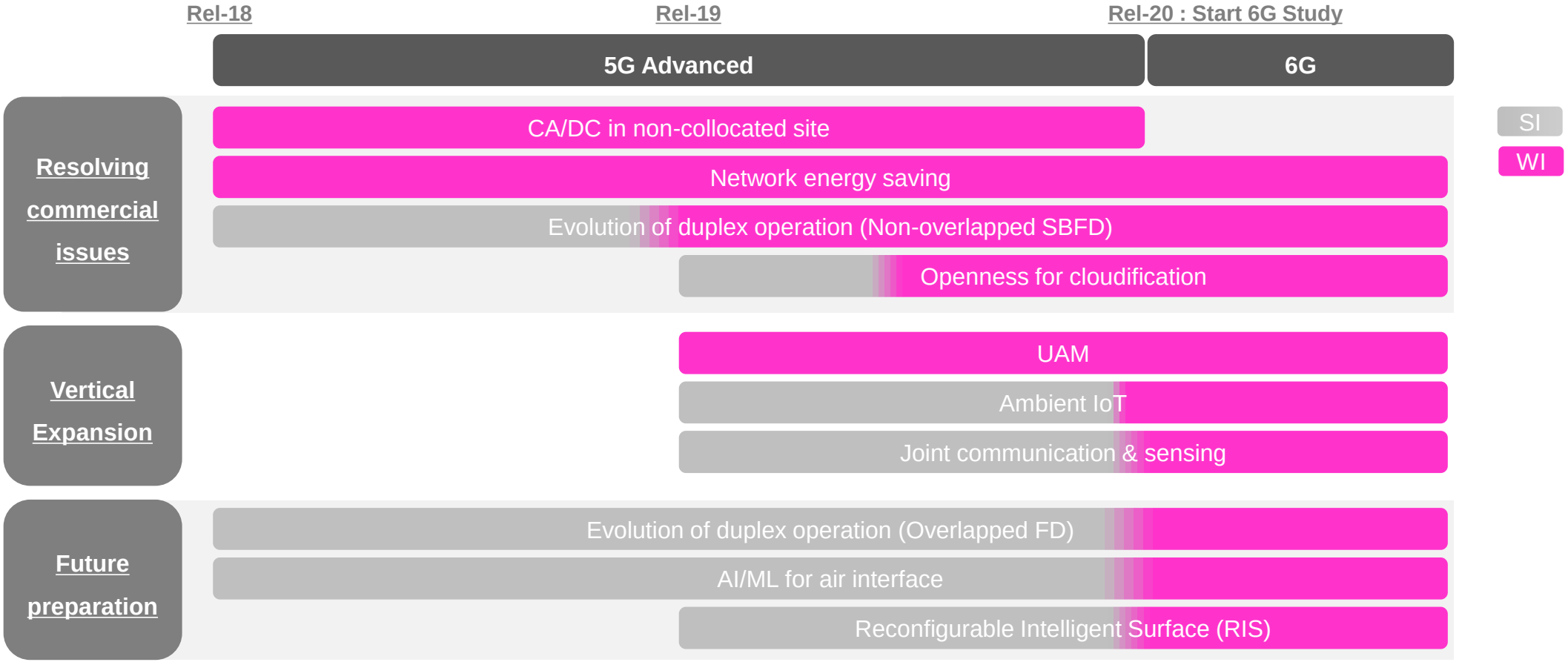
LG Uplus view On Rel-19

LG U+

LG Uplus view on Rel-19

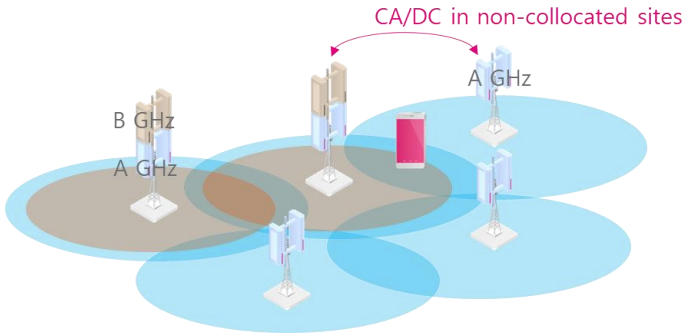
- Through Rel-19,
  - Commercial issue resolution and vertical expansions to fertilize 5G should be prioritized.
  - Some time-consuming breakthrough technologies need to be studied for smooth-landing to 6G.



