



# FiberHome 4G & 5G Mobile Communication Products & Solution

June 2021



**I. Company Introduction**

**II. 4G & 5G Solutions**

**III. 4G & 5G Products**

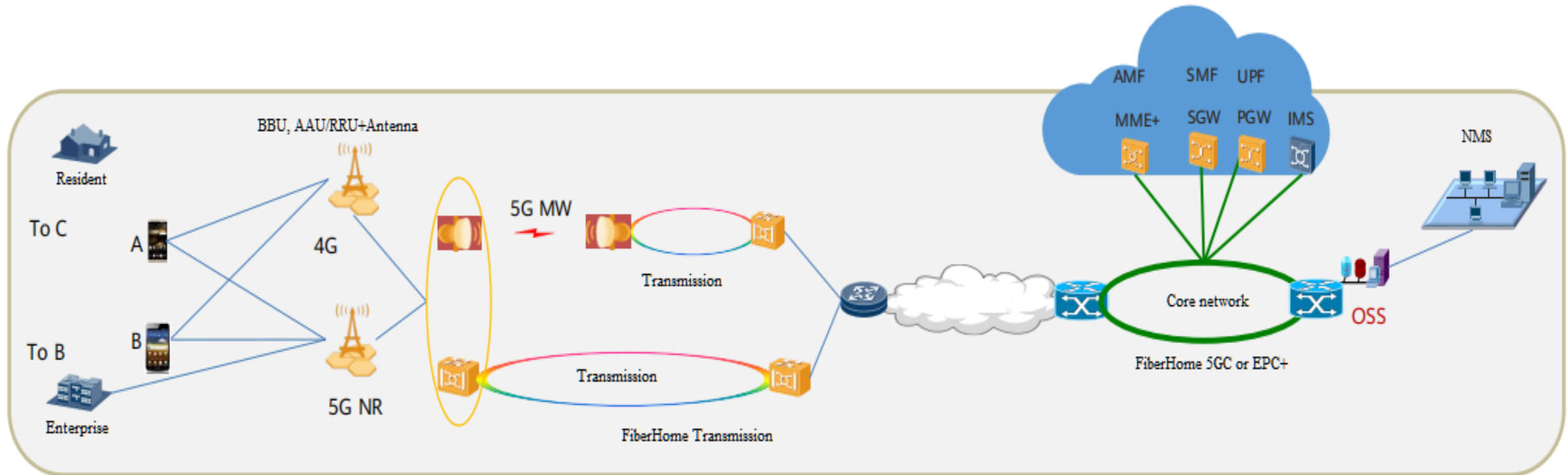
**IV. 5G Products Roadmap**

# ■ Overview of The New Group

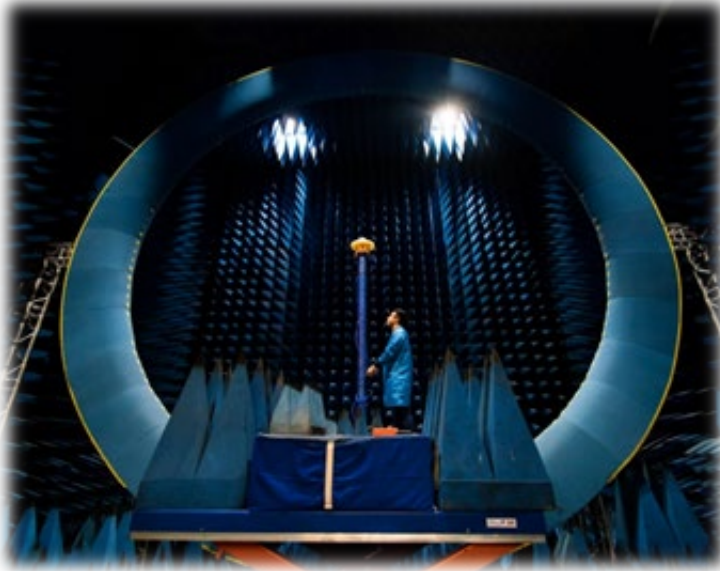


# ■ Mobile Communication solution

FiberHome provides end to end mobile communication solution, including RAN, core network, NMS and relevant products.



