Possible network parameters on IMT-2020/5G transport network

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Agenda

1. Introduction

- ✓ ITU-R IMT vision
- ✓ Possible usage scenarios

2. Possible 5G network deployment scenario

- ✓ Network structures
- ✓ Deployment scenario

3. Possible 5G network parameters

- ✓ Network topology
- ✓ Bandwidth, Interface type, Latency, etc.

4.Summary

ITU-R IMT Vision (IMT-2020)

✓ Enhancement of key capabilities from IMT-Advanced to IMT-2020

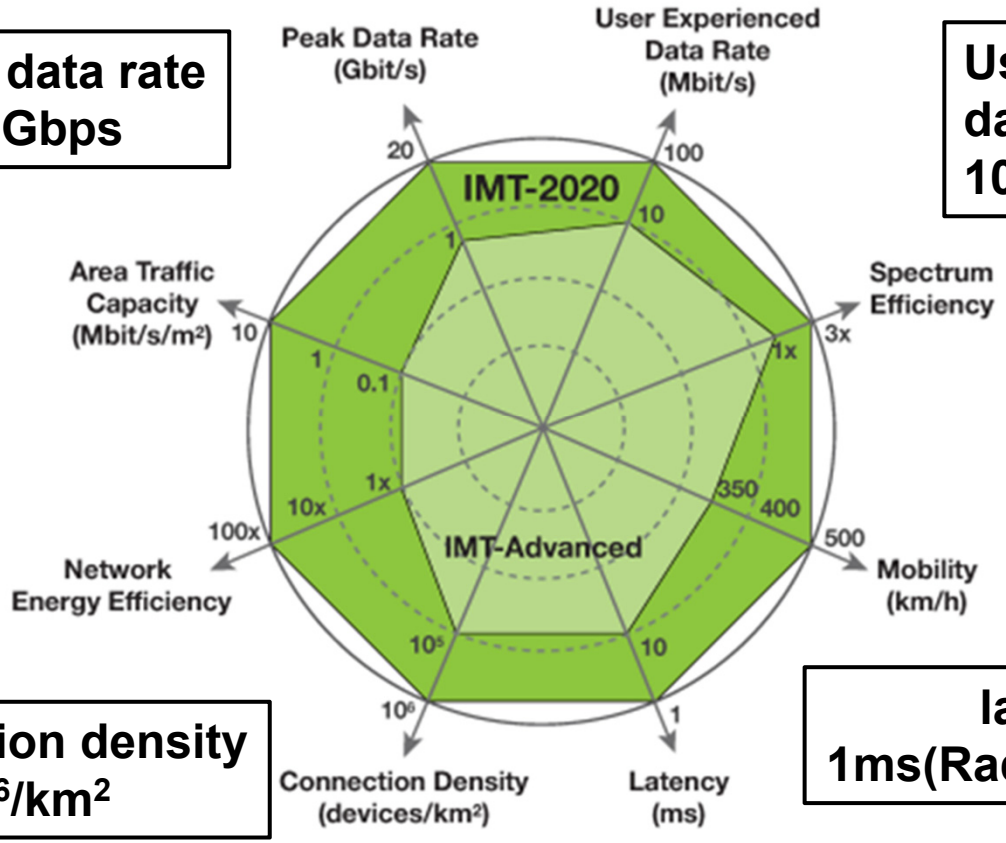
Peak data rate 20Gbps

User experienced data rate 100Mbps

Area traffic capacity 10Mbps/m²

Connection density 10^6/km²

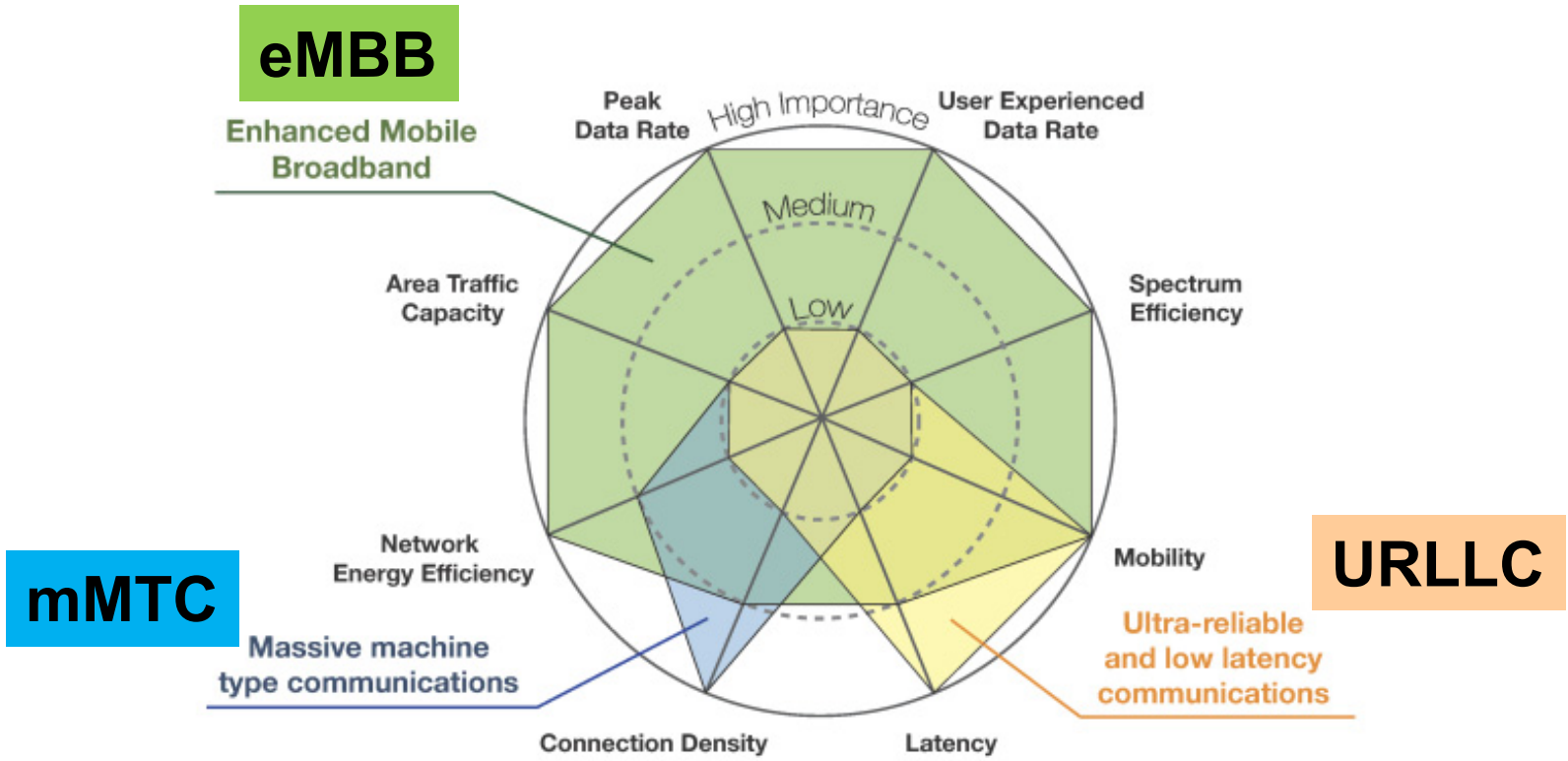
latency 1ms(Radio segment)



Reference : IMT Vision – "Framework and overall objectives of the future development of IMT for 2020 and beyond", ITU-R Recommendation M.2083-0, September 2015.

ITU-R IMT Vision (IMT-2020) (Cont'd)

✓ The importance of key capabilities in different usage scenarios
- eMBB, mMTC, and URLLC



Reference : IMT Vision – "Framework and overall objectives of the future development of IMT for 2020 and beyond", ITU-R Recommendation M.2083-0, September 2015.

Possible 5G usage scenarios

The user-centric broadband world

eMBB

Vivid experience

Realistic-sensational remote virtual experience

Viewing real-time free-viewpoint 3D video

au 5G

URLLC

Industry promotion, Social Infrastructure

Connected car

Control of unmanned agricultural machine

Security camera

mMTC

au : The mobile brand of KDDI.

