

# 4.5G, Bridging to 5G

Chen Yifang

VP of LTE Product Line

# Market is Growing, **Business is Changing**



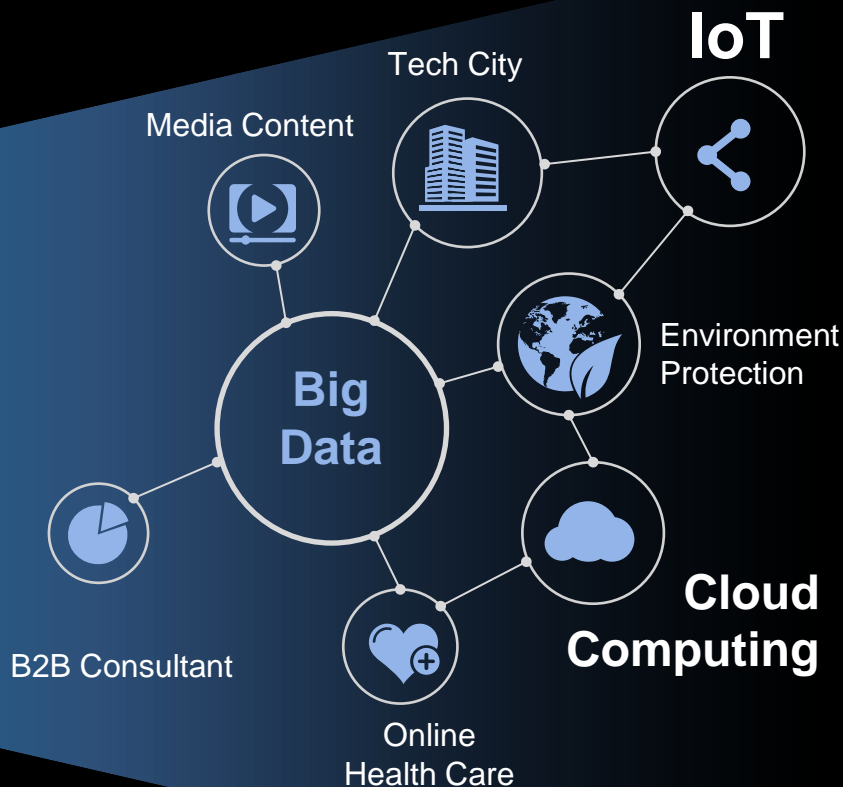
**6.7 Billion**  
2x MBB Users



**5 GB**  
10x Data Usage



**3 Billion**  
7.5x C-IoT Connection



# What Should We Do before 5G Arrives?



Faster  
Speed



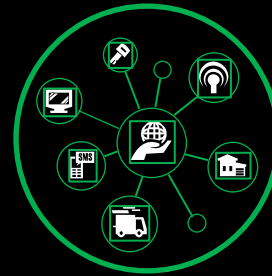
- ✓ Increase Speed
- ✓ Increase Capacity

