

**TSG RAN Meeting #28**  
**Quebec, Canada, 1 - 3 June 2005**

**RP-050255**

**Title** CRs (Rel-6 category F) for corrections of LCRTDD in RAN1 specifications  
**Source** TSG RAN WG1  
**Agenda Item** 8.11

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RAN1 Tdoc	Spec	CR	Rev	Rel	Cat	Current Version	Subject	Work item	Remarks
R1-050516	25.221	127	1	Rel-6	F	6.3.0	Correction to the examples of the association of UL SS commands to UL uplink time slots	LCRTDD-Phys	
R1-050518	25.221	133	1	Rel-6	F	6.3.0	Correction to the examples of the association of UL TPC commands to UL uplink time slot and CCTrCH pairs	LCRTDD-Phys	
R1-050567	25.224	144	2	Rel-6	F	6.4.0	Clarification of UpPCH Sub-channel for 1.28 Mcps TDD	LCRTDD-Phys	

# CHANGE REQUEST

⌘ **TS25.221** **CR** **127** ⌘ **rev** **1** ⌘ Current version: **6.3.0** ⌘

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**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Correction to the examples of the association of UL SS commands to UL uplink time slots		
<b>Source:</b>	⌘ RAN WG1		
<b>Work item code:</b>	⌘ LCRTDD-Phys	<b>Date:</b>	⌘ 09/05/2005
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ Rel-6
	<i>Use one of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		<i>Use one of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>Rel-4</b> (Release 4) <b>Rel-5</b> (Release 5) <b>Rel-6</b> (Release 6)

<b>Reason for change:</b>	⌘ The association illustrated in the example has not been alignment with the regarded equation. It exemplifies the association erroneously.
<b>Summary of change:</b>	⌘ Correct the associations in terms of the equation in 5A.2.2.3.
<b>Consequences if not approved:</b>	⌘ Cause incorrect understanding of the association between the UL time slots and SS commands.

<b>Clauses affected:</b>	⌘ Annex CC(informative)										
<b>Other specs affected:</b>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table>	Y	N		X		X		X	Other core specifications Test specifications O&M Specifications	⌘
Y	N										
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	X										
	X										
<b>Other comments:</b>	⌘										

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

# Annex CC (informative):

## Examples of the association of UL SS commands to UL uplink time slots

In the following two examples of the association of UL SS commands to UL uplink time slots are shown (see 5A.2.2.3):

**Table CC.1 Two examples of the association of UL SS commands to UL uplink time slots with  $N_{ULslot}=3$**

Case 1:  $N_{SSsymbols}=2$ ; Case 2:  $N_{SSsymbols}=4$

Sub-Frame Number $F$	Case 1 (2 UL SS symbols)		The order of the served UL time slot (UL time slot number)	Case 2 (4 UL SS symbols)	
	The order of UL SS symbols			The order of UL SS symbols	
SFN'=0	(1 <sup>st</sup> $UL_{pos}=0$ )	0	→ 0 (TS3) ←	← 0	(1 <sup>st</sup> $UL_{pos}=0$ )
		1	→ 1 (TS4) ←	← 1	
			2 (TS5) ←	← 2	
			0 (TS3) ←	← 3	
SFN'=1	(1 <sup>st</sup> $UL_{pos}=2$ )	0	→ 0 (TS3) ←	← 0	(1 <sup>st</sup> $UL_{pos}=1$ )
		1	→ 1 (TS4) ←	← 1	
			2 (TS5) ←	← 2	
			0 (TS3) ←	← 3	
			1 (TS4) ←		
SFN'=2	(1 <sup>st</sup> $UL_{pos}=1$ )	0	→ 0 (TS3) ←	← 0	(1 <sup>st</sup> $UL_{pos}=2$ )
		1	→ 1 (TS4) ←	← 1	
			2 (TS5) ←	← 2	
			0 (TS3) ←	← 3	
			1 (TS4) ←		
...	...	...	...	...	...

