3GPP TSG-RAN Meeting #15
Jeju, Korea, 5 – 8, March, 2002

RP-020054

Title: **Agreed CRs (Rel-5) for the WI of "Enhancement on the DSCH hard split mode"**

Source: **TSG-RAN WG1**

Agenda item: **9.2.6**

No.	Spec	CR	Rev	R1 T-doc	Subject	Release	Cat	Workitem	V_old	V_new
1	25.212	123	4	R1-02-0465	Inclusion of flexible hard split mode TFCI operation	Rel-5	B	RInImp-DSCHhsp	4.3.0	5.0.0
2	25.214	250	1	R1-02-0513	Description of SSDT operation for TFCI power control in hard split mode	Rel-5	B	RInImp-DSCHhsp	4.3.0	5.0.0

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R1-02-0465

CR-Form-v5

CHANGE REQUEST

⌘ **25.212** **CR** **123** ⌘ **rev** **4** ⌘ Current version: **4.3.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Inclusion of flexible hard split mode TFCI operation
Source:	⌘	TSG RAN WG1
Work item code:	⌘	RInImp-DSCHhsp
Date:	⌘	15 Feb. 2002
Category:	⌘	**B**
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)

Reason for change:	⌘	Changes on coding scheme for TFCI bits are required in TS 25.212 to support the flexible hard split mode operation in Rel-5.
Summary of change:	⌘	It is proposed to include the TFCI coding scheme for the flexible hard split mode in section 4.3.4. Current Rel-99/4 hard split mode operation is included in this scheme, so it's removed for avoiding duplication.
Consequences if not approved:	⌘	Flexible combination of TFCI bits for DCH and DSCH cannot be supported.

Clauses affected:	⌘	4.3.4
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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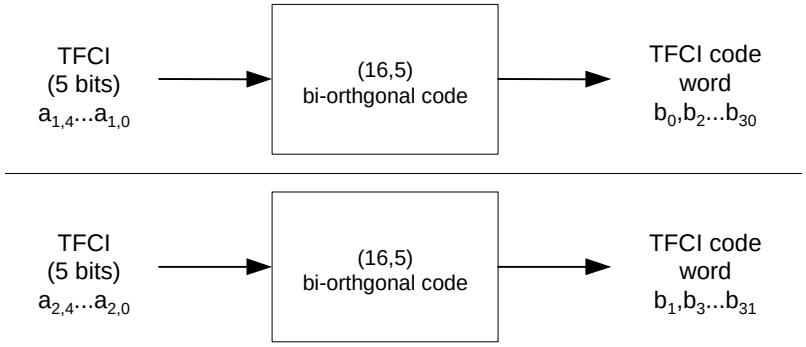
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

4.3.4 Operation of TFCI in Hard Split Mode~~Operation of Transport-Format-Combination Indicator (TFCI) in Split Mode~~

~~If one of the DCH is associated with a DSCH, the TFCI code word may be split in such a way that the code word relevant for TFCI activity indication is not transmitted from every cell. The use of such a functionality shall be indicated by higher layer signalling.~~

~~The TFCI is encoded using a (16, 5) bi-orthogonal (or first order Reed-Muller) code. The coding procedure is as shown in figure 10.~~



~~Figure 10: Channel coding of split mode TFCI information bits~~

~~The code words of the (16,5) bi-orthogonal code are linear combinations of 5 basis sequences as defined in table 9.~~

~~Table 9: Basis sequences for (16,5) TFCI code~~

~~i~~	~~$M_{i,0}$~~	~~$M_{i,1}$~~	~~$M_{i,2}$~~	~~$M_{i,3}$~~	~~$M_{i,4}$~~
~~0~~	~~1~~	~~0~~	~~0~~	~~0~~	~~1~~
~~1~~	~~0~~	~~1~~	~~0~~	~~0~~	~~1~~
~~2~~	~~1~~	~~1~~	~~0~~	~~0~~	~~1~~
~~3~~	~~0~~	~~0~~	~~1~~	~~0~~	~~1~~
~~4~~	~~1~~	~~0~~	~~1~~	~~0~~	~~1~~
~~5~~	~~0~~	~~1~~	~~1~~	~~0~~	~~1~~
~~6~~	~~1~~	~~1~~	~~1~~	~~0~~	~~1~~
~~7~~	~~0~~	~~0~~	~~0~~	~~1~~	~~1~~
~~8~~	~~1~~	~~0~~	~~0~~	~~1~~	~~1~~
~~9~~	~~0~~	~~1~~	~~0~~	~~1~~	~~1~~
~~10~~	~~1~~	~~1~~	~~0~~	~~1~~	~~1~~
~~11~~	~~0~~	~~0~~	~~1~~	~~1~~	~~1~~
~~12~~	~~1~~	~~0~~	~~1~~	~~1~~	~~1~~
~~13~~	~~0~~	~~1~~	~~1~~	~~1~~	~~1~~
~~14~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~
~~15~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~

