[94e-05-R18-SLEvo] - Version 0.0.9
RAN

3GPP TSG RAN Meeting #94-e RP-213531

Electronic Meeting, December 6 - 17, 2021

Source: Moderator (OPPO)

Title: Moderator's summary for discussion on [94e-05-R18-SLEvo]

Agenda item: 8.6.1

Document for: Discussion and Decision

1 Introduction

The scope and a set of feature topics for a propose project work on NR sidelink in Rel-18 was discussed in October over the RAN email reflector. Based on the email discussion outcome, a summary capturing a set of moderator's proposals is available in RP-212664 [1], and a set of corresponding WI objectives based on the moderator's proposals and justification is provided in RP-212704 [2].

In RP-213469 [3], a proposed package including detailed TU allocation for Rel-18 projects is provided and co-sourced by RAN and RAN WG chairs. In the package, detailed scope for each of the proposed Rel-18 project is also provided, and it is to be used for further discussion during this meeting. The scope is based on the Oct. email discussion, with modifications for the purpose of proper load-dimensioning, necessary clarification, etc.

For this email discussion [94e-05-R18-SLEvo], the goal is to finalize remaining details of WID objectives based on the modifications provided in RP-213469 [3], update the justification section (if necessary) and complete the remaining sections of the WID for final approval.

2 Initial round

2.1 General aspects of WID

2.1.1 Project name for Rel-18 NR sidelink

According to the draft WID at the end of October email discussion [2], the project name for the WI was "*further enhancements for NR sidelink*". Based on the proposed Rel-18 package for approval [3], the name is "*NR Sidelink Evolution*", but it is subject to further discussion / refinement. Please indicate which one of the following is preferred.

- Option 1: "*Further enhancements for NR sidelink*"
- Option 2: "*NR Sidelink Evolution*"
- Option 3: No preference

Feedback Form 1: Project name for R18 NR sidelink

1 – Qualcomm CDMA Technologies

Qualcomm input: Option 2 appears more appropriate given we are extending sidelink in many new directions beyond V2X, however we don't have a very strong view on this.

2 – Guangdong OPPO Mobile Telecom.

no strong preference, slightly prefer Option 2 for shorter name.

3 – Panasonic Corporation

We are ok with either option but slight preference to option 2 as it has more appealing impression.

4 – Samsung Electronics Romania

Either option 1 or option 2 is fine.

5 – LG Electronics Inc.

The difference between the meaning of the two words "enhancement" and "evolution" is unclear. So unless there is a critical reason to use "evolution" which has not been used much in the WIs, our preference is Option 1.

6 – DOCOMO Communications Lab.

We do not have strong preference, but our feeling is the same as LGE. "Fe" of sidelink might be better for clear difference from "E" of sidelink. Based on this, we slightly prefer Option 1.

7 – Lenovo (Beijing) Ltd

Option 2: "*NR Sidelink Evolution*" is preferred.

8 – MediaTek Inc.

Prefer Option 2: "*NR Sidelink Evolution*"

9 – Deutsche Telekom AG

Is this really something that needs to be disucssed ?

10 – ZTE Corporation

Both Option 1 and Option 2 are fine for us. The Option 1 seems more aligned with the naming convention of previous release.

11 – Ericsson LM

We prefer Option 1

12 – Intel Corporation (UK) Ltd

No strong preference. Either option is fine

13 – Huawei Tech.(UK) Co.. Ltd Option 2.
14 – NEC Corporation Option 2 is fine for us.
15 – Volkswagen AG Follow-up work items are typically called “Enhancements”, to stay consistent Option 1 is preferred
16 – ROBERT BOSCH GmbH We prefer Option 2.
17 – Apple GmbH We slightly prefer Option 2.
18 – CATT option 1
19 – Philips International B.V. Option 3: no preference
20 – Futurewei We prefer option 2 NR sidelink evolution as SL-U is a new feature in sidelink not an enhancement on an existing SL feature. But we think the project name is not very critical for the WI.
21 – Fraunhofer HHI Either option is fine, with a slight preference for option 2.

2.1.2 Section 3: Justification

Based on RAN and WG chairs co-sourced R18 package in [3] and moderator’s review of contributions submitted to this meeting in [4-15], there has been no proposal/suggestion to update the justification section, which was already discussed in October. If there is any suggestion for improvement, please provide wording(s) / description(s) in the following.

Feedback Form 2: WI justification

1 – Guangdong OPPO Mobile Telecom. no change seems necessary.

2 – Panasonic Corporation

We don't have specific proposal to update the justification.

3 – LG Electronics Inc.

The current version is okay.

4 – DOCOMO Communications Lab.

Basically fine, but corresponding update is necessary if some topic is dropped.

5 – CAICT

We are ok with the latest version.

6 – Lenovo (Beijing) Ltd

We are OK with current version.

7 – MediaTek Inc.

Ok with latest version.

8 – TELECOM ITALIA S.p.A.

This a "monster" project that cannot fit in the foreseen TUs. Justification should be reviewed on the basis of the final objectives

9 – ZTE Corporation

We are fine with the current version.

10 – Sony Group Corporation

We are OK with the current version.

11 – Intel Corporation (UK) Ltd

No specific suggestions at this stage. General observation is that WI has very diverse scope and refinement of objectives/scope is desirable.

12 – Apple GmbH

We do not have additional suggestion on improving the justification section.

13 – CATT

ok with current version

14 – Futurewei

There is one grammar error to be corrected: "For the two different type of devices" -> "For the two different types of devices"

15 – Fraunhofer HHI

We are fine with the current version.

2.1.3 Section 5: Expected output and time scale

It is expected that the following RAN TSs (core and performance parts) and TRs are to be impacted based on the existing WI scope. The corresponding target completion dates are set according to the endorsed R18 time line for RAN1/2/4. Please indicate if any missing TS(s) or TR(s) that should be additionally included in this section.

Table 1: Impacted existing TS/TR {One line per specification. Create/delete lines as needed}

TS/TR No.	Description of change	Target completion plenary#	Remarks
38.201	Introduction of further enhancements for NR sidelink	RAN#101	Core Part
38.211	Introduction of further enhancements for NR sidelink	RAN#101	Core Part
38.212	Introduction of further enhancements for NR sidelink	RAN#101	Core Part
38.213	Introduction of further enhancements for NR sidelink	RAN#101	Core Part
38.214	Introduction of further enhancements for NR sidelink	RAN#101	Core Part
38.215	Introduction of further enhancements for NR sidelink	RAN#101	Core Part
38.300	Introduction of further enhancements for NR sidelink	RAN#102	Core Part
38.304	Introduction of further enhancements for NR sidelink	RAN#102	Core Part

38.306	Introduction of further enhancements for NR sidelink	RAN#102	Core Part
38.321	Introduction of further enhancements for NR sidelink	RAN#102	Core Part
38.322	Introduction of further enhancements for NR sidelink	RAN#102	Core Part
38.323	Introduction of further enhancements for NR sidelink	RAN#102	Core Part
38.331	Introduction of further enhancements for NR sidelink	RAN#102	Core Part
38.101-1	Introduction of further enhancements for NR sidelink	RAN#102	Core Part
38.101-2	Introduction of further enhancements for NR sidelink	RAN#102	Core Part
38.101-3	Introduction of further enhancements for NR sidelink	RAN#102	Core Part
38.101-4	Introduction of further enhancements for NR sidelink	RAN#104	Performance Part
38.133	Introduction of further enhancements for NR sidelink	RAN#102	Core Part
38.133	Introduction of further enhancements for NR sidelink	RAN#104	Performance Part
37.985	Introduction of further enhancements for NR sidelink	RAN#102	Core Part

37.885	Introduction of additional evaluation methodology for SL-U and beam management	RAN#101	Core Part

Feedback Form 3: Impacted TS(s) and TR(s)

1 – Transsion Holdings

From our point of view, 37.213 should be included in the impacted Ts, and its target completion time should be RAN#101, because the channel access mechanisms of SL-U are expected to be different from that of NR-U.

2 – Guangdong OPPO Mobile Telecom.

Agree with the suggestion from Transsions to add 37.213. Need to remove 37.885 since it is no longer possible to add/modify this TR for Rel-18 due to 3GPP working procedure.

3 – Samsung Electronics Romania

37.213 should be included since there would be potential impact on channel access mechanism in sidelink.

4 – LG Electronics Inc.

We are not sure if 37.885 needs to be updated. There was a similar issue in Rel-17 about the additional simulation assumptions including the power saving aspects, and at that time MCC recommendation was not to update 37.885 which is a Rel-15 TR. So a summary of the agreed assumptions was submitted in R1-2105203 as a record. We think the same approach can be used in this WI, or as an alternative, a new TR can be created.

5 – CAICT

We also think 37.213 should be included for the channel access of SL-U.

6 – Lenovo (Beijing) Ltd

We agree that TS37.213 should be included so as to cover channel access procedure for sidelink over unlicensed spectrum.

7 – MediaTek Inc.

Support to add 37.213. The commercial use case/scenarios for SL-U could be captured separately than 37.885.

8 – TELECOM ITALIA S.p.A.

Propose to create new RAN4 specs (series 38.101 and 38.133) specific for sidelink operation

9 – ZTE Corporation

We think TS37.213 should be included.

10 – Intel Corporation (UK) Ltd

It can be checked further once study phases are completed. Current list looks good as a starting point. We have suggestion to add 37.213. We assume that this list can be updated later, if it is needed.

11 – Huawei Tech.(UK) Co.. Ltd

There may be some impacts on 37.213 as well, taking into account channel access on unlicensed band for sidelink communication.

12 – NEC Corporation

The operations of sidelink UE and gNB for SL-U may have impact on TS 37.213, and it should be included in the list.

Besides, if option 2 of the project name *"NR Sidelink Evolution"* is adopted, the "*Description of change"* field should also be modified accordingly.

13 – CATT

This can be updated once study phases are completed.

14 – Fraunhofer HHI

We support to add TS 37.213.

2.1.4 Others

Please indicate any other details(s) of the draft WID (v001 in draft folder) that need to be updated. Note that it is moderator's plan to collect supporting company names in the final round.

Feedback Form 4: Other details of WID

1 – Ericsson LM

In our view the scope of the WI is too large to be completed in one release. We have examples of this cf. SL WIs in previous (and ongoing) releases. We would be supportive of down-scoping and we think we could drop objective on SL operation in FR2 at this stage to have a successful R18 for SL.

2 – Intel Corporation (UK) Ltd

Scope reduction and/or objective refinement is desirable to reduce workload across WGs

3 – ROBERT BOSCH GmbH

We support reducing the objectives by down-scoping SL in FR2.

4 – Verizon UK Ltd

Sidelink operation on FR2 licensed spectrum has been discussed for the past two rounds of pre-RAN plenary NWM discussions and the details are well documented in RP-212503 and RP-212664. The current objectives and the very limited working scopes are outcomes of these technical discussions of all participated companies.

In addition,

1. This is **not** a "monster activity" giving the current proposed study objectives (see RP-212704) of the following:

Work is limited to the support of sidelink beam management (including initial beam-pairing, beam maintenance, and beam failure recovery) by enhancing existing sidelink CSI framework and reusing Uu beam management concepts wherever possible

2. The strong use cases and market needs of sidelink operations on FR2 licensed spectrum are listed in RP-212503

3. Sidelink support on FR2 licensed spectrum is indeed an important part of the ecosystems in terms of the device to device communications.

5 – CATT

We think the current scope is not aligned with the TU available. In fact we think the aspect of SL-U alone will need 2 TU ,therefore we prefer to postpone this part . Actually it is better to separate SL-U with other parts of the WI, since it is quite independent from other objectives.

6 – VODAFONE Group Plc

Considering the lack of market traction of sidelink and the many, many releases that 3GPP has worked on it, significant downscoping would be valuable.

2.2 WI objectives

2.2.1 Objective #1: SL carrier aggregation

1) For the proposal in [3] to start this objective only after RAN#98 (i.e., in second half of this WI), it is observed that similar idea is also proposed in [5] and [12] due to reasons that high workload is expected for the other 3 objectives during the study phase until RAN#98 and it is prefer to start the CA work at the same time considering potential FR2 and unlicensed carriers. To this end, the moderator also observed that:

- Sidelink CA is a RAN2-led objective to carry out a significant part of normative work for upper layers.
- The work during the study phase for the other 3 objectives are mainly to be carried out in RAN1 before RAN#98. Once these 3 objectives proceed into normative phase, it is expected additional specification work will be added for RAN2 after RAN#98 for these 3 objectives.
- If the SL CA objective does not start until after RAN#98 (including RAN2 part), it is expected RAN2 will be highly loaded in the second half of the WI, whereas they will be relatively relax during the first half of WI (with 1TU still allocated during 4Q 2022).
- Due to the above reasons and expected workload in RAN2, it is better to spread out the workload for RAN2 across the Rel-18 timeframe. Therefore, it is suggested to start RAN1 work on sidelink CA after RAN#98 and RAN2 should start their work in 4Q 2022 according to the TU allocation for RAN2 in [3].
- Therefore, the moderator suggests to modify the proposal in [3] as:

  "Specify mechanism to support NR sidelink CA operation based on LTE sidelink CA operation [RAN2, RAN1, RAN4] (~~This~~ *RAN1* part of the work is to be started after RAN#98)". Is it agreeable to have this modification from the moderator?

Feedback Form 5: SL carrier aggregation - objective start time

1 – vivo Communication Technology

Agree with moderator's modification (i.e., only the RAN1 part of the CA work is to be started after RAN#98). It is expected that there would not be much work in RAN2 before RAN#98 for the study phase of other objectives, while the work in RAN2 for SL CA is clear and significant. Thus, before RAN#98, it is reasonable for RAN2 to focus on the SL CA work, while RAN1 focuses on the study phase for other objectives.

2 – Qualcomm CDMA Technologies

Qualcomm input: We prefer to keep the original timeline. Having RAN2 start earlier could lead to issues in terms of operation, for example, if RAN2 has an LS for RAN1, it would have to wait until after RAN #98 for a reply.

3 – SHARP Corporation

We support Moderator's proposal given the very clear scope of the RAN2 work.

4 – Guangdong OPPO Mobile Telecom.

agree, it is important to spread out RAN2 work instead of fully concentrated in the 2nd half of WI.

5 – Panasonic Corporation

We support the update from the moderator.

6 – Nokia Denmark

We agree with starting the RAN1 part of the normative work for SL carrier aggregation only after RAN#98, so to ensure that the outcome of the FR2 and unlicensed study phase is taken into account and the FR2 and unlicensed carriers are supported in the Rel.18 SL carrier aggregation specifications.

The RAN2 part of the work can start in Q4 of 2022, as already suggested in the TU allocation plan.

We agree with the suggested text modification from the moderator.

7 – Transsion Holdings

We support the update from moderator

8 – Samsung Electronics Romania

Fine with moderator's modification

9 – LG Electronics Inc.

We think the moderator's proposal makes sense and thus support it.

10 – DOCOMO Communications Lab.

It is up to other objectives. If some objective is dropped from Rel-18 SL, CA part can/should be started with the other objectives.

11 – CAICT

We support the update from moderator.

12 – Lenovo (Beijing) Ltd

We think it is no need to delay the starting time of RAN1 work till RAN#98. Spreading RAN2 work within entire Rel-18 release is OK with us. But this does not make sense to delay the starting time of RAN1 work.

13 – MediaTek Inc.

Fine with the updates.

14 – Deutsche Telekom AG

We support the update by the moderator

15 – China Mobile E-Commerce Co.

We support the modification.

16 – Ericsson LM

We prefer to keep the original wording, given that the feature has significant impact in RAN1 as well.

17 – ZTE Corporation

We agree with the update. Considering that the NR Sidelink CA is the only objective lead by RAN2, it is suggested that RAN2 start the work earlier, i.e. Q4 of 2022 as suggested by moderator.

18 – Sony Group Corporation

We support the moderator's proposal.

19 – Intel Corporation (UK) Ltd

Intel Agree with moderator's proposal.

It seems during the first half of the Rel.18, RAN1 may look only into the study phase objectives. We prefer organizing SI, rather than WI with multiple diverse study phases.

20 – Huawei Tech.(UK) Co.. Ltd

If the other objectives remain as only "study" objectives, RAN2 TUs in 4Q 2022 (i.e. between RAN#97 and #98) will be needed for completing the overall studies in follow-up to the RAN1 work that will be finishing, so that the normative work for those objectives can be evaluated in RAN#98 based on both WGs inputs. This already gives RAN2 a lot to do in those meetings, without adding more from SL CA in the same quarter.

However, if the other objectives are "study and specify", without a conditional approach to RAN#98, then it is reasonable for all the RAN2 objectives to commence together.

21 – NEC Corporation We agree on this proposal.
22 – ROBERT BOSCH GmbH We agree to relax the work for RAN2 in SL CA.
23 – Apple GmbH In our view, the RAN1 work on this objective could start early (i.e., after RAN #95) and end early, instead of start late (i.e., after RAN #98) and end late. This is because it is expected the specification work of the other 3 objectives will be heavy in the second part of the WI. It is preferred to spread to specification work load among the whole WI, rather than placing the major work load to the second half of the WI.
24 – Philips International B.V. We agree with the proposal from the moderator
25 – Futurewei We are ok with the change to spread out the workload for RAN2.
26 – CATT We think this objectives also has significant workload in rAN1 therefore we don't' agree with the change.
27 – Fraunhofer HHI We support the moderator's proposal.

2) It is brought up in [4][9] that the work on sidelink CA is to be backward compatible to legacy UEs including both Rel-16 and Rel-17. Furthermore, it is also assumed this sidelink functionality should co-exist in the same resource pools as Rel-16/Rel-17 functionalities (e.g., no changes to reservations in SCI, etc). Therefore, it is proposed to update the first sub-bullet under the backward compatible assumption as:

"Rel-16*/Rel-17* UEs can receive Rel-18 sidelink broadcast/groupcast transmissions with CA for the carriers on which they receive and transmit the corresponding sidelink HARQ feedback."

Feedback Form 6: SL carrier aggregation - backward compatibility

1 – vivo Communication Technology We are basically fine with the addition of "Rel-17", but one question on the plural of "carrier" in the sentence (i.e.," ... transmissions with CA for the carrier**s** on which ..."). In Rel-16/17, a SL UE can only receive and transmit on a single carrier, thus it seems the "carrier" should be singular?
2 – Qualcomm CDMA Technologies **Qualcomm input:** We're ok with the update.

3 – SHARP Corporation We support Moderator's proposal. Regarding vivo's comment, we think this can be addressed by changing the sentence to "A Rel-16/Rel-17 UE can receive Rel-18 ... for the carrier on which it receives and transmits ..."
4 – Guangdong OPPO Mobile Telecom. agree, valid point.
5 – Panasonic Corporation We support the update from the moderator.
6 – Nokia Denmark We agree that Rel.17 should also be included in the backward compatibility objectives
7 – Transsion Holdings We support the update from moderator.
8 – LG Electronics Inc. Okay with this change.
9 – DOCOMO Communications Lab. OK with the update.
10 – CAICT Support
11 – Lenovo (Beijing) Ltd We are OK to add "Rel-17" for backward compatibility.
12 – MediaTek Inc. Fine for the updates.
13 – Deutsche Telekom AG ok
14 – China Mobile E-Commerce Co. We support the modification.

15 – Ericsson LM

In general, we support backward combability but we are not supportive of the change. Rel-16 is the common denominator. Any Rel-17 UE can receive Rel-16 transmissions. We want to avoid having one solution for Rel-18 to Rel-16 and another one for Rel-18 to Rel-17. If Rel-17 is mentioned it should be clarified that a common solution should be specified.

16 – ZTE Corporation

We agree in principle. But in our understanding, only groupcast can enable HARQ feedback, and only one carrier can be configured for a Rel-16/17 UE. Thus, the wording is not clear enough and the following modification is suggested:

o Rel-16/17 UE~~s~~ can receive Rel-18 sidelink broadcast/groupcast transmission(s) with CA ~~for the carriers on which they receive and transmit the corresponding sidelink HARQ feedback~~ on the carrier which is for Rel-16/17 NR sidelink transmission and reception.

17 – Sony Group Corporation

We are OK with the update.

18 – Huawei Tech.(UK) Co.. Ltd

We are generally OK with this modification, but it seems that multiple objectives are to capture backward compatibility to Rel-16/17. We think there can be a general description, like in Rel-17 WID:

"Rel-18 sidelink should be able to coexist with Rel-16/17 sidelink in the same resource pool. This does not preclude the possibility of operating Rel-18 sidelink in a dedicated resource pool"

19 – Intel Corporation (UK) Ltd

Intel Supportive. Note: this proposal may not be needed if both bullets in 3) are agreed

20 – NEC Corporation

In our views, before detailed analysis and discussion, a more general description of the backward compatibility for sidelink CA should be used. It is proposed as:

- *This feature is backward compatible in the following regards*

~~o~~ *Rel-16/Rel-17 UEs can receive Rel-18 sidelink transmissions with CA* ~~*broadcast/groupcast transmissions with CA for the carriers on which they receive and transmit the corresponding sidelink HARQ feedback*~~

21 – ROBERT BOSCH GmbH

We support adding explicitly a sentence to indicate that CA is backward compatible. The solution can be decided in the WI.

22 – Apple GmbH

We support to add "Rel-17" in the sub-bullet. Since no HARQ feedback is expected for sidelink broadcast, it is better to clarify that the corresponding sidelink HARQ feedback is for sidelink groupcast.

23 – Futurewei

In Rel-17, we have agreed to support a new type of power saving UE which can only receive PSFCH/S-SSB (type B UE). Since such new power saving UE does not receive PSSCH in the single carrier, it cannot receive the transmissions in multiple carriers. We suggest the following change

”Rel-16*/Rel-17* UEs can receive Rel-18 sidelink broadcast/groupcast transmissions with CA for the carriers on which they *are capable of receiving PSCCH/PSSCH/PSFCH/PSBCH* ~~receive and transmit the corresponding sidelink HARQ feedback~~.”

24 – Fraunhofer HHI

We are ok with the update.

25 – Volkswagen AG

As mentioned in [14] backward compatibility is important for deployments of products with long life-cycles. A clarification as proposed by the moderator seems to be appropriate.

3) In regards to the inter-UE coordination feature in Rel-17, it is proposed in [4] to clarify / add the following two bullets for the sidelink CA objective. Do you agree to add them or propose to modify these bullets?

”*- No optimizations of sidelink inter-UE coordination framework for scenarios with sidelink CA support.*”

”- Rel-16/17 UEs are expected to demodulate and decode PSCCH/PSSCH/PSFCH/PSBCH transmissions from Rel-18 UEs, subject to Rel-17 inter-UE coordination capabilities supported by UEs.”

Feedback Form 7: SL carrier aggregation - inter-UE coordination related

1 – vivo Communication Technology

We are not sure why only the inter-UE coordination feature is explicitly mentioned here. Further, we don’t think iterating the SL feature one by one is necessary or beneficial.

2 – Qualcomm CDMA Technologies

Qualcomm input: We don’t support cross-carrier inter-UE coordination operation due to impact on workload.

3 – SHARP Corporation

We don’t think the two bullets are necessary. In our understanding, anything not listed in the objectives is considered not in scope.

4 – Guangdong OPPO Mobile Telecom.

We support to add the first bullet. No strong view or need to add the second bullet, as the Rel-17 inter-UE coordination function is always subject to the UE capability between the two UEs (UE-A and UE-B).

5 – Panasonic Corporation

We support the update from the moderator.

6 – Samsung Electronics Romania

We think that it has been already clear that inter-UE coordination is not part of Rel-18 objectives. So, it is not necessary to add first/second bullets.

7 – CATT

Agreed that no need to mention inter-UE coordination specifically

8 – LG Electronics Inc.

We wonder why the inter-UE coordination is specifically considered here while not mentioning any other Rel-17 features such as power efficient resource allocation and sideling DRX. If the intention is to focus on introducing the basic SL CA features and not to consider optimizations specific to Rel-17 features, more general description would be needed like "no optimizations of Rel-17 sidelink features with sidelink CA support."

9 – Transsion Holdings

Since the inter-UE coordination operation is not in the original scope, we think it is not necessary to explicitly add these two operations to the scope.

10 – DOCOMO Communications Lab.

Our feeling is same as other companies; why only IUC is explicitly precluded is unclear. LGE's suggested text would be better.

11 – Lenovo (Beijing) Ltd

We don't agree with the two bullets. Regarding the first bullet, we think necessary optimizations for sidelink inter-UE coordination in case of Sidelink CA is needed. Regarding the second bullet, we agree with Rel-16/17 UEs can decode PSCCH/PSSCH/PSFCH/PSBCH from Rel-18 UEs. However, we are not sure why it is subject to Rel-17 IUC capability. If such capability is needed, why is Rel-16 UE mentioned in the bullet.

