

**3GPP TSG RAN Rel-18 workshop Email discussion summary**  
**Variant of RAN-R18-WS-non-eMBB-5GAA Version 0.0.2**  
**RAN**

3GPP TSG RAN Rel-18 workshop

RWS-210549

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.2

Source: 5GAA

Title: Email discussion summary for [RAN-R18-WS-non-eMBB-5GAA]

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## 1 Introduction

This email discussion summary covers the following document:

RWS-210360 5GAA input to 3GPP Rel.18 Workshop

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## 2 Comments and questions to the Tdoc

### Positioning enhancements

#### Feedback Form 1:

<b>1 – Guangdong OPPO Mobile Telecom.</b>
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Comments:

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SL positioning is supposed to be the top-ranking sub-topics in Rel-18 SL enh. It can be a stand-alone item or merged into the SL enh. If a stand-alone item is finally determined, the impact on the existing/future release of SL design should always be considered.

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The positioning mechanism can be further divided into 3 types based on positioning mode:

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Type 1: Uu mode positioning

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Type 2: SL mode positioning

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Type 3: combined Uu and SL mode positioning (mentioned in 1.2)

Question: When supporting a combined Uu and SL positioning mode, should a UE simultaneously maintain in both mode 1 and mode 2?

Comment: Both licensed and unlicensed spectrum should be supported in SL positioning.

Question: For licensed and unlicensed spectrum in SL positioning, is unlicensed spectrum considered as a supplementary to licensed spectrum, or both spectrums can have the same dominant role according to different use cases/scenarios/conditions?

## 2 – Intel Corporation (UK) Ltd

Q1: Could you clarify whether there is a strong demand / urgency for DAS support from automotive sector in R18 and whether DAS support is considered for both Uu and PC5 links in application to V2X positioning?

Q2: Could you clarify the most applicable frequency bands (FR1/FR2/etc.) from 5GAA perspective for V2X positioning with DAS support?

## 3 – Intel Corporation (UK) Ltd

Could you please clarify frequency range for V2X positioning in unlicensed spectrum considered by 5GAA and whether high frequency ranges (mmWave) are of high priority in a near term?

## 4 – Fraunhofer IIS

Comment: We agree to the benefits of all sub-topics.

Question: Do you think that carrier aggregation should also be considered to enhance positioning accuracy?

## 5 – 5GAA

### Answers by 5GAA:

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*Intel Q1: Could you clarify whether there is a strong demand / urgency for DAS support from automotive sector in R18 and whether DAS support is considered for both Uu and PC5 links in application to V2X positioning?*

The first part of the question is more related to another item in the 5GAA input and not specific to positioning enhancements. We will consider this part under the item “Enhancements for vehicular distributed antenna system (DAS) UE transmission.” For the second part, 5GAA thinks that DAS support should be considered for both Uu and PC5 links applications to V2X positioning. Several 5GAA activities, e.g., V2XHAP TR included in RP-210040, indicate possible enhancements to positioning solutions if DAS is considered.

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*Intel Q2: Could you clarify the most applicable frequency bands (FR1/FR2/etc.) from 5GAA perspective for V2X positioning with DAS support?*

5GAA considers a vehicular-DAS solution should operate in both FR1 and FR2. However, 5GAA considers V2X operation in FR2 of low priority in the near term.

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*Intel question: Could you please clarify frequency range for V2X positioning in unlicensed spectrum considered by 5GAA and whether high frequency ranges (mmWave) are of high priority in a near term?*

Currently 5GAA does not have a specific position on unlicensed spectrum for lower frequencies for V2X positioning but for high frequency, the unlicensed spectrum from 57 GHz to 71 GHz can be considered for sidelink operations. Nevertheless, 5GAA considers V2X operation in FR1 has the highest priority and FR2 of low priority for automotive use cases in the near term. However, given the high accuracy for the identified use cases, all opportunities for wider band signalling should be explored.

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*Fraunhofer IIS Question: Do you think that carrier aggregation should also be considered to enhance positioning accuracy?*

In principle, 5GAA sees SL CA as a feature to support new use cases with larger spectrum needs. Nevertheless, 5GAA do believes that increased bandwidth provided by SL CA would support the enhancement of positioning accuracy, in particular for intra-band contiguous CA.