# ■ Mobile Communication



## 3G

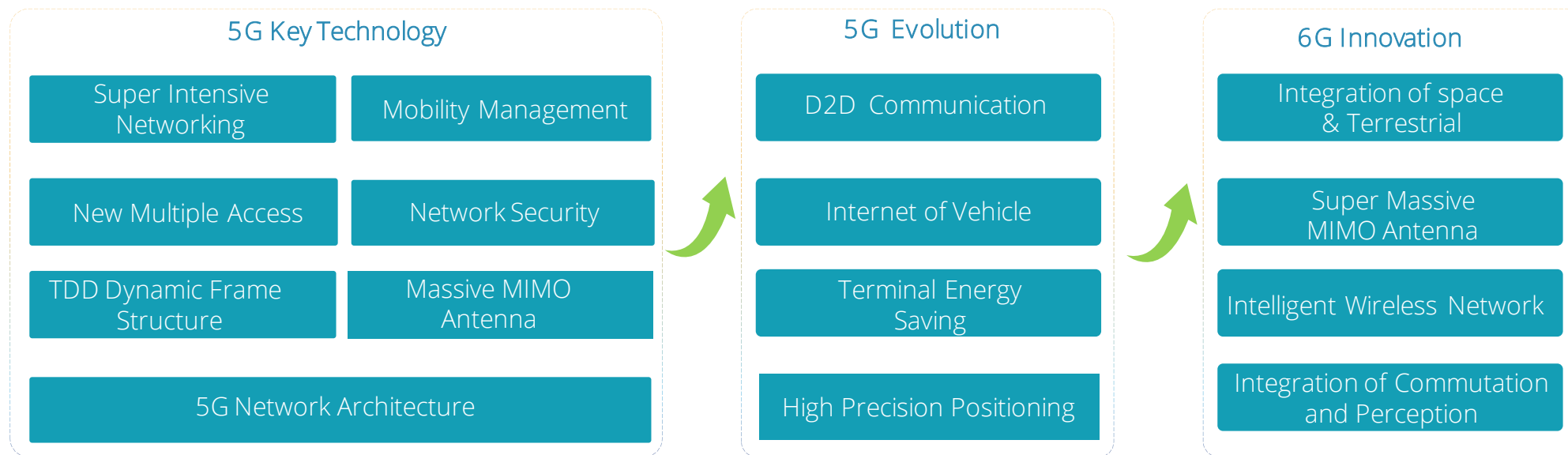
- Proposed TD-SCDMA, one of three 3G standards in 3GPP in 2000
- Largest TD-SCDMA network

## 4G

- Reliable Partner of CM/CU/CT
- Market share:
  - 24** provinces
  - 100** cities
  - 100,000+** eNodeB
  - 100M** subscribers

## 5G

- **7,000** R&D personnel have been devoted to 5G research
- Increasing voice in 5G international standard



Contribute 1400+ 5G Core Patents

Over 9000 5G Standard Proposals

**International Expert Representative**

|                                                     |                                                                                     |                                                     |                                                                                       |                                                      |                                                                                       |                                                      |                                                                                       |
|-----------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Peng Ying</b><br>ITU-R<br>Evaluation<br>Chairman |  | <b>Chen Xiaozhong</b><br>3GPP RAN5<br>Vice Chairman |  | <b>Ai Ming</b><br>3GPP TSG<br>CT<br>Vice<br>Chairman |  | <b>Zhou Wei</b><br>oneM2M<br>WG2<br>Vice<br>Chairman |  |
|-----------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------|

# Market Share of RAN

## Market share in China



### Share of 5G :

**CMCC 5G:** Currently distributing 8 provinces, Future planning 15 provinces (in Phase 3 bidding)

**CT & CU 5G:** Currently distributing 7 provinces, Future planning 14 provinces (in Phase 3 bidding)

### Share of 4G :

- FiberHome has constructed **100,000+** 4G base stations, distributing in the 14 provinces.

## Market share in Global Market



### Share of 4G&5G :

FiberHome relies on overseas branches to provide 4G/5G mobile communication solutions.

- Indonesia:** BAKTI project of the Ministry of Communications of Indonesia, comprising **2,700** stations, including base stations, towers, power supply, transmission network, OSS and so on.
- Malaysia:** TYL 5G RAN project
- Philippines:** SMART, Globe 5G RAN projects

