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Scope Update for R17 Above 52.6 GHz WI

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Above 52.6 GHz Work Item Objectives

- WI objectives were agreed in December 2019, RAN#86, (RP-193229)
 - Physical layer aspects including [RAN1]:
 - New numerology or numerologies (μ value in 38.211) for operation in this frequency range. Addressing impact on physical signals/channels if any, as identified in the SI.
 - Timeline related aspects adapted to each of the new numerologies, e.g., BWP and beam switching times, HARQ scheduling, UE processing, preparation and computation times for PDSCH, PUSCH/SRS and CSI, respectively.
 - Support of up to 64 SSB beams for licensed and unlicensed operation in this frequency range.
 - Physical layer procedure(s) including [RAN1]:
 - Channel access mechanism assuming beam-based operation in order to comply with the regulatory requirements applicable to unlicensed spectrum for frequencies between 52.6GHz and 71GHz.
- The outcomes of the Study Item are captured in Draft TR38808-v10 (R1-2009713, November 18, RAN1 #103-e)
- Based on the SI recommendations and considerations on available time for Rel-17, we think that is necessary to further clarify and focus the WI objectives

Discussion points for WID numerology related objectives

- RAN1 recommends (Draft TR38808-v10, Section 4.1.2.1) for the numerology:
 - Support 120 kHz subcarrier spacing with normal CP length
 - Consider up to two additional SCS to 120kHz from {240 kHz, 480 kHz, 960 kHz}
 - It is not recommended to consider support of only 240 kHz SCS for PDCCH/PDSCH/PUCCH/PUSCH in addition to 120 kHz
- RAN1 notes (Draft TR38808-v10, Section 6.1) different physical layer impact from different candidate numerologies:
 - 120 kHz SCS does not require any changes of the NR design,
 - Additional numerologies may require potential changes to SSB, SSB patterns, RO configuration, the timeline for scheduling and processing, PDCCH monitoring, DM-RS configurations, CPU occupation, while providing no performance improvement for PSS/SSS/PBCH and PRACH.

Recommendations for WID down scope of numerology related objectives

- Based on the above observations, we recommend that WID should have the following WI clarifications:
 - **If necessary, at most one SCS from the set { 240 kHz, 480 kHz, 960 kHz} should be added to 120 kHz SCS**
 - **If an additional SCS is added, that SCS should be used only for control and data channels (PDCCH, PDSCH, PUCCH, PUSCH) and the associated RS (DM-RS, PT-RS, CSI-RS/TRS, and SRS)**
 - **Leave for future releases the possible enhancements for DM-RS, PT-RS, CSI-RS , SRS, PDCCH monitoring due to marginal or no gain observed in simulations**

Discussion points for WID channel access related objectives

- RAN1 recommendations for channel access (Draft TR38808-v10, Section 5.2.2):
 - Support channel access with LBT and channel access without LBT
 - Consider further investigations of receiver assisted channel access (TR, Section 5.2.3)
 - Use the CCA check procedure in EN 302 567 as the baseline for channel access for 60GHz band when LBT is applied.
 - For operation where LBT is not required, the following can be further discussed when specifications are developed:
 - whether to introduce additional conditions/mechanisms for no-LBT to be used, or whether to leave it for gNB implementation,
 - when no-LBT mode is used, whether to introduce additional restrictions, such as DFS needs to be applied, ATPC needs to be applied, long term sensing needs to be applied, certain duty cycle limitation, certain transmit power limitation, MCOT limits, etc, or leave the restriction for gNB implementation,
 - when no-LBT mode is used, whether to introduce mechanism for the system to fallback to LBT mode, or whether to leave it for gNB implementation.

Recommendations for WID clarifications of channel access related objectives

- Based on the above observations, we recommend that WID should have the following WI clarifications:
 - **Focus on the LBT channel access design assuming beam-based operation with receiver assistance**
 - **For No-LBT channel access:**
 - **Use the licensed access as a baseline**
 - **Leave for gNB implementation additional conditions/mechanisms for when no-LBT to be used**
 - **Leave for gNB implementation the mechanisms for the system to fallback to LBT mode**

Summary of Work Item Proposed Objectives

- Proposed refined WI objectives:
 - Physical layer aspects including [RAN1]:
 - ~~New~~ Numerology or numerologies (μ value in 38.211) for operation in this frequency range.
 - Support 120kHz SCS with NCP
 - If necessary, at most one SCS from the set { 240 kHz, 480 kHz, 960 kHz} should be added to 120 SCS
 - If an additional SCS is added, that SCS should be used only for control and data channels (PDCCH, PDSCH, PUCCH, PUSCH) and the corresponding RSs (DM-RS, PT-RS, CSI-RS/TRS, and SRS)
 - No further enhancement for DM-RS, PT-RS, CSI-RS/TRS, SRS, PDCCH monitoring
 - Addressing impact on physical signals/channels if any, as identified in the SI
 - Timeline related aspects adapted to each of the new numerologies, e.g., BWP and beam switching times, HARQ scheduling, UE processing, preparation and computation times for PDSCH, PUSCH/SRS and CSI, respectively.
 - Support of up to 64 SSB beams for licensed and unlicensed operation in this frequency range.
 - Physical layer procedure(s) including [RAN1]:
 - Channel access mechanism assuming beam-based operation in order to comply with the regulatory requirements applicable to unlicensed spectrum for frequencies between 52.6GHz and 71GHz.
 - LBT channel access design assuming beam-based operation with receiver assistance
 - For No-LBT channel access:
 - Use the licensed access as a baseline
 - No standard support of additional restrictions/conditions/mechanisms for when no-LBT to be used
 - No standard support of mechanisms for the system to fallback to LBT mode

Thank You.

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