

# Rel-18 RedCap Enhancement

Agenda Item: 4.2

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# Cellular IoT: A spectrum of requirements

- Cat M (eMTC) and NB-IoT remain as suitable options for the most cost- and power-sensitive LPWA market with very low data rate requirements (*e.g., typically < 1 Mbps, no more than ~4/7 Mbps in DL/UL for Cat M2*)
  - Use cases include: smart meters, basic inventory/asset trackers, etc.
- Rel-17 NR introduces a framework for NR IoT with introduction of Reduced Capability (RedCap) NR devices
  - BW limited to 20 MHz (in FR1) and 100 MHz (in FR2)
  - Peak rates of 80~200 Mbps in the DL and around ~90 Mbps in the UL
- While offering potential reduction in device cost/complexity and power consumption compared to “eMBB” or “URLLC/IIoT” UEs, Rel-17 NR RedCap offers a considerable over-design in terms of device cost/complexity or power consumption for IoT use cases requiring peak rates of a few Mbps (*e.g., 1~20 Mbps*)
  - Use cases include: wireless sensors, low-end wearables, basic (SD) video surveillance, asset trackers (with mobility support), IoT use-cases with human-machine interfaces involving voice (VoIP), etc.
  - Currently, these use cases are mostly served by Cat 1, Cat 1bis, or Cat M UEs
  - This category of IoT devices offers the largest potential volume for NR IoT, second only to LPWA
- **It would be beneficial to specify NR IoT solutions to better address IoT use cases with 1~20 Mbps data rates with higher sensitivity to cost/complexity and UE power consumption to migrate Cat 1/Cat 1bis based solutions to NR**
  - This can further facilitate an eventual migration of LTE-based IoT solutions to NR, possibly including Cat M.

# Potential Evolution of RedCap NR devices in Rel-18

- A new class of RedCap NR devices with lower device cost/complexity and power consumption compared to Rel-17 NR, targeting data rates 1~20 Mbps
  - BW reduced from 20 MHz → preferably no smaller than 5 MHz (Cat M2 UEs)
  - Limited to FR1 bands only, and at least with 15 kHz SCS
  - Further complexity reduction on features/PHY procedures commensurate to the BW reduction
  - Study and (if justified) specify means of coverage and spectral efficiency recovery (mainly in DL)
  - Study and (if justified) specify means of power consumption reduction to realize battery lifetimes of multiple weeks for appropriate traffic assumptions
- **(Optimized) Support of specific functionalities for RedCap UEs (including new class of RedCap UEs)**
  - Positioning [RWS-210367]
  - SL (PC5) support for RedCap UEs (at least for 20 MHz RedCap UEs) [RWS-210371]
  - Operations in unlicensed spectra (at least for 20 MHz RedCap UEs)

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