[95e-30-R17-SL-WI] - Version 0.0.13
RAN

3GPP TSG RAN Meeting #95e Attachment for RP-220986

Electronic Meeting, March 17 - 23, 2022

Source: RAN1 Chair (Samsung)

Title: Moderator's summary for discussion [95e-30-R17-SL-WI] - Intermediate Round

Document for: Discussion and Decision

1 Introduction

2 Initial Round

This email thread covers the discussion on the following tdocs submitted to RAN1#95e:

- RP-220201: On the status of Rel-17 NR sidelink enhancement work in RAN WG1 (Samsung Electronics Nordic AB)
- RP-220403: Rel-17 Specification Finalization (Nokia, Nokia Shanghai Bell)
- RP-220466: On Rel-17 SL enhancement WI status (InterDigital, Inc.)
- RP-220520: Status report of WI: NR sidelink enhancement; rapporteur: LG Electronics (RAN1)
- RP-220521: Summary for WI "NR sidelink enhancement" (LG Electronics)
- RP-220527: Sidelink type-B UEs (if supported) should not be further fragmented into sub-types (Futurewei)
- RP-220533: Views on Rel-17 Sidelink Enhancements WI and UE features (Huawei, HiSilicon)
- RP-220612: Views on Sidelink Enhancement Rel-17 conclusion (Qualcomm Incorporated)
- RP-220648: Discussions on Rel-17 Sidelink Enhancements (Apple)
- RP-220666: Views on Rel-17 NR sidelink enhancements WI (ZTE, Sanechips)

After review of the above tdocs, the following issues are identified for further discussion in RAN#95e:

- Issue 1: Open issues on Rel-17 sidelink enhancement in RAN1
- Issue 2: Candidate resource reporting within SL DRX active time of RX UE
- Issue 3: UE feature for support of PSFCH / S-SSB

2.1 Issue 1: Open issues on Rel-17 sidelink enhancement in RAN1

After RAN1#108-e, there was discussion in RAN1 with regards to having an exception sheet with regards to the RAN1 sidelink enhancement work. Majority of the companies expressed views that the work item can be declared completed and an exception sheet is not needed from RAN1 perspective.

As chair of the Rel-17 sidelink enhancement, my assessment of the situation is that there needs to be maintenance work on Rel-17 sidelink enhancement. However, the relevant work can be done using the maintenance TUs that have been already planned for RAN1 and additional TUs for Rel-17 sidelink enhancement is not needed. Furthermore, it is expected that there will not be any new functionalities defined or specification changes outside the bounds of typical maintenance work. As to impact to other WGs, the only issue that has potential impact to RAN2 is Issue 2 (in section 2.2). For Issue 2, there is broad support for one of the alternatives which has potential RAN2 impact but there is no consensus on this alternative.

Companies are invited to provide their views below on the need for an exception sheet for Rel-17 sidelink enhancement. Moderator recommendation will be made after the initial round of company inputs.

Feedback Form 1:

1 – ZTE Corporation

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There is no need for an exceptional sheet. From RAN1 perspective,
   there is no open issue. However, if some plenary guidance could be
   provided to address some RAN2 leftover as mentioned in section 2.4,
    the CR phase would be much easier.
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2 – Classon Consulting

[for FUTUREWEI] No need for exception sheet. We will bring essential corrections to maintenance as usual for discussion.

3 – vivo Communication Technology

No exception sheet is needed. Any remaining issues can be handled during maintenance phase using the maintenance TUs.

4 – Nokia Denmark

Issues to be resolved for the completion:

1. Finalization of how PHY layer guarantees that at least a subset of the candidate resources reported to MAC layer is located within the active time of the RX UE

2. Finalization of UE-B's behaviour when it receives both preferred resource set and non-preferred resource set from the same UE-A or different UE-As

3. Finalization of relationship between start/end slots of resource selection window used for sidelink transmission carrying inter-UE coordination information and start/end slots of resource selection window for determining the set of resources

5 – TELECOM ITALIA S.p.A.

Based on the issues listed in 2.2-2.4 it seems the WI can hardly be considered completed

6 – Ericsson LM

Our view is that there is substantial amount of work to be completed. Although we can be fine with treating this as part of maintenance, it would be good to list the open issues in the SR and thus there might be need for an exception sheet. Additionally, the issues in sections 2.2-2.4 are still under discussion, and clearly these should be concluded before the WI can be concluded.

Otherwise, as we have seen it can be difficult to predict what happens in future, and in case the discussions take longer time than now expected, there is danger to end up with similar situation as e.g. with Rel-16, where we still see plenty of "maintenance" for years (e.g., in the previous RAN2 meeting we still had 50 tdocs for Rel-16 V2X).

7 – Qualcomm Incorporated

There is no need for an exception sheet in our view, any issues can be handled as part of maintenance.

8 – Samsung R&D Institute UK

Thanks for the discussion. The exception sheet is not needed from RAN1 perspective. Any remaining details can be handled using maintenance TUs.

9 – InterDigital

We also think the exception sheet is not needed for RAN1 and the remaining open issues can be addressed during maintenance phase.

10 – Apple GmbH

Overall, we think exception sheet is not needed and all the remaining open issues can be handled by maintenance TUs. On the other hand, we think some remaining issues are essential to the core functions of Rel-17 sidelink enhancements and lack of clear specification of solution would prevent sidelink UE from achieving the design objectives. Hence, we prefer RAN plenary to identify a list of open issues to be addressed in maintenance phase. This list helps to guide the discussions in maintenance phase and make efficient usage of the maintenance TUs.

11 – Beijing Xiaomi Mobile Software

We think the work item can be declared completed and an exception sheet is not needed

12 – LG Electronics Inc.

We think the WI can enter the maintenance phase without an exception sheet. We agree that one main remaining issue is handling SL DRX in resource selection but this can be quickly closed in this RAN or in the next RAN1 meeting by RAN guidance after we discuss Section 2.2. Most other mentioned issues (including the remaining FFS) are more like potential optimization for which WG didn't reach consensus on their necessity. There are a few parameters to be fixed but they can be done in the maintenance phase.

13 – CATT

We think exception sheet is not needed. All remaining issues should be handled during maintenance phase using the maintenance TUs, as has been agreed in the status report email discussion

14 – Spreadtrum Communications

We think there is no need for an exception sheet. And the remaining issues can be handled during maintenance phase.

15 – Panasonic Corporation

We are ok not to have exception sheet but to be handled them as maintenance.

16 – NTT DOCOMO INC.

We think the remaining issues can be handled in maintenance phase, thereby it would be unnecessary to have exception sheet. If workload of maintenance is a concern, it might be possible that one note to explicitly describe the remaining issues is captured somewhere (but not as exception sheet). But we are also fine with direction without both exception sheet and the above note.

17 – Huawei Tech.(UK) Co.. Ltd

The rapporteur did not submit an exception sheet, and the SR with 100% core part completion. There is no exception sheet to discuss.

The two points raised by Nokia on inter-UE coordination are maintenance, not open core part issues because specifications can be completed now and it is up to RAN1's maintenance effort to clarify any details (e.g. detail values of X1, X2 ,X3) or more specific solutions, if any, in the specs. There is no fundamental unknown answer here.

The point on SL DRX would be helped by RAN providing a decision since both solutions considered have specification impact and the WG seems to be stuck. However, since both solutions are essentially fully-formed in the question below, the level of technical work remaining after RAN picks one is minimal.

Other points listed may or may not need clarifying discussion in RAN1, but in any case are not core part open issues such that an exception sheet would be needed, and thus should not be captured in an SR at the end of the Release. RAN has tried open issues generation for sidelink in the past, and it proved more useful and efficient to rely on RAN1 papers and the preparation phase to decide the work per meeting.

18 – MediaTek Inc.

We don't see a strong need for an exception sheet. The major open issue seems to be Issue 2, where we see value in having some plenary guidance, but we think this can be finalised in the maintenance phase.

19 – Fraunhofer HHI

We do not see a need for an exception sheet and believe that the remaining issues can be handled in the maintenance phase.

20 – Guangdong OPPO Mobile Telecom.

The need to keep the WI open seems to be more related to the issues listed in Section 2.2 - 2.4. As commented below,

- On issue 2, all the technical design work and discussions have been done in RAN1 and no further work is needed regardless which solution option is chosen. Both solutions are self-contained. The remaining task is to simply pick one and it is done. In our view, this does not justify the need to extend the WI and request more TUs. If the WI is not considered complete by some companies due to sustained objection on this issue, the selection of solution option can be done in this RAN.
- On UE feature list discussion, it is business as usual to have this discussion only at the end of a WI and it is common that the discussion extends beyond the WI completion deadline which considers only the freeze of technical design of features. It is also normal to encounter some differences in preferences on some UE features and they are handled as part of CR maintenance.
- In Section 2.4, the remaining corner cases brought up here should be part of normal CR maintenance work in RAN2. It is even mentioned by the company raised this issue that it should be discussed during the CR phase. It is hardly a critical one.
- On the last two points brought up by Nokia, according to RAN1 agreement, these can be solved by either UE implementation or decided in the maintenance phase for some parameter X1, X2 and X3 values. We see all technical design details have been finalized in the corresponding RAN1 agreement. Nothing more need to be done after the parameter values.

