TSG-RAN Working Group 1 ***TSGR1#11(00)0401***
San Diego, California, US
February 29 – March 3, 2000

Source	:	TSG RAN WG1
Title	:	Liaison statement on UTRAN BER measurement
To	:	TSG RAN WG2, WG3 & WG4

During its 11th meeting, RAN WG1 agreed on the principles in TSGR1#11(00)0215, "CR 25.215-037 Uplink transport channel BER", which updates the definitions for the UTRAN BER measurement. The CR is attached to this liaison.

Until now the reference point in the multiplexing chain for the BER measurement has not been defined clearly. The agreed CR defines the reference point and defines that there are two separate measurements:

- Transport channel BER, which is measured on DPDCH after RL combination. The measurement is done from the data considering only non-punctured bits at the input of the channel decoder in Node B. This measurement used to be called "Physical channel BER, type 1".
- Physical channel BER, which is measured on DPCCH after RL combination. This measurement used to be called "Physical channel BER, type 2".

The reason for the change into Transport channel BER, is to reduce the complexity of the BER measurement on DPDCH. In order to calculate raw BER estimate one needs to first decode the received bits, re-encode these bits and compare the re-encoded bits to the received bits. The further down one needs to go in the multiplexing chain to do this comparison the more complex the measurement becomes. Hence, it is easier to do measure the BER at the input of the channel decoder, after rate-matching, compared to do it on the raw channel bits before rate-matching. At the proposed new reference point, the measurement becomes transport channel dependent since rate matching may be different for different transport channels, hence the proposed name change.

RAN WG1 kindly asks RAN WG2, WG3 & WG4 to include this change into their relevant specifications.

Although no CR has been presented yet, a similar approach is expected for TDD.

TSG-RAN Working Group 1 meeting #11

TSGR1#10(00)0215

San Diego, USA

February 29 – March 3, 2000

Agenda item:

Source: Nokia

Title: CR 25215-037: Uplink transport channel BER

Document for: Decision

In 5.2.6 of TS 25.215 the Physical channel BER measured on data is defined as:

"Type 1:

Measured on the DPDCH:

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 is somewhat unclear what the reference point of the measurement is, i.e. where the point "before channel decoding" is located and how estimates are defined to be calculated. This CR defines an exact point for the BER measurement and states how BER is supposed to be calculated. Since it is measured at the channel decoding input it is actually called "Transport channel BER" in this context.

In [1] it is proposed that Physical channel BER would be measured just before rate matching processing, i.e. BER is measured over the CCTrCH. However, this scheme introduces quite a lot of complexity to BER measurement. In order to calculate raw BER estimate one needs to first decode the received bits, re-encode these bits and compare the re-encoded bits to the received bits. The further down one needs to go in the multiplexing chain to do this comparison the more complex the measurement becomes.

In this proposal, BER is only measured over non-punctured bits. Since punctured bits are replaced with zeros after rate matching stage they differ from other symbols in the decoder. Actually, the BER of punctured symbols would be 50% in practise. This kind of information is not seen to help RNC in operating OL PC.

Transport channel BER must be calculated for each TrCH so there are more than one BER estimate. However, since the reference point is just before channel decoding processing, comparing the received bits to re-encoded bits is simple.

Furthermore, the definition of Type 2 BER on DPCCH will be clarified. This is put into a separate section 5.2.7 of physical channel BER.

References:

[1] TSGR1#10(00)0043, "CR 25.215-026: Definition of physical channel BER", Ericsson.

3GPP TSG RAN WG1 Meeting #11
San Diego, USA, 29 Feb – 3 March 2000

***Document* R1-00-0215**
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	037	Current Version:	V3.1.0

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

For submission to:	TSG-RAN #7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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

Source: Nokia **Date:** Feb 14th, 2000

Subject: Definition of physical channel BER

Work item:

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

F	Correction	[X]	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:
TS25.215v310 does not define uniquely at which point the physical channel BER of Type 1 measurement on the DPDCH is measured and how a physical channel BER estimate is supposed to calculate. The CR will clarify the definition of BER for UTRAN by setting the exact point for measurement and, as a consequence of the point, rename Type 1 BER the tranport channel BER, denoted by TrCH BER. Also the fact that the tranport channel BER is required to measure for TrCH's with channel coding only is pointed out.

