**3GPP TSG-RAN WG1 Meeting 102-eR1-200xxxx**

**e-Meeting, August 17th – 28th, 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.215** | **CR** | **DRAFT** | **rev** | **-** | **Current version:** | **16.2.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Corrections to NR positioning measurement definitions | | | | | | | | | |
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| ***Source to WG:*** | Intel Corporation | | | | | | | | | |
| ***Source to TSG:*** | R1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos-Core | | | | |  | ***Date:*** | | | 2020-08-31 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | 1. RTOA Reference Time is not defined, and RTOA measurement can also be performed using Rel-15 SRS.  2. The term "Positioning Node" is undefined in 3GPP specifications. | | | | | | | | |
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| ***Summary of change:*** | | 1. Added UL RTOA reference time definition  2. Replaced “positioning node” with “transmission point (TP)”, reception point “RP” and “transmission and reception point (TRP)”, where applicable. | | | | | | | | |
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| ***Consequences if not approved:*** | | 1. RTOA Reference Time is undefined.  2. Terminology used in RAN1 and RAN2 specifications are not aligned. | | | | | | | | |
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| ***Clauses affected:*** | | 2, 5.1.29, 5.1.30, 5.2.2, 5.2.3 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

# 1 Scope

The present document describes the physical layer measurements for NR.

# 2 References

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

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"

[2] 3GPP TS 38.201: "NR; Physical Layer – General Description"

[3] 3GPP TS 38.211: "NR; Physical channels and modulation"

[4] 3GPP TS 38.212: "NR; Multiplexing and channel coding"

[5] 3GPP TS 38.213: "NR; Physical layer procedures for control channels"

[6] 3GPP TS 38.214: "NR; Physical layer procedures for data channels"

[7] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification"

[8] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification"

[9] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception"

[10] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification"

[11] IEEE 802.11, Part 11: "Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications, IEEE Std."

[12] 3GPP TS 38.133: "NR; Requirements for support of radio resource management"

[13] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation"

[14] 3GPP TS 38.509: "5GS; Special conformance testing functions for User Equipment (UE)"

[15] 3GPP TS 38.901: "Study on channel model for frequencies from 0.5 to 100 GHz"

[16] 3GPP TS 38.455: "NR Positioning Protocol A (NRPPa)"

[17] 3GPP TS 37.213: "Physical layer procedures for shared spectrum channel access"

[18] 3GPP TS 38.305: "NG Radio Access Network (NG-RAN); Stage 2 functional specification of User Equipment (UE) positioning in NG-RAN"

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### 5.1.29 DL reference signal time difference (DL RSTD)

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| **Definition** | DL reference signal time difference (DL RSTD) is the DL relative timing difference between the Transmission Point (TP) [18] *j* and the reference TP *i*, defined as TSubframeRxj – TSubframeRxi,  Where:  TSubframeRxj is the time when the UE receives the start of one subframe from TP *j*.  TSubframeRxi is the time when the UE receives the corresponding start of one subframe from TP *i* that is closest in time to the subframe received from TP *j*.  Multiple DL PRS resources can be used to determine the start of one subframe from a TP.  For frequency range 1, the reference point for the DL RSTD shall be the antenna connector of the UE. For frequency range 2, the reference point for the DL RSTD shall be the antenna of the UE. |
| **Applicable for** | RRC\_CONNECTED |

### 5.1.30 UE Rx – Tx time difference

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| **Definition** | The UE Rx – Tx time difference is defined as TUE-RX –TUE-TX  Where:  TUE-RX is the UE received timing of downlink subframe #*i* from a Transmission Point (TP) [18], defined by the first detected path in time.  TUE-TX is the UE transmit timing of uplink subframe #*j* that is closest in time to the subframe #i received from the TP.  Multiple DL PRS resources can be used to determine the start of one subframe of the first arrival path of the TP.  For frequency range 1, the reference point for TUE-RX measurement shall be the Rx antenna connector of the UE and the reference point for TUE-TX measurement shall be the Tx antenna connector of the UE. For frequency range 2, the reference point for TUE‑RX measurement shall be the Rx antenna of the UE and the reference point for TUE‑TX measurement shall be the Tx antenna of the UE. |
| **Applicable for** | RRC\_CONNECTED |

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### 5.2.2 UL Relative Time of Arrival (TUL-RTOA)

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| **Definition** | The UL Relative Time of Arrival (TUL-RTOA) is the beginning of subframe *i* containing SRS received in Reception Point (RP) [18] *j*, relative to the RTOA Reference Time [16].  The UL RTOA reference time is defined as , where  - is the nominal beginning time of SFN 0 provided by SFN Initialization Time [15, TS 38.455]  - , where and are the system frame number and the subframe number of the SRS, respectively.  Multiple SRS resources can be used to determine the beginning of one subframe containing SRS received at a RP.  The reference point for TUL-RTOA shall be:  - for type 1-C base station TS 38.104 [9]: the Rx antenna connector,  - for type 1-O or 2-O base station TS 38.104 [9]: the Rx antenna (i.e. the centre location of the radiating region of the Rx antenna),  - for type 1-H base station TS 38.104 [9]: the Rx Transceiver Array Boundary connector. |

### 5.2.3 gNB Rx – Tx time difference

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| **Definition** | The gNB Rx – Tx time difference is defined as TgNB-RX –TgNB-TX  Where:  TgNB-RX is the Transmission and Reception Point (TRP) [18] received timing of uplink subframe #*i* containing SRS associated with UE, defined by the first detected path in time.  TgNB-TX is the TRP transmit timing of downlink subframe #*j* that is closest in time to the subframe #*i* received from the UE.  Multiple SRS resources for positioning can be used to determine the start of one subframe containing SRS.  The reference point for TgNB-RX shall be:  - for type 1-C base station TS 38.104 [9]: the Rx antenna connector,  - for type 1-O or 2-O base station TS 38.104 [9]: the Rx antenna (i.e. the centre location of the radiating region of the Rx antenna),  - for type 1-H base station TS 38.104 [9]: the Rx Transceiver Array Boundary connector.  The reference point for TgNB-TX shall be:  - for type 1-C base station TS 38.104 [9]: the Tx antenna connector,  - for type 1-O or 2-O base station TS 38.104 [9]: the Tx antenna (i.e. the centre location of the radiating region of the Tx antenna),  - for type 1-H base station TS 38.104 [9]: the Tx Transceiver Array Boundary connector. |