**3GPP TSG RAN WG2 Meeting #118-e R2-220xxxx
E-Conference, 9th -20th May 2022**

**Agenda item: 6.7.2.1**

**Source: Qualcomm Incorporated**

**Title: Summary report of [AT118-e][620][Relay] System information issues (Qualcomm)**

**WID/SID: NR\_SL\_Relay-Core – Release 17**

**Document for: Discussion and Decision**

# Introduction

This is a summary report for below offline discussion:

* [AT118-e][620][Relay] System information issues (Qualcomm)

      Scope: Discuss the system information proposals from agenda item 6.7.2.1 (R2-2204585, R2-2204586, R2-2204674, R2-2204886, R2-2205064, R2-2205065, R2-2205319, R2-2205609) and determine handling of the technical issues.

      Intended outcome: Report to Monday CB session

      Deadline:  Friday 2022-05-13 1800 UTC

# Discussion

## Format of on demand SIB request by Remote UE

Proposals 1 and 2 in [1], change 1 in [2], and Proposal 1 [3], are reconfirming the below agreements from RAN2#116bis-e and RAN2#113-e and further discussing how the SIB request IEs in the RemoteUEInformationSidelink message should be defined. These proposals are essentially for input to the RRC spec CR.

* Any SIB which the RRC\_IDLE/RRC\_INACTIVE remote UE has a requirement to use (e.g. for relay purpose) can be requested by the remote UE (from the relay UE or the network). RAN2 not pursue further specification work for remote UE using an indirect connection to network to make use of a SIB if it is not supported based on the current spec.

Rapporteur thinks that it is efficient to focus the discussion in this section only on the format of the IEs and not on reconfirming the agreement above. There are two options on the format of the IEs in the RemoteUEInformationSidelink message:

* Option 1: Remote UE indicate the requestedSIB-List, i.e. a list of SIB(s)
* Option 2: Remote UE indicate the requested-SI-List, i.e. a list of SI messages with each SI message corresponding to one or more mapped SIBs

L2 Remote UE in RRC\_IDLE/RRC\_INACTIVE state requesting SIB(s) via Relay UE and receiving the response via dedicated PC5-RRC message is like the Uu RRC\_CONNECTED UE performing DedicatedSIBRequest explicitly indicating the interested SIBs and receiving SIBs via dedicated RRCReconfiguration message. Also, UuMessageTransferSidelink, has sl-SystemInformationDelivery IE to transfer SIB(s) individually to the Remote UE. With that comparison, Rapporteur’s view is that option 2 is reasonable to support and aligns with Uu. It also helps Relay UE to know exactly which SIB(s) to update for the Remote UE.

**~~Q1) Do you agree to support option 1 or option 2 as the format of IEs for a Remote UE to request SIBs from the Relay UE in the RemoteUEInformationSidelink message?~~**

* ~~Option 1: Remote UE indicate the perSIB list like the requestedSIB-List~~
* ~~Option 2: Remote UE indicate the perSI list like the requested-SI-List, i.e. with each SI message corresponding to one or more mapped SIBs~~

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| ~~Company~~ | ~~Response (Yes / No)~~ | ~~Comments~~  |
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## Unsolicited SIB1 forwarding to Remote UE corrections

Rapporteur thinks that Proposal 3 in [1], is to capture the below agreement from RAN2#116bis-e in the TS38.331 spec , section 5.8.9.9.2, CR accurately.

* Recommendation 1-3 [19/23]: 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.

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| 5.8.9.9.2 Actions related to transmission of *UuMessageTransferSidelink* messageThe 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 and the SIBs have been requested by the connected L2 U2N Remote UE from network;The L2 U2N Relay UE shall set the contents of *UuMessageTransferSidelink* message as follows:1> include *sl-PagingDelivery* if the *Paging* message received from network containing the associated *ue-Identity* of the L2 U2N Remote UE;1> include *sl-SystemInformationDelivery* if any of the conditions for initiating Uu message transfer procedure related to System Information are met;1> submit the *UuMessageTransferSidelink* message to lower layers for transmission.NOTE: The L2 U2N Relay UE always forwards SIB1 to the L2 U2N Remote UE. |

Based on input requested by companies for Q2 in [Pre118-e][608][Relay] Summary of AI 6.7.2.1 on control plane (Lenovo), it seems some companies think that the unsolicited SIB1 forwarding is mandatory and some think it is optional. Rapporteur thinks as per the agreement from RAN2#116bis-e, UE implementation choice is only relevant for unsolicited SIB1 forwarding and not for request based SIB1, as for request based SIB1 Relay UE is required to send SIB1 like other SIBs.

**Q2) Do you agree that unsolicited SIB1 forwarding support is not mandatory for Relay UE as per the below agreement from RAN2#116bis-e?**

* Recommendation 1-3 [19/23]: 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.