12 – MediaTek Inc.

OK to add the 1st bullet but no need of the 2nd bullet

13 – Deutsche Telekom AG

We do not thnik these are needed

14 – Ericsson LM

We are fine with the text except the part "*subject to Rel-17 inter-UE coordination capabilities supported by UEs*". The statement is incomplete (it misses Rel-16 UEs) and misleading. Clearly Rel-16/17 UEs not supporting inter-UE coordination will not process the corresponding signalling. There is no need to describe this. We prefer to avoid lengthy discussions about the wording.

15 – ZTE Corporation

We are fine with the intention. However, we think further optimization of inter-UE coordination is not within the Rel-18 scope. It is not necessary to explicitly mention it in WID.

16 – Sony Group Corporation

We also think these are not necessary.

17 – Huawei Tech.(UK) Co.. Ltd

Similar as for the preceding question - suggest adding general text to cover these cases.

18 – Intel Corporation (UK) Ltd

Support. The intention is to preclude inter-UE coordination enhancements for the sidelink CA case.

19 – NEC Corporation

We agree to add the first bullet "- *No optimizations of sidelink inter-UE coordination framework for scenarios with sidelink CA support.*"

20 – ROBERT BOSCH GmbH

We don't need to mention inter-UE coordination. In our understanding, what is/are not written in the WID is/are down-scoped.

21 – Apple GmbH

We support to add these two bullets to restrict the work scope.

22 – Futurewei

We are ok with the first bullet.

For the second bullet, since some power saving UEs in Rel-17 are not capable of receiving PSCCH/PSSCH, they cannot demodulate and decode PSCCH/PSSCH/PSFCH/PSBCH. We suggest the following change if it is included.

"*- Rel-16/17 UEs are expected to demodulate and decode PSCCH/PSSCH/PSFCH/PSBCH transmissions from Rel-18 UEs, subject to Rel-17* ~~*inter-UE coordination*~~ *capabilities supported by UEs*."

However, the second bullet may be redundant as it is included in the backward compatibility.

23 – Fraunhofer HHI

We do not think these additions are necessary and do not think that inter-UE coordination has to be mentioned explicitly here. We are fine to keep "Rel-16/17 UEs are expected to demodulate and decode PSCCH/PSSCH/PSFCH/PSBCH transmissions from Rel-18 UEs".

4) Please indicate other aspects relating to SL carrier aggregation here.

Feedback Form 8: SL carrier aggregation - others

1 – Guangdong OPPO Mobile Telecom. In Oct. email discussion, it was assumed that 3TUs can be allocated to the SL further enhancements item after RAN#98. During the Monday's GTW session, only 2TUs are endorsed for the WI throughout Rel-18 in RAN1. If the scope needs to be trimmed further, we suggest not to consider CA for FR2 and unlicensed band after RAN#98.
2 – Lenovo (Beijing) Ltd We suggest the objectives should clearly include cross-carrier scheduling and HARQ-ACK feedback enhancement in SL CA.
3 – Ericsson LM Our view is that it is preferrable to conclude at this time that there will not be CA for SL unlicensed and/or SL in FR2.
4 – Intel Corporation (UK) Ltd Propose to modify the following part of the objective to reduce work scope or explicitly discuss it as one of the study objectives: - ~~At least for~~ FR1 licensed spectrum and ITS band   ○ ~~Whether or not to support sidelink CA for FR2 and/or unlicensed band is to be decided in RAN#98 after the relevant studies are done~~

2.2.2 Objective #2: Sidelink operation on unlicensed spectrum

1) For the SL-U objective, the work on evaluation methodology is expected to be carried out according to the draft WID from October. In [4], it is proposed to clarify this study scope in the objective. It is also noted that there is already a complete set of evaluation methodology for NR sidelink captured in TR37.885. Therefore, the moderator proposes to clarify the evaluation methodology bullet for SL-U as:

"*Update evaluation methodology in TR37.885 for sidelink operation on unlicensed spectrum for commercial deployment scenario including for example traffic, channels models, user dropping/pairing, performance metric, as wells as coexistence aspects with incumbent technologies (e.g., Wi-Fi, LTE-U/NR-U).*"

Feedback Form 9: SL-U evaluation methodology update

1 – CableLabs The same basic fairness coexistence principle between Wi-Fi and any other coexistence access technologies, operating in unlicensed 5/6 GHz spectra, agreed upon by LAA LTE and NR-U (e.g. Load Based Equipment) should be applied to this particular type of coexistence. Also SL-U shall take into account the incumbent access technologies in 5GHz (e.g. 802.11ac/n, LAA LTE) and 6HGz (e.g. 802.11ax and NR-U).
2 – Comcast Comcast echoes Cablelabs concerns. It is important to maintain the NR-U existing channel access schemes

to avoid co-existence problems with Wi-Fi incumbents.

3 – Qualcomm CDMA Technologies

Qualcomm input: SL-U is expected to coexist with other RATs (WiFi, LTE-LAA, NR-U etc) using the same unlicensed band. However, whether we need a formal coexistence evaluation campaign may need further discussion. If the channel access mechanism reuses what was defined for NR-U or LTE-LAA, it should be convincing enough already that the coexistence with WiFi or other RATs is fair. On the other hand, if new channel access mechanism is introduced or the variation for SL-U channel access mechanism is substantially different from the LTE-LAA and NR-U, a coexistence evaluation may become necessary.

On the evaluation methodology of SL-U, if needed, consider TR37.885 is focusing on V2X use case, and the SL-U in Rel.18 may not focus on V2X, it is not clear to us if we should use 37.885 as the starting point, or we should use TR38.889 instead.

4 – Guangdong OPPO Mobile Telecom.

As indicated for the impacted specification section that it no longer possible to add/modify TR37.885, further discussion is needed on whether and how to capture the updated evaluation methodology for SL-U. One possibility is to create a new TR to capture all relevant existing contents from TR37.885 and new/updated evaluation methodology for SL-U and FR2 enhancements (beam management).

5 – vivo Communication Technology

It is good to capture the evaluation methodology, but we agree with Qualcomm that TR37.885 is for V2X. One option is to use TR38.889, and another option is to have a new TR for Rel-18 SL study phase including other objectives (e.g., FR2).

Regarding the updates of the objective, we are not sure if the examples are needed. The necessary updates of evaluation methodology can be discussed in WG. For example, as commented by Qualcomm, if it is agreed to reuse the NRU channel access mechanism, repeating the coexistence evaluation may not be needed.

6 – Nokia Denmark

The evaluation of coexistence aspects of incumbent technologies should be further limited to Wi-Fi as currently LTE-U and NR-U deployments are very few. Otherwise, no further comment.

7 – LG Electronics Inc.

As mentioned in the response on the expected outcome, we are not sure if TR 37.885 needs to be updated. We are not sure if some of the mentioned examples required, for example, a channel model is already defined for generic sidelink operations and “pairing” sounds like only unicast will be considered in the evaluation.

8 – Beijing Xiaomi Mobile Software

In TR 37.885 indoor scenario is not included, which needs to be considered for SL-U. In addition, we agree that coexistence evaluation may not be needed if NRU access mechanism is reused.

9 – Lenovo (Beijing) Ltd

We are OK with it.

10 – MediaTek Inc.

No need to consider *coexistence aspects with incumbent technologies (e.g., Wi-Fi, LTE-U/NR-U).* Because SL-U will be developed based on NR-U access mechanism which has performed extensive co-existence study.

11 – Deutsche Telekom AG

We propose to drop this entire objective, also for workload reasons.

12 – TELECOM ITALIA S.p.A.

Since there is no specific question, I will repeat the statement several times:

- we propose to drop this entire objective, also for workload reasons.

And several justification why to drop the objective:

- this is monster activity, which cannot fit in two time units
- there is no sidelink implementation with the exception of LTE-V2X
- there are already available in (most) smartphones other direct communications technologies, with much lower costs. We do not see any ecosystem to further expand sidelink

13 – ZTE Corporation

We share similar views with OPPO and vivo, it is better to have a new TR for Rel-18 SL study phase to capture the relevant evaluation methodology for all objectives.

14 – Panasonic Corporation

Our view is to reuse the channel access mechanism which was defined for NR-U or LTE-LAA. Therefore, we are not sure the need of the coexistence evaluation campaign.

15 – Huawei Tech.(UK) Co.. Ltd

OK to add to 37.885 or another method of capturing as appropriate.

16 – NEC Corporation

We agree on this proposal.

17 – Intel Corporation (UK) Ltd

Support.

In our view, it is important to clarify scope of evaluations before actual study starts, e.g. coexistence with incumbent technologies, comparison of different design options, etc. Overall, we think that this specific objective has very broad scope and scope of evaluations needs to be clarified to make study more focused.

We have the following questions to moderator/group:

- Whether and which incumbent technologies are to be considered/prioritized for co-existence studies and in which frequency bands, including co-channel and adjacent channel considerations?

- Whether evaluation methodology should assume support of SL carrier aggregation and which frequency bands should be considered for SL-U evaluation methodology?

18 – ROBERT BOSCH GmbH

In our view, it is important to reuse the channel access mechanism in NR-U, which already considers coexistence of incumbent technologies (e.g., Wi-Fi). It is very important to study coexistence with NR-U separately as coexistence mechanisms may be different.

19 – Apple GmbH

We support to clarify the scope of evaluation methodology in general.

Regarding the detail areas to study, it is unclear to us which additional "performance metric" beyond PRR and PIR is needed. On other hand, we think the "evaluation scenario" (beyond urban grid and highway) needs to be examined in consideration of commercial use cases.

20 – Philips International B.V.

We agree with the proposal from the moderator

21 – Futurewei

Since these details on the evaluation methodology will be discussed in the study phase, we do not think we need to list these items in the WID. We think the original wording is sufficient.

22 – BROADCOM CORPORATION

1. We support CableLabs and Comcast with regard to the coexistence related issues.
2. Considering the coexistence issues that need to be properly addressed for the unlicensed spectrum we do not see how this can be addressed in the small time allocation. Therefore, same as DT and TI we also propose this objective to be dropped for this Release due to workload reasons.

23 – Fraunhofer HHI

We agree with the proposals from Qualcomm and Vivo and think that this can be discussed in the WG.

2) For the work on sidelink operation in unlicensed spectrum, it is agreed to support the 5GHz and 6GHz unlicensed bands in FR1, while no specific optimizations should be applied for SL-U operation in FR2 (i.e., beamforming / beam management). However, it should be clarified the unlicensed frequency band in FR2 for which the work on SL-U is intended. To address this, it is proposed in [6][12] that the target frequency spectrum for the SL-U work should be the unlicensed 60GHz band in FR2-2. Therefore, it is proposed to clarify the target unlicensed frequency bands for SL-U operation as followed.

"Frequency bands for the unlicensed spectrum in FR1 are *n46 and n96 (i.e.,* 5GHz and 6GHz*). Frequency band for the unlicensed spectrum in FR2-2 is n263 (i.e., 60GHz).*"

Feedback Form 10: SL-U frequency bands

1 – Charter Communications

The number of proposed unlicensed bands is too high for a reasonable scope. Suggest to drop FR2.

2 – CableLabs

We note that FCC 47 CFR 15.407 (unlicensed 6 GHz) stipulates (paragraph #189), prohibits the use of 'hot-spot operation by clients' in UNII-5, 6 ,7 and 8 bands (5.925-7.125GHz). Therefore we consider band n96 shall not be included in the SL-U objectives. The same limitations govern UNII-4 (5.825-5.925GHz), therefore band n46 use for SL-U will require further discussions.

3 – Qualcomm CDMA Technologies

Qualcomm input: We support the proposal. The objective text already mentioned no optimization for FR2-2.

4 – Guangdong OPPO Mobile Telecom.

Support. In our understanding, since it is already captured in the objective there will be no specific optimization for SL operation in FR2 unlicensed spectrum, we have agreed to include FR2 in SL-U work. It needs group consensus to backtrack this agreement and common understanding.

Furthermore, the application and use of SL technology for hot spot usage is out of 3GPP domain and control. It is purely up to equipment manufacturers to produce product that does not infringe local rules/regulations, including small cell gNB for hot spot usage as in NR-U. Therefore, it band n96 and n46 are specified and supported in NR-U, the same principle applies to SL-U within 3GPP.

5 – vivo Communication Technology

We are basically fine with the proposal. Maybe it would be better to use "include" instead of "are/is" considering that the frequency bands in RAN4 are defined in a release-independent manner, e.g.:

Frequency bands for the unlicensed spectrum in FR1 *includes at least* n46 and n96 (i.e., 5GHz and 6GHz).
Frequency band for the unlicensed spectrum in FR2-2 *includes at least* n263 (i.e., 60GHz)

6 – Nokia Denmark

We agree with the explicit mentioning of the targeted frequency bands

7 – LG Electronics Inc.

We think the objective can be left generic while the specific frequency bands to support in this WI can be discussed in RAN4 based on company input. We think these specific bands can be included as examples or those to be supported at least.

8 – DOCOMO Communications Lab.

OK with this update.

9 – CAICT

Support the update.

10 – Beijing Xiaomi Mobile Software

We support the proposal.

11 – Lenovo (Beijing) Ltd

We support frequency bands for the unlicensed spectrum in FR1 are 5GHz and 6GHz.

In Rel-18, our view is to deprioritize FR2 related part including both licensed spectrum and unlicensed spectrum due to too many objectives and limited TU in Rel-18 especially considering Rel-17 sidelink progress is quite slow.

12 – Deutsche Telekom AG

Not needed as we drop the unlicensed SL from Rel-18 (see our comment above in form 9)

13 – MediaTek Inc.

Ok for clarification.

14 – Transsion Holdings

In FR2-2, 480kHz SCS and 960kHz SCS are introduced to deal with severe phase noise and maintain a reasonable FFT size in a wider bandwidth. With 120kHz SCS, the performance may be degraded. Furthermore, considering the limited TU and large number of the objectves, we prefer not to inculde the FR2-2 band for SL-U operation.

15 – TELECOM ITALIA S.p.A.

Since there is no specific question, I will repeat the statement several times:

- we propose to drop this entire objective, also for workload reasons.

And several justification why to drop the objective:

- this is monster activity, which cannot fit in two time units
- there is no sidelink implementation with the exception of LTE-V2X
- there are already available in (most) smartphones other direct communications technologies, with much lower costs. We do not see any ecosystem to further expand sidelink

16 – Ericsson LM

We think it is OK to clarify the bands for FR1. For FR2, given that there will not be optimizations, the addition of the band is not justified and should be removed.

17 – ZTE Corporation

We are fine with the clarification. Nevertheless, no specific optimizations for FR2 unlicensed spectrum.

18 – Sony Group Corporation

We are OK with the clarification.

19 – Huawei Tech.(UK) Co.. Ltd

The clarification is ok.

Note: The pre-RAN moderator WID was not agreed, nor was its content.

20 – NEC Corporation We propose that the study of SL-U in this WI should focus on the carriers in FR1 spectrum, and additional discussion for FR2 is unnecessary.
21 – Intel Corporation (UK) Ltd Considering work scope, we are not supportive of adding FR2-2 at this stage
22 – ROBERT BOSCH GmbH We suggest to focus on FR1 (sub 7 GHz) for SL-U and drop FR2.
23 – Apple GmbH Considering different regulations on unlicensed spectrum access on FR1 and FR2-2, we do not expect additional work in this release specifically for supporting SL-U on FR2-2. In other words, we think the support of unlicensed spectrum in FR2-2 should be de-prioritized. In case 3GPP starts specifying this functionality for FR2-2, then it is clear the frequency band for unlicensed spectrum in FR2-2 is n263 (57-71 GHz).
24 – Futurewei If there is no specific optimization for FR2 unlicensed then it is not necessary to specify the target unlicensed frequency bands for SL-U operation in FR-2, but also does not hurt to include.
25 – CATT This can decided after the study since now the scope is not stable yet
26 – BROADCOM CORPORATION Same as DT and TI, this is not needed as we propose SL-U to be dropped in this Release due to workload issues.
27 – Fraunhofer HHI We are ok with the modification. We would also be ok to deprioritize optimizations for FR2.
28 – Volkswagen AG Unlicensed band usage in FR1 should be the primary focus, FR2 only if time allows.
29 – CableLabs We support DT and TI to drop the unlicensed support.

3) In [12], it is proposed to further clarified the following two points to avoid confusions and ambiguity. Do you agree with the following updates?

”Study the support of sidelink on unlicensed spectrum for both mode 1 and mode 2 where Uu operation for mode 1 *and mode 2 configuration are* ~~is~~ limited to licensed spectrum only [RAN1, RAN2, RAN4]”

”~~Reuse~~ Rel-16 *and Rel-17 sidelink operation and* resource allocation mechanism*s are to be reused* ~~as much as possible~~ *as a starting point*.”

Feedback Form 11: SL-U design starting baseline

1 – Charter Communications

SL-U in FR1 (5-6 GHz) should use only the channel access schemes specified in R16 NR-U.

2 – CableLabs

Concerning the following Objective:

”Sidelink channel access mechanism for unlicensed spectrum based on regional regulation requirement and use the existing channel ~~success~~ access schemes from NR-U as a starting point”

we suggest the following changes:

”Sidelink channel access mechanism for unlicensed spectrum **where regional** regulation requirement **permits** and use the existing channel ~~success~~ access schemes **compliant with** NR-U.”

We consider these changes reflecting our above comments concerning the FCC 6 GHz hot-spot client limitations and also the compliance request with NR-U. Accordingly, we consider the SL-U channel access scheme should only use NR-U channel access schemes.

3 – Comcast

The existing schemes should be used in specific. Comcast agrees with Charter and Cablelabs comments.

4 – Qualcomm CDMA Technologies

We believe the channel access schemes for SL-U should use NR-U as baseline.

For the proposed changes:

- We don’t support the first proposed change to limit the Mode 2 configuration to licensed Uu only. Further, we think part of the study should address how Mode 2 is configured. We see standalone SL-U operation in unlicensed band as a useful deployment model. The mode 2 configuration can come from pre-configuration, some system information transmission over SL itself, or some system information transmission over Uu. If system information is transmitted over Uu, design wise, it may not matter the information is carried over a licensed carrier or unlicensed carrier.
- For resource allocation, we don’t think the SL resource allocation should be the starting point. We haven’t discussed if interlaced wavefrom is introduced or not yet, and we also need to discuss if the Rel-16 SL reservation for future retransmission should be carried over to unlicensed band operation.

5 – Guangdong OPPO Mobile Telecom.

We support. We would also like to point out the existing resource allocation mechanisms in Rel-16 and Rel-17 are not the same as channel access scheme for unlicensed spectrum and cannot be used for the purpose of gaining access to an unlicensed carrier/channel. It is already explicitly captured in the objective that the existing channel access schemes from NR-U will be used.

6 – Nokia Denmark

We agree with revised objectives. However, we would like further clarification if partial sensing, inter-UE coordination and DRX will be also assumed as part of the baseline

7 – vivo Communication Technology

- We don't support the updates to the 1st bullet. The original intention of this bullet is to reduce the work load by limiting the mode-1 operation. The proposed updates do not serve this purpose, but unnecessarily restrict the mode-2 deployment.
- We are not sure if the SL resource allocation can be reused together with the NRU channel access mechanism. If necessary we think the following clarificaiton is enough:
  "Reuse the existing sidelink operation and resource allocation mechanism as much as possible".

8 – Samsung Electronics Romania

Regarding Rel-17 sidelink operation, it is not preferable to consider "inter-UE coordination" in Rel-17 since it definitely increases work scope and is not essential feature in unlicensed bands considering limited TU budget. So, we would like to suggest second bullet as follows.

"Reuse Rel-16 resource allocation mechanisms and Rel-17 basic power saving enhancements (such as partial and random resource selection) are to be reused as much as possible as a starting point."

9 – LG Electronics Inc.

We think the first change is unnecessary as mode 2 configuration uses RRC and thus a UE having Uu connection using NR-U can still receive mode 2 configuration without any change. We may clarify the intention that no optimization will be considered for mode 2 configuration signalling transmitted in unlicensed band. We think the second change actually expands the scope even including potential enhancements to the Rel-17 features. Considering the limited time for the study and normative work in this release, we should focus on simple enablers of accessing unlicensed bands without considering optimizations such as those introduced in Rel-17 like power saving, inter-UE coordination, etc. Thus we propose not to take the second change, and actually suggest some clarification in line with what has been discussed for SL CA like "No optimizations of Rel-17 sidelink features with the unlicensed band sidelink support."

10 – Beijing Xiaomi Mobile Software

We also believe that the NR-U channel access mechanism should be reused in sidelink unlicensed, otherwise the evaluation workload could be high. However, we are fine with the current wording from the moderator. Anyway sidelink channel access needs to be discussed in the study phase.

On the proposed revisions:

1. We support the original wording as we think the standalone operation of sidelink unlicensed is important;
2. We are fine with the new version with the understanding that necessary enhancements on sidelink operation and resource allocation are not precluded.

11 – Lenovo (Beijing) Ltd

We are OK with the update.

12 – CAICT

We support the update proposal 2 and open for proposal 1.

13 – Deutsche Telekom AG

Drop

14 – Transsion Holdings

We are fine the update from moderator

15 – TELECOM ITALIA S.p.A.

Since there is no specific question, I will repeat the statement several times:

- we propose to drop this entire objective, also for workload reasons.

And several justification why to drop the objective:

- this is monster activity, which cannot fit in two time units
- there is no sidelink implementation with the exception of LTE-V2X
- there are already available in (most) smartphones other direct communications technologies, with much lower costs. We do not see any ecosystem to further expand sidelink

16 – Ericsson LM

The first change is OK.

The second change is not:

· Unlicensed operation will require significant changes to the SL specs. Adding the Rel-17 functionalities from start to SL-U just increases the complexity of the work without clear benefits.

· The amount of work of SL-U is big. Taking existing procedures as "starting point" leaves the door open for endless discussions. We think that the work should be limited to only the necessary changes.

17 – China Mobile E-Commerce Co.

We are supportive of the updates.

18 – LG Electronics Inc.

We would like to add some more technical comments on top of our earlier response #9. We think "resource allocation" and "channel access" mean different things in sidelink. Resource allocation is a procedure to determine the resource to be used for transmission by the sidelink grant. This sidelink grant comes from gNB in mode 1 and created in the UE in mode 2. So it is even possible that the resource allocation is the same in ITS/licensed carriers and unlicensed carriers while there may be some rooms to enhance the resource allocation for unlicensed band operations, which is also allowed in the original wording in our understanding. Also in our understanding, channel access means a procedure of checking whether a certain sidelink grant can be used for the actual transmission. This additional checking procedure will be necessary for unlicensed bands and can be made based on NR-U. With this understanding, we think the original wording needs to be kept.

19 – ZTE Corporation

We are fine with the updates.

20 – Sony Group Corporation

We are OK with the updates.

21 – Huawei Tech.(UK) Co.. Ltd

There is a typo in this header of 4), it should be "unlicensed" instead of "licensed".

The current WID seems to suggest a study-only objective, thus needs to clarify this is WI with a study phase. The Uu configuration by RRC of mode 2 should be also limited to licensed spectrum. Thus we suggest to modify as follows:

Update the objective 2 as: Study ***and specify*** the support of sidelink on unlicensed spectrum for both mode 1 and mode 2 where Uu operation for mode 1 ***and the RRC configuration of mode 2 are*** limited to licensed spectrum only [RAN1, RAN2, RAN4]

22 – NEC Corporation

For the case that gNB schedules sidelink UE through licensed spectrum to allocate sidelink transmission in unlicensed spectrum, it means that different carriers are used on Uu and PC5, and it introduces additional problems, including cross-carrier measurement and scheduling, multi-carrier operation, etc.

Considering that, we propose to modify the description as follow:

Study the support of sidelink on unlicensed spectrum for both mode 1 and mode 2 where Uu operation for mode 1 is limited to ***the case that Uu and PC5 of the UE using the same unlicensed spectrum*** ~~*licensed spectrum only.*~~

23 – Intel Corporation (UK) Ltd

Supportive for R.16.

Not supportive for R.17, since it may be interpreted as the intention to optimize/enhance inter-UE coordination framework for SL-U.

24 – ROBERT BOSCH GmbH

In the first sentence, we want to clarify that the intention is not exclude private NPN bands; however, it is more a Uu licensed operation and not only licensed spectrum.

Nevertheless, we believe that Uu SL-grants and/or configuration can also be done under NR-U coverage. However, we may need to clarify that there will be no optimization for NR-U operation.