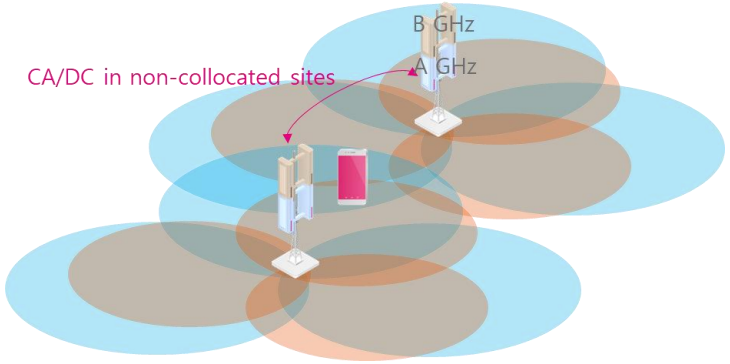
Topic #1: CA/DC in non-collocated site

❑ Motivation

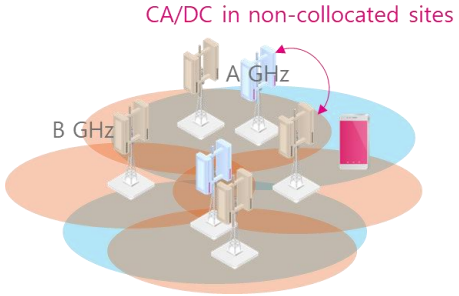
- Collocated site assumption for CA/DC in spectrum with broad bandwidth (e.g. n77 band) seems not general as depicted by the below figure.
- In Rel-18, Type 3 device (shared LNA) for 4 layer per CC is not specified due to the lack of time units.
- In Rel-18, new signaling for device type switching is not handled due to lack of time units.



[Hot spot deployment]



[Different sectorization due to antenna deployment restriction]



[Non-collocated site deployment due to the shortage of site premises]

➢ Objectives

- Type 3 device (shared LNA) for 4 layer per 2CC need to be studied to convince flexible network deployment with considering CA/DC in non-collocated sites.
- New signaling for device type switching need to be studied to enable optimized network scheduling.

