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TSG-RAN Working Group 2 (Radio L2 and Radio L3)
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R2-010745

Source: TSG-RAN WG2

To: TSG-RAN WG1, TSG-RAN WG3, TSG-RAN WG4

Cc:

Title: Response to LS (R3-010317, R3-010325 and R1-010147) on
RTD measurement in UTRAN

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TSG-RAN WG2 would like to thank TSG-RAN WG1 for proposing the “SFN-SFN Observed Time Difference” UTRAN measurement for inclusion into 25.215 (as described in liaison R2-010280). Indeed, this measurement is inline with the Stage 2 description given in 25.305 and thus is appropriate for supporting RNC computation of RTD quantities in UTRAN Rel’4 for UE positioning. The remaining sections of this liaison aim to describe, 1) how RTD quantities are derived, and 2) recommendations for establishing accuracy indicators for UTRAN and UE measurements used for UE positioning.

1) With respect to the derivation of RTD quantities, there are two primary methods by which an RNC can develop an RTD to determine the relative cell frame timing between a particular pair of Node-Bs. Both methods require the RNC to process measurements that have been performed by Node-Bs or their associated LMUs and subsequently reported to the RNC.

- ?? Considering the known reference positions of the pair of Node-Bs concerned, the RNC can develop an RTD from one or more “SFN-SFN Observed Time Difference” measurements associated with this Node-B pair;
- ?? Alternatively, the RNC may relate respective “UTRAN GPS Timing of Cell Frames” measurements from a pair of Node-Bs to determine a corresponding RTD.

Note that TSG-RAN WG2 is currently eliminating references to the “ATD” measurement quantity in 25.305 and replacing these references with the proper “UTRAN GPS Timing of Cell Frames” measurement name.

2) Establishing the granularity and accuracy requirements for UTRAN and UE measurements is the task of TSG-RAN WG4. From a UE positioning perspective, TSG-RAN WG2 recommends that each of the measurements listed below be provided with an accuracy indicator as follows:

UTRAN measurements:

- ?? SFN-SFN Observed Time Difference (as described in liaison R2-010280)
- ?? Round Trip Time (FDD)
- ?? Rx Timing Deviation (TDD)

UE measurements:

- ?? SFN-SFN Observed Time Difference type 2
- ?? UE Rx-Tx Time Difference type 2

The accuracy indicator (shown as a proposed 3-bit data pattern here) for each of these measurements should span the following range of values in the discrete steps shown:

| Accuracy Indicator | Uncertainty (chips) | Corresponding Ranging Uncertainty (meters) |
|--------------------|---------------------|--|
| 0 | 1/16 | 5 |
| 1 | 1/4 | 20 |
| 2 | 1 | 80 |
| 3 | 2 | 160 |
| 4 | 4 | 320 |
| 5 | 8 | 640 |
| 6 | 16 | 1280 |
| 7 | unreliable | - |

For the following GPS -related measurements,

?? UTRAN GPS Timing of Cell Frames

?? UE GPS Timing of Cell Frames

appropriate accuracy indicators should span the following range of values in the discrete steps shown:

| Accuracy Indicator | Uncertainty (time) |
|--------------------|--------------------|
| 0 | 50 ns |
| 1 | 500 ns |
| 2 | 1 us |
| 3 | 10 us |
| 4 | 1 ms |
| 5 | 10 ms |
| 6 | 100 ms |
| 7 | unreliable |