TSG-RAN WG1 meeting #15 **R1-001034**
Berlin, Germany
August 22nd – 25th, 2000

Agenda item: Release 2000 issues
Source: GBT
Title: CLPC-FACH simulations
Document for: Discussion (RAN WG1)

In the previous RAN1 meeting, GBT introduced two contributions on improvement of Cell-FACH state. GBT received several questions and comments that were taken under consideration. GBT has addressed the following topics and issues in contributions R1-00-0134 and R1-00-0135:

1. Generate a common set of simulation assumptions for others to re-produce results.
2. Presentation of the results: Figures are used in presenting the results: Tx-Power versus BER or FER
3. Discussion of the results
4. The impact of having imperfect open loop power control should be included in the analysis and simulations. (This point is addressed in Tdoc R1-00-1035)

There seems to be an agreement in the WG1 that introduction of Closed Loop Power Control will introduce some gain, but the level of gain is still under debate. We address the overall gain from the WG1 perspective in Tdoc#1035. In this contribution, we present the simulation results in a new format. We also provide a set of simulation assumption so that others can re-produce the results if desired.

1. Simulation Assumptions

Nokia had pointed out that we need to have uniform set of simulation assumptions so that the results can be re-produced. GBT generated the following table based on the TX-Diversity simulation assumption set and some comments from other companies. We also presented this on the reflector and did not receive any further comments.

Recommended simulation parameters for FACH simulations.

Bit Rate	60 kbps
Chip Rate	3.84 Mcps
Convolutional code rate	½
Carrier frequency	2 GHz
Power control rate	1500 Hz
PC error rate	4 %
PC Step Size	1 dB total
Channel model(s) and UE	1-path Rayleigh:3, 10, 40, 120 km/h

velocities	**ITU Ped A: 3, 10, 40 km/h** ITU Veh. A: 10, 40, 120 km/h
CL feedback bit error rate	4 %
CL feedback delay	1 slot
TTI	10,20, 40, 80 ms
Target FER/BlkER	10-5 %
Geometry (G)	12 dB
Common Pilot	-10 dB total
Slot Format	[data1,data2,TPC, TFCI, Pilot] [4,56, 4, 8, 16]
OLPC implementation Error	0 dB * * The impact of imperfect open loop power control to be simulated separately.
STTD	Enabled
Channel estimation	Two orthogonal CPICH used to estimate: No averaging over multiple slots
Correlation between antennas	0
CLPC Dynamic range	[-15, +5] dB
CL feedback rate	1500 Hz
Transmission Mode	Bursty

Geometry, *G*, is defined as:

$$G = \frac{average(Rx\_I_{or})}{I_{oc} + N_o} \quad (1)$$

where,

Rx_I_{or} = The total post channel transmitted power density

I_{oc} = The other cell interference power density

N_o = The thermal noise power spectral density

2. Presentation of Results

The results are presented in the following format:

Plot Eb/Ior versus BER for various channel Models
Plot transmit Eb/Ior versus speed at the fixed BER of .005 for each case.

3. Presentation and discussion of Results

Figure 1: Comparison of CLPC-FACH and OLPC-FACH versus FER (Perfect OLPC): 40 ms TTI, 5Hz, ITU Ped A
Figure 2: Comparison of CLPC-FACH and OLPC-FACH versus FER (Perfect OLPC): 10 ms TTI, 5Hz, ITU Ped A
Figures 3-5: Comparison of CLPC-FACH and OLPC-FACH versus BER (Perfect OLPC): 40 ms TTI, 5Hz/ 30 Hz and 120 Hz
Figures 6-8: Comparison of CLPC-FACH and OLPC-FACH versus BER (Perfect OLPC): 10 ms, 20 ms, 80 ms TTI, 5Hz
Figure 9: Fading Rate in Hz versus CLPC Gain over perfect OLPC
Table 1: TTI versus CLPC Gain

Figure 1: Comparison of CLPC-FACH and OLPC-FACH versus FER (Perfect OLPC): 40 ms TTI/ 5Hz