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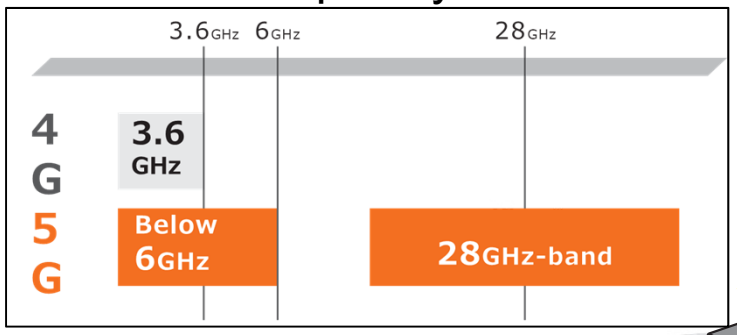
4.Summary

Possible radio access network

- **5G bands will be used in combination with 4G to complement each other.**
  - **Requirement of use cases (Mobility, Area, Latency, etc.)**
  - **Separation of C-plane and U-plane**
  - **Standalone(SA), Non-Standalone(NSA) scenarios**

Possible frequency allocation

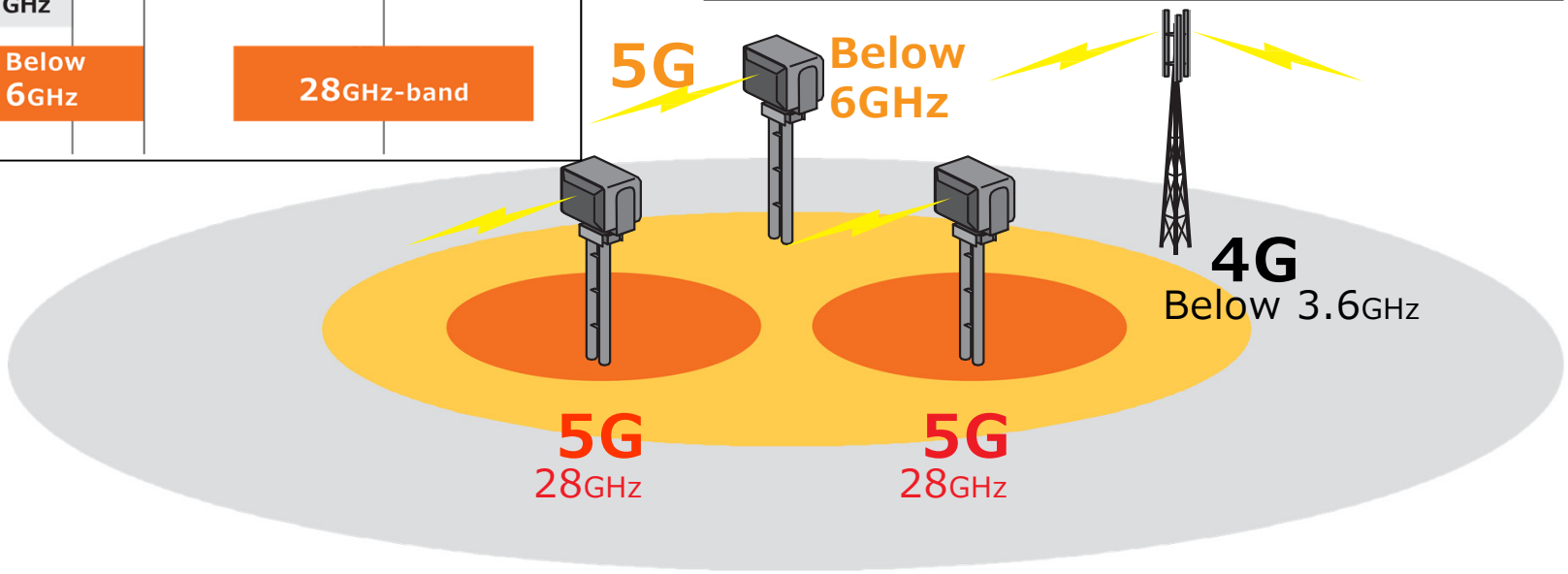


Application example:

- 5G: High speed, Small area.

  ↕ Complementary

- 4G: Lower speed, Wide area.



