3GPP TSG-RAN WG2 Meeting #117 Electronic R2-220xxxx

Online, 21 Feb – 03 Mar 2022

**Agenda item: 8.7.2.1**

**Source: Huawei, HiSilicon**

**Title: [AT117-e][627][Relay] Remaining issues on control plane (Huawei)**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

* [AT117-e][627][Relay] Remaining issues on control plane (Huawei)

Scope:

* Discuss emergency case for relay UE setting cause value

Intended outcome: Report to CB session

Deadline: Tuesday 2022-03-01 1200 UTC

The suggested deadline for companies' feedback: Monday W2, 2022-02-28 1200 UTC.

# 3 Discussion

On how the relay UE to set the cause value in its own msg3 when remote UE’s first RRC message triggers relay UE entering RRC\_CONNECTED state, there was no majority’s support on either specified solution, then it was agree to go with the direction of leaving it to relay UE’s implementation.

It is left to relay UE’s implementation on how to set cause value in its own msg3 when remote UE’s first RRC message triggers relay UE entering RRC\_CONNECTED state, with the possible exception of the emergency case (to be discussed offline).

However there were some comments on the emergency case. This offline was allocated for further discussion and clarification on that case.

Discussion:

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Xiaomi wonder if we leave it to relay UE implementation, the relay UE would have freedom to set any cause value (e.g. emergency). They do not think it is acceptable if the relay UE can set the emergency value by implementation. Ericsson have the same concern. Apple have the same concern.

Moderator understands the comment is whether relay UE is allowed to set the cause value as emergency which would be taken as higher priority access type. However, it is not clear what the real concern/negative impact would be.

On one hand, from network side, it may want to prioritize the access of relay considering the relay is to enhance the coverage and suppose to serve more than one remote UEs. And if the relay UE enters connected mode during path switch, it would be helpful to indicate high priority in msg3 to ensure network will accept the access. On the other hand, companies seems to think if relay UE sets the cause as emergency it may mislead network, resulting in invalid admission control. In this case, the solution could be limit relay UE not to set emergency as cause value. So we would like to check company views in the following questions.

**Question 1: Which option do companies prefer?**

* **Option 1: relay UE is allowed to set establishmentCause/resumeCause as any existing value including emergency;**
* **Option 2: relay UE is allowed to set establishmentCause/resumeCause as any existing value except emergency;**
* **Option 3: relay UE is allowed to set establishmentCause/resumeCause as any existing value, but can use emergency only when remote UE uses emergency**
* **Option 4: relay UE is allowed to set establishmentCause/resumeCause as any existing value, but can use emergency or mcs-PriorityAccess when remote UE uses emergency or mcs\_PriorityAccess**
* **Other options (please add here).**