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*Guangdong OPPO Mobile Telecom Question: When supporting a combined Uu and SL positioning mode, should a UE simultaneously maintain in both mode 1 and mode 2?*

5GAA considers that SL positioning can be maintained in either Mode 1 or Mode 2 and combined with Uu positioning to enhance positioning accuracy. The combination of Uu and SL positioning type is not strictly related to the SL resource allocation mode. In Type 3 positioning, both Uu based positioning and SL based positioning are operated in a combined manner in order to augment each other in meeting the positioning accuracy requirements, and SL resource allocation in this operation can be Mode 1 or Mode 2.

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*Guangdong OPPO Mobile Telecom Question: For licensed and unlicensed spectrum in SL positioning, is unlicensed spectrum considered as a supplementary to licensed spectrum, or both spectrums can have the same dominant role according to different use cases/scenarios/conditions?*

5GAA considers ITS spectrum as the primary choice for SL V2X communications, potentially followed by licensed spectrum, and the use of unlicensed spectrum for SL positioning, if supported, can be complementary. Nevertheless, whether ITS spectrum, licensed or unlicensed is the primary choice for SL positioning will depend on the amount of spectrum available and allocated in each of those bands in a specific region. For automotive use cases, not all deployments/regions have sufficient bandwidth in the ITS bands to satisfy the high accuracy positioning required. Therefore, supporting sidelink positioning using unlicensed bands is an important feature for Rel-18 study. This does not prevent the same sidelink positioning solution to be used on licensed bands when sufficient bandwidth is available for other applications.

## **6 – 5GAA**

5GAA would like to clarify that 5GAA considered the issues of DAS consideration for positioning (a sub-topic of positioning enhancement) and enhancements for DAS UE transmission separately, so their priorities can be different as shown in RWS-210360.

**Feedback Form 2:**

**1 – Intel Corporation (UK) Ltd**

Q1: Could you please clarify whether scenarios when UE has lost synchronization from NW/GNSS where subframe alignment is not guaranteed are also considered by 5GAA for coexistence framework?

**2 – Guangdong OPPO Mobile Telecom.**

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What kind of co-channel coexistence mechanisms can be considered in Rel-18 SL enh? TDM, FDM or any other new concept will be introduced?

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Is co-channel coexistence mechanism considered in the same UE-pair on SL?

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Is co-channel coexistence mechanism considered in among different UEs on SL?

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Should all types of UE be considered in co-channel coexistence, e.g. UE only support LTE, UE only support NR, LTE&NR dual module UE, VRU, etc?

**3 – 5GAA**

**Answers by 5GAA:**

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*Intel Question: Could you please clarify whether scenarios when UE has lost synchronization from NW/GNSS where subframe alignment is not guaranteed are also considered by 5GAA for coexistence framework?*

5GAA understands that, according to Rel-16 specifications, LTE and NR sidelink are aligned in time when a UE operates both technologies in the same frequency band. Nevertheless, both scenarios should be considered. The same issue of common timing exists for in-device coexistence, and similar solutions could be applied.

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*Guangdong OPPO Mobile Telecom Questions:*

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*What kind of co-channel coexistence mechanisms can be considered in Rel-18 SL enh? TDM, FDM or any other new concept will be introduced?*

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*Is co-channel coexistence mechanism considered in the same UE-pair on SL?*

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*Is co-channel coexistence mechanism considered in among different UEs on SL?*

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*Should all types of UE be considered in co-channel coexistence, e.g. UE only support LTE, UE only support NR, LTE&NR dual module UE, VRU, etc?*

5GAA is of the opinion that the LTE/NR sidelink co-channel coexistence mechanism should support enough resources (time and frequency) efficiency in order to fully utilize the ITS spectrum. 5GAA further assumes that this functionality does not affect LTE-V2X UE design.