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | Yes | It’s not mandatory for relay UE |
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There are two options on how the corrections can be made to support the unsolicited SIB1 forwarding RAN2#116bis-e agreement in section 5.8.9.9.2 of TS 38.331

* Option 1: Cover the unsolicited SIB1 forwarding behavior through a NOTE

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| 5.8.9.9.2 Actions related to transmission of *UuMessageTransferSidelink* messageThe 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 SIBs have been requested by the connected L2 U2N Remote UE from network;The L2 U2N Relay UE shall set the contents of *UuMessageTransferSidelink* message as follows:1> include *sl-PagingDelivery* if the *Paging* message received from network containing the associated *ue-Identity* of the L2 U2N Remote UE;1> include *sl-SystemInformationDelivery* if any of the conditions for initiating Uu message transfer procedure related to System Information are met;1> submit the *UuMessageTransferSidelink* message to lower layers for transmission.NOTE: The L2 U2N Relay UE may support unsolicited SIB1 forwarding, i.e. send updated SIB1 received from network without a request from Remote UE, to the L2 U2N Remote UE based on L2 U2N Relay UE implementation. |

* Option 2: Add the unsolicited SIB1 forwarding in the trigger condition and remove NOTE

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| 5.8.9.9.2 Actions related to transmission of *UuMessageTransferSidelink* messageThe 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 SIBs have been requested by the connected L2 U2N Remote UE from network;1. upon unsolicited SIB1 forwarding to the connected L2 U2N Remote UE based on Relay UE implementation;

The L2 U2N Relay UE shall set the contents of *UuMessageTransferSidelink* message as follows:1> include *sl-PagingDelivery* if the *Paging* message received from network containing the associated *ue-Identity* of the L2 U2N Remote UE;1> include *sl-SystemInformationDelivery* if any of the conditions for initiating Uu message transfer procedure related to System Information are met;1> submit the *UuMessageTransferSidelink* message to lower layers for transmission. |

**Q3) Do you agree to support the corrections to TS38.331 spec, section 5.8.9.9.2, using option 1 or option 2?**

* Option 1: Cover the unsolicited SIB1 forwarding behavior through a NOTE
* Option 2: Add the unsolicited SIB1 forwarding in the trigger condition and remove NOTE

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | Option 1 | Since it’s up to UE implementation, NOTE is enough |
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## Other SI handling issues

Proposal 1 in [4] is on a TP to include a NOTE in TS 38.331 to cover the L2 Remote UE behaviour “RRC\_IDLE/RRC\_INACTIVE Remote UE which has connected to Relay UE does not have to perform PRACH based on-demand SI acquisition procedure over Uu.” This proposal seems narrow and does not cover the below agreement from RAN2#116-e. Instead of the suggested TP in proposal 1 in [4], Rapporteur thinks that changes captured via a paragraph in section 5.2.2.2.1 of 38.331 CR update in [Pre118-e][602][Relay] 38331 CR and rapporteur resolutions (Huawei) to address RIL List # E084, H593 is broader and enough.

* Proposal 9: As a baseline, in-coverage Remote UE is allowed to acquire some necessary SIB over Uu irrespective of its PC5 connection to Relay UE. [23/23]

**Q4) Do you agree that the changes covered via below added paragraph in section 5.2.2.2.1 of 38.331 CR update, for [Pre118-e][602][Relay] 38331 CR and rapporteur resolutions (Huawei) to address RIL List # E084, H593, support the concerns of Proposal 1 in [4]?**

A L2 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE can decide whether to perform the SI acquisition procedure over Uu interface as defined in clause 5.2.2.3 by UE implementation. Instead, it can inform the interested SIB(s) to the connected L2 U2N Relay UE as defined in clause 5.8.9.8.2 and receive the SIB(s) from the L2 U2N Relay UE as defined in clause 5.8.9.8.3. A L2 U2N Remote UE in RRC\_CONNECTED is not required to obtain SI over Uu interface, and it receives SIB(s) in *RRCReconfiguration* message and performs on-demand SI request as defined in clause 5.2.2.3.5 and 5.2.2.3.6.

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | Yes |  |
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Proposal 2 in [4] is on a TP to include a NOTE in TS 38.331 to cover “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”. Rapporteur thinks this proposal is reasonable as there is no requirement on Remote UE to acquire MIB while connected to Relay UE and hence asks for company views on the proposed change.