Case 1:  $N_{SSsymbols}=2$ ; Case 2:  $N_{SSsymbols}=4$

Sub-Frame Number $F$	Case 1 (2 UL SS symbols)		The order of the served UL time slot (UL time slot number)	Case 2 (4 UL SS symbols)	
	The order of UL SS symbols			The order of UL SS symbols	
SFN'=0	(1 <sup>st</sup> $UL_{pos}=0$ )	0	→ 0 (TS3) ←	← 0	(1 <sup>st</sup> $UL_{pos}=0$ )
		1	→ 1 (TS4) ←	← 1	
			2 (TS5) ←	← 2	
			1 (TS4) ←	← 3	
SFN'=1	(1 <sup>st</sup> $UL_{pos}=2$ )	0	→ 0 (TS3) ←	← 0	(1 <sup>st</sup> $UL_{pos}=2$ )
		1	→ 1 (TS4) ←	← 1	
			2 (TS5) ←	← 2	
			0 (TS3) ←	← 3	
			1 (TS4) ←		
SFN'=2	(1 <sup>st</sup> $UL_{pos}=2$ )	0	→ 0 (TS3) ←	← 0	(1 <sup>st</sup> $UL_{pos}=1$ )
		1	→ 1 (TS4) ←	← 1	
			2 (TS5) ←	← 2	
			0 (TS3) ←	← 3	
			1 (TS4) ←		
...	...	...	...	...	...

Athens, Greece, May 9<sup>th</sup>-13<sup>rd</sup>, 2005

CR-Form-v7	
<b>CHANGE REQUEST</b>	
⌘ <b>TS25.221</b> CR <b>133</b> ⌘ rev <b>1</b> ⌘	Current version: <b>6.3.0</b> ⌘

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**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Correction to the examples of the association of UL TPC commands to UL uplink time slot and CCTrCH pairs		
<b>Source:</b>	⌘ RAN WG1		
<b>Work item code:</b>	⌘ LCRTDD-Phys	<b>Date:</b>	⌘ 09/05/2005
<b>Category:</b>	⌘ <b>F</b> Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	<b>Release:</b>	⌘ Rel-6 Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

<b>Reason for change:</b>	⌘ The association illustrated in the example has not been alignment with the equation in 5A.2.2.2 . It exemplifies the association erroneously.
<b>Summary of change:</b>	⌘ Correct the associations in Annex CB according to the equation in 5A.2.2.2.
<b>Consequences if not approved:</b>	⌘ Cause incorrect understanding of the association between the UL time slot and CCTrCH pair and UL TPC command.

<b>Clauses affected:</b>	⌘ Annex CB(informative)										
<b>Other specs affected:</b>	<table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px;">Y</td> <td style="width: 20px;">N</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N		X		X		X		
Y	N										
	X										
	X										
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<b>Other comments:</b>	⌘										

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## Annex CB (informative):

### Examples of the association of UL TPC commands to UL uplink time slots and CCTrCH pairs for 1.28 Mcps TDD

In the following two examples of the association of UL TPC commands to UL time slots and CCTrCHs are shown (see 5A.2.2.2):

**Table CB.1 Two examples of the association of UL TPC commands to UL uplink time slots and CCTrCH pairs with NULslot=3**

Case 1:  $N_{UL\_TPCsymbols}=2$ ; Case 2:  $N_{UL\_TPCsymbols}=4$

Sub-Frame-Number f	Case 1 (2 UL-TPC-symbols)		The order of the served UL time slot and CCTrCH pairs (UL time slot and CCTrCH number)	Case 2 (4 UL-TPC-symbols)	
	The order of UL-TPC-symbols			The order of UL-TPC-symbols	
SFN'=0	(1 <sup>st</sup> UL <sub>pos</sub> =0)	0	0 (TS3)	0	(1 <sup>st</sup> UL <sub>pos</sub> =0)
		1	1 (TS4)	1	
			2 (TS5)	2	
			0 (TS3)	3	
SFN'=1	(1 <sup>st</sup> UL <sub>pos</sub> =2)	0	0 (TS3)	0	(1 <sup>st</sup> UL <sub>pos</sub> =1)
		1	1 (TS4)	1	
			2 (TS5)	2	
			0 (TS3)	3	
SFN'=2	(1 <sup>st</sup> UL <sub>pos</sub> =1)	0	0 (TS3)	0	(1 <sup>st</sup> UL <sub>pos</sub> =2)
		1	1 (TS4)	1	
			2 (TS5)	2	
			0 (TS3)	3	
.			1 (TS4)		
.			2 (TS5)		

