TSG-RAN Meeting #15 ***RP-020127***
Jeju, Korea, 5 – 8 March 2002

Presentation of Specification to TSG or WG

Presentation to:	**TSG-RAN Meeting #15**
Agenda item:	**9.2.6 Enhancement on the DSCH hard split mode**
Document for presentation:	**TR 25.870 Version 2.0.0**
Presented for:	**Approval**

Abstract of document:

This technical report is for the Release 5 work item "Enhancement on the DSCH hard split mode". In this report, the changes in TR25.870 are described since the last TSG RAN meeting #13.

TR 25.870 was approved at RAN1#24 with version 1.4.0 (R1-02-0512) and was raised as version 2.0.0 for approval at RAN#15.

Changes since last presentation to TSG-RAN Meeting #13:

- In section 4.4.1, the impact of TFCI coding scheme on WG1 specification is updated.
- In section 4.4.3, the impact of TFCI coding scheme on WG3 specifications is updated according to the approved WG3 internal TR.
- In section 5.4, the impact of the proposed power control scheme on WG1 specifications is updated and the impact of the proposed power control scheme on WG3 specifications is updated according to the approved WG3 internal TR.

Outstanding Issues:
None

Contentious Issues:
None

3G TR 25.870 V2.0.0 (2002-03)

Technical Report

3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Enhancement on the DSCH hard split mode

(Release 5)

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Contents

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Foreword

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Version x.y.z

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x the first digit:

1 presented to TSG for information;

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

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1 Scope

The purpose of the present document is to help the TSG RAN WGs to understand the proposed method and to specify the impacts to existing specifications, which is needed for the introduction of the "Enhancement on the DSCH hard split mode" for Release 5.

"Enhancement on the DSCH hard split mode" is proposed to specify the enhancements of TFCI coding and power control in DSCH hard split mode for UTRA FDD. Based on [1], this work item is composed of two work tasks.

1) TFCI coding in DSCH hard split mode
2) TFCI power control in DSCH hard split mode

The different WTs will be described in subsequent chapters. It is intended to gather all information in order to trace the history and the status of the WTs in each WG.

It describes the proposed methods for each area.

It describes the impacts due to this WI.

It describes agreed requirements related to the WTs.

It identifies the affected specifications according to the introduction of "Enhancement on the DSCH hard split mode".

It also describes the schedule of the WTs.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.
References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

For a specific reference, subsequent revisions do not apply.

For a non-specific reference, the latest version applies.

[1] RP-010205, "Proposed WI Enhancement on the DSCH hard split mode", approved at RAN#11

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

3.2 Symbols

3.3 Abbreviations

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

TFCI Transport Format Combination Indicator

DSCH Downlink Shared Channel

4 TFCI coding in DSCH hard split mode

4.1 Introduction

In the current Rel99 & Rel'4 specification, as identified by RAN WG's (WG1, WG2 and WG3), when DSCH scheduling be done in DRNC, logical split cannot be supported over Iur during the DSCH soft handover. Furthermore, hard split has advantage over logical split in the sense that it can be supported over Iur. However, it was also identified that hard split has some limitation and therefore there is some need to study the enhancement for TFCI coding in the DSCH hard split mode

Currently DSCH hard split mode can support only 5 bit long DSCH and DCH TFCIs. As a result, the number of TFCI is limited upto 32 for DCH and DSCH in DSCH hard split mode. A new TFCI coding scheme to support the flexible bit length can enhance the DSCH hard split mode.

4.2 Requirements

The new TFCI encoding scheme should be an extension of the existing scheme and include the TFCI encoding scheme for non-split mode and 5:5 split mode as a subset. This implies that full backward compatibility to the TFCI encoding and mapping schemes used in R99/Rel-4 must be guaranteed.
The requirements on the new TFCI encoding scheme are summarised as follows:

- There shall be only one TFCI encoding scheme, both for non-split mode and for flexible/fixed split mode. The new TFCI encoding scheme shall give identical output for non-split mode and 5:5 hard split as in R99/Rel-4.
- The mapping of encoded TFCI bits to the bits in the TFCI fields of the physical channel shall not be changed. This implies that 32 bits shall be output from the TFCI encoding process for all hard split combinations.
- Reuse of existing encoder structure, i.e. use of the same basis sequences $M_{i,0}$ … $M_{i,9}$ as in Table 8 of [3].
- The amount of additional hardware, e.g. for storing additional puncturing patterns, shall be minimised.

The new scheme must show acceptable performance.

4.3 Proposed TFCI Coding Scheme for the flexible Hard Split mode

This section describes the modification of the current TFCI coding scheme to support the flexible code length, and explains the performance, backward compatibility and hardware complexity due to an encoding scheme and an example of decoder structure. The modified TFCI coding scheme is called as "Flexible Hard Split mode TFCI coding scheme (FHS-TFCI)".
In the current specification, (16,5) Bi-Orthogonal Code and (32,10) sub-code of the second order Reed-Muller code are used as TFCI coding schemes. Actually, these coding schemes can be implemented by one encoder and one decoder. This means that (16,5) Bi-Orthogonal Code can be obtained from (32,10) sub-code of the second order Reed-Muller code, by selecting some basis and by puncturing some bits. "Shortening techniques" are used in the consideration of the backward compatibilities. The shortening techniques create a new code by selecting basis and puncture some coded symbols from mother code. `FHS-TFCI using shortening technique has a good performance. Moreover, the difference between the current TFCI coding scheme and the flexible hard split mode TFCI coding scheme (FHS-TFCI) is the number of puncturing patterns. That is, FHS-TFCI can use the current TFCI coder and decoder and requires small memory for storing puncturing patterns. This means that the impact of FHS-TFCI is very small in the viewpoint of hardware.

In the following sections, the encoder structure and an example of decoder structure are described in detail.

4.3.1 Effective code rate after mapping of TFCI codeword in normal mode

Before describing FHS-TFCI, we consider the coded symbol length relative to TFCI information ratios. The most natural way is to maintain uniform code rate. The current TFCI coding scheme uses (32,l0) codes. However, according to TS 25.212, if TFCI codeword is not repeated, then the effective TFCI code rate after mapping of TFCI codeword in normal mode is 1/3. Consequently, if the effective code rate is maintained as 1/3, then the effective code lengths relative to TFCI information ratios after the codeword mapping in normal mode are as shown in Table 1:

TFCI Ratio	Effective Code Length		Effective Code Rate
1:9	(3,1) Code	(27,9) Code	1 / 3
2:8	(6,2) Code	(24,8) Code	1 / 3
3:7	(9,3) Code	(21,7) Code	1 / 3
4:6	(12,4) Code	(18,6) Coäe	1 / 3
5:5 (exist already)	(15,5) Code	(15,5) Code	1 / 3

Table 1. Effective Code Length for TFCI information ratio

For backward compatibility, however, code length at the output of TFCI coder should be maintained as 32 while the sum of the effective code lengths for DCH and DSCH is 30 for each case as shown in Table 1. Thus, in TFCI coding scheme that will be implemented, it is necessary to add 1 bit to the code word for DCH and DSCH, respectively, as shown in Table 2.

TFCI Ratio	Code Length		Note
1:9	(4,1) Code	(28,9) Code	New
2:8	(7,2) Code	(25,8) Code	New
3:7	(10,3) Code	(22,7) Code	New
4:6	(13,4) Code	(19,6) Code	New
5:5	(16,5) Code	(16,5) Code	Already exists

Table 2. Code length at the TFCI coder output for TFCI information ratio

4.3.2 TFCI encoder structure for flexible hard split mode

According to the code length in Table 2, the encoder structure of FHS-TFCI is as shown in figure 1:

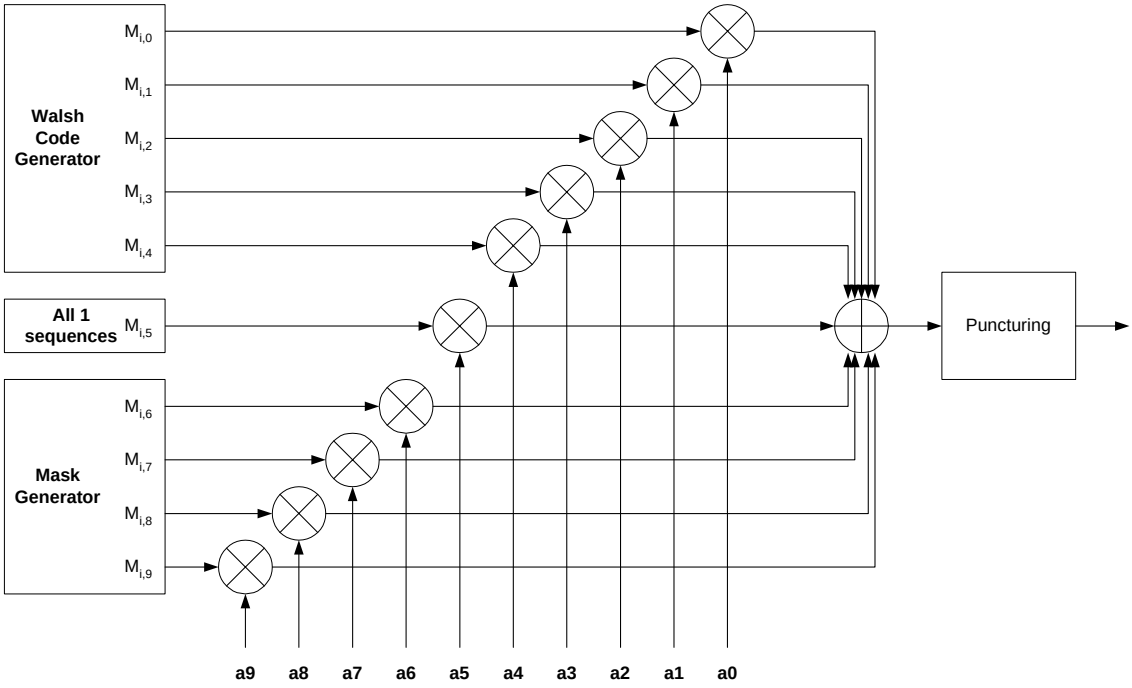


Fig 1. Encoder Structure

In Fig 1, the encoder consists of (32,10) sub-code of the second order Reed-Muller code and a puncturer for each code length. The puncturing pattern and the used basis for each code length are listed in table 3.

Code Length	Puncturing Pattern	Used basis
(4,1)	1, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14,15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	M_0
(7,2)	3, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	M_0, M_1
(10,3)	7, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	M_0, M_1, M_2
(13,4)	0, 1, 2, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	M_0, M_1, M_2, M_3
(16,5) (exist already)	15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 31	M_0, M_1, M_2, M_3, M_5
(19,6)	6, 10, 11, 13, 14, 16, 17, 19, 20, 22, 24, 26, 31	M_0, M_1, M_2, M_3, M_4, M_5
(22,7)	8, 12, 16, 18, 19, 23, 26, 27, 30, 31	M_0, M_1, M_2, M_3, M_4, M_6, M_7
(25,8)	4, 11, 14, 15, 20, 21, 22	M_0, M_1, M_2, M_3, M_4, M_5, M_6, M_7
(28,9)	6, 10, 11, 30	M_0, M_1, M_2, M_3, M_4, M_5, M_6, M_7, M_8
(32,10) (exist already)	N.A	M_0, M_1, M_2, M_3, M_4, M_5, M_6, M_7, M_8, M_9

where *M0 = 10101010101010110101010101010100*
M1 = 01100110011001101100110011001100
M2 = 00011110000111100011110000111100
M3 = 00000001111111100000001111111100
M4 = 00000000000000011111111111111101

M5 = 11111111111111111111111111111111
M6 = 01010000110001111100000111011101
M7 = 00000011100110111011011100011100
M8 = 00010101111100100110110010101100
M9 = 00111000011011101011110101000100

Table 3. Puncturing pattern and used basis

4.3.3 Performance of FHS-TFCI coding scheme

In consideration of fig 1 and table 3, (19,6), (22,7), (25,8), and (28,9) encoders are the shortening version of (32,10) sub-code of second order Reed-Muller code, while others have the following basic structure.

- (4,1) encoder : 4 time repetition code
- (7,2) encoder : Repetition & Puncturing of (3,2) simplex code
- (10,3) encoder : Repetition & Puncturing of (7,3) simplex code
- (13,4) encoder : Puncturing of (15,4) simplex code

As we can see, (4,1), (7,2), (10,3), and (13,4) encoders are based on (2^k-1,k) simplex encoder. These codes have an advantage of designing the decoder because IFHT(Inverse Fast Hadamard transform) can be used for decoder. Using IFHT in decoder can reduce H/W complexity.

As in the current specification, certain 30 bits of 32-bit output of TFCI coder will be transmitted or 32-bit TFCI codeword will be repeatedly transmitted, according to a mapping rule to map the TFCI codeword to the slots of the radio frame. The mapping rule is FFS. However, to get the optimal (or near optimal) performance in the case that only 30 bits are transmitted in normal mode, FHS-TFCI is designed based on the assumption as follows. In the case that only 30 bits are transmitted, the mapping rule shall satisfy that

- The last bit of TFCI codeword for DCH is not transmitted.
- The last bit of TFCI codeword for DSCH is not transmitted.

It is noted that the above assumption preserves the consistency with the TFCI ratio of (5:5) in split mode operation, which is defined in the current specification.

In general, the performance of block code is determined by minimum distance d_{min}. In the viewpoint of performance, d_{min}'s of FHS-TFCI for each code length is shown in table 4.

TFCI coder output			Effective codeword			Note
Code Length	Optimal Bound	D_{min}	Code Length	Optimal Bound	D_{min}	
(4,1)	4	4	(3,1)	3	3	New
(7,2)	4	4	(6,2)	4	4	New
(10,3)	5	5	(9,3)	4	4	New
(13,4)	6	6	(12,4)	6	6	New
(16,5)	8	8	(15,5)	7	7	Already exists
(19,6)	8	7	(18,6)	8	7	New
(22,7)	8	8	(21,7)	8	8	New
(25,8)	9	8	(24,8)	8	8	New
(28,9)	10	10	(27,9)	10	9	New
(32,10)	12	12	(30,10)	11	10	Already exists

Table 4. Performance of FHS-TFCI

As shown in Table 4, FHS-TFCI is the optimal code in (3,1), (4,1), (6,2), (7,2), (9,3), (10,3), (12,4), (13,4), (16,5), (15,5), (21,7), (22,7), (28,9), (32,10), and (24,8) cases, while in (18,6), (19,6), (25,8), and (27,9) cases, the performance of FHS-TFCI is very close to the optimal bound.

4.3.4 Decoder

There are a lot of decoding methods of block code, e.g., " Brute-force method". This section describes an

example of the decoder structure according to FHS-TFCI. The decoder structure in this section is only an example and informative. The purpose of this section is to show the possible way for the current TFCI coding scheme and FHS-TFCI to coexist without significant complexity increase.

Similar to encoder structure for FHS-TFCI in 4.3.2, the decoding scheme for FHS-TFCI can be implemented by one decoder (which is included in current TFCI coding scheme) regardless of the code length. Furthermore, the decoder of "(32,10) the sub-code of the second order Reed-Muller code" for the current TFCI coding scheme can be reused. The decoder structure is as shown in Fig 3.

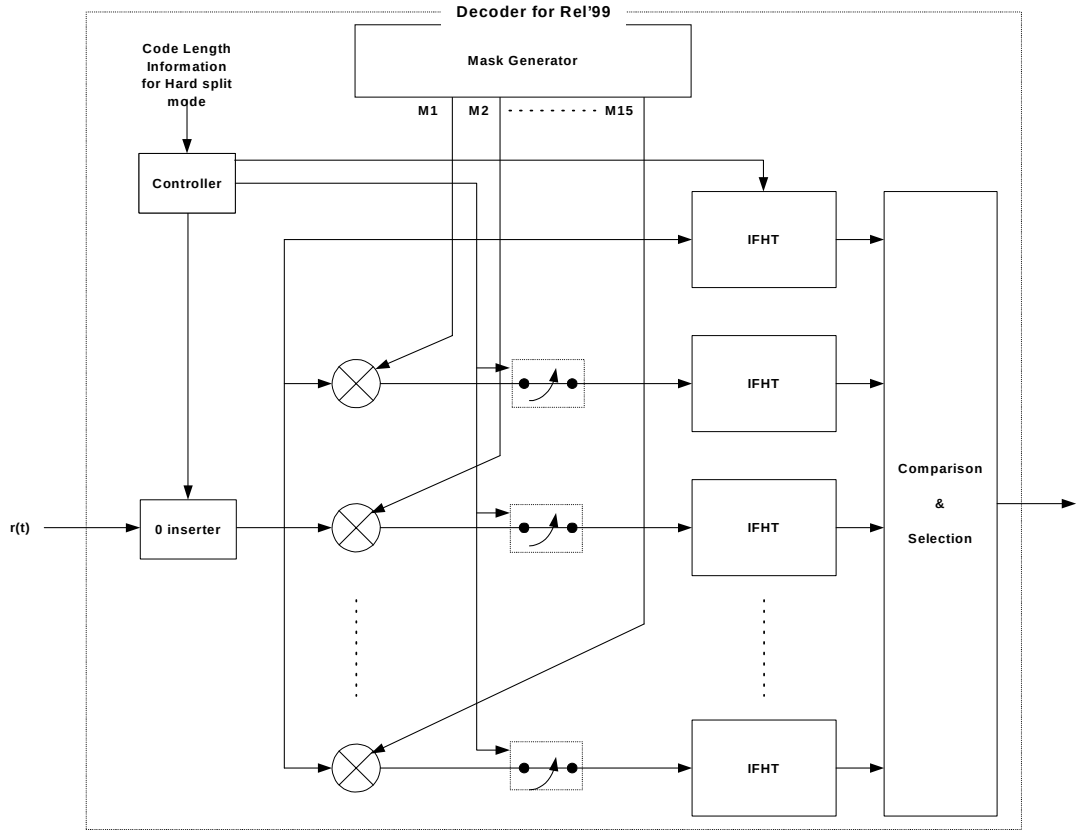


Fig 3. Decoder Structure

The decoder in fig 3 is the decoder of "(32,10) the sub-code of the second order Reed-Muller code" for Rel'99/Rel 4. There is no additional H/W block required for FHS-TFCI and only the code length information is needed for FHS-TFCI. Controller in fig.2 controls the operation of 0 inserter, mask multipliers and IFHT according to code length information. 0 inserter inserts 0 symbols into the received symbols at the puncturing position listed in table 2. Mask multipliers multiplies the received bits by the mask that is generated from mask generator and also used for the current TFCI coding scheme. IFHT performs Inverse Fast Hadamard Transform operation. The number of IFHTs used for FHS-TFCI depends on code length and the maximum number of IFHTs is identical to that of the current TFCI coding scheme in this example. In detail, when the number of information bits is less than or equal to 6 ($k \leq 6$) , no mask-multiplier is used and the one IFHT-the first IFHT- is used. On the other hand, when the number of information bits is over 6 ($k > 6$), (2^{k-6}-1) mask-multipliers and 2^{k-6} IFHTs are used.

4.3.5 Complexity

Considering the encoder structure, there is no additional block except increasing the memory size for storing the puncturing patterns. The decoder in fig 3 is an example to show FHS-TFCI will not increase the H/W complexity of the current decoder.
Thus, in implementing FHS-TFCI, there is no significant increase in complexity, and backward

compatibility can be maintained.

4.3.6. Mapping rule of the TFCI Coded symbol

4.3.6.1. Criterion for the Mapping rule

In this section, we mention about the criterion for mapping rule. Criterion is as follows :

1) n coded symbols with smaller size is ordered as uniformly as possible.
2) In the normal case(non-compressed mode & SF > 64), out of total 32 symbols, 1bit for DSCH and 1bit for DCH is not transmitted.
3) Have a generalized form to include 5:5 hard split case which is in Rel.99/Rel.4 specification.

The first criterion means that the uniform distribution of the transmitted symbol in the time domain guarantee the good time diversity. Actually, when n coded symbols with smaller size are transmitted in the positions uniformly distributed and (32 – n) coded symbols with larger size are transmitted in the other positions, the positions for (32 – n) coded symbols with larger size have also almost uniformly distributed. The second one is for maintaining the code rate 1/3(the code rate 1/3 is the one in non-split mode) in the normal case(non-compressed mode & SF > 64).

4.3.6.2. Mapping rule

In this section, we described about mapping rule based on the criterion as seen in the previous section. We will introduce a formula for calculating the mapping positions. In terms of the criterion, first, the mapping position according to formula is uniformly distributed, and second, the last symbol of the codeword is mapped to the last position in all cases. Before we describing the mapping position, the number of the coded symbol is as the following table 5.

TFCIDCH : TFCIDSCH	Coded symbol for TFCIDCH	Coded symbol for TFCIDSCH
1 : 9	4	28
2 : 8	7	25
3 : 7	10	22
4 : 6	13	19
5 : 5	16	16
6 : 4	19	13
7 : 3	22	10
8 : 2	25	7
9 : 1	28	4

Table 5. The number of coded symbol

We introduce the formula for calculating the mapping position uniformly distributed within 32 positions. In case $n \leq 16$, the formula is as follows :

$$\text{i-th symbol position } Pi = \{\frac{32}{n} \times (i+1)\} - 1 \quad (1)$$

,where $\{t\} = r$ iff $r - 0.5 \leq t < r + 0.5$, r is an integer, $i = 0,\ldots,n-1$.

Then, when we decide the mapping position of the n coded symbols of the field with the smaller size by using the above formula, that of the coded symbol with larger size is all other. The formula for this is as

follows :

$$\text{i-th symbol position } Pi = i + \left\lfloor \frac{n}{32-n} \times (i + \frac{1}{2}) \right\rfloor \quad (2)$$

,where $\lfloor t \rfloor$ is the greatest integer less than or equal to t and i = 0,…, 32 – n – 1.

As an example, in 2 : 8 case. 7 mapping positions for TFCIDCH are 4, 8, 13, 17, 22, 26, 31 according to the equation (1). In the other hand, mapping position for TFCIDSCH are the others, say, 0, 1, 2, 3, 5, 6, 7, 9, 10, 11, 12, 14, 15, 16, 18, 19, 20, 21, 23, 24, 25, 27, 28, 29, 30 according to the equation (2).

We define d*,i as a output coded symbol after puncturing. Then, the mapping rule into the transmitted TFCI coded symbols is

$$b_{i+\left\lfloor \frac{n}{32-n} \times (i+\frac{1}{2}) \right\rfloor} = d_{1,i} \quad (3)$$

i = 0,1,…, 32 – n – 1,

and

$$b_{\{\frac{32}{n} \times (i+1)\}-1} = d_{2,i} \quad (4)$$

, i = 0,1,…, n – 1.

Actually, this formula is the generalized form of 5:5 case, which is in the current specification. For this, substituting n for 16,

$$\left\{\frac{32}{n} \times (i+1)\right\} - 1 = \{2 \times (i+1)\} - 1 = 2i + 1,$$

and

$$i + \left\lfloor \frac{n}{32-n} \times (i + \frac{1}{2}) \right\rfloor = i + \left\lfloor i + \frac{1}{2} \right\rfloor = 2i$$

.

