**3GPP TSG-RAN WG2 Meeting #118e R2-22XXXX**

**E-Meeting, 9th - 20th May 2022**

**Source: Xiaomi**

**Title:****Summary of 6.7.2.12 on service continuity**

**Agenda Item:** **6.7.2.2**

**Document for:** **Discussion and Decision**

# Introduction

This contribution provides summary of contributions under 6.7.2.2 on service continuity. The summary aims to identify critical issues in this meeting. Critical ones are ASN.1 related or have major procedural impact. Note, if the proposed changes have been adopted by RRC rapporteur, those proposals would not be included in this summary.

# Discussion

### 2.1 How to set measurement result

[O022, O023, O024] in [1] propose, from “*for each cell that is included in the measResultNeighCells, include the physCellId;*” to “*set the measResult to include the quantity(ies) indicated in the reportQuantityUTRA-FDD within the concerned reportConfigInterRAT in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first*”, the level should increase 2 since they are in the loop of “*set the measResultNeighCells to include the best neighbouring cells up to maxReportCells in accordance with the following:*”

[O025] in [1] proposes the paragraph of “*set the measResult to include the quantity(ies) indicated in the reportQuantityRelay within the concerned reportConfigRelay in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best L2 U2N Relay UE is included first*” is misplaced under the loop of “*for each included cell/L2 U2N Relay UE, include the layer 3 filtered measured results in accordance with the reportConfig for this measId, ordered as follows*”. The paragraph should under the loop of “*set the sl-MeasResultCandRelay to include the best candidate L2 U2N Relay UEs up to maxReportCells in accordance with the following:*”

The proposed change is as following,

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| 5.5.5.1 General  …  1> if there is at least one applicable neighbouring cell to report:  2> if the *reportType* is set to *eventTriggered* or *periodical*:  3> if the measurement report concerns the candidate L2 U2N Relay UE:  4> set the *sl-MeasResultCandRelay* to include the best candidate L2 U2N Relay UEs up to *maxReportCells* in accordance with the following:  5> if the *reportType* is set to *eventTriggered*:  6> include the L2 U2N Relay UEs included in the *relaysTriggeredList* as defined within the *VarMeasReportList* for this *measId*;  5> else:  6> include the applicable L2 U2N Relay UEs for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;  6> set the *measResult* to include the quantity(ies) indicated in the *reportQuantityRelay* within the concerned *reportConfigRelay* in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best L2 U2N Relay UE is included first;  3> else:  4> set the *measResultNeighCells* to include the best neighbouring cells up to *maxReportCells* in accordance with the following:  5> if the *reportType* is set to *eventTriggered*:  6> include the cells included in the *cellsTriggeredList* as defined within the *VarMeasReportList* for this *measId*;  5> else:  6> include the applicable cells for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;  5> for each cell that is included in the *measResultNeighCells*, include the *physCellId*;  5> for each L2 U2N Relay UE that is included in the *sl-MeasResultsCandRelay*, include the *sl-RelayUEIdentity*;  5> if the reportType is set to eventTriggered or periodical:  6> for each included cell/L2 U2N Relay UE, include the layer 3 filtered measured results in accordance with the *reportConfig* for this *measId*, ordered as follows:  7> if the *measObject* associated with this *measId* concerns NR:  8> if *rsType* in the associated *reportConfig* is set to *ssb*:  9> set *resultsSSB-Cell* within the *measResult* to include the SS/PBCH block based quantity(ies) indicated in the *reportQuantityCell* within the concerned *reportConfig*, in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;  9> if *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport* are configured, include beam measurement information as described in 5.5.5.2;  8> else if *rsType* in the associated *reportConfig* is set to *csi-rs*:  9> set *resultsCSI-RS-Cell* within the *measResult* to include the CSI-RS based quantity(ies) indicated in the *reportQuantityCell* within the concerned *reportConfig*, in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;  9> if *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport* are configured, include beam measurement information as described in 5.5.5.2;  7> if the *measObject* associated with this *measId* concerns E-UTRA:  8> set the *measResult* to include the quantity(ies) indicated in the *reportQuantity* within the concerned *reportConfigInterRAT* in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;  7> if the *measObject* associated with this *measId* concerns UTRA-FDD and if *ReportConfigInterRAT* includes the *reportQuantityUTRA-FDD*:  8> set the *measResult* to include the quantity(ies) indicated in the *reportQuantityUTRA-FDD* within the concerned *reportConfigInterRAT* in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;  … |

Rapporteur understands these two changes have impact on measurement report result. Without these changes, the measurement result content may be set incorrectly.