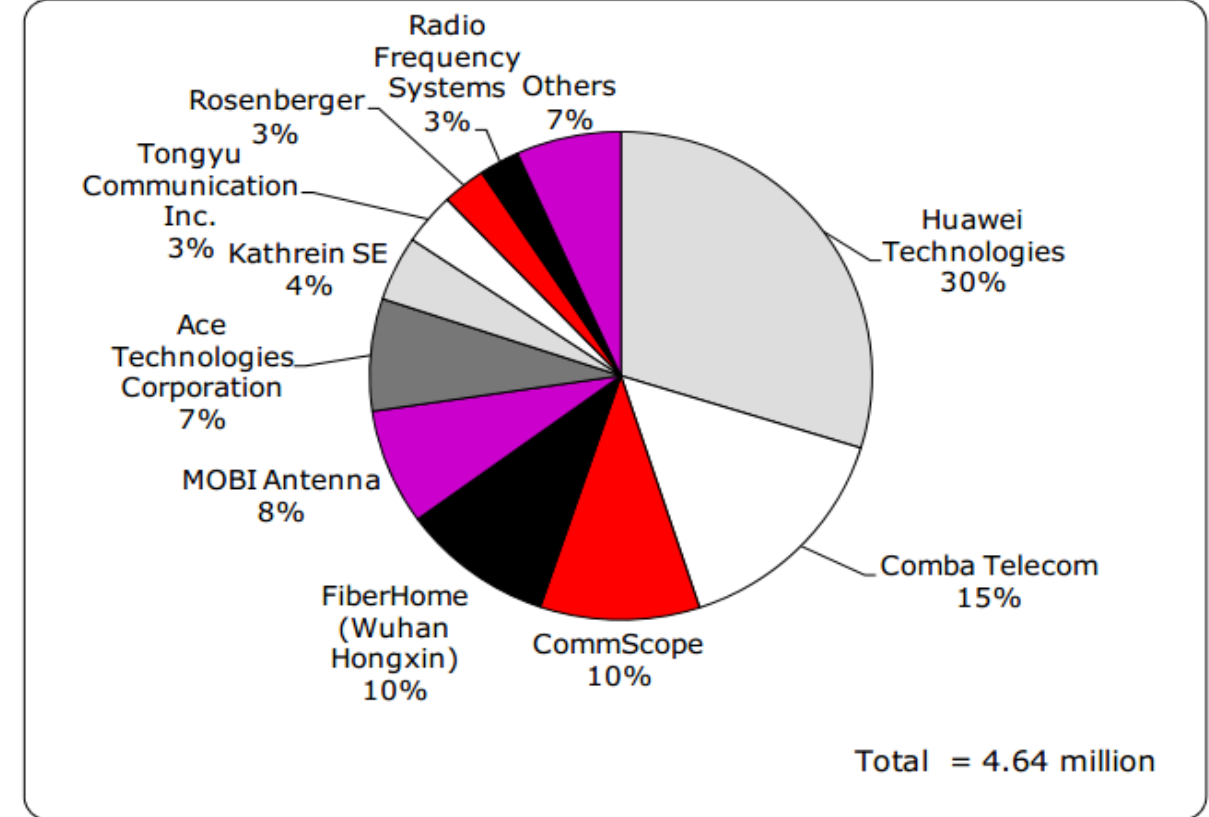
# ■ Antennas Market Share Overview

- In 2018, over **460,000** BTS antennas delivered.
- Chinese market **TOP 2**
- Global market **TOP 4**

## Cooperation Partners



**Exhibit 5: Global Macrocell BTS Antenna Shipment Market Share by Supplier, 2018 (Units)**

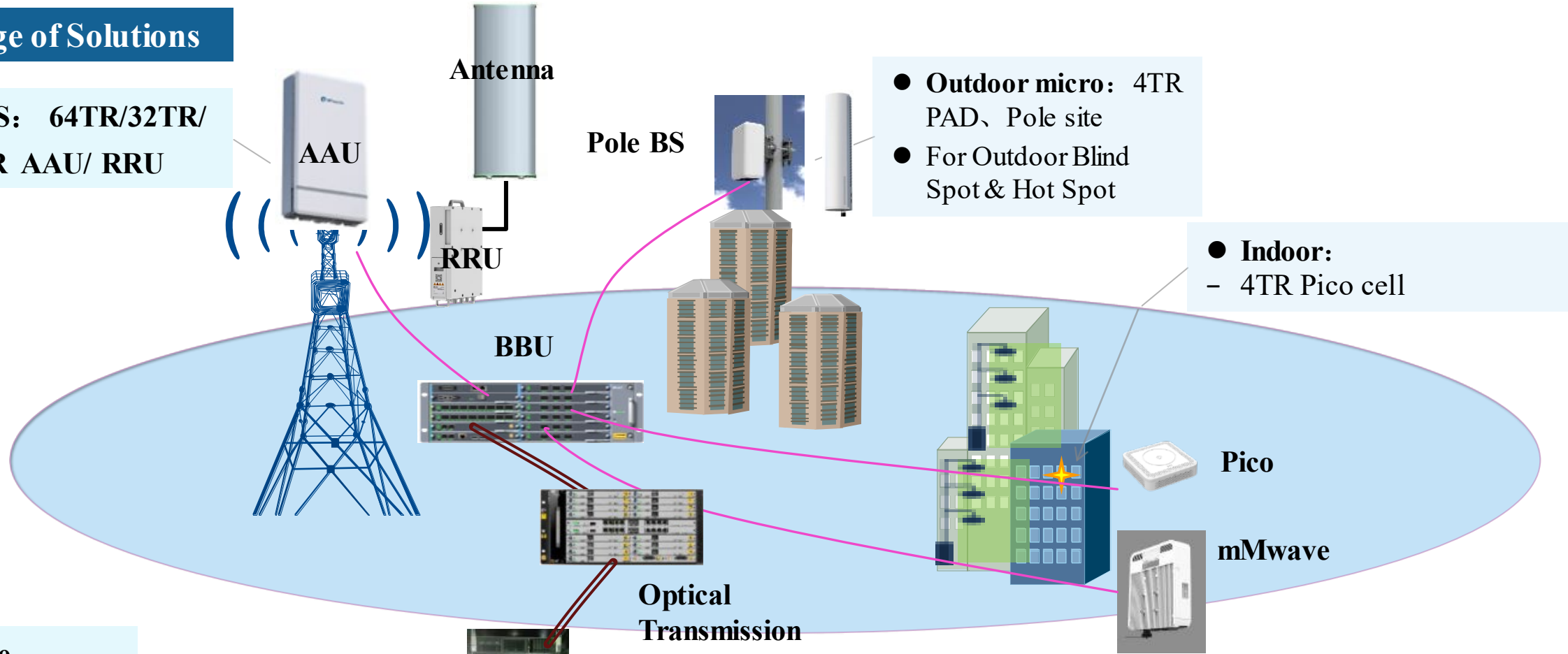


Source: EJI Wireless Research LLC Estimates (October 2019)

