TSGR#3(99) 240

TSGR1#4(99) 522

TS S1.23 V2.0.0 (1999-04)

Technical Specification

3rd Generation Partnership Project (3GPP);
Technical Specification Group (TSG)
Radio Access Network (RAN);
Working Group 1 (WG1);
Spreading and modulation (TDD)

3GPP

Reference

<Workitem>

Keywords

<keyword[, keyword]>

3GPP

Internet

http://www.3gpp.org

Copyright Notification

Contents

Intellectual Property Rights

<Editor's note: The content has to be reviewed according to the 3GPP IPR rules. >

Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).
The contents of this TS are subject to continuing work within 3GPP TSG RAN and may change following formal TSG RAN approval.

1 Scope

This document establishes the characteristics of the spreading and modulation in the TDD mode. The main objectives of the document are to be a part of the full description of the Layer 1, and to serve as a basis for the drafting of the actual technical specification (TS).
<Editor's note: The content has to be reviewed according to the 3GPP rules. >

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, subsequent revisions do apply.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] Reference 1

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions apply:
<defined term>: <definition>.

3.2 Symbols

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

<symbol> <Explanation>

3.3 Abbreviations

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

CDMA Code Division Multiple Access

PN Pseudo Noise

QPSK Quadrature Phase Shift Keying

RACH Random Access 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 section 5 and the spreading modulation in section 6.

Table 1: Basic modulation parameters.

Chip rate	same as FDD basic chiprate, 4.096 Mchip/s [(1.024,8.192,16.384Mcps)]
Carrier spacing	5.0 MHz
Data modulation	QPSK
Chip modulation	same as FDD chip modulation, root-raised cosine roll-off $\alpha = 0.22$
Spreading characteristics	Orthogonal Q chips/symbol, where $Q = 2^p$, 0 <= p <= 4

5 Data modulation

5.1 Symbol rate

The symbol rate and duration are indicated below:

$T_s = Q \times T_c$, where $T_c = \frac{1}{chiprate} = 0.24414$ µs, reflecting the dependence of the symbol time T_s upon the spreading factor Q.

5.2 Mapping of bits onto signal point constellation

A certain number K of CDMA codes can be assigned to either a single user or to different users who are simultaneously transmitting bursts in the same time slot and the same frequency. The maximum possible number of CDMA codes, which is smaller or equal to 16, depends on the individual spreading factors, the actual interference situation and the service requirements. In document S1.21 examples of bodies of such spread bursts associated with a particular user are shown. Each user burst has two data carrying parts, termed data blocks:

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

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 document S1.21.

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 interleaved and encoded data bits

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

using the equation

$$\begin{aligned} \mathrm{Re}\{\underline{d}_n^{(k,i)}\} &= \frac{1}{\sqrt{2}}(2b_{1,n}^{(k,i)}-1) \\ \mathrm{Im}\{\underline{d}_n^{(k,i)}\} &= \frac{1}{\sqrt{2}}(2b_{2,n}^{(k,i)}-1) \qquad \mathrm{k}=1,\ldots,\mathrm{K};\ \mathrm{n}=1,\ldots,\mathrm{N_k};\ \mathrm{i}=1,2. \end{aligned} \tag{3}$$

Equation 3 corresponds to a QPSK modulation of the interleaved and encoded data bits $b_{l,n}^{(k,i)}$ of equation 2.

5.3 Pulse shape filtering

The pulse shape filtering is applied to each chip at the transmitter. In this context the term chip represents a single element $\underline{c}_q^{(k)}$ with k=1,...,K; q=1,...,Q_k; of a spreading code $\underline{\mathbf{c}}^{(k)}$; see also section 6.2.

The impulse response of the above mentioned chip impulse filter $Cr_0(t)$ shall be a root-raised cosine. The corresponding raised cosine impulse $C_0(t)$ is defined as

$$C_0(t) = \frac{\sin p \dfrac{t}{T_c}}{p \dfrac{t}{T_c}} \cdot \frac{\cos a p \dfrac{t}{T_c}}{1-4a^2 \dfrac{t^2}{T_c{}^2}} \qquad (\ )$$

The roll-off factor shall be   = 0.22. T is the chip duration:

$$T_c = \frac{1}{chiprate} = 0.24414ms$$

The impulse response $C_0(t)$ according to equation 4 and the energy density spectrum $\Phi_{C0}(f)$ of $C_0(t)$ are depicted in figure 1 below:

