TSG-RAN Working Group 1 meeting #12
Seoul (Korea), April 10 ~ April 13, 2000

TSGR1#12(00)0555

Agenda Item	**:**	
Source	**:**	Samsung
Title	**:**	Measurements of RACH and CPCH
Document for	**:**	Discussion and approval

This contribution suggests three new measures, one is for the RACH, the others for the CPCH.

In the last meeting, the measurement procedure of the “Acknowledged Random Access (RA) tries value” is added in 25.433 for the RACH. However, there is no measure in 25.215. So, the new measure is needed in 25.215 for the consistency. This measure has the value of the RA tries that are acknowledged by the UTRAN.

Another measure is the “Access Attempts” for the CPCH. This measure has the value of the total access attempts per each access frame. Among the access attempts, there are two kinds of attempts to measure. One is the Access Preamble (AP), the other is the Collision Detection (CD) preamble. Since more than one UE can send the same AP, it is necessary to measure the number of the CD values to find out how many UE’s want to CPCH. This measure will be used to decide the persistency value. The persistency value is very useful to control the access attempts. Furthermore, this measure is helpful to control UL interference by choosing the appropriate persistency values.

The final measure for CPCH is the “Number of PCPCH assignments”. This measure is similar to “Acknowledged Random Access (RA) tries value” in RACH. It measures the total number of PCPCH assignments per each access frame. It will be used for knowing the how many UE’s are assigned to use CPCH. So, it will be used for the load control by controlling the persistency value, too.

3GPP RAN WG1 Meeting #11
Seoul, Korea, 10 April – 13 April 2000

Document R1-00-0555
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	054	Current Version:	3.2.0

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

For submission to:	TSG - RAN #8	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: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]

Source: Samsung **Date:** 10-APR-2000

Subject: Proposed CR for Measurements of RACH and CPCH

Work item:

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

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release	X		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:

Clauses affected: 6 of TS25.215

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.

5.1.12 Observed time difference to GSM cell

Definition	The Observed time difference to GSM cell is defined as: T_{RxGSMj} - T_{RxSFNi}, where: T_{RxSFNi} is the time at the beginning of the P-CCPCH frame with SFN=0 from cell i. T_{RxGSMj} is the time at the beginning of the GSM BCCH 51-multiframe from GSM frequency j received closest in time after the time T_{RxSFNi}. If the next GSM multiframe is received exactly at T_{RxSFNi} then T_{RxGSMj} =T_{RxSFNi} (which leads to T_{RxGSMj} - T_{RxSFNi} = 0). The timing measurement shall reflect the timing situation when the most recent (in time) P-CCPCH with SFN=0 was received in the UE. The beginning of the GSM BCCH 51-multiframe is defined as the beginning of the first tail bit of the frequency correction burst in the first TDMA-frame of the GSM BCCH 51-multiframe, i.e. the TDMA-frame following the IDLE-frame.
Applicable for	Idle, Connected Inter
Range/mapping	The Observed time difference to GSM cell is given with the resolution of 3060/(4096×13) ms with the range [0, …, 3060/13-3060/(4096×13)] ms. Observed time difference to GSM cell shall be reported in the unit GSM_TIME where: GSM_TIME_0000: 0 ms ≤ Observed time difference to GSM cell < 1×3060/(4096×13) ms GSM_TIME_0001: 1×3060/(4096×13) ms ≤ Observed time difference to GSM cell < 2×3060/(4096×13) ms GSM_TIME_0002: 2×3060/(4096×13) ms ≤ Observed time difference to GSM cell < 3×3060/(4096×13) ms ... GSM_TIME_4093: 4093×3060/(4096×13) ms ≤ Observed time difference to GSM cell < 4094×3060/(4096×13) ms GSM_TIME_4094: 4094×3060/(4096×13) ms ≤ Observed time difference to GSM cell < 4095×3060/(4096×13) ms GSM_TIME_4095: 4095×3060/(4096×13) ms ≤ Observed time difference to GSM cell < 3060/13 ms