25 – Apple GmbH

We support the second bullet (which is aligned with our proposal in [7]). For the first bullet, we support the addition of "mode 2 configuration", but do not understand why we should limit it to "licensed spectrum only"? We do not see large specification efforts to extend the Uu operation to "unlicensed spectrum".

26 – Futurewei

For the first update, we prefer not to include mode 2 configuration limited to licensed spectrum only.

For the second updates, we are ok to also include Rel-17 mechanisms. However, since Rel-17 UE may not support any feature in Rel-16, we suggest the following updates based on original text.

"Reuse Rel-16 *and Rel-17 sidelink operation and* resource allocation mechanisms as much as possible"

27 – Fraunhofer HHI

We do not think the update in the first proposal is required. We are fine with the second modification.

28 – BROADCOM CORPORATION

1. As we indicated earlier we believe that the whole feature SL-U should be dropped in this Release.
2. We also agree with Charter and CableLabs that if it is to be done, SL-U in 5-6 GHz should use only the channel access schemes specified in R16 NR-U.

29 – CATT

First bullet : change is OK.

Second bullet: we don't agree. Prefer the following " Existing sidelink mechanism should be reused reused unless change is justified"

4) Please indicate other aspects relating to SL operation on licensed spectrum here.

Feedback Form 12: SL-U others

1 – CableLabs

The actual SL objective is comprised of 4 sub-objectives. 3 out of these 4sub-objectives specifically require to study different SL Rel 18 aspects. Therefore, we suggest this item to have two stages: a SI and a WI, taking into account the SI recommendations. At the very least the unlicensed coexistence part should require a separated study item.

2 – Comcast

Comcast supports the study of the co-existence for NR-U in the sidelink with Wi-Fi incumbents, but it is important to re-use existing channel access and to understand the implication on the Wi-Fi users, we should avoid causing problems with the existing WiFi users. Comcast also supports comment and proposal from cable labs to have a staged approach for this study, again we start with existing framework, and study impacts in existing users to avoid major impact to existing services.

3 – Samsung Electronics Romania

We have a general comment on following sentence in draft WID for FR2 operation in SL-U.

- No specific optimizations for FR2 unlicensed spectrum

"No specific optimizations" seems a vague wording, and may not be very proper for a WID since generic like enhancement should be avoid as much as possible from RAN chair guidance. So, if we don't have any clarification, it can be expected that different companies may have different criteria on defining "optimization", and it will be a waste of time in the RAN1 meeting on clarifying this issue. So, it is better to make it clear early. We would like to suggest following update as follows in order to avoid potential ambiguity.

- No specific **enhancements** for FR2 unlicensed spectrum

4 – CATT

In Oct. email discussion, it was assumed that 3TUs can be allocated to the SL further enhancements item after RAN#98. Now only 2TUs are endorsed for the WI throughout Rel-18 in RAN1. To be honest, the SL-U portion alone will take 2 TU. we believe this part should be postponed.

5 – DOCOMO Communications Lab.

Our view is similar to CATT. SL-U is a quite big topic. At least either SL-U or FR2 should be dropped from Rel-18 SL.

6 – Beijing Xiaomi Mobile Software

In contribution RP-213199 we together with other companies proposed to add a note in the Release 18 sidelink enhancement WID to clarify that **sidelink positioning/ranging signal in unlicensed spectrum should be considered in the design, after SL positioning and ranging in the positioning WI has progressed with the design of the signal.** However, this contribution is not included in moderator's references. We hope the issue can be discussed in the next round.

7 – Lenovo (Beijing) Ltd

We suggest deprioritizing FR2 in Rel-18 SL.

8 – MediaTek Inc.

it is important to keep existing structure rather than more discussion on down-scoping or changes on the objectives due to the huge effort in the early meetings for the outcome. Instead, we can focus on the details of each objective for reasonable scoping in constructive way.

9 – TELECOM ITALIA S.p.A.

To Mediatek: a lot of concern were raised in October and ignored. We cannot agree with the sentence: *the huge effort in the early meetings for the outcome*.

Ignoring comments is not a ”huge effort”

We completely share the statement from CATT.

And finally, let me repeat the ”usual” text:

Since there is no specific question, I will repeat the statement several times:

- we propose to drop this entire objective, also for workload reasons.

And several justification why to drop the objective:

- this is monster activity, which cannot fit in two time units
- there is no sidelink implementation with the exception of LTE-V2X
- there are already available in (most) smartphones other direct communications technologies, with much lower costs. We do not see any ecosystem to further expand sidelink

10 – Ericsson LM

We think it is preferrable to restrict the work to a single channel (20 MHz). Extensions can be considered in a later release.

11 – China Mobile E-Commerce Co.

We are supportive of enhancing SL-U as majority views want it.

At the same time, we share similar views as CATT and DCM that the current sidelink scope is far beyond the workload within 2 TUs, and we should keep in mind and try limit the specification work under each objective as much as possible.

12 – Intel Corporation (UK) Ltd

Objective is rather big. More details are needed in terms of evaluation scope. We suggest refining objective for SL-U studies by precluding FR2-unlicensed, support of sidelink CA for SL-U, inter-UE coordination, resource allocation for sidelink power saving as well as clarify scope of co-existence studies. Consider having study item rather than study phase.

13 – Philips International B.V.

Agree with Xiaomi to add a note that sidelink positioning/ranging signal in unlicensed spectrum should be considered in the design

14 – Apple GmbH

We need to clarify the timeline of the study phase for this objective.

2.2.3 Objective #3: Sidelink enhancement for FR2 licensed spectrum

1) The work to support beam management for sidelink operation has never been studied before. It is proposed in [4] that the existing evaluation methodology for NR sidelink should also be updated or re-defined. Therefore, it is proposed to add the following evaluation methodology work for sidelink enhancement in FR2.

"*Update evaluation methodology in TR37.885 for commercial deployment scenario(s) including for example traffic, channels models, user dropping/pairing, performance metric and etc for the study of sidelink communication with beam management in FR2 licensed spectrum.*"

Feedback Form 13: SL beam management in FR2 - evaluation methodology update

1 – Qualcomm CDMA Technologies

Qualcomm input: Evaluation methodology was updated in Rel-17 for power savings without a corresponding update to the TR. That said, we accept the change if it's the majority view.

2 – Guangdong OPPO Mobile Telecom.

Similar handling as proposed for SL-U, a new Rel-18 TR could be created to capture all relevant evaluation methodology details for both SL-U and FR2 enhancements.

3 – Nokia Denmark

We agree with the revised text

4 – vivo Communication Technology

It is good to capture the evaluation methodology. We are OK to have a new TR for Rel-18 SL study phase including evaluation methodology updates for FR2.

5 – LG Electronics Inc.

As mentioned in the response on the expected outcome, we are not sure if TR 37.885 needs to be updated. We are not sure if some of the mentioned examples required, for example, a channel model is already defined for generic sidelink operations and "pairing" sounds like only unicast will be considered in the evaluation.

6 – Lenovo (Beijing) Ltd

As mentioned above, our view is to deprioritize FR2 related part including both licensed spectrum and unlicensed spectrum in Rel-18 due to too many objectives and limited TU in Rel-18 especially considering Rel-17 sidelink progress is quite slow.

7 – Deutsche Telekom AG

Drop

8 – MediaTek Inc.

37.885 may not be a right place to capture it. And it is better to capture SL-U and SL FR2 evaluation methodology in the same place since the traffic and deployment scenarios of the commercial use cases for evaluation are regardless of the spectrum (unlicensed or FR2).

9 – TELECOM ITALIA S.p.A.

Since there is no specific question, I will repeat the statement several times:

- we propose to drop this entire objective, also for workload reasons.

And several justification why to drop the objective:

- this is monster activity, which cannot fit in two time units
- there is no sidelink implementation with the exception of LTE-V2X
- there are already available in (most) smartphones other direct communications technologies, with much lower costs. We do not see any ecosystem to further expand sidelink

10 – Ericsson LM

We are OK but please note our comment earlier regarding inclusion of the FR2 objective.

11 – ZTE Corporation

We are fine with the update.

12 – Huawei Tech.(UK) Co.. Ltd

Ok to be reflected in 37.885, or elsewhere as appropriate.

13 – NEC Corporation

We agree on this proposal.

14 – Intel Corporation (UK) Ltd

Support. Up to date, RAN1 had very limited discussion on sidelink evaluation methodology for FR2 communication in application to commercial use cases. Sidelink evaluation methodologies so far were mainly determined by PS and V2X use cases and performance analysis was primarily done for FR1.

15 – ROBERT BOSCH GmbH

We are fine to down-scope FR2.

16 – Verizon UK Ltd

Sidelink operation on FR2 licensed spectrum has been discussed for the past two rounds of pre-RAN plenary NWM discussions and the details are well documented in RP-212503 and RP-212664. The current objectives and the very limited working scopes are outcomes of these technical discussions of all participated companies.

In addition,

1. This is **not** a "monster activity" giving the current proposed study objectives (see RP-212704) of the following:

Work is limited to the support of sidelink beam management (including initial beam-pairing, beam maintenance, and beam failure recovery) by enhancing existing sidelink CSI framework and reusing Uu beam management concepts wherever possible

2. The strong use cases and market needs of sidelink operations on FR2 licensed spectrum are listed in RP-212503

3. Sidelink support on FR2 licensed spectrum is indeed an important part of the ecosystems in terms of the device to device communications.

17 – Apple GmbH

We support to clarify the scope of evaluation methodology in general.

Regarding the detail areas to study, it is unclear to us which additional "performance metric" beyond PRR and PIR is needed. On other hand, we think the "evaluation scenario" needs to be examined in consideration of new frequency band.

18 – Futurewei

We are ok to include a subbullet on the evaluation methodology. However, the details on the evaluation methodology will be discussed in the study phase, we do not think we need to list these items in the WID. We proposed the following wording on the evaluation methodology.

"*-Evaluation methodology for sidelink communication with beam management and CSI enhancement in FR2 licensed spectrum*"

19 – CATT

At this stage it is not clear if all the examples listed will be update therefore we prefer removing those

20 – Fraunhofer HHI

We are ok to reflect proposed changes in 37.885 if this is the majority view.

2) The existing sidelink CSI framework introduced in Rel-16 supports unicast communication only. It is proposed in [4][13] to clarify the beam management support in FR2 licensed spectrum is applicable for sidelink unicast operation only. Therefore, it is proposed to update the objective by adding this as followed.

”*- Beam management support in FR2 licensed spectrum is applicable for sidelink unicast communication only*”

Feedback Form 14: SL beam management in FR2 for unicast

1 – Qualcomm CDMA Technologies

Qualcomm input: As we have pointed out previously, the scope for FR2 beam management cannot be limited only to extending of existing SL CSI framework, and must encompass initial beam-pairing, beam maintenance, and beam failure recovery. These may naturally involve signals that are not purely unicast, e.g., initial beam-pairing signals may be transmitted by one UE and received by many other UEs. Thus, there is no need to limit the scope to unicast only.

2 – Guangdong OPPO Mobile Telecom.

We support the clarification. As mentioned earlier, it is now only 2TUs are endorsed for this WI. It is important to limit this work within a feasible scope for unicast only.

3 – Nokia Denmark

We agree with the revision in scope

4 – vivo Communication Technology

We don’t think this update is necessary or beneficial. The meaning of ”applicable for sidelink unicast communication only” is not clear, and may (incorrectly) imply that beam management should not be applied during SL discovery and initial setup phase of unicast PC5 link. On the other hand, the objective already has the text of ”*by enhancing existing sidelink CSI framework*”, which should be enough as we don’t have SL CSI framework for groupcast or broadcast.

5 – Samsung Electronics Romania

Fine with moderator’s suggestion

6 – LG Electronics Inc.

We think the proposed update was the intention in the previous discussions thus support it for clarification.

7 – DOCOMO Communications Lab.

S-SSB TX/RX might also require beam-related operation, we are not sure whether only unicast is OK or not.

8 – Lenovo (Beijing) Ltd

As mentioned above, our view is to deprioritize FR2 related part including both licensed spectrum and unlicensed spectrum in Rel-18 due to too many objectives and limited TU in Rel-18 especially considering Rel-17 sidelink progress is quite slow.

9 – Deutsche Telekom AG

Drop

10 – MediaTek Inc.

Support the change for unicast only FR2 beam management.

11 – Transsion Holdings

We support the update from moderator.

12 – TELECOM ITALIA S.p.A.

Since there is no specific question, I will repeat the statement several times:

- we propose to drop this entire objective, also for workload reasons.

And several justification why to drop the objective:

- this is monster activity, which cannot fit in two time units
- there is no sidelink implementation with the exception of LTE-V2X
- there are already available in (most) smartphones other direct communications technologies, with much lower costs. We do not see any ecosystem to further expand sidelink

13 – Ericsson LM

We are OK with the clarification.

14 – China Mobile E-Commerce Co.

As the current objective says that the enhancement is based on existing sidelink CSI framework, which is applicable for unicast communication, and therefore the update seems not necessary.

We share similar views as QC and vivo that the update may bring further ambiguity of precluding beam management enhancement during initial setup phase of establishing PC5 RRC link.

15 – ZTE Corporation

We support the update. Considering the WID scope and TU assignment, we think the study scope of SL FR2 should be more focused. Considering the three kinds of sidelink communication type, broadcast, groupcast and unicast, we think we should focus on only unicast communication in Rel-18.

16 – Sony Group Corporation

We are OK with the updates.

17 – Huawei Tech.(UK) Co.. Ltd Not needed. This belongs to WG-level study, and RAN or RAN WGs can determine at a appropriate time based on the outcome of such study.
18 – NEC Corporation We agree on this proposal.
19 – Intel Corporation (UK) Ltd Support. Limiting the scope of work (i.e. targeting sidelink unicast communication only) facilitates workload reduction.
20 – Apple GmbH We support to restrict the work scope to only sidelink unicast.
21 – Futurewei Since we will enhance the existing sidelink CSI framework, it is not necessary to limit the beam management to sidelink unicast communication only.
22 – CATT Ok with the proposal
23 – Fraunhofer HHI We do not think that this addition is necessary. We agree with Qualcomm's clarification.

3) Please indicate other aspects relating to SL enhancement for FR2 licensed spectrum here.

Feedback Form 15: SL beam management in FR2 - others

1 – Samsung Electronics Romania It should clarify whether FR2 includes FR2-2 or not. Given we have limited TU, we would like to suggest updating "FR2 except FR2-2" in the objective.
2 – DOCOMO Communications Lab. Currently SL objectives are quite large. At least either SL-U or FR2 should be dropped from Rel-18 SL. We think their motivation is same. Either should be fine.
3 – Deutsche Telekom AG There is no commercial interest in SL operation in licensed spectrum. Neither in FR1 nor in FR2.
4 – TELECOM ITALIA S.p.A. Fully support DT statement. and let my add the "usual" statement: Since there is no specific question, I will repeat the statement several times:

- we propose to drop this entire objective, also for workload reasons.

And several justification why to drop the objective:

- this is monster activity, which cannot fit in two time units
- there is no sidelink implementation with the exception of LTE-V2X
- there are already available in (most) smartphones other direct communications technologies, with much lower costs. We do not see any ecosystem to further expand sidelink

5 – Ericsson LM

We think that the scope for this WI is huge and, as stated earlier, we would like to consider dropping this objective to keep the workload for Rel-18 manageable.

Besides this, our view is that it is preferrable to conclude at this time that there will not be FR2 support for SL-CA and/or for SL unlicensed.

6 – Huawei Tech.(UK) Co.. Ltd

The current WID seems to suggest a study-only objective, thus needs to clarify this is WI with a study phase.

Update the objective 3 as: Study ***and specify*** enhanced sidelink operation on FR2 licensed spectrum [RAN1, RAN2, RAN4]

- **(… …)**

7 – Nokia Denmark

Proposed **change**:

3. Study enhanced sidelink operation on FR2 licensed spectrum [RAN1, RAN2, RAN4]
- Work is limited to the support of sidelink beam management (including initial beam-pairing, beam maintenance, and beam failure recovery) by enhancing existing sidelink CSI framework and reusing Uu beam management concepts wherever possible, ***as well as any necessary resource allocation enhancements related to sidelink beamforming.***

8 – Apple GmbH

We need to clarify the timeline of the study phase for this objective.

9 – Verizon UK Ltd

The scope of sidelink operations on FR2 licensed spectrum has been well discussed and companies provided detailed technical analysis and proposals and made compromises from all aspects to reduce it to the current very limited and reasonable scope, which should be respected.

2.2.4 Objective #4: Co-channel coexistence between LTE-V & NR-V

1) In [4][6][14], the necessity of this work / objective was discussed. However, the outcome of Oct. email discussion was clear that a study of this co-channel coexistence issue should be first carried out to determine the necessity to define a solution. Therefore, the moderator proposes not to make any changes in this regard.

Feedback Form 16: Co-channel coexistence - study the necessity

1 – Qualcomm CDMA Technologies **Qualcomm input:** We also highlighted the importance of this objective in our contribution. We support explicitly adding a "specify" part to the WID objective; however, we would accept the current draft WID wording at this stage.
2 – Guangdong OPPO Mobile Telecom. agree with the moderator. No change is needed.
3 – Panasonic Corporation We agree the view from the moderator.
4 – Nokia Denmark Agree with the proposed way forward
5 – vivo Communication Technology We agree that no change is needed.
6 – Samsung Electronics Romania Agree with moderator's proposal.
7 – LG Electronics Inc. We support the moderator's proposal of not changing the WID in this regard.
8 – DOCOMO Communications Lab. Agree.
9 – Lenovo (Beijing) Ltd Agree with no change to current WID.
10 – CAICT Support moderator's proposal.
11 – Deutsche Telekom AG This has been requested by 5GAA in their contribution to the Rel-18 WS earlier this year and should be considered as the ONLY objective in addition to SL CA (Objetcive #1)

12 – MediaTek Inc.

support moderator's proposal.

13 – Transsion Holdings

We are fine with moderator's proposal.

14 – TELECOM ITALIA S.p.A.

This is the main key objective of the entire activity. All the remaining objectives should be dropped

15 – Ericsson LM

Agree with moderator

16 – China Mobile E-Commerce Co.

We support moderator's proposal that no change is needed.

17 – ZTE Corporation

We are fine with moderator's suggestion.

18 – Huawei Tech.(UK) Co.. Ltd

Agree. The study is needed on performance, necessity, feasibility, and potential specification impact if any before specifying it in Rel-18.

19 – Intel Corporation (UK) Ltd

Prefer to remove the wording "necessity" as it is somewhat misleading for study. The necessity to define a solution can be drawn as a conclusion of the study based on available performance data. We can accept current wording if majority of companies are fine with it.

20 – ROBERT BOSCH GmbH

We agree with the moderator.

21 – Philips International B.V.

Agree with moderator

22 – Apple GmbH

We are fine to keep the objective unchanged.

23 – Futurewei

We support moderator's proposal.

24 – CATT

The Oct WID is only a proposal , not a consensus from the discussion. For this objectives we don't think study phase is needed.

25 – Fraunhofer HHI

Agree with the moderator's proposal.

26 – VODAFONE Group Plc

This is the key objective of the entire R18 sidelink activity. All the other objectives can be dropped.

27 – Volkswagen AG

It was outlined by multiple contributions that a clear framework for NR sidelink deployments is needed by the industry. Therefore LTE sidelink and NR sidelink co-channel coexistence should be studied and specified within Rel-18. This should be clearly stated in the WID.

2) In [4], it is further proposed to "*define reference and coexistence deployment scenario(s) for evaluation of LTE and NR sidelink performance w/ and w/o co-channel coexistence mechanisms*". Do you agree to capture this as a sub-bullet under this objective?

Feedback Form 17: Co-channel coexistence - further clarification for the study

1 – Qualcomm CDMA Technologies

Qualcomm input: We assume that evaluation scenarios would need to be discussed whether this text is present in the objective or not. Therefore, we don't have a strong view either way.

2 – Guangdong OPPO Mobile Telecom.

Not essential to capture this in the objective, as the deployment aspect needs to be discussed during the study anyway.

3 – Panasonic Corporation

We agree the view from the moderator.

4 – Nokia Denmark

Agree the proposed text

5 – vivo Communication Technology

We think the deployment scenarios are necessary for evaluation. We are open to this proposal.

6 – LG Electronics Inc.

We are not sure if an explicit sub-bullet is necessary because depending on the WG discussion outcome, it may be possible to agree a relatively simple coexistence enabler. As the objective is already defined for study in various aspects, WGs can build evaluation assumptions as necessary on top of the existing V2X evaluation methodology. For the proposed wording, we are not sure what "define reference" means.

7 – Samsung Electronics Romania

We think that this should be part of relevant working group's study. So, it is not necessary to specify this bullet under the objective considering description level of other bullets.

8 – DOCOMO Communications Lab.

No need to add this bullet in this stage.

9 – Lenovo (Beijing) Ltd

We are OK to define reference and coexistence deployment scenarios if it helps to make the objective clearer.

10 – Deutsche Telekom AG

We think this is only relevant for the automotive UC and should be solely studied for this in the ITS bands. 5GAA might give additional guidance.-

11 – MediaTek Inc.

It can be up to WG discussion with no need to add it in the objective.

12 – TELECOM ITALIA S.p.A.

Support DT

13 – ZTE Corporation

It is not necessary to include this as sub-bullet.

14 – Huawei Tech.(UK) Co.. Ltd

Not needed. This belongs to WG-level discussion on how to study the scenarios, solutions, etc.

15 – Intel Corporation (UK) Ltd

Support. Evaluation methodology and scenarios for this objective should be discussed and agreed. It is unclear how to perform coexistence analysis and performance assessment w/o definition of harmonized scenario(s) for evaluation. This is additional WG effort, that should be reflected in WI and captured.

16 – ROBERT BOSCH GmbH

This should be at least conducted for ITS bands.

17 – Philips International B.V.

Agree with the addition by the moderator

18 – Apple GmbH

We are fine to add the sub-bullet to specify the details of study scope.

19 – Futurewei

The in-device coexistence supported in Rel-16 can be the reference and the deployment scenarios can be discussed during the study phase. We do not think it is necessary to include these details in the objective.

20 – CATT There is no need for this change
21 – Fraunhofer HHI We do not think this clarification is required. This will be discussed in the WG anyways.
22 – Volkswagen AG It is assumed that an assessment of the relevant deployment scenarios for LTE sidelink and NR sidelink co-channel coexistence is part of the study phase. No need to add the proposed sub-bullet.

3) Please indicate other aspects relating to co-channel coexistence for LTE/NR-V2X here.

Feedback Form 18: Co-channel coexistence - others

2.2.5 RAN4 core part related objectives

Currently, it is clear that normative work for the SL carrier aggregation objective is to be carried out in this WI. For other objectives with a study phase, the exact scope and details are to be determined in RAN#98. The moderator propose it is cleaner to group RF and RRM related objectives that are common across new features together, similar to Rel-17 sidelink WID, as followed.

5. Support of new sidelink frequency bands for single-carrier operation and frequency band combinations for carrier aggregation operation [RAN4]

- *The exact frequency bands for both licensed and ITS-dedicated spectrum in FR1 and FR2 are to be determined based on company input during the WI.*
- *The exact frequency band combinations for both licensed and ITS-dedicated spectrum in FR1 are to be determined based on company input during the WI.*
- *Support of new sidelink frequency bands and band combinations should ensure coexistence between sidelink and Uu interface in the same and adjacent channels in licensed spectrum.*

6. UE Tx and Rx RF requirement for the new features introduced in this WI [RAN4]

7. UE RRM core requirement for the new features introduced in this WI [RAN4]

Feedback Form 19: RAN4 objectives - core part

1 – Qualcomm CDMA Technologies **Qualcomm input:** We don't understand why the first sub-bullet on frequency-bands includes both FR1 and FR2 whereas the second sub-bullet on band combinations only includes FR1. The second sub-bullet should also include FR2, like the first one.

2 – Guangdong OPPO Mobile Telecom.

agree

3 – vivo Communication Technology

We are generally fine with these proposals, assuming that we may have to update the RAN4 parts of work later.

4 – LG Electronics Inc.

Objective 5 seems to miss unlicensed spectrum in the first sub-bullet.

In Objective 6, it needs to clarify "UE Tx and Rx RF requirement for the new features introduced in this WI for the frequency bands and band combinations supported in Objective 5."

5 – Samsung Electronics Romania

Fine with moderator's proposal.

6 – Deutsche Telekom AG

What is this objective about ?

Earlier in the SL discussion DT and TIM already asked about the intended frequenvcy bands and there was no answer provided. There are no "*new sidelink frequency bands*" .. (especially not for ITS)

We do not think that this objective is needed. If it can be added later once the work progressed.

7 – TELECOM ITALIA S.p.A.

