5GAA input to 3GPP Rel. 18 Workshop

Introduction

- 5GAA, the 5G automotive association, appreciates the opportunity to provide guidance to 3GPP on the important features for Rel-18 evolution.
- Scope of 5GAA is focused on bringing connectivity solutions to market addressing technical, business, and regulatory challenges including technology, standards, spectrum, policy & regulations, testing, business models & go-to-market
- It is important to note that C-V2X is in development in different countries, with several milestones in the US and active deployment in China.

Introduction

- 5GAA member companies submitted proposals for new features and requirements as input to 3GPP Rel.18 workshop
- Via a survey, 5GAA companies:
  - Rated the listed proposals in terms of priority

    (Score: 1 = Very low priority – 3 = neutral – 5 = Very high priority)
  - Rated sub-topics of each proposal in terms of relevance

    (Score: 1= not at all relevant – 3 = neutral – 5 = Extremely relevant)
- The survey results were consolidated and provided in their entirety, in a decreasing order according to the final ranking
- The input is aligned amongst all sectors of 5GAA membership: Automotive OEM, Automotive suppliers, MNO, MNO suppliers

5GAA list of proposals according priority ranking

5GAA features and requirements proposals	Priority ranking
Positioning enhancements	1
LTE/NR-V2X sidelink co-channel coexistence	2
Sidelink carrier aggregation (CA)	3
Enhancements to sidelink power saving	4
Predictive QoS	5
UE-to-UE relay	6
NR-V2X sidelink adjacent-channel coexistence with non-3GPP technologies	7
Enhancements for vehicular distributed antenna system (DAS) UE transmission	8

1. Positioning enhancements

- Motivation
  - Advanced use cases require high level positioning accuracy and precision
  - Advanced use cases include basic and advanced VRU protection, automated driving, teleoperated driving, dynamic intersection management, group start, etc.

- Sub-topics
  - **Introduce mechanisms to enhance the positioning accuracy, regardless of the network coverage scenarios, i.e. in- coverage, partial coverage and out-of- coverage.**
  - For in-coverage scenarios, support a combined Uu and sidelink positioning mode.
  - Include positioning enhancements for vehicular Distributed Antenna Systems (DAS) UE.
  - To support positioning in unlicensed spectrum, thus avoiding any impact to existing V2X deployments.

2. LTE/NR-V2X sidelink co-channel coexistence

- Motivation
  - Dedicated V2X spectrum is scarce in some regions and LTE/NR-V2X need to co-exist even in the same channel
  - Important across all basic and advanced use cases
  - Improves overall system performance, increases deployment flexibility, enables technology migration path from IEEE technology
- Sub-topics
  - **Introduce mechanisms for LTE/NR-V2X co-channel coexistence.**
  - Introduce mechanisms for LTE/NR-V2X co-channel coexistence taking into account existing NR-V2X Rel-16/17 solutions.

3. Sidelink carrier aggregation (CA)

- Motivation
  - Some advanced use cases require high data-rate and/or increased reliability
  - In some regions V2X spectrum is fragmented
  - Examples: High-definition sensor sharing, see through for passing,

- Sub-topics
  - **Introduce mechanism to support NR-V2X intra-band non-contiguous CA.**
  - **Introduce mechanism to support NR-V2X intra-band contiguous CA.**
  - Introduce mechanism to support NR-V2X inter-band CA FR1 + FR1. (e.g. combinations of ITS Band / Unlicensed / Licensed)

4. Enhancements to sidelink power saving

- Motivation
  - Some specific advanced use cases require modes of operation and/or UEs with diverse capabilities
  - This includes, for example,
    - reliable and sustainable operation of Automated Valet Parking (AVP), to allow maneuver and authentication of requested/activated vehicles,
    - support the various types of VRU equipment and scenarios, e.g. use of on-board modem for e-Bike and micro-mobility also in battery charge mode

- Sub-topics
  - **Further enhancements to sidelink power saving (e.g. Wake-up, go-to-sleep, adaptive DRX, etc.)**
  - Introduce UE reduced capabilities with sidelink.
  - Introduce configurable UE sidelink power saving capabilities, e.g. different VRU types.

5. Predictive QoS

- Motivation
  - Advanced use cases will benefit from improved predictive QoS, including their safety enhancement goals
  - Current and future QoS information such as latency, for example, is essential for safe and high quality teleoperated driving

- Sub-topics
  - **Introduce more accurate sidelink and Uu Reporting.**
  - Improve E2E reporting e.g. signalling based latency, fine granular reporting.
  - Introduce sidelink report equivalent information as MBB-UE (Mobile Broadband UE) in terms of MDT (Minimization of Drive Test) and NR QoE (Quality-of-Experience).

6. UE-to-UE relay

- Motivation
  - In some environments, e.g. urban, NLOS create challenges to meet the reliability requirements of some V2X use cases.
  - For example, RSUs in intersection may serve as a relay to vehicles in challenging NLOS situations.

- Sub-topic
  - **Introduce the definition of UE-to-UE Relay for V2X operation.**

7. NR-V2X sidelink adjacent-channel coexistence with non-3GPP technologies

- Motivation
  - V2X spectrum is scarce in some regions and non-3GPP technology is already deployed in some of the available channels
- Sub-topic
  - Introduce mechanism for adjacent- channel coexistence of NR-V2X with other ITS technologies.
  - Introduce mechanism for adjacent- channel coexistence of NR-V2X with non- 3GPP ITS technologies also to existing NR-V2X Rel-16/17 by implementing corresponding CRs or by allowing early implementations.

8. Enhancements for vehicular Distributed Antenna System (DAS) UE transmission

- Motivation
  - Advanced use cases operating in sidelink unicast mode and also via Uu will benefit of enhanced vehicular DAS UE transmission due to the improved signal quality
  - This includes HD sensor sharing for AVs, group start, coordinated, cooperative driving manoeuvre, etc.

- Sub-topic
  - **Include enhancements for vehicular DAS UE. E.g. sending the SL/UL signal/channel only from the antenna panel achieving the best performance for the target receiver**