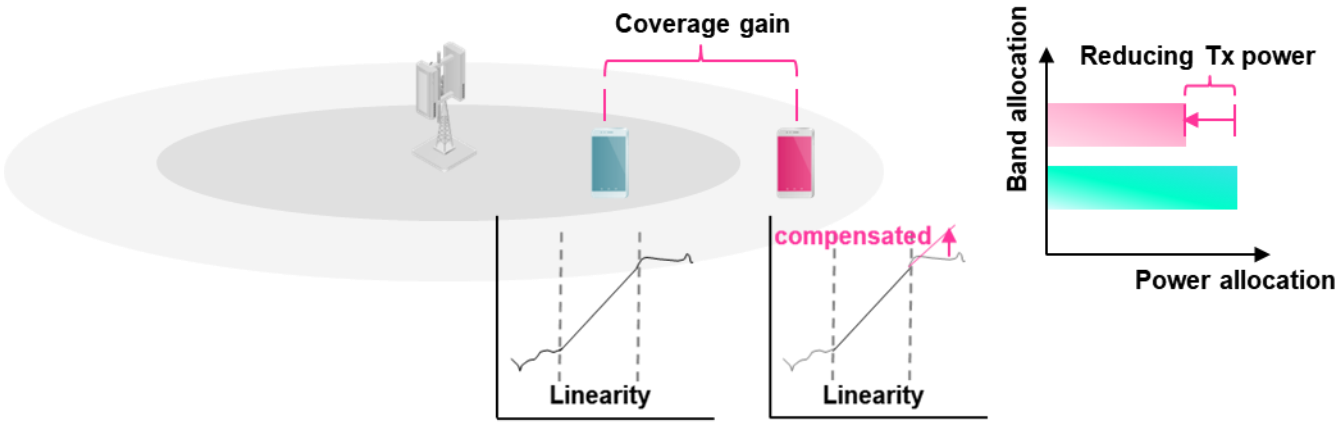
Topic #2: Network energy saving

❑ Motivation

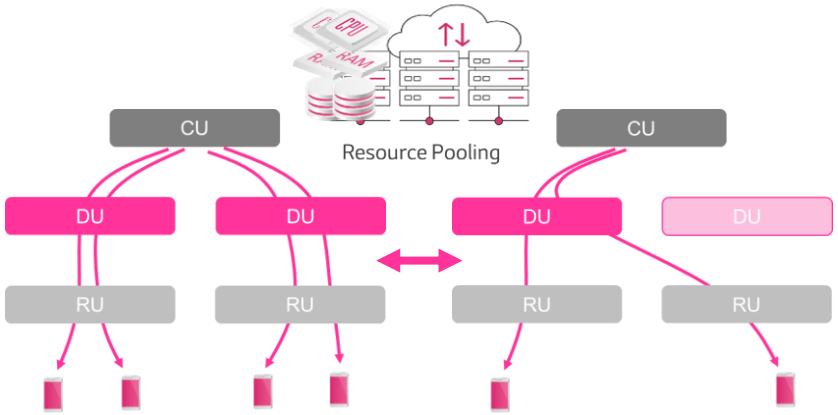
- Time domain solution such as cell DTX/DRX could make mobility management unstable due to RSRP/RSRQ fluctuation.
- Currently, network energy saving mainly focuses on diminishing the power consumption of RU (Radio Unit). However, we need to look around the solution to enable DU (Distributed Unit) energy saving.

➢ Objectives

- Power domain solution which does not affect cell mobility management needs to be studied.
- Computing resource pooling for DU needs to be studied. As for the pooling, the openness between DUs and RUs need to be considered and the dynamic switching between DUs and RUs need to be investigated.



[PA compensation solution for energy saving]



[DU resource pooling for energy saving]

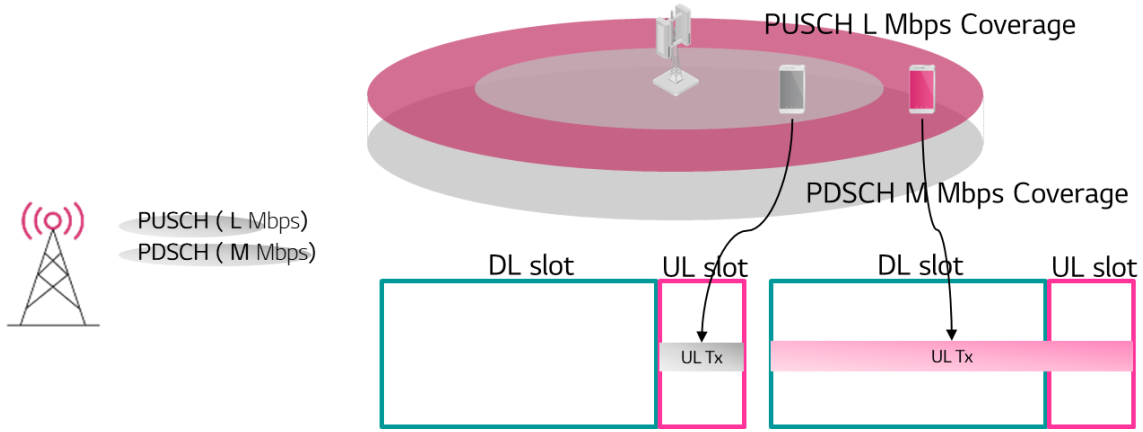
Topic #3: Evolution of duplex operation

❑ Motivation

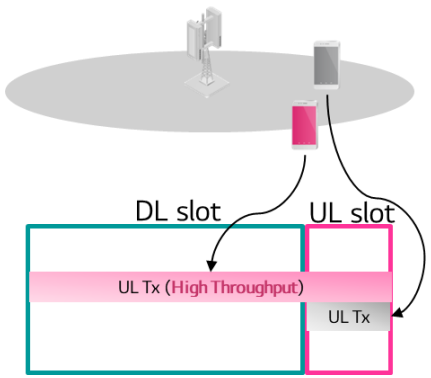
- For SA operation with TDD band, smaller UL service coverage is problematic. In our analysis, a service coverage to provide DL data traffic with M Mbps is limited by UL coverage, where minimum required UL throughput is L Mbps for TCP/IP operation.
- Regarding some B2B cases such as surveillance service and production line, high UL throughput is required.
- Full duplex is remarked as one of 6G key technologies to enable pulling out the extreme spectral efficiency.