All in all, it is our view that no exception sheet is needed and the R17 eSL WI should be declared completion.

2.2 Issue 2: Candidate resource reporting within SL DRX active time of RX UE

The issue of how to determine the candidate resource when reporting within SL DRX active time of RX UE was discussed in RAN1#108-e but without a resolution. The discussion focused on selecting one of the following solutions:

When SL DRX active time of RX UE is provided by the higher layer for candidate resource selection

- *Solution 5 (up to UE implementation): If there is no candidate single-slot resource remained within the indicated SL DRX active time in the set SA after completing the iterations from step 4) to 7) to fulfil X·M_"total", the UE based on its implementation selects and includes at least one candidate single-slot resources within the indicated SL DRX active time in the set SA.*
- *Solution 6 (compromised): If there are less than Z candidate single-slot resources remained within the indicated SL DRX active time in the set SA after completing the iterations from step 4) to 7) to fulfil X·M_"total" , for the reported subset of the candidate resources, the UE applies the RSRP threshold increment in Step 7 and continues the procedure from step 4) to 7) only for resources within the SL DRX active time with replacing X·M_"total" by Z, where Z is determined by UE implementation within a range of $0 < Z \leq X \cdot N$_"total" and N_"total" is the total number of candidate single-slot resources within the SL DRX active time of the initialized set SA in Step 4).*

While Solution 6 received majority support, there were two companies with sustained objections. On the other hand, Solution 5 had less support but more companies objecting. Due to the objections, RAN1 was not able to make an agreement on this issue.

Companies are invited to provide their views below. Moderator recommendation will be made after the initial round of company inputs.

Feedback Form 2:

1 – ZTE Corporation

Following moderator guidance, we would like to further explain why solution 5 should be pursued for Rel-17 sidelink CR:

- The solution 6 is included as one method of implementation to generate the subset needed. And the UE can up to implementation use some modified solution 6 that the RSRP thershold to the resources both in and out of DRX active and some valus other than Rel-16 X percentage so that the outcome resource set A can be of balanced interference and would not end up in RSRP increment deadlock. Technically solution 6 is more inclusive.
- There would be major RAN1 spec. change in the sensing procedure in TS 38.214, whose CR phase would not be easier even without implementing solution 6.

Thus solution 5 is supposed to be better way forward at this stage.

2 – Classon Consulting

[for FUTUREWEI] Prefer Sol 6.

3 – Ericsson LM

We are supportive of Solution 6.

The resource exclusion procedure is central to the operation of Mode 2 sensing. Solution 6 follows the same principle used so far for this specific case. This basic principle is designed to reduce the chances of collision and has been extensively tested in the past. Leaving up to UE implementation part of a channel access procedure is not a good idea.

4 – Samsung R&D Institute UK

Thanks for the discussion. We prefer Solution 6 but we can accept Solution 5 for the progress. We think that spec description is necessary in one of two ways.

5 – Qualcomm Incorporated

When the issue was discussed in RAN1 #108, we preferred Solution 6 over Solution 5. However, at this very late stage, we prefer Solution 5 for its simplicity. There is also the option of not making any further agreements and leaving the details up to UE implementation based on existing RAN1 agreements. In the end, we'd be ok with any of the three options with a first preference of Solution 5.

6 – InterDigital

We also prefer the Solution 6 which is consistent with the legacy UE behavior in the previous releases including LTE V2X. It has been evaluated and proved already that random resource selection significantly increases congestion in the resource pool and the Solution 5 will allow UEs to perform random resource selection whenever SL DRX is used regardless of whether random resource selection is allowed for the resource pool or not. We think it is essential to define UE behavior for resource allocation to guarantee the system performance (at least comparable to legacy system), otherwise whenever a network turns on

SL DRX for UE power saving, the system performance will be degraded significantly and the network unlikely turns on the SL DRX feature in the end. Therefore, we have a strong concern on Solution 5 which can make SL DRX feature useless in the end.

7 – Apple GmbH

If it is up to Tx UE's implementation of resource selection, then the UE's resource selection behavior is unclear and unpredictable. This may degrade the system performance. Hence, we do not agree with Solution 5. It is preferrable to specify UE's resource selection procedure. In case this principle is agreed in RAN plenary meeting, we prefer to agree solution 6 as a baseline for further discussion in RAN1 maintenance phase.

8 – Beijing Xiaomi Mobile Software

We think the issue should be discussed in WG rather than in RAN plenary. In addition, as RAN1 has already made agreement that at least a subset of resource in the active duration should be selected, if no further agreement is made, it should be up to UE implementation on how to select the subset. If RAN guidance is considered necessary, option 5 is preferred.

9 – LG Electronics Inc.

We think Solution 6 is technically beneficial as it follows the principle of mode 2 sidelink resource selection. However, we are fine with concluding this issue with Solution 5 considering that the sidelink specifications already leave details to UE implementation when some condition is met. An example is CPS in partial sensing where the UE behavior is left to UE implantation when the minimum number of CPS slots cannot be guaranteed. Considering that Solution 5 will rely on the UE implementation only when no candidate resource remain within the SL DRX active time after the Rel-16 procedure, its impact will not be as significant as performing random selection for every packet.

10 – Spreadtrum Communications

Both solutions are acceptable to us, and slightly prefer solution 5 for simplicity.

11 – Panasonic Corporation

Our preference is Solution 6 for more predictable UE behavior. On the other hand, we can accept Solution 5 depending on the discussion.

12 – NTT DOCOMO INC.

At least we prefer to have RAN guidance to avoid repeating discussions in RAN1. Between solution 5 and solution 6, we prefer solution 6. Besides, the current solution 5 is a bit different from 'completely up to UE implementation', so anyway spec update regardless of solution 5 or solution 6 is assumed in our understanding.

13 – CATT

First we would like to clarify the situation of discussion in the working group. There are three companies with sustained objections for solution 5 , while two companies sustained object for solution 6 . Other companies are ok with both. So in term of preference among companies there were not too much difference.

But the problem is this is not an issue of down-selection. Solution 6 is unnecessary enhancement which should be excluded from the beginning. We already have corresponding agreement in this aspects, and the

specification is complete. Given there is no RAN1 consensus for the enhancement, we should not discuss that.

In fact, during the status report discussion, it has been agreed the WID is complete and any remaining issue can be discussed in ran1#109e. So even there are companies still want to trigger the discussion for this enhancement, it should happen in ran1#109e.

More importantly, there are still technical problems with solution 6. It was generated on the fly , constantly being changed before and during GTW , and no simulation or no evaluation has been conducted.

In fact looking at the version of solution 6 from the proponent RAN tdocs, you can see there are different variance. (The one listed here is one of them). None of the version is working , including the one listed here. All of them will require CR to fix in the future.

So if a selection is going make in RAN plenary, the only candidate is solution 5. If we are going to include solution 6 , we need to more time to solve the technical issue and discuss how to fix them. As we prepare RAN1#109e tdoc, we were starting with some simulation and evaluation to check if solution 6 is feasible, our initial simulation shows solution 6 will create serious RSRP imbalance problem between resources in DRX active period and DRX inactive period, and introduce high collision rate for DRX active period. In some case, the whole system will stop working. The mechanism of RSRP increment is totally different from legacy method. Note this is not the only problem, there are other technical issue, for example, the definition of Z , etc.

Therefore we encourage the proponent companies first carefully check the mechanism of the proposal, study the impact of the solution, and provide concrete evidence that the solution 6 will not break the system. Currently with these serious concern we cannot accept solution 6 as candidate for down-selection.

To re-cap, specification is complete, no need to make the selection. It is really strange to have this kind of selection at RAN plenary level.

But we are ok with solution 5 since it is aligned with previous agreement and is at least technically sound.

For the enhancement feature (solution 6), extensive technical details are involved , tdocs with simulation and evaluation result will need to reviewed and be take into consideration. Therefore we think if any discussion for this enchantment feature is needed, it should happen in working group level.

14 – MediaTek Inc.

We prefer Solution 5 for its simplicity and lower impact. We do not really see the concern for impact on system performance; as LG pointed out, this solution leaves the selection to UE implementation only in the ”no candidate resource remains” case. This issue has been discussed for quite some time in RAN1, without simulations showing a problem with Solution 5, so we don’t see the need to go for more complexity and spec impact.

In any case we think it is beneficial for the plenary to give some guidance on this point.

15 – NEC Corporation

Thank you for discussion. We prefer solution 6 because it follows the principle of legacy sensing procedure, which achieves a balance between number of reported resources and interference level.

16 – Fraunhofer HHI

We are supportive of Solution 6.

17 – Nokia Denmark

For Nokia both solutions are acceptable.

