

# Overview of Release-19 Proposals



**IIT KANPUR**  
Indian Institute of Technology, Kanpur

Co-Sourced by: CEWiT, IIT Madras

# Proposals for Release-19



- Positioning Enhancements
- AI/ML for NR Air Interface
- Network-Controlled Repeater (NCR) Enhancements
- Reconfigurable Intelligent Surfaces (RIS)
- Integrated Sensing and Communications (ISAC)
- New Waveform for Beyond 71 GHz

# Positioning Enhancements



## Motivation for Positioning Enhancements:

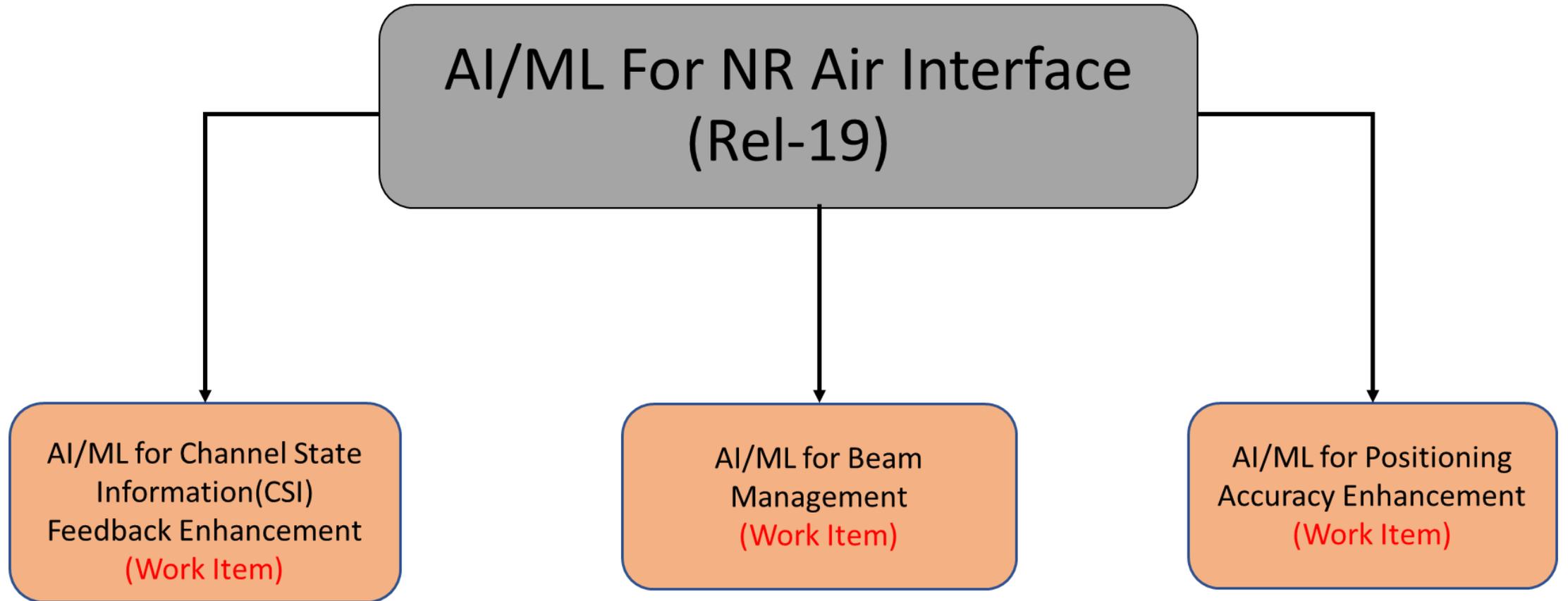
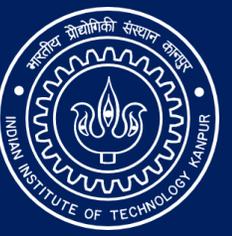
- To support use cases:
  - High-speed mobility
  - Extended reality
  - Collaborative robots
  - Autonomous vehicle mobility
- Requirements:
  - Increasing positioning accuracy in 3-D
  - Ultra-low latency positioning
  - Higher availability (>99% users)

# Positioning Enhancements



- **Extension on Release-18 features**
  - Carrier phase-based positioning (CPP) enhancement for standalone operation
  - CPP for sidelink positioning
  - Sidelink positioning support in FR2
  - Positioning support for eRedCap UEs operating at 5MHz
- **New Release-19 features**
  - Architecture for ultra-low latency positioning
    - Measurements, Procedures and Signalling
  - Positioning support for unlicensed bands
    - Support for the sidelink positioning on unlicensed band
    - Aggregation across the unlicensed band

# AI/ML For NR Air Interface



# NCR enhancements



- SSB forwarding design for NCR
  - NCR forwarding any SSB received in the backhaul link is not efficient.
  - Study methods to efficiently allocate SSBs dedicated for NCR forwarding
- UE detection ambiguity problem
  - Configuration to detect which UEs are in coverage of NCR
  - UE detection is required for efficient time-frequency resource scheduling and beam configuration of signals intended for different UEs
- Feedback of SCI from NCR to gNB
  - In Rel-18, the feedback of SCI in PDSCH, i.e, static/semi-static configuration is agreed.
  - Feedback of dynamic SCI received in PDCCH is needed for efficient operation of NCR.
- Frequency-selective operation of NCR-Fwd
  - Beam configuration and On-OFF configuration for RB/RBG/carrier level forwarding.
  - Single beam from BS to NCR, different beams from NCR to UE for different frequency groups.

# Reconfigurable Intelligent Surfaces

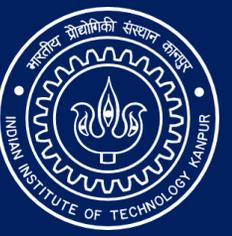


- Use case
  - Improving coverage, mitigating blockage, increasing positioning accuracy
- Deployment scenario
  - Indoor and outdoor scenarios
  - FR1 and FR2
- Channel modeling
  - Near field or Far Field
  - Pathloss, NLOS/LOS, etc.
- Device modelling
  - Sizes and topologies
  - Active/Passive elements
- RIS controller:
  - Backhaul connection to network: Wired or Wireless
  - Take NCR as baseline for wireless backhaul.
- Beam management
  - Beam sweeping, beam failure recovery, etc.
- Interference management
  - Mitigate interference to unwanted users/cells

# Integrated Sensing and Communications



- Use cases/requirements and KPIs from RAN perspective
- Channel modelling for sensing signals
- Study of sensing signal design and potential specification impact



# New Waveform for beyond 71 GHz

- Motivation
  - To support short-range use cases and applications which require extreme capacity.
  - Above 71GHz offers ultra-wide and contiguous band for 5G+/6G applications.
  - Above 71GHz frequencies are a strong candidate for Sensing applications.
- Challenges of current waveform
  - OFDM has high PAPR which reduces power amplifier efficiency
  - OFDM is susceptible to Phase noise
  - OFDM suffers heavily under high Doppler shift

# New Waveform for beyond 71 GHz



- Key parameters to evaluate new waveform
  - Effective for high Doppler spread
  - Low PAPR
  - Robustness against Phase Noise
  - High Spectral Efficiency
  - Low Out of Band Emission (OOBE)
  - Flexible to integrate with existing technology
- Study potential candidate waveforms
  - Start with study item:
    - Evaluation of KPIs for candidate waveforms, e.g., Orthogonal Time Frequency Space (OTFS), Generalized Frequency Division Multiplexing (GFDM), Universal Filter multi carrier (UFMC)



Thank you!