### 2.2 How to trigger measurement report

[4] propose to add text procedure to define th applicable serving L2 U2N Relay UE for event X2 and also exclude allowed-list and excluded-list of event X2.

The proposed change is as following,

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| 5.5.4 Measurement report triggering5.5.4.1 General If AS security has been activated successfully, the UE shall:  1> for each *measId* included in the *measIdList* within *VarMeasConfig*:  2> if the corresponding *reportConfig* includes a *reportType* set to *eventTriggered* or *periodical*:  3> if the corresponding *measObject* concerns NR:  4> if the corresponding *reportConfig* includes *measRSSI-ReportConfig*:  5> consider the resource indicated by the *rmtc-Config* on the associated frequency to be applicable;  4> if the *eventA1* or *eventA2* is configured in the corresponding *reportConfig*:  5> consider only the serving cell to be applicable;  4> if the *eventA3* or *eventA5* is configured in the corresponding *reportConfig*:  5> if a serving cell is associated with a *measObjectNR* and neighbours are associated with another *measObjectNR*, consider any serving cell associated with the other *measObjectNR* to be a neighbouring cell as well;  4> if the *eventX2* is configured in the corresponding *reportConfig*:  5> consider only the serving L2 U2N Relay UE to be applicable;  4> if corresponding *reportConfig* includes *reportType* set to *periodical*; or  4> for measurement events other than *eventA1* or *eventA2* or *eventX2*:  5> if *useAllowedCellList* is set to *true*:  6> consider any neighbouring cell detected based on parameters in the associated *measObjectNR* to be applicable when the concerned cell is included in the *allowedCellsToAddModList* defined within the *VarMeasConfig* for this *measId*;  5> else:  6> consider any neighbouring cell detected based on parameters in the associated *measObjectNR* to be applicable when the concerned cell is not included in the *excludedCellsToAddModList* defined within the *VarMeasConfig* for this *measId*; |

Rapporteur understands this change has impact on measurement report triggering. Without these changes, UE may not be able to perform measurement on serving L2 U2N relay UE.

### 2.3 How to trigger path switch failure in case target relay UE changes PCell

[5] thinks current spec may result in false path switch falire in following scenarios,

**Scenario 1, target relay UE’s PCell changes before measurement report.**

The Remote UE may measure the target L2 U2N Relay UE for a period before measurement report event is fulfilled. The target relay UE may change its PCell before measurement report. This early PCell change doesn’t influence the path switch. However, in current spec, relay UE’s PCell change before measurement report would also trigger path swich failure, since it’s also before path switch.

**Scenario 2, target relay UE’s PCell is the same PCell indicated in remote UE’s measurement report after successive PCell changes.**

The relay UE may change its PCell more than once after measurement report, due to successive cell reselection. If the relay UE changes back to the PCell indicated in remote UE’s measurement report. For example, relay UE’s PCell may change as Cell A -> Cell B -> Cell A. Path switch can success, as long as the relay UE’s PCell is the same as the PCell indicated in remote UE’s measurement report. However, in current spec, any PCell change would trigger path switch failure, regardless whether relay UE’s PCell is same as the the PCell indicated in remote UE’s measurement report.

