3GPP TSG-RAN WG2 Meeting #118 Electronic R2-220xxxx

Online, 9 May – 20 May 2022

**Agenda item: 6.7.2.1**

**Source: Lenovo**

**Title: Summary of [Pre118-e][608][Relay] Summary of AI 6.7.2.1 on CP (Lenovo)**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the summary report of [Pre118-e][608][Relay] Summary of AI 6.7.2.1 on control plane (Lenovo).

* [Pre118-e][608][Relay] Summary of AI 6.7.2.1 on CP (Lenovo)

# 2 Contact Points

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| --- | --- | --- |
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# 3 Discussion

* 1. **System Information**

**3.1.1 MIB**

The contribution [25] has the following proposal:

*Proposal 2. RAN2 is asked to discuss and accept the proposed TP B in Annex A (in case RRC\_IDLE or RRC\_INACTIVE Remote UE in out of coverage but is connected with Relay UE to NW, the Remote UE does not perform the actions for MIB acquisition in clause 5.2.2.5)*

A fundamental question here is if a Remote UE needs MIB information? If not, an IC remote UE (i.e., U2N Remote UE in RRC Idle, Inactive or Connected state), need not consider MIB as part of Essential System Information missing (and therefore do not apply clause 5.2.2.5 for missing MIB) and as [25] suggests, need not acquire it.



Figure 1: MIB

**Question 1: Do companies think MIB information is necessary for a U2N Remote UE?**

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| --- | --- | --- |
| Company | Yes/ No | Comments |
| Apple | No | * Uu PHY related configurations are obviously unnecessary (i.e. subcarrier spacing, offset, dmrs-typeA, PDCCH-configSIB1) * RAN2 has agreed "cellbarred" and "intraFreqReselection" are not needed * For SFN, it is also not needed for two reasons: 1. SFN is aligned based on detection outcome of PBCH, which can't work for remote UE connected to relay UE; 2. SFN is totally 10bit, Another 4bit is implicitly indicated in DMRS coding of PBCH. So, only forwarding 6bit in MIB is useless. |
| Xiaomi | No | We don't see the need of MIB for remote UE. |
| OPPO | No | Agree with Apple |
| Sharp | No | Agree with Apple |
| Lenovo | No | Agree with apple and therefore it should be captured in the specification that MIB is not an essential SI for a Remote UE. |
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* + 1. **SIB1**

**From [18], the following proposal is made:**

Proposal 3: The unsolicited forwarding of SIB1 should be captured in the trigger condition of relay UE’s Uu message transfer.

On this point, though the 3rd condition (highlighted below) already covers this, but this will make SIB1 forwarding by Relay to Remote UE conditional to a SIB request (for any SIB) from the remote first i.e., it does not allow the Relay to forward SIB1 to the Remote UE beforehand.

|  |
| --- |
| 5.8.9.9.2 Actions related to transmission of *UuMessageTransferSidelink* message The L2 U2N Relay UE initiates the Uu message transfer procedure when one of the following conditions is met:  1> upon receiving *Paging* message related to the connected L2 U2N Remote UE from network;  1> upon acquisition of the SIBs requested by the connected L2 U2N Remote UE (as indicated in *sl-Requested-SI-List* in the *RemoteUEInformationSidelink*);  1> upon receiving the updated SIB1 from network; |

**Question 2: Do you agree to the change in section 5.8.9.9.2 (i.e., remove “and the SIBs have been requested by the connected L2 U2N Remote UE”)??**

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| --- | --- | --- |
| Company | Yes/ No | Comments |
| Apple | Agree | Our understanding is the highlighted condition is not aligned with below agreement made in RAN2#116b:  *For SIB1, both request-based delivery (i.e., SIB1 request by the remote UE) and unsolicited forwarding are supported, of which the usage is left to relay UE implementation.* |
| Xiaomi | No | The proposed change may result in two issues,   1. Unsolicited SIB1 forwarding is only supported upon SIB1 update. But we think unsolicited SIB1 forwarding can be done up to relay UE implementation even without SIB1 updated, e.g. relay UE can unsolicited forward SIB1 to newly connected remote UE. 2. Unsolicited SIB1 forwarding is madated, which is not aligned with the agreement of leaving to relay UE implementation.   Alternative way is to specify the unsolicited SIB1 forwarding is up to UE implementation in a NOTE. |
| OPPO | Fine with the RRC-rapp CR | Although the intention seems correct, wouldn’t the removal lead to missing of trigger for delivery of non-SIB1 updated SIBs? so we are fine with the RRC-rapp CR  1> upon receiving the updated SIB1 and/or the SIBs have been requested by the connected L2 U2N Remote UE from network; |
| Sharp | No | Share the same view with Xiaomi, the proposed change may cause confusion on the SIB1 forwarding. |
| Lenovo | Agree with a further change | We now see the intention behind the 3rd condition and therefore, would like to propose the following change (assuming requested SIB updates are not applied in the 2nd condition – see Question Q4):   1. upon receiving the updated SIB1 or an update of any SIB requested by connected L2 U2N Remote UE from network   To Xiaomi’s comments:   1. Also for a new UE, a first SIB1 transmission also qualifies as an update since any UE just applies the SIB1 that it receives 2. Unsolicited SIB1 forwarding actually needs to be mandated otherwise an “essential System Information” is considered missing if the Relay UE does not forward updated SIB1. We do not see any value in hiding this fact under a Note. |
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Further, from [27], it is written thatthe Relay UE will not provide SIB1 anymore (since remote UE has released the request to forward SIB(s) when entering RRC\_Connected State) and in RRC\_Connected state a Remote UE has no means to request SIB1. Therefore, **a Remote UE entering RRC\_Connected may consider Essential system information (SIB1) as missing.** Following proposal is made:

Proposal: Relay UE keeps forwarding SIB1 update to a remote UE even after having received the sl-Requested-SI-List set to release from the remote UE.