Moreover, spectrum sharing should consider either:

- Dynamic spectrum sharing, i.e., NR-V2X transceivers share LTE-V2X bands without interfering with them, or
- per configuration/resource-pools (e.g., TDM, FDM)

5GAA also understands that this should be a R18 feature to be considered for all types of V2X UE: vehicular, VRU, etc. Nevertheless, the exact mechanisms for co-channel co-existence should be developed by 3GPP. From a service requirement perspective, 5GAA assumes that a NR-V2X UE supporting coexistence has LTE-V2X support as well if it also provides Day-1 services.

#### **4 – VODAFONE Group Plc**

Thank you for your contribution, we have a few questions:

1- There could be numerous LTE and NR Combinations , in order to reduce time on these co-channel studies, would you select or propose the most likely combinations ?

#### **5 – Guangdong OPPO Mobile Telecom.**

Thanks for the reply. For the co-channel coexistence, what is the scope of this work? For example, is it suppose to cover only LTE mode 4 and NR mode 2 dynamic resource sharing? Or is it meant to cover also LTE mode 3 with NR mode 2, LTE mode 4 with NR mode 1, and/or LTE mode 3 and NR mode 1?

#### **6 – 5GAA**

##### **Answers by 5GAA:**

5GAA members have different interpretations for this question. One is related to the spectrum bands, where 5GAA sees the ITS band, i.e. LTE B47 and NR n47, as the initial target, but it is up to 3GPP decision to look into other bands. Another interpretation is related to the capability of the UEs to co-exist with, where 5GAA sees that NR-V2X should be able to coexist at least with LTE-V2X-only UEs and UEs supporting both LTE-V2X and NR-V2X.

#### **7 – 5GAA**

##### **Answers by 5GAA:**

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*Guangdong OPPO Mobile Telecom:*

*Thanks for the reply. For the co-channel coexistence, what is the scope of this work? For example, is it suppose to cover only LTE mode 4 and NR mode 2 dynamic resource sharing? Or is it meant to cover also LTE mode 3 with NR mode 2, LTE mode 4 with NR mode 1, and/or LTE mode 3 and NR mode 1?*

5GAA did not discuss in detail the different mode combinations for this contribution to 3GPP. If needed by 3GPP, in a later interaction 5GAA can provide a priority list for the combination of modes to be supported.

**Sidelink carrier aggregation (CA)**

**Feedback Form 3:**

**1 – Intel Corporation (UK) Ltd**

Could you clarify why 5GAA mentions only carrier aggregation framework and has not mentioned / considered mechanisms of SL bandwidth parts (BWP) or BWP mechanisms are considered to be also supported as a part of sidelink CA framework?

**2 – Guangdong OPPO Mobile Telecom.**

The 3 sub-topics seems clearly demonstrate all the potential CA mechanisms.  
Is the intention of the proposed CA for improving the data rate only? Or does it intend to include also packet duplication? If both, then "multi-carrier operation" may be a better term.

**3 – Fraunhofer IIS**

Comment: We see that CA enhances eMBB, positioning and further use cases. We fully support your list of possibly types of CA.

**4 – 5GAA**

**Answers by 5GAA:**

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*Intel question: Could you clarify why 5GAA mentions only carrier aggregation framework and has not mentioned / considered mechanisms of SL bandwidth parts (BWP) or BWP mechanisms are considered to be also supported as a part of sidelink CA framework?*

5GAA has not discussed SL BWP topic in detail including its combination with CA. The main motivation to propose CA is to have a similar SL carrier aggregation framework as it has been done in Rel-15 for LTE V2X enhancements. Nevertheless, 5GAA is open for additional mechanisms like BWP in the SL in combination with CA, if advantages for automotive use cases can be observed. 5GAA would leave to 3GPP the definition of the mechanisms to support V2X operation over multiple carriers.

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*Guangdong OPPO Mobile Telecom question: Is the intention of the proposed CA for improving the data rate only? Or does it intend to include also packet duplication? If both, then "multi-carrier operation" may be a better term.*

5GAA considers that CA allows not only for higher throughput, but also to improve reliability and flexibility. In that sense, 5GAA understands that packet duplication was introduced in Rel-15 for LTE V2X enhancements and a similar mechanism can be considered for NR as well.

