**3GPP TSG- Meeting # *R4-2407326***

**, Japan, May 20 – 24, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **.133** | **CR** | **4346** | **rev** | **-** | **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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | (NR\_SL\_relay\_enh-Perf) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | \_SL\_relay\_enh-Perf | | | | |  | ***Date:*** | | | -05-22 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | -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:*** | | To define applicable conditions for a remote sidelink UE in multipath relay scenario to meet the SD-RSRP and SL-RSRP accuracies and introduce test case for delay of selection/reselection of relay UE by remote UE in U2U relay scenario. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The changes are:   1. Endorsed draft CR R4-2403336 and R4-2409672  * Define applicable conditions for a remote sidelink UE in multipath relay scenario to meet the SD-RSRP and SL-RSRP accuracies.  1. Endorsed draft CR R4-2410140  * Add test case for delay of selection/reselection of relay UE by remote UE in U2U relay scenario. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The SD-RSRP and SL-RSRP accuracy performance of the remote UE in multipath relay operation cannot be guaranteed. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 10.4.5, A.9.1.7 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

### 10.4.5 Intra-Frequency Discovery Signal Measurement Accuracy Requirements

The requirements in this clause are applicable for a remote sidelink UE in U2N relay scenario provided that the remote UE:

- is out of coverage on the frequency used for sidelink, and

- that is synchronised to the sidelink relay UE that is measured.

The requirements in this clause are applicable for a remote sidelink UE in multipath relay scenario provided that the remote UE:

* is synchronised to the sidelink relay UE that is measured and
* is in-coverage on the frequency used for sidelink if both the direct path and the sidelink on the indirect path are on the same frequency
* is out of co coverage on the frequency used for sidelink if the direct path and the sidelink on the indirect path are on different frequencies.

**----------------------END OF CHANGES 1----------------------------**

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

### A.9.1.7 Selection / Reselection of relay UE

#### A.9.1.7.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to selection / reselection of relay UE defined in clauses 12.10. In the test, the UE under test is configured with PCell or an Sidelink UE but not both, based on the scenarios (U2N or U2U relay) UE supported, and is configured with resource pools for NR sidelink discovery message as required for remote UE operation.

This test is applicable to UEs capable of NR sidelink communication and sidelink discovery, and further support the optional feature of sidelink remote UE operation.

The test parameters are given in Table A.9.1.7.1.1-1, Table A.9.1.7.1-2, Table A.9.1.7.1-3, Table A.9.1.7.1-4, Table A.9.1.7.1-5, and Table A.9.1.7.1-6 below. The test consists of one active serving cell (cell 1, configured as Table A.9.1.7.1-5) or an Sidelink UE (Sidelink UE 1, configured as Table A.9.1.7.1-6), one remote UE and two active Sidelink relay UEs (Sidelink Relay UE 1, Sidelink Relay UE 2). The relay UEs are configured in mode 2 to be transmitting relay discovery messages every discovery period, which is determined by resource reservation period indicated by sl-ResourceReservePeriodList.

The test system shall ensure that the remote UE under test has transmitted *SidelinkUEInformationNR* message and has been configured with the sidelink discovery resource pool and sidelink communication resource pool respectively for relay operation prior to the start of the test.

The tests consist of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively.

During T1, RSRP of cell 1 or SL-RSRP of Sidelink UE 1 is kept higher than *threshHighRemote* (within *sl-remoteUE-Config*), and the remote UE is not required to perform relay UE selection.

During T2, RSRP of cell 1 or SL-RSRP of Sidelink UE 1 is configured to be lower than *threshHighRemote.* The UE is expected to start looking for relay UE. The test system shall ensure that the UE under test has been configured the resource pool prior to end of T2 duration. During T2, the SD-RSRP of Sidelink Relay UE 1 and Sidelink Relay UE 2 is configured to be lower than the detection threshold and no relay UE will be available for the remote UE under test.

During T3, the SD-RSRP of Sidelink Relay UE 1 is raised above the threshold *sl-RSRP-Thresh* and the UE is expected to perform relay selection to Sidelink Relay UE 1. The test system can determine that the remote UE has selected a relay by monitoring the configured sidelink communication resource for the ProSe direct link establishment request message to the relay UE.

During T4, the UE is expected to complete the sidelink connection establishment with the relay UE. Note that the RSRP of the serving cell (cell 1) or SL-RSRP of Sidelink UE 1 and the SD-RSRP of sidelink relay UEs are kept unchanged during T3 and T4. The period T4 ends when Sidelink Relay UE1 sends the sidelink communication response message back to the remote UE.