**Question 3: To ensure that an RRC\_Connected Remote UE maintains a valid version of SIB1, do you agree with “Relay UE keeps forwarding SIB1 update to a remote UE even after having received the sl-Requested-SI-List set to release from the remote UE”?**

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| --- | --- | --- |
| Company | Yes/ No | Comments |
| Apple | Disagree | We think Proponent may misunderstand RAN2 agreement. The intention of previous agreement is to avoid duplicated SIBs forwarding from both relay and gNB for CONNECTED remote UE. That is why RAN2 agreed when remote UE enters RRC\_CONNECTED, it rely on gNB unsolicited forwarding updated SIB by gNB implementation rather than ODS. So, there is no issue in current procedure. |
| Xiaomi | No | We understand gNB can provide SIB1 in dedicated signaling. |
| OPPO | Disagree | Remote UE can always get updated SIB1 via Network, that is the reason to set sl-Requested-SI-List as release. |
| Sharp | No | An RRC\_Connected Remote UE could get SIB1 from network. |
| Lenovo | Yes | The gNB may not provide updated SIB1 dedicatedly if the Relay UE is on a BWP that has common search space for receiving SIB1.  This will be an **entirely new behaviour if the gNB needs to remember that it has to forward SIB1 to a “REMOTE” UE.** Please also note that remote UE has no dedicated means to request SIB1. Using the DEDICATEDSIBREQUEST message only certain SIBs can be requested using DEDICATEDSIBREQUEST, as shown below:  SIB-ReqInfo-r16 ::= ENUMERATED { sib12, sib13, sib14, sib20-v1700, sib21-v1700, spare3, spare2, spare1 } |
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* + 1. **System Information aspects of RemoteUEInformationSidelink**

From [10]

Proposal 2: Clarify when the L2 U2N remote UE entering RRC\_CONNECTED, it shall transmit *RemoteUEInformationSidelink* message to the relay UE if it had sent paging or SIB forward request to the current relay UE.

**The above proposal seems logical, and a reasonable UE should be implemented that way, the question is if this needs to be captured in the specification. It seems this is not a necessary correction.**

**3.1.4 Book-keeping and stored information at Relay**

It is reasonable to assume that a Relay UE needs to remember which SIBs were requested by a Remote so that it can forward the updates of the same requested SIBs. The contribution [12] raises this aspect in the following proposals:

Proposal 1 RAN2 to confirm that Relay UE can obtain updated SIB(s) on behalf of Remote UE with stored information about Remote UE’s interest in SIB(s) and without a request from Remote UE.

Proposal 2 RAN2 to confirm that Relay UE maintains multiple requests of SIBs to enable the obtaining and forwarding of updated SIB(s) for remote UE.

The key question (assuming RAN2 confirms these two proposals) is if something needs to be captured in the specification. One possible and useful way would be to clarify this in section 5.8.9.9.2 by adding “or their update” as shown below:

|  |
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| 5.8.9.9.2 Actions related to transmission of *UuMessageTransferSidelink* message The L2 U2N Relay UE initiates the Uu message transfer procedure when one of the following conditions is met:  1> upon receiving *Paging* message related to the connected L2 U2N Remote UE from network;  1> upon acquisition of the SIBs or their update requested by the connected L2 U2N Remote UE (as indicated in *sl-Requested-SI-List* in the *RemoteUEInformationSidelink*);  1> upon receiving the updated SIB1 and the SIBs have been requested by the connected L2 U2N Remote UE from network; |

**Question 4: Do you agree to add “or their update” as shown above (or similar) in section 5.8.9.9.2?**

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| --- | --- | --- |
| Company | Yes/ No | Comments |
| Apple | No | RAN2 do not agree the requirement for relay UE to timely track SIB interest from remote UE and timely update. The issue of validity of SIB interest was actually discussed in previous offline discussion, and was identified as tricky because there is some latency between relay UE obtaining SIB and relay UE forwarding to remote UE (e.g. scheduling delay and half duplex caused delay). Because such latency is unpredictable, it is hard to specify a mechanism / requirement for relay UE to timely track SIB interest from remote UE.  Our understanding is when relay UE to acquire SIB for remote UE is up to its implementation. And no requirement is specified for relay UE. |
| Xiaomi | Yes | We see the benefit of saving signaling overhead. If we relay on remote UE to acquire upon SIB update, relay UE shall first forward SIB1 and remote UE send SIB request. Two more messages are needed. If relay UE can forward the updated SIB autonomously, SIB1 forwarding and SIB request can be saved. |
| OPPO | No | similar view as Apple that we may not need to dig into this issue. On the other hand, “1> upon receiving the updated SIB1 and the SIBs have been requested by the connected L2 U2N Remote UE from network;” seems already sufficient. |
| Sharp | No |  |
| Lenovo | Yes | The condition 2 is not talking about any strict timelines.  The condition is when relay **initiates** the Uu message transfer procedure. It is straightforward that a relay initiates the Uu message transfer procedure when it has acquired the requested SIB(s) update.  The confusion comes because the Condition 3 was not formulated correctly. One rectification is that:   1. Condition 2 is used for Request SIB(s) and their updates 2. Condition 3 is about SIB1 update |
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On the same topic, but different point: [32] believes that “**The relay should avoid making multiple SI requests triggered from different remote UEs**”. Do you agree to specify this? This will mean that a Relay UE performs SI acquisition only if the relay UE does not have stored valid version of the system information indicated in sl-Requested-SI-List and a Uu SI request by the relay UE for the system information is not pending. **While this is a sensible UE implementation, no change might be necessary to indicate this implementation detail in the specification.**

**3.1.5 Requesting System Information (SI or SIB)**

Documents [4], [18] with CR in [19] think that a Remote UE should be allowed to request any SIB (Rel. 16, 17, Public Safety) and corrections have been proposed to ensure that Request for System Information is actually for SIBs (and not for SI-messages). Do you agree?

**Question 5a: Do you agree that a Remote UE can indicate his interests for any SIBs (not SI-messages) to Relay UE via RemoteUEInformationSidelink” and this needs ASN.1 changes as proposed in [4], [19]?**

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| --- | --- | --- |
| Company | Yes/ No | Comments |
| Apple | Yes | We think it is aligned with previous agreement that remote UE can request any SIB |
| Xiaomi | Comments | We think some SIBs forwarding may require further signaling to enable the functionality. For example, the reference time is madatory for the function of SIB9 and posSIB. Relay UE shall inform remote UE the reference time of reception of SIB9 and posSIB(s), if these SIBs are requested by remote UE. The details can be found in R2-2205319. |
| OPPO |  | We can only decide whether to rely on per-SIB solution, and if yes, then to check [4], [19] in more details, which does not seems in a ready shape (some detailed change needed anyway). |
| Sharp | Yes |  |
| Lenovo | Yes |  |
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Continuing the discussion for positioning SI, [5] proposes to Support inclusion of a per-posSI or per-posSIB request (to align with the handling of the existing sl-Requested-SI-List-r17) in the RemoteUEInformationSidelink message.