5.1.13 UE GPS Timing of Cell Frames for LCS

Definition	The timing between cell j and GPS Time Of Week. $T_{UE\text{-}GPSj}$ 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 $T_{UE\text{-}GPSj}$ is 0.125 chips. The range is from 0 to 2319360000000 chips. $T_{UE\text{-}GPSj}$ shall be reported in the unit GPS_TIME where: GPS_TIME_00000000000000: 0 chip ≤ $T_{UE\text{-}GPSj}$ < 0.125 chip GPS_TIME_00000000000001: 0.125 chip ≤ $T_{UE\text{-}GPSj}$ < 0.250 chip GPS_TIME_00000000000002: 0.250 chip ≤ $T_{UE\text{-}GPSj}$ < 0.375 chip ... GPS_TIME_18554879999997: 2319359999999.625 chip ≤ $T_{UE\text{-}GPSj}$ < 2319359999999.750 chip GPS_TIME_18554879999998: 2319359999999.750 chip ≤ $T_{UE\text{-}GPSj}$ < 2319359999999.875 chip GPS_TIME_18554879999999: 2319359999999.875 chip ≤ $T_{UE\text{-}GPSj}$ < 2319360000000.000 chip

5.2 UTRAN measurement abilities

The structure of the table defining a UTRAN measurement quantity is shown below.

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	RSSI is given with a resolution of 0.1 dB with the range [-112, ..., -50] dBm. RSSI shall be reported in the unit RSSI_LEV where: RSSI_LEV _000: RSSI < -112.0 dBm RSSI_LEV _001: -112.0 dBm ≤ RSSI < -111.9 dBm RSSI_LEV _002: -111.9 dBm ≤ RSSI < -111.8 dBm ... RSSI_LEV _619: -50.2 dBm ≤ RSSI < -50.1 dBm RSSI_LEV _620: -50.1 dBm ≤ RSSI < -50.0 dBm RSSI_LEV _621: -50.0 dBm ≤ RSSI

5.2.2 SIR

Definition	Signal to Interference Ratio, is defined as: (RSCP/ISCP)×SF. 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. where: RSCP = Received Signal Code Power, the received power on one code. ISCP = Interference Signal Code Power, the interference on the received signal. Only the non-orthogonal part of the interference is included in the measurement. SF=The spreading factor used on the DPCCH.
Range/mapping	SIR is given with a resolution of 0.5 dB with the range [-11, ..., 20] dB. SIR shall be reported in the unit UTRAN_SIR where: UTRAN_SIR_00: SIR < –11.0 dB UTRAN_SIR_01: -11.0 dB ≤ SIR < –10.5 dB UTRAN_SIR_02: -10.5 dB ≤ SIR < –10.0 dB ... UTRAN_SIR_61: 19.0 dB ≤ SIR < 19.5 dB UTRAN_SIR_62: 19.5 dB ≤ SIR < 20.0 dB UTRAN_SIR_63: 20.0 dB ≤ SIR

5.2.3 Transmitted carrier power

Definition	Transmitted carrier power, is the ratio between the total transmitted power and the maximum transmission power. Total transmission power is the mean power [W] on one carrier from one UTRAN access point. Maximum transmission power is the mean power [W] on one carrier from one UTRAN access point when transmitting at the configured maximum power for the cell. Measurement shall be possible on any carrier transmitted from the UTRAN access point. The reference point for the transmitted carrier power measurement shall be the antenna connector. In case of Tx diversity the transmitted carrier power for each branch shall be measured.
Range/mapping	Transmitted carrier power is given with a resolution of 1 %-unit with the range [0, ..., 100] % Transmitted carrier power shall be reported in the unit UTRAN_TX_POWER where: UTRAN_TX_POWER _000: Transmitted carrier power = 0 % UTRAN_TX_POWER _001: 0 % < Transmitted carrier power ≤ 1 % UTRAN_TX_POWER _002: 1 % < Transmitted carrier power ≤ 2 % UTRAN_TX_POWER _003: 2 % < Transmitted carrier power ≤ 3 % ... UTRAN_TX_POWER _098: 97 % < Transmitted carrier power ≤ 98 % UTRAN_TX_POWER _099: 98 % < Transmitted carrier power ≤ 99 % UTRAN_TX_POWER _100: 99 % < Transmitted carrier power ≤ 100 %

