Jointly Paving the Way for 5G

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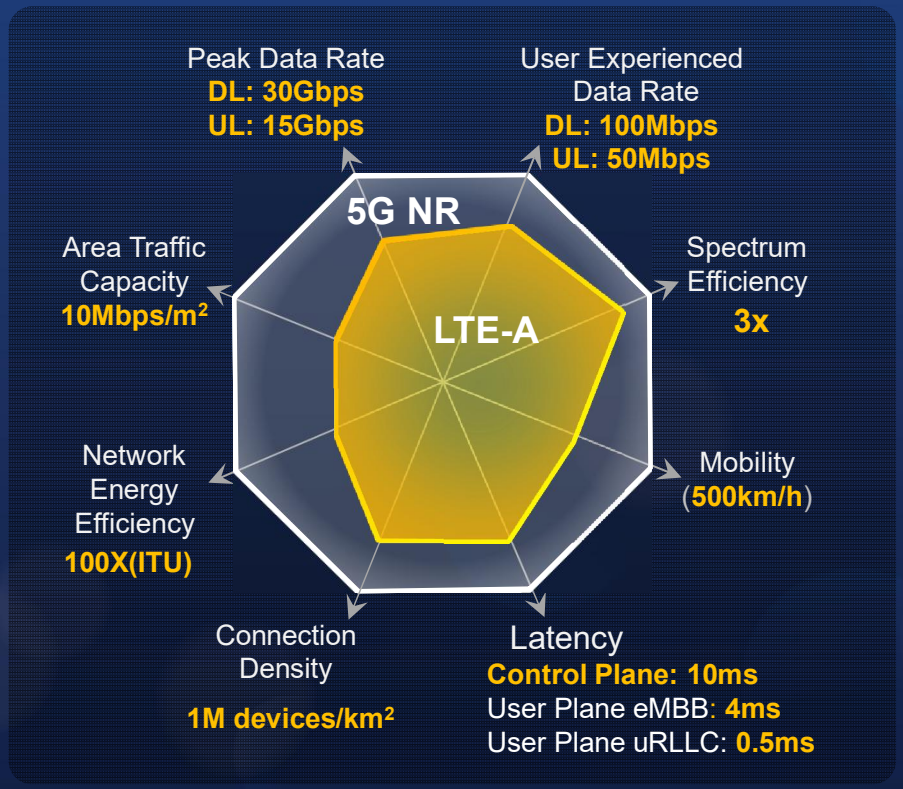
5G Industry Insight

5G Capability

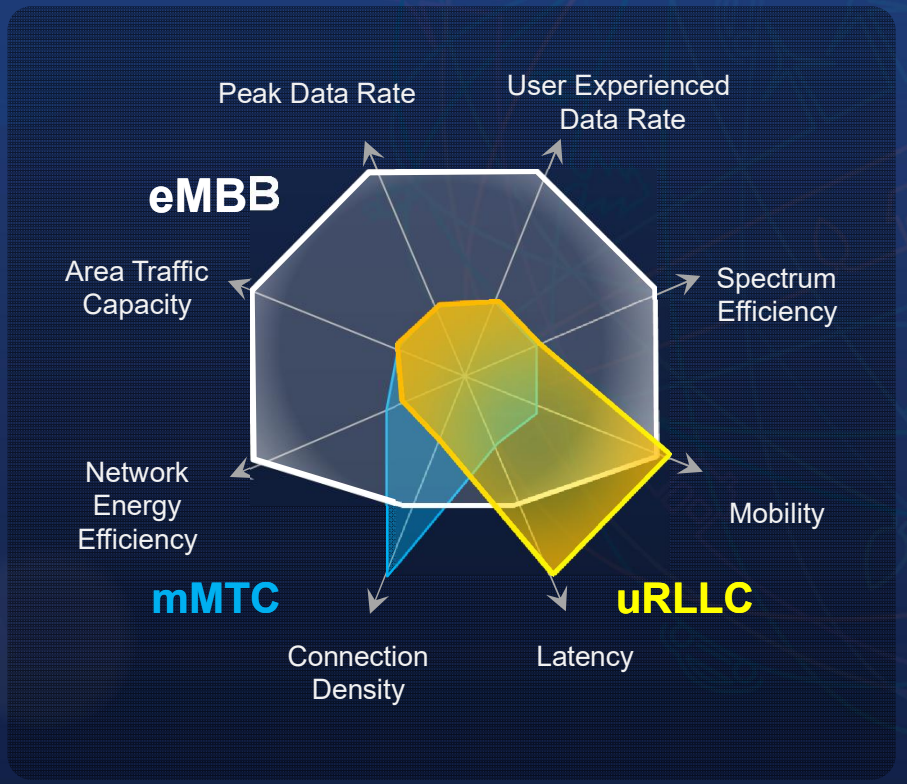
Use Cases

5G Capability Requirements Defined by 3GPP

3GPP Standardization Targets for 5G NR



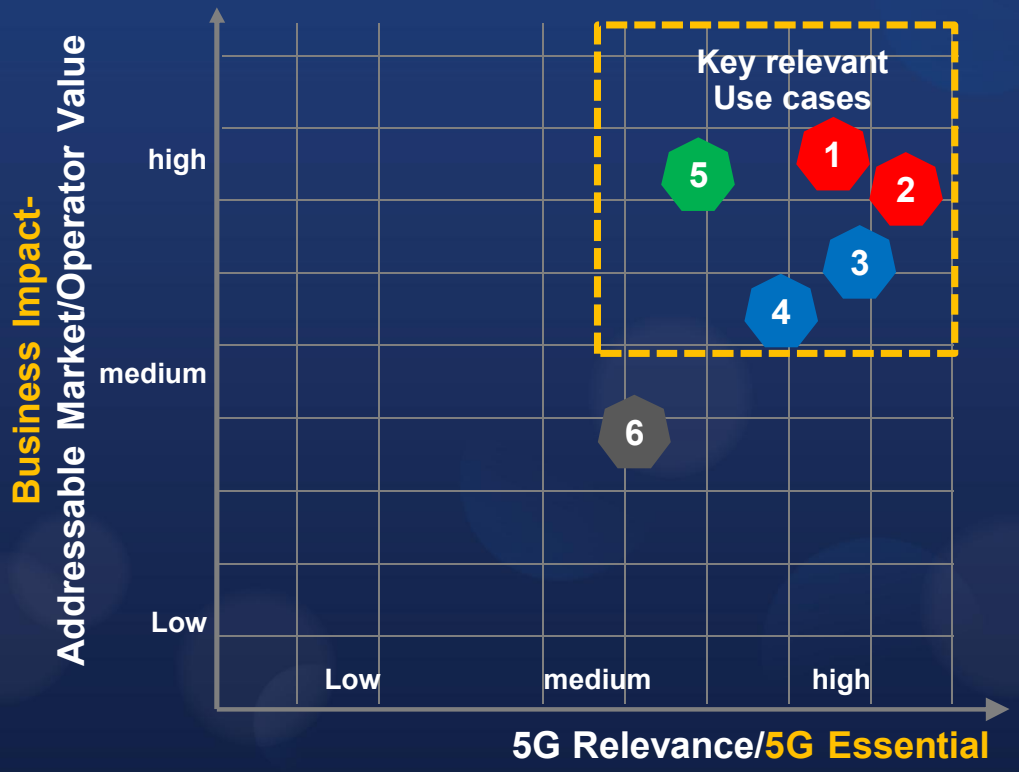
Requirements of Different Services



Source: 3GPP TR 38.913

5G Use Cases Evaluation & Prioritization

Use Case Evaluation

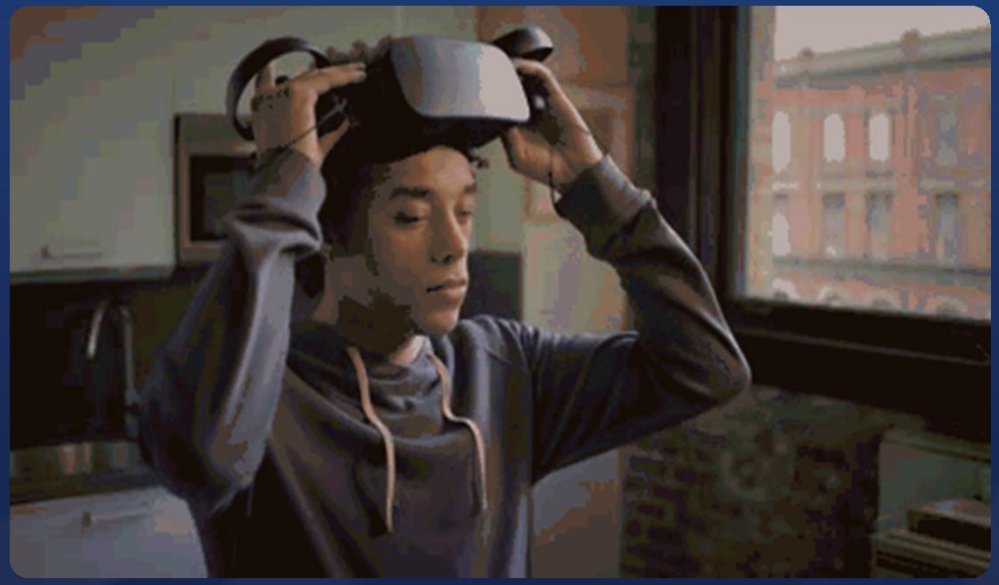


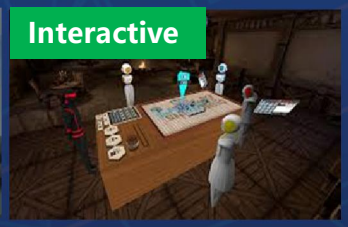
Use Case Example

1. UHD/3D/Holo… Video
2. AR/VR
3. Connected Vehicle
4. Smart Manufacturing
5. Fixed Wireless Access
6. Delivery Drone

Cloud based VR – Social VR

5G eMBB & uRLLC service exploration





Network Requirements

Latency < **5~9ms**

Throughput : **48Mbps~1.2Gbps**

Tele-operated Driving – Autonomous Car

5G uRLLC service joint innovation

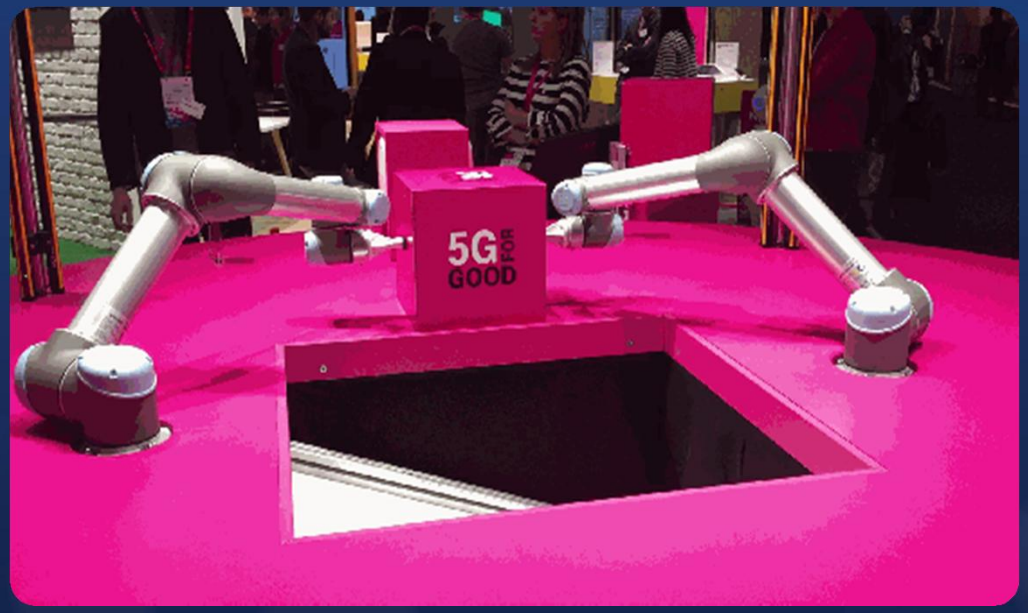
Network Requirements

Latency < 10ms

Reliability: 99.999%

Industry Robotic – Smart Factory

5G uRLLC & mMTC service joint innovation



Network Requirements

Latency < 5~100ms

Throughput > 60Mbps

Pave the Way for 5G

Spectrum & Site Ready

Network Architecture Ready

Spectrum & Site Ready | Architecture Ready

Target Network for 5G NR

mmWave

G30 G40 G70

C-Band

Sub-3GHz

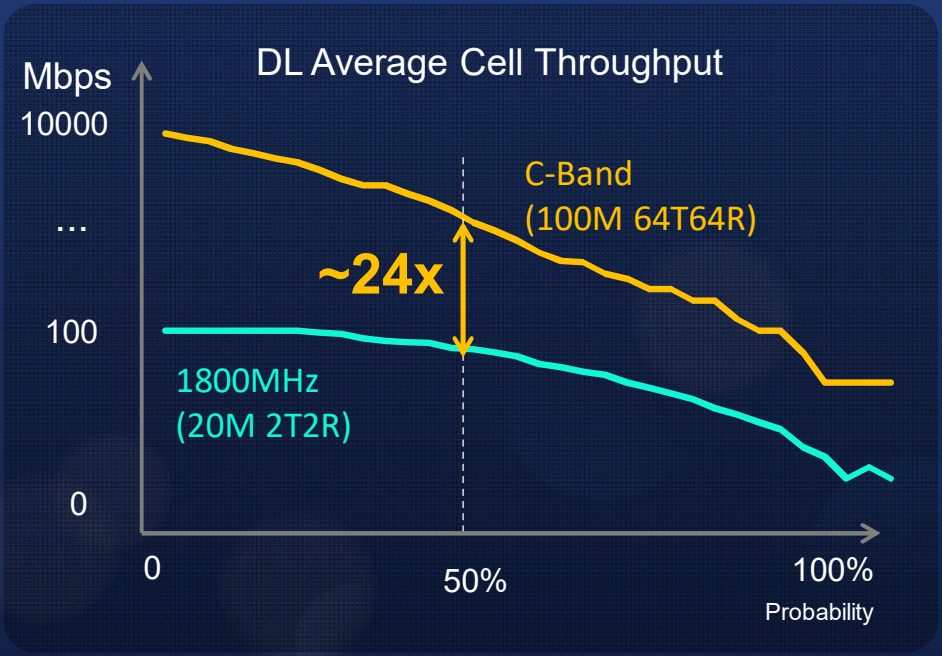
Complementary Capacity Layer
- Hotspot capacity boosting
- Self-backhaul for easy site acquisition
- Fixed wireless access

Primary Capacity Layer
- C-Band with Massive MIMO for capacity & coverage
- UL & DL decoupling extend coverage

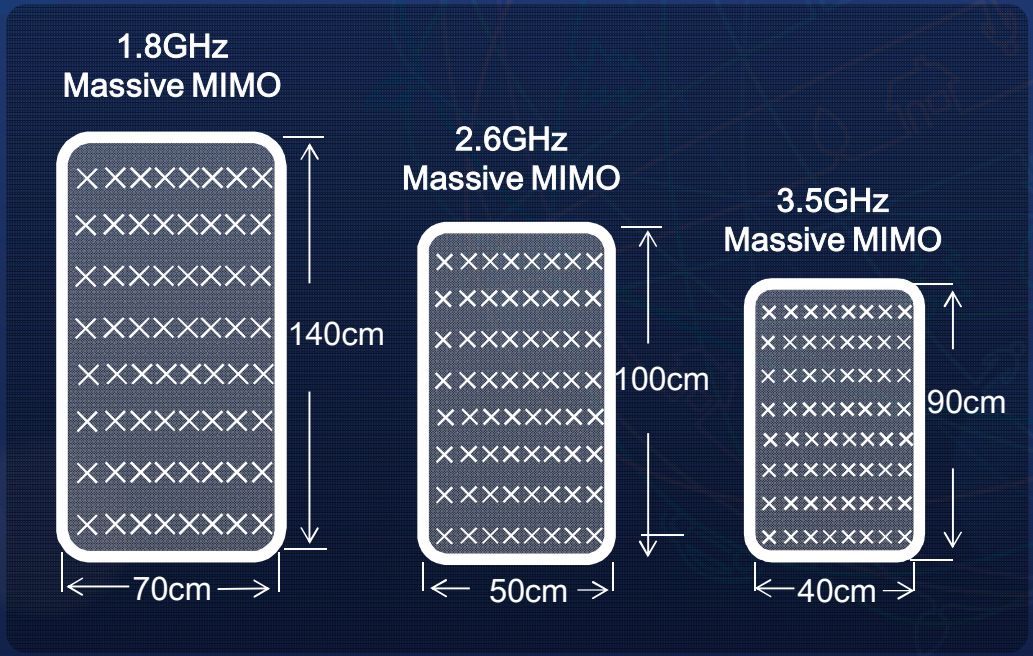
Primary Coverage Layer
- CloudAIR enable NR fast deployment
- 4T4R as basic configuration

C-band M-MIMO Boosts Capacity with Affordable Complexity

C-Band + M-MIMO Boosts DL Capacity



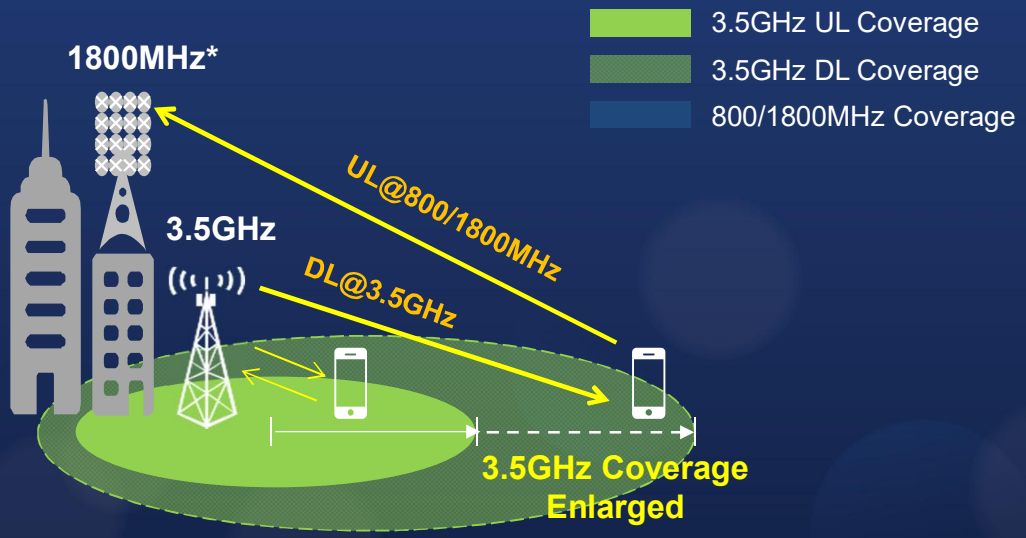
Support M-MIMO with Affordable Complexity



UL&DL Channel Decoupling Enlarges Cellular Coverage

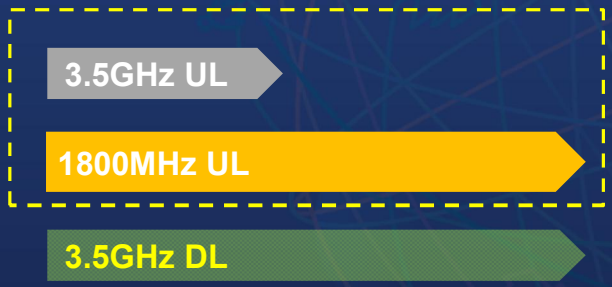
Will comply with 3GPP Release 15.

Implement 3.5GHz Large-Scale Deployment



** Could be any low band frequency*

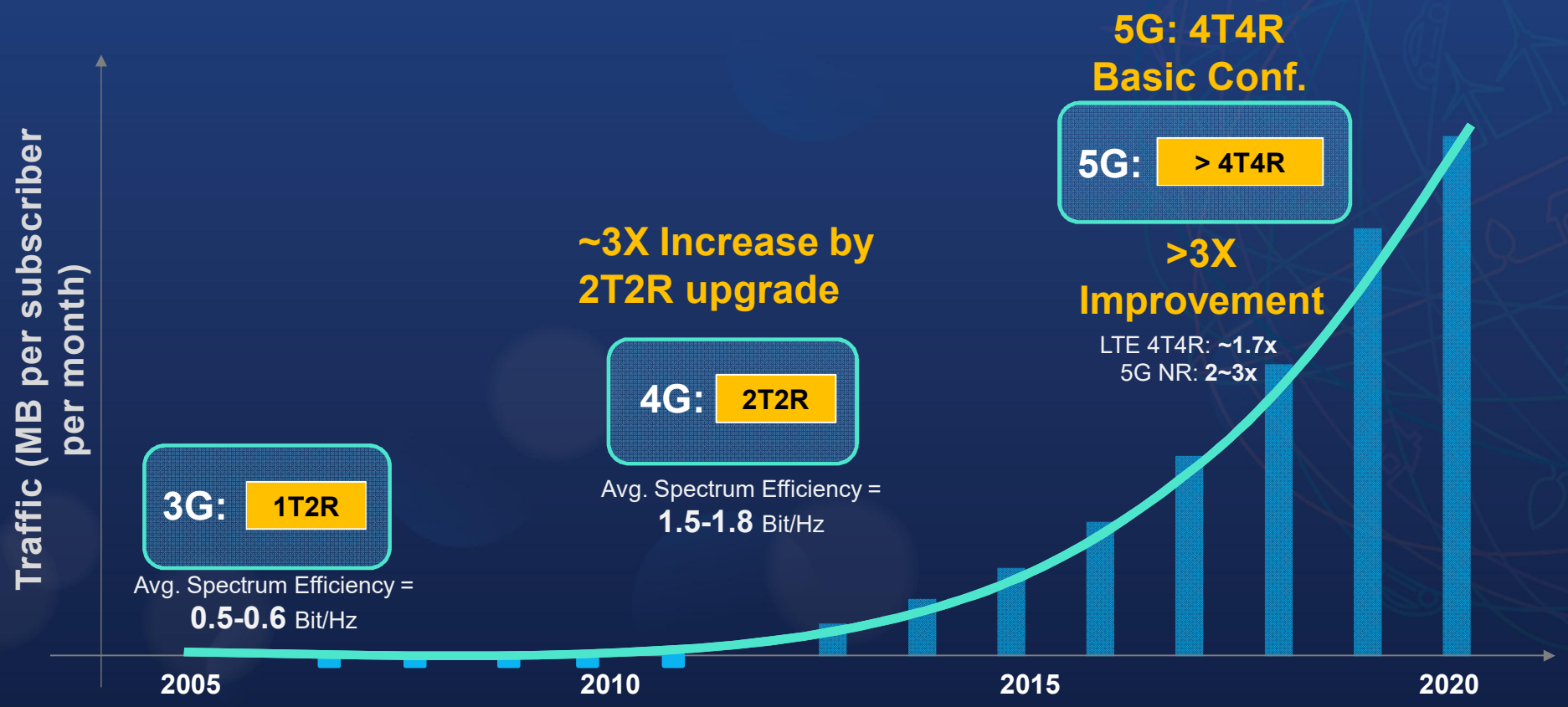
UL@1800MHz + DL@3.5GHz



~2X Coverage Extended

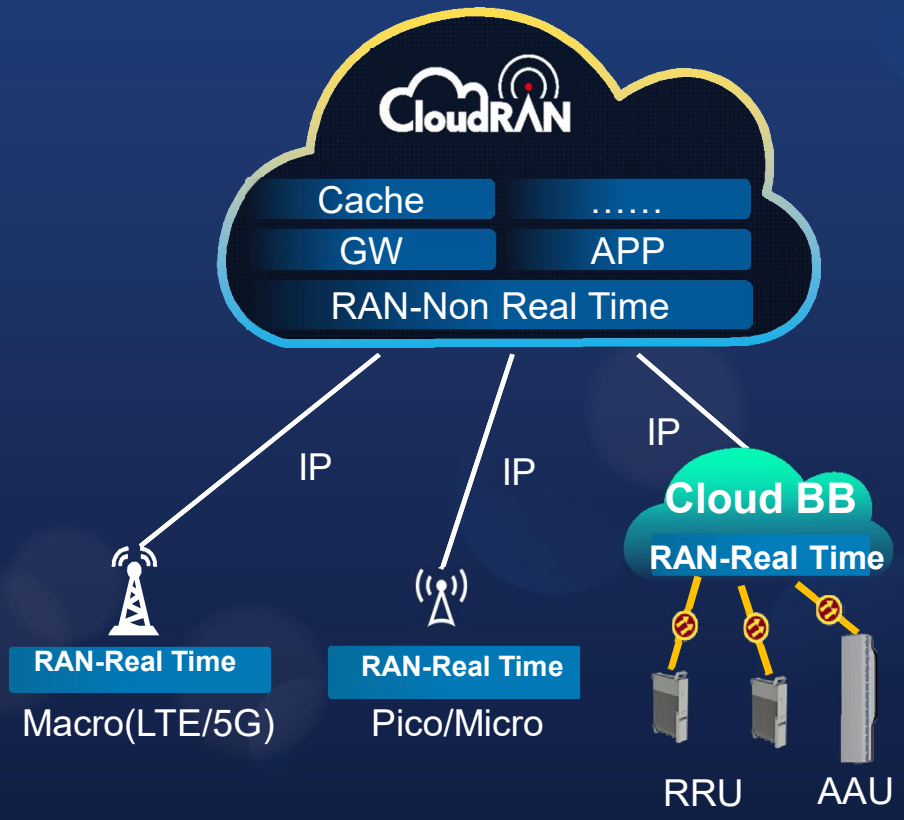
Spectrum & Site Ready | Architecture Ready

Sub3GHz: 4T4R will be the Basic Configuration



CloudRAN as 5G Fundamental Architecture

CloudRAN Architecture



Centralized Unit

- COTS hardware, centralized deployment
- On-demand allocation, rapid deployment for new service

Distributed Unit

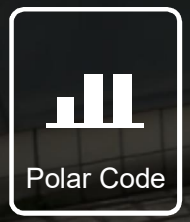
- Dedicated hardware, distributed deployment
- Better performance, >20X efficiency

Huawei 5G Update

Joint Efforts to Bring 5G into Reality

HUAWEI

5G NR Technologies Trial

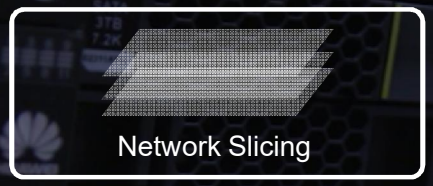


Full Spectrum Access Field Trial

C-band

mmWave

5G Network Architecture Trial

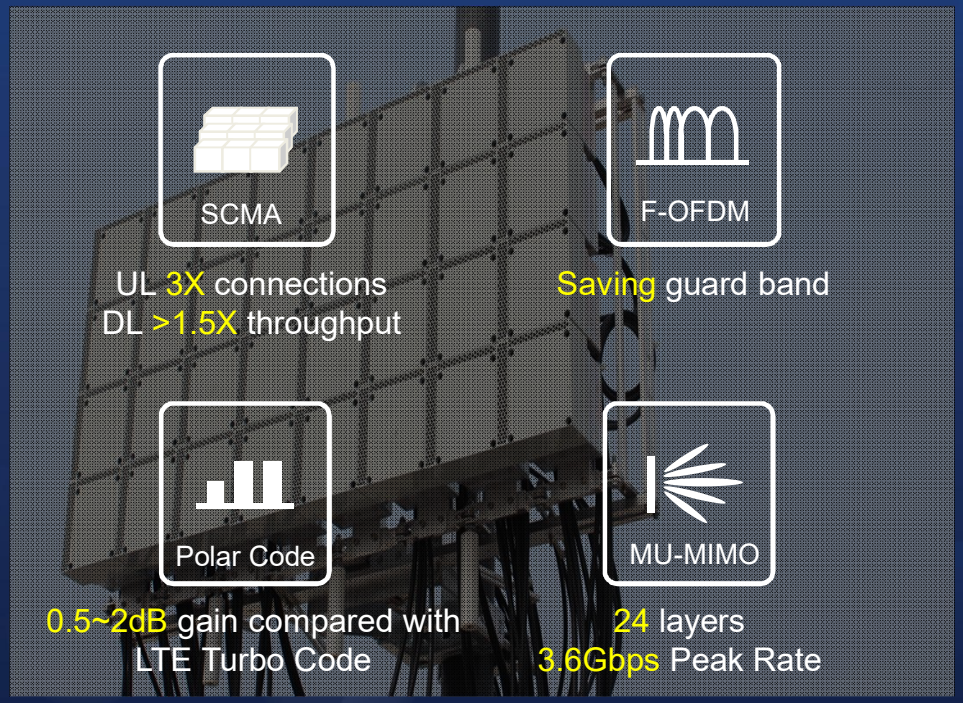


CloudRAN

中国移动 China Mobile · NTT docomo · etisalat · LG U+ · МегаФон · Singtel · SoftBank · T · Telefónica · TeliaSonera · TELUS · TIM · vodafone · ...

First to Finish Verification of 5G Key Technology

5G Large-Scale Trial



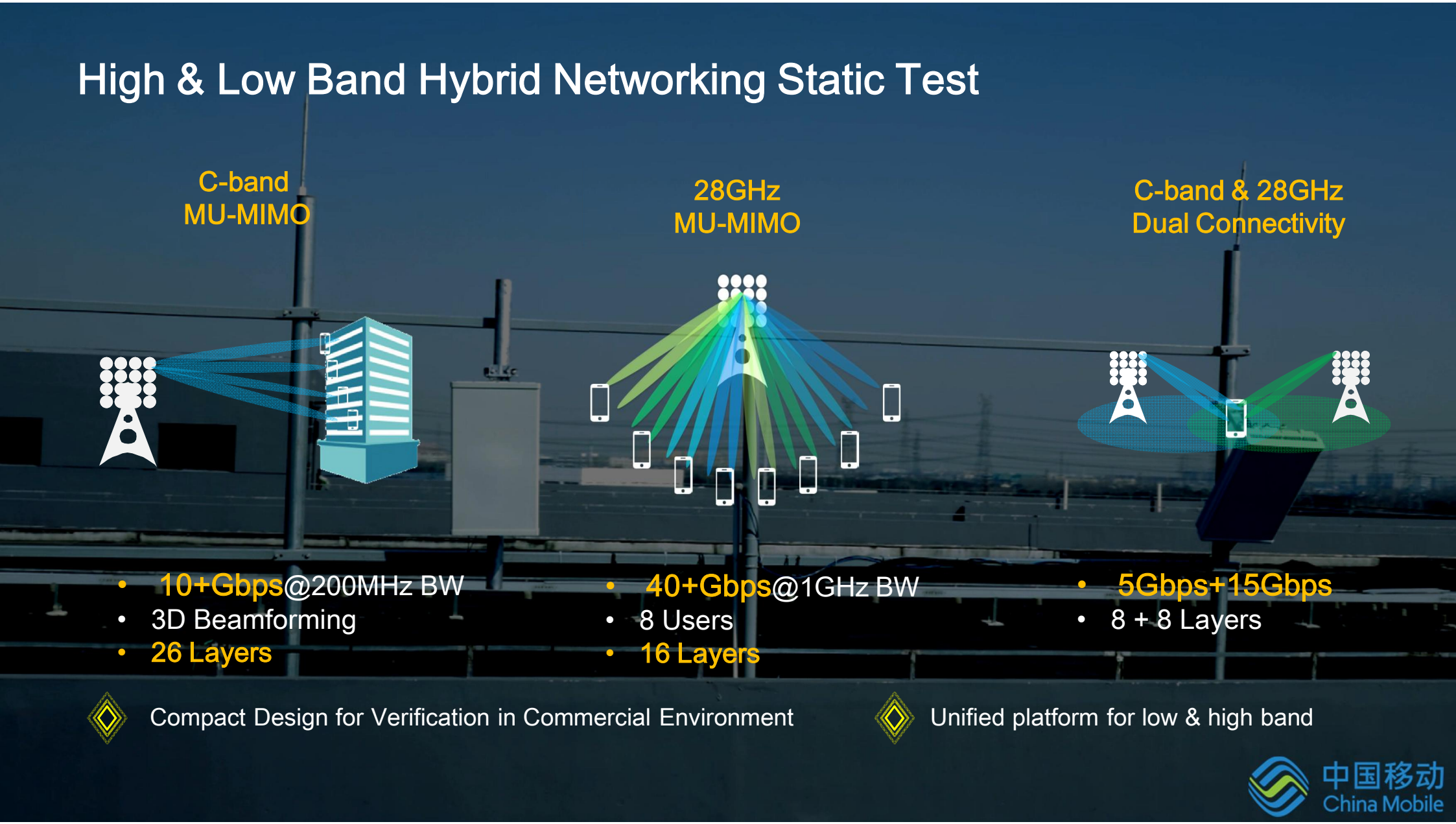
First to Finish NR Trial in IMT-2020 Phase2

Achieve >14Gbps Peak Rate@160MHz, 0.5ms Latency and 4 million connections simultaneously

NTT docomo

IMT-2020

High & Low Band Hybrid Networking Static Test



C-band
MU-MIMO

- 10+Gbps@200MHz BW
- 3D Beamforming
- 26 Layers

28GHz
MU-MIMO

- 40+Gbps@1GHz BW
- 8 Users
- 16 Layers

C-band & 28GHz
Dual Connectivity

- 5Gbps+15Gbps
- 8 + 8 Layers

Compact Design for Verification in Commercial Environment

Unified platform for low & high band

中国移动
China Mobile

Joint Exploration of 5G E2E Slicing in MWC2017

- RAN + Transport + Core + BSS/OSS
- C/U Decoupling
- Programmable Network Functions

AR Slice + Robot Slice + FMC Slice

1 Physical Infrastructure, 3 Isolated Slices

Open Collaboration for Global Unified Standard

Industry Collaborations

Europe

5G PPP — Board Member

5G Innovation Center — Key Founder

5GAA Automotive Association — Key Founder

Asia

IMT-2020 — Board Member (China)

5GMF — Leading R&D Partner (Japan)

5G Forum — Leading R&D Partner (Korea)

Operator Collaborations

ngmn — Leading R&D Partner

docomo, T-Mobile, vodafone, 中国移动 China Mobile, TELUS, Telefónica, TeliaSonera, LG U+, TIM, kt, Singtel, МегаФон, etisalat, BT, SoftBank

20+ operators

5G Research Centers (11)

- **Stockholm, Sweden** — •System Architecture •Algorithms
- **Paris, France** — •Standardization
- **Munich, Germany** — •Verticals
- **5G Research Centers in China** — •Shenzhen •Shanghai •Cheng du •Beijing •Hangzhou
- **New Jersey, USA** — •5G Transmission
- **Ottawa, Canada** — •5G Radio •Network Architecture
- **Moscow, Russia** — •Fundamental Algorithms

Thank You