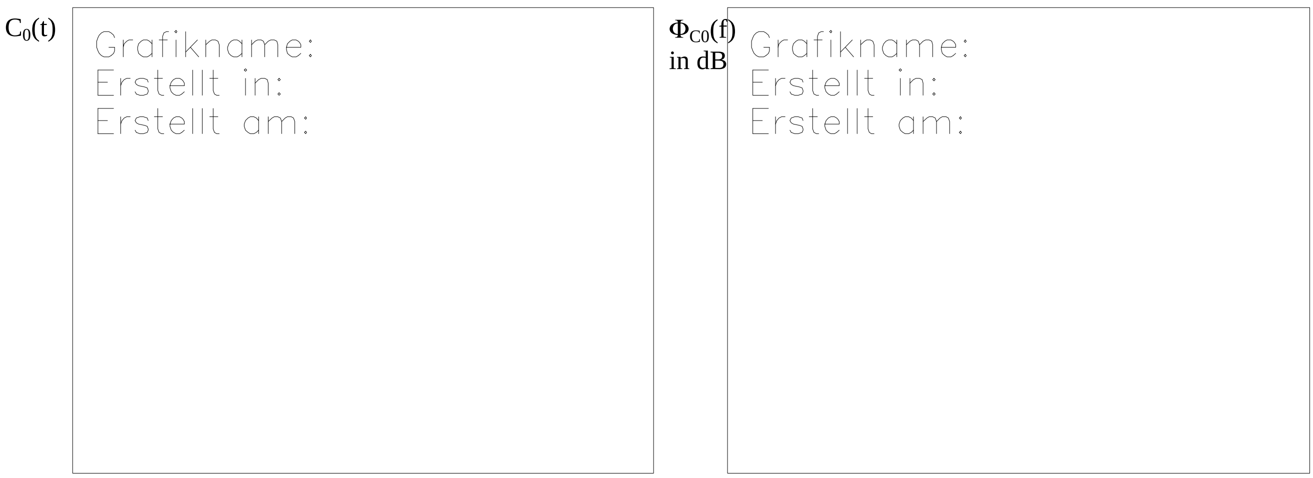

Figure 1: Basic impulse $C_0(t)$ and the corresponding energy density spectrum $\Phi_{C0}(f)$ of $C_0(t)$

6 Spreading modulation

6.1 Basic spreading parameters

Each data symbol $\underline{d}_n^{(k,i)}$ of equation 1 is spread with a spreading code $\underline{\mathbf{c}}^{(k)}$ of length $Q_k \in \{1,2,4,8,16\}$. The resulting sequence is then scrambled by a sequence ν of length 16.

6.2 Spreading codes

The elements $\underline{c}_q^{(k)}$; k=1,...,K; q=1,...,Q_k; of the spreading codes $\underline{\mathbf{c}}^{(k)} = (\underline{c}_1^{(k)}, \underline{c}_2^{(k)}, \ldots, \underline{c}_{Q_k}^{(k)})$; k=1,...,K; shall be taken from the complex set

$$\underline{\mathrm{V}}_{\mathrm{c}} = \{1, \mathrm{j}, -1, -\mathrm{j}\}. \qquad (5)$$

In equation 5 the letter j denotes the imaginary unit. A spreading code $\underline{\mathbf{c}}^{(k)}$ is generated from the binary codes $\mathbf{a}_{Q_k}^{(k)} = \left(a_1^{(k)}, a_2^{(k)}, \ldots, a_{Q_k}^{(k)}\right)$ of length Q_k shown in Figure 2 allocated to the k^{th} user. The relation between the elements $\underline{c}_q^{(k)}$ and $\underline{a}_q^{(k)}$ is given by:

$$\underline{c}_q^{(k)} = (\mathrm{j})^q \cdot a_q^{(k)} \quad a_q^{(k)} \in \{1,-1\}; \ \mathrm{q} = 1, \ldots, \mathrm{Q_k}. \qquad (6)$$

Hence, the elements $\underline{c}_q^{(k)}$ of the CDMA codes $\underline{\mathbf{c}}^{(k)}$ are alternating real and imaginary.

The $\mathbf{a}_{Q_k}^{(k)}$ 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 2.

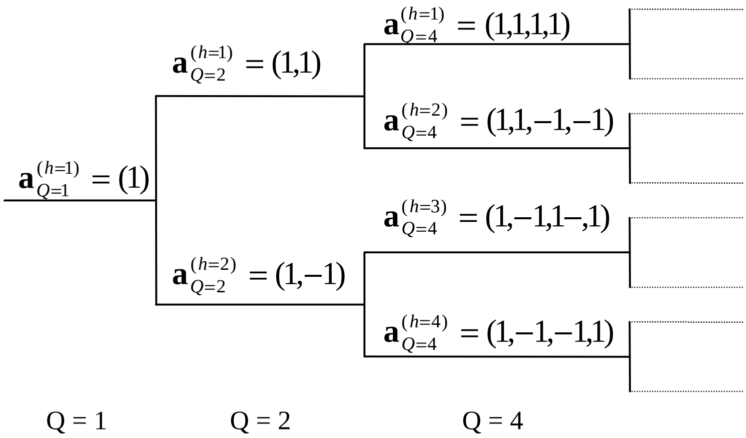

Figure 2: Code-tree for generation of Orthogonal Variable Spreading Factor (OVSF) codes.

Each level in the code tree defines a spreading factors 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 code $\mathbf{c}^{(k)}$ of length Q_k is followed by a cell specific scrambling sequence ν=(ν1, ν2, … ν_{QMAX}). 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 section 6.4

