,K;}$$

shall be taken from the set

$$V_c = \{1, -1\} \qquad (3)$$

The $\mathbf{c}_{Q_k}^{(k)}$ are Orthogonal Variable Spreading Factor (OVSF) codes, allowing to mix in the same timeslot channels with different spreading factors while preserving the orthogonality. The OVSF codes can be defined using the code tree of figure 1.

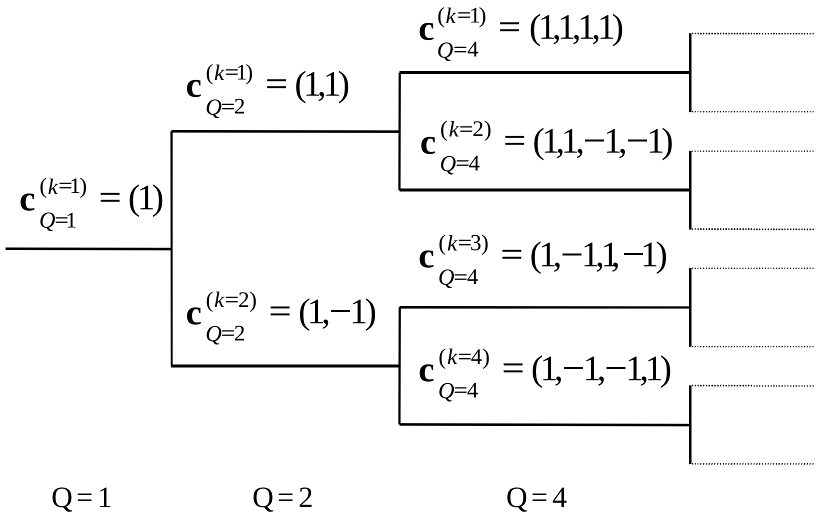


**Figure 1: Code-tree for generation of Orthogonal Variable Spreading Factor (OVSF) codes forChannelisation Operation**

Each level in the code tree defines a spreading factor indicated by the value of Q in the figure. All codes within the code tree cannot be used simultaneously in a given timeslot. A code can be used in a timeslot if and only if no other code on the path from the specific code to the root of the tree or in the sub-tree below the specific code is used in this timeslot. This means that the number of available codes in a slot is not fixed but depends on the rate and spreading factor of each physical channel.

The spreading factor goes up to $Q_{MAX}$=16.

## 6.3 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 $\underline{\mathbf{v}} = (\underline{v}_1, \underline{v}_2, ..., \underline{v}_{16})$. The elements $\underline{v}_i; i = 1,...,16$ of the complex valued scrambling codes shall be taken from the complex set

$$\underline{V}_{\underline{v}} = \{1, j, -1, -j\} \qquad (4)$$

In equation 4 the letter j denotes the imaginary unit. A complex scrambling code $\underline{\mathbf{v}}$ is generated from the binary scrambling codes $\mathbf{v} = (v_1, v_2, ..., v_{16})$ of length 16 shown in Annex A. The relation between the elements $\underline{\mathbf{v}}$ and $\mathbf{v}$ is given by:

$$\underline{v}_i = (j)^i \cdot v_i \qquad v_i \in \{1, -1\}, \ i = 1,...,16 \qquad (5)$$

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. The scheme is illustrated in figure 3 below and is described in more detail in subclause 6.4.

