**3GPP TSG-RAN WG4 Meeting #111 *R4-2407881***

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

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **DraftCR** | **rev** |  | **Current version:** | **18.5.0** |  |
|  |
| *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 |  | Core Network |  |

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| --- |
|  |
| ***Title:***  | [TC 9-5 and 9-6] Draft CR on PRS-RSRP delay TC for case 2 in FR1 |
|  |  |
| ***Source to WG:*** | OPPO |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_pos\_enh2-Perf |  | ***Date:*** | 2024-05-13 |
|  |  |  |  |  |
| ***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 canbe 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:*** | Based on work split for Rel-18 positoning enhancements (R4-2406382), the test cases for PRS-RSRP measurement delay for case 2 when eDRX cycle > 10.24s in RRC\_INACTIVATE state need to be introduced. |
|  |  |
| ***Summary of change:*** | Introduce the test case for PRS-RSRP measurement delay for case 2 when eDRX cycle > 10.24s in RRC\_INACTIVATE state. |
|  |  |
| ***Consequences if not approved:*** | The test configuration and procedure will be imcompleted.  |
|  |  |
| ***Clauses affected:*** | (new)A.6.8.2.X A.16.A.X2.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **x** |  |  Test specifications | TS 38.533 |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

**------------ START OF CHANGE 1--------------**

#### A.6.8.2.X PRS-RSRP reporting delay test case in RRC\_INACTIVE state in FR1 for case 2 when eDRX cycle > 10.24s

##### A.6.8.2.X.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRP measurement in RRC\_INACTIVE with eDRX meets the delay requirements specified in clause 5.6.3.5 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.6.8.2.X.1-1.

Table A.6.8.2.X.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, 20 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 50 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cell. Both cells are on the same NR RF channel in FR1. The test consists of two consecutive time intervals, with duration of T1 and T2. Both cells transmit PRS during T2.

During T1 UE is in RRC\_CONNECTED, the *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 is the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The general test parameters are listed in Table A.6.8.2.X.1-2, and cell specific test parameters are listed in Table A.6.8.2.X.1-3.

Table A.6.8.2.X.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Reference cell |  | 1, 2, 3 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1 | 20: NRB,c = 106 |  |
| 2 | 20: NRB,c = 106 |  |
| 3 | 50: NRB,c = 133 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| DRX | s | 1, 2, 3 | 1.28 |  |
| eDRX cycle length (for both RAN and CN) | s | 1, 2, 3 | 20.48 |  |
| PTW window length | s | 1, 2, 3 | 1.28 |  |
| Time offset between serving and neighbour cells | μs | 1, 2, 3 | 3 | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3 | 5 |  |
| T1 | s | 1, 2, 3 | 5 |  |
| T2 | s | 1, 2, 3 | 10 |  |

Table A.6.8.2.X.1-3: Cell specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | **Cell 2** |
| **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1 | N/A | N/A |
|  |  | 2 | TDDConf.1.1 | TDDConf.1.1 |
|  |  | 3 | TDDConf.2.1 | TDDConf.2.1 |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | N/A |
|  | 2 | SR.1.1 TDD |  |
|  | 3 | SR.2.1 TDD |  |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | N/A |
|  | 2 | CR.1.1 TDD |
|  | 3 | CR.2.1 TDD |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | N/A |
|  | 2 | CCR.1.1 TDD |
|  | 3 | CCR.2.1 TDD |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | OP.1 |
| Initial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | N/A |
| PRS configuration |  | 1 | PRS.1.4 FR1 | PRS.1.4 FR1 |
|  | 2 | PRS.1.4 FR1 | PRS.1.4 FR1 |
|  | 3 | PRS.2.4 FR1 | PRS.2.4 FR1 |
| PRS muting info |  | 1, 2, 3 | ‘10’ | ‘01’ |
|  Note 2 | dBm/SCS | 1 | -98 |
|  | 2 | -98 |
|  | 3 | -95 |
|  Note 2 | dBm/15 kHz | 1 | -98 |
|  | 2 |  |
|  | 3 |  |
| PRS  | dB | 1 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS  | dB | 1 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -88 | -88 | -Infinity | -88 |
| 2 | -88 | -88 | -Infinity | -88 |
| 3 | -85 | -85 | -Infinity | -85 |
| Io | dBm/19.08 MHz | 1 | N/A | -64.57 | N/A | -64.57 |
|  | dBm/19.08 MHz | 2 | -64.57 | -64.57 |
|  | dBm/47.88 MHz | 3 | -60.59 | -60.59 |
| Propagation Condition |  | 1, 2, 3 | AWGN |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.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/PRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

##### A.6.8.2.X.2 Test Requirements

The UE shall perform and report the PRS-RSRP measurements for Cell 1 and Cell 2, within the time limit specified in clause 5.6.3.5, starting from the beginning of time interval T2.

NOTE: The actual overall delays measured in the test may be higher than the time duration above because of the uncertainty in acquiring the first available PRACH occasion to transition to RRC\_CONNECTED state to report the measurements.

The rate of correct events observed during repeated tests shall be at least 90%.

**------------ END OF CHANGE 1--------------**

**------------ START OF CHANGE 2--------------**

#### A.16.A.X2.3 PRS-RSRP reporting delay test case in RRC\_INACTIVE state in FR1 for case 2 when eDRX cycle > 10.24s

##### A.16.A.X2.3.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRP measurement for RedCap UE in RRC\_INACTIVE with eDRX meets the delay requirements specified in clause 5.6A.3.5 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.16.A.X2.3.1-1.