**Enhancements to sidelink power saving**

**Feedback Form 4:**

**1 – Intel Corporation (UK) Ltd**

Q1: Given that 5GAA promotes reduced UE capability for the sake of power saving could you clarify

which UE capabilities are considered to be reduced? Is that similar to Uu RedCap but for sidelink or goes beyond this?

Q2: Could you clarify which V2X applications require support of wake up sidelink signals? We assume it is unicast/groupcast oriented applications. Is that right?

## 2 – Guangdong OPPO Mobile Telecom.

As SL power saving is still on-going/under discussion in Rel-17, how Rel-18 SL power saving can be further enhanced can be considered based on the progress/results of Rel-17 eSL.

## 3 – Fraunhofer IIS

Comment: We fully support the importance of UE power saving.

Question: Do you think that UE position-based power saving (e.g. go-to-sleep when leaving critical areas) should be supported?

## 4 – 5GAA

### Answers by 5GAA:

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*Intel questions:*

*o Given that 5GAA promotes reduced UE capability for the sake of power saving could you clarify which UE capabilities are considered to be reduced? Is that similar to Uu RedCap but for sidelink or goes beyond this?*

5GAA thinks that the Uu RedCap capability could be a starting point. In addition to that, RedCap with SL capability of BW of 20 MHz and 10MHz (if specified) can be considered. Furthermore, RedCap SL capability should include the additional SL power saving features in Rel-17 and Rel-18. Suitable use cases are micro-mobility like e-Bike, 2-wheeler, etc. Nevertheless, the exact UE capabilities will depend on the complete set of use cases to be supported, and so will need to be determined by 3GPP.

*o Could you clarify which V2X applications require support of wake up sidelink signals? We assume it is unicast/groupcast oriented applications. Is that right?*

Many 5GAA use cases would benefit from increased power savings, however, 5GAA has currently considered two main examples as applications requiring power saving enhancements: AVP is mainly a unicast based service and VRU can be involved in unicast/groupcast/broadcast transmissions.

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*Fraunhofer IIS question: Do you think that UE position-based power saving (e.g. go-to-sleep when leaving critical areas) should be supported?*

5GAA has not discussed in detail the specific mechanisms triggering the power saving modes, but considered the proposed use cases, i.e. AVP and VRU protection, we are open to further discuss with 3GPP if UE position is one of those mechanisms.

## Predictive QoS

### Feedback Form 5:

#### 1 – ZTE Corporation

Could you explain the relationship between sidelink report equivalent information and NR QoE. Or how to apply NR QoE into this topic.

#### 2 – 5GAA

Answers by 5GAA:

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*ZTE Corporation question: Could you explain the relationship between sidelink report equivalent information and NR QoE. Or how to apply NR QoE into this topic.*

Today, apart from gNB understanding of the status of the resource-pools for SL in the cell, there is no UE report equivalent as MDT/QoE for SL as in Uu. If we refer, for example, to the see-through automotive use case in out-of-coverage situation, an idle report of the MDT/QoE of the SL could help to identify the road and under which conditions such a service is applicable.

#### 3 – VODAFONE Group Plc

Thank you for your contribution, on the Predictive QoS,

1-How do you envisage the QoS to be reported back to the network ?

2- Would you envisage using either LTE or NR OR Selecting the most dominant frequency ?

#### 4 – 5GAA

Answers by 5GAA:

5GAA thinks that the mechanism report of QoS could rely on existing MDT/QoE framework combined with the outcome of the RAN Data Analytics SI of Rel-17. We do not preclude improvement of these mechanism to improve latency or other.

5GAA does understand that the requirements are mostly related to NR (frequencies), if 3GPP could extend the output, measurements, KPI reports etc. to LTE this will be appreciated, there is gap here.

### UE-to-UE relay

### Feedback Form 6:

#### 1 – Intel Corporation (UK) Ltd

Could you please clarify whether 5GAA prefers/considers support of L2 or L3 UE-to-UE relaying or both options.

#### 2 – Fraunhofer IIS

Would you agree that additional benefits of UE-to-UE-relaying are coverage enhancements and improved QoS?

