**3GPP TSG-RAN WG2 Meeting #119bis-e R2-22xxxxx**

**E-Meeting, 10th – 19th October, 2022**

**Source: vivo (Rapporteur)**

**Title:****Summary of [AT119bis-e][411][Relay] Relay cause value**

**Agenda Item:** **6.7.1**

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

# Introduction

The following offline discussion is triggered to mainly discuss these proposals as follows:

* [AT119bis-e][411][Relay] Relay cause value (vivo)

 Scope: Discuss the LS in R2-2209306 and related documents (R2-2209812 / R2-2209813 / R2-2209814+ first change from R2-2209903), consider the proposed correction, and draft a reply.

 Intended outcome: Report, approvable LS, and agreeable CR if needed

 Deadline: Friday 2022-10-14 1000 UTC

**Phase 1:** The Rapporteur kindly requests companies to provide feedback on the questionnaire by **2022-10-13 1000 UTC.**

**Phase 2:** The Rapporteur kindly requests companies to provide feedback on approvable LS and agreeable CR if needed, by **2022-10-14 1000 UTC.**

## Contact Points

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# Discussion

The offline discussion is organized into the following two parts:

* Firstly, we check the CT1 LS to see if there is any issue for RAN2 to address.
* Secondly, we attempt to agree on a way forward based on the issue found.

## Check CT1 LS

In the LS (see highlighted in yellow as below), CT1 has agreed that the AS layer can decide the final RRC establishment cause value for a simultaneously triggered case at the L2 Relay UE side, i.e., when the Relay UE receives request from the L2 Remote UE, and in the meantime the L2 U2N relay UE has its own service arrival from its upper layers.

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| CT1 has discussed how to set RRC establishment cause value for the case when the access attempt is simultaneously triggered by both the own service of the 5G ProSe layer-2 UE-to-network relay UE in 5GMM-IDLE mode and the 5G ProSe layer-2 remote UE, and achieved the following consensus (see attachment): the RRC establishment cause is selected according to table 4.5.6.1 and table 4.5.6.2 of clause 4.5.6, 3GPP TS 24.501 in the above case, however, it is possible for the lower layer to decide an applicable RRC establishment cause according to the request from the 5G ProSe layer-2 remote UE. |

Moreover, their specification TS 24.501 has been updated accordingly. Please see the highlighted yellow text in NOTE2 as below.

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| 4.5.6 Mapping between access categories/access identities and RRC establishment causeWhen 5GMM requests the establishment of a NAS-signalling connection, the RRC establishment cause used by the UE shall be selected according to one or more access identities (see subclauses 4.5.2 and 4.5.2A) and the determined access category by checking the rules specified in table 4.5.6.1 and table 4.5.6.2. If the access attempt matches more than one rule, the RRC establishment cause of the lowest rule number shall be used. If the determined access category is an operator-defined access category, then the RRC establishment cause used by the UE shall be selected according to table 4.5.6.1 and table 4.5.6.2 based on one or more access identities (see subclauses 4.5.2 and 4.5.2A) and the standardized access category determined for the operator-defined access category as described in subclause 4.5.3.NOTE 1: Following an RRC release with redirection, the lower layers can set the RRC establishment cause to “mps‑PriorityAccess” in the case of redirection to an NR cell connected to 5GCN (see 3GPP TS 38.331 [30]) or to “highPriorityAccess” in the case of redirection to an E‑UTRA cell connected to 5GCN (see 3GPP TS 36.331 [25A]), if the network indicates to the UE during RRC connection release with redirection that the UE has an active MPS session.NOTE 2: In case of the UE is acting as a 5G ProSe layer-2 UE-to-network relay UE, it is possible for the lower layer to decide an applicable RRC establishment cause according to the request from the 5G ProSe layer-2 remote UE as specified in 3GPP TS 38.331 [30]. |

Based on the highlighted text in yellow, Rapporteur would summarize the follows observations:

**Observation 1: When RRC connection establishment at the L2 U2N Relay UE side is simultaneously triggered by both its own service and a request from the L2 U2N Remote UE, two kinds of cause value information are available: one is from Relay UE’s NAS layer and the other is from the request signalling of the Remote UE.**