Therefore, equation (3) and (4) are the same as 5:5 case in the current specification.

4.4 Specification Impact and associated Change Request

4.4.1 WG1

========= Start of change in TS 25.212 ==========

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.~~

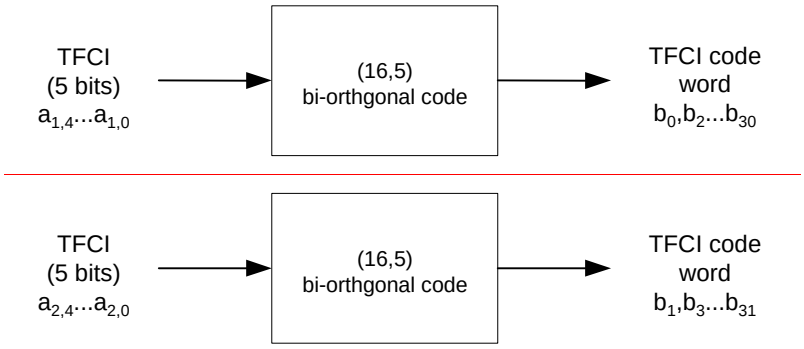


Figure 10: Channel coding of split mode TFCI information bits

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, $k = 0, 1, 2, \ldots, 31$.
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.

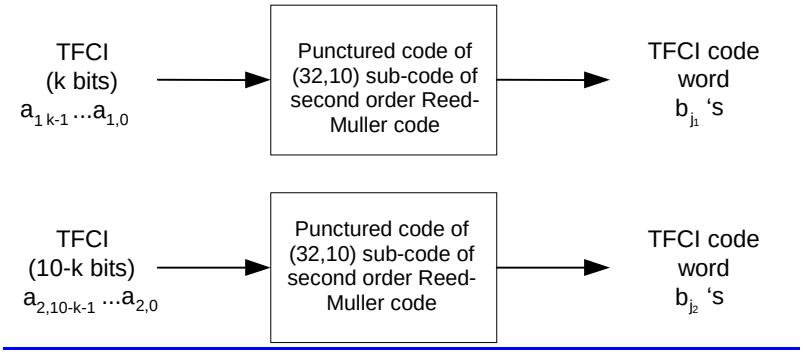


Figure 10: Channel coding of flexible hard split mode TFCI information bits

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

========= End of change in TS 25.212 ==========

4.4.2 WG2

To support the work task “TFCI coding in DSCH hard split mode”, following two requirements shall be fulfilled.

1) UE shall have a method to inform UTRAN whether or not it supports the enhanced TFCI coding in DSCH hard split mode.

2) UTRAN shall have a method to inform UE of the length of TFCI (field1) or TFCI (field2).

The first requirement can be satisfied if a new IE, which represents whether UE supports enhanced TFCI coding in DSCH hard split mode or not, is added in UE CAPABILITY INFORMATION message.

Regarding the second requirement, UTRAN can inform UE of TFCI (field2) length by IE “Length of TFCI(field2)” which is already included in “Transport Format Combination Set”. In current specification, however, the IE “Length of TFCI(field2)” is required only if the logical split mode is applied. So only what we need is to make the IE “Length of TFCI(field2)” available even if the hard split mode is applied by removing the restriction that both TFCI (field1) and TFCI (field2) have a static length of five bits.

4.4.3 WG3

4.4.3.1 Study Areas

4.4.3.1.1 Impact on NBAP messages

Currently, on Iub interface, it is assumed that the TFCI bit for DCH and DSCH in hard split mode have 5 bit/5 bit length. TFCI signalling mode that contains TFCI split information is included in following NBAP messages for DSCH split mode setting.

- RADIO LINK SETUP REQUEST
- RADIO LINK RECONFIGURATION PREPARE
- RADIO LINK RECONFIGURATION REQUEST

The information for TFCI signalling mode described in NBAP message as follows:

========= TS 25.433 ==========

9.2.2.50 TFCI signalling mode

This parameter indicates if the normal or split mode is used for the TFCI. In the event that the split mode is to be used then the IE indicates whether the split is 'Hard' or 'Logical', and in the event that the split is 'Logical' the IE indicates the number of bits in TFCI (field 2).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TFCI signalling option	M		ENUMERATED (Normal, Split)	'Normal' : meaning no split in the TFCI field (either 'Logical' or 'Hard') 'Split' : meaning there is a split in the TFCI field (either 'Logical' or 'Hard')
Split type	C-IfSplit		Enumerated (Hard, Logical)	'Hard' : meaning that TFCI (field 1) and TFCI (field 2) are each 5 bits long and each field is block coded separately. 'Logical' : meaning that on the physical layer TFCI (field 1) and TFCI (field 2) are concatenated, field 1 taking the most significant bits and field 2 taking the least significant bits). The whole is then encoded with a single block code.
Length of TFCI2	C-SplitType		Integer (1..10)	This IE indicates the length measured in number of bits of TFCI (field2).

==========

First Solution:

To support flexible TFCI bit length in the case of hard split mode, the TFCI length information should be sent to Node B. For the backward compatible change, a new optional IE (see below) can be added in the above NBAP messages with a criticality for supporting flexible TFCI bit length in DSCH hard split mode.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Length of TFCI2 for Hard Split	O	1	Integer (1..10)	This IE indicates the length measured in number of bits of TFCI (field2).	YES	reject

Second solution:

Since The *Length of TFCI2* IE is conditional, the IE present only when split type is Logical. To support flexible TFCI bit length in the case of hard split mode, the TFCI length information (e.g., *Length of TFCI2* IE) should be sent to Node B for the case of hard split mode. It should be noted that the change of the NBAP message should be backward compatible.

Length of TFCI2 IE in the existing messages can be re-used for hard split with the following modification:

- The explanation of the condition "SplitType" is changed into "The IE shall be present if the Split type IE is set to "Logical" or "Hard" with the Length of TFCI2 only except for 5 bits.

When Split type is equal to Hard and *Length of TFCI2* IE is present, an e.g., Rel99 Node B may not understand the IE and reject the procedure since the DL DPCH Information IE group has criticality "reject".

The following is the modified IE structure in order to reuse *Length of TFCI2* IE for hard split mode.

9.2.2.50 TFCI signalling mode

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TFCI signalling option	M		ENUMERATED (Normal, Split)	'Normal' : meaning no split in the TFCI field (either 'Logical' or 'Hard') 'Split' : meaning there is a split in the TFCI field (either 'Logical' or 'Hard')
Split type	C-IfSplit		Enumerated (Hard, Logical)	'Hard' : meaning that TFCI (field 1) and TFCI (field 2) are ~~each 5 bits long and each field is~~ block coded separately. 'Logical' : meaning that on the physical layer TFCI (field 1) and TFCI (field 2) are concatenated, field 1 taking the most significant bits and field 2 taking the least significant bits). The whole is then encoded with a single block code.
Length of TFCI2	C-SplitType		Integer (1..10)	This IE indicates the length measured in number of bits of TFCI (field2). If the IE is absent, the Length of TFCI2 is equal to 5 bits for the case of hard split type.

Condition	Explanation
IfSplit	The IE shall be present if the *TFCI signalling option* IE is set to "Split".
SplitType	The IE shall be present if the *Split type* IE is set to "Logical" or "Hard" with the Length of TFCI2 only except for 5 bits.

Note: Condition description is not in line with the principles we have for specifying conditions.

Third Solution:

The *Length of TFCI2* IE is changed to be optional in the table and condition description is move to procedure text.

For Radio Link Setup, Synchronised Radio Link Reconfiguration Preparation and Unsynchronised Radio Link Reconfiguration procedure, texts for successful operation are added as follows (e.g. for Radio Link Setup procedure):

> [FDD – If the RADIO LINK SETUP REQUEST message includes the *Length of TFCI2* IE ~~and the *TFCI signalling option* IE is set to 'Split'~~, then the Node B shall apply the length of TFCI2 field indicated in the message.]
>
> [FDD – If the *Length of TFCI2* IE is not included in the RADIO LINK SETUP REQUEST message and the *Split Type* IE is present with the value 'Hard', then the Node B shall assume the value of the TFCI2 Field is 5 bits.]

For Radio Link Setup, Synchronised Radio Link Reconfiguration Preparation and Unsynchronised Radio Link Reconfiguration procedure, texts for Abnormal Conditions are added as follows (e.g. for Radio Link Setup procedure):

> [FDD – If the RADIO LINK SETUP REQUEST message contains the *Length of TFCI2* IE , but the *TFCI signalling option* IE is set to "Normal", then the Node B shall reject the procedure using the RADIO LINK SETUP FAILURE message.
>
> [FDD – If the RADIO LINK SETUP REQUEST message does not contain *the Length of TFCI2* IE but the *Split type* IE is set to "Logical", then the Node B shall reject the procedure using the RADIO LINK SETUP FAILURE message.
>
> [FDD – If the RADIO LINK SETUP REQUEST message contains the *Length of TFCI2* IE and *the Length of TFCI2* IE is set to 5, but the Split type IE is set to "Hard", then the Node B shall reject the procedure using the RADIO LINK SETUP FAILURE message.

9.2.2.50 TFCI signalling mode

This parameter indicates if the normal or split mode is used for the TFCI. In the event that the split mode is to be used then the IE indicates whether the split is 'Hard' or 'Logical', and in the event that the split is 'Logical' the IE indicates the number of bits in TFCI (field 2).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TFCI signalling option	M		ENUMERATED (Normal, Split)	'Normal' : meaning no split in the TFCI field (either 'Logical' or 'Hard') 'Split' : meaning there is a split in the TFCI field (either 'Logical' or 'Hard')
Split type	C-IfSplit		Enumerated (Hard, Logical)	'Hard' : meaning that TFCI (field 1) and TFCI (field 2) are ~~each 5 bits long and each field is~~ block coded separately. *'Logical' : meaning that on the physical layer TFCI (field 1) and TFCI (field 2) are concatenated, field 1 taking the most significant bits and field 2 taking the least significant bits). The whole is then encoded with a single block code.*
Length of TFCI2	O~~C-SplitType~~		Integer (1..10)	This IE indicates the length measured in number of bits of TFCI (field2).

Condition	Explanation
IfSplit	The IE shall be present if the *TFCI signalling option* IE is set to "Split".
~~SplitType~~	~~The IE shall be present if the *Split type* IE is set to "Logical".~~

4.4.3.1.2 Impact on RNSAP messages

Currently, on Iur interface, hard split mode is assumed that the TFCI bit for DCH and DSCH have 5 bit/5 bit length. TFCI signalling mode that contains TFCI split information is included in following RNSAP messages for DSCH split mode setting.

- RADIO LINK SETUP REQUEST
- RADIO LINK RECONFIGURATION PREPARE
- RADIO LINK RECONFIGURATION REQUEST

Since logical split mode information does not need to be transmitted to DRNC, the information for TFCI signalling mode described in NBAP message contains only the information on TFCI Signalling mode for hard split as follows:

========== TS 25.423 ==========

9.2.2.46 TFCI Signalling Mode

This parameter indicates if the normal or split mode is used for the TFCI.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TFCI Signalling Mode			ENUMERATED (Normal, Split)	

==========

In the above message, if the TFCI Signalling Mode is set to be “Split” then it means hard split mode used. To support flexible TFCI bits for hard split, the TFCI bit length information should be signalled to DRNC using the above RNSAP messages. For the backward compatible change, a new optional IE can be added in the above RNSAP messages with a criticality for supporting flexible TFCI bit length in DSCH hard split mode.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Length of TFCI2 for Hard Split	O		Integer (1..10)	This IE indicates the length measured in number of bits of TFCI (field2).	YES	reject

Before SRNC sets up a Radio Link in a target cell controlled by other RNC, SRNC should know if the target cell supports flexible hard split mode. In order for SRNC to get the information, DRNC can transmit the information using UPLINK SIGNALLING TRANSFER INDICATION message and *Neighbouring FDD Cell Information* IE in RADIO LINK SETUP/ADDITION RESPONSE/FAILURE message.

Flexible Hard Split Support Indicator IE can be transmitted by the following messages

- RADIO LINK SETUP RESPONSE
- RADIO LINK SETUP FAILURE
- RADIO LINK ADDITION RESPONSE
- RADIO LINK ADDITION FAILURE
- UPLINK SIGNALLING TRANSFER INDICATION

9.2.2.x Flexible Hard Split Support Indicator

The Flexible Hard Split Support Indicator indicates whether the particular cell is capable to support Flexible Hard Split or not

IE/Group Name	Presence	Range	IE type and	Semantics description

			reference	
Flexible Hard Split Support Indicator			ENUMERATED (Flexible Hard Split Supported, Flexible Hard Split not Supported).	

4.4.3.1.3 Impact on User Plane

There is no impact on User Plane to support flexible length of TFCI bit for hard split since Frame protocol already supports flexible length of TFCI bit for both logical split and hard split.

4.4.3.2 Agreements and associated contributions

4.4.3.2.1 Impact on TS 25.423

4.4.3.2.1.1 RADIO LINK SETUP REQUEST

FDD Message

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.40		YES	reject
Transaction ID	M		9.2.1.59		–	
SRNC-Id	M		RNC-Id 9.2.1.50		YES	reject
S-RNTI	M		9.2.1.53		YES	reject
D-RNTI	O		9.2.1.24		YES	reject
Allowed Queuing Time	O		9.2.1.2		YES	reject
UL DPCH Information		*1*			YES	reject
>UL Scrambling Code	M		9.2.2.53		–	
>Min UL Channelisation Code Length	M		9.2.2.25		–	
>Max Number of UL DPDCHs	C – CodeLen		9.2.2.24		–	
>Puncture Limit	M		9.2.1.46	For the UL.	–	
>TFCS	M		TFCS for the UL 9.2.1.63		–	
>UL DPCCH Slot Format	M		9.2.2.52		–	
>Uplink SIR Target	O		Uplink SIR 9.2.1.69		–	
>Diversity mode	M		9.2.2.8		–	
>SSDT Cell Identity Length	O		9.2.2.41		–	
>S Field Length	O		9.2.2.36		–	
>DPC Mode	O		9.2.2.12A		YES	reject
DL DPCH Information		*1*			YES	reject
>TFCS	M		TFCS for the DL. 9.2.1.63		–	
>DL DPCH Slot Format	M		9.2.2.9		–	
>Number of DL Channelisation Codes	M		9.2.2.26A		–	
>TFCI Signalling Mode	M		9.2.2.46		–	
>TFCI Presence	C-SlotFormat		9.2.1.55		–	
>Multiplexing Position	M		9.2.2.26		–	
>Power Offset Information		*1*			–	
>>PO1	M		Power Offset 9.2.2.30	Power offset for the TFCI bits.	–	
>>PO2	M		Power Offset 9.2.2.30	Power offset for the TPC bits.	–	
>>PO3	M		Power Offset 9.2.2.30	Power offset for the pilot bits.	–	
>FDD TPC Downlink Step Size	M		9.2.2.16		–	

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
>Limited Power Increase	M		9.2.2.21A		–	
>Inner Loop DL PC Status	M		9.2.2.21a		–	
>Length of TFCI2 for Hard Split	O		9.2.2.x		YES	reject
DCH Information	M		DCH FDD Information 9.2.2.4A		YES	reject
DSCH Information	O		DSCH FDD Information 9.2.2.13A		YES	reject
RL Information		*1…<maxnoofRLs>*			EACH	notify

4.4.3.2.1.2 RADIO LINK RECONFIGURATION PREPARE

FDD Message

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.1.40		YES	reject
Transaction ID	M		9.2.1.59		–	
Allowed Queuing Time	O		9.2.1.2		YES	reject
UL DPCH Information		*0..1*			YES	reject
>UL Scrambling Code	O		9.2.2.53		–	
>UL SIR Target	O		Uplink SIR 9.2.1.69		–	
>Min UL Channelisation Code Length	O		9.2.2.25		–	
>Max Number of UL DPDCHs	C – CodeLen		9.2.2.24		–	
>Puncture Limit	O		9.2.1.46	For the UL.	–	
>TFCS	O		9.2.1.63	TFCS for the UL.	–	
>UL DPCCH Slot Format	O		9.2.2.52		–	
>Diversity Mode	O		9.2.2.8		–	
>SSDT Cell Identity Length	O		9.2.2.41		–	
>S-Field Length	O		9.2.2.36		–	
DL DPCH Information		*0..1*			YES	reject
>TFCS	O		9.2.1.63	TFCS for the DL.	–	
>DL DPCH Slot Format	O		9.2.2.9		–	
>Number of DL Channelisation Codes	O		9.2.2.26A		–	
>TFCI Signalling Mode	O		9.2.2.46		–	
>TFCI Presence	C-SlotFormat		9.2.1.55		–	
>Multiplexing Position	O		9.2.2.26		–	

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
>Limited Power Increase	O		9.2.2.21A		–	
>Length of TFCI2 for Hard Split	O		9.2.2.x		YES	reject
DCHs to Modify	O		FDD DCHs to Modify 9.2.2.13C		YES	reject
DCHs to Add	O		DCH FDD Information 9.2.2.4A		YES	reject
DCHs to Delete		*0..<maxnoof DCHs>*			GLOBAL	reject

4.4.3.2.1.3 UPLINK SIGNALLING TRANSFER INDICATION

FDD Message

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.40		YES	ignore
Transaction ID	M		9.2.1.59		–	
UC-Id	M		9.2.1.71		YES	ignore
SAI	M		9.2.1.52		YES	ignore
Cell GAI	O		9.2.1.5A		YES	ignore
C-RNTI	M		9.2.1.14		YES	ignore
S-RNTI	M		9.2.1.54		YES	ignore
D-RNTI	O		9.2.1.24		YES	ignore
Propagation Delay	M		9.2.2.33		YES	ignore
STTD Support Indicator	M		9.2.2.45		YES	ignore
Closed Loop Mode1 Support Indicator	M		9.2.2.2		YES	ignore
Closed Loop Mode2 Support Indicator	M		9.2.2.3		YES	ignore
L3 Information	M		9.2.1.32		YES	ignore
CN PS Domain Identifier	O		9.2.1.12		YES	ignore
CN CS Domain Identifier	O		9.2.1.11		YES	ignore
URA Information	O		9.2.1.70B		YES	ignore
Cell GA Additional Shapes	O		9.2.1.5B		YES	ignore
Flexible Hard Split Support Indicator	O		9.2.2.x		YES	ignore

4.4.3.2.1.4 (9.2.1.41B) Neighbouring FDD Cell Information

The *Neighbouring FDD Cell Information* IE provides information for FDD cells that are a neighbouring cells to a cell in the DRNC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Neighbouring FDD Cell Information		*1..<maxnoofFDDneighbours>*			–	
>C-Id	M		9.2.1.6		–	
>UL UARFCN	M		UARFCN 9.2.1.66	Corresponds to Nu in ref. [6]	–	
>DL UARFCN	M		UARFCN 9.2.1.66	Corresponds to Nd in ref. [6]	–	
>Frame Offset	O		9.2.1.30		–	
>Primary Scrambling Code	M		9.2.1.45		–	
>Primary CPICH Power	O		9.2.1.44		–	
>Cell Individual Offset	O		9.2.1.7		–	
>Tx Diversity Indicator	M		9.2.2.50			
>STTD Support Indicator	O		9.2.2.45		–	
>Closed Loop Mode1 Support Indicator	O		9.2.2.2		–	
>Closed Loop Mode2 Support Indicator	O		9.2.2.3		–	
>Restriction State Indicator	O		9.2.1.48C		YES	ignore
>Flexible Hard Split Support Indicator	O		9.2.2.x		YES	ignore

4.4.3.2.1.5 New Introduced Information Elements

4.4.3.2.1.5.1 Length of TFCI2 for Hard Split

This IE indicates the length measured in number of bits of TFCI (field2).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Length of TFCI2 for Hard Split			Integer (1..10)	

4.4.3.2.1.5.2 Flexible Hard Split Support Indicator

The Flexible Hard Split Support Indicator indicates whether the particular cell is capable to support Flexible Hard Split or not.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Flexible Hard Split Support Indicator			ENUMERATED (Flexible Hard Split Supported,).	

4.4.3.2.2 Impact on TS 25.433

For Radio Link Setup, Synchronised Radio Link Reconfiguration Preparation and Unsynchronised Radio Link Reconfiguration procedure, texts for successful operation are added as follows (e.g. for Radio Link Setup procedure):

> [FDD – If the RADIO LINK SETUP REQUEST message includes the *Length of TFCI2* IE ~~and the *TFCI signalling option* IE is set to 'Split'~~, then the Node B shall apply the length of TFCI2 field indicated in the message.]
>
> [FDD – If the *Length of TFCI2* IE is not included in the RADIO LINK SETUP REQUEST message and the *Split Type* IE is present with the value 'Hard', then the Node B shall assume the value of the TFCI2 Field is 5 bits.]

For Radio Link Setup, Synchronised Radio Link Reconfiguration Preparation and Unsynchronised Radio Link Reconfiguration procedure, texts for Abnormal Conditions are added as follows (e.g. for Radio Link Setup procedure):

> [FDD – If the RADIO LINK SETUP REQUEST message contains the *Length of TFCI2* IE , but the *TFCI signalling option* IE is set to "Normal", then the Node B shall reject the procedure using the RADIO LINK SETUP FAILURE message.
>
> [FDD – If the RADIO LINK SETUP REQUEST message does not contain *the Length of TFCI2* IE but the *Split type* IE is set to "Logical", then the Node B shall reject the procedure using the RADIO LINK SETUP FAILURE message.
>
> [FDD – If the RADIO LINK SETUP REQUEST message contains the *Length of TFCI2* IE and *the Length of TFCI2* IE is set to 5, but the Split type IE is set to "Hard", then the Node B shall reject the procedure using the RADIO LINK SETUP FAILURE message.

9.2.2.50 TFCI signalling mode

This parameter indicates if the normal or split mode is used for the TFCI. In the event that the split mode is to be used then the IE indicates whether the split is 'Hard' or 'Logical', and in the event that the split is 'Logical' the IE indicates the number of bits in TFCI (field 2).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TFCI signalling option	M		ENUMERATED (Normal, Split)	'Normal' : meaning no split in the TFCI field (either 'Logical' or 'Hard') 'Split' : meaning there is a split in the TFCI field (either 'Logical' or 'Hard')
Split type	C-IfSplit		Enumerated (Hard, Logical)	'Hard' : meaning that TFCI (field 1) and TFCI (field 2) are ~~each 5 bits long and each field is~~ block coded separately. 'Logical' : meaning that on the physical layer TFCI (field 1) and TFCI (field 2) are concatenated, field 1 taking the most significant bits and field 2 taking the least significant bits). The whole is then encoded with a single block code.
Length of TFCI2	O~~C-SplitType~~		Integer (1..10)	This IE indicates the length measured in number of bits of TFCI (field2).

