[95e-24-R18-SLRelay-DRX] - Version 0.0.5
RAN

3GPP TSG RAN#95e RP-220884

Electronic Meeting, March 17 - 23, 2022

Agenda Item: 9.3.2.4

Source: LG Electronics

Title: Moderator's summary for discussion [95e-24-R18-SLRelay-DRX]

Document for: Report

1 Initial round

This email discussion is to discuss how to handle the objective on the sidelink DRX in Layer-2 UE-to-Network relay in the approved WID RP-213585:

- 4. Support of sidelink DRX for Layer-2 UE-to-Network sidelink relay operation if not done in Rel-17 [RAN2]

Note 4A: This objective is to be checked in RAN#95e.

Contributions related to this discussion are RP-220180, 0523, 0664, 0733.

1.1 Discussion

The moderator thinks that the main discussion point is whether Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network sidelink relay operation. RAN2 made the following conclusion about the applicability of sidelink DRX:

- Agreements on SL-DRX for ProSe:

  1: RAN2 confirm R17 SL-DRX design can support non-relay-related ProSe communication directly without additional specific solution discussion / specification effort.

  2: RAN2 confirm the R17 SL-DRX design can support non-relay-related ProSe discovery by reusing SL default-DRX configuration used for communication without further additional specific solution discussion / specification effort.

- Agreements on SL-DRX for ProSe:

  1: RAN2 confirms Rel-17 SL-DRX design can be reused for relay-related ProSe communication in layer-3 relay without additional specific solution discussion/specification effort.

  2: Keep RAN2 previous agreement (prioritize the non-relay case without consideration of relay specific optimization in Rel-17) but we're not going to make any conclusion if L2 relay-related ProSe communication is supported or not in Rel-17 now.

3: RAN2 confirms Rel-17 SL-DRX design can be reused for L3 relay-related ProSe discovery without additional specific solution discussion/specification effort (by applying SL default-DRX configuration). No conclusion if L2 relay-related ProSe discovery is supported or not in Rel-17 now. RAN2 does not specify any restriction now.

In the moderator's observation, RP-220180 and RP-220664 claim that Rel-17 sidleink DRX scheme is applicable to the scenario as there are no specified restrictions while RP-220733 claims that it remains unclear whether SL DRX is properly supported for this scenario in Rel-17. Based on these contributions, the moderator asks companies input in the following questions.

Q1: Do you think Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation?

Feedback Form 1: Company input on the applicability of sidelink DRX to Layer-2 UE-to-Network relay

1 – Qualcomm Incorporated

The previous conclusions in RAN2 had been

"2: Keep RAN2 previous agreement (prioritize the non-relay case without consideration of relay specific optimization in Rel-17) but we're not going to make any conclusion if L2 relay-related ProSe communication is supported or not in Rel-17 now." and

"No conclusion if L2 relay-related ProSe discovery is supported or not in Rel-17 now."

If there is an interest to change the conclusion on the SL DRX applicability for Layer-2 UE-to-Nw Relay, the above RAN2 conclusions need to be updated as well.

Technically, RP-220180 talked about the cases for Relay Discovery and Connection establishment. It seems reasonable that these procedures are common for Layer-2 and Layer-3 UE-to-Network Relays, and therefore SL DRX should be applicable.

However, the procedure on setting up the SL DRX for the unicast connection is not addressed in the paper, especially on how the Layer-2 Relay can determine the SL DRX configuration for the DL traffic towards the Remote UE. For Layer-2 UE-to-Network Relay, there is no QoS Profiles for the Remote UE's flows at the Relay UE from upper layer. Therefore, setting up of the SL DRX obviously requires different procedures than normal Tx UE as defined so far in Rel-17.

It seems that clearly some additional specification texts are required to clarify how the Relay can determine the SL DRX configuration, either by getting information from gNB or from Remote UE.

Therefore, to help reaching the conclusion, the supporter of RP-220180 would need to explain how existing Rel-17 SL DRX procedures (without any change) can support the Layer-2 Relay setting up the DL SL DRX.

2 – Apple Europe Limited

We think R17 SL DRX can be used for L2 U2N relay scenarios.

Regarding the Qualcomm's question about QoS profile availability for SL-DRX determination for DL traffic in relay, and the Paging and SI forwarding issue mentioned in RP-220733 by CATT, we think those are not blocking issues to apply Rel-17 SL-DRX, for the following reasons:

1. There is no QoS profile for SL discovery messages in SL-SRB4 either. But RAN2 has agreed that R17 SL-DRX can be used directly for ProSe discovery and L3 relay discovery. So, as lack of QoS information

is not a problem for SL discovery case for SL-DRX, then it should be fine for other messages such as forwarded SI and paging messages transmitted by IDLE/INACTIVE relay UE.

2. For RRC_CONNECTED relay UE which are supported to forward DL traffic, the relay UE is aware of the split PDB requirements for the PC5 hop of E2E DL traffic, so relay UE can use PDB requirments to determine a proper SL-DRX unicast configuration. There is no specification impact for relay UE to take this PDB information into account.

3. For relay UE's forwarding of DL traffic to L2 remote UE, the L2 remote UE can also send DRX assistance information to the relay UE. L2 relay UE can utilize the assistance information from remote UE to determine SL-DRX configuration.

In addition, regarding potential solutions for this objective 4, the timing alignment of Uu DRX in Uu hop and SL DRX in PC5 hop can be regarded as a DRX optimization for relay-specific scenario to reduce end-to-end latency. However, this optimization is not only limited to L2 U2N relay. To pursue such optimizations, we need to consider both L2 relay and L3 relay. Moreover, DRX optimizations across different hops can also consider the two PC5 hops involved for UE-to-UE relay. Thus, we think it is better to consider this part of work in Rel-19 after UE-to-UE relay is done in Rel-18, with a bigger scope to apply solutions to all needed relay cases.

3 – Ericsson LM

In addition to Qualcomm comments, the work to do for RAN2 regarding SL DRX for L2 relay has been captured in our RAN2 paper R2-2109908 (https://www.3gpp.org/ftp/tsg*ran/WG2*RL2/TSGR2_116-e/Docs/R2-2109908.zip) submitted to RAN2#116. The main controversial scenario is when the remote UE in RRC IDLE or RRC INACTIVE while the relay UE is in RRC CONNECTED, in this case, remote UE may be configured with UE specific paging DRX cycle, meanwhile, the remote UE is also configured with SL DRX cycle, the relay UE may be configured with Uu DRX cycle. In order for the remote UE to be paged on time via the relay UE, all the three DRX configurations need to be aligned between each other. The detailed solutions may be different depending on whether the relay UE applies Mode 1 RA or Mode 2 RA. Such alignment would be insufficient/infeasible to fully leave to relay UE implementation and/or gNB implementation, rather it should be carefully studied in R18.

All in all, this is clearly a discussion to be concluded in WG and as RAN2 has reached no conclusion, we should stick to the existing RAN2 agreement, i.e., there is currently no conclusion if L2 relay-related ProSe communication is supported or not in Rel-17. This is not a good reason to remove the objective from Rel-18 scope, on the contrary, the Rel-18 objective should stay to conclude the work.

4 – AT&T

We believe that Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation with moderate additional specification work including procedures and configuration details. .

5 – Guangdong OPPO Mobile Telecom.

Yes we agree Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation.

Response to QC question "For Layer-2 UE-to-Network Relay, there is no QoS Profiles for the Remote UE's flows at the Relay UE from upper layer. Therefore, setting up of the SL DRX obviously requires different procedures than normal Tx UE as defined so far in Rel-17. ". it seems to say QoS info input is necessary for SL DRX determination, so the missing of QoS info input is a problem (?), however, R2 already agreed

that unicast SL DRX is not dependent on QoS (the QoS-dependent DRX configuration is only for BC and GC!), so not sure where this issue comes from.

Response to E///: ”when the remote UE in RRC IDLE or RRC INACTIVE while the relay UE is in RRC CONNECTED, in this case, remote UE may be configured with UE specific paging DRX cycle, meanwhile, the remote UE is also configured with SL DRX cycle, the relay UE may be configured with Uu DRX cycle. In order for the remote UE to be paged on time via the relay UE, all the three DRX configurations need to be aligned between each other.” not sure why the ”remote UE may be configured with UE specific paging DRX cycle” is involved: in SL-relay design, the paging reception for PC5-connected remote UE comes from relay UE. And then w.rt. the two left DRX configurations ”the remote UE is also configured with SL DRX cycle, the relay UE may be configured with Uu DRX cycle”, for the scenario of ”the relay UE is in RRC CONNECTED”, it can be fully under network control, and thus the so-called alignment, whatever, can be done by network, if wanted. Otherwise, if something more than that, it is merely optimization.

