RAN-R18-WS-non-eMBB-Volkswagen - Version 0.0.4

RAN

3GPP TSG RAN Rel-18 workshop RWS-210603

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.2

Source: Volkswagen AG

Title: Email discussion summary for [RAN-R18-WS-non-eMBB-Volkswagen]

1 Introduction

This email discussion summary covers the following documents:

- RWS-210431 LTE/NR-V2X sidelink co-channel coexistence

- RWS-210432 NR-V2X sidelink adjacent-channel coexistence with other technologies

- RWS-210433 NR-V2X sidelink enhancements

- RWS-210434 Sidelink positioning

2 LTE/NR-V2X sidelink co-channel coexistence - RWS-210431

2.1 Input – Round 1

Feedback Form 1: Input Round 1 - LTE/NR-V2X sidelink co-channel coexistence - RWS-210431

1 – ROBERT BOSCH GmbH

[Bosch]: In our understanding, co-channel coexistence between LTE and NR V2X is a very important feature. One important benefit, is being a good approach to takeover LTE-V2X in the future. A second benefit, the may be the only possibility for some regions.

Question: Should we consider retrofitting the identified solutions also in older releases (e.g., R17/16) ?

2 – Huawei Tech.(UK) Co.. Ltd

Revising earlier releases is against 3GPP principles of frozen releases, discussed as recently as this week in RAN#92e. Shouldn't the effort be focused on solutions which adhere to 3GPP principles, such as suitable resource configurations (which are already pretty flexible)?

3 – Intel Corporation (UK) Ltd

Q1: Thanks for contribution and bringing this important topic. Please clarify the intention whether you assume that R18 NR V2X UEs should be able to support co-channel operation with LTE V2X or you also consider R16 and R17 NR V2X UEs? We also assume that coexistence is considered only for Mode-2 UEs right and for Mode-1 it is a network implementation issue. Is that correct understanding?

4 – Guangdong OPPO Mobile Telecom.

Do you consider dynamic or semi-static "co-channel sidelink operation of LTE-V2X and NR-V2X" is proposed?

If semi-static solution is envisioned, currently non-overlapping resource pool configuration in both LTE-V2X and NR-V2X is sufficient to support co-channel coexistence. If dynamic coexistence (e.g. with overlapping resource pools), how do you resolve the issue with backward compatibility, hardware implementation issues and Mode 1 scheduling?

5 – CATT

Q1. What specific co-channel coexistence scheme do you envisioned ?
Q2. "To account for the reduced ITS spectrum for C-V2X direct communication it is proposed to revise earlier assumptions and to introduce co-channel coexistence mechanisms also to earlier NR sidelink releases. " New features cannot be added to frozen releases .

2.2 Response – Round 1

Thank you for the valuable questions. Within the 5.9GHz ITS band Mode 2 deployments are expected. For Mode 1 deployments in other bands the issue of co-channel coexistence is not seen.

We expect that NR-sidelinks (Re-16/17) and future NR-sidelink (Rel-18) are capable of co-channel coexistence. RWS-210431 proposes co-channel coexistence of NR-sidelinks (Re-16/17/18) with LTE-sidelinks (Rel-14/15).

As stated in RWS-210431 the 5.9GHz ITS frequency landscape is changing. The current understanding is that in some countries only 30MHz will be available for C-V2X. If deployments of Rel-16/17 sidelink UEs are foreseen, than co-channel coexistence mechanisms for these types of UEs need to be considered. If not, then there is a risk that different regional standardization organizations (e.g. in ETSI, SAE) will define coexistence solutions which potentially resulting in different regional implementations. This fragmentation creates rising costs and technology uncertainty.

To reduce the impacts to existing Rel-16/17 designs it is proposed to focus on mechanisms which can be implemented without hardware changes.