Condition	Explanation
IfSplit	The IE shall be present if the *TFCI signalling option* IE is set to "Split".
~~SplitType~~	~~The IE shall be present if the *Split type* IE is set to "Logical".~~

4.4.3.3 Specification Impact and associated Change Request

Table 1: Place where Change request is given in order to refer the new procedure

3G TS	CR	Title	Remarks
25.433	583	NBAP signalling support for DSCH hard split mode	
25.423	543	RNSAP signalling support for DSCH hard split mode	

4.4.3.4 Backward Compatibility

5 TFCI power control in DSCH hard split mode

5.1 Introduction

According to Release99 and Rel'4 specification, there is split mode of operation where TFCI2 (TFCI for DSCH) is not necessarily transmitted from every cell in the active set when UE is in soft handover region. Thus, the combined TFCI power in UE may not be enough to detect it reliably. As well, the power offset for TFCI (PO1) is determined in Radio Link Setup procedure, and cannot be flexibly changed any longer when Radio Link Reconfiguration, Radio Link Addition or Deletion occurs. Therefore, there seems to be a reliability problem if the power offset is initially decided a lower value than required one regardless of whether UE is in soft handover or not. To consider this problem in Release99 and Rel'4, the power offset must be always set the highest value even when UE does not exist in soft handover region. In the viewpoint of power resource management, it may be inefficient to always allocate the high power offset to TFCI. Therefore, TFCI power control enhancement methods in the DSCH hard split mode are proposed to solve these problems in Rel'5. In the following sections, two methods are described to flexibly adjust the power offset for TFCI.

5.2 Requirements

The proposed TFCI power control scheme is to flexibly adjust the power offset for TFCI. The requirements are summarised as follows.

- The backward compatibility to Release 99/Rel 4 should be guaranteed.
- Hardware increase shall be minimised.
- The proposed scheme shows an acceptable performance.
- Compatibility with other proposed methods is still kept.

5.3 **Proposed TFCI power control scheme**

In this section, some details on the proposed TFCI power control scheme are described, in which new parameters such as TFCI PO or TFCI PO_primary are introduced in Frame Protocol specification and how to allocate flexible power offset for TFCI is explained. As well, simulation results are shown to indicate the required values for TFCI power offset in soft handover.

5.3.1 Proposed TFCI power control scheme for Rel'5

The proposed TFCI power control scheme is to flexibly adjust the power offset for TFCI in the DSCH hard split mode. For such an operation via Frame Protocol, the parameters that express power offset are introduced. Note that the proposed power offset is applied to both TFCI1 (TFCI for DCH) and TFCI2 (TFCI for DSCH) in the DSCH hard split mode, since the only power offset for TFCI, PO1, is defined in Release99 and Rel'4. Several TFCI power offset values can be supported if the power offset values with additional information are updated.

Two methods are described to show the operation of the proposed scheme based on the additional information such as whether UE exists in soft handover region or whether the cell transmitting DSCH is primary using SSDT uplink only signaling. In method 1, the power offset of PO1 can be determined by whether UE is in soft handover region. If the UE moves from non-handover to handover region, the power offset of PO1 is added to DPCCHs as shown in Figure 5.1. The proper power offset value may beobtained in RNC and signaled by the parameter of TFCI PO to Node B via Frame Protocol.

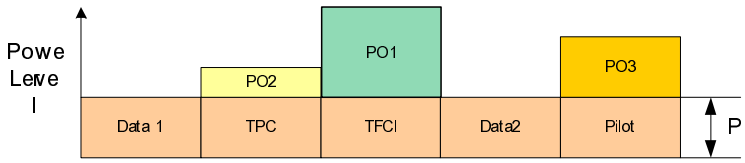
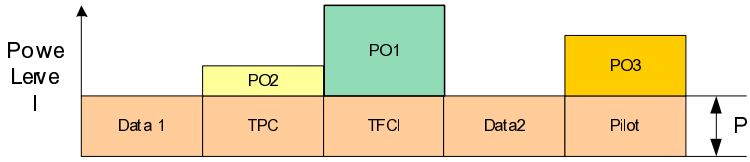
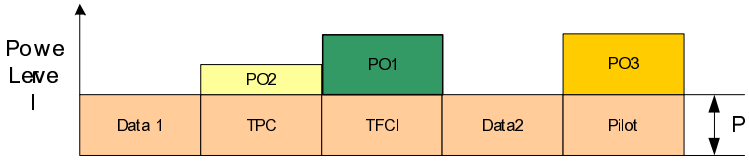


Figure 5.1 Power level in method 1

In method 2, it is the same point that the power offset of PO1 is determined by whether UE is in soft handover (see Figure 5.2 (a)). In addition, the power offset of PO1is determined by whether TFCI2 is transmitted from primary cell (see Figure 5.2 (b)). The decision on primary or non-primary is made using SSDT uplink only signaling. Note that the SSDT uplink only signaling in method 2 is activated when DSCH power control improvement in soft handover in Rel'4 is operated. When the cell that transmits TFCI2 is primary, the power offset of PO1 for TFCI is added by TFCI PO_primary via Frame Protocol. Otherwise, the power offset of PO1 is applied in soft handover as such a method 1.



(a) non-primary cell case



(b) primary cell case

Figure 5.2 Power level in method 2

In Table 5.1 the Frame Protocol parameters for power offset for TFCI, PO1, are summarised. Note that the proposed power offset should be applied to the DPCCHs, which send both TFCI1 and TFCI2 in the DSCH hard split mode. While the power offset values for the DPCCHs transmitting TFCI1 only follow the procedure defined in Release99 or Rel'4.

Table 5.1 Frame Protocol Parameters for TFCI power offset

	Cell sending the DSCH		Cell(s) not sending the DSCH
	Primary	Non-primary	
Method 1	TFCI PO		
Method 2	TFCI PO_primary	TFCI PO	

Note that all parameters show the TFCI power offset, PO1, which is updated by Frame Protocol. TFCI PO means the power offset for TFCI in method 1, and the power offset for TFCI transmitted from non-

primary cell in soft handover for method 2. TFCI PO_primary is the power offset for TFCI transmitted from primary cell in soft handover for method 2.

Figures 5.3 and 5.4 are the overall system behavior in the proposed TFCI power control scheme in the DSCH hard split mode, which show the example cases of methods 1 and 2, respectively. Here, it is assumed that UE in soft handover has three radio links in active set. Since Node B2 in DRNC sends DSCH, DRNC treats DSCH scheduling and thus TFCI hard split signaling mode is used. TFCI2 (TFCI for DSCH) is transmitted from Node B1 and 2, not from every cell in the active set.

Figure 5.3 shows that the method 1 can adjust TFCI bit power by the proper power offset in radio links where TFCI2 is transmitted. TFCI PO is determined in SRNC and signaled to DRNC and then to Node B1 and 2 by Iur/Iub DCH Frame Protocol.

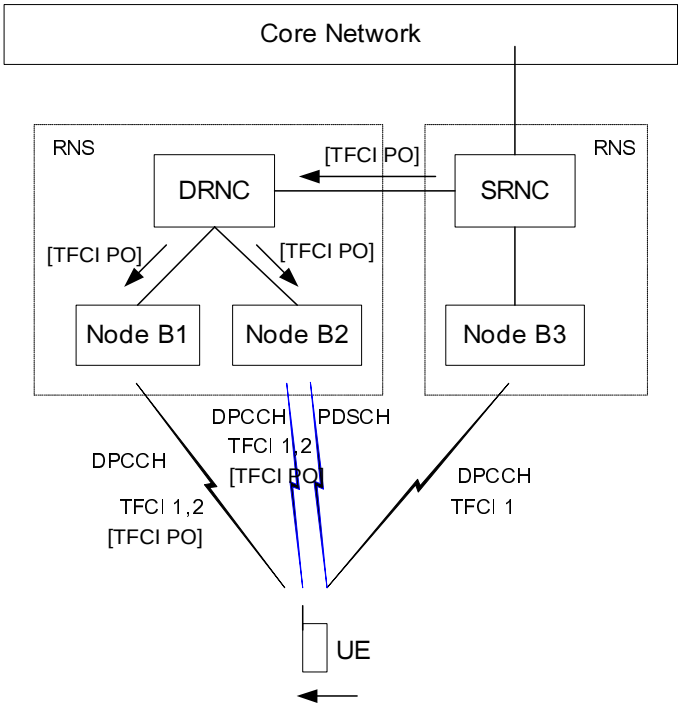


Figure 5.3 Overall system behavior for method 1 with additional power offset

In Figure 5.4, it is assumed that Node B 2 is determined primary cell by using the activated uplink SSDT signaling. TFCI POin method 2 is defined in the same way with that in method 1. Additionally, the power offset parameter for the primary case, TFCI PO_primary, is sent to Node B2 which transmit the DSCH. Node B2 may choose the parameter of TFCI PO/TFCI PO_primary according to the primary/non-primary condition. Note that in Figures 5.3 and 5.4 TFCI power offset of PO1 from Node B3 is transmitted in the same way with Release 99 or Rel'4, because TFCI2 is not transmitted in the radio link from Node B3.

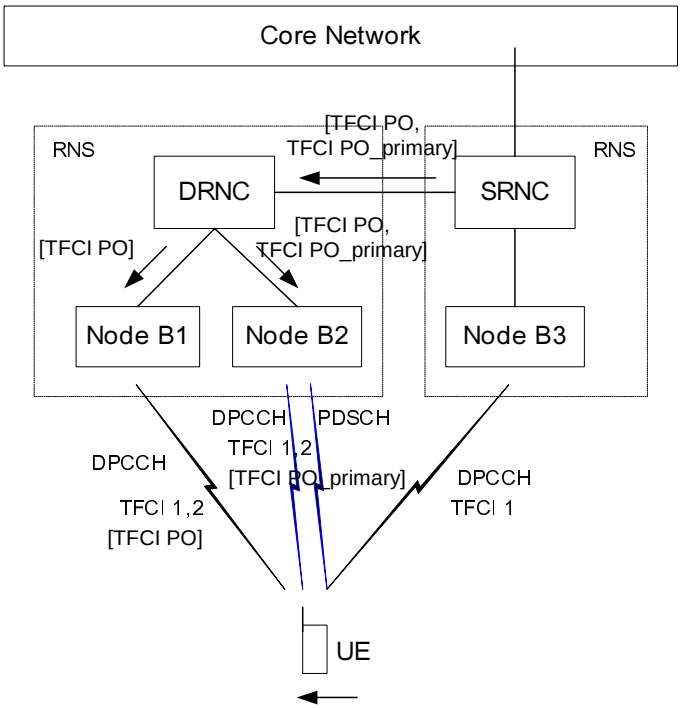


Figure 5.4 Overall system behavior for method 2 with additional power offset

5.3.2 Considerations on the required power offset

In this section, the required power offset for various radio link environments is obtained through link level simulations. The simulation is performed to show how much power offset for TFCI is required to guarantee the reliability of TFCI 2 bits when TFCI2 is not transmitted from every cell in the active set. The simulation assumptions are shown in Table 5.2.

Table 5.2 Simulation assumptions.

Fading channel	Flat Rayleigh
Mobile speed	3 km/hr
Active set in soft handover	2 or 3
Received power from each cell in active set	Equal
TFCI coding for DSCH	Same as in Release 99
Power control	Perfect

Table 5.3 shows the required power offset for TFCI2, which is relatively calculated from reference power. The reference is the required power to achieve a word error rate (WER) of 1 % when every cell transmits TFCI2. Note that all of TFCI2 from several links are received and combined in UE in order to calculate such a required power offset. Three cases of handover are assumed, among which 3-way(1 cell) and 3-way(2 cells) mean that 1 and 2 cells transmit TFCI2 in 3-way handover, respectively.

Table 5.3 Required power offset for TFCI2

Cases	Method 1	Method 2	
	PO1 (TFCI PO)	PO1 (TFCI PO_primary)	PO1 (TFCI PO)
2-way (1 cell)	19.5 dB	4.6 dB	19.5 dB
3-way (1 cell)	23.27 dB	7.27 dB	23.27 dB
3-way (2 cells)	8.97 dB	3.47 dB	8.97 dB

From the Table 5.3, we see that the required TFCI power offset (PO1) which guarantees the reliability has the range of 3.47 to 23.27dB. Some of the ranges include the power offset values beyond the range of PO1 that is from 0 to 6dB. Therefore, it is needed to adaptively set TFCI2 power with power offset of TFCI PO or TFCI PO_primary via Frame Protocol, in order to guarantee the reliable and efficient transmission of TFCI2. As well, the conditions to determine the power offset for TFCI is as follows:

- The number of radio links in the active set
- The number of radio links in the active set that transmit TFCI2

5.3.3 Complexity

In order to support the proposed TFCI power control scheme, there is no increase in hardware complexity, but a higher layer signaling from SRNC to CRNC/Node B is required. The power offset value should be obtained in SRNC and signaled to CRNC/Node B by the newly defined parameters in Section 5.3.1.

- UE point of view
  No additional hardware and software are required.
- Node B point of view
  The software changes are expected in order to flexibly set the power offset for TFCI. The new singling elements are added to the Iur/Iub specification. There is no impact on the existing hardware structures.
- RNC point of view
  The software changes are expected in order to calculate the newly defined TFCI power offset. The new signaling elements are required to add to the Iur/Iub specification. The existing hardware structures are not impacted.

5.4 Specification Impact and associated Change Request

The expected specification impacts are small.

25.214: Time-varying TFCI power by method 1 or method 2 should be explained.

- For method 1, no impact is expected.
- For method 2, SSDT uplink signalling usage for TFCI power control is to be described.

25.427: The changed power offset should be signalled via Iur/Iub signalling.

- For method 1, new parameter, TFFCI PO, is to be added in the information element.
- For method 2, new parameter, TFCI PO and TFCI PO_primary, is to be added in the information element.

25.435: Description regarding to the DSCH power offset should be clarified.

WG1

========== start of change in TS25.214 ==========

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.

========== end of change in TS25.214 ==========

WG3

5.4.1 Study Areas

5.4.1.1 New Information

The parameters to be needed for supporting TFCI power control in the DSCH hard split mode are as followings:

1) for TFCI power control method 1 : TFCI PO

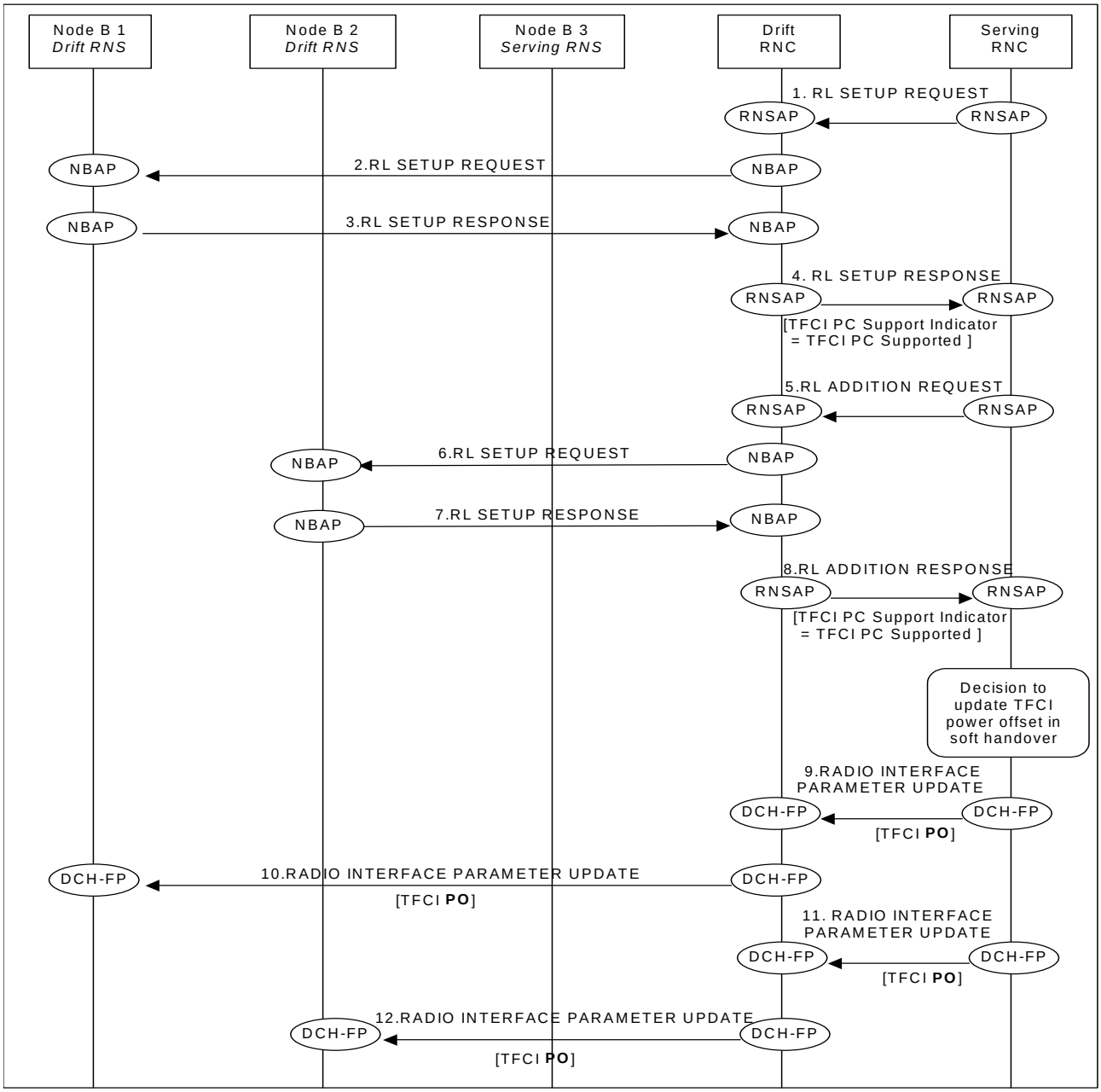
2) for TFCI power control method 2 : TFCI PO, TFCI PO_primary

3) to indicate whether the proposed TFCI power control scheme is supported in the cell : TFCI PC Support Indicator

For the method 2, the parameters for the primary/secondary status determination from SSDT commands in the uplink FBI (Feedback Information) field would be shared with DSCH Power Control Improvement. When the improved DSCH PC is activated, the TFCI power control method 2 is also activated.

5.4.1.2 Example Scenario

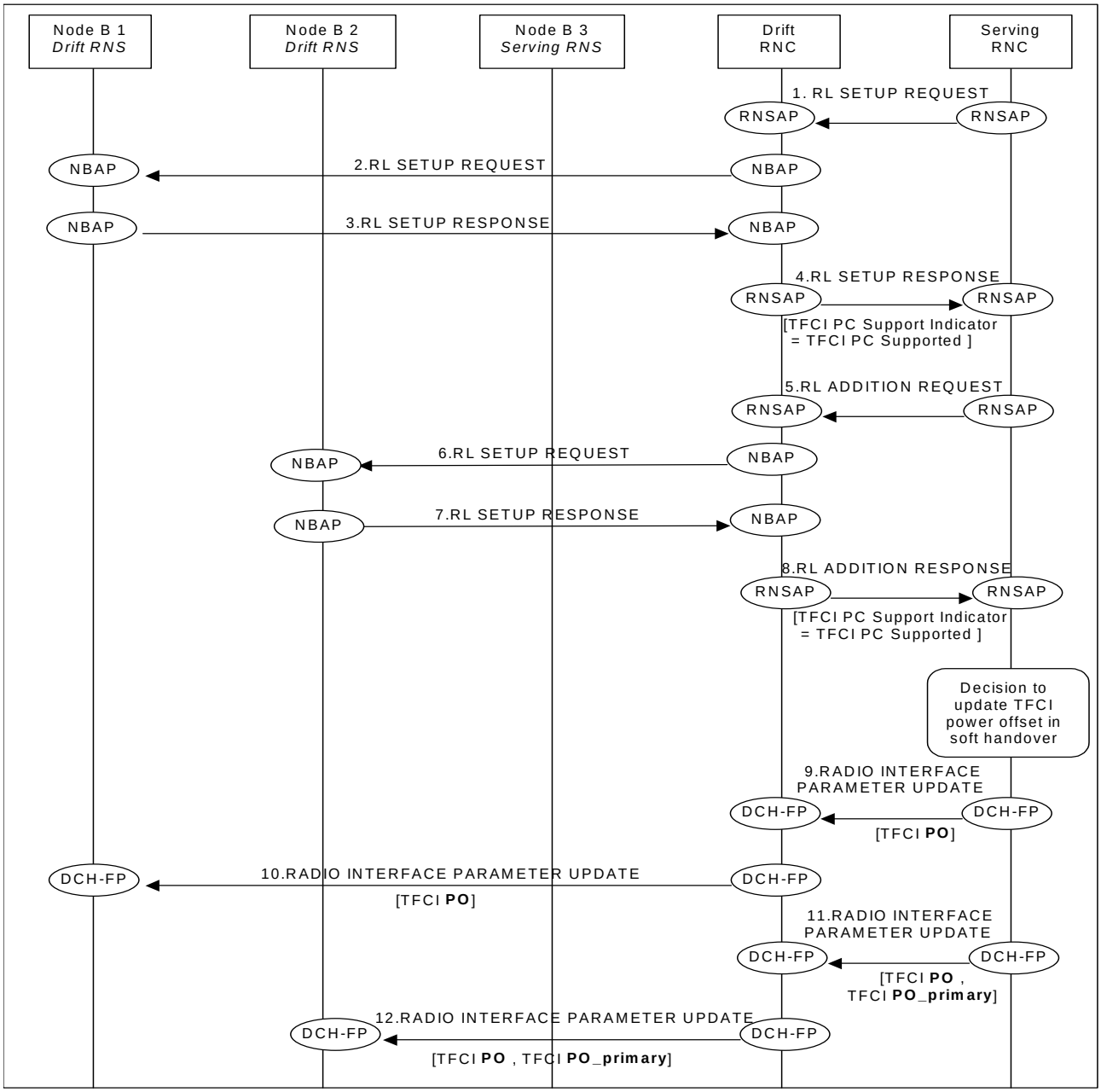
5.4.1.2.1 Example Scenario for Method 1



This signalling procedure is for figure 5.3, and shows how the new power offset is applied.

1. SRNC sends RNSAP message RADIO LINK SETUP REQUEST to DRNC.
2. DRNC sends RADIO LINK SETUP REQUEST to Node B1.
3. Node B1 sends RADIO LINK SETUP RESPONSE to DRNC.
4. DRNC sends RNSAP message RADIO LINK SETUP RESPONSE to SRNC with the parameter which Node B1 provided [TFCI PC Support Indicator].
5. SRNC sends RNSAP message RADIO LINK ADDITION REQUEST to DRNC.
6. DRNC sends RADIO LINK SETUP REQUEST to Node B2.
7. Node B2 sends RADIO LINK SETUP RESPONSE to DRNC.
8. DRNC sends RNSAP message RADIO LINK ADDITION RESPONSE to SRNC with the parameter which Node B2 provided [TFCI PC Support Indicator].
9. SRNC sends RADIO INTERFACE PARAMTER UPDATE control frame to DRNC with the power offset parameter [TFCI PO].
10. DRNC sends RADIO INTERFACE PARAMTER UPDATE control frame to Node B1 with the power offset parameter [TFCI PO].
11. SRNC sends RADIO INTERFACE PARAMTER UPDATE control frame to DRNC with the power offset parameter [TFCI PO].
12. DRNC sends RADIO INTERFACE PARAMTER UPDATE control frame to Node B2 with the power offset parameter [TFCI PO].

