TSG-RAN Working Group 1 meeting #9
Dresden, Germany
November 30 – December 3, 1999

TSGR1#9(99)i59

Agenda item:

Source: Ericsson

Title: CR 25.212-018: Minimum SF in uplink

Document for: Decision

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1 Introduction

In uplink, the spreading factor (SF) and the number of codes are selected in order to satisfy the following criteria given by order of priority:

i. The number of used DPDCHs is minimised, or the SF is constrained to be greater than or equal to the minimum value supported by the UE

ii. The puncturing is minimised, provided that constraint (i) still holds

iii. The SF is maximised provided that constraints (i) and (ii) still hold.

This is described with the relations in section 4.2.7.1.1 of [1]. Using the above criteria, there is no need to signal the SF. However, there could be situations where UTRAN prefers to use puncturing and a higher SF. Consider for example the case when 10% puncturing would enable a higher SF. If the base station is short of resources it is preferable from an UTRAN perspective to use the higher SF rather then rejecting the UE's request.

In the physical channel information elements (section 10.2.6.8 of [2]) there is a SF parameter called DPDCH channelization code. The name is not very suitable but it could be used for signalling the minimum SF that the UE is allowed to use. The criteria for choosing SF would then be changed to:

i. The number of used DPDCHs is minimised, or the SF is constrained to be greater than or equal to the minimum value supported by the UE *and allowed by UTRAN*.

ii. The puncturing is minimised, provided that constraint (i) still holds

iii. The SF is maximised provided that constraints (i) and (ii) still hold.

This means that the definition of SET0 in section 4.2.7.1.1 of [1] needs to be modified. A CR with this change is attached.

2 References

[1] TSG RAN WG1, "TS 25.212 Multiplexing and channel coding (FDD)".

[2] TSG RAN WG2, "TS 25.331 RRC Protocol Specification

3GPP TSG RAN WG1 Meeting #9
Dresden, Germany, Nov 30 –Dec 3, 1999

Document ????99???
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.

25.212	CR	018	Current Version:	3.0.0

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

For submission to: TSG-RAN #6 *list expected approval meeting # here ↑*

for approval	X	Strategic	
for information		non-strategic	

(for SMG 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: *(at least one should be marked with an X)*

(U)SIM		ME	X	UTRAN / Radio	X	Core Network	

Source: Ericsson **Date:** 1999-11-18

Subject: Minimum SF in UL

Work item:

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

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature	X		Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: SF for UL can be signalled according to 25.331. 25.212 does not take this into account.

Clauses affected: 4.2.7.1.1

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:

help.doc

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

$$Z_{ij} = \left\lfloor \frac{\sum_{m=1}^{i} RM_m \cdot N_{mj}}{\sum_{m=1}^{I} RM_m \cdot N_{mj}} \cdot N_{data,j} \right\rfloor \quad \text{for all } i = 1 .. I \qquad (1)$$

$$\Delta N_{ij} = Z_{ij} - Z_{i-1,j} - N_{ij} \qquad \text{for all } i = 1 .. I$$

4.2.7.1 Determination of rate matching parameters in uplink

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. ~~In uplink puncturing can be used to avoid multicode or to enable the use of a higher spreading factor when this is needed because the UE does not support SF down to 4.~~ 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 for all possible spreading factors is given in [2]. Denote these 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 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~~ies~~ and the restrictions from UTRAN, the ~~supported~~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, $2N_4$, $3N_4$, $4N_4$, $5N_4$, $6N_4$}. $N_{data,j}$ for the transport format combination j is determined by executing the following algorithm:

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

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

$N_{data,j}$ = min SET1

else

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

Sort SET2 in ascending order

N_{data} = min 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, DN_{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 $N^{cm}_{data,j}$ in Equation 1. $N^{cm}_{data,j}$ is given from the following relation:

$N_{data,j}^{cm} = 2N_{data,j} - N_{TGL}$, where