**TSG-RAN Working Group 1 meeting #9** ***TSGR1#9(99)L30***
**Dresden, Germany, Nov. 30 – Dec. 3, 1999**

**Agenda Item:**
**Source:** **SK Telecom, ETRI**
**Title:** **CR for channelization code allocation for USTS in 25.213**
**Document for:** **Decision**

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# 1. Introduction

The procedure for Uplink Synchronous Transmission Scheme (USTS) was accepted in text (in section 9 of TS25.214) at the last Kyongju meeting [1]. However it is required to elaborate the specification related to USTS. More detailed information on the method of channelization code allocation for USTS should be included in section 4.3.1 of TS25.213 which is the section for uplink channelization code allocation method. This document have CR for the additional description on the method of channelization code allocation for USTS in TS25.213.

# 2. References

[1] SK Telecom, "Uplink Synchronous Transmission Scheme," TSGR1#7 (99)e68

**3GPP TSG RAN WG1 Meeting #9**
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***Document R1-99L30***
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| 25.213 | CR | 016 | Current Version: | 3.0.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑* *↑ CR number as allocated by MCC support team*

| For submission to: | TSG-RAN #6 | for approval | X | Strategic | | (for SMG use only) |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | | |

*Form: CR cover sheet, version 2 for 3GPP and SMG* *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** *(at least one should be marked with an X)*

| (U)SIM | | ME | X | UTRAN / Radio | X | Core Network | |
|---|---|---|---|---|---|---|---|

**Source:** SK Telecom, ETRI **Date:** 1999-12-03

**Subject:** Channelization Code Allocation for USTS

**Work item:**

**Category:** *(only one category shall be marked with an X)*

| | | |
|---|---|---|
| F | Correction | |
| A | Corresponds to a correction in an earlier release | |
| B | Addition of feature | |
| C | Functional modification of feature | X |
| D | Editorial modification | |

**Release:**

| | |
|---|---|
| Phase 2 | |
| Release 96 | |
| Release 97 | |
| Release 98 | |
| Release 99 | X |
| Release 00 | |

**Reason for change:** The additional descriptions are required to support the channelization code allocation method for USTS.

**Clauses affected:** 4.3.1

**Other specs affected:**

| | | |
|---|---|---|
| Other 3G core specifications | | → List of CRs: |
| Other GSM core specifications | | → List of CRs: |
| MS test specifications | | → List of CRs: |
| BSS test specifications | | → List of CRs: |
| O&M specifications | | → List of CRs: |

**Other comments:**

## 4.3 Code generation and allocation

### 4.3.1 Channelization codes

The channelization codes of figure 1 are Orthogonal Variable Spreading Factor (OVSF) codes that preserve the orthogonality between a user's different physical channels. The OVSF codes can be defined using the code tree of figure 4.