Slice network

Example: Multiple slices concurrently operated on the same infrastructure.

eMBB

URLLC

mMTC

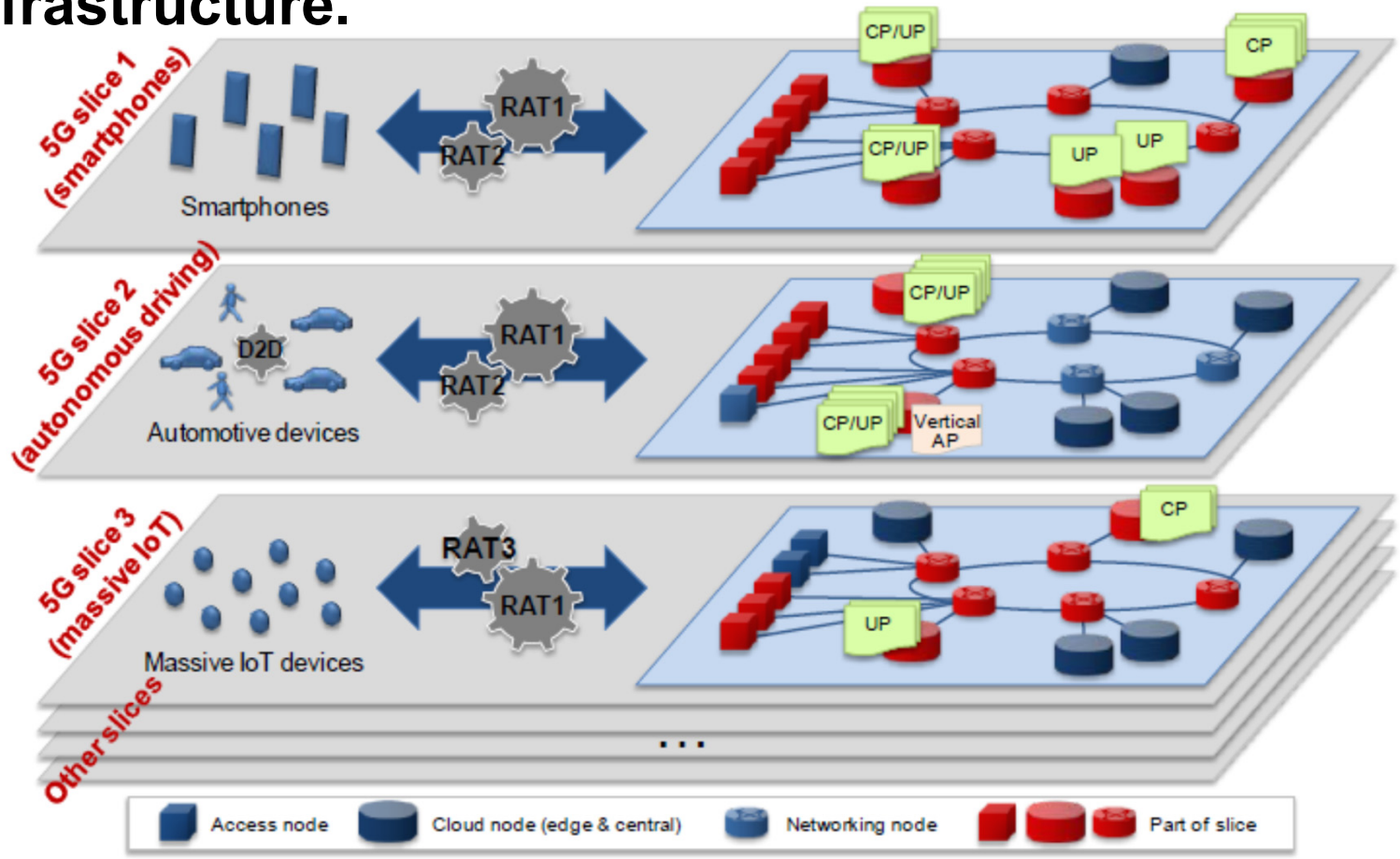
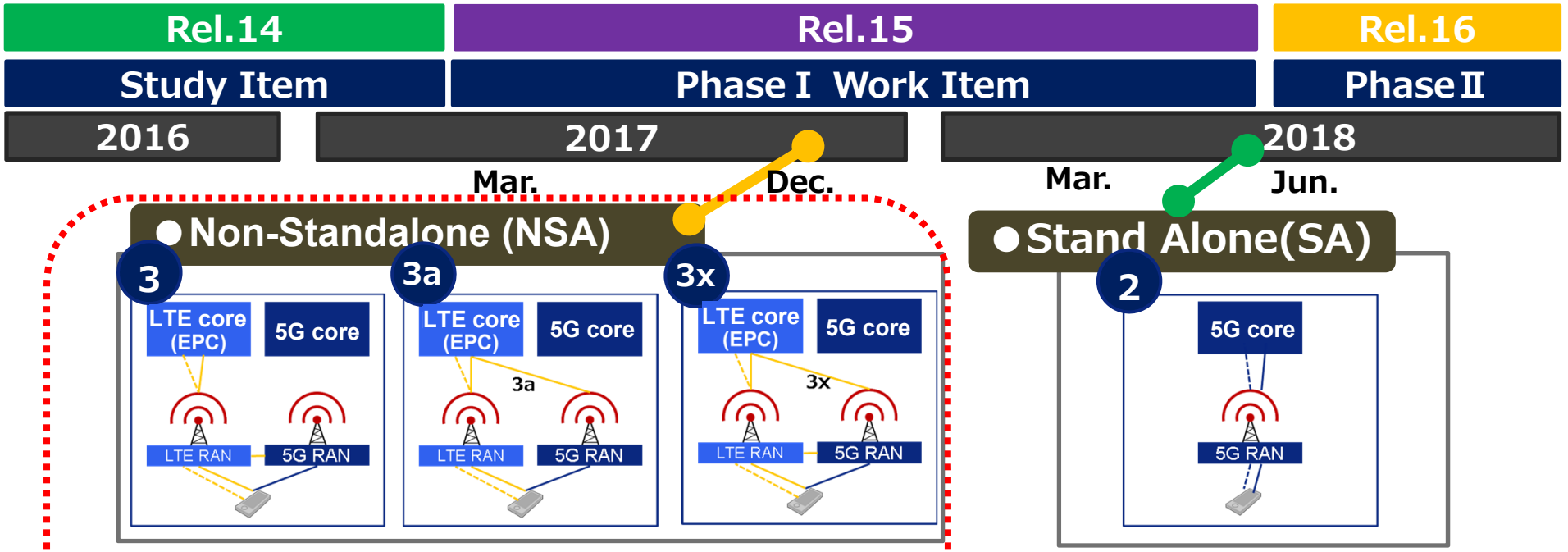