During T5, SD-RSRP of Sidelink Relay UEs are modified such that the remote UE is expected to reselect to Sidelink Relay UE2.

Table A.9.1.7.1-1: Test parameters for selection / reselection of relay UE test for NR FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | HD carrier in Band n47 or n38 |
| Channel Bandwidth (BWchannel) Note 1 | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| SCS | kHz | 30 |  |
| Traffic destination |  | Cell 1 or Sidelink UE 1 | Serving NR cell will broadcast SIB12. Sidelink UE 1 will use the configuration in SL-PreconfigurationNR. |
| Active Relay UEs |  | Relay UE 1, Relay UE 2 | Transmitting relay discovery message |
| CP length of Cell 1 and Sidelink UE 1 |  | Normal |  |
| T1 | ms | 100 |  |
| T2 | s | Up to receiving RRC reconfiguration setup complete from the UE, or up to [1] sec if UE does not transmit *SidelinkUEInformationNR* during this period. |  |
| T3 | s | 1 |  |
| T4 | s | 2 |  |
| T5 | s | 1 |  |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | | | |

Table A.9.1.7.1-2: Sidelink discovery configuration for selection / reselection of relay UE test for NR FR1

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1 | HD carrier in Band n47 or n38 |
| Channel Bandwidth (BWchannel) Note 1 | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| Resource pool configuration for sidelink discovery |  | As specified in Table A.3.21.2-2 Note 2 | IE values unless specified otherwise in this test. |
| sl-TimeResource included in *sl-DiscTxPoolSelected-r17* and *sl-DiscRxPool-r17* |  | 0000111100 | Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[3]) |
| sl-NumSubchannel included in *sl-DiscTxPoolSelected-r17* and *sl-DiscRxPool-r17* |  | 2 | Indicates the number of sub-channels for TX resource pool |
| sl-SubchannelSize included in *sl-DiscTxPoolSelected-r17* and *sl-DiscRxPool-r17* |  | 10 | Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB |
| *sl-ResourceReservePeriodList* | s | 0.04 | Indicates the resource reservation period for discovery period |
| *threshHighRemote within sl-remoteUE-Config* |  | -91dBm |  |
| *sl-RSRP-Thresh within sl-remoteUE-Config* |  | -91dBm |  |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: This test is according to the principle defined in section A.3.21. | | | |

Table A.9.1.7.1-3: Sidelink Communication configuration for selection / reselection of relay UE test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | | - | 1 | HD carrier in Band n47 or n38 |
| Channel Bandwidth (BWchannel) Note 1 | | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) |  |
| Sidelink Communication configuration | | - | As specified in section A.3.21.2 | IE values unless specified otherwise in this test. |
| sl-TimeResource | | - | 0000000011 | Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[3]) |
| Number of Active Sidelink Relay UEs | | - | 2 | Active Sidelink UE i = 0, 1 |
| Active Sidelink Relay UEs (UE i = 0, 1) and Sidelink UE 1Note 2 | PSCCH Reference Measurement Channel | - | CC.1A HD | As specified in Table A.3.21.3-1 |
| PSSCH Reference Measurement Channel | - | CD.1A HD | As specified in Table A.3.21.3-2 |
| sl-NumSubchannel-r16 included in SL-ResourcePool | - | 1 | Indicates the number of sub-channels for TX resource pool |
| sl-SubchannelSize-r16 included in SL-ResourcePool |  | 10 | Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB |
| sl-StartRB-Subchannel-r16 included in SL-ResourcePool | - | floor(i)x10 | Indicates the lowest RB index of the subchannel with the lowest index for Sidelink Relay UE i = 0 starts RB=0;  Sidelink Relay UE i = 1 starts RB=10. Sidelinke UE 1 i = 2 starts RB=20. |
| PSBCH-RSRP | dBm/30kHz | -95 |  |
| Note 1: The UE is only required to be tested in one of the supported test configurations.  Note 2: The parameters for Sidelink UE 1 are applicable only when it exists. | | | | |

Table A.9.1.7.1-4: Sidelink Relay UE specific test parameters for selection / reselection of relay UE test for NR FR1

