

On the 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

To check in RAN#97 for objectives 1 and 3, taking into account the progress on objectives 2 and 4, aiming to have specification work for both objective 1 and 3.

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#97)
 - 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
 - o 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 and specify enhanced sidelink operation on FR2 licensed spectrum [RAN1, RAN2, RAN4] (This part of the work is put on hold until further checking in RAN#97)
 - Update evaluation methodology for commercial deployment scenario
 - Work 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.
 - o Beam management in FR2 licensed spectrum considers sidelink unicast communication only.

2. Study and specify support of sidelink on unlicensed spectrum for both mode 1 and mode 2 where Uu operation for mode 1 is limited to licensed spectrum only [RAN1, RAN2, RAN4]

- Channel access mechanisms from NR-U shall be reused for sidelink unlicensed operation
 - o Assess the applicability of sidelink resource reservation from Rel-16/Rel-17 to sidelink unlicensed operation within the boundaries of unlicensed channel access mechanism and operation
 - No specific enhancements for Rel-17 resource allocation mechanisms
 - If the existing NR-U channel access framework does not support the required SL-U functionality, WGs will make appropriate recommendations for RAN approval.
- Physical channel design framework: Required changes to NR sidelink physical channel structures and procedures to operate on unlicensed spectrum
 - o The existing NR sidelink and NR-U channel structure shall be reused as the baseline.
- No specific enhancements for existing NR SL feature|
- The study should focus on FR1 unlicensed bands (n46 and n96/n102) and is to be completed by RAN#98.
- Note: In sidelink unlicensed operation, the gNB does not perform Type 1 channel access to initiate and share a channel occupancy, neither Type 2 channel access to share an initiated channel occupancy, nor semi-static channel access procedures to access an unlicensed channel.

4. Study and specify, if necessary, mechanism(s) for co-channel coexistence for LTE sidelink and NR sidelink including performance, necessity, feasibility, and potential specification impact if any [RAN1, RAN2, RAN4]

- Reuse the in-device coexistence framework defined in Rel-16 as much as possible

Consideration on Progress and Scope

- For objective 2 and 4, the completion level has been declared on progress (~20%), and we expect good progress down the road.
 - Objective 2 -> Good progress. Further work can be based as much as possible on Rel-16 NR-U design.
 - Objective 4 -> Slower than objective 2. Rel-16 in-device co-existence is taken as baseline, and further progress is expected in developing dynamic resource partitioning solution(s).
- Objective 1 aims to specify CA operation based on LTE sidelink CA operation
 - Amount of work is limited as many CA components from LTE can be reused as they are, while few others may need harmonization with NR design (e.g, SL carrier (re-)selection procedure, HARQ codebook design and prioritization rules).
 - Market has currently demand for such feature and 5GAA has labelled this with high priority.
- Objective 3 aims to enable SL operation in licensed only FR2 band
 - The work is limited to supporting SL beam management by reusing existing Uu based beam management. Though, it is expected not smaller work scopes than objective 1
 - To prioritize FR2-1 over FR2-2

Recommendations

- Considering current progress of objective 2 and 4, market interest and scope:

- Objective 1 is approved with current 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#97~~)

- **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)*
- Objective 3 is approved for SL beam management only:

Study and specify enhanced sidelink operation on FR2-1 licensed spectrum [RAN1, RAN2, RAN4] (~~This part of the work is put on hold until further checking in RAN#97~~)

- ***Update evaluation methodology for commercial deployment scenario***
- ***Work 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.***
- ***Beam management in FR2-1 licensed spectrum considers sidelink unicast communication only.***

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