Furthermore, the definition of Type 2 BER on DPCCH will be clarified. This is put into a separate section 5.2.7.

Clauses affected: 5.2.6., 5.2.7.

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:

<--------- double-click here for help and instructions on how to create a CR.

Range/mapping	Transmitted carrier power is given with a resolution of 0.5 dB with the range [0, ..., 50] dBm Transmitted carrier power shall be reported in the unit UTRAN_TX_POWER where: UTRAN_TX_POWER _016: 0.0 dBm ≤ Transmitted carrier power < 0.5 dBm UTRAN_TX_POWER _017: 0.5 dBm ≤ Transmitted carrier power < 1.0 dBm UTRAN_TX_POWER _018: 1.0 dBm ≤ Transmitted carrier power < 1.5 dBm ... UTRAN_TX_POWER _114: 49.0 dBm ≤ Transmitted carrier power < 49.5 dBm UTRAN_TX_POWER _115: 49.5 dBm ≤ Transmitted carrier power < 50.0 dBm UTRAN_TX_POWER _116: 50.0 dBm ≤ Transmitted carrier power < 50.5 dBm

6.1.1. 5.2.4 Transmitted code power

Definition	Transmitted code power, is the transmitted power on one channelisation code on one given scrambling code on one given carrier. Measurement shall be possible on any DPCH transmitted from the UTRAN access point and shall reflect the power on the pilot bits of the DPCH. 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	Transmitted code power is given with a resolution of 0.5 dB with the range [-10, ..., 46] dBm. Transmitted code power shall be reported in the unit UTRAN_CODE_POWER where: UTRAN_CODE_POWER _010: -10.0 dBm ≤ Transmitted code power < -9.5 dBm UTRAN_CODE_POWER _011: -9.5 dBm ≤ Transmitted code power < -9.0 dBm UTRAN_CODE_POWER _012: -9.0 dBm ≤ Transmitted code power < -8.5 dBm ... UTRAN_CODE_POWER _120: 45.0 dBm ≤ Transmitted code power < 45.5 dBm UTRAN_CODE_POWER _121: 45.5 dBm ≤ Transmitted code power < 46.0 dBm UTRAN_CODE_POWER _122: 46.0 dBm ≤ Transmitted code power < 46.5 dBm

6.1.2. 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	The Transport channel BLER shall be reported for 0 ≤ Transport channel BLER ≤ 1 in the unit BLER_dB where: BLER_dB_00: Transport channel BLER = 0 BLER_dB_01: -∞ < Log10(Transport channel BLER) < -4.03 BLER_dB_02: -4.03 ≤ Log10(Transport channel BLER) < -3.965 BLER_dB_03: -3.965 ≤ Log10(Transport channel BLER) < -3.9 ... BLER_dB_61: -0.195 ≤ Log10(Transport channel BLER) < -0.13 BLER_dB_62: -0.13 ≤ Log10(Transport channel BLER) < -0.065 BLER_dB_63: -0.065 ≤ Log10(Transport channel BLER) ≤ 0

