

Agenda Item: 8.2, AH 01
Source: Nokia
Title: Benchmarking simulation results
Document for: Discussion

1. INTRODUCTION

In the last RAN4 meeting it was agreed that volunteer companies can execute link level simulations to benchmark their simulations platform.

This document shows Nokia's results of benchmarking link level simulations for downlink in FDD system. Assumptions were defined in R4-99341 for these simulations. Assumptions can be found also in Annex A at the end of this document.

2. SIMULATION RESULTS

Simulations were done using defined assumptions. Also some additional assumptions were done but these do not have any effect on final results. Additional assumptions were that channel coding, rate matching and interleaving were not included, since these are not necessary for these simulations. This is the reason why a figure describing a measurement channel for 64 kbps test case was not drawn.

Each point in curves were achieved by simulating at least 10 000 frames.

Figure 1 shows simulations results for tests 1 and 2. The curves are given as raw BER as a function of DPCH_Ec/I_{or}. It can be seen from Figure 1 that when a terminal is closer to a base station (case 2) it needs less transmission power from base station to achieve the same BER level.

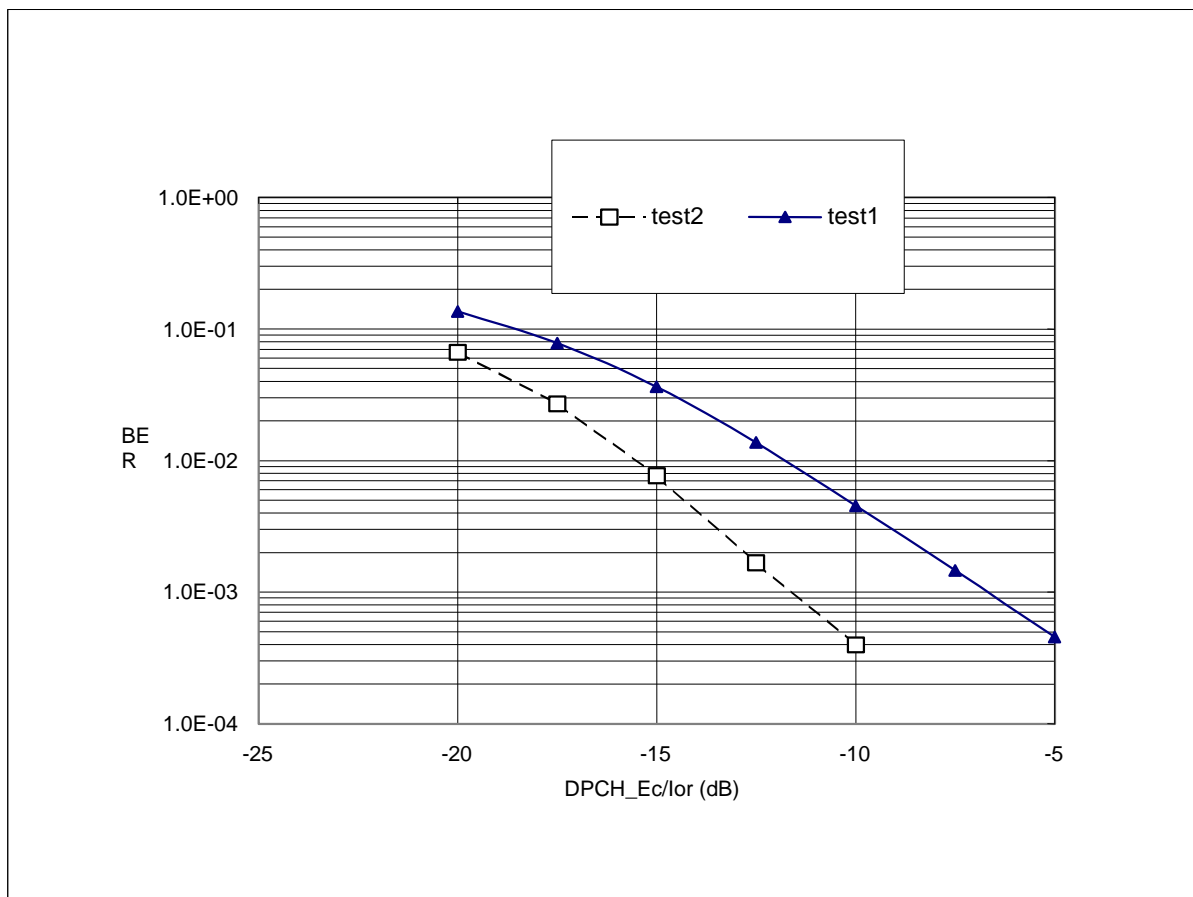


Figure 1. Results for tests 1 and 2.

Figure 2 shows simulations results for tests 3 and 4. It can be seen that now a base station needs to use more power per a user compared to cases 1 and 2 since used data rates are higher in cases 3 & 4.