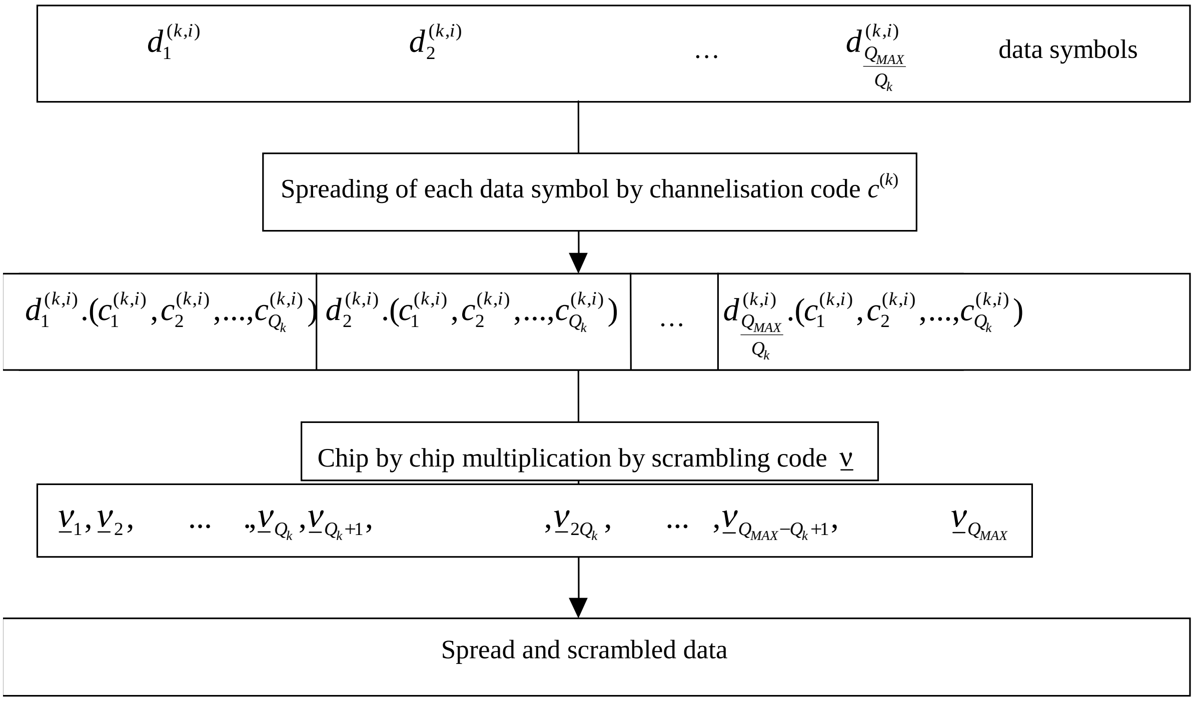


**Figure 2: Spreading of data symbols**

# 6.4 Spread signal of data symbols and data blocks

The combination of the user specific channelisation and cell specific scrambling codes can be seen as a user and cell specific spreading code $\mathbf{s}^{(k)} = \left(s_p^{(k)}\right)$ with

$${}_p^{(k)} = c^{(k)}_{1+[(p-1)\bmod Q_k]} \cdot \underline{v}_{1+[(p-1)\bmod Q_{MAX}]}$$ , k=1,…,K, p=1,…,$N_kQ_k$.

With the root raised cosine chip impulse filter $Cr_0(t)$ the transmitted signal belonging to the data block $\underline{\mathbf{d}}^{(k,1)}$ of equation 1 transmitted before the midamble is

$$\underline{d}^{(k,1)}(t) = \sum_{\mathrm{n}=1}^{N_k} \underline{d}_n^{(k,1)} \sum_{q=1}^{Q_k} s_{(n-1)Q_k+q}^{(k)} \cdot Cr_0(t-(q-1)T_c-(n-1)Q_kT_c) \qquad (6)$$

and for the data block $\underline{\mathbf{d}}^{(k,2)}$ of equation 1 transmitted after the midamble

$$\underline{d}^{(k,2)}(t) = \sum_{\mathrm{n}=1}^{N_k} \underline{d}_n^{(k,2)} \sum_{q=1}^{Q_k} s_{(n-1)Q_k+q}^{(k)} \cdot Cr_0(t-(q-1)T_C-(n-1)Q_kT_c-N_kQ_kT_c-L_mT_c). \qquad (7)$$

where $L_m$ is the number of midamble chips.

# 6.5 Modulation

The complex-valued chip sequence is QPSK modulated as shown in Figure 3 below.

