3GPP TSG-RAN WG1#7 TSGR1#7(99)C19

Hanover, Germany

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Agenda Item: AdHoc 1 + AdHoc 6

Source: Panasonic

Performance Analysis on OL-TPC based on parallel transmitted Midamble

1. Introduction

Transmit Diversity scheme for both Dedicated Channel and Common Control Channels are introduced in FDD mode. But in TDD mode, no Transmit Diversity scheme is adopted to Common Control Channels. In this document, we propose the scheme to increase the quality of Open Loop Power Control (OL-TPC) transmitting CCPCH (BCH, FACH, PCH) from 2 antennas separately.

2. Proposal and Simulation Parameters

In the document [1], example for a multiframe structure for DL-CCPCH is shown. Figure B.2 in [1], two CCPCH are allocated in a same time slot. The BCH and PCH are transmitted constantly, but the FACH is transmitted on demand. When some kind of transmit diversity scheme for DPCH are used, CCPCH are transmitted from diversity antennas if more than two CCPCH are transmitted. For example [1], Primary BCH with Midamble 0 is transmitted from antenna A and FACH with Midamble n is transmitted from antenna B at frame 0 and 1.

OL-TPC scheme is basically same as decided in Ad Hoc 1 at WG1 #6, Espoo[2]. When CCPCH are transmitted from diversity antenna, the UE measures the received signal power of Midamble transmitted from antenna A and B, respectively. Then add them to make the reference received power described in [2].

When there are no data to transmit via FACH, only Midamble should be transmitted like DTX in TDD mode.

The simulation parameters are as follows. In this analysis, only the performance of first step on cell search was evaluated.

Table 1 Simulation parameters

Items		Parameters
DPCH		SF=16 8kbps
FEC		Convolutional Code(K=9, R=1/2)
Chip Rate		4.096[Mcps]
Detection		Joint Detection
Antennas	NodeB	Transmit : 2 , Receive : 2
	UE	Transmit : 1 , Receive : 1
Channel Model		2path Model
Max. Doppler Freq.		52.8 [Hz]
OL-TPC type		Without TPC, OL-TPC(single antenna), OL-TPC(diversity antenna), CL-TPC
OL-TPC control Delay		0 [ms]

3. Simulation results

Figure 1 shows the simulation results of uplink BER performance. OL-TPC gain of single transmit antenna at Node B is 2.0 dB at BER = 10^{-3} and that of diversity antenna is 4.8 dB, respectively. The gain between single antenna and diversity antenna is achieved as follows. Let's consider the situation that fading channel between antenna A at the Node B and antenna at the UE is small and that between antenna B at the Node B and the antenna at UE is large. If transmit diversity is NOT applied, transmit power of the UE is large. Received signal quality after some kind of diversity scheme at Node B is better than required. If transmit diversity is applied and reference received signal power at the UE is average of antenna A and antenna B, transmit power at the UE is smaller than in case of single antenna and quality at the Node B is same as required.

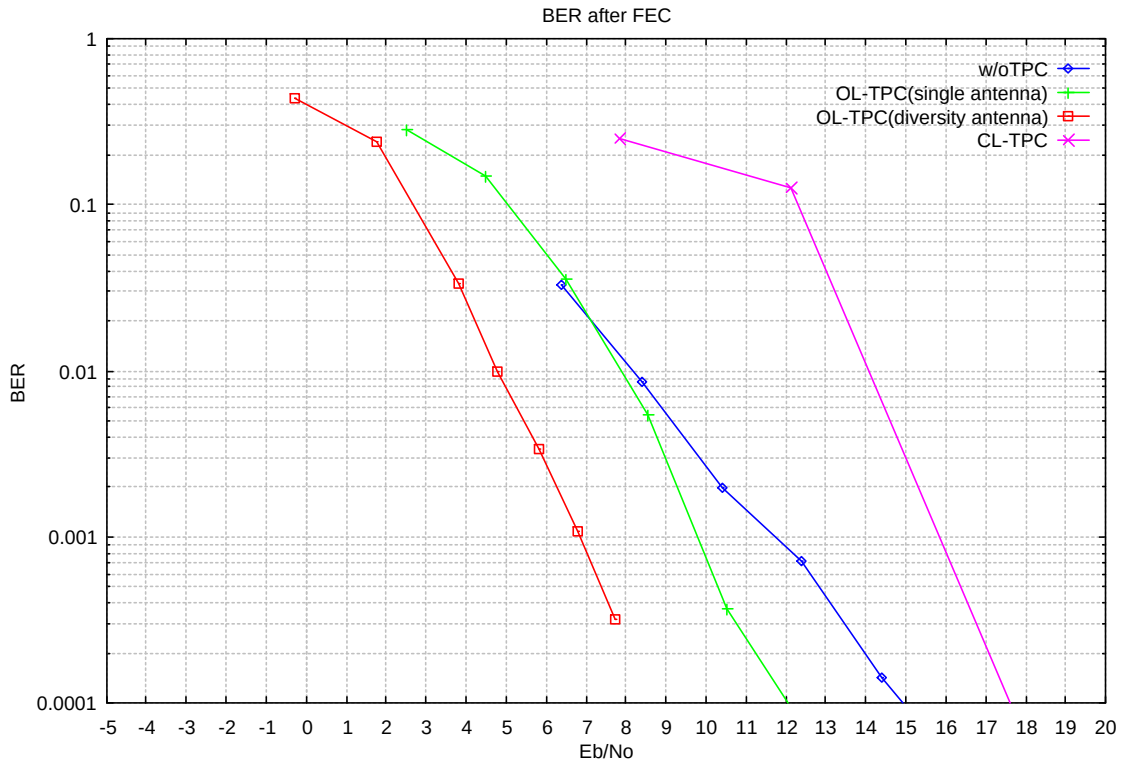

Figure 1 Effect of TSTD scheme for SCH (parameter is Eb/N0)

3. Conclusion

We propose that transmit diversity of CCPCH and how to determine the reference received power for OL-TPC at the UE. When Midamble of CCPCH is transmitted from both antennas at the Node B, to combine the received signal power transmitted from diversity antennas can give good BER performance at Node B.

4. References

[1] Tdoc 3GPP TSGR1#4(99)A25, "Update of specification document TS25.221"

[2] Tdoc 3GPP TSGR1#4(99)575, "Performance of Weighted Open Loop Scheme for Uplink Power Control in TDD Mode"