Agenda item:

Source: Ericsson

Title: CR 25.212-041: Correction of UL compressed mode by higher
                     layer scheduling

Document for: Decision

The number of bits in a radio frame in normal mode is denoted by $N_{data,j}$ and the number of bits located in the transmission gap N_{TGL}. In compressed mode by higher layer scheduling, the number of bits in a radio frame is calculated as $N_{data,j}^{cm} = N_{data,j} - N_{TGL}$ (1).

In uplink, the spreading factor (SF) and therefore $N_{data,j}$ is changed on radio frame basis. The idea with compressed mode by higher layer scheduling is that higher layers will only allow TFCs with low bitrate in compressed frames. If all TFCs use the same SF, $N_{data,j}$ is constant and the relation (1) is correct.

If there for example are two TFCs that use different SFs then the lower SF may be needed in compressed mode by higher layer scheduling. That is, only allowing the TFC with lower bitrate but using the SF of the TFC with higher bitrate creates the transmission gap. However, in the relation (1) $N_{data,j}$ denotes the number of bits for current TFC, i.e. in compressed mode this would always correspond to the number of bits for the TFC with lower bitrate. This is of course not what is wanted and it is therefore proposed that 25.212 is changed as shown in the attached CR.

In 25.211, N_{data} is defined as the number of bits in a slot, while N_{data} in section 4.2.7.1.1 means the number of bits in a frame. The attached CR therefore also proposes that the notation in section 4.2.7.1.1 is changed.

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.212 CR 041   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:	**TSG-RAN #7**	for approval	**X**	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic		*use only)*

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 **X**   UTRAN / Radio **X**   Core Network ☐
(at least one should be marked with an X)

Source:	Ericsson		**Date:**	2000-01-17

Subject:	Correction of UL compressed mode by higher layer scheduling

Work item:	

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

			Release:	
F	Correction	**X**	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:	Current expression for the number of bits in a radio frame in compressed mode by puncturing only holds when all TFCs use the same SF.

Clauses affected:	4.2.7.1.1 and 4.2.7.1.2

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:	These CR also aligns the definition of N_{data} with the definition in 25.211.

help.doc

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

4.2.7.1.1   Determination of SF and number of PhCHs needed

In uplink, puncturing can be applied to match the CCTrCH bit rate to the PhCH bit rate. The bit rate of the PhCH(s) is limited by the UE capability and restrictions imposed by UTRAN, through limitations on the PhCH spreading factor. The maximum amount of puncturing that can be applied is signalled from higher layers and denoted by PL. The number of available bits in the radio frames of one PhCH is $15N_{data}$, where the number of bits per slot, N_{data}, for all possible spreading factors is given in [2]. Denote the number of bits in one radio frame~~se values~~ by N_{256}, N_{128}, N_{64}, N_{32}, N_{16}, N_8, and N_4, where the index refers to the spreading factor. The possible number of bits, N, available to the CCTrCH on all PhCHs~~values of N_{data}~~ then are $\{ N_{256}, N_{128}, N_{64}, N_{32}, N_{16}, N_8, N_4, 2N_4, 3N_4, 4N_4, 5N_4, 6N_4\}$. Depending on the UE capability and the restrictions from UTRAN, the allowed set of N_{data}~~-~~, denoted SET0, can be a subset of $\{ N_{256}, N_{128}, N_{64}, N_{32}, N_{16}, N_8, N_4, 2N_4, 3N_4, 4N_4, 5N_4, 6N_4\}$. The number of bits, $N_{data, j}$, available to the CCTrCH for the transport format combination j is determined by executing the following algorithm:

SET1 = { N_{data} in SET0 such that $\displaystyle N ~\cancel{N_{data}}~ - \sum_{x=1}^{I} \frac{RM_{x,}}{\min_{1 \le y \le I}\{RM_y\}} \cdot N_{x,j}$ is non negative }

If SET1 is not empty and the smallest element of SET1 requires just one PhCH then

 $N_{data,j} = \min \text{SET1}$

else

 SET2 = { N_{data} in SET0 such that $\displaystyle \underline{N} ~\cancel{N_{data}}~ - PL \cdot \sum_{x=1}^{I} \frac{RM_x}{\min_{1 \le y \le I}\{RM_y\}} \cdot N_{x,j}$ is non negative }

 Sort SET2 in ascending order

 $N_{data} = \min \text{SET2}$

 While N_{data} is not the max of SET2 and the follower of N_{data} requires no additional PhCH do

  $N_{data} = $ follower of N_{data} in SET2

 End while

 $N_{data,j} = N_{data}$

End if

4.2.7.1.2   Determination of parameters needed for calculating the rate matching pattern

The number of bits to be repeated or punctured, $\boldsymbol{D}N_{ij}$, within one radio frame for each TrCH i is calculated with equation 1 for all possible transport format combinations j and selected every radio frame. $N_{data,j}$ is given from section 4.2.7.1.1. In compressed mode $N_{data,j}$ is replaced by $N_{data,j}^{cm}$ in Equation 1. $N_{data,j}^{cm}$ is given from the following relation:

$$N_{data,j}^{cm} = 2N_{data,j} - 2N_{TGL}, \text{ for compressed mode by spreading factor reduction}$$

$$\cancel{N_{data,j}^{cm} = N_{data,j} - N_{TGL}, \text{ for compressed mode by higher layer scheduling}}$$

$$N_{TGL} = \begin{cases} \dfrac{TGL}{15} N_{data,j}, & \text{if } N_{first} + TGL \le 15 \\[2em] \dfrac{15 - N_{first}}{15} N_{data,j}, & \text{in first frame if } N_{first} + TGL > 15 \\[2em] \dfrac{TGL - (15 - N_{first})}{15} N_{data,j} & \text{in second frame if } N_{first} + TGL > 15 \end{cases}$$

N_{first} and *TGL* are defined in section 4.4.

In compressed mode by higher layer scheduling, $N_{data,j}^{cm}$ is obtained by executing the algorithm in section 4.2.7.1.1 but with the number of bits in one radio frame of one PhCH replaced by $N_{tr} \cdot N_{data}$. The number of bits in a slot, N_{data}, is defined in [2] and N_{tr} is the number of transmitted slots in a compressed radio frame.

If $DN_{ij} = 0$ then the output data of the rate matching is the same as the input data and the rate matching algorithm of section 4.2.7.5 does not need to be executed.

If $DN_{ij} \neq 0$ the parameters listed in sections 4.2.7.1.2.1 and 4.2.7.1.2.2 shall be used for determining e_{ini}, e_{plus}, and e_{minus} (regardless if the radio frame is compressed or not).