Better  
Experience



- ✓ Improve Experience
- ✓ HD Voice, HD Video

More  
Connections



- ✓ Enable Vertical Industries
- ✓ Access to IoT Market

Flexible  
Architecture

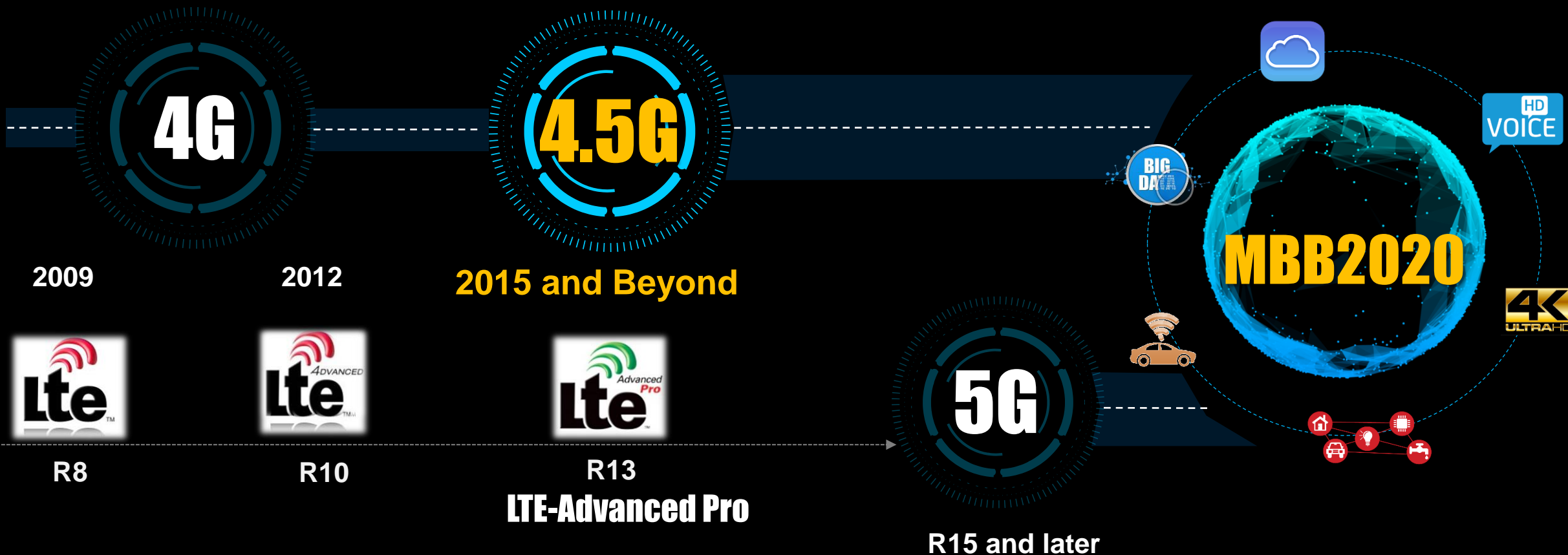


- ✓ Redefine Architecture
- ✓ Ready for 4.5G&5G

# 4.5G, Step to MBB2020



**Gbps**   **Connection+**   **Experience 4.0**   **CloudRAN**



# Gbps, Empowers Ultra-Fast Services



**Massive MIMO**  
~6x Gain




**D-MIMO**  
3~4x Gain



FDD  
FDD  
FDD  
TDD  
WiFi

**Flexible CA**  
>3x Gain



**256QAM**  
~10% Gain



Licensed  
Unlicensed

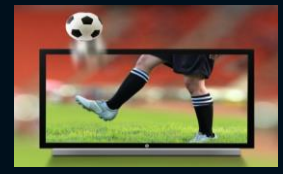
**LAA**  
>3x Gain

**8x** peak rate **6x** capacity **10x** cell edge throughput



**Cloud Storage**

70% data stored in cloud



**2K/4K Video**

everywhere



**VR**

in Mobile



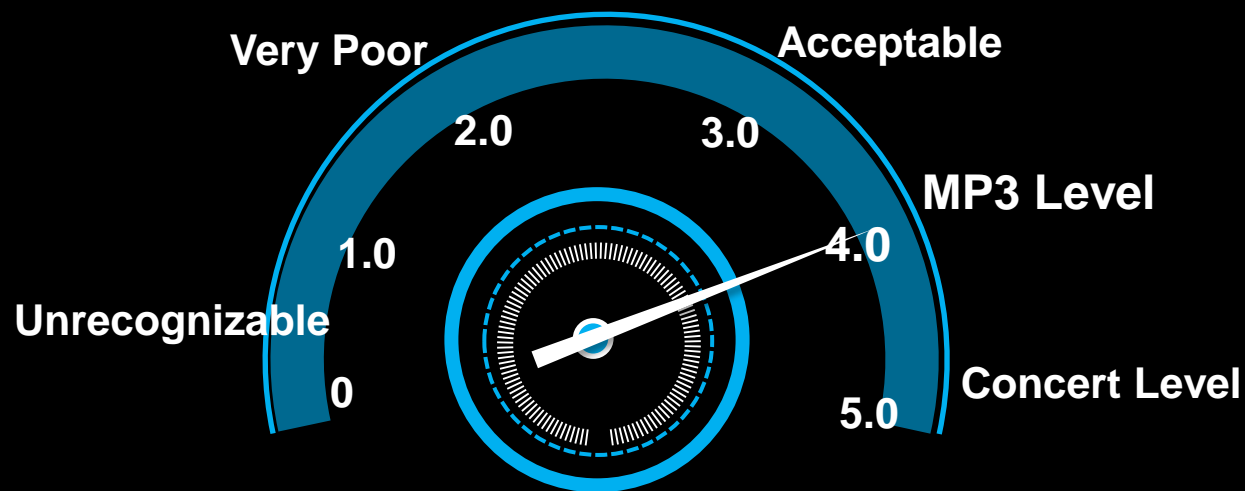
**Hologram**

in Mobile

# Experience 4.0, Enables Dual HD Service Everywhere



## HD Voice



## HD Video



Speedvideo  
APP



U-V MOS > 4.0

**On Site Experience**  
**Hi-Fi Quality**

**Touch To Talk**  
**No Latency**

4.5G introduces **EVS (Enhanced Voice Service)** codec for FHD voice quality  
EVS will be supported by UE chipset in 2016



