TSG-RAN Working Group 1 meeting #10
Beijing, China
January 18 – January 21, 2000

TSGR1#10(00)0047

Agenda item: AH 16

Source: Ericsson

Title: CR 25.215-030: Mapping of timing measurements

Document for: Decision

For the timing measurements in TS 25.215 no detailed mapping of the range is currently given. This CR proposes detailed mapping to bits of the defined ranges for all timing related measurements in TS 25.215.

Note that for the Round trip time measurement the upper limit has been reduced with 0.25 chip to fit the mapping to 8192 unique values, e.g. using 13 bits.

For the GPS related measurements, section 5.1.15 and 5.2.8, in the “Range/mapping” row the capital “S” has been changed to a lower case “s” to indicate the unit seconds.

3GPP TSG RAN WG1 Meeting #10
Beijing, China, Jan 18 –Jan 21, 1999

Document ??00???
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	030	Current Version:	3.1.0

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

Source: Ericsson **Date:** 1999-12-20

Subject: Mapping of timing measurements

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: For the timing measurements in TS 25.215 no detailed mapping of the range is given. This CR proposes detailed mapping to bits of the defined ranges for all timing related measurements in TS 25.215. For the round trip time measurement, the range of the mapping is reduced with 0.25 chip to fit into a 13 bit representation of the values. For the GPS related measurements, section 5.1.15 and 5.2.8, in the “Range/mapping” row the capital “S” has been changed to a lower case “s” to indicate the unit seconds.

Clauses affected: 5.1.11 CFN-SFN observed time difference, 5.1.12 SFN-SFN observed time difference, 5.1.13 UE Rx-Tx time difference, 5.1.14 Observed time difference to GSM cell, 5.1.15 UE GPS Timing of Cell Frames for LCS, 5.2.7 Round trip time, 5.2.8 UTRAN GPS Timing of Cell Frames for LCS

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:

help.doc

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

5.1.11 CFN-SFN observed time difference

Definition	The CFN-SFN observed time difference to cell is defined as: OFF×38400+ T_m, where: T_m= T_{RxSFN} - (T_{UETx}-T_0), given in chip units with the range [0, 1, …, 38399] chips T_{UETx} is the time when the UE transmits an uplink DPCCH/DPDCH frame. T_0 is defined in TS 25.211 section 7.1.3. T_{RxSFN} is time at the beginning of the next received neighbouring P-CCPCH frame after the time instant T_{UETx}-T_0in the UE. If the next neighbouring P-CCPCH frame is received exactly at T_{UETx}-T_0 then T_{RxSFN}=T_{UETx}-T_0 (which leads to T_m=0). and OFF=(CFN_{Tx}-SFN) mod 256, given in number of frames with the range [0, 1, …, 255] frames CFN_{Tx} is the connection frame number for the UE transmission of an uplink DPCCH/DPDCH frame at the time T_{UETx}. SFN = the system frame number for the neighbouring P-CCPCH frame received in the UE at the time T_{RxSFN}. In case the inter-frequency measurement is done with compressed mode, the value for the parameter OFF is always reported to be 0. In case that the SFN measurement indicator indicates that the UE does not need to read cell SFN of the target neighbour cell, the value of the parameter OFF is always be set to 0. *Note: In Compressed mode it is not required to read cell SFN of the target neighbour cell.*
Applicable for	Connected Inter, Connected Intra
Range/mapping	Time difference is given with the resolution of one chip with the range [0, …, 9830399] chips. Time difference shall be reported in the unit SFN-CFN_TIME where: SFN-CFN_TIME_0000000: 0 chip ≤ Time difference < 1 chip SFN-CFN_TIME_0000001: 1 chip ≤ Time difference < 2 chip SFN-CFN_TIME_0000002: 2 chip ≤ Time difference < 3 chip … SFN-CFN_TIME_9830397: 9830397 chip ≤ Time difference < 9830398 chip SFN-CFN_TIME_9830398: 9830398 chip ≤ Time difference < 9830399 chip SFN-CFN_TIME_9830399: 9830399 chip ≤ Time difference < 9830400 chip