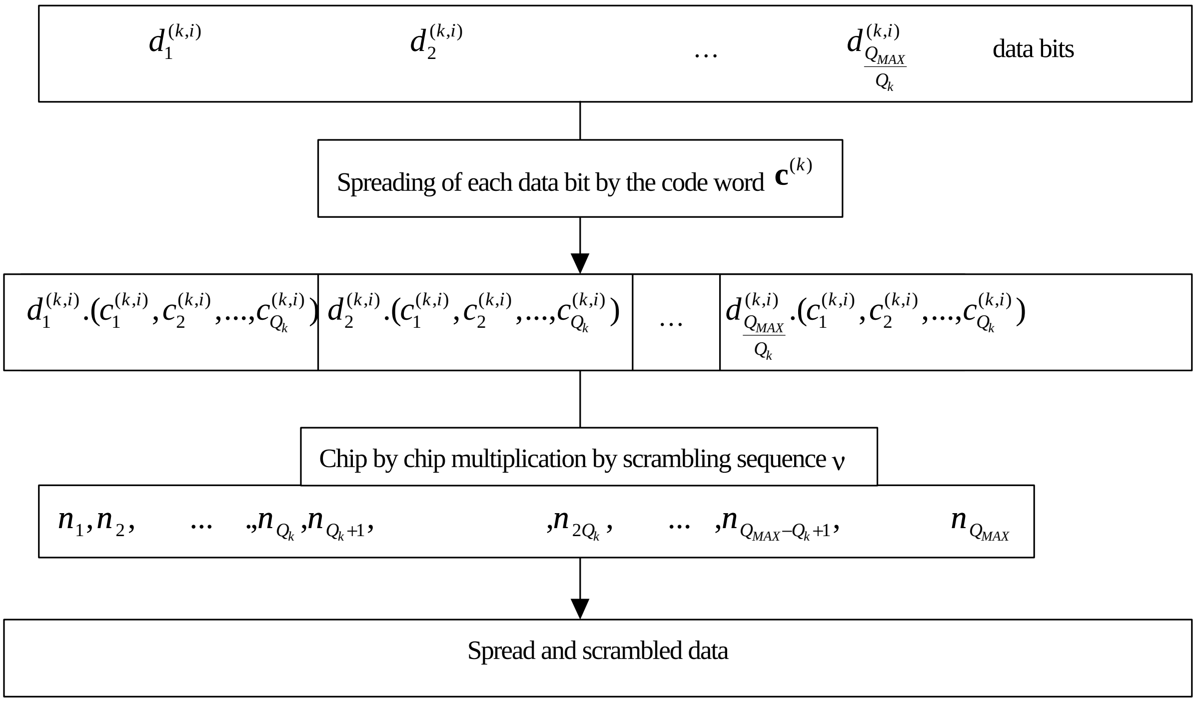

Figure 3: Spreading and subsequent scrambling of data bits.

<Editor's note: longer scrambling code over Qmax is FFS on Ad Hoc 1 (TDD) in case of insufficient performance of the current scrambling code n. >

6.4 Spread and scrambled signal of data symbols and data blocks

The combination of the spreading 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 $s_p^{(k)} = c^{(k)}_{1+[(p-1) \bmod Q_k]} \cdot \nu_{1+[(p-1) \bmod Q_{MAX}]}$, 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

$$\underline{d}^{(k,1)}(t) = \sum_{n=1}^{N_k} \underline{d}_n^{(k,1)} \sum_{q=1}^{Q_k} s_{(n-1)Q_k+q}^{(k)} \cdot Cr_o(t-(q-1)T_c-(n-1)Q_kT_c) \qquad (7)$$

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

$$\underline{d}^{(k,2)}(t) = \sum_{n=1}^{N_k} \underline{d}_n^{(k,2)} \sum_{q=1}^{Q_k} s_{(n-1)Q_k+q}^{(k)} \cdot Cr_0(t-(q-1)T_C-(n-1)Q_kT_c-N_kQ_kT_c-L_mT_c). \qquad (8)$$

where L_m is the number of midamble chips.

7. Synchronisation codes

7.1 Code Generation

The code generation for synchronisation codes is handled in the same way as in FDD Mode. Thus we refer to S1.13, chapter ‘7.2.3 Synchronisation Codes’. From this procedure we obtain one primary synchronisation code $C_p = C_{SCH,0}$ and seventeen different secondary synchronisation codes $C_{S,i} = C_{SCH,i}$ with i=1…17.

To avoid misunderstandings when documents are reorganised in the future, we repeat the actual content of this chapter below using small font.

The Primary and Secondary code words, C_p and $\{C_1,\ldots,C_{17}\}$ are constructed as the position wise addition modulo 2 of a Hadamard sequence and a fixed so called hierarchical sequence. The [Primary SCH] [1st search code] is furthermore chosen to have good aperiodic auto correlation properties.

< *Editor’s note: There is a choice on the terminology. Also, the text in the 2nd [ ] needs to be verified*>

The hierarchical sequence y sequence is constructed from two constituent sequences x_1 and x_2 of length n_1 and n_2 respectively using the following formula:

$y(i) = x_2(i \bmod n_2) + x_1(i \operatorname{div} n_2) \text{ modulo } 2,\ i = 0 \ldots (n_1 * n_2) - 1$

The constituent sequences x_1 and x_2 are chosen to be identical and to be the following length 16 (i.e. $n_1 = n_2 = 16$) sequence:

$x_1 = x_2 = <0, 0, 1, 1, 1, 1, 0, 1, 0, 0, 1, 0, 0, 0, 1, 0>$

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

$$H_0 = (0)$$

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

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

The Hadamard sequence *h* depends on the chosen code number *n* and is denoted h_n in the sequel.

[This code number is chosen from every 8th low of the matrix H_8. Therefore, there are 32 possible code numbers out of which 17 are used.]

<*Editor’s note: Only ARIB input specifies this code group out of which 17 codes are chosen but it has to do with fast Hadamard transformation*>

Furthermore, let $h_n(i)$ and $y(i)$ denote the *i*:th symbol of the sequence h_n and *y*, respectively.

$h(i)$ is identical to $C_{2^8,i'}$ where i' is the bit-reversed number of the 8-bit binary representation of i.

The definition of the *n*:th [SCH][search] code word follows (the left most index correspond to the chip transmitted first in each slot):

$C_{SCH,n} = < h_n(0)+y(0), h_n(1)+y(1), h_n(2)+y(2), \ldots, h_n(255)+y(255) >$,

All sums of symbols are taken modulo 2.

