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Motivation for new SI on enhanced duplexing for NR

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Agreements from Rel-14 NR SI

- NR should support at least following design targets:
 - It should allow FDD operation on a paired spectrum
 - It should allow different transmission directions in either part of a paired spectrum
 - It should allow TDD operation on an unpaired spectrum where the transmission direction of time resources is not dynamically changing
 - It should allow TDD operation on an unpaired spectrum where the transmission direction of most time resources can be dynamically changing
- Strive for a common framework for cross-link interference mitigation schemes for both paired and unpaired spectra
- NR should support dynamically assigned DL and UL transmission directions at least for data on a per-slot basis at least in a TDM manner

Performance observations from Rel-14 NR SI

➤ Observations for indoor hotspot scenario:

- Evaluations show that duplexing flexibility with cross-link interference mitigation schemes and on a 4GHz and 30GHz provides better UPT compared to static UL/DL resource partition and duplexing flexibility without cross-link interference mitigation schemes
- Evaluations show that duplexing flexibility without cross-link interference mitigation schemes on a 4GHz and 30GHz provides better UPT compared to static UL/DL resource partition at least for some cases
- The evaluated cross-link interference mitigation schemes include sensing based methods, advanced receivers (e.g. MMSE-IRC, EMMSE-IRC), coordinated scheduling/beamforming, power control, link adaptation, hybrid dynamic/static UL/DL resource assignment.

➤ Observations for urban macro scenario:

- Evaluations show that duplexing flexibility with cross-link interference mitigation schemes on a 4GHz unpaired spectrum and on a 2GHz paired spectrum provides better average UPT compared to static UL/DL resource partition and duplexing flexibility without cross-link interference mitigation schemes.
- The evaluated cross-link interference mitigation schemes include advanced receivers (e.g. MMSE-IRC, EMMSE-IRC, packet exchange for interference cancellation), coordinated scheduling/beamforming, power control, link adaptation.
- Evaluations show that duplexing flexibility on a 2GHz paired spectrum with SRS on the DL part without dynamic DL/UL resource allocation provides better cell average/edge throughput compared to no SRS on the DL part of the spectrum.

Performance observations from Rel-14 NR SI

- Observations for dense urban scenario,
 - Evaluations show that duplexing flexibility with cross-link interference mitigation schemes on a 4GHz and 30GHz unpaired spectrum provides better UPT compared to static UL/DL resource partition and duplexing flexibility without cross-link interference mitigation schemes
 - The evaluated cross-link interference mitigation schemes include advanced receivers (e.g. MMSE-IRC, eMMSE-IRC), sensing based schemes, coordinated scheduling/beamforming, power control, link adaptation, hybrid dynamic/static UL/DL resource assignment.

- ***Common physical layer design for duplexing flexibility of paired and unpaired spectrum shall be specified in Rel-15 NR WI***



Interference mitigation schemes

- Many interference mitigation schemes are proposed during the Rel-14 NR SI
- Some of the interference mitigation schemes are verified by evaluation assumptions
- Different observations are made on the benefits of some interference mitigation schemes
- ***Some enabler for interference mitigation scheme shall be specified in Rel-15 NR WI, e.g.***
 - Interference measurement
 - Coordinated scheduling/beamforming
 - Power control
 - Information exchange between gNBs
- ***More advanced interference mitigation schemes shall be further studied***, e.g. cross-link interference cancellation receivers, cross-link interference measurement, and cross-link interference coordination

Objectives

- Study further enhanced duplexing for NR, including
 - Advanced cross-link interference mitigation schemes for unpaired and paired spectrum with duplexing flexibility [RAN1, RAN3, RAN4]
 - ✓ Identify the enabler for advanced cross-link interference mitigation schemes, e.g. cross-link interference cancellation receivers, cross-link interference measurement, and cross-link interference coordination.
 - ✓ Evaluate the performance gain of advanced cross-interference mitigation schemes
- Study in this study item shall take into account the agreements in other relevant Rel-15 NR items

Thanks !



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