Several comments

The sentence

Support of new sidelink frequency bands for single-carrier operation and frequency band combinations for carrier aggregation operation [RAN4]

is not clear. As mentioned by DT there are no new SL bands.

I suppose the intention is to list unlicensed bands and licensed bands when doing CA, but it should be clarified.

The impact on RAN4 is clearly huge and we cannot accept to arrive at the end of the release and hijack a large amount of RAN4 capacity

Clearly the WI scope needs to be reduced (drop objectives #2 and #3)

8 – MediaTek Inc.

Fine with the proposals from the moderator.

9 – Ericsson LM

We think it would be good to include the unlicensed band also in sub-bullet, as the band is listed in previous objective (n46 and n96 in FR1 and n263 in FR2-2). If it is also OK to decide exact unlicensed band based on company input (which unlicensed bands should be prioritized), the sub-bullet could be modified:

- *The exact frequency bands for both licensed, **unlicensed** and ITS-dedicated spectrum in FR1 and FR2 are to be determined based on company input during the WI.*
- *The exact frequency band combinations for both licensed, **unlicensed** and ITS-dedicated spectrum in FR1 are to be determined based on company input during the WI.*

10 – ZTE Corporation

We are fine with the proposal.

11 – Huawei Tech.(UK) Co.. Ltd

OK

12 – Intel Corporation (UK) Ltd

For objective #5, clarify that sidelink carrier aggregation is limited to FR1 licensed spectrum and ITS band, similar to objective #1.

Supportive of objective #6 and #7.

The exact RAN4 scope can be decided later based on outcome of the study / study phases

13 – HuaWei Technologies Co.

RAN4 Chair: Many thanks for moderator to group all the RAN4 normative work on RF, RRM core requirements in one place. For band and band combinations, it would be better to decide the example bands and band combinations from the beginning to have clear scope for RAN4. And other bands and band combinations can be introduced in release independent way in future release.

14 – Futurewei

We are ok to include the proposed bullets for RAN4 core part objectives.

15 – CATT

The sub-bullet for #5 should be removed and put as a note since these are not actual objectives

2.2.6 RAN4 performance part related objectives

In the latest draft WID (v001 in draft inbox), RAN4 performance part of WI objective is not yet included. The moderator proposes to include the following text/paragraph in Section 4.2 of WID. Please indicate if any other RAN4 performance part is missing.

Specify the following requirements [RAN4]

- UE demodulation performance requirements
- UE RRM performance requirements

Feedback Form 20: RAN4 objectives - performance part

1 – Guangdong OPPO Mobile Telecom. agree
2 – vivo Communication Technology We are generally fine with these proposals, assuming that we may have to update the RAN4 parts of work later.
3 – LG Electronics Inc. Okay with the proposed objectives
4 – Samsung Electronics Romania Fine with moderator's proposal.
5 – TELECOM ITALIA S.p.A. agree, but again it is too vague and the impact of this monster activity could take a lot of resources in RAN4 - and this is not acceptable. Clearly the overall WI scope needs to be reduced (drop objectives #2 and #3)
6 – MediaTek Inc. Fine with the proposals from the moderator.
7 – Ericsson LM We are OK with the proposals from moderator.
8 – Huawei Tech.(UK) Co.. Ltd OK
9 – Intel Corporation (UK) Ltd Supportive
10 – Futurewei We are ok to include the proposed bullets for RAN4 performance objective. Since if SL enhancement in FR2 is agreed to support in RAN#98, UE CSI performance requirement will be needed as CSI enhancement in FR2 is to specified, we propose to also include the following subbullet - UE CSI performance requirements if RAN determines to have a specification support on enhanced sidelink operation on FR2 licensed spectrum in RAN#98
11 – CATT Ok with the original proposal

2.3 Summary of initial round and proposals

2.3.1 General aspects of WID / justification section

Project name:

- Option 1: “Further enhancements for NR sidelink” (LGE, DCM, E///, VW, CATT)
- Option 2: “NR sidelink evolution” (QC, OPPO, Panasonic, Lenovo, MediaTek, Huawei, NEC, BOSCH, Apple, Futurewei, Fraunhofer)
- Option 3: No preference (Samsung, DT, ZTE, Intel, Philips)

Justification section: No change is necessary at the moment. If one or more objective(s) is added/removed, the justification should be updated accordingly.

Expected output and time scale:

- TS37.213 should be added for channel access scheme
- TR37.885 should be removed since it is no longer maintained by MCC. Summary of new / updated evaluation methodologies for SL-U and FR2 enhancements can be captured in a Tdoc as a record (same as Rel-17) or in a new TR.
- The description filed should be updated if WI name follows Option 2 in the above.

Others:

- Scope reduction by dropping Objective 3
- Scope reduction by dropping Objective 2 and 3
- Scope reduction by dropping Objective 1, 2 and 3

2.3.2 WI Objectives

2.3.2.1 SL carrier aggregation

- Objective start timing
    - Only RAN1 part to start after RAN#98: vivo, Sharp, OPPO, Panasonic, Nokia, Transsion, Samsung, LGE, CAICT, MediaTek, DT, CMCC, ZTE, Sony, Intel, Huawei (study and specify in other objective), NEC, BOSCH, Philips, Futurewei, Fraunhofer
    - Objective to start after RAN#98: QC (due to LS), E///, CATT
    - No delay start: Lenovo, Apple
- Backward compatibility

    - OK: vivo (single carrier), QC, Sharp (wording update), OPPO, Panasonic, Nokia, Transsion, LGE, DCM, CAICT, Lenovo, MediaTek, DT, CMCC, E/// (a common solution), ZTE (HARQ feedback only for GC), Sony, Huawei (use R17 note), Intel, NEC, BOSCH, Apple, Futurewei, Fraunhofer, VW

- Inter-UE coordination
    - Support bullet 1: OPPO, Panasonic, MediaTek, Intel, NEC, Apple, Futurewei
    - Support bullet 2: Panasonic, Intel, Apple
    - They are not needed: vivo, QC, Sharp, Samsung, CATT, LGE (general description), Transsion, DCM (general description), Lenovo, DT, Ericsson, ZTE, Sony, Huawei (general description), BOSCH, Fraunhofer

- Others
    - Remove CA and FR2 unlicensed bands from the scope after RAN#98 (OPPO, E///, Intel)
    - Add cross-carrier scheduling and HARQ feedback enhancement (Lenovo)
    - Drop entire objective for SL CA: Telecom Italia, Vodafone

2.3.2.2 SL operation in unlicensed spectrum

- Evaluation methodology update:
    - Support in general: CableLabs, Comcast, QC, vivo (no examples), Nokia (remove LTE-U and NR-U), LGE (no examples), Xiaomi, Lenovo, MediaTek (no examples), Huawei, NEC, Intel, BOSCH, Apple, Philips, Futurewei (general wording), Fraunhofer
    - No need to have a formal coexistence evaluation campaign: QC, vivo, Xiaomi, MediaTek, Panasonic, Fraunhofer
    - Issue with TR 37.885 / container:
        - Use TR 38.889: QC, vivo
        - New TR: OPPO, vivo, LGE, ZTE
        - Summarize updates in a Tdoc (R17 approach): LGE, OPPO

- Frequency bands
    - Support the clarification: QC, OPPO, vivo/LGE (include at least), Nokia, DCM, CAICT, Xiaomi, MediaTek, ZTE, Sony, Huawei, Futurewei
    - Drop / no mentioning / de-prioritize FR2: Charter, Lenovo, Transsion, E///, NEC, Intel, BOSCH, Apple, Futurewei, VW
    - Drop n96 (6GHz): CableLabs
    - FFS n46 (5GHz): CableLabs

- Starting baseline
    - CableLabs: "… channel access schemes **compliant with** NR-U".
    - First change on "mode 2 configuration":
        - Support: OPPO, Nokia, Lenovo, Transsion, E///, CMCC, Sony, ZTE, Huawei (modify), Apple, CATT
        - Not support: QC (pre-configuration), vivo, LGE, Xiaomi, Futurewei,

- Second change on “R17 sidelink operation as a starting point”:
  - Support: OPPO, Nokia, vivo (generic wording), Xiaomi, Lenovo, CAICT, Transsion, CMCC, Sony, ZTE, Apple, Futurewei,
  - Not support: QC (interlaced waveform and resource reservation), Samsung (no R17 IUC), LGE (original wording), E///, CATT

- Others
  - Dropping entire SL-U objective: DT, Telecom Italia, CATT, DCM (or FR2), Vodafone, Broadcom
  - Create a separate SI specific for SL-U: CableLabs, Comcast, Intel
  - Deprioritize/dropping FR2: Lenovo, Intel,
  - Restrict to a single channel of 20MHz: E///
  - Adding SL positioning / ranging signal: Xiaomi, Philips,
  - To clarify the timeline for the study: Apple

2.3.2.3 Enhancements for FR2 licensed spectrum

- Evaluation methodology update:
  - OK/support: QC, OPPO, Nokia, vivo, LGE (no examples), E///, ZTE, Huawei, NEC, Intel, Apple, Futurewei, CATT, Fraunhofer

- For unicast only:
  - Yes: OPPO, Nokia, Samsung, LGE, MediaTek, Transsion, Ericsson, ZTE, Sony, NEC, Intel, Apple, CATT
  - No: QC, vivo, [DCM], CMCC, Huawei, Futurewei, Fraunhofer

- Others:
  - Dropping entire FR2 enhancement objective: Lenovo, DT, Telecom Italia, E///, BOSCH, DCM, Vodafone
  - Clarify FR2-2 is not included: Samsung
  - Study and specify formulation: Huawei,
  - Add “necessary resource allocation enhancements”: Nokia
  - Timeline for the study needs to be clarified: Apple

2.3.2.4 Co-channel coexistence between LTE-V & NR-V

- Remove the word “necessity”:
  - Yes: QC (accept current objective), Intel (accept current objective)
  - No change to objective: OPPO, Panasonic, Nokia, vivo, Samsung, LGE, DCM, Lenovo, CAICT, MediaTek, Transsion, E///, CMCC, ZTE, Huawei, BOSCH, Philips, Apple, Futurewei, Fraunhofer
  - No study phase is necessary: CATT

- Define reference and coexistence deployment scenario(s)

- Yes: Nokia, vivo, Lenovo, Intel, Philips, Apple,
- No/not necessary: QC, OPPO, Panasonic, LGE, Samsung, DCM, MediaTek, ZTE, Huawei, Futurewei, CATT, Fraunhofer, VW,

– Others

- No input

2.3.2.5 RAN4 core part

– New bullets to follow the same style in Rel-17 WID

- Yes: QC (why no FR2 in CA), OPPO, vivo, LGE (missing unlicensed bands), Samsung, MediaTek, E///, ZTE, Huawei, Intel, Futurewei, CATT (no objective 5 sub-bullets)
- No: DT, Telecom Italia

2.3.2.6 RAN4 performance part

– Adding RAN4 UE demodulation and RRM performance requirement work

- Yes: OPPO, vivo, LGE, Samsung, Telecom Italia, MediaTek, E///, Huawei, Intel, Futurewei (add CSI performance requirements), CATT

2.3.3 Proposals

2.3.3.1 Objective 1: SL carrier aggregation

Specify mechanism to support NR sidelink CA operation based on LTE sidelink CA operation [RAN2, RAN1, RAN4] (~~This~~ *RAN1* part of the work is to be started after RAN#98)

– Prioritize supporting LTE sidelink CA features for NR (i.e., SL carrier (re-)selection, synchronization of aggregated carriers, handling the limited capability, power control for simultaneous sidelink TX, packet duplication)

– At least for FR1 licensed spectrum and ITS band

- [Whether or not to support sidelink CA for FR2 and/or unlicensed band is to be decided in RAN#98 after the relevant studies are done]

– *No specific enhancements of Rel-17 sidelink features with sidelink CA support.*

– This feature is backwards compatible in the following regards

- *A* Rel-16*/Rel-17* UE~~s~~ can receive Rel-18 sidelink broadcast/groupcast transmissions with CA for the carrier~~s~~ on which ~~they~~ *it* receive*s PSCCH/PSSCH* and transmit*s* the corresponding sidelink HARQ feedback *(when SL-HARQ is enabled in SCI)*
- ~~Assuming this sidelink functionality would co-exist in the same resource pools as Rel-16/Rel-17 functionalities (e.g., no changes to reservations in SCI, etc.)~~

Rel-18 sidelink should be able to coexist with Rel-16/17 sidelink in the same resource pool. This does not preclude the possibility of operating Rel-18 sidelink in a dedicated resource pool.

2.3.3.2 Objective 2: SL operation in unlicensed spectrum

Study *and specify, if necessary,* ~~the~~ support of sidelink on unlicensed spectrum for both mode 1 and mode 2 where Uu operation for mode 1 is limited to licensed spectrum only [RAN1, RAN2, RAN4]

- *Update* evaluation methodology for sidelink operation on unlicensed spectrum *for commercial deployment scenario as well as coexistence aspects with incumbent technologies (e.g., Wi-Fi)*.
- Sidelink channel access mechanism for unlicensed spectrum based on regional regulation requirement and use the existing channel access schemes from NR-U as a starting point
  - Reuse Rel-16 resource allocation mechanism*s* as much as possible
  - *No specific enhancements for Rel-17 resource allocation mechanisms*
- Required changes to NR sidelink physical channel structures and procedures to operate on unlicensed spectrum
  - No specific *enhancements* ~~optimizations~~ for existing NR SL feature
- Frequency bands for the unlicensed spectrum in FR1 are *n46 and n96 (i.e.,* 5GHz and 6GHz*)*.
- [*Frequency band for the unlicensed spectrum in FR2-2 is n263 (i.e., 60GHz).* No specific *enhancements* ~~optimizations~~ for FR2 unlicensed spectrum.]

2.3.3.3 Objective 3: Enhancement for FR2 licensed spectrum

Study enhanced sidelink operation on FR2 licensed spectrum [RAN1, RAN2, RAN4]

- *Update evaluation methodology for commercial deployment scenario*
- Work is limited to the support of sidelink beam management (including initial beam-pairing, beam maintenance, and beam failure recovery) by enhancing existing sidelink CSI framework and reusing Uu beam management concepts wherever possible.
  - *Beam management in FR2 licensed spectrum should prioritize sidelink unicast communication. If time allows, beam management for broadcast and groupcast can be considered.*

2.3.3.4 RAN4 objective: Core part

5. Support of new sidelink frequency bands for single-carrier operation and frequency band combinations for carrier aggregation operation [RAN4]

- *The exact frequency bands for both licensed, unlicensed and ITS-dedicated spectrum in FR1 and FR2 are to be determined based on company input during the WI.*
- *The exact frequency band combinations for both licensed and ITS-dedicated spectrum in FR1 are to be determined based on company input during the WI.*
- *Support of new sidelink frequency bands and band combinations should ensure coexistence between sidelink and Uu interface in the same and adjacent channels in licensed spectrum.*

6. UE Tx and Rx RF requirement for the new features introduced in this WI for the frequency bands and band combinations supported in Objective 5 [RAN4]

7. UE RRM core requirement for the new features introduced in this WI [RAN4]

2.3.3.5 RAN4 objective: Performance part

Specify the following requirements [RAN4]

- *UE demodulation performance requirements*
- *UE RRM performance requirements*

3 Intermediate round

3.1 Managing NR sidelink WI scope

During the Tuesday / 7th December GTW session, many views are expressed on the concern of the workload for this WI in R18. And surely, different flavors of proposal are made on how to cut down the scope to fit within the allocated 2TUs. Some suggestions were to reduce the workload at the objective level by dropping certain feature(s) depending on their needs, standpoint and commercial interests. At the same time, some others suggest to cut down the scope / prioritization within each objective to bring the workload to a manageable level.

For most of the objectives, we will have a check point at RAN#98 to determine the scope and exact details for the normative work. So, naturally we will have a chance to carefully choose what needs and can be specified within R18 once we have done all the necessary studies. And hence, the CA work for RAN1 does not start until after the check point so that we can achieve a proper load balancing.

According to RAN chair's guidance during the GTW session, the next step is to regulate / control the workload in RAN1 to reduce the amount of required resources (time and delegates). During the initial round, the moderator had tried to do this to a certain extend by limiting the scope and restricting unnecessary enhancements. Given that the workload is the biggest concern from the GTW session, the moderator would like to focus purely on this aspect only during the intermediate round of discussion. Also, since we have already spent one round of clarifying / refining description and discussing proposals from submitted Tdocs. Based on comments raised during the GTW session, the moderator thinks the description for each objective is relatively stable for now.

For the proposals presented and discussed during the GTW session, the moderator mentioned some further down-scoping is possible within each of the objective 1, 2 and 3 (slide 2, 3 and 4 in RP-213485). Specifically, they are:

- **Option 1**: In the SL carrier aggregation work, we support only aggregating carriers in FR1 licensed and ITS bands. By removing the bullet "[*Whether or not to support sidelink CA for FR2 and/or unlicensed band is to be decided in RAN#98 after the relevant studies are done*]"
- **Option 2**: In the SL operation on unlicensed spectrum study, we consider unlicensed bands in FR1 (5 and 6GHz) by removing the bullet "[*Frequency band for the unlicensed spectrum in FR2-2 is n263 (i.e., 60GHz). No specific enhancements optimizations for FR2 unlicensed spectrum*]"

– **Option 3**: In the FR2 enhancement work, we *prioritize beam management work in FR2 licensed spectrum for unicast communication first. If time allows, beam management for broadcast and groupcast can be considered*.

Please indicate your views and preferences of which option(s) to take to match the overall workload for the WI to the allocated 2 TUs. If there is other suggestion(s) on how to further trim down the work within an objective, please feel free to propose them for consideration. There is no mistake, it is one question (most important one) for the intermediate round. The latest version of WID draft is still v002.

Feedback Form 21: Managing NR sidelink WI scope

1 – LG Electronics Inc.

We support Option 1 as SL CA is mainly motivated by automotive industry where interest on FR2 or unlicensed band is low in our understanding. We understand Option 1 still includes intra-band SL CA especially in ITS band and thus propose to modify it to "… only support intra-band and inter-band aggregation in …" If Option 1 is taken, the words "at least" in the second bullet also needs to be removed.

We are not sure if Option 2 will contribute to the workload reduction in RAN1 as no additional RAN1 discussion will take place as long as "No specific enhancements optimizations for FR2 unlicensed spectrum" is kept. Nevertheless, if the intention is to also consider RAN4 workload, we are fine with Option 2.

In Option 3, we think "If time allows, beam management for broadcast and groupcast can be considered" needs to be removed and the objective needs to be restricted to unicast only. The objective already states that it will be done based on the sidelink CSI framework which is specified only for unicast in Rel-16. So beam management for broadcast and groupcast would mean that RAN1 needs to re-design SL CSI framework for these cast types, which doesn't seem feasible under the current situation. In this sense, we propose to change "enhancing existing sidelink CSI framework" to "reusing existing sidelink CSI framework" in the second bullet in order to avoid discussing more fundamental changes to the sidelink CSI. We understand there was a comment on the applicability of beam management to S-SSB, but we think this was already taken into consideration in Rel-16 which supports quite many S-SSB repetitions in FR2 with the understanding that beam used for each S-SSB transmission can be changed by UE implementation.

In addition, we would like to propose the following for more concise work:

1) In the second bullet of Objective 2, Rel-16 resource allocation mechanisms are "reused as much as possible" and NR-U channel access schemes are "used as a starting point," and we wonder the implication of using difference wording. We think "starting point" would allow more chances for deviation from the existing feature, so we would like to keep the same wording of "reused as much as possible". Or more preferable wording can be used such as "the existing NR-U channel access schemes and Rel-16 resource allocation mechanisms shall be reused whenever possible" with the intention that enhancements will be allowed only when the system becomes broken if the existing features are applied as they are.

2) In the third bullet of Objective 2, there seems no guidance on the changes to PHY channel structure (we understand the SL procedure part is covered by the sub-bullet) especially when SL PHY structure needs to be changed to meet the regulatory requirements. Thus we would like to propose a similar note like "the existing NR sidelink and/or NR-U channel structure shall be reused [as much as possible or whenever possible]."

3) Based on the GTW discussion, the main idea of the workload management is to check the situation based on the study progress. For this, we propose to set an explicit check point for Objective 2 even the group agrees to adopt the wording "study and specify." An example would be to add a note like "WGs shall complete the study phase by RAN#98 in which further objective refinement can be considered." We think this will be a good motivation of accelerating the study phase progress.

4) In Objective 1, "prioritizing" LTE SL CA features would allow discussion on the other features as well.

For the workload management, we should be able to delete the word so that the work scope is limited only to specifying LTE SL CA features.

2 – Panasonic Corporation

On the view of option 1, 2, 3, I share the view from above LGE.

On the second objective, the second bullet of Objective 2, something similar view with LGE but I have some difference. ”Rel-16 resource allocation mechanisms” can be ok with “starting point” or ”shall be reused whenever possible” but ”NR-U channel access schemes” is ”shall be reused ~~whenever possible~~” because it has the impact on the coexistence aspects with incumbent technologies (e.g., Wi-Fi). The amount of workload is so different depending on full reuse or partial reuse in my view.

3 – TELECOM ITALIA S.p.A.

I do appreciate the proposals from LGE and Panasonic to streamline the work, but the full project is still not acceptable.

Having a study phase with a check point does not solve the workload issue, but simply hide it and postpone the implications on RAN4.

The study phase will be surely very contentious and the points raised by several companies related to regulation (in the USA), coexistence with other unlicensed technologies are to be taken into account. Moreover, coexistence with NR-U and LTE-LAA should also be considered.

RAN4 has to be involved from the beginning.

The situation is not dissimilar to the one we experienced in ETSI where the co-channel coexistence between C-V2X (based on PC5) and G5/DSRC (based on WiFi) in the 5.9 GHz ITS band has been extensively studied and no good solution has been found:

- either the two technologies co-exists in the same channel with severe degradation for both
- or a preferred channel allocation is indicated, i.e. a sort of channel segregation is applied

In a similar way, the work on FR2 will require a full new set of requirements to be defined by RAN4 and also a coexistence analysis with Uu operations.

RAN1 workload is just the emerging part of the iceberg, but the implication on other WGs (and in particular to RAN4) is major.

In summary the current proposal is not acceptable and at least objective 2 or 3 (or both) need to dropped to ensure the workload is manageable in all WGs

4 – SHARP Corporation

We support to down-scope following all three options from Moderator.

5 – DOCOMO Communications Lab.

We have concern on this direction. Even if scope reduction per objective is tried, we think in the end many issues are raised, progress is not good, and the WI does not complete on time. For example Rel-17, we have only two topics. One is power saving, and the other is IUC. Only two topics, but the situation is that, i.e. RAN1 did not complete by Nov. meeting.

Considering this Rel-17 situation, much safer way is to drop some of objectives rather than reduction per objective. Still we believe that it is obviously better to drop either objective 2 or 3 (or both). We are not sure why both of objective 2 and 3 are necessary since motivation is the same - increase of data rate.

6 – Beijing Xiaomi Mobile Software

We support option 1 and option 3 proposed by the moderator. However, for option 2, we think it is not necessary. We do not see much benefit on workload to exclude FR2-2 as there is no specific optimizaiton enhancement for FR2 unlicensed, as stated in the WID draft.

7 – Fujitsu Limited

To reduce the workload as much as possible, we can accept all the three options from the moderator.

8 – vivo Communication Technology

- Option-1: We are not sure if this options is really helpful. With or without this option, the workload does not change before RAN#98, and anyway the support of CA for unlicensed/FR2 can only be included if agreed in RAN#98.
- Option-2: Given that it already clearly says that "*No specific enhancements optimizations for FR2 unlicensed spectrum*", there would not be additional workload for the imformative text. Removing this part does not reduce the workload.
- Option-3: We are open to this option, but as commented before, the current objective already says to reuse the existing CSI framework that is applicable only for unicast.

9 – Spreadtrum Communications

To reduce workload, we support option 1 and option 3.

For option 2, if "No specific enhancements optimizations for FR2 unlicensed spectrum." in WID draft is kept, we can support frequency band for the unlicensed spectrum in FR2-2.

10 – Guangdong OPPO Mobile Telecom.

