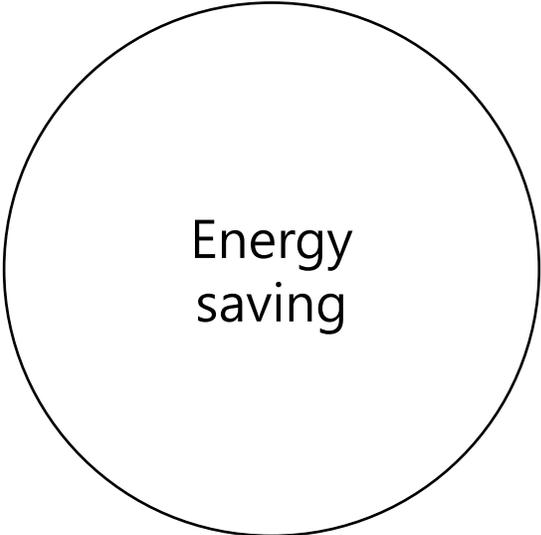


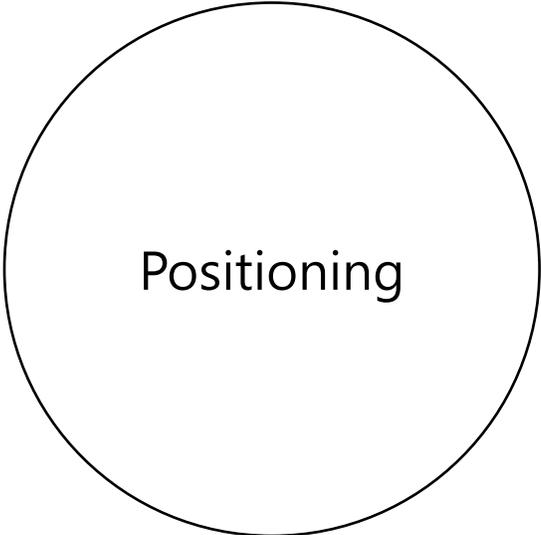
LG Uplus views on Rel-18 Non-eMBB area

Motivation

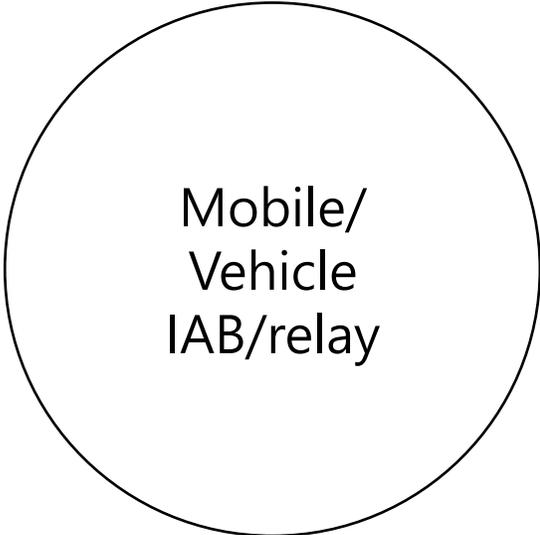
- This area is not directly related with eMBB enhancements in which it should address various scenarios and services not requiring high speed, but efficiency, accuracy, and coverage enhancements with following items.



Energy
saving



Positioning



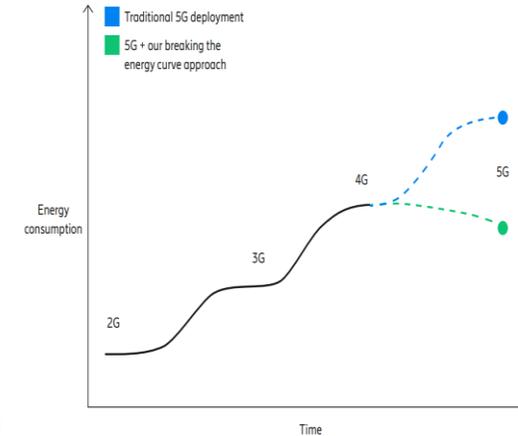
Mobile/
Vehicle
IAB/relay

Motivation

- NR UE energy efficiency is not sufficient still for daily use due to high power consumption and overhitting
- NR BS energy efficiency per traffic is better than LTE, but not sufficient in terms of total consumption



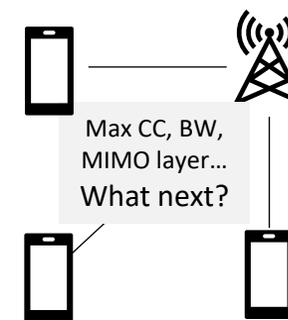
Typical maximum power consumption of a single 5G base station



