**3GPP TSG RAN Meeting #20** **RP-030276**
**Hameenlinna, FINLAND, 3 - 6 June 2003**

**Title:** **CRs (Rel-5) to TS 25.222**

**Source:** **TSG-RAN WG1**

**Agenda item:** **7.1.5**

**1.** ***TS 25.222*** **(RP-030276)**

| RP Tdoc # | WG Toc# | Spec | CR | Rev | Subject | Phase | Cat | Curren | New V | Workitem | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RP-030276 | R1-030504 | 25.222 | 111 | - | Corrections to field coding of CQI for HS-SICH (3.84Mcps TDD) | Rel-5 | F | 5.4.0 | 5.5.0 | HSDPA-Phys | |
| RP-030276 | R1-030505 | 25.222 | 112 | - | Correction to definition of number of bits available to HS-DSCH in one TTI. | Rel-5 | F | 5.4.0 | 5.5.0 | HSDPA-Phys | |

**3GPP TSG-RAN WG1 Meeting #32**
**Paris, France, 19-23 May 2003**

***Tdoc ⌘R1-030504***

*CR-Form-v7*

# CHANGE REQUEST

⌘ **TS 25.222 CR 111** ⌘ **rev -** ⌘ Current version: **5.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

***Proposed change affects:*** UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Corrections to field coding of CQI for HS-SICH (3.84Mcps TDD) |
| ***Source:*** | ⌘ | TSG RAN WG1 |
| ***Work item code:*** | ⌘ | HSDPA-Phys |
| ***Date:*** | ⌘ | 12/05/2003 |
| ***Category:*** | ⌘ | **F** |
| ***Release:*** | ⌘ | Rel-5 |

*Use one of the following categories:*
***F*** *(correction)*
***A*** *(corresponds to a correction in an earlier release)*
***B*** *(addition of feature),*
***C*** *(functional modification of feature)*
***D*** *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

*Use one of the following releases:*

| | |
|---|---|
| *2* | *(GSM Phase 2)* |
| *R96* | *(Release 1996)* |
| *R97* | *(Release 1997)* |
| *R98* | *(Release 1998)* |
| *R99* | *(Release 1999)* |
| *Rel-4* | *(Release 4)* |
| *Rel-5* | *(Release 5)* |
| *Rel-6* | *(Release 6)* |

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | The coding applied to the CQI field is not in line with the performances of other fields within the HS-SICH burst, specifically the ACK/NACK field and the midamble. This weakness in coding results in between 3.3 and 4.5dB increase in required transmission power which may be easily avoided by re-using the portion of the HS-SICH payload occupied by padding bits. |
| ***Summary of change:*** | ⌘ | The output of the (32,10) CQI block encoder is followed by a new stage of repetition encoding. |
| ***Consequences if not approved:*** | ⌘ | HS-SICH will suffer a serious and unnecessary performance degradation. |

| | | | | | |
|---|---|---|---|---|---|
| ***Clauses affected:*** | ⌘ | 4.7.2.2.2 | | | |
| ***Other specs affected:*** | ⌘ | **Y** | **N** | | |
| | | | X | Other core specifications | ⌘ |
| | | | X | Test specifications | |
| | | | X | O&M Specifications | |
| ***Other comments:*** | ⌘ | | | | |

**How to create CRs using this form:**
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

#### *4.7.2.2.2 Field Coding of CQI for 3.84 Mcps TDD*

RTBS and RMF bits are multiplexed onto the bits $y_1, y_2 ... y_{10}$ according to the following rule :

$y_1 = x_{rmf,1}$

$y_2, y_3 ... y_{10} = x_{tbs,1}, x_{tbs,2} ... x_{tbs,9}$

The bits $y_1, y_2 ... y_{10}$ are coded to produce the ~~CQI~~ bits $w_1, w_2, \ldots w_{32}$ ~~$z_1, z_2 ... z_{n_{CQI}}$~~ using a (32,10) sub-code of the second order Reed-Muller code as defined in subclause 4.3.1.1~~, where $n_{CQI} = 32$~~.

The bits $w_1, w_2, \ldots w_{32}$ are used to produce the CQI bits $z_1, z_2 ... z_{n_{CQI}}$ using a (4,1) repetition code, where $n_{CQI}=128$, such that:

$z_n, z_{n+32}, z_{n+64}, z_{n+96} = w_n \quad n=1 \ldots 32$

**3GPP TSG-RAN Meeting #32**
**Paris, France, 19-23 May 2003**

***Tdoc ⌘R1-030505***

*CR-Form-v7*

# CHANGE REQUEST

⌘ **25.222** **CR** **112** ⌘ **rev** **-** ⌘ Current version: **5.4.0** ⌘

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***Proposed change affects:*** UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Correction to definition of number of bits available to HS-DSCH in one TTI. |
| ***Source:*** | ⌘ | TSG RAN WG1 |
| ***Work item code:*** | ⌘ | HSDPA-Phys |
| ***Date:*** | ⌘ | 12/05/2003 |
| ***Category:*** | ⌘ | **F** |
| ***Release:*** | ⌘ | Rel-5 |

*Use one of the following categories:*
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| *R99* | *(Release 1999)* |
| *Rel-4* | *(Release 4)* |
| *Rel-5* | *(Release 5)* |
| *Rel-6* | *(Release 6)* |

