

Samsung's views on Scope for Ambient IoT

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Study plan

Considering the RAN study status, current TR covers too wide range of topologies, device types, and more

- We believe that it is difficult to complete everything in Rel-19 with SI alone without adjusting the entire scope.
- In particular, in the case of device types, there are three new types that have not been verified for feasibility so far, and their complexity of study would be high.
- In addition, we still don't see the needs of the market or the strong need to replace RFID.

With these in mind, we can consider two options for a study plan.

- Option 1) SI for 18 months only with prioritization of scenarios identified in RAN SI
- Option 2) SI for first 9 months with limited scenarios, e.g., one UE type and have a checkpoint whether we need to continue study or have normative phase
 - If WI is made, the scope should be reasonable limited (with one device type and one or two topologies)

Device types

For device types, three types are on the table in RAN SI

- Type A: backscatter based without storage (passive)
- Type B: backscatter with some energy storage (passive)
- Type C: energy harvest (e.g., RF) with energy storage (active)

For backscatter based, still many questions should be answered before move to WG level study, for example

- How to operate in FDD (DL to UL band frequency shifting backscattering seems not possible)
- How to operate in CW node in topology (how to manage CW node and interference problem)
- How to make high receiver sensitivity for long range communication with BS (if not, RFID is better solution for this use cases)

Among device types, type C is more feasible and will work for short/mid range transmission (less than 50 m)

- If WI is really necessary, type C should be one can go with and others need more feasibility study for real zero power device in 6G

Topologies

For topology, there are multiple node types to describe the Ambient IoT connection including BS and assisting node,

- Among topologies in RAN SI, topology 1 (direct BS connection) and 4 (direct UE connection) might be useful
- However, considering use case of ambient and range, direction UE connection seems not urgent and other solutions (BLE, UWB, NFC, and RFID) can be used instead.

To understand feasibility of ambient IoT, WG study should firstly focus on direction BS connection

Potential Scope for Study

The followings are considering for WG level study

- Study architecture and functionality for device A, B, and C
- Study modelling of backscatter efficiency, impedance change in RF front for device type A and B
- Study RF complexity aspect for FDD and TDD ambient IoT devices
- Study feasibility RF harvesting signals in DL and feasibility of reusing the legacy signal as carrier wave(CW)
- Study design of energy efficient physical-layer UL signal for ambient IoT packet
- Study coexistence with legacy systems and other devices, and interference handling of CW and other signals for gNB and devices
- Evaluate performance of ambient IoT based on ambient IoT modelling
- Study on identification and management of ambient IoT devices with light weight protocol (RAN2)