➢ Objectives

- For 5G-Adavaced, UL improvement by non-overlapped SBFD (sub-band full duplex) is preferred to move into WI stage.
- General full duplex operation can be studied further but would be specified in 6G timeline.



[UL/DL coverage imbalance]

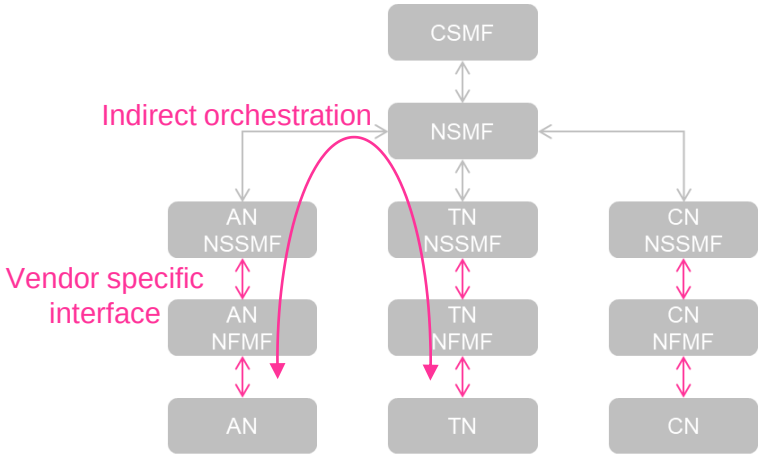


[B2B UL throughput improvement]

Topic #4: Openness for cloudification

❑ Motivation

- E2E network slicing management: Obstacles from O&M without openness over multiple vendors.
  - The interface between NSSMF and AN is still vendor specific.
  - The inter-operation between AN and TN is not interactive.
- RU-DU association adjustment:
  - As similar as the resiliency of CU-DU in Rel-18, the resiliency of RU-DU is important.
  - Even though the power saving on RU is major portion, energy saving can be obtained by optimizing DU computing power (i.e. resource pooling).

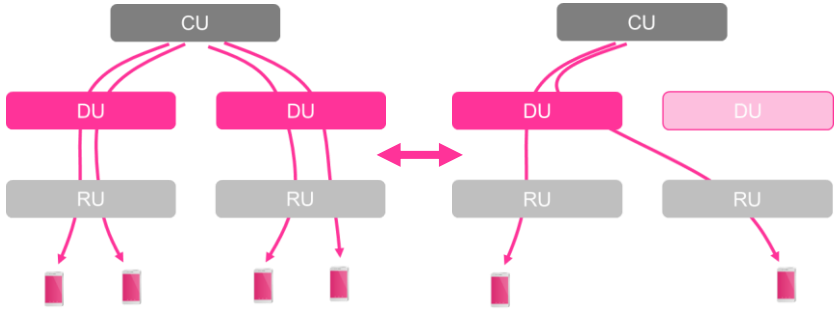


CSMF: Communication Service Management Function
NSMF: Network Slice Management Function
NSSMF: Network Slice Subnet Management Function
NFMF: Network Function Management Function

[E2E network slicing architecture]

➢ Objectives

- O&M openness over multiple vendors need to be studied for realizing actual E2E network slicing.
- The resiliency of RU-DU need to be studied as the resiliency of CU-DU in Rel-18.