~~The first set of TFCI information bits ($a_{1,0}$, $a_{1,1}$, $a_{1,2}$, $a_{1,3}$, $a_{1,4}$ where $a_{1,0}$ is LSB and $a_{1,4}$ is MSB) shall correspond to the TFC index (expressed in unsigned binary form) defined by the RRC layer to reference the TFC of the DCH CCTrCH in the associated DPCH radio frame.~~

~~The second set of TFCI information bits ($a_{2,0}$, $a_{2,1}$, $a_{2,2}$, $a_{2,3}$, $a_{2,4}$ where $a_{2,0}$ is LSB and $a_{2,4}$ is MSB) shall correspond to the TFC index (expressed in unsigned binary form) defined by the RRC layer to reference the TFC of the associated DSCH CCTrCH in the corresponding PDSCH radio frame.~~

~~The output code word bits b_k are given by:~~

$$b_{2i} = \sum_{n=0}^{4} (a_{1,n} \times M_{i,n}) \bmod 2; \qquad b_{2i+1} = \sum_{n=0}^{4} (a_{2,n} \times M_{i,n}) \bmod 2$$

~~where $i = 0, \ldots, 15$.~~

~~The output bits are denoted by b_k, k = 0, 1, 2, …, 31.~~

If one of the DCH is associated with a DSCH, the TFCI code word may be split in such a way that the code word relevant for TFCI activity indication is not transmitted from every cell. The use of such a functionality shall be indicated by higher layer signalling.

The TFCI is encoded by using punctured code of (32,10) sub-code of second order Reed-Muller code. The coding procedure is as shown in figure 10.

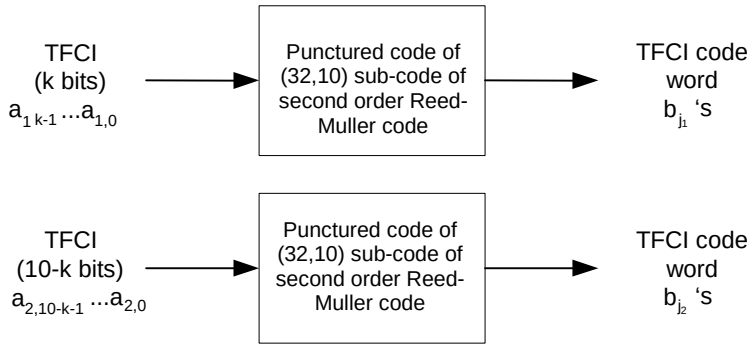


Figure 10: Channel coding of flexible hard split mode TFCI information bits

The code words of the punctured code of (32,10) sub-code of second order Reed-Muller code are linear combinations of basis sequences generated by puncturing 10 basis sequences defined in table 8 in section 4.3.3.

The first set of TFCI information bits ($a_{1,0}$, $a_{1,1}$, $a_{1,2}$, $a_{1,3}$, …, $a_{1,k-1}$ where $a_{1,0}$ is LSB and $a_{1,k-1}$ is MSB) shall correspond to the TFC index (expressed in unsigned binary form) defined by the RRC layer to reference the TFC of the DCH CCTrCH in the associated DPCH radio frame.

The second set of TFCI information bits ($a_{2,0}$, $a_{2,1}$, $a_{2,2}$, $a_{2,3}$, .., $a_{2,10-k-1}$ where $a_{2,0}$ is LSB and $a_{2,10-k-1}$ is MSB) shall correspond to the TFC index (expressed in unsigned binary form) defined by the RRC layer to reference the TFC of the associated DSCH CCTrCH in the corresponding PDSCH radio frame.

The output code word bits are given by :

$$b_{j_1} = \sum_{n=0}^{k-1} (a_{1,n} \times M_{\pi_1(k,i_1),\pi_2(k,n)}) \bmod 2; \qquad b_{j_2} = \sum_{n=0}^{10-k-1} (a_{2,n} \times M_{\pi_1(10-k,i_2),\pi_2(10-k,n)}) \bmod 2$$

where $i_1 = 0, \ldots, 3\times k$ and $i_2 = 0, \ldots, 30-3\times k$.

Then, the relation between j_1 (or j_2) and i_1 (or i_2) is as follows:

- If $k \neq 5$,

$$j_1 = \left\lfloor \frac{32}{3\times \min(k,10-k)+1} \times (i_1+1) + \frac{1}{2} \right\rfloor - 1; \qquad j_2 = i_2 + \left\lfloor \frac{3\times \min(k,10-k)+1}{32-(3\times \min(k,10-k)+1)} \times (i_2 + \frac{1}{2}) \right\rfloor.$$

- If $k = 5$,

$$j_1 = 2\times i_1; \qquad j_2 = 2\times i_2 + 1.$$

The functions π_1, π_2 are defined as shown in the following table 9.

