TSG-RAN Working Group 1 meeting #11 **_TSGR1#10(00)0253_**

San Diego, USA

February 29 – March 3, 2000

Agenda item:

Source: Nokia

Title: CR 25213-027: SSC code generation: a minor correction

Document for: Decision

A right paranthesis is missing from the definition of z_n in 5.2.2. The meaning of b in the definition of the SSCs is clarified a bit in 5.2.3.1.

3GPP RAN WG1 Meeting #11
San Diego, USA, 29 Feb -3 Mar 2000

Document ***R1-00-0253***
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**	**027**	Current Version:	3.1.0

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

For submission to:	RAN #7	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: NOKIA **Date:** 15-Feb-00

Subject: A typo correction for 5.2.2 and clarification for 5.2.3.1 of TS 25.213V3.1.1

Work item:

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

Reason for change: A right paranthesis is missing from the definition of z_n in 5.2.2. The meaning of *b* in the definition of the SSCs is clarified a bit in 5.2.3.1.

Clauses affected:

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:

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

In case of mapping the DSCH to multiple parallel PDSCHs, the same rule applies, but all of the branches identified by the multiple codes, corresponding to the smallest spreading factor, may be used for higher spreading factor allocation.

5.2.2 Scrambling code

A total of 2^{18}-1 = 262,143 scrambling codes, numbered 0…262,142 can be generated. However not all the scrambling codes are used. The scrambling codes are divided into 512 sets each of a primary scrambling code and 15 secondary scrambling codes.

The primary scrambling codes consist of scrambling codes n=16*i where i=0…511. The i:th set of secondary scrambling codes consists of scrambling codes 16*i+k, where k=1…15.

There is a one-to-one mapping between each primary scrambling code and 15 secondary scrambling codes in a set such that i:th primary scrambling code corresponds to i:th set of scrambling codes.

Hence, according to the above, scrambling codes k = 0, 1, …, 8191 are used. Each of these codes are associated with a left alternative scrambling code and a right alternative scrambling code, that may be used for compressed frames. The left alternative scrambling code corresponding to scrambling code k is scrambling code number k + 8192, while the right alternative scrambling code corresponding to scrambling code k is scrambling code number k + 16384. The alternative scrambling codes can be used for compressed frames. In this case, the left alternative scrambling code is used if n<SF/2 and the right alternative scrambling code is used if n≥SF/2, where $c_{ch,SF,n}$ is the channelization code used for non-compressed frames. The usage of alternative scrambling code for compressed frames is signalled by higher layers for each physical channel respectively.

The set of primary scrambling codes is further divided into 64 scrambling code groups, each consisting of 8 primary scrambling codes. The j:th scrambling code group consists of primary scrambling codes 16*8*j+16*k, where j=0..63 and k=0..7.

Each cell is allocated one and only one primary scrambling code. The primary CCPCH and primary CPICH are always transmitted using the primary scrambling code. The other downlink physical channels can be transmitted with either the primary scrambling code or a secondary scrambling code from the set associated with the primary scrambling code of the cell.

The mixture of primary scrambling code and secondary scrambling code for one CCTrCH is allowable.

The scrambling code sequences are constructed by combining two real sequences into a complex sequence. Each of the two real sequences are constructed as the position wise modulo 2 sum of 38400 chip segments of two binary *m*-sequences generated by means of two generator polynomials of degree 18. The resulting sequences thus constitute segments of a set of Gold sequences. The scrambling codes are repeated for every 10 ms radio frame. Let *x* and *y* be the two sequences respectively. The *x* sequence is constructed using the primitive (over GF(2)) polynomial $1+X^7+X^{18}$. The y sequence is constructed using the polynomial $1+X^5+X^7+ X^{10}+X^{18}$.