Case 1:  $N_{UL\_TPCsymbols}=2$ ; Case 2:  $N_{UL\_TPCsymbols}=4$

Sub-Frame Number $r$	Case 1 (2 UL TPC symbols)		The order of the served UL time slot and CCRCH pairs (UL time slot and CCRCH number)	Case 2 (4 UL TPC symbols)	
	The order of UL TPC symbols			The order of UL TPC symbols	
SFN'=0	(1 <sup>st</sup> $UL_{pos}=0$ )	0	0 (TS3)	0	(1 <sup>st</sup> $UL_{pos}=0$ )
		1	1 (TS4)	1	
			2 (TS5)	2	
			1 (TS4)	3	
SFN'=1	(1 <sup>st</sup> $UL_{pos}=2$ )	0	0 (TS3)	0	(1 <sup>st</sup> $UL_{pos}=2$ )
		1	1 (TS4)	1	
			2 (TS5)	2	
			0 (TS3)	3	
			1 (TS4)		
SFN'=2	(1 <sup>st</sup> $UL_{pos}=2$ )	0	0 (TS3)	0	(1 <sup>st</sup> $UL_{pos}=1$ )
		1	1 (TS4)	1	
			2 (TS5)	2	
			0 (TS3)	3	
			1 (TS4)		
			2 (TS5)		
...	...		...		...



# CHANGE REQUEST

⌘ **TS25.224** CR **144** ⌘ rev **2** ⌘ Current version: **6.4.0** ⌘

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

**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Clarification of UpPCH Sub-channel for 1.28 Mcps TDD		
<b>Source:</b>	⌘ RAN WG1		
<b>Work item code:</b>	⌘ LCRTDD-Phys	<b>Date:</b>	⌘ 09/05/2005
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ Rel-6
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<b>Reason for change:</b>	⌘ The definition of an UpPCH sub-channel for 1.28Mcps TDD in TS25.224 is not clear, and it mismatches the configuration in TS25.331.  In TS25.224, an UpPCH sub-channel for 1.28Mcps TDD is defined by a (sub-set of) signature(s) and sub-frame numbers, its configuration in TS25.331, however, is identical with the one for 3.84Mcps TDD, in which a sub-channel is defined as a subset of frame(s) with respect to a certain timeslot.  Therefore, it is necessary to define an UpPCH sub-channel with the similar approach for 3.84Mcps TDD.
<b>Summary of change:</b>	⌘ Define an UpPCH sub-channel with the similar approach used in 3.84Mcps TDD and adjust random access procedure accordingly.
<b>Consequences if not approved:</b>	⌘ Misalignment in the concept of an UpPCH sub-channel for 1.28Mcps TDD and it may cause confusion at configuration and random access.

<b>Clauses affected:</b>	⌘ 5.6.1, 5.6.2, 5.6.3										
<b>Other specs affected:</b>	<table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px;">Y</td> <td style="width: 20px;">N</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> </table> Other core specifications      ⌘ Test specifications O&M Specifications	Y	N		X		X		X		
Y	N										
	X										
	X										
	X										
<b>Other comments:</b>	⌘										

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## 5.6 Random Access Procedure

The physical random access procedure described below is invoked whenever a higher layer requests transmission of a message on the RACH. The physical random access procedure is controlled by primitives from RRC and MAC.

### 5.6.1 Definitions

$FPACH_i$ : The  $i^{th}$  FPACH number parameter  $i$  indicates the position of the FPACH, the first position is corresponding to the first instance defined in IE "PRACH system information list" (see [15]).

$L_i$  : Length of RACH transport blocks associated to  $FPACH_i$  in sub-frames

$N_{RACH_i}$  : The number of PRACHs associated to the  $i^{th}$  FPACH

$n_{RACH_i}$  : The number of a PRACH associated to the  $i^{th}$  FPACH ranging from 0 to  $N_{RACH_i}-1$

$M$  : Maximum number transmissions in the UpPCH

$WT$  : Maximum number of sub-frames to wait for the network acknowledgement to a sent signature

$SFN'$  : The sub-frame number counting the sub-frames. At the beginning of the frame with the system frame number  $SFN=0$  the sub-frame number is set to zero.