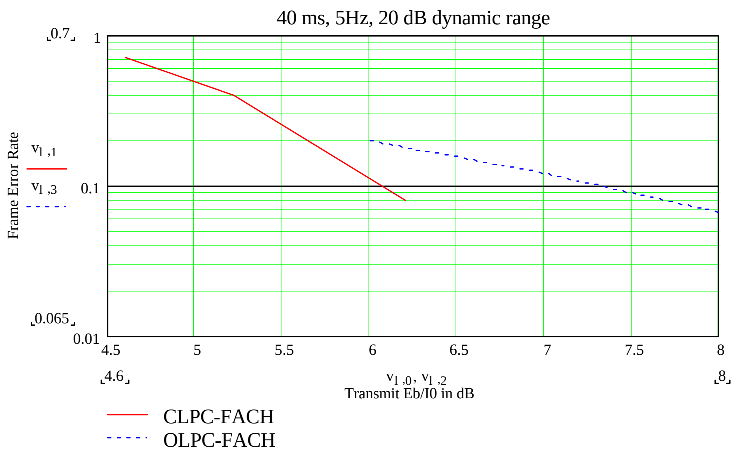

Figure 2: Comparison of CLPC-FACH and OLPC-FACH versus FER (Perfect OLPC): 10 ms TTI/5 Hz

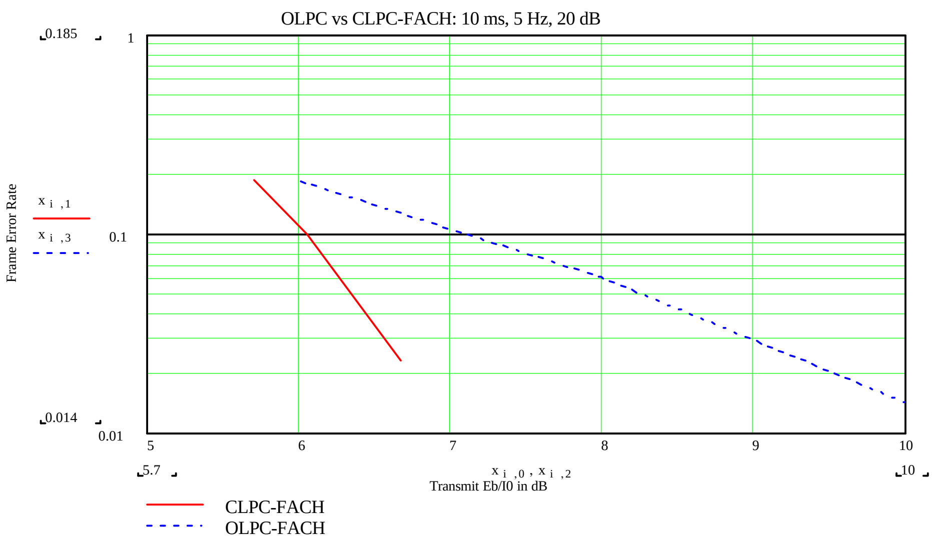

Figure 3: Comparison of CLPC-FACH and OLPC-FACH versus BER (Perfect OLPC): 40 ms TTI, 5Hz/ 30 Hz and 120 Hz

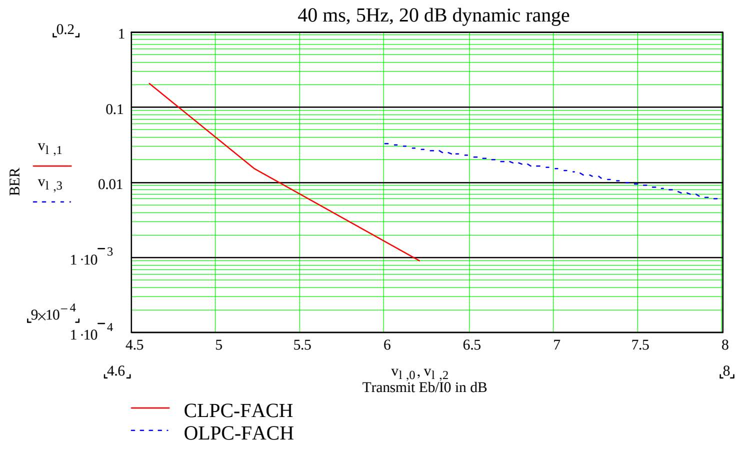

Figure 4:

