**3GPP TSG RAN Meeting #93-e RP-21xxxx**

**Electronic Meeting, September 13 - 17, 2021**

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**Source:** LG Electronics (moderator)

**Title:** Email discussion [93e-14-Sidelink-Progress] on the progress of Rel-17 NR sidelink enhancement WI

**Document for:** Report

# **Introduction**

This contribution summarizes the email discussion [93e-14-Sidelink-Progress] on the progress of Rel-17 NR sidelink enhancement WI. Input contributions covered: RP-211782, 1783, 1790, 1807, 2034.

# **Discussion: Initial round**

2.1. SL-DRX applicability to ProSe service

Q1: [RP-211782, OPPO] proposed to confirm that the R17 SL-DRX design does not exclude ProSe direct communication, discovery, and UE-to-Network relay parts. It also proposed to send an informative LS to SA2 and CT1. A WID revision was proposed in RP-211783.

Please provide your view on this.

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| Company | Comment |
| OPPO | In R17, according to SA/CT spec, ProSe can be divided into **relay**-related and **non-relay**-related parts, for both **communication** and **discovery**.   1. For **non-relay-**related ProSe **communication**, we understand it is straightforward to be included in R17 since no additional work is needed. Otherwise, it means **no support of SL-DRX for public safety and commercial use case** at all in R17. 2. For **relay**-related ProSe **communication**, we understand it is straightforward to be included in R17 since no additional work is needed. Otherwise, we wonder how one can exclude it from the support of SL-DRX, i.e., for a UE which is involved in both relay and non-relay related ProSe communication, since the two can happen in the same resource pool, **if there is no DRX support for relay-related communication, the power saving gain for non-relay-related ProSe communication will disappear as well**. 3. For **relay**-related ProSe **discovery**, the only additional work is to agree on the usage of **default SLDRX configuration** for ProSe discovery. Otherwise, we wonder how one can exclude it from the support of SL-DRX, i.e., for a UE which is involved in both relay-related discovery and non-relay related ProSe communication, since the two can happen in the same resource pool, **if there is no DRX support for relay-related discovery, the power saving gain for non-relay-related ProSe communication will disappear as well**. 4. For **non-relay-**related ProSe **discovery**, the same logic as described above in 3) holds. But surely, it is pending the conclusion of [93e-23-SLRelay-WI], i.e., whether it is to be supported in R17.   After RAN conclude on each aspect of the four above, an informative LS is helpful for SA2/CT1 to know the RAN decision for alignment on normative work in R17. |
| Ericsson | In our view, it is not needed to add this confirmation or send an LS to SA2 and CT1. Currently, RAN1 and RAN2 are working on the design of SL-DRX for SL which could be potentially extended to other cases once the basic framework is in place. |
| Samsung | We do not agree with this proposal. At first, ProSe discovery is not the scope of Rel-17 and also is not supported in Rel-16. Only SL Relay discovery is in the scope of RAN SL Relay. However, We do not want to extend SL DRX scope for SL relay with the following reasons.  - Physically no time to consider SL relay discovery in combined with SL DRX.  - Once SL relay discovery is considered, it will introduce other discussion for other issues from SL relay.  - 3GPP normally don’t consider ongoing other WIs, otherwise we cannot complete WI in time |
| Qualcomm | Our view is that the decision on applicability of DRX to the mentioned cases needs to be made in RAN2 first. Once that decision is made, we’d be ok with sending an LS to SA2 and CT1. |
| Apple | We think that SL-DRX can be applicable to both ProSe discovery and communication and relay, as those are not meant for V2X only. This is clear from the WID as it said "The objective of this work item is to specify radio solutions that can enhance NR sidelink for the V2X, public safety and commercial use cases.” So, it seems there is no need to change the WID.  We are fine to send LS to SA2/CT1 to clarify on this. |
| Huawei,  HiSilicon | The exact impacts should be first clarified. We see some value for UE power saving to apply DRX to Prose, on the other hand it is a bit unclear what specific impacts are needed to support so. The current SL DRX dependent on QoS can be easily reused to Prose direct communication. However Prose discovery and SL relay discovery are using broadcast with no dependency on QoS, and how to make apply DRX to these two cases is not clear. If the impacts are considered not small, we think the existing DRX in scope should be first completed. Thus we suggest to only apply SL DRX to Prose direct communication, but not apply to Prose discovery and SL relay for Rel-17. |
| LGE | Our view is that SL-DRX is already applicable to ProSe discovery, communication, and relay as per the WID text Apple quoted. So we don’t think WID update is necessary.  We don’t think there is an immediate blocker which prevents SL DRX solution RAN2 is currently defining from being used for general use cases. But if something which prevent this is identified, we need to consider whether it is feasible to treat a separate solution in this WI. |
| vivo | We think the current WID does not preclude applying DRX to ProSe, thus do not see the need to change the WID.  Further, we think this issue is being discussed in RAN2 and the progress depends on the SL DRX and SL relay design progress. RAN2 can decide to send LS to SA2/CT1 if necessary. |
| ZTE | RAN2 has agreed to prioritize normal use case without consideration of relay UE use case in Rel-17. However, if the SL DRX could be used for SL relay or ProSe discovery without further enhancement, it is good to support these scenarios in Rel-17 as well.  From our perspective, whether the U2N or ProSe discovery capable UE support SL DRX can be part of SL UE capability discussion at the end of Rel-17, just as we usually do for the introduction of new features specified in other WIs. It is not necessary to change the WID or send LS to SA2/CT1. |