2.3 Input – Round 2

Feedback Form 2: Input Round 2 - LTE/NR-V2X sidelink co-channel coexistence - RWS-210431

2.4 Response – Round 2

3 NR-V2X sidelink adjacent-channel coexistence with other technologies - RWS-210432

3.1 Input – Round 1

Feedback Form 3: Input Round 1 - NR-V2X sidelink adjacent-channel coexistence with other technologies - RWS-210432

1 – ROBERT BOSCH GmbH

[Bosch] We support this discussion. We believe it is very easy and can be handled by RAN4 without impacting other WGs.

2 – Huawei Tech.(UK) Co.. Ltd

Regarding adjacent-channel coexistence in ITS, It has already been captured in the TR 38.886 (according to RAN4's input) "Based on the simulation results, NR V2X can coexist with LTE V2X or DSRC in ITS spectrum of n47". It seems no further action is needed in Rel-18 upon using ITS spectrum in the 5.9 GHz band. Is there any other intention or solution to be considered in Rel-18?

3 – Intel Corporation (UK) Ltd

Q1: Could you clarify the proposal whether coexistence is considered from 1) the single device perspective that supports multiple V2X technologies operating in adjacent channels or 2) from system perspective where different vehicles are equipped with different technologies operating in adjacent channels? You have mentioned "inter-UE" which seems to be the 2nd interpretation. If it is the 2nd interpretation then please clarify what kind of solutions you have in mind and what is currently missing?

4 – Guangdong OPPO Mobile Telecom.

For all frequency bands / channels defined, ACLR requirement shall be always satisfy to protect adjacent channels. This has been done since LTE-V and also in NR-V. Besides this, specifically what more should be done at the 3GPP side to protect non-3GPP technology operating in an adjacent channel? If the current ACLR requirement is not stringent enough, perhaps tightening the requirement is a better way to go, instead of creating new features to achieve the same thing. Additionally, with this requirement, has it been shown in practice that it is inadequate for NR-V2X to coexistence with non-3GPP technologies in adjacent-channel? Is it 3GPP technology creating excessive interference to other technologies or the other way around?

5 – CATT

For the proposal "it is proposed to revise earlier assumptions for C-V2X direct communication and to introduce adjacent-channel coexistence mechanisms also to earlier NR sidelink releases". Q1. Which "earlier assumptions for C-V2x" is proposed to revise? Q2: What specific "adjacent-channel coexistence mechanisms" is proposed to introduce ?

3.2 Response – Round 1

Thank you for the valuable questions. As outlined in RWS-210432 not only 11p stations may operate adjacent channel to NR-V2X. In particular in those regions who enabled unlicensed operation in frequency ranges nearby.

In every region the 5.9GHz ITS band is surrounded by the operation of non-3GPP devices (WiFi, CEN DSRC, SRD in general). It is proposed to re-evaluate the Rel-16/17 assumptions made for adjacent channel coexistence in terms of adding further technologies as well as reassessing the ACLR masks as well the ACS limits. No new mechanism need to be introduced for Rel-16/17.

For Rel-18 it is encouraged to study mechanism which also account for in-devices (e.g. ITS-G5 and NR-V2X in one module) coexistence and issues.

3.3 Input – Round 2

Feedback Form 4: Input Round 2 - NR-V2X sidelink adjacent-channel coexistence with other technologies - RWS-210432

1 – Huawei Tech.(UK) Co.. Ltd

Thanks for the response. It appears your proposed work on this aspect would be within RAN4. Is that correct?

3.4 Response – Round 2

Thank you for the important questions. The adjacent-channel coexistence with other technologies is mainly seen as a RAN4 task. Nevertheless it is not precluded that other RAN groups provide additional mechanism to address in-devices coexistence aspects.

4 NR-V2X sidelink enhancements - RWS-210433

4.1 Input – Round 1

Feedback Form 5: Input Round 1 - NR-V2X sidelink enhancements - RWS-210433

1 – ROBERT BOSCH GmbH

[Bosch] CA for Sidelink is a very important topic. We have the following question:

- Do you envisage CA SL for duplication only (as in Rel-14) or allowing also multiplexing?
- Do you support backward comparability for older releases (R17/16)?