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Relay UE 1 | | | | | Relay UE 2 | | | | |
| T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number |  | 1 (HD carrier in Band n47 or n38) | | | | | | | | | |
| BWchannel Note 4 | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) | | | | | | | | | |
| SCS | kHz | 30 | | | | | | | | | |
| Sidelink Discovery resource pool configuration |  | As specified in Table A.9.1.7.1-2 | | | | | | | | | |
| Transmission frequency |  | Every discovery period (40ms) | | | | | | | | | |
| Resource allocation |  | Non-overlapping PRBs | | | | | | | | | |
| Note1 | dBm/30 kHz | -97 | | | | | | | | | |
|  | dB | -inf | -inf | 10.5 | 10.5 | -1.5 | -inf | -inf | -inf | -inf | 10.5 |
| SD-RSRP / SL-RSRP  Note2, Note 3 | dBm/30 kHz | -inf | -inf | -86.5 | -86.5 | -98.5 | -inf | -inf | -inf | -inf | -86.5 |
| Antenna Configuration | - | 1x2 | | | | | | | | | |
| Propagation Condition |  | AWGN | | | | | | | | | |
| Note 1: 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 2: SD-RSRP / SL-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: PSCCH-DMRS Es/Iot is set the same as PSSCH-DMRS Es/Iot.  Note 4: This test is according to the principle defined in section A.3.21.2. | | | | | | | | | | | |

Table A.9.1.7.1-5: Cell specific test parameters for selection / reselection of relay UE test for NR FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell1 | | | | |
| T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number | |  | 2 | | | | |
| Serving/Non-serving | |  | Serving | | | | |
| Duplex Mode | Config 1 |  | FDD | | | | |
| Config 2,3 | TDD | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | | |
| Config 2 |  | TDDConf.1.1 | | | | |
| Config 3 |  | TDDConf.2.1 | | | | |
| Channel Bandwidth (BWchannel) | Config 1,2 |  | 10: NRB,c = 52 | | | | |
| Config 3 |  | 40: NRB,c = 106 | | | | |
| Initial BWP Configuration | |  | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration | |  | DLBWP.1.1  ULBWP.1.1 | | | | |
| DRX Cycle | |  | N/A | | | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | |
| Config 2 |  | SR.1.1 TDD | | | | |
| Config 3 |  | SR.2.1 TDD | | | | |
| CORESET Reference Channel | Config 1 |  | CR.1.1 FDD | | | | |
| Config 2 |  | CR.1.1 TDD | | | | |
| Config 3 |  | CR.2.1 TDD | | | | |
| Dedicated CORESET Reference Channel | Config 1 |  | CCR.1.1 FDD | | | | |
| Config 2 |  | CCR.1.1 TDD | | | | |
| Config 3 |  | CCR.2.1 TDD | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | |
| Config 3 |  | SSB.2 FR1 | | | | |
| SMTC Configuration | |  | SMTC.2 | | | | |
| 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) | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | | | |
| drx-Configuration | |  | N/A | | | | |
| PDCCH/PCFICH/PHICH Reference measurement channelNote1 | |  | R.11 FDD | | | | |
| OCNG Pattern defined in A.3.2.1 | |  | OP.16 FDD | | | | |
| Note2 | Config 1,2,3 | dBm/15 kHz | -97 | | | | |
| Note2 | Config 1,2, | dBm/SCS | -97 | | | | |
| Config 3 | -94 | | | | |
|  | | dB | 10.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| RSRP Note3 | | dBm/15 kHz | -86.5 | -95.5 | -95.5 | -95.5 | -95.5 |
| Propagation condition | |  | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low | | | | |
| Note 1: OCNG shall be used such that cell 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 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.9.1.7.1-6: Sidelink UE specific test parameters for selection / reselection of relay UE test for NR FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Remote UE 2 | | | | |
| T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number |  | 1 (HD carrier in Band n47 or n38) | | | | |
| BWchannel Note 4 | MHz | 20 (NRB,c = 50) or  40 (NRB,c = 100) | | | | |
| SCS | kHz | 30 | | | | |
| Resource allocation |  | Non-overlapping PRBs | | | | |
| Note1 | dBm/30 kHz | -97 | | | | |
|  | dB | 10.5 | -1.5 | -1.5 | -1.5 | -1.5 |
| SD-RSRP / SL-RSRP  Note2, Note 3 | dBm/30 kHz | [-86.5] | [-98.5] | [-98.5] | [-98.5] | [-98.5] |
| Antenna Configuration | - | 1x2 | | | | |
| Propagation Condition |  | AWGN | | | | |
| Note 1: 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 2: SD-RSRP / SL-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: PSCCH-DMRS Es/Iot is set the same as PSSCH-DMRS Es/Iot.  Note 4: This test is according to the principle defined in section A.3.21.2. | | | | | | |

**----------------------END OF CHANGES 2----------------------------**