**Observation 2: For the simultaneously triggered case (described in Observation 1), CT1 has agreed that it is possible for the Relay UE’s AS layer to decide the final cause value according to the applicable cause value information included in request signalling of the Remote UE.**

**Observation 3: CT1 Specification has been updated to capture CT1 agreement on L2 U2N Relay UE’s cause value setting behaviour for the simultaneously triggered case.**

However, it’s unclear whether the current TS 38.331 has correctly captured the case agreed by CT1 or not. According to current TS 38.331, the L2 U2N Relay UE’s cause value setting behaviors are specified as follows. In general, there are 3 cases to trigger the L2 U2N Relay UE’s RRC connection establishment:

only triggered by L2 U2N Relay UE’s its own service from the NAS layer (specified in green text as below)

only triggered by a request from the L2 U2N Remote UE within the AS layer (specified in blue text as below)

simultaneously triggered by both L2 U2N Relay UE’s own service and a request from the L2 U2N Remote UE (specified?)

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| 5.3.3.3 Actions related to transmission of *RRCSetupRequest* messageThe UE shall set the contents of *RRCSetupRequest* message as follows:1> set the *ue-Identity* as follows:2> if upper layers provide a 5G-S-TMSI:3> set the *ue-Identity* to *ng-5G-S-TMSI-Part1*;2> else:3> draw a 39-bit random value in the range 0..239-1 and set the *ue-Identity* to this value;NOTE 1: Upper layers provide the *5G-S-TMSI* if the UE is registered in the TA of the current cell.1> if the establishment of the RRC connection is the result of release with redirect with *mpsPriorityIndication* (either in NR or E-UTRAN):2> set the *establishmentCause* to *mps-PriorityAccess*;1> else:2> set the *establishmentCause* in accordance with the information received from upper layers;NOTE 2: In case the L2 U2N Relay UE initiates RRC connection establishment triggered by reception of message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1 as specified in 5.3.3.1a, the L2 U2N Relay UE sets the *establishmentCause* by implementation, but it can only set the *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess* as *establishmentCause* if the same cause value is in the message received from the L2 U2N Remote UE via SL-RLC0. |

For the simultaneously triggered case, the problem is that based on current RRC specification, the above if condition will also be met since the Relay UE will be provided with cause value information by NAS layer in this case. Consequently, the Relay UE shall always set the cause value indicated by NAS layer. In other words, the RRC Specification is not aligned with CT1 specification on L2 U2N Relay UE’s cause value setting behavior for the simultaneously triggered case.

**Observation 4: According to current RRC Specification, the L2 U2N Relay UE’s cause value shall be set to the cause value information from NAS layer for the simultaneously triggered case, which is against the CT1 agreement& specification.**

Given Observation 1,2,3,4 as above, Rapporteur believes that misalignment has occurred between the current RRC Specification and CT1 Specification on Relay UE cause value setting ehavior for the simultaneously triggered case. Therefore, Rapporteur would like to check with companies in the following Q1.

**Q1: Do companies agree that there is misalignment between current RRC Specification and CT1 Specification on Relay UE cause value setting ehavior for the simultaneously triggered case?**