**~~Q5) Do you agree to include a NOTE “~~**~~When RRC\_IDLE or RRC\_INACTIVE L2N Remote UE is out of coverage and has connected to network via L2 U2N Relay UE, the Remote UE does not perform the actions specified in clause 5.2.2.5 if the Remote UE is unable to acquire the MIB.” in section~~ **~~5.2.2.3.1 of TS 38.331 as per Proposal 2 in [4]?~~**

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Change 5 in [2] is to correct TS 38.331 for “sl-SIB1-Delivery” is missing in procedure 5.8.9.9.3. Rapporteur thinks this change is straightforward and can be agreed for TS 38.331 CR.

**Q6) Do you support the change 5 in [2], Add ‘sl-SIB1-Delivery and’ in the first bullet 4 in clause 5.8.9.9.3. of TS 38.331 CR?**

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | Yes |  |
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Change 7 in [2] is to correct TS 38.331 for “According to agreement, for SIB-update in case of RRC\_CONNECTED remote UE(s), relay on network to send updated SIB(s) when they are updated, no further restriction in specification. PWS SIBs acquisition of RRC\_CONNECTED remote UE should also rely on network.” Rapporteur thinks this change is straightforward and can be agreed.

**Q7) Do you support the change 7 in [2],** Add ‘or the L2 U2N Remote UE in RRC\_CONNECTED’ in the RRCReconfiguration-IEs field descriptions ‘dedicatedSystemInformationDelivery’ **in TS 38.331 CR?**

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | Yes |  |
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[5] has proposals to clarify the Relay UE behavior on how the relay UE decides which SIBs to update to Remote UEs. The proposals are about Relay UE storing the request information from Remote UEs and using that to send updated SIBs without explicit request from Remote UE for SIB updates. Rapporteur thinks the proposals are covering Relay UE implementation and is not necessary to specify in RRC spec. Also, the changes covered for Q3) in this document cover these aspects.

**Q8) Do you agree that proposals in [5] are covered by trigger condition 3 in option 1 or option 2 provided in Q3?**

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | Yes |  |
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[6] has below proposals. Rapporteur thinks these proposals are reasonable based on the arguments in [6]

**Proposal 1: Adding a Note in specification to clarify that, when the remote UE is connected to the relay UE and two copies of the same SIB have been acquired by the remote UE (one copy via indirect link from relay UE and the other copy from Uu interface), the one from indirect link via relay UE should be applied by the remote UE.**

**Proposal 2: If Proposal 1 is agreeable, adopt the TP provided in Section 5.**

**Q9) Do you agree to support proposal 1 and proposal 2 in [6]?**

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | No | When remote UE is connected with relay UE, remote UE is aware of the relay UE’s serving cell. Therefore, the SIB via indirect path is provided by relay UE’s serving cell. Also, remote UE can tell the SIB is provided by which cell via direct path.If the SIBs via direct and indirect are from different cell, there is no additional work, since there is no need to prioritize.If the SIBs via direct and indirect are from the same cell, UE shall use the latest one, identified by value tag.Therefore, there seems to be no spec impact. |
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## posSIB support

[7] discuss about corrections to RemoteUEInformationSidelink message to support forwarding of positioning SIBs to the Remote UE via Relay UE. Before we discuss the details, rapporteur would like to point out the below agreements from RAN2#116bis-e and RAN2#113bis-e

* Any SIB which the RRC\_IDLE/RRC\_INACTIVE remote UE has a requirement to use (e.g. for relay purpose) can be requested by the remote UE (from the relay UE or the network). RAN2 not pursue further specification work for remote UE using an indirect connection to network to make use of a SIB if it is not supported based on the current spec.
* [603] For RRC\_Connected remote UE, RAN2 confirm that DedicatedSIBRequest procedure is re-used for the Remote UE to request the SI via relay UE.

As per the above agreements, it seems reasonable to support corrections to include posSIBs request in RemoteUEInformationSidelink message for L2 Remote UE in RRC\_IDLE/RRC\_INACTIVE to have consistent behavior as RRC\_CONNECTED L2 Remote UE (Option1). However, during the ASN.1 adhoc discussions and responses for Proposal5b in [Pre118-e][608][Relay] Summary of AI 6.7.2.1 on control plane (Lenovo), it seems some companies think that posSIBs forwarding via Relay UE should not be supported (option 2) or some exceptions on which posSIBs can be forwarded via Relay UE have to be discussed (Option 3).

As positioning SIBs are used by upper layers, it is not clear how can upper layers selectively know when to support positioning feature as there is no indication from AS layer to upper layers that UE is operating on 5G connection via Relay UE. Option 2 or Option 3 may result in inconsistent behaviour for positioning support. Also, for option 2 or option 3, we may have to make some exceptions for L2 Remote UE which need to be reverted later. Further for option 3, we may need coordination with positioning WI to decide what to exclude.

