Agenda Item: *Sync Ad Hoc 4.8*

Source: **Ericsson**

Title: **Sync related counters – ranges, resolutions and acronyms**

Document for: **Decision**

1. Introduction

A lot of different counters and names are used in the 3GPP specifications. It is hard to judge what a counter name is and the consistency in the specifications. WG1 have made their asumptions and WG3 our own, sometimes with some misunderstandings of respective use and needs.

This contribution is written as if the Tdoc R3-99 874 (128 frames super-frame) and R3-99 879 ("SFN" is 12 bits) are approved.

2. Discussion

There are no counter definitions or counter acronyms defined in 25.401. People refer to their own counters and imply their own interpretation. This makes the specifications inconsistent. There are frequent misunderstandings.

This contribution specifies sync related counter names with their ranges and resolutions. Some counters are sub-set of other counters and others are super-set of counters.

Example: The counter broadcasted on BCCH is called SFN, Node B Reference FN, Cell FN, Cell SFN, FN_{CELL}, FN_{BCCH} etc. We must change this situation.

3. Proposal

The following Counters are proposed to be used in all Sync related 3GPP specifications, WG3 as well as WG1 and WG2.

Add the list of "Counter names and definitions" presented on next page to the specification 25.401 as a "Counter names and definitions" sub-chapter in the Synchronisation chapter 9 (the editor of 25.401 finds a good place).

The purpose with the counter definitions is to have them defined in one place.

<u>Counter names and definitions:</u>

BFN   Node **B** Frame Number counter. This is the Node B common frame number counter, often hard-coupled with the 'good' node oscillator. BFN is optionally frequency-locked to a Network sync reference.
BFN is free-running, not phase-locked to any other counter.
Range: 0 to 4095 frames, 12 bits.

RFN   **R**NC Frame Number counter. This is the RNC node common frame number counter, often hard-coupled with the 'good' node oscillator. BFN is optionally frequency-locked to a Network sync reference.
RFN is free-running, not phase-locked to any other counter.
Range: 0 to 4095 frames, 12 bits.

UFN   **U**E Frame Number counter. This is the UE node common frame number counter, often hard-coupled with the 'good' oscillator.
UFN is frequency locked to UTRAN via air-interface SCH.
Range: 0 to 4095 frames, 12 bits.

SFN   Cell **S**ystem Frame Number counter. This is the long counter in a Cell. SFN is sent on BCCH on Layer 1. SFN is used for paging groups and system information scheduling etc.
SFN = BFN adjusted with Tcell.
Range: 0 to 4095 frames, 12 bits.

EFN   CCH Frame Number (counter). This is the 7 least significant bits of SFN. EFN is used for transport of common channels over Iub (/Iur).
EFN = SFN mod 128
Range: 0 to 127 frames, 7 bits.

CFN   Connection Frame Number (counter). This is the 7 least significant bits of one of the node counters BFN, RFN or UFN plus OFF plus Td. CFN is used in Node B, RNC and UE for DCH frame transport references.
CFN = (a Node Counter + OFF + Td) mod 128
Range: 0 to 127 frames, 7 bits.

HFN   Hyper Frame Number (counter). This is the H number of most significant bits on top CFN or EFN to form a ciphering counter.
Range: 0 to 2^{25}-1, 25 bits.

IFN   Ciphering Frame Number (counter). This is the total counter in a node for Ciphering purposes. IFN = [HFN, CFN] for DCH channels or [HFN, EFN] for CCH channels.
Range: 0 to 2^{32}-1 frames, 32 bits.