5.4.1.2.2 Example Scenario for Method 2



This signalling procedure is for figure 5.4, and shows how the new power offsets are applied.

1. SRNC sends RNSAP message RADIO LINK SETUP REQUEST to DRNC.
2. DRNC sends RADIO LINK SETUP REQUEST to Node B1.
3. Node B1 sends RADIO LINK SETUP RESPONSE to DRNC.
4. DRNC sends RNSAP message RADIO LINK SETUP RESPONSE to SRNC with the parameter which Node B1 provided [TFCI PC Support Indicator].
5. SRNC sends RNSAP message RADIO LINK ADDITION REQUEST to DRNC.

6. DRNC sends RADIO LINK SETUP REQUEST to Node B2.
7. Node B2 sends RADIO LINK SETUP RESPONSE to DRNC.
8. DRNC sends RNSAP message RADIO LINK ADDITION RESPONSE to SRNC with the parameter which Node B2 provided [TFCI PC Support Indicator].
9. SRNC sends RADIO INTERFACE PARAMTER UPDATE control frame to DRNC with the power offset parameter [TFCI PO].
10. DRNC sends RADIO INTERFACE PARAMTER UPDATE control frame to Node B1 with the power offset parameter [TFCI PO].
11. SRNC sends RADIO INTERFACE PARAMTER UPDATE control frame to DRNC with the power offset parameter [TFCI PO, TFCI PO_primary].
12. DRNC sends RADIO INTERFACE PARAMTER UPDATE control frame to Node B2 with the power offset parameter [TFCI PO, TFCI PO_primary].

5.4.2 Agreements and associated contributions

It is agreed that the Method2 described in the study area is accepted as the Enhanced TFCI Power Control procedure and this solution will be adopted and specified in RAN3 TSs.

1. It is agreed to use the User plane to signal TFCI power offsets.
2. It is agreed that TFCI PO and TFCI PO_primary parameters are introduced in RADIO INTERFACE UPDATE PARAMTER in DCH frame protocol.
3. It is agreed that *TFCI PC Support Indicator* IE is introduced in RADIO LINK SETUP RESPONSE, RADIO LINK SETUP FAILURE, RADIO LINK ADDITION RESPONSE and RADIO LINK ADDITION FAILURE messages in RNSAP.

It is clarified that the parameters for the primary/secondary status determination from SSDT commands in the uplink FBI (Feedback Information) field are shared with DSCH Power Control Improvement.

5.4.3 Specification Impact and associated Change Request

5.4.3.1 Impacts on RNSAP (TS 25.423)

========== TS 25.423 ==========

8.3.1 Radio Link Setup

8.3.1.1 General

This procedure is used for establishing the necessary resources in the DRNS for one or more radio links. The connection-oriented service of the signalling bearer shall be established in conjunction with this procedure.

8.3.1.2 Successful Operation

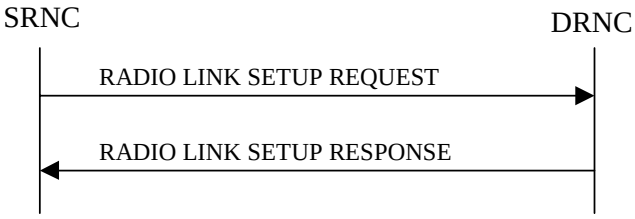


Figure 5: Radio Link Setup procedure: Successful Operation

When the SRNC makes an algorithmic decision to add the first cell or set of cells from a DRNS to the active set of a specific UE-UTRAN connection, the RADIO LINK SETUP REQUEST message is sent to the corresponding DRNC to request establishment of the radio link(s).
The DRNS shall prioritise resource allocation for the RL(s) to be established according to Annex A.
If the RADIO LINK SETUP REQUEST message includes the *Allowed Queuing Time* IE the DRNS may queue the request the time corresponding to the value of the *Allowed Queuing Time* IE before starting to execute the request.
If no *D-RNTI* IE was included in the RADIO LINK SETUP REQUEST message, the DRNC shall assign a new D-RNTI for this UE.
Transport Channels Handling:

DCH(s):

[TDD - If the *DCH Information* IE is present in RADIO LINK SETUP REQUEST message, the DRNS shall configure the new DCHs according to the parameters given in the message.]

If the RADIO LINK SETUP REQUEST message includes a *DCH Information* IE with multiple *DCH Specific Info* IEs then the DRNS shall treat the DCHs in the *DCH Information* IE as a set of co-ordinated DCHs.

[FDD - For DCHs which do not belong to a set of co-ordinated DCHs with the *QE-Selector* IE set to "selected", the Transport channel BER from that DCH shall be the base for the QE in the UL data frames. If no Transport channel BER is available for the selected DCH the Physical channel BER shall be used for the QE, ref. [4]. If the QE-Selector is set to "non-selected ", the Physical channel BER shall be used for the QE in the UL data frames, ref. [4].]

For a set of co-ordinated DCHs the Transport channel BER from the DCH with the *QE-Selector* IE set to "selected" shall be used for the QE in the UL data frames, ref. [4]. [FDD - If no Transport channel BER is available for the selected DCH the Physical channel BER shall be used for the QE, ref. [4]. If all DCHs have *QE-Selector* IE set to "non-selected" the Physical channel BER shall be used for the QE, ref. [4].]

The DRNS shall use the included *UL DCH FP Mode* IE for a DCH or a set of co-ordinated DCHs as the DCH FP Mode in the Uplink of the user plane for the DCH or the set of co-ordinated DCHs.

The DRNS shall use the included *ToAWS* IE for a DCH or a set of co-ordinated DCHs as the Time of Arrival Window Start Point in the user plane for the DCH or the set of co-ordinated DCHs.

The DRNS shall use the included *ToAWE* IE for a DCH or a set of co-ordinated DCHs as the Time of Arrival Window End Point in the user plane for the DCH or the set of co-ordinated DCHs.

The *Frame Handling Priority* IE defines the priority level that should be used by the DRNS to prioritise between different frames of the data frames of the DCHs in the downlink on the radio interface in congestion situations once the new RL(s) have been activated.

If the *DCH Specific Info* IE in the *DCH Information* IE includes the *Guaranteed Rate Information* IE, the DRNS shall treat the included IEs according to the following:

- If the *Guaranteed Rate Information* IE includes the *Guaranteed UL Rate* IE, the DRNS may decide to request the SRNC to limit the user rate of the uplink of the DCH at any point in time. The DRNS may request the SRNC to reduce the user rate of the uplink of the DCH below the guaranteed bit rate, however, whenever possible the DRNS should request the SRNC to reduce the user rate between the maximum bit rate and the guaranteed bit rate. If the *DCH Specific Info* IE in the *DCH Information* IE does not include the *Guaranteed UL Rate* IE, the DRNS shall not limit the user rate of the uplink of the DCH.

- If the *Guaranteed Rate Information* IE includes the *Guaranteed DL Rate* IE, the DRNS may decide to request the SRNC to limit the user rate of the downlink of the DCH at any point in time. The DRNS may request the SRNC to reduce the user rate of the downlink of the DCH below the guaranteed bit rate, however, whenever possible the DRNS should request the SRNC to reduce the user rate between the maximum bit rate and the guaranteed bit rate. If the *DCH Specific Info* IE in the *DCH Information* IE does not include the *Guaranteed DL Rate* IE, the DRNS shall not limit the user rate of the downlink of the DCH.

DSCH(s):

If the *DSCH Information* IE is included in the RADIO LINK SETUP REQUEST message, the DRNC shall establish the requested DSCHs [FDD - on the RL indicated by the PDSCH RL ID IE]. In addition, the DRNC shall send a valid set of *DSCH Scheduling Priority* IE and *MAC-c/sh SDU Length* IE parameters to the SRNC in the message RADIO LINK SETUP RESPONSE message.

[TDD - USCH(s)]:

[TDD – The DRNS shall use the list of RB Identities in the *RB Info* IE in the *USCH information* IE to map each *RB Identity* IE to the corresponding USCH.]

Physical Channels Handling:

[FDD - Compressed Mode]:

[FDD - If the RADIO LINK SETUP REQUEST message includes the *Transmission Gap Pattern Sequence Information* IE, the DRNS shall store the information about the Transmission Gap Pattern Sequences to be used in the Compressed Mode Configuration. This Compressed Mode Configuration shall be valid in the DRNS until the next Compressed Mode Configuration is configured in the DRNS or last Radio Link is deleted.]

[FDD - If the RADIO LINK SETUP REQUEST message includes the *Transmission Gap Pattern Sequence Information* IE and the *Active Pattern Sequence Information* IE, the DRNS shall use the information to activate the indicated Transmission Gap Pattern Sequences(s) in the new RL. The received *CM Configuration Change CFN* IE refers to latest passed CFN with that value. The DRNS shall treat the received *TGCFN* IEs as follows:]

- [FDD - If any received *TGCFN* IE has the same value as the received *CM Configuration Change CFN* IE, the DRNS shall consider the concerning Transmission Gap Pattern Sequence as activated at that CFN.]

- [FDD - If any received *TGCFN* IE does not have the same value as the received *CM Configuration Change CFN* IE but the first CFN after the CM Configuration Change CFN with a value equal to the *TGCFN* IE has already passed, the DRNS shall consider the concerning Transmission Gap Pattern Sequence as activated at that CFN.]

- [FDD - For all other Transmission Gap Pattern Sequences included in the *Active Pattern Sequence Information* IE, the DRNS shall activate each Transmission Gap Pattern Sequence at the first CFN after the CM Configuration Change CFN with a value equal to the *TGCFN* IE for the Transmission Gap Pattern Sequence.]

[FDD- If the *Downlink Compressed Mode Method* IE in one or more Transmission Gap Pattern Sequence is set to 'SF/2' in the RADIO LINK SETUP REQUEST message, the DRNS shall include the *Transmission Gap Pattern Sequence Scrambling Code Information* IE in the RADIO LINK SETUP RESPONSE message indicating for each DL Channelisation Code whether the alternative scrambling code shall be used or not.]

[FDD - DL Code Information]:

[FDD – When more than one DL DPDCH are assigned per RL, the segmented physical channel shall be mapped on to DL DPDCHs according to [8]. When *p* number of DL DPDCHs are assigned to each RL, the first pair of DL Scrambling Code and FDD DL Channelisation Code Number corresponds to "*PhCH number 1*", the second to "*PhCH number 2*", and so on until the *p*th to "*PhCH number p*".]

General:

[FDD - If the *Propagation Delay* IE is included, the DRNS may use this information to speed up the detection of UL synchronisation on the Uu interface.]

[FDD – If the received *Limited Power Increase* IE is set to 'Used', the DRNS shall, if supported, use Limited Power Increase according to ref. [10] subclause 5.2.1 for the inner loop DL power control.]

Radio Link Handling:

Diversity Combination Control:

[FDD - The *Diversity Control Field* IE indicates for each RL except for the first RL whether the DRNS shall combine the RL with any of the other RLs or not on the Iur. If the *Diversity Control Field* IE is set to "May" (be combined with another RL), then the DRNS shall decide for any of the alternatives. If the *Diversity Control Field* IE is set to "Must", the DRNS shall combine the RL with one of the other RL. When an RL is to be combined, the DRNS shall choose which RL(s) to combine it with. If the *Diversity Control Field* IE is set to "Must not", the DRNS shall not combine the RL with any other existing RL.]

[FDD - In the case of combining one or more RLs the DRNC shall indicate in the RADIO LINK SETUP RESPONSE message with the *Diversity Indication* IE that the RL is combined with another RL RL for all RLs but the first RL. In this case the Reference *RL ID* IE shall be included to indicate with which RL the combination is performed. The Reference *RL ID* IE shall not be included for the first of the combined RLs, for which the *Transport Layer Address* IE and the *Binding ID* IE shall be included.]

[FDD - In the case of not combining an RL with another RL, the DRNC shall indicate in the RADIO LINK SETUP RESPONSE message with the *Diversity Indication* IE that no combining is performed. In this case the DRNC shall include both the *Transport Layer Address* IE and the *Binding ID* IE for the transport bearer to be established for each DCH and DSCH of the RL in the RADIO LINK SETUP RESPONSE message.]

[TDD - The DRNC shall always include in the RADIO LINK SETUP RESPONSE message both the *Transport Layer Address* IE and the *Binding ID* IE for the transport bearer to be established for each DCH, DSCH and USCH of the RL.]

In case of a set of co-ordinated DCHs requiring a new transport bearer on Iur the *Binding ID* IE and the *Transport Layer Address* IE shall be included only for one of the DCHs in the set of co-ordinated DCHs.

[FDD-Transmit Diversity]:

[FDD – If the cell in which the RL is being set up is capable to provide Close loop Tx diversity, the DRNC shall include the *Closed Loop Timing Adjustment Mode* IE in the RADIO LINK SETUP RESPONSE message indicating the configured Closed loop timing adjustment mode of the cell.]

[FDD – When *Diversity Mode* IE is "STTD", "Closed loop mode1", or "Closed loop mode2", the DRNC shall activate/deactivate the Transmit Diversity to each Radio Link in accordance with *Transmit Diversity Indicator* IE].

DL Power Control:

[FDD - If both the *Initial DL TX Power* IE and *Uplink SIR Target* IE are included in the message, the DRNS shall use the indicated DL TX Power and Uplink SIR Target as initial value. If the value of the *Initial DL TX Power* IE is outside the configured DL TX power range, the DRNS shall apply these constrains when setting the initial DL TX power. The DRNS shall also include the configured DL TX power range defined by *Maximum DL TX Power* IE and *Minimum DL TX Power* IE in the RADIO LINK SETUP RESPONSE message. The DRNS shall not transmit with a higher power than indicated by the *Maximum DL TX Power IE* or lower than indicated by the *Minimum DL TX Power IE* on any DL DPCH of the RL except during compressed mode, when the $P_{SIR}(k)$, as described in ref.[10] subclause 5.2.1.3, shall be added to the maximum DL power in slot k.]

[FDD - If both the *Initial DL TX Power* and the *Uplink SIR Target* IEs are not included in the RADIO LINK SETUP REQUEST message, then DRNC shall determine the initial Uplink SIR Target and include it in the *Uplink SIR Target* IE in the RADIO LINK SETUP RESPONSE message.]

[FDD - If the *Primary CPICH Ec/No* IE is present, the DRNC should use the indicated value when deciding the Initial DL TX Power.]

[TDD - If the *Primary CCPCH RSCP* IE and/or the [3.84Mcps TDD - *DL Time Slot ISCP Info* IE] and/or the [1.28Mcps TDD - *DL Time Slot ISCP Info LCR* IE] are present, the DRNC should use the indicated values when deciding the Initial DL TX Power.]

[FDD – The DRNS shall start the DL transmission using the indicated DL TX power level (if received) or the decided DL TX power level on each DL channelisation code of a RL until UL synchronisation is achieved on the Uu interface for the concerning RLS or Power Balancing is activated. No inner loop power control or power balancing shall be performed during this period. The DL power shall then vary according to the inner loop power control (see ref.[10] subclause 5.2.1.2) and the power control procedure (see 8.3.7).]

[TDD – The DRNS shall start the DL transmission using the decided DL TX power level on each DL channelisation code and on each Time Slot of a RL until UL synchronisation is achieved on the Uu interface for the concerning RL. No inner loop power control shall be performed during this period. The DL power shall then vary according to the inner loop power control (see ref. [22] subclause 4.2.3.3).]

[FDD – If the received *Inner Loop DL PC Status* IE is set to "Active", the DRNS shall activate the inner loop DL power control for all RLs. If *Inner Loop DL PC Status* IE is set to "Inactive", the DRNS shall deactivate the inner loop DL power control for all RLs according to ref. [10].

[FDD - If the *DPC Mode* IE is present in the RADIO LINK SETUP REQUEST message, the DRNC shall apply the DPC mode indicated in the message, and be prepared that the DPC mode may be changed during the life time of the RL. If the *DPC Mode* IE is not present in the RADIO LINK SETUP REQUEST message, DPC mode 0 shall be applied (see ref. [10]).]

Neighbouring Cell Handling:

If there are UMTS neighbouring cell(s) to the cell in which a Radio Link was established then:

- The DRNC shall include the *Neighbouring FDD Cell Information* IE and/or *Neighbouring TDD Cell Information* IE in the *Neighbouring UMTS Cell Information* IE for each neighbouring FDD cell and/or TDD cell respectively. In addition, if the information is available, the DRNC shall include the *Frame Offset* IE, *Primary CPICH Power* IE, *Cell Individual Offset* IE, *STTD Support Indicator* IE, *Closed Loop Mode1 Support Indicator* IE and *Closed Loop Mode2 Support Indicator* IE in the *Neighbouring FDD Cell Information* IE, and the *Frame Offset* IE, *Cell Individual Offset* IE, *DPCH Constant Value* IE and the *PCCPCH Power* IE in the *Neighbouring TDD Cell Information* IE.

- If a UMTS neighbouring cell is not controlled by the same DRNC, the DRNC shall also include the *CN PS Domain Identifier* IE and/or *CN CS Domain Identifier* IE which are the identifiers of the CN nodes connected to the RNC controlling the UMTS neighbouring cell.

- [FDD - The DRNC shall include the *DPC Mode Change Support Indicator* IE if the DRNC is aware that the neighbouring cell supports DPC mode change.]

For the UMTS neighbouring cells which are controlled by the DRNC, the DRNC shall report in the RADIO LINK SETUP RESPONSE message the restriction state of those cells, otherwise *Restriction state indicator* IE may be absent. The DRNC shall include the *Restriction state indicator* IE for the neighbouring cells which are controlled by the DRNC in the *Neighbouring FDD Cell Information* IE, the *Neighbouring TDD Cell Information* IE and the *Neighbouring TDD Cell Information LCR* IE.

If there are GSM neighbouring cells to the cell(s) where a radio link is established, the DRNC shall include the *Neighbouring GSM Cell Information* IE in the RADIO LINK SETUP RESPONSE message for each of the GSM neighbouring cells. If available the DRNC shall include the *Cell Individual Offset* IE in the *Neighbouring GSM Cell Information* IE.

General:

[FDD - If the RADIO LINK SETUP REQUEST message includes the *SSDT Cell Identity* IE and the *S-Field Length* IE, the DRNS shall activate SSDT, if supported, using the *SSDT Cell Identity* IE and *SSDT Cell Identity Length* IE.]

[FDD - If the RADIO LINK SETUP REQUEST message includes the *SSDT Cell Identity for EDSCHPC* IE, the DRNS shall activate enhanced DSCH power control, if supported, using the *SSDT Cell Identity for EDSCHPC* IE and *SSDT Cell Identity Length* IE as well as *Enhanced DSCH PC* IE in accordance with ref. [10] subclause 5.2.2. If the RADIO LINK SETUP REQUEST message includes both *SSDT Cell Identity* IE and *SSDT Cell Identity for EDSCHPC* IE, then the DRNS shall ignore the *SSDT Cell Identity for EDSCHPC* IE.]

[FDD - If the *DRAC Control* IE is set to "requested" in the RADIO LINK SETUP REQUEST message for at least one DCH and if the DRNS supports the DRAC, the DRNC shall indicate in the RADIO LINK SETUP RESPONSE message the *Secondary CCPCH Info* IE for the FACH where the DRAC information is sent, for each Radio Link established in a cell where DRAC is active. If the DRNS does not support DRAC, the DRNC shall not provide these IEs in the RADIO LINK SETUP RESPONSE message.]

If no *D-RNTI* IE was included in the RADIO LINK SETUP REQUEST message, the DRNC shall include the node identifications of the CN Domain nodes that the RNC is connected to (using LAC and RAC of the current cell), and the *D-RNTI* IE in the RADIO LINK SETUP RESPONSE message.

[FDD - If the *D-RNTI* IE was included the RADIO LINK SETUP REQUEST message the DRNC shall include the *Primary Scrambling Code* IE, the *UL UARFCN* IE and the *DL UARFCN* IE in the RADIO LINK SETUP RESPONSE message.]

[TDD – If the *D-RNTI* IE was included in the RADIO LINK SETUP REQUEST message the DRNC shall include the *UARFCN* IE, the *Cell Parameter ID* IE,[3.84Mcps TDD - the *Sync Case* IE, the *SCH Time Slot* IE,] the *SCTD Indicator* IE, and the *PCCPCH Power* IE in the RADIO LINK SETUP RESPONSE message.]

[TDD - The DRNC shall include the *Secondary CCPCH Info TDD* IE in the RADIO LINK SETUP RESPONSE message if at least one *DSCH Information Response* IE or *USCH Information Response* IE is included in the message and at least one DCH is configured for the radio link. The DRNC shall also include the [3.84Mcps TDD - *Secondary CCPCH Info TDD* IE] [1.28Mcps TDD – *Secondary CCPCH Info TDD LCR* IE] in the RADIO LINK SETUP RESPONSE message if at least one *DSCH Information Response* IE or *USCH Information Response* IE is included in the message and the SHCCH messages for this radio link will be transmitted over a different secondary CCPCH than selected by the UE from system information.]

For each Radio Link established in a cell where at least one URA Identity is being broadcast, the DRNC shall include a URA Identity for this cell in the *URA ID* IE, the *Multiple URAs Indicator* IE indicating whether or not multiple URA Identities are being broadcast in the cell, and the RNC Identity of all other RNCs that are having at least one cell within the URA in the cell in the *URA Information* IE in the RADIO LINK SETUP RESPONSE message.

Depending on local configuration in the DRNS, it may include the geographical co-ordinates of the cell, represented either by the *Cell GAI* IE or by the *Cell GA Additional Shapes* IE and the UTRAN access point position for each of the established RLs in the RADIO LINK SETUP RESPONSE message.

If the DRNS need to limit the user rate in the uplink of a DCH already when starting to utilise a new Radio Link, the DRNC shall include the *Allowed UL Rate* IE of the *Allowed Rate Information* IE in the *DCH Information Response* IE for this DCH in the RADIO LINK SETUP RESPONSE message for this Radio Link.

If the DRNS need to limit the user rate in the downlink of a DCH already when starting to utilise a new Radio Link, the DRNC shall include the *Allowed DL Rate* IE of the *Allowed Rate Information* IE in the *DCH Information Response* IE for this DCH in the RADIO LINK SETUP RESPONSE message for this Radio Link.

If the *Permanent NAS UE Identity* IE is included in the RADIO LINK SETUP REQUEST message, the DRNS shall store the information for the considered UE Context for the life-time of the UE Context.
If the RADIO LINK SETUP REQUEST message includes the *Permanent NAS UE Identity* IE and a *C-ID* IE corresponding to a cell reserved for operator use, the DRNC shall use this information to determine whether it can set up a Radio Link on this cell or not for the considered UE Context.

