**3GPP TSG-RAN WG2 Meeting #114 e R2-2106463**

**E-Meeting, 19th - 27th May 2021**

**Source: vivo**

**Title:****Summary on agenda item 8.7.4.1 on L2 relay control plane**

**Agenda Item:** **8.7.4.1**

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

# Introduction

This contribution summarize contribution on L2 relay control plane under AI 8.7.4.1

In this contribution is structured with sub-sections for the following issues:

* Connection management
* SI delivery
* Paging
* UAC
* Others

# Connection management

## RRC state combination

Following proposal is left as an open issue in the offline #603 at last RAN2#113bis-e meeting.

*Proposal 7: [16/21] [For discussion] The RRC state combination of relay in IDLE and remote UE in INACTIVE is supported.*

Related company proposals at this meeting are summarized in the following table.

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| **Qualcomm** | R2-2104738 | Proposal 1: In L2 U2N relay, allow the RRC state combination of relay in IDLE and remote UE in INACTIVE |
| **OPPO** | R2-2104838 | Proposal 1For L2 UE-to-Network Relay, support the RRC state combination of (Relay UE in RRC\_IDLE, Remote UE in RRC\_INACTIVE). |
| **Spreadtrum** | R2-2105537 | Proposal 6: The RRC state combination of Relay in IDLE and Remote UE in INACTIVE is supported. |
| **Ericsson** | R2-2105773 | Proposal 19The RRC state combination of the relay UE in RRC\_IDLE while the remote UE is in RRC\_INACTIVE is supported, but RAN2 will not do any specific enhancement for supporting this scenario. |

It is observed that the majority companies still would like to confirm the support of RRC state combination of Relay UE in RRC\_DLE and Remote UE in RRC\_INACTIVE. As such RRC state combination has been discussed since SI phase for several times and should be determined ASAP, as rapporteur we suggest RAN2 to confirm the support of RRC state combination of Relay UE in RRC\_DLE and Remote UE in RRC\_INACTIVE. The potential specification impact to support such RRC state combination can be investigated later based on company contributions in future meetings if any.

Based on the above, Rapporteur proposes:

1. [Easy] RAN2 to confirm that the RRC state combination of Relay UE in RRC\_IDLE and Remote UE in RRC\_INACTIVE is supported.

## Cause value of Relay UE

Following proposal is left as an open issue in the offline #603 at last RAN2#113bis-e meeting.

*Proposal 1: [16/23, 22/23] [Cross group] New establishment/resume cause value should be set when relay UE enters RRC\_CONNECTED for relaying purpose. RAN2 send an LS to SA2/CT1 on RAN2’s progress on this.*

Related company proposals at this meeting are summarized in the following table.

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| **Qualcomm** | R2-2104738 | Proposal 2: New establishment/resume cause value should be set when relay UE enters RRC\_CONNECTED for relaying purpose. RAN2 send an LS to SA2/CT1 on RAN2’s progress on this. |
| **OPPO** | R2-2104838 | Proposal 15Define a specific (new) *establishmentCause* value for relay service. |
| **InterDigital** | R2-2104871 | Proposal 4: A new Establishment/Resume cause value is introduced for a relay UE access triggered by a remote UE access.Proposal 5: The remote UE can inform the relay UE via PC5 of when the relay UE should use a higher priority (e.g. emergency) cause value for its establishment/resume. |
| **Intel** | R2-2104888 | Proposal 3a: If both RRC\_INACTIVE and RRC\_IDLE states are supported for Relay UE, RAN2 discuss how the Relay UE obtains the establishment cause for both cases: a) always from upper layer b) derived from Remote UE, so that it can establish RRC connection for relaying unless the Relay UE establishes the connection based on upper layer request (e.g. discovery). Proposal 3b: If Relay UE is in RRC\_IDLE state and upper layer trigger including establishment cause and access category is agreed, RAN2 initiate LS to SA2 as necessary. |
| **vivo** | R2-2104960 | Proposal 1 RAN2 assumes that existing establishment/resume cause values are re-used for Relay UE to enter RRC\_CONNECTED for relaying purpose.Proposal 2 Relay UE AS layer provides an indication to NAS layer upon reception of RRC message(s) on default PC5 RLC channel and then NAS layer sets from one of the existing establishment/resume cause value for Relay UE. |
| **ZTE** | R2-2104978 | Proposal 2: Relay UE reuse existing establishment/resume cause provided by upper layer when relay UE initiate the RRC establishment/resume only for the purpose of relaying. The interaction with NAS can be left to UE implementation. |
| **Futurewei** | R2-2105030 | Proposal 1: A new establishment/resume cause value should be defined for relay UE to request access for relaying purpose. |
| **Xiaomi** | R2-2105486 | Proposal 1: Relay UE shall align cause value as remote UE in RRC establishment or resume.Proposal 2: Remote UE shall indicate its cause value to relay UE. FFS using AS or NAS signalling. |
| **Huawei** | R2-2106161 | Proposal 9: A new establishment/resume cause value is needed for the case that a Relay UE establishes RRC connection in order to be a relay or relaying remote UE’s service, and the establishment/resume cause is set by RRC layer. |
| **LG** | R2-2106273 | Proposal 9: Relay UE can use existing establishment/resume cause value when relay UE enters RRC\_CONNECTED for relaying purpose.Proposal 10: We need to discuss whether the establishment/resume cause value from remote UE will be handled the same as the establishment/resume cause value from relay UE.  |
| **Xiaomi, Nokia, Nokia Shanghai Bell, Lenovo, Motorola Mobility, Vivo, Apple, ZTE** | R2-2106293 | Proposal: Reuse existing establishment/resume cause value for relay UE when relay UE enter RRC\_CONNECTED only for relaying purpose. |

According to above proposals, we observe that there is no clear majority view on this issue:

1. **Existing cause value**: supported by 7 companies (Xiaomi, Nokia, Lenovo, vivo, Apple, ZTE, LG)
2. **New cause value**: supported by 5 companies (Qualcomm, OPPO, InterDigital, Futurewei, Huawei)

Moreover, even if existing cause value is agreeable, we still need to further discuss how to set the exact establishment/resume cause value for Relay UE. There are two options on the table:

* **Option 1:** Follow the same establishment/resume cause value as received from the Remote UE
* **Option 2:** Up to NAS layer, i.e., it is not necessarily the same cause value as the Remote UE.

In **Option 1**, considering one Relay UE can serve several Remote UEs, it may not be feasible when receiving connection request from more than one Remote UE(s) with different establishment/resume cause values. **Option 2** is more flexible. When receiving connection request from more than one Remote UEs, the Relay UE can just indicate to the NAS layer and let the NAS layer set the appropriate establishment/resume cause value by considering all served Remote UE service types discovered during discovery procedure. The details may be discussed later once we converge on the issue of using existing establishment/resume cause value or not firstly. Our decision may also have impact on SA2 and CT1. Therefore,

1. [Cross WG] RAN2 to decide firstly whether new or existing establishment/resume cause value is used for Relay UE when Relay UE enters RRC\_CONNECTED only for relaying purpose.
2. [Cross WG] Send LS to SA2/CT1 to check their view on whether new or existing establishment/resume cause value is used.

## FFS for SRB0/SRB1

There are still 2 FFS points in the following agreement for Uu RLC channel of Remote UE’s SRB0 and SRB1.

Agreement：

Proposal 6-1: [20/23] [Easy] For the delivery of remote UE’s SRB0 RRC message, specified (fixed) configuration is used for the configuration of PC5 RLC channel. FFS for the Uu RLC channel.

Proposal 6-2: [21/23, 22/23] [Easy] For the delivery of remote UE’s SRB1 RRC message other than RRCResume and RRCReestablishment message, network configuration via dedicated signalling is used for the configuration of PC5 RLC channel and Uu RLC channel.

Proposal 6-3: [23/23] [Easy] For the delivery of remote UE’s SRB1 RRC message such as RRCResume and RRCReestablishment message, default configuration is used for the configuration of PC5 RLC channel which can be reconfigured by network. FFS for Uu RLC channel.

Related company proposals at this meeting are summarized in the following table.