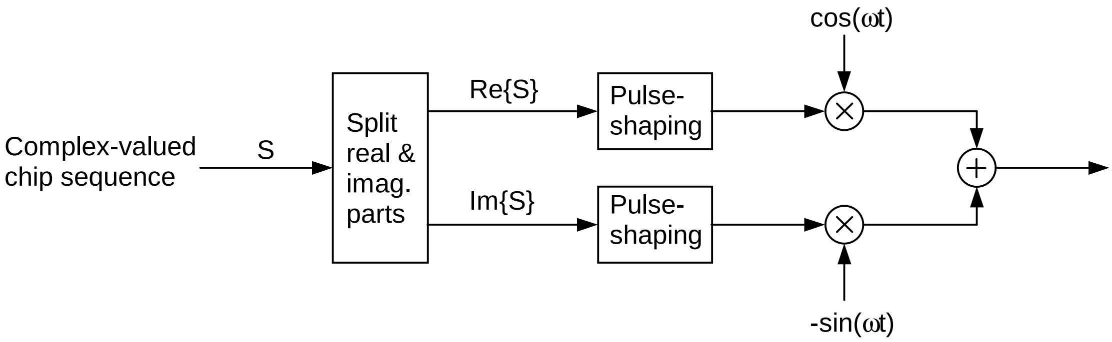


**Figure 3: Modulation of complex valued chip sequences**

# 7 Synchronisation codes

## 7.1 Code Generation

The Primary code sequence, $C_p$ is constructed as a so-called generalised hierarchical Golay sequence. The Primary SCH is furthermore chosen to have good aperiodic auto correlation properties.

Define a = $< x_1, x_2, x_3, \ldots, x_{16} >$ = < 1, 1, 1, 1, 1, 1, -1, -1, 1, -1, 1, -1, 1, -1, -1, 1 >

The PSC code word is generated by repeating the sequence 'a' modulated by a Golay complementary sequence and creating a complex-valued sequence with identical real and imaginary components.

The PSC code word $C_p$ is defined as $C_p=< y(0),y(1),y(2),\ldots,y(255) >$

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

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

The 16 secondary synchronization code words, $\{C_0,\ldots,C_{15}\}$ are complex valued with identical real and imaginary components, and are constructed from 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 = $< x_1,\ldots, x_8,-x_9,\ldots,-x_{16} >$ = <1, 1, 1, 1, 1, 1, -1, -1, -1, 1, -1, 1, -1, 1, 1, -1>.

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 zeros sequence).

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

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

The i:th SCH code word, $C_{SCH,i}$, i = 0, …, 15 is then defined as

$C_{SCH,i} = (1 + j) \times <h_m(0) \times z(0), h_m(1) \times z(1), h_m(2) \times z(2), \ldots, h_m(255) \times z(255)>$,

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

This code word is chosen from every 16th row of the matrix $H_8$., which yields 16 possible codewords.

The Secondary SCH code words are defined in terms of $C_{SCH,i}$ and the definition of $\{C_0,\ldots,C_{15}\}$ now follows as:

$C_i = C_{SCH,\,i}$ , i=0,…,15

## 7.2 Code Allocation

Three 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 (5 bits; Cases 1, 2);
- the position of the frame within an interleaving period of 20 msec (1 bit, Cases 1, 2);
- the position of the slot within the frame (1 bit, Case 2).

The modulated 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 2: 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 3: 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: $C_0$, $C_1$, $C_{2.}$

Code set 2: $C_3$, $C_4$, $C_{5.}$

Case 2

Code set 1: $C_0$, $C_1$, $C_{2.}$

Code set 2: $C_3$, $C_4$, $C_{5.}$

Code set 3: $C_6$, $C_7$, $C_{8.}$

Code set 4: $C_9$, $C_{10}$, $C_{11.}$

The following subclauses 7.2.1 to 7.2.2 refer to the two cases of SCH/P-CCPCH usage as described in [7].

Note that in the Tables 4-6 corresponding to Cases 1,2, and 3, respectively, Frame 1 implies the frame with an odd SFN and Frame 2 implies the frame with an even SFN.

## 7.2.1 Code allocation for Case 1

NOTE: Modulation by "j" indicates that the code is transmitted on the Q channel.

