TSG-RAN Working Group 1 meeting #15 ***TSGR1(00)1018***

Berlin, Germany, August 22-25, 2000

Agenda Item: AH21
Source: CWTS
To: TSG RAN WG1
Title: Subframe segmentation in 1.28Mcps
Document for: Decision

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1. Summary

In 1.28Mcps TDD, there is an additional sub-frame segmentation step in the coding/multiplexing steps. As a result, the physical channel mapping procedure of 1.28Mcps TDD has some difference with that of 3.84Mcps TDD.

2. Introduction and comparison with 3.84Mcps TDD

In 3.84Mcps TDD, the bit streams from the 2nd interleaving unit are directly mapped onto code channels of timeslots in radio frames. While in 1.28Mcps TDD, the radio frame is subdivided into 2 sub-frames of 5ms duration each. The basic operated unit is a sub-frame. An additional sub-frame segmentation step is added between 2nd interleaving and physical channel mapping. So the bit streams from 2nd interleaving unit are not directly mapped onto the physical channel, but first segmented into sub-frames and then mapped onto the physical channel in 1.28Mcps TDD.

3. Proposal

It's proposed to discuss and include the following paragraphs into the Working CR for TS25.222 as the description of physical channel mapping of the 1.28Mcps TDD.

4.2.12 Physical channel mapping

4.2.12.1 Physical channel mapping for the 3.84 Mcps TDD

Note: this section is same as that in TS 25.222, just modifies the section number.

4.2.12.2 Physical channel mapping for the 1.28 Mcps TDD

The bit streams from the sub-frame segmentation unit are mapped onto code channels of time slots in sub-frames.

The bits after physical channel mapping are denoted by $w_{p1}, w_{p2}, \ldots, w_{pU_p}$, where p is the PhCH number and Up is the number of bits in one sub-frame for the respective PhCH. The bits wpk are mapped to the PhCHs so that the bits for each PhCH are transmitted over the air in ascending order with respect to k.

The mapping of the bits $g_{p1}, g_{p2}, \ldots, g_{pU_p}$ is performed like block interleaving, writing the bits into columns, but a PhCH with an odd number is filled in forward order, were as a PhCH with an even number is filled in reverse order.

The mapping scheme, as described in the following subclause, shall be applied individually for each timeslot t used in the current subframe. Therefore, the bits $g_{p1}, g_{p2}, \ldots, g_{pU_p}$ are assigned to the bits of the physical channels $w_{t1,1\ldots U_{t1}}, w_{t2,1\ldots U_{t2}}, \ldots, w_{tP_t,1\ldots U_{tP_t}}$ in each timeslot.

In uplink there are at most two codes allocated (P≤2). If there is only one code, the same mapping as for downlink is applied. Denote SF1 and SF2 the spreading factors used for code 1 and 2, respectively. For the number of consecutive bits to assign per code bsk the following rule is applied:

if

SF1 >= SF2 then bs1 = 1 ; bs2 = SF1/SF2 ;

else

SF2 > SF1 then bs1 = SF2/SF1; bs2 = 1 ;

end if

In the downlink case bsp is 1 for all physical channels.

4.2.12.2.1 Mapping scheme

Notation used in this subclause:

P t: number of physical channels for timeslot t , Pt = 1..2 for uplink ; Pt = 1...16 for downlink

Utp: capacity in bits for the physical channel p in timeslot t

Ut.: total number of bits to be assigned for timeslot t

bsp: number of consecutive bits to assign per code

for downlink all bsp = 1

for uplink if SF1 >= SF2 then bs1 = 1 ; bs2 = SF1/SF2 ;

if SF2 > SF1 then bs1 = SF2/SF1; bs2 = 1 ;

fbp: number of already written bits for each code

pos: intermediate calculation variable

```
for  p=1  to P t                    -- reset number of already written bits for every physical channel
fbp = 0
end for
p = 1                                -- start with PhCH #1
for k=1  to Ut.
do while (fbp == Utp)               -- physical channel filled up already ?
p = ((p + 1) mod (P t +1))  + 1 ;
end do
if (p mod 2) == 0
pos = Utp - fbp                     -- reverse order
else
pos = fbp + 1                       -- forward order
end if
wtp,pos = gt,k                      -- assignment
fbp = fbp + 1                       -- Increment number of already written bits
If (fbp mod bsp) == 0               -- Conditional change to the next physical channel
p = ((p + 1) mod (P t +1))  + 1;
end if
end for
```