For commercial applications, it requires large bandwidth to achieve high data rate SL communication as a main KPI. This can either come from a single carrier with large bandwidth (e.g., in FR2-2 60GHz) or aggregating multiple smaller carriers. In this sense, either Option 1 or Option 2 should be kept. In our understanding, from workload's perspective, aggregating multiple carriers (i.e., licensed + unlicensed and unlicensed + unlicensed) will require more work in both RAN1 (LAA type of operation and mixture of FR1/FR2 carriers with different SCS) and in RAN4 (RF requirements for band combinations) than supporting FR2-2 60GHz by specifying channel access scheme that is reused from NR-U work (plus UE RF requirements in RAN4 which we expect this to be the same or at least very similar to requirements defined in NR-U work). Therefore, we suggest to adopt Option 1 and keep Option 2. Regarding Option 3, we have same understanding as LGE in that the existing sidelink CSI framework applies to only unicast communication. Enhancing/extending this CSI framework to broadcast and groupcast communication itself will already take up a very significant work in RAN1, even without considering the beam management support. Therefore, to really restrict the impact on workload in RAN1, Option 3 should be adopted. Regarding other wording suggestions/improvement from LGE, we are fine with them as well to streamline discussion in WGs and to avoid unnecessary enhancements/optimizations.

11 – CATT

First of all, we don't think the options provided for down scope is enough.

We are also shocked to see all new changes to the original version of the draft WID. For many changes there are already concern companies have raised. Also, some of important changes have never been discussed ,

they are just single company proposal, for example , removing the RAN#98 decision on SL-U, as copied below

For the objectives with a study phase ***(except for sidelink on unlicensed spectrum),*** *RAN to determine in RAN#98 whether or not there is to be specification support in Rel-18 and if there is specification support, the scope of this work.*

This is not acceptable as it contradicts with principle outlined by RAN chair during Tuesday's GTW that RAN needs to take a look and make decision for the study item in RAN#98 to make sure the scope for the WI is reasonable.

12 – Lenovo (Beijing) Ltd

Since only 2 TUs are allocated for Rel-18 Sidelink, we agree with scope reduction to ensure this topic can be completed timely. We have below comments for scope reduction:

(1) we understand the motivation of introducing FR2 is to exploit more frequency resources for sidelink communication. So the motivation of introducing FR2 licensed spectrum is exactly same to that of introducing FR1 unlicensed spectrum. As proposed in pre-RAN#94 NWM discussion, either FR2 licensed spectrum or FR1 unlicensed is selected to reduce the work load. We think the down-selection between the two objectives should be performed. Moreover, after the first stage of unlicensed spectrum in FR1, it is straightforward to support unlicensed spectrum in FR2 (e.g.. 60GHz) for sidelink in next release. Hence, FR1 unlicensed spectrum should be prioritized over FR2 licensed spectrum. Our priority order is FR1 unlicensed à FR2unlicensed à FR2 licensed. +

As pointed out in the GTW, the main reason for delaying the commercial deployment of sidelink is the absence of licensed spectrum, and why are we still optimizing the FR2 licensed spectrum is not justified. Also we are not sure which licensed band in FR2 can be considered for sidelink.

Also, studying only beam management is not beneficial as the corresponding RA is not optimized for beams. Increasing the work load just for the sake of optimizing FR2 licensed spectrum for BM is still not justified.

(2) based on above, regarding Option 1, if we suggest removing sidelink CA for FR2 and keeping sidelink CA for unlicensed band for scope reduction. Since the main benefit of unlicensed spectrum is plenty of frequency resources which requires using carrier aggregation for improving user data rate, anyway, sidelink CA in FR1 with FR1 unlicensed spectrum needs to be considered for forward compatibility purpose. So our suggestion is listed below:

Whether or not to support sidelink CA for ~~FR2 and/or~~ unlicensed band is to be decided in RAN#98 after the relevant studies are done]"

(3) Regarding Option 2, we agree removing the bullet "[*Frequency band for the unlicensed spectrum in FR2-2 is n263 (i.e., 60GHz). No specific enhancements optimizations for FR2 unlicensed spectrum*]" so that we can more focus on FR1 unlicensed spectrum study.

(4) Regarding Option 3, as mentioned above, we suggest removing the whole FR2 from Rel-18 sidelink.

13 – Ericsson LM

While we are supportive of all three options proposed by the moderator, we do not think that this solves the workload problem.

As stated in our earlier replies and as commented by others, we think that the scope of the WI is too large. It is not possible to fit the four objectives in the allocated 2 TUs. Having delayed starts, initial study phases, or minimal scope reduction within each objective is not sufficient. In fact, this often hides the real problems, especially for RAN4, who will need to deal with a large amount of work concentrated at the end

of the release, the time when the WG is typically more loaded in any case. Our assessment is that RAN4 workload for SL in FR2 would be largest, followed by SL in unlicensed.

From the previous email/meeting discussions, it is clear to us that:

- SL-CA is the feature with widest support, followed by SL for unlicensed. Both SL operation in FR2 and NR/LTE SL coexistence had signficantly less support.
- NR/LTE SL coexistence is requested by some players in the automotive industry.

In view of this, our proposal is to:

- Specify SL-CA with the objectives in RP-213485 and the clarification that there will be no specific enhancement to support SL-CA together with any other SL feature speciefied in Rel-18.
- Study SL in unlicensed bands with the objectives in RP-213485. Potential normative work is to be decided in RAN#98.
- Although our preference is not to have further objectives, we are OK to study co-channel coexistence for LTE sidelink and NR sidelink (with the objectives in RP-213485), given the automotive industry support and the relatively small size of the work. Potential normative work is to be decided in RAN#98.

An alternative to this, would be to restrict the normative work in Rel-18 to SL-CA only. That is:

- Specify SL-CA with the objectives in RP-213485 and the clarification that there will be no specific enhancement to support SL-CA together with any other SL feature speciefied in Rel-18.
- Study SL in unlicensed bands with the objectives in RP-213485. Potential normative work is to be considered for a later release.
- Study SL in licensed FR2 with the objectives in RP-213485. Potential normative work is to be considered for a later release.
- Study co-channel coexistence for LTE sidelink and NR sidelink with the objectives in RP-213485. Potential normative work is to be considered for a later release.

This latter alternative is our second preference, but at least it would allow the WGs to modulate their workload without the potential to delay the normative work and/or the release.

14 – Huawei Tech.(UK) Co.. Ltd

- We note comments about the scope of sidelink work. Based on the value it brings, we would agree to retaining **only** objective 2 (study & specify sidelink unlicensed). Note that SL unlicensed is already almost limited to FR1, because of the no specific enhancements statement on FR2. This is a substantial limitation to workload.
- On coexistence, we think likely no normative work is needed for this objective. We are OK to have this ”study” objective since there is question from 5GAA, and it is better for 3GPP to provide an answer. At this stage, we do not think technical enhancement work will turn out to be needed.

The above is our proposal. Our views on the options from the moderator are:

- Option 1 and 2: We do not think the full exclusion of FR2 is strongly needed, since the current approach is to apply the FR1 & ITS design to FR2 without optimization, i.e. without added workload. It is preferable not to unnecessarily discard applicable work. Wording which says “*FR2 is supported*

by applying the design from FR1, with no specific optimizations for FR2" would be desirable. Nevertheless, if the group has a strong desire to apply this FR2 exclusion, instead of down-selecting to SL unlicensed as a whole, we can live with it.

- Option 3 is acceptable as proposed by the moderator, if there is not a down-selection to retain only SL unlicensed.

15 – ZTE Corporation

We are fine with option 1. Based on the potential TU allocation and the objectives on the table, we think it would be good enough if we could complete the most basic sidelink CA in Rel-18. It is hard to have extra time to discuss the sidelink CA for FR2 and/or unlicensed band. To save the time, it is suggested to directly remove it from the begining.

For option 2, since it explicitly mentions no specific enhancements optimizations for FR2 unlicensed spectrum, we are fine to keep it as it is.

For the option 3, we share the same view with LG to remove the statement "If time allows, beam management for broadcast and groupcast can be considered" and foucs on unicast only.

16 – Samsung Electronics Romania

We are fine with option 2 in order to make reasonable workload, and have a little bit different views on option 1 and option 3.

- For option 1, we prefer to keep this sentence since anyhow the check point will be in RAN#98 and it will be decided whether or not to support this feature at that time considering available TU estimation and identified issues after relevant studies are done.
- For option 2, we think that this is not urgent feature in Rel-18 and it would create a dependency on beam management. That's why we think that it would increase workload and therefore it should be considered in future release.
- For option 3, the wording "if time allows" is not that clear to us since "the time" companies think would be different depending on their preference, and then it is likely to spend RAN1 discussion time unnecessarily. Therefore, we slightly prefer to remove the part "*If time allows, beam management for broadcast and groupcast can be considered*."

17 – China Mobile E-Commerce Co.

We share similar views as DOCOMO that even with down-scoping under each objective, the workload would still be larger than what we can handle. We are OK to just keep objective 2 and 3; however, we are not sure whether we can further delete some of the objectives at this stage. Basically, we can accept all three options that the moderator proposed to limit the scope.

18 – KT Corp.

Option 1 is acceptable

19 – CAICT

We are fine for the three options and would like to give objective 2 higher priority.

20 – NEC Corporation

We agree on option 1 and option 2.

For option 3, we prefer to study the beam management in FR2 licensed spectrum for **sidelink unicast only.**

21 – Nokia Denmark

In general we are fine with option 2 and 3.

For option 1, we think the decision to proceed with normative work should be done in RAN#98 when the unlicensed and FR2 sidelink design will be clearer.

For the support of sidelink on unlicensed spectrum, we are ok with leaving SL-U FR2-2 to later releases and with using Rel.16 and NR-U as baseline for SL-U.

For the SL-FR2 operation, we note that the impact of beamforming on the Mode 2 sensing and resource selection/exclusion procedure should also be considered. Namely, as beamforming can decrease the sensing performance due to increased deafness. Therefore, we propose the following change to this objective:

3 Study enhanced sidelink operation on FR2 licensed spectrum [RAN1, RAN2, RAN4]

- Update evaluation methodology for commercial deployment scenario
- Work is limited to the support of sidelink beam management (including initial beam-pairing, beam maintenance, and beam failure recovery) by enhancing existing sidelink CSI framework and reusing Uu beam management concepts wherever possible, <u>including any necessary sensing and resource allocation enhancements to address the impact of beamforming</u>.
  - Beam management in FR2 licensed spectrum should prioritize sidelink unicast communication. If time allows, beam management for broadcast and groupcast can be considered;

22 – Transsion Holdings

Looking at the discussion, there are more supporters than opponents of each objective. For sure, different companies have different flavors of objective. Hence, it is really hard to convince each other to drop or deprioritize the objective. In this case, compromise between two sides is quite necessary. From our pespetive, the proposal from moderator is a reasonable way forward.

23 – Apple GmbH

We support Option 1 by restricting SL carrier aggregation to only FR1 licensed or ITS bands. If Rel-18 sidelink supports sidelink on FR2 or on unlicensed spectrum, we could further enhance the sidelink CA for FR2 or on unlicensed spectrum in a later release.

We support Option 2, but not sure how much it actually affects the workload, as it is understood that no specific enhancements for FR2 unlicensed spectrum anyway.

Regarding Option 3, our preference is to limit beam management work for unicast only. We think this is the most important use case of beam management in sidelink. But we can accept Option 3 by leaving the possibility of extending beam management work to groupcast or broadcast.

We think with this down-scoping, the workload of Rel-18 sidelink fits in the allocated time units.

24 – InterDigital

We support all options to reduce work load of R18 SL WI. We think it is pre-mature to drop objective(s) in this meeting given the support for each objective. It is more reasonable to re-evaluate all objectives in RAN #98 as planned to accommodate the allocation TU after the study phases, since more information regarding the scope of the design and the resultant work load may become more clear by then.

25 – CableLabs

We support Option 1. We consider the workload associated with Option 2 too high (defining new specs concerning new coexistence specs in FR1-U goes well beyond the actual TU allocation for this item). Therefore we consider Option 2 doesn't address the workload issue for this item.

26 – ROBERT BOSCH GmbH

We support Option 1 and Option 2. We are fine to remove SL-U in FR2. We are also considering to down scope Option 3 (FR2 beam management) to limit the work load.

27 – Qualcomm CDMA Technologies

Qualcomm supports Option 1 and Option 3.

We believe that FR2-2 is an important piece of spectrum for proximity type communications which SL-U would enable. Therefore, we would find unfortunate to remove FR2-2 from the scope of SL-U.

28 – Volkswagen AG

The three outlined options seem to provide a reasonable down-scoping while still keeping all objectives.

It is again emphasized to keep Objective 4 and also to target a normative phase in Rel-18. As outlined in some contributions a clear framework for NR sidelink deployments is needed by the industry. This is not given by just conducting a study on LTE sidelink and NR sidelink co-channel coexistence methods.

It is even proposed to expand the coexistence study also to an adjacent-channel coexistence of NR sidelink with non-3GPP technologies. This is important to NR sidelink deployments at least in Europe and the US.

29 – Verizon UK Ltd

We support moderator's proposal of three options and think it is a reasonable way forward.

30 – Deutsche Telekom AG

We are a bit confused about this discussion.

As indicated in the call on 7/12 we ONLY support the objectives SL CA and SL LTE/NR co-existence as only these have clear commercial requirements from the automotive industry requested via 5GAA.

Especially the SL-U does never fit to the allocated and available TU !

31 – Fraunhofer HHI

For option 1, we prefer to keep the sentence, since this can be decided at the checkpoint in RAN#98, and it does not really reduce the workload in the study phase. We are ok with the modifications in options 2 and 3. We are also ok to study the co-channel coexistence for LTE and NR sidelink as requested by 5GAA.

32 – Futurewei

For option 1, it does not seem to impact the workload at all to keep the bullet and decide later. If at that time after the study is done, the workload is too big we can decide not to do it then.

For option 2, we do not think removing the text in bracket will reduce the workload since there is no specific enhancements optimization for FR2 unlicensed spectrum. We suggest not to remove the text.

For option 3, we do not think it is necessary to prioritize beam management for unicast communication now as it might limit the space for the efficient design on the beam management schemes with enhancing Rel-16 CSI framework. We can determine it later after the study whether it is ok to prioritize unicast communication first. We propose the following update.

Option 3: In the FR2 enhancement work, we ***determine whether to*** *prioritize beam management work in FR2 licensed spectrum for unicast communication* ***after the study*** *~~first~~. ~~If time allows, beam management for broadcast and groupcast can be considered.~~*

33 – FirstNet

It is not true that the requirements that we are discussing are confined to just automotive industry. Instead, these are equally applicable to public safety and other vertical industries.

34 – Philips International B.V.

We support all 3 options for down-scoping. This is probably the best solution, since as mentioned by the chair it would be too controversial to remove entire objectives.

35 – TOYOTA Info Technology Center

We are fine with Options 2 and 3 to reduce the workload, while keeping the objectives.

Regarding Option 1, we prefer to keep the current sentence, and a decision on whether to proceed with the normative work can be made in RAN#98.

36 – VODAFONE Group Plc

As indicated in the call on 7/12 we ONLY support the objectives on SL LTE/NR co-existence

37 – Intel Corporation (UK) Ltd

We agree that all three options proposed by moderator are essential for workload and scope reduction. From our side, we can also accept dropping of one or two objective(s).

For Option 3, we propose to remove statement "If time allows, beam management for broadcast and groupcast can be considered." It is clear that even if all options are agreed, the study scope is still very broad/-diverse. There is no room to discuss additional objectives. We also suggest to explicitly mention that the study scope is limited to single carrier for SL FR1 unlicensed. The beam management operation in FR2 licensed band should also be limited to single carrier.

We also suggest clarifying objective for LTE/NR V2X coexistence

- Update evaluation methodology for LTE-V2X and NR-V2X co-channel coexistence studies

Finally, we observe that RAN1 needs to work on three evaluation methodologies and deliver system level evaluation results for each objective. Therefore, we prefer to have SI with corresponding TR that will capture evaluation methodology aspects and evaluation results.

38 – AT&T GNS Belgium SPRL

We are supportive of the compromises in the three options proposed by the moderator to address automotive, commercial and public safety use cases. An aspect of Option 2 that we could keep: "*No specific enhancements optimizations for FR2 unlicensed spectrum"* as it does not diminish any of the workload by removing this sentence.

3.2 Summary of intermediate round and proposals

Preference of Option(s) for reducing the workload to 2TUs:

- **Option 1 (24)**: LGE, Panasonic, OPPO, Sharp, Xiaomi, Fujitsu, Lenovo (FR2 only), E///, ZTE, CMCC, KT, CAICT, NEC, Transsion, Apple, IDC, CableLabs, BOSCH, Qualcomm, VW, Verizon, Philips, Intel, AT&T
- **Option 2 (20)**: Sharp, Fujitsu, Lenovo, E///, Samsung, CMCC, CAICT, NEC, Nokia, Transsion, Apple, IDC, BOSCH, VW, Verizon, Fraunhofer, Philips, TOYOTA, Intel, AT&T
- **Option 3 (26)**: LGE, Panasonic, OPPO, Sharp, Xiaomi, Fujitsu, vivo, E///, Huawei, ZTE, Samsung, CMCC, CAICT, NEC, Nokia, Transsion, Apple, IDC, Qualcomm, VW, Verizon, Fraunhofer, Philips, TOYOTA, Intel, AT&T
- **Reducing the workload at the objective level (9)**: TI, DCM, CATT, Lenovo, E///, Huawei, DT, VDF, Intel

Based on expressed views and preferences, all three potential options of limiting the scope of first 3 objectives are widely supported by companies in order to reduce the amount of workload to a reasonable level to match the allocated 2TUs for the WI. At the same time, it is also observed some preference towards reducing the WI scope by focusing on only a subset of objectives. However, the topic(s) of choice are quite widely spread among the expressed preferences, as different objective is critical to different vertical / company / application. For example, based on past discussions and the Rel-18 workshop in June, SL CA is critical to Public Safety community, co-channel coexistence is critical to automotive industry, SL-U is essential to commercial application, and FR2 beam management is important to operators (at least some). To remove any of these objectives, it will be difficult to convince the affected group to accept.

Table 2:

Hence, the moderator believes the best approach is to be inclusive, minimize the scope within each of the objectives to the essential level only, and put in a check point (RAN#98) to review the scope and workload (including RAN4), and adjust/remove objective(s) as necessary.

To do this, also taking into account of some of wording improvement suggestions, the moderator proposes the following changes to the objectives as followed.

Proposal 1:

1. Specify mechanism to support NR sidelink CA operation based on LTE sidelink CA operation [RAN2, RAN1, RAN4] (~~This~~ RAN1 part of the work is to be started after RAN#98)

- ~~Prioritize~~ Support~~ing~~ LTE sidelink CA features for NR (i.e., SL carrier (re-)selection, synchronization of aggregated carriers, handling the limited capability, power control for simultaneous sidelink TX, packet duplication)
- ~~At least for~~ *The work is limited to* FR1 unlicensed spectrum and ITS band
  - ~~Whether or not to support sidelink CA for FR2 and/or unlicensed band is to be decided in RAN#98 after the relevant studies are done~~
- *No specific enhancements of Rel-17 sidelink features with sidelink CA support.*
- This feature is backwards compatible in the following regards
  - A Rel-16/Rel-17 UE can receive Rel-18 sidelink broadcast/groupcast transmissions with CA for the carrier on which it receives PSCCH/PSSCH and transmits the corresponding sidelink HARQ feedback (when SL-HARQ is enabled in SCI)

Rel-18 sidelink should be able to coexist with Rel-16/17 sidelink in the same resource pool. This does not preclude the possibility of operating Rel-18 sidelink in a dedicated resource pool.

Proposal 2:

2. Study *and specify, if necessary,* ~~the~~ support of sidelink on unlicensed spectrum for both mode 1 and mode 2 where Uu operation for mode 1 is limited to licensed spectrum only [RAN1, RAN2, RAN4]

- *Update* evaluation methodology for sidelink operation on unlicensed spectrum *for commercial deployment scenario as well as coexistence aspects with incumbent technologies (e.g., Wi-Fi).*
- Sidelink channel access mechanism for unlicensed spectrum *shall be* based on regional regulation requirement and *re*use the existing channel access schemes from NR-U ~~as a starting point~~ *and Rel-16 resource allocation mechanisms as much as possible*
  - *No specific enhancements for Rel-17 resource allocation mechanisms*
- Required changes to NR sidelink physical channel structures and procedures to operate on unlicensed spectrum
  - *The existing NR sidelink and/or NR-U channel structure shall be reused as much as possible*
  - No specific *enhancements* for existing NR SL feature
- Frequency bands for the unlicensed spectrum in FR1 are *n46 and n96 (i.e.,* 5GHz and 6GHz*)*.
- No specific *enhancements* for FR2 unlicensed spectrum.
- *The study shall be completed by RAN#98 in which further objective refinement can be considered including the unlicensed frequency band in FR2-2.*

Proposal 3:

3. Study enhanced sidelink operation on FR2 licensed spectrum [RAN1, RAN2, RAN4]

- *Update evaluation methodology for commercial deployment scenario*

- Work is limited to the support of sidelink beam management (including initial beam-pairing, beam maintenance, and beam failure recovery) by enhancing existing sidelink CSI framework and reusing Uu beam management concepts wherever possible*, including any necessary sensing and resource allocation enhancements to address the impact of beamforming*.
    - *Beam management in FR2 licensed spectrum ~~should prioritize~~ considers sidelink unicast communication only.* ~~*If time allows, beam management for broadcast and groupcast can be considered.*~~

4 Final round

4.1 Proposals at the end of intermediate round (Section 3.2)

Please provide comments/suggestions below on Proposal 1 from end of the intermediate round.

Feedback Form 22: Proposal 1 of Section 3.2

1 – Beijing Xiaomi Mobile Software We support the moderator's proposal.
2 – LG Electronics Inc. We support Proposal 1 with a minor comment that "unicast" needs to be added to the bullet about the backward compatibility (i.e., "A Rel-16/Rel-17 UE can receive Rel-18 sidelink unicast/broadcast/groupcast transmissions with CA...")
3 – Transsion Holdings We support Proposal 1.
4 – DOCOMO Communications Lab. Support proposal 1.
5 – SHARP Corporation We support Proposal 1 from Moderator (and agree with LGE's comment).
6 – MediaTek Inc. SL CA may be carrier agonistic from RAN1/RAN2 perspective. The specific carriers may only have the impact on RAN4 work. So "~~At least for~~ *The work is limited to* FR1 unlicensed spectrum and ITS band" seems to be applicable only for RAN4. P.S: it seems a typo for "unlicensed".
7 – vivo Communication Technology We can live with this proposal (i.e., to explicitly limit the support of CA only for FR1 **licensed**/ITS band) if it addresses the workload concern of some companies.

8 – TELECOM ITALIA S.p.A.

The current proposal (to keep objectives 1, 2 and 3) is not acceptable to us.

The workload and especially the impact on RAN4 is not acceptable. and Therefore we are going to have sustained objection to the approval of the activity if the moderator's proposal is brought forward.

Moreover, all the objectives 1, 2 and 3 aim to the same goal, i.e. to improve available data rates. Therefore, they are somehow redundant.

If the proponents are so confident all the work can be done, a possible compromise would be to start with one of the three objectives, have a hard deadline to verify the progress of the activity (RAN#98, if I well remember from the discussion) and then decide if new objectives could be added.

But even this compromise solution may not solve the impact on RAN4, which I underline is the major concern.

And stop with the practice to push stuff in RAN1 and forget that without RAN4 (and RAN5) part nothing can be commercialized in practice

9 – Sony Group Corporation

We support proposal 1 with the following correction.

The work is limited to FR1 ~~un~~licensed spectrum and ITS band

10 – ZTE Corporation

For the proposal 1, it talks about the sidelink CA, we think there is one typo for the following sub-bullet. It should be FR1 licensed spectrum instead of FR1 unlicensed spectrum. We are fine with other part of proposal 1.

"The work is limited to FR1 **unlicensed** spectrum and ITS band"

11 – NEC Corporation

We agree on the proposal with a correction that **"***The work is limited to* FR1 ~~un~~licensed spectrum**".**

12 – Huawei Tech.(UK) Co.. Ltd

We can agree with Proposal 1 for the sake of progress.

On LG's request to add "A Rel-16/Rel-17 UE can receive Rel-18 sidelink UNICAST/broadcast/groupcast transmissions with CA for the carrier…", this is a misunderstanding of the bullet. When in unicast, the two UEs know the relevant capabilities, and TX UE cannot use CA with a RX UE not supporting CA (i.e. this is not a Rel-18 sidelink transmission). The bullet is needed for broadcast and groupcast, where the TX UE may use a CA transmission which can be received fully on all its carriers by some, but not all, RX UEs, since the TX UE does not know the capabilities of each.

13 – Samsung Electronics Romania

We understand that majority of companies want to remove option 1 [Whether or not to support sidelink CA for FR2 and/or unlicensed band is to be decided in RAN#98 after the relevant studies are done]. At least, our thinking is whether or not to support sidelink CA for unlicensed band should be considered in RAN#98 because 1) CA feature in unlicensed bands was considered a basic feature when LTE LAA and NR-U were designed and 2) we don't think that workload is significant as option 2/3 (which were in intermediate round). In that sense, we would like to suggest to add back [whether or not to support sidelink CA for unlicensed band is to be decided in RAN#98 after the relevant studies are done]. Actually, it is noted that

this bullet will not increase workload in the study phase since sidelink CA will be directly in normative work phase.

