TSG-RAN Meeting #8 *TSGRP#8(00)0232*
Düsseldorf, Germany, 21 - 23 June 2000

Title: **Agreed CRs to TS 25.402**

Source: **TSG-RAN WG3**

Agenda item: **5.3.3**

Tdoc_Num	Specification	CR_Num	Revision_Nu	CR_Subject	CR_Category	WG_Status	Cur_Ver_Num	New_Ver_Nu
R3-001244	25.402	006	2	Clarification to section 9	F	agreed	3.1.0	3.2.0

3GPP TAG RAN WG3 Meeting #12
Seoul, Korea, 10 - 13 April, 2000

***Document* R3-001244**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.402	**CR**	**6 r2**	Current Version: 3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ ↑ *CR number as allocated by MCC support team*

For submission to:	RAN#8	for approval	X	strategic	*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic	*use only)*

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from:* ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

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

Source:	R_WG3	**Date:**	April 04, 2000
Subject:	Clarifications to section 9		
Work item:			

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

Reason for change: This documents provides some clarifications to section 9, especially regarding the corrections applied to UTRAN synchronisation counters during transitions from common channel to dedicated channel state and vice versa.

Clauses affected: 9

Other specs affected:	Other 3G core specifications		→ List of CRs:
	Other GSM core specifications		→ List of CRs:
	MS test specifications		→ List of CRs:
	BSS test specifications		→ List of CRs:
	O&M specifications		→ List of CRs:

Other comments:

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

9 Usage of Synchronisation Counters and Parameters to support Transport Channel and Radio Interface Synchronisation

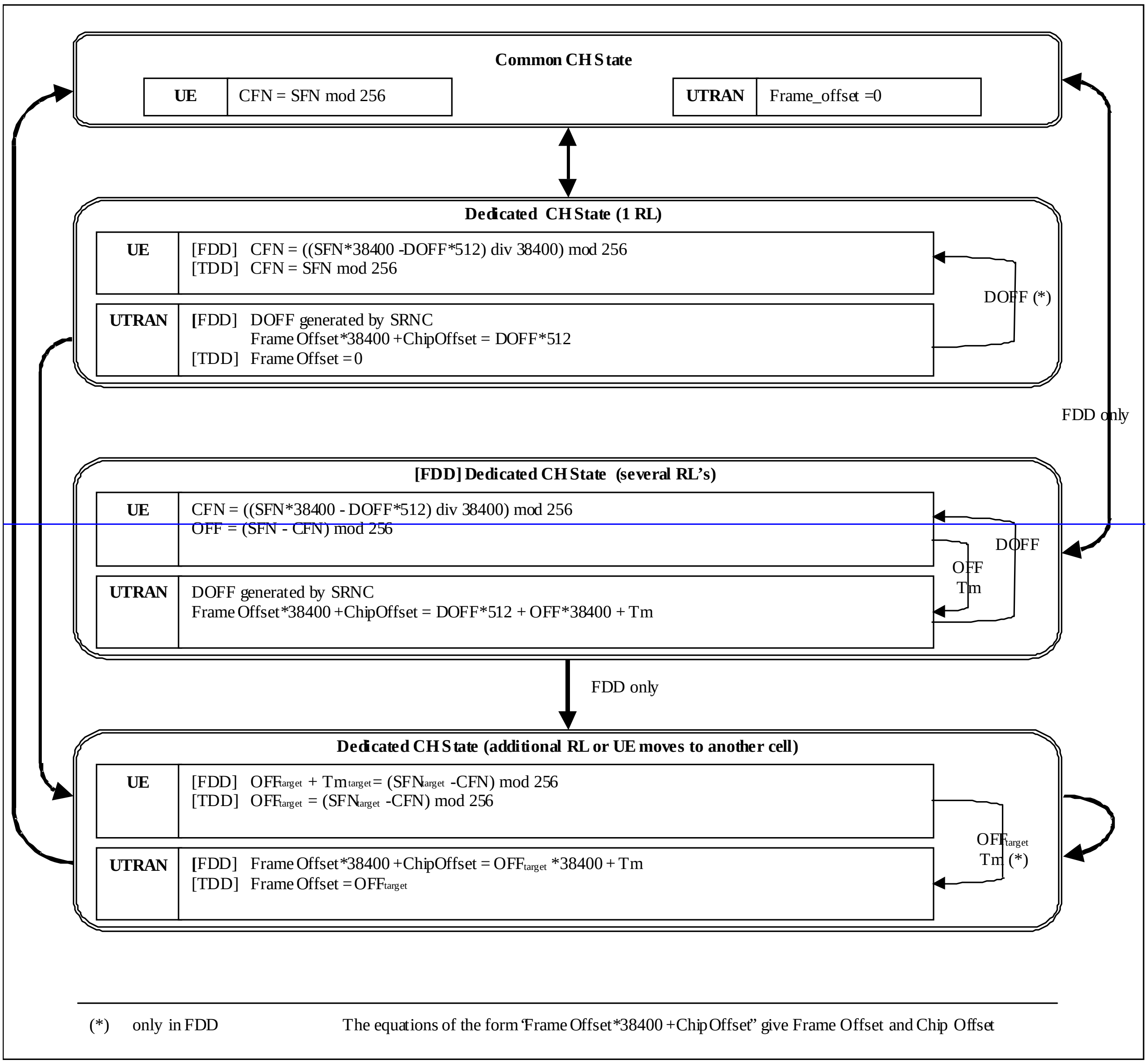
9.1 General

This section describes how the different synchronisation parameters and counters are computed and used in order to obtain Transport Channel (L2) and Radio Interface (L1) Synchronisation.

The parameters that need to be determined by the UE are CFN, OFF [FDD – and Tm] ~~(FDD only)~~.

The parameters that need to be determined by the UTRAN are [FDD – DOFF] ~~(FDD only)~~, Frame Offset and [FDD – Chip Offset] ~~(FDD only)~~.

Figure 21 summarises how these parameters are computed. A detailed description of the actions in each state is given in the ~~following sub-~~sections 9.2 – 9.4, while some examples of corrections applied to synchronisation counters during UE state transitions are shown in section 9.5.


Common CH State
UE
CFN = SFN mod 256
UTRAN
Frame_offset =0
Dedicated CH State (1 RL)
UE
[FDD] CFN = ((SFN*38400 -DOFF*512) div 38400) mod 256
[TDD] CFN = SFN mod 256
UTRAN
[FDD] DOFF generated by SRNC
Frame Offset*38400 +ChipOffset = DOFF*512
[TDD] Frame Offset = 0
DOFF (*)
FDD only
[FDD] Dedicated CH State (several RL's)
UE
CFN = ((SFN*38400 - DOFF*512) div 38400) mod 256
OFF = (SFN - CFN) mod 256
UTRAN
DOFF generated by SRNC
Frame Offset*38400 +ChipOffset = DOFF*512 + OFF*38400 + Tm
DOFF
OFF
Tm
FDD only
Dedicated CH State (additional RL or UE moves to another cell)
UE
[FDD] OFFtarget + Tmtarget = (SFNtarget -CFN) mod 256
[TDD] OFFtarget = (SFNtarget -CFN) mod 256
UTRAN
[FDD] Frame Offset*38400 +ChipOffset = OFFtarget *38400 + Tm
[TDD] Frame Offset = OFFtarget
OFFtarget
Tm (*)
(*) only in FDD
The equations of the form "Frame Offset*38400 +Chip Offset" give Frame Offset and Chip Offset

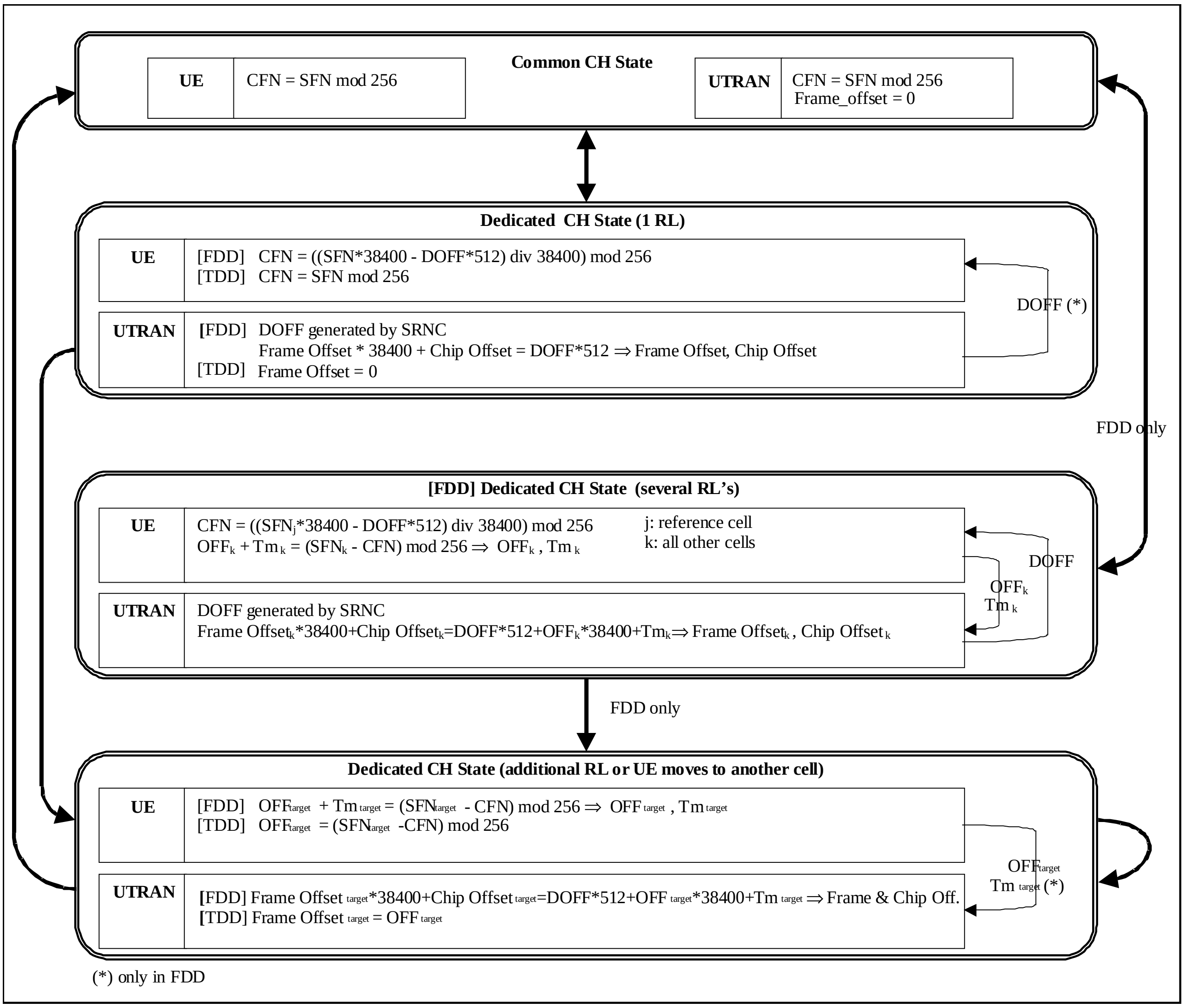
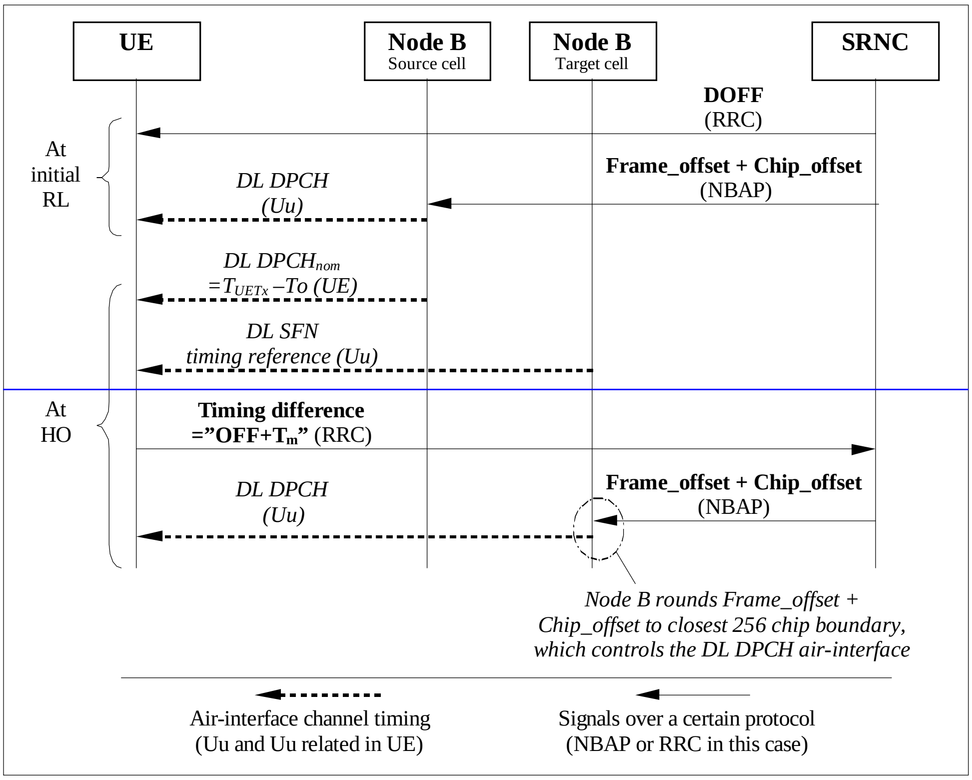


Figure 21: Calculations performed by UE and UTRAN

Figure 22 describes what offset parameters are signalled and used in the different nodes at Initial RL setup and at Handover (HO) in FDD. The rounding to closest 256 chip boundary is done in Node B. The rounded Frame Offset and Chip Offset control the DL DPCH air-interface timing. The 256 chip boundary is to maintain DL orthogonality in the cell (the rounding to the closest 256 chip boundary is done in Node B to facilitate the initial UL chip synchronisation process in Node B).



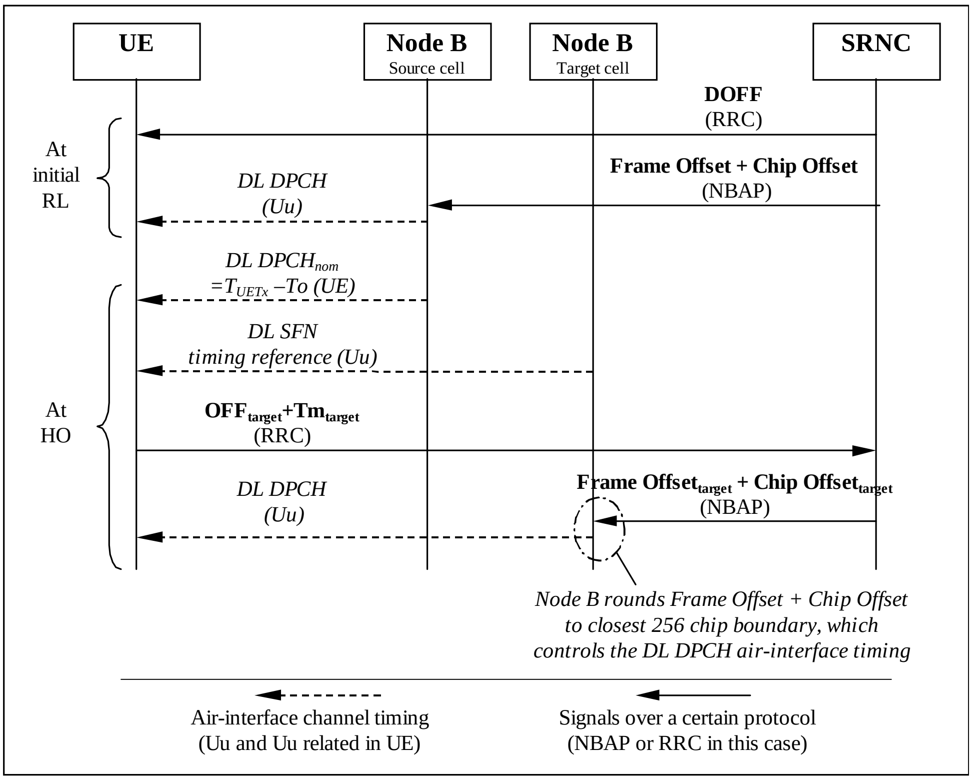
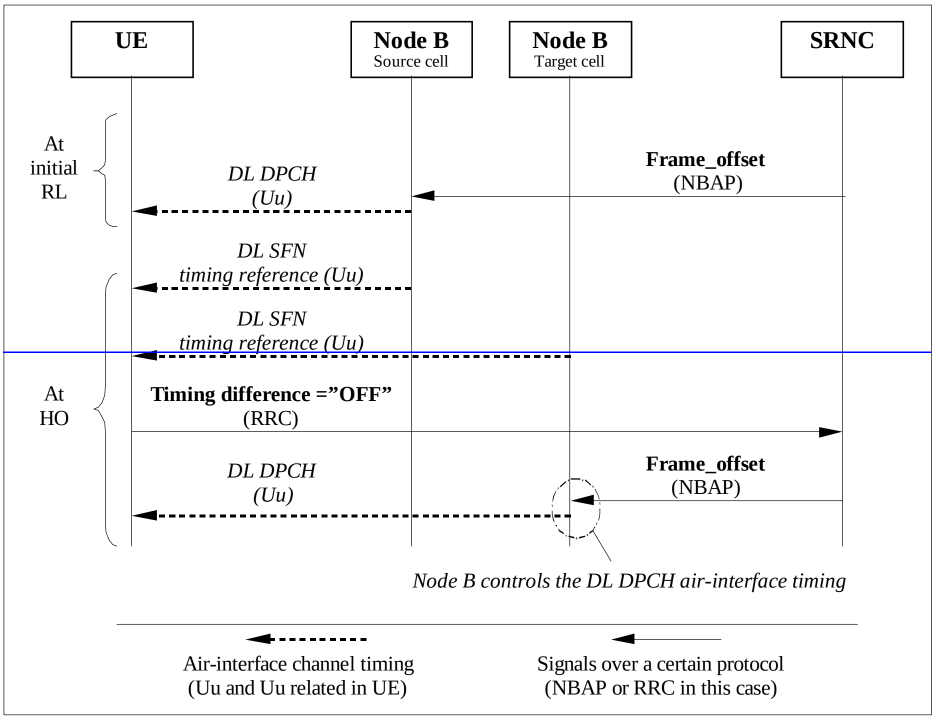


Figure 22: [FDD] - Usage of Offset values at initial RL and at HO]

Figure 23 describes what offset parameters are signalled and used in the different nodes at Initial RL setup and at Handover (HO) in TDD.



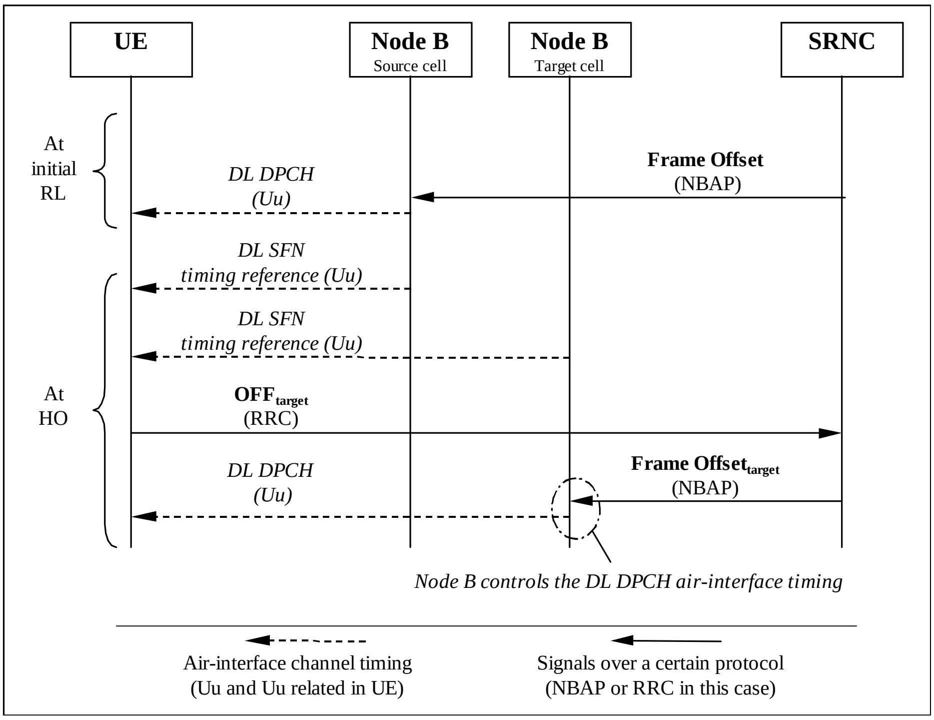


Figure 23: [TDD]- Usage of Offset values at initial RL and at HO]

9.2 Calculations performed in the UTRAN

~~This chapter describes how an SRNC can calculate the Frame Offset and Chip Offset based on the parameters received from the UE and available in the UTRAN.~~

9.2.1 UE in CELL_FACH/PCH ~~common channel~~ state or CELL_DCH state with only stand-alone shared channels.

In CELL_FACH/PCH ~~common channel~~ state ~~(UE on RACH/FACH),~~ or CELL_DCH state with only stand-alone shared channels the Frame Offset is set to 0.

9.2.2 UE changes ~~state~~ from CELL_FACH/PCH ~~common CH~~ state to CELL_DCH ~~dedicated CH~~ state: 1 RL

~~In~~ [FDD~~,~~ - ~~b~~Based on the received parameters from the UE and the DOFF value generated in the SRNC, the SRNC calculates the Frame Offset and the Chip Offset from formula (9.1).

$$\text{Frame Offset}*38400 + \text{Chip Offset} = \text{DOFF}*512 \qquad (9.1)$$

Frame Offset and Chip Offset are then signalled to the Node B controlling the serving cell.]

[TDD- In ~~TDD~~ this case Frame Offset = 0.

Frame Offset is then signalled to the Node B controlling the serving cell.]

9.2.3 [FDD - UE changes ~~state~~ from CELL_FACH/PCH ~~common CH~~ state to CELL_DCH ~~dedicated CH~~ state: several RL's] ~~(FDD only)~~

Based on the received parameters from the UE for each cell$_k$ (OFF$_k$ and Tm$_k$) and the DOFF value generated in the SRNC, the SRNC calculates the Frame Offset$_k$ and the Chip Offset$_k$. The Frame Offset$_k$ and the Chip Offset$_k$ are calculated from ~~the following~~ formula (9.2).~~:~~

$$\text{Frame Offset}_k*38400 + \text{Chip Offset}_k = \text{DOFF}*512 + \text{OFF}_k*38400 + \text{Tm}_k \qquad (9.2)$$

NOTE: ~~that~~ formula (9.~~2~~3) is covering formula (9.1) since in the case ~~1~~described in section 9.2.2, OFF$_k$ and Tm$_k$ are both equal to zero.

Each Frame Offset$_k$ and Chip Offset$_k$ are then signalled to the Node B controlling the cell$_k$.

9.2.4 UE in CELL_DCH ~~dedicated CH~~ state request to add a new RL or moves to another cell

~~In~~ [FDD~~,~~ - ~~b~~Based on the received parameters from the UE, the SRNC calculates the Frame Offset$_{target}$ and the Chip Offset$_{target}$ with ~~the following~~ formula~~:~~ (9.3).

$$\text{Frame Offset}_{target}*38400 + \text{Chip Offset}_{target} = \text{OFF}_{target}*38400 + \text{Tm}_{target} \qquad (9.3)$$

Frame Offset$_{target}$ and Chip Offset$_{target}$ are then signalled to the Node B controlling the target cell.]

[TDD - In ~~TDD~~ this case Frame Offset$_{target}$ = OFF$_{target}$.

It is signalled to the Node B controlling the target cell.]

9.2.5 Handover from other RAN to UMTS

~~In~~ [FDD~~,~~ - ~~b~~Based on the definitions for OFF and Tm formula (9.1) can also be used when the UE enters the UTRAN from another CN and establishes ~~1~~ one dedicated RL. The same is true for formula (9.2) when establishing ~~1~~ one or more dedicated RL's.]

~~In~~ [TDD - ~~w~~When the UE enters the UTRAN from another CN and establishes ~~1~~ one dedicated RL, OFF is 0.]

9.3 ~~9.3~~ Calculations performed in the UE

This chapter describes which synchronisation parameters are computed and how the CFN is initialised in the UE in case of CELL_FACH/PCH state and CELL_DCH state.

9.3.1a UE in CELL_FACH/PCH state or CELL_DCH state with only stand-alone shared channels.

In CELL_FACH/PCH state or CELL_DCH state with only stand-alone shared channels the Frame Offset is set to 0, i.e. the CFN is initialised with the values CFN = SFN for PCH and CFN = SFN mod 256 for all other common and shared channels. The CFN for all common and shared channels in the CRNC is increased (mod 256) by 1 every frame, except PCH, which CFN has the same range of the SFN.

9.3.1 UE changes from CELL_FACH/PCH state to CELL_DCH state: 1 RL~~First RL~~

~~In~~ [FDD~~,~~ - ~~b~~Based on the received DOFF and the SFN of the cell in which the UE is source, the UE can ~~calculate~~ initialise the CFN with the value given by ~~following~~ formula (9.4)~~:~~

$$CFN = ((SFN*38400 - DOFF*512) \text{ div } 38400) \text{ mod } 256 \qquad (9.4)]$$

~~In~~ [TDD - ~~the~~ The CFN is initialised with the value given by formula (9.5).~~:~~

$$CFN = SFN \text{ mod } 256 \qquad (9.5)]$$

~~NOTE: in case the UE is coming from another RAN, the SFN is not the SFN from the source cell but the SFN from the reference cell. In this case the OFF is set to 0.~~

After the initialisation, the CFN in the UE is increased (mod 256) by 1 every frame.

9.3.1b [FDD - UE changes from CELL_FACH/PCH to CELL_DCH state: several RL's]

Based on the received DOFF and the SFN_j of the reference cell, the UE initialises the CFN with the value given by formula (9.6)

$$CFN = ((SFN_j*38400 - DOFF*512) \text{ div } 38400) \text{ mod } 256 \qquad (9.6)$$

After the initialisation, the CFN in the UE is increased (mod 256) by 1 every frame.

The UE reports to the SRNC the parameters OFF_k and Tm_k for each $cell_k$ measured respect to the reference $cell_j$ determined by means of formula (9.7)

$$OFF_k + Tm_k = (SFN_k - CFN) \text{ mod } 256 \qquad (9.7)$$

9.3.2 UE in CELL_DCH state request to add a new RL or moves to another cell~~Additional RL's or UE moves into a new cell~~

~~As long as the UE has one or more RL's established, the CFN will be increased (mod 256) by 1 every frame. Normally~~ N~~n~~o special corrections to CFN are needed when moving from one cell to ~~the~~ another.

However every time the UE enters a new cell (target cell), OFF_{target} might have to be reported.

~~In~~ [FDD - Tm_{target} is always reported. The target cell OFF_{target} is calculated using ~~the following~~ formula (9.8):

$$OFF_{target} + Tm_{target} = (SFN_{target} - CFN) \text{ mod } 256 \qquad (9.\cancel{6}8)$$

NOTE: OFF_{target} is calculated as the integer number of frames, Tm_{target} is the ~~F~~frame fractional part with the unit chips.]

~~In~~ [TDD - ~~t~~The target cell OFF_{target} is calculated using ~~the following~~ formula (9.9):

$$OFF_{target} = (SFN_{target} - CFN) \bmod 256 \qquad (9.~~7~~9)]$$

9.4 Synchronisation of L1 configuration changes

When a synchronised L1 configuration change shall be made, the SRNC commands the related Node B's to prepare for the change. When preparations are completed and SRNC informed, serving RNC decides appropriate change time. SRNC tells the CFN for the change by a suitable RRC message. The Node B's are informed the CFN by RNSAP and NBAP Synchronised Radio Link Reconfiguration procedures.

At indicated switch time UE and Node B's change the L1 configuration.

9.5 Examples of synchronisation counters during state transitions

The example of Figure 24 shows the corrections applied to UTRAN synchronisation counters during multiple transitions from CELL_FACH/PCH state to CELL_DCH state before and after handover, without SRNS relocation.

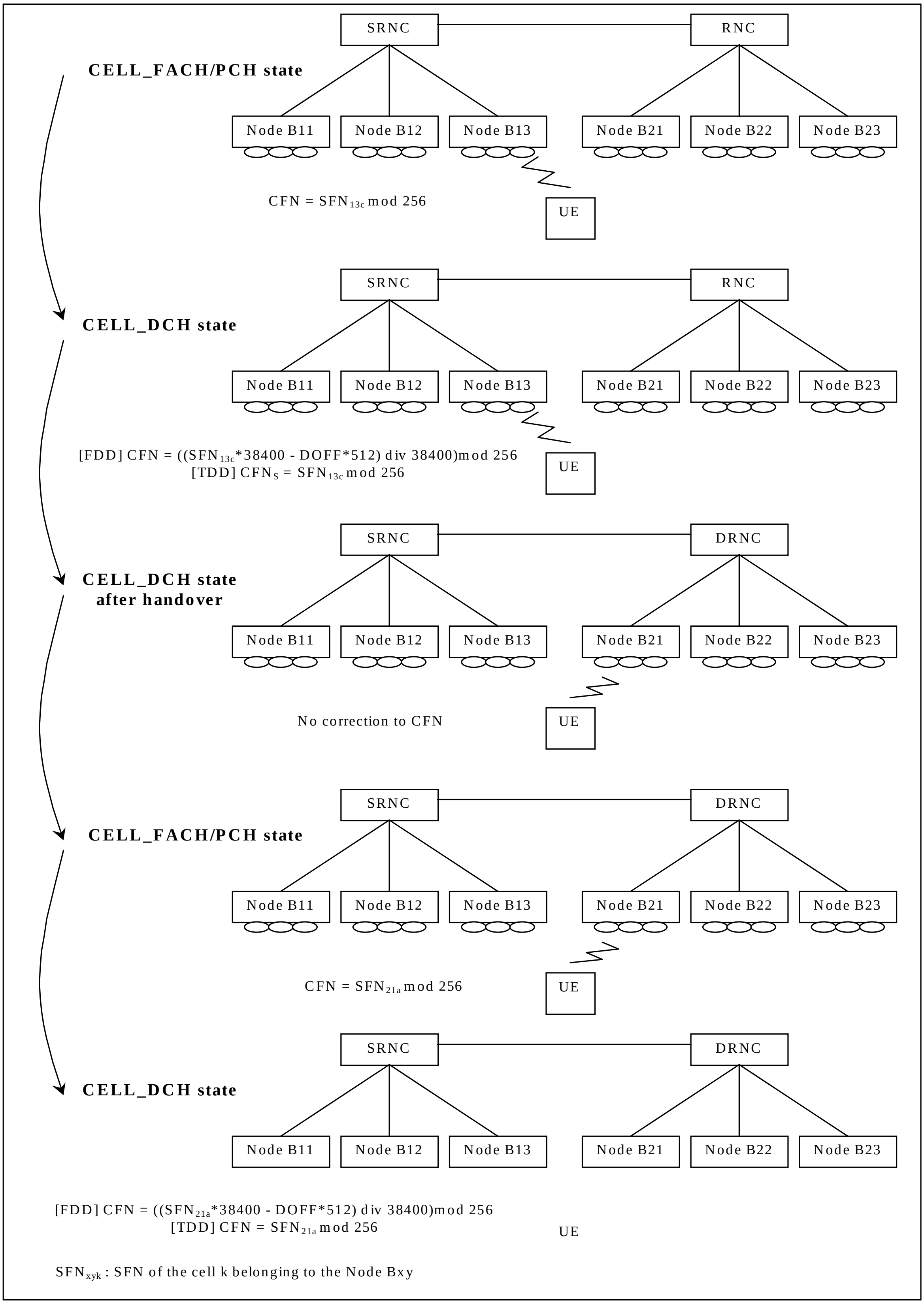


Figure 24: Example 1

The example of Figure 25 shows the corrections applied to UTRAN synchronisation during multiple transitions from CELL_FACH/PCH state to CELL_DCH state after cell reselection, without SRNC relocation.

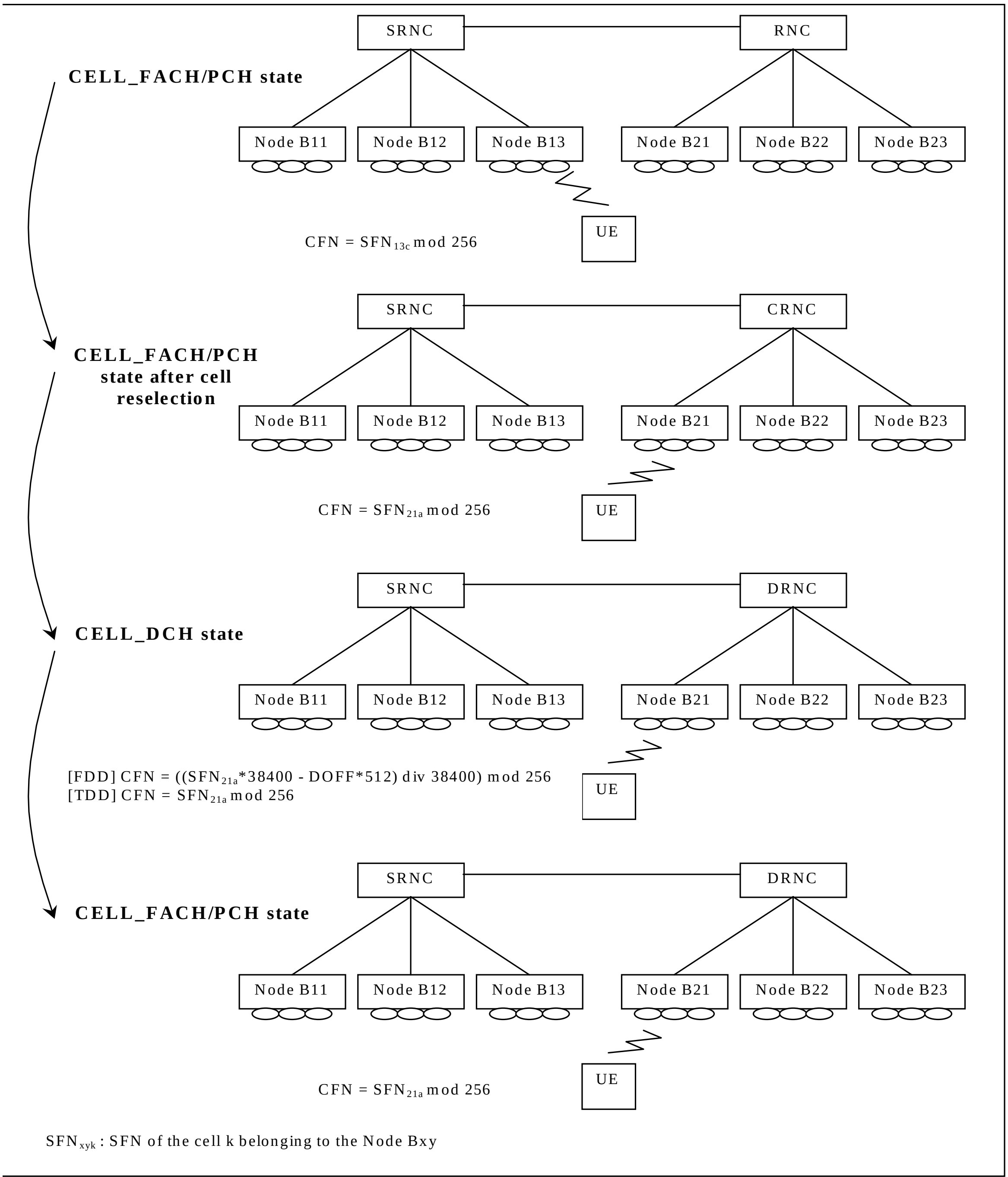


Figure 25: Example 2

The example of Figure 26 shows the corrections applied to UTRAN synchronisation counters during multiple transitions from CELL_FACH/PCH state to CELL_DCH state before and after handover and SRNS relocation (without UE involvement).

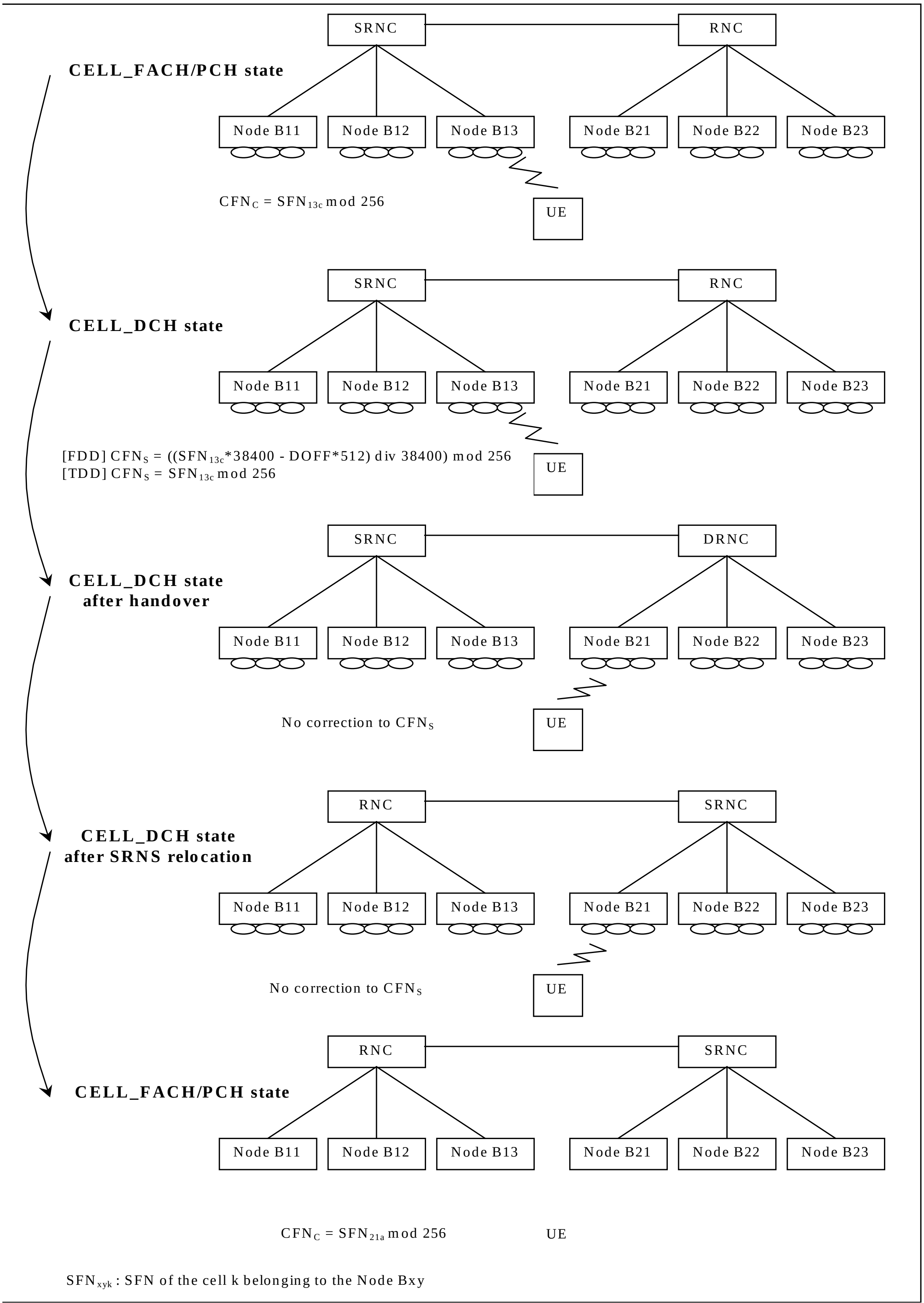


Figure 26: Example 3