2.2. RAN guidance to finalize the WI

Q1: [RP-211790, Samsung] proposed to confirm that any part not completely specified by RAN#94-e will be down scoped by default.

Please provide your view on this.

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| Company | Comment |
| OPPO | While we think this approach is possible for the inter-UE coordination objective (i.e., scheme1 with option 1 and option 2, scheme 2 with option 1), but this principle may not be applicable for the power saving RA and SL-DRX objectives, as currently for these two objectives the WGs are working on only the essential functionalities. If some of these essential functionalities are not included, then the whole feature will not function properly. We can review the progress of R17 SL enhancement WI in December again and make appropriate action based on the latest status then. |
| Ericsson | We see no need to explicitly add this confirmation. This is the normal procedure. |
| FUTUREWEI | We feel that progress was good last quarter and RAN guidance is not needed.  On the specific proposal, it would apply to all WI and not just SL, but RAN doesn’t tend to make these sorts of conclusions. The difficulty in practice with this sort of general guidance is it is always debatable whether something is complete enough to be handled by a CR. It may be enough for companies to know that it is possible that their preferred option(s) may be removed if we do not work together to complete all options. |
| Huawei, HiSilicon | Setting up potential automated reverting of agreements would not lead to constructive discussions in WGs in Q4. Before removing or changing a feature, details need to be considered fully. RAN#94e can make decisions in full knowledge of the situation at that time, if it wants to re-scope the WI. |
| InterDigital | Similar view with Futurewei that we have a reasonable progress in the last quarter and no RAN guidance is needed at this point. Downscoping of a specific feature which cannot be finalized by the end of the WI is a natural consequence and doesn’t need to be captured as an agreement. |
| Samsung | Support the proposal. Agree that this is a natural consequence. However, since Rel-17 eSL currently behind the schedule, this can be good RAN guidance. |
| Qualcomm | The WGs have shown significantly improved progress in the last quarter, and we prefer to discuss any down-scoping in RAN #94 per regular procedures. |
| Apple | Depending on the progress in RAN1 #106b-e and RAN1 #107-e meetings, we could revisit the proposal to check which parts can be down scoped. It may be too early to conclude the down scoping at this moment. |
| LGE | We think the proposal is a normal procedure, so no explicit confirmation is necessary. We can revisit the WI progress in RAN#94e. But considering the status report indicated a slow progress, it will help WGs if RAN reminds that essential functionalities should be completed in RAN1 in Q4. |
| vivo | While we understand the motivation, we do not see the need to set up a hard condition in RAN #93e. It actually does not help to make progress in the next quarter, but may unfortunately make it more difficult to have compromise between companies. |
| ZTE | Which part to down scope need to be discussed case by case. Agree with QC, Apple and LG to revisit the potential down-scoping in RAN94 if necessary. |
| NTT DOCOMO | Our view is similar to other companies, i.e. no agreement/conclusion/etc. for the normal 3GPP procedure is necessary at this meeting. |
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Q2: [RP-211807, OPPO] proposed to recommend RAN1 and RAN2 to adopt simple solution whenever possible. In addition, it proposed to increase the TU for this WI in Q4 by 0.5 – 1 while minimizing Rel-16 sidelink maintenance in Q4.

