TSG-RAN Working Group 1(Radio) meeting #10
18 – 21 January 2000, Beijing, China

*TSGR1#10(00)0116*

**Source : LGIC**

**Title : CR to 25.212 for Clarification of Fixed Position Rate Matching**

**Document for : Approval**

# Introduction

In current specification, there are no explicit definitions of $\Delta N_{i,l}^{TTI}$ for fixed position rate matching. Therefore there may be misunderstandings that $\Delta N_{i,l}^{TTI}$ does not depend on the TF *l*. $\Delta N_{i,l}^{TTI}$, which is the effective amount of rate matching for fixed position, may vary according to the different fixed rate matching pattern. It means that the effective amount of rate matching may have different values according to the different $e_{ini}$ and '*a*' of the rate matching pattern determination algorithm. In this CR, explicit expressions of $\Delta N_{i,l}^{TTI}$ both for convolutional codes and turbo codes are provided just for clarification and information. If it is possible to represent $\Delta N_{i,l}^{TTI}$ with exact formula, the meaning of fixed position RM can be more easily understood, since the formula represents explicitly that the effective amount of RM is a function of the ratio between $N_{i,l}^{TTI}$ and $N_{max}$.

# Text Proposal

**3GPP TSG RAN WG1 Meeting #10**
**Beijing, China, Jan 18 – Jan 21, 1999**

***Document* R1-00-0116**
*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 | 034rev1 | 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 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 | X | UTRAN / Radio | X | Core Network | |
|---|---|---|---|---|---|---|---|---|

**Source:** LGIC **Date:** 2000-01-18

**Subject:** Clarification of fixed position rate matching

**Work item:**

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

| | | | | | |
|---|---|---|---|---|---|
| F | Correction | X | **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 | | | Release 98 | |
| D | Editorial modification | | | Release 99 | X |
| | | | | Release 00 | |

**Reason for change:** The current description for the block size variation $\Delta N_{i,l}^{TTI}$ is not explicitly defined, therefore it may give rise to misunderstanding that it does not depend on the TF *l*.

**Clauses affected:**
3.2 Symbols
4.2.7.2.1.1 Uncoded and convolutionally encoded TrCHs
4.2.7.2.1.2 Turbo encoded TrCHs

**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:** There was a comment that sgn(x) function should be defined in the “Symbol” section.

help.doc

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

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

| | |
|---|---|
| *éxù* | round towards ¥, i.e. integer such that *x* £ *éxù* < *x*+1 |
| *ëxû* | round towards -¥, i.e. integer such that *x*-1 < *ëxû* £ *x* |
| *çxç* | absolute value of *x* |
| sgn(*x*) | signum function, i.e. $\operatorname{sgn}(x) = \begin{cases} 1; & x \geq 0 \\ -1; & x < 0 \end{cases}$ |
| $N_{first}$ | The first slot in the *TG*. |
| $N_{last}$ | The last slot in the *TG*. $N_{last}$ is either a slot in the same radio frame as $N_{first}$ or a slot in the radio frame immediately following the slot that contains $N_{first}$. |

Unless otherwise is explicitly stated when the symbol is used, the meaning of the following symbols is:

| | |
|---|---|
| *i* | TrCH number |
| *j* | TFC number |
| *k* | Bit number |
| *l* | TF number |
| *m* | Transport block number |
| $n_i$ | Radio frame number of TrCH *i*. |
| *p* | PhCH number |
| r | Code block number |
| *I* | Number of TrCHs in a CCTrCH. |
| $C_i$ | Number of code blocks in one TTI of TrCH *i*. |
| $F_i$ | Number of radio frames in one TTI of TrCH *i*. |
| $M_i$ | Number of transport blocks in one TTI of TrCH *i*. |
| *P* | Number of PhCHs used for one CCTrCH. |
| *PL* | Puncturing Limit for the uplink. Signalled from higher layers |
| $RM_i$ | Rate Matching attribute for TrCH *i*. Signalled from higher layers. |

Temporary variables, i.e. variables used in several (sub)sections with different meaning.

x, X
y, Y
z, Z

#### 4.2.7.2.1.1 Uncoded and convolutionally encoded TrCHs

$$\Delta N_i = \Delta N_{max}$$

$a$=2

$$N_{max} = \max_{l \in TFS(i)} N_{il}^{TTI}$$

For each transmission time interval of TrCH $i$ with TF $l$, the rate-matching pattern is calculated with the algorithm in section 4.2.7.5. The following parameters are used as input:

$$X_i = N_{il}^{TTI}$$

$$e_{ini} = 1$$

$$e_{plus} = a \cdot N_{max}$$

$$e_{minus} = a \cdot |\Delta N_i|$$

Puncturing if $\Delta N_i < 0$, repetition otherwise. The values of $\Delta N_{i,l}^{TTI}$ may be computed by counting repetitions or puncturing when the algorithm of section 4.2.7.5 is run. The resulting values of $\Delta N_{i,l}^{TTI}$ can be represented with following expression.

$$\Delta N_{i,l}^{TTI} = \left\lceil \frac{|\Delta N_{max}| \times X_i}{N_{max}} \right\rceil \times \mathrm{sgn}(\Delta N_{max})$$

#### 4.2.7.2.1.2 Turbo encoded TrCHs

If repetition is to be performed on turbo encoded TrCHs, i.e. $\Delta N_{max} > 0$, the parameters in section 4.2.7.2.1.1 are used.

If puncturing is to be performed, the parameters below shall be used. Index $b$ is used to indicate systematic ($b$=1), 1st parity ($b$=2), and 2nd parity bit ($b$=3).

$a$=*2* when $b$=2

$a$=*1* when $b$=3

The bits indicated by $b$=1 shall not be punctured.

$$\Delta N_i = \begin{cases} \lfloor \Delta N_{max}/2 \rfloor, & b = 2 \\ \lceil \Delta N_{max}/2 \rceil, & b = 3 \end{cases}$$

$$N_{max} = \max_{l \in TFS(i)} (N_{il}^{TTI}/3)$$

For each transmission time interval of TrCH $i$ with TF $l$, the rate-matching pattern is calculated with the algorithm in section 4.2.7.5. The following parameters are used as input:

$$X_i = N_{il}^{TTI}/3$$

$$e_{ini} = N_{max}$$

$$e_{plus} = a \cdot N_{max}$$

$$e_{\min us} = a \cdot |\Delta N_i|$$

The values of $\Delta N_{i,l}^{TTI}$ may be computed by counting ~~repetitions or~~ puncturing when the algorithm of section 4.2.7.5 is run. The resulting values of $\Delta N_{i,l}^{TTI}$ can be represented with following expression.

$$\Delta N_{i,l}^{TTI} = -\left\lfloor \frac{\left|\left\lfloor \Delta N_{max}/2 \right\rfloor\right| \times X_i}{N_{max}} + 0.5 \right\rfloor - \left\lfloor \frac{\left|\left\lceil \Delta N_{max}/2 \right\rceil\right| \times X_i}{N_{max}} \right\rfloor$$

In the above equation, the first term of the right hand side represents the amount of puncturing for $b$=2 and the second term represents the amount of puncturing for $b$=3.