TSG RAN1#7 **TSGR1#7(99)A72**
Hannover, Germany
Aug 30 – Sept 3, 1999

TSG RAN1#6

TSGR1#6(99A46)1

Epsoo, Finland
July 13-18 1999

Source: **Ad hoc 14**

Title: **Proposed CPCH-related insertions into 25.213 (Resubmission)**

Agenda item:

Document for: **Approval**

Add to Section 3.3 abbreviation

AP Access Preamble
CD Collision Detection
PCPCH Physical Common Packet Channel
CPCH Common Packet Channel

New section: 4.2.3 PCPCH

The spreading and modulation of the message part of the CPCH Access Burst is basically the same as for the uplink dedicated physical channels. Only the control part is transmitted during the first [N] msec of the PCPCH message part. The scrambling code for the PCPCH message part is chosen based on the base station specific preamble code.

Add the following sections:

4.3.4 Common packet channel codes

4.3.4.1 Access preamble scrambling code

The scrambling code for the.access preamble part is cell specific and is broadcast by the base station. More than one preamble code can be used in a base station if the traffic load is high. The access preamble codes must be code planned, since two neighboring cells should not use the same preamble code

As in the case of the RACH, the code generating method is the same as for the long codes on dedicated channels. Only the first 4096 (0-4095) chips of the code are used for the access preamble spreading with the chip rate of 3.84 Mchip/s. The long code c_{257} for the phase component is used directly on both in phase and quadrature branches without offset between branches. <Note the PAR reduction method is FFS>. The access preamble scrambling code c_{ap} is defined as the position wise modulo 2 sum of 4096 chips 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

Let $n_7 \ldots n_0$ be the binary representation of the code number *n* (decimal) with n_0 being the least significant bit. The *m*-sequences x_n and *y* are constructed as: $x_n(0)=n_0$, $x_n(1)= n_1$, … ,$x_n(7)= n_7$, $x_n(8)= 1$, $x_n(9)=0$,… , $x_n(22)= 0$,$x_n(23)=1$, $x_n(24)=0$
$y(0)=y(1)= \ldots =y(23)= y(24)=1$
The recursive definition of subsequent symbols is:
$x_n(i+25) =x_n(i+3) + x_n(i)$ modulo 2, $i=0,\ldots, 4070$,
$y(i+25) = y(i+3)+y(i+2) +y(i+1) +y(i)$ modulo 2, $i=0,\ldots, 4070$.
The definition of the *n*th scrambling code word follows as (the left most index corresponds to the chip scrambled first in the preamble):
$c_{p,n}= < x_n(0)+y(0), x_n(1)+y(1), \ldots,x_n(4095)+y(4095) >$,
These binary code words are converted to real valued sequences by the transformation ‘0’ -> ‘+1’, ‘1’ -> -1’.The access preamble scrambling code generator can be found in Figure 9 in Section 4.3.3.1

The access preamble scrambling code generation is done in the same way as for the PRACH with a difference of the initialisation of the x m-sequence. The long code c_{257} for the in-phase component is used directly on both in phase and quadrature branches without offset between branches. For the access preamble scrambling code this is done as follows:

$x_n(0)=n_0$, $x_n(1)= n_1$, … ,$x_n(7)= n_7$, $x_n(8)= 1$, $x_n(9)=0$,… , $x_n(22)= 0$,$x_n(23)=1$, $x_n(24)=0$

4.3.4.2 CD preamble spreading code

~~As in the case of the access preamble of the CPCH access burst, the scrambling code for the CD preamble part is cell specific and is broadcast by the base station. More than one CD preamble code can be used in a base station if the traffic load is high. The CD access preamble codes must be code planned, since two neighboring cells should not use the same CD preamble code~~

The code generating method is the same as for the long codes on dedicated channels. The 4096 chips from 4096 to 8191 of the code are used for the CD ~~access~~ preamble spreading with the chip rate of 3.84 Mchip/s. The long code c_{257} for the in-phase component is used directly on both in phase and quadrature branches without offset between branches. The method of generating the long scrambling code can be found in Section 4.3.4.1.

4.3.4.3 CPCH preamble Signatures

4.3.4.3.1 Access preamble signature

The access preamble part of the CPCH-access burst carries one of the sixteen different orthogonal complex signatures identical to the ones used by the preamble part of the random-access burst.

4.3.4.3.2 CD preamble signature

The CD-preamble part of the CPCH-access burst carries one of sixteen different orthogonal complex signatures identical to the ones used by the preamble part of the random-access burst.

4.3.4.4 Channelization codes for the CD message part

~~The number of channelization codes and their corresponding node location on the code tree shall be specified through a BCH message.~~ The control (Q-branch) is always spread with a channelization code of spreading factor 256. The code is chosen from the lowest branch of the sub-tree. ~~Node B could determine the rate in a manner similar to that used in the RACH.~~ The data (I-branch) may use channelization codes from spreading factor 4 to 64 ~~256~~. A UE is allowed to increase its spreading factor during the message transmission by choosing any channelization code from the uppermost branch of the sub-tree code.

4.3.4.5 Scrambling code for the CD message part

In addition to spreading, the message part is also subject to scrambling with a 38,400 chip~~10 ms~~ complex code. The scrambling code is cell-specific and has a one-to-one correspondence to the spreading code used for the preamble part.

