Smarter technology for all

3GPP TSG RAN#101
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RP-232188

Agenda Item:	8A.2.4
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Views on Ambient IoT for Rel-19

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Motivation

- Ambient IoT devices may satisfy the zero energy based sustainable device objective from 6G

- Ambient IoT SA1 use cases described in SA1 TR 22.840 is broadly mapped under 4 main use case area in the Ambient RAN study. Table 4.1.1-1 from TR 38.848 shows Mapping between RAN representative use cases and SA1 use cases.
  - Inventory, positioning, sensors, command
  - Indoor, Indoor/Outdoor, Outdoor

- Device type discussion in RAN study
  - Device A: No energy storage, no independent signal generation, i.e. backscattering transmission.
  - Device B: Has energy storage, no independent signal generation, i.e. backscattering transmission.
  - Device C: Has energy storage, has independent signal generation, i.e. active RF component for transmission

- Device complexity discussion in RAN study
  - Device A: comparable to UHF RFID
  - Device B: Device A < Device B < Device C
  - Device C: order of magnitude lower than NB-IoT

- The user experienced data rate target is, at least for the uplink, maximum not less than 5 kbps, and minimum not less than 0.1 kbps.

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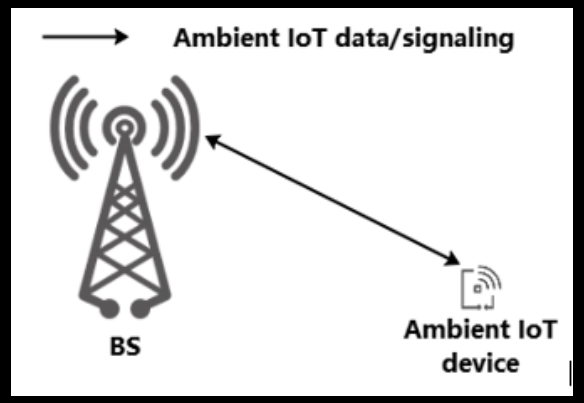
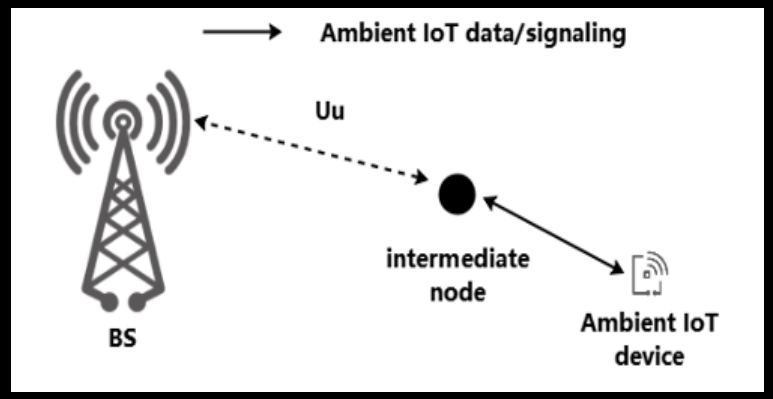
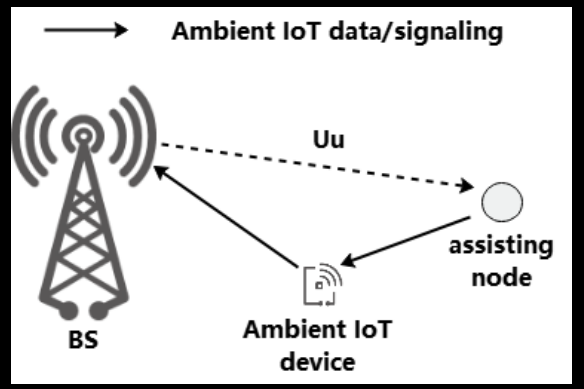
Connectivity Topology

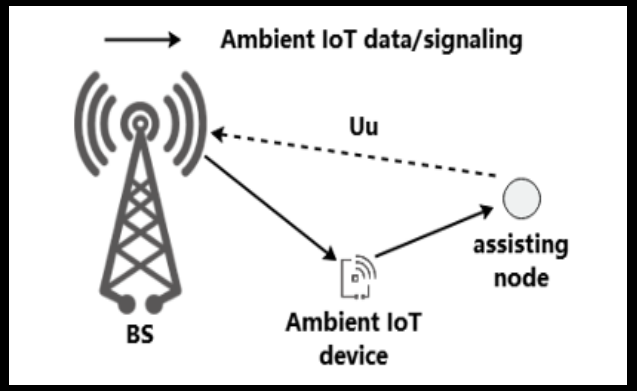


Top-1: BS directly communicates with the Ambient IoT device communicates bidirectionally

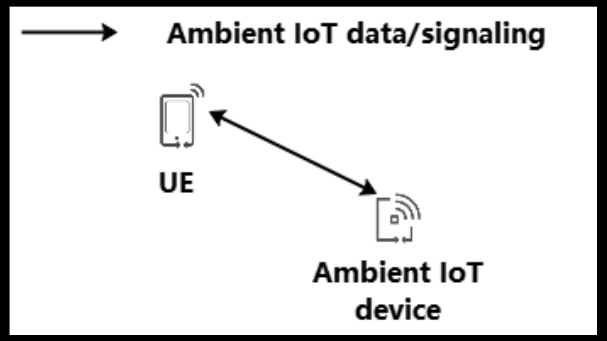


Top-2: Ambient IoT device communicates bidirectionally with an intermediate node between the device and base station. The intermediate node can be a relay, IAB node, UE, repeater, etc





Top-3: The assisting node can be a relay, IAB, UE, repeater, etc. The assisting node either transmits or receives from the Ambient IoT device



Top-4: Ambient IoT device communicates bidirectionally with a UE

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Deployment Scenarios

Deployment scenario 1: Device indoors, base station indoors	Topology 1, 2, 3
Deployment scenario 2: Device indoors, base station outdoors	Topology 1, 2, 3
Deployment scenario 3: Device indoors, UE-based reader	Topology 4
Deployment scenario 4: Device outdoors, base station outdoors	Topology 1, 2, 3
Deployment scenario 5: Device outdoors, UE-based reader	Topology 4

- Deployment scenarios providing mapping between connectivity topology to the indoor/outdoor deployments needed for the UC
- Down-select the deployment scenario according to the prioritized UC e.g., for indoor inventory UC consider prioritizing indoor deployment scenario 1, 3 and topology 1, 4

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Proposal for Ambient IoT Rel-19 scoping

- Support RAN WG1 Rel-19 study item for Ambient IoT and the normative work to be done in the later release

- Prioritize indoor deployment scenario compared with outdoor deployment scenarios to be evaluated in RAN WG1 study

- Study in R19 one category of Ambient IoT Device type according to the selected use case(s):
  - Down-select the UC to be evaluated in Rel-19 study according to the majority views in the RAN plenary level study phase and urgent market needs
    - Prioritize indoor deployment scenario compared with outdoor deployment scenarios for standardization workload consideration. e.g., indoor inventory

  - Down-select the device type(s) to be evaluated in Rel-19 according to the selected UCs,
    - Air interface design of each device category may be different
    - e.g., Device type A/B for Rel-19 evaluation if indoor inventory is the top priority UC for operators/Vertical industry

  - Select a device type for Rel-19 evaluation that satisfies all UC requirements and deployments, if down-selection of UC is not possible

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thanks.

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