Before modulation and transmission these binary code words are converted to real valued sequences by the transformation ‘0’ -> ‘+1’, ‘1’ -> ‘-1’.

The [Primary SCH][1st] search] and [Secondary SCH][2nd search] code words are defined in terms of $C_{SCH,n}$ and the definition of C_p and $\{C_1,\ldots,C_{17}\}$ now follows as:

$C_p = C_{SCH,0}$

and

$C_i = C_{SCH,i}$, i=1,…,17

The definitions of C_p and $\{C_1,\ldots,C_{17}\}$ are such that a 32 point fast Hadamard transform can be utilised for detection.

<*Editor’s note: choice has to be made between for example primary SCH code and 1st search code.*>

7.2 Code Allocation

Sequences of 8 secondary SCH codes, thus composed of $C_{S,i}$ from chapter 7.1 above, are used to transmit information on the PSCH. In general the information on the code group of a cell and on the frame timing (see S1.24, Section ‘6.6.1 Cell Search’) is transmitted in the PSCH. According to S1.21 section ‘7.4 The Physical Synchronisation Channel (PSCH)’, there is case (3) where additional information from SCH transport channel is to be transmitted in the PSCH.

The sequences of secondary SCH codes are constructed such that their cyclic-shifts are unique, i.e. a non-zero cyclic shift less than 8 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 8 of any of the sequences is not equivalent to itself with any other cyclic shift less than 8. This property is used to uniquely determine the transmitted sequence in the receiver.

The evaluation of transmitted information on code group and frame timing is shown in table 9, where the 32 code groups are listed. Each code group is containing 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}. Positioning of the secondary SCH codes is depicted in the last line of table 10 and 11.

The complete mapping of Code Group to Scrambling Code, Midamble Codes and t_{Offset} is depicted in table 9, cf. also S1.31.

CELL PARA-METER	Code Group	Associated Codes			Associated t_{Offset}
		Scrambling Code	Long Basic Midamble Code	Short Basic Midamble Code	
0	Group 1	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 2	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 32	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}	

Table 9 Mapping scheme for Cell Parameters, Code Groups, Scrambling Codes, Midambles and t_{Offset}.
For basic midamble codes m_P cf.S1.21, section '7.2.3.1 & 7.2.3.2 Midamble Sequences'.
For CELL PARAMETERS also cf. S1.31.

The following subchapters 7.2.1 and 7.2.2 are referring to the three cases of PSCH/CCPCH usage as described in S1.21 section 7.4.

7.2.1 Code allocation for case 1 and 2

In table 10 the 32 sequences used in the cases 1 and 2 of PSCH/CCPCH scheme are listed. Again, these are used to encode the 32 different code groups.

It should be mentioned that the sequences used here can be derived from FDD sequences by puncturing every 2^{nd} position, thus a UE can use same database for FDD and TDD.

Code Group	Secondary SCH Code Position								Associated t_{Offset}
	#1	#2	#3	#4	#5	#6	#7	#8	
Group1	C_1	C_2	C_6	C_{15}	C_8	C_7	C_3	C_{11}	t_0
Group2	C_1	C_9	C_{10}	C_{13}	C_{11}	C_3	C_2	C_{16}	t_1
Group 3	C_1	C_{16}	C_{14}	C_{11}	C_{14}	C_{16}	C_1	C_4	t_2
Group 4	C_1	C_6	C_1	C_9	C_{17}	C_{12}	C_{17}	C_9	t_3
Group 5	C_1	C_{13}	C_5	C_7	C_3	C_8	C_{16}	C_{14}	t_4
Group 6	C_1	C_3	C_9	C_5	C_6	C_4	C_{15}	C_2	t_5
Group 7	C_1	C_{10}	C_{13}	C_3	C_9	C_{17}	C_{14}	C_7	t_6
Group 8	C_1	C_{17}	C_{17}	C_1	C_{12}	C_1	C_{13}	C_{12}	t_7
Group 9	C_1	C_7	C_4	C_{16}	C_{15}	C_9	C_{12}	C_{17}	t_8
Group 10	C_1	C_{14}	C_8	C_{14}	C_1	C_5	C_{11}	C_5	t_9
Group 11	C_1	C_4	C_{12}	C_{12}	C_4	C_1	C_{10}	C_{10}	t_{10}
Group 12	C_1	C_{11}	C_{16}	C_{10}	C_7	C_{14}	C_9	C_{15}	t_{11}
Group 13	C_1	C_1	C_3	C_8	C_{10}	C_{10}	C_8	C_3	t_{12}
Group 14	C_1	C_8	C_7	C_6	C_{13}	C_6	C_7	C_8	t_{13}
Group 15	C_1	C_{15}	C_{11}	C_4	C_{16}	C_2	C_6	C_{13}	t_{14}
Group 16	C_1	C_5	C_{15}	C_2	C_2	C_{15}	C_5	C_1	t_{15}
Group 17	C_1	C_{12}	C_2	C_{17}	C_5	C_{11}	C_4	C_6	t_{16}
Group 18	C_2	C_{11}	C_{14}	C_4	C_{10}	C_1	C_{15}	C_8	t_{17}
Group 19	C_2	C_1	C_1	C_2	C_{13}	C_{14}	C_{14}	C_{13}	t_{18}
Group 20	C_2	C_8	C_5	C_{17}	C_{16}	C_{10}	C_{13}	C_1	t_{19}
Group 21	C_2	C_{15}	C_9	C_{15}	C_2	C_6	C_{12}	C_6	t_{20}
Group 22	C_2	C_5	C_{13}	C_{13}	C_5	C_2	C_{11}	C_{11}	t_{21}
Group 23	C_2	C_{12}	C_{17}	C_{11}	C_8	C_{15}	C_{10}	C_{16}	t_{22}
Group 24	C_2	C_2	C_4	C_9	C_{11}	C_{11}	C_9	C_4	t_{23}
Group 25	C_2	C_9	C_8	C_7	C_{14}	C_7	C_8	C_9	t_{24}
Group 26	C_2	C_{16}	C_{12}	C_5	C_{17}	C_3	C_7	C_{14}	t_{25}
Group 27	C_2	C_6	C_{16}	C_3	C_3	C_{16}	C_6	C_2	t_{26}
Group 28	C_2	C_{13}	C_3	C_1	C_6	C_{12}	C_5	C_7	t_{27}
Group 29	C_2	C_3	C_7	C_{16}	C_9	C_8	C_4	C_{12}	t_{28}
Group 30	C_2	C_{10}	C_{11}	C_{14}	C_{12}	C_4	C_3	C_{17}	t_{29}
Group 31	C_2	C_{17}	C_{15}	C_{12}	C_{15}	C_{17}	C_2	C_5	t_{30}
Group 32	C_2	C_7	C_2	C_{10}	C_1	C_{13}	C_1	C_{10}	t_{31}
Frame position	Frame #1		Frame #2		Frame #3		Frame #4		