Please provide your view on this.

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| Company | Comment |
| OPPO | It is always recommended to adopt simple solution whenever possible in the technical design to complete basic/essential functionalities in this work item, and not to spend time on enhancements that are “nice to have” or features that provides minimal gains or flexibility that does not have obvious technical benefits.  It is noticed that RAN1 chair has announced no maintenance discussion in October. We think this is a good idea / practice also for the November WG meeting and RAN2 as well, at least for this R17 WI. If it is too much hassle to increase to the TU in RAN for a R17 WI, then it can be up to WG chair’s best judgement to flexibly increase the amount of online and offline discussion time for this WI to speed up the progress. |
| Ericsson | We agree to the first part, i.e., to aim for a simple solution whenever possible.  We do not agree on increasing the number of TUs for this WI. Due to the progress in the last meetings, it is a reasonable to achieve a minimal/basic functionality within the allocated TUs. |
| FUTUREWEI | We feel that progress was good last quarter and RAN guidance is not needed.  On the specific proposal, we do this already, the chairs will look for this anyway during the upcoming meetings. ‘Simple’ is also debatable, especially since we have multiple use cases to support. It is a ‘simple’ design to adopt a general design with minimum standard impact that has the flexibility to cover the existing agreements.  No objection to minimizing Rel-16 maintenance giving more time to Rel-17 items, but this is not strictly necessary. |
| Huawei, HiSilicon | It seems likely that an instruction to “adopt simple solutions” will mainly add another layer of discussion into WGs on whether a solution is sufficiently simple to be adopted. The pressure to complete the WI on time will naturally lead to solutions which can be finalized in the available time, without needing qualitative statements from RAN that themselves take up time in WGs.  Chair guidance may be necessary for whether TU alterations are at all on the table, before engaging in a discussion inside one WI. |
| InterDigital | Not sure if we need this as RAN guidance although we agree with the philosophy. As HW mentioned above, it could create another layer of discussion to decide whether the proposed schemes on the table are simple enough to meet the RAN guidance.  Regarding increasing TU, we are supportive if possible. |
| Samsung | Rather than increasing TU, we prefer to focus on specifying only essential functions. (No discussion for optimization issues) |
| Qualcomm | RAN1 #106bis-e will exclude any maintenance work per the RAN1 chair’s plan. Maintenance work of Rel-16 is also important, and we prefer to not exclude maintenance work in RAN1 #107-e at this point. |
| Apple | In general, simple solutions are welcome in RAN1 and RAN2 due to the time limitation.  However, we are not sure whether increasing the TU for this WI in Q4 will be realistic. Note that no TU was allocated to Rel-16 sidelink maintenance, as it is simply done via emails. |
| LGE | We agree with recommending simple solutions but more details are necessary if it should stand as RAN guidance. We are not sure if TU increase is a viable option at this stage. |
| vivo | It is always the design principle in RAN WG to design simple solutions, no need to specifically emphasize this only for SL.  Regarding the second part, considering that the Rel-16 SL spec seems to quite stable based on the situation in RAN1#106e, it is acceptable to consider prioritizing the Rel-17 work over Rel-16 maintenance, *if the Rel-17 progress in RAN1#106bis-e is problematic*. |
| ZTE | We are fine with the principle of simple solutions whenever possible.  Whether more TUs are allocated depends on the down-scoping discussion result in this meeting and chair’s guidance. With regard to the Rel-16 maintenance, we think it is important and should not be put on hold in Q4. |
| NTT DOCOMO | Simple solutions are better, but what is simple would be unclear and the guidance might lead undesirable confusion in each WG. We believe that companies will strive to complete this WI and to be more constructive for that, which can be seen at the last RAN1 meeting. Based on this, we think the guidance is unnecessary.  Regarding TU, we are not sure whether it is possible or not. TU of some other WI can be reduced? |
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Q3: For inter-UE coordination, [RP-211790, Samsung], [RP-212034, LGE] proposed specify/prioritize only a single solution for each of scheme 1 with preferred resources, scheme 1 with non-preferred resources, and scheme 2, respectively.