[FDD - If the accessed cell supports TFCI power control, the DRNC shall include the *TFCI PC Support Indicator* IE in the RADIO LINK SETUP RESPONSE message.]

[FDD - Radio Link Set Handling]:

[FDD - The *First RLS Indicator* IE indicates if the concerning RL shall be considered part of the first RLS established towards this UE. The *First RLS Indicator* IE shall be used by the DRNS to determine the initial TPC pattern in the DL of the concerning RL and all RLs which are part of the same RLS, as described in [10], section 5.1.2.2.1.2.

[FDD – For each RL not having a common generation of the TPC commands in the DL with another RL, the DRNS shall assign the *RL Set ID* IE included in the RADIO LINK SETUP RESPONSE message a value that uniquely identifies the RL Set within the UE Context.]

[FDD – For all RLs having a common generation of the TPC commands in the DL with another RL, the DRNS shall assign the *RL Set ID* IE included in the RADIO LINK SETUP RESPONSE message the same value. This value shall uniquely identify the RL Set within the UE context.]

[FDD –The UL Uu synchronisation detection algorithm defined in ref. [10] subclause 4.3 shall for each of the established RL Set(s) use the maximum value of the parameters N_OUTSYNC_IND and T_RLFAILURE, and the minimum value of the parameters N_INSYNC_IND, that are configured in the cells supporting the radio links of the RL Set].

Response Message:

At the reception of the RADIO LINK SETUP REQUEST message, DRNS allocates requested type of channelisation codes and other physical channel resources for each RL and assigns a binding identifier and a transport layer address for each DCH or set of co-ordinated DCHs and for each DSCH [TDD – and USCH]. This information shall be sent to the SRNC in the message RADIO LINK SETUP RESPONSE when all the RLs have been successfully established.

After sending of the RADIO LINK SETUP RESPONSE message the DRNS shall continuously attempt to obtain UL synchronisation on the Uu interface and start reception on the new RL. [FDD - The DRNS shall start DL transmission on the new RL after synchronisation is achieved in the DL user plane as specified in ref. [4].] [TDD – The DRNS shall start transmission on the new RL immediately as specified in ref. [4].]

8.3.1.3 Unsuccessful Operation

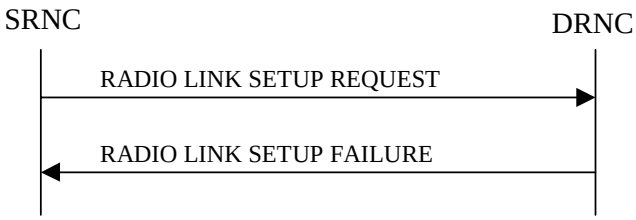


Figure 6: Radio Link Setup procedure: Unsuccessful Operation

In unsuccessful case (i.e. one or more RLs can not be established) the RADIO LINK SETUP FAILURE message shall be sent to the SRNC, indicating the reason for failure. If some radio links were established successfully, the DRNC shall indicate this in the RADIO LINK SETUP FAILURE message in the same way as in the RADIO LINK SETUP RESPONSE message.

If the RADIO LINK SETUP REQUEST message includes a *C-ID* IE corresponding to a cell reserved for operator use and the *Permanent NAS UE Identity* IE is not present, the DRNC shall consider the procedure as failed and send the RADIO LINK SETUP FAILURE message.

[FDD - If the accessed cell supports TFCI power control, the DRNC shall include the *TFCI PC Support Indicator* IE in the RADIO LINK SETUP FAILURE message.]

Typical cause values are:

Radio Network Layer Causes:

- [FDD - UL Scrambling Code Already in Use];
- DL Radio Resources not Available;
- UL Radio Resources not Available;

- [FDD - Combining Resources not available];
- Combining not Supported
- Requested Configuration not Supported;
- Cell not Available;
- [FDD - Requested Tx Diversity Mode not Supported];
- Power Level not Supported;
- Number of DL codes not supported;
- Number of UL codes not supported;
- Dedicated Transport Channel Type not Supported;
- DL Shared Channel Type not Supported;
- [TDD - UL Shared Channel Type not Supported];
- [FDD - UL Spreading Factor not Supported];
- [FDD - DL Spreading Factor not Supported];
- CM not Supported;
- [FDD – DPC mode change not Supported];
- Cell reserved for operator use.

Transport Layer Causes:
- Transport Resource Unavailable.

Miscellaneous Causes:
- Control Processing Overload;
- HW Failure;
- Not enough User Plane Processing Resources.

● ● ● ● ● ● Unaffected parts are omitted ● ● ● ● ● ●

8.3.2 Radio Link Addition

8.3.2.1 General

This procedure is used for establishing the necessary resources in the DRNS for one or more additional RLs towards a UE when there is already at least one RL established to the concerning UE via this DRNS.

This procedure shall use the signalling bearer connection for the relevant UE context.

The Radio Link Addition procedure shall not be initiated if a Prepared Reconfiguration exists, as defined in subclause 3.1.

[FDD – The Radio Link Addition procedure serves to establish one or more new Radio Links which do not contain the DSCH. If the DSCH shall be moved into a new Radio Link, the Radio Link reconfiguration procedure shall be applied.]

[TDD – The Radio Link Addition procedure serves to establish a new Radio Link with the DSCH and USCH included, if they existed before.]

8.3.2.2 Successful Operation

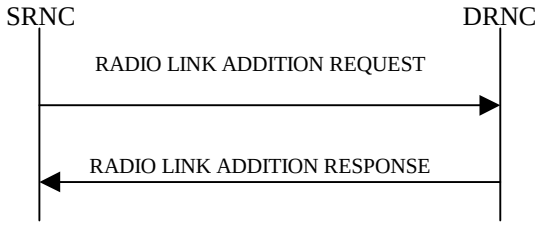


Figure 7: Radio Link Addition procedure: Successful Operation

The procedure is initiated with a RADIO LINK ADDITION REQUEST message sent from the SRNC to the DRNC.

Upon reception, the DRNS shall reserve the necessary resources and configure the new RL(s) according to the parameters given in the message. Unless specified below, the meaning of parameters is specified in other specifications.

The DRNS shall prioritise resource allocation for the RL(s) to be established according to Annex A.

Transport Channel Handling:

DSCH:

[TDD - If the radio link to be added includes a DSCH, the DRNC shall send a set of valid *DSCH Scheduling Priority* IE and *MAC-c/sh SDU Length* IE parameters to the SRNC in the message RADIO LINK ADDITION RESPONSE message.]

Physical Channels Handling:

[FDD-Compressed Mode]:

[FDD - If the RADIO LINK ADDITION REQUEST message includes the *Active Pattern Sequence Information* IE, the DRNS shall use the information to activate the indicated (all ongoing) Transmission Gap Pattern Sequence(s) in the new RL. The received *CM Configuration Change CFN* IE refers to the latest passed CFN with that value. The DRNS shall treat the received *TGCFN* IEs as follows:]

- [FDD - If any received *TGCFN* IE has the same value as the received *CM Configuration Change CFN* IE, the DRNS shall consider the concerning Transmission Gap Pattern Sequence as activated at that CFN.]

- [FDD - If any received *TGCFN* IE does not have the same value as the received *CM Configuration Change CFN* IE but the first CFN after the CM Configuration Change CFN with a value equal to the *TGCFN* IE has already passed, the DRNS shall consider the concerning Transmission Gap Pattern Sequence as activated at that CFN.]

- [FDD - For all other Transmission Gap Pattern Sequences included in the *Active Pattern Sequence Information* IE, the DRNS shall activate each Transmission Gap Pattern Sequence at the first CFN after the CM Configuration Change CFN with a value equal to the *TGCFN* IE for the Transmission Gap Pattern Sequence.]

FDD - If the *Active Pattern Sequence Information* IE is not included, the DRNS shall not activate the ongoing compressed mode pattern in the new RLs, but the ongoing pattern in the existing RL shall be maintained.]

[FDD - If some Transmission Gap Pattern sequences using SF/2 method are initialised in the DRNS, DRNS shall include the *Transmission Gap Pattern Sequence Scrambling Code*

Information IE in the RADIO LINK ADDITION RESPONSE message to indicate the Scrambling code change method that it selects for each channelisation code.]

[FDD-DL Code Information]:

[FDD – When more than one DL DPDCH are assigned per RL, the segmented physical channel shall be mapped on to DL DPDCHs according to [8]. When *p* number of DL DPDCHs are assigned to each RL, the first pair of DL Scrambling Code and FDD DL Channelisation Code Number corresponds to "*PhCH number 1*", the second to "*PhCH number 2*", and so on until the *p*th to "*PhCH number p*".]

General:

[FDD - The DRNS shall use the provided Uplink SIR Target value as the current target for the inner-loop power control.]

Radio Link Handling:

Diversity Combination Control:
The *Diversity Control Field* IE indicates for each RL whether the DRNS shall combine the new RL with existing RL(s) or not on the Iur. If the *Diversity Control Field* IE is set to "May" (be combined with another RL), then the DRNS shall decide for any of the alternatives. If the *Diversity Control Field* IE is set to "Must", the DRNS shall combine the RL with one of the other RL. When a new RL is to be combined the DRNS shall choose which RL(s) to combine it with. If the *Diversity Control Field* IE is set to "Must not", the DRNS shall not combine the RL with any other existing RL.

In the case of combining an RL with existing RL(s) the DRNC shall indicate in the RADIO LINK ADDITION RESPONSE message with the *Diversity Indication* IE that the RL is combined. In this case the Reference RL ID shall be included to indicate one of the existing RLs that the new RL is combined with.

[FDD - In the case of combining one or more RLs being established by this procedure, the DRNC shall indicate in the RADIO LINK ADDITION RESPONSE message with the *Diversity Indication* IE that the RL is combined with another RL for all RLs but the first RL. In this case the Reference RL ID shall be included to indicate one of the other RLs being established by this procedure that the new RL is combined with. The Reference *RL ID* IE shall not be included for the first of the combined RLs, for which the *Transport Layer Address* IE and the *Binding ID* IE shall be included.]

In the case of not combining an RL with existing RL(s), the DRNC shall indicate in the RADIO LINK ADDITION RESPONSE message with the *Diversity Indication* IE that no combining is done. In this case the DRNC shall include both the *Transport Layer Address* IE and the *Binding ID* IE for the transport bearer to be established for each DCH, [TDD – and DSCH, USCH] of the RL in the RADIO LINK ADDITION RESPONSE message.

In case of a set of co-ordinated DCHs, the *Binding ID* IE and the *Transport Layer Address* IE shall be included for only one of the DCHs in the set of co-ordinated DCHs.

If the DRNS need to limit the user rate in the uplink of a DCH already when starting to utilise a new Radio Link, the DRNC shall include the *Allowed UL Rate* IE of the *Allowed Rate Information* IE in the *DCH Information Response* IE for this DCH in the RADIO LINK ADDITION RESPONSE message for this Radio Link.

If the DRNS need to limit the user rate in the downlink of a DCH already when starting to utilise a new Radio Link, the DRNC shall include the *Allowed DL Rate* IE of the *Allowed Rate Information* IE in the *DCH Information Response* IE for this DCH in the RADIO LINK ADDITION RESPONSE message for this Radio Link.

[FDD-Transmit Diversity]:

The DRNS shall activate any feedback mode diversity according to the received settings.

[FDD – If the cell in which the RL is being added is capable to provide Close loop Tx diversity, the DRNC shall include the *Closed Loop Timing Adjustment Mode* IE in the RADIO LINK ADDITION RESPONSE message indicating the Closed loop timing adjustment mode of the cell.]

[FDD – When *Transmit Diversity Indicator* IE is present the DRNS shall activate/deactivate the Transmit Diversity to each new Radio Link in accordance with the *Transmit Diversity Indicator* IE using the diversity mode of the existing Radio Link(s).]

DL Power Control:

[FDD - If the *Primary CPICH Ec/No* IE measured by the UE is included for an RL in the RADIO LINK ADDITION REQUEST message, the DRNS shall use this in the calculation of the Initial DL TX Power for this RL. If the *Primary CPICH Ec/No* IE is not present, the DRNS shall set the Initial DL TX Power based on the power relative to the Primary CPICH power used by the existing RLs.]

[TDD - If the *Primary CCPCH RSCP* IE and/or the [3.84Mcps TDD - *DL Time Slot ISCP Info* IE] and/or the [1.28Mcps TDD - *DL Time Slot ISCP Info LCR* IE] are included in the RADIO LINK ADDITION REQUEST message, the DRNS shall use them in the calculation of the Initial DL TX Power. If the *Primary CCPCH RSCP* IE and [3.84Mcps TDD - *DL Time Slot ISCP Info* IE] and [1.28Mcps TDD - *DL Time Slot ISCP Info LCR* IE] are not present, the DRNS shall set the Initial DL TX Power based on the power relative to the Primary CCPCH power used by the existing RL.]

[FDD - The Initial DL TX Power shall be applied until UL synchronisation is achieved on the Uu interface for that RLS or Power Balancing is activated. No inner loop power control or power balancing shall be performed during this period. The DL power shall then vary according to the inner loop power control (see ref. [10] subclause 5.2.1.2) and the power control procedure (see 8.3.7)].

[TDD – The Initial DL TX Power shall be applied until UL synchronisation is achieved on the Uu interface for that RL. No innerloop power control shall be performed during this period. The DL power shall then vary according to the inner loop power control (see ref. [22] subclause 4.2.3.3).].

[FDD - If the *DPC Mode* IE is present in the RADIO LINK ADDITION REQUEST message, the DRNC shall apply the DPC mode indicated in the message, and be prepared that the DPC mode may be changed during the life time of the RL. If the *DPC Mode* IE is not present in the RADIO LINK ADDITION REQUEST message, DPC mode 0 shall be applied (see ref. [10]).]

The DRNC shall also provide the configured UL Maximum SIR and UL Minimum SIR for every new RL to the SRNC in the RADIO LINK ADDITION RESPONSE message. These values are taken into consideration by DRNS admission control and shall be used by the SRNC as limits for the UL inner-loop power control target.

The DRNC shall provide the configured *Maximum DL TX Power* IE and *Minimum DL TX Power* IE for every new RL to the SRNC in the RADIO LINK ADDITION RESPONSE message. The DRNS shall not transmit with a higher power than indicated by the *Maximum DL TX Power IE* or lower than indicated by the *Minimum DL TX Power IE* on any DL DPCH of the RL [FDD – except during compressed mode, when the $P_{SIR}(k)$, as described in ref.[10] subclause 5.2.1.3, shall be added to the maximum DL power in slot k].

DL Code Information:

The DRNC shall also provide the selected scrambling and channelisation codes of the new RLs in order to enable the SRNC to inform the UE about the selected codes.

Neighbouring Cell Handling:

If there are UMTS neighbouring cell(s) to the cell in which a Radio Link was established then:

- The DRNC shall include the *Neighbouring FDD Cell Information* IE and/or *Neighbouring TDD Cell Information* IE in the *Neighbouring UMTS Cell Information* IE for each neighbouring FDD cell and/or TDD cell respectively. In addition, if the information is available, the DRNC shall include the *Frame Offset* IE, *Primary CPICH Power* IE, *Cell Individual Offset* IE, *STTD Support Indicator* IE, *Closed Loop Mode1 Support Indicator* IE and *Closed Loop Mode2 Support Indicator* IE in the *Neighbouring FDD Cell Information* IE, and the *Frame Offset* IE, *Cell Individual Offset* IE, *DPCH Constant Value* IE and the *PCCPCH Power* IE in the *Neighbouring TDD Cell Information* IE.

- If a UMTS neighbouring cell is not controlled by the same DRNC, the DRNC shall also include the *CN PS Domain Identifier* IE and/or *CN CS Domain Identifier* IE which are the identifiers of the CN nodes connected to the RNC controlling the UMTS neighbouring cell.

- [FDD - The DRNC shall include the *DPC Mode Change Support Indicator* IE if the DRNC is aware that the neighbouring cell supports DPC mode change.]

For the UMTS neighbouring cells which are controlled by the DRNC, the DRNC shall report in the RADIO LINK SETUP RESPONSE message the restriction state of those cells, otherwise *Restriction state indicator* IE may be absent. The DRNC shall include the *Restriction state indicator* IE for the neighbouring cells which are controlled by the DRNC in the *Neighbouring FDD Cell Information* IE, the *Neighbouring TDD Cell Information* IE and the *Neighbouring TDD Cell Information LCR* IE.

If there are GSM neighbouring cells to the cell(s) where a radio link is established, the DRNC shall include the *Neighbouring GSM Cell Information* IE in the RADIO LINK ADDITION RESPONSE message for each of the GSM neighbouring cells. If available the DRNC shall include the *Cell Individual Offset* IE in the *Neighbouring GSM Cell Information* IE.

[FDD - The DRNS shall use the provided Uplink SIR Target value as the current target for the inner-loop power control.]

General:

[FDD - If the RADIO LINK ADDITION REQUEST message contains an *SSDT Cell Identity* IE, SSDT shall, if supported, be activated for the concerned new RL, with the indicated SSDT Cell Identity used for that RL.]

Depending on local configuration in the DRNS, it may include the geographical co-ordinates of the cell, represented either by the *Cell GAI* IE or by the *Cell GA Additional Shapes* IE, and the UTRAN access point position for each of the added RLs in the RADIO LINK ADDITION RESPONSE message.

For each Radio Link established in a cell where at least one URA Identity is being broadcast, the DRNC shall include a URA Identity for this cell in the *URA ID* IE, the *Multiple URAs Indicator* IE indicating whether or not multiple URA Identities are being broadcast in the cell, and the RNC Identity of all other RNCs that are having at least one cell within the URA in the cell in the *URA Information* IE in the RADIO LINK ADDITION RESPONSE message.

[FDD - If the UE has been allocated one or several DCH controlled by DRAC and if the DRNS supports the DRAC, the DRNC shall indicate in the RADIO LINK ADDITION RESPONSE message the *Secondary CCPCH Info* IE for the FACH where the DRAC information is sent, for each Radio Link established in a cell where DRAC is active. If the DRNS does not support DRAC, the DRNC shall not provide these IEs in the RADIO LINK ADDITION RESPONSE message.]

[TDD - The DRNC shall include the [3.84Mcps TDD - *Secondary CCPCH Info TDD* IE] [1.28Mcps TDD – *Secondary CCPCH Info TDD LCR* IE] in the RADIO LINK ADDITION RESPONSE message if at least one *DSCH Information Response* IE or *USCH Information Response* IE is included in the message and at least one DCH is configured for the radio link. The DRNC shall also include the [3.84Mcps TDD - *Secondary CCPCH Info TDD* IE] [1.28Mcps TDD – *Secondary CCPCH Info TDD LCR* IE] in the RADIO LINK ADDITION RESPONSE message if at least one [3.84Mcps TDD - *DSCH Information Response* IE] [1.28Mcps TDD – *DSCH Information Response LCR* IE or *USCH Information Response LCR* IE] or *USCH Information Response* IE is included in the message and the SHCCH messages for this radio link will be transmitted over a different secondary CCPCH than selected by the UE from system information.]

If the *Permanent NAS UE Identity* IE is present in the RADIO LINK ADDITION REQUEST message, the DRNS shall store the information for the considered UE Context for the life-time of the UE Context.

If the RADIO LINK ADDITION REQUEST message includes a *C-ID* IE corresponding to a cell reserved for operator use and the Permanent NAS UE Identity is available in the DRNC for the considered UE Context, the DRNC shall use this information to determine whether it can add the Radio Link on this cell or not.

[FDD - If the accessed cell supports TFCI power control, the DRNC shall include the *TFCI PC Support Indicator* IE in the RADIO LINK ADDITION RESPONSE message.]

[FDD-Radio Link Set Handling]:

[FDD – For each RL not having a common generation of the TPC commands in the DL with another RL, the DRNS shall assign the *RL Set ID* IE included in the RADIO LINK ADDITION RESPONSE message a value that uniquely identifies the RL Set within the UE context.]

[FDD – For all RLs having a common generation of the TPC commands in the DL with another new or existing RL, the DRNS shall assign the *RL Set ID* IE included in the RADIO LINK ADDITION RESPONSE message the same value. This value shall uniquely identify the RL Set within the UE context.]

[FDD – After addition of the new RL(s), the UL Uu synchronisation detection algorithm defined in ref. [10] subclause 4.3 shall for each of the previously existing and newly established RL Set(s) use the maximum value of the parameters N_OUTSYNC_IND and T_RLFAILURE, and the minimum value of the parameters N_INSYNC_IND, that are configured in the cells supporting the radio links of the RL Set].

Response message:

If all requested RLs are successfully added, the DRNC shall respond with a RADIO LINK ADDITION RESPONSE message.

After sending of the RADIO LINK ADDITION RESPONSE message the DRNS shall continuously attempt to obtain UL synchronisation on the Uu interface and start reception on the new RL. [FDD - The DRNS shall start DL transmission on the new RL after synchronisation is achieved in the DL user plane as specified in ref. [4].] [TDD – The DRNS shall start transmission on the new RL immediately as specified in ref. [4].]

8.3.2.3 Unsuccessful Operation

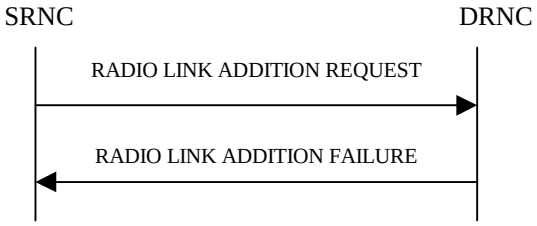


Figure 8: Radio Link Addition procedure: Unsuccessful Operation

If the establishment of at least one RL is unsuccessful, the DRNC shall send a RADIO LINK ADDITION FAILURE as response.

If some RL(s) were established successfully, the DRNC shall indicate this in the RADIO LINK ADDITION FAILURE message in the same way as in the RADIO LINK ADDITION RESPONSE message.

[FDD – If the RADIO LINK ADDITION REQUEST message includes the *Active Pattern Sequence Information* IE and the DRNS cannot provide the requested compressed mode the DRNS shall regard the Radio Link Addition procedure as failed and shall respond with a RADIO LINK ADDITION FAILURE message with the cause value "Invalid CM settings".]

[FDD - If the accessed cell supports TFCI power control, the DRNC shall include the *TFCI PC Support Indicator* IE in the RADIO LINK ADDITION FAILURE message.]

Typical cause values are:

Radio Network Layer Causes:

- DL Radio Resources not Available;
- UL Radio Resources not Available;
- Combining Resources not Available;
- Combining not Supported
- Cell not Available;
- [FDD - Requested Tx Diversity Mode not Supported];
- Power Level not Supported;
- CM not Supported;
- Reconfiguration CFN not Elapsed;
- Number of DL Codes not Supported;
- Number of UL codes not Supported;
- [FDD – DPC mode change not Supported];
- Cell reserved for operator use.

Transport Layer Causes:

- Transport Resource Unavailable.

Miscellaneous Causes:

- Control Processing Overload;
- HW Failure;
- Not enough User Plane Processing Resources.