Table 10 Spreading Code allocation for Secondary SCH Code, case 2) of PSCH/CCPCH scheme

7.2.2 Code allocation for case 3

In table 11 the 256 sequences used in case 3 of PSCH/CCPCH scheme are listed. In addition to the information on code group three bits from SCH transport channel are transmitted to the UE with these codes.

<Editors note: The usage of CCPCH pointing is for further study (cf. TDoc R1#2(99) 74)>

Code Group	Secondary PSCH Code at Position								Additional Bits from SCH Transport Channel	Associated t_{Offset}
	#1	#2	#3	#4	#5	#6	#7	#8		
Group 1	C2	C14	C6	C8	C4	C9	C17	C15	000	t_0
	C2	C4	C10	C6	C7	C5	C16	C3	001	
	C3	C3	C5	C10	C12	C12	C10	C5	010	
	C3	C10	C9	C8	C15	C8	C9	C10	011	
	C3	C17	C13	C6	C1	C4	C8	C15	100	
	C3	C7	C17	C4	C4	C17	C7	C3	101	
	C3	C14	C4	C2	C7	C13	C6	C8	110	
	C3	C4	C8	C17	C10	C9	C5	C13	111	
Group 2	C3	C11	C12	C15	C13	C5	C4	C1	000	t_1
	C3	C1	C16	C13	C16	C1	C3	C6	001	
	C3	C8	C3	C11	C2	C14	C2	C11	010	
	C3	C15	C7	C9	C5	C10	C1	C16	011	
	C3	C5	C11	C7	C8	C6	C17	C4	100	
	C3	C12	C15	C5	C11	C2	C16	C9	101	
	C3	C2	C2	C3	C14	C15	C15	C14	110	
	C3	C9	C6	C1	C17	C11	C14	C2	111	
Group 3	C3	C16	C10	C16	C3	C7	C13	C7	000	t_2
	C3	C6	C14	C14	C6	C3	C12	C12	001	
	C3	C13	C1	C12	C9	C16	C11	C17	010	
	C4	C12	C13	C16	C14	C6	C5	C2	011	
	C4	C2	C17	C14	C17	C2	C4	C7	100	
	C4	C9	C4	C12	C3	C15	C3	C12	101	
	C4	C16	C8	C10	C6	C11	C2	C17	110	
	C4	C6	C12	C8	C9	C7	C1	C5	111	
Group 4	C4	C13	C16	C6	C12	C3	C17	C10	000	t_3
	C4	C3	C3	C4	C15	C16	C16	C15	001	
	C4	C10	C7	C2	C1	C12	C15	C3	010	
	C4	C17	C11	C17	C4	C8	C14	C8	011	
	C4	C7	C15	C15	C7	C4	C13	C13	100	
	C4	C14	C2	C13	C10	C17	C12	C1	101	
	C4	C4	C6	C11	C13	C13	C11	C6	110	
	C4	C11	C10	C9	C16	C9	C10	C11	111	
Group 5	C4	C1	C14	C7	C2	C5	C9	C16	000	t_4
	C4	C8	C1	C5	C5	C1	C8	C4	001	
	C4	C15	C5	C3	C8	C14	C7	C9	010	
	C4	C5	C9	C1	C11	C10	C6	C14	011	
	C5	C4	C4	C5	C16	C17	C17	C16	100	
	C5	C11	C8	C3	C2	C13	C16	C4	101	
	C5	C1	C12	C1	C5	C9	C15	C9	110	
	C5	C8	C16	C16	C8	C5	C14	C14	111	
Group 6	C5	C15	C3	C14	C11	C1	C13	C2	000	t_5
	C5	C5	C7	C12	C14	C14	C12	C7	001	
	C5	C12	C11	C10	C17	C10	C11	C12	010	
	C5	C2	C15	C8	C3	C6	C10	C17	011	
	C5	C9	C2	C6	C6	C2	C9	C5	100	
	C5	C16	C6	C4	C9	C15	C8	C10	101	
	C5	C6	C10	C2	C12	C11	C7	C15	110	
	C5	C13	C14	C17	C15	C7	C6	C3	111	
Group7	C5	C3	C1	C15	C1	C3	C5	C8	000	t_6
	C5	C10	C5	C13	C4	C16	C4	C13	001	
	C5	C17	C9	C11	C7	C12	C3	C1	010	
	C5	C7	C13	C9	C10	C8	C2	C6	011	
	C5	C14	C17	C7	C13	C4	C1	C11	100	
	C6	C13	C12	C11	C1	C11	C12	C13	101	
	C6	C3	C16	C9	C4	C7	C11	C1	110	