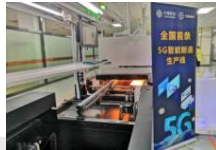
# ■ Experts in 4G & 5G Solutions

## Full Range of Solutions

- **Macro BS:** 64TR/32TR/8TR /4TR AAU/ RRU



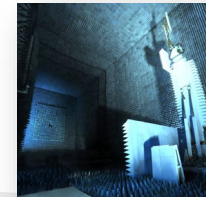
## Enterprise Applications



## Core network



## Test Instruments

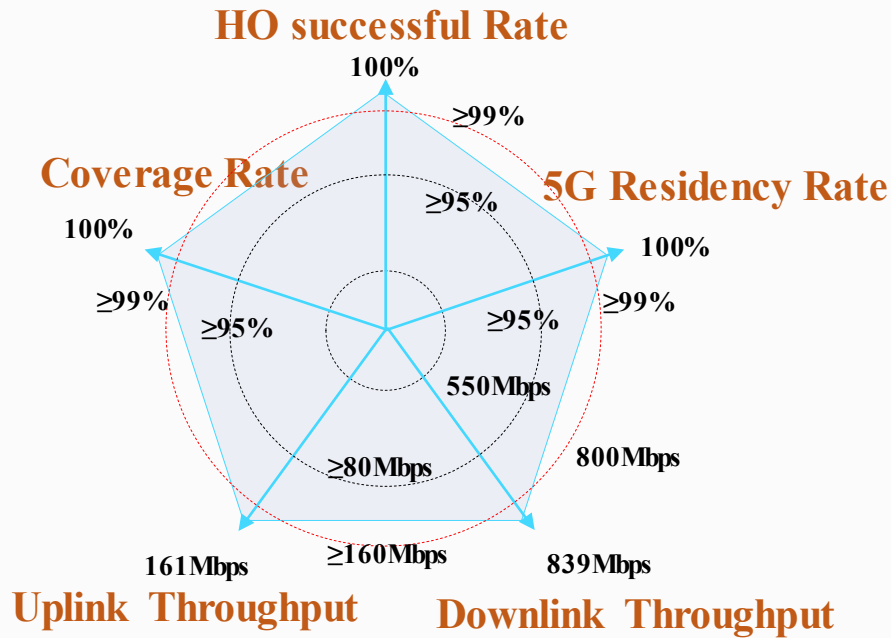


## Planning & Opti. Tool



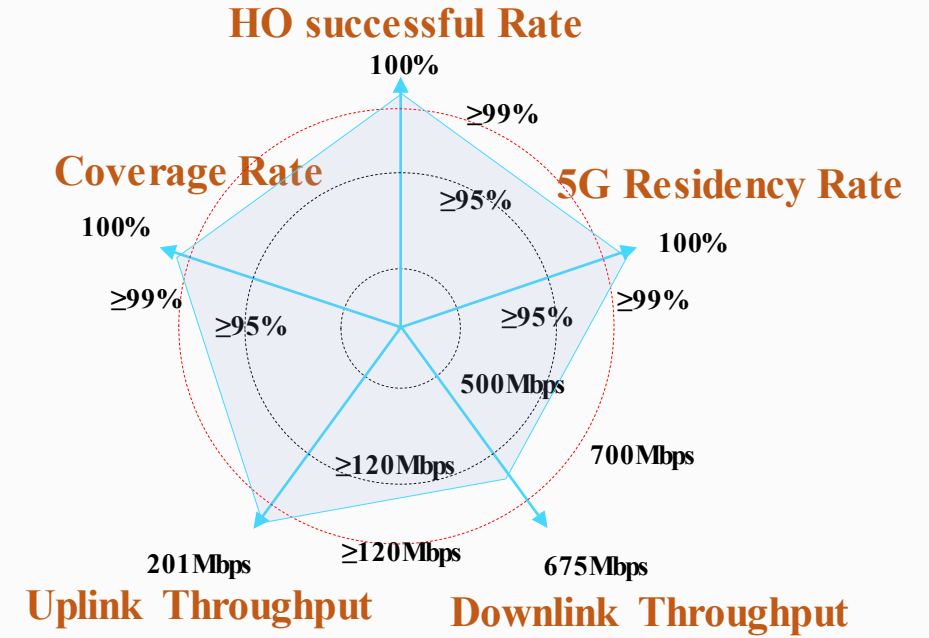
# ■ Build Excellent Network for China Operators