14 – Ericsson LM

We are supportive of Proposal 1 with the understanding that the work is limited to FR1 ~~un~~licensed spectrum and ITS band.

15 – Lenovo (Beijing) Ltd

Firstly, there is a typo in Proposal 1. It should be "licensed spectrum" instead of "unlicensed spectrum" in the 2nd sub-bullet.

According to current proposals, limiting it to FR1 licensed spectrum/ITS for Sidelink CA without consideration of unlicensed spectrum for Sidelink CA may arise in forward compatibility of CA over unlicensed spectrum. We prefer not to delay sidelink CA work. Since the start of the SL CA work is planned only after RAN#98, it is good to capture the possibility of including the unlicensed band in the SL CA feature. We propose to capture the previous wording

Whether or not to support sidelink CA for FR2 and/or unlicensed band is to be decided in RAN#98 after the relevant studies are done

16 – Deutsche Telekom AG

We support Proposal 1 with the correction of the typio mentioed in several post.

We propose that a clear priority is mentioned in regard to ITS spectrum as NR SL CA in licensed spectrum is of low priority for commerical operators (if of interest at all ?).

17 – CAICT

We are fine with moderator's proposal.

18 – China Mobile E-Commerce Co.

We are supportive of Proposal 1.

19 – CATT

We are still not clear for the change why "RAN1 part of the work is to be started after RAN#98". This part involves significant RAN1 work. In fact, it was agreed before that 'For sidelink enhancement, RAN1 is the primary working group. Secondary working groups are RAN2 and RAN4'. Now if RAN1 part only starts after RAN#98, which is at the end of next year, then we have concern that the WID will not be finished on time.

20 – ROBERT BOSCH GmbH

We are fine with the proposal; even though we prefer to reedit this part of the proposal as follows:

The work is focusing on FR1 licensed spectrum and ITS band

We don't see the need for inclusion of CA in SL-U at the moment. However, we may also need to clarify that we can study unlicensed wideband operation (which is different from CA we are discussing here). Wideband operation in unlicensed bands is concatenation of multiple nominal subbands (e.g., multiple 20 MHz or based on the regulation of the band). A clarification will be very helpful as well.

21 – Fraunhofer HHI

We support proposal 1 with the fix in the 2nd subbullet "~~un~~licensed" as mentioned by other companies. Also **unicast** should be added to the last bullet on backwards compatibility as mentioned by LG.

22 – InterDigital

We support proposal 1 with the understanding that the targeted spectrum is FR1 licensed spectrum and ITS band.

23 – Volkswagen AG

Proposal 1 is supported but with the typo correction on the "FR1 **un**licensed spectrum" as already expressed by multiple companies.

24 – Apple GmbH

We support Proposal 1 with the correction of "The work is limited to FR1 ~~un~~licensed spectrum and ITS band".

25 – Intel Corporation (UK) Ltd

We agree with proposal from moderator with typo correction mentioned by companies

26 – Futurewei

We are ok with proposal 1. For clarity, in the first subbullet, we propose to replace "Support" with "Support only as the current wording may still open for some new features.

- ~~Prioritize~~ Support~~ing~~ ***only*** LTE sidelink CA features for NR (i.e., SL carrier (re-)selection, synchronization of aggregated carriers, handling the limited capability, power control for simultaneous sidelink TX, packet duplication)

27 – Philips International B.V.

We agree with proposal 1

28 – CableLabs

We support proposal 1 with the understanding that is limited to F1 licensed spectrum and ITS band

29 – BROADCOM CORPORATION

Same as Apple: We support Proposal 1 with the correction of "The work is limited to FR1 ~~un~~licensed spectrum and ITS band".

Please provide comments/suggestions below on Proposal 2 from end of the intermediate round.

Feedback Form 23: Proposal 2 of Section 3.2

1 – Beijing Xiaomi Mobile Software

Although we still think the benefit on workload by removing FR2-2 is marginal, we can accept the moderator's proposal.

2 – LG Electronics Inc.

We support Proposal 2.

3 – Transsion Holdings

As we comment earlier, we prefer to remove FR2-2, hence, we support Proposal 2.

4 – DOCOMO Communications Lab.

We are confused by the following two bullets. First one is saying no enhancement for FR2 SL-U, but second one seems open to discuss enhancements for FR2-2. What is the relationship between these two? If intention of second one is to discuss possibility of re-including FR2-2 in Rel-18, let's remove the second one to reduce scope size for each objective.

- No specific enhancements for FR2 unlicensed spectrum.
- The study shall be completed by RAN#98 in which further objective refinement can be considered including the unlicensed frequency band in FR2-2.

5 – SHARP Corporation

We support Proposal 2 from Moderator.

6 – MediaTek Inc.

Suggest to remove the following words because it may still increase the work load in RAN4. And such FR2 SL-U solution may not even work.

- No specific *enhancements* for FR2 unlicensed spectrum.
- *The study shall be completed by RAN#98 in which further objective refinement can be considered including the unlicensed frequency band in FR2-2.*

To further reduce the work load, maybe mode 1 can be removed in this release. uu in licensed spectrum to control SL in unlicensed spectrum seems unclear on the use case and benefits.

7 – vivo Communication Technology

We are fine with proposal 2.

8 – TELECOM ITALIA S.p.A.

The current proposal (to keep objectives 1, 2 and 3) is not acceptable to us.

The workload and especially the impact on RAN4 is not acceptable. and Therefore we are going to have sustained objection to the approval of the activity if the moderator's proposal is brought forward.

Moreover, all the objectives 1, 2 and 3 aim to the same goal, i.e. to improve available data rates. Therefore, they are somehow redundant.

If the proponents are so confident all the work can be done, a possible compromise would be to start with one of the three objectives, have a hard deadline to verify the progress of the activity (RAN#98, if I well remember from the discussion) and then decide if new objectives could be added.

But even this compromise solution may not solve the impact on RAN4, which I underline is the major concern.

And stop with the practice to push stuff in RAN1 and forget that without RAN4 (and RAN5) part nothing can be commercialized in practice

9 – Sony Group Corporation

We support proposal 2.

10 – ZTE Corporation

We are fine with proposal 2.

11 – Huawei Tech.(UK) Co.. Ltd

For the sake compromise, we can remove FR2-2. But we don't think it is necessary to remove mode 1 (as suggested by MediaTek). The benefit of Uu controlling sidelink was already proven in Rel-16, and it helps to reduce the inference in sidelink. Re-using Rel-16 design as much as possible can make the work load controllable

12 – NEC Corporation

We agree on the proposal, and removing the last bullet "*The study shall be completed by RAN#98 in which further objective refinement can be considered including the unlicensed frequency band in FR2-2.*" can make the study scope more clear.

13 – Samsung Electronics Romania

Actually, it seems that only option 2 in intermediate round seems not to be reflected in the summary of intermediate round since 20 companies want to remove the bullet "[*Frequency band for the unlicensed spectrum in FR2-2 is n263 (i.e., 60GHz). No specific enhancements optimizations for FR2 unlicensed spectrum*]". However, now it is still kept in the final proposal. Furthermore, we failed to understand the moderator's logic between the explanation "Based on expressed views and preferences, all three potential options of limiting the scope of first 3 objectives are widely supported by companies in order to reduce the amount of workload to a reasonable level to match the allocated 2TUs for the WI." and the last two bullets in the final proposal. Therefore, since majority companies have supported option 2 (that is, removing [...]), we prefer to remove last two bullets in proposal 2.

14 – Ericsson LM

We are generally OK with the proposal but prefer to modify the second part of the statement "The study shall be completed by RAN#98 in which further objective refinement can be considered including the unlicensed frequency band in FR2-2.". Given that no dedicated optimizations will be specified for FR2, and the long discussion on how to reduce the scope, we think that bringing back FR2-2 would go in the opposite direction and can hardly be considered a refinement of the scope, but rather an expansion of it.

In addition, we think there is no value in saying "specify, if necessary". There is no question that for supporting SL operation on unlicensed band it is necessary to make changes to the specification. The issue is whether there are enough TUs for it or not.

15 – Lenovo (Beijing) Ltd

We are OK with Proposal 2.

16 – Deutsche Telekom AG

Similar to TIM we proposed to drop this Proposal 2 completly from the Rel-18 work package as the workload is totally under-estimated.

17 – CAICT

We support proposal 2.

18 – China Mobile E-Commerce Co.

Agree to remove the bullet regarding FR2-2 to preclude the possibility of re-openining the lengthy discussion, and to minimize the workload under this objective as much as we can.

19 – ROBERT BOSCH GmbH

We can support proposal 2. We can also agree to exclude Rel-17 resource allocation (including partial sensing, which may fit well SL-U) for the sake of minimizing the work load.

20 – CATT

We think the scope reduction reflected above is the correct step toward a possible compromise.

However, we are still not sure why SL-U is exempted from the checkpoint in RAN#98 for further adjustment of the scope. This is regarding our concern raised before, which has never been given any reason :

For the objectives with a study phase ***(except for sidelink on unlicensed spectrum)****, RAN to determine in RAN#98 whether or not there is to be specification support in Rel-18 and if there is specification support, the scope of this work*

This is actually a rather big change, and contradicts with agreement during GTW discussion. It has not been discussed before. We exempt SL-U and make it different from the other two study will lose control of the scope of objectives.

We also noticed that now the study phase's activity has been changed to 'study and specify', this actually will increase the workload and make it difficult for the study phase to finish on RAN98#.

21 – Fraunhofer HHI

We are fine with proposal 2.

22 – InterDigital

We support proposal 2.

23 – Apple GmbH

We prefer to remove the following two sentences: "where Uu operation for mode 1 is limited to licensed spectrum only" and "No specific enhancements for Rel-17 resource allocation mechanisms", but can accept Proposal 2 for the sake of progress in considering the workload.

24 – Charter Communications

We don't see how keeping FR2-2 as a future scope extension is even feasible. There is no commonality between FR1 and FR2-2 SL-U design. Therefore, FR2-2 should be removed from the scope.

25 – Futurewei

For proposal 2, we are ok with the proposal and accept the suggested changes from moderator on the objective for SL-U.

26 – Intel Corporation (UK) Ltd

Overall, we are supportive of the proposal. Prefer to remove FR2-2 considerations. Suggest the following additional change:

"strive to *re*use the existing channel access schemes from NR-U ~~as a starting point~~ *and Rel-16 resource allocation mechanisms* ~~***as much as possible***~~***"***

27 – Philips International B.V.

We agree with proposal 2

28 – Philips International B.V.

In addition, we share the same view as Ericsson

29 – CableLabs

We object to updating NR-U. Also any unlicensed FR1 coexistence work is massive and it should be considered a separate SID. Based on the actual stated goals we do not agree with Proposal 2.

30 – BROADCOM CORPORATION

Similar position with CableLabs.

Please provide comments/suggestions below on Proposal 3 from end of the intermediate round.

Feedback Form 24: Proposal 3 of Section 3.2

1 – Beijing Xiaomi Mobile Software

We support the moderator's proposal.

2 – LG Electronics Inc.

We have concern on the wording "including any necessary sensing and resource allocation enhancements to address the impact of beamforming" as this will open more complicated discussion of resource allocation under beamforming and is thus against the direction of reducing the workload of each objective. So we propose to delete this part. We support the other part of Proposal 3 with a minor comment that we prefer replacing "enhancing" with "reusing" in the part of "existing sidelink CSI framework" in order to be aligned with the following text of "reusing Uu beam management concept."

3 – Transsion Holdings

We support Proposal 3.

4 – DOCOMO Communications Lab.

We have same view as LGE. Our understanding is that now we are trying to limit scope size of each objective. But that part (i.e. ”including any necessary sensing and resource allocation enhancements to address the impact of beamforming”) rather increases scope size. We do not understand why such an update is proposed.

5 – SHARP Corporation

We support Proposal 3 from Moderator.

6 – MediaTek Inc.

Suggest to remove this objective. The last proposal is actually increasing the work load by further taking into account additional sensing impact. Moreover, if FR2 doesn’t support broadcast enhancement, it is unclear on how to setup the connection for unicast. That is, it may imply that either FR2 doesn’t work or the existing FR2 can work well with no need of enhancement. Thus, this objective can be removed and left for e.g., R19, for the full-blown enhancement of FR2.

7 – vivo Communication Technology

We are fine with proposal 3.

8 – TELECOM ITALIA S.p.A.

The current proposal (to keep objectives 1, 2 and 3) is not acceptable to us.

The workload and especially the impact on RAN4 is not acceptable. and Therefore we are going to have sustained objection to the approval of the activity if the moderator’s proposal is brought forward.

Moreover, all the objectives 1, 2 and 3 aim to the same goal, i.e. to improve available data rates. Therefore, they are somehow redundant.

If the proponents are so confident all the work can be done, a possible compromise would be to start with one of the three objectives, have a hard deadline to verify the progress of the activity (RAN#98, if I well remember from the discussion) and then decide if new objectives could be added.

But even this compromise solution may not solve the impact on RAN4, which I underline is the major concern.

And stop with the practice to push stuff in RAN1 and forget that without RAN4 (and RAN5) part nothing can be commercialized in practice

9 – Sony Group Corporation

We support proposal 3. We are also OK with removing ”including any necessary sensing and resource allocation enhancements to address the impact of beamforming” to limit the work.

10 – ZTE Corporation

We support proposal 3.

11 – Huawei Tech.(UK) Co.. Ltd

We can agree with LGE to remove the “including any necessary sensing and resource allocation enhancements to address the impact of beamforming”, In Rel-18, the necessary framework for beam management is sufficient.

On MediaTek's comment, it is not necessary to rely on FR2 broadcast to setup the connection for unicast. A unicast connection can be set up based on FR1 broadcast, and the Rel-16 scheme can be used. So limiting FR2 to unicast has no issues and can benefit data rates.

12 – NEC Corporation

We agree on this proposal.

13 – Ericsson LM

While we still have the concern on the workload aspects and the number of available ThUs, we can agree on this proposal if FR2 study is kept in the Rel-18 scope.

14 – Samsung Electronics Romania

Although we generally fine with the updated proposal, we would like to clarify what FR2 other companies have in mind. From our side, we have thought that FR2 means FR2-1, not FR2-2. Actually, if FR2 also includes FR2-2, the supporting of SL on FR2-2 is highly non-trivial (including the discussion on whether and how to support 480/960 kHz SCS, which may need lots of evaluations). It is noted that Rel-16 sidelink even don't consider FR2-2 when making evaluation methodology. Furthermore, it seems not clear on "initial beam-pairing". So, it might be better to replace by "initial beam acquisition" and also it needs to add beam measurement and reporting for completeness. Therefore, we would like to suggest updated proposal 3 as follows.

3. Study enhanced sidelink operation on **FR2-1** licensed spectrum [RAN1, RAN2, RAN4]

   - *Update evaluation methodology for commercial deployment scenario*

   - Work is limited to the support of sidelink beam management (including **beam measurement and reporting, initial beam-~~pairing~~ acquisition**, beam maintenance, and beam failure recovery) by enhancing existing sidelink CSI framework and reusing Uu beam management **framework ~~concepts~~** wherever possible*, including any necessary sensing and resource allocation enhancements to address the impact of beamforming*.

   - *Beam management in **FR2-1** licensed spectrum ~~should prioritize~~ considers sidelink unicast communication only. ~~If time allows, beam management for broadcast and groupcast can be considered.~~*

15 – Lenovo (Beijing) Ltd

We still think the current 4 objectives are too much for only 2 TUs and quite slow progress for sidelink in Rel-16 and Rel-17 (considering that both the study and work item phase in Rel17 was delayed).

Optimizing the FR2 licensed spectrum is not justified yet considering that the majority of the companies raised concern on the availability of licensed band for sidelink operation, also we are not sure which licensed band in FR2 can be considered for sidelink.

Many operators such as DT, TIM, DCM, VDF raised the same concern about it and also on the work load that brings in with it both in RAN1 and RAN4, the commercial interest for such FR2 licensed band should be analyzed before committing to further optimization,

Our first priority is delay FR2 licensed to Rel-19 and second priority is to start FR2 licensed after RAN#98 and not delay sidelink CA by including the unlicensed band.

16 – Deutsche Telekom AG

This should be removed for workload reasons ... there will be a Rel-19 (promised !)

17 – CAICT

We are fine with proposal 3.

18 – China Mobile E-Commerce Co.

We are fine with Proposal 3 in general, and are open to remove "including any necessary sensing and resource allocation enhancements to address the impact of beamforming" to minimize the workload to the essential level.

19 – ROBERT BOSCH GmbH

Even though we prefer to down-prioritize FR2 to better manage the work load in this WI, we can accept it with the proposed reduced tasks.

20 – CATT

Similar to other companies, we also have concern for addition of wording 'including any necessary sensing and resource allocation enhancements to address the impact of beamforming" , instead of down-scoping this seems to increase the workload , and open the door for enhancement of sensing and resource allocation, which has been specifically not preferred by the group.

21 – Fraunhofer HHI

It is unclear why the part on "sensing…" was added. We support the proposed changes by LG and would be supportive of proposal 3 with these changes.

22 – InterDigital

We support proposal 3 from the moderator.

23 – Apple GmbH

We support Proposal 3 from the moderator, and are open to remove "including any necessary sensing and resource allocation enhancements to address the impact of beamforming" to further restrict the workload.

24 – Futurewei

For proposal 3, we can accept this direction but suggest some clarifications.

For limitation to unicast communication, we want to clarify it is only for data delivery. It should not exclude broadcast/groupcast of some information exchange on PSSCH, if there is any, for beam management purpose. Therefore, we propose to add a note.

- *Beam management in FR2 licensed spectrum ~~should prioritize~~ considers sidelink unicast communication only. ~~If time allows, beam management for broadcast and groupcast can be considered.~~* ***Note: it does not preclude broadcast/groupcast of some information on PSSCH, if there is any, for beam management purpose.***

Similar to Rel-16 NR SL which focused on FR1 but could be applied to FR2 without specific enhancement for FR2 (other than PTRS), the enhanced CSI for FR2 could possibly be used by FR1 without enhancement. So we suggest the following checkpoint at RAN#98.

- *The study shall be completed by RAN#98 in which further objective refinement can be considered including whether the CSI enhancement can be applied also to FR1 without specific further enhancement.*

25 – Philips International B.V.

We agree with proposal 3

26 – Verizon UK Ltd

We support the direction of moving forward on this proposal. Do share the similar concern as Futurewei and think during the study phase, it should not exclude broadcast/groupcast for necessary information exchange.

27 – CableLabs

We agree with Proposal 3 if will be capturing the relevant RAN4 workload, since the actual n96 and UNII-4 doesn't support, accordingly FCC Ttile 47, Subchapter A, Part 15, Subpart E

Further comments on other objectives in draft WID v003 (Final_round folder).

Feedback Form 25: Other objectives of draft WID v003

1 – TELECOM ITALIA S.p.A.

The current proposal (to keep objectives 1, 2 and 3) is not acceptable to us.

The workload and especially the impact on RAN4 is not acceptable. and Therefore we are going to have sustained objection to the approval of the activity if the moderator's proposal is brought forward.

Moreover, all the objectives 1, 2 and 3 aim to the same goal, i.e. to improve available data rates. Therefore, they are somehow redundant.

If the proponents are so confident all the work can be done, a possible compromise would be to start with one of the three objectives, have a hard deadline to verify the progress of the activity (RAN#98, if I well remember from the discussion) and then decide if new objectives could be added.

But even this compromise solution may not solve the impact on RAN4, which I underline is the major concern.

And stop with the practice to push stuff in RAN1 and forget that without RAN4 (and RAN5) part nothing can be commercialized in practice

2 – ZTE Corporation

For the objective 5, we still have one question. For the exact frequency bands, both licensed and ITS-dedicated spectrum in FR1 and FR2 are mentioned. Here does the FR2 denote the band used in Objective 3? If yes, since the objective 3 is only for study and whether it will be specified is to be detemined on RAN#98 meeting, it seems not necessary to mention it for now. Could you please clarify it?

"5. Support of new sidelink frequency bands for single-carrier operation and frequency band combinations for carrier aggregation operation [RAN4]

- The exact frequency bands for **both licensed and ITS-dedicated spectrum in FR1 and FR2** are to be determined based on company input during the WI."

3 – Futurewei

For Section 4.2 objective of performance part, we propose to add the CSI performance requirement as we already identified that enhancing CSI is necessary for SL FR2 beam management. Without CSI performance requirement, the entire SL FR2 feature is not complete for market adoption. We propose to add the following subbullet.

- *UE CSI performance requirements if RAN determines to have a specification support on enhanced sidelink operation on FR2 licensed spectrum in RAN#98*

4 – Intel Corporation (UK) Ltd

Propose to clarify objective for LTE/NR V2X coexistence, by adding the following bullet

- Update evaluation methodology for LTE-V2X and NR-V2X co-channel coexistence studies

4.2 Other details in draft WID v003 (Final_round folder)

Comments/suggestions on other parts of the draft draft WID v003 (Final_round folder)

Feedback Form 26: Other parts of draft WID v003

1 – Panasonic Corporation

We support the current draft WID. We would like to be supporting company.

2 – Beijing Xiaomi Mobile Software

Please add xiaomi as the supporting company.

3 – Transsion Holdings

We transsion would like to be the supporting company.

4 – SHARP Corporation

Please add ”SHARP” as a supporting company.

5 – TELECOM ITALIA S.p.A.

We are raising sustained objection to the current proposal

6 – VODAFONE Group Plc

As Telecom Italia have said, the Rel 18 workload on RAN 4 and RAN 5 should be taken into account. Also, the status of sidelink work from earlier releases in RAN 4 and 5 should be considered before starting new work in Rel 18 (e.g. only low RAN 5 activity levels are shown for sidelink in RP-212650/2652).

7 – Sony Group Corporation

Please add Sony as a supporting company.

8 – Nokia Denmark We support the WID. Please add Nokia and Nokia Shanghai Bell as supporting IM.
9 – Huawei Tech.(UK) Co.. Ltd Please add both Huawei and HiSilicon as supporting IMs.
10 – NEC Corporation NEC would like to be a supporting company.
11 – CAICT Please add CAICT to supporting company list.
12 – Deutsche Telekom AG We still observe that the proposal is far to large. The objectives 2 and 3 should be completly removed to have a managable WID. 6 & 7 are subbullets of 5 and should be placed there ...
13 – Fraunhofer HHI Please co-sign as indicated via email.
14 – InterDigital We support the proposed draft version of the R18 WID and please include IDCC as a supporting company.
15 – Verizon UK Ltd Please include Verizon as a supporting company
16 – Intel Corporation (UK) Ltd We propose to have SI with corresponding TR that will capture evaluation methodology and evaluation results. We still prefer to drop at least one of the study objectives to have more focused study and reduce load across WGs
17 – Philips International B.V. Please add Philips as a supporting company
18 – Futurewei Our proposed changes in Sec. 4.1 are all for clarifications. We are ok with the WID in general. Please add FUTUREWEI as a supporting company.

4.3 Moderator's responses to final round inputs

4.3.1 On Proposal 1 (objective 1)

To MediaTek, vivo, Sony, ZTE, NEC, Ericsson, Levono, DT, VW, Apple, Intel, Broadcom, good catch! the typo seems to be in the summary only, not in the draft WID.

To DT, Technically, in my understanding, there is no difference of CA in ITS band and CA in licensed bands in RAN1/2. The difficulty lies in CA when unlicensed carrier is involved. For RAN4, the work is based on operator's input. If there are no interests from operators, there will be no work for RAN4 to work on RF requirements for band combination.

To Telecom Italia, Different objective targets different industry, verticals and operator interests as can be seen using June workshop presentations and email discussions up to and including this meeting. During the 6 months, we have eliminated more than 10 different potential features that could further enhance the NR sidelink. What we have now the remaining 4 topics in my view is a good and balance set of features that are useful for everyone to further expand the SL technology to different verticals and operating scenarios. The concern on the workload has been addressed constantly during our email discussions. I believe the scope in each objective has been trimmed to the bare minimum now. No special optimizations to existing SL functions, limited communication type and frequency spectrum. Key changes / features are reused from existing defined functions from the Uu link. And therefore, the impact to RAN4 is also keep to the minimum. In fact, many of existing RAN4 RF requirements could be reused for SL and frequency bands / band combinations for licensed spectrum are driving by operators input. For the notion on objective 1, 2, and 3 aim to the same goal of improving data rate is not the real intention. For example, objective 2 for SL-U is about enabling SL communication in the unlicensed spectrum for enabling commercial applications (as currently defined ITS band can be only used for V2X and there are no operator licensed bands defined for SL). For objective 3, it allows operators to utilize their allocated FR2 spectrum in areas where there is no FR2 network coverage and to improve SL coverage at the same time. Only objective 1 is for improving data rate, but it could be also used for improving the reliability through packet duplication. If the concern is on the workload or unrealistic target, the check point in RAN#98 will help us in managing this properly before the normative work starts for some objective.

