TSG-RAN Working Group1 meeting #11 TSGR1#11(00)444

San Diego, CA, U.S.A., February 29 – March 3, 2000

Agenda Item **:**

Source **: Mitsubishi Electric (MCRD)**

Title **: Compressed mode terminology, and R'00 new items**

Document for **: Discussion and Decision**

Introduction

In this paper we propose some terminology clarification for release '99, and two new items for release '00.

References

[1] R1-00-0342, CR 25.215-036 rev4: Clarification of compressed mode parameters, source Nokia

[2] 25.212 ver 3.1.1. Multiplexing and channel coding (FDD)

Terminology clarification

We propose that in release 99 the following terminology be used :

- *compressed mode by spreading factor division by 2* : We noticed terminology discrepancy between [1]. and [2]. In order to align terminology we propose to use the term "*compressed mode by spreading factor division by 2"* instead of "SF reduction" or "comrpessed mode by SF/2". To this document is attach a CR on [2] to align the terminology.
- *compressed mode by rate matching* : currently the term in use is compressed mode by puncturing. However nothing prevents the case when one transport channel would be instead of more punctured just less repeated. So, we propose to use the term " *compressed mode by rate matching* " instead. If this is accepted several CR will need drafting.

New items for release '0

We propose that the following items be studied in release '0

- *combination of compressed mode by higher layer scheduling and by rate matching*. The benefit of such a combination of method would be that less puncturing would be need on the side of rate matching, and less postponing on the side of higher layer scheduling.
- *combination of compressed mode by SF division by 2 and by rate matching*. Currently division of SF by 2 can bring too much room compared to what is needed, by combining it with rate matching, the bits unused by the gap can be used to bring more time diversity to the CCTrCH.
- *UL multiframe compressed mode.*

Conclusion

We propose the new items mentioned above to be study items for R'0, and the terminology clarification we propose to be accepted for R'99.

TSG Working Group 1 # 11
San Diego, CA, USA, 2000

***Document* R1-00-444**
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.

24.212	**CR**	**62**	Current Version:	3.1.1

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

For submission to:	RAN#11	for approval	X	strategic		*(for SMG use only)*
list expected approval meeting # here ↑		for information		non-strategic		

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		UTRAN / Radio	X	Core Network	

Source:

Date: Feb 24, 2000

Subject: **Renaming 'SF reduction by 2' to 'SF division by 2'**

Work item:

Category:	F Correction		**Release:**	Phase 2	
	A Corresponds to a correction in an earlier release			Release 96	
(only one category shall be marked with an X)	B Addition of feature			Release 97	
	C Functional modification of feature			Release 98	
	D Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

Clauses affected: 4.2.7.1.2; 4.2.9.1; 4.4.3; 4.4.3.2; 4.4.4.3

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:

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

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

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

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

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

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).

4.2.9.1 1st insertion of DTX indication bits

This step of inserting DTX indication bits is used only if the positions of the TrCHs in the radio frame are fixed. With fixed position scheme a fixed number of bits is reserved for each TrCH in the radio frame.

The bits from rate matching are denoted by $g_{i1}, g_{i2}, g_{i3}, \ldots, g_{iG_i}$, where G_i is the number of bits in one TTI of TrCH i. Denote the number of bits in one radio frame of TrCH i by H_i. In normal or compressed mode by spreading factor ~~reduction~~division by 2, H_i is constant and corresponds to the maximum number of bits from TrCH i in one radio frame for any transport format of TrCH i. In compressed mode by higher layer scheduling, only a subset of the TFC Set is allowed. From this subset it is possible to derive which TFs on each TrCH that are allowed. The maximum number of bits belonging to one TTI of TrCH i for the allowed TFs is denoted by X_i. H_i is then calculated as $H_i = \left\lceil \frac{X_i}{F_i} \right\rceil$, where F_i is the number of radio frames in a TTI of TrCH i. The bits output from the DTX insertion are denoted by $h_{i1}, h_{i2}, h_{i3}, \ldots, h_{i(F_i H_i)}$. Note that these bits are three valued. They are defined by the following relations:

$$h_{ik} = g_{ik} \qquad k = 1, 2, 3, \ldots, G_i$$

$$h_{ik} = d \qquad k = G_i+1, G_i+2, G_i+3, \ldots, F_i H_i$$

where DTX indication bits are denoted by d. Here $g_{ik} \in \{0, 1\}$ and $d \notin \{0, 1\}$.

4.4.3 Transmission time reduction method

When in compressed mode, the information normally transmitted during a 10 ms frame is compressed in time. The mechanisms provided for achieving this are puncturing, ~~reduction~~ division of the spreading factor by ~~a factor of~~ two , and higher layer scheduling. In the downlink, all methods are supported while compressed mode by puncturing is not used in the uplink. The maximum idle length is defined to be 7 slots per one 10 ms frame. The slot formats that are used in compressed mode are listed in [2].

4.4.3.1 Compressed mode by puncturing

During compressed mode, rate matching (puncturing) is applied for creating transmission gap in one frame. The algorithm for rate matching (puncturing) as described in section 4.2.7 is used.

4.4.3.2 Compressed mode by ~~reducing~~ dividing the spreading factor by 2

During compressed mode, the spreading factor (SF) can be ~~reduced~~ divided by 2 during one radio frame to enable the transmission of the information bits in the remaining time slots of a compressed frame.

On the downlink, UTRAN can also order the UE to use a different scrambling code in compressed mode than in normal mode. If the UE is ordered to use a different scrambling code in compressed mode, then there is a one-to-one mapping between the scrambling code used in normal mode and the one used in compressed mode, as described in TS 25.213[3] section 5.2.1.

4.4.4.3 Parameters for downlink compressed mode

Table 10 shows the detailed parameters for each transmission gap length for the different transmission time reduction methods.

Table 10: Parameters for compressed mode

TGL	Type	Adjustable /fixed gap position	Spreading Factor	Idle length[ms]	Transmission time Reduction method	Idle frame Combining
3	A	Adjustable Or Fixed	512 – 4	1.73-1.99	Puncturing Spreading factor ~~reduction~~ division by 2 Higher layer scheduling	(S) (D) =(1,2),(2,1)
	B		256- 4	1.60-1.86		
4	A		512 - 4	2.40-2.66		(S) (D) =(1,3),(2,2),(3,1)
	B		256- 4	2.27-2.53		
7	A		512 -4	4.40-4.66		(S) (D)=(1,6),(2,5),(3,4),(4,3),(5,2),(6,1)
	B		256- 4	4.27-4.53		
10	A		512 - 4	6.40-6.66		(D)=(3,7),(4,6),(5,5),(6,4),(7,3)
	B		256- 4	6.27-6.53		
14	A	Fixed	512 - 4	9.07-9.33		(D) =(7,7)
	B		256- 4	8.93-9.19		

(S): Single-frame method as shown in figure 15 (1).

(D): Double-frame method as shown in figure 15 (2). (x,y) indicates x: the number of idle slots in the first frame, y: the number of idle slots in the second frame.

NOTE: Compressed mode by spreading factor ~~reduction~~ division by 2 is not supported when SF=4 is used in normal mode.