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| **Qualcomm** | R2-2104738 | Proposal 3: For the delivery of remote UE’s SRB0 RRC message and SRB1 RRC message such as *RRCResume* and *RRCReestablishment* message:* Introduce a default configuration of Uu RLC channel for relaying, which can be reconfigured to dedicated configuration by the Network
* Network configuration via dedicated signaling is used for the configuration of Uu RLC channel if it is available in relay UE. Otherwise, relay UE can use the default configuration
 |
| **CATT** | R2-2104748 | Proposal 1: Uu RLC channel configuration of Remote UE’s SRB0 RRC message shall reuse CCCH configuration which is specified in specification.Proposal 3: The default configuration is applied for Uu RLC channel configuration of Remote UE’s SRB1 for *RRCReestablishment* message when Remote UE re-establishes the RRC connection via Uu link directly.Proposal 4: The network configuration is applied for Uu RLC channel configuration of Remote UE’s SRB1 for *RRCReestablishment* message when Remote UE re-establishes the RRC connection via U2N relay. |
| **OPPO** | R2-2104838 | Proposal 2For L2 UE-to-Network Relay, for the delivery of remote UE’s SRB0/1 RRC message, network configuration is used for the configuration of Uu RLC channel. |
| **InterDigital** | R2-2104871 | Proposal 1: The first RRC message from the remote UE is carried by SRB1 of the relay UE.Proposal 2: The relay UE encapsulates the first RRC message from the remote UE in its own RRC message on Uu.Proposal 3: The relay UE in RRC\_IDLE buffers the remote UE’s first RRC message until SRB1 at the relay UE is established. |
| **Intel** | R2-2104888 | Proposal 4: RAN2 agree that default/common configuration for the Uu Adaptation layer is supported to relay the first RRC message from the Remote UE via Relay UE.Proposal 5: Agree that the it is up to network implementation whether the Relay UE is provided with default configuration or Remote-UE specific configuration for adaptation over Uu of Remote UE’s first message.Proposal 6: Relay UE applies Remote UE-specific configuration to adaptation layer over Uu as soon as it is received. |
| **MediaTek** | R2-2104946 | Proposal-5: The *RRCSetupRequest* from Remote UE is forwarded in an RRC message (i.e. in a RRC container) from the Relay UE to the gNB.Proposal-6: *RRCSetup* message (going to Remote UE) from gNB to Relay UE is put into a RRC message container (e.g. *RRCReconfiguration* message). |
| **vivo** | R2-2104960 | Proposal 3 For the delivery of remote UE’s SRB0 RRC message, specified (fixed) configuration is used for the configuration of Uu RLC channel.Proposal 4 For the delivery of remote UE’s SRB1 RRC message such as *RRCResume* and *RRCReestablishmen*t message, default configuration is used for the configuration of Uu RLC channel.Proposal 5 The default configuration of Uu/PC5 RLC channel for the delivery of remote UE’s SRB1 RRC message can be reconfigured by network in *RRCResume* message and first *RRCReconfiguration* message after *RRCReestablishment*. |
| **ZTE** | R2-2104978 | Proposal 3: The Uu RLC bearer configuration for remote UE’s SRB0 and SRB1 (i.e. *RRCResume* and R*RCRestablishment*) message transmission can be provided by network via dedicated signaling. |
| **Samsung** | R2-2105678 | Proposal 1: SRB0 message between Relay UE and gNB can be transmitted even if Adapt is not configured.Proposal 3 :Fixed Uu RLC channel configuration is used for the delivery of Remote UE’s SRB0 message. Proposal 4: Default Uu RLC channel configuration is used for the delivery of Remote UE’s *RRCResume* and *RRCReestablishment* messages. |
| **Nokia** | R2-2106054 | Proposal 1: RAN2 to agree adaptation layer is not applied for SRB0. |
| **Huawei** | R2-2106161 | Proposal 1: The Remote UE’s SRB0 messages (i.e. msg3 and msg4) should be delivered with AL header carrying Remote UE ID@Uu link for the purpose of Remote UE differentiation at Relay UE and the gNB.Proposal 2: One dedicated Uu RLC bearer with default configuration should be used for Remote UE’s SRB0 delivering at Uu link. |

Based on above proposals, it is observed that:

1. **For the delivery of Remote UE’s SRB0 RRC message:**
	1. **Default configuration**: supported by 3 companies (QC, Intel, Huawei, Intel)
	2. **Specified (fixed) configuration**: supported by 3 companies (CATT, vivo, Samsung)
	3. **Network configuration**: supported by 4 companies (QC, OPPO, ZTE, Intel)
2. **For the delivery of Remote UE’s SRB1 RRC message such as *RRCResume* and *RRCReestablishment* message:**
	1. **Default configuration**: supported by 4 companies (QC, CATT, vivo, Samsung)
	2. **Network configuration**: supported by 4 companies (QC, CATT, OPPO, ZTE)

There is no clear majority view for both FFS points. To make progress Rapporteur would like to invite companies to think about the potential use cases for *RRCResume* and *RRCReestablishment*:

* **Case 1:** Remote UE Resume or Reestablishment to its own serving cell
* **Case 2:** Remote UE Resume or Reestablishment via current Relay UE to Relay UE’s serving cell
* **Case 3:** Remote UE Resume or Reestablishment via new Relay UE to Relay UE’s serving cell

If RAN2 aims to achieve common solution for the above 3 use case for *RRCResume* and *RRCReestablishment*, then for the delivery of remote UE’s SRB0 RRC message, specified (fixed) configuration is used for the configuration of Uu RLC channel as legacy SRB0. And for delivery of Remote UE’s SRB1 RRC message such as *RRCResume* and *RRCReestablishment* message, default configuration can be at least used for the configuration of Uu RLC channel as legacy SRB1, which can be reconfigured by the network later in *RRCResume* message and first *RRCReconfiguration* message after *RRCReestablishment*. Therefore,

1. [For discussion] For the delivery of remote UE’s SRB0 RRC message, for the configuration of Uu RLC channel the following options can be considered:
	* + - * **Default configuration**
				* **Specified (fixed) configuration**
				* **Network configurable**
2. [For discussion] For the delivery of Remote UE’s SRB1 RRC message such as *RRCResume* and *RRCReestablishment* message as legacy SRB1:
	* + Introduce default configuration of Uu RLC channel for relaying, which can be reconfigured to dedicated signalling by the Network
		+ Network configuration via dedicated signaling is used for the configuration of Uu RLC channel if available in Relay UE. Otherwise, default configuration is used

## RRC Re-establishment of Remote UE

There are still 2 FFS points in the following agreement related to PC5 RLF and Uu RLF.

Agreement:

Proposal 8: RAN2 confirm that remote UE triggers relay reselection if PC5 RLF with current relay UE is detected by remote UE. FFS if there is any impact to other RLF handling activities.

Agreement:

Proposal 4: When Uu RLF is detected by relay UE, relay UE may send a PC5-S message (similar to LTE) to its connected remote UE(s) and this message may trigger relay reselection. FFS other indication/message can also be used for notification.

Although the above agreement was discussed and reached in the AI of 8.7.3 Relay re/selection, it may have some impact to the RRC re-establishment procedure of Remote UE. Related company proposals at this meeting are summarized in the following table.

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| **Qualcomm** | R2-2104738 | Proposal 5: Upon either detected PC5 RLF or notified Uu RLF by relay UE, remote UE triggers RRC re-establishment either via a suitable relay or a suitable cell based on its implementation |
| **OPPO** | R2-2104838 | Proposal 8 For L2 UE-to-Network Relay, Relay can notify Remote UE on the relay UE Uu connection RLF via either PC5-S message or adaptation layer control PDU, and it is up to UE implementation to select between the two options. |
| **InterDigital** | R2-2104871 | Proposal 6: A remote UE that is RRC\_CONNECTED via a relay UE can trigger RLF when either SL-RLF occurs, or when it is informed of Uu-RLF of the relay UE.Proposal 7: A remote UE can receive an AS layer indication from the relay UE which triggers Uu RLF at the remote UE. FFS if network can provide SL-RLF indication from the relay UE to an IC remote UE. |
| **vivo** | R2-2104960 | Proposal 8 The Relay UE upon detecting Uu RLF or Uu RLF recovery failure can be indicated to Remote UE via PC5 RRC. The indication may trigger the Remote UE connection re-establishment.Proposal 9 The PC5 RLF detected by Remote UE may trigger the Remote UE connection re-establishment.Proposal 10 The Remote UE performs RRC re-establishment procedure as follows:* i.If a suitable cell is available, the Remote UE initiates RRC re-establishment procedure towards the suitable cell;
* ii.If a suitable relay is available, the Remote UE initiates RRC re-establishment procedure towards the suitable relay UE’s serving cell;
* iii.If both a suitable cell and a suitable relay are available, the remote UE can select either one to initiate RRC re-establishment procedure based on implementation.
 |
| **Kyocera** | R2-2105391 | Proposal 4 If the gNB receives a re-establishment request from the remote UE prior to receiving the PC5 RLF indicator from the relay UE associated with the same remote UE, the gNB should send a PC5 RLF indicator to the relay UE.Proposal 5 RAN2 should consider whether the remote UE should perform relay reselection before or after the outcome of the relay UE’s RRC re-establishment. |
| **Xiaomi** | R2-2105486 | Proposal 9: Whether relay UE send PC5-S message to remote UE upon Uu RLF is controlled by gNB.Proposal 10: Relay UE indicate remote UE upon RRC re-establishment failure. FFS reuse release message or use new indication. |
| **Huawei** | R2-2106161 | Proposal 10: When SL RLF is detected, Remote UE considers it as radio link failure with the gNB.Proposal 11: When Uu RLF is detected by relay UE, the relay UE sends an indication to the remote UE. After receiving the indication from the Relay UE indicating Uu RLF, the remote UE considers it as radio link failure with gNB.Proposal 12: When Remote UE radio link failure with gNB is detected, the remote UE tries to re-establish the RRC connection with gNB, during which a relay UE or a normal cell could be selected as long as the relay UE/cell meets the relay selection/cell selection criteria. |

## Uu RLF detected by Relay UE

In case that the Relay UE Uu RLF, majority companies think that this situation can be indicated to Remote UE instead of using existing PC5-S message (i.e., PC5 link release similar to LTE). But details of the indication/message e.g., PC5 RRC or adaptation layer control PDU may need further study. Moreover, the Remote may treat it as end-to-end radio link failure based on the indication and trigger re-establishment. Therefore,:

1. [Easy] The indication of Relay UE upon detecting Uu RLF may trigger the Remote UE connection re-establishment.

## PC5 RLF detected by Remote UE

In case of the PC5 RLF detected by Remote UE itself, the Remote may also treat it as end-to-end radio link failure and trigger re-establishment. Thus, similar to above, we have:

1. [Easy] Remote UE may trigger the Remote UE connection re-establishment upon detecting PC5 RLF.

## Remote UE re-establishes towards a suitable cell or suitable relay UE

Since Remote UE performs relay (re)selection and cell (re)selection independently. The suitable cell condition and/or suitable relay condition may be fulfilled when the Remote UE initiates the RRC re-establishment procedure. It is not clear for now that Remote UE re-establishes towards a suitable cell or suitable relay UE when either or both conditions are met. To simplify the Remote UE behaviour, rapporteur suggest the following methods can be considered as baseline.

1. [For discussion] The Remote UE performs RRC re-establishment procedure as follows:
* If a suitable cell is available, the Remote UE initiates RRC re-establishment procedure towards the suitable cell;
* If a suitable relay is available, the Remote UE initiates RRC re-establishment procedure towards the suitable relay UE’s serving cell;
* If both a suitable cell and a suitable relay are available, the remote UE can select either one to initiate RRC re-establishment procedure based on implementation.

## TAU/RNAU and Inter gNB resume/reestablishment of Remote UE

## TAU and RNAU of Remote UE

RAN2 made the following agreement on TAU and RNAU.