**Proposal 5b: Do you support inclusion of a per-posSI or per-posSIB request (to align with the handling of the existing sl-Requested-SI-List-r17) in the RemoteUEInformationSidelink message?**

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| --- | --- | --- |
| Company | Yes/ No | Comments |
| Apple | See comment | We think more discussion is needed because Rel-18 will specify sidelink positioning anyway. For example, it seems only GNSS assistance information is meaningful to OOC UEs. Then, the new IE for posSIB request from the remote UE shall be limited to those posSIBs, not all the posSIBs. In other words, the relay UE shall be only burdened with SIB forwarding for which is deemed necessary, not any SIBs in Rel-17. As long as there is a chance that the NW refuse to give OOC remote UE OTDOA/DL-TDOA posSIBs, the relay UE shall not be allowed to support forwarding those posSIBs. |
| Xiaomi | Comments | If posSIB request is supported, it shall be requested in SIB granularity.  But we think some SIBs forwarding may require further signaling to enable the functionality. For example, the reference time is madatory for the function of SIB9 and posSIB. Relay UE shall inform remote UE the reference time of reception of SIB9 and posSIB(s), if these SIBs are requested by remote UE. The details can be found in R2-2205319. |
| Lenovo |  | No strong opinion. Maybe as a first step, the necessity of providing posSIBs can be agreed. |
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**3.1.6 System Information: Other issues**

**Reducing broadcast overhead for deriving SL connection timers (T300, T301 and T319)**

RIL [B100] was agreed in the ASN.1 ad-hoc and [26] proposes to further reduce the SIB signalling: A single SL time-offset is included in SIB12. To derive SL connection timers (T300, T301 and T319), this offset is added on the corresponding connection timer in *ue-TimersAndConstants* received in SIB1.

**Question 6: Do you agree to reduce broadcast overhead by deriving SL connection timers (T300, T301 and T319), by using a single PC5 time offset added on the corresponding connection timer in ue-TimersAndConstants received in SIB1?**

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| --- | --- | --- |
| Company | Yes/ No | Comments |
| Apple | No | The way in current running CR can work, and is more readable. We tend to think this signaling optimization can be deprioritized. And if this change is adopted, multiple places in procedure text also need change (e.g. first read legacy timer, and then obtain offset and then remote UE calculate the value) |
| Xiaomi | No |  |
| OPPO | No | We do not think signalling overhead is a severe issue in this scenario. Also agree with Apple that current mechanism is more readable. |
| Sharp | No |  |
| Lenovo | Yes | 3GPP initiates multiple study/ work to ensure that power/ battery of the eco-system is optimized. We need to respect the energy needs when this will worldwide affect every base station transmission round the clock. Broadcast is expensive. The implementation can hardly be called complex. Even field description for the same can clarify that the new PC5-timeOffset will be added on top of the Uu timers. |
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**Emergency call**

Doc [8] raises and interesting question suggesting that it may be left to UE implementation to select an acceptable cell or a suitable relay UE to originate an emergency call when UE has no suitable cell.

According to TS38.304, an acceptable cell must also meet the cell selection criteria (clause 5.2.3.2) i.e., S criterion. So, for the same cell, where a UE can only receive Limited service, the configured threshold (entry) conditions should generally not allow a UE to act as a remote UE. And, if the serving cell of a relay UE is different and can allow a connecting remote UE to have normal services, then the remote UE should prefer to connect via the Relay. If, as the proponents propose to leave this to UE implementation, is there anything to capture here?

**There may be nothing to specify, including a Note to specify UE behaviour to select an acceptable cell or a suitable relay UE to originate an emergency call when UE has no suitable cell.**

* 1. **Paging**

**3.2.1 Paging Release**

Paper [1] argues that upon the PC5 RRC connection with remote UE is released, relay UE initiate transmission of the. *SidelinkUEInformationNR* message to release the received *sl-PagingIdentity-RemoteUE* from the remote UE and release the corresponding paging information. Given that a gNB can’t forward the paging messages to the remote UE via the same Relay anymore (as the RRC Connection has been released), this proposal makes sense.

**Question 7: Do you agree that upon PC5 RRC connection release, relay UE initiate transmission of the *SidelinkUEInformationNR* message to release the corresponding *sl-PagingIdentity-RemoteUE*?**

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| --- | --- | --- |
| Company | Yes/ No | Comments |
| Apple | Yes |  |
| Xiaomi | No | We understand gNB can acknowledge the SL RRC release by the removal of destination ID in r16 tx resource request implicitly. |
| OPPO | Yes |  |
| Sharp | Yes |  |
| Lenovo | Yes |  |
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Doc [9] on the same topic but with a different scenario thinks that once the remote UE enters into RRC\_CONNECTED, why the relay UE needs to send the release message through *SidelinkUEInformationNR* from relay UE to gNB? Considering once the remote UE enters into RRC\_CONNECTED state, there will be no paging message needed for the RRC\_CONNECTED remote UE anymore. It is redundant to release the paging request of remote UE via *SidelinkUEInformationNR* from relay UE to gNB under the procedure of 5.8.9.8.3 in[1]. Here one can argue that, basically RAN2 never intended to make Remote UE’s transition to RRC\_Connected known to the relay UE, therefore this is fine to let the relay UE send the release message through *SidelinkUEInformationNR* to gNB.

**3.2.2 UE specific DRX cycle not configured**

Documents [18] and [30] identify the same issue that sometimes UE specific DRX cycle may not configured. In this case, their resolution is that in section 5.8.9.8.3, indicate that the relay calculates the paging occasions of the remote UE using the minimum of the DRX cycle received from the remote UE and the default only when a value is received from the remote UE.