The proposed change is as following,

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| 5.3.5.8.3 T304 expiry (Reconfiguration with sync Failure) or Txxx expiry (Path switch failure)  The UE shall:  1> if T304 of the MCG expires, or  1> if Txxx expires, or,  1> if the target L2 U2N Relay UE changes its serving PCell, before path switch (i.e. the received *RRCReconfiguration* message containing *reconfigureWithSync* indicating path switch as specified in 5.3.5.5.2), compared to its serving PCell indicated in the last measurement report:  2> release dedicated preambles provided in *rach-ConfigDedicated* if configured;  2> release dedicated msgA PUSCH resources provided in *rach-ConfigDedicated* if configured;  2> if any DAPS bearer is configured, and radio link failure is not detected in the source PCell, according to subclause 5.3.10.3:  3> reset MAC for the target PCell and release the MAC configuration for the target PCell;  3> for each DAPS bearer:  4> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the target PCell;  4> reconfigure the PDCP entity to release DAPS as specified in TS 38.323 [5];  3> for each SRB:  4> if the *masterKeyUpdate* was not received:  5> configure the PDCP entity for the source PCell with state variables continuation as specified in TS 38.323 [5];  4> release the PDCP entity for the target PCell;  4> release the RLC entity as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the target PCell;  4> trigger the PDCP entity for the source PCell to perform SDU discard as specified in TS 38.323 [5];  4> re-establish the RLC entity for the source PCell;  3> release the physical channel configuration for the target PCell;  3> discard the keys used in target PCell (the KgNB key, the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key), if any;  3> resume suspended SRBs in the source PCell;  3> for each non-DAPS bearer:  4> revert back to the UE configuration used for the DRB or multicast MRB in the source PCell, includes PDCP, RLC states variables, the security configuration and the data stored in transmission and reception buffers in PDCP and RLC entities ;  3> revert back to the UE measurement configuration used in the source PCell;  3> store the handover failure information in *VarRLF-Report* as described in the subclause 5.3.10.5;  3> initiate the failure information procedure as specified in subclause 5.7.5 to report DAPS handover failure.  2> else:  3> revert back to the UE configuration used in the source PCell;  3> if the associated T304 was not initiated upon cell selection performed while timer T311 was running, as defined in subclause 5.3.7.3:  4> store the handover failure information in *VarRLF-Report* as described in the subclause 5.3.10.5;  3> initiate the connection re-establishment procedure as specified in subclause 5.3.7.  NOTE 1: In the context above, "the UE configuration" includes state variables and parameters of each radio bearer. |

Rapporteur understands this change has impact on path switch failure trigger. Without this change, UE may trigger false path switch failure.

### 2.4 How to evaluate Remote UE threshold conditions

[7] thinks conditions provided for the remote UE when testing the the RSRP measurement for the PCell seems incomplete due to the fact that;

1. The conditions in the sections using the description in 5.8.15.2, e.g. 5.8.13.3 only checks whether the condition is met, however in the description, there is also a description on when it is not met. The not met description is incomplete, and there should be consistensy between describing only whether the condition is met, or both
2. Whether the threshold is configured is only checked when considering the thresholds to be met
3. The first bullet stating the condition that the

“2> if the threshold conditions specified in this clause were not met”

is wrong/ambiguous, as the it states the conditions are not met unless the conditions were not met.

1. In the the level 1 else condition, the check for RSRP measurement value does not contribute to anything, as it only leads to “not being met”, and the threshold implicitly being above the threshHighRemote if the other conditions are not met
2. The (entry) and (leave) explanations, as it does not provide any beneficial guidance to the behaviour as it does not state what to leave anywhere

The proposed change is as following,

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| --- |
| 5.8.15.1 General  This procedure is used by a UE supporting NR sidelink U2N Remote UE operationconfigured by upper layers to receive/ transmit NR sidelink discovery message to evaluate AS layer conditions.  5.8.15.2 NR Sidelink U2N Remote UE threshold conditions  A UE capable of NR sidelink U2N Remote UE operation shall:  1> if the threshold conditions specified in this clause were not previously met:  2> if *threshHighRemote* and *hystMaxRemote* is configured;  3> if the RSRP measurement of the PCell is below *threshHighRemote* by *hystMaxRemote*; or  3> the cell on which the UE camps, is below *threshHighRemote* by *hystMaxRemote* if configured:  4> consider the threshold conditions to be met;  2> else if the UE has no suitable cell, or *threshHighRemote* and *hystMaxRemote is not configured*:  3> consider the threshold conditions to be met;  2> else:  consider the threshold conditions not to be met;  1> else:  2> consider the threshold conditions not to be met; |

Rapporteur understands the current structure is inherited from legacy LTE spec. The proposed change is more like wording improvement.