Considering the late stage of Rel-17, rapporteur thinks that a compromise option could be a NOTE is added in specs (option 4) to clarify that Rel-17 only supports the signaling framework to support posSIBs to L2 Remote UE connected to a Relay UE and it does not guarantee the optimal working of the positioning feature. To summarize, the below options are possible for L2 Remote UE positioning SIBs handling:

* Option 1: support posSIBs request in RemoteUEInformationSidelink message as per existing RAN2 agreements for L2 Remote UE in any RRC state
* Option 2: Do not support posSIBs for L2 Remote UE in any RRC state + make corrections to RRC spec to not allow L2 Remote UE in any state request posSIBs
* Option 3: Support posSIBs request in RemoteUEInformationSidelink message as per existing RAN2 agreements for L2 Remote UE in any RRC state + make some exceptions on which posSIBs can be requested and may need coordination with positioning WI.
* Option 4: Option1 + add a NOTE to clarify that Rel-17 only supports the signaling framework to support posSIBs to L2 Remote UE connected to a Relay UE and it does not guarantee the optimal working of the positioning feature.
* Option 5: Support posSIBs request in RemoteUEInformationSidelink message as per existing RAN2 agreements for L2 Remote UE in any RRC state + make corrections to RRC spec to allow L2 Remote UE in any state request posSIBs

Rapporteur thinks that option 1 or option 4 are the simplest changes to the RRC specs. Whereas, option 2 or option 3 require further discussion on what changes to make to the RRC specs and may require coordination with positioning WI.

**Q10) Do you agree to support Option 1, option 2, option 3 or option 4 for L2 Remote UE positioning SIBs handling in Rel-17?**

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | Option 2 or 5 | If no additional signaling is introduced, positioning can’t be supported, since the time of posSIB reception is essential. |
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**Q11) If you agree to support Option1, option3 or option 4 or option 5in Q10, do you agree to support perSIB request or perSIrequest as the format of IEs for a Remote UE to request posSIBs as clarified in Q1?**

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | perSIB | Aligend with Uu |
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[8] discusses about a case where the L2 remote UE supports posSIBs but L2 Relay UE does not. It is not clear when can such scenario happen, i.e. if both are Rel-17 UEs and the gNB supports posSIB(s), then both Remote UE and Relay UE should support posSIBs acquisition.

**Q12) If you agree to support option1, option 3 or option4 or option 5, do you agree that the case of L2 remote UE supports posSIBs but L2 Relay UE does not support posSIBs is possible?**

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | Yes | Relay and positioning are separate features. It’s possible relay UE is not capable of positioning. |
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[8], to support the case discussed above, proposes that L2 relay UE need to indicate its posSIBs support indication to L2 Remote UE and Remote UE can use this information to decide when to include posSIBs request in RemoteUEInformationSidelink message. [8] further raises an issue as below and proposes to introduce changes to indicate the received timing information to Remote UE. Rapporteur thinks these proposals are to check the correctness of positioning feature and it is not appropriate to consider these for discussion at this stage of Rel-17. Such changes can be deferred to later release of the standard by supporting a NOTE in option 4 above.

“Even if the relay UE supports positioning and posSIB(s) forwarding, the posSIB(s) may require target UE, i.e. remote UE, to know the time of the posSIB(s) reception, as indicated by following spec in [2] TS 37.355. The IE *GNSS-ReferenceTime* is carried by posSIB. Apparently, the remote UE is not aware of the time of reception of posSIB(s) by relay UE. To enable the positioning functionality, relay UE shall provide the time of reception of the posSIB(s) to remote UE.”

**Q13) If answer to Q12 is yes and/or if there are changes necessary to support the correct operation of positioning feature in Rel-17, do you agree to add a NOTE as in option 4 and not support any changes other than posSIBs forwarding in Rel-17?**

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| Company | Response (Yes / No) | Comments  |
| Xiaomi | No, changes are needed to support pos in relay | We understand positionging can’t be supported without reference time, not in a suboptimal way. The details can be found in [8] |
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# Conclusion

TBD based on company inputs

# References

[1] R2-2205064, Discussion on remote UE’s SIB(s) acquisition and paging monitoring, ZTE, Sanechips

[2] R2-2205065, Corrections on remote UE’s SIB(s) acquisition and paging monitoring, ZTE, Sanechips

[3] R2-2204585, General SIB forwarding for Remote UE [M119][H629], MediaTek Inc

[4] R2-2205609, Clarification of SI acquisition for RRC\_IDLE/RRC\_INACTIVE Remote UE (RIL#: E084, H593), Samsung

[5] R2-2204886, Discussion on SI forwarding, NEC

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

[7] R2-2204586, PosSIBs Forwarding for Remote UE [M119][H629], MediaTek Inc

[8] R2-2205319, Discussion on how to support posSIB(s) forwarding, Xiaomi