In the R2 discussion during R17, it is observed that the WG-level discussion has proved there is no real tech issue for applying R17 SL DRX design to L2 relay, while the objection was mainly to promote further optimization and thus tried to prevent the usage of baseline scheme. Given the current R18 scope, it is clearly a part that should be deprioritized compared to the other objectives.

6 – CATT

We think QC comments make sense.

As we also explained in RP-220733, it should be a matter of fact that one can not conlcude from the current agreements whehter Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation.

7 – Beijing Xiaomi Mobile Software

We understand additional indication in SL negotiation procedure may be pursed in relay. Because in current relay design, the UE can provide multiple preferred the SL DRX configurations to peer UE via PC5 RRC message, so that DRX on different PC5 connection and Uu can be aligned. However, when determining the SL DRX configuration, peer UE may only be able to follow one preferred SL DRX configuration rather than all of them. Peer UE has no information whether the preferred SL DRX configuration is to align with SL DRX on other PC5 connection or align with Uu DRX. As stated by Ericsson and QC, if the preferred SL DRX configurations is to align the paging cycle of relay UE or QoS profile of the DL traffic, peer UE should try to follow these preferred SL DRX configurations with higher priority. Therefore, we think some further information is needed to indicate the intention of the preferred SL DRX configuration.

8 – HuaWei Technologies Co.

We share the similar view as OPPO, the aspects raised by companies are not essential issues to apply SL DRX to L2 relay.

9 – Intel Corporation (UK) Ltd

We think that Rel-17 sidelink DRX is applicable for L2 U2N relay. However, there may be some aspects to clarify. And also it is true that RAN2 cannot conclude clearly.

10 – LG Electronics Inc.

Yes. In general, sidelink transmissions in Layer-2 UE-to-Network relay operation follow those specified for sidelink unicast, groupcast, broadcast transmissions. Rel-17 specifications do not differentiate these transmissions in applying sidelink DRX and thus Layer-2 UE-to-Network relay operation is supported by following the agreed behavior, i.e., the default DRX configuration is used for the messages with no dedicated DRX configuration and the sidelink unicast DRX mechanism is applied for the other message. There might be some room for further enhancement but we think they are not essential in supporting the scenario.

11 – vivo Mobile Communication Co.

PC5-S signalling and procedures specified in TS 23.287 for PC5 unicast link management in Rel-16 is also reused for the Unicast mode of ProSe direct communication. Therefore, SL-DRX mechanism for PC5-S signalling (i.e. SL-SRB0/1/2) under the discussion in SL enh. WI can be directly reused for the Unicast mode of ProSe direct communication as well. thus, Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation. It can be directly reused w/o extra Spec impact needed, including both PC5 QoS based SL-DRX framework and SL-DRX mechanism for PC5-S signalling.

12 – Futurewei

Yes, we think Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation.

13 – Lenovo (Beijing) Ltd

We agree that Rel-17 DRX can be reused for L2 relay UE case. No optimization is needed.

14 – CTSI

Yes, we think Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation. No optimization is needed.

15 – Nokia Denmark

We agree that Rel-17 DRX can be reused for L2 relay UE case.

16 – MediaTek Inc.

We agree that the Rel-17 SL-DRX solution works for the L2 relay case. Regarding the concerns raised in some comments above, we have generally the same understanding as Apple and OPPO, that the lack of QoS profile at the relay UE is not a problem and the multiple DRX cycles for a relay UE in RRC_CONNECTED can be managed on legacy principles. We do not see a need for further enhancements.

17 – Spreadtrum Communications

we agree that Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation.

18 – Philips International B.V.

We agree with Qualcomm and Ericsson. In general the procedures for applying DRX end-to-end (i.e. Remote UE – Relay UE – gNB and vice versa) certainly need to be clarified.

19 – ZTE Corporation

Yes, we think Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation and it is suggested not to consider additional SL DRX enhancement for L2 U2N relay in Rel-18.

Q2: What is your view on the update to Objective 4 in the approved WID?

Alt 1: Remove the objective as proposed in RP-220523.

- ~~Support of sidelink DRX for Layer-2 UE-to-Network sidelink relay operation if not done in Rel-17 [RAN2]~~

  ~~Note 4A: This objective is to be checked in RAN#95e~~.

Alt 2: Update the objective as proposed in RP-220733 to start normative work in Rel-18.

- Support of sidelink DRX for Layer-2 UE-to-Network sidelink relay operation ~~if not done in Rel-17~~ [RAN2]

  ~~Note 4A: This objective is to be checked in RAN#95e~~.

Alt 3: Others (please specify)

Feedback Form 2: Company input on the objective update

1 – Qualcomm Incorporated

As commented to Q1, in order to remove the objectives for Rel-18 WID, the group needs to first change the RAN2 agreements to concluded that Layer-2 Relay is covered with Rel-17 SL DRX design.

Before that, it is premature to remove the objectives.

2 – InterDigital Finland Oy

We feel that the objectives should remain, the CATT contribution has several strong technical argument why this should be considered (IDLE relay, consideration of SI and paging). Also, RAN2 did not have any time to discuss this in Rel17. As Qualcomm stated if RAN2 agrees that there is no DRX issues then it would be fine.

3 – Apple Europe Limited

We support Alt.1 As RAN2 has not made conclusions on SL-DRX applicability to L2 U2N relay case, we think RAN plenary can make an agreement on this applicabilty, then objective 4 can be safely removed.

4 – Ericsson LM

Alt 2, agree with QC comment.

5 – AT&T

Our preference is to adopt a slightly modified Alt2:

Alt3: Confirm ~~Support~~ support of sidelink DRX for Layer-2 UE-to-Network sidelink relay operation ~~if not done~~ in Rel-17 with enhancements if necessary. [RAN2]

~~Note 4A: This objective is to be checked in RAN#95e.~~

However, we will not object to Alt2 if it appears to gain consensus. Our position is that the feature should be completed.

6 – Guangdong OPPO Mobile Telecom.

Support Alt1.

This objective is clearly of lower priority given the baseline scheme is already ready and the leftover is just optimization (if needed by some companies perspective), so should be removed from the WID.

Response to Interdigital on the issues raised in CATT paper: 1) for issue-1, there is no restiction at all in R17 SL-DRX scheme saying that it has to be the scenario of different different gNB for the two UEs; 2) for issue-2: SI and paging forwarding by relay UE is based on the unicast-based PC5-RRC signaling, as agreed in SL-Relay WI, so the SL-DRX for unicast link would surely include that part as for the other PC5-RRC signaling, no delta part at all; 3) it is not true that ”Uu/SL DRX alignment was only considered for RRC_CONNECTED UE using mode 1 resource allocation mode”, for mode-2, relay-UE can still by implementation (as by network in mode-1) to do the alignment, so no difference either. In conclusion, it is quite misleading to list issues which is not techinically reasonable as the stoppers.

7 – CATT

Alt.2. We are the proponent.

Since whether L2 relay-related ProSe communication is supported or not in Rel-17 remains unclear, we think it is a bit premature to conclude that evertying is set and drop the related objective. The reason we have this ffs in the WID is to check now based on new progress in WGs. So with the current situation, we think some further discussions in Rel-18 (perferably technial discussions in WGs) are meaingful before we are able to conclude.

8 – Beijing Xiaomi Mobile Software

Alt3. We prefer to state the enhancement clearly in the objective to avoid over optimization. For example, Specify additional indication during SL DRX negotiation between remote UE and relay UE.

9 – HuaWei Technologies Co.

Alt1. We agree with Apple and OPPO.

10 – Intel Corporation (UK) Ltd

We wonder if RAN2 can first identify what is the gap in Rel-17 sideline DRX because there is no consensus on whether any enhancements are needed on top of existing Rel-17 sideline DRX operation. In that sense, we suggest the following objective.