**FiberHome Builds Excellent Network For China Mobile In 8 Provinces**



**Most KPI exceed  
Challenge Value**

**FiberHome Builds Excellent Network For China Unicom & China Telecom In 7 Provinces**



**Stable Throughputs  
Extreme Experience**

## ■ Build Excellent Network for China Operators

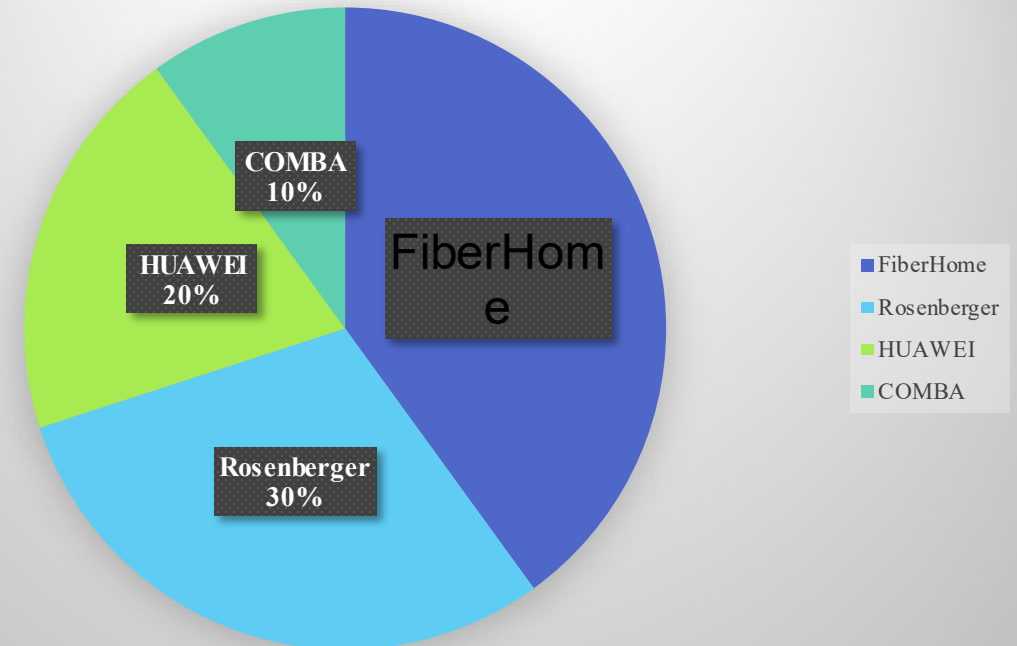
In “China Mobile--- Hybrid Smart Antenna Centralized Procurement 2019” , the quantity of required antenna (4+4+8+8 Convergent Smart Antenna) is around 281.9 thousand PCS , Fiberhome won the 40% share (around 113 k pcs, Rank top 1).

| Customer     | Antenna Type Bid                                                            | Unit | Quantity   |
|--------------|-----------------------------------------------------------------------------|------|------------|
| China Mobile | “ 4+4+8+8” 900 4T4R /1800 4T4R/2100 8T8R/2600 8T8R Convergent Smart Antenna | PCS  | 281,900.00 |

