**3GPP TSG-RAN2 Meeting #127 *R2-2407729***

**Maastricht, Netherlands, Aug 19th – 23rd, 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **38.331** | **CR** | **4957** | **rev** | **1** | **Current version:** | **18.2.0** |  |
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| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)*** *on using this form: comprehensive instructions can be found at <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 for SL relay measurements |
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| ***Source to WG:*** | ZTE Corporation, Sanechips, Apple, OPPO, Nokia, Huawei, HiSilicon |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | NR\_SL\_relay-Core |  | ***Date:*** | 2024-8-7 |
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| ***Category:*** | A |  | ***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)* |
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|  ***Reason for change:*** | 1. In 5.5.3.4, it is specified that a UE may be configured to derive NR sidelink measurement results of serving L2 U2N Relay UE or candidate L2 U2N Relay UEs and apply layer 3 filtering as described in 5.5.3.2.

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| A UE may be configured by network to derive NR sidelink measurement results of serving L2 U2N Relay UE or candidate L2 U2N Relay UEs associated to the measurement objects configured in the *measObjectRelay*.The UE shall:1> for each L2 U2N Relay UE measurement quantity to be derived:2> derive the corresponding measurement quantity based on PSSCH/PSCCH DMRS as described in TS 38.215 [9];2> apply layer 3 filtering as described in 5.5.3.2; |

However, in 5.5.3.2, only candidate L2 U2N Relay UE is mentioned, while the serving L2 U2N Relay UE is missing. 1. In 5.8.15.3, it is specified that *sl-FilterCoefficientRSRP* is used for layer 3 filtering when evaluating the detected NR sidelink U2N Relay UE.

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| 4> when evaluating the one or more detected NR sidelink U2N Relay UEs, apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same U2N Relay UE ID and using the *sl-FilterCoefficientRSRP* in *SIB12* (if in RRC\_IDLE/INACTIVE), the *sl-FilterCoefficientRSRP* in *sl-ConfigDedicatedNR* (if in RRC\_CONNECTED) or the preconfigured *sl-FilterCoefficientRSRP* as defined in 9.3 (out of coverage), before using the SD-RSRP measurement results; |

For relay re-selection, the currently selected relay should also be measured. However, the description on how to evaluate the SL-RSRP/SD-RSRP measurement results of the currently selected relay is missing.1. As discussed above, the currently selected relay should also be measured for relay re-selection and layer 3 filtering is applied. However, in 5.5.3.2, the evaluating of the currently selected relay is missing.
2. Editorial issue, to cover Issue 8 from R2-2406680. “as defined in 9.3” is not a proper way to introduce the IE defined for SL preconfiguration. To align with other usage in TS 38.331, this should be changed to “in SidelinkPreconfigNR”.
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| ***Summary of change:*** | 1. In 5.5.3.2, remove “candidate” from “each candidate L2 U2N Relay UE” to cover both serving L2 U2N Relay UE and candidate L2 U2N Relay UE.
2. In 5.8.15.3, add the description on how to evaluate the SL-RSRP/SD-RSRP measurement results of the currently selected relay, i.e. add the sentence “When evaluating the U2N Relay UE, apply layer 3 filtering as specified in 5.5.3.2 using the *sl-FilterCoefficientRSRP* in *SIB12* (if in RRC\_IDLE/INACTIVE), the *sl-FilterCoefficientRSRP* in *sl-ConfigDedicatedNR* (if in RRC\_CONNECTED) or the *sl-FilterCoefficientRSRP* in *SidelinkPreconfigNR* (out of coverage), before using the SL-RSRP or SD-RSRP measurement results”.
3. In 5.5.3.2, add the evaluating of the currently selected relay.
4. In 5.8.15.3. change “as defined in 9.3” to “in SidelinkPreconfigNR”.