To CATT: The original recommendation in RP-213469 is to start the whole CA work after RAN#98. The discussion on this point was discussed in depth during the initial round. Without repeating the whole discussion, it is recognized to start the RAN2 part early to spread out the work while RAN1 can start after RAN#98, since RAN1 will be mostly occupied by the study phase of the other 3 objectives.

To All, there are still preferences from some companies to add back / inclusion of possibility to work on CA for unlicensed and FR2 bands. As instructed by the Chair and following his guidance to limit the scope / regulate the workload in RAN1 for all 4 objectives, the moderator recommends to limit the CA work in R18 to FR1 licensed spectrum and ITS band only.

To Ones who want to include unicast in the backward compatible section, please refer to HW's response and the moderator tends to agree with HW on the technical reasoning.

4.3.2 On Proposal 2 (objective 2)

To DCM, Samsung, Ericsson, MediaTek, NEC, Philips, For the first sub-bullet, agree it should be deleted since the FR2-2 unlicensed band is removed. For the second sub-bullet to have a check point for the work scope by RAN#98 was suggested by RAN chair during the last GTW session. If this is not needed, since the existing scope is already down to the bare minimum, the moderator has no problem of moving this entire

bullet during the next GTW session.

To MediaTek: Please refer to HW's answer on keeping mode 1 in the scope.

To CATT, For the part where it says "study and specify, if necessary" and "except for sidelink on unlicensed spectrum" came from the recommendations in RP-213469. In moderator's understanding, the intention is to continue with the normative work after study is completed in WG, just as in R17 SL WI. And the benefit of this is to have a smooth transition from the study to work phase when there are 2 meetings with in a quarter without having to wait and waste one WG meeting until the next plenary to make the decision. From the moderator's point of view, this can also facilitate the technical discussion and decision-making process more efficiently in the WGs without focusing only on the evaluation study. Resulting more technical decisions can be made and more progress can be achieved even during the study phase. So ideally, all objectives with a study phase should have a "study and specify" approach.

To Apple, thank you for the understanding that due to workload concern, no enhancement/optimization should be considered.

To CableLabs, Broadcom, since the whole R18 package is already endorsed on Monday, it is not possible to considered a separate SID.

4.3.3 On Proposal 3 (objective 3)

To LGE, DCM, MediaTek, Sony, HW, CMCC, CATT, Fraunhofer, Apple, addition of this part was proposed by Nokia. Technically, the moderator understands their concern and seems logically valid at this moment. But without a proper study, the moderator cannot be sure there is a significant impact on RA due to beamforming. Since the proposal had a word "necessary", it does not mean we will definitely do some enhancements to sensing and RA. But without this part in the WID, it also does not preclude any necessary enhancements once we found there is a problem during the study. For the sake of progress and not to include more aspects for the work, this can be removed for now.

To MediaTek, Lenovo, DT, I understand your preference to consider broadcast and groupcast at the same time. But removing the whole objective at this stage is not recommended especially when this is requested by operator, even if the work is limited to unicast. Please also refer to HW's response.

To Samsung, on the exact frequency range for the beam management work in FR2 can be discussed later during the evaluation stage. Although, I can understand your reasonings, but due to very late stage of SL WID discussion before the approval, it will require more discussion and checking by other companies. Since FR2 includes FR2-1, let's use the generic one for now. Regarding other changes, I also feel it is quite late to make changes and include more. Let me address your proposal by adding "etc" within the bracket.

To Futurewei, Verizon, this is a significant change to applied enhanced CSI for FR2 to FR1 and work scope expansion. The moderator advices not to consider this. For the proposed clarification change, it is very solution specific and better to discuss this during the actual study.

To CableLabs, this objective is intended only for FR2 licensed bands. Let me know if I misunderstood your comment.

4.3.4 On other objectives

To ZTE: Yes, it is mainly intended for objective 3. In this sense, you have a point. But since the existing NR sidelink already supports FR2 since Rel-16, if an operator wishes to use SL in FR2 licensed carrier, we should still allow them to bring FR2 frequency band proposal to RAN4 to define RF requirements without needing the objective 3.

4.3.5 On other parts of draft WID (v003)

To Vodafone: It should be first clarified that RAN5 work scope and planning is not part of a normal RAN1/2/3/4 core WI. Secondly, RAN4 core work of this R18 WI starts 3Qs after RAN1 (after Dec 2022). This means there is a substantial gap between now and then (1 year) to complete their R17 work in RAN4. Normally, then after that, RAN5 WI will be created.

To Futurewei, in moderator's understanding, CSI requirements are considered to be part of core work in RAN4.

To Intel: Since the study is intended for V2X only, then all existing evaluation assumptions defined in R16 should still be applicable and reused.

4.4 Output of final round discussion

Based on the inputs raised in the last 3 rounds of discussions and the discussions that the group had in the GTW session, the latest version of the WID is provided in RP-213556 for the GTW session on December 10, 2021.

5 Week 2 Initial round

5.1 Managing NR sidelink WI workload

During the GTW session on December 10, 2021, there was still a strong concern on the overall workload (also in RAN4) to carry out WG study for 3 objectives before RAN#98 and potentially normative work for all 4 objectives after RAN#98. Some also questioned that if a decision cannot be made now on which objective(s) will be specified in Rel-18, it is equally as hard to make a decision in RAN#98.

It is, therefore, the moderator would like to propose a staggered approach to resolve the workload concern and also making Obj. 3 (beam management for FR2 licensed band) into a study phase only in Rel-18, with potentially a follow up normative work in a future release.

In the staggered approach, it is propose that Obj. 4 (coexistence study and specification) is handled until RAN#98 and followed by Obj. 1 (SL-CA) RAN1 part after RAN#98. For Obj. 3 (FR2 beam management), the study starts only RAN#98 to update evaluation methodology and identify potential solutions / specification impact in Rel-18. For Obj. 2 (SL-U), the study phase is to be completed by RAN#98 and the normative work starts after that.

With this staggered work plan, the workload in RAN1 is more spread-out working on no more than 3 objectives at the same time, while the workload impact to RAN2 and RAN4 is also reduced. In summary:

Staggered work approach:

- Objective 1 (SL CA) RAN1 part starts after objective 4 (where the RAN2 1TU in 4Q'2022 can be used for Obj. 1 and 2).
- Objective 2 (SL-U) study and specify in Rel-18. The study phase is to be completed by RAN#98.
- Objective 3 (FR2) study after RAN#98 with limited TU in RAN1 only. The scope includes update evaluation methodology, identify potential solutions and specification impacts.
- Objective 4 (co-CH coexist) study and specify, if necessary, in Rel-18. This objective should be completed by RAN#98.
- Overall RAN4 impacts (after RAN#98) due to:
  - Obj. 1 (SL-CA) based on band combination request in FR1 licensed and ITS band
  - Obj. 2 5GHz and 6GHz unlicensed bands (similar UE RF requirements already defined in NR-U)
  - [Obj. 4 depending on solution for coexistence]

Feedback Form 27: Managing the workload - staggered approach

1 – DOCOMO Communications Lab.

We can support this approach. It seems that scope size for each quarter is organized well.

Of course this is not best from our perspective, but we think this is best we can do as RAN group, at least much better than previous one. The previous version has a checkpoint to discuss whether to specify or not for each, but we can easily assume that situation at the checkpoint is same, and in the end the WID includes all objectives and the work item is not concluded on time. Current version avoids such a undesirable way.

2 – TELECOM ITALIA S.p.A.

same view as DOCOMO

3 – Charter Communications

We suggest applying the moderator's approach to Obj. 2 instead of Obj. 3. That is, Objective 2 (SL-U) study after RAN#98 with limited TU in RAN1 only. The scope includes update evaluation methodology, identify potential solutions and specification impacts. The reason is that SL-U genuinely needs a study phase to ensure coexistence with other unlicensed 3GPP and non-3GPP technologies. On the other hand, Obj. 3 is more straightforward and does not present any coex issues.

4 – Huawei Tech.(UK) Co.. Ltd

We are supportive of the moderator's proposal.

In summary, the study-only objective 3 after RAN#98 releases sufficient time for objective 2 (study phase + WI) which is important for extending Rel-18 to support vertical commercial applications. Note that objective 2 scope is already largely reduced. In addition, TU will be further released for objective 2 study by the arrangement for the start time of objective 1, of which scope would be small and limited since it is only targeting at support of existing LTE-V technologies in NR.

5 – CableLabs

The most demanding part in terms of workload is NR-U study. WE suggest to apply the moderator's workload downscoping to Objective 2 and not to Objective 3. Specifically start SL-U not earlier than RAN

P #99, with a limited RAN1 TU allocation only. WEealso raise the issue of a RAN4 SID since bands n46 n96, particularly UNII-4/5/6/7/8 do not support UE to UE communications (e.g. SL Mode 2 of operation).

6 – BROADCOM CORPORATION

As we indicated multiple times we believe that the current proposal does not addresses our concerns regarding how objective 2 is to be handled. At a minimum we support CableLabs and Charter position that ”The most demanding part in terms of workload is NR-U study. WE suggest to apply the moderator’s workload downscoping to Objective 2 and not to Objective 3. Specifically start SL-U not earlier than RAN P #99, with a limited RAN1 TU allocation only. We also raise the issue of a RAN4 SID since bands n46 n96, particularly UNII-4/5/6/7/8 do not support UE to UE communications (e.g. SL Mode 2 of operation”

7 – Ericsson LM

We are supportive of the moderator’s proposal for approach to get the scope agreed. One specific proposal on the wording: It should be clarified that Obj 1 starts after objective 4 is completed.

8 – VODAFONE Group Plc

The moderators’ proposal seems a good approach. Agree with the comment form Ericsson.

9 – Comcast

5G-NR-U requires study which will be time consuming and so we want to apply moderators approach downscoping to objective 2, as opposed to objective 3. We are aligned with Charter and Cablelabs comments and preferences.

10 – ROBERT BOSCH GmbH

Bosch supports the moderator’s proposals and compromise. We also would like to add Robert Bosch GmbH as a supporting company to this WID. Now, it seems to us that the work load can be handled in Rel-18; here is our view in more details:

- As indicated online, Objective 4 and Objective 1 are very important for automotive. We will be also fine if Obj 1 starts after Obj 4 is ”completed” as proposed by Ericsson.
- Regarding Objective 2, we support the current scope. We also believe that unlicensed operation will enhance the commercial value of SL.
- Finally, Objective 3, in such a limited study scope, can be accepted in order to keep whole SL doable. Rel-19 can further develop SL-FR2, i.e., once we are able to identify the possible frequency bands.

11 – CATT

We appreciate the effort from the moderator during discussion process. Similar with some other companies, this is is not best from our perspective, but as compromise we are OK with this to proceed.

12 – Futurewei

We feel that the RAN chair proposal to study 2,3,4, then work on (some of) 1,2,3,4 (TBD after study) was a better way, as we can still limit to three items and there is still a chance for normative work on 3. We will also be in a better position to scope the work after the study. The current proposal from the moderator loses the possibility of normative work for 3 and front-loads 4, which we feel is less important than 3 and a better choice to be made study only. However, from a workload perspective, the chair proposal and the moderator proposal are both OK, and if the group is going in this direction, we can accept it. It is

very important however that 2 remains a full release study/specify objective, to both ensure adequate study for any possible concerns AND so that the study output is available at approximately the same time as unlicensed is to be considered in the positioning WI.

13 – Panasonic Corporation

We support the proposal.

14 – Qualcomm Incorporated

We disagree with the proposal.

It compresses, but does not reduce, the workload and jeopardizes completion of objectives. It also allocates more WG time and work for Objective 1 (sidelink CA), which is the lowest priority objective of the four in our view, at the expense of other objectives. This objective started with all the work after RAN #98 but is now starting earlier in RAN2.

Objective 3 (sidelink over FR2) is of commercial interest to address new high throughput applications, yet it is now changed to a study only in Rel-18 to make more room for Objective 1. In our view, work on FR2 should be prioritized over SL CA. Given the group's desire to additionally limit the workload of Rel-18, we prefer to delay SL CA until a future release.

Objective 4 (co-channel coex) was highlighted by the automotive industry as the highest priority item for sidelink evolution in Rel-18 and no company expressed concerns or opposition. However, the proposed work approach limits the time available for it, reducing the study phase to two RAN1 meetings, which are not enough, to accommodate a lower priority item. This is not a direction we can support and we propose reverting back to study until RAN 98 followed by the work phase.

15 – Apple GmbH

We support the staggered work approach. Basically, before RAN# 98, RAN1 has Objective 4 (SI+WI) and Objective 2 (SI). After RAN # 98, RAN1 has Objective 1 (WI), Objective 2 (WI) and Objective 3 (SI). It also allows RAN2 to start working on sidelink CA before RAN# 98. With this approach, the workload (especially RAN1 workload) is pretty much balanced and acceptable over the whole Rel-18 timeline.

16 – CAICT

We support moderator's proposal.

17 – LG Electronics Inc.

We are generally fine with the direction of the moderator's proposal. We want to point out one point.

SL CA is an important feature for automotive. 5GAA input already indicated that this is the 2nd highest priority (not counting the positining enhancement which is being treated in another SI) for the sidelink enhancements. In our view its major work will be done in RAN2 and thus starting its RAN2 work from the beginning while waiting for other RAN1-led objective progress will help RAN2 workload management. We would like to confirm that Ericsson's proposal is to start the RAN1 part of SL CA after the completion of the co-channel coex objective.

18 – Transsion Holdings

We support the staggered approach in general. Compared to the previous one, this staggered approach evenly distributes the entire study and nomortive work to all R18 quarters. One question that needs to be clarified is, if there is no follow-up normative work, what is the expected outcome of objective 3. We know that the outcome of the study phase will not be captured into the TR, because this is a work item.

19 – Lenovo (Beijing) Ltd

With this staggered work plan, we think Rel-18 Sidelink evolution is well arranged. The work load is fully spread among the entire release. We support this proposal.

20 – Verizon UK Ltd

We don't agree with moderator's proposal.

We agree with Qualcomm and work on FR2 licensed spectrum should be prioritized over SL CA.

Sidelink hasn't been widely commercialized, a major reason is the lack of the licensed spectrum support. Support FR2 licensed spectrum indeed provides huge opportunity on sidleink commercialization and increase the spectrum usage. There is indeed urgent operator's need on the support of sidelink operation on FR2 licensed spectrum.

21 – Guangdong OPPO Mobile Telecom.

From workload's perspective, in our view SL-U and co-channel coexistence are the highest priority. We may still need to review the situation for SL-CA and FR2 at a checkpoint in RAN#98.

22 – SHARP Corporation

We support the proposal from the moderator.

23 – Samsung Electronics Romania

Thank you very much for moderator's great efforts to move forward.

Since 4 objectives in previous draft WID have reflected different flavors from different sectors and each objective had its own urgency to be specified in Rel-18, we think that including 4 objectives is better than this staggerd approach. Especially, from our perspective, objective 3 should be in the scope of Rel-18 considering that there has been strong desire from the market for its commercialization. On the other hand, we also understand strong concerns from some operators on the scope and the way to accommodate it is to reduce the scope further.

Having said that, we think that objective 2 and objective 3 need to be studied first followed by objective 1 and objective 4 because objectives 2 and 3 have not studied in 3GPP so far. On the other hand, objective 1 can be easily specified based on LTE CA and even though we understand strong demand on objective 4 from 5GAA, we still think objective is a kind of optimization on top of semi-static resource pool configuration.

In summary, objectives 2 and 3 need to go in parallel and with this approach, we will only have two objectives 2 and 3 until RAN#98 and objectives 1 and 4 will start after RAN#98. Whether or not to have normative work for objectives 2 and 3 will be decided at RAN#98 depending on the outcome of the studies.

24 – Hewlett-Packard Enterprise

We agree that some objectives should be downscoped in order to progress on other fronts. However, we are concerned that the proposal neglects to consider the substantial study that would still needed to establish adequate coexistence before any significant progress could be made on Objective 2 (SL-U) and fails to recognize the more immediate commercial value of Objective 3. We concur with Qualcomm's observation

regarding the need to prioritize work on Objective 3 over Objective 1. We further concur with CableLabs, Broadcom, and Charter that consideration of Objective 2 should be deferred until at least after RAN P #99.

25 – Beijing Xiaomi Mobile Software

We are supportive to the moderator proposal. We also agree with Ericsson that object 1 only starts if object 4 is complete by RAN 98 meeting.

26 – vivo Communication Technology

We can accept the staggered work plan if it can address the concern of workload.

However, considering that SL FR2 (Objective 3) has not been carefully discussed before, while LTE/NR coexistence (Objective 4) has somewhat already been discussed in Rel-16 (thus, the potential solution/impact should be much clearer than FR2), we would prefer to start Objective 2 and Objective 3 first, and start Objective 1 (RAN1 part) and Objective 4 after RAN#98.

27 – NEC Corporation

We agree on the staggered approach as it better balances the overall workload of the WI.

28 – Fujitsu Limited

We support the proposal.

29 – Philips International B.V.

We agree with the staggered approach proposed by the moderator

30 – China Unicom

We support moderator's proposal, and we may review the situation for SL-CA and FR2 at a checkpoint in RAN#98.

31 – ZTE Corporation

We are basically fine with the staggered approach. For objective 1, the RAN1 work starts after the completion of objective 4, which allows RAN2 to start working on sidelink CA before RAN# 98. This may balance the RAN1 workload and also ensure RAN2's progress to fit into the timeline. For example, RAN2 may focus on specification work of objective 2 after RAN#98. For objective 3, we support the current arrangement, i.e., this part of the work is to be started after RAN#98. Actually, we may have a check point to discuss whether the workload is fit for the TU and when the SL FR2 should be studied. For objective 4, it is acceptable for us if the study and specification work can be completed before RAN#98. However, if this objective would not be completed on time, should this objective be delayed one more quarter or should the incompleted issues/solutions be dropped? Is the RAN1 start date of obective 1 be impacted or not? It is suggested to make clear.

32 – Fraunhofer HHI

We agree with the staggered approach proposed by the moderator. We are also ok to clarify that Objective 1 in RAN1 starts after the completion of Objective 4.

33 – Intel Corporation (UK) Ltd

Thanks for further efforts to reduce workload, which is an important step to move forward. Unfortunately, current situation is still not ideal, but it seems that the staggered approach is the only possible option to make progress and we tend to accept this approach. For staggered approach, we are open changing the order of objective 3 and objective 2 in terms of timelines.

One additional request from our side is to organize a TR to collect the results of studies for objectives 2-4.

34 – Volkswagen AG

The moderator's proposal sounds reasonable and is agreed to.

35 – Sony Group Corporation

We support this proposal from the moderator.

Feedback Form 28: Redundant feedback form - please ignore

5.2 Summary of week 2 initial round

Issues and suggestions raised on the Week2 initial round proposals and objectives

- Overall staggered approach
  - All 3 heavy objectives (CA, unlicensed and FR2) are in parallel after RAN#98, creating too much workload for RAN1 and other WGs.
  - No checkpoint to control the scope (at the same time there are preferences not to have a checkpoint).
    - A checkpoint is still needed to assess workload situation in RAN#98
  - It compresses, but does not reduce, the workload and jeopardizes completion of objectives.
  - Inclusion of 4 objectives is better than the staggered approach
- Objective 1 (SL carrier aggregation)
  - Lowest priority objective out of the four, and should not be given higher priority than others.
  - Delay to a future release.
- Objective 2 (SL over unlicensed)
  - Down scoping by start after RAN#99 with limited RAN1 TU
  - Unlicensed band n46 and n96 do not support UE to UE communication (SL mode 2)
  - Remain a fully release of study then normative work. The study outcome can be used for SL positioning.
- Objective 3 (multi-beam FR2)
  - Not long enough to allow specification support in R18

    - Study only in R18 to give more time for Obj.1 is seen as lower priority
    - Operator demand to specify in R18, the study should start from the beginning

- Objective 4 (LTE-NR-V coexistence)

    - Reduced timeframe for study phase and work phase until RAN#98 is not enough
    - If the work cannot be completed in set timeframe, it will impact subsequent SL-CA work and workload for other objectives.

Moderator's comments and proposal for Week2 intermediate round

Although there are some supports toward the staggered approach, there are also some serious concerns still on the overall workload of this WI and lack of control of scope/workload after RAN#98. Additionally, in the staggered approach it is assumed obj. 4 can be completed by RAN#98 and obj. 1 RAN1 part will start after that. However, there is an uncertainty whether this can be achieved due to the short timeframe. Due to these concerns on compressing some of the objectives and the approach cannot be accepted, the work plan and the scope needs to be updated once again.

For the next intermediate round of discussion, the moderator proposes to focus on obj. 2 (SL-U) and obj. 4 (coexistence) firstly. At a checkpoint in RAN#98, based on the progress made on these two objectives, decide to start obj. 1 (SL-CA) or obj. 3 (multi-beam FR2) to minimize the workload and impact to other WGs.

In bullet/summary form:

- SL-U and coexistence objectives to start from the beginning
- SL-CA (all WGs) and multi-beam FR2 are put on-hold until RAN#98
- At RAN#98, to decide on SL-CA or multi-beam FR2 considering workload and importance

Please refer to v006 in draft inbox for the corresponding WID for this new proposal approach.

Note that, obj. 2 (SL-U) cannot be postponed due to it is already that other R18 project work (e.g. at least SL positioning) has some dependency on the study outcome of SL-U by RAN#98.

6 Week 2 Intermediate round

6.1 Managing NR sidelink WI workload

Please provide comments / suggestions to the moderator's proposal below (copied from Section 5.2).

For the intermediate round of discussion, the moderator proposes to focus on obj. 2 (SL-U) and obj. 4 (coexistence) firstly. At a checkpoint in RAN#98, based on the progress made on these two objectives, decide to start obj. 1 (SL-CA) or obj. 3 (multi-beam FR2) to minimize the workload and impact to other WGs.

In bullet/summary form:

- SL-U and coexistence objectives to start from the beginning
- SL-CA (all WGs) and multi-beam FR2 are put on-hold until RAN#98
- At RAN#98, to decide on SL-CA or multi-beam FR2 considering workload and importance

Please refer to v006 in draft folder (Week2_intermediate_round) for the corresponding WID for this new proposal approach.

Feedback Form 29: Managing the workload - intermediate round

1 – Nokia Denmark

We support this proposal from the moderator.

2 – Charter Communications

We echo Intel's proposal for a TR to capture the results of SL-U and LTE coexistence with a properly-worded SL-U objective that emphasizes SL-U shall not impact an unlicensed NR-U/non-3GPP network more than another network of that technology with respect to user-perceived throughput and latency.

3 – Verizon UK Ltd

Thanks for moderator's summary and we do not agree with this proposal and we don't think this proposal addressed the issues and suggestions raised on the Week2 initial round proposals and objectives (section 5.2). This proposal leaving the Objective 3 actually as to be determined.

The moderator's proposal of "…. At a checkpoint in RAN#98, based on the progress made on these two objectives, decide to start obj. 1 (SL-CA) or obj. 3 (multi-beam FR2) to minimize the workload and impact to other WGs" is not clear and not acceptable to us. In addition, the WID draft doesn't clearly state if the Objective 3 will have a study phase and a normative work phase or not.

We think Samsung's proposal of objectives 2 and 3 need to go first in parallel with a study phase is more reasonable, and with this approach, we will only have two objectives 2 and 3 until RAN#98 and objectives 1 and 4 will start after RAN#98. Whether or not to have normative work for objectives 2 and 3 will be decided at RAN#98 depending on the outcome of the studies.

Other options, as CableLabs and Charter Communications pointed out, bands n46 n96, particularly UNII-4/5/6/7/8 do not support UE to UE communications, and SL-U indeed has a very large scope which requires huge amount of work to study the coexistence with other unlicensed 3GPP and non-3GPP technologies. May consider this Objective as study only item in Rel-18.

4 – Ericsson LM

Our preference is to take the proposal from the previous round, given that it was a compromise with very wide support.

We agree with Verizon that the scope of the work to be performed regarding objective 3 is not clear. We are supportive of clarifying this, and the work study needs to be added back. With such change, we can agree to the moderator's current proposal.

In addition, we think that SL-CA should be considered. It was the topic with widest support and with real use cases behind the support (PS, V2X see RWS-210360).