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

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_LOG where: BLER_LOG_00: Transport channel BLER = 0 BLER_LOG_01: -∞ < Log10(Transport channel BLER) < -4.03 BLER_LOG_02: -4.03 ≤ Log10(Transport channel BLER) < -3.965 BLER_LOG_03: -3.965 ≤ Log10(Transport channel BLER) < -3.9 ... BLER_LOG_61: -0.195 ≤ Log10(Transport channel BLER) < -0.13 BLER_LOG_62: -0.13 ≤ Log10(Transport channel BLER) < -0.065 BLER_LOG_63: -0.065 ≤ Log10(Transport channel BLER) ≤ 0

5.2.6 Transport channel BER

Definition	The 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 at the input of the channel decoder 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.
Range/mapping	The Transport channel BER shall be reported for 0 ≤ Transport channel BER ≤ 1 in the unit TrCh_BER_LOG where: TrCh_BER_LOG_000: Transport channel BER = 0 TrCh_BER_LOG_001: -∞ < Log10(Transport channel BER) < -2.06375 TrCh_BER_LOG_002: -2.06375 ≤ Log10(Transport channel BER) < -2.055625 TrCh_BER_LOG_003: -2.055625 ≤ Log10(Transport channel BER) < -2.0475 ... TrCh_BER_LOG_253: -0.024375 ≤ Log10(Transport channel BER) < -0.01625 TrCh_BER_LOG_254: -0.01625 ≤ Log10(Transport channel BER) < -0.08125 TrCh_BER_LOG_255: -0.008125 ≤ Log10(Transport channel BER) ≤ 0

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 $0 \leq$ Physical channel BER ≤ 1 in the unit PhCh_BER_LOG where: PhCh_BER_LOG_000: Physical channel BER = 0 PhCh_BER_LOG_001: $-\infty <$ Log10(Physical channel BER) < -2.06375 PhCh_BER_LOG_002: -2.06375$\leq$ Log10(Physical channel BER) < -2.055625 PhCh_BER_LOG_003: -2.055625 $\leq$ Log10(Physical channel BER) < -2.0475 ... PhCh_BER_LOG_253: -0.024375 $\leq$ Log10(Physical channel BER) < -0.01625 PhCh_BER_LOG_254: -0.01625 $\leq$ Log10(Physical channel BER) < -0.008125 PhCh_BER_LOG_255: -0.008125 $\leq$ Log10(Physical channel BER) $\leq$ 0

5.2.8 Round trip time

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, …, 2923.50] chips. The Round trip time shall be reported in the unit RT_TIME where: RT_TIME_0000: Round trip time < 876.00 chip RT_TIME_0001: 876.00 chip $\leq$ Round trip time < 876.25 chip RT_TIME_0002: 876.25 chip $\leq$ Round trip time < 876.50 chip RT_TIME_0003: 876.50 chip $\leq$ Round trip time < 876.75 chip ... RT_TIME_8188: 2922.75 chip $\leq$ Round trip time < 2923.00 chip RT_TIME_8189: 2923.00 chip $\leq$ Round trip time < 2923.25 chip RT_TIME_8190: 2923.25 chip $\leq$ Round trip time < 2923.50 chip RT_TIME_8191: 2923.50 chip $\leq$ Round trip time

5.2.9 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 0.125 chips. The range is from 0 to 2319360000000 chips. $T_{UTRAN-GPSj}$ shall be reported in the unit GPS_TIME where: GPS_TIME_00000000000000: 0 chip $\leq T_{UTRAN-GPSj} <$ 0.125 chip GPS_TIME_00000000000001: 0.125 chip $\leq T_{UTRAN-GPSj} <$ 0.250 chip GPS_TIME_00000000000002: 0.250 chip $\leq T_{UTRAN-GPSj} <$ 0.375 chip ... GPS_TIME_18554879999997: 2319359999999.625 chip $\leq T_{UTRAN-GPSj} <$ 2319359999999.750 chip GPS_TIME_18554879999998: 2319359999999.750 chip $\leq T_{UTRAN-GPSj} <$ 2319359999999.875 chip GPS_TIME_18554879999999: 2319359999999.875 chip $\leq T_{UTRAN-GPSj} <$ 2319360000000.000 chip