18 – Guangdong OPPO Mobile Telecom.

Agree with Ericsson, Samsung, InterDigital, Apple, Panasonic, DOCOMO, NEC on the reasons for the solution choice and the need to make progress.

This issue topic has been discussed and the solution design work have been extensively carried out in RAN1 for two meetings. It is natural and a common practice that a solution is updated based on the discussion outcomes such that we reach at a sound and fully reviewed solution. As pointed out by others, the technical design for Solution 6 is based on the existing resource selection principle used since R14 LTE-V and R16 NR-V. This should be seen as a necessary solution (not an enhancement) to address the 4 FFS's in the last agreement on this topic, and to ensure a Tx-UE does not randomly or by poor judgement include resources that would cause collision and interference to others in the system. As commented in the previous section, Solution 6 is a complete solution does not require any further work to be done.

It is clear the sustained objection in RAN1 has caused some to question whether the WI can be deemed completed since a flag has now been raised on the SR. Consequently, it may be necessary to make a decision to close this issue in this RAN.

Our preference is Solution 6 as it has been thoroughly reviewed and widely accepted in RAN1, while Solution 5 poses unknown UE behavior as pointed by others and it can cause serious impact to the system performance if implemented poorly.

19 – vivo Communication Technology

We slightly prefer solution 6, but we are also OK with solution 5 in this late stage.

2.3 Issue 3: UE feature for support of PSFCH / S-SSB

RAN1 was not able to reach consensus on whether to split the capabilities for PSFCH and S-SSB receptions as different FGs, under FG 32-2 (i.e. receiving NR sidelink of PSFCH/S-SSB). Companies were split between

- Alt1: Keep both capabilities for PSFCH and S-SSB receptions under FG 32-2
- Alt2: Split FG 32-2 into two FGs (one FG for support of only PSFCH and another for support of only S-SSB)

Companies favoring Alt1 claim that the scope of the Rel-17 WI does not call for a low-cost sidelink UE and split of FG 32-2 is not essential from the WI objective view (RP-220533). Furthermore, splitting FG32-2 would will cause market fragmentation in the sidelink device space (RP-220527).

On the other hand, companies favoring Alt2 claim that reception of S-SSB and reception of PSFCH are two separate functions serving different purposes and have different implementation requirements. Hence, they should be in separate FGs. (RP-220612)

Companies are invited to provide their views below. Moderator recommendation will be made after the initial round of company inputs.

Feedback Form 3:

1 – ZTE Corporation We prefer Alt 1. For progress we can accept Alt 2 by assigning pre-requisite of S-SSB reception to PSFCH reception and two separate FGs
2 – Classon Consulting [for FUTUREWEI] This UE type is currently not supported (marked in yellow). It is also not included in the WID. It is not normal procedure to include FGs for aspects not in the WID or meeting agreements. We prefer not to include at all. If it is included it should not be split. Please see our paper in https://www.3gpp.org/ftp/tsg*ran/TSG*RAN/TSGR_95e/Docs/RP-220527.zip
3 – vivo Communication Technology We prefer Alt 2, and also would be OK to the compromise solution, e.g., having the PSFCH reception as the prerequisite of S-SSB reception.
4 – Ericsson LM Alt. 1. We are not convinced that there is practical consideration that justifies the split. PSFCH is a critical component of NR SL since Rel-16.
5 – Samsung R&D Institute UK Thanks for the discussion. We do not have a strong view but prefer Alt 2 since S-SSB and PSFCH are two separate signals which have a difference purpose.
6 – Qualcomm Incorporated Alt 2 (separate FGs.) The utility and implementation of S-SSB are completely different from those of PSFCH and we don't see why the two functionalities should be grouped into the same FG. Some UEs are broadcast-only UEs that do not request or receive feedback for their transmissions. Separating S-SSB reception from PSFCH reception allows such UEs to have more robust synchronization without expending power or complexity to turn on or to implement the reception chain and processing for PSFCH. In our understanding, this UE type is already supported per the prior RAN1 agreement to introduce the FG (with the FFS on the split). The reason the FG was highlighted yellow was to decided whether it will end up as one or two FGs, not to decide whether it should stay or be removed.

ZTE's compromise is acceptable to us as a way forward.

7 – Apple GmbH

Our preference is Alt 2. We are also fine with the compromise solution where the FG of S-SSB reception is a pre-requisite FG for the FG of PSFCH reception.

First, we think this FG is necessary, as it is closely related to random resource selection. This is similar to the newly introduced FG 32-4b and 32-4c. Second, we agree that PSFCH reception and S-SSB reception are two different functionalities, and do not think they should be bundled. Also, there exist use cases with only S-SSB reception, or with only PSFCH reception.

8 – Beijing Xiaomi Mobile Software

We do not have strong view on this issue but prefer to ALt2 as S-SSB and PSFCH are independent functions.

9 – LG Electronics Inc.

In our understanding, this FG is being defined mainly for pedestrian UEs that only send data packets, not receive data from the other UEs. Such UEs still need to receive S-SSB and PSFCH in order to maintain synchronization in partial and out-of-coverage scenarios and to transmit packets for which sidelink HARQ feedback is enabled. Noting that the basic FGs defined in Rel-16 5G V2X WI included both S-SSB and PSFCH, we think it is natural to consider this is still the basic component for the pedestrian UEs only sending data packets. Thus we support Alt 1.

10 – CATT

We support alt1. No need for further categorization which complicate specification

11 – Spreadtrum Communications

We prefer Alt 2 that FG 32-2 is split into two FGs, because the capabilities for PSFCH and S-SSB receptions are two separate functions.

12 – Panasonic Corporation

Our preference is alt 2 as separate FGs by assigning pre-requisite of S-SSB reception to PSFCH reception.

13 – NTT DOCOMO INC.

We do not have strong view, but in this situation some compromise solution like Panasonic's suggestion would be a possible way.

14 – MediaTek Inc.

We prefer Alt 2 with separate FGs. The features are functionally separate, and we see a legitimate use case for S-SSB reception without PSFCH. The compromise proposed by ZTE is fine for us.

15 – Huawei Tech.(UK) Co.. Ltd

The scope of the Rel-17 WI does not call for a low-***complexity*** sidelink UE, but calls rather for ***power consumption reduction***, which is mainly achieved by power-efficient resource allocation schemes of partial sensing and random resource selection, as well as SL-DRX. Therefore the split of FG 32-2 is not essential at least from a WID objective view.

In fact, the existence of the FG as a whole is not a critical part of the WI. If RAN cannot decide and RAN1 is stuck, we can simply skip defining the FG altogether.

16 – Nokia Denmark

ZTE's compromise is acceptable to us as a way forward.

2.4 Any other issues to be discussed

If there's any other issues to be discussed, please provide your comments below.

Feedback Form 4:

1 – ZTE Corporation

Based on RAN2 agreement as below, a leftover issue is finalization of signaling and procedure for the case when

RX UE does not receive any SL DRX configuration from TX UE:

For unicast and TX UE in RRC CONNECTED and Mode 1 RA, the serving gNB of TX UE determines the SL DRX configurations for RX UE.

RAN2 needs to handle different scenarios where gNB supports or not supports SL DRX.

Keep RX UE's reject option for SL DRX configuration sent by TX UE. If reject happens for initial SL DRX configuration, default SL DRX configuration is no UC SL DRX. FFS on the default SL DRX configuration for non-initial SL DRX configuration.

When a mode 1 TX UE is connected with SL DRX incapable gNB, the TX UE cannot provide SL configuration to RX UE even if the TX UE itself is SL DRX capable. So if RX UE does not receive any SL DRX configuration from TX UE, there may be two reasons corresponding to each of which different RX UE behavior shall be assumed:

1) The TX UE is in mode 1 and connected with SL DRX incapable gNB.

2) The TX UE is in mode 2 and the TX UE does not provide SL DRX configuration.

Given RAN2 has agreed to handle the scenario where gNB does not support SL DRX under which the RX UE shall assume no SL DRX instead of default SL DRX, there should be mechanism defined for RX UE to distinguish this case from the case when TX UE does not provide SL DRX configuration in mode 2. Potential solution is allowing TX UE to inform RX UE that the TX UE is in mode 1 and connected with SL DRX incapable gNB. Thus we propose the following

Task RAN2 to implement the mechanism on Tx UE informing Rx UE that the TX UE is in mode 1 and connected with SL DRX incapable gNB during CR phase.

2 – Ericsson LM

The issue brought up by ZTE should be discussed further in RAN2, there is no need for RAN guidance on this.

3 – Huawei Tech.(UK) Co.. Ltd

There is nothing in what ZTE mentions needing RAN intervention. It is single WG, can be resolved in a single meeting, and does not represent an intractable issue in a WG.

4 – Samsung R&D Institute UK

We also think that RAN guidance is not necessary for the issue ZTE mentioned. This can be handled by RAN2 using maintenance TUs.

5 – Guangdong OPPO Mobile Telecom.