**Question 8: Do you think it is necessary to handle and specify the situation that sometimes UE specific DRX cycle may not configured?**

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| --- | --- | --- |
| Company | Yes/ No | Comments |
| Apple | Yes | The current procedure text is misleading that it is always configured. |
| Xiaomi | Yes |  |
| OPPO | Yes | We understand the upper-layer configured value is optional, yet wonder whether the AS-layer configured value is mandatory for RRC\_INACTIVE UE? |
| Sharp | Yes |  |
| Lenovo | Yes |  |
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**Other minor issues from CR**

**From [19] following points are remaining:**

These seem to be simple enough:

Point 1) Relay UE monitor remote UE’s paging message at remote UE’s paging occasion, the calculation of remote UE’s paging occasion need UE ID and UE specific DRX cycle of remote UE. The procedure in 5.8.9.8.3 does not mention “sl-PagingIdentity-RemoteUE”.

Point 2) The “sl-SIB1-Delivery” is missing in procedure 5.8.9.9.3.

**Stage 2 issues from [3]**

1. NR sidelink communication is used to carry the 5G Proximity based Services (ProSe) as defined in TS 23.304, which cover 5G ProSe Direct Discovery, 5G ProSe Direct communication and 5G ProSe UE-to-Network Relay Communication.
2. There is a typo at SRAP header on the remote UE’s SRAP prcessing (which should be PC5 SRAP). There is a restriction on the update of local Remote ID via RRCReconfiguration message from gNB to only Relay UE
3. Unclear text for the resource allocation of Relay discovery.
4. The configuration of within RRCSetup message gNB to U2N Remote UE during RRC connection establishment is not clear.
5. Lack of readability on the description for paging monitoring indication
6. Lack of reference number for the referred TS.
7. The identity information within RRCReconfiguration message (for the case that Remote UE switches from direct to indirect path) is not complete.

All above issues seem to not require any technical discussions.

**We think all the above 9 points (2 from [19] and 7 from [3]) can be handled by the specification rapporteur.**

* 1. **Cell change of remote UE**
     1. **R2-2204551**

[2] R2-2204551 Discussion on cell change of remote UE due to relay UE's cell change SHARP Corporation discussion NR\_SL\_relay-Core

In [2], it mentioned that a relay UE could forwards new SIB1 after HO and cell reselection to the remote UE connecting to it. Then, a remote UE, if the received SIB1 includes a different cell, consider a cell reselection occurs. Namely, the cell change of remote UE in IDLE/INACTIVE state occurs due to relay UE’s cell change.

It further pointed out that there are different behaviours of the remote UE for legacy cell reselection and cell change due to relay UE’s cell change.

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| --- | --- | --- |
| Timer | Case | |
| Cell change due to relay UE’s cell change | Cell reselection |
| T300 | Keep running till expiry.  Upon expiry, UE goes to IDLE | Stop if running, and UE goes to IDLE |
| T319 | Keep running till expiry.  Upon expiry, UE goes to IDLE | Stop if running, and UE goes to IDLE |
| T390 | Keep running till expiry.  Barring alleviated till expiry. | Stop if running, and barring alleviated |
| T302 | Keep running till expiry.  Barring alleviated till expiry. | Stop if running, and barring alleviated |

[2] prefers the same behaviours for cell change of remote UE due to relay UE’s change can be applied as cell reselection. So, [2] proposes:

**Proposal 2: specify that for a remote UE, if the received SIB1 includes a different cell, consider a cell reselection occurs.**

**Change from TP:**

<begin>

5.2.2.4.2 Actions upon reception of the *SIB1*

Upon receiving the *SIB1* the UE shall:

1> store the acquired *SIB1*;

1> if the L2 U2N Remote UE is in RRC\_IDLE or in RRC\_INACTIVE,

2> if the *cellIdentity* in the acquired *SIB1* is different from the stored *cellIdentity,*

3> consider cell re-selection occurs;

1> if the *cellAccessRelatedInfo* contains an entry of a selected SNPN or PLMN and in case of PLMN the UE is either allowed or instructed to access the PLMN via a cell for which at least one CAG ID is broadcast:

2> in the remainder of the procedures use npn-IdentityList, trackingAreaCode, and cellIdentity for the cell as received in the corresponding entry of npn-IdentityInfoList containing the selected PLMN or SNPN;

1> else if the cellAccessRelatedInfo contains an entry with the PLMN-Identity of the selected PLMN:

2> in the remainder of the procedures use plmn-IdentityList, trackingAreaCode, and cellIdentity for the cell as received in the corresponding PLMN-IdentityInfo containing the selected PLMN;

<end>

**Rapporteur comments:**

* For T302, ‘upon cell change due to relay (re)selection’ has been added in TS38.331 as stop condition.
* For T390, ‘upon cell change due to relay (re)selection’ has been added in TS38.331 as stop condition.
* For T300, [R2-2204960](file:///D:\OneDrive%20-%20Lenovo\3GPP\RAN2\TSGR2_118\Docs\R2-2204960.zip) propose that ‘cell changes due to relay handover or relay UE’s cell re-selection’ can be added as stop condition to stop T300, which will be discussed in next question.

**Question 9: Do companies agree on the proposal and change for Remote UE in RRC\_IDLE or in RRC\_INACTIVE in [2]?**

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| --- | --- | --- | --- |
| Company | Agree on Proposal?  (Yes or No) | Agree on Change?  (Yes or No) | Comments |
| Apple | Yes | Yes but | For change, do we need to define a short terminology for "cell change due to relay (re)selection/HO"? It is error-prone in spec because multiple places may use such terminology. |
| Xiaomi | Yes | Yes |  |
| OPPO | Comment | Comment | For the proposal: we are open, on the one hand, if we do not adopt the change, we basically rely on T300/302/319/390 expiry to handle the case, or we proactively stop the timers as proposed. Both seems feasible?  For the change, it seems fine. Different from rapp/Apple, we understand the intention of 4551 is to rely on “cell reselection” instead of “cell change due to relay (re)selection”, which is the main reason to have change on 5.2.2.4.2. Yet may be instead of a normative text, a NOTE to clarify the intention is sufficient.  Especially, for T390, there is a RIL O090 for checking on the feasibility of “cell change due to relay (re)selection”. |
| Sharp | Yes | Yes | Regarding to the comments from rapporteur ‘upon cell change due to relay (re)selection’, our understanding is this condition is for the case that a remote UE performs relay (re)selection and the (re)selected relay UE belongs to a different cell, but not the case in the proposal. |
| Lenovo | No | No | We agree that we need to handle the case of cell change due to relay HO and cell reselection when the corresponding timer(s) is running.  Actually, the same case happens in idle, inactive and connected state (see Q11 associated with connected state). The change from [2] is only applied to idle/inactive state. We prefer to a common solution for all states. Q10&Q11 provide the common solution for all states. |
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* + 1. **R2-2204960**

[14] R2-2204960 [B105] TP on setup request procedure Lenovo discussion Rel-17

In [14], it mentioned that a remote UE shall start T300 if a L2 U2N remote UE transmits RRCSetupRequest message to the serving cell via L2 U2N relay UE. Before receiving the response from the serving cell, the remote UE may receive the notification message due to relay UE handover, Uu RLF, relay reselection or L2 U2N Relay UE’s RRC connection failure.

