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Source: 3GPP RAN WG3
Title: Answer to LS from RAN1 on Power Control – TDD aspects
To: 3GPP RAN WG1
Copy: 3GPP RAN WG2, 3GPP RAN WG4, TSG T1 RF SWG

1 Introduction

RAN1 had sent a LS to RAN2, RAN3, and RAN4 on power control issues [1]. It lists questions on power control in the FDD mode, and mentions that for TDD, similar questions arise. At RAN3#7, some answers have been given for FDD which have been listed in the minutes [2]. In this contribution, the corresponding answers for TDD are given.

The focus is on RAN WG3 aspects. Questions which clearly address WG2 or WG4 issues are left to these groups.

2 Questions and answers

2.1 Question#1 of [1]: Limits on the fast (inner) loop power control

WG3 specifications indicate a minimum and maximum power between which inner loop power control allows to vary the power. Does such a limit apply to uplink and downlink or only to the downlink?

Answer to #1, for TDD:

As in the FDD mode, these limits apply to the downlink power control only.

2.2 Question#2 of [1] (extract): Open loop power control

I_{BTS} measurement is not currently specified. No requirement on the rate of update of the information to be broadcast. – Open loop power control should also be specified for the CPCH.

Answer to #2, for TDD:

I_{BTS} measurement has been defined for TDD in the WG1 specification TS 25.225 [3], section 5.1.3 – it is the “Time Slot Interference Signal Code Power (**Time Slot ISCP**)” to be measured by the NodeB. The application of this measurement for Open Loop Uplink Power Control has been specified in TS 25.224 [4] in section 4.2.2.1 for the PRACH, and in section 4.2.2.2 for the Uplink DPCH.

The NodeB reports the measured Time Slot ISCP value to the CRNC within the “Common Measurement Report” as specified in the NBAP protocol [5], section 8.1.4.4. The measurement reporting period may be specified by the CRNC within the “Common Measurement Initiation Request” message ([5], section 8.1.4.1).

The NodeB broadcasts the Time Slot ISCP value for all the time slots used for uplink transmission, under control of the CRNC.

Open Loop Power Control is also applied to the Physical Uplink Shared Channel (PUSCH). The details of this are mainly a WG2 and WG1 issue.

Power control for CPCH: Not applicable for TDD.

2.3 Question#3 of [1]: Range of power ramping steps for RACH access and CPCH

Not applicable for TDD.

2.4 Question#4 of [1]: Slow power control

Not applicable for TDD.

2.5 Question#5 of [1]: Uplink power setting for RACH message part

Not applicable for TDD.

2.6 Question#6 of [1] (extract): Uplink power setting at start of transmission on DPDCH

How to use the "Uplink DPCH Power Control info" included in the RRC messages RRC Connection Setup etc.

Answer to #6, for TDD:

The equation for uplink power setting on DPCH (there is no DPDCH in TDD), based on the interference level at the BTS, and on the target SIR, is given in 25.224 [4], section 4.2.2.2. In TDD, the uplink DPCH power is controlled by open loop PC continuously, and not only during start-up of the DPCH. The UE gets the required parameters for uplink DPCH power control both via BCH broadcast and via RRC message. The NodeB provides the required measurement of the "Timeslot ISCP" to be broadcasted.

2.7 Question#7 of [1]: Uplink initial power setting for hard handover

How to use the contents of the HANDOVER COMMAND sent to the UE.

Answer to #7, for TDD:

Again, the equation for UL DPCH power setting is given in 25.224 [4]. The details of the Handover Command message are WG2 issue.

2.8 Question#8 of [1]: Outer loop power control

Do the WG3 specs specify that if the data rate changes, the receiver adjusts its SIR target, and the transmitter adjusts its transmit power?

Answer to #8, for TDD:

Downlink: SIR target adjustment in UE is WG2 issue (same as for FDD).

Transmit power adjustment in NodeB: In the WG3 specifications, an automatic adjustment due to rate change is not described.

2.9 Question#9 of [1]: Impact of the compressed mode on outer loop PC

Not applicable for TDD.

3 References

- [1] R3#7(99)A96, LS from RAN1, "LS to WG2, WG3, and WG4 on power control issues."
- [2] Draft minutes of RAN3#7.
- [3] TS 25.225 v.3.0.0, Physical Layer Measurements (TDD)
- [4] TS 25.224 v.3.0.0, Physical Layer Procedures (TDD)
- [5] TS 25.433 v.1.3.1, NBAP Specification
- [6] TS 25.331 v.3.0.0, RRC protocol specification