5.1.12 SFN-SFN observed time difference

Definition	**Type 1:** The SFN-SFN observed time difference to cell is defined as: OFF×38400+ T_m, where: T_m= T_{RxSFNi} - T_{RxSFNj}, given in chip units with the range [0, 1, …, 38399] chips T_{RxSFNj} is the time at the beginning of a received neighbouring P-CCPCH frame from cell j. T_{RxSFNi} is time at the beginning of the next received neighbouring P-CCPCH frame from cell i after the time instant T_{RxSFNj} in the UE. If the next neighbouring P-CCPCH frame is received exactly at T_{RxSFNj} then T_{RxSFNj}= T_{RxSFNi} (which leads to T_m=0). and OFF=(SFN_j- SFN_i) mod 256, given in number of frames with the range [0, 1, …, 255] frames SFN_j = the system frame number for downlink P-CCPCH frame from cell j in the UE at the time T_{RxSFNj}. SFN_i = the system frame number for the P-CCPCH frame from cell i received in the UE at the time T_{RxSFNi}. **Type 2:** The relative timing difference between cell j and cell i, defined as $T_{CPICHRxj}$ - $T_{CPICHRxi}$, where: $T_{CPICHRxj}$ is the time when the UE receives one Primary CPICH slot from cell j $T_{CPICHRxi}$ is the time when the UE receives the Primary CPICH slot from cell i that is closest in time to the Primary CPICH slot received from cell j
Applicable for	**Type 1:** Idle, Connected Intra **Type 2:** Idle, Connected Intra, Connected Inter
Range/mapping	**Type 1:** Time difference is given with a resolution of one chip with the range [0, …, 9830399] chips. Time difference shall be reported in the unit T1_SFN-SFN_TIME where: T1_SFN-SFN_TIME_0000000: 0 chip ≤ Time difference < 1 chip T1_SFN-SFN_TIME_0000001: 1 chip ≤ Time difference < 2 chip T1_SFN-SFN_TIME_0000002: 2 chip ≤ Time difference < 3 chip … T1_SFN-SFN_TIME_9830397: 9830397 chip ≤ Time difference < 9830398 chip T1_SFN-SFN_TIME_9830398: 9830398 chip ≤ Time difference < 9830399 chip T1_SFN-SFN_TIME_9830399: 9830399 chip ≤ Time difference < 9830400 chip **Type 2:** Time difference is given with a resolution of 0.25 chip with the range [-1279.75, …, 1280] chips. Time difference shall be reported in the unit T2_SFN-SFN_TIME where: T2_SFN-SFN_TIME_00000: -1279.75 chip < Time difference ≤ -1279.50 chip T2_SFN-SFN_TIME_00001: -1279.50 chip < Time difference ≤ -1279.25 chip T2_SFN-SFN_TIME_00002: -1279.25 chip < Time difference ≤ -1279.00 chip … T2_SFN-SFN_TIME_10236: 1279.25 chip < Time difference ≤ 1279.50 chip T2_SFN-SFN_TIME_10237: 1279.50 chip < Time difference ≤ 1279.75 chip T2_SFN-SFN_TIME_10238: 1279.75 chip < Time difference ≤ 1280.00 chip

5.1.13 UE Rx-Tx time difference

Definition	The difference in time between the UE uplink DPCCH/DPDCH frame transmission and the first significant path, of the downlink DPCH frame from the measured radio link. Measurement shall be made for each cell included in the active set. Note: The definition of "first significant path" needs further elaboration.
Applicable for	Connected Intra
Range/mapping	The UE Rx-Tx time difference is given with the resolution of 0.25 chip with the range [876, …, 1172] chips. The UE Rx-Tx Time difference shall be reported in the unit RX-TX_TIME where: RX-TX_TIME_0000: UE Rx-Tx Time difference < 876.00 chip RX-TX_TIME_0001: 876.00 chip ≤ UE Rx-Tx Time difference < 876.25 chip RX-TX_TIME_0002: 876.25 chip ≤ UE Rx-Tx Time difference < 876.50 chip RX-TX_TIME_0003: 876.50 chip ≤ UE Rx-Tx Time difference < 876.75 chip … RX-TX_TIME_1582: 1271.25 chip ≤ UE Rx-Tx Time difference < 1271.50 chip RX-TX_TIME_1583: 1271.50 chip ≤ UE Rx-Tx Time difference < 1271.75 chip RX-TX_TIME_1584: 1271.75 chip ≤ UE Rx-Tx Time difference < 1272.00 chip RX-TX_TIME_1585: 1272.00 chip ≤ UE Rx-Tx Time difference

