3GPP TSG RAN Rel-18 workshop
Electronic Meeting June 28 – July 2, 2021
Agenda Item: 4.2

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Evolution of RedCap in Release 18

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Outline

- Background
- Potential evolution directions for Release-18
- Proposal summary

Background: Rel-17 use cases and requirements

Wearables

- Reference bitrates: 5-50Mbps in DL and minimum 2-5Mbps in UL
- Peak bitrate: up to 150Mbps for DL and up to 50Mbps for UL
- Battery of the device should last several days (up to 1~2 weeks)

Video Surveillance

- Reference bitrates: 2-4Mbps for economic video, 7.5-25Mbps for high-end video
- Latency: <500ms
- Reliability: 99%~99.9%

Industrial Sensors

- Reference bitrates: Less than 2M bps
- End-to-End latency:<100ms
- Service availability: 99.99%
- Battery lifetime: at least few years

Background: Rel-17 technique features

Reduced Complexity

- Reduced UE bandwidth:
  - 20MHz in FR1, 100MHz in FR2
- Reduced number of Rx:
  - Minimum number in FR1 and FR2 is 1
- Reduced number of MIMO layer
  - Minimum number in FR1 and FR2 is 1
- Half-duplex FDD operation
  - HD-FDD operation type A
- Relaxed modulation order
  - Support of 256 QAM in DL is optional (instead of mandatory) in FR1

Power Saving

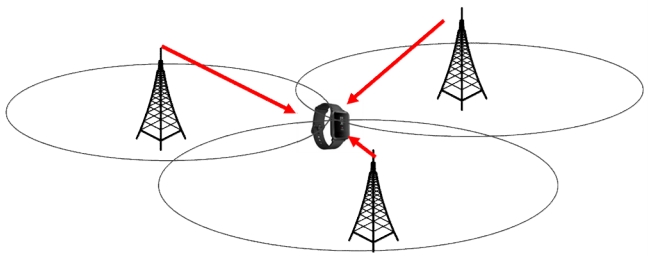
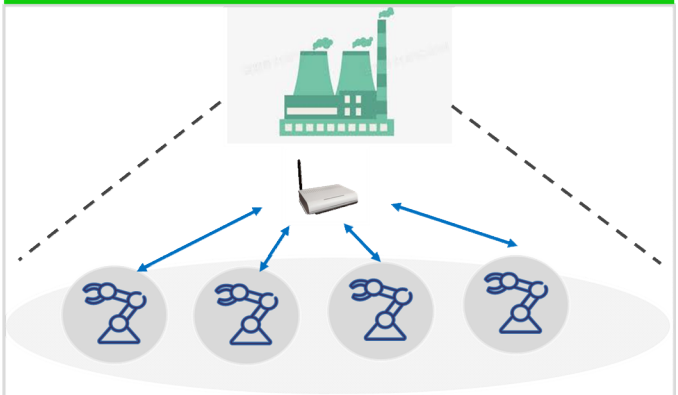
- eDRX:
  - eDRX cycle is extend up to 10.24s and 10485.76s for Inactive and Idle, respectively
- Relaxed RRM:

UE type Framework

- UE type definition:
  - Capabilities supported by RedCap
- RedCap UE identification
- Access control

Potential evolution directions in Rel-18

- Rel-18 RedCap should aim to expand more use cases and applications to enrich the market
  - More service types : Support positioning in RedCap
  - More diversified interfaces : Sidelink RedCap
  - More operation bands: Unlicensed RedCap

Positioning in RedCap	Sidelink RedCap	Unlicensed RedCap
		

Positioning in RedCap

Application scenario

- UE positioning and tracking are important in many IoT applications, such as children tracking via wearable devices and asset tracking via industrial sensors

Potential challenge

- The narrow UE bandwidth poses challenges for the positioning accuracy when using the 3GPP positioning functionalities defined for normal UEs
- Due to the small factor, the battery capacity is limited for Redcap devices. In this case, more power-efficient positioning solutions should be considered

Proposal:

- Positioning accuracy
  - Study the positioning accuracy requirement for applications served by RedCap
  - Investigate the impact on the positioning accuracy due to limited UE bandwidth and reduced Rx
  - Work out solutions to guarantee the positioning accuracy to satisfy the positioning requirement
- Improve the power efficiency by simplifying the positioning procedure

Sidelink RedCap

Application scenario:

- Interaction between Redcap wearable and smartphone, or between Redcap wearable and vehicle, or between Redcap industry sensors and the center control devices, for information sharing
- Smartphone help to relay the data of Redcap wearables to the network for
  - Coverage extension
  - Power saving

Potential challenge:

- Reduced UE bandwidth of Redcap would pose restriction on the coexistence between normal UE and Redcap UE in the sidelink system

Proposal :

- Support sidelink interface for RedCap
  - Guarantee good coexistence between normal UE and Redcap UE
    - E.g., New BWP framework

Unlicensed RedCap

Application scenario

- In industrial scenario, utilizing unlicensed band is usual. Industrial sensor is one important use case for RedCap and they work on the unlicensed should be considered as well

Potential challenge

- Due to the limited UE bandwidth, the monitored narrow frequency resource would be easily blocked, which would impose negative impact on the channel access and data transmission

Proposal

- Support RedCap to work on the unlicensed bands
  - Guarantee the probability of successful access
  - Enhance the transmission procedure

Proposal summary

- Study the following features for Redcap
  - Positioning in RedCap
    - Positioning accuracy
      - Study the positioning accuracy requirement for applications served by RedCap
      - Investigate the impact on the positioning accuracy due to limited UE bandwidth and reduced Rx
      - Work out solutions to guarantee the positioning accuracy to satisfy the positioning requirement
    - Improve the power efficiency by simplifying the positioning procedure
  - Sidelink RedCap
    - Support sidelink interface for RedCap
      - Guarantee good coexistence between normal UE and Redcap UE, e.g., New BWP framework
  - Unlicensed RedCap
    - Support RedCap to work on the unlicensed bands
      - Guarantee the probability of successful access
      - Enhance the transmission procedure

Thanks