

**Agenda Item:**        **UTRAN Sync Ad Hoc**

**Source:**             **Rapporteur (Ericsson)**

**Title:**               **Draft Report at SI-ARC/5: Synchronization**

**Document for:**

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## **1. Introduction**

This report summarizes discussion ongoing in the study item ARC/5: Synchronization.

## **2. Discussion Items**

As was proposed by the chairman in the Agenda Proposal for sync ad hoc meeting, the following items should be discussed:

Definition of OFF relative Tm

CFN range

UE measurement of OFF

Initialization of CFN

Node Sync: necessary to standardize or not

HFN knowledge in CRNC for long sleep mode paging

TDD synchronization issues

Other issues.

This report of the discussion follows this subject list.

### **2.1 Definition of OFF Relative Tm**

Ericsson proposed to join the parameters OFF and Tm into one parameter: Tm72, since in many cases OFF and Tm are sent together. It was also pointed out that if the cells are synchronized to a certain level, the power of the PCCPCH may be reduced, since the UE needs only to find the SCH of the neighbouring cell. Ericsson also thinks that figure 9 in TS 25.401, v.1.2.1 is unclear with respect to OFF and Tm. Also a new parameter, Tf, is proposed with the range of 1 radio frame, and resolution 1 chip.

Alcatel and Nokia argued that they shall be kept separate. In case the UE knows that the cells are synchronized to a certain extent (+/- 4 ms), the UE needs only to report the Tm value to UTRAN, and, hence, bits are saved on the Uu.

Alcatel does not agree to the need of Tf. The view of Alcatel is the following:

OFF: 7 bits, range: 0-127.

Tm is a value modulo 10 ms, resolution TBD (1 chip).

“Overall Offset” = OFF\*10ms + Tm

Td is a rounded version of Tm to the closest multiple of 256 chips. Td represented by an 8 bit word in the range 0-149. Caution needs to be taken if a large Tm is rounded up to Td=0. In that case OFF needs to be adjusted.

AT SHO, if the UE is requested to report OFF, it will report OFF and Tm, otherwise just Tm.

Alcatel; may also consider other resolution of Tm (4 or 8 chips).

## **2.2 CFN Range**

Concerning the CFN range no one argued to keep the 0-71 range. There was an agreement by Ericsson, Nokia, and Alcatel that 72 is a “strange” value.

Ericsson proposed to use the range 0-127 (existing 7 bits), and Nokia proposed 0-255 for byte aligning and long transport delay reasons. Alcatel argued that 72 is enough concerning transport delays, and could consider the range 0-63, in order to save bits.

The OFF parameter has the same range as the CFN.

## **2.3 UE Measurement of OFF**

See the discussion in section 2.1.

## **2.4 Initialization of CFN**

Alcatel proposed to skip this point with the argument that the mechanisms are already provided. OFF and Td are given at connection setup. Ericsson had a proposal to include a frame offset parameter together with Td.

## **2.5 Node Synchronization**

Ericsson had a contribution, showing that with the inclusion of node synchronization parameters (t1, t2, and t3) in the existing UL and DL synchronization control frames, it is possible to combine the node sync approach by the non-node sync approach. No special synchronization channel is proposed, the “Node Phase Measurement” procedure is run on either FACH or DCH transport bearers.

Alcatel agreed that the combined sync solution looks reasonable. NTT DoCoMo also supported the basic idea. Moreover, NTT DoCoMo wanted to add that the “Node Phase Measurement” procedure could be used for supervision of the nodes. Ericsson and Alcatel agreed that it may be performed in the background also.

It is stated by both Alcatel and NTT DoCoMo that usage of high priority, VC with AALO provide a better accuracy in the “Node Phase Measurement” procedure. Alcatel also states that usage of special “NPM cells” can be applied, irrespective of the transport layer.

NTT DoCoMo proposes to use a high priority VC for release99, since R99 assumes ATM as transport layer. Also no adaptation layer between ATM and upper layer, and, hence, AAL0 should be used in NTT DoCoMo's opinion. However, NTT DoCoMo are open to other AAL-types. In case other transport technologies are introduced in the future, NTT DoCoMo states the synchronization establishment may be studied again. Some things may be reused, while others are new.

## **2.6 HFN Knowledge in CRNC**

No explicit discussion were performed.

## **2.7 TDD Synchronization**

There was no discussion concerning TDD synchronization issues.

## **2.8 Other Issues**

Alcatel stated that one more item should be discussed: Transfer of Tm and Td.

Ericsson proposed to change to definition of the ToA in the Synchronization and Timing Adjustment Control Frames to be relative the latest time of arrival, instead of measured relative the window endpoint. The ToA values then become independent of the ToAWE.

Ericsson also stated that the receiving window position (ToAWS and ToAWE) are determined by the RNC, to which Nokia and Alcatel agreed. Alcatel added that the window should be service and Node B specific.

Alcatel stated that there are no messages in 25.433, 423, 427, or 435, with the ability to transfer the window parameters ToAWE and ToAWS.

Ericsson contributed in the mail discussion with definition of the different counters used:

BFN: Node B FN counter, 12 bits, 0-4095 frames plus fractions if needed.

RFN: RNC FN counter, 12 bits, 0-4095 frames.

UFN: UE FN counter, 12 bits.

SFN: Cell FN counter on BCH, 12 bits.

EFN: Lower part of SFN used for transport of CCH frames, 7 bits, 0-127.

CFN: Connection frame FN used for transport of DCH frames, 7 bits, 0-127.  
Used with offsets relative BFN, RFN, and UFN.

HFN: Hyper frame number that fills up one of the RFN of UFN counters to reach the ciphering counter length (IFN).

IFN: composite of [HFN and RFN] in RNC and [HFN, UFN] in UE.