

IoT Security

Prepared by Dr. Abdelrhman Ahmed

Lecture 3

جامعة الجميع الذكية

تسعى لتكون الكيان الأول الذي يتبنى مبدأ المجتمع التعليمي
التعاوني ويقدم العلم مقابل العمل لتنمية وبناء المجتمعات.

5G Communications Technologies and Solutions



جامعة الجميع الذكية
EVERYONE'S SMART UNIVERSITY

- During the World Radiocommunication Conference 2015 held in Geneva, Switzerland from October 26 to 30, ITU Radiocommunication Sector (ITU-R) officially approved the resolution on promoting future 5G research and formally decided on "IMT-2020" as the official name of 5G.
- 5G is a new-generation communications technology. Its standards evolution and industry development have attracted much attention and will be promoted by multiple parties. In addition, for mobile Internet and IoT scenarios, 5G brings new technologies and transformations.

Upon completion of this course, you will be able to:

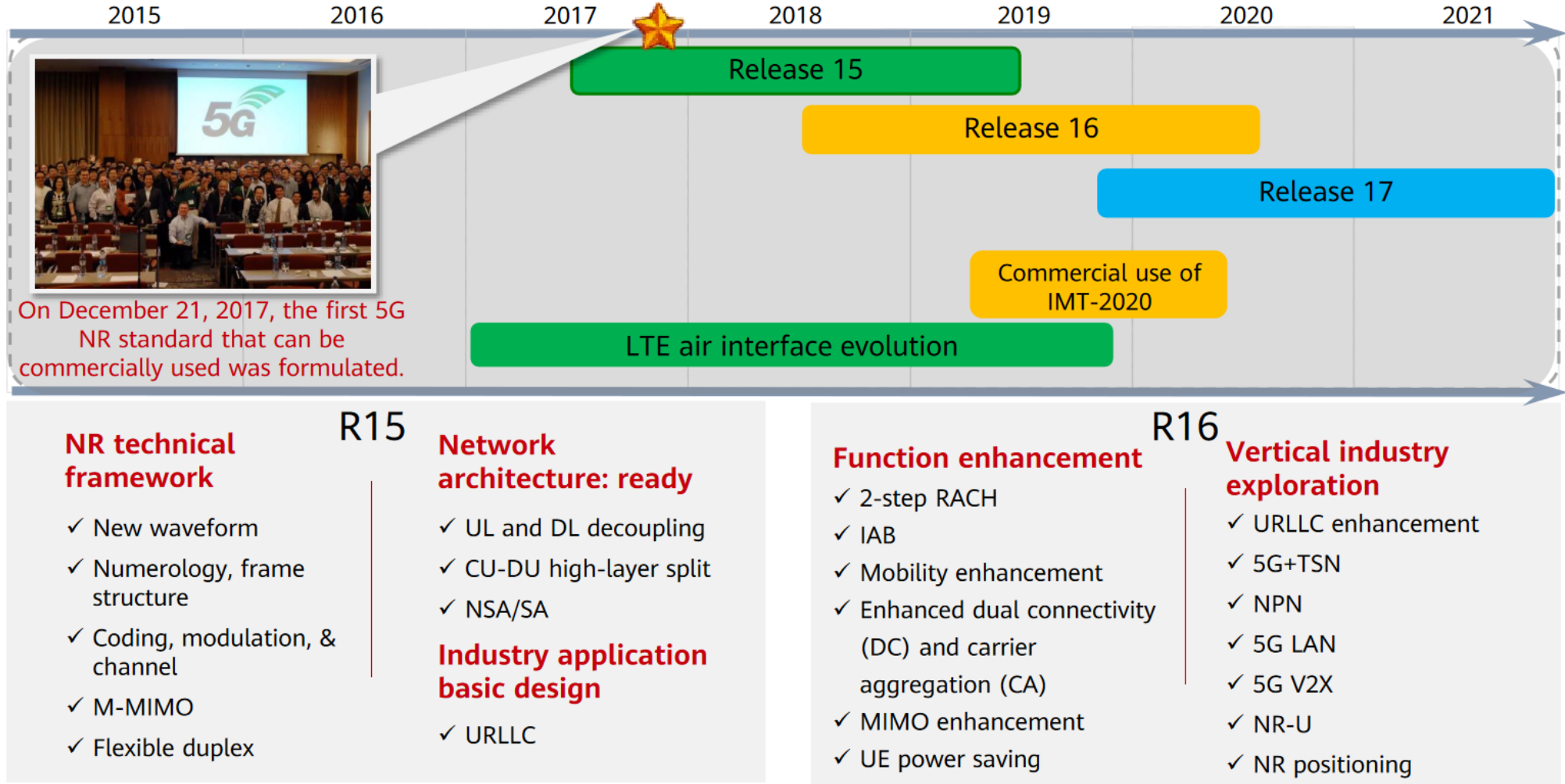
- ☐ **Understand 5G standards evolution and industry development.**
- ☐ **Master key technologies and points for 5G communications.**
- ☐ **Distinguish between three 5G scenarios and their supported applications.**
- ☐ **Be familiar with 5G business solutions and know the key to the success of operators'**