The scenarios mentioned by ZTE are exceptional cases. Whether there is a need and how to handles these corner cases fall right within the scope of maintenance in RAN2.

6 – InterDigital

We also think that this issue should be discussed further in RAN2 and no RAN guidance is needed at this point.

7 – Apple GmbH

Besides some prior-known issues in RAN1 and RAN2 discussions in February WG meetings, we want to raise the following two open issues (more details in RP-220648).

1. Ambiguity of multiple IUC information from the same UE-A:

The agreed IUC information does not carry "priority" value used by UE-A to determine the preferred resource set. When both explicit request triggered and condition triggered IUC are supported, there are different ways (e.g., based on explicit request, resource pool (pre)configuration, etc) for UE-A to determine the "priority" value to be used in determining the preferred resource set. When UE-B receives multiple IUC information from UE-A, it does not know which "priority" value is used by UE-A in determining the corresponding preferred resource set. Although it was agreed in RAN1 that it is up to UE-B implementation to use one or multiple of them in its resource selection, it is unclear how UE-B can make the proper decision without the knowledge of "priority" value associated with preferred resource set.

2. Incompatibility of RAN2-configured latency timer with RAN1-defined sensing timeline for IUC information transmission:

The latency bound for IUC triggered by explicit request is statically configured in PC5-RRC. This semi-statically configured latency bound does not have dependency on the start of resource selection window of IUC information indicated in the explicit request. According to RAN2 agreement, the IUC information will be cancelled if it exceeds the configured latency bound. On the other hand, it is agreed in RAN1 that UE-A collects sensing results for IUC information generation until near the start of resource selection window of IUC information. This leads to incompatible MAC layer and physical layer behavior.

8 – vivo Communication Technology In our view, whether/how to handle the issues raised by ZTE and Apple can be handled during maintenance phase in WGs.
9 – LG Electronics Inc. We think the solution ZTE mentioned is not necessary. We firstly note that even a SL DRX capable gNB may decide not to provide SL DRX configuration to a TX UE and the mentioned case is not different. In our view, a natural consequence in such cases is that the UEs do not use SL DRX. While we think RAN2 can further discuss whether additional clarification is necessary during the maintenance phase, we think this is not an open issue which requires technical solutions. Currently we have similar assessment for the issues Apple mentioned. While we think no critical problem will happen with the extant agreements, WGs can further discuss whether additional clarification is needed as a part of maintenance.
10 – MediaTek Inc. We think the issues raised by ZTE and Apple can be discussed at WG level in the maintenance phase, without plenary action.
11 – Huawei Tech.(UK) Co.. Ltd Further response on Apple's points: (1) This is a purely technical RAN1 issue, if any issue is considered to exist, which is not relevant to a RAN decision process. (2) RAN2 are able to handle this, and decide if any change is needed. There may prove to be no technical incompatibility on further inspection. Resolving such questions is normal business of maintenance, and does not involve RAN.
12 – Nokia Denmark The issue brought up by ZTE should be discussed further in RAN2, there is no need for RAN guidance on this.

2.5 Summary of Initial Round

2.5.1 Issue 1: Open issues on Rel-17 sidelink enhancement in RAN1

20 companies provided inputs on whether an exception sheet is needed for Rel-17 sidelink enhancement to capture open issues in RAN1. Out of the 20 companies, 17 companies indicated that an exception sheet is not needed.

From RAN1 chair perspective, even without an exception sheet, work on Rel-17 sidelink enhancement can proceed as part of maintenance. Furthermore, as mentioned in Section 2.1, additional TUs on top of what is already been assigned for maintenance in RAN1 is not necessary. Considering these aspects as well as the input from the companies in the initial round, moderator would like to recommend the following:

Proposal: Rel-17 sidelink enhancement WI is declared completed and therefore, an exception sheet is not needed.

2.5.2 Candidate resource reporting within SL DRX active time of RX UE

19 companies provided inputs on the issue of candidate resource reporting within SL DRX active time of RX UE. The support for Solution 5 and Solution 6 are divided. A number of companies indicated that either option is acceptable.

Considering the fact that Solution 6 had less number of companies with concerns in RAN1#108-e, the moderator will check if Solution 6 is acceptable in the intermediate round.

2.5.3 Issue 3: UE feature for support of PSFCH / S-SSB

Companies were split between

- Alt1: Keep both capabilities for PSFCH and S-SSB receptions under FG 32-2
- Alt2: Split FG 32-2 into two FGs (one FG for support of only PSFCH and another for support of only S-SSB)

Futurewei and Huawei also indicated that selecting one of the two options is not absolutely necessary and Rel-17 sidelink enhancement can do without FG 32-3 altogether.

For the intermediate round, the moderator will if companies can accept the compromise from ZTE.

2.5.4 Other issues

ZTE and Apple raised potential issues. General consensus among the companies who provided inputs was that these issues should be discussed in WGs and not RAN.

Additional round of discussions is not needed considering the comments received so far.

3 Intermediate Round

3.1 Issue 1: Open issues on Rel-17 sidelink enhancement in RAN1

Proposal: Rel-17 sidelink enhancement WI is declared completed and therefore, an exception sheet is not needed.

Considering the discussions from the initial round, the moderator would like to check if there any companies who cannot accept the above proposal.

Feedback Form 5:

1 – Nokia Denmark

Our view is that there is substantial amount of work to be completed. It is important to have a transparent status report and an agreed list of open items. The following items are at least still open, requiring significant effort to be closed.

1. Finalization of how PHY layer guarantees that at least a subset of the candidate resources reported to MAC layer is located within the active time of the RX UE

2. Finalization of UE-B's behaviour when it receives both preferred resource set and non-preferred resource set from the same UE-A or different UE-As

3. Finalization of relationship between start/end slots of resource selection window used for sidelink transmission carrying inter-UE coordination information and start/end slots of resource selection window for determining the set of resources

2 – Ericsson LM

As mentioned earlier, we think it is clear there is substantial work remaining and we support having list of open issues to properly focus the remaining work, and to avoid a never-ending maintenance phase. The list Nokia provides above lists the most obvious functionality requiring further discussion.

3.2 Issue 2: Candidate resource reporting within SL DRX active time of RX UE

To move forward, the moderator would like check if there are any companies who still maintain a position of sustained objection against Solution 6. If there are companies with sustained objections, please make clear indication of it. If there is no clear indication of sustained objections, the moderator will assume that all companies can accept Solution 6.

Note that in case there is still sustained objection against Solution 6, moderator would like to recommend that RAN agree on Solution 5. Without any further agreement, current specification can only operate with candidate resource selection within DRX active time by UE implementation. It would better to have an explicit agreement to make necessary changes to the specifications and avoid any confusion or debate.

Feedback Form 6:

1 – Huawei Tech.(UK) Co.. Ltd

We can accept solution 6.

On the second paragraph of the moderator's statement, it seems not the case that current specifications already permit UE implementation. 38.214 captured nothing regarding resource selection in DRX active time, unfortunately, and this means that UE only follows the procedures which are there. They are, in fact, somehow complete, but undesirable according to all proposals. Whatever resources the prescribed procedures result in are passed up to MAC for processing. That set of resources (SA) can be completely empty, and nonetheless fully compliant with 214's procedures today. If so, there is no permission in the spec for the UE to make up some other non-empty set of resources for MAC. Nor is there any permission for UE to increase or decrease the quantity of resources when it is non-zero. Thus neither solution 5 nor solution 6 is currently specified, and nor do the specs leave the UE with arbitrary freedom.

2 – CATT

We briefly gave our analysis why solution 6 has serious technical problems in the initial round. These technical issues are still not addressed . **Therefore, we still have serious concern for solution 6 and hereby indicate we cannot accept solution 6.**

Unlike as some proponent claimed, solution 6 is different from legacy mechanism. Currently, legacy mechanism is to apply RSRP increment for all candidate set, but in solution 6 the increment will 'only for resources within the SL DRX active time'. This will create RSRP imbalance with the whole candidates set, which does not exist in legacy system. The imbalance will become more serious as N_total and X increases, and it will seriously push higher the final RSRP threshold. On average, we can show the resulted final RSRP threshold will be much higher than in the legacy system. Note higher level of final RSRP threshold level will lead to higher probability of collision if the corresponding candidates are chosen. Therefore at certain level the collision is so severe that the transmission using the selected candidate in DRX active time is bound to fail. **This fatal problem does not exist in legacy system**.

In this round, we would like to discuss another technical concern we have with solution 6. This is regarding the specification of Z for UE implementation. It is said that 'Z' is UE implementation parameter , and '*If there are less than Z candidate single-slot resources remained within the indicated SL DRX active time in the set SA after completing the iterations from step 4) to 7) to fulfil X·M_total,* then the problematic RSRP increment procedure for DRX active period will be triggered.