**Table 4: Code Allocation for Case 1**

| Code Group | Code Set | Frame 1 | | | Frame 2 | | | Associated $t_{offset}$ |
|---|---|---|---|---|---|---|---|---|
| 0 | 1 | $C_0$ | $C_1$ | $C_2$ | $C_0$ | $C_1$ | $-C_2$ | $t_0$ |
| 1 | 1 | $C_0$ | $-C_1$ | $C_2$ | $C_0$ | $-C_1$ | $-C_2$ | $t_1$ |
| 2 | 1 | $-C_0$ | $C_1$ | $C_2$ | $-C_0$ | $C_1$ | $-C_2$ | $t_2$ |
| 3 | 1 | $-C_0$ | $-C_1$ | $C_2$ | $-C_0$ | $-C_1$ | $-C_2$ | $t_3$ |
| 4 | 1 | $jC_0$ | $JC_1$ | $C_2$ | $jC_0$ | $jC_1$ | $-C_2$ | $t_4$ |
| 5 | 1 | $jC_0$ | $-jC_1$ | $C_2$ | $jC_0$ | $-jC_1$ | $-C_2$ | $t_5$ |
| 6 | 1 | $-jC_0$ | $JC_1$ | $C_2$ | $-jC_0$ | $jC_1$ | $-C_2$ | $t_6$ |
| 7 | 1 | $-jC_0$ | $-jC_1$ | $C_2$ | $-jC_0$ | $-jC_1$ | $-C_2$ | $t_7$ |
| 8 | 1 | $jC_0$ | $JC_2$ | $C_1$ | $jC_0$ | $jC_2$ | $-C_1$ | $t_8$ |
| 9 | 1 | $jC_0$ | $-jC_2$ | $C_1$ | $jC_0$ | $-jC_2$ | $-C_1$ | $t_9$ |
| 10 | 1 | $-jC_0$ | $JC_2$ | $C_1$ | $-jC_0$ | $jC_2$ | $-C_1$ | $t_{10}$ |
| 11 | 1 | $-jC_0$ | $-jC_2$ | $C_1$ | $-jC_0$ | $-jC_2$ | $-C_1$ | $t_{11}$ |
| 12 | 1 | $jC_1$ | $JC_2$ | $C_0$ | $JC_1$ | $jC_2$ | $-C_0$ | $t_{12}$ |
| 13 | 1 | $jC_1$ | $-jC_2$ | $C_0$ | $JC_1$ | $-jC_2$ | $-C_0$ | $t_{13}$ |
| 14 | 1 | $-jC_1$ | $JC_2$ | $C_0$ | $-jC_1$ | $jC_2$ | $-C_0$ | $t_{14}$ |
| 15 | 1 | $-jC_1$ | $-jC_2$ | $C_0$ | $-jC_1$ | $-jC_2$ | $-C_0$ | $t_{15}$ |
| 16 | 2 | $C_3$ | $C_4$ | $C_5$ | $C_3$ | $C_4$ | $-C_5$ | $t_{16}$ |
| 17 | 2 | $C_3$ | $-C_4$ | $C_5$ | $C_3$ | $-C_4$ | $-C_5$ | $t_{17}$ |
| … | … | … | … | … | … | … | … | … |
| 20 | 2 | $jC_3$ | $JC_4$ | $C_5$ | $jC_3$ | $jC_4$ | $-C_5$ | $t_{20}$ |
| … | … | … | … | … | … | … | … | … |
| 24 | 2 | $jC_3$ | $jC_5$ | $C_4$ | $jC_3$ | $JC_5$ | $-C_4$ | $t_{24}$ |
| … | … | … | … | … | … | … | … | … |
| 31 | 2 | $-jC_4$ | $-jC_5$ | $C_3$ | $-jC_4$ | $-jC_5$ | $-C_3$ | $t_{31}$ |

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.

