3GPP TSG RAN WG1 Meeting #10
Beijing, China, 18-21 Jan, 2000

Document ***R1-00-0091***

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.

21.212	**CR**	**039**	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*
list expected approval meeting # here ↑		for information		non-strategic		*Use only)*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME	**X**	UTRAN / Radio	**X**	Core Network	

Source: QUALCOMM Europe **Date:** 2000-01-12

Subject: Clarification on TFCI coding input

Work item:

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

Reason for change: The Mapping between RRC TFC index and physical layer TFCI bits is currently not explicit. This CR specfies the relation between the TFCI information bits and TFC indexes defined by the RRC layer.

Clauses affected: 4.3.3 & 4.3.4

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.

4.3.3 Coding of Transport-Format-Combination Indicator (TFCI)

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

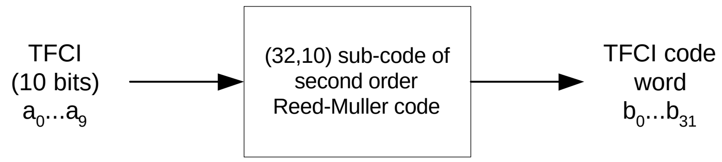

Figure 10: Channel coding of TFCI bits

If the TFCI consist of less than 10 bits, it is padded with zeros to 10 bits, by setting the most significant bits to zero. The length of the TFCI code word is 32 bits.

The code words of the (32,10) sub-code of second order Reed-Muller code are linear combination of 10 basis sequences. The basis sequences are as in the following table 7.

Table 7: Basis sequences for (32,10) TFCI code

i	$M_{i,0}$	$M_{i,1}$	$M_{i,2}$	$M_{i,3}$	$M_{i,4}$	$M_{i,5}$	$M_{i,6}$	$M_{i,7}$	$M_{i,8}$	$M_{i,9}$
0	1	1	0	0	0	0	0	0	0	0
1	1	0	1	0	0	0	1	0	0	0
2	1	1	1	0	0	0	0	0	0	1
3	1	0	0	1	0	0	1	0	1	1
4	1	1	0	1	0	0	0	0	0	1
5	1	0	1	1	0	0	0	0	1	0
6	1	1	1	1	0	0	0	1	0	0
7	1	0	0	0	1	0	0	1	1	0
8	1	1	0	0	1	0	1	1	1	0
9	1	0	1	0	1	0	1	0	1	1
10	1	1	1	0	1	0	0	0	1	1
11	1	0	0	1	1	0	0	1	1	0
12	1	1	0	1	1	0	0	1	0	1
13	1	0	1	1	1	0	1	0	0	1
14	1	1	1	1	1	0	1	1	1	1
15	1	1	0	0	0	1	1	1	0	0
16	1	0	1	0	0	1	1	1	0	1
17	1	1	1	0	0	1	1	0	1	0
18	1	0	0	1	0	1	0	1	1	1
19	1	1	0	1	0	1	0	1	0	1
20	1	0	1	1	0	1	0	0	1	1
21	1	1	1	1	0	1	0	1	1	1
22	1	0	0	0	1	1	0	1	0	0
23	1	1	0	0	1	1	1	1	0	1
24	1	0	1	0	1	1	1	0	1	0
25	1	1	1	0	1	1	1	0	0	1
26	1	0	0	1	1	1	0	0	1	0
27	1	1	0	1	1	1	1	1	0	0
28	1	0	1	1	1	1	1	1	1	0
29	1	1	1	1	1	1	1	1	1	1
30	1	0	0	0	0	0	0	0	0	0
31	1	0	0	0	0	1	1	0	0	0

Let's define the TFCI information bits as a_0 , a_1 , a_2 , a_3 , a_4 , a_5 , a_6 , a_7 , a_8 , a_9 (a_0 is LSB and a_9 is MSB). The TFCI information bits shall correspond to the TFC index (expressed in unsigned binary form) defined by the RRC layer to reference the TFC of the CCTrCH in the associated DPCH radio frame.~~For TFCI information bits a_0 , a_1 , a_2 , a_3 , a_4 , a_5 , a_6 , a_7 , a_8 , a_9 (a_0 is LSB and a_9 is MSB), t~~

The output code word bits b_i are given by:

$$b_i = \sum_{n=0}^{9} (a_n \times M_{i,n}) \bmod 2$$

where i=0…31.

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

In downlink, when the SF <128 the encoded TFCI code words are repeated yielding 8 encoded TFCI bits per slot in normal mode and 16 encoded TFCI bits per slot in compressed mode. Mapping of repeated bits to slots is explained in section 4.3.5.

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

~~In the case of DCH in Split Mode, the UTRAN shall operate with as follows:~~

~~-~~ If one of the ~~links~~ 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 bits are encoded using a (16, 5) bi-orthogonal (or first order Reed-Muller) code. The coding procedure is as shown in figure 11.

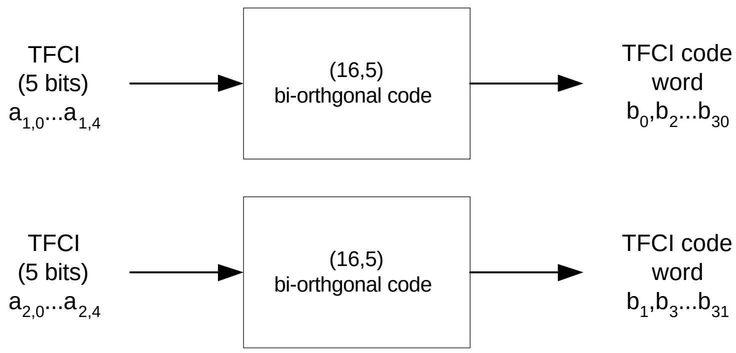

Figure 11: Channel coding of split mode TFCI bits

The code words of the (16,5) bi-orthogonal code are linear combinations of 5 basis sequences as defined in table 8 below.

Table 8: 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	1	0	0	0
1	1	0	1	0	0
2	1	1	1	0	0
3	1	0	0	1	0
4	1	1	0	1	0
5	1	0	1	1	0
6	1	1	1	1	0
7	1	0	0	0	1
8	1	1	0	0	1
9	1	0	1	0	1
10	1	1	1	0	1

11	1	0	0	1	1
12	1	1	0	1	1
13	1	0	1	1	1
14	1	1	1	1	1
15	1	0	0	0	0

~~For TFCI information bits for DCH $a_{1,0}$, $a_{1,1}$, $a_{1,2}$, $a_{1,3}$, $a_{1,4}$ ($a_{1,0}$ is LSB and $a_{1,4}$ is MSB) and for DSCH $a_{2,0}$, $a_{2,1}$, $a_{2,2}$, $a_{2,3}$, $a_{2,4}$ ($a_{2,0}$ is LSB and $a_{2,4}$ is MSB), the output code word bits b_0, b_1, ..., b_{31}, are given by:~~

Let's define a first set of TFCI information bits as $a_{1,0}$, $a_{1,1}$, $a_{1,2}$, $a_{1,3}$, $a_{1,4}$ ($a_{1,0}$ is LSB and $a_{1,4}$ is MSB). This set of TFCI information bits 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.

Let's define a second set of TFCI information bits as $a_{2,0}$, $a_{2,1}$, $a_{2,2}$, $a_{2,3}$, $a_{2,4}$ ($a_{2,0}$ is LSB and $a_{2,4}$ is MSB). This set of TFCI information bits 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 DPSCH 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…15, j=0,1.

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