Figure 9: 5G network slices implemented on the same infrastructure

Reference : NGMN 5G White paper, next generation mobile networks, February 2015.

Toward 5G network (3GPP)

3GPP has approved a consensus to move forward on plans to accelerate specifications for a non-standalone (NSA).



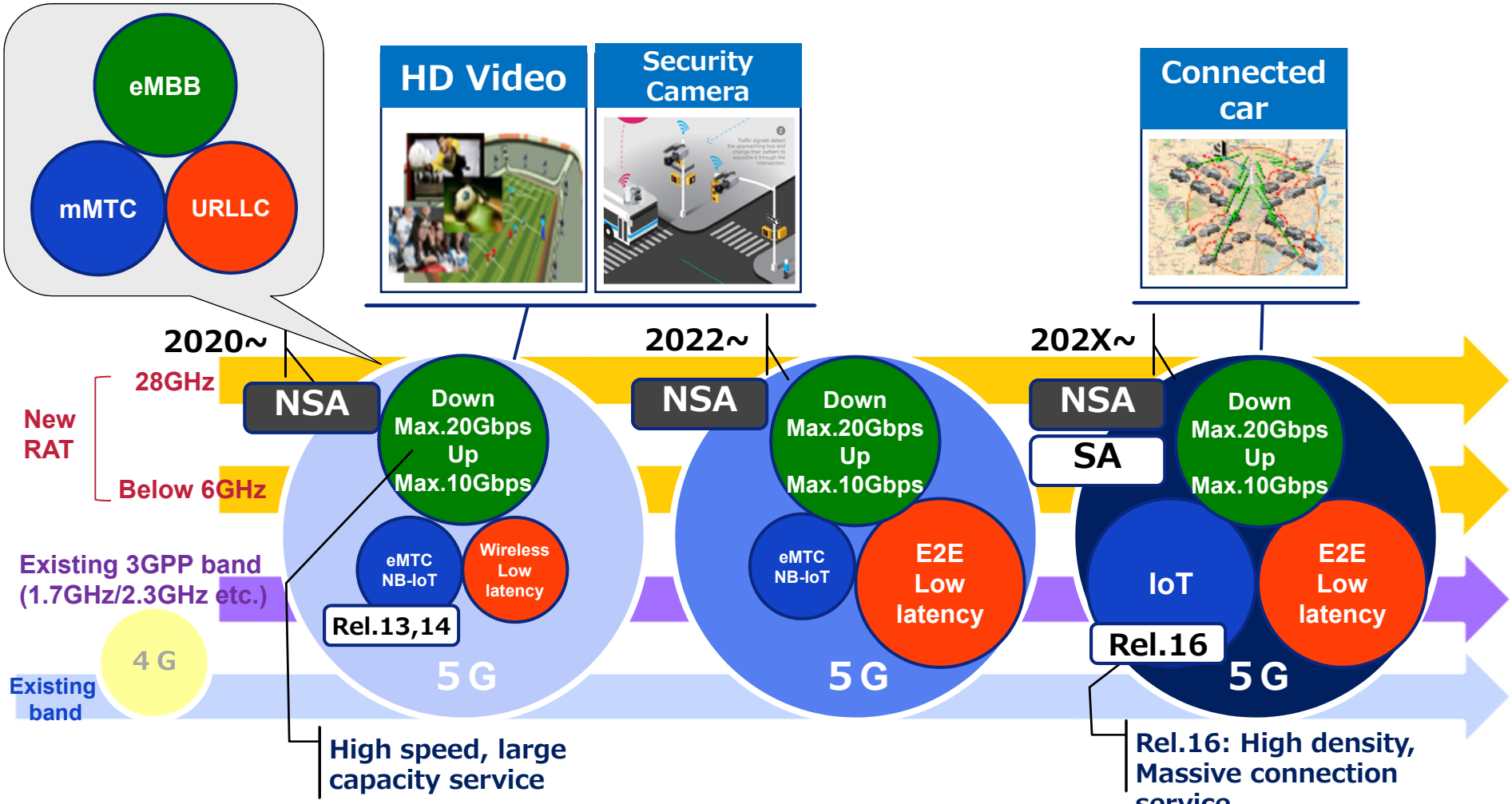
NSA(Non-Standalone) will use the existing LTE core and RAN while adding a new 5G RAN.

Standalone (SA) means full user and control plane capability for 5G RAN, using the new 5G core network.

x Option x :Proposal for 5G in 3GPP

Possible 5G deployment scenario

- **Initial phase: Large capacity services(eMBB)**
- **Second phase: Low latency services(URLLC), IoT services(mMTC)**



