TSG-RAN Meeting #13 ***RP-010524***
Beijing, China, 18 - 21, September, 2001

Title: **Agreed CRs (R99 and Rel-4 Category A) to TS 25.223**

Source: **TSG-RAN WG1**

Agenda item: **8.1.3**

No.	Spec	CR	Rev	R1 T-doc	Subject	Release	Cat	Work Item	V_old	V_new
1	25.223	020	2	R1-01-0966	Clarification of notations in TS25.221 and TS25.223	R99	F	TEI	3.6.0	3.7.0
2	25.223	021	1	R1-01-0966	Clarification of notations in TS25.221 and TS25.223	REL-4	A	TEI	4.1.0	4.2.0

3GPP TSG RAN Meeting #13
Beijing, China, 18th – 21st , September, 2001

R1-01-0966

CR-Form-v4

CHANGE REQUEST

⌘	**25.223**	**CR**	**020**	⌘	rev	**2**	⌘	Current version:	**3.6.0**	⌘

For ***HELP*** *on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Clarification of notations in TS25.221 and TS25.223		
Source:	⌘	TSG RAN WG1		
Work item code:	⌘	TEI	***Date:*** ⌘	21-08-2001
Category:	⌘	**F**	***Release:*** ⌘	R99
		Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	⌘	The letter K is used in the specifications for three different purposes. It currently indicates the number of codes per time slot, the number of supported midambles in a cell, and the max. number of possible midambles for the different basic midamble codes. New abbreviations are introduced to distinguish between those purposes.
Summary of change:	⌘	K is used to indicate the max. Number of possible midambles for the different basic midambles. K_{CELL} is used to indicate the number of supported midambles in a cell. K_{CODE} is used to indicate the number of codes. In addition this CR replaces the term 'PRACH burst type' by 'burst type 3' to be consistent with other specifications.
Consequences if not approved:	⌘	Ambiguous specifications

Clauses affected:	⌘	5.2, 6.2, 6.5		
Other specs Affected:	⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	TS25.221
Other comments:	⌘			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

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downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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:

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

K_{Code} is the number of used codes in a time slotusers, max K_{Code} =16. N_k is the number of symbols per data field for the codeuser 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_{Code}; 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]:

$$b_{l,n}^{(k,i)} \in \{0,1\}, \quad l = 1,2; k = 1,..., K_{Code}; n = 1,..., N_k; i = 1,2 \quad b_{l,n}^{(k,i)} \in \{0,1\} \quad l = 1,2;\ k = 1,...K;\ n = 1,..., N_k;\ i = 1,2 \qquad (2)$$

using the following mapping to complex symbols:

Consecutive binary bit pattern	complex symbol
$b_{1,n}^{(k,i)}\ b_{2,n}^{(k,i)}$	$\underline{d}_n^{(k,i)}$
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 3

In case of PRACH burst type 3, the definitions in subclause 5.2.1 apply with a modified number of symbols in the second data block. For the PRACH burst type 3, the number of symbols in the second data block $\underline{\mathbf{d}}^{(k,2)}$ is decreased by $\frac{96}{Q_K}$ symbols.

6.2 Channelisation codes

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

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

shall be taken from the set

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

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.

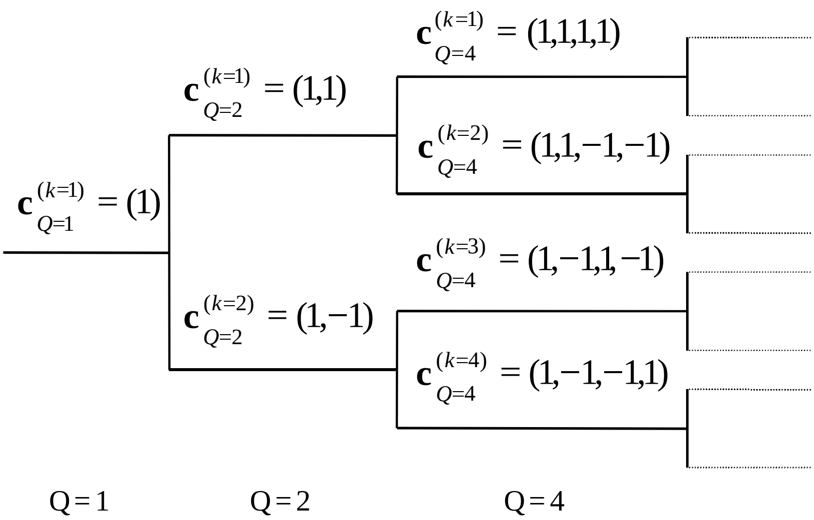

Figure 1: Code-tree for generation of Orthogonal Variable Spreading Factor (OVSF) codes for Channelisation Operation

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.

6.5 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

$$s_p^{(k)} = c^{(k)}_{1+[(p-1)\bmod Q_k]} \cdot v_{1+[(p-1)\bmod Q_{MAX}]}, \quad k=1,\ldots,K_{Code},\ p=1,\ldots,N_k Q_k.$$

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

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

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

$$d^{(k,2)}(t) = \sum_{n=1}^{N_k} d_n^{(k,2)} w_{Q_k}^{(k)} \sum_{q=1}^{Q_k} s_{(n-1)Q_k+q}^{(k)} \cdot Cr_0(t-(q-1)T_c-(n-1)Q_k T_c - N_k Q_k T_c - L_m T_c) \qquad (7)$$

where L_m is the number of midamble chips.

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R1-01-0966

CR-Form-v4

CHANGE REQUEST

⌘ **25.223 CR 021**	⌘	rev **1**	⌘	Current version:	**4.1.0**	⌘

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5 Data modulation for the 3.84 Mcps option

5.1 Symbol rate

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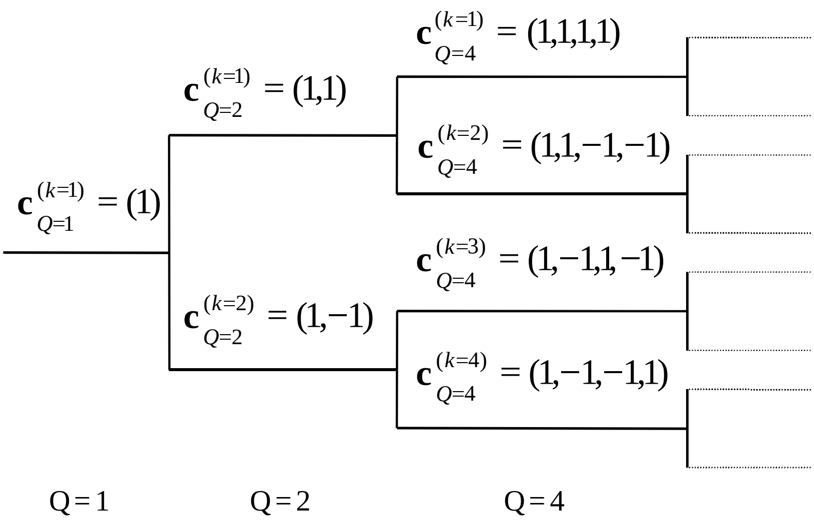

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where L_m is the number of midamble chips.