It is evident that the higher Z value chosen , the higher probability that the second round of RSRP increment will be triggered, and higher probability of RSRP imbalance and final RSRP threshold will be resulted. To alleviate the RSRP imbalance problem discussed in the prior section of the contribution, UE implementation will try to select a value for Z as small as possible, for example Z=1 could be chosen in the extreme case. However, small value of Z will create another problem , which is not enough candidates set are within the DRX active time. This will introduce difficulty for higher layer selection .

In fact, this paradox is created because of specification of 'Z' and related procedure. Ideally , the number of selected candidates in the active set should be based on the channel condition and that condition is varying. Without Z, the UE could just start the iteration from step 4) to 7) and select the resource, and end up with certain number of candidate selected within DRX active set. At this time, the UE could decide that to do next, depending on the resulted RSRP threshold. It is entirely possible some more intelligent implementation could be utizlied, but one simple approach/principle is if RSRP threshold is low then the UE could afford to trigger another round of selection, but if RSRP threshold is already high then the UE will stop. The key difference here is UE now can adapt to the channel condition while the use of Z will remove this flexibility. **We can show that there are vast differences of the two approaches, reflected in both the average probability of triggering of second round of selection, and in the final resulted RSRP threshold.**

In summary, we explain some of the problems exists in solution 6. **We are open to more discussions, but until these concerns are addressed we think any hasty decision to adopt solution 6 should be avoided since that will severely degrade the quality of 3GPP specification.**

3 – ZTE Corporation

Following Moderator's guidance, we would like to indicate the currently formulated solution 6 is not acceptable to us.

CATT's concern on the problem that comes with the configuration of *Z* has been raised several times in RAN1 and we think the compromised solution didn't address that either. First of all, the value for Z can not be configured TB wise and match the corresponding sensing procedure so that there should be sufficent and appropriate number of resources within the DRX active in the RSW. When for some TB, the RSRP increment shall amount to a point that infinite loop of increase shall not generate a resource set whose DRX active component is of cardinality larger than Z, the UE behavior is ambiguous and needs further fix. We

understand proponent's enthusiam on keeping Z, thus a way forward would be to ensure the number of resources within DRX active would be up to Z instead of larger than Z eventually.

Regarding the RSRP increment to DRX active only, in addition to the imbalance issue mentioned by CATT, it's likely that the deadlock situation of infinite RSRP increment by applying the increment and counting the resources within the set of DRX active only would get worse compared with applying the RSRP increment to the whole set as the legacy percentage X for the whole set can not be translated into the percentage X of the resources within the DRX active. A way forward would be keeping RSRP increment yet the applying the increment to the whole set.

Summing up the above, we would like to propose a modified solution 6' wherein the RSRP increment is kept but applied to the whole set A instead of the part of DRX only and the configuration of Z is kept but as a target instead of a mandatory threshold.

*Solution 6 (compromised): If there are **no** candidate single-slot resources remained within the indicated SL DRX active time in the set SA after completing the iterations from step 4) to 7) to fulfil X·M"total" , for the reported subset of the candidate resources, the UE applies the RSRP threshold increment in Step 7 and continues the procedure from step 4) to 7) with replacing X·M"total" by **up to** Z , where Z is determined by UE implementation within a range of 0 < Z ≤ X·N"total" and N"total" is the total number of candidate single-slot resources within the SL DRX active time of the initialized set SA in Step 4).*

4 – Guangdong OPPO Mobile Telecom.

It seems like we are starting a round of technical discussion in RAN, but I am not sure if this is the intention of the moderator (RAN1 chair) for this round of discussion. Anyway, since there is a will / proposal to further modify Solution 6 to accommodate concerns from ZTE and CATT, let me try proposing a new Solution 6 since there is some errors in formulation from ZTE (while appreciate the intention).

Regarding the concern on raising the RSRP threshold "only for resources within the SL DRX active time" and how this will cause the RSRP imbalance problem and subsequently creating high interference / collisions and/or even causing infinite loop within this portion , I think all these are all due to there is already a high load within the SL DRX active time portion. In such operating environment, it is equally difficult based on UE implementation to find candidate resources that does not create high interference / collisions to other UEs. By raising the RSRP threshold only within the DRX active time, the intention is to limit the interference only within this portion. If the RSRP threshold increment is equally applied to the entire set SA (including the inactive time), then it will also cause more interferences to the DRX inactive time. Hence, the RSRP threshold increment only within the DRX active time is a necessary restriction.

Regarding the Z value, although I don't think it will create any problem as it can be fully decided by UE implementation (e.g., it can be a small number or a large number), but I can see by replacing it with "at least one" may be this can resolve the concerns from ZTE and CATT. Furthermore, by using "at least one", I think it can also resolve the concern from ZTE and CATT on creating too much interference / collisions within the DRX active time, since the requirement is just one resource instead of Z. Therefore, I suggest the following new version of Solution 6.

*Solution 6' (further compromised): If there **is no** candidate single-slot resource remained within the indicated SL DRX active time in the set S_A after completing the iterations from step 4) to 7) to fulfil X·M_total,*

for the reported subset of the candidate resources, the UE applies the RSRP threshold increment in step 7) and continues the procedure from step 4) to 7) only for resources within the SL DRX active time ***until there is at least one candidate single-slot resource remained within the SL DRX active time in the set S_A****.*

3.3 Issue 3: UE feature for support of PSFCH / S-SSB

Moderator would like to check if the following modified Alt2 (a compromise suggested by ZTE) can be acceptable to the companies:

Modified Alt2: Split FG 32-2 into two sub-FGs

- ***One sub-FG for support of only S-SSB reception***
- ***Another sub-FG for support of PSFCH reception with pre-requisite of S-SSB reception***

Companies are invited to provide their views below.

Feedback Form 7:

1 – Huawei Tech.(UK) Co.. Ltd

If ZTE could explain the market and/or deployment relevance of each of this pair of FGs? We will return for further comment if so, thanks.

In general, it seems like the proposal is an assumption that ”something must be done!”, when RAN should ask the question, as mentioned in GTW, whether *anything* has to be done here at all. Bear in mind that low complexity is not an objective for the WID. Looking at the current list of features, not including 32-2, it does not seem to have any particular flaw in representing what has been standardized. Whereas 32-2 is something extra without a link to the rest of the WI.

2 – Samsung Electronics Co.

(Moderator) In response to Huawei’s comment on assumption with regards to the proposal, there is no assumption that something has to be done. However, a compromise proposal has been made and it is now brought forth for consideration.

3 – Ericsson LM

Our preference is still to go with alternative 1 for the reasons shared earlier, but we would be fine with the modified Alt. 2 if there is wide support for it.

4 – Samsung R&D Institute UK

Thanks for the discussion. We are O.K with the Modified Alt 2.

5 – LG Electronics Inc.

We are fine with the modified Alt 2.

6 – Panasonic Corporation

We support the proposal of Modified Alt2.

7 – Qualcomm Incorporated

We are ok with the compromise proposal. We commented earlier on why we support having the features in separate FGs, including power saving aspects.

8 – vivo Communication Technology

We can accept the compromise proposal. We would like to remind that the intention of introducing FG 32-2 is endorsed. Thus the argument is whether/how to split the FG, not the introducation of the FG.

9 – Apple GmbH

We support the proposal.

We would like to mention that FG 32-4b and FG 32-4c are introduced without any corresponding RAN1 agreements (except in UE feature discussions). They can be used for the synchronization of random resource selection UE. Similarly, the FG of S-SSB reception could be introduced for the synchronization of random resource selection UE.

10 – CATT

We still prefer alt1. For progress, we can accept the modified alt2 if it is the majority view.

11 – Classon Consulting

[for FUTUREWEI] The meaning of an all yellow FG is clear, it is not currently agreed. Our preference is not to introduce the FG 32-2. So far there is no compelling use case brought out as to why this fragmentation, or further fragmentation from the alternatives, is truly necessary. Introducing Type B UEs is different than partial sensing and RRS, in that partial sensing and RRS are in the WID and Type B is not. Whatever FGs are needed for partial sensing and RRS of course need to be added in the capability discussion. The same logic does not apply for type B UEs. The WID justification is also quite clear that we need to have ”maximum commonality” and ”maximize the economy of scale”. Modified Alt 2 does not do that, but will result in further fragmentation.

12 – Beijing Xiaomi Mobile Software

We support the modified alt.2 as a compromise.

13 – Spreadtrum Communications

We are fine with the modified Alt 2.

14 – MediaTek Inc.

We support the modified Alt 2.

15 – Nokia Denmark

We are fine with the modified Alt 2.

16 – ZTE Corporation
support

3.4 Summary of Intermediate Round

3.4.1 Issue 1: Open issues on Rel-17 sidelink enhancement in RAN1

For the intermediate round, moderator asked whether there were any company who had concerns on the following proposal.

Proposal 1: Rel-17 sidelink enhancement WI is declared completed and therefore, an exception sheet is not needed.

