

Agenda item: AH99
Source: Ericsson
Title: CR 25.211-075, CR 25.215-071: Clarification of first significant path
Document for: Decision

Introduction

In 25.215 the term “first significant path” is used in the definition of several timing measurements, both for the UE and UTRAN. Together with the term there is also a note saying that: “The definition of “first significant path” needs further elaboration”. The same term is also used in 25.211, defining the UE uplink/downlink timing. This document tries to clarify the definition of “first significant path” so that the note can be removed from the R-99 specification.

The intention with the term “first significant path” is to define the signal with the shortest propagation time from the base station to the UE, that also is detectable by the UE. As the term is written today it is not clear what is the meaning of “first significant path” as it could also be interpreted as “strongest path”.

Therefore it is proposed to clarify the wording to be: “first detected path (in time)”

The term “first significant path” is used in 25.211 section 7.6.3 Uplink/downlink timing at the UE to define the reference time instant for the uplink DPCCH/DPDCH frame transmission. As it will be implementation dependent which exact path that will be the “first significant path”, it is difficult to have a strict definition of the term in the specification. However the UE uplink/downlink timing is verified in the WG4 specification 25.133 v3.2.0 section 7.1 UE Transmit Timing. It is therefore proposed to implicitly define the term by referring to the test case in 25.133 in the same way that is done for the synchronisation primitives in 25.214 3.3.0 section 4.3.1 Synchronisation primitives, i.e. the first detected path (in time) is defined implicitly by the relevant tests in 25.133.

In 25.215, the term “first significant path” is used for both UE and UTRAN timing measurements. For the UE measurements “UE Rx-Tx time difference” and “UE GPS Timing of Cell Frames for LCS”, a similar change is proposed as for 25.211.

For the UTRAN measurements “Round trip time”, “UTRAN GPS Timing of Cell Frames for GPS” and “PRACH/PCPCH Propagation delay”, it is proposed to use the same term “first detected path (in time)” as for the UE measurements and to remove the note in 25.215.

Proposal

The attached CR's for 25.211 and 25.215 contains the above proposed changes.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] 3G TS 25.201: "Physical layer - general description".
- [2] 3G TS 25.211: "Physical channels and mapping of transport channels onto physical channels (FDD)".
- [3] 3G TS 25.212: "Multiplexing and channel coding (FDD)".
- [4] 3G TS 25.213: "Spreading and modulation (FDD)".
- [5] 3G TS 25.214: "Physical layer procedures (FDD)".
- [6] 3G TS 25.221: "Transport channels and physical channels (TDD)".
- [7] 3G TS 25.222: "Multiplexing and channel coding (TDD)".
- [8] 3G TS 25.223: "Spreading and modulation (TDD)".
- [9] 3G TS 25.224: "Physical layer procedures (TDD)".
- [10] 3G TS 25.231: "Measurements".
- [11] 3G TS 25.301: "Radio Interface Protocol Architecture".
- [12] 3G TS 25.302: "Services Provided by the Physical Layer".
- [13] 3G TS 25.401: "UTRAN Overall Description".
- [14] [3G TS 25.133: "Requirements for Support of Radio Resource Management \(FDD\)".](#)

7.6 DPCCH/DPDCH timing relations

7.6.1 Uplink

In uplink the DPCCH and all the DPDCHs transmitted from one UE have the same frame timing.

7.6.2 Downlink

In downlink, the DPCCH and all the DPDCHs carrying CCTrCHs of dedicated type to one UE have the same frame timing.

7.6.3 Uplink/downlink timing at UE

At the UE, the uplink DPCCH/DPDCH frame transmission takes place approximately T_0 chips after the reception of the first ~~significant~~ detected path (in time) of the corresponding downlink DPCCH/DPDCH frame. T_0 is a constant defined to be 1024 chips. The first detected path (in time) is defined implicitly by the relevant tests in [14]. More information about the uplink/downlink timing relation and meaning of T_0 can be found in [5].

<h2 style="margin: 0;">CHANGE REQUEST</h2>		Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.
25.215	CR	071
GSM (AA.BB) or 3G (AA.BBB) specification number ↑		↑ CR number as allocated by MCC support team
For submission to: TSG-RAN #9 <i>list expected approval meeting # here ↑</i>		Current Version: 3.3.0
for approval <input checked="" type="checkbox"/>		strategic <input type="checkbox"/>
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		(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: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: Ericsson **Date:** 2000-08-14

Subject: Clarification of first significant path

Work item: _____

Category:	F Correction <input checked="" type="checkbox"/> A Corresponds to a correction in an earlier release <input type="checkbox"/> B Addition of feature <input type="checkbox"/> C Functional modification of feature <input type="checkbox"/> D Editorial modification <input type="checkbox"/>	Release:	Phase 2 <input type="checkbox"/> Release 96 <input type="checkbox"/> Release 97 <input type="checkbox"/> Release 98 <input type="checkbox"/> Release 99 <input checked="" type="checkbox"/> Release 00 <input type="checkbox"/>
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(only one category shall be marked with an X)

Reason for change: In 25.215 the term "first significant path" is used in the definition of several timing measurements, both for the UE and UTRAN. Together with the term there is also a note saying that: "The definition of "first significant path" needs further elaboration". The same term is also used in 25.211, defining the UE uplink/downlink timing. This CR clarifies the definition of "first significant path" so that the note can be removed from the R-99 specification.