After the remote UE receives the notification, the remote UE will perform relay/cell reselection if the remote UE decides not to keep PC5 link. According to section 5.3.3.6 and 5.3.11 of TS38.331, the remote UE will stop T300 (see B104, R2-2204959).

If the remote UE decides to keep PC5 link after the remote UE receives notification message, relay/cell reselection will not happen. If the serving cell of the relay UE changes, it is better for the remote UE to stop T300. Therefore, we propose:

**Proposal 1: The remote UE shall stop T300, if running, when cell changes due to relay handover or relay UE’s cell re-selection.**

**Changes from TP:**

<begin>

5.3.3.6 Cell re-selection or cell selection while T390, T300 or T302 is running (UE in RRC\_IDLE)

The UE shall:

1> if cell reselection occurs while T300 or T302 is running; or

1> if relay reselection or cell change due to handover or cell reselection of the connected relay UE occurs while T300 is running; or

1> if cell changes due to relay reselection while T302 is running:

2> perform the actions upon going to RRC\_IDLE as specified in 5.3.11 with release cause 'RRC connection failure';

1> else if cell selection or reselection occurs while T390 is running, or cell change due to relay selection or reselection occurs while T390 is running:

2> stop T390 for all access categories;

2> perform the actions as specified in 5.3.14.4.

7.1.1 Timers (Informative)

| Timer | Start | Stop | At expiry |
| --- | --- | --- | --- |
| T300 | Upon transmission of *RRCSetupRequest.* | Upon reception of *RRCSetup* or *RRCReject* message, cell re-selection, cell change due to handover or cell reselection of the connected relay UE, the (re)selected L2 U2N Relay UE becomes unsuitable, and upon abortion of connection establishment by upper layers. | Perform the actions as specified in 5.3.3.7. |

<end>

Note: [B105] is not included in [602].

**Question 10: Do companies agree on the proposal and change in [14]?**

|  |  |  |  |
| --- | --- | --- | --- |
| Company | Agree on Proposal?  (Yes or No) | Agree on Change?  (Yes or No) | Comments |
| Apple | Yes | Yes but | For change, do we need to define a short terminology for "cell change due to relay (re)selection/HO"? It is error-prone in spec because multiple places may use such terminology. |
| Xiaomi | Yes | No, if Q9 is agreed | If we agree the change in Q9 as below,  1> if the L2 U2N Remote UE is in RRC\_IDLE or in RRC\_INACTIVE,  2> if the *cellIdentity* in the acquired *SIB1* is different from the stored *cellIdentity,*  3> consider cell re-selection occurs;  The event can already covered by cell re-selection in legacy procedure. |
| OPPO | Comment | Comment | We understand the issue is essentially the same as in Q9, so should be handled jointly. |
| Sharp | Yes | Yes but | If it is agreed, the condition should be also applied to T319, T390 and T302. |
| Lenovo | Yes | Yes | See Q9.  In addition, we agree the condition should be applied to T319, T390 and T302 if agreed. |
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* + 1. **R2-2204961**

[15] R2-2204961 [B106] TP on re-establishment procedure Lenovo discussion Rel-17

[15] thinks that it is possible that the remote UE receives the notification message from the relay UE when T301 of the remote UE is running. After the remote UE receives notification message, the remote UE may or may not decide to perform relay/cell reselection. If the remote UE decides to perform relay/cell reselection, UE needs to stop T301. If the remote UE decides to keep the current PC5 link, the remote UE will further monitor the discover message because relay UE will transmit the discovery message including new cell ID once relay UE changes to the new serving cell. If the cell of relay UE changes, the remote UE also need to stop T301. Therefore, we propose the remote UE shall stop T301 upon cell of the remote UE change.

**Proposal 1: The remote UE shall stop T301 upon cell of the remote UE change.**

**Changes from TP:**

<begin>

5.3.7.7 T301 expiry or selected cell no longer suitable

The UE shall:

1> if timer T301 expires;

1. if the selected cell becomes no longer suitable according to the cell selection criteria as specified in TS 38.304 [20]; or
2. if cell change due to relay handover or cell reselection of relay UE:

2> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with release cause 'RRC connection failure'.

7.1.1 Timers (Informative)

|  |  |  |  |
| --- | --- | --- | --- |
| T301 | Upon transmission of *RRCReestabilshmentRequest* | Upon reception of *RRCReestablishment* or *RRCSetup* message as well as when the selected cell becomes unsuitable, the (re)selected L2 U2N Relay UE becomes unsuitable or cell change due to relay handover or cell reselection of relay UE. | Go to RRC\_IDLE |

<end>

Note: [B106] is not included in [602].

**Question 11: Do companies agree on the proposal and change in [15]?**

|  |  |  |  |
| --- | --- | --- | --- |
| Company | Agree on Proposal?  (Yes or No) | Agree on Change?  (Yes or No) | Comments |
| Apple | Yes | Yes but | For change, do we need to define a short terminology for "cell change due to relay (re)selection/HO"? It is error-prone in spec because multiple places may use such terminology. |
| Xiaomi | Yes | No, if Q9 is agreed | If we agree the change in Q9 as below,  1> if the L2 U2N Remote UE is in RRC\_IDLE or in RRC\_INACTIVE,  2> if the *cellIdentity* in the acquired *SIB1* is different from the stored *cellIdentity,*  3> consider cell re-selection occurs;  We can simply say cell re-selection to cover the event.  [Lenovo] The proposal from Q9 cannot be applied to re-establishment in which the remote UE stays at connected state. The UE performs cell selection rather than re-selection during re-establishment. In addition, after UE transmits re-establishment request, this re-establishment fails if relay performs handover or cell reselection. |
| OPPO | Comment | Comment | We understand the issue is essentially the same as in Q9, so should be handled jointly. |
| Sharp | Yes | Yes |  |
| Lenovo | Yes | Yes | See Q9 |
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* 1. **Connection management**
     1. R2-2205991

[34] R2-2205991 Clarification on relay and remote UE behavior during failure handling Huawei, HiSilicon discussion Rel-17 NR\_SL\_relay-Core

In [34], there are two proposals as follow.

