

## 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 003**

Current Version: **V3.0.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **RAN #6**  
 list expected approval meeting # here ↑

for approval   
 for information

strategic   
 non-strategic  (for SMG use only)

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

**Source:** ETRI **Date:** 25 Nov 1999

**Subject:** Repetition and Mapping of TFCI code word in downlink

**Work item:** TS25.212

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

**Release:** Phase 2   
 Release 96   
 Release 97   
 Release 98   
 Release 99   
 Release 00

**Reason for change:** Word repetition of TFCI code word has time-diversity gain over current repetition (symbol) in downlink channels whose SF is less than 128.

**Clauses affected:** 4.3.5

**Other specs affected:**

Other 3G core specifications	<input type="checkbox"/>	→ List of CRs:	
Other GSM core specifications	<input type="checkbox"/>	→ List of CRs:	
MS test specifications	<input type="checkbox"/>	→ List of CRs:	
BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
O&M specifications	<input type="checkbox"/>	→ List of CRs:	

**Other comments:**



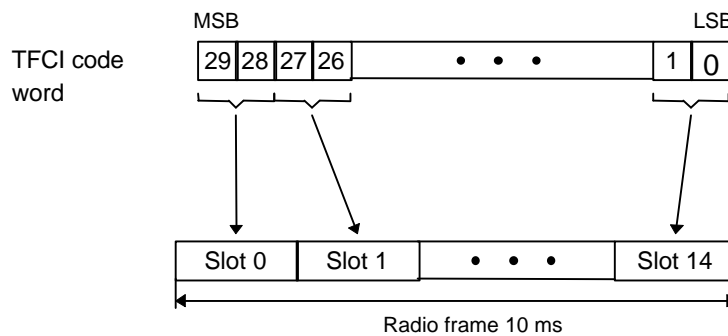
help.doc

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

### 4.3.5 Mapping of TFCI words

#### 4.3.5.1 Mapping of TFCI word

As only one code word for TFCI is needed no channel interleaving for the encoded bits are done. Instead, the bits of the code word are directly mapped to the slots of the radio frame as depicted in the Figure 1. Within a slot the more significant bit is transmitted before the less significant bit.



**Figure 1 Mapping of TFCI code words to the slots of the radio frame**

For downlink physical channels whose SF is lower than 128, bits of the TFCI code words are repeated and mapped to slots as shown in the Table 1. Code word bits are denoted as  $b_k^l$ , where subscript  $k$ , indicates bit position in the code word ( $k=29$  is the MSB bit) and superscript  $l$  indicates bit repetition. In each slot transmission order of the bits is from left to right in the Table 1.

Table 1: Mapping order of repetition encoded TFCI code word bits into slots.