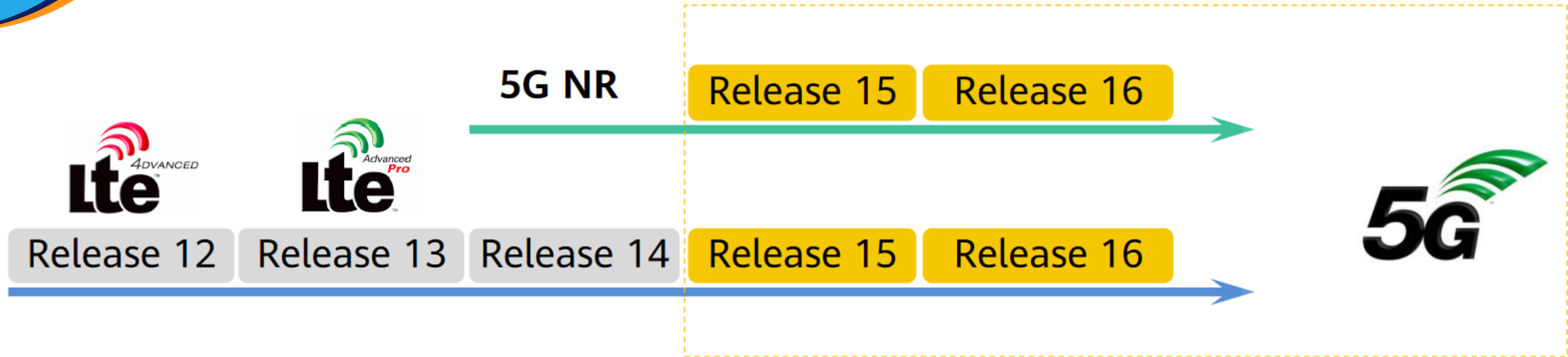
Chapter 03

Evolution of 5G Communications Technical Standards



Chapter 03

3GPP Release 15: New 5G Technology Standards



These include:

New radio

LTE Advanced Pro evolution

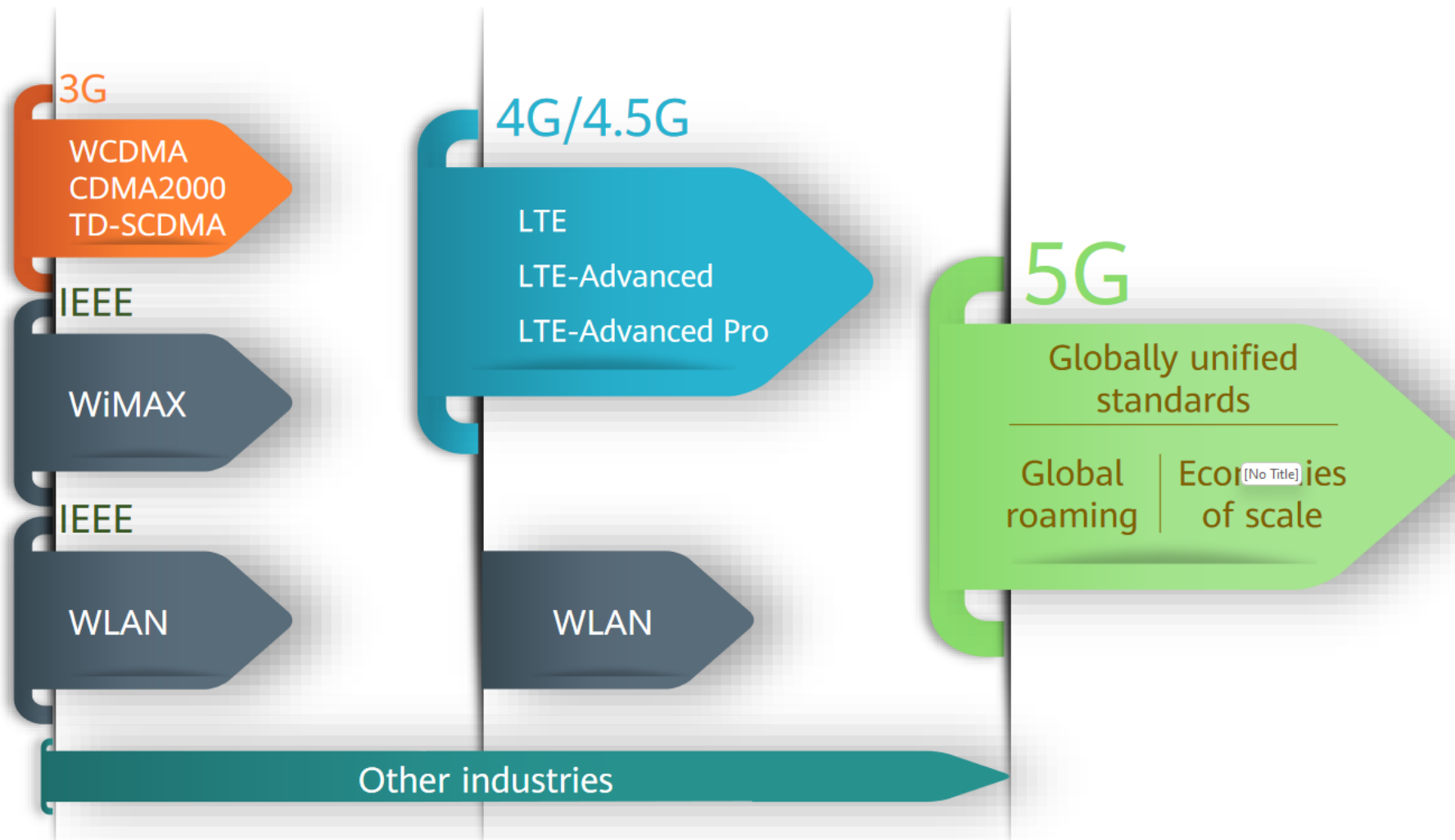
Next generation core (NGC)