● ● ● ● ● ● Unaffected parts are omitted ● ● ● ● ● ●

9.1.4 RADIO LINK SETUP RESPONSE

9.1.4.1 FDD Message

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.40		YES	reject
Transaction ID	M		9.2.1.59		–	
D-RNTI	O		9.2.1.24		YES	ignore
CN PS Domain Identifier	O		9.2.1.12		YES	ignore
CN CS Domain Identifier	O		9.2.1.11		YES	ignore
RL Information Response		*1..<maxnoofRLs>*			EACH	ignore
>RL ID	M		9.2.1.49		–	
>RL Set ID	M		9.2.2.35		–	
>URA Information	O		9.2.1.70B		–	
>SAI	M		9.2.1.52		–	
>Cell GAI	O		9.2.1.5A		–	
>UTRAN Access Point Position	O		9.2.1.70A		–	
>Received Total Wide Band Power	M		9.2.2.35A		–	
>Secondary CCPCH Info	O		9.2.2.37B		–	
>DL Code Information	M		FDD DL Code Information 9.2.2.14A		–	
>Diversity Indication	C-NotFirstRL		9.2.1.21		–	
>CHOICE *Diversity Indication*	M				–	
>>*Combining*					–	
>>>RL ID	M		9.2.1.49	Reference RL ID for the combining	–	
>>>DCH Information Response	O		9.2.1.16A		YES	ignore
>>*Non Combining or First RL*					–	
>>>DCH Information Response	M		9.2.1.16A		–	
>SSDT Support Indicator	M		9.2.2.43		–	
>Maximum Uplink SIR	M		Uplink SIR 9.2.1.69		–	
>Minimum Uplink SIR	M		Uplink SIR 9.2.1.69		–	
>Closed Loop Timing Adjustment Mode	O		9.2.2.3A		–	
>Maximum Allowed UL Tx Power	M		9.2.1.35		–	
>Maximum DL TX Power	M		DL Power 9.2.1.21A		–	
>Minimum DL TX Power	M		DL Power 9.2.1.21A		–	
>Primary Scrambling Code	O		9.2.1.45		–	
>UL UARFCN	O		UARFCN 9.2.1.66	Corresponds to Nu in ref. [6]	–	
>DL UARFCN	O		UARFCN 9.2.1.66	Corresponds to Nd in ref. [6]	–	

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
>Primary CPICH Power	M		9.2.1.44		–	
>DSCH Information Response	O		DSCH FDD Information Response 9.2.2.13B		YES	ignore
>Neighbouring UMTS Cell Information	O		9.2.1.41A		–	
>Neighbouring GSM Cell Information	O		9.2.1.41C		–	
>PC Preamble	M		9.2.2.27a		–	
>SRB Delay	M		9.2.2.39A		–	
>Cell GA Additional Shapes	O		9.2.1.5B		YES	ignore
>TFCI PC Support Indicator	O		9.2.2.x		YES	ignore
Uplink SIR Target	O		Uplink SIR 9.2.1.69		YES	ignore
Criticality Diagnostics	O		9.2.1.13		YES	ignore

Condition	Explanation
NotFirstRL	The IE shall be present if the RL is not the first RL in the *RL Information Response* IE.

Range bound	Explanation
MaxnoofRLs	Maximum number of RLs for one UE.

● ● ● ● ● ● Unaffected parts are omitted ● ● ● ● ● ●

9.1.5 RADIO LINK SETUP FAILURE

9.1.5.1 FDD Message

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.40		YES	reject
Transaction ID	M		9.2.1.59		–	
D-RNTI	O		9.2.1.24		YES	ignore
CN PS Domain Identifier	O		9.2.1.12		YES	ignore
CN CS Domain Identifier	O		9.2.1.11		YES	ignore
CHOICE *Cause Level*	M				YES	ignore
>General					–	
>>Cause	M		9.2.1.5		–	
>RL Specific					–	
>>Unsuccessful RL Information Response		*1...<maxnoofRLs>*			EACH	ignore
>>>RL ID	M		9.2.1.49		–	
>>>Cause	M		9.2.1.5		–	
>>Successful RL Information Response		*0..<maxnoofRLs-1>*			EACH	ignore
>>>RL ID	M		9.2.1.49		–	
>>>RL Set ID	M		9.2.2.35		–	
>>>URA Information	O		9.2.1.70B		–	
>>>SAI	M		9.2.1.52		–	
>>>Cell GAI	O		9.2.1.5A		–	
>>>UTRAN Access Point Position	O		9.2.1.70A		–	
>>>Received Total Wide Band Power	M		9.2.2.35A		–	
>>>Secondary CCPCH Info	O		9.2.2.37B		–	
>>>DL Code Information	M		FDD DL Code Information 9.2.2.14A		–	
>>>Diversity Indication	M		9.2.1.21		–	
>>>CHOICE *Diversity Indication*	M				–	
>>>>*Combining*					–	
>>>>>RL ID	M		9.2.1.49	Reference RL ID for the combining	–	
>>>>>DCH Information Response	O		9.2.1.16A		YES	ignore
>>>>*Non Combining or First RL*					–	
>>>>>DCH Information Response	M		9.2.1.16A		–	
>>>SSDT Support Indicator	M		9.2.2.43		–	
>>>Maximum Uplink SIR	M		Uplink SIR 9.2.1.69		–	
>>>Minimum Uplink SIR	M		Uplink SIR 9.2.1.69		–	
>>>Closed Loop Timing Adjustment Mode	O		9.2.2.3A		–	
>>>Maximum Allowed UL Tx Power	M		9.2.1.35		–	
>>>Maximum DL TX	M		DL Power		–	

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Power			9.2.1.21A			
>>>Minimum DL TX Power	M		DL Power 9.2.1.21A		–	
>>>Primary CPICH Power	M		9.2.1.44		–	
>>>Primary Scrambling Code	O		9.2.1.45		–	
>>>UL UARFCN	O		UARFCN 9.2.1.66	Corresponds to Nu in ref. [6]	–	
>>>DL UARFCN	O		UARFCN 9.2.1.66	Corresponds to Nd in ref. [6]	–	
>>>DSCH Information Response	O		DSCH FDD Information Response 9.2.2.13B		YES	ignore
>>>Neighbouring UMTS Cell Information	O		9.2.1.41A		–	
>>>Neighbouring GSM Cell Information	O		9.2.1.41C		-	
>>>PC Preamble	M		9.2.2.27a		-	
>>>SRB Delay	M		9.2.2.39A		-	
>>>Cell GA Additional Shapes	O		9.2.1.5B		YES	ignore
>>>TFCI PC Support Indicator	O		9.2.2.x		YES	ignore
Uplink SIR Target	O		Uplink SIR 9.2.1.69		YES	ignore
Criticality Diagnostics	O		9.2.1.13		YES	ignore

Range bound	Explanation
MaxnoofRLs	Maximum number of RLs for one UE.

● ● ● ● ● ● Unaffected parts are omitted ● ● ● ● ● ●

9.1.7 RADIO LINK ADDITION RESPONSE

9.1.7.1 FDD Message

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.40		YES	reject
Transaction ID	M		9.2.1.59		–	
RL Information Response		*1..<maxnoof RLs-1>*			EACH	ignore
>RL ID	M		9.2.1.49		–	
>RL Set ID	M		9.2.2.35		–	
>URA Information	O		9.2.1.70B		–	
>SAI	M		9.2.1.52		–	
>Cell GAI	O		9.2.1.5A		–	
>UTRAN Access Point Position	O		9.2.1.70A		–	
>Received Total Wide Band Power	M		9.2.2.35A		–	
>Secondary CCPCH Info	O		9.2.2.37B		–	
>DL Code Information	M		FDD DL Code Information 9.2.2.14A		YES	ignore
>Diversity Indication	M		9.2.1.21		–	
>CHOICE *Diversity Indication*	M				–	
>>*Combining*					–	
>>>RL ID	M		9.2.1.49	Reference RL ID	–	
>>>DCH Information Response	O		9.2.1.16A		YES	ignore
>>*Non Combining*					–	
>>>DCH Information Response	M		9.2.1.16A		–	
>SSDT Support Indicator	M		9.2.2.43		–	
>Minimum Uplink SIR	M		Uplink SIR 9.2.1.69		–	
>Maximum Uplink SIR	M		Uplink SIR 9.2.1.69		–	
>Closed Loop Timing Adjustment Mode	O		9.2.2.3A		–	
>Maximum Allowed UL Tx Power	M		9.2.1.35		–	
>Maximum DL TX Power	M		DL Power 9.2.1.21A		–	
>Minimum DL TX Power	M		DL Power 9.2.1.21A		–	
>Neighbouring UMTS Cell Information	O		9.2.1.41A		–	
>Neighbouring GSM Cell Information	O		9.2.1.41C		–	
>PC Preamble	M		9.2.2.27a		–	
>SRB Delay	M		9.2.2.39A		–	
>Primary CPICH Power	M		9.2.1.44		–	
>Cell GA Additional Shapes	O		9.2.1.5B		YES	ignore
>TFCI PC Support Indicator	O		9.2.2.x		YES	ignore
Criticality Diagnostics	O		9.2.1.13		YES	ignore

Range bound	Explanation
MaxnoofRLs	Maximum number of radio links for one UE.

● ● ● ● ● ● Unaffected parts are omitted ● ● ● ● ● ●

9.1.8 RADIO LINK ADDITION FAILURE

9.1.8.1 FDD Message

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.40		YES	reject
Transaction ID	M		9.2.1.59		–	
CHOICE *Cause Level*	M				YES	ignore
>*General*					–	
>>Cause	M		9.2.1.5		–	
>*RL Specific*					–	
>>Unsuccessful RL Information Response		*1..<maxnoof RLs-1>*			EACH	ignore
>>>RL ID	M		9.2.1.49		–	
>>>Cause	M		9.2.1.5		–	
>>Successful RL Information Response		*0..<maxnoof RLs-2>*			EACH	ignore
>>>RL ID	M		9.2.1.49		–	
>>>RL Set ID	M		9.2.2.35		–	
>>>URA Information	O		9.2.1.70B		–	
>>>SAI	M		9.2.1.52		–	
>>>Cell GAI	O		9.2.1.5A		–	
>>>UTRAN Access Point Position	O		9.2.1.70A		–	
>>>Received Total Wide Band Power	M		9.2.2.35A		–	
>>>Secondary CCPCH Info	O		9.2.2.37B		–	
>>>DL Code Information	M		FDD DL Code Information 9.2.2.14A		YES	ignore
>>>Diversity Indication	M		9.2.1.21		–	
>>>CHOICE *Diversity Indication*	M				–	
>>>>*Combining*					–	
>>>>>RL ID	M		9.2.1.49	Reference RL ID	–	
>>>>>DCH Information Response	O		9.2.1.16A		YES	ignore
>>>>*Non Combining*					–	
>>>>>DCH Information Response	M		9.2.1.16A		–	
>>>SSDT Support Indicator	M		9.2.2.43		–	
>>>Minimum Uplink SIR	M		Uplink SIR 9.2.1.69		–	
>>>Maximum Uplink SIR	M		Uplink SIR 9.2.1.69		–	
>>>Closed Loop Timing Adjustment Mode	O		9.2.2.3A		–	
>>>Maximum Allowed UL Tx Power	M		9.2.1.35		–	
>>>Maximum DL TX Power	M		DL Power 9.2.1.21A		–	
>>>Minimum DL TX Power	M		DL Power 9.2.1.21A		–	
>>>Neighbouring	O		9.2.1.41A		–	

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
UMTS Cell Information						
>>>Neighbouring GSM Cell Information	O		9.2.1.41C		–	
>>>Primary CPICH Power	M		9.2.1.44		–	
>>>PC Preamble	M		9.2.2.27a		-	
>>>SRB Delay	M		9.2.2.39A		-	
>>>Cell GA Additional Shapes	O		9.2.1.5B		YES	ignore
>>>TFCI PC Support Indicator	O		9.2.2.x		YES	ignore
Criticality Diagnostics	O		9.2.1.13		YES	ignore

Range bound	Explanation
MaxnoofRLs	Maximum number of radio links for one UE.

● ● ● ● ● ● Unaffected parts are omitted ● ● ● ● ● ●

9.2.2.x TFCI PC Support Indicator

The TFCI PC Support Indicator indicates whether the TFCI power control in the DSCH hard split mode can be applied to DL DPCH in the cell or not. TFCI PC Mode 1 means that the only one power offset(TFCI PO[4]) is applied in TFCI power control. TFCI PC Mode 2 means that the cell also supports enhanced DSCH power control and two power offset(TFCI PO and TFCI PO_primary[4]) are applied in TFCI power control.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TFCI PC Support Indicator			ENUMERATED (TFCI PC Mode 1 Supported, TFCI PC Mode 2 Supported)	

● ● ● ● ● ● Unaffected parts are omitted ● ● ● ● ● ●

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5.4.3.2 Impacts on NBAP (TS 25.433)

========== TS 25.433 ==========

8.2.17 Radio Link Setup

8.2.17.1 General

This procedure is used for establishing the necessary resources for a new Node B Communication Context in the Node B.

[FDD – The RL Setup procedure is used to establish one or more radio links. The procedure establishes one or more DCHs on all radio links, and in addition, it can include the establishment of one or more

DSCHs on one radio link.]

[TDD – The RL Setup procedure is used for establish one radio link including one or more transport channels. The transport channels can be a mixture of DCHs, DSCHs, and USCHs, including also combinations where one or more transport channel types are not present.]

8.2.17.2 Successful Operation

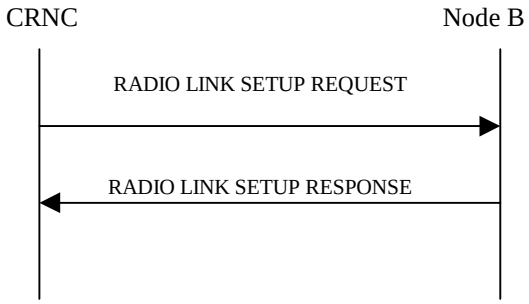

Figure 24: Radio Link Setup procedure, Successful Operation

The procedure is initiated with a RADIO LINK SETUP REQUEST message sent from the CRNC to Node B.

Upon reception of RADIO LINK SETUP REQUEST message, the Node B shall reserve necessary resources and configure the new Radio Link(s) according to the parameters given in the message.

The Node B shall prioritise resource allocation for the RL(s) to be established according to Annex A.

Transport Channels Handling:

DCH(s):

[TDD – If the *DCH Information* IE is present, the Node B shall configure the new DCH(s) according to the parameters given in the message.]

If the RADIO LINK SETUP REQUEST message includes a *DCH Information* IE with multiple *DCH Specific Info* IEs then, the Node B shall treat the DCHs in the *DCH Information* IE as a set of co-ordinated DCHs. The Node B shall include these DCHs in the new configuration only if it can include all of them in the new configuration.

[FDD – For DCHs which do not belong to a set of co-ordinated DCHs with the *QE-Selector* IE set to "selected", the Transport channel BER from that DCH shall be the base for the QE in the UL data frames. If no Transport channel BER is available for the selected DCH the Physical channel BER shall be used for the QE, ref. [16]. If the QE-Selector is set to "non-selected", the Physical channel BER shall be used for the QE in the UL data frames, ref. [16].]

For a set of co-ordinated DCHs the Transport channel BER from the DCH with the *QE-Selector* IE set to “selected” shall be used for the QE in the UL data frames, ref. [16]. [FDD - If no Transport channel BER is available for the selected DCH the Physical channel BER shall be used for the QE, ref. [16]. If all DCHs have *QE-Selector* IE set to "non-selected" the Physical channel BER shall be used for the QE, ref. [16]].

The Node B shall use the included *UL FP Mode* IE for a DCH or a set of co-ordinated DCHs to be added as the FP Mode in the Uplink of the user plane for the DCH or the set of co-ordinated DCHs in the configuration.

The Node B shall use the included *ToAWS* IE for a DCH or a set of co-ordinated DCHs to be added as the Time of Arrival Window Start Point in the user plane for the DCH or the set of co-ordinated DCHs in the configuration.

The Node B shall use the included *ToAWE* IE for a DCH or a set of co-ordinated DCHs to be added as the Time of Arrival Window End Point in the user plane for the DCH or the set of co-ordinated DCHs in the configuration.

The received *Frame Handling Priority* IE specified for each Transport Channel should be used when prioritising between different frames in the downlink on the radio interface in congestion situations within the Node B once the new RL(s) has been activated.

[FDD – The *Diversity Control Field* IE indicates for each RL (except the first RL in the message) whether the Node B shall combine the concerned RL or not. If the *Diversity Control Field* IE is set to"May", then Node B shall decide for either of the alternatives. If the *Diversity Control Field* IE is set to "Must", the Node B shall combine the RL with one of the other RL. Diversity combining is applied to Dedicated Transport Channels (DCH), i.e. it is not applied to the DSCHs. When a new RL is to be combined, the Node B shall choose which RL(s) to combine it with. If the *Diversity Control Field* IE is set to “Must not” , the Node B shall not combine the RL with any other existing RL.]

[FDD – In the RADIO LINK SETUP RESPONSE message the Node B shall indicate with the *Diversity Indication* IE whether the RL is combined or not. In case of combining, only the *Reference RL ID* IE shall be included to indicate one of the existing RLs that the concerned RL is combined with. In case of not combining the Node B shall include in the RL SETUP RESPONSE the *Binding ID* IE and *Transport Layer Address* IE for the transport bearer to be established for each DCH of this RL.]

[TDD – The Node B shall include in the RADIO LINK SETUP RESPONSE the *Binding ID* IE and *Transport Layer Address* IE for the transport bearer to be established for each DCH of this RL.]

In case of coordinated DCH, the *Binding ID* IE and the *Transport Layer Address* IE shall be specified for only one of the coordinated DCHs.

DSCH(s):

If the *DSCH Information* IE is present, the Node B shall configure the new DSCH(s) according to the parameters given in the message.

[FDD – If the RADIO LINK SETUP REQUEST message includes the *TFCI2 Bearer Information* IE then the Node B shall support the establishment of a transport bearer on which the DSCH TFCI Signaling control frames shall be received. The Node B shall manage the time of arrival of these frames according to the values of ToAWS and ToAWE specified in the IE’s. The *Binding ID* IE and *Transport Layer Address* IE for the new bearer to be set up for this purpose shall be returned in the RADIO LINK SETUP RESPONSE message.]

The Node B shall include in the RADIO LINK SETUP RESPONSE the *Binding ID* IE and *Transport Layer Address* IE for the transport bearer to be established for each DSCH of this RL.

[TDD – USCH(s)]:

[TDD – If the *USCH Information* IE is present, the Node B shall configure the new USCH(s) according to the parameters given in the message.]

[TDD – In case the *USCH Information* IE is present, the Node B shall include in the RADIO LINK SETUP RESPONSE the *Binding ID* IE and *Transport Layer Address* IE for the transport bearer to be established for each USCH of this RL.]

Physical Channels Handling:

[FDD – Compressed Mode]:

[FDD – If the RADIO LINK SETUP REQUEST message includes the *Transmission Gap Pattern Sequence Information* IE, the Node B shall store the information about the Transmission Gap Pattern Sequences to be used in the Compressed Mode Configuration. This Compressed Mode Configuration shall be valid in the Node B until the next Compressed Mode Configuration is configured in the Node B or Node B Communication Context is deleted.]

[FDD – If the *Downlink compressed mode method* IE in one or more Transmission Gap Pattern Sequence is set to 'SF/2' in the RADIO LINK SETUP REQUEST message, the Node B shall use or not the alternate scrambling code as indicated for each DL Channelisation Code in the *Transmission Gap Pattern Sequence Code Information* IE.]

[FDD – If the RADIO LINK SETUP REQUEST message includes the *Transmission Gap Pattern Sequence Information* IE and the *Active Pattern Sequence Information* IE, the Node B shall use the information to activate the indicated Transmission Gap Pattern Sequence(s) in the new RL.The received *CM Configuration Change CFN* refers to the latest passed CFN with that value The Node B shall treat the received *TGCFN* IEs as follows:]

- [FDD - If any received *TGCFN* IE has the same value as the received *CM Configuration Change CFN* IE, the Node B shall consider the concerning Transmission Gap Pattern Sequence as activated at that CFN.]
- [FDD - If any received *TGCFN* IE does not have the same value as the received *CM Configuration Change CFN* IE but the first CFN after the CM Configuration Change CFN with a value equal to the *TGCFN* IE has already passed, the Node B shall consider the concerning Transmission Gap Pattern Sequence as activated at that CFN.]
- [FDD - For all other Transmission Gap Pattern Sequences included in the *Active Pattern Sequence Information* IE, the Node B shall activate each Transmission Gap Pattern Sequence at the first CFN after the CM Configuration Change CFN with a value equal to the *TGCFN* IE for the Transmission Gap Pattern Sequence.]

[FDD – DL Code Information]:

[FDD – When more than one DL DPDCH are assigned per RL, the segmented physical channel shall be mapped on to DL DPDCHs according to [8]. When *p* number of DL DPDCHs are assigned to each RL, the first pair of DL Scrambling Code and FDD DL Channelisation Code Number corresponds to "*PhCH number 1"*, the second to *"PhCH number 2"*, and so on until the *p*th to "*PhCH number p*".]

General:

[FDD – If the *Propagation Delay* IE is included, the Node B may use this information to speed up the detection of L1 synchronisation.]

[FDD – The *UL SIR Target* IE included in the message shall be used by the Node B as initial UL SIR target for the UL inner loop power control.]

[1.28Mcps TDD – The *UL SIR Target* IE included in the message shall be used by the Node B as initial UL SIR target for the UL inner loop power control according [19] and [21].]

[FDD – If the received *Limited Power Increase* IE is set to 'Used', the Node B shall, if supported, use Limited Power Increase according to ref. [10] subclause 5.2.1 for the inner loop DL power control.]

[FDD – If the *TFCI Signalling Mode* IE within the RADIO LINK SETUP message indicates that there shall be a hard split on the TFCI field but the *TFCI2 Bearer Information* IE is not included in the message then the Node B shall transmit the TFCI2 field with zero power.]

[FDD - If the *TFCI Signalling Mode* IE within the RADIO LINK SETUP message indicates that there shall be a hard split on the TFCI and the *TFCI2 Bearer Information* IE is included in the message then the Node B shall transmit the TFCI2 field with zero power until Synchronization is achieved on the TFCI2 transport bearer and the first valid DSCH TFCI Signalling control frame is received on this bearer (see ref.[24]).]

Radio Link Handling:

[FDD – Transmit Diversity]:

[FDD – When *Diversity Mode* IE is "*STTD*", "*Closedloop mode1*", or "*Closedloop mode2*", the Node B shall activate/deactivate the Transmit Diversity to each Radio Link in accordance with *Transmit Diversity Indication* IE]

DL Power Control:

[FDD – The Node B shall start the DL transmission using the initial DL power specified in the message on each DL DPCH of the RL until either UL synchronisation on the Uu is achieved for the RLS or Power Balancing is activated. No inner loop power control or balancing shall be performed during this period. The DL power shall then vary according to the inner loop power control (see ref.[10], subclause 5.2.1.2) and the power control procedure (see subclause 8.3.7), but shall always be kept within the maximum and minimum limit specified in the RADIO LINK SETUP REQUEST message. During compressed mode, the $P_{SIR}(k)$, as described in ref.[10] subclause 5.2.1.3, shall be added to the maximum DL power in slot k.]