Initial  
Booster



Speed  
Variator

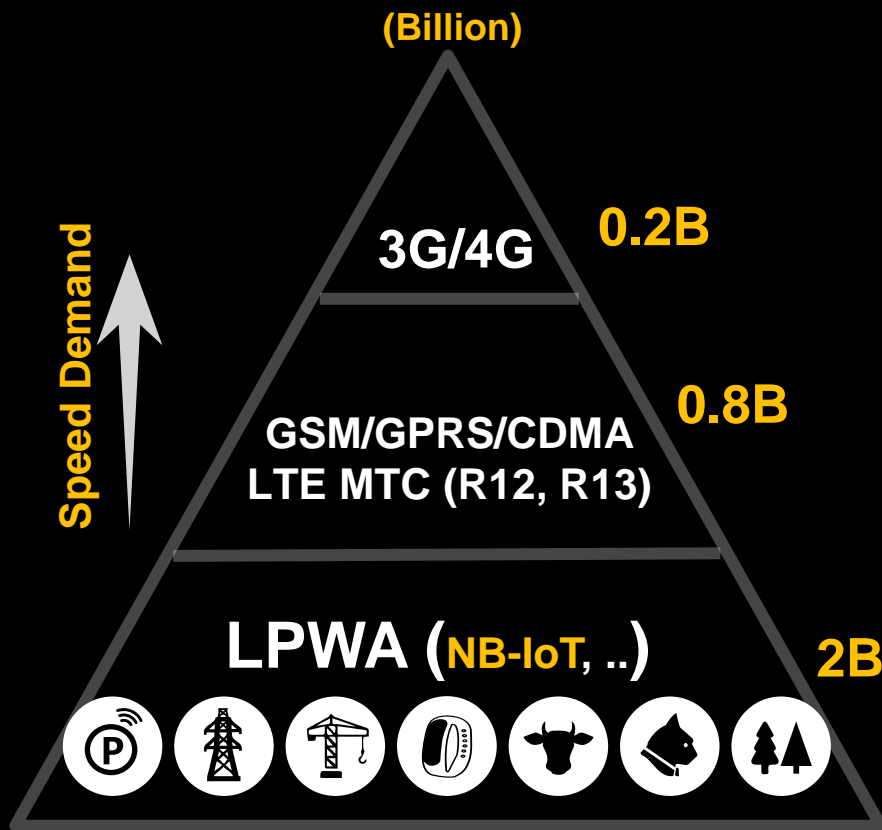


Resource  
Equalizer

# Cellular-IoT, Explore Vertical Opportunities



## Connections in 2020

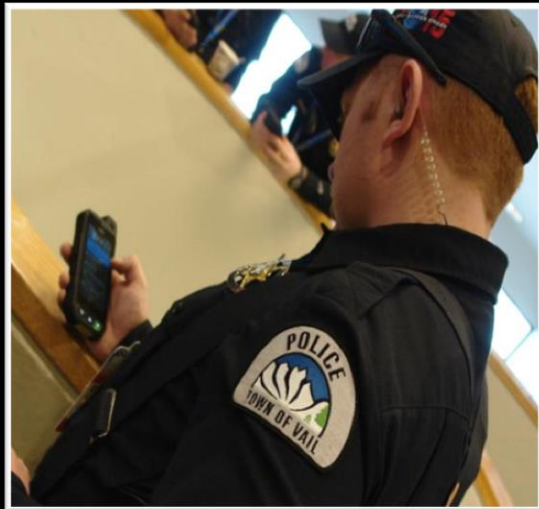


LPWA: Low Power Wide Area

Scenario	Requirement	Standard
Ads, CCTV ...	>10Mb/s	
Smart Home POS Auto Vending	~1Mb/s Low Power Consumption	<b>eMTC:</b> Sep 2016 Frozen