Study and specify, if needed, enhancements to support sidelink DRX for Layer-2 UE-to-Network sidelink relay operation [RAN2]

Note 4A: Rel-17 sidelink DRX operation should be maintained wherever it is applicable.
11 – LG Electronics Inc. Alt 1. We think no additional work is necessary in Rel-18 for the sidelink DRX in Layer-2 UE-to-Network relay operation.
12 – vivo Mobile Communication Co. We are ok for Alt.1 . With no explicit conclusion on whether SL DRX can/cannot be supported for L2 Relay in Rel-17, our understanding is that it is left to NW/UE implementation on whether to support this feature (similar to most inter-feature supports). As a compromise, we can consider Alt.2 with lower priority.
13 – Futurewei We support Alt.1 so that WGs can focus on the remaining objectives better.
14 – Lenovo (Beijing) Ltd Support Alt1.
15 – CTSI We support Alt.1.
16 – Nokia Denmark Alt 1: Remove the objective as proposed in RP-220523.
17 – MediaTek Inc. Support Alt 1 based on our answer under Q1.
18 – Spreadtrum Communications We support Alt.1.
19 – Philips International B.V. We support Alt. 2, since we think further work is needed.
20 – ZTE Corporation We support Alt1.

1.2 Summary and moderator's proposal

Company input during the initial round can be summarized as follows:

Q1: Do you think Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation?

- Yes: Apple, OPPO, Huawei, Intel (clarification may be needed), LGE, vivo, Futurewei, Lenovo, CTSI, Nokia, MediaTek, Spreadtrum, ZTE (13)

- No/unclear: Qualcomm, Ericsson, AT&T, Xiaomi, CATT, Philips (6)

Potential issues in supporting SL DRX in L2 U2N relay:

- Setting up the SL DRX for the DL traffic towards the remote UE which has no sidelink QoS profile (Qualcomm) => Unicast SL DRX is not dependent of QoS (OPPO)
- Paging and SI forwarding in relay UE (CATT) => SL DRX is also applicable for the transmissions without SL QoS profile in L3 relay or ProSe discovery (Apple)
- Alignment of the cycle of the relay UE Uu DRX, the remote UE Uu DRX, and the sidelink DRX (Ericsson) => Alignment of these DRX configurations are up to the network implementation and something more than it is optimization (OPPO)

Q2: What is your view on the update to Objective 4 in the approved WID?

- Alt 1: Apple, OPPO, Huawei, LGE, vivo, Futurewei, Lenovo, CTSI, Nokia, MediaTek, Spreadtrum, ZTE (12)
- Alt 2: Ericsson, CATT, vivo (with a low priority), Philips (4)
- Other views:
    - Keep the objective before a clear conclusion: Qualcomm, InterDigital
    - Confirm the support with enhancements if necessary: AT&T
    - Specify additional indication during SL DRX negotiation between remote UE and relay UE: Xiaomi
    - Study and specify, if needed, enhancements to support sidelink DRX for Layer-2 UE-to-Network sidelink relay operation: Intel

The moderator observes that a clear majority agreed that Rel-17 SL DRX is applicable to Layer-2 UE-to-Network relay and no additional work is necessary in Rel-18. Some companies responded that it is unclear about the support of SL DRX in Layer-2 UE-to-Network relay operations and the objective needs to be kept or modified.

Considering the discussion around the potential technical issues summarized above, the moderator thinks that these issues are mostly for better support of SL DRX in Layer-2 UE-to-Network relay, not something blocking the application of SL DRX itself in the operation. If this is the common understanding, the group can conclude that SL DRX is supported in Layer-2 UE-to-Network relay, i.e., it is possible to apply SL DRX irrespective of whether it is sufficiently optimized. Then, discussion can focus on whether additional enhancements are necessary in Rel-18. Based on the discussion outcome, the WID can be revised such that the objective is removed (if the group agree to do no more enhancement) or updated in a more precise form (if the group agree that some enhancements are necessary). These seems two possibilities in case of updating the objective; the specific enhancements are listed as a part of the objective or WGs are taked to study to identify the need of enhancements.

2 Intermediate round

2.1 Discussion

Based on the discussion in the initial round, the moderator asks company input on the following questions:

Q1: Can we conclude that Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation. Please note that "support" in this question means that the sidelink DRX is applicable irrespective of its level of optimization. If you don't agree to this conclusion, please specify which parts in the specifications make it impossible to apply Rel-17 sidelink to Layer-2 UE-to-Network relay.

Feedback Form 3: Company input on the proposed conclusion on the support of SL DRX in Layer 2 UE-to-Network relay

1 – Qualcomm Incorporated

The claim on "support" so far seems to be only on the procedure level. The defined PC5-RRC procedures can obviously be used by Layer-2 Relay. However, the main issue unresolved is how the Layer-2 Relay can come up with the proper SL DRX configuration, and whether and how it could obtain the information to make such decision.

The aspect on how Relay obtaining such proper information needs to be specified. It cannot be brushed aside as "optimization", as it is fundamental to make SL DRX to even work for the Layer-2 Relay.

One example raised in the 1st round discussion was on how the Layer-2 Relay obtains the DL traffic info/QoS Profile (which is available on gNB and Remote UE only) to determine the SL DRX configuration. This is the major difference between Layer-2 and Layer-3 Relays. The answers so far did not clarify how it could be done. If the Relay does not have proper information, it could result in SL DRX configuration that is detrimental to the service of the Remote UE. It would be better off to disable SL DRX instead of allowing an incorrect configuration.

There might be already means to provide the Layer-2 Relay with such information (e.g. even using Rel-17 design), but those has to be spelled out.

Regardless whether this is done in Rel-18 or with some additional RAN2 updates in Rel-17, the conclusion should not be Layer-2 Relay use case can be magically supported by doing nothing.

2 – Ericsson LM

As Qualcomm explains above, one could conclude that SL DRX can be "supported" for L2 U2N relay in R17 but this leaves many aspects unresolved. As we commented for the initial round, the performance with SL DRX in case of L2 U2N relay will not be guaranteed, especially for the SL transmissions with critical latency requirements e.g., paging, control signaling, SI, and SL communication with critical latency requirements. We agree with the Qualcomm reply and examples provided above.

RAN2 should further study and discuss the performance of SL DRX in case of L2 U2N relay and find out whether further specification work is needed.

3 – Apple Europe Limited

We agree Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation. The concern about latency issue of SI and paging forwarding is not a blocking issue, because:

First, the remote UE, relay UE and/or the serving gNB can always decide to not use SL-DRX in the PC5 hop for the unicast communication between L2 remote UE and L2 relay UE.

Second, even in Rel-17 L2 relay without SL-DRX, there is no latency requirements specified for the delivery of SI and paging forwarding. So, we are not sure there is an urgent need to design it only for the SL-DRX case in Rel-18. If companies all agree this QoS aspect is important and worth more work, we can have a more general latency reduction objective in Rel-19 for all relay cases.

4 – Guangdong OPPO Mobile Telecom.

We agree that Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation.

We also observe that the opponent also agree the support on procedural level at least, and ”The defined PC5-RRC procedures can obviously be used by Layer-2 Relay. ”

W.r.t. the input which is claimed as missing by opponent, e.g., QoS / latency requirement, it is a bit confusing since: 1) if the concern is for the CP signaling like paging and SI, they are not related to QoS requirement but one can simply relies on requirement on CP latency which is not UP traffic specific, so there is no need for a scheme design in order for AS layer to acquire the information; 2) or if the concern is for the UP traffic, then as clarified multiple times above already, it is for CONNECTED relay UE, and gNB can take it into control, which is clearly aware of the QoS requirement (as also confirmed by opponent already). So there is no real problem identified so far in our view.

5 – Beijing Xiaomi Mobile Software

We think the SL DRX can be supported in relay, but in a non-optimized way.

6 – LG Electronics Inc.

Yes, we think Rel-17 SL DRX supports Layer-2 UE-to-Network relay operation.

We understand the point Qualcomm and Ericsson raised is whether sufficient information is provided for the SL DRX determination. According to RAN2#116e agreement ”gNB directly configures relay UE for PC5 QoS configuration via Uu RRC signalling,” it is clear that relay UE is aware of PC5 QoS configuation for DL traffic. The relay UE becomes the TX UE for relaying DL traffic, and as per RAN2 agreements, the serving gNB of the relay UE determined SL DRX configuration when mode 1 is used. When mode 2 is used, the relay UE by its implementation determines SL DRX configuation, and we think it can be based on the QoS configuration provided by the gNB and the assitance information sent from the remote UE which becomes the RX UE in this case.

7 – CATT

Technically we tend to agree with the points from QC and Ericsson and some others that there are still issues to solve.