[FDD - If the *DPC Mode* IE is present in the RADIO LINK SETUP REQUEST message, the Node B shall apply the DPC mode indicated in the message, and be prepared that the DPC mode may be changed during the life time of the RL. If the *DPC Mode* IE is not present in the RADIO LINK SETUP REQUEST message, DPC mode 0 shall be applied (see ref. [10]).]]

[TDD – The Node B shall start the DL transmission using the initial DL power specified in the message on each DL DPCH and on each Time Slot of the RL until the UL synchronisation on the Uu is achieved for the RL. No inner loop power control shall be performed during this period. The DL power shall then vary according to the inner loop power control (see ref.[22], subclause 4.2.3.3), but shall always be kept within the maximum and minimum limit specified in the RL SETUP REQUEST message.]

[TDD – If the [3.84Mcps TDD - *DL Time Slot ISCPInfo* IE] or [1.28Mcps TDD - *DL Timeslot ISCP LCR* IE] is present, the Node B shall use the indicated value when deciding the initial DL TX Power for each timeslot as specified in [21], i.e. it shall reduce the DL TX power in those downlink timeslots of the radio link where the interference is low, and increase the DL TX power in those timeslots where the interference is high, while keeping the total downlink power in the radio link unchanged].

[FDD – If the received *Inner Loop DL PC Status* IE is set to "Active", the Node B shall activate the inner loop DL power control for all RLs. If *Inner Loop DL PC Status* IE is set to "Inactive", the Node B shall deactivate the inner loop DL power control for all RLs according to ref. [10]]

General:

[FDD – If the RADIO LINK SETUP REQUEST message includes the *SSDT Cell Identity* IE and the *S-Field Length* E, the Node B shall activate SSDT, if supported, using the *SSDT Cell Identity* IE and *SSDT Cell Identity Length* IE.]

[FDD – Irrespective of SSDT activation, the Node B shall include in the RADIO LINK SETUP RESPONSE message an indication concerning the capability to support SSDT on this RL. Only if the RADIO LINK SETUP REQUEST message requested SSDT activation and the RADIO LINK SETUP RESPONSE message indicates that the SSDT capability is supported for this RL, SSDT is activated in the Node B.]

[FDD - If the RADIO LINK SETUP REQUEST message includes the *SSDT Cell Identity for EDSCHPC* IE, the Node B shall activate enhanced DSCH power control, if supported, using the *SSDT Cell Identity for EDSCHPC* IE and *SSDT Cell Identity Length* IE as well as *Enhanced DSCH PC* IE in accordance with ref. [10] subclause 5.2.2. If the RADIO LINK SETUP REQUEST message includes both *SSDT Cell Identity* IE and *SSDT Cell Identity for EDSCHPC* IE, then the Node B shall ignore the value in *SSDT Cell Identity for EDSCHPC* IE. If the enhanced DSCH power control is activated and the TFCI power control in DSCH hard split mode is supported, the primary/secondary status determination in the enhanced DSCH power control is also applied to the TFCI power control in DSCH hard split mode.]

[FDD – Radio Link Set Handling]:

[FDD – The *First RLS Indicator* IE indicates if the concerning RL shall be considered part of the first RLS established towards this UE. The *First RLS Indicator* IE shall be used by the Node B together with the value of the *DL TPC pattern 01 count* IE which the Node B has received in the Cell Setup procedure, to determine the initial TPC pattern in the DL of the concerning RL and all RLs which are part of the same RLS, as described in [10], section 5.1.2.2.1.2.]

[FDD – For each RL not having a common generation of the TPC commands in the DL with another RL, the Node B shall assign the *RL Set ID* IE included in the RADIO LINK SETUP RESPONSE message a value that uniquely identifies the RL Set within the Node B Communication context.]

[FDD – For all RLs having a common generation of the TPC commands in the DL with another RL, the Node B shall assign the *RL Set ID* IE included in the RADIO LINK SETUP RESPONSE message the same value. This value shall uniquely identify the RL Set within the Node B Communication context.]

[FDD – The UL out-of-sync algorithm defined in [10] shall for each of the established RL Set(s) use the maximum value of the parameters N_OUTSYNC_IND and T_RLFAILURE, and the minimum value of the parameters N_INSYNC_IND, that are configured in the cells supporting the radio links of the RL Set]

Response Message:

If the RLs are successfully established, the Node B shall start reception on the new RL(s) and respond with a RADIO LINK SETUP RESPONSE message.

After sending of the RADIO LINK SETUP RESPONSE message the Node B shall continuously attempt to obtain UL synchronisation on the Uu and start reception on the new RL. [FDD – The Node B shall start transmission on the new RL after synchronisation is achieved in the DL user plane as specified in [16].] [TDD – The Node B shall start transmission on the new RL immediately as specified in [16].]

● ● ● ● ● ● Unaffected parts are omitted ● ● ● ● ● ●

8.3.2 Synchronised Radio Link Reconfiguration Preparation

8.3.2.1 General

The Synchronised Radio Link Reconfiguration Preparation procedure is used to prepare a new configuration of Radio Link(s) related to one UE-UTRAN connection within a Node B.

The Synchronised Radio Link Reconfiguration Preparation procedure shall not be initiated if a Prepared Reconfiguration exists, as defined in subclause 3.1.

8.3.2.2 Successful Operation

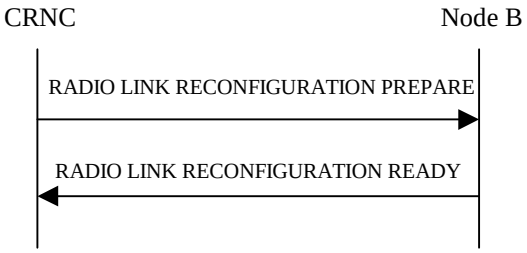

Figure 30: Synchronised Radio Link Reconfiguration Preparation procedure, Successful Operation

The Synchronised Radio Link Reconfiguration Preparation procedure is initiated by the CRNC by sending the message RADIO LINK RECONFIGURATION PREPARE to the Node B. The message shall use the Communication Control Port assigned for this Node B Communication Context.

Upon reception, the Node B shall reserve necessary resources for the new configuration of the Radio Link(s) according to the parameters given in the message. Unless specified below, the meaning of parameters is specified in other specifications.

The Node B shall prioritise resource allocation for the RL(s) to be modified according to Annex A.

DCH Modification:

If the RADIO LINK RECONFIGURATION PREPARE message includes any *DCHs to Modify* IEs then the Node B shall treat them each as follows:

- If the *DCHs to Modify* IE includes the *Frame Handling Priority* IE, the Node B should store this information for this DCH in the new configuration. The received Frame Handling Priority should be used when prioritising between different frames in the downlink on the radio interface in congestion situations within the Node B once the new configuration has been activated.

- If the *DCHs to Modify* IE includes the *Transport Format Set* IE for the UL of a DCH, the Node B shall apply the new Transport Format Set in the Uplink of this DCH in the new configuration.

- If the *DCHs to Modify* IE includes the *Transport Format Set* IE for the DL of a DCH, the Node B shall apply the new Transport Format Set in the Downlink of this DCH in the new configuration.

- If the *DCHs to Modify* IE includes multiple *DCH Specific Info* IEs then the Node B shall treat the DCHs in the *DCHs to Modify* IE as a set of co-ordinated DCHs. The Node B shall include these DCHs in the new configuration only if it can include all of them in the new configuration.

- If the *DCHs to Modify* IE includes the *UL FP Mode* IE for a DCH or a DCH which belongs to a set of co-ordinated DCHs, the Node B shall apply the new FP Mode in the Uplink of the user plane for the DCH or the set of co-ordinated DCHs in the new configuration.

- If the *DCHs to Modify* IE includes the *ToAWS* IE for a DCH or a DCH which belongs to a set of co-ordinated DCHs, the Node B shall apply the new ToAWS in the user plane for the DCH or the set of co-ordinated DCHs in the new configuration.

- If the *DCHs to Modify* IE includes the *ToAWE* IE for a DCH or a DCH which belongs to a set of co-ordinated DCHs, the Node B shall apply the new ToAWE in the user plane for the DCH or the set of co-ordinated DCHs in the new configuration.

- [TDD – If the *DCHs to Modify* IE includes the *CCTrCH ID* IE for the DL of a DCH to be modified, the Node B shall apply the new CCTrCH ID in the Downlink of this DCH in the new configuration.]

- [TDD – If the *DCHs to Modify* IE includes the *CCTrCH ID* IE for the UL of a DCH to be modified,

the Node B shall apply the new CCTrCH ID in the Uplink of this DCH in the new configuration.]

DCH Addition:

If the RADIO LINK RECONFIGURATION PREPARE message includes any *DCHs to Add* IEs then the Node B shall treat them each as follows:

- If the *DCHs to Add* IE includes multiple *DCH specific Info* IEs then, the Node B shall treat the DCHs in the *DCHs to Add* IE as a set of co-ordinated DCHs. The Node B shall include these DCHs in the new configuration only if it can include all of them in the new configuration.

- [FDD – For DCHs which do not belong to a set of co-ordinated DCHs with the *QE-Selector* IE set to "selected", the Transport channel BER from that DCH shall be the base for the QE in the UL data frames. If no Transport channel BER is available for the selected DCH the Physical channel BER shall be used for the QE, ref. [16]. If the QE-Selector is set to "non-selected", the Physical channel BER shall be used for the QE in the UL data frames, ref. [16].]

- For a set of co-ordinated DCHs the Transport channel BER from the DCH with the *QE-Selector* IE set to "selected" shall be used for the QE in the UL data frames, ref. [16]. [FDD – If no Transport channel BER is available for the selected DCH the Physical channel BER shall be used for the QE, ref. [16]. If all DCHs have *QE-Selector* IE set to ”non-selected” the Physical channel BER shall be used for the QE, ref. [16].]

- The Node B should store the *Frame Handling Priority* IE received for a DCH to be added in the new configuration The received Frame Handling Priority should be used when prioritising between different frames in the downlink on the radio interface in congestion situations within the Node B once the new configuration has been activated.

- The Node B shall use the included *UL FP Mode* IE for a DCH or a set of co-ordinated DCHs to be added as the new FP Mode in the Uplink of the user plane for the DCH or the set of co-ordinated DCHs in the new configuration.

- The Node B shall use the included *ToAWS* IE for a DCH or a set of co-ordinated DCHs to be added as the new Time of Arrival Window Start Point in the user plane for the DCH or the set of co-ordinated DCHs in the new configuration.

- The Node B shall use the included *ToAWE* IE for a DCH or a set of co-ordinated DCHs to be added as the new Time of Arrival Window End Point in the user plane for the DCH or the set of co-ordinated DCHs in the new configuration.

- [TDD – The Node B shall apply the *CCTrCH ID* IE (for the DL) in the Downlink of this DCH in the new configuration.]

- [TDD – The Node B shall apply the *CCTrCH ID* IE (for the UL) in the Uplink of this DCH in the new configuration.]

DCH Deletion:

If the RADIO LINK RECONFIGURATION PREPARE message includes any *DCHs to Delete* IEs, the Node B shall not include the referenced DCHs in the new configuration.

If all of the DCHs belonging to a set of coordinated DCHs are requested to be deleted, the Node B shall not include this set of coordinated DCHs in the new configuration.

Physical Channel Modification:

[FDD – If the RADIO LINK RECONFIGURATION PREPARE message includes an *UL DPCH Information* IE then the Node B shall apply the parameters to the new configuration as follows:]

- [FDD – If the *UL DPCH Information* IE includes the *Uplink Scrambling Code* IE, the Node B shall

apply this Uplink Scrambling Code to the new configuration.]

- [FDD – If the *UL DPCH Information* IE includes the *Min UL Channelisation Code Length* IE, the Node B shall apply the value in the new configuration. The Node B shall apply the contents of the *Max Number of UL DPDCHs* IE (if it is included) in the new configuration.]

- [FDD – If the *UL DPCH Information* IE includes the *UL SIR Target* IE, the Node B shall use the value for the UL inner loop power control when the new configuration is being used.]

- [FDD – If the *UL DPCH Information* IE includes the *Puncture Limit* IE, the Node B shall apply the value in the uplink of the new configuration.]

- [FDD – The Node B shall use the *TFCS* IE for the UL (if present) when reserving resources for the uplink of the new configuration. The Node B shall apply the new TFCS in the Uplink of the new configuration.]

- [FDD – If the *UL DPCH Information* IE includes the *UL DPCCH Slot Format* IE, the Node B shall set the new Uplink DPCCH Structure to the new configuration.]

- [FDD - If the *UL DPCH Information* IE includes the *Diversity Mode* IE, the Node B shall apply diversity according to the given value.]

- [FDD – If the *UL DPCH Information* IE includes an *SSDT Cell Identity Length* IE and/or an *S-Field Length* IE, the Node B shall apply the values in the new configuration.]

[FDD - If the RADIO LINK RECONFIGURATION PREPARE message includes a *DL DPCH Information* IE then the Node B shall apply the parameters to the new configuration as follows:]

- [FDD – The Node B shall use the *TFCS* IE for the DL (if it is present) when reserving resources for the downlink of the new configuration. The Node B shall apply the new TFCS in the Downlink of the new configuration.]

- [FDD – If the *DL DPCH Information* IE includes the *TFCI Signalling Mode* IE or the *TFCI Presence* IE, the Node B shall use the information when building TFCIs in the new configuration.]

- [FDD – If the *DL DPCH Information* IE includes the *DL DPCCH Slot Format* IE, group the Node B shall set the new Downlink DPCCH Structure to the new configuration.]

- [FDD – If the *DL DPCH Information* IE includes the *Multiplexing Position* IE, the Node B shall apply the indicated multiplexing type in the new configuration.]

- [FDD – If the *DL DPCH Information* IE includes the *Limited Power Increase* IE and the IE is set to 'Used', the Node B shall use Limited Power Increase ref. [10] subclause 5.2.1 for the inner loop DL power control in the new configuration.]

- [FDD – If the *DL DPCH Information* IE includes the *Limited Power Increase* IE and the IE is set to 'Not Used', the Node B shall not use Limited Power Increase for the inner loop DL power control in the new configuration.]

- [FDD – If the *DL DPCH Information* IE includes the *PDSCH code mapping* IE then the Node B shall apply the defined mapping between TFCI values and PDSCH channelisation codes.]

- [FDD – If the *DL DPCH Information* IE includes the *PDSCH RL ID* IE then the Node B shall infer that the PDSCH for the specified user will be transmitted on the defined radio link.]

[FDD – If the RADIO LINK RECONFIGURATION PREPARE message includes the *Transmission Gap Pattern Sequence Information* IE the Node B shall store the new information about the Transmission Gap Pattern Sequences to be used in the new Compressed Mode Configuration. This new Compressed Mode Configuration shall be valid in the Node B until the next Compressed Mode Configuration is configured in the Node B or Node B Communication Context is deleted.]

[TDD – UL/DL CCTrCH Modification]

[TDD – If the RADIO LINK RECONFIGURATION PREPARE message includes any *UL CCTrCH to Modify* or *DL CCTrCH to Modify* IEs, then the Node B shall treat them each as follows:]

- [TDD – If the IE includes any of *TFCS* IE, *TFCI coding* IE or *Puncture Limit* IE the Node B shall apply these as the new values, otherwise the old values specified for this CCTrCH are still applicable.]

- [TDD – If the IE includes any *UL DPCH to add* or *DL DPCH to add* IEs, the Node B shall include this DPCH in the new configuration.]

- [TDD – If the IE includes any *UL DPCH to delete* or *DL DPCH to delete* IEs, the Node B shall remove this DPCH in the new configuration.]

- [TDD – If the IE includes any UL *DPCH to modify* or *DL DPCH to modify* IEs, and includes any of *Repetition Period* IE, *Repetition Length* IE, or *TDD DPCH Offset* IE or the message includes UL/DL Timeslot Information and includes any of *[3.84Mcps TDD - Midamble shift and Burst Type* IE, *Time Slot* IE], [1.28Mcps TDD - *Midamble shift LCR* IE, *Time Slot LCR* IE], or *TFCI presence* IE or the message includes UL/DL Code information and includes [3.84Mcps TDD - *TDD Channelisation Code* IE], [1.28Mcps TDD - *TDD Channelisation Code LCR* IE], the Node B shall apply these specified information elements as the new values, otherwise the old values specified for this DPCH configuration are still applicable.]

- [1.28Mcps TDD – If the *UL CCTrCH to Modify* IE includes the *UL SIR Target* IE, the Node B shall use the value for the UL inner loop power control according [19] and [21] when the new configuration is being used.]

[TDD – UL/DL CCTrCH Addition]

[TDD – If the RADIO LINK RECONFIGURATION PREPARE message includes any *UL CCTrCH to Add* IE or *DL CCTrCH to Add* IE, the Node B shall include this CCTrCH in the new configuration.]

[TDD – If the *UL/DL CCTrCH to Add* IE includes any *UL/DL DPCH Information* IE, the Node B shall reserve necessary resources for the new configuration of the UL/DL DPCH(s) according to the parameters given in the message.]

[TDD – If the RADIO LINK RECONFIGURATION PREPARE message includes a *DL CCTrCH to Add* IE, the Node B shall set the TPC step size of that CCTrCH to the same value as the lowest numbered DL CCTrCH in the current configuration.]

[1.28Mcps TDD –The Node B shall use the *UL SIR Target* IE in the *UL CCTrCH to Add* IE as the UL SIR value for the inner loop power control for this CCTrCH according [19] and [21] in the new configuration.]

[TDD – UL/DL CCTrCH Deletion]

[TDD – If the RADIO LINK RECONFIGURATION PREPARE message includes any UL or DL CCTrCH to be deleted , the Node B shall remove this CCTrCH in the new configuration.]

DSCH Addition/Modification/Deletion:

If the RADIO LINK RECONFIGURATION PREPARE message includes any *DSCH to modify*, *DSCH to add* or *DSCH to delete* IEs, then the Node B shall use this information to add/modify/delete the indicated DSCH channels to/from the radio link, in the same way as the DCH info is used to add/modify/release DCHs.

The Node B shall include in the RADIO LINK RECONFIGURATION READY message both the *Transport Layer Address* IE and the *Binding ID* IE for the transport bearer to be established for each DSCH.

[FDD – If the RADIO LINK RECONFIGURATION PREPARE message includes the *TFCI2 Bearer Information* IE then the Node B shall support the establishment of a transport bearer on which the DSCH TFCI Signaling control frames shall be received if one does not already exist or shall apply the new values if such a bearer does already exist. The *Binding ID* IE and *Transport Layer Address* IE of any new bearer to be set up for this purpose shall be returned in the RADIO LINK RECONFIGURATION READY message. If the RADIO LINK RECONFIGURATION PREPARE message specifies that the TFCI2 transport bearer is to be deleted then the Node B shall release the resources associated with that bearer in the new configuration.

[FDD – If the *TFCI Signalling Mode* IE within the RADIO LINK RECONFIGURATION PREPARE message indicates that there shall be a hard split on the TFCI field but a TFCI2 transport bearer has not already been set up and *TFCI2 Bearer Information* IE is not included in the message then the Node B shall transmit the TFCI2 field with zero power in the new configuration.]

[FDD – If the *TFCI Signalling Mode* IE within the RADIO LINK RECONFIGURATION PREPARE message indicates that there shall be a hard split on the TFCI and the *TFCI2 Bearer Information* IE is included in the message then the Node B shall transmit the TFCI2 field with zero power until Synchronisation is achieved on the TFCI2 transport bearer and the first valid DSCH TFCI Signalling control frame is received on this bearer in the new configuration (see ref. [24]).]

[FDD - If the RADIO LINK RECONFIGURATION PREPARE message includes the *DSCH Common Information IE,* the Node B shall treat it as follows:]

- [FDD - If the *Enhanced DSCH PC Indicator* IE is included and set to "Enhanced DSCH PC Active in the UE ", the Node B shall activate enhanced DSCH power control in accordance with ref. [10] subclause 5.2.2, if supported, using either:]

- [FDD - the *SSDT Cell Identity for EDSCHPC* IE in the *RL Information* IE, if the *SSDT Cell Identity* IE is not included in the *RL Information* IE or]

- [FDD - the *SSDT Cell Identity* IE in the *RL Information* IE, if both the *SSDT Cell Identity* IE and the *SSDT Cell Identity for EDSCHPC* IE are included in the *RL Information* IE.]

[FDD - together with the *SSDT Cell Identity Length* IE in *UL DPCH Information* IE, and *Enhanced DSCH PC* IE, in the new configuration.]

[FDD - If the enhanced DSCH power control is activated and the TFCI power control in DSCH hard split mode is supported, the primary/secondary status determination in the enhanced DSCH power control is also applied to the TFCI power control in DSCH hard split mode.]

[FDD - If the RADIO LINK RECONFIGURATION PREPARE message includes the *Enhanced DSCH PC Indicator* IE set to "Enhanced DSCH PC not Active in the UE", the Node B shall deactivate enhanced DSCH power control in the new configuration.]

[TDD – USCH Addition/Modification/Deletion:]

- [TDD – If the RADIO LINK RECONFIGURATION PREPARE message includes USCH information for the USCHs to be added/modified/deleted then the Node B shall use this information to add/modify/delete the indicated USCH channels to/from the radio link, in the same way as the DCH info is used to add/modify/release DCHs.]

- [TDD – The Node B shall include in the RADIO LINK RECONFIGURATION READY message both the *Transport Layer Address* IE and the *Binding ID* IE for the transport bearer to be established for each USCH.]

RL Information:

If the RADIO LINK RECONFIGURATION PREPARE message includes the *RL Information* IE, the Node B shall treat it as follows:

- [FDD – When more than one DL DPDCH are assigned per RL, the segmented physical channel shall be mapped on to DL DPDCHs according to [8]. When *p* number of DL DPDCHs are assigned to each RL, the first pair of DL Scrambling Code and FDD DL Channelisation Code Number corresponds to "*PhCH number 1*", the second to "*PhCH number 2"*, and so on until the *p*th to "*PhCH number p*".]

- [FDD – If the *RL Information* IE includes the *SSDT Indication* IE set to "SSDT Active in the UE", the Node B may activate SSDT using the *SSDT Cell Identity* IE in the new configuration.]

- [FDD – If the *RL Information* IE includes the *SSDT Indication* IE set to "SSDT not Active in the UE", the Node B shall deactivate SSDT in the new configuration.]

- [FDD – If the *RL Information* IE includes a *DL Code Information* IE, the Node B shall apply the values in the new configuration.]

- [FDD – If the *RL Information* IE contains the *Transmission Gap Pattern Sequence Code Information* IE in the *DL Code Information* IE for any of the allocated DL Channelisation Codes, the Node B shall apply the alternate scrambling code as indicated whenever the downlink compressed mode method SF/2 is active in the new configuration.]