Slot	TFCI code word bits							
0	$b_{29}^1$	$b_{29}^2$	$b_{29}^3$	$b_{29}^4$	$b_{28}^1$	$b_{28}^2$	$b_{28}^3$	$b_{28}^4$
1	$b_{27}^1$	$b_{27}^2$	$b_{27}^3$	$b_{27}^4$	$b_{26}^1$	$b_{26}^2$	$b_{26}^3$	$b_{26}^4$
2	$b_{25}^1$	$b_{25}^2$	$b_{25}^3$	$b_{25}^4$	$b_{24}^1$	$b_{24}^2$	$b_{24}^3$	$b_{24}^4$
3	$b_{23}^1$	$b_{23}^2$	$b_{23}^3$	$b_{23}^4$	$b_{22}^1$	$b_{22}^2$	$b_{22}^3$	$b_{22}^4$
4	$b_{21}^1$	$b_{21}^2$	$b_{21}^3$	$b_{21}^4$	$b_{20}^1$	$b_{20}^2$	$b_{20}^3$	$b_{20}^4$
5	$b_{19}^1$	$b_{19}^2$	$b_{19}^3$	$b_{19}^4$	$b_{18}^1$	$b_{18}^2$	$b_{18}^3$	$b_{18}^4$
6	$b_{17}^1$	$b_{17}^2$	$b_{17}^3$	$b_{17}^4$	$b_{16}^1$	$b_{16}^2$	$b_{16}^3$	$b_{16}^4$
7	$b_{15}^1$	$b_{15}^2$	$b_{15}^3$	$b_{15}^4$	$b_{14}^1$	$b_{14}^2$	$b_{14}^3$	$b_{14}^4$
8	$b_{13}^1$	$b_{13}^2$	$b_{13}^3$	$b_{13}^4$	$b_{12}^1$	$b_{12}^2$	$b_{12}^3$	$b_{12}^4$
9	$b_{11}^1$	$b_{11}^2$	$b_{11}^3$	$b_{11}^4$	$b_{10}^1$	$b_{10}^2$	$b_{10}^3$	$b_{10}^4$
10	$b_9^1$	$b_9^2$	$b_9^3$	$b_9^4$	$b_8^1$	$b_8^2$	$b_8^3$	$b_8^4$
11	$b_7^1$	$b_7^2$	$b_7^3$	$b_7^4$	$b_6^1$	$b_6^2$	$b_6^3$	$b_6^4$
12	$b_5^1$	$b_5^2$	$b_5^3$	$b_5^4$	$b_4^1$	$b_4^2$	$b_4^3$	$b_4^4$
13	$b_3^1$	$b_3^2$	$b_3^3$	$b_3^4$	$b_2^1$	$b_2^2$	$b_2^3$	$b_2^4$
14	$b_1^1$	$b_1^2$	$b_1^3$	$b_1^4$	$b_0^1$	$b_0^2$	$b_0^3$	$b_0^4$

Slot	TFCI code word bits							
0	$b_{29}^1$	$b_{28}^1$	$b_{27}^1$	$b_{26}^1$	$b_{25}^1$	$b_{24}^1$	$b_{23}^1$	$b_{22}^1$
1	$b_{21}^1$	$b_{20}^1$	$b_{19}^1$	$b_{18}^1$	$b_{17}^1$	$b_{16}^1$	$b_{15}^1$	$b_{14}^1$
2	$b_{13}^1$	$b_{12}^1$	$b_{11}^1$	$b_{10}^1$	$b_9^1$	$b_8^1$	$b_7^1$	$b_6^1$
3	$b_5^1$	$b_4^1$	$b_3^1$	$b_2^1$	$b_1^1$	$b_0^1$	$b_{29}^2$	$b_{28}^2$
4	$b_{27}^2$	$b_{26}^2$	$b_{25}^2$	$b_{24}^2$	$b_{23}^2$	$b_{22}^2$	$b_{21}^2$	$b_{20}^2$
5	$b_{19}^2$	$b_{18}^2$	$b_{17}^2$	$b_{16}^2$	$b_{15}^2$	$b_{14}^2$	$b_{13}^2$	$b_{12}^2$
6	$b_{11}^2$	$b_{10}^2$	$b_9^2$	$b_8^2$	$b_7^2$	$b_6^2$	$b_5^2$	$b_4^2$
7	$b_3^2$	$b_2^2$	$b_1^2$	$b_0^2$	$b_{29}^3$	$b_{28}^3$	$b_{27}^3$	$b_{26}^3$
8	$b_{25}^3$	$b_{24}^3$	$b_{23}^3$	$b_{22}^3$	$b_{21}^3$	$b_{20}^3$	$b_{19}^3$	$b_{18}^3$
9	$b_{17}^3$	$b_{16}^3$	$b_{15}^3$	$b_{14}^3$	$b_{13}^3$	$b_{12}^3$	$b_{11}^3$	$b_{10}^3$
10	$b_9^3$	$b_8^3$	$b_7^3$	$b_6^3$	$b_5^3$	$b_4^3$	$b_3^3$	$b_2^3$
11	$b_1^3$	$b_0^3$	$b_{29}^4$	$b_{28}^4$	$b_{27}^4$	$b_{26}^4$	$b_{25}^4$	$b_{24}^4$
12	$b_{23}^4$	$b_{22}^4$	$b_{21}^4$	$b_{20}^4$	$b_{19}^4$	$b_{18}^4$	$b_{17}^4$	$b_{16}^4$
13	$b_{15}^4$	$b_{14}^4$	$b_{13}^4$	$b_{12}^4$	$b_{11}^4$	$b_{10}^4$	$b_9^4$	$b_8^4$
14	$b_7^4$	$b_6^4$	$b_5^4$	$b_4^4$	$b_3^4$	$b_2^4$	$b_1^4$	$b_0^4$