Please provide your view on this.

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| Company | Comment |
| OPPO | Generally, OK. We also would like to stop discussing FFS points on “other topics” or “other values” in both power saving RA and inter-UE coordination agendas in RAN1. |
| Ericsson | This down-selection/prioritization can be performed in RAN1 WG if needed. There is no need to have the down-selection at RAN plenary level. |
| FUTUREWEI | We feel that progress was good last quarter and RAN guidance is not needed.  We should continue from what we have in the chair notes so far as we have achieved these agreements after extensive discussions. Forced down selection or prioritization may have the opposite effect and actually slow the progress. A single solution is also hard to define, for example there may be higher layer control / configuration for each scheme which is a ‘solution’ that therefore would prevent the additional solution of PHY signaling. |
| Huawei, HiSilicon | We think it is more important to focus on the essential components of what is already agreed, rather than for RAN to delete WG agreements that are already made.  Thus, we suggest it’s better to tell RAN1 to not have discussions in Q4 on generic "*FFS other options/solutions*" points in the RAN1 agreements wherever they occur, and save time that way.  There are some FFS points which already concretely express technical details needed to finish agreed solutions, and they will necessarily continue. |
| InterDigital | It can be discussed in RAN1 if needed as it requires details of technical discussion in many aspects. |
| Samsung | Support the proposal. Based on this proposal, we can focus on specifying a single solution within the remaining two RAN1 meetings. This doesn’t revert any RAN1 agreements as all solutions agreed by RAN1 are specified, but reduces the number of combination. Moreover, introducing multiple solutions for each inter-UE coordination scheme is not desirable. |
| Qualcomm | We are ok with the suggestions in RP-212034 on combinations of transmission conditions in Scheme 1 and prioritizing completion of agreed items in general but prefer to leave the decision to RAN1. |
| Apple | We are generally fine with this proposal. |
| LGE | We support this as we see some risk if RAN1 tries to complete all the possible variants in Q4. Especially this would be important in terms of discussion time allocation as the group might spent too much discussion time for some variants and the others may not have time for discussions. One possible guidance is to recommend RAN1 to complete at least one solution for each of scheme 1 with preferred resources, scheme 1 with non-preferred resources, and scheme 2, respectively. |
| vivo | We are generally OK to have a single solution for each scheme. But we prefer to leave the decision to RAN1 – no RAN decision is needed at this point. |
| ZTE | We are fine with this proposal. Single solution for each scheme is enough to support the objective. |
| NTT DOCOMO | On scheme 1, we are OK with the suggestion since currently so many possibilities are remaining. If RAN1 decides witch option is adopted, the discussion will be quite controversial..  On scheme 2, there is only one direction, i.e. collision detection then reselection. So this kind of guidance is unnecessary for scheme 2. |
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Q4: For power efficient resource allocation, [RP-212034, LGE] proposed to focus on introducing the baseline in the WID (i.e., “the principle of Rel-14 LTE sidelink random resource selection and partial sensing”) and deprioritize other enhancements beyond this. It also proposed to minimize RAN1 discussion time for the relation between partial sensing and sidelink DRX and strive for defining resource allocation solutions that are commonly applicable to a TX UE configured with sidelink DRX for its own data reception and a TX UE not performing its own data reception.