The scrambling codes used are from the same set of codes as is used for the other dedicated uplink channels when the long scrambling codes are used for these channels. The long scrambling codes for 256 to 511 ~~(c_{256} to c_{511})~~ (c_{257} to c_{512}) of the long scrambling codes are used for the CPCH. The phases ~~8192+38400*N_Frames_Max~~ 8192 to 46591~~2~~ of the codes are used for the message part (phases 0 to 4095 of ~~c_{256}~~ c_{257} are used in the access preamble spreading and phases 4096 to 8191 for the CD preamble) with the chip rate of 3.84 Mchips/s.

The generation of these codes is explained in Section 4.3.2.2. The mapping of these codes to provide a complex scrambling code is also the same as for the other dedicated uplink channels and is described in Section 4.3.2.

<Editor's note: check that there is no ambiguity between CD and RACH message part reference in the specification.>

Add the bold sentences to section 5.1 as follows:

5.1 Spreading

Figure 1 illustrates the spreading and modulation for the downlink DPCH. Data modulation is QPSK where each pair of two bits are serial-to-parallel converted and mapped to the I and Q branch respectively. The I and Q branch are then spread to the chip rate with the same channelization code c_{ch} (real spreading) and subsequently scrambled by the scrambling code C_{scramb} (complex scrambling).

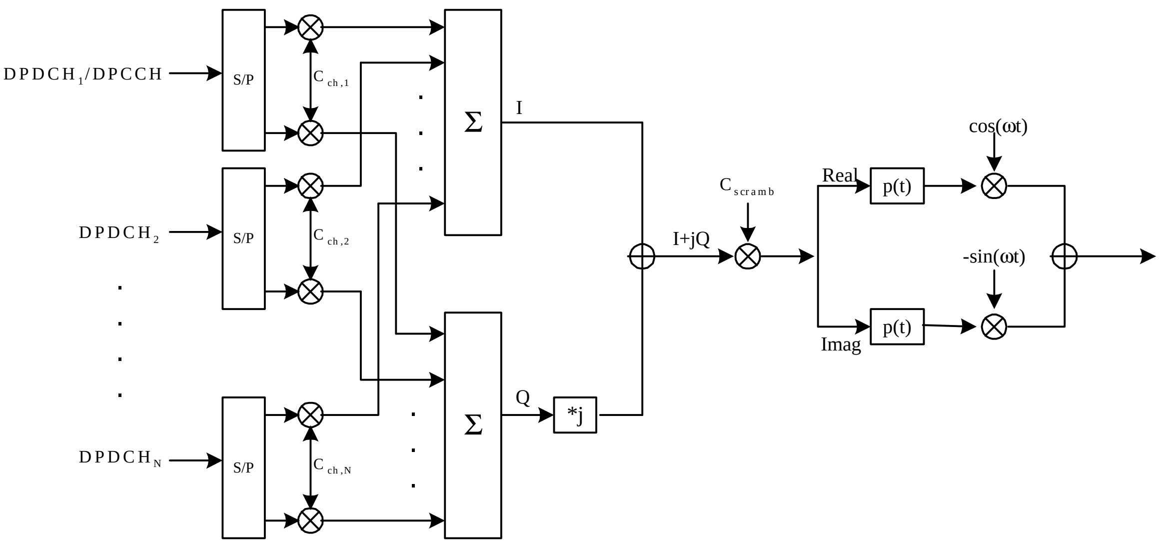

Figure 1. Spreading/modulation for downlink DPCH.

Spreading/modulation of the Secondary CCPCH, PSCCCH, PDSCH, AICH, AP-AICH and CD-AICH is done in an identical way as for the downlink DPCH.

Spreading/modulation of the Primary CCPCH is done in an identical way as for the downlink DPCH, except that the Primary CCPCH is time multiplexed after spreading as illustrated in **Error! Reference source not found.**. Primary SCH and Secondary SCH are code multiplexed and transmitted simultaneously during the 1^{st} 256 chips of each slot. The transmission power of SCH can be adjusted by a gain factor $G_{P\text{-}SCH}$ and $G_{S\text{-}SCH}$, respectively, independent of transmission power of P-CCPCH. The SCH is *non-orthogonal* to the other downlink physical channels.

Add the bold sentences to the section 5.2.1

5.2 Code generation and allocation

5.2.1 Channelization codes

The channelization codes of Figure 1 and **Error! Reference source not found.** are the same codes as used in the uplink, namely Orthogonal Variable Spreading Factor (OVSF) codes that preserve the orthogonality between downlink channels of different rates and spreading factors. The OVSF codes are defined in **Error! Reference source not found.** in Section 4.3.1. The same restriction on code allocation applies as for the

uplink, but for a cell and not a UE as in the uplink. Hence, in the downlink, a specific combination of channelization code and scrambling code can be used in a cell if and only if no other channelization 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 the same cell with the same scrambling code.
The channelization code for the BCH is a predefined code which is the same for all cells within the system.
The channelization codes used for the CPCH are a predefined set of codes, which is the same for all cells within the system. ~~Specific cells are able to reduce the number of codes in the code set. This information shall be broadcast over the BCH.~~

The channelization code(s) used for the Secondary Common Control Physical Channel is broadcast on the BCH.
<Editor’s note: the above sentence may not be within the scope of this document.>