Agreement：

Proposal 5: [23/23] [Cross group] [Easy] The remote UE should perform TAU/RNAU procedure while in RRC\_INACTIVE and RRC\_IDLE. No LS to be sent from this meeting to SA2/ CT1/RAN3 on the remote UE’s TAU/RNAU procedure.

Related company proposals at this meeting are summarized in the following table.

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| **vivo** | R2-2104960 | Proposal 6 RAN2 to confirm that OOC Remote UE should perform TAU/RNAU procedure.Proposal 7 The Remote UE judges whether it moves out of its configured TA/RNA based on:1. Its own serving cell information before PC5 connected with Relay UE;
2. Relay UE’s serving cell information after PC5 connected with Relay UE.
 |
| **Lenovo** | R2-2105076 | Proposal 2: CN Registration/RNAU should be supported for the remote UE.Proposal 3: CN Registration/RNAU for the remote UE can be triggered by registration tracking change and periodic registration area update as legacy.Proposal 4: The RRC\_Connected relay UE can indicate the list of the served idle-mode remote UE(s) to network for the CN registration of the served remote UE(s) purpose.Proposal 5: The RRC\_Connected relay UE can indicate the list of the served inactive-mode remote UE(s) to network for the RNAU of the served remote UE(s) purpose. |
| **Apple** | R2-2105129 | Proposal 1 When out-of-coverage RRC\_INACTIVE remote UE is connected to a L2 U2N relay UE via PC5, the remote UE shares the same configured RNA as the relay UE.Proposal 2 When in-coverage RRC\_INACTIVE remote UE is disconnected to L2 U2N relay UE via PC5, the remote UE follows legacy RNA update procedures.Proposal 4 In this release, only consider periodic RNA update if remote UE is connected to the same L2 relay UE via PC5.Proposal 5 After relay reselection, if RRC\_INACTIVE remote UE reselects a relay UE whose serving cell is not belong to remote UE’s configured RNA, RNA update procedure is triggered. Proposal 6 After relay reselection, if RRC\_INACTIVE UE reselects a relay UE whose serving cell is not belong to remote UE’s RNA, RNA update procedure is triggered. Proposal 7 When RRC\_INACIVE relay UE conducts RNA update, relay UE report its associated remote UEs (with I-RNTI) to the gNB; gNB performs RNA updates for both relay UE and remote UE(s) altogether.Proposal 8 RRC\_INACTIVE remote UE, if connected to the same RRC\_INACTIVE relay UE, skips RNAU procedure and delegates its RNAU to the relay UE. |
| **Sony** | R2-2105696 | Proposal 1: RAN2 to discuss whether there is a need for a remote UE to perform RNA update if its relay UE’s serving cell belongs to the RNA of the remote UE.  |
| **Ericsson** | R2-2105773 | Proposal 10 The remote UE does not perform RNAU and TAU procedures if in out-of-coverage.Proposal 11 If the remote UE is out-of-coverage, the relay UE performs RNAU and TAU procedure for itself and on behalf of the remote UE.Proposal 12 When the relay UE performs RNAU and TAU procedure for itself and on behalf of the remote UE, the new gNB/AMF should retrieve both the remote and relay UE context.Proposal 13 RAN2 to send an LS to RAN3 to inform that when the relay UE performs RNAU and TAU procedure for itself and on behalf of the remote UE, the new gNB/AMF should retrieve both the remote and relay UE context. |
| **LG** | R2-2106273 | Proposal 1: In the L2 relay, Remote UE and Relay UE perform TAU/RNAU procedure independently.Proposal 2: When Relay UE and Remote UE exist in different TAU/RNAU areas, it is necessary to check with SA2 whether there is a problem when Relay UE receives a paging message instead of Remote UE. |

For OOC case, whether the OOC Remote UE should perform TAU/RNAU procedure or not needs to be clarified. Based on above proposal, company views differ on this issue. Therefore,

1. [For discussion] For OOC case, RAN2 to discuss whether Remote UE should perform TAU/RNAU procedure.

For IC case, regarding how to judge the Remote UE moves out of its configured TA/RNA, two different cases should be considered.

* Case 1: Remote UE is NOT PC5-connected with Relay UE;
* Case 2: Remote UE is PC5 connected with Relay UE.

For Case 1, it is clear that Remote UE performs TAU/RNAU as legacy, i.e., read SIB1 from its own serving cell to decide the trigger of TAU/RNAU. While for Case 2, Remote UE is controlled by the Relay UE's serving cell. Several companies suggested that Remote UE performs TAU/RNAU based on Relay UE’s serving cell in such case. However, there are also companies which would like to enhance Relay UE’s TAU/RNAU procedure on behalf of Remote UE. Therefore,

1. [Easy] For IC case, Remote UE performs TAU/RNAU based on its own serving cell information (i.e., as legacy) if Remote UE is NOT PC5-connected with Relay UE.
2. [For discussion] For IC case, Remote UE performs TAU/RNAU based on Relay UE’s serving cell information after Remote UE is PC5-connected with Relay UE.

## Inter-gNB Resume/Reestablishment

According to RAN2#113-bisRAN2 has made the following agreement

**“When relay performs HO to another gNB, relay UE may send a PC5-S message (similar to LTE) to its connected remote UE(s) and this message may trigger relay reselection. FFS other indication/message can also be used”**

There some considerations of remaining issue related to this agreement the open issue “FFS other indication/message can also be used” in term of:

* Retrieval of a remote UE’s context to a new gNB
* Indicates to the new gNB that the UE context of both the remote UE and relay UE should be retrieved

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| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| **Futurewei** | R2-2105030 | Proposal 3: Retrieval of a remote UE’s context to a new gNB is done when the remote UE performs RRC resume. The relay links (both over Uu and PC5) of a remote UE are released by the relay UE, after the relay UE performs RRC reestablishment or resume towards a new gNB. |
| **Ericsson** | R2-2105773 | Proposal 1 In case of RRC resume, when the Retrieve UE Context procedure is performed, the new gNB should retrieve both the remote and relay UE context.Proposal 2 RAN2 to send an LS to RAN3 in order to address the case that when the Retrieve UE Context procedure is performed, the new gNB should retrieve both the remote and relay UE context.Proposal 3 RAN2 to include in the LS the following solutions and let RAN3 to decide which solution to adopt.a. Solution 1: The UE that trigger the procedure (either the remote or relay UE) it indicates to the new gNB that the UE context of both the remote UE and relay UE should be retrieved.b. Solution 2: When getting the Retrieve UE Context Request, the old gNB sends to the new gNB both the remote and relay UE context. |

gNB may keep a UE context for the remote UE and another gNB for the relay UE, in that case during the Retrieve UE Context procedure, both the UE context of the remote UE and relay UE may retrieve. In order the UE context of both the remote UE and relay UE to be retrieved, the new gNB should be aware that there is a relay connection on-going.

1. [Cross WG] In case of remote UE RRC resume, RAN2 to discuss when the Retrieve UE Context procedure is performed, the new gNB may retrieve both the remote and relay UE context.
2. [Cross WG] If it is agreed that when the Retrieve UE Context procedure is performed, the new gNB may retrieve both the remote and relay UE context, RAN2 to send a Ls to RAN3 on whether UE Context has inter-gNB specification impact

## Remote UE ID

Who is responsible to allocate the remote UE identity is FFS from the last meeting.

Agreements:

Proposal 3b: The UE ID in the adaptation layer header is a local, temporary remote UE ID. FFS whether the local, temporary remote UE ID is assigned by the relay UE, or the serving gNB of the relay UE. (23/24)

Related company proposals at this meeting are summarized in the following table.

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| **OPPO** | R2-2104838 | Proposal 3For L2 UE-to-Network Relay, network allocate UE ID to be used in adaptation layer.Proposal 4For L2 UE-to-Network Relay, RAN2 discuss whether network allocates remote UE ID in adaption layer to relay UE before or after the first UL CCCH message. |
| **MediaTek** | R2-2104946 | Proposal-3: The Remote UE explicitly indicates its Remote UE ID to Relay UE when sending the initial RRC message (i.e. RRCSetupRequest) from Remote UE to gNB via Relay UEProposal-4b: Remote UE ID is put outside of the contained Uu *RRCSetupRequest* message within the PC5-RRC message that contains Uu RRCSetupRequest message from Remote UE.Proposal-5a: The Relay UE explicitly indicates its Remote UE ID to gNB when forwarding the *RRCSetupRequest* from Relay UE to gNB.Proposal-6b: Remote UE ID is put outside of the RRC message container (e.g. *RRCReconfiguration* message from gNB to Relay UE) that contains *RRCSetup* message going to Remote UE. |
| **Samsung** | R2-2105678 | Proposal 7: Temporary remote UE ID is assigned by the serving gNB of the relay UE.Proposal 8: Inform SA3 of the agreement that temporary remote UE ID is assigned by the serving gNB. |
| **Nokia** | R2-2106054 | Proposal 2: RAN2 to agree the temporary remote UE’s local ID is assigned by the serving gNB of the relay UE. |
| **Huawei** | R2-2106161 | Proposal 3: The Remote UE ID is allocated by Relay UE, and used to uniquely identify one Remote UE under one Relay UE.Proposal 4: RAN2 confirms that there is no security issues to include the local ID in the adaption layer header. |
| **Qualcomm Incorporated** | **R2-2104742** | Proposal 5: Relay UE generates the local remote UE ID and notifies gNB by including it in UL adaptation layer header for remote UE’s SRB0 message forwarding Proposal 6: Relay UE updates the local remote UE ID periodically or based on trigger events, and notifies gNB via *SidelinkUEinformationNR* message |

There are slightly more companies who prefer the network controlled Remote UE ID allocation. This is also in line with legacy Uu that all radio protocol layer configuration is under the network control. Therefore, rapporteur suggest that we take one step further to make one choice based on above agreement.

1. [For discussion] The serving gNB of the Relay UE allocates Remote UE ID to be used in adaptation layer. FFS details.

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## RRC Message content/configuration

Related proposals about RRC Message content/configuration for relaying are listed as below. These are more stage 3 details which are more suitable for discussion in future meetings.

