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Agenda item: **Ad hoc 1**

Source: **Siemens**

Title: **TDD closed loop power control in case of transmission pauses**

Document for: **Discussion**

Introduction

Closed Loop power control has been adopted as the method to be used for TDD in downlink direction. This method works best in case of continuous transmissions to the UE. The UE uses these downlink transmissions for SIR estimation in the inner power control loop.

However, in some cases like speech or shared channels, the downlink data transmission may be discontinued for some time. In this case there is no signal transmitted to the UE. The inner loop is interrupted. No TPC bits can be generated by the UE. After the transmission gap the nodeB has to restart the transmission with high uncertainty in the transmit power.

Proposal

In case of a downlink transmission pause on the DPCH or PDSCH, the receive power (RSCP) of the data can no longer be used for inner loop SIR calculations in the UE. However, the UE can trace the fluctuations of the pathloss based on the P-CCPCH and use these values instead. The fluctuations in the RSCP of a downlink DPCH are assumed to be the same as the ones of the pathloss of the P-CCPCH. The same algorithm as for open loop power control can be used in order to weight the short and long term pathloss measurements in case of a delay between the P-CCPCH and the DCH timeslot.

This pathloss together with the timeslot ISCP measurement in the data timeslot, which is ongoing, is used to calculate a virtual SIR value:

$$SIR_{virt}(i) = RSCP_{virt}(i) - ISCP(i),$$

$$RSCP_{virt}(i) = RSCP_0 + L_0 - L(i) + \sum_{k=1}^{i-1} TPC(k),$$

RSCP: Received signal code power in dB
ISCP: Interference signal code power in the DPCH / PDSCH timeslot in dB
L: pathloss in dB measured on the P-CCPCH. The same weighting of the long- and short-term pathloss is used as for uplink open loop power control, see section 4.2.2.2
i: index for the frames during a transmission pause, $1 \le i \le$ number of frames in the pause
L_0: weighted pathloss in the last frame before the transmission pause
$RSCP_0$: RSCP of the data that was used in the SIR calculation of the last frame before the pause
TPC (k): ± power control stepsize in dB according to the TPC bit generated and transmitted in frame k, TPC bit "1" = +stepsize, TPC bit "0" = –stepsize

The UTRAN accumulates all TPC commands received during a transmission pause. The initial UTRAN transmission power for the first data transmission after the pause is then set to the sum of transmission power before the pause and a power offset according to the accumulated TPC commands. Additionally this sum may include a constant set by the operator and a correction term due to uncertainties in the reception of the TPC bits.