### Announcement of winning bid

<https://b2b.10086.cn/b2b/main/viewNoticeContent.html?noticeBean.id=578992>

Biding share





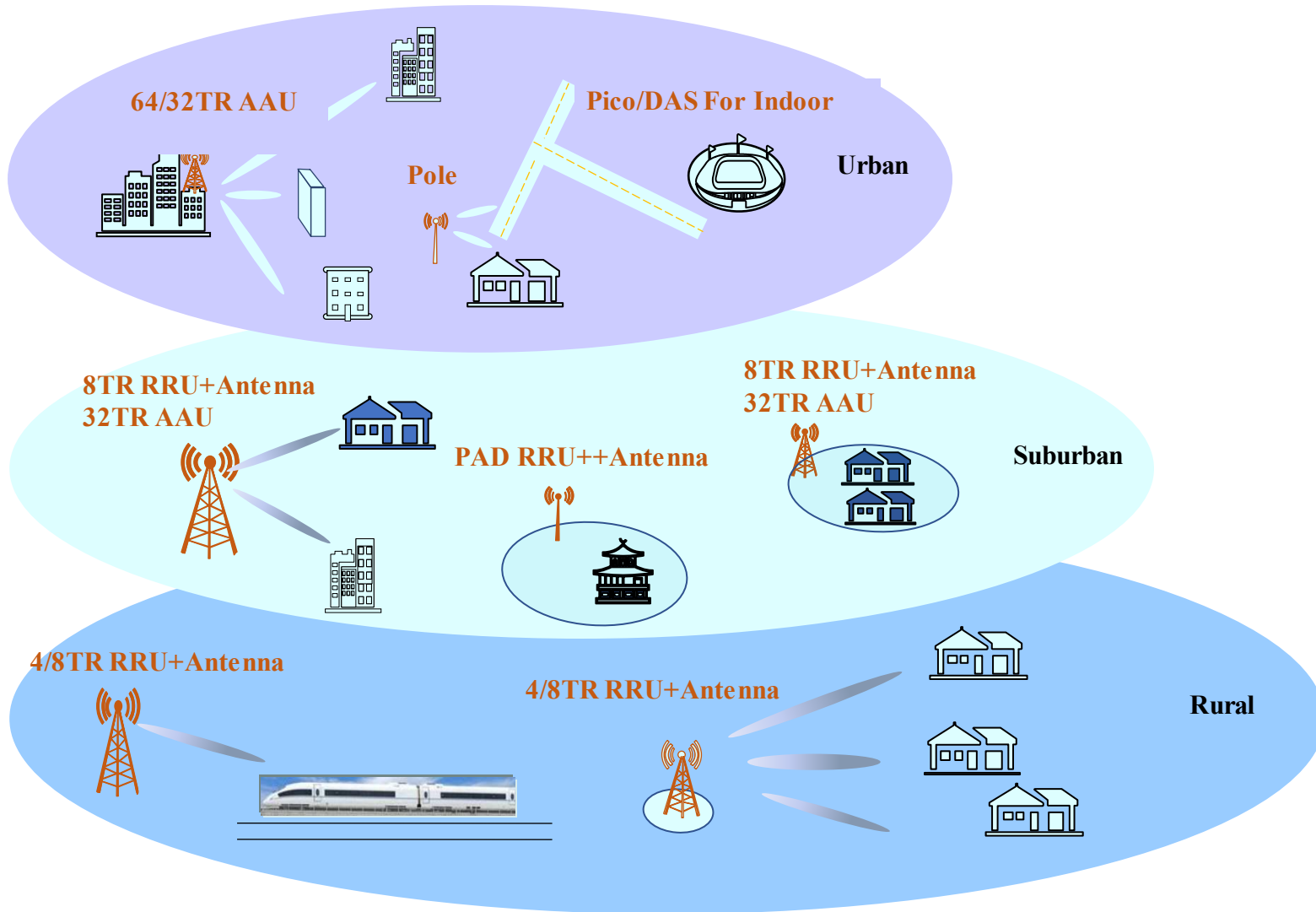
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# ■ 4G/5G Outdoor Coverage Solution



## Outdoor Macro Coverage

- Urban area: **64TR AAU** for high-rise and high capacity scenario. **32TR AAU** for medium-rise buildings.
- Suburban area: **32TR AAU** or **8TR RRU**
- + **Antenna** based on performance and cost.
- Rural area: **8TR/4TR RRU+Antenna** for wide coverage

## Indoor coverage

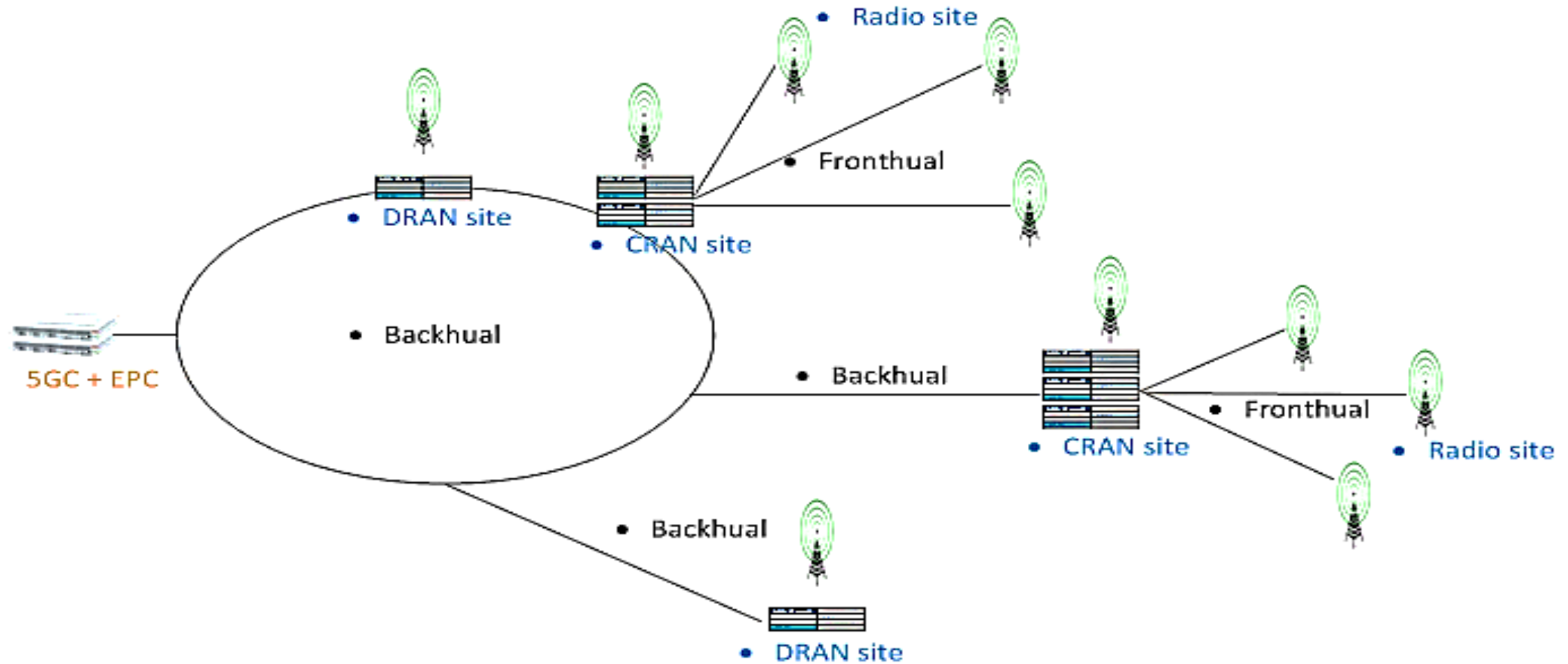
- High-capacity and high-value area; **4TR PICO**.
- Medium or low capacity area: **2TR PICO**

## Micro coverage

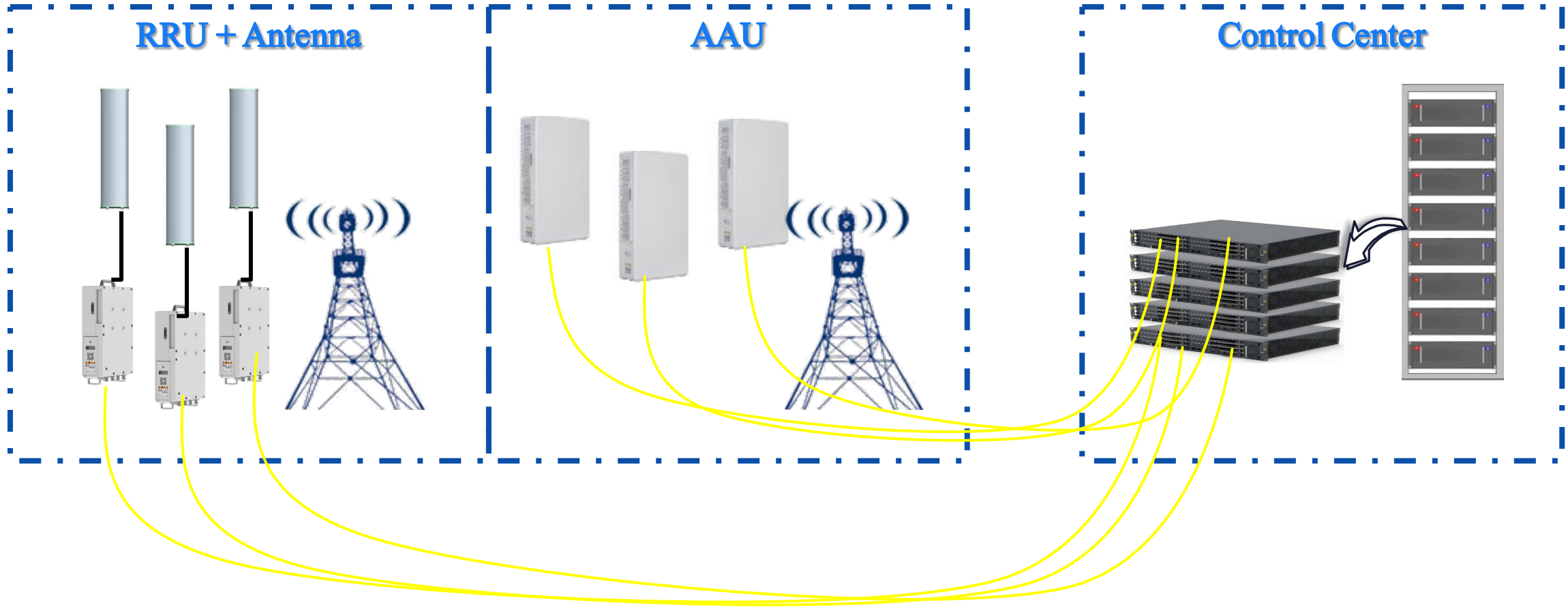
- Hot spots & blind area; **4TR/8TR Micro RRU+Antenna** .