The only comment was from Nokia and Ericsson. Nokia requested three open issues to be listed as part of the Rel-17 sidelink enhancement SR. Ericsson agreed with Nokia on the need for the three open issues to be captured. Given the situation, moderator recommendation is to agree on the above proposal a0nd capture the following issues in the SR to be handled as part of maintenance work on Rel-17 sidelink enhancement.

Proposal 2: Capture the following in the SR for Rel-17 sidelink enhancement

Following issues are to be handled as part of RAN1 maintenance work

1. *Finalization of how PHY layer guarantees that at least a subset of the candidate resources reported to MAC layer is located within the active time of the RX UE*
2. *Finalization of UE-B's behavior when it receives both preferred resource set and non-preferred resource set from the same UE-A or different UE-As*
3. *Finalization of relationship between start/end slots of resource selection window used for sidelink transmission carrying inter-UE coordination information and start/end slots of resource selection window for determining the set of resources*

Note that bullet 1 can be removed by resolving Issue 2 in section 3.4.2.

3.4.2 Issue 2: Candidate resource reporting within SL DRX active time of RX UE

Moderator's proposal for the intermediate round was to agree on Solution 6.

When SL DRX active time of RX UE is provided by the higher layer for candidate resource selection

- *Solution 6 (compromised): If there are less than Z candidate single-slot resources remained within the indicated SL DRX active time in the set SA after completing the iterations from step 4) to 7) to fulfil X·M_"total" , for the reported subset of the candidate resources, the UE applies the RSRP threshold increment in Step 7 and continues the procedure from step 4) to 7) only for resources within the SL DRX active time with replacing X·M_"total" by Z, where Z is determined by UE implementation within a range of 0 < Z ≤ X·N_"total" and N_"total" is the total number of candidate single-slot resources within the SL DRX active time of the initialized set SA in Step 4).*

CATT and ZTE explicitly indicated that they cannot accept Solution 6. The situation is no different from that of RAN1#108-e. A modification to Solution 6 was proposed by ZTE. Given the situation, the moderator would like to check if companies can accept Solution 5 to close this issue.

Proposal 3: When SL DRX active time of RX UE is provided by the higher layer for candidate resource selection

- *Solution 5 (up to UE implementation): If there is no candidate single-slot resource remained within the indicated SL DRX active time in the set SA after completing the iterations from step 4) to 7) to fulfil X·M_"total", the UE based on its implementation selects and includes at least one candidate single-slot resources within the indicated SL DRX active time in the set SA.*

3.4.3 Issue 3: UE feature for support of PSFCH / S-SSB

15 companies provided inputs on the issue of UE feature for support of PSFCH / S-SSB in the intermediate round. All companies indicated support for the modified Alt2 except Huawei and Futurewei.

Proposal 4 (Modified Alt2): Split FG 32-2 into two sub-FGs

- *One sub-FG for support of only S-SSB reception*
- *Another sub-FG for support of PSFCH reception with pre-requisite of S-SSB reception*

Compared to the original Alt1 vs Alt2 situation in RAN1, Proposal 4 seems to be more acceptable to companies. Moderator recommendation is to take Proposal 4.

Note that despite the FG 32-2 being acceptable to most companies, the support of FG 32-2 or some form of its variation is not absolutely essential. And RAN1 was not able to converge on this issue despite extensive discussions. All things considered, if RAN cannot agree on Proposal 4, it is very unlikely that any further discussions in RAN1 will help.

3.5 Proposals for Monday's GTW Session

Proposal 1: Rel-17 sidelink enhancement WI is declared completed and therefore, an exception sheet is not needed.

Proposal 2: Capture the following in the SR for Rel-17 sidelink enhancement

Following issues are to be handled as part of RAN1 maintenance work

1. *Finalization of how PHY layer guarantees that at least a subset of the candidate resources reported to MAC layer is located within the active time of the RX UE*
2. *Finalization of UE-B's behavior when it receives both preferred resource set and non-preferred resource set from the same UE-A or different UE-As*

3. *Finalization of relationship between start/end slots of resource selection window used for sidelink transmission carrying inter-UE coordination information and start/end slots of resource selection window for determining the set of resources*

Proposal 3: When SL DRX active time of RX UE is provided by the higher layer for candidate resource selection

- *Solution 5 (up to UE implementation): If there is no candidate single-slot resource remained within the indicated SL DRX active time in the set SA after completing the iterations from step 4) to 7) to fulfil X·M_"total", the UE based on its implementation selects and includes at least one candidate single-slot resources within the indicated SL DRX active time in the set SA.*

Proposal 4: Split FG 32-2 into two sub-FGs

- *One sub-FG for support of only S-SSB reception*
- *Another sub-FG for support of PSFCH reception with pre-requisite of S-SSB reception*

3.6 Outcome of Intermediate Round

The following proposals were agreed.

Proposal 1: Rel-17 sidelink enhancement WI is declared completed and therefore, an exception sheet is not needed.

Proposal 2: Capture the following in the SR for Rel-17 sidelink enhancement

Following issues are to be handled as part of RAN1 maintenance work

- ***Finalization of UE-B's behavior when it receives both preferred resource set and non-preferred resource set from the same UE-A or different UE-As***
- ***Finalization of relationship between start/end slots of resource selection window used for sidelink transmission carrying inter-UE coordination information and start/end slots of resource selection window for determining the set of resources***

Proposal 3: When SL DRX active time of RX UE is provided by the higher layer for candidate resource selection

- ***Solution 5 (up to UE implementation): If there is no candidate single-slot resource remained within the indicated SL DRX active time in the set SA after completing the iterations from step 4) to 7) to fulfil X·M_"total", the UE based on its implementation selects and includes at least one candidate single-slot resources within the indicated SL DRX active time in the set SA.***

4 Final Round

4.1 Issue 1: Open issues on Rel-17 sidelink enhancement in RAN1

Draft of the updated status report with the following two open issues have been uploaded to the draft folder for [95e-30-R17-SL-WI]

Following issues are to be handled as part of RAN1 maintenance work

- *Finalization of UE-B's behavior when it receives both preferred resource set and non-preferred resource set from the same UE-A or different UE-As*
- *Finalization of relationship between start/end slots of resource selection window used for sidelink transmission carrying inter-UE coordination information and start/end slots of resource selection window for determining the set of resources*

There should not be any issues on the update since it is a simple copy and paste to implement the agreement during Monday's GTW session. Nonetheless, **if there are any issues**, please comment below.

Feedback Form 8:

4.2 Issue 2: Candidate resource reporting within SL DRX active time of RX UE

Draft CR has been upload to the draft folder for [95e-30-R17-SL-WI]. Please provide your comments on the draft CR below (if any).

Feedback Form 9:

1 – Ericsson LM

For the text in the draft CR, we have the following suggestion where in our view, adding the word "*additionally*" makes the intention of the CR text clearer as follows:

7a) If sidelink DRX active time of RX UE is provided by the higher layer and there is no candidate single-slot resource remained within the sidelink DRX active time in the set SA, the UE based on its implementa-

tion *additionally* selects and includes at least one candidate single-slot resources within the sidelink DRX active time in the set SA

4.3 Issue 3: UE feature for support of PSFCH / S-SSB

Based on the guidance from the RAN chair during the Monday GTW, Proposal 4 will be further discussed in the final round so that different companies can better understand the underlying motivation, scenario, and relevant aspects of the proposal.

Proponent companies are invited to provide additional information (underlying motivation, scenario, and relevant aspects) that can help companies better understand Proposal 4.

Proposal 4: Split FG 32-2 into two sub-FGs

- *One sub-FG for support of only S-SSB reception*
- *Another sub-FG for support of PSFCH reception with pre-requisite of S-SSB reception*

Feedback Form 10:

1 – Apple GmbH

We think the motivation of introducing the FGs of S-SSB reception/PSFCH reception is to facilitate sidelink transmissions with reduced sensing.

It is agreed that Rel-16 basic sidelink feature groups are not basic feature groups for UE supporting Rel-17 sidelink feature groups. This implies that a UE with the capability of transmitting sidelink with random resource selection does not mandatorily have the full sidelink reception capability.

To achieve the sidelink synchronization of this type of UE, we already agreed two additional FGs: FG32-4b (synchronization sources for NR sidelink transmission) and FG32-4c (eNB type synchronization sources for NR sidelink transmission). These two feature groups will likely serve as pre-requisite of the feature groups of transmitting sidelink mode 2 with reduced sensing.

Similarly, an additional feature group (S-SSB reception) can be introduced to facilitate the sidelink transmissions with reduced sensing. Again, this new feature group can serve as an alternative pre-requisite of the feature groups of transmitting sidelink mode with reduced sensing.

2 – Samsung R&D Institute UK

Thanks for further discussion. This kind of UE type (i.e. Type B: Same as Type A with an exception of performing PSFCH and S-SSB reception) was agreed in RAN1#104 as the reference for evaluation and designing for SL power saving features in Rel-17. So, we think that the motivation is already clear. Furthermore, we think that the modified Alt 2 is good compromise. Specifically, only S-SSB reception UE can operate without having a PSFCH or PSCCH/PSSCH receiver. In this case, S-SSB reception is useful for out of coverage cases with no GNSS. For additional PSFCH reception, this is useful for a UE to know when the transmission has been received and avoid blind re-transmissions, this can (1) reduce UE Tx power (2) reduce interference. Having a PSFCH receiver is much simpler than having a full SL receiver with PSCCH/PSSCH.