	C6	C10	C3	C7	C7	C3	C10	C6	111	
Group 8	C6	C17	C7	C5	C10	C16	C9	C11	000	t_7
	C6	C7	C11	C3	C13	C12	C8	C16	001	
	C6	C14	C15	C1	C16	C8	C7	C4	010	
	C6	C4	C2	C16	C2	C4	C6	C9	011	
	C6	C11	C6	C14	C5	C17	C5	C14	100	
	C6	C1	C10	C12	C8	C13	C4	C2	101	
	C6	C8	C14	C10	C11	C9	C3	C7	110	
	C6	C15	C1	C8	C14	C5	C2	C12	111	
Group 9	C6	C5	C5	C6	C17	C1	C1	C17	000	t_8
	C6	C12	C9	C4	C3	C14	C17	C5	001	
	C6	C2	C13	C2	C6	C10	C16	C10	010	
	C6	C9	C17	C17	C9	C6	C15	C15	011	
	C6	C16	C4	C15	C12	C2	C14	C3	100	
	C6	C6	C8	C13	C15	C15	C13	C8	101	
	C7	C5	C3	C17	C3	C5	C7	C10	110	
	C7	C12	C7	C15	C6	C1	C6	C15	111	
Group 10	C7	C2	C11	C13	C9	C14	C5	C3	000	t_9
	C7	C9	C15	C11	C12	C10	C4	C8	001	
	C7	C16	C2	C9	C15	C6	C3	C13	010	
	C7	C6	C6	C7	C1	C2	C2	C1	011	
	C7	C13	C10	C5	C4	C15	C1	C6	100	
	C7	C3	C14	C3	C7	C11	C17	C11	101	
	C7	C10	C1	C1	C10	C7	C16	C16	110	
	C7	C17	C5	C16	C13	C3	C15	C4	111	
Group 11	C7	C7	C9	C14	C16	C16	C14	C9	000	t_{10}
	C7	C14	C13	C12	C2	C12	C13	C14	001	
	C7	C4	C17	C10	C5	C8	C12	C2	010	
	C7	C11	C4	C8	C8	C4	C11	C7	011	
	C7	C1	C8	C6	C11	C17	C10	C12	100	
	C7	C8	C12	C4	C14	C13	C9	C17	101	
	C7	C15	C16	C2	C17	C9	C8	C5	110	
	C8	C14	C11	C6	C5	C16	C2	C7	111	
Group 12	C8	C4	C15	C4	C8	C12	C1	C12	000	t_{11}
	C8	C11	C2	C2	C11	C8	C17	C17	001	
	C8	C1	C6	C17	C14	C4	C16	C5	010	
	C8	C8	C10	C15	C17	C17	C15	C10	011	
	C8	C15	C14	C13	C3	C13	C14	C15	100	
	C8	C5	C1	C11	C6	C9	C13	C3	101	
	C8	C12	C5	C9	C9	C5	C12	C8	110	
	C8	C2	C9	C7	C12	C1	C11	C13	111	
Group 13	C8	C9	C13	C5	C15	C14	C10	C1	000	t_{12}
	C8	C16	C17	C3	C1	C10	C9	C6	001	
	C8	C6	C4	C1	C4	C6	C8	C11	010	
	C8	C13	C8	C16	C7	C2	C7	C16	011	
	C8	C3	C12	C14	C10	C15	C6	C4	100	
	C8	C10	C16	C12	C13	C11	C5	C9	101	
	C8	C17	C3	C10	C16	C7	C4	C14	110	
	C8	C7	C7	C8	C2	C3	C3	C2	111	
Group 14	C9	C6	C2	C12	C7	C10	C14	C4	000	t_{13}
	C9	C13	C6	C10	C10	C6	C13	C9	001	
	C9	C3	C10	C8	C13	C2	C12	C14	010	
	C9	C10	C14	C6	C16	C15	C11	C2	011	
	C9	C17	C1	C4	C2	C11	C10	C7	100	
	C9	C7	C5	C2	C5	C7	C9	C12	101	
	C9	C14	C9	C17	C8	C3	C8	C17	110	
	C9	C4	C13	C15	C11	C16	C7	C5	111	
Group 15	C9	C11	C17	C13	C14	C12	C6	C10	000	t_{14}
	C9	C1	C4	C11	C17	C8	C5	C15	001	

