TSG-RAN Meeting #9 ***RP-000346***
Hawaii, U.S.A. , 20-22 September 2000

Title: **Agreed CRs to TS 25.223**

Source: **TSG-RAN WG1**

Agenda item: **5.1.3**

No.	R1 T-doc	Spec	CR	Rev	Subject	Cat	Current	New
1	R1-000992	25.223	007	1	Gain Factors for TDD Mode	F	3.3.0	3.4.0
2	R1-000988	25.223	014	-	Synchronisation codes	F	3.3.0	3.4.0

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Hawaii, USA, 20-22 September 2000

Document *R1-00-0992*
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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25.223	**CR**	**007r1**	Current Version:	3.3.0

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

For submission to:	RAN#9	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: TSG RAN WG1 **Date:** 27/06/2000

Subject: Gain Factors for TDD Mode

Work item:

Category:				**Release:**		
	F	Correction	X		Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
(only one category	B	Addition of feature			Release 97	
shall be marked	C	Functional modification of feature			Release 98	
with an X)	D	Editorial modification			Release 99	X
					Release 00	

Reason for change: Alignment with FDD Mode

Clauses affected: 6.5.1

Other specs affected:				
	Other 3G core specifications	X	→ List of CRs:	TS25.224CR019r1
	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:

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6.5.1 Combination of physical channels in uplink

Figure 4 illustrates the principle of combination ~~how the maximum~~ of two different physical uplink channels ~~are combined~~ within one timeslot. The DPCHs to be combined belong to same CCTrCH, did undergo spreading as described in sections before and are thus represented by complex-valued sequences. First, the amplitude of all DPCHs is adjusted according to UL open loop power control as described in [10]. Each DPCH ~~complex-valued spread channel~~ is then separately weighted by a weight factor γ_i ~~G_i~~ and combined using complex addition. After combination of Physical Channels the gain factor β_j is applied, depending on the actual TFC as described in [10].

In case of different CCTrCH, principle shown in Figure 4 applies to each CCTrCH separately.

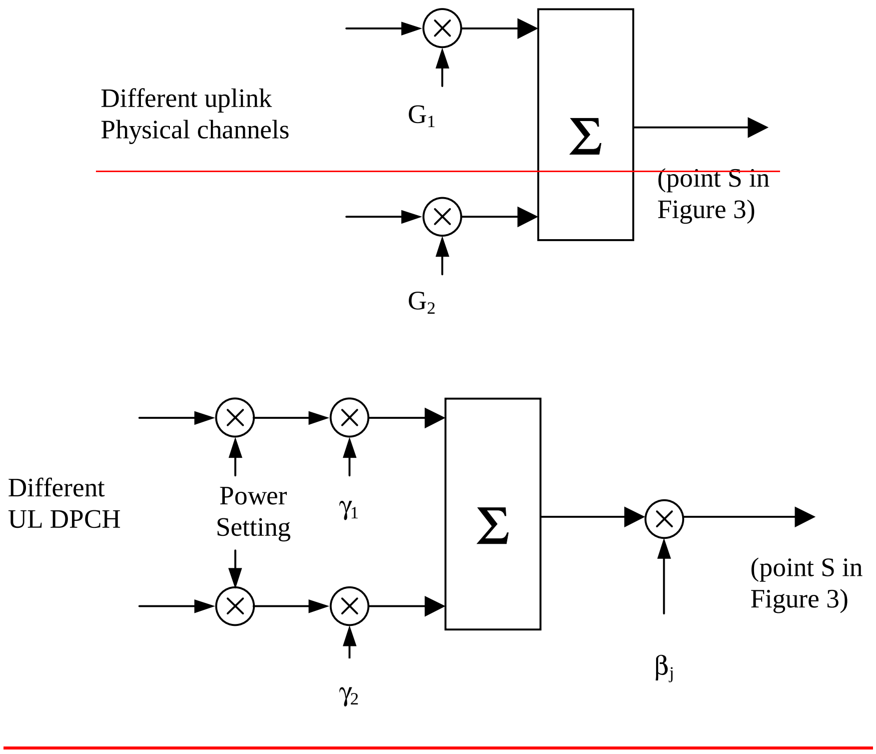

Figure 4: Combination of different physical channels in uplink

The values of weight factors γ_i are depending on the spreading factor SF of the corresponding DPCH:

SF of DPCH$_i$	γ_i
16	1
8	$\sqrt{2}$
4	2
2	$2\sqrt{2}$
1	4

The possible values for gain factors β_j (corresponding to *j*–th TFC) are listed in table below:

Signalling value for β_j	Quantized value β_j
15	16/8
14	15/8
13	14/8
12	13/8
11	12/8

10	11/8
9	10/8
8	9/8
7	8/8
6	7/8
5	6/8
4	5/8
3	4/8
2	3/8
1	2/8
0	1/8

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Document *R1-00-0988*
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CHANGE REQUEST

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25.223 CR 014 Current Version: 3.3.0

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

For submission to: RAN #9
list expected approval meeting # here ↑

for approval	X	strategic		*(for SMG use only)*
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: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG RAN WG1 **Date:**

Subject: Synchronisation codes

Work item: TS 25.223

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

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: The incorrect indexing is used in the section describing the generation of synchronization codes.

Clauses affected: 7.1, 7.2

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:

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<--------- double-click here for help and instructions on how to create a CR.

7 Synchronisation codes

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

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 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(~~i~~*l*) and *z*(~~i~~*l*) denote the ~~i:~~*l*th symbol of the sequence h_m and *z*, respectively where ~~i~~ *l* = 0, 1, 2, …, 255 and ~~i~~ *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 then defined as

$C_i = (1 + j) \times <h_m(0) \times z(0),\ h_m(1) \times z(1),\ h_m(2) \times z(2),\ \ldots,\ h_m(255) \times z(255)>$,

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

7.2 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 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: