

Agenda Item: 6.3
Source: NTT DoCoMo
Title: Definition of Synchronisation related parameters used in NBAP,RNSAP
Document for: Approval

1 Introduction

During the sync ad Hoc (23rd Aug 1999), an agreement was reached regarding the Synchronisation Parameters used in NBAP, RNSAP. This contribution proposes to introduce more clear definitions based on the agreement in the Sync ad Hoc.

The agreement in the Sync ad Hoc was as follows [ref. R3-99901];

3. PROPOSAL TO PLENARY: OFF, DOFF and Tm

It is proposed that the WG3 plenary accepts the following statements:

- a) *At first RL-setup, the SRNC transmits OFF (max interleaving depth so currently 0..7) and Td to the node-B.*
- b) *At second RL-setup, the SRNC transmits OFF (maybe measured by the UE or known by the SRNC) and Tm (measured by the UE) to the node-B.*
- c) *For the first RL, the SRNC transmits a DOFF to the UE with RRC. The DOFF value is derived from the OFF and Td send to the node-B: $DOFF = OFF + Td$.*

Note: In RL-Setup, Tm and Td are both optional IE's and 1 of the two needs to be present. In RL-ADDITION, no Td IE needs to be present.

2 Discussion

2.1 Parameters used on lub/lur and Uu

(1) Parameters on NBAP/RNSAP (RAN WG3 responsibility)

This contribution proposes 2 parameters to be included in NBAP and RNSAP which are "Frame_offset" and "Chip_offset"¹. The Frame_offset parameter has a resolution of 1 frame and a range of 0 to 255 (<=2,55 seconds). The Chip_offset parameter has a resolution of 1 chip and a range of 0 to 38399 (< 10ms). The Chip_offset is used as offset for the DL DPCH relative to the PCCPCH timing. The Frame_offset is used in the translation between Connection Frame Number (CFN) on lub/lur and least significant 8 bits of SFN (System Frame Number) on Uu.

(2) Parameters on RRC (RAN WG2 responsibility)

This contribution is based on the assumption that when adding a RL, the UE sends "Measured Time Difference to Cell" which includes measured "OFF" and "Tm" values to the SRNC. The reported OFF parameter has a resolution of 1 frame and a range of 0 to 255. The reported Tm parameter has a resolution of 1 chip and a range of 0 to 38399. The Tm shall always be sent by the UE whereas the OFF shall only be sent when the UTRAN has requested the UE to send this parameter. In addition it is assumed that the SRNC sends a "DOFF" parameter to the UE when the new RL will make the UE change its state from common CH to dedicated CH. The DOFF parameter has a resolution of

¹ Although the use is not described in much detail, currently NBAP and RNSAP do include similar parameters called "OFF" and "Chip offset". The proposed parameters are to replace the existing ones.

512chips and a range of 0 to 599 (<80ms). The maximum value is chosen in accordance with the largest interleaving period supported on Uu.

The DOFF value sent to the UE is determined by the SRNC based on certain (load distributing) algorithms.

2.2 Cases to be considered

(1) UE changes state from common CH state to dedicated CH state: 1 RL

Considering the case that the UE requests to set 1 RL (Cell#1) in the cell to which it is already camping on a common channel, the UE will report "OFF"=0 and "Tm"=0.

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. The Frame_offset and the Chip_offset are calculated from the following formula:

$$\text{Frame_offset} * 38400 + \text{Chip_offset} = \text{DOFF} * 512 \quad (1)$$

(2) UE changes state from common CH state to dedicated CH state: several RL's

Considering the case that the UE requests to set several RLs (Cell#1,2,3) from the beginning, the UE measures "OFF", "Tm" which are in this case defined as being the time difference between the received PCCPCH path of the camping cell and the received PCCPCH paths of the other candidate cells. Again the UE sets "OFF"=0, "Tm"=0 for the cell#1 to which the UE sends an UL RRC message. At the same time, the UE sets "OFF" and "Tm" for cell #2,3 which are the time difference of the PCCPCH reception timing of cell#2,3 from the PCCPCH reception timing of cell#1.

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. The Frame_offset and the Chip_offset are calculated from the following formula:

$$\text{Frame_offset} * 38400 + \text{Chip_offset} = \text{DOFF} * 512 + \text{OFF} * 38400 + \text{Tm} \quad (2)$$

Note [1]: note that formula (2) is covering formula (1) since in case 1, OFF and Tm were both equal to zero.

(3) UE requests to add a new RL in dedicated CH state

Again the UE measures "OFF" and "Tm" which are in this case defined as the time difference between "TTX,UL – To" and the earliest received PCCPCH path of the target cell. TTX,UL is the time when the UE transmits an uplink DPCH frame, hence "TTX,UL – To" is the "optimum" arrival time for the first path of a received DPCH.

Based on the received parameters from the UE, the SRNC calculates the Frame_offset and the Chip_offset with the following formula:

$$\text{Frame_offset} * 38400 + \text{Chip_offset} = \text{OFF} * 38400 + \text{Tm} \quad (3)$$

3 Proposal

It is proposed to:

- 1) Modify the NBAP/RNSAP RL_SETUP synchronisation parameters in line with what is proposed in this contribution.
- 2) Include the description of the handling of these parameters (as described in section 2.2. of this contribution) in the synchronisation section of 25.401.
- 3) Include the provided information in the already agreed liaison to RAN WG1 and RAN WG2 on synchronisation issues, for a confirmation on the assumptions and the proposed handling of the parameters.