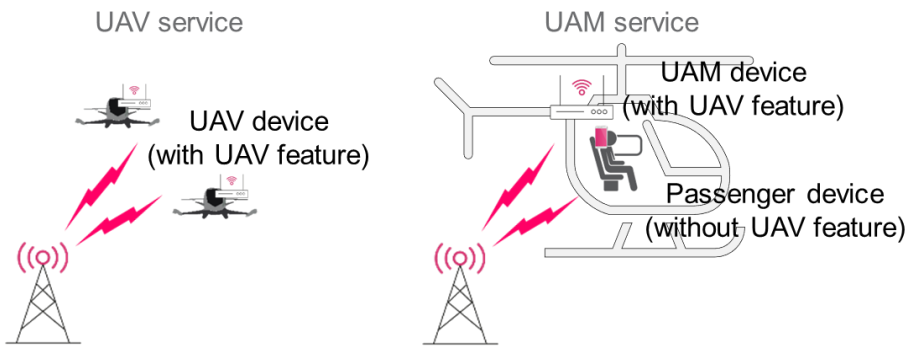


[RU-DU association adjustment]

Topic #5: Urban Aerial Mobility (UAM)

❑ Motivation

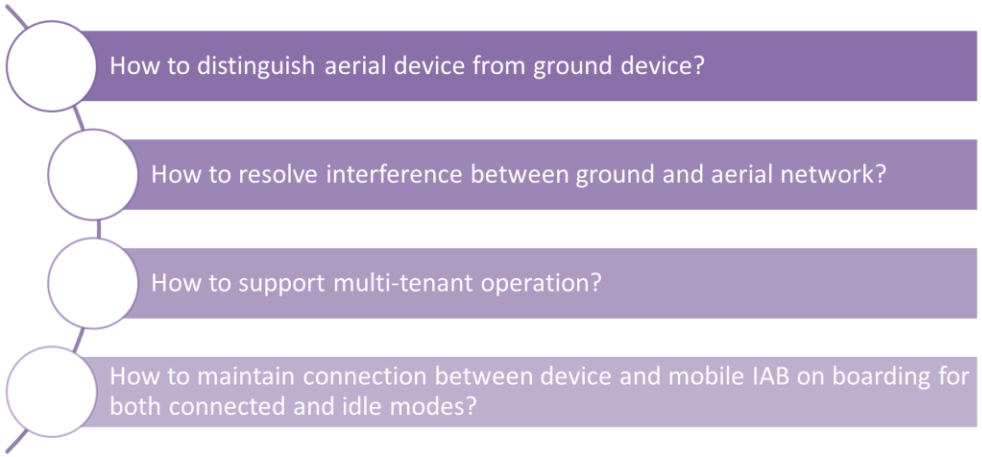
- UAM service will be started from 2025 in Korea.
- UAM service is differentiated from UAV (Uncrewed vehicle) with related to passengers' riding. Details for UAM services is dealt with in RWS-230036.

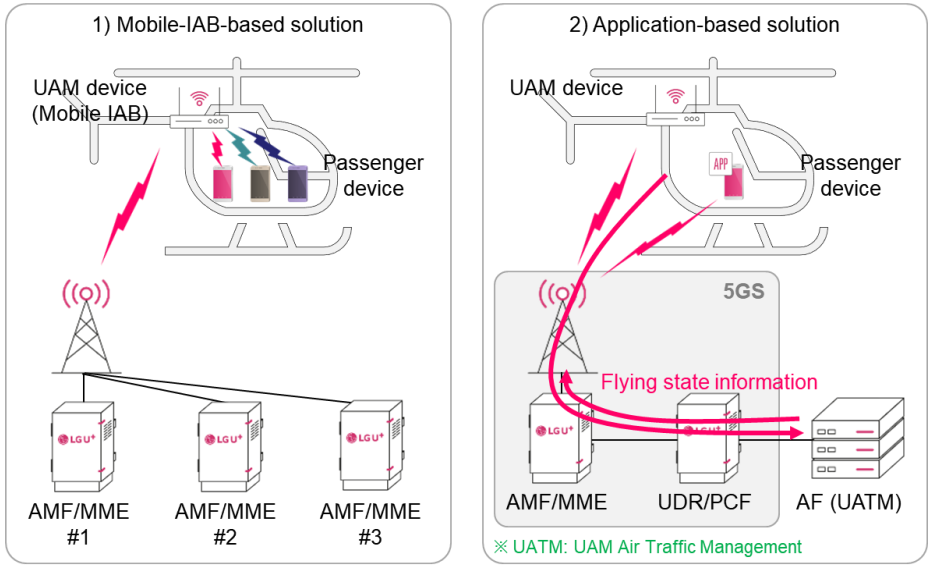


[UAV vs UAM]