6.1.3. 5.2.6 Transport~~Physical~~ channel BER

Definition	~~Type 1:~~ ~~Measured on the DPDCH:~~ The ~~physical~~transport channel BER is an estimation of the average bit error rate (BER)) of RL-combined DPDCH data. The transport channel (TrCH) BER is measured from the data considering only non-punctured bits ~~before~~ at the input of the channel decoder~~ing of the DPDCH data after RL combination.~~ in Node B. It shall be possible to report an estimate of the transport channel BER for a TrCH after the end of each TTI of the TrCH. The reported TrCH BER shall be an estimate of the BER during the latest TTI for that TrCH. Transport channel BER is only required to be reported for TrCHs that are channel coded. ~~Type 2:~~ ~~Measured on the DPCCH:~~ ~~The Physical channel BER is an estimation of the average bit error rate (BER) on the DPCCH after RL combination in Node B.~~ ~~It shall be possible to report a physical channel BER estimate of type 1 or of type 2 or of both types 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	The Transport~~Physical~~ channel BER shall be reported for 0 ≤ Transport~~Physical~~ channel BER ≤ 1 in the unit BER_dB where: BER_LOG~~dB~~_00: Transport~~Physical~~ channel BER = 0 BER_LOG~~dB~~_01: -∞ < Log10(Transport~~Physical~~ channel BER) < -4.03 BER_LOG~~dB~~_02: -4.03 ≤ Log10(Transport~~Physical~~ channel BER) < -3.965 BER_LOG~~dB~~_03: -3.965 ≤ Log10(Transport~~Physical~~ channel BER) < -3.9 ... BER_LOG~~dB~~_61: -0.195 ≤ Log10(Transport~~Physical~~ channel BER) < -0.13 BER_LOG~~dB~~_62: -0.13 ≤ Log10(Transport~~Physical~~ channel BER) < -0.065 BER_LOG~~dB~~_63: -0.065 ≤ Log10(Transport~~Physical~~ channel BER) ≤ 0

6.1.4. 5.2.7 Physical channel BER

Definition	The Physical channel BER is an estimation of the average bit error rate (BER) on the DPCCH after RL combination in Node B. An estimate of the Physical channel BER shall be possible to be reported after the end of each TTI of any of the transferred TrCHs. The reported physical channel BER shall be an estimate of the BER during the latest TTI.
Range/mapping	The physical channel BER shall be reported for 0 ≤ Physical channel BER ≤ 1 in the unit BER dB where: BER_LOG_00: Physical channel BER = 0 BER_LOG_01: -∞ < Log10(Physical channel BER) < -4.03 BER_LOG_02: -4.03 ≤ Log10(Physical channel BER) < -3.965 BER_LOG_03: -3.965 ≤ Log10(Physical channel BER) < -3.9 ... BER_LOG_61: -0.195 ≤ Log10(Physical channel BER) < -0.13 BER_LOG_62: -0.13 ≤ Log10(Physical channel BER) < -0.065 BER_LOG_63: -0.065 ≤ Log10(Physical channel BER) ≤ 0

6.1.5. 5.2.~~8~~7 Round trip time

NOTE: The relation between this measurement and the TOA measurement defined by WG2 needs clarification.

Definition	Round trip time (RTT), is defined as RTT = T_{RX} – T_{TX}, where T_{TX} = The time of transmission of the beginning of a downlink DPCH frame to a UE. T_{RX} = The time of reception of the beginning (the first significant path) of the corresponding uplink DPCCH/DPDCH frame from the UE. Note: The definition of "first significant path" needs further elaboration. Measurement shall be possible on DPCH for each RL transmitted from an UTRAN access point and DPDCH/DPCCH for each RL received in the same UTRAN access point.
Range/mapping	The Round trip time is given with the resolution of 0.25 chip with the range [876, …, 2923.75] chips.

6.1.6. 5.2.9~~8~~ UTRAN GPS Timing of Cell Frames for LCS

Definition	The timing between cell j and GPS Time Of Week. $T_{UTRAN-GPSj}$ is defined as the time of occurrence of a specified UTRAN event according to GPS time. The specified UTRAN event is the beginning of a particular frame (identified through its SFN) in the first significant multipath of the cell j CPICH, where cell j is a cell within the active set.
Applicable for	Connected Intra, Connected Inter
Range/mapping	The resolution of $T_{UTRAN-GPSj}$ is 1μS. The range is from 0 to 6.04×10^{11} μS.