3 – Panasonic Corporation

We think the functionality of the synchronization and the functionality of S-SSB are orthogonal. If the system does not work without PSFCH functionality, the case of GNSS synch without PSFCH should be also prohibited. If GNSS or gNB synch without PSFCH functionality is allowed (as current status), similarly, S-SSB synch without PSFCH should be allowed as the difference is how synch is obtained. I'd like to understand why S-SSB synch case only requires to mandate to have S-SSB. It is not for low cost but we are discussing the orthogonality of the functions.

4 – Qualcomm Incorporated

Having two FGs allows for more rapid and widespread deployment of Rel-17 sidelink devices by providing more flexible deployment and implementation choices. Rel-17 includes commercial applications in addition to V2X and public safety, which encompass a broad range of deployment scenarios and devices types. We worry that bundling multiple, unrelated functions into FGs could limit or delay adoption of some Rel-17 sidelink features.

One example of devices that benefit from and would be enabled by having S-SSB and PSFCH in separate FGs are devices that broadcast messages but do not require feedback, such devices include some beacons and pedestrian UEs. Those devices would benefit from a robust synchronization enabled by receiving S-SSB but do not need to receive PSFCH. We note that S-SSB reception is a relatively rare event that happens infrequently. One the other hand, feedback occurs for every retransmission of a TB and places minimum gaps between retransmissions, requiring both the reception and transmission chains to remain on for longer times and increasing power consumption. The UE can save power by not receiving (or requesting) PSFCH for feedback and not having to turn on the receiver chain at PSFCH occasions or perform PSFCH processing.

5 – Classon Consulting

[for FUTUREWEI] Thank you for the more detailed discussion. From the above responses, it appears that the targeted use case are UEs that implement rel-17 power savings features such as RRS or PS, who also try to save more power by not receiving PSFCH. In particular, it is to introduce back UEs that cannot support PSFCH reception, which was a major mandatory feature in Rel-16. It is not clear is why the UE has to be *incapable* of PSFCH (ever) in order to save power by not receiving PSFCH (when desired, such as with broadcast). Beyond that, it is not clear how much power savings can be achieved from an incapable UE on top of the bulk of the gains which come from RRS/PS and SL DRX. PSFCH can actually help performance and power savings in some cases, as Samsung mentions. So power savings is not really the argument, the argument seems to be trying to *reduce cost* by not implementing the PSFCH feature. Putting aside that cost reduction is not in the WID, how much cost savings will be obtained? We understand that we are not defining basic features in Rel-17 (copied over or new), and that some basic features from rel-16 are not appropriate for RRS or PS UEs. But it is not a mandate that we should be dropping features for cost reduction that are usually expected to be present.

The other argument given is that unrelated features should not be grouped, but practically there were a number of basic features in Rel-16 that were all expected to be present though arguably unrelated, for the benefit of the ecosystem. It was mentioned that there are commercial applications in addition to V2X and public safety, which encompass a broad range of deployment scenarios and devices types. As shown in the Justification of the WID, those possible variations were anticipated and we declared we should strive for maximum commonality. That is why we feel that, if another UE type is introduced, the UEs should still support PSFCH reception.

6 – vivo Communication Technology

Firstly, we don't think the argument of "maximum commonality" is relevant here. The text of WID just says "should strive to achieve maximum commonality between commercial, V2X, and Critical Communication usage of sidelink in order to avoid duplicated solutions and maximize the economy of scale". The discussion here is on the UE capability supporting sidelink operation, regardless of the solutions – there is no intention nor proposal to introduce any new solutions.

Secondly, having two FGs enables many use cases. For example, it supports the pedestrian UE or RSU that having only sidelink broadcast transmission operating in out of coverage (i.e., having the S-SSB reception only). Support of PSFCH reception would be needed only if the HARQ feedback based unicast/groupcast is required for the specific traffic type for the device. Such flexibility would be beneficial for rapid deploying of sidelink devices.

Moreover, noted that the FG 32-2 has already been agreed in RAN1#107 (R1-2112144) and sent to RAN2 in the FG list R1-212902. It was highlighted in yellow in RAN1#107bis just because no consensus in RAN1 to further split the FG (There is no consensus in RAN1 on "FFS whether to split the capabilities for PSFCH and S-SSB receptions as different FGs", R1-2200256). It is expected RAN to provide the answer on whether to split, but there is no point to revert the RAN1 agreement (i.e., to remove the whole FG 32-2).

7 – Panasonic Corporation

On the reply of that unrelated features are grouped as Rel.16 basic feature, I was not sure. Basic as minimum function in this context would be sidelink Tx only with GNSS synch capable UE without PSFCH for broadcast traffic. Then sidelink Tx only with S-SSB synch would be on top of the basic function. If basic function is Tx only with GNSS synch capable UE with PSFCH, I can understand the commonality argument better.

8 – CATT

We agree that the prior ran1 agreement regarding this issue should be respected. As vivo pointed out, ran1#107bis has the conclusion:

- There is no consensus in RAN1 on "FFS whether to split the capabilities for PSFCH and S-SSB receptions as different FGs"
    - Remove the FFS in FG 32-2, highlight FG 32-2

(FFS in FG 32-2 is as follows:

FFS whether to split the capabilities for PSFCH and S-SSB receptions as different FGs

FFS whether other components will be included

9 – ZTE Corporation

We support the proposal. We preferred not to split 32-2 in WG meeting with the understanding of not to enlarge the scope of the indicated UE feature compared with what was discussed in the corresponding agendas. Given companies' position in this meeting, the compromise was proposed to fulfill the following targets:

1) the UE with PSFCH and S-SSB reception only capability can be indicated using the sub-FG of PSFCH reception, which was agreed at the begining of the WI.

2) the UE with S-SSB reception capability only can be indicated under some claimed deployment use case and in the meantime serve as synchronization sources to other Tx FGs.

Indeed the second point is somehow enlarged UE feature indication. But our understanding is at least using the S-SSB reception as synchronization source shall incur no harm if we consider the corresponding use cases, though what should be left to further discussion is whether S-SSB Tx shall be included in the corresponding Tx FGs as with the case for Rel-16 LTE 5-4(2)/15-4(2)

10 – NTT DOCOMO INC.

We think this proposal 4 is a good compromise for the current situation. In our understanding, one use case of V2X is devices only performing broadcast device e.g. VRUs as commented by QC, which was already considered in LTE-V2X discussions and described in TR. WID is also referring to VRUs; thereby it seems there is no reason to preclude such a use case. The device type does not need PSFCH RX, which can be achieved by proposal 4.

One important note is 'no consensus in RAN1' does not mean 'no split'. The discussion status was - companies' opinions are divergent and let's conclude this issue at RAN plenary. There is no agreement to be respected in this discussion and either direction should be agreed for RAN1, without any bias.

11 – Spreadtrum Communications

Thanks for the good discussion. We think that the functions of PSFCH reception and S-SSB reception can be considered separately. From the perspective of deployment scenarios, UE supporting S-SSB reception does not necessarily have to support PSFCH reception. For example, as mentioned by QC and vivo, when handheld UEs by pedestrian only support broadcast, those UEs can do S-SSB reception for synchronization without the function of PSFCH reception. The two separate functions can make the deployment scenarios more diverse and flexible.

12 – Nokia Denmark

Nokia is ok with proposal 4

13 – Beijing Xiaomi Mobile Software

We support proposal 4. From our understanding, the potential usage scenario for only SSB reception includes when a UE has only broadcast type of traffic, and needs to work in areas without GNSS/gNB synchronization e.g. an indoor commercial device. We agree with other companies that the maximum commonality in the WID refers to the solution but not UE capabilities.

14 – Ericsson LM

Our preference is to specify on FG, but accept the moderator's proposal if this is the way to achieve consensus.

15 – Ericsson LM

Correction to above reply "on FG" should be "one FG".

16 – MediaTek Inc.

We support P4. As noted by other companies above, the separation is useful for UEs that have broadcast traffic only, and such a UE could still benefit from SSB reception when other sync sources are not available.

With respect to the contents of the WID, our reading of the ”maximum commonality” statement is that we intended not to introduce duplicate/overlapping solutions for different use cases. We do not find in this language any guidance that functionalities must be grouped in the UE capability.

17 – Classon Consulting

[for FUTUREWEI] Thanks for all of the good discussion. I understand some view that retaining 32-2 in an earlier meeting with details to be worked out means it is still agreed, but the entire FG was marked yellow / not yet agreed due to our inability to work out whether or not to split. The current status is yellow.