BS energy consumption comparison ^{1) 2)}

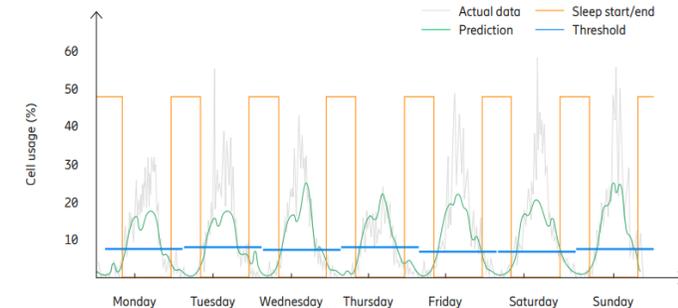
Direction/Requirements

- UE : UE/NW information exchanging type of solution is more preferred because CDRX type(sleep) of technique is not readily used in real networks due to the drawbacks as it sacrifices seamless and rapid reaction with worse statistics of operator
- NW : 1) Identifying possibility of specifying the standard way while most NW vendors to their own way to save the energy and 2) utilizing the trend data in terms of time and place



Information exchanging

Figure 7: Traffic prediction using machine learning for augmented MIMO Sleep Mode



Traffic prediction with ML ²⁾

1) <https://www.huawei.com/en/technology-insights/publications/huawei-tech/89/5g-power-green-grid-slashes-costs-emissions-energy-use>

2) <https://www.ericsson.com/495d5c/assets/local/about-ericsson/sustainability-and-corporate-responsibility/documents/2020/breaking-the-energy-curve-report.pdf>

Non-eMBB area – Positioning enhancements

Motivation

- Rel-18 SA1 WI, LPHAP, requirements for industrial sensors
- Availability including indoor and On-demand basis is crucial for safety and critical use cases

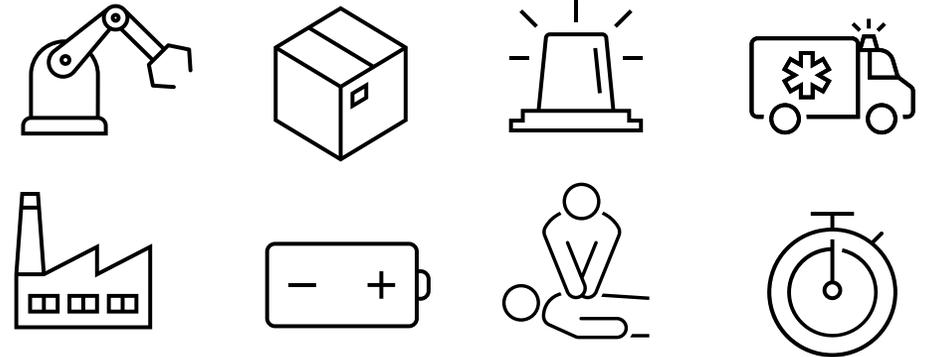
Table A.7.2-1: Low power high accuracy positioning use cases¹⁾

Use Case # ¹⁾	Horizontal accuracy ²⁾	Corresponding service level (22.261) ²⁾	Positioning interval/ duty cycle ²⁾	battery life time/ minimum operation time ²⁾
1 ¹⁾	10 m ²⁾	Service Level 1 ²⁾	on request ²⁾	24 months ²⁾
2 ¹⁾	2 m to 3 m ²⁾	Service Level 2 ²⁾	< 4 seconds ²⁾	> 6 months ²⁾
3 ¹⁾	< 1 m ²⁾	Service Level 3 ²⁾	no indication ²⁾	1 work shift - 8 hours (up to 3 days, 1 month for inventory purposes) ²⁾
4 ¹⁾	< 1 m ²⁾	Service Level 3 ²⁾	1 second ²⁾	6 - 8 years ²⁾
5 ¹⁾	< 1 m ²⁾	Service Level 3 ²⁾	5 seconds - 15 minutes ²⁾	18 months ²⁾
6 ¹⁾	< 1 m ²⁾	Service Level 3 ²⁾	15 s to 30 s ²⁾	6 - 12 months ²⁾
7 ¹⁾	30 cm ²⁾	Service Level 5 ²⁾	250 ms ²⁾	18 months ²⁾
8 ¹⁾	30 cm ²⁾	Service Level 5 ²⁾	1 second ²⁾	6 - 8 years (no strong limitation in battery size) ²⁾

