Intermediate round
Variant of [94e-05-R18-SLEvo] Version 0.0.1
RAN

3GPP TSG RAN Meeting #94-e RP-213485

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 General aspect of WID / justification section

To be updated, according to outcome of initial round discussion (Section 2.3)

3.2 WI objectives

To be updated, according to outcome of initial round discussion (Section 2.3)

3.3 Summary of intermediate round and proposals (way forward)

TBD, depending on inputs of intermediate round discussion (Section 3.1 and 3.2)

4 Final round

4.1 TBD, depending on outcome of intermediate round discussion

4.2 Supporting company

5 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