[9] thinks a UE should follow dedicated configuration received from gNB, that is a UE should perform Relay UE measurement if configured. However, it is not specified in the current spec whether the Remote UE should perform Relay UE measurement if it receives the measurement configuration for relay discovery but the Uu threshold conditions are not met. The proposed change is as following,

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| --- |
| 5.8.15.2 NR Sidelink U2N Remote UE threshold conditions  A UE capable of NR sidelink U2N Remote UE operation shall:  1> if the threshold conditions specified in this clause were not met:  2> if *threshHighRemote* is not configured; or the RSRP measurement of the PCell, or the cell on which the UE camps, is below *threshHighRemote* by *hystMaxRemote* if configured, or  2> if the UE has no suitable cell:  3> consider the threshold conditions to be met (entry);  2> if the UE is configured with NR sidelink measurements of L2 U2N Relay UEs:  3> consider the threshold conditions to be met (entry);  1> else:  2> if the RSRP measurement of the PCell, or the cell on which the UE camps, is above *threshHighRemote* if configured:  3> consider the threshold conditions not to be met (leave); |

Rapporteur understands UE shall perform relay UE measurement even without this change, according to 5.5.3.1. Therefore, there may be no impact on procedure or ASN.1.

### 2.5 How to obtian remote UE’s local ID when target UE is in IDLE/INACTIVE

[8] thinks RAN2#117-e has confirm the working assumption of the support of handover to an IDLE/INACTIVE relay UE in direct-to-indirect path switch. And default PC5 RLC channel is used to deliver RRCReconfigurationComplete message. Meanwhile in the same meeting, it also agreed that relay UE obtains remote UE's local ID used in SRAP header via gNB configuration, which is similar to agreed RRC establishment procedure. However, please note RAN2 also agreed that remote UE obtains its local ID from gNB in RAN2#116b-e. Then, it means that both remote UE and relay UE may obtain the remote UE local ID from gNB in direct-to-indirect path switch. Following issues are not clear:

1. In which Uu RRC message that remote UE obtains its local ID

2. Whether these two remote UE IDs (remote UE obtained and relay UE obtained) are same

Two alternatives are proposed for remote UE to obtain its local ID when the target relay UE is IDLE/INACTIVE state:

Alt-1: In RRCReconfiguration message after relay UE enters CONNECTED state

Alt-2: In path switch command towards remote UE

Rapporteur understands the gNB implementation can resolve the mentioned issue, so there may be no impact on procedure or ASN.1.

### 2.6 Whether to support conditional path switch in R17

[6] propose RAN2 to support conditional handover for switching from direct to indirect path as well as switching from indirect to direct path.

Rapporteur understands R17 relay has closed. Therefore, the condition handover for path switch may not be supported in R17.

### 2.7 Correction to stage 2

[2][3] propose miscellaneous corrections to 38.300.

# Conclusion

Following proposals are made,

**Proposal 1: Change 4 and 5 in [1], [4], [5] are critical changes.**

**Proposal 2: [2], [3], [6], [7], [8], [9] are non-critical changes.**

# Reference

[1] R2-2204635 Correction on [O009, o017, O020, O022-O025] OPPO

[2] R2-2204795 Miscellaneous corrections for NR SL Relay in 38.300 ZTE, Sanechips

[3] R2-2204990 Correction to support IDLE INACTIVE relay UE OPPO

[4] R2-2205093 38.331 CR for SL relay events Samsung

[5] R2-2205320 [X200] Discussion on path swith failure upon target relay UE Pcell change Xiaomi

[6] R2-2205339 Service continuity open issues in L2 NR sidelink relay Sony

[7] R2-2205375 On the entry and leave conditions for path switch in SL relay Nokia, Nokia Shanghai Bell

[8] R2-2205633 Discussion on how remote UE gets its local ID in direct-to-indirect path switch when target relay UE is in IDLE/INACTIVE state Apple

[9] R2-2205987 Clarification on Uu threshold handling when configured with measurements of L2 U2N Relay Ues Huawei, HiSilicon CR