One thing clear from the discussion is that we seem to be mixing up use cases with capability. You can have a more capable UE that, in certain circumstances, is configured to or uses less power. We do not need to introduce a UE incapable of PSFCH reception in order to cover an out of GNSS coverage broadcast use case, UE that also have PSFCH reception capability can also work in that scenario and in more scenarios. That we believe is more aligned with the Justification of the WID.

For the grouping of features arguments, the issue again we see is going from a so much more capable rel-16 UE supporting the basic features to help the market, to fragmenting to save the (small, agree with Samsung) cost of the PSFCH receiver.

So our preference again is to not introduce 32-2. If we are going to introduce, it should not be split. (i.e., not Proposal 4) or the FG should have each other as a pre-requisite.

4.4 Summary of Final Round

4.4.1 Issue 1: Open issues on Rel-17 sidelink enhancement in RAN1

There were no concerns on the updated Rel-17 sidelink enhancement SR from the rapporteur with the following added:

Following issues are to be handled as part of RAN1 maintenance work

- *Finalization of UE-B’s behavior when it receives both preferred resource set and non-preferred resource set from the same UE-A or different UE-As*
- *Finalization of relationship between start/end slots of resource selection window used for sidelink transmission carrying inter-UE coordination information and start/end slots of resource selection window for determining the set of resources*

The status report will be updated in RP-220945.

4.4.2 Issue 2: Candidate resource reporting within SL DRX active time of RX UE

One comment was made to add the word ”additionally” to the draft CR from OPPO. From moderator’s point of view, the suggestion seems fine.

7a) If sidelink DRX active time of RX UE is provided by the higher layer and there is no candidate single-slot resource remained within the sidelink DRX active time in the set SA, the UE based on its implementation ***additionally*** *selects and includes at least one candidate single-slot resources within the sidelink DRX active time in the set SA*

Moderator recommendation is to endorse the text proposal provided by OPPO in the draft folder with the additional suggestion from Ericsson. The final CR is submitted in RP-220949.

4.4.3 Issue 3: UE feature for support of PSFCH / S-SSB

13 companies provided comments on Proposal 4: Apple, Samsung, Panasonic, Qualcomm, vivo, CATT, ZTE, DOCOMO, Spreadtrum, Nokia, Ericsson, MediaTek, Futurewei. Other than Futurewei, all companies expressed support or willingness to accept Proposal 4. A number of companies provided detailed explanations on why Proposal 4 would be beneficial. However, Futurewei indicated that despite the explanation and supporting companies, their preference is to not introduce 32-2. If it is to be introduced, it should not be split. (i.e., not Proposal 4) or the FG should have each other as a pre-requisite.

Although Futurewei has expressed concerns on Proposal 4, the moderator would like to request Futurewei to kindly reconsider considering the views from the other 12 companies. Moderator recommendation is to take Proposal 4.

4.5 Proposals from Final Round

Status report for Rel-17 sidelink enhancement in updated in RP-220945.

Proposal 3A: Approve the CR in RP-220949.

Proposal 4: Split FG 32-2 into two sub-FGs

- ***One sub-FG for support of only S-SSB reception***
- ***Another sub-FG for support of PSFCH reception with pre-requisite of S-SSB reception***

5 Extended Round

The extended round will handle the last remaining issue for [95e-30-R17-SL-WI]: (Issue 3) UE feature for support of PSFCH / S-SSB. From moderator point of view, RAN has the following alternatives to consider for resolution of the situation.

- *Alt1: Keep both capabilities for PSFCH and S-SSB receptions under FG 32-2*
- *Modified Alt2: Split FG 32-2 into two sub-FGs*
    - *One sub-FG for support of only S-SSB reception*
    - *Another sub-FG for support of PSFCH reception with pre-requisite of S-SSB reception*

Note that Alt2 which was listed as one of the alternatives in the initial round is not listed above considering the fact that all companies who supported Alt2 and a few more companies are supportive of the modified version.

Although much can be said on the motivations and implications of choosing one alternative over another alternative, the choices are simple enough. If either Alt1 or modified Alt2 cannot be taken, the only remaining choice would be to conclude that FG 32-2 is not introduced. This outcome would be unfortunate considering the super majority support on modified Alt2.

Considering the current situation, the moderator would like to check with companies if they can accept Alt1. Please note that if there are serious concerns on taking Alt1, the moderator intends to maintain the recommendation from the final round to take Proposal 4 (modified Alt2) as the final outcome of this discussion.

Companies are requested to provide their views on whether Alt1 (Keep both capabilities for PSFCH and S-SSB receptions under FG 32-2) is acceptable or not. Also, if Futurewei can kindly reconsider their position on Proposal 4, that could help wrap up the discussions early.

Feedback Form 11:

1 – Classon Consulting

[for FUTUREWEI] As the extended round is for looking for compromises (and not repeating arguments), here we will just summarize our position:

Our preference is not to introduce 32-2 (i.e., neither Alt 1 or modified Alt 2), for reasons provided in earlier rounds. Though not our preference, we can accept Alt 1. We are not OK with modified Alt 2. We can also live with the following, which may address comments on not liking to combine two components in one FG in Alt 1. The PSFCH RX still needs to be implemented, so PSFCH can be used or not for performance/power savings/IUC/etc etc as desired.

Alt X: Split FG 32-2 into two sub-FGs

- *One sub-FG for support of only S-SSB reception<u>with pre-requisite of PSFCH reception</u>*
- *Another sub-FG for support of PSFCH reception with pre-requisite of S-SSB reception*

We do not expect that there should be serious concerns from the above, since cost reduction (if any) from not implementing PSFCH is not in the WID. But if there are, we have no concern with the conclusion to not introduce 32-2.

2 – vivo Communication Technology

As we commended before, from RAN1#107 FG 32-2 has already been agreed (while having FFS on whether to further split into two FGs) in R1-2112144 and sent to RAN2 in the FG list R1-212902:

Agreement

- For Rel-17 SL Rx capabilities,
  - Remove FG 32-1 from Rel-17 UE feature list
  - **FG 32-2 is kept** as “Receiving NR sidelink of PSFCH/S-SSB” as follows

In RAN1#107bis, it was concluded that There is no consensus in RAN1 on "FFS whether to split the capabilities for PSFCH and S-SSB receptions as different FGs" (R1-2200256). However, **the prior agreement is still valid**, e.g., FG 32-2 has already been agreed.

If unfortunately RAN cannot has consensus either, the consequence should be following the existing RAN1 agreement to keep FG32-2, i.e., Alt.1 (not our preference but acceptable). We cannot accept to remove the FG 32-2 (i.e., to revert the existing RAN1 agreement).

3 – Guangdong OPPO Mobile Telecom.

It seems like this discussion is stuck and sending back to RAN1 will not help either. For the sake of progress on UE feature, we can accept moderator's proposal to go with Alt 1 at late stage of this meeting.

4 – Samsung R&D Institute UK

Thanks for the discussion. For vivo's comment above, we capture the conclusion in RAN1#107bis meeting as:

Conclusion

There is no consensus in RAN1 on "FFS whether to split the capabilities for PSFCH and S-SSB receptions as different FGs"

- Remove the FFS in FG 32-2,highlight FG 32-2

Since we made the conclusion to highlight FG 32-2 again. We think that FG 32-2 was not agreed finally.

Anyway, it would be better to have FG 32-2 (Alt 1 or Modified Alt 2) in many aspects as we discussed previously. Also, we can accept either Alt 1 or Modified Alt 2.

5 – Qualcomm Incorporated

We support the moderator's original recommendation to take the modified Alt. 2, (split with pre-requisite), especially given the super majority supporting it. We note that modified Alt. 2, was already a compromise that went halfway between the two original proposals. We believe the purpose of the extended discussion with additional time was to give the company with the concerns a chance to explain to everyone how modified Alt. 2 would break the system or other reasons that would motivate a strong objection on their part, or to provide a similarly meaningful compromise proposal that goes halfway. Instead, the company proposes Alt. X, which is just a restatement of Alt.1, i.e. not a compromise at all, and now also proposes to remove the whole Feature Group, against the RAN1 agreement.

We have an objection to removing the FG and an objection to Alt. 1 after all these discussions. Again, we would like to point out that with modifying the original Alt. 2, already a significant compromise was made.

Finally, we share the view with the other commenting companies that RAN1 already agreed to support a UE that can only receive S-SSB and/or PSFCH and the only remaining issue is whether this is captured as one or two FGs, not whether this optional functionality should be captured at all. The latter option of removing the FG(s) would be against the RAN1 agreement and we do not support that.

6 – Nokia Denmark

It seems like this discussion is stuck, seems the best option is to align and agree in today's GTW

7 – Samsung Electronics Co.

(As moderator) I have to agree that further discussion on NWM is not necessary. I will report the situation to RAN during the Wednesday GTW session.

8 – MediaTek Inc.

We agree with the moderator's conclusion that discussion in GTW is necessary. We just want to add that we need to reach a decision at this plenary, and we object to taking Alt. 1 over the supermajority view at one company's insistence.