NSA: Non-stand alone, SA: Stand alone

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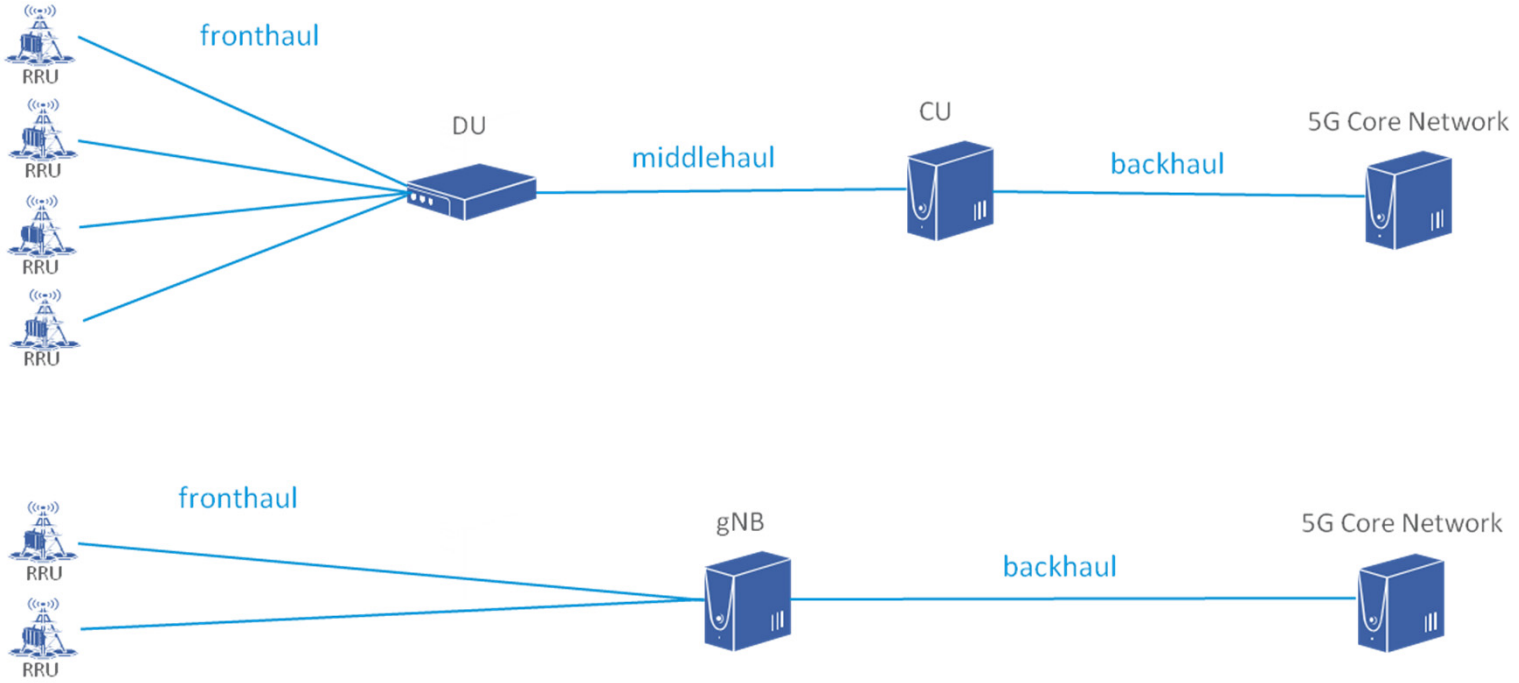
   - **✓ Bandwidth, Interface type, Latency, etc.**

4.Summary

Possible network topologies

■Fronthaul, Middlehaul, and Backhaul networks

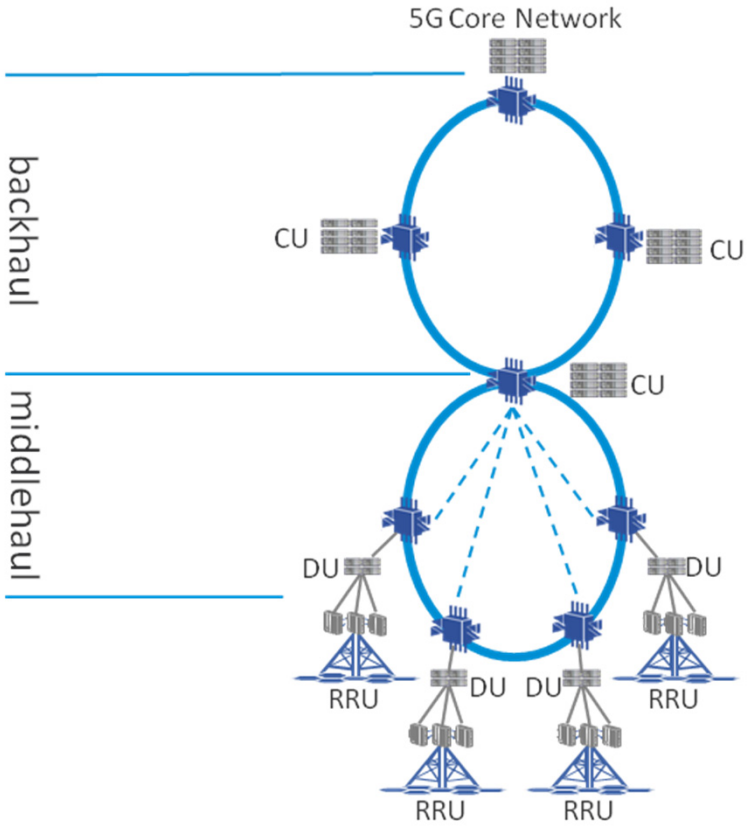
- **Network reach**
  - Fronthaul network: Less than 20 km
  - Middlehaul/Backhaul network: Less than 200 km