LPHAP use cases and requirements¹⁾

Direction/Requirements

- Simplified protocol for specific use cases defined in SA1 Rel-18 WI
- Multiple technique should be available to guarantee full availability, especially for indoor, and also On-demand based solution should be specified to support the operation at proper time and position with energy saving purpose
 - For on-demand based solution, any leftovers from updated Rel-17 WI, NR Positioning Enhancements(RP-210903), should be addressed



1)TS 22.104(Service requirements for cyber-physical control applications in vertical domains) v18.0.0 where the use cases are :

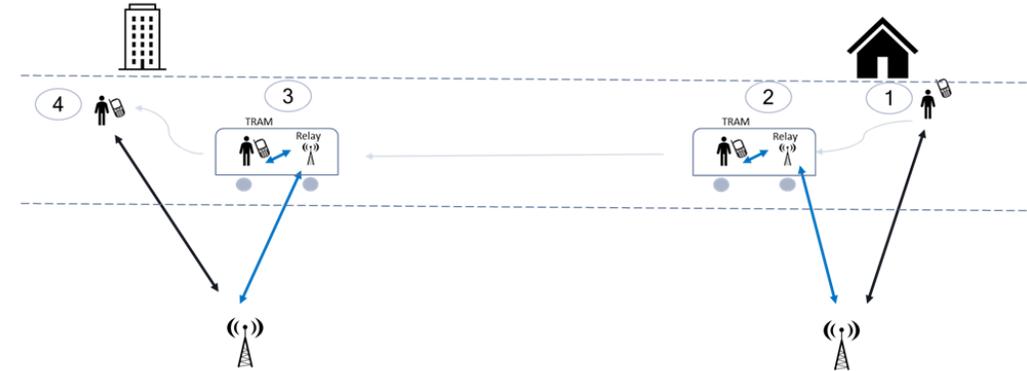
#1 Process automation: Dolly tracking (outdoor), #2 Process automation: Asset tracking, #3 Flexible modulare assembly area: Tool tracking in flexible, modular assembly areas in smart factories, #4 Process automation: Sequence container (Intralogistics), #5 Process automation: Palette tracking (e.g. in turbine construction), #6 Flexible modulare assembly area: Tracking of workpiece (in- and outdoor) in assembly area and warehouse, #7 Flexible modulare assembly area: Tool assignment (assign tool to vehicles in a production line, left/right) in flexible, #8 modular assembly area in smart factories, Flexible modulare assembly area: Positioning of autonomous vehicles for monitoring purposes (vehicles in line, distance 1.5 meter).

Motivation

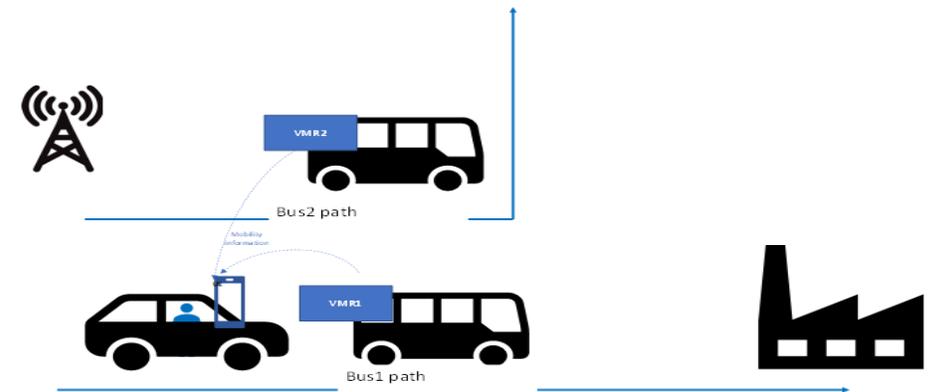
- Rel-18 SA1 SI, Vehicle-mounted relays, requirements
- Normal IAB is too expensive and advanced for applying widely, but mobile/vehicle IAB is different as the required CAPEX may be shared with the related players such as local Government, Vehicle vendors, etc.
- From UE TX power perspective, UE to BS via relay node route has better power efficiency than UE to BS route directly

Direction/Requirements

- Outdoor coverage enhancement for intended area via mobile/vehicle IAB/relay based on the itinerary
- Seamless connection management including handover and signaling management for the passengers moving between outside and inside of the vehicle
- NR supports for replacing the wireless and wired connectivity in vehicle (Network in vehicle)



Use case for mobility between macro and relay ¹⁾



Use case for Optimizing UE mobility from planned or predicted mobility information ²⁾

1) TR 22.839(Study on Vehicle-Mounted Relays) v0.3.0 - 5.11.1

2) TR 22.839(Study on Vehicle-Mounted Relays) v0.3.0 - 5.12

Thank you!