Table 9. π_1, π_2 functions

m	$\pi_1(m,i)$ for i = 0, …, 3×m	$\pi_2(m,n)$ for n = 0,…, m-1

3	0, 1, 2, 3, 4, 5, 6, 8, 9, 11	0, 1, 2
4	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	0, 1, 2, 3
5	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 30	0, 1, 2, 3, 5
6	0, 1, 2, 3, 4, 5, 7, 8, 9, 12, 15, 18, 21, 23, 25, 27, 28, 29, 30	0, 1, 2, 3, 4, 5
7	0, 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 17, 20, 21, 22, 24, 25, 28, 29	0, 1, 2, 3, 4, 6, 7

3GPP TSG RAN Meeting #15
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R1-02-0513

CR-Form-v5

CHANGE REQUEST

⌘ **25.214** **CR** **250** ⌘ **rev** **1** ⌘ Current version: **4.3.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network ☐

Title:	⌘	Description of SSDT operation for TFCI power control in hard split mode
Source:	⌘	TSG RAN WG1
Work item code:	⌘	RInImp-DSCHhsp
Date:	⌘	2002.02.19.
Category:	⌘	**B**
Release:	⌘	REL-5

Use one of the following categories:
F *(correction)*
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R98 *(Release 1998)*
R99 *(Release 1999)*
REL-4 *(Release 4)*
REL-5 *(Release 5)*

Reason for change:	⌘	To describe SSDT operation in section 5.2.1 is required to support the TFCI power control scheme for the flexible hard split mode in Rel'5
Summary of change:	⌘	In section 5.2.1.1, "UTRAN may use the SSDT operation as specified in section 5.2.2 to determine what power offset to use for TFCI in hard split mode with respect to the associated downlink DPDCH.". In section 5.2.1.4, "UTRAN may use the SSDT information for for the PDSCH power control as specified in section 5.2.2 and the TFCI power control in hard split mode."
Consequences if not approved:	⌘	The TFCI power control scheme for the flexible hard split mode cannot be supported

Clauses affected:	⌘	5.2.1.1, 5.2.1.4.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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5.2.1 DPCCH/DPDCH

5.2.1.1 General

The downlink transmit power control procedure controls simultaneously the power of a DPCCH and its corresponding DPDCHs. The power control loop adjusts the power of the DPCCH and DPDCHs with the same amount, i.e. the relative power difference between the DPCCH and DPDCHs is not changed.

The relative transmit power offset between DPCCH fields and DPDCHs is determined by the network. The TFCI, TPC and pilot fields of the DPCCH are offset relative to the DPDCHs power by PO1, PO2 and PO3 dB respectively. The power offsets may vary in time. UTRAN may use the SSDT operation as specified in section 5.2.2 to determine what power offset to use for TFCI in hard split mode with respect to the associated downlink DPDCH. The method for controlling the power offsets within UTRAN is specified in [6].

The power of CCC field in DL DPCCH for CPCH is the same as the power of the pilot field.

5.2.1.4 Site selection diversity transmit power control

5.2.1.4.1 General

Site selection diversity transmit power control (SSDT) is another macro diversity method in soft handover mode. This method is optional in UTRAN.

Operation is summarised as follows. The UE selects one of the cells from its active set to be ‘primary’, all other cells are classed as ‘non primary’. The main objective is to transmit on the downlink from the primary cell, thus reducing the interference caused by multiple transmissions in a soft handover mode. A second objective is to achieve fast site selection without network intervention, thus maintaining the advantage of the soft handover. In order to select a primary cell, each cell is assigned a temporary identification (ID) and UE periodically informs a primary cell ID to the connecting cells. The non-primary cells selected by UE switch off the transmission power. The primary cell ID is delivered by UE to the active cells via uplink FBI field. SSDT activation, SSDT termination and ID assignment are all carried out by higher layer signalling.

SSDT can only be used when the P-CPICH is used as the downlink phase reference.

UTRAN may also command UE to use SSDT signalling in the uplink although cells would transmit the downlink as without SSDT active. In case SSDT is used in the uplink direction only, the processing in the UE for the radio links received in the downlink is as with macro diversity in non-SSDT case. The downlink operation mode for SSDT is set by higher layers. UTRAN may use the SSDT information for the PDSCH power control as specified in section 5.2.2 and for the TFCI power control in hard split mode.

NOTE: This feature of SSDT limited to uplink only applies to terminals that are DSCH capable.