与场景亲密接触
做方案创新专家

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RP-233045

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Agenda Item: 9.1.1.4

Considerations on Rel-19 Ambient IoT

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Potential objectives for Rel-19 Ambient IoT

According to 3GPP RAN chair's summary in RP-232745, several potential objectives for Rel-19 Ambient IoT have been proposed:

Ambient IoT SI

- References: RWS-230488, RP-231540, RP-232614
- Potential objectives:
  - Consider all Devices A, B and C in the SI?
  - Down-selection among:
    - Deployment scenario 1 with Topology 1
    - Deployment scenario 2 with Topology 1
    - Deployment scenario 2 with Topology 2
    - Deployment scenario 4 with Topology 1
    - Deployment scenario 4 with Topology 3
  - FR1 licensed spectrum, focusing on FDD only
    - Downselection Spectrum in-band to NR, in guard-band to LTE/NR, and in standalone band(s)

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- Evaluations and remaining feasibility assessments
  - Device architecture and characteristics
  - Evaluation methodology and assumptions
  - Design target evaluations
  - Coexistence evaluations
- Physical layer study on:
  - Waveform and multiple access
  - Frame structure and numerology
  - Modulation and channel coding
  - Physical layer signals/channels
  - Physical layer procedures including initial access and mobility, scheduling, (H)ARQ, power control, etc
- Higher layers study on:
  - Compact protocol stack and lightweight signaling procedure, including mobility aspects
    - Control plane functionalities, including CN connectivity
    - User plane functionalities
    - Security aspects (*Note: This does not necessarily mean security has RAN impact)
- RAN3 aspects for study:
  - Enabling necessary CN-RAN signalling
  - RAN architecture aspects, if any
- RAN4 aspects for study:
  - Feasibility study of BS/UE/device architectures
  - Link budget study
  - Coexistence analysis
  - RRM

Proposed scopes for Rel-19 Ambient IoT

The Rel-18 Ambient IoT SI result has been well documented in 3GPP TR 38.848, including deployment scenarios, uses cases, services, RAN design targets as well as comparison and assessment. Based on TR 38.848 and the TU estimate for Rel-19 Ambient IoT (~3.5 TUs), our views on the scope for Rel-19 Ambient IoT are summarized as follows:

- Support **SI+WI**
  - 12-month for SI completion, check in Dec'24 for conversion to WI or if necessary, continuation of SI
- Prioritization on device categorization: **Device type B**
  - **Device type B**: Has energy storage, no independent signal generation, i.e. backscattering transmission. Use of stored energy can include amplification for reflected signals.
  - Device type B has the merit of both low complexity/cost and low power consumption, which justify the original intention of Ambient IoT.
- Prioritization on connectivity topologies and deployment scenarios: **Deployment scenario 1 with Topology 1**
  - **Deployment scenario 1 with Topology 1:** Ambient device indoors, basestation indoors with the Ambient IoT device directly and bidirectionally communicates with a basestation.
  - Deployment scenario 1 with Topology 1 is a fundamental combination of deployment scenario and topology, which should be considered as the first priority in SI.
- Prioritization on type of spectrum: **FR1 licensed spectrum, FDD 1st priority and TDD 2nd priority, in guard-band to LTE/NR**
  - **FR1 licensed spectrum**: good coverage and controlled interference.
  - **FDD as the first priority but also include TDD as the second priority**: to maximize usage of frequency resources for commercial profit maximization.
  - **In guard-band to LTE/NR**: to avoid interference to current LTE/NR as much as possible.
- Support RAN1-led SI on Ambient-IoT in Rel-19: **Physical layer design is the first priority**
  - **Focus on physical layer design** including waveform and multiple access, frame structure and numerology, modulation and channel coding, physical layer signals/channels, physical layer procedures including initial access and mobility, scheduling, (H)ARQ, power control, etc.

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Thanks

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