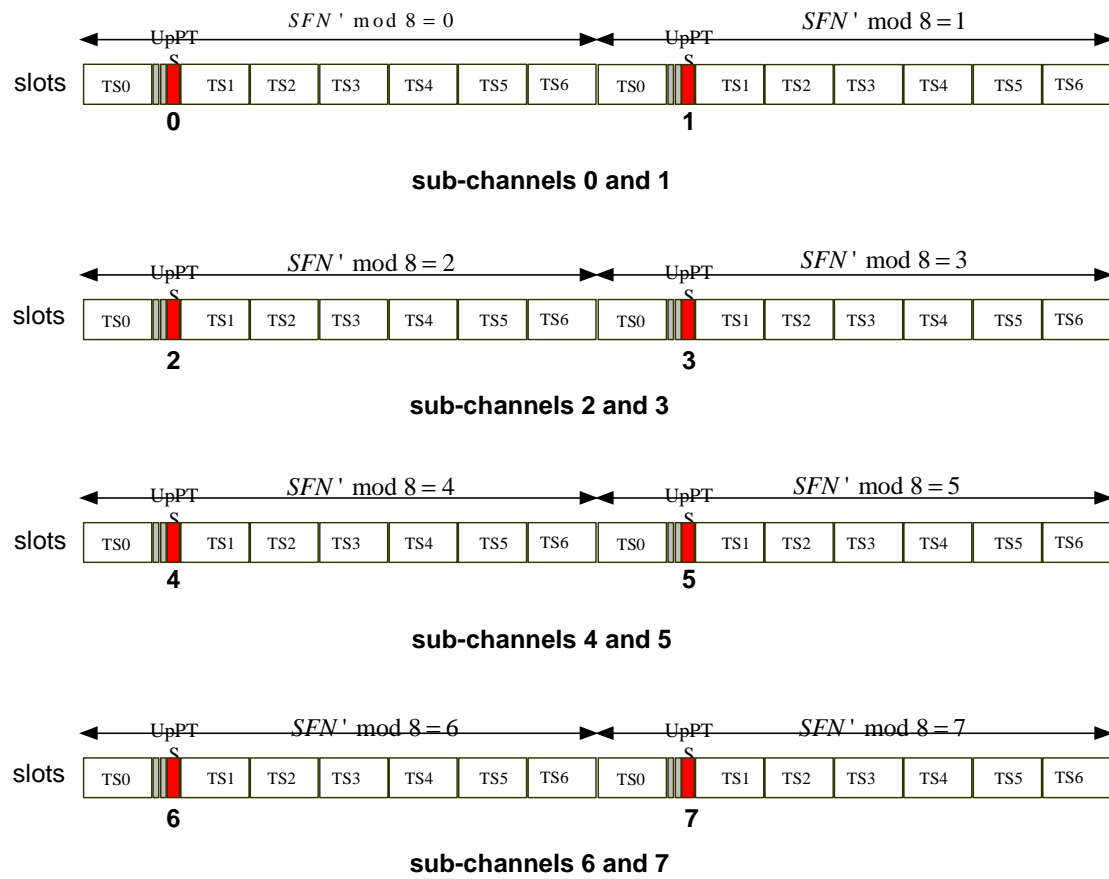
#### 5.6.1A UpPCH sub-channel

In order to separate different ASCs, UpPCH has  $N$  sub-channels associated with it (numbered from 0 to  $N-1$ ).  $N$  may be assigned the value 1,2,4, or 8 by higher layer signaling.

- Sub-channel  $i$  for UpPCH is defined as the UpPTS timeslot in the sub frame where  $SFN' \bmod N = i$ .

Where  $SFN'$ : the sub-frame number counting the sub-frames. At the beginning of the frame with the system frame number  $SFN=0$  the sub-frame number is set to zero.

The following figure illustrates the eight possible sub channels for the case,  $N=8$ .



**Figure 11: Example of UpPCH subchannels**

## 5.6.2 Preparation of random access

When the UE is in idle mode, it will keep the downlink synchronisation and read the system information. From the used SYNC-DL code in DwPCH, the UE will get the code set of 8 SYNC-UL codes (signatures) assigned to UpPCH for random access.