**Proposal 1: During Relay UE’s RRC reestablishment/HO, the Relay UE is not allowed to send discovery message or forward system information until RRC reestablishment/HO success.**

**Proposal 3: T311 is stopped after the remote UE receives system information of new cell from relay UE.**

**Rapporteur comments:** It is reasonable that relay UE transmits discovery message or forward system information associated with new cell until RRC reestablishment/HO success. But it can be left for relay UE implementation. So, we can focus on P3.

**Question 12: Do companies agree on the proposal 3 and changes in [34]?**

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| --- | --- | --- | --- |
| **Company** | **Agree on Proposal?**  **(Yes or No)** | **Agree on Change?**  **(Yes or No)** | **Comments** |
| Apple | Yes | Yes | It is reasonable to regard it as one new scenario of cell reselection. |
| Xiaomi | No | No | In legacy, T311 stop upon selection of suitable relay or cell. To acknowledge relay UE changes cell, the remote UE shall already select the relay UE, which had stopped the T311. We are not sure whether the mentioned scenario exists. |
| OPPO | No |  | Not sure about the intention of P3: current T311 stop condition includes “upon selection of a suitable L2 U2N Relay UE”, which is align with legacy condition “Upon selection of a suitable NR cell”. If the condition as stated in P1, i.e., the relay UE may be undergoing a re-establishment / HO, then if the definition of suitable-relay includes checking on updated discovery message, the concern have been considered / addressed. NOTE that we have raised a RIL O088, and tdoc of 4944. |
| Sharp | Yes | Yes |  |
| Lenovo | No | No | In current specification, the remote UE will stop T311 once the remote UE decides to keep the current PC5 link. If following P3, the relay UE may not broadcast new cell when T311 expires. Namely, the relay UE may not complete e.g handover when T311 expires. It will result in re-establishment failure. Then, the remote UE enters idle state. |
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* + 1. R2-2205065

[19] R2-2205065 Correction on remote UE’s SIB(s) acquisition and paging monitoring ZTE, Sanechips CR Rel-17 38.331 17.0.0 3037 - F NR\_SL\_relay-Core

There are seven issues in [19]. The 6th issue is discussed in this section. [19] pointed out that the procedure in 5.8.9.10.4 is not aligned with agreement. According to agreement, for remote UE to make decision on whether to trigger relay (re)selection, the PC5-RRC notification message sent by relay UE includes the cause value, i.e., HO or cell (re)selection or Uu RLF.

**Change from DraftCR:**

<begin>

5.8.9.10.4 Actions related to reception of *NotificationMessageSidelink* message

Upon receiving the *NotificationMessageSidelink*, the U2N Remote UE shall:

1> if the *indicationType* is included:

2> if the UE is L2 U2N Remote UE in RRC\_CONNECTED:

3> initiate the RRC connection re-establishment procedure as specified in 5.3.7;

2> else if the UE is L3 U2N Remote UE, or L2 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE:

3> if the PC5-RRC connection with the U2N Relay UE is determined to be released:

4> perform the relay (re)selection as specified in 5.8.15.3.

3> else

4> maintain the PC5-RRC connection;

NOTE: For L3 U2N Remote UE, or L2 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE, it is up to Remote UE implementation whether to trigger relay (re)selection or keep the unicast PC5 link.

<end>

**Rapporteur comments:** after the remote UE receives the PC5-RRC notification message sent by relay UE due to, i.e., HO or cell (re)selection or Uu RLF, the re-establishment procedure is triggered. The remote UE performs relay/cell selection during re-establishment procedure if deciding to release. Therefore, ‘relay/cell (re)selection’ is captured in the section for re-establishment already. Therefore, ‘PC5 RRC connection release’ is captured in 5.8.9.10.4.

**Question 13: Do companies agree on the changes in [19]?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree on changes?**  **(Yes or No)** | **Comments** |
| Apple | No | Agree with Rapporteur: ‘relay/cell (re)selection’ is captured in the section for re-establishment already |
| Xiaomi | No |  |
| OPPO | No |  |
| Sharp | No | Agree with Rapporteur |
| Lenovo | No | ‘relay/cell (re)selection’ has been captured in the section for re-establishment already. |
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* + 1. R2-2205131

[21] R2-2205131 Connection establishment and resume failure occurrence to a L2 U2N Remote UE ASUSTeK CR Rel-17 38.331 17.0.0 3052 - F NR\_SL\_relay-Core

In [21], it mentioned that the relay UE will transmit notification message or PC5-S message to the remote UE upon the connection establishment/resume failure. Similarly, the connection establishment/resume failure may also occur to a L2 U2N Remote UE when it performs the connection establishment/resume procedure via a L2 U2N Relay UE. In this situation, [21] thinks the L2 U2N Remote UE may also trigger PC5-S release or keep the current PC5 connection.

**[21] proposes the L2 U2N Remote UE may trigger PC5-S release or keep the current PC5 connection upon the connection establishment/resume failure.**

**Rapporteur comments:** [21] considers the case that the remote UE fails to perform the connection establishment/resume when the PC5 link is available. That means there is a problem in Uu link. Therefore, the remote UE will receive the PC5-S message or notification message from the relay UE in this situation.