But on the other hand, it is after a lot of WG discussions that it was concluded ”not going to make any conclusion if L2 relay-related ProSe communication is supported or not in Rel-17 now”, and ”No conclusion if L2 relay-related ProSe discovery is supported or not in Rel-17 now.” We think normally technial discussions like in Q2 below should be done in RAN WG, instead of in RP.

As we pointed out in the contribution as well as in 1st round response, the claim that ‘SL-DRX is already supported with the current spec for Layer 2 UE-to-Network relay’ is not following the WG conclusion, and if RP has a different conclusion, we see a need that it’s offcially confirmed in RAN.

8 – Futurewei

Yes, we think Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation.

9 – HuaWei Technologies Co.

We agree Rel-17 specification can support applying sidelink DRX to L2 relay, it seems that opponents also acknowledge procedures are already there.

Regarding the performance, if it is the gNB to determine the SL DRX, the gNB is of course aware of the DL QoS info, and thus there is no issue;if it is relay UE to decide the SL DRX, relay UE is configured by gNB with PDB per LCH, therefore relay UE is also able to determine a proper SL DRX configuration. In addition, the remote UE is allowed to provide desired SL DRX configuration to the relay UE by existing mechanism. Therefore we don’t see any issue here.

It is also worth mentioning that what we are discussing here is whether the current specification can support L2 relay, there is no stringent performance requirement ever raised and agreed. How to make a suitable configuration is up to the implementation as usual.

10 – Nokia Denmark

We agree Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation.

11 – vivo Mobile Communication Co.

No. We prefer no explicit conclusion made by RAN plenary on whether SL DRX can OR cannot be supported for L2 Relay in Rel-17, as this is beyond the technical conclusion made by RAN2. Our understanding is that it is left to NW/UE implementation on whether/how to support this feature in L2 U2N relay. In other words, We think this can be inherited directly to Rel-18, without a need of having to spend an amount of time just for a “formal” confirmation. So we’re ok to not have this objective in the scope, if this is the majority’s preference, w/o any more conclusion/discussion needed for R17.

12 – MediaTek Inc.

We consider that Rel-17 SL-DRX can support the L2 relay case.

Procedurally, we understand that there is no disagreement, and the procedures can be applied without needing any enhancement.

As other companies have indicated above, there is no problem for UP traffic, where the relay UE is made aware of QoS information (see the agreement quoted above by LG). The concern appears to be for paging and SI, which do not have corresponding QoS profiles, but the relay UE is aware of the general CP latency

requirements and the remote UE's paging DRX cycle (it needs the latter since it monitors the remote UE's paging occasions); for this case, we don't understand what requirement would be unmet.

13 – Spreadtrum Communications

We agree that Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation.

14 – InterDigital Finland Oy

We support the comments of Qualcomm and Ericsson, there are valid arguments why the issue of DRX in SL relay is not concluded. Clearly RAN2 has not firmly concluded that release 17 can support layer-2 UE-to-Network relay. Even some proponents of the idea like AT&T have stated that there needs to be some specification work needed. Others state it is not optimal. This is a RAN2 discussion not a RAN plenary one, and it is clear RAN2 has not concluded on this.

15 – ZTE Corporation

Yes, we think Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation.

For TX relay UE in RRC CONNECTED and Mode 1 RA, the gNB may determine the DRX pattern for Rx remote UE's E2E Uu bearer, which can be used for the SL DRX configuration between Tx relay UE and Rx remote UE. For TX relay UE in RRC CONNECTED and Mode 2 RA, the following two cases can be considered:

1) For TX relay UE in RRC CONNECTED and Mode 2 RA and Rx remote UE in RRC CONNECTED, the relay UE may determine the SL DRX for Rx remote UE based on the traffic arrival pattern. Moreover, the relay UE may adjust the SL DRX configuration of remote UE based on the relay UE's Uu DRX configured by serving gNB.

2) For TX relay UE in RRC CONNECTED and Mode 2 RA and Rx remote UE in RRC IDLE/INACTIVE, remote UE may send the desired SL DRX assistance info which is aligned with the paging occasion to relay UE. Relay UE may then determine the SL DRX configuration for remote UE which are aligned with the remote UE's paging occasion. Moreover, the relay UE may adjust the SL DRX configuration of remote UE based on the relay UE's Uu DRX configured by serving gNB.

In this way, the SL DRX and Uu DRX can also be aligned without gNB involvement.

16 – Philips International B.V.

Agree with Qualcomm

Q2: Do you think additional enhancements are necessary to sidelink DRX for Layer-2 UE-to-Network relay in Rel-18? If so, please specify what the enhancements are.

Feedback Form 4: Company input on the need of enhancements to sidelink DRX

1 – Qualcomm Incorporated

As commented to Q1, the first step is identify the fundamental functionalities required to make the SL DRX work for Layer-2 Relay use.

For example, it is hard to say if a mechanism is "additional enhancements" if it is required to avoid a SL DRX configuration that breaks the normal operation or QoS guarantee of either the Relay UE or Remote UE.

2 – Ericsson LM

Yes, we think we should study the necessary work to guarantee SL DRX works properly for L2 Relays.

The examples can include at least the following

1. Alignment of Uu DRX and SL DRX for paging, control signalling, SI and SL communication with critical latency requirements

3 – Apple Europe Limited

No. As explained in Q1, it is unclear to us that additional enhancements are necessarey.

4 – Guangdong OPPO Mobile Telecom.

No. As explained in Q1 above, we have not identified reasonable point to go for opitimization.

5 – Beijing Xiaomi Mobile Software

As commented in Q1, we think it's beneficial to introduce additional information during the SL DRX negotiation procedure to achieve optimized performance.

6 – LG Electronics Inc.

No. As we explained in Q1, all the basic information is avaiable for the determination of sidelink SL DRX. There might exist some room for further enhancement for the relay UE in mode 2 if it is identified that the information we mentioned in Q1 is still insufficient, but current we don't see an evidence for it.

7 – CATT

The points raised by QC and Ericsson are valid in our view. In our paper RP-22073 there are some points rasied as well. For example,

a) For relay scenario, the relay UE and remote UE are served by the same gNB, the current Tx-centric SL DRX configuration procedure may be not proper in relay scenario.

b) For paging and SI forwarding, there is no QoS profile for paging and SI messages, how to determine the SL DRX Pattern needs further discussion.

c) In R17 SL enhancement, Uu/SL DRX alignment was only considered for RRC_CONNECTED UE using mode 1. But for L2 U2N relay, if the relay UE is in RRC IDLE, whether the Uu/SL DRX alignment for remote UE paging reception should be considered needs further discussion.

BUT, as said in feedback to the previous question response, the main point in our view is not about 'ad-diontal enhacements', it is about RAN WG's conclusion after their technial discussions. In our view given the discussions in WG and in RAN so far, it would be reasonable to at least allow some further discussions in the WI in the WG level, as RAN is not the correct place for detailed technical discussions.

So we'd prefer to task the WG to look into potential technical points. This seems related to Q3 below as well.

8 – Futurewei

No.

9 – HuaWei Technologies Co. No. Same view as Apple and OPPO.
10 – Nokia Denmark No. As explained in Q1, it is unclear to us that additional enhancements are necessarey.
11 – vivo Mobile Communication Co. As replied in above Feedback Form 3, we're ok to not have this objective in the scope, if this is the majority's preference.
12 – MediaTek Inc. We do not see the need for additional enhancements.
13 – Spreadtrum Communications No, it is also unclear to us that additional enhancements are necessary.
14 – ZTE Corporation No, we think R17 SL DRX can be used to support the L2 U2N relay appropriately.
15 – Philips International B.V. Agree with Ericsson.

Q3: Do you think WGs need to conduct study in Rel-18 in order to identify the need of enhancements for sidelink DRX for Layer-2 UE-to-Network relay?

Feedback Form 5: Company input on the need of study about the enhancements to sidelink DRX

1 – Qualcomm Incorporated Related to the above questions, it is desirable to keep the objectives for Rel-18 for now till the conclusion on Q1 can be reached.
2 – Ericsson LM Given that it may be difficult for companies to reach consensus on the specific functionality to be specified, we are willing to compromise to further discuss during Rel-18 what functionality, if any, should be worked on. Thus, a study objective, e.g. as following would be acceptable to us for Rel-18: - *Study and specify support for sidelink DRX operation for Layer-2 UE-to-Network sidelink relay operation*
3 – Apple Europe Limited We are not sure whether a study phase for this is feasible, as this may need extra TU allocation.