➢ Objectives

- Aerial device identification could be defined in 5G-Advanced.
- More general issues could be defined in 6G.
- Research Topics:



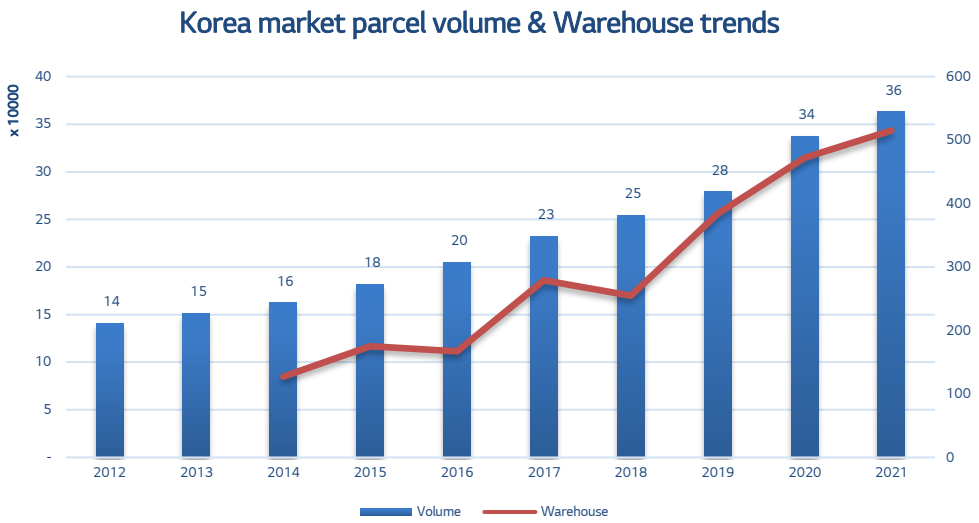


[Candidate solutions]

Topic #6: Ambient IoT

❑ Motivation and Use case

- The spread of online/non-face-to-face consumption culture has increased the overall volume of goods, and the number of warehouses for logistics management is also increasing.
- Requirements for efficiently managing large logistics volumes are increasing, and inventory management for logistics automation is a key requirement.
- There is a need to study Ambient IoT, which is being studied in RAN/SA, for vertical expansion, which is a requirement of the market and a goal of 5G Advanced.



➢ Objective

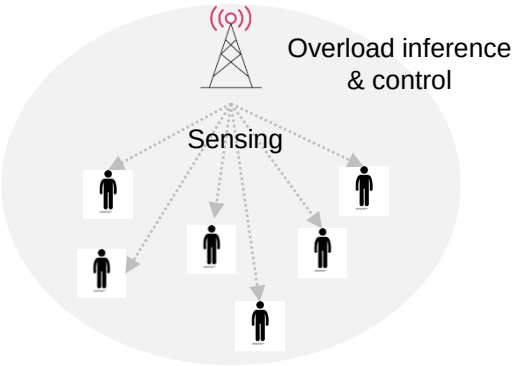
- Study of the characteristics of ambient IoT devices and the deployment scenarios
- Study feasibility to support the use case defined by SA1

※ Ambient -IoT should use existing network deployments

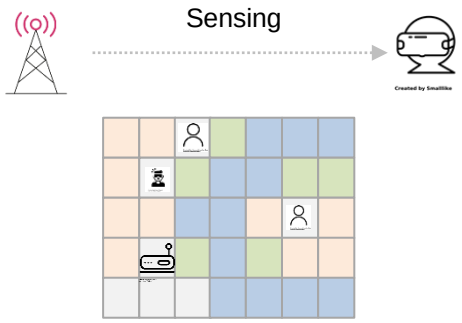
Topic #7: Joint Communication and Sensing (JCAS)

