3GPP TSG RAN WG1#9 Tdoc R1-99j17
Dresden, Germany
November 30th - December 3rd, 1999

Agenda Item:
Source: Nokia
Title:Deleting physical channel BER measurement from TS 25.215
Document for: Decision

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1 Introduction

At RAN WG1#7 transport channel BLER and physical channel BER estimation methods were accepted in the layer one specification TS 25.215. However, according to our link level simulations physical channel BER estimation do not result adequate estimate for the outer loop power control. On the other hand, the BLER measurement offers reasonable estimation for outer loop power control purposes.

2 Simulation results

The simulation assumptions are described more detailed in Annex A. The simulated BLER, BER and rawBER curves in AWGN channel are depicted in Figure 1. The corresponding curves for the fading channel are in Figure 2. When comparing the behaviour of the BLER and rawBER it can be concluded that BLER metric follows quite nicely the actual BER value. On the other hand the rawBER estimation metric results almost like flat behaviour through the selected Ec/Ior range.

Simulations were performed with many bit rates with different channel models. It was found that physical channel BER is almost flat in some environments, especially when turbo coding is used and UE speed is quite high. In addition to this, we found that the value for physical channel BER for given BLER/BER requirement depends on multipath environment, UE speed, bit rate and obviously from implementation (e.g, number of iterations in turbo decoding). Furthermore, the rawBER curves shown in Figures 1 and 2 are ideal physical channel BER curves. Thus, the received bits after RAKE combining are compared to the transmitted bits. In real life physical channel BER needs to be estimated and estimates have always some limited accuracy.

Consequently, reasons mentioned above gave us a conclusion that we do not see any use for physical channel BER measurement in the scope of the outer loop power control. Physical channel BER is also a very poor Quality of Service indicator.