4 – Guangdong OPPO Mobile Telecom.

We have not seen the point to go for a study 1) which requires more effort, and thus makes it even more difficult to meet the TU capacity (which is one reason to remove this bullet), 2) and clearly there is no consensus to pursue the work (i.e., the situation is NOT that nothing has been done so we do not know what is the solution and thus study is needed, instead, majority view is actually this work has been done (regardless whether optimization is needed or not))

5 – Beijing Xiaomi Mobile Software

If it's impossible to decide the specific objective, we can accept study phase as compromise.

6 – Intel Corporation (UK) Ltd

Yes, at least RAN2 can study further. It is hard to conclude in this RAN plenary without taking a further look at some issues companies raised although Rel-17 sidelink could be generally applicable to L2 U2N relay.

7 – LG Electronics Inc.

No. We think a gerenal objective like opening a study will require considerable work load in RAN2 as all the potential issues need to be treated. We are not sure if this is feasible with the current TU allocation.

8 – CATT

The issues mentioned by companies in the previous question may not be a full list but in our view it is premature to conclude that everything is ready and remove the WID bullet.

We are OK with Ericsson proposal as a compromise.

9 – Futurewei

No. We should focus on the remaining objectives for Rel-18.

10 – HuaWei Technologies Co.

No. As explained above we don't see need to study, and also we understand this plenary would not discuss anything which is to expand the R18 scope.

11 – vivo Mobile Communication Co.

Prefer No, and the consequence is that there is only Rel-17 sidelink DRX for Layer-2 UE-to-Network relay as baseline. The additional benefits to study on the need about the enhancements to sidelink DRX is not clear to us.

12 – Nokia Denmark

It is desirable to keep the objectives for Rel-18 for now till the conclusion on "Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation".

13 – MediaTek Inc. We do not see the need for a study phase.
14 – Spreadtrum Communications No, we think no need to conduct study in R18.
15 – InterDigital Finland Oy We agree with Qualcomm that the objective was added to work item with a checkpoint in hope that RAN2 could conclude that it wasn't needed within the Release 17 work. This clearly didn't happen so we would like to keep the objective in as is. However, we can support the compromise by Ericsson, to study and specify.
16 – ZTE Corporation No, we see no motivations for this.
17 – Philips International B.V. If it's impossible to decide the specific objective, we can accept study phase as compromise.

2.2 Summary and moderator's proposal

Input from the intermediate round can be summarized as follows:

Q1: Can we conclude that Rel-17 specifications for sidelink DRX can support Layer-2 UE-to-Network relay operation. Please note that "support" in this question means that sidelink DRX is applicable irrespective of its performance. If you don't agree to this conclusion, please specify which parts in the specifications make it impossible to apply Rel-17 sidelink to Layer-2 UE-to-Network relay.

- Yes: Qualcomm (only on the procedure level), Ericsson (only on the procedure level), Apple, OPPO, Xiaomi (in a non-optimized way), LGE, Futurewei, Huawei, Nokia, MediaTek, Spreadtrum, ZTE, Philips (only on the procedure level) (13)
- No: vivo (1)
- WG discussion is needed: CATT, InterDigital (2)

Q2: Do you think additional enhancements are necessary to sidelink DRX for Layer-2 UE-to-Network relay in Rel-18? If so, please specify what the enhancements are.

- Yes: Qualcomm, Ericsson, Xiaomi, Philips (4)
- No: Apple, OPPO, LGE, Futurewei, Huawei, Nokia, vivo, MediaTek, Spreadtrum, ZTE (10)
- Discussed potential objective:
    - Alignment of Uu DRX and SL DRX for paging, control signalling, SI and SL communication with critical latency requirements

- additional indication during SL DRX negotiation between remote UE and relay UE

Q3: Do you think WGs need to conduct study in Rel-18 in order to identify the need of enhancements for sidelink DRX for Layer-2 UE-to-Network relay?

- Yes: Qualcomm, Ericsson, Xiaomi, Intel, CATT, InterDigital, Philips (7)
- No: Apple, OPPO, LGE, Futurewei, Huawei, vivo, Nokia, MediaTek, Spreadtrum, ZTE (10)

For Q2 and Q3, a number of companies expressed concerns about the TU and work load.

From the input on Q1, it can be observed that the majority agreed the support of SL DRX in Layer-2 UE-to-Network relay. Several companies replied that RAN plenary cannot make a conclusion but the moderator actually has an opposite idea. It firstly needs to be noted that the RAN2 conclusion was made in RAN2#116e in November 2021 and it also said "we're not going to make any conclusion." The Rel-18 WID was approved in last December (being aware of that RAN2 conclusion) and the note in the WID said RAN will check the situation in this meeting where the Rel-17 WI is supposed to be closed. Given that RAN2 conclusion already mentioned no further discussion in RAN2 side, the checking as per the note should be RAN plenary side discussion. Considering that it is a usual RAN plenary work to discuss what the current specifications support and what the limitations are, RAN should be able to make a conclusion on this matter. From the moderator's viewpoint, it is the very first step to have a common understanding what Rel-17 specification can do for SL DRX in Layer-2 UE-to-Network relay, and failing to reach a consensus wouldn't make it possible to have productive future discussion. Based on this idea and the majority view, the moderator proposes the following: The moderator notes again that conclusion on the support does not automatically block any enhancements in a future release; in fact discussing whether to include some enhancements to the already working specifications is the main job in RAN plenary.

Proposal 1: It is concluded that Rel-17 SL DRX supports Layer-2 UE-to-Network relay operation. This does not preclude potential future discussion on the enhancements related to it in Rel-18.

From the input on Q2 and Q3, there seems no consensus on how to revise the objective. In fact, the majority responded that no more work or study is necessary in Rel-18. But, at least it is clear that everyone agrees some change to the WID, either deleting the objective or modifying it to confirm a normative work or study. As Proposal 1 concludes the support of SL DRX in L2 UE-to-Network relay but does not preclude further discussion on the enhancement, a possible WF is to remove the objective in this meeting and discuss in a future RAN meeting whether some specific enhancements are necessary and need to be added to the WID.

Proposal 2: Objective 4 in the approved WID is removed. The revised WID in RP-220523 is approved.

3 Final round

3.1 Discussion

The moderator proposes the proposals discussed in Section 2.2 as the WF. The idea is to conclude that Rel-17 SL DRX is supported in Layer-2 UE-to-Network relay and thus remove the objective in the current WID. However, considering that a number of companies mentioned that this support is done without resolving some issues, e.g., insufficient information in determining the SL DRX configuation, on which still the majority was of the opinion that no work or study is necessary in Rel-18, it is suggested to allow some disucssion for potential objective in the next RAN meeting as per the normal RAN working procedure.

Proposal 1: It is concluded that Rel-17 SL DRX supports Layer-2 UE-to-Network relay operation. This does not preclude potential future discussion on the enhancements related to it in Rel-18.

If a company has serious concern on this proposal, please leave a comment in the following format:

Feedback Form 6: Feedback on Proposal 1

1 – Qualcomm Incorporated

The conclusion should be "It is concluded that Layer-2 UE-to-Network Relay may use Rel-17 SL DRX procedures. However, its behaviors are not defined and should be specified in Rel-17 or Rel-18."

Therefore, it is suggested that the objective 4 of the Rel-18 WID to be modified as following:

- ~~Support of~~Determine and specify how the sidelink DRX procedure defined in Rel-17 can be adapted for Layer-2 UE-to-Network sidelink relay operation ~~if not done in Rel-17~~ [RAN2]

~~Note 4A: This objective is to be checked in RAN#95e.~~

As discussed in previous rounds, there are multiple aspects on how the Relay configures the SL DRX unresolved.

The proponents of RP-220180 provided some of their theories/options. However, using those to address SL DRX for Layer-2 UE-to-Network Relay hasn't been reviewed/agreed by RAN2.

Furthermore, there are many special cases to consider to ensure a consistent behavior and not break existing procedures. For example, what exactly does gNB provide to the Relay UE, and what is the mandated behavior of Relay.

Therefore, either RAN2 needs to spend time making such agreements in Rel-17 for SL DRX or it has to be addressed in Rel-18.

The argument of TU shortage is not a good reason for concluding the feature as supported, without a proper specification work done.

An alternative is for RAN plenary to hold off the decision on this matter and instruct RAN2 to work and update the related agreements for Rel-17 SL DRX. RAN plenary can make a decision on the Rel-18 WID next meeting, given the work won't start till Q3'22.