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| **Company** | **Tdoc** | **Proposal** |
| **Qualcomm** | R2-2104738 | Proposal 4: Relay related message contents / configurations in different RRC messages: * In *RRCSetup* message towards remote UE, gNB can include PC5 RLC/LCH config for Uu SRB1 and Uu PDCP config for Uu SRB1
* In *RRCResume* / *RRCReconfiguration* message towards remote UE, gNB can include PC5 RLC/LCH config for Uu SRB1/SRB2/DRB, Uu PDCP config for Uu SRB1/SRB2/DRB, and Uu SDAP config for Uu DRB
* In *RRCReconfiguration* message towards relay UE, gNB can include PC5 RLC/LCH config for Uu SRB1/SRB2/DRB, Uu RLC/LCH config for Uu SRB1/SRB2/DRB, and bearer mapping configuration between PC5 and Uu
 |
| **Apple** | R2-2105129 | Proposal 9 When sending *RRCRelease* with *suspendConfig*, NW configures the t380 timer value(s) to algin the RNAU for both RRC\_INACTIVE relay UE and remote UE connected via this relay UE. |
| **Huawei** | R2-2106161 | Proposal 6: *RRCSetup*/*RRCResume*/*RRCReestablishment* of the Remote UE should contain PC5 RLC bearer configuration of SRB1, and the remote UE performs the association between the Uu SRB1 PDCP and PC5 RLC bearer.Proposal 7: When the RRC Reconfiguration message for the Remote UE is adding a Uu DRB, it should include PC5 RLC bearer configuration with assigned LCID.Proposal 8: Reuse the RRC Release message as Uu interface for the Remote UE. |

**Rapporteur view: Stage 3 details without rapporteur’s suggestion at this meeting.**

## Others

The followings are issues proposed by only one company. Rapporteur think that we can take them into account in future study, but without discussion at this meeting.

|  |  |  |
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| **Company** | **Tdoc** | **Proposal** |
| **Intel** | R2-2104888 | Proposal 1: RAN2 discuss whether it is feasible for the Relay UE to send indication to the gNB when the Relay UE intends to perform relay functionalities. |
| **Vivo** | R2-2104960 | Proposal 11 The PC5 connection between Remote UE and Relay UE is kept when Remote UE is released to RRC IDLE or RRC INACTIVE upon reception of *RRCRelease* message. |
| **Kyocera** | R2-2105391 | Proposal 3 For scenario 2, RAN2 should consider how to handle the case when the relay UE’s own RRC connection request fails while it has already received an *RRCSetupRequest* or an *RRCResumeRequest* from the remote UE. |
| **Ericsson** | R2-2105773 | Proposal 1 In case of RRC resume, when the Retrieve UE Context procedure is performed, the new gNB should retrieve both the remote and relay UE context.Proposal 2 RAN2 to send an LS to RAN3 in order to address the case that when the Retrieve UE Context procedure is performed, the new gNB should retrieve both the remote and relay UE context.Proposal 3 RAN2 to include in the LS the following solutions and let RAN3 to decide which solution to adopt.a. Solution 1: The UE that trigger the procedure (either the remote or relay UE) it indicates to the new gNB that the UE context of both the remote UE and relay UE should be retrieved.b. Solution 2: When getting the Retrieve UE Context Request, the old gNB sends to the new gNB both the remote and relay UE context. |
| **LG** | R2-2106273 | Proposal 7: we need to discuss how to handle NAS message generation on RRC\_IDLE/INACTIVE relay UE when the relay UE receives the RRC connection request message on SRB0 from remote UE.- Option 1: NAS layer of the relay UE always provides service requests of the relay UE itself to AS layer.- Option 2: NAS layer of the relay UE provides the received NAS message of the remote UE to AS layer.- Option 3: NAS layer of the relay UE provides the service request of the relay UE, and the received NAS message of the remote UE to AS layer. |
| **MediaTek** | R2-2104946 | Proposal-4: A Remote UE can use a PC5-RRC message (e.g. *RRCReconfigurationSidelink* or a new message) as a container to deliver the *RRCSetupRequest* message to Relay UE.Proposal-4a: A new SRB (e.g. SL SRB5) based on the fixed PC5 configuration is used to carry the PC5-RRC message that contains Uu SRB0 (including *RRCSetupRequest*) from Remote UE. |

**Rapporteur view: Issues proposed by only one company. Can be considered in future discussion.**

# SI delivery

## SIB delivery before vs after PC5 connection

Following proposals are left as open issues due to lack of online time for discussion:

*Proposal 10-1: [18/23] Remote UE can receive the system information via PC5 both before and after PC5 connection establishment with relay UE.*

*Proposal 10-3: [20/23] [Easy] If remote UE can receive the system information via PC5 before PC5 connection establishment with relay UE, broadcast can be used for the system information forwarding via PC5.*

*Proposal 10-4: [22/23] [Easy] If remote UE can receive the system information via PC5 after PC5 connection establishment with relay UE, at least unicast can be used for the system information forwarding via PC5.*

Related company proposals at this meeting are summarized in the following table.

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| Qualcomm | R2-2104738 | Proposal 10: Remote UE in OOC can receive SIB before PC5 connection with relay UE for initialization of RRC establishment.Proposal 14: After PC5 connection established with remote UE, relay UE can use a new SL-SRB to unicast forward entire Uu SIB(s) to remote UE. The logical channel priority of the new SL-SRB is fixed and between SL-SRB 2 and SL-SRB3. FFS whether to also support SIB forwarding via broadcast/groupcast. Proposal 15: When to forward and which SIB to forward are left to relay UE implementation. |
| OPPO | R2-2104838 | Proposal 9 Remote UE should receive the system information both before and after PC5 connection establishment with relay UE. |
| vivo | R2-2104960 | Proposal 12 Remote UE can receive the system information via PC5 only after PC5 connection establishment with relay UE. |
| Spreadtrum | R2-2105537 | Proposal 1: Remote UE can receive the system information via PC5 before PC5 connection establishment with Relay UE. |
| CMCC | R2-2106252 | Proposal 1: Remote UE can receive the system information via PC5 both before and after PC5 connection establishment with relay UE. |
| LG | R2-2106273 | Proposal 4: Relay UE delivers relaying related SIB to the remote UE after PC5 connection establishment with remote UE.Proposal 6: Remote UE can use the received SIB from its comping on the cell before PC5 connection establishment with remote UE. |

Based on above proposals, more companies suggest that Remote UE can receive the system information via PC5 before and after PC5 connection establishment with Relay UE. But there are also companies who think limiting the system information delivery after PC5 connection establishment with Relay UE is more simple and avoid potential WG impact. Therefore,

1. [For discussion] Remote UE can receive the system information via PC5 before and after PC5 connection establishment with Relay UE.

## Which SIB(s) can be forwarded

At last RAN2#113bis-e meeting, there are quite divergent views on which system information can forwarded to Remote UE. Therefore, no agreement has been achieved on this issue yet.

Companies continues further consideration on this issue at this meeting and their proposals are summarized as follows.

|  |  |  |
| --- | --- | --- |
| Company | Tdoc | Proposal |
| Qualcomm | R2-2104738 | Proposal 12: E-SIB is generated by relay UE based on Uu SIBs, i.e. no need to introduce a new Uu SIB to provide E-SIB.Proposal 13: For E-SIB delivery, at least PLMN ID, TAC, and cell ID are included in discovery message because they are required to be sent to upper layer according to TS 38.331. FFS whether to include other Ies of E-SIB in discovery message or a new broadcast PC5 RRC message |
| CATT | R2-2104748 | Proposal 9: Relay UE forwards the original SIBs to Remote UE without changing the information and format of the SIB. |
| OPPO | R2-2104838 | Proposal 12Some essential SIBs should be defined and delivered to remote UE by default, FFS on what are the essential SIBs. |
| Intel | R2-2104888 | Proposal 9: If it is decided to support SI over PC5 broadcast, then only the minimum or essential SI over PC5 broadcast channel could be considered. |
| ZTE | R2-2104978 | Proposal 4: The system information for cell selection, access control, ETWS and CMAS warning, GPS time, and NR sidelink resource configuration should be forwarded to the Remote UE.Proposal 5: It is not necessary to forward the system information of cell reselection (SIB2~5), idle/inactive measurements (SIB11) and V2X sidelink resource configuration (SIB13~14) to the Remote UE. |
| Samsung | R2-2105343 | Proposal 1. Relay UE sends its acquired SIB1 to Remote UE in any RRC state over PC5. |
| ASUSTeK | R2-2105380 | Proposal 1: Relay UE periodically broadcasts at least the si-SchedulingInfo of SIB1 stored in Relay UE via PC5 RRC message when it is configured as a role of a relay. Whether to broadcast whole SIB1 or partial content of SIB1 is FFS. |
| Nokia | R2-2105739 | Proposal 5: RAN-2 to discuss whether a custom SIB is provided to remote UE(s) to address UE specific requirements in a multi-cell scenario where a remote UE may receive the SIB either on Uu and/or over PC5 interface via the relay UE. |
| Ericsson | R2-2105773 | Proposal 14RAN2 to discuss whether a new SIB is needed for sidelink relay or whether the existing NR sidelink SIB can be re-used.Proposal 15A full SIB is relayed by the relay UE to the remote UE (FFS on the stage3 details e.g., whether the SIB is delivered in an OCTET STRING). |
| Huawei | R2-2106161 | Proposal 18: SIB1/2/3/4/5/6/7/8/12/13/14 should be relayed to the Remote UE by Relay UE. FFS on forwarding the whole MIB or parts of information. |
| LG | R2-2106273 | Proposal 5: Remote UE can request not-relaying related SIB to the relay UE by on-demand. |

Among all the existing system information, e.g., MIB and SIB1~14, which SIB(s) can be forwarded should consider the concept of minimum SI and other SI. Because for the minimum SI or essential SIB(s) which is used for camping on a cell, they are always periodically broadcasted by default, and for the other SI which is used for specific purpose, they will be acquired on demand. Moreover, it may also impact RAN2 design on how SIB(s) can be forwarded. Therefore, rapporteur suggest to firstly decide whether minimum SI or essential SIB(s) needs to be defined for Remote UE. Otherwise, all system information may be delivered in a on-demand fashion.