- If the *RL Information* IE includes the *Maximum DL Power* and/or the *Minimum DL Power* IEs, the Node B shall apply the values in the new configuration. [FDD - During compressed mode, the $P_{SIR}(k)$, as described in ref.[10] subclause 5.2.1.3, shall be added to the maximum DL power in slot k.].

- [TDD – If the *RL Information* IE includes the *Initial DL Transmission Power* IE, the Node B shall apply the given power to the transmission on each DPCH of the CCTrCH when starting transmission on a new CCTrCH.until the UL synchronisation on the Uu is achieved for the CCTrCH. If no *Initial DL Transmission power* IE is included with a new CCTrCH, the Node B shall use any transmission power level currently used on already existing CCTrCH's when starting transmission for a new CCTrCH. No inner loop power control shall be performed during this period. The DL power shall then vary according to the inner loop power control (see ref.[22], subclause 4.2.3.3).]

General

If the requested modifications are allowed by the Node B and the Node B has successfully reserved the required resources for the new configuration of the Radio Link(s), it shall respond to the CRNC with the RADIO LINK RECONFIGURATION READY message. When this procedure has been completed successfully there exist a Prepared Reconfiguration, as defined in subclause 3.1.

In the RADIO LINK RECONFIGURATION READY message, the Node B shall include the *RL Information Response* IE for each affected Radio Link.

The Node B shall include in the RADIO LINK RECONFIGURATION READY message the Transport Layer Address and the Binding ID for any Transport Channel being added, or any Transport Channel being modified for which a new transport bearer was requested with the *Transport Bearer Request Indicator* IE.

In case of a DCH requiring a new transport bearer on Iub, the *Transport Layer Address* IE and the *Binding ID* shall be included in the IE *DCH Information Response* IE.

In case of a set of coordinated DCHs requiring a new transport bearer on Iub, the *Transport Layer Address* IE and the *Binding ID* IE in the *DCH Information Response* IE shall be included only for one of the DCH in the set of coordinated DCHs.

In case of a Radio Link being combined with another Radio Link within the Node B,the RL Information Response IE shall be included only for one of the combined RLs. The *Transport Layer Address* IE and the *Binding ID* IE in the *DCH Information Response* IE shall be included only for one of the combined Radio Links.

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5.4.3.3 Impacts on DCH FP (TS 25.427)

========== TS 25.427 ==========

5.8 Radio Interface Parameter Update [FDD]

This procedure is used to update radio interface parameters which are applicable to all RL's for the concerning UE. Both synchronised and unsynchronised parameter updates are supported.

The procedure consists of a RADIO INTERFACE PARAMETER UPDATE control frame sent by the SRNC to the Node B.

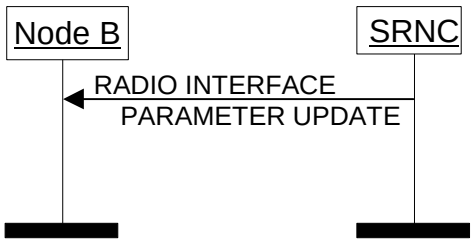

Figure 9: Radio Interface Parameter Update procedure

If the RADIO INTERFACE PARAMETER UPDATE control frame contains a valid TPC power offset value, the Node B shall apply the newly provided TPC PO in DL. If the frame contains a valid DPC mode value, the Node B shall apply the newly provided value in DL power control. If the frame contains valid TFCI PO_primary parameter and cell is decided to be primary, the Node B shall apply the newly provided value in DL TFCI power control. If the frame contains valid TFCI PO parameter, the Node B shall apply the newly provided value in DL TFCI power control. The new values shall be applied as soon as possible in case no valid CFN is included or from the indicated CFN.

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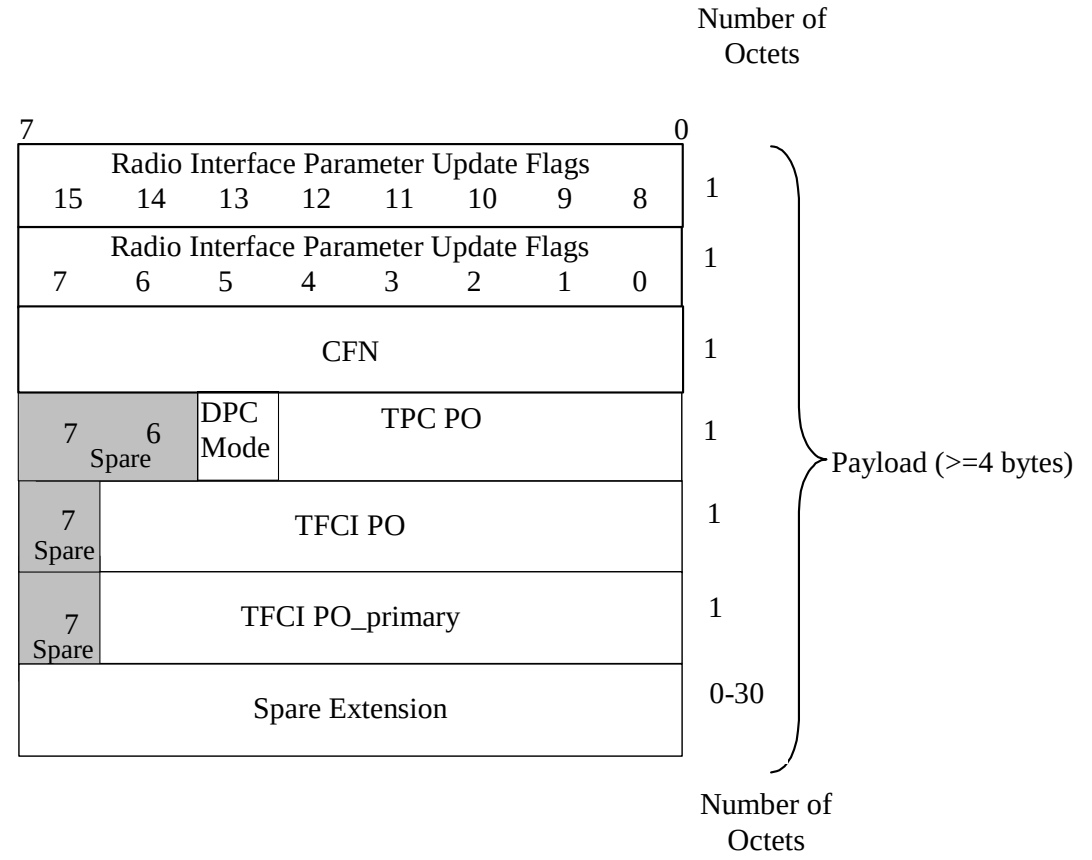
6.3.3.9 RADIO INTERFACE PARAMETER UPDATE [FDD]

6.3.3.9.1 Payload structure

The figure 22 shows the structure of the payload when the control frame is used for signalling radio interface parameter updates.



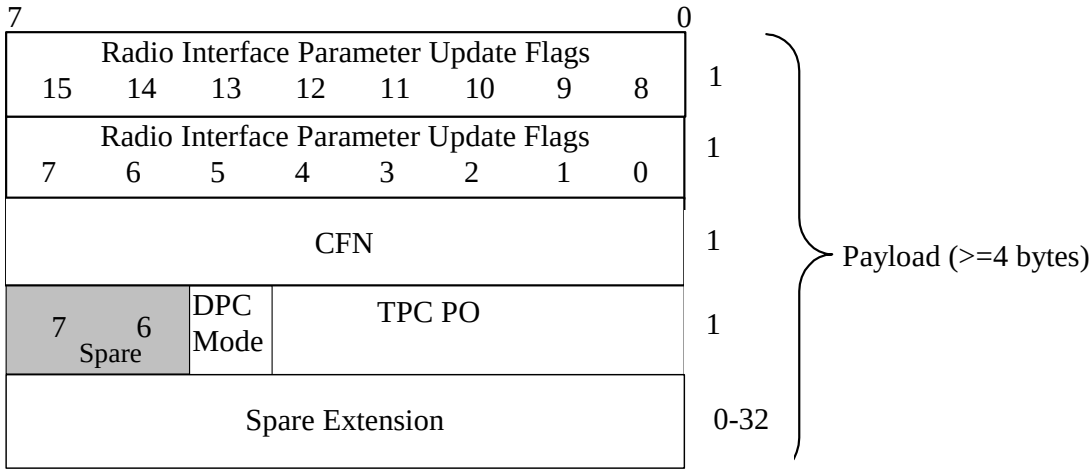


Figure 22: Structure of the payload for the RADIO INTERFACE PARAMETER UPDATE control frame

6.3.3.9.2 Radio Interface Parameter Update flags

Description: Contains flags indicating which information is valid in this control frame.

Value range:

Bit 0: Indicates if the 3rd byte of the control frame payload contains a valid CFN (1) or not (0);

Bit 1: Indicates if the 4th byte (bits 0-4) of the control frame payload contains a valid TPC PO (1) or

not (0);

Bit 2: Indicates if the 4th byte (bit 5) of the control frame payload contains a valid DPC mode (1) or not (0);

Bit 3: Indicates if the 5th byte (bit 0-7) of the control frame payload contains a valid TFCI PO (1) or not (0);

Bit 4: Indicates if the 6th byte (bit 0-7) of the control frame payload contains a valid TFCI PO_primary (1) or not (0);

Bit 35-15: Set to (0): reserved in this user plane revision. Any indicated flags shall be ignored by the receiver.

Field length: 16 bits.

6.3.3.9.3 TPC Power Offset (TPC PO)

Description: Power offset to be applied in the DL between the DPDCH information and the TPC bits on the DPCCH as specified in the clause 5.2 of [12].

Value range: {0-7.75 dB}.

Granularity: 0.25 dB.

Field length: 5 bits.

6.3.3.9.4 Spare Extension

The *Spare Extension* IE is described in subclause 6.3.3.1.4.

6.3.3.9.4A CFN

Description: The CFN value indicates when the presented parameters shall be applied.

Value range: As defined in subclause 6.2.4.3.

Field length: 8 bits.

6.3.3.9.5 DPC Mode

Description: DPC mode to be applied in the UL.

Value range: {0,1}.

The DPC mode shall be applied as specified in [12].

Field length: 1 bit.

6.3.3.9.x TFCI Power Offset (TFCI PO)

Description: Power offset to be applied in the DL between the DPDCH information and the TFCI bits on the DPCCH.

Value range: {0-31.75 dB}.

Granularity: 0.25 dB.

Field length: 7 bits.

6.3.3.9.x TFCI Power Offset for primary cell (TFCI PO_primary)

Description: Power offset to be applied in the DL between the DPDCH information and the TFCI bits on the DPCCH when cell is decided to be primary. The primary status shall be determined as specified in [4].

Value range: {0-31.75 dB}.

Granularity: 0.25 dB.

Field length: 7 bits.

==========

Table 1: Place where Change request is given in order to refer the new procedure

3G TS	CR	Title	Remarks
25.423	CR582	RNSAP changes for TFCI power control in DSCH hard split mode	
25.427	CR082	DCH FP changes for TFCI power control in DSCH hard split mode	
25.433	CR626	NBAP changes for TFCI power control in DSCH hard split mode	

5.4.4 Backward Compatibility

Rel' 5-Node Bs and Release 99 (or Rel' 4)-Node Bs in the same active set:

- Rel' 5- and Release 99 (or Rel' 4)-Node Bs may be configured in the same active set. In this case, while flexible TFCI power offset would be set in the Rel' 5-Node Bs, fixed power offset would be set in the Release 99 (or Rel' 4)-Node Bs. This does not cause any problem to network operation. By using *TFCI PC Support Indicator* IE in the RADIO LINK SETUP RESPONSE, RADIO LINK SETUP FAILURE, RADIO LINK ADDITION RESPONSE and RADIO LINK ADDITION FAILURE messages, SRNC knows which cell in the active set is using flexible TFCI power offset.

Consequently, the TFCI power control procedure in the DSCH hard split mode is backward compatible with Release 99 and REL-4.

========== End of the WG 3 part ==========

5.5 Backward Compatibility

5.5.1 DSCH power offset

In the current specification, the DSCH power offset is described as information element in the Iub specification (Frame Protocol) [3].

The indicated value is the offset relative to the power of the TFCI bits of the downlink DPCCH directed to the same UE as the DSCH.

From the above description, the power level of the DSCH is based on the PO1, which is the time-invariant TFCI power offset relative to the DPDCH power in Release 99 and Rel'4. Since the TFCI power offset may vary in time with the proposed scheme, clarification as regard to the DSCH power offset is required. If the power level of the DSCH is based on the flexible TFCI power, the flexible DSCH power offset should be used for the DSCH power control as in Release 99 and Rel'4. Thus, there is no backward compatibility problem regarding DSCH power offset.

5.5.2 Rel' 5-Node Bs and Release 99 (or Rel' 4)-Node Bs in the same active set

Rel' 5- and Release 99 (or Rel' 4)-Node Bs may be configured in the same active set. In this case, while flexible TFCI power offset would be set in the Rel' 5-Node Bs, fixed power offset would be set in the Release 99 (or Rel' 4)-Node Bs. This does not cause any problem to network operation.

5.5.3 Backward compatibility issues in UE

It is clear that Release 99 (or Rel' 4)- UEs operate in Rel' 5 Node Bs and Rel' 5-UEs operate with Release 99 (or Rel' 4)-Node Bs where the proposed schemes are not available. Therefore, there is no backward compatibility problem.

Appendix (Informative)

- **IFHT Algorithm for supporting the flexible length**

When the number of information bits is less than 6 (k < 6), there are some alternatives to decode the received data efficiently. In fact, it doesn't matter if we do not use the following structure for decoding. The following structure only provides an example of efficient decoding scheme.

When the number of information bits < 6, only the first IFHT is performed. But, this structure is so loose in terms of the number of operation because the first IFHT with 32x32 size is always fully performed for each k < 6 case. Actually, it is desirable to use IFHT with size $2^k x 2^k$ for each k. That is, it is desirable to use IFHT with the flexible size. Therefore, the flexible IFHT can be used as shown in Fig A1.

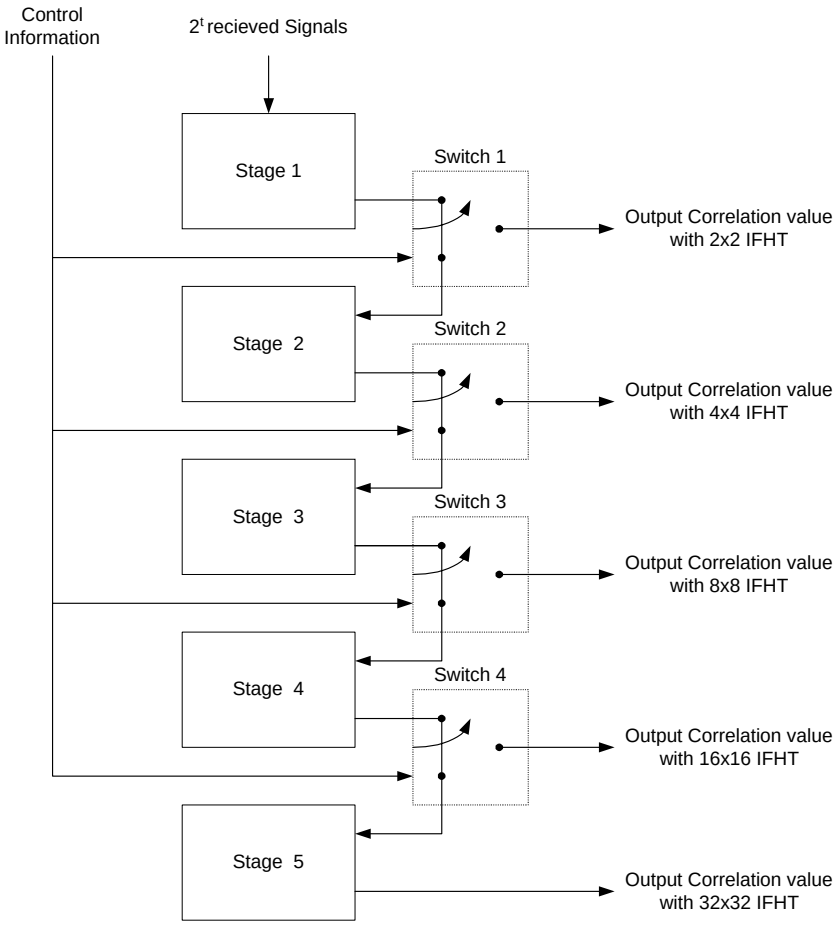


Fig A1. Flexible IFHT Structure

Fig. A1 describes the overall structure of the flexible IFHT. Generally, $2^k x 2^k$ IFHT performance consists of k stages. For example, 32x32 IFHT consists of 5 stages. Hence, by using this property, the size of IFHT can be varied adaptively. That is, if 2 stages out of 5 stages are performed, then 4x4 IFHT is effectively calculated, and if 3 stages out of 5 stages are performed, then 8x8 IFHT is effectively calculated, and so on. This is called "Nested Property". Fig A.1 is a well-designed structure based on this "Nested Property". But this structure requires some new circuits in each stage, instead of the well-known "Butterfly Logic", because "Butterfly Logic" is not suited for "Nested Property". The new circuit suited for "Nested Property" is as shown in Fig A.2.

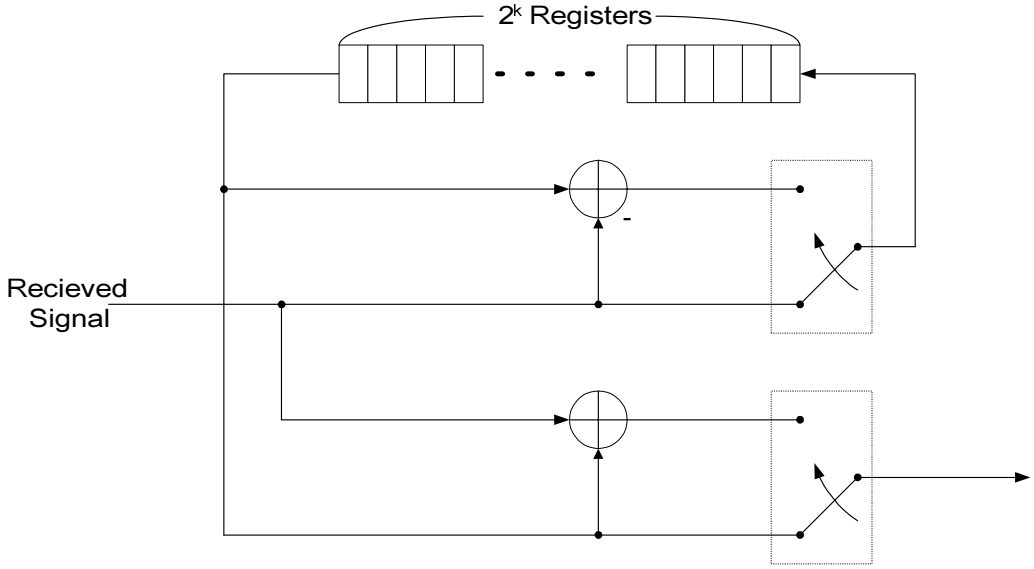


Fig A2. Circuit of Stage

- **Implementation of mapping rule**

In this section, we describe the method to implement the mapping rule. Actually, instead of the formula, it may be very useful to use a mask for presenting the transmission position that is calculated according to the position calculation method described above. That is, we define as follows:

- "0" means that the coded symbol of TFCI for DSCH is holding, not transmitted, and that of TFCI for DCH is transmitted.
- "1" means that the coded symbol of TFCI for DCH is holding, not transmitted, and that of TFCI for DSCH is transmitted.

By using such presentation, mask patterns for all case are as shown in the following table A1.

$TFCI_{DCH}$: $TFCI_{DSCH}$	Mask for mapping position
1 : 9	000000010000000100000001000000001
2 : 8	000010001000010001000010001000001
3 : 7	001001000100100100100100010001001
4 : 6	010010010010010010010010010010101
5 : 5	010101010101010101010101010101010
6 : 4	101101011010110101101101101011010
7 : 3	110110111011011011011011101110110
8 : 2	111011101111011101111011101111110
9 : 1	111111011111110111111101111111110

Table A1. Masks for mapping position

We see an example to transmit the coded symbol. Before this, we define the i-th output coded symbol after puncturing for DCH as $d_{1,i}$ and the k-th outputted coded symbol after puncturing for DSCH as $d_{2,k}$.
In 3 : 7 case, the first bit in mask for mapping rule is 0. Hence, the first coded symbol $d_{2,0}$ of TFCI for DSCH is holding, not transmitted, and the coded symbol $d_{1,0}$ of TFCI for DCH is transmitted. The second bit in mask for mapping rule is 0. Hence, the first coded symbol $d_{2,0}$ of TFCI for DSCH which is not transmitted is holding again, not transmitted, and the coded symbol $d_{1,1}$ of TFCI for DCH is transmitted. The third bit in mask for mapping rule is 1. Hence, the coded symbol $d_{1,2}$ of TFCI for DCH is held, not transmitted, and the coded symbol $d_{2,0}$ of TFCI for DSCH is transmitted. And so on.
According to this operation, the output symbol after symbol mapping is as following Fig A3.

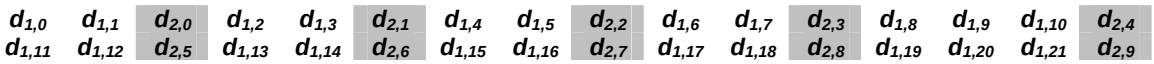


Fig A3. Example of mapping rule in 3 : 7 case

6 Project Plan

6.1 Schedule

Date	Meeting	Scope	[expected] Input	[expected]Output
2001.09	RAN #13	TR submission		TR V1.0.0
2001.12	RAN #14	TR submission		TR V2.0.0
2002.03	RAN #15	TR and CR submission		TR V5.0.0 and CR

6.2 Work Task Status

	Planned Date	Milestone	Status

7 History

Document history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2001.8	RAN 1 #21	R1-01-0886			The requirement section 4.2 is filled	0.1.0	0.2.0
2001.8	RAN 1 #21	R1-01-0963			The Proposed TFCI Coding scheme and mapping rule are included.	0.2.0	0.3.0
2001.9	RAN #13	RP-01-0534			RAN submission	0.3.0	1.0.0
2001.11	RAN1 #22	R1-01-1173			Addition of TFCI power control section (with revision mark)	1.0.0	1.0.1
2001.11	RAN1 #22	R1-01-1329			Addition of Impact on WG1	1.0.1	1.1.0
2002.1	RAN1 #23	R1-02-0052			Editorial change	1.1.0	1.1.1
2002.1	RAN1 #23	R1-02-0161			Editorial change	1.1.1	1.2.0
2002.1	RAN1 #23	R1-02-0197			Clarification on TFCI Power Control	1.2.0	1.3.0
2002.1	RAN1 #24	R1-02-0466			Editorial change	1.3.0	1.3.1
2002.2	RAN1 #24	R1-02-0512			Editorial change	1.3.1	1.4.0
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