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Title: Status Report SI "Mitigating the Effect of CPICH Interference at the UE"

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This document provides a status report of the Study Item "Mitigating the Effect of CPICH Interference at the UE". TSG-RAN WG4 is the lead working group for this study item. Background material for the SI can be found in [1-6].

RAN WG4

There was significant progress made at the most recent WG4 meeting on the SI. A total of 6 technical contributions from Motorola, Nokia, Intel, and Telia were presented. In addition, version 0.1.0 of the technical report for this study, TR 25.991, was presented [15]. The extensive simulation results presented at the last meeting are currently being incoporated into the technical report. To summarize what has been contributed to date on behalf of the SI:

- Radio Network Simulations - Extensive voice capacity simulations were reported by Intel, Nokia, Motorola, and Telia, with similar results [8-10,13,14]. Issues that remain mainly pertain to determining the realistic level of mitigation accuracy and the realistic size of the cancellation set. In addition, one set of data capacity simulations (for 64 kbps and 144 kbps services) was presented illustrating increased gains over the voice capacity scenario [8]. Reference [14] also addressed scenarios where CPICH power is constrained to be large due to regulatory requirements.
- Link Level Simulations - Two contributions were presented addressing the issue of accuracy of cancellation. Reference [8] reported extensive simulation results illustrating a relatively high degree of cancellation accuracy for the cases considered. Reference [11] considered the performance of CPICH mitigation under extreme pessimistic timing error conditions, and found that gains remain, although reduced.
- Complexity - Reference [7] addressed the implementation complexity of mitigating CPICH interference effects by providing upper bounds on gate count, DSP requirements, and current consumption. Reference [12] considered gate count and confirmed the results in [7]. Reference [8] extended the complexity assessment to Transmit Diversity and Multi-Code operation.

Work Group 4 expressed the need for additional work to be done in the following areas before concluding the Study:

- Radio Network Simulations – At least one additional set of data simulation results (64 kbps, 144 kbps) are desirable.
- Link Level Simulations – There was much discussion at the last WG4 meeting about cancellation accuracy feasibility, particularly for neighbor cells. Additional results are needed to complement the results already presented in [8].
- Complexity – Additional companies have expressed interest in providing complexity assessments.

References

[1] 3GPP TSGR1-00-1371, “CPICH interference cancellation as a means for increasing DL capacity,” Intel Corporation, Nov. 2000.

[2] 3GPP TSGR1-00-0030, “Further Results on CPICH Interference Cancellation as A Means for Increasing DL Capacity,” Intel Corporation, Jan. 2001.

[3] 3GPP TSGR4-01-0238, “CPICH Interference Cancellation as a Means for Increasing DL Capacity,” Intel Corporation, Feb. 2001.

[4] 3GPP TSGRP-01-0177, “Mitigating the Effect of CPICH Interference at the UE,” Intel Corporation, Mar. 2001.

[5] 3GPP TSGR4-01-1014, “On the potential capacity gain of CPICH interference mitigation,” Intel Corporation, July 2001.

[6] 3GPP TSGR4-01-1015, “Study description for SI: Mitigating the effect of CPICH interference at the UE,” Intel Corporation, July 2001.

[7] 3GPP TSGR4-01-0650, “On the Implementation Complexity of CPICH Interference Cancellation,” Intel Corporation, May 2001.

[8] 3GPP TSGR4-01-1330, “Feasibility Assessment for CPICH Interference Mitigation”, Intel Corporation, September 2001.

[9] 3GPP TSGR4-01-0967, “CPICH cancellation,” Motorola, July 2001.

[10] 3GPP TSGR4-01-1230, “CPICH cancellation, 2-way soft handoff capacity gain” Motorola, September 2001.

[11] 3GPP TSGR4-01-1231, “CPICH cancellation, UE sample time offset” Motorola, September 2001.

[12] 3GPP TSGR4-01-1232, “CPICH cancellation complexity” Motorola, September 2001.

[13] 3GPP TSGR4-01-1202, “Simulation results for CPICH interference mitigation” Nokia, September 2001.

[14] 3GPP TSGR4-01-1256, “Capacity gain from CPICH cancellation”, Telia, September 2001.

[15] 3GPP TSGR4-01-1330, “TR 25.991 V0.1.0 Feasibility study on the mitigation of the effect of the common pilot channel (CPICH) interference at the user equipment”, Sep. 2001.