1. [For discussion] RAN2 to decide whether minimum SI or essential SIB(s) should be defined for Remote UE.
2. [For discussion] If minimum SI or essential SIB(s) is supported, whether the minimum SI or essential SIB(s) should be defined before or after the remote UE PC5 connection establishment with Relay UE

## How SIB(s) can be forwarded

RAN2 agreed to use PC5 RRC message to forward SIB(s). However, the cast type(s) of the PC5 RRC message has not been decided yet.

Agreements:

Proposal 10-2: [23/23] [Easy] PC5-RRC message can be used to carry the system information forwarding via PC5.

The related proposals on how SIB(s) can be forwarded are listed in below Table.

|  |  |  |
| --- | --- | --- |
| Company | Tdoc | Proposal |
| Qualcomm | R2-2104738 | Proposal 13: For E-SIB delivery, at least PLMN ID, TAC, and cell ID are included in discovery message because they are required to be sent to upper layer according to TS 38.331. FFS whether to include other Ies of E-SIB in discovery message or a new broadcast PC5 RRC message |
| CATT | R2-2104748 | Proposal 7: RAN2 should discuss whether relay UE can send some SIBs to remote UE without request. Proposal 8: Remote UE can acquire any SIB from relay UE based on SL on-demand SI manner.Proposal 10: SL-SCH should be used to the system information forwarding via PC5.Proposal 11: Broadcast should be used to the system information forwarding via PC5.Proposal 12: Unicast can be used to the system information forwarding via PC5.Proposal 13: Remote UE can aware whether the TB contains SIB or not via explicit indication. |
| OPPO | R2-2104838 | Proposal 10Relay UE forwards the system information to remote UE via broadcast manner as baseline.Proposal 11Define dedicated L2 ID for the forwarded SI. |
| vivo | R2-2104960 | Proposal 13 Unicast PC5-RRC message/procedure are used to carry the system information request and forwarding. |
| ZTE | R2-2104978 | Proposal 7: RAN2 is suggested to consider the groupcast PC5 signalling or dedicated PC5-RRC signalling for Relay UE to forward system information to Remote UE after the Remote UE establishes PC5 connection with Relay UE. |
| Samsung | R2-2105343 | Proposal 2. Remote UE in RRC\_CONNECTED can acquire SI message(s) with si-BroadcastStatus set to broadcasting by Relay UE via PC5 RRC message.Proposal 3. Relay UE in any RRC states can transmit on-demand SI request for Remote UE in RRC\_IDLE or RRC\_INACTIVE if the requested SI message(s) for Remote UE is not broadcasted by gNB. |
| ASUSTeK | R2-2105380 | Proposal 2: Remote UE in RRC\_IDLE/INACTIVE generates the RRCSystemInfoRequest message as legacy Uu and sends it to Relay UE via PC5 RRC message for acquiring the required SI message(s), no matter which Msg1-based or Msg3-based SI request is configured for acquiring the on-demand SI message(s). |
| Xiaomi | R2-2105486 | Proposal 7: SI could be delivered by broadcast/groupcast to reduce signaling. |
| Spreadtrum | R2-2105537 | Proposal 2: Broadcast as baseline for SI forwarding before PC5 connection establishment with Relay UE. |
| ETRI | R2-2105960 | Proposal 6) RAN2 is recommended to discuss how to forward the system information via PC5 including broadcast PC5 RRC signalling and dedicated PC5 RRC signalling.Proposal 7) New PC5 RRC message is introduced for system information delivery. |
| Huawei | R2-2106161 | Proposal 16: For the System information forwarding using the new PC5-RRC message, unicast should be supported. Proposal 17: System information forwarding by broadcast or group cast is not supported in Release 17. |

From rapporteur point of view, how SIB(s) can be forwarded has dependency on Proposal 16. In other words, if minimum SI or essential SIB(s) is defined for Remote UE, then they can be broadcasted periodically by Relay UE similar as legacy. Otherwise, unicast may be more suitable for SI delivery based on Remote UE’s request.

1. [Lower priority] RAN2 to discuss how SIB(s) can be forwarded after decision on if minimum SI or essential SIB(s) is defined for Remote UE.

## SIB delivery path

For in-coverage Remote UE, the allowed SIB delivery path is a left issue from the last meeting.

*Proposal 2-6: [Lower priority] RAN2 to discuss whether in coverage remote UE is allowed to directly receive the system information via Uu after connected to relay UE.*

Related proposals on the same issue are listed in below Table.

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| **CATT** | R2-2104748 | Proposal 14: For IC Remote UE, it shall acquire the SIBs from the linked Relay UE when it switches to U2N relay link. |
| **Intel** | R2-2104888 | Proposal 10: Any restriction on reception of SIB over Uu and/or PC5 for IC Remote UE can be considered once the cast types for system information forwarding over PC5 is decided.  |
| **Nokia** | R2-2105739 | Proposal 1: The in-coverage remote UE should be able to receive SI in addition via relay UE over Uu as well.Proposal 2: Intra-cell scenario should be considered by RAN2 for receiving SIs via Uu and/or PC5 interface.Proposal 3: Inter-cell scenario should be considered by RAN2 for receiving SIs via Uu and/or PC5 interface.Proposal 4: RAN-2 to discuss how to handle SI reception via different paths (PC5 and Uu) inter-cell UE-to-Nwk relay scenario, where SIs (associated to different cells) may differ. |
| **Ericsson** | R2-2105773 | Proposal 16RAN2 to confirm that a remote UE that is OOC can only request/receive SIBs via the relay UE via PC5-RRC.Proposal 17A remote UE that is IC shall be allowed to acquire the necessary SI message via Uu broadcast, if capable to do so.Proposal 18Whether a remote UE that is IC acquires the SI messages via the relay UE or via the Uu broadcast shall be left to the remote UE implementation. |

Companies still have divergent views on whether IC remote UE shall be allowed to directly receive the system information via Uu after connection relay UE. Therefore, we propose that:

1. [Lower priority] For IC, RAN2 to discuss whether Remote UE shall be allowed to request and receive SI over direct (Uu) path. FFS on any enhancement to Remote UE if both direct (Uu) path and indirect (relay) path are available for SI request and reception.

## Others

The following proposals are mainly on the potential enhancement of the Relay UE on-demand SI procedure. Rapporteur think that they are not urgent for the moment and can take them into further study.

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| CATT | R2-2104748 | Proposal 12: Relay UE monitors for SI modification on behalf of its remote UEs using its own (legacy) procedure.Proposal 13: Relay UE forwards an SI modification indication to a remote UE in RRC\_CONNECTED. FFS for the relay UE behaviour for a remote UE in RRC\_IDLE/RRC\_INACTIVE. |
| ZTE | R2-2104978 | Proposal 6: RAN2 is suggested to enhance the on-demand SI acquisition procedure for RRC\_Connected relay UE. For example, allowing the RRC\_Connected relay UE to request all possible SIB(s) interested by remote UE and of which si-BroadcastStatus is set to notBroadcasting. |
| Lenovo | R2-2105076 | Proposal 1: RAN2 discuss efficient mechanism of System Information distribution to multiple remote UEs. |
| ASUSTeK | R2-2105380 | Proposal 3a: Relay UE in RRC\_IDLE/INACTIVE initiates RA procedure with Msg1-based SI request according to Remote UE’s RRCSystemInfoRequest message, if Msg1-based SI request is configured for acquiring the on-demand SI message(s) required by Remote UE. Proposal 3b: Relay UE in RRC\_IDLE/INACTIVE initiates RA procedure with Msg3-based SI request and includes Remote UE’s RRCSystemInfoRequest message in Msg3, if Msg3-based SI request is configured for acquiring the on-demand SI message(s) required by Remote UE.Proposal 4: If Relay UE is in RRC\_CONNECTED and Remote UE is in RRC\_IDLE/INACTIVE, Relay UE generates a DedicatedSIBRequest message according to Remote UE’s RRCSystemInfoRequest message and transmits the DedicatedSIBRequest message to gNB for acquiring the on-demand SI message(s) required by Remote UE. |
| Spreadtrum | R2-2105537 | Proposal 3: When multiple relay UEs in the cell forward the same system information at the same time, such as SIB1 update, these Relay UEs would consume many transmission resources. RAN2 need to consider this scenario and avoid the potential congestion. |
| Sony | R2-2105696 | Proposal 2: System information procedure should be discussed depending on: 1.Whether remote UE and relay UE are in same or different cell coverage, and2.Whether SIA ID of requested SIB of remote UE has been changed or not. |
| Nokia | R2-2105739 | Proposal 6: The remote UE that may have missed one or more individual SIB12 segments, should only request the missing SIB12 segments (instead of complete SIB12).Proposal 7: The UE performing cell-reselection, should only request the missing SIB12 segments (instead of complete SIB12) in the new cell if the content of the SIB12 in the new cell is identical to the previous cell. |
| LG | R2-2106273 | Proposal 3: If the requested SIB type from Remote UE to Relay UE is the up-to-date SIB type stored in Relay UE, the Relay UE delivers the SIB type to the Remote UE from the storage of Relay UE without on-demand SIB procedure. |

**Rapporteur view: Potential enhancement of Relay UE on-demand SI procedure. Not urgent. Can be considered in future discussion.**

# Paging

## Paging monitoring when Relay UE in IDLE/INACTVE/CONNECTED

Based on Relay UE RRC state, i,e., IDLE/INACTVE/CONNECTED, Relay may monitor and forward CN paging for an IDLE remote UE connected through PC5 or monitor and forward RAN paging for an INACTIVE remote UE connected through PC5. With regard to relay paging monitoring paging for remote UE connected through PC5, the following proposals can be summarized in below table.