**Question 14: Do companies agree on the proposal and draftCR in [21]?**

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| --- | --- | --- | --- |
| **Company** | **Agree on Proposal?**  **(Yes or No)** | **Agree on Change?**  **(Yes or No)** | **Comments** |
| Apple | No | No | For these cases, remote UE can directly trigger relay  reselection. There is no need to send PC5-S or PC5 RRC. |
| ASUSTeK | Yes | Yes | L2 U2N Remote UE RRC connection establishment may fail due to T300 expiry or reception of RRCReject from gNB when the Uu link between L2 U2N Relay UE and gNB is OK. In this situation, the Remote UE would not receive the PC5-S message or notification message from the relay UE. Thus, the Remote UE should be responsible for taking care of the failure. |
| Xiaomi | No | No | In this case, UE would enter IDLE as legacy. UE can try to trigger RRC establishment. No new UE behavior is needed. |
| OPPO | No | NO | This seems just normal UE behavior as in legacy (since we do not assume the issue due to relay UE in this case). We do not see any necessity to support additional mechanism. |
| Sharp | No | No | Agree with Apple, remote UE is supposed to directly trigger relay reselection |
| Lenovo | No | No | Agree with Apple and Xiaomi. |
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* + 1. R2-2205132

[22] R2-2205132 Associating two sidelink RLC bearer configurations for bi-directional sidelink RLC bearer to support L2 U2N Relay ASUSTeK CR Rel-17 38.331 17.0.0 3053 - F NR\_SL\_relay-Core

In [22], it pointed out that in Rel-16, there is a 1-to-1 mapping between sidelink DRB and Tx/Rx sidelink RLC bearer configuration. However, in Rel-17 L2 U2N Relay, multiple Remote UE’s DRBs can be mapped to one Tx/Rx sidelink RLC bearer configuration. And, both remote UE and relay UE may receive multiple Tx sidelink RLC bearer configurations from gNB and multiple Rx sidelink RLC bearer configurations from each other. In this situation, it is not clear how remote UE/relay UE can know which two sidelink RLC bearer configurations among the multiple Tx sidelink RLC bearer configurations and the multiple Rx sidelink RLC bearer configurations should be associated for one bi-directional sidelink RLC bearer.

Currently each RLC bearer configuration (i.e. SL-RLC-ChannelConfig) in L2 U2N Relay is identified with a sidelink RLC channel ID (i.e. SL-RLC-ChannelID) and it is up to gNB to determine which two sidelink RLC bearer configurations (one sidelink RLC bearer configuration sent to remote UE and the other sidelink RLC bearer configuration sent to relay UE) are associated for a bi-directional sidelink RLC bearer. In this situation, it should be feasible and easier for gNB to use the same value of sidelink RLC channel ID for both sidelink RLC bearer configurations so that remote UE and relay UE can associate them according to the same sidelink RLC channel ID.

To ensure gNB uses the same value of sidelink RLC channel ID for both sidelink RLC bearer configurations, it is suggested to add related description on the field of sl-RLC-ChannelID.

**Changes from DraftCR:**

<begin>

6.3.5 Sidelink information elements

*<omitted>*

– SL-RLC-ChannelConfig

The IE *SL-RLC-ChannelConfig* specifies the SL RLC bearer configuration information for PC5 Relay RLC channel between L2 U2N Relay UE and L2 U2N Remote UE.

***SL-RLC-ChannelConfig* information element**

-- ASN1START

-- TAG-SL-RLC-RLC-CHANNEL-CONFIG-START

SL-RLC-ChannelConfig-r17 ::= SEQUENCE {

sl-RLC-ChannelID-r17 SL-RLC-ChannelID-r17,

sl-RLC-Config-r17 SL-RLC-Config-r16 OPTIONAL,

sl-MAC-LogicalChannelConfig-r17 SL-LogicalChannelConfig-r16 OPTIONAL,

sl-PacketDelayBudget-r17 INTEGER (0..1023) OPTIONAL,

...}

-- TAG-SL-RLC-CHANNEL-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SL-RLC-ChannelConfig* field descriptions** |
| ***sl-MAC-LogicalChannelConfig***  The field is used to configure MAC SL logical channel paramenters. |
| ***sl-RLC-ChannelID***  Indicates the PC5 Relay RLC channel in the link between L2 U2N Relay UE and L2 U2N Remote UE. Two PC5 Relay RLC channel configurations (one received from gNB and the other received from the peer UE) with the same value of *sl-RLC-ChannelID* are associated for a bi-directional sidelink RLC bearer. |
| ***sl-RLC-Config***  Determines the RLC mode (UM, AM) and provides corresponding parameters. |
| ***sl-PacketDelayBudget***  Indicates the Packet Delay Budget for a PC5 RLC bearer. Upper bound value for the delay that a packet may experience expressed in unit of 0.5ms. |

<end>

**Question 15: Do companies agree on the changes in [22]?**

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| --- | --- | --- |
| **Company** | **Agree on changes?**  **(Yes or No)** | **Comments** |
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* 1. **Other**

[6] R2-2204634 Correction on [O006, O007, O008, O010, O011, O054, O900] OPPO draftCR Rel-17 38.331 17.0.0 F NR\_SL\_relay-Core

[7] R2-2204674 [E083][H593] Two copies of a same SIB and related remote UE behaviour vivo discussion

[13] R2-2204959 [B104] TP on stop condition of T300 Lenovo discussion Rel-17

[16] R2-2204989 Discussion on inter layer interaction for NR sidelink relay OPPO discussion Rel-17 NR\_SL\_relay-Core

[31] R2-2205907 [U456][U473] Draft CR on Corrections to Trigger Conditions of RemoteUEInformationSidelink InterDigital draftCR Rel-17 38.331 17.0.0 NR\_SL\_relay-Core

[33] R2-2205909 [U482] Draft CR on Corrections to NotificationMessageSidelink InterDigital draftCR Rel-17 38.331 17.0.0 NR\_SL\_relay-Core

[35] R2-2204958 [B103] TP for initiation condition of notification message Lenovo discussion Rel-17

[36] R2-2204962 [B107] TP on unsuitable relay during re-establishment Lenovo discussion Rel-17

**Rapporteur comments:** [6] [7] [13][16][31] [33] will be handled in RIL list [602].

[12] R2-2204766 Discussion on the LCIDs of SL-SCH for Uu Logical Channels of Remote UE CATT discussion Rel-17 NR\_SL\_relay-Core

[17] R2-2204991 Correction to support L3 U2N Relay OPPO draftCR Rel-17 38.300 17.0.0 NR\_SL\_relay-Core

[20] R2-2205115 remaining issues for control plane procedure for relay operation LG Electronics France discussion Rel-17

~~[22] R2-2205132 Associating two sidelink RLC bearer configurations for bi-directional sidelink RLC bearer to support L2 U2N Relay ASUSTeK CR Rel-17 38.331 17.0.0 3053 - F NR\_SL\_relay-Core~~

**Rapporteur comments:** The above contributions are deprioritized in this summary. Stage 3 CP issue will be discussed first in this summary. The contributions without TP are considered as low priority.