4.3.5.2 Mapping of TFCI word in Split Mode

After channel encoding of the two 5 bit TFCI words there are two code words of length 15 bits. They are mapped to DPCCH as shown in the Figure 2. Note that  $b_{1,k}$  and  $b_{2,k}$  denote the bit  $k$  of code word 1 and code word 2, respectively.

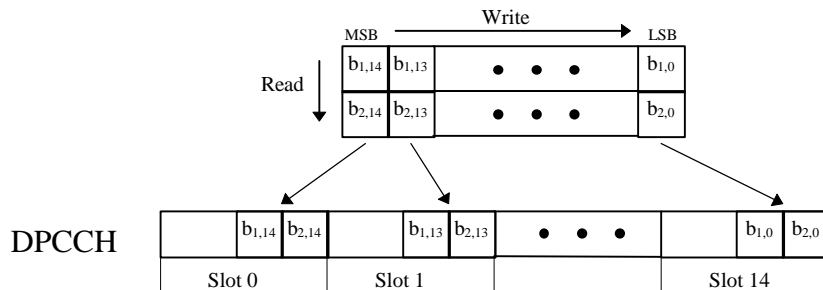


Figure 2: Mapping of TFCI code words to the slots of the radio frame in Split Mode

For downlink physical channels whose SF is lower than 128, bits of the extended TFCI code words are repeated and mapped to slots as shown in the ~~Table 2~~~~Table 2~~~~Table 2~~. Code word bits are denoted as  $b'_{j,k}$ , where subscript  $j$  indicates the code word, subscript  $k$  indicates bit position in the code word ( $k=14$  is the MSB bit) and superscript  $l$  indicates bit repetition. In each slot transmission order of the bits is from left to right in the ~~Table 2~~~~Table 2~~~~Table 2~~.

Table 2: Mapping order of repetition encoded TFCI code word bits to slots in Split Mode