Please provide your view on this.

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| Company | Comment |
| OPPO | In the power saving RA agenda in RAN1, we followed closely the R14 LTE-V based random selection and partial sensing schemes for NR sidelink, and incorporated some enhancements (as needed and allowed by the WID) to take into account of small reservation periodicities and aperiodic transmissions. In this sense, we don’t need to remind RAN1 that R14 principle should be used as the baseline. From LGE’s proposal, we should focus on the sidelink DRX part only.  For the topic on relation between partial sensing and sidelink DRX, it can be categorized in two technical aspects. Firstly, the relation between the actual monitoring of slots (including RSRP measurement) and SL-DRX has been discussed for many meetings due to the LS from RAN2. In the last meeting, RAN1 finally reached the following agreement and replied to RAN2.  ***Agreement***  A UE can perform SL reception of PSCCH and RSRP measurement for sensing during its SL DRX inactive time.   * FFS: When such reception and measurement is performed, whether it is subject to specification, or is up to UE implementation * FFS: Other details   For this first technical aspect, it seems to adopt the rule that “the monitoring of slots is commonly applicable to a TX UE configured with sidelink DRX for its own data reception and a TX UE not performing its own data reception.” That is, when the reception and measurement is performed, it is up to UE implementation, to close the first FFS bullet. And there is no need to treat the second FFS bullet.  The second technical aspect is related to determination of the candidate resource set *SA* and its relation to RX UE sidelink DRX. While it is possible to leave everything to UE implementation to align with SL-DRX on duration, but a specific question / action has been asked by RAN2 in an LS R2-2108997 for which RAN1 should provide a response LS. We think at least for this issue, we should have a technical discussion in the next RAN1 meeting. If a simple agreement can be reached, this issue can be closed. If not, everything is leave it to UE implementation regarding partial sensing in sidelink DRX.  If the intention is to completely decouple the relationship between partial sensing and sidelink DRX, then we suggest to remove the following bullet from the WID objective and instruct RAN1 not to spend time in finding solution and replying to RAN2’s LS in R2-2108997.  This work should consider the impact of sidelink DRX, if any. |
| Ericsson | There is no need to include any clarification/observation in the WID regarding the aspects to focus on the power efficient resource allocation. The potential down-selection of the topics can be done during the normal WG progress. |
| FUTUREWEI | The power saving discussion was focusing on the baseline, i.e., based on Rel-14 LTE random resource selection and partial sensing. However, given the higher flexibility for periodic transmission and dynamic resource allocation for aperiodic transmissions in Rel-16 NR V2X design, the enhancement is necessary. We made good progress on both PBPS and CPS, as well as random resource selection. We should continue from what we have in the chair notes so far. We do not need to prioritize or down selection for discussions on power saving other than DRX.  For SL-DRX, regarding the relationship between partial sensing and sidelink DRX, we have reached an agreement. We are ok with the proposal to consider only the sidelink DRX at the TX UE. In order to fulfill the design objective in WID, some specification is needed for partial sensing in sidelink DRX off instead of leaving it to UE implementation. |
| Huawei, HiSilicon | RAN1 has already agreed that sensing will be performed in SL-DRX inactive time, and apart from finalizing the necessary details of when that should be mandated, we think enhancements to optimize the relationship between partial sensing and SL-DRX is not needed in Rel-17. The generic FFS points on this relationship which occur in a few agreements can be stopped by RAN |
| InterDigital | We also think down-selection of topics can be discussed in the working group level. Regarding relationship between partial sensing and S-DRX, both RAN1 and RAN2 recently made relatively good progress and it can be finalized within the rest of the time. |
| Samsung | For power efficient resource allocation (random selection and partial sensing), we think that the agreements we made already beyond the baseline. However, we believe that some remaining issues can be resolved without RAN guidance within remaining two RAN1 meetings.  For sidelink DRX, introducing different UE sensing behavior with and without DRX seems optimization. If we do not provide a RAN1 DRX solution (related to UE sensing behavior) to RAN2 in the next meeting, it would be difficult to finalize in time. So, providing RAN guidance for sidelink DRX would be good. |