[28] R2-2205856 Correction for RRC Reestablishment in Sidelink relay Nokia, Nokia Shanghai Bell draftCR Rel-17 38.331 17.0.0 F NR\_SL\_relay\_enh-Core

**Rapporteur comments:** It was agreed in RAN2 that re-establishment procedure will be triggered upon reception of PC5-S release message. A306 in RIL list proposed the following condition should be added in 5.3.7.2, which is noted as ‘Prop agree’.

# 3 Conclusion

# References

1. R2-2204550 Discussion on paging information management for a remote UE SHARP Corporation discussion NR\_SL\_relay-Core
2. R2-2204551 Discussion on cell change of remote UE due to relay UE's cell change SHARP Corporation discussion NR\_SL\_relay-Core
3. R2-2204584 38.300 CR Correction for SL Relay MediaTek Inc. CR Rel-17 38.300 17.0.0 0440 - F NR\_SL\_relay-Core
4. R2-2204585 General SIB forwarding for Remote UE [M119][H629] MediaTek Inc. discussion Rel-17 NR\_SL\_relay-Core
5. R2-2204586 Positioning SIB forwarding for Remote UE [M119][H629] MediaTek Inc. discussion Rel-17 NR\_SL\_relay-Core
6. R2-2204634 Correction on [O006, O007, O008, O010, O011, O054, O900] OPPO draftCR Rel-17 38.331 17.0.0 F NR\_SL\_relay-Core
7. R2-2204674 [E083][H593] Two copies of a same SIB and related remote UE behaviour vivo discussion
8. R2-2204676 OOC concept for remote UE vivo discussion
9. R2-2204764 [C121] Necessity of Releasing the Paging Request of Remote UE via SidelinkUEInformationNR CATT discussion Rel-17 NR\_SL\_relay-Core
10. R2-2204765 [C122]Conditions of RemoteUEInformationSidelink Transmission CATT discussion Rel-17 NR\_SL\_relay-Core
11. R2-2204766 Discussion on the LCIDs of SL-SCH for Uu Logical Channels of Remote UE CATT discussion Rel-17 NR\_SL\_relay-Core
12. R2-2204886 Discussion on SI forwarding NEC Corporation discussion Rel-17 NR\_SL\_relay-Core
13. R2-2204959 [B104] TP on stop condition of T300 Lenovo discussion Rel-17
14. R2-2204960 [B105] TP on setup request procedure Lenovo discussion Rel-17
15. R2-2204961 [B106] TP on re-establishment procedure Lenovo discussion Rel-17
16. R2-2204989 Discussion on inter layer interaction for NR sidelink relay OPPO discussion Rel-17 NR\_SL\_relay-Core
17. R2-2204991 Correction to support L3 U2N Relay OPPO draftCR Rel-17 38.300 17.0.0 NR\_SL\_relay-Core
18. R2-2205064 Discussion on remote UE’s SIB(s) acquisition and paging monitoring ZTE, Sanechips discussion Rel-17 NR\_SL\_relay-Core
19. R2-2205065 Correction on remote UE’s SIB(s) acquisition and paging monitoring ZTE, Sanechips CR Rel-17 38.331 17.0.0 3037 - F NR\_SL\_relay-Core
20. R2-2205115 remaining issues for control plane procedure for relay operation LG Electronics France discussion Rel-17
21. R2-2205131 Connection establishment and resume failure occurrence to a L2 U2N Remote UE ASUSTeK CR Rel-17 38.331 17.0.0 3052 - F NR\_SL\_relay-Core
22. R2-2205132 Associating two sidelink RLC bearer configurations for bi-directional sidelink RLC bearer to support L2 U2N Relay ASUSTeK CR Rel-17 38.331 17.0.0 3053 - F NR\_SL\_relay-Core
23. R2-2205321 [X208] Discussion on remote UE’s on-demand SI in CONNECTED Xiaomi discussion
24. R2-2205496 Correction on cause value in sidelink relay Nokia, Nokia Shanghai Bell draftCR Rel-17 38.331 17.0.0 NR\_SL\_relay-Core
25. R2-2205609 Clarification of SI acquisition for RRC\_IDLE/RRC\_INACTIVE Remote UE (RIL#: E084, H593) Samsung discussion Rel-17 NR\_SL\_relay-Core
26. R2-2205695 [B100] SL Timer Broadcast in SIB1 Lenovo discussion NR\_SL\_relay-Core Revised
27. R2-2205699 [B212] RRC Connected Remote UE cannot acquire SIB1 Lenovo discussion NR\_SL\_relay-Core R2-2205695
28. R2-2205856 Correction for RRC Reestablishment in Sidelink relay Nokia, Nokia Shanghai Bell draftCR Rel-17 38.331 17.0.0 F NR\_SL\_relay\_enh-Core
29. R2-2205905 Draft CR on Corrections on Paging Reception by the Relay UE InterDigital draftCR Rel-17 38.304 17.0.0 NR\_SL\_relay-Core
30. R2-2205906 [U455] Draft CR on Corrections to Paging DRX Cycle InterDigital draftCR Rel-17 38.331 17.0.0 NR\_SL\_relay-Core
31. R2-2205907 [U456][U473] Draft CR on Corrections to Trigger Conditions of RemoteUEInformationSidelink InterDigital draftCR Rel-17 38.331 17.0.0 NR\_SL\_relay-Core
32. R2-2205908 [U465] Draft CR on Corrections to Relay UE Uu SI Request InterDigital draftCR Rel-17 38.331 17.0.0 NR\_SL\_relay-Core
33. R2-2205909 [U482] Draft CR on Corrections to NotificationMessageSidelink InterDigital draftCR Rel-17 38.331 17.0.0 NR\_SL\_relay-Core
34. R2-2205991 Clarification on relay and remote UE behavior during failure handling Huawei, HiSilicon discussion Rel-17 NR\_SL\_relay-Core
35. R2-2204958 [B103] TP for initiation condition of notification message Lenovo discussion Rel-17
36. R2-2204962 [B107] TP on unsuitable relay during re-establishment Lenovo discussion Rel-17