3GPP TSG-RAN WG4 Meeting #86
Athens , Greece, 26 Feb. – 02 Mar., 2018

R4-1802744

Agenda item: 9

Motivation for new WI : Vehicle UE for NR

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Motivation of Vehicle UE for NR

- In March 2017, RAN4 completed Rel-14 NR Study Item[1] and published TR38.803. Rel-15 Study Item on test methods for New Radio has been progressing in 3GPP RAN WG 4 based on the initial scope for testability topics in TR38.803. And Rel-15 Work Item on New Radio Access Technology has been progressing in 3GPP WG 1, 2, 3 and 4.
  - Above SIs & WI, RAN4 have not considered vehicle UE.
- A lot of automobile companies have shown significant interest in 5G service to be equipped into their vehicle. It is sure that vehicle UE can be a significant use-case in NR for 'Connected Car' concept
- For vehicle type UE unlike phone type UE, high power transmission and various antenna layouts (e.g., centralized or distributed antenna layout) could be potentially considered.

Motivation of Vehicle UE for NR

- Possible factors to impact on UE RF requirements
  - High transmission power
  - Antenna type
  - Antenna placement on vehicle body
  - Architecture of vehicle UE in aspect of how to connect RF, Baseband and Antenna.
  - Coordinate system

- Potential higher transmission power
  - Higher than handheld UE for FR1 and FR2

- Antenna type
  - Horn, ULA and patch, etc
  - Related to Beam angle

Motivation of Vehicle UE for NR

➢ Antenna placement

(a) roof rear centre side (b) roof side (c)head light & rear light side

– Centralized antenna can be equipped on vehicle body like (a)
– Distributed antenna can be equipped on vehicle body like (b) and (c)

Motivation of Vehicle UE for NR

- Architecture of vehicle UE in aspect of how to connect RF, Baseband and Antenna.
  - Consider the architecture regarding that in general Remote Unit(RU) is equipped on the vehicle body and Central Unit(CU) is equipped on the Console
  - 1RU(RF)-CoaxialCable-1CU(BB+AP)
  - 1RU(RF+BB)-CoaxialCable-1CU(AP)
  - 1RU(RF+BB)-Ethernet-1CU(AP)
  - Multiple RUs(RFs)-CoaxialCable-1CU(BB+AP)
  - Multiple RUs([RF+BB]s)-CoaxialCable-1CU(BB+AP)
  - Multiple RUs([RF+BB]s)-Ethernet-1CU(BB+AP)

Motivation of Vehicle UE for NR

- Coordinate system
  - Hemisphere model

WI scope for Vehicle UE for NR

- Only Uu link is considered.

- Investigate/identify potential coexistence issues in both FR1 & FR2 :
  - Identify potential necessary higher power for vehicle type UE than handheld UE

- Investigate impact due to different antenna deployment in both FR1 & FR2
  - Identify baseline antenna deployment

- Identify/define potential UE RF requirement
  - Operating band
  - New power class and REFSENS if necessary
  - Other potential impacts on RF requirements are not precluded

Conclusion

- New WI is necessary to identify and define the operating band, transmission power and antenna deployment for vehicle type UE capable of 5G NR technology including coexistence issue on adjacent channels.