Clauses affected: 5.1.11, 5.1.13, 5.2.7, 5.2.8, 5.2.9

Other specs affected:	Other 3G core specifications <input type="checkbox"/> Other GSM core specifications <input type="checkbox"/> MS test specifications <input type="checkbox"/> BSS test specifications <input type="checkbox"/> O&M specifications <input type="checkbox"/>	→ List of CRs: → List of CRs: → List of CRs: → List of CRs: → List of CRs:	
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Other comments: _____



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5.1.11 UE Rx-Tx time difference

Definition	The difference in time between the UE uplink DPCCH/DPDCH frame transmission and the first significant detected path (in time) , 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

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

5.1.13 UE GPS Timing of Cell Frames for LCS

Definition	The timing between cell j and GPS Time Of Week. $T_{UE-GPSj}$ 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 detected path (in time) significant multipath of the cell j CPICH, where cell j is a cell within the active set.
Applicable for	Connected Intra, Connected Inter

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.

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.
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5.2.2 SIR

Definition	<p>Signal to Interference Ratio, is defined as: $(RSCP/ISCP) \times SF$. Measurement shall be performed on the DPCCH after RL combination in Node B. In compressed mode the SIR shall not be measured in the transmission gap. The reference point for the SIR measurements shall be the antenna connector.</p> <p>where:</p> <p>RSCP = Received Signal Code Power, the received power on one code.</p> <p>ISCP = Interference Signal Code Power, the interference on the received signal. Only the non-orthogonal part of the interference is included in the measurement.</p> <p>SF=The spreading factor used on the DPCCH.</p>
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5.2.3 Transmitted carrier power

Definition	<p>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.</p>
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5.2.4 Transmitted code power

Definition	<p>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 the DPCCH-field of any dedicated radio link transmitted from the UTRAN access point and shall reflect the power on the pilot bits of the DPCCH-field. When measuring the transmitted code power in compressed mode all slots shall be included in the measurement, e.g. also the slots in the transmission gap shall be included in the measurement. 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 and summed together in [W].</p>
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5.2.5 Transport channel BER

Definition	<p>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.</p>
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5.2.6 Physical channel BER

Definition	<p>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 averaged over the latest TTI of the respective TrCH.</p>
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5.2.7 Round trip time

Definition	<p>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 DPCCH frame to a UE. T_{RX} = The time of reception of the beginning (the first <u>detected significant path, in time</u>) 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 DPCCH for each RL transmitted from an UTRAN access point and DPDCH/DPCCH for each RL received in the same UTRAN access point.</p>
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5.2.8 UTRAN GPS Timing of Cell Frames for LCS

Definition	<p>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 <u>detected significant multipath (in time)</u> of the cell j CPICH, where cell j is a cell within the active set.</p>
Applicable for	Connected Intra, Connected Inter

5.2.9 PRACH/PCPCH Propagation delay

Definition	<p>Propagation delay is defined as one-way propagation delay as measured during either PRACH or PCPCH access:</p> <p><u>PRACH</u> :</p> <p>Propagation delay = $(T_{RX} - T_{TX} - 2560)/2$, where: T_{TX} = The transmission time of AICH access slot (n-2-AICH transmission timing), where $0 \leq (n-2-AICH \text{ Transmission Timing}) \leq 14$ and AICH_Transmission_Timing can have values 0 or 1. T_{RX} = The time of reception of the beginning (the first <u>detected significant path, in time</u>) of the PRACH message from the UE at PRACH access slot n. Note: The definition of "first significant path" needs further elaboration.</p> <p><u>PCPCH</u>:</p> <p>Propagation delay = $(T_{RX} - T_{TX} - (L_{pc-preamble} + 1) * 2560 - (k-1) * 38400)/2$, where T_{TX} = The transmission time of CD-ICH at access slot (n-2-T_{cpch}), where $0 \leq (n-2-T_{cpch}) \leq 14$ and T_{cpch} can have values 0 or 1. T_{RX} = The time of reception of the first chip (the first <u>detected significant path, in time</u>) of the kth frame of the PCPCH message from the UE, where $k \in \{1, 2, \dots, N_Max_frames\}$. N_max_frames is a higher layer parameter and defines the maximum length of the PCPCH message. The PCPCH message begins at uplink access slot $(n + L_{pc-preamble}/2)$, where $0 \leq (n + L_{pc-preamble}/2) \leq 14$ and where $L_{pc-preamble}$ can have values 0 or 8. Note: The definition of "first significant path" needs further elaboration.</p>
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