2 – Guangdong OPPO Mobile Telecom.

We support P1. (Although as indicated by moderator, there is no need to leave a comment as proponent of P1, this comment is just to respond to the Q by opponent)

W.r.t the Q by QC above "For example, what exactly does gNB provide to the Relay UE, and what is the mandated behavior of Relay. ", our understanding is that has been clarified sufficiently in terms of how for UE and gNB to interact forthe DRX parameter configuration / alignment.

So we do not see the necessity of "either RAN2 needs to spend time making such agreements in Rel-17 for SL DRX or it has to be addressed in Rel-18.", since what happened in R2 @ 2021-Nov is that there

was no feasiblity issue identified for applicability to L2 relay, the restriction (if any) would be just artificial rather than procedure/functionality-wise. By having P1 concluded, this issue can be concluded for R17, and therefore, there is no point to further delay the decision to Q3'22.

3 – HuaWei Technologies Co.

We support P1 and generally agree with OPPO.

4 – Intel Corporation (UK) Ltd

The second sentence of P1 needs some clarification considering proposal 2. Is it correct to understand that the proponent should bring technical contribution to RAN2 under TEI18 if there is any remaining issue instead of having a separate objective in Rel-18 sideline relay WI? That might be one way to conclude this issue.

5 – LG Electronics Inc.

To Intel:

From the moderator's perspective, besides the option of having a separate objective in the Rel-18 WI, TEI18 can be a way for the proponents to bring the issue to the working group. But this email discussion is not supposed to make a conclusion on the TEI.

6 – vivo Mobile Communication Co.

We do not think the 2nd sentence is needed. This means that any enhancements on top of the Rel-17 Rel-17 SL DRX principles can be left to UE/NW implementation. On the other hand, from companies' comments, it is obvious that a number of companies are not convinced that the SL-DRX for SL relay can be automatically supported in Rel-17 w/o further technical discussion/clarification. In this case, a compromise approach is not pursuing P1 and any relevant discussion on Rel-17 anymore in either RAN plenary or RAN2.

7 – InterDigital Finland Oy

The Qualcomm version of proposal 1 is more accurate.

8 – MediaTek Inc.

We support the principle of P1, but as a procedural matter, we think we should avoid the situation that proposed enhancements need to be handled under TEI18. (Moving the topic from the relay WI to TEI18 does not actually make more time available, since the same delegates would need to handle the discussion anyway.)

- From the comments in previous rounds, it seems settled that the SL-DRX procedures are applicable in the L2 relay setting, and the question is only whether the relay UE has enough information to determine a good DRX configuration.
- The question of the relay UE's available information has been answered in this discussion (see e.g. LG and OPPO's comments on Q1 in the intermediate round), and there has been no clear description of what requirements would not be met. We continue to see an adequate technical basis for confirming that SL-DRX works with L2 relays, without adding any qualification.

- The language suggested for agreement by Qualcomm above (”its behaviors are not defined”) is not accurate in light of the discussion and would not be acceptable.

If the plenary truly cannot come to a stronger agreement on this point, we can accept P1, but in this case, it should be clear that any discussion of enhancements takes place under the relay WI, not TEI18 (see Q2 for our views on how to capture this).

9 – CATT

QC comments seem very reasonable to us. And, please see our comments to the next Q.

10 – Beijing Xiaomi Mobile Software

We can accept P1

11 – Nokia Denmark

Nokia support proposal 1.

12 – Ericsson LM

We support the QC suggestion of revising objective 4. The current wording of proposal 1 is not clear in our opinion, especially if taken together with P2.

13 – Philips International B.V.

We support Qualcomm’s proposal.

Proposal 2: Objective 4 in the approved WID is removed. The revised WID in RP-220523 is approved.

If a company has serious concern on this proposal, please leave a comment in the following format:

Feedback Form 7: Feedback on Proposal 2

1 – Qualcomm Incorporated

As explained above, it is not agreeable to simply remove the objective 4.

Either RAN2 has to resolve all the issues in Rel-17 or an (updated) objective has to be kept for Rel-18.

2 – Guangdong OPPO Mobile Telecom.

We support P2. (As indicated by moderator, there is no need to leave a comment as proponent of P2, this comment is just to respond to the Q by opponent)

We understand that by having P1, this issue is resolved in R17 and thus no need to keep the objective in R18.

3 – HuaWei Technologies Co.

We support P2, there is no blocking issue seen and we don’t think the objective is needed.

4 – Intel Corporation (UK) Ltd

Considering that the discussion is not converged well, we would be ok to remove objective 4 for now, and then the potential open issue if any can be further discussed in RAN2 as a part of TEI18.

5 – vivo Mobile Communication Co.

Agree.

6 – InterDigital Finland Oy

We agree with Qualcomm, either RAN2 resolves the issue in R17 or it should remain in the R18 WID

7 – MediaTek Inc.

Our first preference would be to conclude that DRX for L2 relay can be supported in Rel-17, and agree P2 to remove the DRX objective from Rel-18.

If this is not possible, we would prefer to keep a DRX objective with clearer scope. We could agree to P1 as proposed by the moderator, and modify the DRX objective to ”Specify any needed enhancements to the SL-DRX procedure to optimise the relay UE’s selection of the PC5 DRX configuration”, which would allow proponents of some enhancement to submit proposals without giving the impression that DRX is not there in Rel-17.

8 – CATT

QC’s suggested wording looks good to us. Then a few comments below.

1) Perhaps it doesn’t help much to postpone to June RP. As R2 will be very busy with asn.1 review in the reminder of Q2, we don’t think it a good idea to further give any task to them on this topic in Q2. If we do so it should better be in the later stage in the R18 WI.

2) We still believe that given the RAN WGs were not able to give explicit conclusion regarding ’supported’ or ’not supported’ based on their technical discussions, it is not very reasoanble to draw a conclusion, for a) RP is not handling those techical details, b) lack of consensus. So again we don’t think it a reasoanble WF to simply say everthing is OK and drop the bullet.

3) For the sake of progress, we can accept a compromise such that we use a bullet like suggested by QC above, but the related studies/work only start when the other aspects have already sufficiently progressed. If as some suggested everthing is just ready, then it is likely we do not need too much time for the bullet anyway.

9 – Beijing Xiaomi Mobile Software

We can accept compromised objective proposed by MediaTek. However, we think both remote and relay UE should be considered, therefore relay UE can be removed from the objective as following,

Specify any needed enhancements to the SL-DRX procedure to optimise the selection of the PC5 DRX configuration

10 – Nokia Denmark Nokia support proposal 2.
11 – Ericsson LM We do not agree to remove the objective from Rel-18. It seems rather clear from the discussion that there remains work in RAN2 for the feature which is better to place then in Rel-18 according to the current WID. We support the QC revision of objective 4 as way forward.
12 – Philips International B.V. We agree with Qualcomm, either RAN2 resolves the issue in R17 or it should remain in the R18 WID

3.2 Summary and moderator's proposal

Input from the intermediate round can be summarized as follows:

Proposal 1: It is concluded that Rel-17 SL DRX supports Layer-2 UE-to-Network relay operation. This does not preclude potential future discussion on the enhancements related to it in Rel-18.

- Concern: Qualcomm, InterDigital, CATT, Ericsson, Philips
  - vivo (2nd sentence is not needed)
- Proposed alternative: It is concluded that Layer-2 UE-to-Network Relay may use Rel-17 SL DRX procedures. However, its behaviors are not defined and should be specified in Rel-17 or Rel-18.

TEI18 was mentioned as one way to bring this topic to RAN2, but a company raised concern on this possibility.

The moderator thinks that the issue is whether the relay UE has enough information to determine a good DRX configuration. As emphasized several times, it is the moderator's understanding that nothing in the specifications block supporting SL DRX in Layer-2 UE-to-Network relay, and thus the concerns from the companies are about lack of enhancements in determining the SL DRX configuration, not about the conclusion on the "support" which was supposed to be checked as per the note in the WID. If the group cannot reach consensus on this point, the moderator wonders how the group can discuss another direction such as what Intel or MediaTek proposed.

Proposal 2: Objective 4 in the approved WID is removed. The revised WID in RP-220523 is approved.