EPC evolution

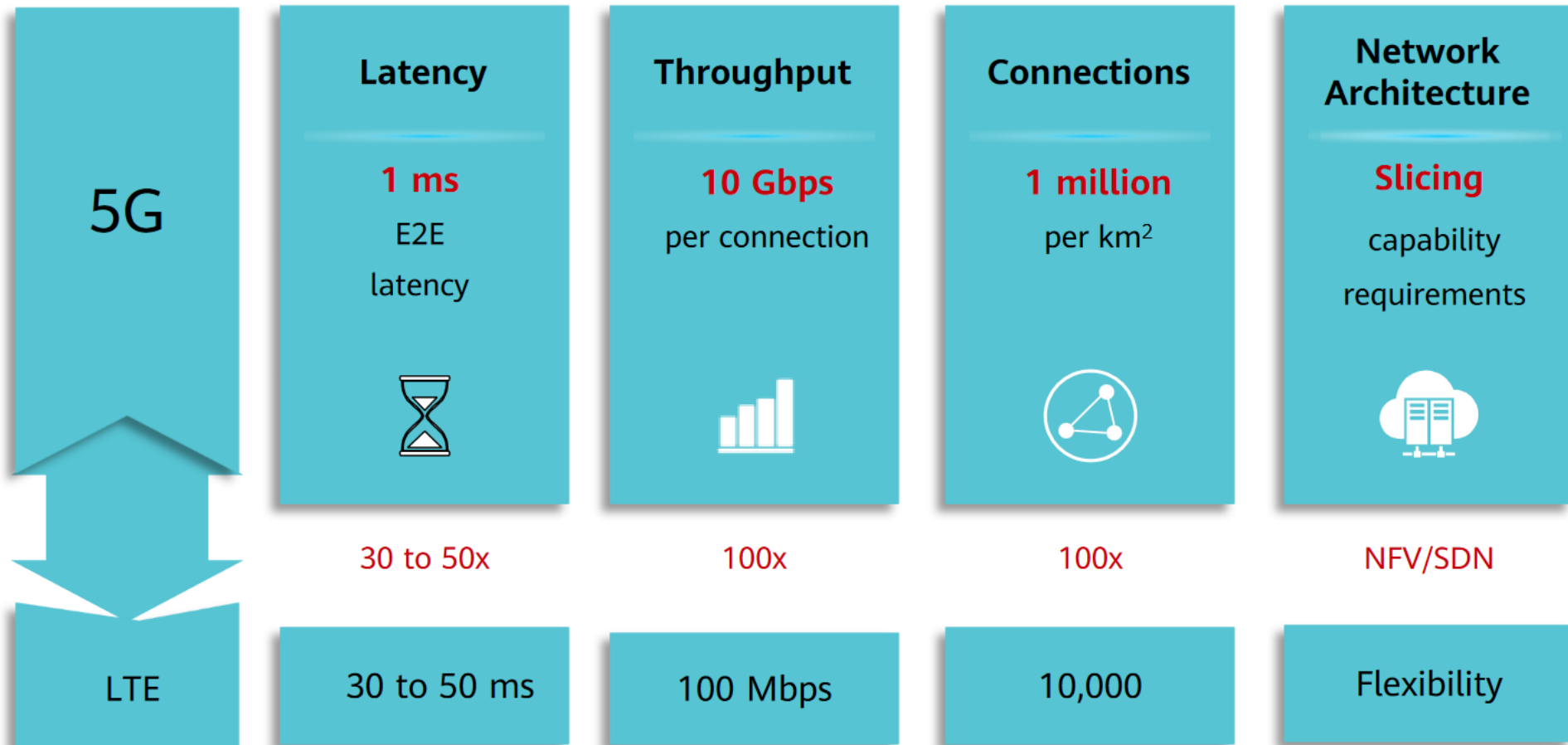


Chapter 03

5G Unified Standards

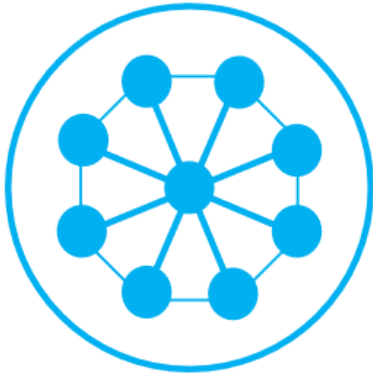


5G Key Performance Indicators



Three Key 5G Innovations

New Architecture



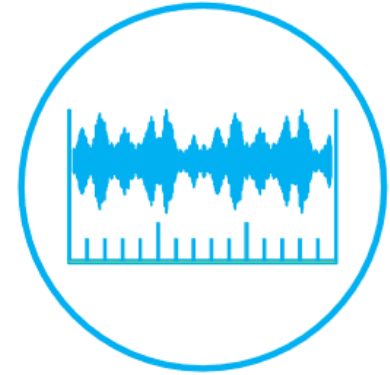
Using both low and high frequency bands for new experience

