

Agenda Item: 5
Source: Samsung Electronics Co.
Title: A clarification on DPCCH gated transmission.

1. Introduction

There were two kinds of concerns related to RAN WG2 on the DPCCH gated transmission, the possibility of unacceptable RRC blocking, during gating, induced by the transmission power limitation of UE at cell boundaries (LS from WG2, TSGR2#7(99)d13), and the impact of removing COS(Control Only Substate) from RRC state definition. The purpose of this contribution is to provide clarity for these concerns.

2. Unacceptable RRC blocking

The main objection raised WG2#7 was that at Cell boundaries the UE would not have sufficient overhead to increase the power of the DPDCH, in order to overcome the effects of gating on the DPCCH. It was therefore, assumed that it would be necessary to signal the UE to return to non-gated mode, and that such signalling would effectively block the RRC for up to 2 seconds, which was not acceptable at time when resources need to be configured to support handover.

The assumption about UE power saturation was based on cells being designed to support a UE transmitting highly protected 16 kbps speech with its maximum power at the cell edge. Thus, signalling at 16 kbps with the DPCCH in gated mode, would require the UE to increase its power beyond its maximum capability, if the signalling message was to be correctly received at the Node B. Samsung agrees that cell planning may be based a requirement to support 16 kbps speech at the cell edge, but also believes that an additional overhead will be included in the system design, in order to support uplink compressed mode transmission in which the transmit power is increased for the purposes of inter-frequency handover.

R1-99869 contained simulation results showing the required increase in DPDCH power during signalling, to compensate for the gating of the DPCCH. The worst case required increase in power for the UE for 1/5 rate gating is less than 2.5 dB. The increase in UE transmitted power due to the use of uplink compressed mode will depend on the uplink slot structure which is still to be agreed in R1, but the worst case is likely to be in the region of 3dB. Networks should be planned to allow for the use of compressed mode thus, the perceived problem of the UE not being able to increase its power sufficiently to support signalling during gated DPCCH mode, is not likely to occur.

3. Removing of COS

In last WG2 meeting, the COS was removed from RRC state diagram for its clarification and changed into "Radio Bearer Suspended" [1] mode (R2-99B25 of NOKIA). Nevertheless, Radio Bearer Suspended mode has same meaning with COS from the perspective of WG2 since the suspension of Radio Bearer means that only signalling messages can be transmitted on the established DPCH. Therefore, no impact is induced by this change except minor WG1 text modification, replacing "COS" with "Radio Bearer Suspended mode".

4. Conclusion

This document has shown that the concerns over possible UE power saturation during signalling in Gated DPCCH mode at cell boundaries, are unfounded and WG1 has no fundamental impact by eliminating COS from RRC state. The dimensioning of the network should be to accommodate worst case operation. For the sake of future compatibility, it is necessary to dimension cells to support compressed mode at their boundaries. The increase in required UE power for signalling during DPCCH gating is not likely to exceed the overhead allowed for compressed mode operation, so the UE would not have to return to the non-gated DPCCH mode for such signalling. For inter-frequency handover, the UE could return to non-gated mode without a requirement for any additional procedure, or messages.

5. References

[1] TSGR2#7(99)b25, "Suspension of uplink user data transmission", Nokia, Malmo, 20~24 Sep. 1999.