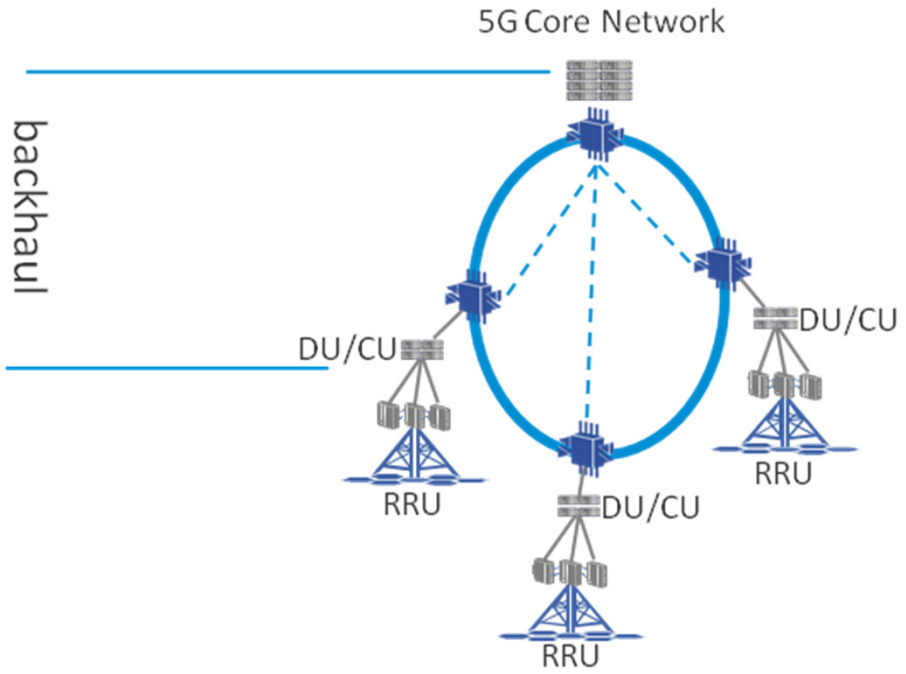
Possible network topologies are the same as the networks described in TD78r2/G.

Reference : TD78r2/G "Transport network support for IMT-2020/5G," ITU-T SG15 plenary meeting, Geneva, 19-30 June 2017.

Possible network topologies (Cont'd)



RRU and DU Integration



RRU, DU and CU Integration

Reference : TD78r2/G "Transport network support for IMT-2020/5G," ITU-T SG15 plenary meeting, Geneva, 19-30 June 2017.

Possible 5G network parameters

Items	Parameters
Network reach	Fronthaul: Less than 20 km Middle/Backhaul: Less than 200 km
Estimated values for bandwidth	Fronthaul: N x 10 G or higher (e.g. 25 G) Middle/Backhaul: N x 100 G or beyond 100 G
Estimated values for latency allocation	UE – CU: less than 4 ms (Tentative)
Estimated interface type	Fronthaul: eCPRI, etc. Middle/Backhaul: 100 GbE or beyond 100 GbE (over OTN)
Slice	Each service should be isolated at layer 2 or higher (e.g. VLAN, etc.)
Synchronization	N/A (GPS-based synchronization)
OAM	Packet network based OAM (e.g. E-OAM)

Summary

■Possible usage scenarios for 5G network era

- **Three important capabilities**
  - eMBB, mMTC, URLLC
- **Vivid experience, Industry promotion, Social infrastructure**
  - Viewing real-time free-viewpoint video, Connected car, etc.

■Possible 5G network deployment scenario

- **The 5G networks are going to be built around a combination of the 4G networks (Non-standalone (NSA) approach).**

■Possible 5G network parameters

- **Network reach, Bandwidth, Latency allocation, Interface type, Slice, Synchronization, and OAM.**