TSG-RAN Working Group 1(Radio) meeting #8 **_TSGR1#8(99)f35_**
New York, USA, 12 –15 October 1999

Agenda Item:

Source: **Nokia**

Title: **Text proposal for 4.3.2.2 of TS25.213v2.3.0**

Document for: **Discussion in AH10**

Introduction

Nokia proposes the following changes for 4.3.2.2. of TS25.213 v2.3.0 in oder to make the section less misleading.

4.3.2.2 Long scrambling code

The long scrambling codes are formed as described in Section 4.3.2, where c_1 and c_2 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 25. Let *x*, and *y* be the two *m*-sequences respectively. The *x* sequence is constructed using the primitive (over GF(2)) polynomial $X^{25}+X^3+1$. The *y* sequence is constructed using the polynomial $X^{25}+X^3+X^2+X+1$. The resulting sequences thus constitute segments of a set of Gold sequences.

The code, c_2, used in generating the quadrature component of the complex spreading code is a 16,777,232 chip shifted version of the code, c_1, used in generating the in phase component.

The uplink scrambling code word has a period of one radio frame.

Let $n_{23} \ldots n_0$ be the 24 bit binary representation of the scrambling code number *n* (decimal) with n_0 being the least significant bit. The *x* sequence depends on the chosen scrambling code number *n* and is denoted x_n, in the sequel. Furthermore, let $x_n(i)$ and $y(i)$ denote the *i*:th symbol of the sequence x_n and *y*, respectively

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

Initial conditions:

$x_n(0)=n_0$, $x_n(1)= n_1$, … $=x_n(22)= n_{22}$,$x_n(23)= n_{23}$, $x_n(24)=1$

$y(0)=y(1)= \ldots =y(23)= y(24)=1$

Recursive definition of subsequent symbols:

$x_n(i+25) =x_n(i+3) + x_n(i)$ *modulo 2*, $i=0,\ldots, 2^{25}-27$,

$y(i+25) = y(i+3)+y(i+2) +y(i+1) +y(i)$ *modulo 2*, $i=0,\ldots, 2^{25}-27$.

~~The definition of the *n*:th scrambling code word for the in phase and quadrature components follows as (the left most index correspond to the chip scrambled first in each radio frame):~~

Define

$z_{1,n}(i) = x_n(i)+y(i),\ i = 0, 1, 2, \ldots, 2^{25}-2,$

$z_{2,n}(i) = x_n(\ (i+M) \text{ modulo } (2^{25}-1)\ )+y(i),\ i = 0, 1, 2, \ldots, 2^{25}-2,$

~~$c_{1,n} = < x_n(0)+y(0), x_n(1)+y(1), \ldots, x_n(N-1)+y(N-1) >,$~~

~~$c_{2,n} = < x_n(M)+y(M), x_n(M+1)+y(M+1), \ldots, x_n(M+N-1) + y(M+N-1) >,$~~

again all sums of symbols being modulo 2 ~~additions.~~

~~Where N is the period in chips~~ and M = 16,777,232.

Now, the real valued codes $c_{1,n}$ and $c_{2,n}$ are defined as follows:

$$c_{k,n}(i) = \begin{cases} 1 & if\ \ z_{k,n}(i) = 0 \\ -1 & if\ \ z_{k,n}(i) = 1 \end{cases} \quad k = 1,2 \quad i = 0,1,\ldots,2^{25}-1.$$

~~These binary code words are converted to real valued sequences by the transformation '0' -> '+1', '1' -> '-1'.~~