New Radio



One physical network for hundreds of industries

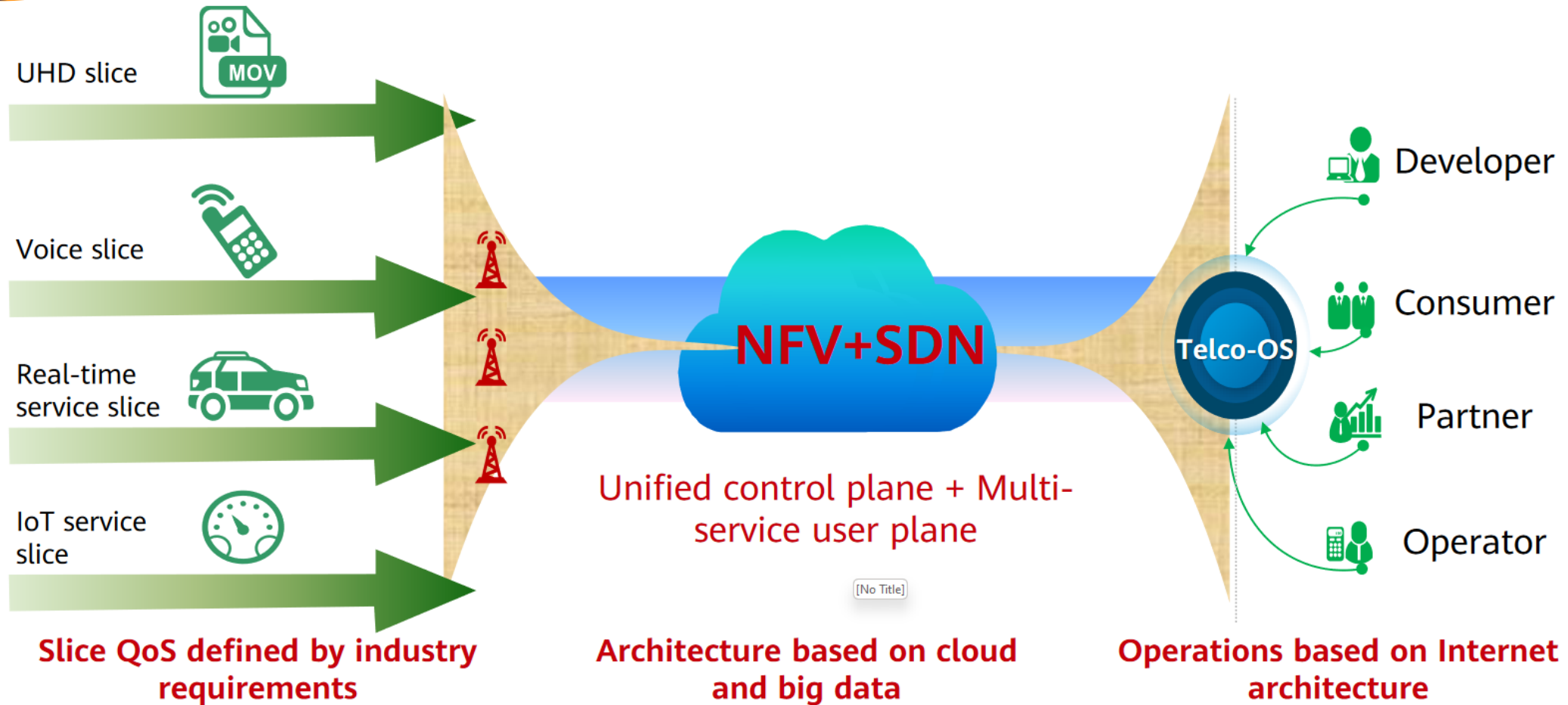
Full Spectrum



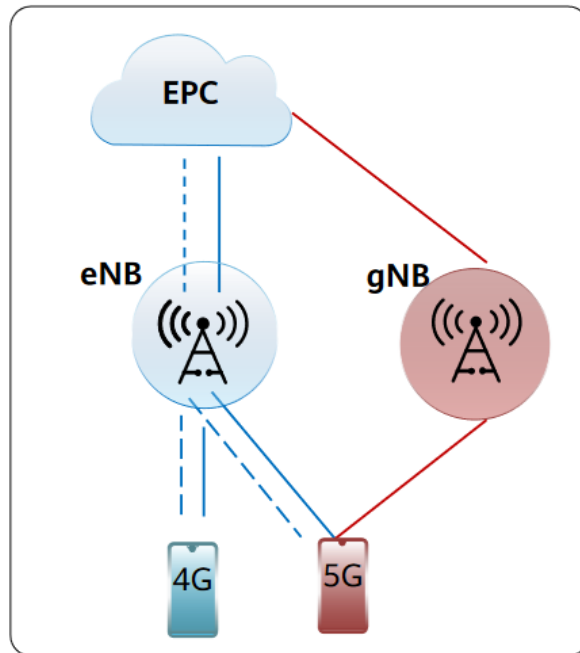
Flexible adaptation to various services
Improved spectral efficiency

Chapter 03

5G New Architecture - One Network for Hundreds of Industries



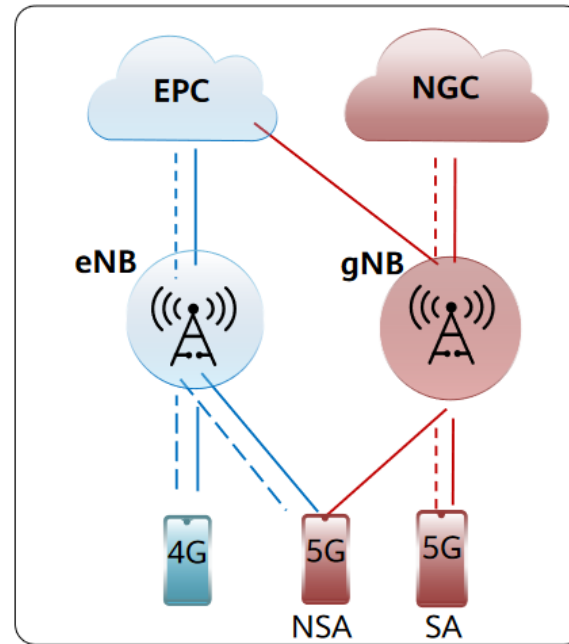
2019
NSA Option 3x



Enabling eMBB services:

- Quick deployment in the early stage
- LTE as the anchor point
- LTE&NR DC

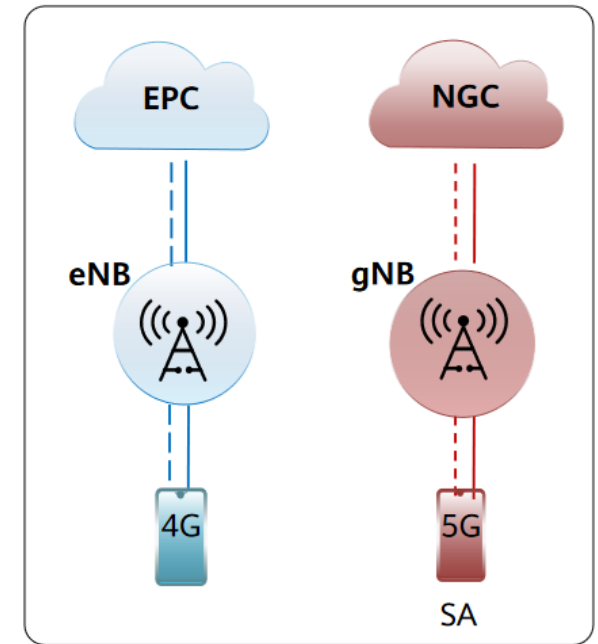
2020 to 2023
Long-term coexistence of NSA and SA



Enabling 5G 2B services:

- One network adapts to both NSA and SA networking.
- Uplink enhancement (such as super uplink and NR uplink CA)

2023+
SA as the target architecture



Fully enabling vertical services:

- NR carrier aggregation

eMBB

- In eMBB scenarios, 5G needs to provide enhanced mobile Internet services:
 - Services such as VR/AR/MR require higher rates.

VR



Everything you see is unreal.

AR



You can tell the difference between the 'real' and the 'virtual'.

MR



You cannot tell the difference between the 'real' and the 'virtual'.

Immersion



Interaction



Imagination



Panoramas

mMTC

- In mMTC scenarios, 5G needs to provide IoT services with massive connections.
 - Internet of everything – large-scale IoT

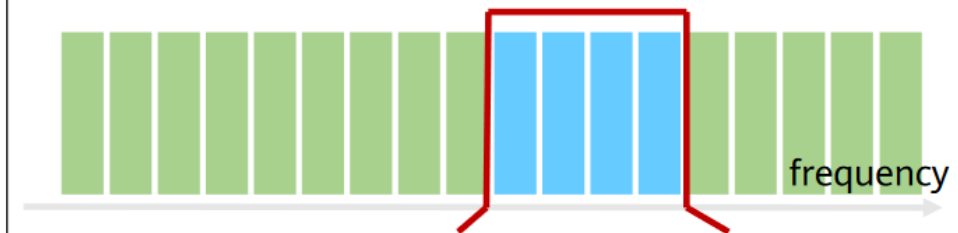


All things connected

NB-IoT Already Evolved to NR

The ITU-R WP 5D#35e remote conference held by the International Telecommunication Union (ITU) announced that 3GPP 5G technologies (including NB-IoT) meet the requirements of IMT-2020 5G technical standards and are officially accepted as ITU IMT-2020 5G technical standards.

NB-IoT systems embedded into 5G

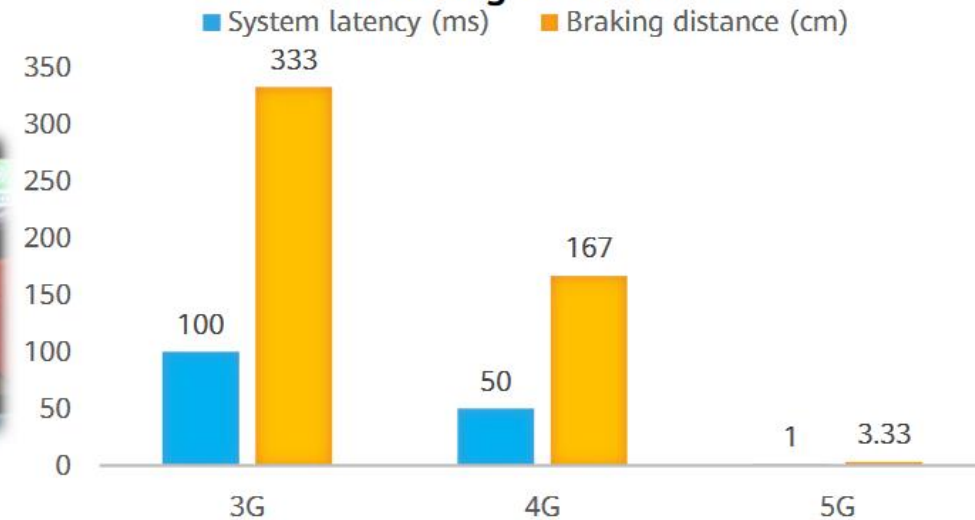


URLLC

- In URLLC scenarios, 5G needs to provide ultra-high reliability and ultra-low latency services.
 - In V2X scenarios, services such as assisted driving and automated driving require low latency.
 - Scenarios demanding high real-time performance, such as smart healthcare and remote surgery, require low latency.



Relationship between system delay and braking distance



Chapter 03

Three 5G Business Solutions Driving Business Success

5G Business Solutions



B2C: 5G enriches life



Experience 5G anytime, anywhere

- **Business insight:** 3 key success factors
- **Solution:** Leading VR service solution; Digital indoor solution
- **Best practice:** LG U+ China Mobile, Elisa, ...



B2B: 5G boosts industry

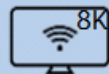


Industry-level quality, ensuring SLA

- **Business insight:** Blue ocean market, starting from connectivity
- **Solution:** Rapid and economical business connections; Guaranteed SLA solution
- **Best practice:** STC, China Unicom, Sunrise, ...



B2H: 5G enables wireless optical fibers

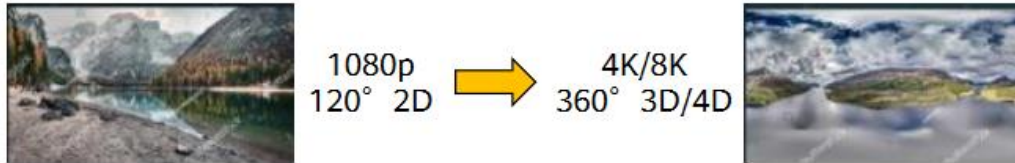


Quick launch and experience of
wireless optical fibers

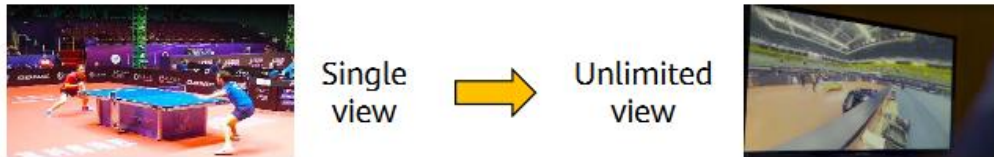
- **Business insight:** Three scenarios drive business development.
- **Solution:** All-scenario CPEs + WTTx suite
- **Best practice:** Globe, Telcom, 3, ...

5G Brings More New Services

New video: more details, immersive experience



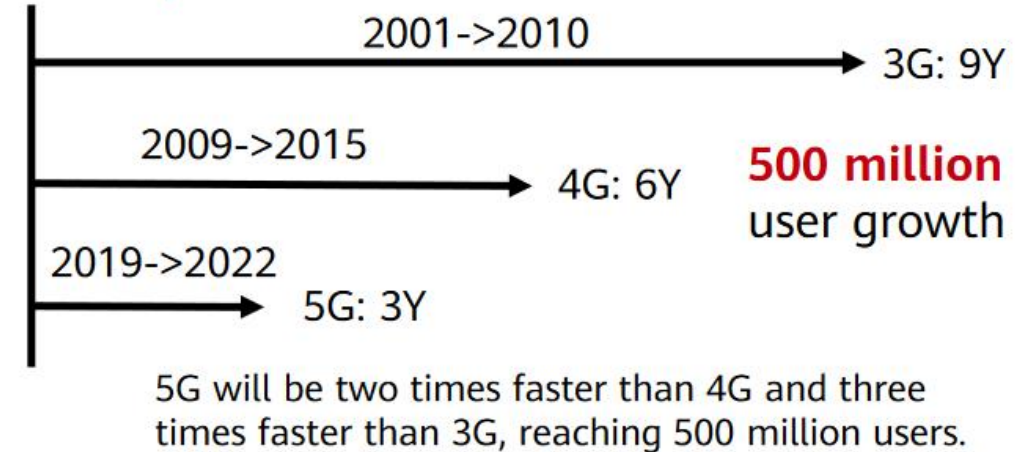
New live broadcast: onsite-like experience