#### 3 – 5GAA

Answers by 5GAA:

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*Intel questions: Could you please clarify whether 5GAA prefers/considers support of L2 or L3 UE-to-UE relaying or both options.*

The service requirement from 5GAA is to support the relaying of the V2X traffic, including groupcast and broadcast. This is different from the study in 3GPP Rel-17 for SL relay. Therefore, 5GAA would request 3GPP to consider these new use cases in Rel-18 study. 5GAA did not discuss nor decide whether L2 or L3 architecture would be preferred and this should be determined by the 3GPP study. The option most suitable for V2X use cases should be supported.

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*Fraunhofer IIS question: Would you agree that additional benefits of UE-to-UE-relaying are coverage enhancements and improved QoS?*

5GAA thinks that UE-to-UE relaying can provide better coverage and reliability.

#### **4 – VODAFONE Group Plc**

Thank you for your contribution we have the following question:

1- Have you considered security aspect of UE to UE Relay ? and how would you remove or identify a rogue UE?

#### **5 – 5GAA**

##### **Answers by 5GAA:**

5GAA thinks that security aspects of UE-to-UE Relay should be considered in the 3GPP studies.

### **NR-V2X sidelink adjacent-channel coexistence with non-3GPP technologies**

#### **Feedback Form 7:**

#### **1 – 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?

#### **2 – Fraunhofer IIS**

Do you assume that DAS could also enhance the positioning accuracy?

#### **3 – 5GAA**

##### **Answers by 5GAA:**

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*Guangdong OPPO Mobile Telecom questions:*

5GAA does not preclude the possibility of updating ACLR requirements as a solution, i.e. updating ACLR requirements and possible adjustments may provide a good solution for adjacent-channel coexistence with non-3GPP direct communication. 5GAA may provide more inputs in the future regarding the adjacent channel coexistence situations in different regions if requested by 3GPP. Nevertheless, identifying the adjacent channel interference issues and the requirements and mechanisms for addressing them should be part of the 3GPP efforts.

## Enhancements for vehicular distributed antenna system (DAS) UE transmission

### **Feedback Form 8:**

#### **1 – Intel Corporation (UK) Ltd**

Q1: Could you please clarify target frequency ranges for DAS support and whether target application is unicast communication? Overall it seems to be an optimization/implementation problem, so we would like to clarify how strong is the demand/urgency for such solutions in a near term?

#### **2 – Fraunhofer IIS**

Do you assume that DAS could also enhance the positioning accuracy?

#### **3 – 5GAA**

##### Answers by 5GAA:

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*Intel questions: Could you please clarify target frequency ranges for DAS support and whether target application is unicast communication? Overall it seems to be an optimization/implementation problem, so we would like to clarify how strong is the demand/urgency for such solutions in a near term?*

5GAA sees that any frequency band may benefit from DAS, with higher priority to FR1 currently and lower priority to FR2. For the SL, the focus should be on ITS bands such as 5.9 GHz. Nevertheless, Uu mode providing V2N services could also benefit.

Considering the priority ranking provided, 5GAA still sees a clear motivation for the new vehicular DAS approach for the implementation of wireless communication systems in the automotive area. It is commonly accepted within the automotive industry that various constraints in automotive specific design compel a kind of DAS implementation approach.

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*Intel question copied from the positioning enhancements: Could you clarify whether there is a strong demand / urgency for DAS support from automotive sector in R18 and whether DAS support is considered for both Uu and PC5 links in application to V2X positioning?*

This question is already covered in the response to the previous question.

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*Fraunhofer IIS question: Do you assume that DAS could also enhance the positioning accuracy?*

As mentioned in 5GAA input under the positioning enhancements item, 5GAA thinks that DAS can enhance both relative and absolute positioning accuracy (compared to current situation without DAS).

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## 3 Conclusion

5GAA thanks 3GPP members for all the questions in the two rounds of discussions and hopes that all the open points were clarified. Nevertheless, 5GAA is open for any remaining clarifications and will continue its exchanges with 3GPP after the RAN Rel-18 Workshop.