**Impact analysis**Impacted functionality: The supporting of SL U2N relay operation.Inter-operability: 1. If Sidelink UE implements this change and gNB does not, there is no inter-operability issue between UE and gNB.
2. If Sidelink TX UE implements this change, but the Sidelink RX UE is not implemented this change, there is no inter-operability issue.
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| ***Consequences if not approved:*** | The operation for measuring serving L2 U2N Relay UE is not clear. The operation for evaluating the currently selected U2N Relay UE for relay re-selection is not clear. |
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| ***Clauses affected:*** | 5.5.3.2, 5.8.15.3 |
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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 ...  |
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| ***Other comments:*** |  |
| ***This CR’s revision history:*** | Rev 1: Revision of R2-2407496, change the addition in the NOTE into normative text, and merge Issue 8 from R2-2406680. |

*START OF CHANGE*

#### 5.5.3.2 Layer 3 filtering

The UE shall:

1> for each cell measurement quantity, each beam measurement quantity, each sidelink measurement quantity as needed in clause 5.8.10, for each CLI measurement quantity that the UE performs measurements according to 5.5.3.1, for each L2 U2N Relay UE measurement quantity according to 5.5.3.4, for evaluating the selected or detected NR sidelink U2N Relay UEs according to 5.8.15.3, for evaluating the SyncRef UE according to 5.8.5 and 5.8.6, for evaluating the NR sidelink U2U Relay/Remote UE threshold conditions according to 5.8.16.2 and 5.8.17.2, for evaluating the conditions for selection and reselection of NR sidelink U2U Relay UE according to 5.8.17.3, and for evaluating the detected NR sidelink U2U Relay UEs according to 5.8.17.4:

2> filter the measured result, before using for evaluation of reporting criteria, for measurement reporting, for U2N/U2U Relay (re)selection evaluation or for evaluating the SyncRef UE, by the following formula:

 ***F*n = (1 – *a*)\**F*n-1 + *a*\**M*n**

 where

***Mn*** is the latest received measurement result from the physical layer;

***Fn*** is the updated filtered measurement result, that is used for evaluation of reporting criteria, for measurement reporting, for U2N/U2U Relay (re)selection evaluation or for evaluating the SyncRef UE;

***Fn-1*** is the old filtered measurement result, where ***F0*** is set to ***M1*** when the first measurement result from the physical layer is received; and for *MeasObjectNR*, ***a*** = 1/2(***ki***/4), where ***ki*** is the *filterCoefficient* for the corresponding measurement quantity of the i:th *QuantityConfigNR* in *quantityConfigNR-List*, and *i* is indicated by *quantityConfigIndex* in *MeasObjectNR*; for other measurements, ***a*** = 1/2(***k***/4), where ***k*** is the *filterCoefficient* for the corresponding measurement quantity received by the *quantityConfig*; for UTRA-FDD, a = 1/2(k/4), where k is the filterCoefficient for the corresponding measurement quantity received by *quantityConfigUTRA-FDD* in the *QuantityConfig*;

2> adapt the filter such that the time characteristics of the filter are preserved at different input rates, observing that the *filterCoefficient k* assumes a sample rate equal to X ms; The value of X is equivalent to one intra-frequency L1 measurement period as defined in TS 38.133 [14] assuming non-DRX operation, and depends on frequency range.

NOTE 1: If ***k*** is set to 0, no layer 3 filtering is applicable.

NOTE 2: The filtering is performed in the same domain as used for evaluation of reporting criteria, for measurement reporting, for U2N Relay (re)selection evaluation or for evaluating the SyncRef UE, i.e., logarithmic filtering for logarithmic measurements.

NOTE 3: The filter input rate is implementation dependent, to fulfil the performance requirements set in TS 38.133 [14]. For further details about the physical layer measurements, see TS 38.133 [14].

NOTE 4: For CLI-RSSI measurement, it is up to UE implementation whether to reset filtering upon BWP switch.

NOTE 5: For SSB measurements when multiple altitude range-based *ssb-ToMeasure* are configured, it is up to UE implementation whether to reset filtering upon entering a different altitude range.

NOTE 6: Upon satellite switch with resynchronization, it is up to UE implementation to reset filtering for the serving cell.

