TSG RAN WG1
San Diego, USA, 29 Feb – 3 Mar, 2000

TSG R1(00)0324

Source: Lucent Technologies

Title: CR 25.215-044: Correction to UE/UTRAN GPS timing of cell frames for LCS

Document for: Approval

1. Introduction

TS 25.215 specifies the required inter-system timing measurements [1] (UE/UTRAN-GPS) for the network assisted GPS LCS method, as approved at TSG RAN#6.

CR 25.215-044 is presented to propose a change in the measurement resolution, from 1μs to 0.25 chip, for the following reasons:

- Accurate measurement of UE/UTRAN GPS timing of cell frames for LCS is essential for high performance of the network assisted GPS method, described in Chapter 4 of TS25.305 (ie. in order to ensure compliance to LCS accuracy requirements as stated in UMTS 22.05). The information, stored and updated from time to time at a location server, can be used by UEs for very efficient GPS signal detection using a narrow search window around the GPS code offset and carrier frequency Doppler correction sent to the UE.
- The resolution of ±0.125 chip period does not require significant additional complexity in the UE or UTRAN.

The range (0 to 6.04×10^{11} μs) does not need to be modified; therefore the proposed change results in a 4 bits increase only on the total number of bits needed for parameter communication.

2. References

[1] Tdoc R1-99L09: "CR 25.215-010R2"; RAN WG1 #9; 30 Nov – 3 Dec 1999.

3GPP/SMG Meeting WG1#11
San Diego, USA, 29 Feb – 3 Mar 2000

Document R1-00-0324
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**	**044**	Current Version:	V 3.1.1

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

For submission to: 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: Lucent Technologies **Date:** 29 Feb 2000

Subject: Correction to sections: 5.1.15 UE GPS Timing of Cell Frames for LCS; 5.2.8 UTRAN GPS Timing of Cell Frames for LCS

Work item: TS 25.215

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: Correction of UE/UTRAN measurement parameters to support assisted GPS LCS method to required accuracy. The requirement to measure these parameters has been defined by RAN WG2 in LS R299J47.

Clauses affected: 5.1.15; 5.2.8

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.

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. **Type 2:** Time difference is given with a resolution of 0.25 chip with the range [-1279.75, …, 1280] chips.

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.

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.

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~~0.25 chips. The range is from 0 to 6.04×10^{11} μS.

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, …, 2923.75] chips.

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~~0.25 chips. The range is from 0 to $6.04×10^{11}$ μS.