## 7.2.2 Code allocation for Case 2

**Table 5: 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 | $C_0$ | $C_1$ | $C_2$ | $C_0$ | $C_1$ | $-C_2$ | $-C_0$ | $-C_1$ | $C_2$ | $-C_0$ | $-C_1$ | $-C_2$ | $t_0$ |
| 1 | 1 | $C_0$ | $-C_1$ | $C_2$ | $C_0$ | $-C_1$ | $-C_2$ | $-C_0$ | $C_1$ | $C_2$ | $-C_0$ | $C_1$ | $-C_2$ | $t_1$ |
| 2 | 1 | $jC_0$ | $jC_1$ | $C_2$ | $jC_0$ | $jC_1$ | $-C_2$ | $-jC_0$ | $-jC_1$ | $C_2$ | $-jC_0$ | $-jC_1$ | $-C_2$ | $t_2$ |
| 3 | 1 | $jC_0$ | $-jC_1$ | $C_2$ | $jC_0$ | $-jC_1$ | $-C_2$ | $-jC_0$ | $jC_1$ | $C_2$ | $-jC_0$ | $jC_1$ | $-C_2$ | $t_3$ |
| 4 | 1 | $jC_0$ | $jC_2$ | $C_1$ | $jC_0$ | $jC_2$ | $-C_1$ | $-jC_0$ | $-jC_2$ | $C_1$ | $-jC_0$ | $-jC_2$ | $-C_1$ | $t_4$ |
| 5 | 1 | $jC_0$ | $-jC_2$ | $C_1$ | $jC_0$ | $-jC_2$ | $-C_1$ | $-jC_0$ | $jC_2$ | $C_1$ | $-jC_0$ | $jC_2$ | $-C_1$ | $t_5$ |
| 6 | 1 | $jC_1$ | $jC_2$ | $C_0$ | $jC_1$ | $jC_2$ | $-C_0$ | $-jC_1$ | $-jC_2$ | $C_0$ | $-jC_1$ | $-jC_2$ | $-C_0$ | $t_6$ |
| 7 | 1 | $jC_1$ | $-jC_2$ | $C_0$ | $jC_1$ | $-jC_2$ | $-C_0$ | $-jC_1$ | $jC_2$ | $C_0$ | $-jC_1$ | $jC_2$ | $-C_0$ | $t_7$ |
| 8 | 2 | $C_3$ | $C_4$ | $C_5$ | $C_3$ | $C_4$ | $-C_5$ | $-C_3$ | $-C_4$ | $C_5$ | $-C_3$ | $-C_4$ | $-C_5$ | $t_8$ |
| 9 | 2 | $C_3$ | $-C_4$ | $C_5$ | $C_3$ | $-C_4$ | $-C_5$ | $-C_3$ | $C_4$ | $C_5$ | $-C_3$ | $C_4$ | $-C_5$ | $t_9$ |
| 10 | 2 | $jC_3$ | $jC_4$ | $C_5$ | $jC_3$ | $jC_4$ | $-C_5$ | $-jC_3$ | $-jC_4$ | $C_5$ | $-jC_3$ | $-jC_4$ | $-C_5$ | $t_{10}$ |
| 11 | 2 | $jC_3$ | $-jC_4$ | $C_5$ | $jC_3$ | $-jC_4$ | $-C_5$ | $-jC_3$ | $jC_4$ | $C_5$ | $-jC_3$ | $jC_4$ | $-C_5$ | $t_{11}$ |
| 12 | 2 | $jC_3$ | $jC_5$ | $C_4$ | $jC_3$ | $jC_5$ | $-C_4$ | $-jC_3$ | $-jC_5$ | $C_4$ | $-jC_3$ | $-jC_5$ | $-C_4$ | $t_{12}$ |
| 13 | 2 | $jC_3$ | $-jC_5$ | $C_4$ | $jC_3$ | $-jC_5$ | $-C_4$ | $-jC_3$ | $jC_5$ | $C_4$ | $-jC_3$ | $jC_5$ | $-C_4$ | $t_{13}$ |
| 14 | 2 | $jC_4$ | $jC_5$ | $C_3$ | $jC_4$ | $jC_5$ | $-C_3$ | $-jC_4$ | $-jC_5$ | $C_3$ | $-jC_4$ | $-jC_5$ | $-C_3$ | $t_{14}$ |
| 15 | 2 | $jC_4$ | $-jC_5$ | $C_3$ | $jC_4$ | $-jC_5$ | $-C_3$ | $-jC_4$ | $jC_5$ | $C_3$ | $-jC_4$ | $jC_5$ | $-C_3$ | $t_{15}$ |
| 16 | 3 | $C_6$ | $C_7$ | $C_8$ | $C_6$ | $C_7$ | $-C_8$ | $-C_6$ | $-C_7$ | $C_8$ | $-C_6$ | $-C_7$ | $-C_8$ | $t_{16}$ |
| … | … | … | … | … | … | … | … | … | … | … | … | … | … | … |
| 23 | 3 | $jC_7$ | $-jC_8$ | $C_6$ | $jC_7$ | $-jC_8$ | $-C_6$ | $-jC_7$ | $jC_8$ | $C_6$ | $-jC_7$ | $jC_8$ | $-C_6$ | $t_{20}$ |
| 24 | 4 | $C_9$ | $C_{10}$ | $C_{11}$ | $C_9$ | $C_{10}$ | $-C_{11}$ | $-C_9$ | $-C_{10}$ | $C_{11}$ | $-C_9$ | $-C_{10}$ | $-C_{11}$ | $t_{24}$ |
| … | … | … | … | … | … | … | … | … | … | … | … | … | … | … |
| 31 | 4 | $jC_{10}$ | $-jC_{11}$ | $C_9$ | $jC_{10}$ | $-jC_{11}$ | $-C_9$ | $-jC_{10}$ | $jC_{11}$ | $C_9$ | $-jC_{10}$ | $jC_{11}$ | $-C_9$ | $t_{31}$ |