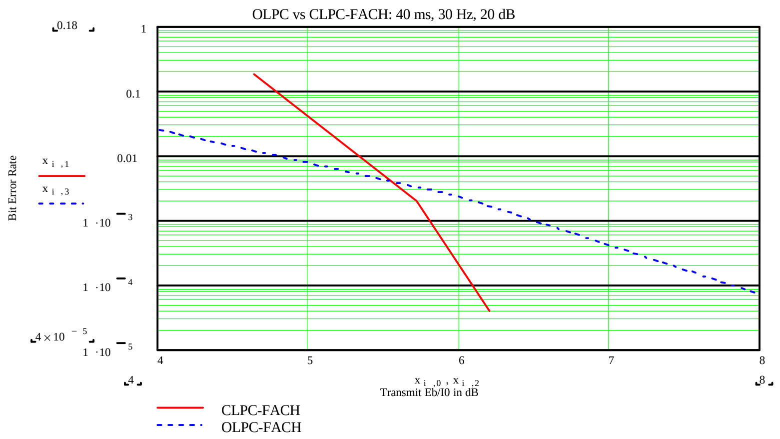

Figure 5:

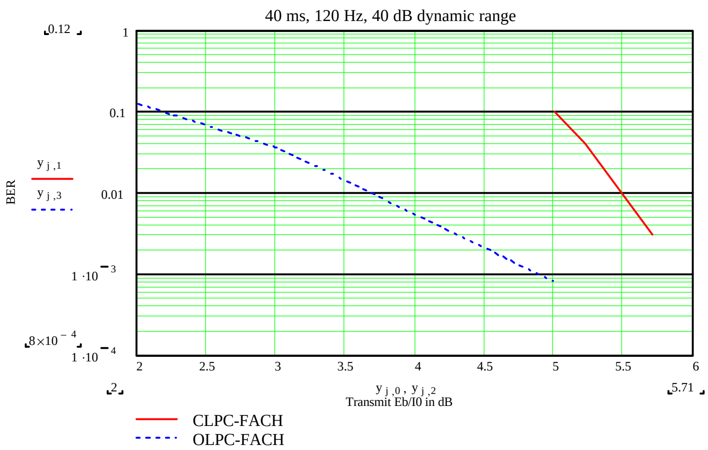

Figure 6: Comparison of CLPC-FACH and OLPC-FACH versus BER (Perfect OLPC): 10 ms TTI, 5Hz

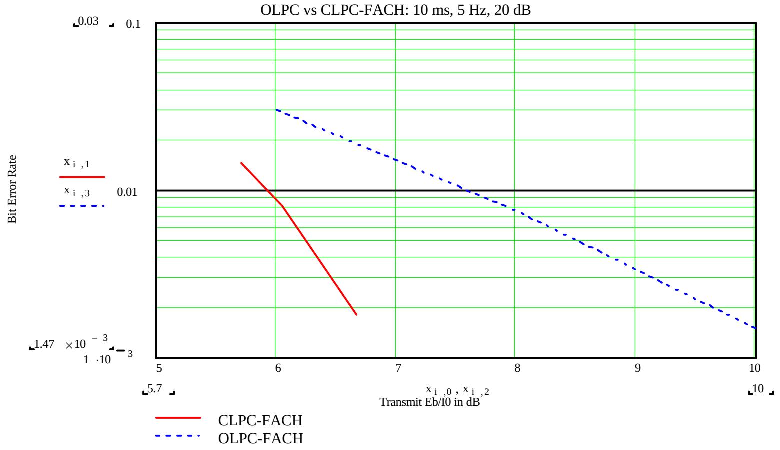

Figure 7:

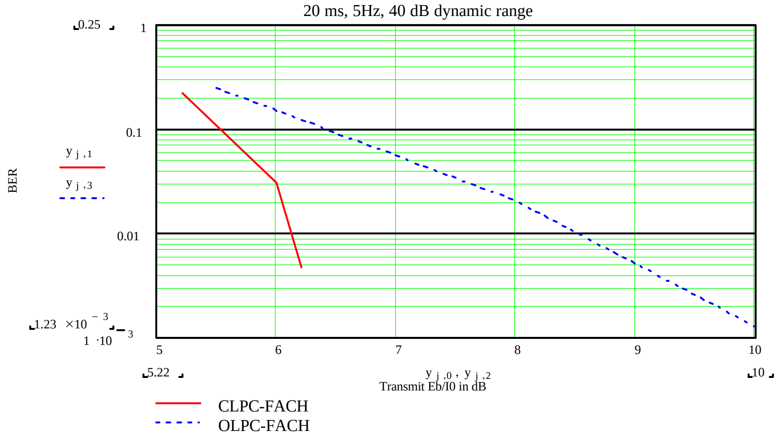

Figure 8:

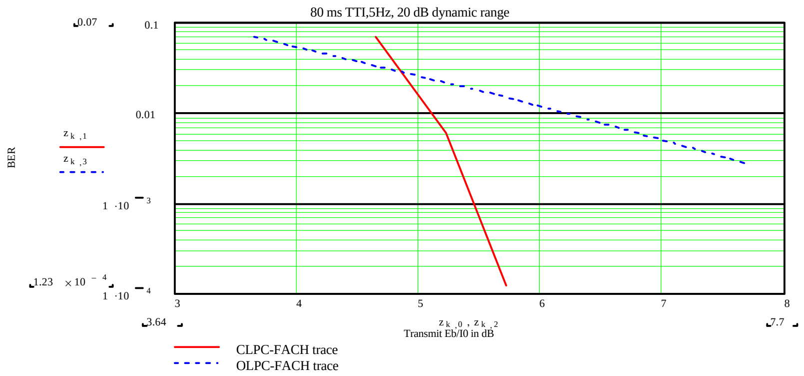

Figure 9: Fading Rate in Hz versus CLPC Gain over perfect OLPC

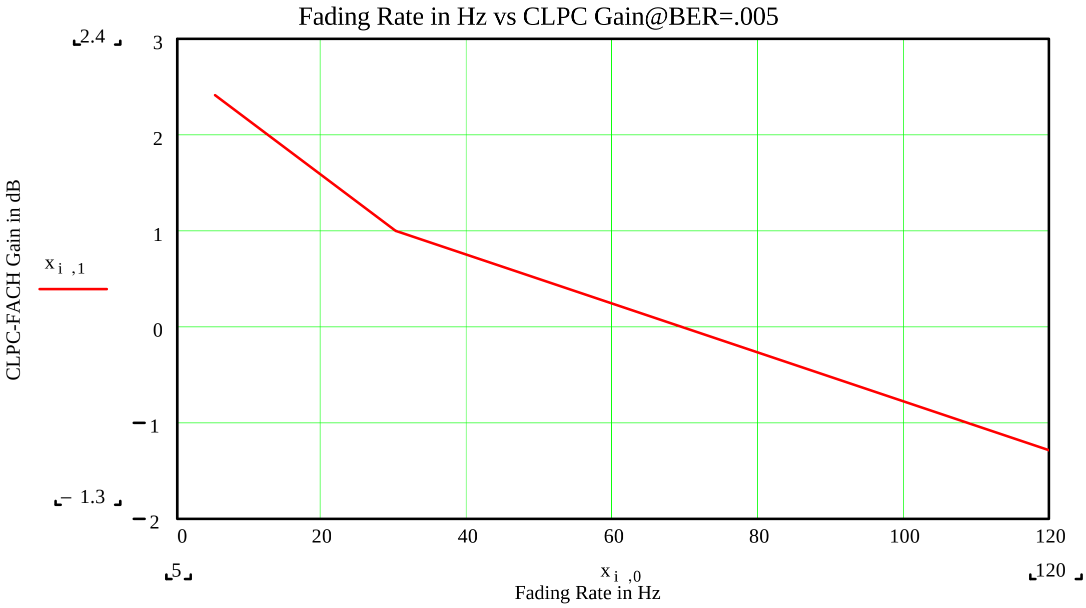

Table 1: TTI versus CLPC Gain (5Hz fading)

TTI length	Gain of CLPC over OLPC-FACH BER=.005
10 ms	2.3 dB
20 ms	2.8
40 ms	2.4
80 ms	2.6

4. Discussion of Results: As can be seen from the simulation results presented in the previous section, there is a 2.3-2.8 dB gain at the BER of .005 for various TTI lengths. Figure 2 clearly shows a 2dB gain at the FER of .05 for the 5Hz fading environment. These gains are for perfect OLPC.

5. Conclusion: GBT have already shown (Tdoc R1-00-0917) that the forward link system-wide capacity gain is directly proportional to the gain in transmit Eb/N0. In this contribution, we have documented the gain in dB associated with introduction of CLPC on FACH as compared to OLPC-FACH.

6. Recommendation: GBT recommends WG1 to report the link level simulations results in this contribution to WG2.