Agenda item: 8.4.1 UE positioning enhancements

Status Report for WI to TSG

Work Item Name: UE Positioning Enhancements - other methods (LCS2-UEpos-enh)

SOURCE: Siemens   **TSG:** RAN   **WG:** 2

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Ref. to WI sheet: RAN_Work_Items.doc

Progress Report since the last TSG (for all involved WGs):

Status at RAN #22 in Dec. 2003:   see former status report RP-030652
Status at RAN #23 in March 2004:   see former status report RP-040012

Since RAN #23, the following work has been done with respect to UE positioning proposal "IPDL enhancement using advanced blanking methods":

RAN1 #37 in Montreal:
R1-040613, "Concerns about Soft IPDL Proposal", Siemens, Nokia [3]
Summary of concerns against the 'soft IDPL' (= enhanced IPDL proposal) stated in this Tdoc:
-        REL-6 proposal is modifying the existing IPDL feature in a way that is not REL-5 backward compatible
-        added complexity to the UE due to CPICH cancellation algorithm is unclear
-        IPDL synchronization impacts on the UTRAN (considered areas, update periods, feasibility unclear)
-        for rural and suburban environments no performance improvements due to soft IPDL

R1-040602, "Enhanced IPDL using time-aligned idle periods", Cambridge Positioning Systems [2]
Summary of simulation results together with statements addressing some of the concerns:
-        CPICH not interrupted leads to less complexity of UE processing and at least one IPDL fewer as also the serving cell could be heard
-        lower impact on RRM as IPDLs are not introduced pseudo-randomly
-        switching off all signals (apart from CPICH) during IPDL and time-aligning allows more sites to be heard
-        REL-5 UEs are expected to require no adjustment to work in a soft IPDL network with the comparable accuracy
-        only 'coarse' IPDL time alignment of half a CPICH symbol (±33.3µs) required; not critical as Node B time difference is anyway needed for OTDOA; can be done by 'IPDL alignment offset' in the 'IPDL FDD parameters'
-        it is comparable in accuracy to standard IPDL but the position accuracy with the enhancement is independent of network load
-        soft-IPDL always provides a performance improvement
-        concerns about backward compatibility are not significant as nobody has implemented REL-5 IPDL method

R1-040567, "Expected Performance of OTDOA-IPDL Positioning - Initial Indications Based on Live Measurements, Ericsson [1]
The Tdoc considers performance evaluation of the IPDL method as in REL-5:
-        performance predictions for OTDOA are affected by the chosen simulation model (e.g. radio propagation effects, cell geometries, obstacles, interference)
-        inaccuracy and coverage of the positioning method are better evaluated by real life measurements
-        measured real life inaccuracies of E-OTD of GSM are combined into an expected inaccuracy for OTDOA with REL-5 IPDL method for FDD and assuming a tightening of the SFN-SFN type 2 UE measurement by 10dB accuracies of 125m (67%) and 400m (95%) are achievable which is 3 times worse than the least optimistic simulation results
Cambridge Positioning Systems didn't agree with the pessimistic results as measurement results of 2G systems could not be applied for 3G system considerations.

<u>Status in RAN1</u>:
All 3 inputs to this topic were noted.
Arguments regarding the concerns about the proposed 'soft IPDL' concept were exchanged.
Also different views about the evaluation of the performance of the method were exchanged.
Both without agreements.
Discussions and investigations need to be continued to find out the performance improvement that can be expected in real deployment. Due to the number of system impacts a real performance improvement is needed to further consider the proposal.

RAN2 #42 in Montreal:
R2-040877, "Enhanced IPDL using time-aligned idle periods", Cambridge Positioning Systems [4]
Tdoc was asking for RAN2 feedback to RAN1 especially regarding 'feasibility of time aligning idle periods' and 'potential messaging changes suggested'.

<u>Status in RAN2</u>:
There were no comments to the proposal. The input was noted.

RAN3 #42 in Montreal:
R3-040704, "Enhanced IPDL using time-aligned idle periods", Cambridge Positioning Systems [5]
Tdoc was asking for RAN3 feedback to RAN1 especially regarding 'feasibility of time aligning idle periods' and 'potential messaging changes suggested' since R3-040386 was not treated at RAN3 #41 in Feb. 2004.
The following concerns were stated:
- considerable complexity impact regarding signalling load, drift and processing due to time alignments (requested ±33.3μs; realistic range: ms...sec)
- gain of 'soft IPDL' unclear compared to IPDL as it is standardized now
- TDD inter RNC synchronisation would be an open issue

<u>Status in RAN3</u>:
Tdoc was noted. RAN3 feedback was provided.

RAN4 #31 in China:
R4-040229, "Enhanced IPDL using time-aligned idle periods", Cambridge Positioning Systems [6]
According to the request from RAN #23 that RAN4 is informed and consulted for this topic (as CPICH cancellation was already studied in RAN4), Cambridge Positioning Systems provided this input which is in most parts similar to R1-040602 (apart from section 1 and parts of section 2).

Comments and clarifications to the proposal and the included simulation results:
- simulation results different for larger cells than the considered 500m radius?
- doubts that 15 cells can be seen by a UE as in the simulation results
- technology impact since upgrades in the Node B would be necessary
- unclear whether CPICH_Ec/Io measurement used for RRM would not take the idle periods into account
- synchronization of Node Bs to align the idle periods has not been studied in RAN WG1 so far
- enhanced IPDL has not yet been compared with AGPS performance
- evidence of the advantages of this new method
- questioned whether this can be seen as an enhancement of the IPDL rather than a new method

<u>Status in RAN4</u>:
Tdoc was noted. RAN4 feedback was provided. It was 'noted that the frame of this work is unclear'.

List of Completed elements (for complex work items):
- RAN1 work was presented to RAN2, RAN3 and RAN4
- Detailed simulation results for performance analysis were presented in RAN1 and also some results in RAN2, RAN3 and RAN4.

List of open issues:
- Signalling support for Time aligning Idle Periods
- Performance comparison with standard IPDL. This is still studied in RAN1.

Estimates of the level of completion (when possible):
Status at RAN #22 in Dec. 2003: not available as just started

Status at RAN #23 in March 2004:   25%
Status at RAN #24 in June 2004:   not discussed

WI completion date review resulting from the discussion at the working group:

Status at RAN #22 in Dec. 2003:   not provided
Status at RAN #23 in March 2004:   September 2004
Status at RAN #24 in June 2004:   not discussed

References to WG's internal documentation and/or TRs:

[1]   R1-040567, "Expected Performance of OTDOA-IPDL Positioning - Initial Indications Based on Live Measurements, Ericsson, RAN1 #37, Montreal (Canada), 10-14.05.2004

[2]   R1-040602, "Enhanced IPDL using time-aligned idle periods", Cambridge Positioning Systems, RAN1 #37, Montreal (Canada), 10-14.05.2004

[3]   R1-040613, "Concerns about Soft IPDL Proposal", Siemens, Nokia, RAN1 #37, Montreal (Canada), 10-14.05.2004

[4]   R2-040877, ""Enhanced IPDL using time-aligned idle periods", Cambridge Positioning Systems, RAN2 #42, Montreal (Canada), 10-14.05.2004

[5]   R3-040704, "Enhanced IPDL using time-aligned idle periods", Cambridge Positioning Systems, RAN3 #42, Montreal (Canada), 10-14.05.2004

[6]   R4-040229, "Enhanced IPDL using time-aligned idle periods",Cambridge Positioning Systems, RAN4 #31, Beijing (China), 10-14.05.2004