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.

## 7.3 Evaluation of synchronisation codes

The evaluation of information transmitted in SCH on code group and frame timing is shown in table 6, where the 32 code groups are listed. Each code group is containing 4 specific scrambling codes (cf. subclause 6.3), 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 6.

**Table 6: 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 | $m_{PL127}$ | $m_{SL127}$ | |

For basic midamble codes $m_P$ cf.TS 25.221, annex A 'Basic Midamble Codes'.

Each cell shall cycle through two sets of cell parameters in a code group with the cell parameters changing each frame. Table 7 shows how the cell parameters are cycled according to the SFN.

**Table 7: 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 1 | 0 | 1 |
| 1 | | 1 | 0 |
| 2 | | 2 | 3 |
| 3 | | 3 | 2 |
| 4 | Group 2 | 4 | 5 |
| 5 | | 5 | 4 |
| 6 | | 6 | 7 |
| 7 | | 7 | 6 |
| . . . . | | | |
| 124 | Group 32 | 124 | 125 |
| 125 | | 125 | 124 |
| 126 | | 126 | 127 |
| 127 | | 127 | 126 |

# Annex A (Normative): Scrambling Codes

The applicable scrambling codes are listed in below. Code numbers are referring to table 6 'Mapping scheme for Cell Parameters, Code Groups, Scrambling Codes, Midambles and $t_{offset}$' in subclause 7.2 'Code Allocation'.

| Scrambling Code | $\nu_1$ | $\nu_2$ | $\nu_3$ | $\nu_4$ | $\nu_5$ | $\nu_6$ | $\nu_7$ | $\nu_8$ | $\nu_9$ | $\nu_{10}$ | $\nu_{11}$ | $\nu_{12}$ | $\nu_{13}$ | $\nu_{14}$ | $\nu_{15}$ | $\nu_{16}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code 0 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 |
| Code 1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | -1 |
| Code 2 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 |
| Code 3 | 1 | 1 | 1 | -1 | -1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 |
| Code 4 | 1 | 1 | 1 | -1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 |
| Code 5 | -1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 |
| Code 6 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 |
| Code 7 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 |
| Code 8 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 |
| Code 9 | 1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | -1 |
| Code 10 | 1 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 |
| Code 11 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 |
| Code 12 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 |
| Code 13 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | -1 | 1 | -1 | -1 |
| Code 14 | 1 | -1 | -1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | -1 |
| Code 15 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 |
| Code 16 | 1 | -1 | -1 | 1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | 1 | 1 | -1 | -1 |
| Code 17 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 |
| Code 18 | -1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 |
| Code 19 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 |
| Code 20 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 |
| Code 21 | 1 | 1 | 1 | 1 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | 1 | -1 |
| Code 22 | 1 | -1 | -1 | -1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 |
| Code 23 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 |
| Code 24 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 |
| Code 25 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 |
| Code 26 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 |
| Code 27 | -1 | 1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 | -1 | 1 | -1 | -1 |
| Code 28 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 |
| Code 29 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 |
| Code 30 | -1 | -1 | -1 | -1 | -1 | -1 | 1 | 1 | 1 | -1 | -1 | 1 | 1 | -1 | 1 | -1 |
| Code 31 | 1 | 1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | 1 | -1 | 1 | 1 | -1 |
| Code 32 | 1 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 |
| Code 33 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 |
| Code 34 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 |
| Code 35 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 |
| Code 36 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 |
| Code 37 | -1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 |
| Code 38 | -1 | 1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 |
| Code 39 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 |
| Code 40 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 |
| Code 41 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 |
| Code 42 | 1 | -1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 |
| Code 43 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | -1 | 1 | 1 | -1 |
| Code 44 | -1 | -1 | 1 | -1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | -1 |