The description (codes, spreading factor, midambles, time slots) of the P-RACH, FPACH, S-CCPCH (carrying the FACH transport channel) channel; mapping relation of RACH and FPACH; ASC (available SYNC-UL sequences and available sub-channels) sets for each RACH are broadcast on the BCH.

Thus, when sending a SYNC-UL sequence, the UE knows which FPACH resource, P-RACH resources and S-CCPCH resources will be used for the access.

The physical random access procedure described in this sub-clause is initiated upon request from the MAC sub-layer (see [18] and [19]).

Before the physical random-access procedure can be initiated, Layer 1 shall receive the following information by a CPHY-TrCH-Config-REQ from the RRC layer:

- The association between which signatures and which FPACHs; which FPACHs and which PRACHs; which PRACHs and which S-CCPCHs; including the parameter values for each listed physical channel.
- The length  $L_i$  of a RACH message associated to  $FPACH_i$  can be configured to be either 1 or 2 or 4 sub-frames corresponding to a length in time of either 5 ms or 10 ms or 20 ms.

NOTE 1:  $N_{RACH_i}$  PRACHs can be associated with to  $FPACH_i$ . The maximum allowed

$N_{RACH_i}$  is  $L_i$ .

- The available UpPCH sub-channels for each Access Service Class (ASC);

~~NOTE 2: An UpPCH sub-channel is defined by a (sub-set of) signature(s) and sub-frame numbers.~~

- The set of Transport Format parameters for the PRACH message;
- The "M" maximum number transmissions in the UpPCH;
- The "WT" maximum number of sub-frames to wait for the network acknowledgement to a sent signature; (1..4) the maximum value supported by Layer 1 is 4 sub-frames.
- The initial signature power "Signature\_Initial\_Power";
- The power-ramping factor Power Ramp Step [Integer];

The above parameters may be updated from higher layers before each physical random access procedure is initiated.

At each initiation of the physical random access procedure, Layer 1 shall receive the following information from the higher layers (MAC):

- The Transport Format to be used for the specific PRACH message;
- The ASC for the specific Random Access procedure;
- The data to be transmitted (Transport Block Set).

### 5.6.3 Random access procedure

The physical random-access procedure shall be performed as follows:

UE side:

- 1 Set the Signature Re-Transmission Counter to M.
- 2 Set the Signature transmission power to Signature\_Initial\_Power.
- 3 Based on the transport format indicated by MAC layer, a unique RACH used for the radio access is chosen, and then randomly select ~~one~~ the UpPCH sub-channel ~~and one signature respectively~~ from the available ones for the given ASC. The random function shall be such that each of the allowed selections is chosen with equal probability.
- 4 Transmit ~~the~~ signature using the selected UpPCH sub-channel at the signature transmission power. In the case that the Commanded Signature transmission Power exceeds the maximum allowed value, set the Signature transmission Power to the maximum allowed power.
- 5 After sending a signature, listen to the relevant FPACH for the next WT sub-frames to get the network acknowledgement. The UE will read the  $FPACH_i$  associated to the transmitted UpPCH only in the sub-frames fulfilling the following relation:

$(SFN \cdot \text{mod } L_i) = n_{RACH_i}; n_{RACH_i} = 0, \dots, N_{RACH_i} - 1$ , Here, FPACH to which UE should listen is decided according to the following formula:

$$FPACH_i = N \text{ mod } M,$$

Where, N denotes the signature number (0..7) and M denotes the maximum number of FPACHs that defined in the cell.

- 6 In case no valid answer is detected in the due time: Increase the Signature transmission power by  $\Delta P_0 = \text{Power Ramp Step [dB]}$ , decrease the Signature Re-transmission counter by one and if it is still greater than 0, then repeat from step 3; else report a random access failure to the MAC sub-layer.
- 7 In case a valid answer is detected in the due time
  - a) set the timing and power level values according to the indication received by the network in the  $FPACH_i$

- b) send at the sub-frame coming 2 sub-frames after the one carrying the signature acknowledgement, the RACH message on the relevant PRACH. In case  $L_i$  is bigger than one and the sub-frame number of the acknowledgement is odd the UE will wait one more sub-frame. The relevant PRACH is the  $n_{\text{RACH}i}$ <sup>th</sup> PRACH associated to the FPACH<sub>*i*</sub> if the following equation is fulfilled:

$$(\text{SFN}' \bmod L_i) = n_{\text{RACH}i};$$

Here SFN' is the sub-frame number of the arrival of the acknowledgement.

