Title: PTCRB LS on Inner Loop Power Control Test Coverage
Re:

Source: PTCRB
To: 3GPP RAN5 and 3GPP RAN4
Cc: PVG

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1. Overall Description:

Power control is a crucial element within 3G networks and incorrect implementation can have an adverse affect on network capacity.

> *"An excess error of the inner loop power control decreases the system capacity"* (3GPP TS 34.121, 2008-09)

Because of the importance of power control, it's good engineering practice to require validation of power control under environmental extremes that devices can be subjected to in the field.

We believe the current measurement criteria defined in the 3GPP TS 34.121-1 of transmitter behaviour over the working range of a transmitter does not adequately cover innerloop power control.

2. Proposal

PTCRB propose the introduction of extreme testing for Inner Loop Power Control, 3GPP TS 34.121-1 Section 5.4.2.

3. Supporting information

Currently ***Maximum Output Power*** is tested for low, mid and high frequency ranges including extreme conditions.

Likewise ***Minimum Output Power*** is tested for low, mid and high frequency ranges including extreme conditions.

The above two test cases adequately cover the upper and lower range required for power control implemented in UEs.

Open Loop Power control is tested for low, mid and high frequency ranges including extreme conditions and is a check on the UE transmitters ability to set power to a specific level. The test parameters are Rx Upper dynamic end, Rx middle and Rx Sensitivity level (only 3 measurement points within each frequency range).

The ***Inner Loop Power Control*** test measures the entire dynamic range for the frequency range being tested and therefore is a good measure of the behaviour of the UE transmitter.
Measuring the entire dynamic range, for the frequency range being tested, for extreme conditions would give a much more accurate indication of the transmitter performance under the UEs Inner Loop Power Control.

Whilst test time will be increased by 4 times per band, to cover the additional extreme conditions, the duration of the test case (Section 5.4.2) is such that this will not have a dramatic effect on overall project test time assuming a full RF test suite is to be run.
E.g. for one platform the nominal conditions of this test case is conducted in 3 steps each taking approximately up to 4 minutes per step, a total of approximately 12 minutes to complete this test case per supported band.
Introduction of extreme testing would increase testing by 48 minutes making a total test run of 60 minutes per band.

An alternative platform takes approximately 2 minutes to complete the same test case per band supported.
Introduction of extreme testing would increase testing by 8 minutes making a total test run of 10 minutes per band.

The disadvantage of the relatively small increase in test time is far out weighed by the benefits of testing the UE transmitter across the entire dynamic range for extreme conditions and the confidence in correct UE transmitter behaviour this would bring.

4. Actions

RAN4/RAN5 to Expand test coverage in 3GPP TS 34.121, Section 5.4.2, to include extreme temperature conditions LT (low temperature), HT (high temperature) and extreme voltage conditions, LV (low voltage) and HV (high voltage).

5. References:

3GPP, 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); Part 1: Conformance specification (Release 8), version 8.4.0 (2008-09).

6. Date of Next PTCRB Meetings

PTCRB #55	March 9 – 12, 2009	San Francisco, California