3GPP TSG RAN Meeting #99

Rotterdam , NL, March 20-23, 2023

RP-230330

View on Scope of Rel-18 NR Sidelink Evolution

Agenda Item: 9.3.1.5

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Rel-18 WID on NR SL Evolution: Summary

- During prior RAN#98-e meeting, it was decided to:
  - Put on hold the support of CA for NR SL, and to check further during RAN#99
  - Start a study phase to enhance SL operation on FR-2 licensed spectrum

1. Specify mechanism to support NR sidelink CA operation based on LTE sidelink CA operation [RAN2, RAN1, RAN4] (This part of the work is put on hold until further checking in RAN#99)
   - Support only LTE sidelink CA features for NR (i.e., SL carrier (re-)selection, synchronization of aggregated carriers, handling the limited capability, power control for simultaneous sidelink TX, packet duplication)
   - The work is limited to FR1 licensed spectrum and ITS band in FR1.
   - No specific enhancements of Rel-17 sidelink features with sidelink CA support.
   - This feature is backwards compatible in the following regards
     - A Rel-16/Rel-17 UE can receive Rel-18 sidelink broadcast/groupcast transmissions with CA for the carrier on which it receives PSCCH/PSSCH and transmits the corresponding sidelink HARQ feedback (when SL-HARQ is enabled in SCI)

3. Study enhanced sidelink operation on FR2 licensed spectrum [RAN1, RAN2]
   - Focus only on updating the evaluation methodology for commercial deployment scenario in 4Q 2022. [RAN1]
   - Study is limited to the support of sidelink beam management (including initial beam-pairing, beam maintenance, and beam failure recovery, etc) by reusing existing sidelink CSI framework and reusing Uu beam management concepts wherever possible. [RAN1, RAN2]
     - Beam management in FR2 licensed spectrum considers sidelink unicast communication only.

Considerations on Progress and Scope (1/2)

- For objectives 2, 3, and 4, the progress is *slow:*
  - Objective 2 (SL-U) → While the high-level framework (for both channel access and PHY design) is already in place, despite the effort from companies the work needed to complete this objective seems quite large, and there are still a very large set of open issues.
  - Objective 3 (SL FR-2) → RAN1#112 meeting was the first where this topic was threated as part of the study, and RAN1 mainly focused on the general assumptions to take.
  - Objective 4 (SL Co-Ex) → After RAN intervention, the work from RAN1 has been more focused and RAN1 defined the general direction to take to mitigate collisions between NR-V and LTE-V devices.

- Objective 4 - Support higher SCS for co-existence scenarios:
  - For objective 4, a contentious topic is whether to allow the system to operate at higher SCS (>15 kHz) for co-existence scenarios
    - Considering that NR SL legacy design supports 30 kHz as a mandatory SCS, limiting the operation to 15 kHz only may have implementation complexity repercussions, while intricating communication between Rel.18 devices and legacy Rel.16/17 devices and negatively impacting latency performance.

Considerations on Progress and Scope (2/2)

- Objective 1 - Specify CA operation based on LTE sidelink CA operation
  - The amount of work may be limited as many CA components can be reused as they are from LTE. However, few aspects may need harmonization with NR design (e.g., SL carrier (re-)selection procedure, HARQ CB design for forwarding of SL HARQ to gNB, prioritization rules).
  - While market currently has demand for such feature and 5GAA has labelled this with high priority, to realistically fit to the remaining time left in Rel-18 for SL work item, the following could be considered to further narrow down the scope and effort for this agenda item:
    - Only intra-band CA is supported and limited CA to ITS band only,
    - PSFCH transmission is confined within the same carrier where the associated PSCCH/PSSCH transmission is performed, and no further enhancements to PSFCH and the SL-HARQ feedback procedure are pursued,
    - SL RSRP and CSI measurement and reporting procedures are independent between carriers and no enhancements to these procedures are considered.
  - If 3GPP decides to pursue this feature, it should start after RAN#99 considering that only few meetings are left.

Recommendations

- Objective 1 is approved with updated scoping:

  Specify mechanism to support NR sidelink CA operation based on LTE sidelink CA operation [RAN2, RAN1, RAN4] ~~(This part of the work is put on hold until further checking in RAN#98-e)~~

  - **Support only LTE sidelink CA features for NR (i.e., SL carrier (re-)selection, synchronization of aggregated carriers, handling the limited capability, power control for simultaneous sidelink TX, packet duplication)**
  - **No specific enhancements to the SL HARQ procedure, PSFCH, RSRP feedback and CSI feedback compared to Rel-16**
  - **The work is limited to the ~~FR1 licensed spectrum and~~ ITS band in FR1.**
  - **No specific enhancements of Rel-17 sidelink features with sidelink CA support.**
  - **This feature is backwards compatible in the following regards**
    - ***A Rel-16/Rel-17 UE can receive Rel-18 sidelink broadcast/groupcast transmissions with CA for the carrier on which it receives PSCCH/PSSCH and transmits the corresponding sidelink HARQ feedback (when SL-HARQ is enabled in SCI)***

- Objective 4 is kept untouched

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