**3GPP TSG-RAN WG4 Meeting #111 R4-2407519**

**Fukuoka City, Fukuoka, Japan, 20th – 24th May, 2024**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | (Set 1-4 & 10-2) Draft CR for SL PRS configuration and SL Rx-Tx measurement delay TC in FR1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | CATT | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh2-Perf | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The requirements for SL Rx-Tx measurement delay are defined and the corresponding test cases need to be introduced. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce the SL PRS configuration and the test case for SL Rx-Tx measurement delay requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The test case for SL Rx-Tx measurement delay requirements is missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | New A.3.X, A.9A.1.1.X | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

# <Start of Change 1>

## A.3.X NR Sidelink Measurements for Positioning

### A.3.X.1 Introduction

This clause defines the principles and the reference configurations that are applicable to test cases verifying RRM requirements for NR sidelink measurements for positioning.

### A.3.X.2 NR SL-PRS configurations

### A.3.X.2.1 NR SL-PRS configurations for FR1

Table A.3.X.2.1-1: SL PRS.1 FR1: SL-PRS configuration

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SL PRS Parameters | Values | | | |
| Reference channel | SL PRS.1.1 FR1 | SL PRS.1.2 FR1 | SL PRS.1.3 FR1 | SL PRS.1.4 FR1 |
| SCS | 15kHz, 30kHz | | | |
| SL-PRS comb size | 2 | | 4 | |
| Number of SL-PRS symbols | 4 | | 4 | |
| SL-PRS comb offset Note 1 | [1] | | [1] | |
| SL-PRS resource slot offset (slot) Note 1 | [0] | [4] | [0] | [4] |
| RB numbers containing SL PRS within channel Bandwidth Note 1 | [48] | | [96] | |
| SL-PRS starting PRB | [4] | | [4] | |
|  |  | |  | |
| Note 1: Unless otherwise specified in the test case | | | | |

# <End of Change 1>

# <Start of Change 2>

# A.9A Tests for NR Sidelink Measurements for Positioning

## A.9A.1 Tests for NR Sidelink Measurements for Positioning in FR1

### A.9A.1.1 Measurement delay tests

#### A.9A.1.1.X SL Rx-Tx measurement delay tests

##### A.9A.1.1.X.1 Test Purpose and Environment

The purpose of this test is to verify that the V2X UE meets the SL Rx-Tx time difference measurement requirements defined in clause 12A.4 in AWGN propagation condition in FR1 when additional frequency layer is configured for SL positioning. And the reference timing used for sidelink transmissions is a NR serving cell in FR1 on a non-V2X sidelink carrier.

This test is applicable for UEs supporting NR Uu and V2X or 5G ProSe operation, which are capable of performing SL Rx-Tx measurements.

The supported NR Uu test configurations in FR1 are shown in Table A.9A.1.1.X.1-1.

**Table A.9A.1.1.X.1-1: Supported Test Configurations for FR1 NR cell**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR Uu: 15 kHz SSB SCS, 20 MHz BW, FDD duplex mode |
| 2 | NR Uu: 15 kHz SSB SCS, 20 MHz BW, TDD duplex mode |
| 3 | NR Uu: SSB SCS 30 kHz, 40 MHz BW, TDD duplex mode |
| Note 1: The UE is only required to pass in one of the supported test configurations in FR1. | |

The supported NR SL test configurations are specified in Table A.9A.1.1.X.1-2.