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| **Company** | **Agree/Not-agree** | **Comment** |
| OPPO | Disagree | We fail to understand why there is a misalignment, according to our C1 colleague, this C1 LS is only sent for information, it is not used to trigger R2 action at all. |
| Vivo | Agree(Proponent) | As the LS contact company, we want to further clarify that CT1’s agreement was to leave it to AS layer to decide the final cause value for the simultaneously triggered case but they are not aware of whether/how RRC spec are updated in order to match their agreement. |
| Qualcomm | Disagree | We do not think there is a misalignment. In fact, with the updates made to CT1 spec, CT1 already aligned to the RAN2 spec NOTE2 and there is no action to take in RAN2. |
| Samsung | Disagree | We understand that NOTE2 is to align with NOTE2. So we do not see any further specification impact in RAN2. |
| Sharp | Comments | We don’t see misalignment. However according to the current NOTE2 in RRC spec, relay UE can only set cause value as *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess* if the same cause value is received from remote UE. Does it mean when different cause value is received from remote UE even the upper layer indicates the same cause value, relay UE cannot set cause value to *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess*?If so, it seems unreasonable. |
| Huawei, HiSilicon | Disagree | We do not see a misalignment, because in RAN2 we already agree it’s left to relay UE’s implementation, which does not exclude any possible interaction between upper layers and AS layer.In addition the NOTE in RRC spec is only for the case that relay UE’s RRC connection is triggered by remote UE’s access, if there is relay UE’s own service, how to set the cause value can be considered as the legacy UE behavior, which is not to be changed according to RRC spec in any case. |
| Xiaomi | Can follow majority | The simultaneous trigger case is not included in current spec. However, we believe this should be a corner case. We can go with majority. |
| ZTE | agree | In our understanding, based on section 4.5.6 (TS 24.501), even for only triggered by remote UE case, there will be also a cause value from upper layer (upper layer implementation to give a cause value other than the three high priority values, mostly mo-data), but in this case, the AS layer can (re)decide a applicable cause according to the request from remote UE. So the question is, when triggered by remote UE case (including simultaneously triggered by its own service), current RRC Specification does not include the case that relay UE can also set the cause value to *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess* if received the three values from upper layer. |
| Ericsson | Disagree | We also do not see the misalignment. When the relay UE does not have its own service and the connection establishment is triggered by the remote UE’s access, NOTE2 applies. If the relay UE has its own service, we follow legacy behaviour. The current spec is clear.  |
| Nokia | Disagree | We do not think that there is real misalignment: NOTE 2 in the RRC specification covers it, as "sets the establishmentCause by implementation" covers the case that cause value received from NAS is used. However, some clarifications may be added (see our comment for Q2). |
| Apple | See comment | We do not see big issue (simultaneous triggering is a corner case), but are open to further enhance NOTE 2 to align with CT1 understanding. |
| Futurewei | Disagree but … | NOTE2 applies to the case being described. Therefore, implementation of Relay UEs is not required to follow its own NAS-layer value. The current text should be OK except for a corner case where the NAS-layer of the Relay UE indicates one of *emergency*, *mps-PriorityAccess*, and *mcs-PriorityAccess* cause values while the remote UE’s message indicates a different one of these three cause values. |
| CATT | See comment | We reckon that the simultaneous triggering is a corner case, for UE’s implementation, if the remote UE’s trigger is ahead the processing queue, sure it is possible for the lower layer to decide an applicable RRC establishment cause according to the request from the 5G ProSe layer-2 remote UE. That’s to say, there is no further R2 alignment work is needed at all. |

**Summary:**

**Xxx**

## Decide on a way forward

If the ANS to **Q1** is **Agree**, then RAN2 can further discuss on whether/how to resolve the misalignment issue. Rapporteur understanding is that the CT1 agreement to leave it to AS layer to decide an appropriate cause value is mainly for the simultaneously trigger cases when the upper layer triggered event at the Relay UE side is not very critical i.e., except *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess*. In other words, the L2 U2N Relay UE can only ignore the cause value information received from upper layers except *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess* and set it by AS layer in these cases. Regarding the specific CR wording, there are two contributions submitted in this meeting to address the related misalignment issue. One is R2-2209814, and the other is the first change from R2-2209903. Rapporteur would like to check companies view on the CRs in the following Q2.

**Q2: If the ANS to Q1 is Agree, which Option(s) do companies prefer** **for an agreeable CR to address the misalignment issue?**