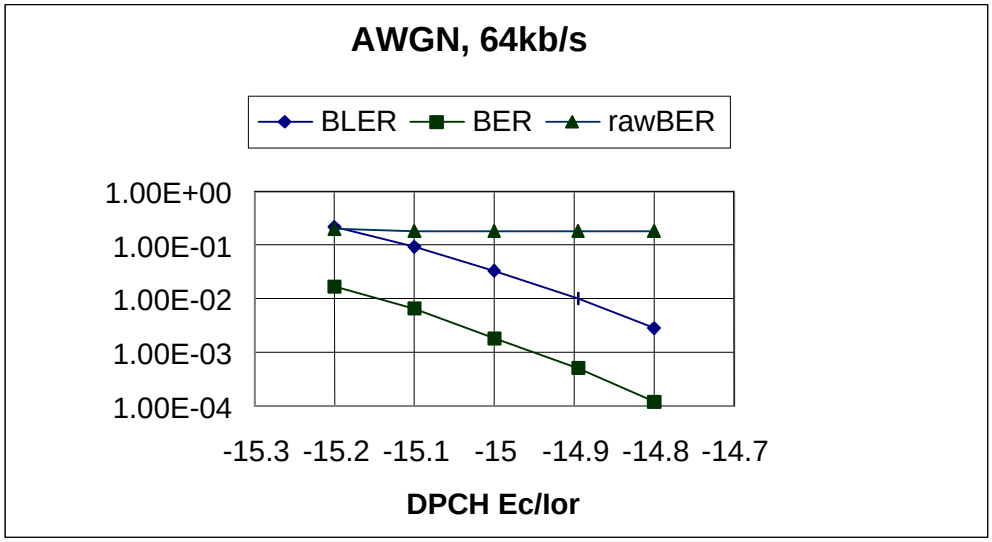

Figure 1. BLER, BER and rawBER results in AWGN channel

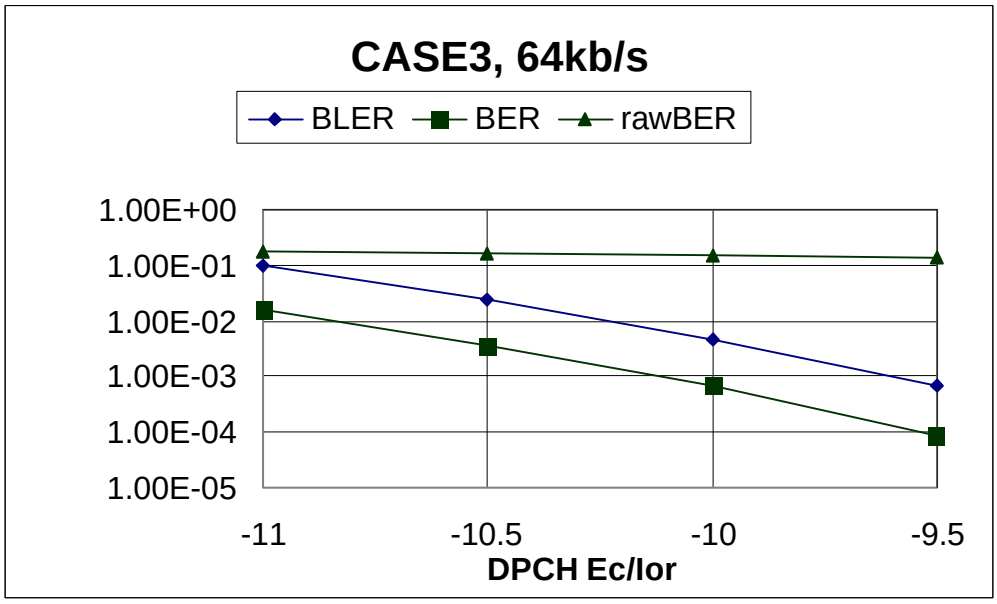

Figure 2. BLER, BER and rawBER results in fading channel

3 Conclusions

In this paper the link level simulation results of the transport channel BLER and physical channel BER are presented. According to the physical channel BER i.e. rawBER results very flat behaviour in some environments and hence we see it as very poor QoS indicator. Thus we do not see physical channel BER as a useful measurement for outer loop power control. We are not aware of any other purpose of this measurement. So we do not see any motivation for this measurement since it adds UE complexity. Consequently, we propose that physical channel BER measurement should be withdrawn from TS 25.215.

Annex A Simulation Assumptions

Table 1 shows assumptions used in simulations.

Table 1. Simulation assumptions

Parameter	Explanation/Assumption
Chip Rate	3.84 Mcps
Closed loop Power Control	OFF, Note that power control does not help in AWGN and in Case 3 propagation model
AGC	OFF
Channel Estimation	Ideal delay, amplitude and phase estimation
Number of samples per chip	1
Propagation Conditions	As specified in Annex B of TS 25.101 v.3.0.0. Case 3: 120 km/h, 4 taps (0 dB, -3 dB, -6 dB and –9dB). One chip separation.
Number of bits in AD converter	Floating point simulations
Number of Rake Fingers	Equals to number of taps in propagation condition models
Downlink Physical Channels and Power Levels	As specified in Annex C of TS 25.101 v3.0.0
BLER target	Results for BLER from 0.5 to 10-3 are presented
BLER calculation	BLER has been calculated by comparing with transmitted and received bits. So CRC is not used for BLER estimation. Note that both methods give same results in practice, when 16 bit CRC is used.
PCCPCH model	Random symbols transmitted, ignored in a receiver
PICH model	Random symbols transmitted, ignored in a receiver
DCCH model	Random symbols transmitted, ignored in a receiver
TFCI model	Random symbols, ignored in a receiver but it is assumed that receiver gets error free reception of TFCI information.
Used OVSF and scrambling codes	Codes are chosen from the allowed set.
$\hat{I}_{or} / I_{oc}$ values	Bit Rate / AWGN / Case 3 12.2 kbps / -1 dB / -3 dB 64 kbps / -1 dB / -3 dB 144 kbps / -1 dB / 3 dB 384 kbps / -1 dB / 6 dB
Turbo decoding	MaxLogMap algorithm is used with 8 iterations
SCH position	Offset between SCH and DPCH is zero chips meaning that SCH is overlapping with the first symbols in DPCH in the beginning of DPCH slot structure
Measurement Channels	As specified in Annex A of TS 25.101 v3.0.0
Other L1 parameters	As Specified in latest L1 specifications (October 1999 versions)

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***Document* R1-99???**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.215	CR	012	Current Version:	3.0.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG RAN #6 *list expected approval meeting # here ↑*

for approval [X] for information [ ]

strategic [ ] non-strategic [ ] *(for SMG use only)*

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]

Source: Nokia **Date:** 1999-11-17

Subject: Deleting physical channel BER measurement

Work item: UTRAN

Category: *(only one category shall be marked with an X)*

F	Correction	[X]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[ ]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change: According to link level simulation the physical channel BER results very flat behaviour in some environments and hence it is seen as very poor QoS indicator. Thus we do not see physical channel BER as a useful measurement for outer loop power control. We are not aware of any other purpose of this measurement. So we do not see any motivation for this measurement since it adds UE complexity. Consequently, we propose that physical channel BER measurement should be withdrawn from TS 25.215