Table A.9A.1.1.X.1-2: Supported test configurations for NR SL UEs

|  |  |
| --- | --- |
| NR SL configuration | Description |
| SL\_conf1 | NR SL: 15 kHz SSB SCS, 10 MHz bandwidth, HD duplex mode |
| SL\_conf2 | NR SL: 30 kHz SSB SCS, 10 MHz bandwidth, HD duplex mode |
| SL\_conf3 | NR SL: 30 kHz SSB SCS, 20 MHz bandwidth, HD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

There is one NR active cell (Cell 1) and three active UEs (one target UE and two anchor UEs for SL positioning measurement) in this test. The target UE receives SL-PRS and performs the SL Rx-Tx time difference measurement. The two anchor UEs transmit the SL-PRS for the SL Rx-Tx time difference measurement on NR SL RF channel 2. The target UE and all anchor UEs are in RRC\_CONNECTED state, with Cell 1 as their PCell in FR1 on NR Uu RF channel 1.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. Before T2 starts, the UEs have been synchronized to the NR serving cell. And during T2, two anchor UEs transmit SL-PRS for positioning measurements.

The *SL-TDOA-ProvideAssistanceData* and *SL-TDOA-RequestLocationInformation* as defined in TS 38.355 [37, clause 6.9], shall be provided to the target UE via Cell 1 during T1. The last TTI containing the two messages shall be provided to the target UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *SL-TDOA assistance* data and location information request.

The test parameters are given in Table A.9A.1.1.X.1-3, A.9A.1.1.X.1-4, A.9A.1.1.X.1-5 and Table A.9A.1.1.X.1-6 below.

Table A.9A.1.1.X.1-3: General Test Parameters for SL Rx-Tx measurement reporting delay

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Serving cell |  | Cell 1 | NR PCell of the target UE and all anchor UEs (anchor UE 1, anchor UE 2), in FR1 on NR Uu RF channel 1. This cell is also the synchronization source for SL operation for all UEs in the test. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| Measurement gap |  | OFF |  |
| Target UE |  | UE 0 | The performing SL Rx-Tx measurements based on SL-PRS transmissions from anchor UEs |
| Other anchor UEs |  | UE 1 and UE 2 | Anchor UE 1 and Anchor UE 2 appear at the first and second places in the anchor UE list SL-RTD-Info in the SL-TDOA assistance data. |
| Number of anchor UEs provided in SL-TDOA assistance data |  | 3 | Including the target UE |
| Sidelink communication configuration |  | As specified in Table A.3.21.2-2 |  |
| Target UE antenna configuration |  | 1 x 2 |  |
| Timing offset between the anchor UEs at the target UE antenna connector | μs | UE 2 to UE 1: 0  UE 3 to UE 1: 3 | Synchronous transmissions |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Table A.9A.1.1.X.1-4: NR Uu specific test parameters for Cell 1Parameter | | Unit | Value | Comment |
| NR Uu RF channel number | |  | 1 | RF channel of Cell 1. |
| SSB configuration | Uu\_conf1 |  | SSB.1 FR1 | SSB configuration of Cell 1. |
| Uu\_conf2 |  | SSB.1 FR1 |
| Uu\_conf3 |  | SSB.2 FR1 |
| SMTC configuration | Uu\_conf1 |  | SMTC.2 | SMTC configuration of Cell 1. |
| Uu\_conf2 |  | SMTC.1 |
| Uu\_conf3 |  | SMTC.1 |
| PDSCH RMC configuration | Uu\_conf1 |  | SR.1.1 FDD |  |
| Uu\_conf2 |  | SR.1.1 TDD |  |
| Uu\_conf3 |  | SR.2.1 TDD |  |
| RMSI CORESET RMC configuration | Uu\_conf1 |  | CR.1.1 FDD | As specified in clause A.3.1.2.1 |
| Uu\_conf2 |  | CR.1.1 TDD |  |
| Uu\_conf3 |  | CR.2.1 TDD |  |
| Dedicated CORESET RMC configuration | Uu\_conf1 |  | CCR.1.1 FDD |  |
| Uu\_conf2 |  | CCR.1.1 TDD |  |
| Uu\_conf3 |  | CCR.2.1 TDD |  |
| Initial BWP configuration | Uu\_conf1,2,3 |  | DLBWP.0.1  ULBWP.0.1 |  |
| Active DL BWP configuration | Uu\_conf1,2,3 |  | DLBWP.1.1 |  |
| Active UL BWP configuration | Uu\_conf1,2,3 |  | ULBWP.1.1 |  |

