

3GPP RAN #86  
December 9-12, 2019  
Sitges, Spain

RP-192776

# Rel-16 NR V2X status and way forward

Qualcomm Incorporated

Agenda Item: 9.4.8

# Background

## Status of Rel-16 NR V2X

- RAN1#99 has declared completion of Rel-16 WI on NR V2X
  - A few items were left for email discussion
  - Some conclusions may leave the design subject to further improvements in next release (e.g., reliability)
- RAN2#108 has completed the majority of the WI objectives
  - Open issues are mainly on stage 3 support of other WG's conclusions (RAN1, SA2, SA3);
  - Email discussions were organized to resolve some of the RAN2 centric topics
- RAN3 progressed well to finish all items in time
  - Essential support for PC5 operation added, e.g. authorization, and PC5 QoS parameters
  - Remaining issues to be resolved in Q1'20

# RAN1 status and way forward

RAN1 has completed its objectives on time. Further enhancements needed in Rel-17

- Per 5G\_V2X\_NRSL WI (RP-190984), RAN1 has completed all the major items before RAN#86
- The email discussion on merging of sidelink cluster **faced clear minority objection**
  - Current agreement (RSRP based \*only\*) does NOT allow for merging sidelink clusters with independent synchronization sources creating human safety issues
  - **Proposal:** Agree on supplemental mechanism based on SLSS ID:
    - Proposal from the email discussion:
    - *If pre-configured in a carrier, the mechanism given below replaces the RSRP-based SynchRefUE selection only for P6 and P6' priority case.*
      - *For the prioritization among references of the same priority for P6/P6' UE, UEs select the lowest SLSS ID SynchRefUE among the SyncRefUEs with RSRP>threshold.*
      - *FFS whether the value of (pre)-configured threshold can be different to the one used for RSRP based SynchRef UE (re)-selection.*

# RAN1 status and way forward

RAN1 has completed its objectives on time. Further enhancements needed in Rel-17

- Additional, a few important items which were studied are not included in the WI
  - Those may affect V2X performance esp. in non-line-of-sight (NLOS) scenarios:
    - Hidden node issue for NLOS scenario not explicitly addressed in Rel-16
      - It may play a big role for Rel-16 performance
    - → Rel-17 enhancements required to improve NLOS performance and reliability
- **Proposal:** Include objective to improve SL reliability esp. in NLOS scenarios in the Rel-17 follow up WI for NR V2X.

# RAN2 status and way forward

A few open issues, but largely on track to finish on time

- RAN2 has already finished the majority of the items per 5G\_V2X\_NRSL WI
- Work item anticipated to close by RAN#87, as planned
  
- A few open issues left to be concluded by RAN#87 (in coordination with other WGs):
  - Unicast SL RLM/RLF: this may not have AS layer impact if SA2 agrees upper layer mechanism;
  - MAC multiplexing of MCRs;
  - Stage 3 level detail designs, e.g. RRC, MAC CE, ANS.1 parameters, etc.
  
- Some issues are not essential for Rel-16, and should be either dropped or moved to Rel-17:
  - Simultaneous Mode 1 and Mode 2

# RAN3 status and way forward

- RAN3 has provided the network solutions to support PC5 operation:
  - V2X service authorization & PC5 QoS configurations
  - SIB encoding performed by the gNB-DU
  - F1 signalling for the support of NR V2X is specified; remaining (stage 3) F1 details, if any, to be done in Q1'20
  - Details on Resources coordination will be resolved in Q1'20.

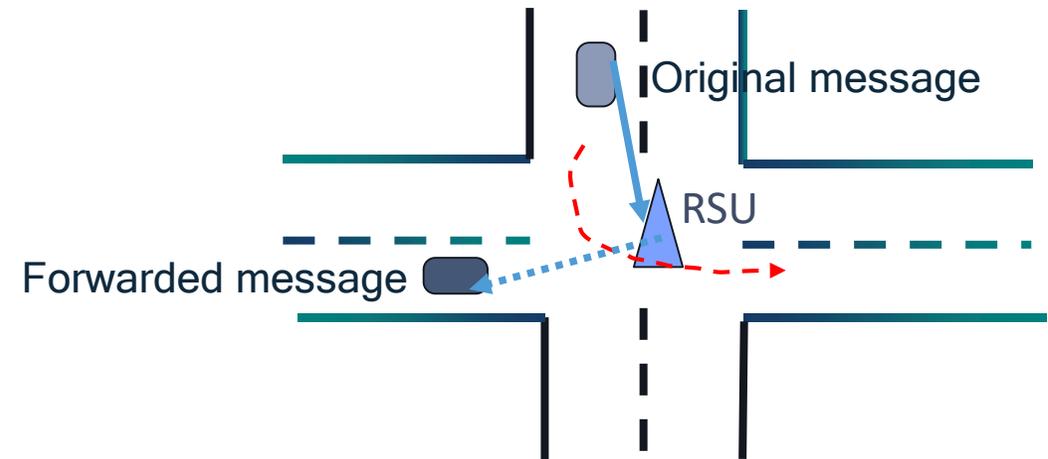
# Conclusion

- Rel-16 5G\_V2X\_NRSL WI is on track to finish on time (no extension needed):
  - RAN#86 for RAN1 part;
  - RAN#87 for RAN2, RAN3 part;
- Further work in Rel-17 follow up WI is needed (following regular Rel-17 schedule)
  - **Proposal:** **Include objective** in the Rel-17 follow up WI for NR V2X **to improve SL reliability esp. in NLOS scenarios**
  - To enhance the performance based on study done in Rel-16

# Annex: High reliability support in NR V2X

Already studied as part of the Rel-16 SI phase.

- Inter-UE coordination
  - Receiver side protection to combat hidden node problem (more severe in NLOS)
  - Repetition of High reliability/Priority packets
    - Cluster head (e.g. RSU) can repeat the transmissions from two (or more) transmitters (which transmitted on same period) in resources reserved for repetition.



- UE scheduling another UE
  - Resource allocation is performed by a cluster head UE (e.g. RSU) for high priority/high reliability.
  - Use unicast communication to setup connection with the cluster head for scheduling purpose
  - Use flexibility provided by SCI-2 for providing scheduling grant to other UEs.



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