TSG-RAN Plenary meeting #18 ***RP-020816***
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Agenda item: **7.1.5**
Source: NEC
Title: Suggestion for the guidance to RAN1 regarding HS-DPCCH operation
Document for: Discussion

1. Introduction

HS-DPCCH operation in HSDPA has been discussed at recent RAN WG1 meetings. The biggest problem is that, during soft handover (SHO), large power offset is required in HS-DPCCH and also large SIR target may be required in inner loop power control of uplink DPCH in order to satisfy the requirement of ACK/NACK error rate [1][2]. Although many solutions were proposed and discussed at RAN WG1 meetings, agreement has not yet been achieved [6] - [9]. In this contribution, we explain our view about this issue.

2. Discussion

If enhancement is not introduced in Rel-5, the ACK/NACK requirement cannot be satisfied in SHO region without significant increase of power offset in HS-DPCCH and uplink DPCH transmit power. According to [3], the expected increase of mean delay is 10 % and 50 % when the ACK/NACK error rate is increased from 1e-4 to 1e-3 and from 1e-3 to 1e-2 respectively. Also, SHO area is approximately 40 % with the SHO window size of 5 dB. Even with the smaller SHO window size of 3dB, SHO area is approximately 20 %. (Further information about SHO probability is shown in Appendix A.) Therefore, without enhancement of ACK/NACK transmission in SHO, delay may be significantly increased in the service area of 20 – 40 %. Considering the possible impact on system performance, it is not sensible for RAN to decide whether such enhancement is needed or not, before RAN1 evaluates the impact.

A CR [4] is provided as a company proposal for this problem in this meeting although it has not been endorsed at RAN WG1. Since RAN should not approve the CR without investigation at RAN1, RAN1 should continue the study of ACK/NACK transmission in SHO.

3. Proposed approach

While there are original and relaxed requirements of 1e-4 and 1e-3 in the error rate from NACK to ACK, RAN WG1 does not have other clear criteria to evaluate the impact of the problem and improvement of the solutions, and this might be one reason why the discussion in RAN1 is not yet closed. To solve this issue, RAN1 should review other criteria. The criteria should include impact on UTRAN, impact on UE, complexity and system performance. Among these criteria, system performance might be evaluated in terms of the ratio of the area where the original or relaxed requirements are not satisfied. Through the review of such criteria, many companies might express their views, and this might help to conclude the discussion.

4. Conclusion

We suggest that RAN provides guidance to RAN WG1 to continue the study on this issue under the suggested criteria by RAN.

Reference

[1] R1-02-363, “Further results on the different power offsets for ACK/NACK signaling”, LGE
[2] R1-02-0421, “Energy requirements for UL HS-DPCCH signaling with and without special pilot bits”, Lucent

[3] R2-021934, “ACK/NACK Error Performance for HSDPA”, Panasonic
[4] RP-020822, “Correction of HARQ-ACK in 25.212 and 25.214 (without higher layer signalling),” CR25.214-295 rev3, Philips, Nokia
[5] TR25.942 v5.1.0, “RF System Scenarios (Release-5)”
[6] R1-02-1304, “Further results on enhanced HS-DPCCH power control in soft handover”, Nortel Networks
[7] R1-02-1315, “Modified TPC for HS-DPCCH operation in SHO”, NEC
[8] R1-02-1335, “Simulation results on scheme for meeting HS-DPCCH performance requirements for Rel-5”, Philips
[9] R1-02-1352, “HS-DPCCH Power Control in Soft-Handoff”, Motorola, Samsung, Lucent

Appendix A

Table 1 shows the SHO probability in area provided in TR 25.942 [5].

Table 1 SHO probability in area

Cell type		SHO window size	SHO probability
3 sector cell	65° antenna	5 dB	34.9 %
	90° antenna	5 dB	43.8 %
Omni cell		3 dB	21.8 %
		5 dB	34.1 %
		7 dB	44.3 %