The sequence depending on the chosen scrambling code number *n* is denoted z_n, in the sequel. Furthermore, let *x(i)*, *y(i)* and $z_n(i)$ denote the *i:*th symbol of the sequence *x*, *y*, and z_n, respectively

The *m*-sequences *x*and *y* are constructed as:

Initial conditions:

x is constructed with x (0)=1, x(1)= x(2)=...= x (16)= x (17)=0

y(0)=y(1)= … =y(16)= y(17)=1

Recursive definition of subsequent symbols:

x(i+18) =x(i+7) + x(i) modulo 2, i=0,…,2^{18}-20,

y(i+18) = y(i+10)+y(i+7)+y(i+5)+y(i) modulo 2, i=0,…, 2^{18}-20.

The n:th Gold code sequence z_n, $n=0,1,2,\ldots,2^{18}-2$, is then defined as

$z_n(i)$ = x((i+n) modulo (2^{18} - 1)) + y(i) modulo 2, i=0,…, 2^{18}-2.

These binary sequences are converted to real valued sequences Z_n by the following transformation:

$$Z_n(i) = \begin{cases} +1 & if \ z_n(i) = 0 \\ -1 & if \ z_n(i) = 1 \end{cases} \quad for \quad i = 0,1,\ldots,2^{18}-2.$$

Finally, the n:th complex scrambling code sequence $S_{dl,n}$ is defined as:

$$S_{dl,n}(i) = Z_n(i) + j\, Z_n((i+131072) \text{ modulo } (2^{18}-1)),\ i=0,1,\ldots,38399.$$

Note that the pattern from phase 0 up to the phase of 38399 is repeated.

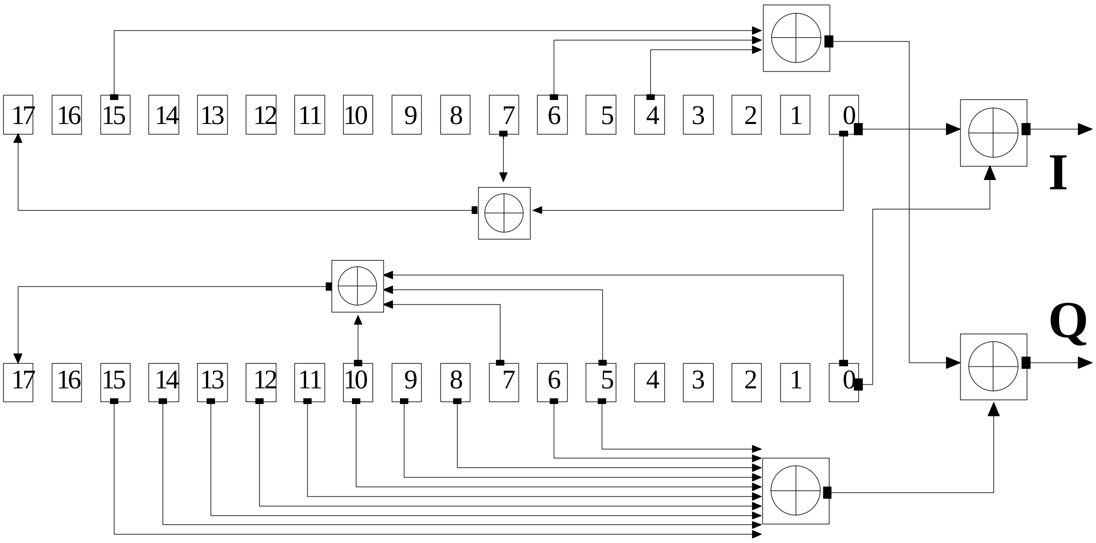

Figure 10: Configuration of downlink scrambling code generator

5.2.3 Synchronisation codes

5.2.3.1 Code generation

The primary synchronisation code (PSC), C_{psc} 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_{psc} is defined as

C_{psc} = (1 + j) × <a, a, a, -a, -a, a, -a, -a, a, a, a, -a, a, -a, a, a>,

where the leftmost chip in the sequence corresponds to the chip transmitted first in time

The 16 secondary synchronization codes (SSCs), {$C_{ssc,1}$,…,$C_{ssc,16}$}, are complex-valued with identical real and imaginary components, and are constructed from position wise multiplicationof 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_{15}, x_{16} are 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: