Beyond 5G

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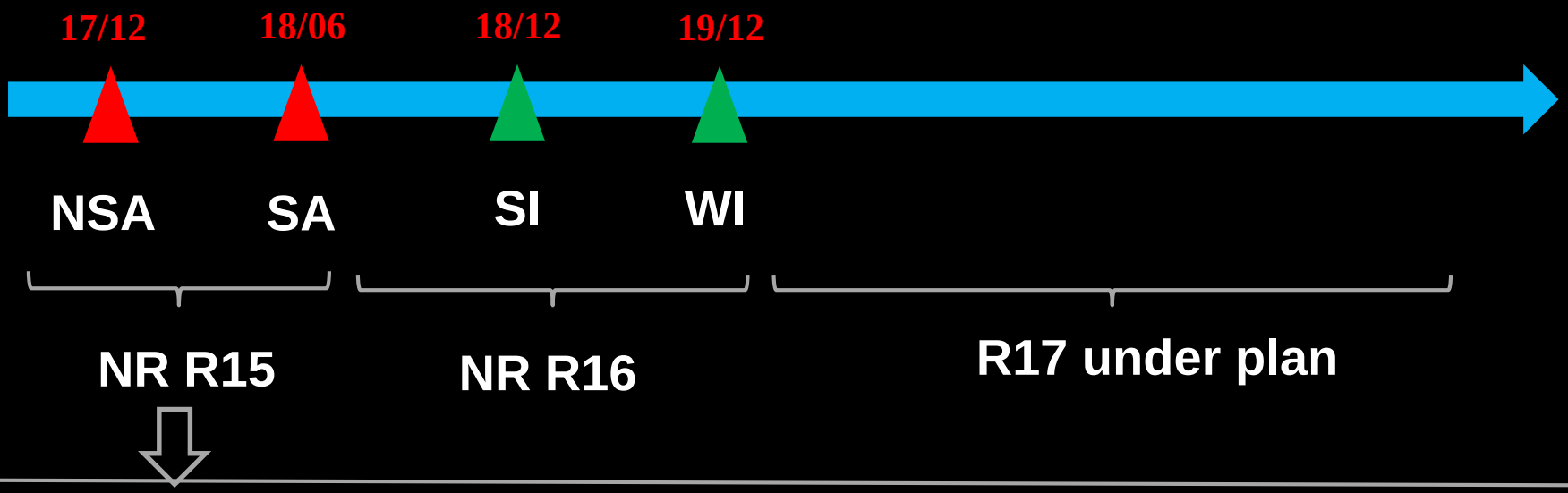
5G is Well On the Way



10,000+
Shipped Base Stations

22
Commercial Contracts

150
Commercial Trials

World 1st Terminal

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R15/R16 Key Features

R15

1. **Soft Air Interface**
   (Hybrid Numerology/Slot/Frame)
2. **New Waveform**
   (F/W-OFDMA)
3. **New Coding**
   (Polar Code, LDPC)
4. **Ultra Low Latency**
   (Special Slot and Transmission Mechanism)
5. **New Transmission Mode**
   (Grant Free)
6. **New Access Scheme**
   (UCNC)
7. **Enhanced MIMO**
   (Massive MIMO)
8. **mmWave Transmission**
   (Beam-Centric UP/CP)

R16

1. **V2X**
   (Autonomou driving)
2. **IAB**
   (Integrated Access and Backhaul)
3. **URLLC Enhancement**
   (Reliability, Jitter)
4. **NR-U**
   (unlicensed)
5. **NoMA**
   (Non-orthogonal multiple access_
6. **RIM**
   (Remote Interference Management)
7. **UE power saving**
8. **Positioning**

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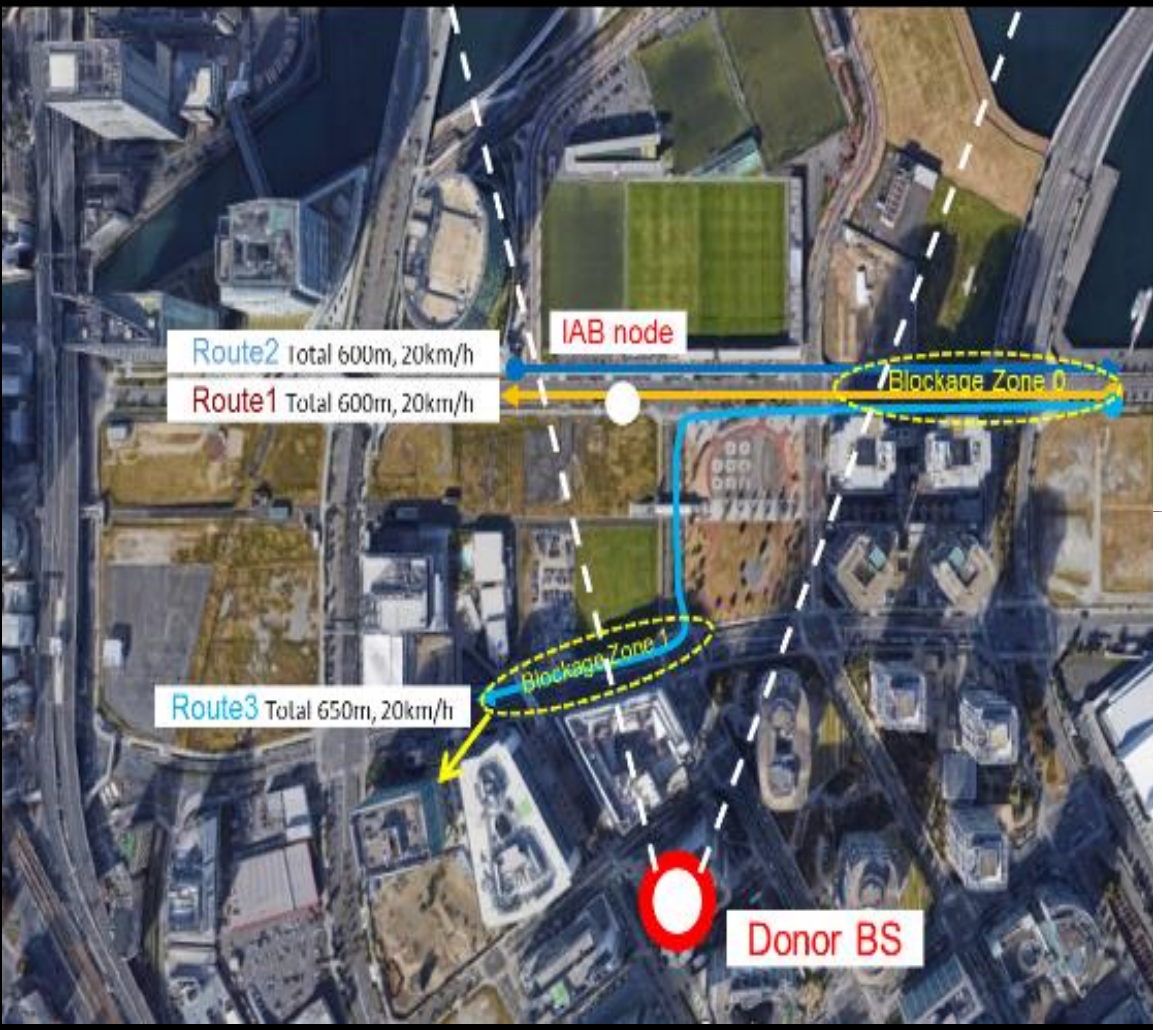
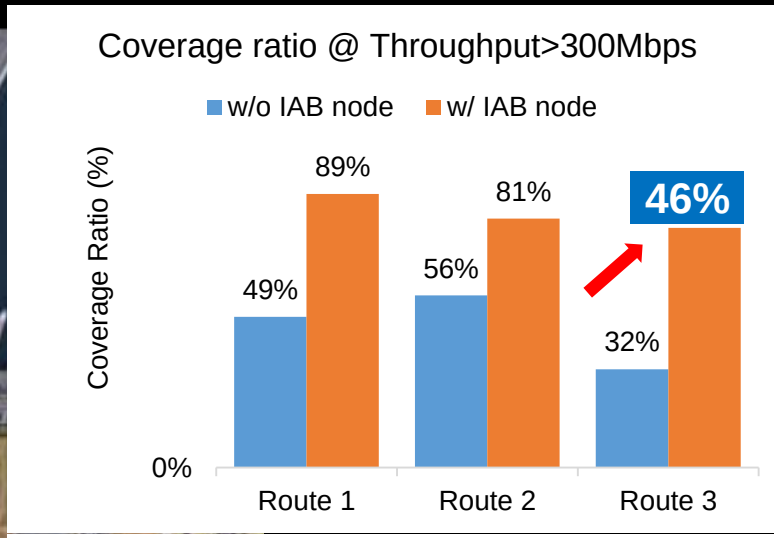
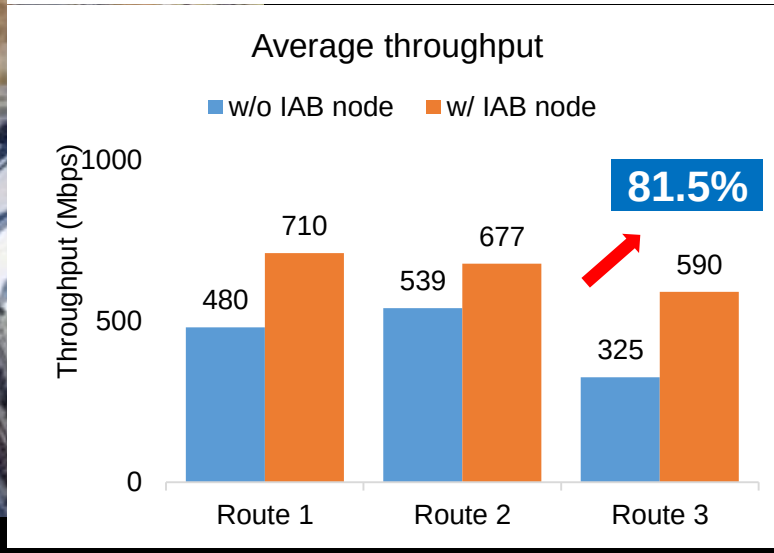
IAB test in Japan

(Single hop IAB at 39.5-40.9GHz GHz)







With IAB node deployment, both coverage ratio & UE throughput increases significantly

Multi-hop IAB Trial

800MHz | Single-port

IAB 1st Hop

Blockage Area

Blockage Area

Blockage Area

IAB 2nd Hop

gNB

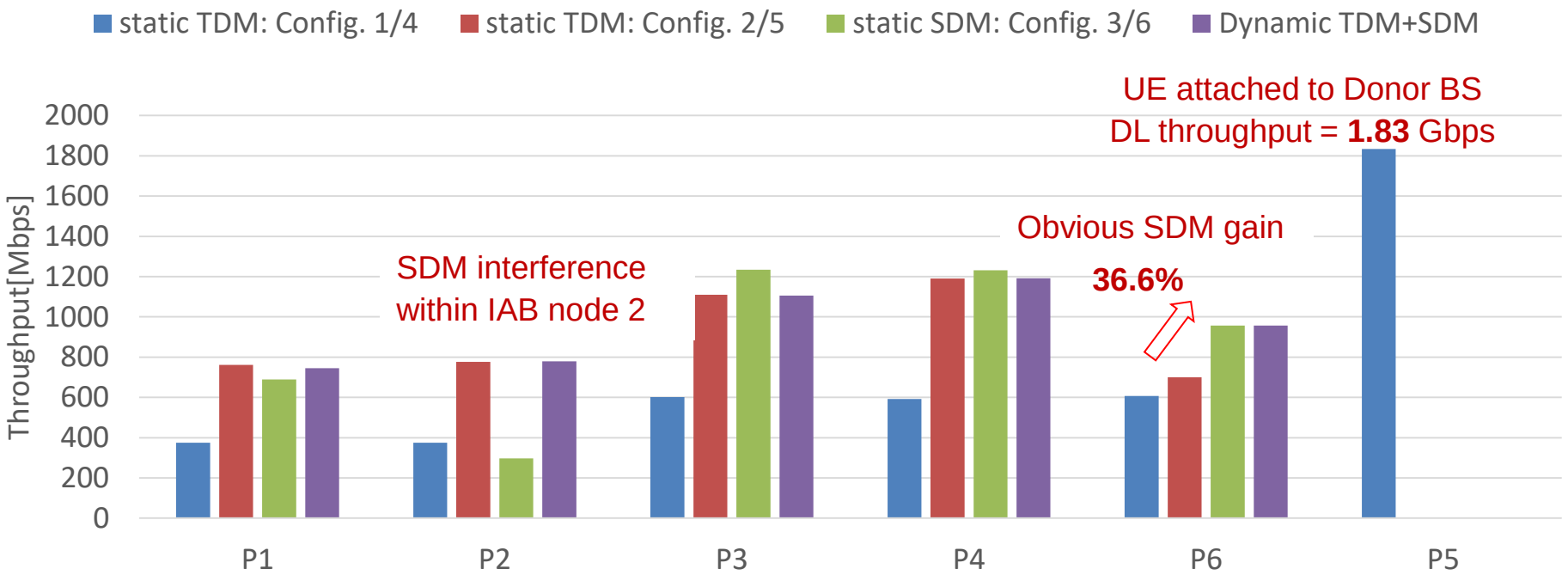
Specification	BS	IAB	TUE
Frequency(GHz)	39.5-40.9GHz	39.5-40.9GHz	39.5-40.9GHz
Duplex Mode	TDD	TDD	TDD
Antenna	Lens-Based	Lens-Based	Lens-Based
TRx Num.	4	4	4
Antenna Gain	30±1.5dBi	30±1.5dBi	15±1.5dBi
Antenna Polarization	Dual-Pol	Dual-Pol	V-Pol
RMS Output Power per Beam	13dBm±50%	13dBm±50%	13dBm±50%

20米

Dynamic TDM+SDM Test

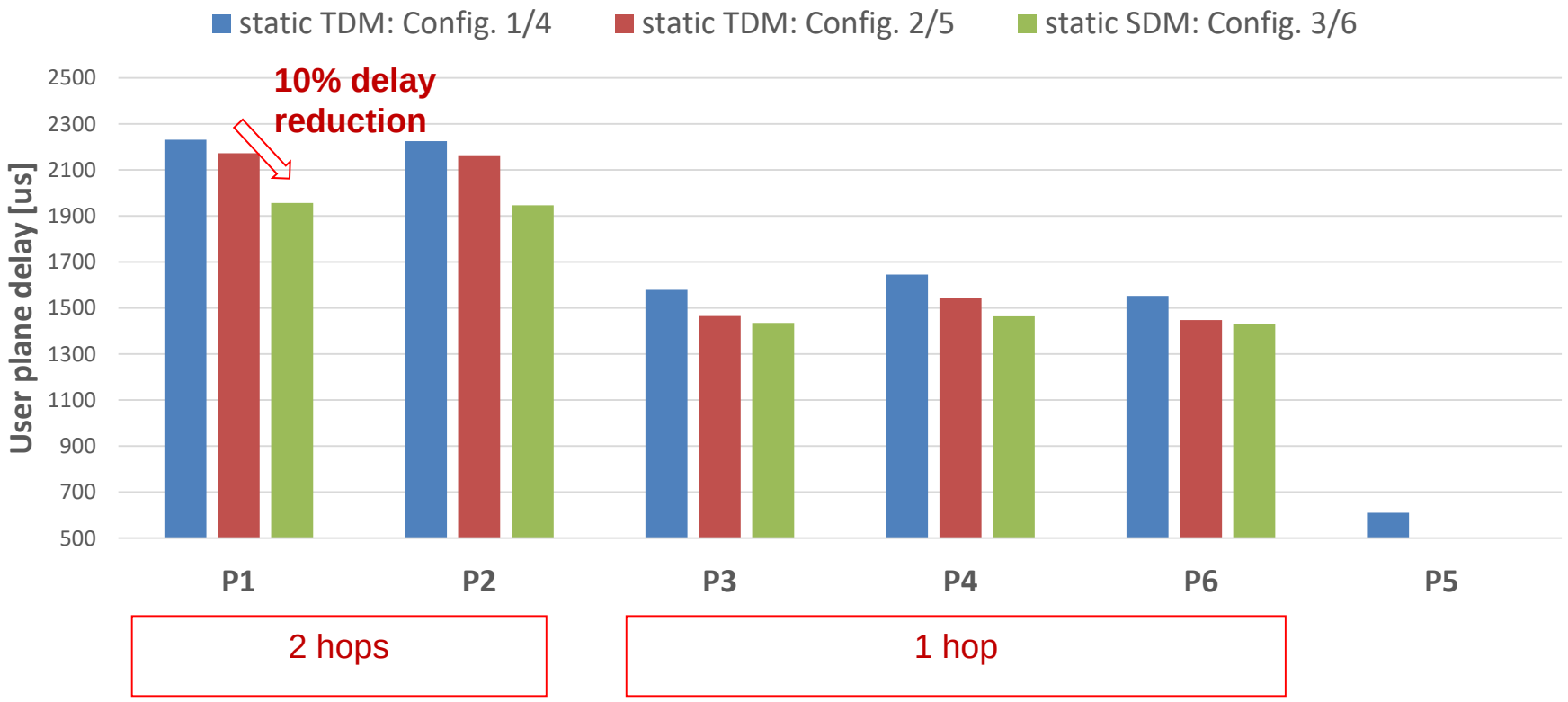
TDM+SDM Throughput

Observation: More than 36% SDM gain can be observed in some places



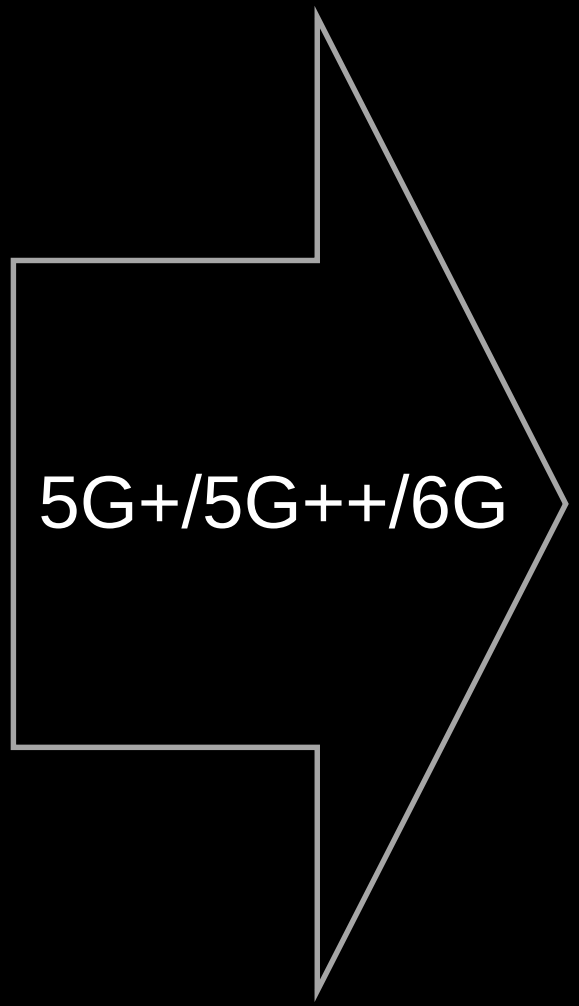
SDM Latency Performance

Observation: User plane delay can be reduced by SDM due to more transmission opportunity.



Beyond 2020

1. Network Assisted Device Collaborations
2. MESH/Multi-hop Network
3. Full Duplex
4. Integration of Communication + Sensing
5. ML/AI Enabled Proactive Network Design
6. Integration of Non-terrestrial Network
7. Even Higher Frequency (E-band, 140gHz)
8. On Demand Mobile Base Station



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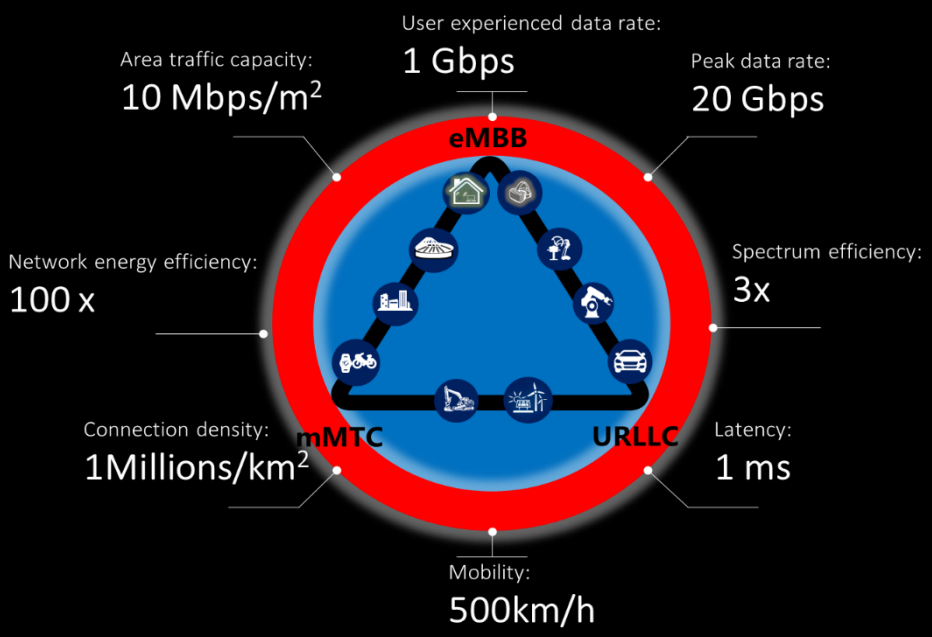
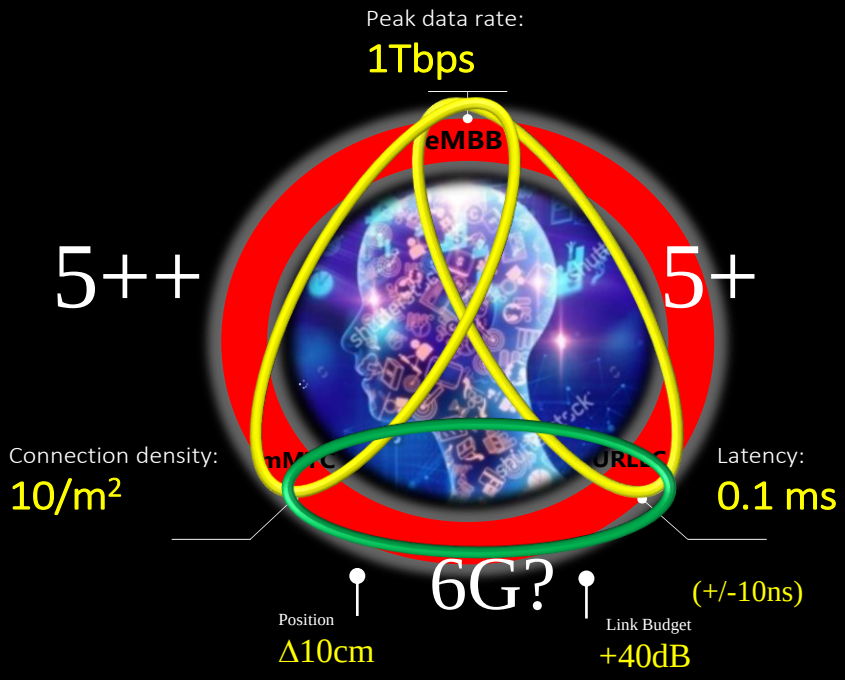
Beyond 5G

From Connected things to Connected Intelligence



2020



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