Sensors Metering Tracing Industry Agriculture...	Small Packet <100Kb/s Deep Coverage 20dB Low Power 10 Years Low Cost <\$5	<b>NB-IoT:</b> Core Part <b>June 2016 Frozen</b> Performance Sep 2016 Frozen

# LiTRA, Creates Public Safety & Utilities Business

## Public Safety



Police  
Fire  
Ambulance  
Civil Defence

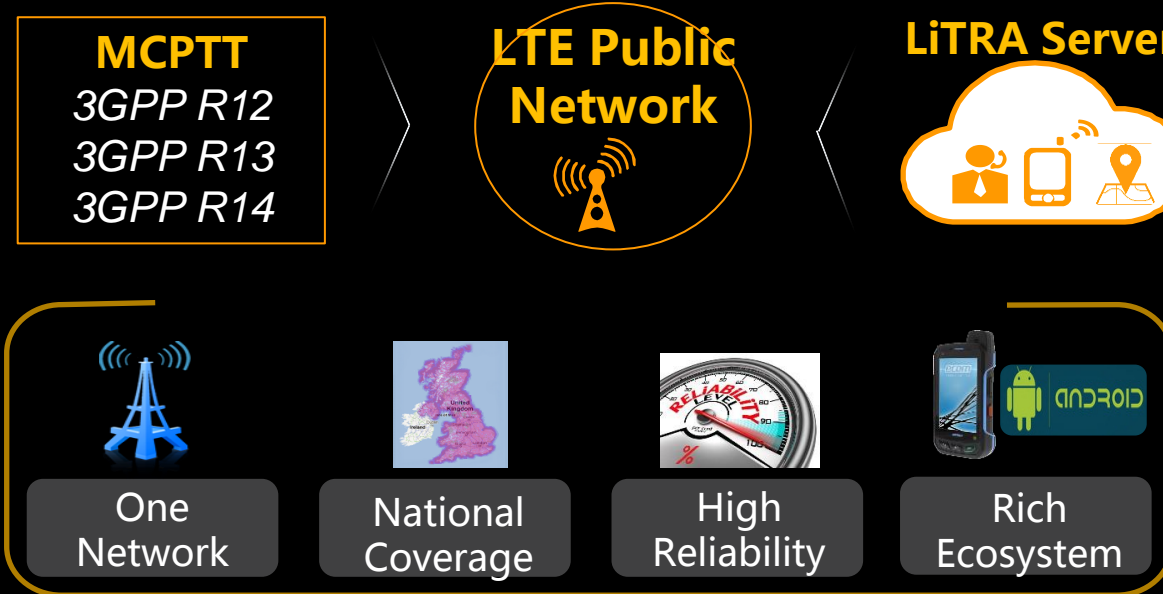


## Public Utilities



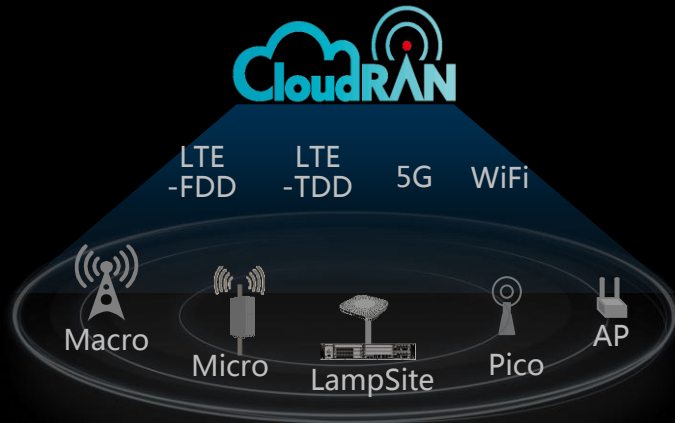
Industrial complexes  
Heavy Industries  
Airport  
Health care  
Transportation.....