| Scrambling Code | $\nu_1$ | $\nu_2$ | $\nu_3$ | $\nu_4$ | $\nu_5$ | $\nu_6$ | $\nu_7$ | $\nu_8$ | $\nu_9$ | $\nu_{10}$ | $\nu_{11}$ | $\nu_{12}$ | $\nu_{13}$ | $\nu_{14}$ | $\nu_{15}$ | $\nu_{16}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code 45 | -1 | -1 | 1 | -1 | 1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 |
| Code 46 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | -1 |
| Code 47 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | -1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 |
| Code 48 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 |
| Code 49 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 |
| Code 50 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 |
| Code 51 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 |
| Code 52 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 |
| Code 53 | -1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | 1 | 1 | -1 |
| Code 54 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 |
| Code 55 | -1 | 1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | -1 | 1 | 1 | -1 | -1 |
| Code 56 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 |
| Code 57 | -1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 |
| Code 58 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 |
| Code 59 | 1 | 1 | -1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | 1 | 1 | -1 |
| Code 60 | -1 | 1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 |
| Code 61 | -1 | -1 | 1 | 1 | 1 | -1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 |
| Code 62 | -1 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 |
| Code 63 | -1 | 1 | -1 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 | -1 |
| Code 64 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | -1 |
| Code 65 | -1 | -1 | -1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 |
| Code 66 | -1 | -1 | -1 | -1 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | -1 | 1 | -1 | 1 | -1 |
| Code 67 | -1 | -1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 |
| Code 68 | 1 | -1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 |
| Code 69 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | 1 | 1 | 1 | -1 | -1 | 1 | -1 | -1 |
| Code 70 | 1 | 1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 |
| Code 71 | 1 | -1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 |
| Code 72 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | -1 | 1 | -1 |
| Code 73 | -1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | 1 | -1 |
| Code 74 | 1 | 1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 |
| Code 75 | 1 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 |
| Code 76 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | 1 | -1 |
| Code 77 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 |
| Code 78 | -1 | 1 | -1 | 1 | -1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | -1 |
| Code 79 | -1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | -1 | -1 |
| Code 80 | 1 | 1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 |
| Code 81 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 |
| Code 82 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 |
| Code 83 | 1 | 1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | -1 | 1 | 1 | -1 |
| Code 84 | -1 | -1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 |
| Code 85 | -1 | 1 | 1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | -1 | -1 |
| Code 86 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 |
| Code 87 | 1 | 1 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 |
| Code 88 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 |
| Code 89 | -1 | 1 | -1 | -1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 |
| Code 90 | 1 | -1 | -1 | -1 | -1 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | -1 |
| Code 91 | -1 | 1 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | -1 |
| Code 92 | -1 | 1 | 1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | 1 | -1 | -1 |
| Code 93 | -1 | -1 | -1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 |
| Code 94 | 1 | -1 | 1 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 | -1 | -1 | -1 | -1 |
| Code 95 | 1 | 1 | 1 | 1 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 |
| Code 96 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | -1 |
| Code 97 | 1 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 |