New games: any game, any device



Rapid Increase of 5G B2C Users

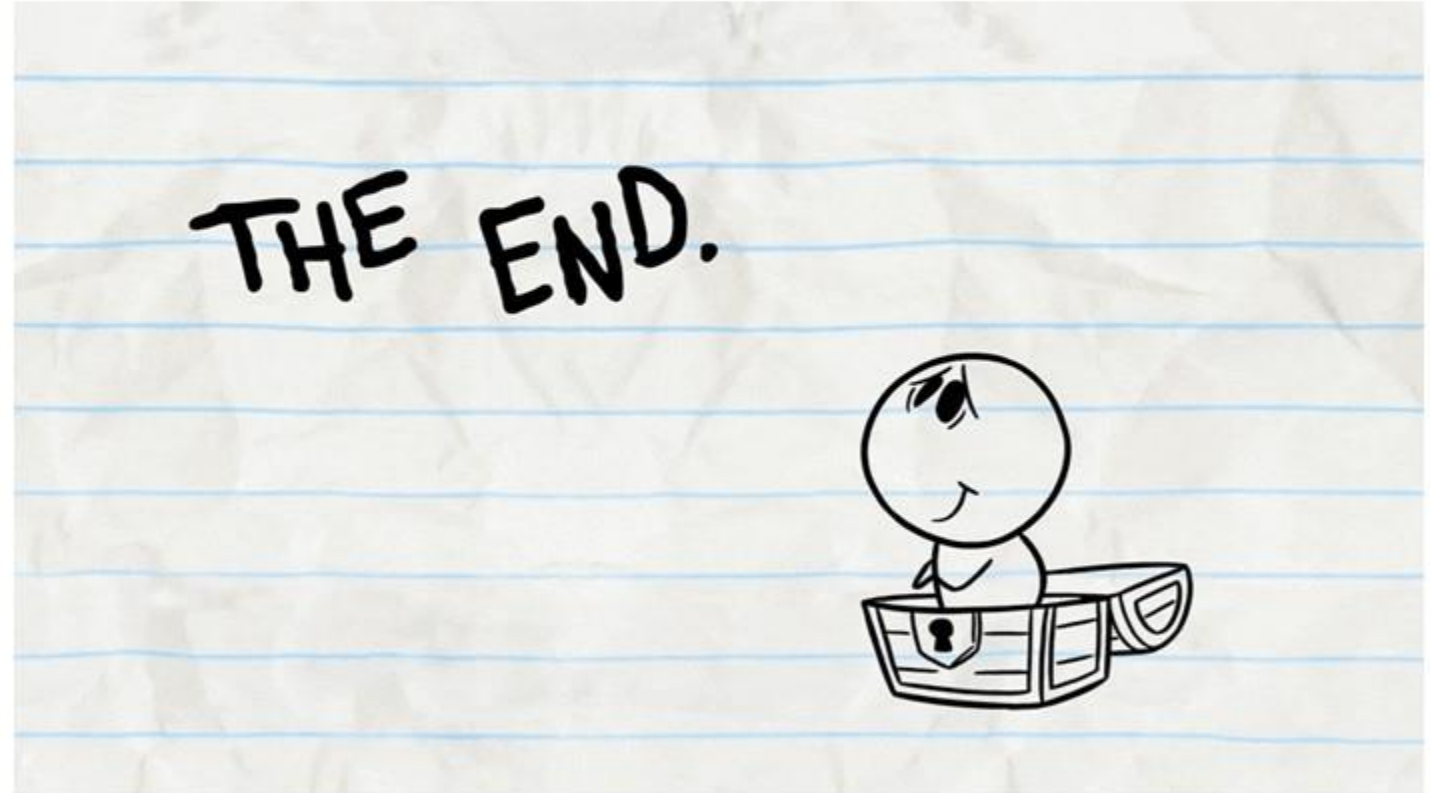


Three Key Factors for 5G B2C Success

- ✓ High-quality network
- ✓ Rich content
- ✓ Flexible multi-dimension tariffs

The End

Please feel free to contact me anytime if you have any questions



جامعة الزكية
EVERYONE'S SMART UNIVERSITY