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | HS-DSCH can span multiple timeslots. Consistent with Release 99, each timeslot does not necessarily have the same burst type. The existing definition of the number of bits available to the HS-DSCH in one TTI ($N_{data}$) is incorrect when the HS-DSCH spans multiple timeslots containing differing burst types. |
| ***Summary of change:*** | ⌘ | $N_{data}$ is defined as the sum of the number of bits available per timeslot over all timeslots in the HS-DSCH allocation as opposed to the product of the number of physical channels and the number of bits per physical channel. |
| ***Consequences if not approved:*** | ⌘ | Inability to calculate second stage rate matching parameters. Inconsistent specification. |

| | | | | | |
|---|---|---|---|---|---|
| ***Clauses affected:*** | ⌘ | 4.5.4.3 | | | |
| | | **Y** | **N** | | |
| ***Other specs affected:*** | ⌘ | | X | Other core specifications | ⌘ |
| | | | X | Test specifications | |
| | | | X | O&M Specifications | |
| ***Other comments:*** | ⌘ | | | | |

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### 4.5.4.3 HARQ Second Rate Matching Stage

HARQ second stage rate matching for the HS-DSCH transport channel shall be done with the general method described in 4.2.7.3 above with the following specific parameters. Bits selected for puncturing which appear as $\delta$ in the algorithm in 4.2.7.3 above shall be discarded and are not counted in the streams towards the bit collection.

The parameters of the second rate matching stage depend on the value of the RV parameters s and r. The parameter s can take the value 0 or 1 to distinguish between transmissions that prioritise systematic bits (s = 1) and non systematic bits (s = 0). The parameter r (range 0 to $r_{max}$-*1*) changes the initial error variable $e_{ini}$ in the case of puncturing. In case of repetition both parameters *r* and *s* change the initial error variable $e_{ini}$. The parameters $X_i$, $e_{plus}$ and $e_{minus}$ are calculated as per table 14below.

Denote the number of bits before second rate matching as $N_{sys}$ for the systematic bits, $N_{p1}$ for the parity 1 bits, and $N_{p2}$ for the parity 2 bits, respectively. For the HS-DSCH, ~~D~~denote the number of timeslots used as *T*, the number of codes per timeslot as *C* and the number of bits available in timeslot *t* as $U_t$, where $U_t = C \times N_{Data/Slot}$ and $N_{Data/Slot}$ is as defined in [7] for timeslot *t*. ~~physical channels used for the HS-DSCH by *P*.~~ $N_{data}$ is the number of bits available to the HS-DSCH in one TTI and is defined as $N_{data} = \sum_{t=1}^{T} U_t$ ~~$N_{data} = P \times N_{Data/Slot}$, where $N_{Data/Slot}$ is defined in [7]~~. The rate matching parameters are determined as follows.

For $N_{data} \le N_{sys} + N_{p1} + N_{p2}$, puncturing is performed in the second rate matching stage. The number of transmitted systematic bits in a transmission is $N_{t,sys} = \min\{N_{sys}, N_{data}\}$ for a transmission that prioritises systematic bits and $N_{t,sys} = \max\{N_{data} - (N_{p1} + N_{p2}), 0\}$ for a transmission that prioritises non systematic bits.

For $N_{data} > N_{sys} + N_{p1} + N_{p2}$ repetition is performed in the second rate matching stage. A similar repetition rate in all bit streams is achieved by setting the number of transmitted systematic bits to $N_{t,sys} = \left\lfloor N_{sys} \cdot \frac{N_{data}}{N_{sys} + 2N_{p1}} \right\rfloor$.

The number of parity bits in a transmission is: $N_{t,p1} = \left\lfloor \frac{N_{data} - N_{t,sys}}{2} \right\rfloor$ and $N_{t,p2} = \left\lceil \frac{N_{data} - N_{t,sys}}{2} \right\rceil$ for the parity 1 and parity 2 bits, respectively.

Table 14 below summarizes the resulting parameter choice for the second rate matching stage.

**Table 14: Parameters for HARQ second rate matching**

| | $X_i$ | $e_{plus}$ | $e_{minus}$ |
|---|---|---|---|
| Systematic RM S | $N_{sys}$ | $N_{sys}$ | $\lvert N_{sys} - N_{t,sys} \rvert$ |
| Parity 1 RM P1_2 | $N_{p1}$ | $2 \cdot N_{p1}$ | $2 \cdot \lvert N_{p1} - N_{t,p1} \rvert$ |
| Parity 2 RM P2_2 | $N_{p2}$ | $N_{p2}$ | $\lvert N_{p2} - N_{t,p2} \rvert$ |

The rate matching parameter $e_{ini}$ is calculated for each bit stream according to the RV parameters r and s using

$e_{ini}(r) = \{(X_i - \lfloor r \cdot e_{plus} / r_{\max} \rfloor - 1) \bmod e_{plus}\} + 1$ in the case of puncturing, i.e., $N_{data} \le N_{sys} + N_{p1} + N_{p2}$, and

$e_{ini}(r) = \{(X_i - \lfloor (s + 2 \cdot r) \cdot e_{plus} / (2 \cdot r_{\max}) \rfloor - 1) \bmod e_{plus}\} + 1$ for repetition, i.e., $N_{data} > N_{sys} + N_{p1} + N_{p2}$.

Where $r \in \{0, 1, \cdots, r_{\max} - 1\}$ and $r_{\max}$ is the total number of redundancy versions allowed by varying $r$ as defined in 4.6.1.4. Note that $r_{max}$ varies depending on the modulation mode, i.e. for 16QAM $r_{max}$ = 2 and for QPSK $r_{max}$ = 4.

Note: For the modulo operation the following clarification is used: the value of (x mod y) is strictly in the range of 0 to *y*-1 (i.e. -1 mod 10 = 9).