LTE integrated Trunked Radio

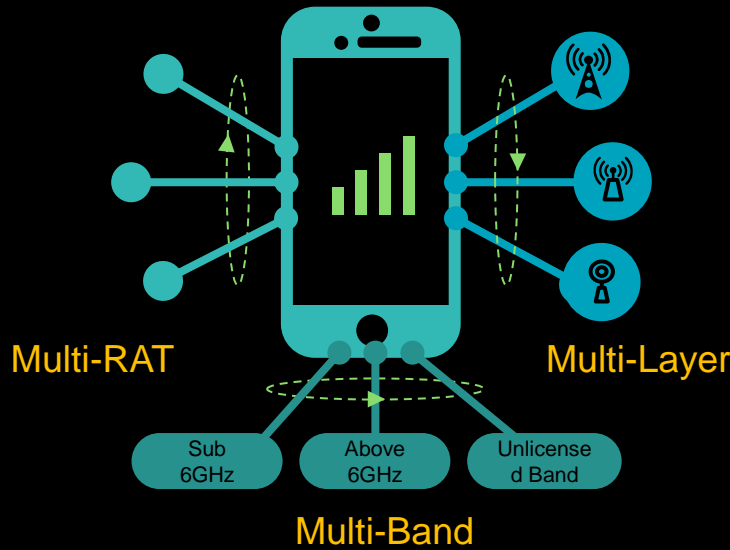


From "Push to Talk" to "Push to Video"

# 3 Transformations of RAN Architecture to 5G



From  
**Silo-Architecture**  
To  
**Cloudified-Architecture**



From  
**Single-Connectivity**  
To  
**Multi-Connectivity**

## Scalable Network for

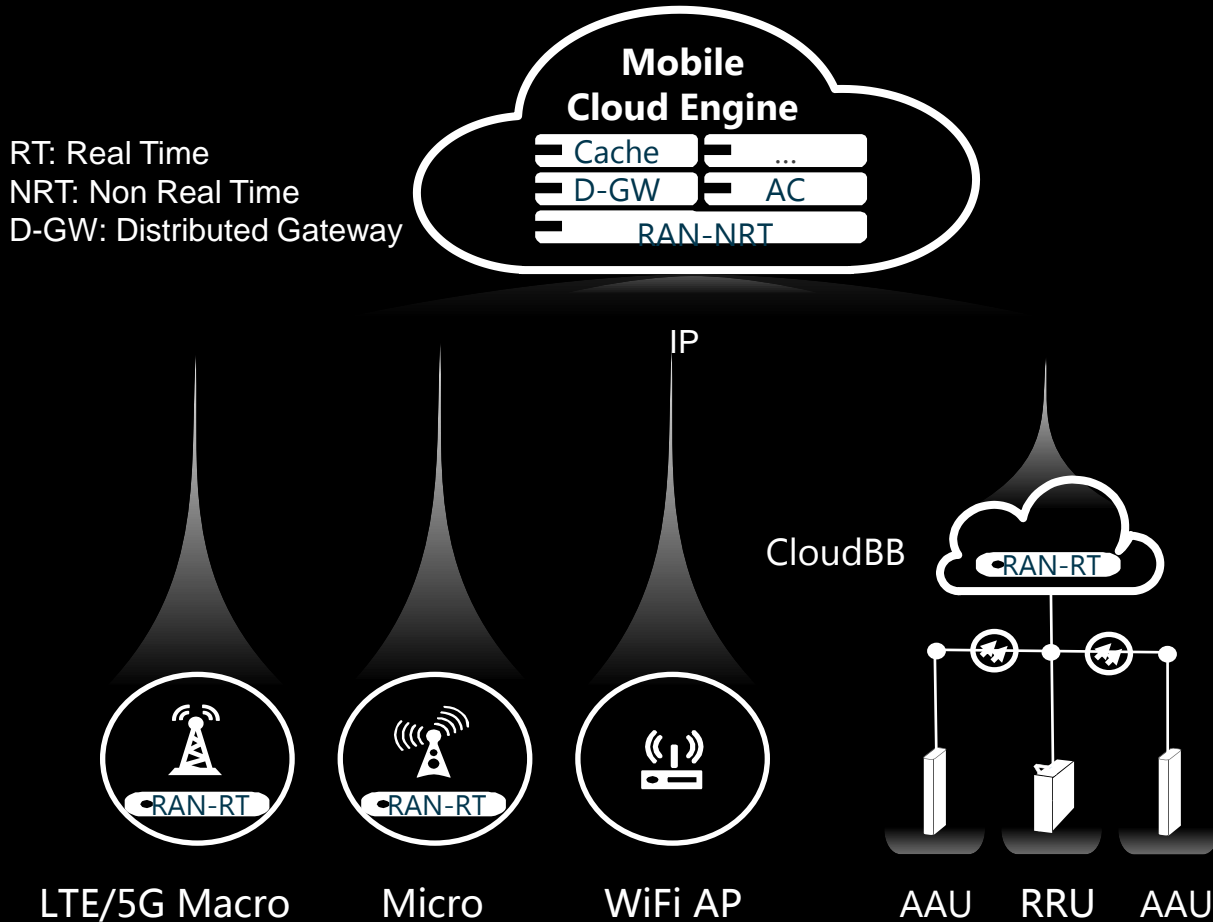
**On-demand  
Deployment**

**New RAT Fast  
Introduction**

**Scalable to Meet  
Growing Demand**

**New Services  
Fast TTM**

# CloudRAN™, Common Architecture for 4G/4.5G/5G



## Cloud-formation

Laying the foundation of elastic architecture, bridge 4G & 5G



## Multi-Connectivity

Native ability to integrate all available resources and enable ultimate experience



## Layered Architecture

Balance the centralization & distribution, enable on-demand configuration & management of network functions