❑ Motivation and Use case

- As sensing is an attractive item as it adds value to 5G core services such as SmartX and autonomous driving, we need RAN-level research to support the use cases in SA1.
- Use cases of particular interest are Seamless XR streaming & crowded spot
- Study is needed on sensing technology for frequency characteristics



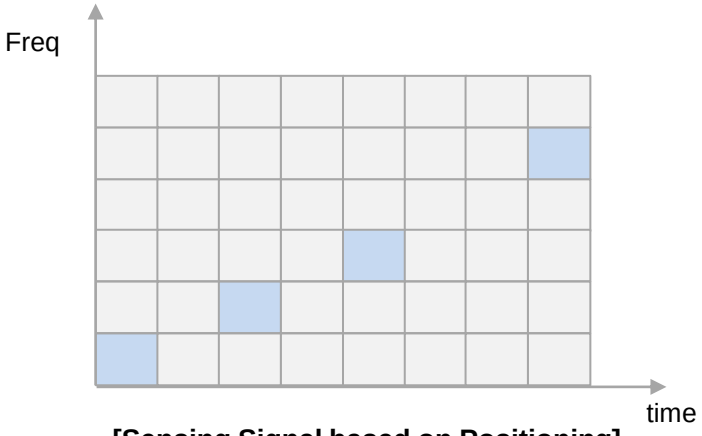
[Use case for Overload control]



[Use case for Seamless XR Streaming]

➢ Objective

- Study the capabilities and feasibility of technologies that support sensing with the existing NW configuration.
- Need to research how to define and use sensing signal in 5G System (NR Positioning Signal based)

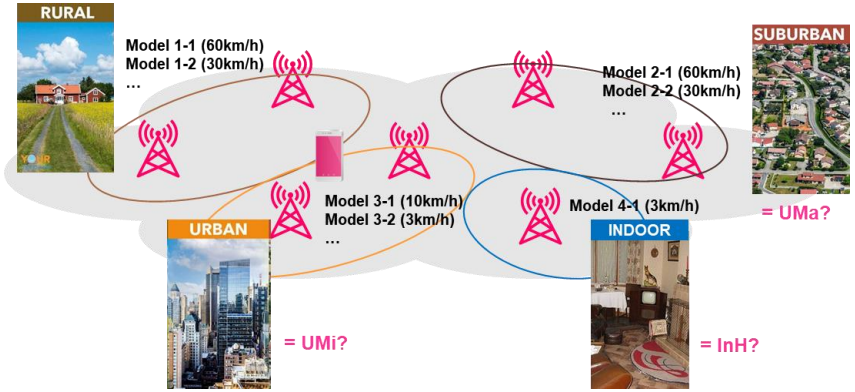


[Sensing Signal based on Positioning]

Topic #8: AI/ML for air interface

❑ Motivation

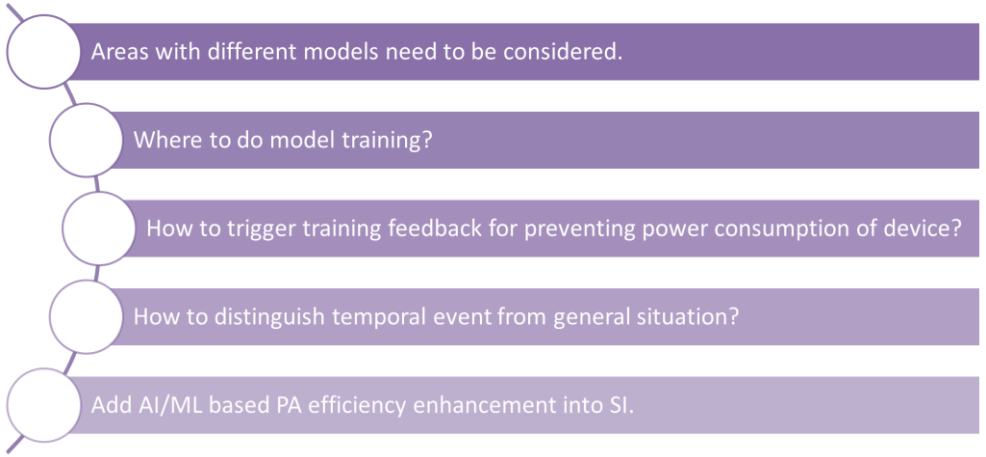
- AI/ML could improve the performance of air interface significantly and, hence, mostly denoted as a key 6G candidate technology.
- From Rel-18, we have studied AI/ML for air interface and, however, there is missing points such as an applicable area by a model and a function for model training, which is described in detail at RWS-230037.

