5GAA input to 3GPP Rel-19 Workshop

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Introduction

- 5GAA members submitted consolidated proposals for new features and requirements, as well as a study item, as input to 3GPP Rel-19 workshop.
- The proposals were presented & discussed during 5GAA F2F meeting Q2 2023 in Seoul.
- Via an online survey, all 5GAA companies were invited to:
  - Rate the listed proposals in terms of priority

    (Score: 1 = Very low priority – 5 = Very high priority)
  - Rate sub-topics of each proposal in terms of relevance

    (Score: 1= not at all relevant – 5 = Extremely relevant)
- The survey results were consolidated and provided in their entirety, in a decreasing order according to the final ranking
  - Sub-topics in “bold” indicate higher priority
- The input is reviewed and aligned amongst all 5GAA members.

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5GAA list of proposals according priority ranking

5GAA features and requirements proposals	5GAA Priority ranking
NTN Satellite Connectivity High Level Requirements	1
Sidelink Enhancements	2
Sidelink Positioning Enhancements	3
Predictive QoS for Application and Network Adaptation	4

5GAA study item proposal
Integrated Sensing and Communications (ISAC)

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1. NTN Satellite Connectivity High Level Requirements

Motivation:

1. **Seamless and ubiquitous automotive user experience by TN/NTN integration (*)**
2. Enable the evolution of automotive use cases leveraging satellite connectivity with
   - Narrowband data rate e.g., e-call, hazard information
   - Wideband data rate e.g., field monitoring, audio streaming
   - Broadband data rate e.g., entertainment (video streaming, gaming)

- In 3GPP (TR 38.821) the NTN UE characteristics for evaluation assumptions do not fulfil automotive requirements:
  - E.g., current handheld antenna is limiting data rate for NTN
  - E.g., VSAT antenna (60 cm aperture) is too large for automotive

Subtopic:

1. **Mobility enhancements between TN and NTN and between NTN and TN to ensure service continuity**
2. Consider additional NR NTN capable automotive UE characteristics (adapted to vehicle mounted constraints) to support satellite connectivity scenarios (e.g. for coexistence analysis)
   - automotive UE characteristics 1: targeting narrowband and wideband data rates in FR1 bands
   - automotive UE characteristics 2: targeting broadband data rates in above 10 GHz bands

   These automotive UE characteristics might involve enhancements to e.g. antenna gain, UE Tx Power, improved noise figure

5GAA will provide further details on vehicle mounted NR NTN UE characteristics for consideration in Rel-19 work by December 2023 (RAN#102)

(*) 5GAA NTN position paper: "5GAA wishes to clarify that ubiquitous and uninterrupted connectivity can only be provided if **terrestrial and non-terrestrial networks are integrated seamlessly**"

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2. Sidelink Enhancements

Motivation:

Underlying assumption: Backward compatibility with existing NR V2X operations. E.g. vehicles have a typical lifetime of +10 years

1. Support of a wider bandwidth for SL-based V2X operations using multiple narrowband SL channels
   - Examples include some ITS bands in 5.9 GHz that are fragmented into multiple 10 or 20 MHz channels.

Other identified motivation:

2. Consider options for co-channel sharing with non-3GPP V2X technologies in Europe beyond 2030+
   - NR sidelink needs to be able to ensure sharing of spectrum with non-3GPP V2X technologies (e.g., ITS-G5) when it starts to use a channel which is already used by the other technologies.
   - Rel-16 NR sidelink operations in a channel where no other technology exists shall not be impacted.

Subtopic:

General requirements for Rel-19 sidelink: any enhancement shall ensure that a Rel-19 UE can communicate with another UE operating NR sidelink defined in a previous release.

1. **Enhancement for sidelink carrier aggregation (strongly recommended by 5GAA)**
   - **Introduction of the features defined Rel-15 LTE, including Mode-1 support, handling limited transmission/reception capability.**
   - **Enhancements for sidelink carrier aggregation shall ensure compatibility and coexistence with legacy sidelink operations.**

Other identified subtopic:

2. Adaptation of unlicensed band sidelink channel access mechanism (defined in Rel18) for ITS band n47, as an optional feature

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3. Sidelink Positioning Enhancements

Motivation:

5GAA investigated the performance of Uu-based positioning and sidelink positioning (Rel. 18 study outcome) for different automotive use cases.

1. Due to limited available bandwidth in the ITS band, the required positioning accuracy for ADAS and safety use cases cannot be achieved in most evaluation scenarios
2. Vehicle applications already have a lot of “situational awareness information”, due to own sensors. Positioning accuracy can be improved by considering further non-RAT dependent technologies in the 5G protocol stack. Furthermore, enhanced positioning approaches could improve the accuracy as well
3. Automotive use cases have demanding latency requirements and reliability requirements for the positioning services

Subtopic:

1. **Support of wider positioning bandwidth by using:**
   - **Unlicensed band in FR1**
   - **Licensed band, ITS band, Unlicensed in FR2.**
2. Support additional non-RAT dependent positioning (like UWB) and sensor data sharing
   - Support further enhanced positioning techniques, like sidelink carrier phase positioning, multi-panel positioning, etc.
3. Introduce sidelink positioning integrity study, considering error sources, etc. similar to the Uu-based positioning integrity study in Rel. 18.

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4. Predictive QoS for Application and Network Adaptation

Motivation:

1. Predictive QoS enables fast adaptation of vehicular applications QoS to improve user experience regarding comfort and safety.
2. Further, predictive QoS information can be exploited in the network to optimize the network performance for V2X services.

Subtopic:

1. **Prediction and network pre-adaption mechanism to improve network performance in consistent manner.**
2. Solutions/algorithms capable of generating high accuracy predictions.

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Integrated Sensing and Communications (ISAC) (5GAA Study Item proposal)

Motivation:

From academic research, ISAC is expected to acquire information about a remote object and its surrounding. Perception of surrounding environment is a technology that is also involved with automotive industry, and it is expected to enable a basic technologies condition of ISAC for investigation of automotive use.

Subtopic:

1. Study of ISAC approach for different scenarios, e.g., in network coverage, out of network coverage, partial coverage.
2. Study of possible frequency bands to support ISAC features
3. Enable a baseline for ISAC in RAN with an initial Study Item on channel modelling

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