	C9	C8	C8	C9	C3	C4	C4	C3	010	
	C9	C15	C12	C7	C6	C17	C3	C8	011	
	C9	C5	C16	C5	C9	C13	C2	C13	100	
	C9	C12	C3	C3	C12	C9	C1	C1	101	
	C9	C2	C7	C1	C15	C5	C17	C6	110	
	C9	C9	C11	C16	C1	C1	C16	C11	111	
Group 16	C9	C16	C15	C14	C4	C14	C15	C16	000	t_{15}
	C10	C15	C10	C1	C9	C4	C9	C1	001	
	C10	C5	C14	C16	C12	C17	C8	C6	010	
	C10	C12	C1	C14	C15	C13	C7	C11	011	
	C10	C2	C5	C12	C1	C9	C6	C16	100	
	C10	C9	C9	C10	C4	C5	C5	C4	101	
	C10	C16	C13	C8	C7	C1	C4	C9	110	
	C10	C6	C17	C6	C10	C14	C3	C14	111	
Group 17	C10	C13	C4	C4	C13	C10	C2	C2	000	t_{16}
	C10	C3	C8	C2	C16	C6	C1	C7	001	
	C10	C10	C12	C17	C2	C2	C17	C12	010	
	C10	C17	C16	C15	C5	C15	C16	C17	011	
	C10	C7	C3	C13	C8	C11	C15	C5	100	
	C10	C14	C7	C11	C11	C7	C14	C10	101	
	C10	C4	C11	C9	C14	C3	C13	C15	110	
	C10	C11	C15	C7	C17	C16	C12	C3	111	
Group 18	C10	C1	C2	C5	C3	C12	C11	C8	000	t_{17}
	C10	C8	C6	C3	C6	C8	C10	C13	001	
	C11	C7	C1	C7	C11	C15	C4	C15	010	
	C11	C14	C5	C5	C14	C11	C3	C3	011	
	C11	C4	C9	C3	C17	C7	C2	C8	100	
	C11	C11	C13	C1	C3	C3	C1	C13	101	
	C11	C1	C17	C16	C6	C16	C17	C1	110	
	C11	C8	C4	C14	C9	C12	C16	C6	111	
Group 19	C11	C15	C8	C12	C12	C8	C15	C11	000	t_{18}
	C11	C5	C12	C10	C15	C4	C14	C16	001	
	C11	C12	C16	C8	C1	C17	C13	C4	010	
	C11	C2	C3	C6	C4	C13	C12	C9	011	
	C11	C9	C7	C4	C7	C9	C11	C14	100	
	C11	C16	C11	C2	C10	C5	C10	C2	101	
	C11	C6	C15	C17	C13	C1	C9	C7	110	
	C11	C13	C2	C15	C16	C14	C8	C12	111	
Group 20	C11	C3	C6	C13	C2	C10	C7	C17	000	t_{19}
	C11	C10	C10	C11	C5	C6	C6	C5	001	
	C11	C17	C14	C9	C8	C2	C5	C10	010	
	C12	C16	C9	C13	C13	C9	C16	C12	011	
	C12	C6	C13	C11	C16	C5	C15	C17	100	
	C12	C13	C17	C9	C2	C1	C14	C5	101	
	C12	C3	C4	C7	C5	C14	C13	C10	110	
	C12	C10	C8	C5	C8	C10	C12	C15	111	
Group 21	C12	C17	C12	C3	C11	C6	C11	C3	000	t_{20}
	C12	C7	C16	C1	C14	C2	C10	C8	001	
	C12	C14	C3	C16	C17	C15	C9	C13	010	
	C12	C4	C7	C14	C3	C11	C8	C1	011	
	C12	C11	C11	C12	C6	C7	C7	C6	100	
	C12	C1	C15	C10	C9	C3	C6	C11	101	
	C12	C8	C2	C8	C12	C16	C5	C16	110	
	C12	C15	C6	C6	C15	C12	C4	C4	111	
Group 22	C12	C5	C10	C4	C1	C8	C3	C9	000	t_{21}
	C12	C12	C14	C2	C4	C4	C2	C14	001	
	C12	C2	C1	C17	C7	C17	C1	C2	010	
	C12	C9	C5	C15	C10	C13	C17	C7	011	
	C13	C8	C17	C2	C15	C3	C11	C9	100	