5 – Futurewei

We can live with the proposal from the moderator. Please include text that the Objective 4 study on SL co-channel coexistence is also to be completed by RAN#98, so that all of the study outcomes are available at the point when we decide on the remaining work scope.

6 – CATT

We can live with this version from the moderator, if other companies are fine . However, we also think there are problems with this arrangement.

1. As Ericsson pointed out, SL-CA is the objective with the widest support from the count of previous discussion, So we shared the view that SL-CA should not be de-prioritized .

2. As Verizon pointed out, SL-U has a very large scope which requires huge amount of work to study, so we support Verizon proposal to consider this objective as study only item in Rel-18.

3.We see other company expressed the view that all of the study outcomes should be available at the check-point on RAN#98 when deciding on the remaining work scope. We agree with this view that in #RAN98 all objectives should be reviewed again to make sure the scope and progress is under control, and this should be made clear in the WID.

7 – CableLabs

We have to re-iterate our previous objections to the WID objectives, which were not considered so far:

1. As previously indicated by Intel, Charter, Broadcom and other parties, the same fairness coexistence criteria employed by LAA LTE and later updated by NR-U shall be re-used for any evaluation work.

2. So far we failed to see any compelling reasons why the NR-U work-frame in terms of channel access mechanism and frame structure can't be re-used by SL-U. Therefore we recommend the SL-U to re-use NR-U specifications, identify the NR-U specifications non-compliance with SL-U coexistence with Wi-Fi, if any, and make proper recommendations.

3. RAN4 shall study and recommend suitable 3GPP bands supporting SL-U, based on the limitations imposed by different national regulatory boards on device to device communications in unlicensed 5 and 6 GHz. So far, our understanding is that FCC Title 47 CFR15.407(d)(u) and CFR15.407(a)(3)9v) precludes the use of device to device communications in UNII-5/6/7/8 and respectively UNII-4. If correct, FCC allows SL-U Mode2 only in UNII-1/2/3.

We do not agree with the Objectives 2 and 4 as referenced by v006 WID.

8 – BROADCOM CORPORATION

From our perspective we can not discuss the overall workload without a clear understanding of the objectives of this WI and, so far, we have not agreed on the current objectives.

We continue to support the objections to the WID objectives detailed by CableLabs above as well as during previous rounds and request the moderator to take them into account before this discussion concludes.

9 – CableLabs

We would like to correct a typo on the last sentence of our position: we do not agree with Objective 2 and party with Objective 5, as referenced by v006 WID

10 – Huawei Tech.(UK) Co.. Ltd

- The previous version seems preferable, and had sufficient support for approval.

- In this latest version, objective 4 (coexistence) is not suitable. It is a poorly-defined objective compared to the others, with almost no definition of what it means in case any actual specification turns to be needed, nor even really what is being studied. Worse, it has expanded from being complete by RAN#98 to taking on the entire release, and putting at risk all the other objectives - including the approval of objectives 1 and 3. Thus objective 4 must be timepointed to finish in RAN#98. A secondary alternative for the sake of compromise is run the coexistence study RAN#97 - 98, and then in RAN#98 take the responsible overall workload view in arranging objectives 1,2,4, including completion of coexistence by RAN#99. If proponents claim that is not sufficient time, then the objective is much more unweildy than previously revealed.

To CableLabs et al. It seems your concern is on coexistence with WiFi and if the NR-U specification principles can be used, and having RAN4 eyes on the work. Yet, this seems well within the scope of **the text in bold below**; and certainly well enough that it would be reasonable of you to raise your technical points in WGs. Whereas it does not sound reasonable to expect RAN to reach already now the conclusions you are confident of, because it is technical pre-judgement, but your confidence suggests it would be easy for you to win those arguments in RAN1+4.

2. Study and specify support of sidelink on unlicensed spectrum for both mode 1 and mode 2 where Uu operation for mode 1 is limited to licensed spectrum only [RAN1, RAN2**, RAN4**]

- Update evaluation methodology for sidelink operation on unlicensed spectrum for commercial deployment scenario as well as **coexistence aspects with incumbent technologies (e.g., Wi-Fi)**.

- Sidelink channel access mechanism for unlicensed spectrum shall be based on regional regulation requirement and **strive to reuse the existing channel access schemes from NR-U** and Rel-16 resource allocation mechanisms as much as possible

o No specific enhancements for Rel-17 resource allocation mechanisms

- Required changes to NR sidelink physical channel structures and procedures to operate on unlicensed spectrum

o **The existing NR sidelink and/or NR-U channel structure shall be reused as much as possible**

o **No specific enhancements for existing NR SL feature**

- The study is to be completed by RAN#98, in which decide whether or not FR2-2 is included or not.

11 – Hewlett-Packard Enterprise

We share the concerned expressed by CableLabs, Broadcom and others regarding SL-U, coexistence with other users, lack of UE-to-UE support in n46 and n96, and the general complexity of objectives that appear prioritized in the current proposal, over the reasoned objections of many parties. We cannot support the current proposal.

12 – ROBERT BOSCH GmbH

We can try this version if the majority will accept it. However, we prefer the previous version as indicated in our previous comment. We don't like to deprioritize/put conditions on CA as it was supported by many companies and, also, automotive sector (via 5GAA). In our view, the most supported objectives are: 1, 2, and 4.

Therefore, if we need to deprioritize, we may consider objective 3 (FR2) as a conditional objective (e.g., a SI which may be Checked in RAN#98, i.e., if time permits).

We also agree with Huawei's clarification on SL-U coexistence with incumbent technologies. Our intention is also to guarantee safe an fair coexistence with WiFi. However, we also understand it is captured in the objectives as well. May be we can try to add:

”strive to reuse the existing channel access schemes from NR-U and Rel-16 resource allocation mechanisms as much as possible **to guarantee fair coexistence with incumbent technologies**.”

13 – DOCOMO Communications Lab.

We also think the previous version is much better. Even if we have a checkpoint to discussion which objective can be included in this work item, the situation is same as current one. Just companies requesting some objective will keep pushing it and other companies requesting other objective will propose that. The checkpoint does not work well.

The previous version rather reduces scope size well, and it seems that more companies support/accept it. We suggest to use the previous version. On the previous version, we are fine with modifications to change handling order as long as scope is still reasonable.

14 – Panasonic Corporation

We are also ok with this version.

15 – Beijing Xiaomi Mobile Software

We are fine with either this version or the previous version.

16 – Cisco Systems Belgium

Cisco agree with the concerns of other commenters in relation to coexistence. It is vital that the proposed work not depart from the basic principles for coexistence that were agree after much discussion between stakeholders from the NR and Wi-Fi communities. It is not good enough to ”strive strive to reuse the existing channel access schemes from NR-U”. Any channel access must reuse the existing channel access schemes from NR-U.

17 – Apple GmbH

We prefer the work plan in Week 2 initial round. Since SL CA has the widest support, we think it should be in the work plan after RAN #98. As a compromise, we may clarify that if co-channel coexistence is done by RAN #98, then we proceed with all remaining objectives after RAN #98. If co-channel coexistence is not done by RAN #98, then we can consider deprioritizing either multi-beam FR2 or co-channel coexistence after RAN #98.

18 – vivo Communication Technology

We still prefer to start Objective 2 and Objective 3 first, and start Objective 1 (RAN1 part) and Objective 4 after RAN#98, considering that SL FR2 (Objective 3) has not been carefully discussed before.

If this approach were not agreeable, we would prefer the previous version. The current version would make the RAN2 work unbalance before and after RAN#98-e, because the RAN2 work is expected quite limited for objective 2 and objective 4 before RAN#98-e, but would be inflated after RAN#98-e due to the start of CA.

We also agree with Huawei that the coexistence of SL-U and WiFi are already well within the scope.

19 – LG Electronics Inc.

In our view, the previous version is better and received enough support for the progress. We think there are several issues in the new version as follows:

- We think SL CA should not be deprioritized as several companies mentioned above. It received wide support and also specific request from the verticals. And as we mentioned before, starting RAN2 work for this objective would be the best way of utilizing the given TU allocation. From the automotive perspective, we think Objective 4 needs to be operated together with SL CA because we don't think it is practical in fulfilling the required QoS for advanced applications using NR SL to rely only on a single SL carrier shared with LTE SL; in other words, more practical usage is there is a carrier dedicated to NR SL (or at least NR SL is prioritized over any other technologies) and NR SL uses another carrier shared with LTE SL when the bandwidth of the dedicated carrier is insufficient.

- As several companies already mentioned, it is unclear whether Objective 3 will have study only or have a normative phase as well in Rel-18. We think it is not practical to have both study and normative work in Rel-18 if this starts at RAN#98.

- We think the note added in the positioning SID should not be interpreted as a guarantee for Objective 2. If not enough information is prepared at the check point of the positioning SID for any reason (e.g., slow progress in SL Evo WI, removal of Objective 2 from this WID, etc.), unlicensed band will not be considered for SL positioning in Rel-18 as per the note.

20 – Qualcomm CDMA Technologies

We appreciate the Moderator's effort to find a good set of objectives. In our opinion, we would like to use the available workload for the objectives with larger commercial interest and prospects. In that sense we see Objectives 2 (SL-U), 3 (FR2) and 4 (Coex) of greatest relevance.

Re. the formulation of Objective 2 and the comments received from multiple companies, we would like to suggest a simplified formulation of the objective as follows:

[…]

2. Study and specify support of sidelink on unlicensed spectrum for both mode 1 and mode 2 where Uu operation for mode 1 is limited to licensed spectrum only [RAN1, RAN2, RAN4]

- Channel access mechanisms from NR-U shall be reused for sidelink unlicensed operation
  - Assess the applicability of sidelink resource reservation from Rel-16/Rel-17 to sidelink unlicensed operation within the boundaries of unlicensed channel access mechanism and operation
- Required changes to NR sidelink physical channel structures and procedures to operate on unlicensed spectrum
  - The existing NR sidelink and NR-U channel structure shall be reused. If the existing NR-U framework does not support the required SL-U functionality, this objective will make appropriate recommendations for approval
  - No specific enhancements for existing NR SL feature
- The study is to be completed by RAN#98, at which time RAN will decide whether or not FR2-2 is included in the normative scope.

[…]

5. UE Tx and Rx RF requirement for supporting new features introduced in this WI, sidelink frequency bands for single-carrier operation and frequency band combinations for carrier aggregation operation [RAN4]

- The exact frequency bands for both licensed and ITS-dedicated spectrum in FR1 and FR2 are to be determined based on company input during the WI.
- The exact frequency band combinations for both FR1 licensed and ITS-dedicated spectrum are to be determined based on company input during the WI. (Subject to RAN#98 decision)

- Frequency bands for the unlicensed spectrum in FR1 are [n46 and n96/n102] (i.e., 5GHz and 6GHz) in accordance with corresponding national regulatory requirements.
    - Support of new sidelink frequency bands and band combinations should ensure coexistence between sidelink and Uu interface in the same and adjacent channels in licensed spectrum.

[…]

21 – Fujitsu Limited

We support this proposal.

22 – TOYOTA Info Technology Center

We prefer the work plan in Week 2 initial round (with modified handling order and combination of objectives if necessary). It has a better balance between objectives and workload as a compromise.

23 – Sony Group Corporation

We prefer the previous version. But we can accept this version if this can be compromised.

24 – Samsung Electronics Romania

Many thanks to moderator for further updated proposal.

Actually, there are two ways to reduce workload in Rel-18 sidelink. 1) taking all objectives with conditionally down-scoping details of all objectives, and 2) deprioritizing some of objectives. It is noted that the way of 2) has been failed since June because it does not reflect different interests from different players. So, our preference is to go with 1) and we would like to suggest the following proposal in order to reduce workload further.

- For objectives 2 and 3, we have study phase until RAN#98 (check point).
    - RAN#98 determines whether any of the objectives 2 or 3 can be converted to a work phase.
- Objective 1 starts work phase from RAN#98 (in RAN1 perspective).
- For objective 4, we have study phase (and work item, if necessary) until RAN#98.

We have some questions/clarifications for latest WID 006.

- Main sentence is saying that "*RAN to determine in RAN#98 whether objective 1 (SL carrier aggregation) will start, and the scope of the work.*" while objective 1 starts with "*specify* ". Here, we are wondering whether objective 1 is necessary because the main sentence means that the scope of objective 1 will be determine at RAN#98.
- For objective 2, we noticed that FR2-2 is added back from previous version without related discussion and common understanding. So, we prefer to do limitation only for FR1 to reduce workload.
- For objective 4, it seems workload is rather larger than previous version because "(This part of the work should be completed by RAN#98)" is deleted. It is not clear why this sentence is removed and we prefer to limit the study phase until RAN#98 as previous version.

25 – MediaTek Inc.

We support this proposal from the moderator. And the co-existence objective could be closed by RAN#98 as proposed early.

26 – Transsion Holdings

We slightly prefer the previous version. but we can accept this version if most companies support it.

We have different views on the ”reuse the channel access schemes from NR-U” proposed by some companies. The word ”reuse” is not clear to us, does it mean simply copying the NR-U’s existing channel access scheme, or can the existing scheme be modified to be suitable for SL-U scenario. After all, we cannot prejudge that the channel access scheme of NR-U can be well applied to SL-U scenario before we have a careful study. Therefore, we believe the current word ”strive to reuse the existing channel access schemes from NR-U” is applicable at this stage.

27 – CAICT

We support moderator’s proposal.

28 – Intel Corporation (UK) Ltd

We propose to add a very minimal work from objective 3 (multi-beam FR2-1) to start from the beginning: “Update evaluation methodology for commercial deployment scenario” till RAN#98. Allowing this small work can be a good compromise while addressing workload concern.

The 2nd request from our side is to organize a TR to collect the results of studies for objectives 2-4.

Finally, we have additional comments on WID (draft-3634 v006) aiming to clarify and limit the scopes in objectives due to the following reasons:

- FR2-1 needs to be clarified. Including FR2-2 will result in too big scope (not realistic)

- There is ITS band in 60GHz range (FR2-2). Thus, to avoid confusion we suggest to clarify to “ITS band in FR1”

- There is unlicensed spectrum in FR2-1 (in US) and FR2-2. We suggest to clarify “unlicensed spectrum in FR1”

Suggested changes for WID v006

1/ In the first paragraph, “...RAN to determine in RAN#98 whether objective 1 (SL carrier aggregation) or objective 3 (SL beam management in **FR2-1**...)”

2/ In objective 1, “...The work is limited to FR1 licensed spectrum and ITS band **in FR1**...”

3/ In objective 2, “...support of sidelink on unlicensed spectrum **in FR1** for both mode 1 and mode 2...”

4/ In objective 2, delete “..The study is to be completed by RAN#98, in which decide whether or not FR2-2 is included or not..”

5/ In objective 3, change FR2 to FR2-1 and delete square brackets [] in licensed: “...Enhanced sidelink operation on **FR2-1** licensed spectrum...”

6/ In objective 5,

- The exact frequency bands for both licensed and ITS-dedicated spectrum in FR1 and **FR2-1** are to be determined based on company input during the WI
- The exact frequency band combinations for both FR1 licensed and ITS-dedicated spectrum **in FR1** are to be determined based on company input during the WI. (Subject to RAN#98 decision)

29 – Panasonic Corporation

On SL-U, we propose to revise as following seeing the comment from the other companies. Depending on the full reuse or ”slight modification based on as much as possible”, the amount of work is so different. If some are modified, the full campaign, which was carried out in LAA, would be required to check ”SL-U shall not impact an unlicensed NR-U/non-3GPP network more than another network of that technology with respect to user-perceived throughput and latency”.

Sidelink channel access mechanism for unlicensed spectrum shall be based on regional regulation requirement and **shall** ~~**strive to**~~ reuse the existing channel access schemes from NR-U ~~**and Rel-16 resource allocation mechanisms as much as possible.**~~ **If it is identified to full reuse is not possible, the work plan shall be revisited. Rel-16 resource allocation mechanisms is strived to be reused as much as possible.**

30 – TELECOM ITALIA S.p.A.

We can accept version 0.0.5 (the one distributed in the initial round of week 2) with the clear indication that obj 2 is restricted to FR1. The version 0.0.6 (the one proposed in the intermediate round) is not acceptable to us for the many reasons expressed by other companies.

Some specific details:

- agree with DOCOMO: if we are not able to decide now, we will not be able to decide in RAN#96, resulting in unacceptable workload
- we believe obj 2 and 3 are the most impacting in terms of workload, especially on RAN4 during the normative phase. We cannot accept to run obj 2 and 3 in parallel and require a staggered approach
- we agree with the request to document the results of the study phase. In that perspective, it would be more appropriate to approve a Study Item until RAN#98 and then decide on the normative phase
- **on obj 2:**
  - we believe the scope should be restricted to FR1 in Rel 18, and it should be clearly stated
  - the concern on coexistence should be taken into account. the text proposed by Huawei and/or Qualcomm could be a starting point to address the issue. Note, this comment does not mean we can accept V.0.0.6 with these revisions. These revisions should be applied to V 0.0.5

31 – TELECOM ITALIA S.p.A.

in addition, we share the comment from Panasonic

32 – ZTE Corporation

We prefer the previous version. In our opinion, the SL CA got wide support and was regarded as high priority during the previous email discussions. If RAN2 have TU for it before RAN#98, It is no harm to start the SL CA specification work in RAN2 earlier. For the objective 4, it would be better to set a deadline for the study and potential specification work as in the first round email discussion. This may accelerate the completion of objective 4 and reserve more time for other objectives after RAN#98.

33 – NEC Corporation

In general, we agree on the updated draft WID.

Besides, we notice that for the objective of SL-U, whether FR2-2 should be considered is added in the new draft WID. At this stage, the main comment is to keep the workload of this WI under control, so it may be better to avoid introducing additional issues, and we propose to keep it as in V005:

“The study is to be completed by RAN#98~~, in which decide whether or not FR2-2 is included or not.~~”

34 – Philips International B.V. We prefer the staggered approach proposed by the moderator in the previous round
35 – Volkswagen AG The workplan as proposed for the initial round of week 2 seems to better balance the interest of the multiple industries being interested in sidelink. V005 of the SID had a better support by companies than V006. Therefore it is proposed to revert to V005. If companies are concerned by the utilization of unlicensed spectrum, then further clarification of objective 3 as outlined by some comments in this discussion round can be added.
36 – Lenovo (Beijing) Ltd Although we prefer previous version, as a compromise, we can live with current proposal.
37 – VODAFONE Group Plc As long as objective 4 (NR/LTE V2X co-existence) is completed promptly then we are OK with the SID. However, we would fully support downscoping of other objectives (as we expect Rel 17 sidelink work to continue in Q2 2022.)
38 – Fraunhofer HHI We prefer the staggered approach proposed by the moderator in the previous version. We also share the view of other companies that the design principles of NR-U can be adopted for SL operation in unlicensed bands in case clarification is needed on this objective. We can also accept this version if this can be compromised.

6.2 Summary of week 2 intermediate round

Issues and suggestions raised on the Week2 initial round proposals and objectives

- Overall proposal
  - Some serious concerns are also raised for the intermediate round work plan.
  - There is significant support for the previous version (staggered approach) discussed during the Week2 initial round.
- Objective 1 (SL carrier aggregation)
  - A wide support for the SL-CA objective that should not be deprioritized or based on further decision in RAN#98.
- Objective 2 (SL over unlicensed)
  - There are some uncertainty or flexibility that the channel access mechanisms from NR-U are not fully reused.
  - Uncertainty around the existing R16/R17 resource allocation schemes can be reused with the channel access mechanism(s).
  - There should be more visibility / control of design for sidelink operation in unlicensed spectrum.
  - Fair coexistence between NR sidelink and incumbent technologies should be ensured.

- Objective 3 (multi-beam FR2)
  - It is not practical to have both study and normative work in R18 if this starts at RAN#98
  - The work on FR2 should start from the beginning with specification support in R18
- Objective 4 (LTE/NR-V coexistence)
  - Some timeframe by RAN#98 is needed

Moderator's comments and proposal for Wed GTW session

- Although this proposal is acceptable to some companies, but the previous proposal of staggered approach is still preferred by most companies.
- For the Wednesday GTW session, the moderator proposes to modify the previous proposal from the Week2 initial round to address some concerns raised as followed.
  - Modified staggered approached:
    - Objective 2 (SL-U) and objective 4 (co-channel coexistence) to start from the beginning of Rel-18
    - Objective 1 (SL-CA) starts when objective 4 (co-channel coexistence) is completed
    - Objective 3 (SL beam management in FR2) starts after RAN#98 (study only)
- In addition, the moderator also proposes to further discuss over email the following remaining issues:
  - Objective 2 (SL-U)
    - Wording refinement on reusing the existing NR sidelink and NR-U channel structure
  - Objective 4 (co-channel coexistence)
    - Whether or not the necessity of specification support should be checked by RAN#98
  - Whether or not a new TR is needed to capture evaluation methodology updates for objectives 3 and 4

Please refer to RP-213634 for the corresponding WID for this new proposal approach.

7 Week2 intermediate round extended

7.1 Outcome of Week 2 Wednesday GTW session

- *The followings are endorsed/agreed during the week 2 Wednesday GTW session*
  - Objective 2 (SL-U) and objective 4 (co-channel coexistence) to start from the beginning of Rel-18
  - To check in RAN#97 for objectives 1 and 3, taking into account the progress on objectives 2 and 4
    - Aim to have specification work for both objectives 1 and 3
- *To continue email discussion on the following bullets under objective 2*
  - If the existing NR-U framework does not support the required SL-U functionality, this objective will make appropriate recommendations for RAN approval.
  - The study is to be completed by RAN#98, at which time RAN will decide whether or not FR2-2 is included in the normative work.

7.2 Discussion summary

The following points were raised during the week 2 intermediate round extended discussion, all on objective 2 (SL-U):

- For SL-U, to report study conclusions and recommendations at RAN #98
- Due to workload concern, it is proposed to drop “at which time RAN will decide whether or not FR2-2 is included in the normative work”
- To clarify the study scope, it is proposed to explicitly state only FR1 unlicensed frequency bands (5GHz and 6GHz) to be considered.
- Some clarification questions were raised related to the wording “this objective”, whether the reporting and recommendations for RAN approval is only for the study phase, and the timing / contents of the recommendation that should be reported to RAN.
- Why “unicast” has been explicitly excluded from the backward compatible bullet under objective 1.
- Various editorial updates to align with endorsed / agreed checkpoint at RAN#97 and aiming to have specification support for objective 3.

Based on email discussions on the above points, an update WID is proposed by the moderator to the Week 2 Thursday GTW session in RP-213672.

8 Conclusion of [94e-05-R18-SLEvo]

Based on further discussions during the week 2 Thursday GTW session, the final version of the WID for Rel-18 NR sidelink evolution WI is approved in RP-213678 only to fix a bullet alignment in objective 5. It is also a common understanding that

- WGs should first focus on FR1 unlicensed frequency bands during the study phase of objective 2 (SL-U). If time allows, FR2-2 unlicensed band (60GHz) can be considered as well.
- The exclusion of ‘unicast communication’ in the backward compatible section of objective 1 can be further discussed and updated in the future, if needed.

9 References

[1] RP-212664 Moderator’s summary for discussion [RAN94e-R18Prep-04] Sidelink enhancements (excluding positioning and relaying) RAN1 chair (Samsung)

[2] RP-212704 New WI: Further enhancements for NR sidelink RAN1 chair (Samsung)

[3] RP-213469 Summary for RAN Rel-18 Package RAN Chair, RAN1 Chair, RAN2 Chair, RAN3 Chair, RAN4 Chair

[4] RP-212918 Views on NR sidelink enhancements for Rel-18 Intel Corporation

[5] RP-212924 Views on Rel-18 Sidelink Project Qualcomm Incorporated

[6] RP-212926 Discussion on R18 SL further enhancement topics and WID OPPO

[7] RP-212992 On Rel-18 NR Sidelink Enhancements Apple

[8] RP-213231 Views on Rel-18 Sidelink topics Ericsson

[9] RP-213310 On scope of Rel-18 further enhancements for NR Sidelink CATT

[10] RP-213325 Views on Rel-18 WI of Sidelink Enhancement NEC

[11] RP-213338 Views on Sidelink Enhancements for Rel-18 ROBERT BOSCH GmbH

[12] RP-213366 Comments on Rel-18 sidelink draft WID Huawei, HiSilicon

[13] RP-213391 Discussion on Rel-18 Sidelink enhancements ZTE, Sanechips

[14] RP-213429 Views on Sidelink Enhancements for Rel-18 Volkswagen AG

[15] RP-213450 NR Sidelink Multi-hop Requirements for Public Safety in Rel-18 FirstNet