Table A.16.A.X2.3.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. |

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cell. Both cells are on the same NR RF channel in FR1. The test consists of two consecutive time intervals, with duration of T1 and T2. Both cells transmit PRS during T2.

During T1 UE is in RRC\_CONNECTED, the *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n. In the next DL slot after slot #n, UE is released into RRC\_INACTIVE.

The beginning of the time interval T2 is the first PRS resource occasion occurring ΔT after the slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The general test parameters are listed in Table A.16.A.X2.3.1-2, and cell specific test parameters are listed in Table A.16.A.X2.3.1-3.

Table A.16.A.X2.3.1-2: General test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| Reference cell |  | 1, 2, 3, 4 | Cell 1 | Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data. |
| Neighbour cell |  | 1, 2, 3, 4 | Cell 2 | Cell 2 is a neighbour cell in the positioning assistance data. |
| RF Channel Number |  | 1, 2, 3, 4 | 1: Cell 1 and Cell 2 |  |
| BWchannel | MHz | 1, 4 | 10: NRB,c = 52 |  |
| 2 | 10: NRB,c = 52 |  |
| 3 | 20: NRB,c = 51 |  |
| SSB configuration |  | 1, 4 | SSB.1 FR1 |  |
|  |  | 2 | SSB.1 FR1 |  |
|  |  | 3 | SSB.2 RedCap FR1 |  |
| SMTC configuration |  | 1, 4 | SMTC.1 |  |
|  |  | 2 | SMTC.1 |  |
|  |  | 3 | SMTC.1 |  |
| CP length |  | 1, 2, 3, 4 | Normal |  |
| DRX | s | 1, 2, 3, 4 | 1.28 |  |
| eDRX cycle length (for both RAN and CN) | s | 1, 2, 3, 4 | 20.48 |  |
| PTW window length | s | 1, 2, 3, 4 | 1.28 |  |
| Time offset between serving and neighbour cells | μs | 1, 2, 3, 4 | 3 | Synchronous cells |
| Expected RSTD | μs | 1, 2, 3, 4 | 3 |  |
| Expected RSTD uncertainty | μs | 1, 2, 3, 4 | 5 |  |
| T1 | s | 1, 2, 3, 4 | 5 |  |
| T2 | s | 1, 2, 3, 4 | 10 |  |

Table A.16.A.X2.3.1-3: Cell specific test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Cell 1** | **Cell 2** |
| **T1** | **T2** | **T1** | **T2** |
| TDD configuration |  | 1, 4 | N/A | N/A |
|  |  | 2 | TDDConf.1.1 | TDDConf.1.1 |
|  |  | 3 | TDDConf.2.1 | TDDConf.2.1 |
| PDSCH RMC configuration |  | 1, 4 | SR.1.1 FDD | N/A |
|  | 2 | SR.1.1 TDD |  |
|  | 3 | SR.2.1 TDD |  |
| RMSI CORESET RMC configuration |  | 1, 4 | CR.1.1 FDD | N/A |
|  | 2 | CR.1.1 TDD |
|  | 3 | CR.2.1 TDD |
| Dedicated CORESET RMC configuration |  | 1, 4 | CCR.1.1 FDD | N/A |
|  | 2 | CCR.1.1 TDD |
|  | 3 | CCR.2.1 TDD |
| OCNG Patterns |  | 1, 2, 3, 4 | OP.1 | OP.1 |
| Initial BWP configuration |  | 1, 2, 3, 4 | DLBWP.0.1 ULBWP.0.1 | N/A |
| PRS configuration |  | 1 | PRS.1.3 FR1 | PRS.1.3 FR1 |
|  | 2 | PRS.1.3 FR1 | PRS.1.3 FR1 |
|  | 3 | PRS.2.3 FR1 | PRS.2.3 FR1 |
| PRS muting info |  | 1, 2, 3, 4 | ‘10’ | ‘01’ |
|  Note 2 | dBm/SCS | 1, 4 | -98 |
|  | 2 | -98 |
|  | 3 | -95 |
|  Note 2 | dBm/15 kHz | 1, 4 | -98 |
|  | 2 |  |
|  | 3 |  |
| PRS  | dB | 1, 4 | -Infinity | -2.41 | -Infinity | -12.12 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS  | dB | 1, 4 | -Infinity | -2 | -Infinity | -10 |
|  | 2 |  |  |  |  |
|  | 3 |  |  |  |  |
| PRS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -Infinity | -100 | -Infinity | -108 |
|  |  | 2 | -Infinity | -100 | -Infinity | -108 |
|  |  | 3 | -Infinity | -97 | -Infinity | -105 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1, 4 | -88 | -88 | -Infinity | -88 |
| 2 | -88 | -88 | -Infinity | -88 |
| 3 | -85 | -85 | -Infinity | -85 |
| Io | dBm/9.36 MHz | 1, 4 | N/A | -67.92 | N/A | -69.63 |
|  | dBm/9.36 MHz | 2 | -67.92 | -69.63 |
|  | dBm/18.36 MHz | 3 | -65.01 | -66.72 |
| Propagation Condition |  | 1, 2, 3, 4 | AWGN |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.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/PRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

##### A.16.A.X2.3.2 Test Requirements

The UE shall perform and report the PRS-RSRP measurements for Cell 1 and Cell 2, within the time limit specified in clause 5.6A.5.5, starting from the beginning of time interval T2.

NOTE: The actual overall delays measured in the test may be higher than the time duration above because of the uncertainty in acquiring the first available PRACH occasion to transition to RRC\_CONNECTED state to report the measurements.

The rate of correct events observed during repeated tests shall be at least 90%.

**------------ END OF CHANGE 2--------------**