- Concern: Qualcomm, InterDigital, CATT, Ericsson, Philips
- Proposed alternative: Specify any needed enhancements to the SL-DRX procedure to optimise the selection of the PC5 DRX configuration

Several companies mentioned that this part needs to be resolved in Rel-17 but the moderator wonders how it is possible given that the Rel-17 sidelink enhancement WI and relay WI are closed in this meeting. Considering the input during the intermediate round, the moderator thinks that the alternative of starting normative work for needed enhancements will not be easily agreeable in this meeting, but a final check would be meaningful.

4 Final summary

The email discussion [95e-24-R18-SLRelay-DRX] discussed the following objective in the approved WID RP-213585:

4. Support of sidelink DRX for Layer-2 UE-to-Network sidelink relay operation if not done in Rel-17 [RAN2]

Note 4A: This objective is to be checked in RAN#95e.

The check point was set in the approval at RAN#94e (December 2021) as RAN2 at RAN2#116e (November 2021) agreed that they are not going to make any conclusion on the support of SL DRX in Layer-2 UE-to-Network relay:

1: RAN2 confirms Rel-17 SL-DRX design can be reused for relay-related ProSe communication in layer-3 relay without additional specific solution discussion/specification effort.

2: Keep RAN2 previous agreement (prioritize the non-relay case without consideration of relay specific optimization in Rel-17) but we're not going to make any conclusion if L2 relay-related ProSe communication is supported or not in Rel-17 now.

3: RAN2 confirms Rel-17 SL-DRX design can be reused for L3 relay-related ProSe discovery without additional specific solution discussion/specification effort (by applying SL default-DRX configuration). No conclusion if L2 relay-related ProSe discovery is supported or not in Rel-17 now. RAN2 does not specify any restriction now.

From the multiple rounds of the discussion, the moderator observed that it was the majority view that Rel-17 specifications support sidelink DRX in Layer-2 UE-to-Network relay and thus no study or normative work is needed in Rel-18. A number of companies responded that there are several unresolved issues which in the moderator's understanding can be summarized as unclear and/or insufficient specifications in determining SL DRX configuration in Layer-2 UE-to-Network relay. Several companies responded that the existing Rel-17 agreements are enough; sidelink DRX configuration in mode 1 is determined by gNB which has all the information, and the relay UE which determines sidelink DRX in mode 2 has information on PC5 QoS configuration directed configured by gNB and the assistance information from the remote UE.

The moderator thinks that nothing block "supporting" sidelink DRX in the scenario, and based on this understanding and the majority view, the moderator proposed the following:

"It is concluded that Rel-17 SL DRX supports Layer-2 UE-to-Network relay operation. This does not preclude potential future discussion on the enhancements related to it in Rel-18."

The 2nd sentence intends to clarify that any possible future discussion can be allowed as per the normal procedure and one company mentioned TEI18 as a possibility. In the final round, 5 companies (Qualcomm, InterDigital, CATT, Ericsson, Philips) expressed concerns. If the original proposal is not agreeable, an alternative can be "It is concluded that Layer-2 UE-to-Network Relay may use Rel-17 SL DRX procedures." The moderator notes that the 2nd sentence of the proposal from Qualcomm is not included in this alternative as it seems clear to the moderator that it will not be acceptable to a number of companies.

The moderator thinks that it is important to draw a conclusion on this because no additional discussion will be productive if the group cannot reach consensus on what the current specification can do. From the moderator's

view, concluding that an operation is supported does not automatically mean that no enhancements are necessary; it is a normal procedure in RAN to discuss potential enhancement to something already supported in a previous release. So the final proposal from the moderator is to take either the original proposed conclusion or the alternative:

Proposal 1:

- **(Original proposal) It is concluded that Rel-17 SL DRX supports Layer-2 UE-to-Network relay operation. This does not preclude potential future discussion on the enhancements related to it in Rel-18.**
- **(Alternative) It is concluded that Layer-2 UE-to-Network Relay may use Rel-17 SL DRX procedures.**

Companies are asked to check Proposal 1 and leave a comment on the two possible conclusions.

Feedback Form 8: Company input on the possible conclusions in Proposal 1

1 – Apple Europe Limited We support the original proposal. It is clear to us that R17 SL DRX design supports L2 relay operations. Companies can bring further optimizations in any future releases, as always allowed. For the alternative proposal, I think we need to be clear that ”L2 U2N relay may use R17 SL DRX procedures w/o any further enhancements”. If we can add ”w/o any further enhancements”, then alternative proposal is also OK to us.
2 – LG Electronics Inc. We support the original proposal. We have the same view as Apple, including accepting the alternative proposal with the addition of ”w/o any further enhancements.”
3 – Qualcomm Incorporated There is currently NO RAN2 agreements regarding the Layer-2 UE-to-Network Relay operation on SL DRX. In the previous rounds of discussions, multiple issues had been raised, with different various answers or options provided, e.g. gNB provides configurations, remote UE provides information, etc. It is clear that there is no Relay behavior agreed or defined on how to handle the SL DRX configurations. It is unclear if any of the option would be actually agreed or approved by RAN2. Therefore, we believe it is accurate to state that ”the L2 Relay behavior on setting SL DRX is not specified”. For companies objecting that statement, please point to a RAN2 agreement on how Layer-2 Relay configures SL DRX. The original proposal is also baffling. If it does not preclude work on SL DRX in Rel-18, why should the objective be deleted from Rel-18 WID?

In general, as iterated several times, it is not agreeable to state that ”Rel-17 SL DRX supports Layer-2 Relay operation” without any RAN2 agreements. In order to delete the Rel-18 objective, a clear RAN2 agreement and conclusion in Rel-17 is needed.

Otherwise, any agreeable conclusion has to carry the clarification that ”the L2 Relay behavior on setting SL DRX is not specified”.

4 – Guangdong OPPO Mobile Telecom.

Same view as Apple and LG.

Based on the discussion @ R2 and RP here, it should be quite clear that there is no tech blocking issue, but just different taste on whether a baseline scheme is enough or something more to be added - nevertheless, it is misleading to say ”there is no Relay behavior agreed or defined on how to handle the SL DRX configurations” / ”the L2 Relay behavior on setting SL DRX is not specified”, given R2 conclusion that ” RAN2 does **not** specify any **restriction** now.” and ”we’re not going to make any conclusion if L2 relay-related ProSe communication is supported **or not** in Rel-17 now.”

In order for a feasible way-out/compromise, P1 is the baseline.

5 – Futurewei

We support the original proposal.

6 – Intel Corporation (UK) Ltd

We are ok with the original proposal.

7 – Beijing Xiaomi Mobile Software

We can accept original proposal

8 – ZTE Corporation

We support the original proposal.

9 – vivo Mobile Communication Co.

Fine with the Alternative one with following modification:

− (Alternative) It is concluded that Layer-2 UE-to-Network Relay may use Rel-17 SL DRX procedures(i.e. up to NW/UE implementation on whether to configure/support SL DRX for L2 relay case)**.**

10 – HuaWei Technologies Co.

We support the original proposal.

11 – Samsung R&D Institute UK

We are okay with the original proposal.

12 – CTSI

[China Telecom comment]: we support the original proposal.

13 – Nokia Denmark We support the original proposal.
14 – Spreadtrum Communications We support the original proposal.
15 – Ericsson LM We have similar views as QC regarding the status of the discussion in RAN2, but as a compromise we can accept the vivo suggestion on rewording the Alternative proposal.
16 – New H3C Technologies Co. We support the original proposal
17 – CATT We tend to agree with QC's comments.
18 – MediaTek Inc. We prefer the alternative proposal (vivo's suggestion is also OK), and we can accept the original proposal.
19 – Philips International B.V. We agree with Qualcomm, but as a compromise we could live with a statement that its behavior is not specified, e.g. **"it is concluded that Layer-2 UE-to-Network Relay may use Rel-17 SL DRX procedures, but its behavior is not specified.** We don't agree with the statement from Vivo which makes it sound that it is just a simple network configuration option.
20 – InterDigital Finland Oy We agree with Qualcomm, but as a compromise the Phillips proposal is the best alternative, Vivo's proposal is also better than the original proposal.

In the discussion of how to revise the objective in the WID, it was the majority view that it needs to be removed as Rel-17 specifications are enough. A number of companies were of the opinion that it needs to be revised such that RAN2 can specify some enhancements in Rel-18. An example of the revised objective can be "Specify necessary enhancements, if any, to the SL-DRX procedure to optimise the selection of the PC5 DRX configuration in Layer-2 UE-to-Network relay operation." The word "if any" was added by the moderator with the intention that it is possible for RAN2 to conclude that no enhancements are necessary. Several companies mentioned that the issue needs to be resolved in Rel-17 but the moderator thinks it is not possible as the related Rel-17 WIs are closed in this meeting.