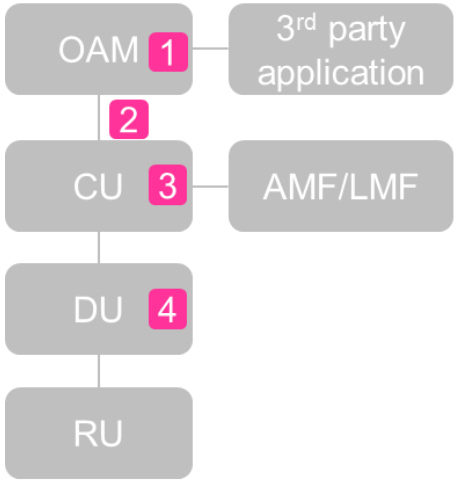


[Areas with different AI/ML models]

➢ Objectives

- SI stage with enough long duration on 5G and WI stage on 6G is preferred in order to secure the commercialization stability.
- Research topics:





Attr 1: Location information accessibility
Attr 2: 3rd party application accessibility
Attr 3: computing power scalability

	Attr 1	Attr 2	Attr 3
Opt 1	Bad	Good	Bad
Opt 2	Medium	Good	Medium
Opt 3	Good	Bad	Medium
Opt 4	Medium	Bad	Bad

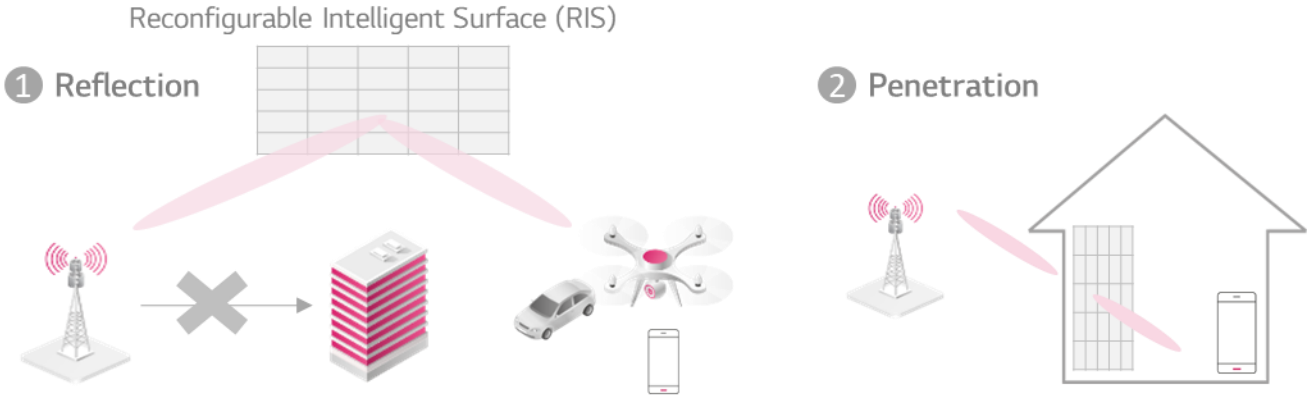
■ : ML training function

[Analysis on the location of ML training function]

Topic #9: Reconfigurable Intelligent surface (RIS)

❑ Motivation and Use case

- Compared to LTE low band, NR with higher band suffers from coverage deficiency since being vulnerable to non-LOS circumstances.
- Even though coverage improvement schemes such as IAB and NCR exist, more cost-effective solution would be beneficial to study for various deployment scenarios. RIS is frequently remarked as a candidate technology.



[RIS Concept]

➢ Objective

- Feasibility check of RIS over various deployment scenarios could be useful for 6G preparation.

Thank You

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