| Qualcomm | RAN1’s progress on power saving has been very good. We don’t see the need for changes at this point. |
| Apple | We agree that the relation between partial sensing and sidelink DRX has been discussed for several meetings. Some agreement has been achieved in last RAN1 meeting and reply LS is in R1-2108580. We are generally fine to minimize RAN1 further discussions along this line in Rel-17.  One comment on “solutions that are commonly applicable to a TX UE configured with sidelink DRX for its own data reception and a TX UE not performing its own data reception”: The TX UE which has been configured with SL-DRX cannot be simply treated as same as the TX UE not configured with SL-DRX for data reception, in either sensing or resource selection. If there is no time to work on a proper solution for the SL-DRX case, RAN1 can claim that partial sensing and resource allocation in Rel-17 are meant for work for non-DRX TX UEs, and leave the DRX-related enhancements and considerations to Rel-18 sidelink enhancement.  On the other hand, there is a new LS from RAN2 to RAN1 (R2-2108997): Tx UE should select the resources taking into account the active time of the Rx UE. It is open whether RAN1 or RAN2 implement this restriction. Hence, we think the corresponding discussions should be conducted.  Finally, it is unclear whether “deprioritize **other enhancements** beyond this” only indicates the relation between partial sensing and sidelink DRX. |
| LGE | We see some risk on the power efficient resource allocation topic as there are many pending FFS and new topics are raised continuously (e.g., those by RAN2 LS). At least some high level guidance is necessary to complete the essential part of the operation while deprioritizing optimization. |
| vivo | The proposal is not clear but confusing especially on the part of “deprioritize other enhancements” and “strive for defining resource allocation solutions that are commonly applicable”. If it means that UE should always perform sensing regardless of DRX on or off, the proposal would result in defining two separate features (i.e., partial sensing in RAN1 and DRX in RAN2) but gaining nothing when integrating them together, as the power saved by DRX off would be unfortunately consumed by sensing. The WG should try not only to introduce a solution, but also to define a really useful system…  Secondly, unlike the inter UE cooperation, the progress of power saving seems to be quite good. The current discussion seems to already touch many stage-3 design aspects. Therefore, we don’t see the need to restrict the design of WG at this point. |
| ZTE | We are basically fine with this proposal.  During last RAN1 meeting, it is agreed that a UE can perform SL reception of PSCCH and RSRP measurement for sensing during its SL DRX inactive time. With regard to the relevant FFS, such as when such reception and measurement is performed, whether it is subject to specification, or is up to UE implementation, we may leave it to UE implementation and no more discussion is necessary in RAN1.  On the other hand, for the latest LS (R2-2108997) from RAN2, RAN2 asks RAN1 to consider how to enable the TX UE selects the resources taking into account the active time (current or future) of the RX UE(s) determined by the timers maintained at the TX UE. In our opinion, the resource selection and DRX configuration are generally specified in MAC and RRC layer, and physical layer has no ideas of the timers of DRX. So the DRX restriction of resource selection should be done by RAN2, other than RAN1. To be specific, the Tx UE may perform sensing based on implementation and provide the full or partial sensing result to MAC layer without considering the Rx UE’s on duration. For the resource selection, MAC layer may consider the potential on duration of Rx UE for initial transmission. Based on this observation, it is suggested not to spend time in RAN1 to discuss this issue or simply reply to RAN2 that it is up to RAN2. |
| NTT DOCOMO | On power saving scheme, we think that each WG already is discussing on top of LTE mechanism. However, many aspects of NR-SL Rel-16 are not same as LTE-SL, so corresponding modification is discussed. This would be the current situation. Based on this, we do not see the benefit by the guidance.  On DRX, it is unclear for us what is the intention of the suggestion. Rather, the guidance might lead to confusions and more discussions... At the last meeting, we had progress on DRX, and in this meeting, subsequent and last agreement is expected. We do not see some issue here. |
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Q5: If you think there are any other topics to discuss, please specify them.

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