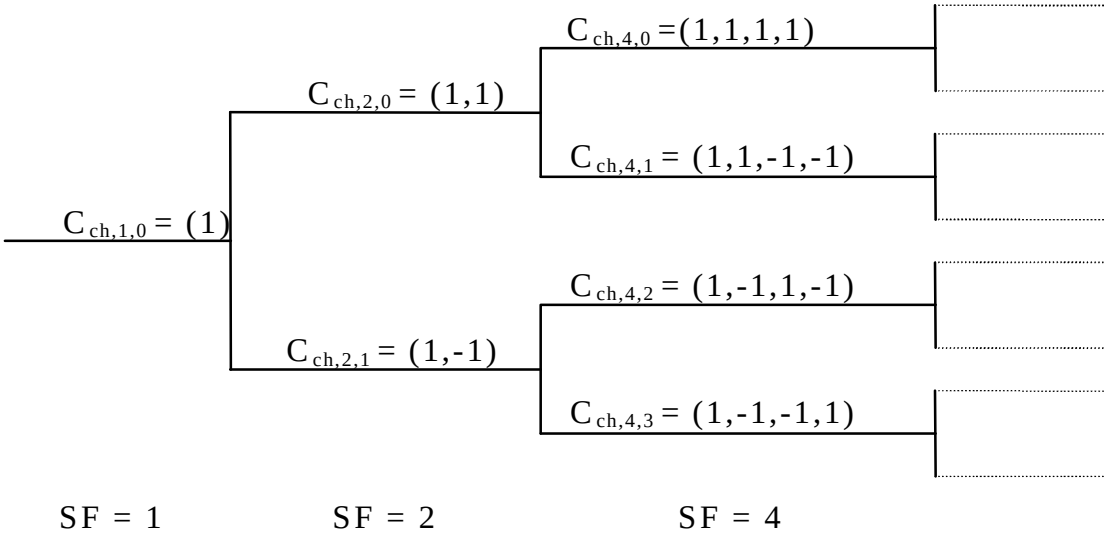


**Figure 4: Code-tree for generation of Orthogonal Variable Spreading Factor (OVSF) codes**

In figure 4, the channelization codes are uniquely described as $C_{ch,SF,k}$, where SF is the spreading factor of the code and *k* is the code number, $0 \le k \le SF-1$.

Each level in the code tree defines channelization codes of length SF, corresponding to a spreading factor of SF in figure 4.

The generation method for the channelization code is defined as:

$$C_{ch,1,0} = 1,$$

$$\begin{bmatrix} C_{ch,2,0} \\ C_{ch,2,1} \end{bmatrix} = \begin{bmatrix} C_{ch,1,0} & C_{ch,1,0} \\ C_{ch,1,0} & -C_{ch,1,0} \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$$

$$\begin{bmatrix} C_{ch,2^{(n+1)},0} \\ C_{ch,2^{(n+1)},1} \\ C_{ch,2^{(n+1)},2} \\ C_{ch,2^{(n+1)},3} \\ \vdots \\ C_{ch,2^{(n+1)},2^{(n+1)}-2} \\ C_{ch,2^{(n+1)},2^{(n+1)}-1} \end{bmatrix} = \begin{bmatrix} C_{ch,2^n,0} & C_{ch,2^n,0} \\ C_{ch,2^n,0} & -C_{ch,2^n,0} \\ C_{ch,2^n,1} & C_{ch,2^n,1} \\ C_{ch,2^n,1} & -C_{ch,2^n,1} \\ \vdots & \vdots \\ C_{ch,2^n,2^n-1} & C_{ch,2^n,2^n-1} \\ C_{ch,2^n,2^n-1} & -C_{ch,2^n,2^n-1} \end{bmatrix}$$

The leftmost value in each channelization code word corresponds to the chip transmitted first in time.

For the DPCCH and DPDCHs the following applies:

- The DPCCH is always spread by code $C_{ch,0} = C_{ch,256,0}$.

- When only one DPDCH is to be transmitted, $DPDCH_1$ is spread by code $C_{ch,SF,k}$ where SF is the spreading factor of $DPDCH_1$ and k= $SF_{d,1}$ / 4

- When more than one DPDCH is to be transmitted, all DPDCHs have spreading factors equal to 4. $DPDCH_n$ is spread by the the code $C_{ch,n} = C_{ch,4,k}$, where $k = 1$ if $n \in \{1, 2\}$, $k = 3$ if $n \in \{3, 4\}$, and $k = 2$ if $n \in \{5, 6\}$.

In case of USTS, for the DPCCH, the UTRAN assigns a node number $v_c$ ($0 \le v_c \le 255$) in the code-tree that corresponds to a channelization code of length 256. For a DPDCH, the UTRAN assigns a node number $v_d$ ($0 \le v_d \le L-1$) in the code-tree that corresponds to a channelization code of length L (i.e., SF for the UE). The sub-tree below the assigned node is used for spreading of DPDCH. When more than one DPDCH is to be transmitted, all DPDCHs have spreading factors equal to 4. In this case, the UTRAN assigns node numbers $v_{d1}$, $v_{d2}$, and $v_{d3}$ ($0 \le v_{d1}, v_{d2}$, and $v_{d3} \le 3$) that correspond to channelization codes of length 4.

- The DPCCH is always spread by code $C_{ch,0} = C_{ch,256,k}$, where $k=v_c$.

- When only one DPDCH is to be transmitted, $DPDCH_1$ is spread by code $C_{ch,SF,k}$, where SF is the spreading factor of $DPDCH_1$ and k= $v_d$*SF/L.

- When more than one DPDCH is to be transmitted, all DPDCHs have spreading factors equal to 4 (i.e., L=4). $DPDCH_n$ is spread by the code $C_{ch,n} = C_{ch,4,k}$, where $k = v_{d1}$ if $n \in \{1, 2\}$, $k = v_{d2}$ if $n \in \{3, 4\}$, and $k = v_{d3}$ if $n \in \{5, 6\}$.