2 – Intel Corporation (UK) Ltd Q1: Thanks for contribution and proposal. Are you considering carrier aggregation only for data rate increase or you in general fine with multi-carrier operation that can be used for different purposes. Q2: What is your views on support of multiple sidelink bandwidth parts? Do you see any additional flexibility that can be provided for NR V2X sidelink in terms of bandwidth adaptation / power saving / service mapping and forward looking coexistence aspects, etc.?
3 – Fraunhofer IIS Comment: We fully support CA. Question: Similar to Bosch, we would like to know, whether you would see CA mostly to enhance reliability, i.e. data duplication, or in addition to increase the data rate?
4 – Guangdong OPPO Mobile Telecom. Do you consider CA with ITS / licensed band + unlicensed band?
5 – CATT We agree the motivation for CA is for both throughput and reliability.

4.2 Response – Round 1

Thank you for the valuable questions. It is not expected that Rel-16/17 UE need to take part in a Rel-18 CA communication. But besides CA it needs to be guaranteed the Rel-18 UE can communicate with Rel-16/17 UE.

In terms of utilization of CA the 3GPP system should decide based on the applications layers's QoS requirements whether duplication or multiplexing is utilized.

First priority should be given on intra-ITS band CA.

4.3 Input – Round 2

Feedback Form 6: Input Round 2 - NR-V2X sidelink enhancements - RWS-210433

4.4 Response – Round 2

5 Sidelink positioning - RWS-210434

5.1 Input – Round 1

Feedback Form 7: Input Round 1 - Sidelink positioning - RWS-210434

1 – ROBERT BOSCH GmbH

[Bosch] Sidelink positioning is crucial for V2X and (if accepted) IIoT use cases. I have the following question:

- Do you support Sidelink positioning for all coverage scenario (in / out / partial- coverage) ?
- Do you support Sidelink positioning reference signal scheduling in Mode 1 as well as Mode 2 resource allocation?

2 – CATT

CATT shares the similar views on SL positioning.

3 – Beijing Xiaomi Mobile Software

In general, the answer is yes for both of your questions. Besides, we have the following questions:

1. Do you think the commercial and public safety use cases and requirements identified in SA1 Ranging WI(TR22.855/TS22.261) should be taken into account?

2. According to the definition and the KPI requirements of relative positioning and ranging in TS22.261(see below), do you agree that relative positioning and ranging are different, i.e. relative positioning requires to acquire the 2D/3D coordinates(e.g. the horizontal accuracy of relative positioning set requirements on both distance accuracy and angle accuracy) while Ranging requires to acquire only one component of 2D/3D coordinates(either distance or angle) and thereby only set requirements on one component(either distance or angle)?

- relative positioning: relative positioning is to estimate position relatively to other network elements or relatively to other UEs.

- Ranging: refers to the determination of the distance between two UEs and/or the direction of one UE from the other one via direct communication connection.

3. Do you think unlicensed band should be considered? If so, what frequency range is considered(e.g. 60GHz)?

4. For in coverage case, do you think UE based SL-positioning should also be supported?

5. Do you think power consumption and Redcap UE should be taken into account?

4 – Intel Corporation (UK) Ltd

Q1: If we understand correctly, it seems you are focusing only on sidelink positioning and ITS band. What is your view on Uu positioning and combination of Uu and PC5 solutions as well as other spectrum options?

5 – Fraunhofer IIS

We assume SL positioning is major important for public and further safety related use cases.

Would you agree to that?

In addition, we would like to ask the same 2 questions as Bosch.

6 – InterDigital Communications Currently GNSS is classified as an RAT independent positioning technology. By “complementing existing positioning technologies e.g. GNSS.”, do you expect specification support to combine GNSS measurements and sidelink positioning measurements?
7 – Guangdong OPPO Mobile Telecom. How do you resolve the insufficient bandwidth in ITS channel for accurate SL positioning in 5.9GHz band?

5.2 Response – Round 1

Thank you for the valuable questions.

Precise and reliable positioning is vital for several future use cases and services as advanced driving (AD) and maneuver coordination.

All coverage scenarios should leverage SL based positioning. From the current deployment perspective, the main focus here is on the unsupervised spectrum allocation. But it should not be limited to.