*NEXT CHNAGE*

#### 5.8.15.3 Selection and reselection of NR sidelink U2N Relay UE

A UE capable of NR sidelink U2N Remote UE operation that is configured by upper layers to search for a NR sidelink U2N Relay UE shall:

1> if the UE has no serving cell; or

1> if the RSRP measurement of the cell on which the UE camps (for L2 and L3 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE)/ the PCell (for L3 U2N Remote UE in RRC\_CONNECTED) is below *threshHighRemote* within *sl-RemoteUE-Config*:

2> if the UE does not have a selected NR sidelink U2N Relay UE; or

2> if the UE has a selected NR sidelink U2N Relay UE, and SL-RSRP of the currently selected NR sidelink U2N Relay UE is available and is below *sl-RSRP-Thresh*; or

2> if the UE has a selected NR sidelink U2N Relay UE, and SL-RSRP of the currently selected NR sidelink U2N Relay UE is not available, and SD-RSRP of the currently selected U2N Relay UE is below *sl-RSRP-Thresh*; or

NOTE 1: U2N Remote UE uses SL-RSRP measurements for relay reselection trigger evaluation when there is data transmission from U2N Relay UE to U2N Remote UE, and it is left to UE implementation whether to use SL-RSRP or SD-RSRP for relay reselection trigger evaluation in case of no data transmission from U2N Relay UE to U2N Remote UE. If SD-RSRP is used, the discovery procedure will be performed between the U2N Remote UE and the selected U2N Relay UE.

2> if the UE has a selected NR sidelink U2N Relay UE, and upper layers indicate not to use the currently selected NR sidelink U2N Relay UE; or

2> if the UE has a selected NR sidelink U2N Relay UE, and upper layers request the release of the PC5-RRC connection; or

2> if the UE has a selected NR sidelink U2N Relay UE, and sidelink radio link failure is detected on the PC5-RRC connection with the current U2N Relay UE as specified in clause 5.8.9.3:

3> perform NR sidelink discovery procedure as specified in clause 5.8.13 in order to search for candidate NR sidelink U2N Relay UEs:

4> when evaluating the one or more detected NR sidelink U2N Relay UEs, apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same U2N Relay UE ID and using the *sl-FilterCoefficientRSRP* in *SIB12* (if in RRC\_IDLE/INACTIVE), the *sl-FilterCoefficientRSRP* in *sl-ConfigDedicatedNR* (if in RRC\_CONNECTED) or the *sl-FilterCoefficientRSRP* in *SidelinkPreconfigNR* (out of coverage), before using the SD-RSRP measurement results;

4> consider a candidate NR sidelink U2N Relay UE for which SD-RSRP exceeds *sl-RSRP-Thresh* by *sl-HystMin* has met the AS criteria;

3> if the UE detects any suitable NR sidelink U2N Relay UE(s):

4> consider one of the available suitable NR sidelink U2N relay UE(s) can be selected;

NOTE 2: A candidate NR sidelink U2N Relay UE which meets all AS layer criteria defined in 5.8.15.3 and higher layer criteria defined in TS 23.304 [65] can be regarded as suitable NR sidelink U2N Relay UE by the NR sidelink U2N Remote UE. If multiple suitable NR sidelink U2N Relay UEs are available, it is up to Remote UE implementation to choose one NR sidelink U2N Relay UE. The details of the interaction with upper layers are up to UE implementation.

NOTE 3: For L2 U2N Remote UEs in RRC\_IDLE/INACTIVE and L3 U2N Remote UEs, the cell (re)selection procedure and relay (re)selection procedure run independently. If both suitable cells and suitable NR sidelink U2N Relay UEs are available, it is up to NR sidelink U2N Remote UE implementation to select either a cell or a NR sidelink U2N Relay UE. Furthermore, L3 U2N Remote UE's selection on both cell and NR sidelink U2N Relay UE is also based on UE implementation.

3> else:

4> consider no NR sidelink U2N Relay UE to be selected.

When evaluating the currently selected NR sidelink U2N Relay UE, U2N Remote UE should apply layer 3 filtering as specified in 5.5.3.2 using the *sl-FilterCoefficientRSRP* in *SIB12* (if in RRC\_IDLE/INACTIVE), the *sl-FilterCoefficientRSRP* in *sl-ConfigDedicatedNR* (if in RRC\_CONNECTED) or the *sl-FilterCoefficientRSRP* in *SidelinkPreconfigNR* (out of coverage), before using the SL-RSRP or SD-RSRP measurement results.

*END OF CHNAGE*