Table A.9A.1.1.X.1-5: NR Uu UE-specific test parameters for UE 0, UE 1 and UE 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| NR Uu RF channel number | |  | 1 | RF channel of Cell 1. |
| DRX | |  | OFF |  |
| OCNG Patterns | |  | OP.1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 |  |
| EPRE ratio of PBCH DMRS to SSS | |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |
| EPRE ratio of PDSCH to PDSCH | |  |
| EPRE ratio of OCNG DMRS to SSS Note 1 | |  |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |  |
| Note2 | Config 1,2,3 | dBm/15 kHz | -110 |  |
| Config 1, 2 | dBm /SCS | -110 |  |
| Config 3 | -107 |  |
|  | dB |  | 4.5 |  |
|  | dB |  | 4.5 |  |
| SS-RSRPNote3 | Config 1,2 | dBm /SCS | -105.5 |  |
|  | Config 3 | -102.5 |  |
| IoNote3 | Config 1,2 | dBm /9.36MHz | -76.2 |  |
| Config 3 | dBm/ 38.16MHz | -70.1 |  |
| Propagation condition | |  | AWGN |  |
| NOTE 1: OCNG shall be used such that cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | |

Table A.9A.1.1.X.1-6: Anchor V2X UE specific test parameters for SL Rx-Tx measurement

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Anchor UE 1 | | Anchor UE 2 | | | Comment |
| T1 | T2 | T1 | T2 | |  |
| SL RF Channel number | |  | 2 | | 2 | | |  |
| SL DRX | |  | OFF | | OFF | | |  |
| networkControlledSyncTx | |  | ON | | ON | | |  |
| inCoverage (in MIB-SL) | |  | TRUE | | TRUE | | |  |
| SL pool configuration | SL\_conf1 |  | N/A | TBD | N/A | | TBD |  |
| SL\_conf2 |  |
| SL\_conf3 |  |
| SL-PRS configuration | SL\_conf1 |  | N/A | TBD | N/A | | TBD | As specified in Table A.3.X.2.1-1 |
| SL\_conf2 |
| SL\_conf3 |
| PSCCH RMC (defined in TBD) | |  | TBD | TBD | TBD | | TBD |  |
| PSSCH RMC (defined in A.3.21.3) | |  | TBD | TBD | TBD | | TBD |  |
| Note 2 | | dBm/SCS | -98 | | | | |  |
| SL-PRS | | dB | -Infinity | TBD | -Infinity | | TBD |  |
| PSCCH | | dB | TBD | TBD | TBD | | TBD |  |
| Io Note 3 | SL\_conf1 | dBm/BW | TBD | TBD | TBD | | TBD |  |
| SL\_conf2 |  |
| SL\_conf3 |  |
| SL PRS-RSRP Note3 | | dBm/SCS | -Infinity | TBD | -Infinity | | TBD |  |
| Propagation Condition | |  | AWGN | | | | |  |
| Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SL PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io level is based on the allocated RBs for SL PRS symbols.  Note 3: The UE is only required to be tested in one of the supported test configurations. | | | | | | | |  |

##### A.9A.1.1.X.2 Test Requirements

The SL Rx-Tx time difference measurement time fulfils the requirements specified in clause 12A.4.5.

The UE shall perform and report the SL Rx-Tx time difference measurements for anchor UE 1 and anchor UE 2 within the specified SL Rx-Tx time difference measurement time starting from the beginning of time interval T2.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the time duration above because of TTI insertion uncertainty of the measurement report in DCCH.

The rate of the correct events for each anchor UE observed during repeated tests shall be at least 90%, where the reported SL Rx-Tx measurement for each correct event shall be within the SL Rx-Tx reporting range specified in clause 10.4A.4.1.

# <End of Change 2>