Both on the UpPCH and on the PRACH, the transmit power level shall never exceed the indicated value signalled by the network.

Network side:

- The node B will transmit the FPACH<sub>*i*</sub> associated with the received UpPCH only in the sub-frames fulfilling the following relation:

$$(\text{SFN}' \bmod L) = n_{\text{RACH}i}; n_{\text{RACH}i} = 0, \dots, N_{\text{RACH}i} - 1,$$

Here, FPACH number *i* is selected according to the following formula based on acknowledged signature:

$$\text{FPACH}_i = N \bmod M,$$

Where, N denotes the signature number (0..7) and M denotes the maximum number of FPACH that defined in the cell.

- The Node B will not acknowledge UpPCHs transmitted more than WT sub-frames ago

At the reception of a valid signature:

- Measure the timing deviation with respect to the reference time  $T_{\text{ref}}$  of the received first path in time from the UpPCH and acknowledge the detected signature sending the FPACH burst on the relevant FPACH.

For examples on the random access procedure refer to Annex CB.

### 5.6.3.1 The use and generation of the information fields transmitted in the FPACH

The Fast Physical Access CHannel (FPACH) is used by the Node B to carry, in a single burst, the acknowledgement of a detected signature with timing and power level adjustment indication to a user equipment. The length and coding of the information fields is explained in TS25.221 sub-clause 5A.3.3.1 .

#### 5.6.3.1.1 Signature Reference Number

The Signature Reference Number field contains the number of the acknowledged signature. The user equipment shall use this information to verify whether it is the recipient of the FPACH message.

#### 5.6.3.1.2 Relative Sub-Frame Number

The Relative Sub-Frame Number field indicates the current sub-frame number with respect to the sub-frame at which the acknowledged signature has been detected.

The user equipment shall use this information to verify whether it is the recipient of the FPACH message.

#### 5.6.3.1.3 Received starting position of the UpPCH ( $\text{UpPCH}_{\text{POS}}$ )

The *received starting position of the UpPCH ( $\text{UpPCH}_{\text{POS}}$ )* field indirectly indicates to the user equipment the timing adjustment it has to implement for the following transmission to the network. The node B computes the proper value for this parameter according to the following rules:  $\text{UpPCH}_{\text{POS}} = \text{UpPTS}_{\text{Rxpath}} - \text{UpPTS}_{\text{TS}}$

where

$\text{UpPTS}_{\text{Rxpath}}$ : time of the reception in the Node B of the SYNC-UL to be used in the uplink synchronization process

$\text{UpPTS}_{\text{TS}}$ : time instance two symbols prior to the end of the DwPCH according to the Node B internal timing

This information shall be used by the UE to adjust its timing when accessing the network, as described in section [5.2 'Uplink Synchronisation'] .

#### 5.6.3.1.4 Transmit Power Level Command for the RACH message

This field indicates to the user equipment the power level to use for the RACH message transmission on the

FPACH associated P-RACH.

The network may set this value based on the measured interference level (I) (in dBm) on the specific PRACH and on the desired signal to interference ratio (SIR) (in dB) on this channel as follows:

*Transmit Power Level Command for the PRACH*( $PRX_{PRACH,des}$ )

$PRX_{PRACH,des}$  is the desired receive power level on the PRACH.

The UE shall add to this value the estimated path-loss to compute the power level to transmit for the PRACH.

## 5.6.4 Random access collision

When a collision is very likely or in bad propagation environment, the Node B does not transmit the FPACH or cannot receive the SYNC-UL. In this case, the UE will not get any response from the Node B. Thus the UE will have to adjust its Tx time and Tx power level based on a new measurement and send a SYNC-UL again after a random delay.

Note that at each (re-)transmission, the SYNC-UL sequence [and the UpPCH sub-channel](#) will be randomly selected again by the UE.

Note: Due to the two-step approach a collision most likely happens on the UpPCH. The resources allocated to PRACH are virtually collision free. This two-step approach will guarantee that the RACH resources can be handled with conventional traffic on the same UL time slots.