	C13	C15	C4	C17	C1	C16	C10	C14	101	
	C13	C5	C8	C15	C4	C12	C9	C2	110	
	C13	C12	C12	C13	C7	C8	C8	C7	111	
Group 23	C13	C2	C16	C11	C10	C4	C7	C12	000	t_{22}
	C13	C9	C3	C9	C13	C17	C6	C17	001	
	C13	C16	C7	C7	C16	C13	C5	C5	010	
	C13	C6	C11	C5	C2	C9	C4	C10	011	
	C13	C13	C15	C3	C5	C5	C3	C15	100	
	C13	C3	C2	C1	C8	C1	C2	C3	101	
	C13	C10	C6	C16	C11	C14	C1	C8	110	
	C13	C17	C10	C14	C14	C10	C17	C13	111	
Group 24	C13	C7	C14	C12	C17	C6	C16	C1	000	t_{23}
	C13	C14	C1	C10	C3	C2	C15	C6	001	
	C13	C4	C5	C8	C6	C15	C14	C11	010	
	C13	C11	C9	C6	C9	C11	C13	C16	011	
	C13	C1	C13	C4	C12	C7	C12	C4	100	
	C14	C17	C8	C8	C17	C14	C6	C6	101	
	C14	C7	C12	C6	C3	C10	C5	C11	110	
	C14	C14	C16	C4	C6	C6	C4	C16	111	
Group 25	C14	C4	C3	C2	C9	C2	C3	C4	000	t_{24}
	C14	C11	C7	C17	C12	C15	C2	C9	001	
	C14	C1	C11	C15	C15	C11	C1	C14	010	
	C14	C8	C15	C13	C1	C7	C17	C2	011	
	C14	C15	C2	C11	C4	C3	C16	C7	100	
	C14	C5	C6	C9	C7	C16	C15	C12	101	
	C14	C12	C10	C7	C10	C12	C14	C17	110	
	C14	C2	C14	C5	C13	C8	C13	C5	111	
Group 26	C14	C9	C1	C3	C16	C4	C12	C10	000	t_{25}
	C14	C16	C5	C1	C2	C17	C11	C15	001	
	C14	C6	C9	C16	C5	C13	C10	C3	010	
	C14	C13	C13	C14	C8	C9	C9	C8	011	
	C14	C3	C17	C12	C11	C5	C8	C13	100	
	C14	C10	C4	C10	C14	C1	C7	C1	101	
	C15	C9	C16	C14	C2	C8	C1	C3	110	
	C15	C16	C3	C12	C5	C4	C17	C8	111	
Group 27	C15	C6	C7	C10	C8	C17	C16	C13	000	t_{26}
	C15	C13	C11	C8	C11	C13	C15	C1	001	
	C15	C3	C15	C6	C14	C9	C14	C6	010	
	C15	C10	C2	C4	C17	C5	C13	C11	011	
	C15	C17	C6	C2	C3	C1	C12	C16	100	
	C15	C7	C10	C17	C6	C14	C11	C4	101	
	C15	C14	C14	C15	C9	C10	C10	C9	110	
	C15	C4	C1	C13	C12	C6	C9	C14	111	
Group 28	C15	C11	C5	C11	C15	C2	C8	C2	000	t_{27}
	C15	C1	C9	C9	C1	C15	C7	C7	001	
	C15	C8	C13	C7	C4	C11	C6	C12	010	
	C15	C15	C17	C5	C7	C7	C5	C17	011	
	C15	C5	C4	C3	C10	C3	C4	C5	100	
	C15	C12	C8	C1	C13	C16	C3	C10	101	
	C15	C2	C12	C16	C16	C12	C2	C15	110	
	C16	C1	C7	C3	C4	C2	C13	C17	111	
Group 29	C16	C8	C11	C1	C7	C15	C12	C5	000	t_{28}
	C16	C15	C15	C16	C10	C11	C11	C10	001	
	C16	C5	C2	C14	C13	C7	C10	C15	010	
	C16	C12	C6	C12	C16	C3	C9	C3	011	
	C16	C2	C10	C10	C2	C16	C8	C8	100	
	C16	C9	C14	C8	C5	C12	C7	C13	101	
	C16	C16	C1	C6	C8	C8	C6	C1	110	
	C16	C6	C5	C4	C11	C4	C5	C6	111	

Group 30	C16	C13	C9	C2	C14	C17	C4	C11	000	t_{29}
	C16	C3	C13	C17	C17	C13	C3	C16	001	
	C16	C10	C17	C15	C3	C9	C2	C4	010	
	C16	C17	C4	C13	C6	C5	C1	C9	011	
	C16	C7	C8	C11	C9	C1	C17	C14	100	
	C16	C14	C12	C9	C12	C14	C16	C2	101	
	C16	C4	C16	C7	C15	C10	C15	C7	110	
	C16	C11	C3	C5	C1	C6	C14	C12	111	
Group 31	C17	C10	C15	C9	C6	C13	C8	C14	000	t_{30}
	C17	C17	C2	C7	C9	C9	C7	C2	001	
	C17	C7	C6	C5	C12	C5	C6	C7	010	
	C17	C14	C10	C3	C15	C1	C5	C12	011	
	C17	C4	C14	C1	C1	C14	C4	C17	100	
	C17	C11	C1	C16	C4	C10	C3	C5	101	
	C17	C1	C5	C14	C7	C6	C2	C10	110	
	C17	C8	C9	C12	C10	C2	C1	C15	111	
Group 32	C17	C15	C13	C10	C1	C15	C17	C3	000	t_{31}
	C17	C5	C17	C8	C16	C11	C16	C8	001	
	C17	C12	C4	C6	C2	C7	C15	C13	010	
	C17	C2	C8	C4	C5	C3	C14	C1	011	
	C17	C9	C12	C2	C8	C16	C13	C6	100	
	C17	C16	C16	C17	C11	C12	C12	C11	101	
	C17	C6	C3	C15	C14	C8	C11	C16	110	
	C17	C13	C7	C13	C17	C4	C10	C4	111	
Frame position	Frame #1		Frame #2		Frame #3		Frame #4			

Table 11 Spreading Code allocation for Secondary SCH Code, case 3) of PSCH/CCPCH scheme

History

Document history		
Date	**Version**	**Comment**
February 1999	0.0.1	Document created. Based on ETSI XX.11, v1.0.0 and ARIB Vol.3, v1.0-1.0.
23rd Feb.1999	0.0.2	Document updated according to TSGR1#2(99)076 which was agreed in TSG RAN WG1 meeting#2, Yokohama, February 23, 1999
25th Feb. 1999	0.1.0	Numbering increased due to approval by TSG RAN WG1 meeting #2 in Yokohama
1st to 5th Mar 1999	1.0.0	Numbering increased due to presentation at TSG RAN #2 meeting
23rd Mar 1999	1.0.1	Document updated according to TSGR1#3(99)161 which was approved in TSG RAN WG1 meeting#3, Nynaeshamn, March 23, 1999
26th Mar.1999	1.1.0	Version approved by WG#3 meeting (Nynaeshamn).
21st April.1999	2.0.0	Numbering increased due to presentation at TSG RAN #3 meeting

Rapporter for 3GPP S1.23 is:

Kenji Ito
Siemens K.K.
Tel.: +81-3-5423-8520
e-mail: **Error! Bookmark not defined.**

This document is written in Microsoft Word Version 97 SR-1 and saved in Rich Text Format.