5.1.14 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.
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

5.1.15 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 1μs. The range is from 0 to 6.04×10^{11} μs. $T_{UE\text{-}GPSj}$ shall be reported in the unit GPS_TIME where: GPS_TIME_000000000000: 0 μs ≤ $T_{UE\text{-}GPSj}$ < 1 μs GPS_TIME_000000000001: 1 μs ≤ $T_{UE\text{-}GPSj}$ < 2 μs GPS_TIME_000000000002: 2 μs ≤ $T_{UE\text{-}GPSj}$ < 3 μs … GPS_TIME_603999999997: 603999999997 μs ≤ $T_{UE\text{-}GPSj}$ < 603999999998 μs GPS_TIME_603999999998: 603999999998 μs ≤ $T_{UE\text{-}GPSj}$ < 603999999999 μs GPS_TIME_603999999999: 603999999999 μs ≤ $T_{UE\text{-}GPSj}$ < 604000000000 μs

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 0.5 dB with the range [-105, ..., -74] dBm. RSSI shall be reported in the unit RSSI_LEV where: RSSI_LEV _00: RSSI < –105.0 dBm RSSI_LEV _01: -105.0 dBm ≤ RSSI < –104.5 dBm RSSI_LEV _02: -104.5 dBm ≤ RSSI < –104.0 dBm ... RSSI_LEV _61: -73.0 dBm ≤ RSSI < -73.5 dBm RSSI_LEV _62: -73.5 dBm ≤ RSSI < -74.0 dBm RSSI_LEV _63: -74.0 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 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	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

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_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

5.2.6 Physical channel BER

Definition	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. 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 Physical channel BER shall be reported for 0 ≤ Physical channel BER ≤ 1 in the unit BER_dB where: BER_dB_00: Physical channel BER = 0 BER_dB_01: -∞ < Log10(Physical channel BER) < -4.03 BER_dB_02: -4.03 ≤ Log10(Physical channel BER) < -3.965 BER_dB_03: -3.965 ≤ Log10(Physical channel BER) < -3.9 ... BER_dB_61: -0.195 ≤ Log10(Physical channel BER) < -0.13 BER_dB_62: -0.13 ≤ Log10(Physical channel BER) < -0.065 BER_dB_63: -0.065 ≤ Log10(Physical channel BER) ≤ 0

5.2.7 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, …, 2923.5075] 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 ≤ Round trip time < 876.25 chip RT_TIME_0002: 876.25 chip ≤ Round trip time < 876.50 chip RT_TIME_0003: 876.50 chip ≤ Round trip time < 876.75 chip ... RT_TIME_8188: 2922.75 chip ≤ Round trip time < 2923.00 chip RT_TIME_8189: 2923.00 chip ≤ Round trip time < 2923.25 chip RT_TIME_8190: 2923.25 chip ≤ Round trip time < 2923.50 chip RT_TIME_8191: 2923.50 chip ≤ Round trip time

5.2.8 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~~S~~. The range is from 0 to 6.04×10^{11} µs~~S~~. $T_{UTRAN-GPSj}$ shall be reported in the unit GPS_TIME where: GPS_TIME_000000000000: 0 µs ≤ $T_{UTRAN-GPSj}$ < 1 µs GPS_TIME_000000000001: 1 µs ≤ $T_{UTRAN-GPSj}$ < 2 µs GPS_TIME_000000000002: 2 µs ≤ $T_{UTRAN-GPSj}$ < 3 µs ... GPS_TIME_603999999997: 603999999997 µs ≤ $T_{UTRAN-GPSj}$ < 603999999998 µs GPS_TIME_603999999998: 603999999998 µs ≤ $T_{UTRAN-GPSj}$ < 603999999999 µs GPS_TIME_603999999999: 603999999999 µs ≤ $T_{UTRAN-GPSj}$ < 604000000000 µs