

Smarter technology for all

**3GPP TSG RAN Rel-18 workshop
Electronic Meeting, June 28 – July 2, 2021**

RWS-210395

Agenda Item: 4.3
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New Waveform and Extending NR operation Beyond 71 GHz

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Motivation & Use-cases

- Availability of large contiguous bands is a key motivation to extend NR operation from 71 – 114.25 GHz
 - Licensed bands 71 – 76 GHz and 81 – 86 GHz in ITU regions 1, 2 and 3
 - Support for ultra-wideband spectrum operation in licensed bands
- Following use-cases/deployment scenarios can be better supported:
 - High data rate eMBB including mobile data offloading
 - Fixed wireless and backhaul
 - Factory automation
 - Positioning with extreme precision
 - Urban and rural macro deployment with good coverage
 - Potential new use case of sensing
- Study of NR operation beyond 71GHz can be a pre-cursor for operating in sub-terahertz frequency range

Key Aspects for NR operation from 71 – 114.25 GHz in Rel-18 (1/2)

- **Evaluation Methodology**

- Study if modifications to channel model (TR38.901) needed for operating between 100 – 114.25 GHz
- Identify HW limitations, antenna models, PN models, and reference PA models for FR beyond 71GHz

- **New waveform candidates**

- Identify and evaluate new waveform candidates to deal with high PAPR issue
 - Identify required enhancements with selected waveform for DL and/or UL including:
 - Impact to initial access procedures, control channel design, reference signals such as DM-RS, PT-RS, etc.
 - Low modulation schemes such as pi/2 BPSK for DL
 - Support of multiplexing different/mixed waveforms across different physical channels/signals

Key Aspects for NR operation from 71 – 114.25 GHz in NR Rel-18 (2/2)

- **New numerologies (> 960 kHz) with existing waveforms**

- Evaluate and identify if numerology beyond 960kHz needed beyond 71GHz
 - Investigate if Rel-17 enhancements for 480kHz and 960kHz sufficient
- Evaluate and identify enhancements for coverage for initial access including SSB, PRACH, PDCCH

- **Beam enhancements**

- Evaluate and identify need for larger number of (narrower) beams i.e., beyond 64 SSB beams
 - Identify enhancements related to SSB patterns and beam-management procedures including timeline aspects such as beam switching gaps, beam application time, etc.
 - Identify enhancements for beam management procedures with larger number of beams considering overhead and latency

Proposal for NR operation from 71 – 114.25 GHz in NR Rel-18

- Study item for NR operation from 71 – 114.25 GHz with following objectives:
 - Identify the evaluation methodology including channel models for above 100GHz, antenna models, PN models, reference PA models for waveform and new numerology analysis
 - Study and identify the required enhancements for new waveform (if adopted)
 - Evaluate and identify if numerology beyond 960kHz is needed
 - Identify enhancements for supporting numerologies larger than 960kHz
 - Identify enhancements for coverage aspects for at least initial access and PDCCH
 - Study need for introducing larger number of beams (> 64 SSB beams)
 - Identify enhancements for beam management procedures with larger number of beams

thanks.

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