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| **Qualcomm** | R2-2104738 | Proposal 6: INACTIVE relay UE can monitor and forward CN paging for an IDLE remote UE, without transition to IDLE state due to CN paging for remote UE. Proposal 7: IDLE relay UE can monitor and forward RAN paging for an INACTIVE remote UE.Proposal 8: CONNECTED relay UE doesn’t monitor paging for remote UE in CONNECTED state.Proposal 9: CONNECTED relay doesn’t monitor IDLE/INACTIVE remote UE’s paging. Instead, the Network includes paging record of remote UE in dedicated RRC message towards relay. |
| **InterDigital** | R2-2104871 | Proposal 8: A relay UE monitors paging occasions of its PC5-RRC connected remote UEs, regardless of the RRC state of the relay UE |
| **vivo** | R2-2104960 | Proposal 16 Relay UE in RRC IDLE/INACTIVE can monitor and forward paging messages for Remote UE, at least, after the Remote UE is PC5 connected to the Relay UE. |
| **Futurewei** | R2-2105030 | Proposal 4: Relay UE in RRC\_IDLE/INACTIVE state should monitor paging for remote UE connected through PC5; relay UE in RRC\_CONNECTED state should be able to receive paging of remote UE through RRC message. |
| **Lenovo** | R2-2105074 | Proposal 1: A RRC connected U2N relay UE informs its serving gNB about time periods (paging occasions of remote UE(s)) of its intended absence (away time) from the current DL BWP.Proposal 2: The RRC connected U2N relay UE updates its serving gNB about time periods (paging occasions of remote UE(s)) of its intended absence (away time) from the current DL BWP.Proposal 3: The serving gNB informs the U2N relay UE if the autonomous switch to the initial DL BWP for monitoring Paging of the linked remote UE(s) is the selected solution.Proposal 4: RAN2 discuss the necessity of some handshaking procedure to explicitly signal if and when a remote UE needs its linked U2N relay UE to monitor its paging and if and when the paging for the remote UE can really be monitored by the linked relay. |
| **Ericsson** | R2-2105773 | Proposal 5 When both the remote UE and relay UE are in RRC\_CONNECTED, the relay UE shall monitor, in its own and remote UE POs, only the SI change indication and/or the indication about PWS notification in short messages (no monitor for reception of the Paging message).Proposal 8 For the relay UE in RRC\_CONNECTED, when the network wants to page the remote UE, it sends the Paging message via a new (DL-DCCH) RRC message to the relay UE (FFS how to define this new RRC message). |

According to above proposals, there common understanding that Relay UE in RRC IDLE or RRC INACTVE can monitors paging occasions of its PC5-RRC connected Remote UE. But, for Connected mode Relay UE, UE behavior may not the same. The remote UE in UEs in RRC\_CONNECTED may have to monitor for SI change indication or for indication about PWS notification in any paging occasion. Thus, Rapporteur proposes:

1. [Easy] When a Relay UE in RRC IDLE or RRC INACTVE, the Relay UE monitors paging occasions of its PC5-RRC connected Remote UEs.
2. [For discussion] When Relay UE in RRC CONNECTED and Remote UE in RRC\_IDLE/RRC\_INACTIVE, whether the Relay UE monitors PO of its PC5-RRC connected Remote UE(s) or receive paging message of the Remote UE(s) through dedicated RRC message.
3. [For discussion] When Relay UE in RRC CONNECTED and remote UE in RRC CONNECTED, Relay UE may monitor only for SI change indication and/or PWS notifications in any PO.

## Whether can skip Paging monitoring of Remote UEs

On whether Relay UE should always monitor paging for Remote UE, there are some view that there may be cases where the relay UE need not monitor paging for a remote UE. For example, when the remote UE is in RRC\_CONNECTED or when the remote UE is in coverage and decides to monitor its own paging on Uu. Thus, for whether Relay UE can skip paging monitoring for remote UE, we the following proposals:

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| **InterDigital** | R2-2104871 | Proposal 9: A relay UE is not required to monitor paging occasions of an RRC\_CONNECTED remote UE. FFS whether the remote UE can further indicate that paging monitoring by the relay UE is not required (e.g. remote UE receives paging directly from Uu).Proposal 10: A relay UE can skip monitoring of POs of one or more remote UEs based on network indication.  |
| **ZTE** | R2-2104978 | Proposal 10: For the paging message monitoring, the relay UE only need to monitor the PO of RRC\_IDLE / RRC\_INACTIVE remote UE. |
| **ETRI** | R2-2105960 | Proposal 4) It is suggested to discuss the enhancement of the baseline paging relay solution for power saving of the relay UE.Proposal 5) The relay UE may not monitor the PO for paging Remote UE if it is informed that a paging message to Remote UE is not transmitted in the PO. |
| **CMCC** | R2-2106252 | Proposal 2: Power saving for paging of remote UE should be considered. Proposal 3: Down-select solution from network controlled or Remote UE triggered for power saving. |

Based on above proposals, Rapporteur thinks on whether Relay UE can skip paging monitoring for remote UE is valid issue, but not very urgent and can be discussed once baseline for paging monitoring mechanism is clear, thus,

1. [Lower priority] RAN2 to discuss whether Relay UE can skip Paging monitoring of Remote UEs after the baseline paging monitoring and forwarding mechanism is clear.

## Short Paging message

On whether short paging message should be supported, we have some related proposals as follows:

|  |  |  |
| --- | --- | --- |
| **Company** | **Tdoc** | **Proposal** |
| vivo | R2-2104960 | Proposal 15 For Remote UE, Short Message relaying via Relay UE is NOT supported. |
| ZTE | R2-2104978 | Proposal 11: For the short message monitoring, the relay UE only need to monitor the POs of itself to obtain the short message.Proposal 12: Suppose the *systemInfoModification* or *etwsAndCmasIndication* in the short message is set to 1, the relay UE need to forward the change indication to associated remote UEs via PC5. |
| Xiaomi | R2-2105486 | Proposal 8: If short message set bit 1 or 2, relay UE send the short message to all remote UEs by broadcast/groupcast. If short message set bit 3, relay UE doesn’t send the short message to remote UE. |
| Ericsson | R2-2105773 | Proposal 9 Short messages over sidelink are not supported in Rel-17. |

On whether short paging message should be supported, companies’ proposals views are split, thus,

1. [For discussion] RAN2 to decide whether Short Paging message forwarding over sidelink is supported in Rel-17.

## Paging DRX over PC5

Consideration the Remote UE’s power consumption, there may be some benefit from some limited SL monitoring to save power. There is some suggestion that the Remote UE should monitor paging using discontinuous reception (DRX) over PC5 interface as considered in the following proposals:

|  |  |  |
| --- | --- | --- |
| Company | Tdoc | Proposal |
| **CATT** | R2-2104748 | Proposal 5: Remote UE should monitor paging using discontinuous reception (DRX) over PC5 interface. How to define the SL PO should be further discussed. |
| **InterDigital** | R2-2104871 | Proposal 11: RAN2 to discuss how to define a minimum set of SL monitoring slots for a remote UE in RRC\_IDLE/RRC\_INACTIVE and PC5-RRC connected to a relay UE. |

The above two proposals are related SL DRX which is being discussed in Release 17 SL enhancement WI. Therefore, Rapporteur proposes: **Postponed without proposal.**

## PO overlapping of Relay and Remote

There was some discussion there may be cases that: Relay UE and remote UE POs are overlapping and Relay UE and remote UE POs are NOT overlapping. In case the POs of the relay UE and remote UE are not, it easier for the relay UE to distinguish what is for himself and what is for the remote UE. But, in case Relay UE and remote UE POs are overlapping it may not be easier. On this issue, we have the following proposals:

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| **Company** | **Tdoc** | **Proposal** |
| **vivo** | R2-2104960 | Proposal 17 Remote UE and Relay UE PO overlapping issue is resolved up to NW implementation to notify either one or both. |
| **Ericsson** | R2-2105773 | Proposal 6 For RRC\_IDLE or RRC\_INACTIVE, if the POs of the remote and relay UE are not overlapping, the network sends separate paging messages for both the relay UE and remote UE.Proposal 7 For RRC\_IDLE or RRC\_INACTIVE, if the POs of the remote UE and relay UE are overlapping, the network sends the paging message for the remote UE embedded (in an OCTET STRING) within the paging message of the relay UE. |

On how the relay UE can distinguish what is for himself and what is for the remote UE may require some consideration from network side when sending the paging message for remote UE. A specified solution or network implementation are possible, thus,

1. [Lower priority] RAN2 to study if any potential issue and solution needed on Remote UE and Relay UE PO overlapping case.

## How Paging message is forwarded

In RAN2#113bis meeting, it is agreed that unicast can be used for paging forwarding via PC5 as follows.

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| Proposal 13: [23/23] [Easy] Unicast can be used for the paging forwarding via PC5. |

On how the paging message is forwarded is further considered on whether a new PC5 RRC is used and whether Broadcast and group cast can also be used for the paging forwarding. The following proposal are captured.

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| Company | Tdoc | Proposal |
| Huawei | R2-2106161 | Proposal 14: A new PC5-RRC message is needed to relay the paging information from relay UE to Remote UE for unicast. Proposal 15: Broadcast and group cast cannot be used for the paging forwarding via PC5. |
| ETRI | R2-2105960 | Proposal 3) New PC5 RRC message at PC5 is introduced for the paging forwarding to remote UE |

This should be addressed but not with urgency, thus,

1. [Lower priority] A new PC5-RRC message is needed to relay the paging information from relay UE to Remote UE for unicast.