* **Option 1: CR in R2-2209814**



* **Option 2: first change in R2-2209903**



* **Others, please specify.**

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| **Company** | **Option(s)** | **Comment** |
| vivo | Option 1 or Option 2, we can follow majority | Both Option 1 and Option have the same intention to align with CT1. We have no strong view which option is adopted as long as the misalignment issue is resolved. |
| Sharp | Option 2 | For Option 1, if *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess* is indicated by upper layer, UE must set cause value according to indication from upper layer.For Option 2, it is UE’s implementation when *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess* are both indicated by upper layer and remote UE. |
| Xiaomi | Option 2, if any change is needed |  |
| ZTE | Option 2 | In simultaneous case, when at least one of the cause values from NAS layer or L2 U2N remote UE is *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess*, L2 U2N relay UE can set *establishmentCause* with *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess*. When cause value from both NAS layer and L2 U2N remote UE are not *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess*, the L2 U2N relay UE can also set the *establishmentCause* with the cause value from NAS layer. So in this condition, ‘ignore’ the cause value information from NAS layer is not exactly correct. In our opinion, RAN2 only needs to specify the condition L2 U2N relay UE is allowed to set cause value as *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess*. In all other cases, L2 U2N relay UE can set the *establishementCause* by implementation. |
| Nokia | Option 2 is acceptable, but not necessary | Option 1 makes mandatory to use the cause value received from NAS if it is emergency, or mps-PriorityAccess, or mcs-PriorityAccess. |
| Apple | Option 2 |  |
| Futurewei | - | For both options, we wonder which one should be followed if the NAS-layer of the Relay UE indicates one of *emergency*, *mps-PriorityAccess*, and *mcs-PriorityAccess* cause values while the remote UE’s message indicates a different one of these three cause values. |

**Summary:**

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Lastly, Rapporteur would like to check with companies on the need of an approvable LS reply to CT1. On one hand,the LS reply can inform CT1 our specification update with the 331 CR as attachment, if any. Then the misalignment issue is closed and no further discussions may occur. On the other hand, if there is no agreeable CR to address the misalignment issue. Then, the LS reply can at least describe the misalignment issue between current RRC Specification and CT1 Specification, and may also ask CT1 to re-consider the Relay UE’s cause value setting behavior if there is any concern. For the latter option, more discussions across CT1 and RAN2 cannot be avoided.

* **Q3: Do companies agree to send an LS reply to CT1 in accordance with the outcome of above Q1 and Q2?**

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| **Company** | **Agree/Not-agree** | **Comment** |
| OPPO | Disagree | We do not foresee a critical issue and thus do not see the need of R2 action (including LS reply) upon the reception of this C1 LS. |
| Vivo | Agree | As replied in Q1, it’s better for RAN2 to send the LS reply to resolve the misalignment issue across different specs. And also attach the agreeable RAN2 CR if any. |
| Qualcomm | Disagree | Same view as OPPO. No need to send an LS reply as CT1 already updated CT1 spec and there is no input expected. |
| Samsung | Disagree | Same view as OPPO and Qualcomm. |
| Sharp |  | No strong view, ok to follow the majority. |
| Huawei, HiSilicon | Disagree | Same view as OPPO and Qualcomm. We do expect any RAN2 action, so reply LS is not needed. |
| Xiaomi | Disagree | Even if any change is needed, it’s not related to CT1. So, we don’t see the need of LS. |
| ZTE | agree |  |
| Ericsson | Disagree | Agree with OPPO, Qualcomm and Huawei |
| Nokia | Disagree  | We should only send an LS if we disagree with CT1 and RAN2 expects CT1 to change their specifications. |
| Apple | Disagree | No need for a reply LS |
| Futurewei | - | We wonder whether the following corner case can happen:The NAS-layer of the Relay UE indicates one of *emergency*, *mps-PriorityAccess*, and *mcs-PriorityAccess* cause values while the remote UE’s message indicates a different one of these three cause values. If RAN2 decide that such corner case won’t happen or is not a concern, then there is no need to send LS to CT1. But if we want to check CT1’s opinion on this, then we can send an LS. |
| CATT | Disagree | Same view as OPPO. |

**Summary:**

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# Conclusion

The summary concludes with the following proposals:

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1. Reference
2. R2-2209306 LS on setting RRC establishment cause value when relay UE has its own service (C1-225453; contact: vivo) CT1 LS in Rel-17 5G\_ProSe To:RAN2 Cc:SA2
3. R2-2209812 [Draft] LS reply on setting RRC establishment casue value when relay UE has its own service vivo LS out To:CT1 Cc:SA2
4. R2-2209813 Discussion on LS from R2-2209206(C1-225453) vivo discussion
5. R2-2209814 Correction to the L2 U2N Relay UE’s cause value setting behaviour vivo CR Rel-17 38.331 17.2.0 3509 - F NR\_SL\_relay-Core
6. R2-2209903 Correction on control plane for L2 U2N relay ZTE, Sanechips draftCR Rel-17 38.331 17.2.0 F NR\_SL\_relay-Core