TSG-RAN Working Group 4 meeting #3 **TSGW4#3(99) 126**

Tokyo 29-31, March 1999

Agenda item :

Source : 3GPP RAN WG1

Title : Liaison statement to WG4 on clarification of closed loop power control assumptions

To : 3GPP RAN WG4

3GPP RAN WG1 is continuing the specification work for the uplink and downlink closed loop power control for FDD. 3GPP RAN WG1 understands that there are large dependencies of this work on aspects that are currently under specification by 3GPP RAN WG4. In order to ensure consistency between specifications produced by our two Working Groups, in particular S1.14, S4.01 A and S4.01 B, 3GPP RAN WG1 would like to ask the following questions to 3GPP RAN WG4, based on our reading of S4.01 :

Concerning the UE :

1) What is the set of possible power control step sizes at the UE, where a step size is assumed to correspond to the variation of UE output power between two adjacent slots as a result of fast power control? Our reading of S4.01 A is that the minimum step size is 1 dB with an accuracy of 0.5 dB (see section 6.4.3 of S4.01 version 0.0.3). This could be understood such that any step corresponding to multiples of 1 dB would be allowed. So we would like to know whether there is a limit on the maximum step size, with respect to the maximum power range.

2) Is it the understanding of WG4 that the set of step sizes must also accommodate the variation of output power due to the change of the gain factor between the DPCCH and DPDCH as a result of the variation of the data rate? If yes, then the gain factors themselves and the change of gain factors are constrained by the set of step sizes. If the step sizes are defined independently from the gain variation, which could be the maximum power change between adjacent slots?

3) How is the output power specified ? Is the output power specified in steps from the minimum power to the maximum power with any flexibility on the split of power between the DPCCH and DPDCH, which means that such a split is seen only from the base-band point of view rather than the RF?

4) Is there any restriction on the sequence of power control commands and step sizes ? Section 6.4.3.1 of S4.01 A item b) might indeed be understood as corresponding to a restriction rather than only a test of accuracy of power control for consecutive up/down commands.

5) In S4.01 A section 6.4.1, the error for the Open loop power control is indicated to be [9dB]. Does this value account for the tolerance on the transmitted power and the error on the downlink power estimation, which is used to set the output power ?

Concerning the Base Station

1) Section 6.4.2 of S4.01 B says that a minimum power control step size of [1dB]. Does it mean that any power control step multiple of 1 dB is allowed, limited of course by the power control dynamic range supported ? Given that the output power is the result of the superposition of multiple physical channels, which are not aligned in time, could WG4 clarify which is the foreseen benefit to specifying the power step? Could that for example be that the output power at the antenna connector would vary in step, assuming that the minimum power of each Physical channel is the same for all channels ?

2) In 3GPP RAN WG1 we have been discussing for some time, the possibility to apply power offset on some fields, like the TPC command, in order to improve the detection of these field in particular in Soft Handover. We are also studying the possibility to encode some information by applying power offsets between different fields on the downlink to control the operation of the uplink. This would then modify the requirement of the output power per physical channel, if there was any. Since the output power at the BTS connector is the sum of power from all DPCH does WG4 intend to set any restriction on the power variation over the slot ?

-
- 3GPP RAN WG1 would like to inform 3GPP RAN WG4 that we are currently evaluating the benefit of using multi-level power control, or variable power step sizes, where the step size could be provided to the transmitter in an explicit or implicit manner and may vary on a slot basis. (Such step size would be naturally a multiple of the minimum step size). Such variable step size may be of particular interest for the slotted mode.
- In 3GPP RAN WG1 we are continuing our discussion on the benefit of having a minimum step size which could either be UE dependent (indicated e.g. as part of the class mark to the UTRAN) or varied from release 99 of the standard to future releases. The objective of having multiple minimum step sizes is to be flexible enough to allow reduction of the minimum step size as the technology evolves, if it proves to bring benefit on the system level performance. We would like to get the opinion of WG4 on such an approach, knowing that the minimum step size should accommodate for the power control in-accuracy.
-
- 3GPP RAN WG1 would like to thank in advance 3GPP RAN WG4 for providing answers on some or all of these questions as soon as possible. Indeed it is the intention of 3GPP RAN WG1 to progress the work on closed loop power control as much as possible via e-mail in the framework of ad-hoc 9 by its next meeting.