Slot	TFCI code word bits in split mode							
0	$b_{1,14}^1$	$b_{1,14}^2$	$b_{1,14}^3$	$b_{1,14}^4$	$b_{2,14}^1$	$b_{2,14}^2$	$b_{2,14}^3$	$b_{2,14}^4$
1	$b_{1,13}^1$	$b_{1,13}^2$	$b_{1,13}^3$	$b_{1,13}^4$	$b_{2,13}^1$	$b_{2,13}^2$	$b_{2,13}^3$	$b_{2,13}^4$
2	$b_{1,12}^1$	$b_{1,12}^2$	$b_{1,12}^3$	$b_{1,12}^4$	$b_{2,12}^1$	$b_{2,12}^2$	$b_{2,12}^3$	$b_{2,12}^4$
3	$b_{1,11}^1$	$b_{1,11}^2$	$b_{1,11}^3$	$b_{1,11}^4$	$b_{2,11}^1$	$b_{2,11}^2$	$b_{2,11}^3$	$b_{2,11}^4$
4	$b_{1,10}^1$	$b_{1,10}^2$	$b_{1,10}^3$	$b_{1,10}^4$	$b_{2,10}^1$	$b_{2,10}^2$	$b_{2,10}^3$	$b_{2,10}^4$
5	$b_{1,9}^1$	$b_{1,9}^2$	$b_{1,9}^3$	$b_{1,9}^4$	$b_{2,9}^1$	$b_{2,9}^2$	$b_{2,9}^3$	$b_{2,9}^4$
6	$b_{1,8}^1$	$b_{1,8}^2$	$b_{1,8}^3$	$b_{1,8}^4$	$b_{2,8}^1$	$b_{2,8}^2$	$b_{2,8}^3$	$b_{2,8}^4$
7	$b_{1,7}^1$	$b_{1,7}^2$	$b_{1,7}^3$	$b_{1,7}^4$	$b_{2,7}^1$	$b_{2,7}^2$	$b_{2,7}^3$	$b_{2,7}^4$
8	$b_{1,6}^1$	$b_{1,6}^2$	$b_{1,6}^3$	$b_{1,6}^4$	$b_{2,6}^1$	$b_{2,6}^2$	$b_{2,6}^3$	$b_{2,6}^4$
9	$b_{1,5}^1$	$b_{1,5}^2$	$b_{1,5}^3$	$b_{1,5}^4$	$b_{2,5}^1$	$b_{2,5}^2$	$b_{2,5}^3$	$b_{2,5}^4$
10	$b_{1,4}^1$	$b_{1,4}^2$	$b_{1,4}^3$	$b_{1,4}^4$	$b_{2,4}^1$	$b_{2,4}^2$	$b_{2,4}^3$	$b_{2,4}^4$
11	$b_{1,3}^1$	$b_{1,3}^2$	$b_{1,3}^3$	$b_{1,3}^4$	$b_{2,3}^1$	$b_{2,3}^2$	$b_{2,3}^3$	$b_{2,3}^4$
12	$b_{1,2}^1$	$b_{1,2}^2$	$b_{1,2}^3$	$b_{1,2}^4$	$b_{2,2}^1$	$b_{2,2}^2$	$b_{2,2}^3$	$b_{2,2}^4$
13	$b_{1,1}^1$	$b_{1,1}^2$	$b_{1,1}^3$	$b_{1,1}^4$	$b_{2,1}^1$	$b_{2,1}^2$	$b_{2,1}^3$	$b_{2,1}^4$
14	$b_{1,0}^1$	$b_{1,0}^2$	$b_{1,0}^3$	$b_{1,0}^4$	$b_{2,0}^1$	$b_{2,0}^2$	$b_{2,0}^3$	$b_{2,0}^4$

Slot	TFCI code word bits							
0	$b_{1,14}^1$	$b_{1,13}^1$	$b_{1,12}^1$	$b_{1,11}^1$	$b_{2,14}^1$	$b_{2,13}^1$	$b_{2,12}^1$	$b_{2,11}^1$
1	$b_{1,10}^1$	$b_{1,9}^1$	$b_{1,8}^1$	$b_{1,7}^1$	$b_{2,10}^1$	$b_{2,9}^1$	$b_{2,8}^1$	$b_{2,7}^1$
2	$b_{1,6}^1$	$b_{1,5}^1$	$b_{1,4}^1$	$b_{1,3}^1$	$b_{2,6}^1$	$b_{2,5}^1$	$b_{2,4}^1$	$b_{2,3}^1$
3	$b_{1,2}^1$	$b_{1,1}^1$	$b_{1,0}^1$	$b_{1,14}^2$	$b_{2,2}^1$	$b_{2,1}^1$	$b_{2,0}^1$	$b_{2,14}^2$
4	$b_{1,13}^2$	$b_{1,12}^2$	$b_{1,11}^2$	$b_{1,10}^2$	$b_{2,13}^2$	$b_{2,12}^2$	$b_{2,11}^2$	$b_{2,10}^2$
5	$b_{1,9}^2$	$b_{1,8}^2$	$b_{1,7}^2$	$b_{1,6}^2$	$b_{2,9}^2$	$b_{2,8}^2$	$b_{2,7}^2$	$b_{2,6}^2$
6	$b_{1,5}^2$	$b_{1,4}^2$	$b_{1,3}^2$	$b_{1,2}^2$	$b_{2,5}^2$	$b_{2,4}^2$	$b_{2,3}^2$	$b_{2,2}^2$
7	$b_{1,1}^2$	$b_{1,0}^2$	$b_{1,14}^3$	$b_{1,13}^3$	$b_{2,1}^2$	$b_{2,0}^2$	$b_{2,14}^3$	$b_{2,13}^3$
8	$b_{1,12}^3$	$b_{1,11}^3$	$b_{1,10}^3$	$b_{1,9}^3$	$b_{2,12}^3$	$b_{2,11}^3$	$b_{2,10}^3$	$b_{2,9}^3$
9	$b_{1,8}^3$	$b_{1,7}^3$	$b_{1,6}^3$	$b_{1,5}^3$	$b_{2,8}^3$	$b_{2,7}^3$	$b_{2,6}^3$	$b_{2,5}^3$
10	$b_{1,4}^3$	$b_{1,3}^3$	$b_{1,2}^3$	$b_{1,1}^3$	$b_{2,4}^3$	$b_{2,3}^3$	$b_{2,2}^3$	$b_{2,1}^3$
11	$b_{1,0}^3$	$b_{1,14}^4$	$b_{1,13}^4$	$b_{1,12}^4$	$b_{2,0}^3$	$b_{2,14}^4$	$b_{2,13}^4$	$b_{2,12}^4$
12	$b_{1,11}^4$	$b_{1,10}^4$	$b_{1,9}^4$	$b_{1,8}^4$	$b_{2,11}^4$	$b_{2,10}^4$	$b_{2,9}^4$	$b_{2,8}^4$
13	$b_{1,7}^4$	$b_{1,6}^4$	$b_{1,5}^4$	$b_{1,4}^4$	$b_{2,7}^4$	$b_{2,6}^4$	$b_{2,5}^4$	$b_{2,4}^4$
14	$b_{1,3}^4$	$b_{1,2}^4$	$b_{1,1}^4$	$b_{1,0}^4$	$b_{2,3}^4$	$b_{2,2}^4$	$b_{2,1}^4$	$b_{2,0}^4$