Ranging UC are out of scope here (even if TR22.855 has interesting UCs as e.g. Smart Vehicle Key, Power efficient Ranging Operation)

Ranging is distance and relative position is the position relative to the ego UE. Driving assistance systems require the positions. Depending on the use case scenario this might be relative (e.g. unicast services or 1on1 scenarios) or absolute position (e.g. maneuver, group coordination).

Any further improvement of the positioning quality based on SL communication is welcomed and in case of in out-of-coverage even “required”, solutions using spectrum beyond ITS spectrum (unlicensed and licensed) are interesting but depending on the use case scenario / situation (availability of spectrum or free resources) should not be expected or mandated. The focus should be on FR1 band but shouldn’t be limited to.

Considering power consumption and Redcap UE might be beneficial but shouldn’t be the focus in this work.

As the current positioning accuracy is not sufficient for all use cases/services/situations, any SL based positioning improvement is highly welcomed. 3GPP only or “fusion” based solution is important and will be recognized depending on the achieved performance.

5.3 Input – Round 2

Feedback Form 8: Input Round 2 - Sidelink positioning - RWS-210434

5.4 Response – Round 2

6 Summary

This document captures the email discussion on Volkswagen AG inputs to AI 4.2 of the RAN plenary Release-18 workshop. The email discussion was held via NWM using the NWM tag of "RAN-R18-WS-non-eMBB-Volkswagen".

The email discussion was based on the following Volkswagen AG input documents:

- RWS-210431 LTE/NR-V2X sidelink co-channel coexistence

- RWS-210432 NR-V2X sidelink adjacent-channel coexistence with other technologies

- RWS-210433 NR-V2X sidelink enhancements

- RWS-210434 Sidelink positioning

On RWS-210431:

Five comments were received in round 1. Some comments addressed the importance of the topic. Other comments asked for clarification which sidelink modes need to be considered as well as which co-channel scenarios (LTE-V2X / Rel-18-V2X or Rel-18-V2X / Rel-16/17). Further comments addressed the backward compatibility with previous NR-V2X releases and raised concerns about changing previous NR-V2X releases.

It was clarified that Mode 2 deployments with LTE-V2X / Rel-16/17/18 are of main concern for the co-channel coexistence. Further it was highlighted that changing regulations for the 5.9GHz band require also co-channel coexistence mechanism to be provided by previous NR-V2X sidelink releases (Rel-16/17).

On RWS-210432:

Five comments were received in round 1, one comment in round 2. One company expressed their support. Most of the other comments emphasized that RAN4 already addressed the adjacent-channel operation with the 802.11p technology.

It was clarified that a consideration of 11p is not sufficient for operation in the 5.9GHz spectrum since further non-3GPP technologies (such as WiFi, CEN DSRC, general SRD) operate in adjacent channel. Concerns about changing previous NR-V2X releases were expressed and it was clarified that no new mechanism need to be introduced to Rel-16/17 as a revision of ACLR masks and ACS limits may suffice. Further it was encouraged to introduced mechanism to Rel-18 which enable in-device coexistence.

On RWS-210433:

Five comments were received in round 1. Some companies expressed their support. Some clarification of the intended use (enhancement of data rate or reliability) as well as of the band scenarios (licensed vs unlicensed band) was requested. One question was about backward compatibility.

It was responded that the first priority should be on intra-ITS band CA. Further it was proposed that Rel-18 supports both, data rate and reliability enhancements. The 3GPP system should decide based on application's QoS requirements what to utilize.

On RWS-210434:

Seven comments were received in round 1. Some companies expressed their support. It was asked which coverage scenarios need to be supported and which positioning requirements should be considered. Some comments asked specifics about relative positioning vs. ranging and implementation aspects. Further some frequency spectrum related questions were raised.

It was clarified that solutions targeting FR1 are in the focus, in particular the 5.9GHz ITS band plays a significant role in the sidelink deployment. Further it was clarified that a relative positioning is important for automotive use cases in all coverage scenarios.