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Agenda item: Ad Hoc 24 (HSDPA)

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Title: System aspects of power control for Fast Cell Selection in HSDPA

Document for: Discussion

1. Introduction

For Fast Cell Selection (FCS), power control techniques are investigated in the dedicated channels associated with HSDPA. This contribution presents an additional alternative of power control techniques, and discusses the features of the alternatives from system aspects.

2. Alternatives of power control techniques

For uplink power control, at least three possible solutions were presented so far as follows [1][2]:

- (1) Use a modified uplink power-control strategy, where the UE transmit power is increased if any Node B in the active set request an increase in the UE transmit power.
- (2) Use the normal uplink power-control strategy, but add a sufficiently large energy offset to the UE power to ensure that the transmission-state information is correctly detected with sufficiently high probability by the new Node-B.
- (3) Uplink power control is performed according to the power control request from the current best cell. When a new best cell is selected by UE, uplink transmit power may be increased if the current or new best cell requires to increase UE transmit power.

The additional alternative is as follows:

- (4) Use the normal uplink power-control strategy in UE, but add a sufficiently large offset to the SIR target of all Node-B in the active set.

It remains to be studied to evaluate the impact on system performance. In the evaluation, it should be noted that uplink transmit power should be increased only in the period of HSDPA transmission, and more than one UE should not simultaneously increase uplink transmit power in a

cell. This is because uplink interference might increase exponentially if a lot of UE increases transmit power.

3. Discussions

Table 1 summarizes the features of the alternatives. In Table 1, simplicity for the switching of operation in UE and Node-B is not considered although complexity increases for the switching of operation. Also, “excessive” does not mean “unacceptable” because the impact may be small on overall system performance.

Table 1: Features of the alternatives

	UE Operation	Node-B Operation	Features
(1)	Modified	Normal	<ul style="list-style-type: none"> - Operation in UE is simple. - Increase of uplink interference may be excessive.
(2)	Modified	Normal	<ul style="list-style-type: none"> - Increase of uplink interference depends on UE power offset, which is signalled from RNC. - Increase of uplink interference may be excessive.
(3)	Modified	Normal	<ul style="list-style-type: none"> - Increase of uplink interference may be minimized. - Operation in UE requires for further study.
(4)	Normal	Modified	<ul style="list-style-type: none"> - Increase of uplink interference depends on SIR target, which is signalled from RNC. - Increase of uplink interference may be excessive.

4. Conclusion

It is proposed that the alternative (4) and the following texts in Section 2 is included as parts of the RAN WG1 technical report TR.25.848 “Physical Layer Aspects of UTRA High Speed Downlink Packet Access”.

References

- [1] TSGR1#17(00)1424, “Physical layer aspects of Fast Cell Selection for HSDPA”, Ericsson.
- [2] TSGR1#18(01)0033, “Power Control for Fast Cell Selection in HSDPA”, Samsung.