5.2.10 Propagation delay

Definition	Propagation delay is defined as one-way propagation delay as measured during PRACH access: Propagation delay = (T_{RX} – T_{TX} – 2560)/2, where: T_{TX} = The time of AICH access slot (n-2-AICH transmission timing), where 0≤(n-2-AICH Transmission Timing)≤14 and AICH_Transmission_Timing can have values 0 or 1. T_{RX} = The time of reception of the beginning (the first significant path) of the PRACH message from the UE at PRACH access slot n. Note: The definition of "first significant path" needs further elaboration.
Range/mapping	The Propagation delay is given with the resolution of 3 chips with the range [0, …, 765] chips. The Propagation delay shall be reported in the unit PROP_DELAY where: PROP_DELAY_000: 0 chip ≤ Propagation delay < 3 chip PROP_DELAY_001: 3 chip ≤ Propagation delay < 6 chip PROP_DELAY_002: 6 chip ≤ Propagation delay < 9 chip ... PROP_DELAY_252: 756 chip ≤ Propagation delay < 759 chip PROP_DELAY_253: 759 chip ≤ Propagation delay < 762 chip PROP_DELAY_254: 762 chip ≤ Propagation delay < 765 chip PROP_DELAY_255: 765 chip ≤ Propagation delay

5.2.11 RACH Acknowledged RA tries Value

Definition	The RACH acknowledged RA tries value is defined as the total number of acknowledged RA tries per one access frame.
Range/mapping	The RACH acknowledged RA tries value is given with the resolution of one acknowledgement with the range [0, …, 240] acknowledgements. The RACH acknowledged RA tries value shall be reported in the unit RACH_ACK_VALUE where: RACH_ACK_VALUE_00: RACH acknowledged RA tries = 0 ACKs RACH_ACK_VALUE_01: RACH acknowledged RA tries = 1 ACKs RACH_ACK_VALUE_02: RACH acknowledged RA tries = 2 ACKs ... RACH_ACK_VALUE_237: RACH acknowledged RA tries = 237 ACKs RACH_ACK_VALUE_238: RACH acknowledged RA tries = 238 ACKs RACH_ACK_VALUE_239: RACH acknowledged RA tries = 239 ACKs RACH_ACK_VALUE_240: RACH acknowledged RA tries = 240 ACKs

5.2.12 CPCH Access Attempts

Definition	The CPCH access attempts is defined as the total number of received access preambles and collision detection preambles per one access slot frame.
Range/mapping	The CPCH access attempts is given with the resolution of one try with the range [0, …, 480] tries. The CPCH access attempts shall be reported in the unit CPCH_ACCESS_ATTEMPT where: CPCH_ACCESS_ATTEMPT_000: CPCH access attempt = 0 tries CPCH_ACCESS_ATTEMPT_001: CPCH access attempt = 1 tries CPCH_ACCESS_ATTEMPT_002: CPCH access attempt = 2 tries ... CPCH_ACCESS_ATTEMPT_477: CPCH access attempt = 477 tries CPCH_ACCESS_ATTEMPT_478: CPCH access attempt = 478 tries CPCH_ACCESS_ATTEMPT_479: CPCH access attempt = 479 tries CPCH_ACCESS_ATTEMPT_480: CPCH access attempt = 480 tries

5.2.13 Number of PCPCH assignments

Definition	The Number of PCPCH assignments is defined as the total number of PCPCH assignments per one access frame.
Range/mapping	The Number of PCPCH assignments is given with the resolution of one assignment with the range [0, …, 15] assignments. The Number of PCPCH assignments shall be reported in the unit PCPCH_ASSIGN where: PCPCH_ASSIGN_00: Number of PCPCH assignments = 0 assignments PCPCH_ASSIGN_01: Number of PCPCH assignments = 1 assignments PCPCH_ASSIGN_02: Number of PCPCH assignments = 2 assignments … PCPCH_ASSIGN_12: Number of PCPCH assignments = 12 assignments PCPCH_ASSIGN_13: Number of PCPCH assignments = 13 assignments PCPCH_ASSIGN_14: Number of PCPCH assignments = 14 assignments PCPCH_ASSIGN_15: Number of PCPCH assignments = 15 assignments