Clauses affected: 5.1.9 and 5.2.6

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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5.1.5 UTRA carrier RSSI

Definition	Received Signal Strength Indicator, the wide-band received power within the relevant channel bandwidth. Measurement shall be performed on a UTRAN downlink carrier. The reference point for the RSSI is the antenna connector at the UE.
Applicable for	Idle, Connected Intra, Connected Inter
Range/mapping	

5.1.6 GSM carrier RSSI

Definition	Received Signal Strength Indicator, the wide-band received power within the relevant channel bandwidth. Measurement shall be performed on a GSM BCCH carrier. The reference point for the RSSI is the antenna connector at the UE.
Applicable for	Idle, Connected Inter
Range/mapping	According to the definition of RXLEV in GSM 05.08.

5.1.7 CPICH Ec/No

Definition	The received energy per chip divided by the power density in the band. The Ec/No is identical to RSCP/RSSI. Measurement shall be performed on the CPICH. The reference point for Ec/No is the antenna connector at the UE.
Applicable for	Idle, Connected Intra, Connected Inter
Range/mapping	

5.1.8 Transport channel BLER

Definition	Estimation of the transport channel block error rate (BLER). The BLER estimation shall be based on evaluating the CRC on each transport block after RL combination. BLER estimation is only required for transport channels containing CRC. In connected mode the BLER shall be possible to measure on any transport channel. If requested in idle mode it shall be possible to measure the BLER on transport channel PCH.
Applicable for	Idle, Connected Intra
Range/mapping	

~~5.1.9 Physical channel BER~~

~~Definition~~	~~The physical channel BER is an estimation of the average bit error rate (BER) before channel decoding of the DPDCH data after RL combination. At most it shall be possible to report a physical channel BER estimate at the end of each TTI for the transferred TrCh's, e.g. for TrCh's with a TTI of x ms a x ms averaged physical channel BER shall be possible to report every x ms.~~
~~**Applicable for**~~	~~Connected Intra~~
~~**Range/mapping**~~	

5.1.10 UE transmitted power

Definition	The total UE transmitted power on one carrier. The reference point for the UE transmitted power shall be the UE antenna connector.
Applicable for	Connected Intra
Range/mapping	

Column field	**Comment**
Definition	Contains the definition of the measurement.
Range/mapping	Gives the range and mapping to bits for the measurements quantity.

5.2.1 RSSI

Definition	Received Signal Strength Indicator, the wide-band received power within the UTRAN uplink carrier channel bandwidth in an UTRAN access point. The reference point for the RSSI measurements shall be the antenna connector.
Range/mapping	

5.2.2 SIR

Definition	Signal to Interference Ratio, is defined as the RSCP divided by the ISCP. Measurement shall be performed on the DPCCH after RL combination in Node B. The reference point for the SIR measurements shall be the antenna connector.
Range/mapping	

5.2.3 Transmitted carrier power

Definition	Transmitted carrier power, is the total transmitted power on one carrier from one UTRAN access point. Measurement shall be possible on any carrier transmitted from the UTRAN access point. The reference point for the total transmitted power measurement shall be the antenna connector. In case of Tx diversity the total transmitted power for each branch shall be measured.
Range/mapping	

5.2.4 Transmitted code power

Definition	Transmitted code power, is the transmitted power on one carrier, one scrambling code and one channelisation code. Measurement shall be possible on any channelisation code transmitted from the UTRAN access point. The reference point for the transmitted code power measurement shall be the antenna connector. In case of Tx diversity the transmitted code power for each branch shall be measured.
Range/mapping	

5.2.5 Transport channel BLER

Definition	Estimation of the transport channel block error rate (BLER). The BLER estimation shall be based on evaluating the CRC on each transport block. Measurement shall be possible to perform on any transport channel after RL combination in Node B. BLER estimation is only required for transport channels containing CRC.
Range/mapping	

5.2.6 Physical channel BER

Definition	The physical channel BER is an estimation of the average bit error rate (BER) before channel decoding of the DPDCH data after RL combination in Node B. It shall be possible to report a physical channel BER estimate at the end of each TTI for the transferred TrCh's, e.g. for TrCh's with a TTI of x ms a x ms averaged physical channel BER shall be possible to report every x ms.
Range/mapping	