From the moderator's understanding, the original proposal of removing the objective is consistent with any of the two alternatives in Proposal 1 and does not block any further discussion in Rel-18 in the form of further WID revision or TEI18. On the other hand, final check seems meaningful on an alternative to see if there are any change of views.

Proposal 2

- **(Original proposal) Objective 4 in the approved WID is removed. The revised WID in RP-220523 is approved**
- **(Alternative) Objective 4 is updated to "Specify necessary enhancements, if any, to the SL-DRX procedure to optimise the selection of the PC5 DRX configuration in Layer-2 UE-to-Network relay operation"**

Companies are asked to check Proposal 2 and leave a comment on the two possible WID revision.

Feedback Form 9: Company input on possible WID revision in Proposal 2

1 – Apple Europe Limited We support the original proposal. For the alternative proposal, we are not convinced that the optimization of this particular aspect of L2 relay is well justified, while SL-DRX is used for both L2 and L3 relays. Further enhancements are better to be considered for a common solution for all relay scenarios (including UE-to-UE relay) in Rel-19.
2 – LG Electronics Inc. We support the original proposal. We agree with Apple on the alternative proposal. During the discussion so far, we failed to see what specific information or procedure are additionally needed in supporting the scenario as SL-DRX is configured by gNB in mode 1 and UEs in mode 2 have enough information like the PC5 QoS profile and assistence information.
3 – Qualcomm Incorporated As explained above, the Rel-18 objective needs to be kept, until RAN2 has a official conclusion on the SL DRX for Layer-2 Relay. It is suggested that the objective to be modified to: **"Specify necessary enhancements, if any, to the SL DRX procedureto <u>support</u> the Layer-2 UE-to-Network relay operation"**
4 – Guangdong OPPO Mobile Telecom. Same view as Apple and LG, i.e., support the original proposal as our first choice. For the Alternative proposal, 1) we do not agree that add "to support", i.e., P1 should be the base / premise before going to the alternative proposal, 2) the alternative proposal should come with a NOTE in the WID clarifying thie objective is of **secondary / lower** prority compared to the other objectives, meaning it can progress after the others being finished (since it is undeniable we are under the pressue to meet the TU capacity) => only with the two points, the alternative proposal could be a compromise point - otherwise, it is not agreeable.
5 – Futurewei We support the original proposal.

6 – Intel Corporation (UK) Ltd We are ok with the original proposal. One compromise would be to go with the alternative proposal and put this objective as second priority in Rel-18.
7 – Beijing Xiaomi Mobile Software We prefer alternative proposal.
8 – ZTE Corporation We support the original proposal.
9 – vivo Mobile Communication Co. Support original proposal.
10 – HuaWei Technologies Co. We support original proposal.
11 – Samsung R&D Institute UK We support the original proposal.
12 – CTSI [China Telecom comment]: we support the original proposal.
13 – Nokia Denmark We support the original proposal.
14 – Spreadtrum Communications We support the original proposal.
15 – Ericsson LM We don't agree to remove Objective 4 from the WID but we can accept the Alternative proposal which is a compromise from the previous rounds of discussion.
16 – New H3C Technologies Co. We support the original proposal.
17 – CATT We tend to agree with QC's suggested wording.

18 – MediaTek Inc.

We understand that P2 fundamentally depends on P1; that is, if we cannot agree to some form of P1, we need to keep the objective so that DRX is not left hanging in an ambiguous state. (The note would need to be deleted.)

For P2 itself, we prefer the alternative proposal, and if we take this alternative, we agree with OPPO and Intel that the objective could be marked as second priority. We cannot accept the suggested wording from Qualcomm.

19 – InterDigital Finland Oy

Qualcomm 's suggested wording is probably best but the alternative proposal can work

20 – Philips International B.V.

We don't agree to remove Objective 4 from the WID, but we can agree to one of the following alternatives:

- Qualcomm's wording. And although we think that energy saving is very important, we could live with Intel's suggestion to make it secondary priority.
- remove the note about on RAN#95e (since neither RAN2 not RAN plenary has come to a conclusion). Again, we could live with Intel's suggestion to make it secondary priority.
- change RAN#95e to RAN#96e in the note, and RAN plenary to ask RAN2 to resolve the issue in the next quarter.

If neither original one or alterative can be agreed in Proposal 1 and 2, it is the moderator's opinion that no additional discussion would be useful in this meeting and thus this email thread can be closed with no conclusion or agreement. From the viewpoint as the moderator as well as the rapporteur company, keeping the objective with no conclusion would mean 1) RAN2 cannot work on this issue as a part of Rel-18 sidelink relay enhancement WI since the objective is not confirmed, 2) a WG activity including TEI18 cannot be discussed as it is a pending issue in RAN, 3) the check point of RAN#95e is passed and it becomes unclear when this can be revisited.

5 Extended round

Company input on the two proposals in Section 4 Final summary can be summarized as follows:

Proposal 1

- (Original proposal) It is concluded that Rel-17 SL DRX supports Layer-2 UE-to-Network relay operation. This does not preclude potential future discussion on the enhancements related to it in Rel-18.
- (Alternative) It is concluded that Layer-2 UE-to-Network Relay may use Rel-17 SL DRX procedures.

Company input

- Support or accept original proposal: Apple, LGE, OPPO, Futurewei, Intel, Xiaomi, ZTE, Huawei, Samsung, CTSI, Nokia, Spreadtrum, New H3C Technologies, MediaTek (14)

- Support or accept alternative: MediaTek (1)
- Other view
  - Okay with alternative if “w/o any further enhancements” is added: Apple, LGE (2)
  - the L2 Relay behavior on setting SL DRX is not specified: Qualcomm, Ericsson, CATT, Philips, InterDigital (5)
  - Okay with alternative if “(i.e. up to NW/UE implementation on whether to configure/support SL DRX for L2 relay case).” Is added: vivo, Ericsson, MediaTek, InterDigital (4)
  - Okay with alternative if “but its behavior is not specified” is added: Philips, InterDigital (2)

Proposal 2

- (Original proposal) Objective 4 in the approved WID is removed. The revised WID in RP-220523 is approved
- (Alternative) Objective 4 is updated to “Specify necessary enhancements, if any, to the SL-DRX procedure to optimise the selection of the PC5 DRX configuration in Layer-2 UE-to-Network relay operation”

Company input

- Support of accept original proposal: Apple, LGE, OPPO, Futurewei, Intel, ZTE, vivo, Huawei, Samsung, CTSI, Nokia, Spreadtrum, New H3C Technologies (13)
- Support or accept alternative: OPPO (if lower priority is given), Intel (if lower priority is given), Xiaomi, Ericsson, MediaTek, InterDigital (6)
- Other view
  - Change “optimize” to “support” in alternative: Qualcomm, CATT, InterDigital, Philips (4)
  - Remove the note or change it to RAN#96e: Philips (1)

6 Moderator's proposal after the extended round

Considering the input during the extended round, the moderator thinks that the original proposals will be agreeable to more companies but they could be modified to be more acceptable.

For the conclusion on the support of SL DRX in Layer-2 UE-to-Network relay, the moderator suggest considering a modified version of the original proposal. Note that a modified alternative is still kept to prepare the GTW discussions.

Proposal 1:

- **(Modified original proposal) It is concluded that Rel-17 SL DRX supports Layer-2 UE-to-Network relay operation. It is understood that the determination of SL DRX is up to gNB or UE implementation in Rel-17. This conclusion does not preclude potential future discussion on the enhancements related to it in Rel-18.**
- (Modified alternative) It is concluded that Layer-2 UE-to-Network Relay may use Rel-17 SL DRX procedures (i.e. up to NW/UE implementation on whether to configure/support SL DRX for L2 relay case).

For the WID revision, the moderator suggest considering the original proposal. Note that a modified alternative is still kept to prepare the GTW discussions.

Proposal 2

- **(Original proposal) Objective 4 in the approved WID is removed. The revised WID in RP-220523 is approved.**
- (Modified alternative) Objective 4 is updated to "Specify necessary enhancements, if any, to the SL-DRX procedure to optimise the selection of the PC5 DRX configuration in Layer-2 UE-to-Network relay operation" with a note that this objective is of a lower priority.