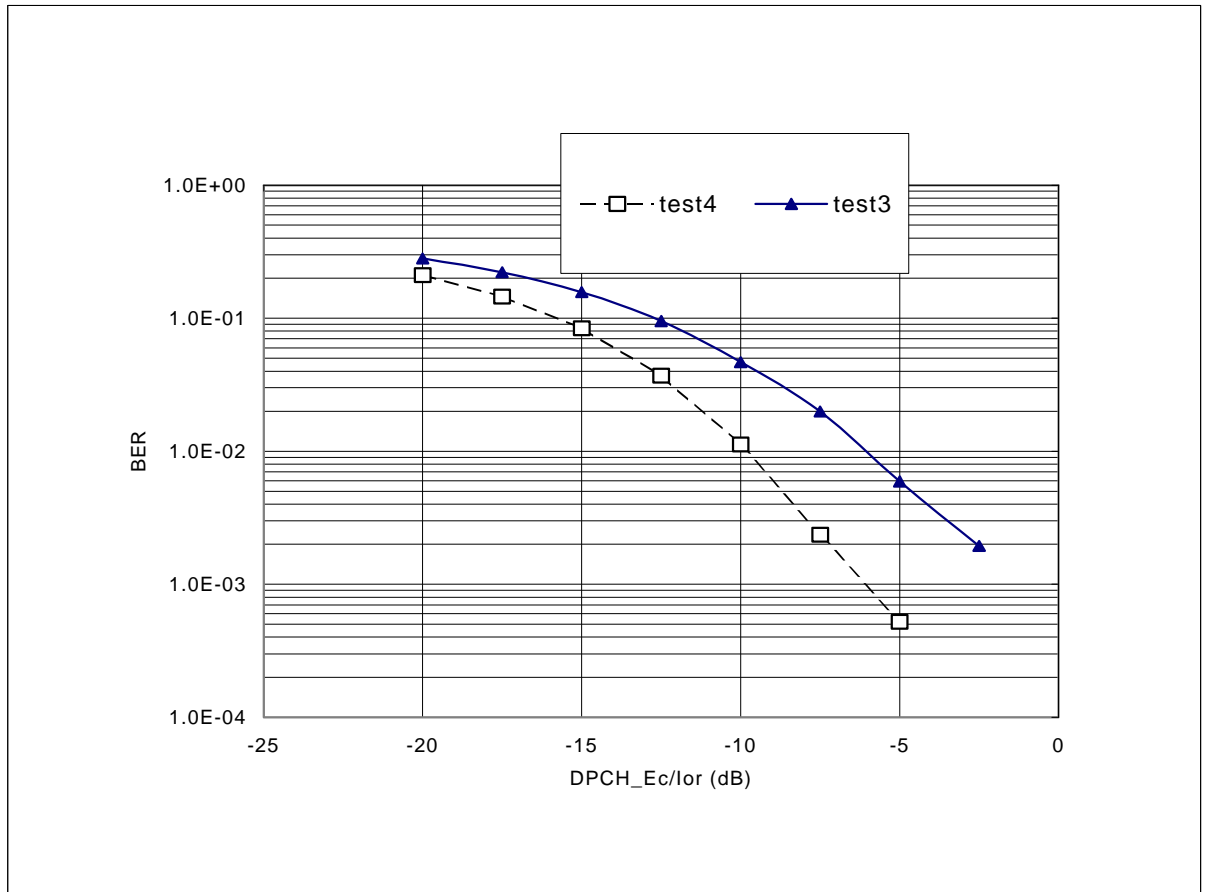


Figure 2. Results for tests 3 and 4.

3. CONCLUSIONS

The Nokia results of benchmarking simulations for downlink have been presented. These results should be compared to results of other companies in order to validate simulations platforms.

ANNEX A

Simulations Assumptions

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
$\frac{P_{CCPCH} - E_c}{I_{or}}$	dB	-10	-10	-10	-10
\hat{I}_{or}/I_{oc}	dB	3	9	3	9
Information Data Rate	kbps	12.2	12.2	64	64
Channel Symbol Rate	ksps	32	32	128	128
TCFI	-	on	on	on	on

- 3GPP specifications inputed to the RAN meeting #4 should be used for the benchmarking phase. Harmonization impacts are not taken into account.
- Orthogonal channel noise simulator (OCNS) is used (one additional orthogonal user). Set up the power of it so that the total power of BS equals to 1 always. (if power of DPCH increases, the power of OCNS decreases).
- Power control is switched off.
- Automatic Gain Control (AGC) is not used.
- Two tap equal gain propagation model with rayleigh fading. Taps are 2 chips apart from each other. Speed of a terminal is 120 km/h in test 1 and 2 and 3 km/h in test 3 and 4.
- Ideal channel estimation from PCCPCH is used.
- Floating point chip level simulations, one sample per chip.
- 2 Rake fingers is used.
- Produce curves for uncoded BER as the function $\frac{DPCH - E_c}{I_{or}}$. Make a curve for uncoded BER $> 10^{-3}$.
Implementation margin shall not be added to curves.
- In test 1 & 2 use downlink reference measurement channel (12.2 kbps) as in Annex A.2.2. In test 3 & 4 use same principles for 64 kbps measurement channel as for 12.2 kbps case . Draw a figure describing reference measurement channel for 64 kbps that have been used in simulations.