

# On IoT Evolution in Rel-16

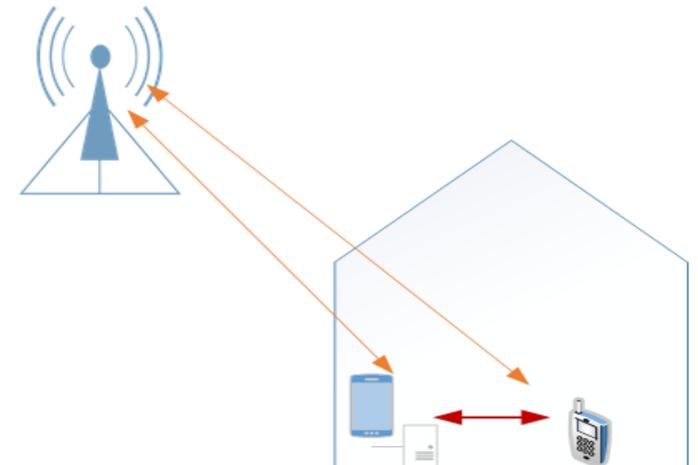
**SAMSUNG**

# Overview of IoT Evolution

- NR-IoT and LTE track (eMTC/NB-IoT) shall have clear market segment.
  - eMTC/NB-IoT is targeting to low-end applications, and use cases with extreme requirement as longer battery life, extended coverage
  - NR-IoT target to mid- /high-end IoT applications
- Evolution of eMTC/NB-IoT
  - Enhancements should have no impact on hardware implementation for both UE and eNB
  - For further power saving of the UEs in the extended coverage, techniques beneficial for legacy UE can be considered
  - Leftover of Rel-15 (if needed)
  - Enhancement on co-existence with NR (if needed)
- NR-IoT
  - Target to mid-/high-end IoT applications
  - No need or urgency to have normative work in Rel-16

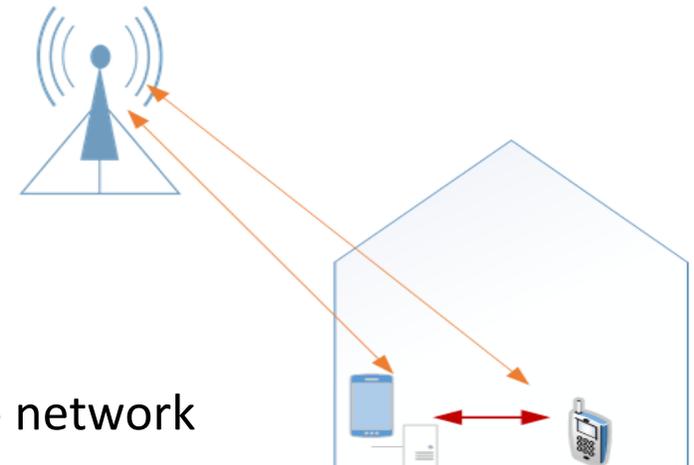
- **Motivation**

- For some IoT applications (e.g., smart home, metering), some devices may be easy to recharge or connect to power line, while most of devices rely on battery.
- The power consumption of UE in deep indoor/basement is the bottleneck due to the large repetitions of transmission and reception.
- New feature requires hardware change may not have positive impact to IoT ecosystem.
- Techniques that can also benefit for legacy IoT Devices, are more attractive and healthy for 3GPP LPWA ecosystem .



# In-band UE Relay

- Sidelink UE relay
  - New feature to all the IoT UEs.
    - May have impact on UE hardware and increase on cost.
    - Reliability may not be guaranteed in sidelink.
  - Not able to support legacy UE.
- Relay nodes/Repeater/Femto
  - Increase deployment cost of operators.
- In-band UE Relay
  - Able to serve legacy UE
  - Full control by network
  - Without relay, remote UE is still able to connect to network



# Leftover of Rel-15 (if needed)

- Leftover of Rel-15 eMTC /NB-IoT (if any) may be considered in Rel-16.
- For example:
  - eMTC
    - Specify physical signal/channel/DCI for HARQ-ACK feedback in DL for data transmission in UL.
      - Support of HD-FDD.
      - Support of DCI to provide HARQ-ACK for more than one UE (if not specified in Rel-15)
  - NB-IoT
    - Connected mode SPS (except UL SPS for SR/BSR if specified in Rel-15)
    - Idle mode SPS

# Better co-existence with NR (If needed)

- Co-existence with NR is important
  - Check if co-existence with NR needs further optimization
    - In-band/guard-band deployment of eMTC/NB-IoT within NR for both TDD and FDD