### 4.3.5.3 Mapping of TFCI in compressed mode

The mapping of the TFCI bits in compressed mode is dependent on the transmission time reduction method. Denote the TFCI bits by  $c_0, c_1, c_2, c_3, c_4, \dots, c_C$ , where:

~~$c_k = b_k, C = 29$ , when there are 2 TFCI bit in each slot.~~

•  $c_k = b_k, C = 29$ , for the channels whose spreading factor is equal to or more than 128.

~~$c_0 = b_0^4, c_1 = b_0^3, c_2 = b_0^2, c_3 = b_0^1, c_4 = b_1^4, c_5 = b_1^3, \dots, c_{119} = b_{14}^1$ , when there are 8 TFCI bits in each slot.~~

•  $c_0 = b_0^4, c_1 = b_1^4, c_2 = b_2^4, c_3 = b_3^4, c_4 = b_4^4, \dots, c_{119} = b_{29}^1, C=119$ , for the channels whose spreading factor is less than 128.

~~$c_0 = b_{2,0}, c_1 = b_{1,0}, c_3 = b_{2,1}, c_4 = b_{1,1}, \dots, c_{29} = b_{1,14}$ , in split mode when there are 2 TFCI bits in each slot.~~

•  $c_0 = b_{2,0}, c_1 = b_{1,0}, c_2 = b_{2,1}, c_3 = b_{1,1}, \dots, c_{29} = b_{1,14}, C=29$ , in split mode for the channels whose spreading factor is equal to or more than 128.

~~$c_0 = b_{2,0}^4, c_1 = b_{2,0}^3, c_2 = b_{2,0}^2, c_3 = b_{2,0}^1, c_4 = b_{1,0}^4, c_5 = b_{1,0}^3, \dots, c_{119} = b_{1,14}^1$ , in split mode when there are 8 TFCI bits in each slot.~~

•  $c_0 = b_{2,0}^4, c_1 = b_{2,1}^4, \dots, c_3 = b_{2,3}^4, c_4 = b_{1,0}^4, c_5 = b_{1,1}^4, \dots, c_7 = b_{1,3}^4, c_8 = b_{2,4}^4, \dots, c_{119} = b_{1,14}^1, C=119$ , in split mode for the channels whose spreading factor is less than 128.

The TFCI mapping for each transmission method is given in the sections below.