## Others

Varies issues have been related to:

* *PagingRecord* matched the remote UE identity
* paging related configuration of the remote UE
* Remote UE’s paging UE identity
* security concern on UE identity

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| **Company** | **Tdoc** | **Proposal** |
| **CATT** | R2-2104748 | Proposal 6: Relay UE need to decode the paging message and forward the *PagingRecord* matched the remote UE identity to the remote UE. |
| **OPPO** | R2-2104838 | Proposal 13RAN2 wait for SA3’s reply before the discussion of which paging related configuration of remote should be shared with relay.Proposal 14The paging related configuration of the remote UE can be released by remote UE, if the remote UE doesn’t need relay UE to monitor the paging message for it.  |
| **Intel**  | R2-2104888 | Proposal 7: Discuss whether the Remote UE or the gNB transfers Remote UE’s paging UE identity i.e. NG-5G-S-TMSI and fullI-RNTI to the Relay UE. FFS how the gNB or Relay UE obtain Remote UE’s DRX cycle configured by upper layers. |
| **vivo** | R2-2104960 | Proposal 14 For Remote UE, which path to receive paging message follows the same path as for system information delivery. |
| **ZTE** | R2-2104978 | Proposal 8: Suppose security concern does not exist, it is suggested to directly provide the 5G-S-TMSI/I-RNTI of remote UE to relay UE. If the remote UE is paged, relay UE may send the paging indication via PC5 RRC message to the specific remote UE. Proposal 9: Suppose security concern exists, the relay UE can not determine whether the relay UE is paged or not in the PO. In this case, relay UE may forward the whole paging message to the remote UEs associated with the PO. |
| **Xiaomi** | R2-2105486 | Proposal 4: Remote UE reports its Paging Occasion(s) to relay UE. Relay UE relays any paging messages received in these PO(s) to corresponding remote UE.Proposal 5: If multiple remote UE report overlapped PO(s), relay UE shall deliver received paging message in overlapped PO(s) to multiple remote UEs.Proposal 6: Relay UE may send the paging message by broadcast/groupcast to multiple remote UEs. |
| **Ericsson** | R2-2105773 | Proposal 4 The POs of the remote and relay UE are configured via system information (SIB). |
| **ETRI** | R2-2105960 | Proposal 1) The relay UE acquires monitored POs for remote UE’s paging. RAN2 is recommended to discuss how the relay UE obtains POs for the remote UE.Proposal 2) When receiving a paging message, the relay UE filters the paging message for remote UE.Proposal 3) New PC5 RRC message at PC5 is introduced for the paging forwarding to remote UE |
| **Huawei** | R2-2106161 | Proposal 13: RAN2 to wait for SA3’s response before making decision on paging monitoring. |

**T**he above proposals are mostly related to the Ls sent to SA3 by RAN2. Thus, rapporteur proposes to wait SA3.

**Rapporteur view**: **Wait until SA3 LS response before further discussion.**

# UAC

## UAC check of Remote UE

In RAN2#113b-e [3], the following WA on UAC was made:

**“WA: Proposal 15: [23/23] [Easy] Remote UE can reuse legacy access control and no need to enhance the access control procedure of Remote UE. FFS whether the relay UE performs UAC”**. With regard to this WA, there are some proposals to confirm the WA as follows:

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| **Company** | **Tdoc** | **Proposal** |
| **Qualcomm** | R2-2104738 | Proposal 16: Remote UE can reuse legacy access control and no need to enhance the access control procedure of Remote UE. Relay UE needs to perform UAC with existing AC 8 (i.e. MO signaling on RRC level resulting from other than paging) when it intends to access network only for the purpose of relaying but not for its own service. |
| **Apple** | R2-2105128 | Proposal 1 Confirm the working assumption that remote UE performs UAC based on legacy procedure independently. |

As the WA is in line with legacy procedure, and this WA is also related to other WG, RAN2 should confirm the WA. Thus,

1. [Cross WG] Confirm the WA that Remote UE performs UAC based on legacy procedure independently.

## UAC check of Relay UE

On whether Relay UE can skip the UAC check when Relay UE intends to access NW only for relaying data or RRC signalling of Remote UE without any service for itself, there are many contributions with the following proposals:

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| **Company** | **Tdoc** | **Proposal** |
| **Qualcomm** | R2-2104738 | Proposal 16: Remote UE can reuse legacy access control and no need to enhance the access control procedure of Remote UE. Relay UE needs to perform UAC with existing AC 8 (i.e. MO signaling on RRC level resulting from other than paging) when it intends to access network only for the purpose of relaying but not for its own service. |
| **CATT** | R2-2104748 | Proposal 15: Relay UE should also perform UAC when relay UE intends to access network only for the purpose of relaying but not for its own service.Proposal 16: AC 8 (MO signaling on RRC level resulting from other than paging) can be reused for the case relay access network only for the purpose of relaying but not for its own service. |
| **OPPO** | R2-2104838 | Proposal 16RAN2 discuss either no UAC for relay UE access due to relayed traffic, or UAC is performed based on an AS layer defined AC value, e.g., value-8. |
| **Intel** | R2-2104888 | Proposal 11: RAN2 discuss whether the Relay UE obtains the establishment cause and access identity/access category from a) upper layer or b) AS layer (derived from Remote UE). Confirm with SA2/CT1 accordingly. |
| **vivo** | R2-2104960 | Proposal 18 Relay UE can skip the UAC check when Relay UE intends to access NW only for relaying data or RRC signalling of Remote UE w/o its own service.Proposal 19 Relay UE should perform UAC check when Relay UE intends to access NW for relaying data or RRC signalling of Remote UE together with its own service.Proposal 20 RAN2 assumes that existing Access category and Access identity are re-used for Relay UE to enter RRC\_CONNECTED for relaying purpose. |
| **ZTE** | R2-2104978 | Proposal 1: It is suggested that the relay UE is not under UAC control when relay UE access the network just for relaying purpose. |
| **Futurewei** | R2-2105030 | Proposal 2: A new AC should be defined for UAC control of UE to network relay. |
| **Apple** | R2-2105128 | Proposal 2 RAN2 discuss whether SL relay UE can have the prioritized access to skip UAC.Proposal 3 In case of UAC needs to be performed by relay UE, relay UE choose an AC matching the intent of remote UE access request.Proposal 4 In case of relay UE is triggered by access attempts from different remote UEs, relay UE performs a new UAC check for each new access request, in regardless of whether there is an existing T390 timer running or not.Proposal 5 Relay UE can maintain multiple T390 timers for each Access Category.Proposal 6 When UAC is barred in relay UE, relay UE informs the barring to remote UE via a PC5-RRC signaling. |
| **Xiaomi** | R2-2105486 | Proposal 3: Relay UE shall not perform UAC when it intends to access network only for the purpose of relaying but not for its own service. |
| **Spreadtrum** | R2-2105537 | Proposal 4：Relay UE dose not perform UAC when it initiates RRC procedure due to Remote UE request.Proposal 5：Relay UE rejects Remote UE access request if it has running T302. |
| **Huawei** | R2-2106161 | Proposal 19: RAN 2 should discuss how to set the AC in relay UE when it intends to access network only to serve as a Relay UE but not for its own service. |
| **LG** | R2-2106273 | Proposal 8: Even though relay UE is rejected to access as the result of UAC, the relay UE can ignore the barring of itself and relay the received data from connected remote UE. |

Companies views on this issue are split as follows:

Relay UE Skip UAC: vivo, ZTE, Xiaomi, Spreadtrum, LG, OPPO

Relay performs UAC: Qualcomm, CATT, Futurewei, Huawei

Neutral: Intel, apple

**T**his skipping or performing UAC is also related to SA2, thus Rapporteur proposes:

1. [Cross WG] RAN2 to discussion whether Relay UE should perform UAC or can skip UAC when it intends to access network only for the purpose of relaying but not for its own service.
2. [Cross WG] Send a LS to SA2 to ask SA2 view on whether Relay UE should perform UAC or can skip UAC when it intends to access network only for the purpose of relaying but not for its own service

# Others

**Rapporteur view:** contributions in this section are either related to other Agenda Item or they are not purely CP procedure on connection management, SI, paging, and access control. Rapporteur proposes to List them without proposals and can be further revisited later.

## Uu PDCP behavior for Remote UE

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| **Company** | **Tdoc** | **Proposal** |
| **OPPO** | R2-2104838 | Proposal 5For L2 UE-to-Network Relay, for delivery of SRB1 message of remote UE, rely on the legacy specification for PDCP layer behavior at remote UE. |

## Uu connection establishment failure

According to RAN2#113-bisRAN2 has made the following agreement

**“When relay performs HO to another gNB, relay UE may send a PC5-S message (similar to LTE) to its connected remote UE(s) and this message may trigger relay reselection. FFS other indication/message can also be used”**

There some considerations of remaining issue related to this agreement the open issue “FFS other indication/message can also be used” in term of:

* Relay can notify Remote UE on the relay UE Uu connection establishment failure via either PC5-S message or adaptation layer control PDU

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| **Company** | **Tdoc** | **Proposal** |
| **OPPO** | R2-2104838 | Proposal 7For L2 UE-to-Network Relay, Relay can notify Remote UE on the relay UE Uu connection establishment failure via either PC5-S message or adaptation layer control PDU, and it is up to UE implementation to select between the two options. |

## Discovery

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| **Company** | **Tdoc** | **Proposal** |
| **Intel** | R2-2104888 | Proposal 2: RAN2 discuss whether it is desirable to allow RRC\_IDLE state for the Relay UE which has already enabled relaying functionalities (e.g. by sending discovery message). |

## Relay reselection

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| **Company** | **Tdoc** | **Proposal** |
| **Apple** | R2-2105128 | Proposal 7 Remote UE triggers relay reselection, if one of the following conditions met: 1) relay UE fails to enter RRC\_CONNECTED within a certain time; 2) the number of failures of remote UE procedure due to relay UAC barring has reached or exceeded the configured threshold.Proposal 8 RAN2 consider to add RRC state of relay UE as an additional AS layer criterion. |
| **Apple** | R2-2105129 | Proposal 3 RAN2 introduce a reselection procedure timer to control how long an OOC RRC\_INACTIVE remote UE can remain INACTIVE state when it is disconnected to relay UE (e.g., after SL RLF). |

## QoS

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| **Company** | **Tdoc** | **Proposal** |
| **Apple** | R2-2105130 | Proposal 1 Send an LS to SA2 asking for clarification of QoS split guidance, especially for Priority in 5QI/PQI. Proposal 2 Relay UE reports relay-related measurements to gNB to help gNB dynamically adjust per-flow QoS Split. Proposal 3 RAN2 discuss the methods to support relay UE to measure the QoS performance of upstream traffic.  |
| **Samsung** | R2-2105678 | Proposal 10: RAN2 to examine ways of reducing overall latency including pre-emptive BSR.Proposal 11: RAN2 will discuss if any congestion mitigation signaling is needed, and whether this should be a function of the Adapt layer. |