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| Company | Yes/No | Comments |
| Qualcomm | See comments | First, I think it is necessary to clarify understanding on Monday’s outcome of discussion. Our understanding is:   * No new PC5-RRC signaling is introduced to indicate cause value of remote UE * Relay UE doesn’t have requirement to decode Msg3 of remote UE   If this understanding is correctly, it seems to imply that relay UE has no way to know cause value of remote UE. Then, Option 2 is the only choice (i.e., it is impossible for relay UE to use “emergency”, given it doesn’t even know which cause value remote UE is using) |
| InterDigital | Option 3 | We think the main concern during online is that the relay UE sets the cause value to emergency/high priority unnecessarily. In the context of leaving the cause value setting upto relay UE implementation, we think emergency/high priority should only be used when the remote UE uses emergency/high priority.  We think there are different ways we can ensure the relay UE knows the cause value of the remote UE (even without new PC5-RRC signalling) and it is important that we prioritize proper functioning of the system, rather than focusing on simplifications at the relay UE. |
| Ericsson | Option 2 | First, after checking a bit the IAB history, it is indeed true that there is no limitation in setting up the establishmentCause/resumeCause by the IAB-MT. However, this agreement was made by keeping in mind that the IAB-MT is for all intents and purposes a network node. In this sense, the other network nodes (parent IAB or donor IAB) are able to figure out on whether the emergency cause was set for a real emergency or just to get the priority access.  According to this, our main preference would be Option 2 (also given the QC explanation). However, we are also fine to accept Option 3 is majority is fine. |
| MediaTek | Option-2 or Option-1 | We have the same understanding as Qualcomm and Ericsson.  Meanwhile, we think that Option-1 is equal to Option-2, since Relay UE doesn’t have requirement to decode Msg3 of remote UE, and it is up to Relay UE implementation.  Maybe Option-2 and Option-1 can be merged as below without the indication of emergency:  **Relay UE is allowed to set establishmentCause/resumeCause as any existing value** |
| Xiaomi | Option 3 | Option 1 is not preferred since relay UE may set Emergency as cause value even if the access attempt from remote UE is for normal data transmission, e.g. MO-data.  Option 2 is not preferred since remote UE may trigger emergency access attempt. If relay is not allowed to set emergency as cause value, the access attempt may be rejected, which result in remote UE’s emergency call is rejected.  Option 3 is a compromised solution which can avoid the drawback of option 1 and 2, but also leave room for UE implementation in the case that remote UE’s access attempt is non-emergency.  The remote UE can indicate relay UE when it set emergency as cause value in existing PC5 RRC message. Otherwise, remote UE doesn’t indicate relay UE. |
| OPPO | Option 1 or Option 2 | We agree with Qualcomm that according to Monday’s discussion, **No PC5-RRC signalling will be introduced for cause value setting and relay UE doesn’t need to decode remote UE’s Msg3** which means Option 3 is not feasible (we interpret option-3 as an attempt to further introduce new signalling over PC5-RRC (regardless of using new or old message) or require relay UE to check MSG3 of remote-UE) !  For option 1 and option 2, we are fine to follow majority view, and slightly prefer option 1 as an easy solution. |
| Lenovo, MotM | Option 2 or Option 3 | We prefer Option 2 with the assumption that since the network is aware that “emergency” can’t be used as a cause by a relay UE, it will prioritize all relay establishments, at least for access control purposes. This is a burden, but the network needs to live with it – given our agreements so far.  Option 3 is still somewhat useful since reading Msg3 of remote is possible – Msg3 is not ciphered and therefore technically reading clear-text is possible, even though we do not generally specify such behaviour…but at least an implementation has this possibility. |
| Nokia | Option 3 | Option 2 is also acceptable for Rel-17.  Option 1 is not acceptable as it does not limit the use of emergency by relay UEs |
| Intel | Option 2 or Option 1 | We have the same understanding as Qualcomm. With the agreement to leave it to Relay UE implementation to choose a cause value, it is not clear how option 3 works. We are now left with the disadvantage that an ‘emergency’ request from Remote UE may be mapped to a non-emergency cause value at an IDLE Relay UE. |
| FirstNet | Option 4 | This is a modified Option 3. This is very important to public safety /First Responder community. As stated above, the Option 4 says “relay UE is allowed to set establishmentCause/resumeCause as any existing value, but can use emergency or mcs-PriorityAccess when remote UE uses emergency or mcs\_PriorityAccess |
| Apple | Option 2 | Option 1 is unacceptable because it gives too much latitude to relay UE to claim the emergency. Option 3/4 is not feasible as relay UE cannot know remote UE cause value. The only remaining choice is Option 2 |
| CATT | Option 2 | Agree with Ericsson’s comments. It answered the relevant understanding of IAB. |
| Huawei, HiSilicon | Prefer Option1, can accept Option2 | First we would like to confirm the following understanding from Qualcomm.   * No new PC5-RRC signaling is introduced to indicate cause value of remote UE * Relay UE is not required to decode Msg3 of remote UE   Based on above understanding, UE implementation means UE is allowed to set cause value considering the content in remote UE’s msg3 or not decode remote UE’s msg3 at all. Thus option 3 and option 4 are candidate ways for UE implementation, but relay UE should not be mandate for either one.  Between option1 and option2, we prefer option1, because option2 exclude the way of option 3/4 for UE implementation, but we can accept if majority prefer it. |
| Kyocera | Option 1 or 2 | We are fine to go with the majority between Option 1 and Option 2.  With regards to IAB, our understanding is that IAB nodes are always assumed to be in RRC CONN; therefore, the situation is different from relay UEs.  With regards to Option 3, the only way for this to work is for the relay UE to always decode Msg3 of the remote UE, even if only the emergency cause value can be applied from the remote UE. |
| ZTE | Option 1 or 2 | It is suggested that relay UE may set the establishment cause value as emergency only if relay UE’s has emergency call on its own. Otherwise, it should not set it as emergency. |
| AT&T | Option 3 and Option 4 with edits | We support the views of FirstNet and InterDigital and understand that this is an essential feature for mission critical/public safety use cases.  Option 1 is not acceptable. The primary issue with Option 1 is that the relay UE is allowed to set *establishmentCause/resumeCause* as any existing value **including emergency** even in the circumstances where the remote UE access attempt is for normal data transmission.  Option 2 is also not acceptable. Option 2 will enable the worst-case scenario for MC/Public Safety use cases. This would allow for the case where a remote UE requests *emergency* or *mcs-PriorityAccess* and can be denied access since the relay UE is allowed to set *establishmentCause/resumeCause* as any existing value except *emergency* or *mcs-PriorityAccess*.  Therefore, AT&T supports option 3 along with a slightly modified Option 4. We think that there are methods for the Relay UE to be made aware of the cause value of the remote UE to set *establishmentCause/resumeCause* and this can be specified in a simple manner. As mentioned in Q2, we propose something similar to Option 3 and 4:  The relay UE is allowed to set *establishmentCause/resumeCause* as any existing value, but only uses *emergency* or *mcs-PriorityAccess* cause values when the remote UEs cause value is *emergency* or *mcs-PriorityAccess.* |
| Samsung | Option 1 or option 2 | We have the same understanding as Qualcomm so option 3 and option 4 are not acceptable. |
| Spreadtrum | Option 2 | We prefer Option 2 and support the views of Lenovo, with the assumption that the network will prioritize all relay establishments, at least for access control purposes. |