**Common Network Architecture across Different Technologies & Layers**

# Two Phases for CloudRAN™ Introduction



Architecture Ready for 5G

## Phase I

### **Introducing CloudRAN™ in LTE Network to Support**

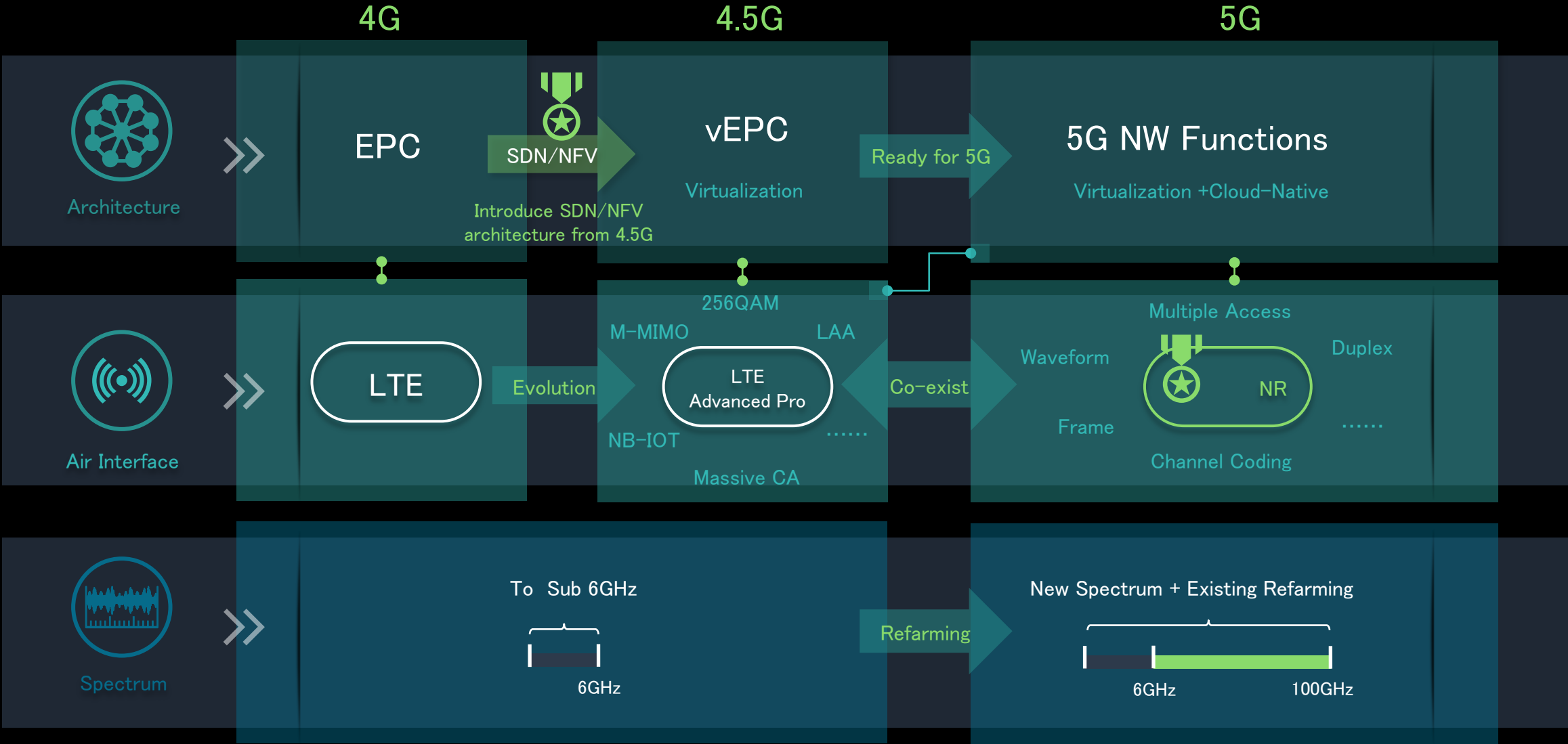
- LTE Dual Connectivity
- LTE and WiFi Link Aggregation (LWA)
- License Assisted Access(LAA)

## Phase 2

### **Introducing CloudRAN™ to Support**

- 5G New RAT

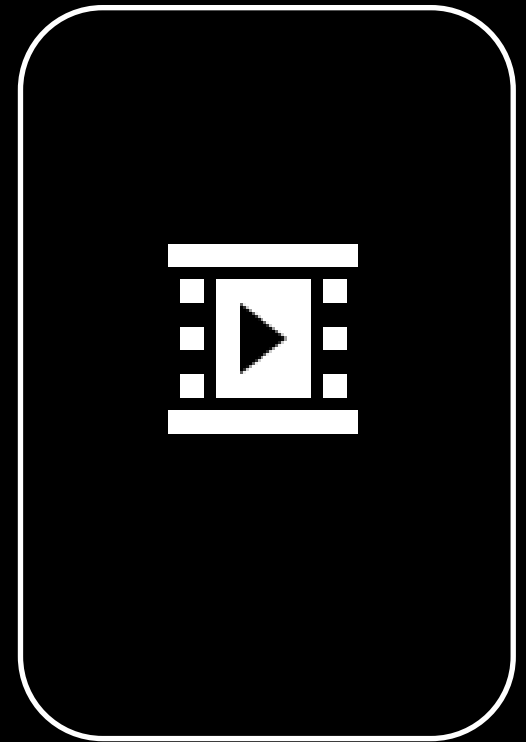
# 4.5G will Keep Evolving and Co-Exist with 5G for a Long Time



# 4.5G LTE-Advanced(Pro) is Now Mainstream Trend



## 4.5G Industry Video



29 4.5G Commercial and Trial Networks (June 2016 )

Over 60 Commercial Networks in 2016

# Take Away

- 4.5G is required before 5G to accommodate fast market and business changing.
- 4.5G is bridging to 5G through 4 aspects: Speed, Experience, Connection and Architecture.
- 4.5G will keep evolving and co-exist with 5G for a long time.

 All in One  
Cloud Architecture

# Thank you

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