## Uu Adaptation layer

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| **Company** | **Tdoc** | **Proposal** |
| **Samsung** | R2-2105678 | Proposal 5: Traffic differentiation between relaying and non-relaying traffic is supported. Proposal 6: RAN2 will examine ways of achieving this which do not involve Adapt layer as well as those that do, to determine if Adapt would need to support this function. |
| **Nokia** | R2-2106054 | Proposal 3: RAN2 to agree to have Uu RLC channel specific adaptation layer entity to limit the adaption layer header overhead.Proposal 4: RAN2 to agree adaptation layer header is always configured, i.e. the presence of adaptation layer is not configurable. |
| **Huawei** | R2-2106161 | Proposal 5: the AL configuration should include the mapping between PC5 RLC bearer IDs, identity information of remote UE and Uu radio bearer and Uu RLC bearer IDs provided by the network to the relay UE when adding a remote UE’s SRB1/SRB2/DRBs. |

## PC5 Adaptation layer

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| **Company** | **Tdoc** | **Proposal** |
| **MediaTek** | R2-2104946 | Proposal-2: The initial message (i.e. *RRCSetupReques*t) from Remote UE to gNB does not go through PC5 adaptation layer if PC5 adaptation layer is supported  |
| **Samsung** | R2-2105678 | Proposal 9: PC5 link shall not support the Adapt layer. |

# Conclusion

The summary concludes with the following proposals:

**[Easy]**

**Proposal 1： [Easy] RAN2 to confirm that the RRC state combination of Relay UE in RRC\_IDLE and Remote UE in RRC\_INACTIVE is supported.**

**Proposal 1：**

**Proposal 6： [Easy] The indication of Relay UE upon detecting Uu RLF may trigger the Remote UE connection re-establishment.**

**Proposal 7： [Easy] Remote UE may trigger the Remote UE connection re-establishment upon detecting PC5 RLF.**

**Proposal 10： [Easy] For IC case, Remote UE performs TAU/RNAU based on its own serving cell information (i.e., as legacy) if Remote UE is NOT PC5-connected with Relay** UE.

**Proposal 20： [Easy] When a Relay UE in RRC IDLE or RRC INACTVE, the Relay UE monitors paging occasions of its PC5-RRC connected Remote UEs.**

**[Cross WG]**

**Proposal 2： [Cross WG] RAN2 to decide firstly whether new or existing establishment/resume cause value is used for Relay UE when Relay UE enters RRC\_CONNECTED only for relaying purpose.**

**Proposal 3： [Cross WG] Send LS to SA2/CT1 to check their view on whether new or existing establishment/resume cause value is** used.

**Proposal 12： [Cross WG] In case of remote UE RRC resume, RAN2 to discuss when the Retrieve UE Context procedure is performed, the new gNB may retrieve both the** remote and relay UE context.

**Proposal 13： [Cross WG] If it is agreed that when the Retrieve UE Context procedure is performed, the new gNB may retrieve both the remote and relay UE context, RAN2 to send a Ls to RAN3 on whether UE Context has inter-gNB specification impact**

**Proposal 27： [Cross WG] Confirm the WA that Remote UE performs UAC based on legacy procedure independently.**

**Proposal 28： [Cross WG] RAN2 to discussion whether Relay UE should perform UAC or can skip UAC when it intends to access network only for the purpose of relaying but not for its own service.**

**Proposal 29： [Cross WG] Send a LS to SA2 to ask SA2 view on whether Relay UE should perform UAC or can skip UAC when it intends to access network only for the purpose of relaying but not for its own** service

**[For discussion]**

**Proposal 4： [For discussion] For the delivery of remote UE’s SRB0 RRC message, for the configuration of Uu RLC channel the following options can be considered**

* + - * + **Default configuration**
				+ **Specified (fixed) configuration**
				+ **Network configurable**

**Proposal 5： [For discussion] For the delivery of Remote UE’s SRB1 RRC message such as *RRCResume* and *RRCReestablishment* message as legacy SRB1:**

* + - Introduce default configuration of Uu RLC channel for relaying, which can be reconfigured to dedicated signalling by the Network
		- Network configuration via dedicated signaling is used for the configuration of Uu RLC channel if available in Relay UE. Otherwise, default configuration is used

**Proposal 8： [For discussion] The Remote UE performs RRC re-establishment procedure as follows:**

* If a suitable cell is available, the Remote UE initiates RRC re-establishment procedure towards the suitable cell;
* If a suitable relay is available, the Remote UE initiates RRC re-establishment procedure towards the suitable relay UE’s serving cell;
* If both a suitable cell and a suitable relay are available, the remote UE can select either one to initiate RRC re-establishment procedure based on implementation.

**Proposal 9： [For discussion] For OOC case, RAN2 to discuss whether Remote UE should perform TAU/RNAU procedure.**

**Proposal 11： [For discussion] For IC case, Remote UE performs TAU/RNAU based on Relay UE’s serving cell information after Remote UE is PC5-connected with Relay UE.**

 **Proposal 14： [For discussion] The serving gNB of the Relay UE allocates Remote UE ID to be used in adaptation layer. FFS details.**

**Proposal 15： [For discussion] Remote UE can receive the system information via PC5 before and after PC5 connection establishment with Relay UE.**

**Proposal 16： [For discussion] RAN2 to decide whether minimum SI or essential SIB(s) should be defined for Remote UE.**

**Proposal 17： [For discussion] If minimum SI or essential SIB(s) is supported, whether the minimum SI or essential SIB(s) should be defined before or after the remote UE PC5 connection establishment with Relay UE**

**Proposal 21： [For discussion] When Relay UE in RRC CONNECTED and Remote UE in RRC\_IDLE/RRC\_INACTIVE, whether the Relay UE monitors PO of its PC5-RRC connected Remote UE(s) or receive paging message of the Remote UE(s**) through dedicated RRC message.

**Proposal 22： [For discussion] When Relay UE in RRC CONNECTED and remote UE in RRC CONNECTED, Relay UE may monitor only for SI change indication and/or PWS notifications in any PO.**

**Proposal 24： [For discussion] RAN2 to decide whether Short Paging message forwarding over sidelink is** supported in Rel-17.

**[Lower priority**]

**Proposal 1：**

**Proposal 18： [Lower priority] RAN2 to discuss how SIB(s) can be forwarded after decision on if minimum SI or essential SIB(s) is defined for Remote UE.**

**Proposal 19： [Lower priority] For IC, RAN2 to discuss whether Remote UE shall be allowed to request and receive SI over direct (Uu) path. FFS on any enhancement to Remote UE if both direct (Uu) path and indirect (relay) path are available for SI request and reception.**

**Proposal 23： [Lower priority] RAN2 to discuss whether Relay UE can skip Paging monitoring of Remote UEs after the baseline paging monitoring and forwarding mechanism is clear.**

**Proposal 25： [Lower priority] RAN2 to study if any potential issue and solution needed on Remote UE and Relay UE PO overlapping case**.

**Proposal 26： [Lower priority] A new PC5-RRC message is needed to relay the paging information from relay UE to Remote UE for unicast.**

1. Reference
2. R2-2104738 Further discussion on control plane procedures of L2 U2N relay Qualcomm Incorporated
3. R2-2104748 Control Plane Procedures of L2 Relay CATT
4. R2-2104838 Left issues on RRC procedure for L2 U2N Relay OPPO
5. R2-2104871 Control Plane Procedures for L2 UE to NW Relays InterDigital
6. R2-2104888 Control plane procedures for L2N relaying Intel Corporation
7. R2-2104946 Stage 2 level procedure for Connection Establishment MediaTek Inc.
8. R2-2104960 Further Discussion on L2 Control Plane Procedures vivo
9. R2-2104978 Consideration on the control plane procedure of SL relay ZTE, Sanechips
10. R2-2105030 Open Issues in L2 Relay Control Plane Procedures Futurewei
11. R2-2105074 Monitoring Paging by a U2N Relay Lenovo, Motorola Mobility
12. R2-2105076 SI acquisition, CN Registration and RNAU Lenovo, Motorola Mobility
13. R2-2105128 Discussion on Unified Access Control in Relay UE Apple
14. R2-2106450 Discussion on RNA Update procedures in L2 UE-to-NW Relay Apple
15. R2-2105130 Discussion on QoS mechanism for Layer 2 UE-to-NW relay Apple
16. R2-2105343 On-demand SI request for Remote UE Samsung
17. R2-2105380 Discussion on on-demand SI acquisition procedure for U2N Relay ASUSTeK
18. R2-2105391 RRC state transitions and RLF handling in L2 relaying Kyocera discussion
19. R2-2105486 Connection control on L2 relay Xiaomi communications discussion
20. R2-2105537 Discussion on control plane procedures for L2 U2N relay Spreadtrum Communications
21. R2-2105678 Various configuration and QoS management aspects of L2 relaying Samsung Electronics GmbH
22. R2-2105696 L2 relay control plane procedures Sony
23. R2-2105739 SIB Handling in Sidelink UE-to-Nwk Relay Nokia, Nokia Shanghai Bell
24. R2-2105773 Discussion on control plane procedures for L2 sidelink relay Ericsson discussion
25. R2-2105960 Paging and SI deliveries for L2 relay ETRI
26. R2-2106054 Discussion on Uu adaptation layer in L2 UE-to-NW relay Nokia, Nokia Shanghai Bell
27. R2-2106161 Discussion on the CP procedures for L2 Relay Huawei, HiSilicon discussion
28. R2-2106252 Discussion on control plane procedure CMCC discussion
29. R2-2106273 L2 relay specific topics related to the control plane procedures LG Electronics Inc.
30. R2-2106293 Discussion on establishment cause value of relay UE Xiaomi, Nokia, Nokia Shanghai Bell, Lenovo, Motorola Mobility, Vivo, Apple, ZTE discussion
31. R2-2104742 Further discussion adaptation layer of L2 U2N relay Qualcomm Incorporated