| Scrambling Code | $v_1$ | $v_2$ | $v_3$ | $v_4$ | $v_5$ | $v_6$ | $v_7$ | $v_8$ | $v_9$ | $v_{10}$ | $v_{11}$ | $v_{12}$ | $v_{13}$ | $v_{14}$ | $v_{15}$ | $v_{16}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code 98 | 1 | 1 | -1 | 1 | 1 | -1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 | -1 |
| Code 99 | 1 | -1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | -1 |
| Code 100 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 | -1 | 1 | -1 |
| Code 101 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 |
| Code 102 | 1 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 |
| Code 103 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 | -1 |
| Code 104 | 1 | -1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 |
| Code 105 | 1 | 1 | 1 | 1 | 1 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | 1 | -1 | 1 | -1 |
| Code 106 | 1 | 1 | -1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | 1 | -1 |
| Code 107 | -1 | -1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 | 1 | -1 | 1 | -1 |
| Code 108 | -1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 | -1 |
| Code 109 | -1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | -1 | -1 | -1 | -1 | -1 |
| Code 110 | -1 | -1 | 1 | 1 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 |
| Code 111 | 1 | 1 | 1 | -1 | -1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | 1 | -1 | -1 |
| Code 112 | -1 | -1 | 1 | 1 | 1 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 |
| Code 113 | 1 | 1 | -1 | -1 | 1 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | -1 |
| Code 114 | -1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 | 1 | 1 | -1 | 1 | -1 | 1 | -1 | -1 |
| Code 115 | 1 | -1 | -1 | 1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | 1 | 1 | -1 | -1 |
| Code 116 | -1 | 1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | -1 |
| Code 117 | 1 | 1 | 1 | -1 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 |
| Code 118 | -1 | -1 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | -1 |
| Code 119 | -1 | -1 | -1 | 1 | -1 | 1 | 1 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 |
| Code 120 | -1 | -1 | 1 | -1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 |
| Code 121 | -1 | 1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | -1 |
| Code 122 | -1 | -1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 |
| Code 123 | 1 | -1 | 1 | -1 | 1 | 1 | -1 | -1 | 1 | -1 | -1 | 1 | -1 | -1 | -1 | -1 |
| Code 124 | -1 | -1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | -1 | 1 | 1 | -1 |
| Code 125 | 1 | -1 | -1 | 1 | 1 | -1 | 1 | -1 | 1 | 1 | 1 | 1 | 1 | 1 | -1 | -1 |
| Code 126 | 1 | 1 | 1 | 1 | -1 | 1 | -1 | 1 | -1 | 1 | 1 | -1 | 1 | 1 | -1 | -1 |
| Code 127 | 1 | -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 | -1 | 1 | 1 | 1 | -1 | -1 |

# Annex B (informative): Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 14/01/00 | RAN_05 | RP-99593 | - | | Approved at TSG RAN #5 and placed under Change Control | - | 3.0.0 |
| 14/01/00 | RAN_06 | RP-99696 | 001 | 01 | Primary and Secondary CCPCH in TDD | 3.0.0 | 3.1.0 |
| 14/01/00 | RAN_06 | RP-99695 | 003 | 1 | Alignment of Terminology Regarding Spreading for TDD Mode | 3.0.0 | 3.1.0 |
| 14/01/00 | RAN_06 | RP-99696 | 004 | - | Code allocation for Case 3 | 3.0.0 | 3.1.0 |
| 14/01/00 | - | - | - | | Change history was added by the editor | 3.1.0 | 3.1.1 |
| 31/03/00 | RAN_07 | RP-000069 | 002 | 3 | Cycling of cell parameters | 3.1.1 | 3.2.0 |
| 31/03/00 | RAN_07 | RP-000069 | 005 | - | Removal of Synchronisation Case 3 in TDD | 3.1.1 | 3.2.0 |
| 31/03/00 | RAN_07 | RP-000069 | 006 | 1 | Signal Point Constellation | 3.1.1 | 3.2.0 |

# History

| Document history | | |
|---|---|---|
| V3.2.0 | March 2000 | Publication |
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