

Document for: Discussion

Agenda Item: 10.1.3

Motivation for new WI on Network Assistance for Network Synchronization in LTE

Huawei, HiSilicon

Background and Motivation

- The SI “Network Assistance for Network Synchronization in LTE” is complete in RAN3#92. TR 36.898 v2.0.0 is submitted to RAN#72.
- To provide low cost way(s) to synchronize LTE networks, four solutions have been proposed and evaluated whether they can meet the existing phase requirements for the features or not from RAN3’s perspective.
 - Solution 1 is a network based solution reusing the existing signaling during handover. It enables collecting, exchanging time information, and adjusting by statistical approach with a deployed frequency synchronization mechanism (i.e., Synchronous Ethernet).
 - Solution 2 is based on eNBs detecting/measuring reference signals transmitted over the air by DL receivers and compensating propagation delay by calculating timestamps.
 - Solution 3 and 4 focus on enhancing RIBS by compensating the inter-cell propagation delay.
 - Solution 3 is utilizing TA during mobility for the case that synchronisation target is a small cell with negligible intra-cell propagation delay.
 - Solution 4 is based on exchange of location information over S1/X2/OAM to compensate line of sight propagation delay.
- Since the SI has the constraint that only RAN3 is involved and there are some questions which need confirmation from other groups, co-operation is required in the normative phase.

Proposed Objectives

- The purpose of this work item is to standardize the feasible network based solution(s) as captured in TR 36.898 for network synchronization in LTE.
- RAN3 has agreed to list the questions in TR which are not clear for the group, and would ask other groups' help to clarify with some few efforts. And then RAN3 can proceed on the next step of standardization work.
- The detailed objectives of the work item are to specify the following functionalities:
 - RAN3 coordinates with RAN4/RAN1 to clarify the followings by liaison, if needed:
 - the timing estimation error range by receiving RACH preamble and performance requirements in solution 1; (RAN4)
 - accuracy of the phase offset measurement T_{diff} with/without statistical approach in solution 1; (RAN4)
 - whether it is allowed for loss of synchronisation in cases where mobility events are not available or initial synchronisation cannot be gained in solution 1; (RAN4)
 - accuracy of the propagation delay estimation in solution 2; (RAN4)
 - standardization of the time-stamps T1 and T2 for received RACH preamble in solution 1. (RAN1)
 - RAN3 continues working on:
 - detailed analysis of specifications impacts brought by the solutions.
 - enhancements of S1 and/or X2 interface(s) to obtain network synchronization, which possibly include exchanging time /location information, and/or introducing new signalling between eNBs, and etc.