**Question 2: Whether/how to capture the adopted option in Q1 in spec?**

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| Company | Comments and Suggestions |
| InterDigital | To ensure that emergency/high priority is not used unnecessarily, the specification can indicate that the relay UE can use any cause value, but only uses emergency/high priority cause value when the remote UE’s cause value is emergency/high priority. |
| MediaTek | The specs just captures: “the cause value for establishmentCause/resumeCause is set by Relay UE by implementation” |
| OPPO | We agree with MediaTek. |
| Intel | On top of MediaTek’s suggestion, if we go with option 2, we can add explicitly that the Relay UE is not allowed to use ‘emergency’ cause value. If we use ‘except emergency’, we wonder if it may be misinterpreted that there is another way to use emergency cause value by the Relay UE. |
| CATT | We share the same view as Intel. |
| Huawei, HiSilicon | We agree with MediaTek if something has to be capture. We are also fine if nothing is to be captured in spec. |
| Kyocera | We think it can be captured the adopted option in Stage 2. |
| ZTE | We agree with Huawei’s comment. Capture nothing is also fine for us. |
| AT&T | We think that setting the cause value of the Relay UE based on implementation will be problematic for deployments with undesirable outcomes for the mission critical/public safety use cases as we described in Q1. We agree with the InterDigital suggestion that the specification can indicate that the relay UE may use any cause value, but only uses *emergency/mcs-PriorityAccess* cause value when the remote UE’s cause value is *emergency/mcs-PriorityAccess*. |
| Samsung | Agree with MediaTek |
| Spreadtrum | Same view as Intel |

**Summary:**

1. **On Q1:**

**Clarification#1: During the discussion, companies confirmed that according to the W1 online discussion, the agreement of leaving to UE implementation means no new PC5-RRC signalling and no requirement on relay UE decoding remote UE’s msg3.**

**Clarification#2: with the Clarification#1, the moderator understand the new added option3 (and option4) is giving some guidance on the relay UE’s implementation on top of option1/2 (putting restriction on option1 or adding exceptional case to option2), i.e. it can decode remote UE’s msg3, and only when the remote UE’s cause value is emergency it is allowed to set emergency as its own cause value. For other cases, the UE is not allowed to set emergency. But as the decoding is not a mandate UE requirement, when relay UE does not decode remote UE’s msg3, it is allowed to set any existing cause value except emergency.**

* 18 companies participate the discussion.

**The support:**

* 5/16 companies (Qualcomm, Ericsson, Apple, CATT, Spreadtrum) select option 2. The argument is relay UE should not be allowed to set emergency for the remote UE’s service which is not emergency. Then given that during W1 online discussion it was not agree to let relay UE decode remote UE’s msg3 or receive it via PC5 signalling, then relay UE cannot differentiate remote UE’s emergency service and other service, thus the only way is that relay cannot set emergency in any case. 1 company (Ericsson) can accept option3.
* 3 companies (MTK, OPPO, Huawei) prefer option 1 than option 2, but can accept option 2, as there is no strong motivation foreseen to restrict relay UE cannot set emergency cause.
* 4 companies (Intel, Kyocera, ZTE, Samsung) can accept option1 and option2 with no explicit preference.
* 1 company (Lenovo) can accept option2 and option3.
* 3 companies (InterDigital, Xiaomi, Nokia) select new added option 3, while one company (Nokia) can accept option2.
* 2 operators (FirstNet, AT&T) select new added option 4, while one operator (AT&T) can accept option 3.

**The objection:**

* 1 company (nokia) oppose option1.
* Some companies do not think option3/4 are feasible. and one company (Samsung) oppose option 3 and option 4 explicitly

In a word, option 2 has significant majority support (14/18) and has no objection. Thus the moderator suggest we go with majority view to adopt option.

Thus the moderator suggest:

**[14/18] Proposal 1: On top of the agreement that it is left to relay UE’s implementation on how to set cause value in its own msg3 when remote UE’s first RRC message triggers relay UE entering RRC\_CONNECTED state, RAN2 to agree: Relay UE is allowed to set establishmentCause/resumeCause as any existing value except emergency.**

1. **On Q2:**

Based on company’s comments, the moderator suggests:

**Proposal 2: Capture “*The cause value for establishmentCause/resumeCause is set by Relay UE by implementation. Relay UE is not allowed to use ‘emergency’ cause value.”* in a Note in RRC spec.**

# 4 Conclusion

**[14/18] Proposal 1: On top of the agreement that it is left to relay UE’s implementation on how to set cause value in its own msg3 when remote UE’s first RRC message triggers relay UE entering RRC\_CONNECTED state, RAN2 to agree: Relay UE is allowed to set establishmentCause/resumeCause as any existing value except emergency.**

**Proposal 2: Capture “*The cause value for establishmentCause/resumeCause is set by Relay UE by implementation. Relay UE is not allowed to use ‘emergency’ cause value.”* in a Note in RRC spec.**