# RAN Solution ---- Outdoor Solution Architecture

- CRAN & DRAN for different scenario requirement

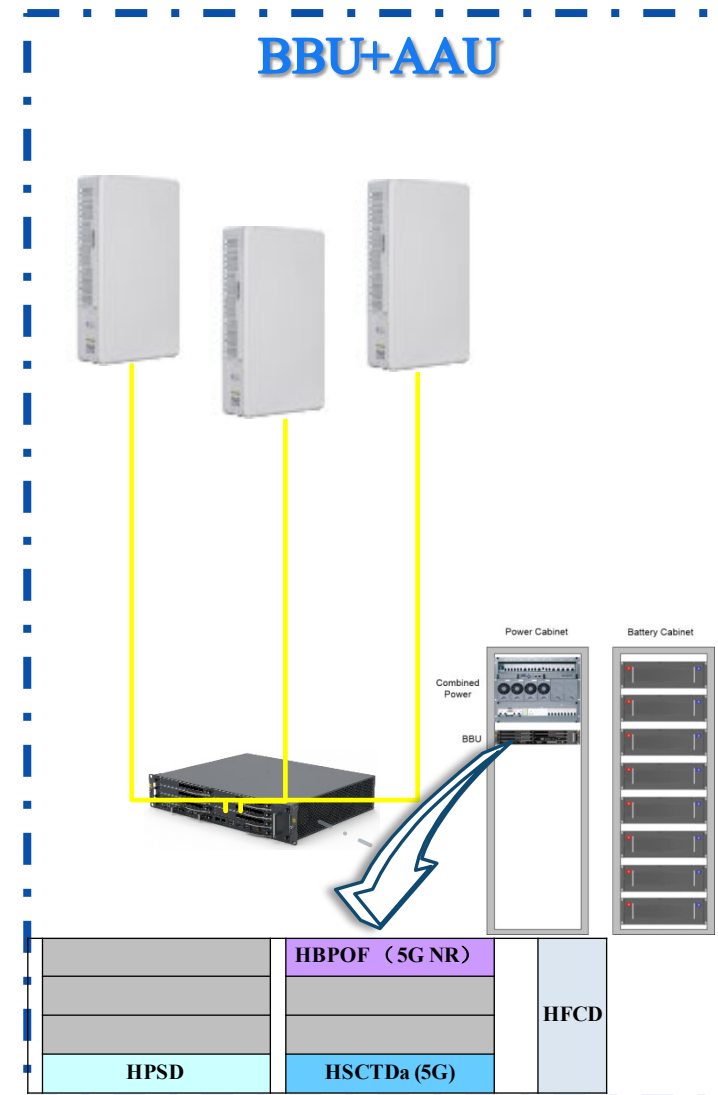
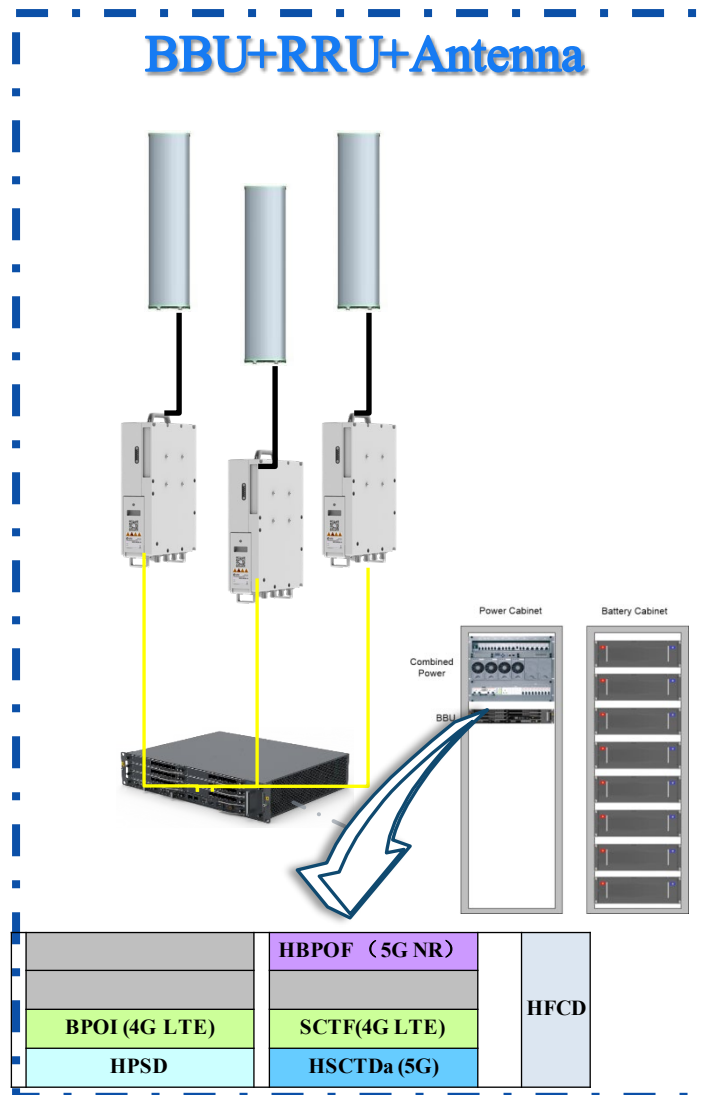


# ■ CRAN Configuration



- **BBU in the subrack can be insert vertically or crosswisely, and vertical deployment is recomended for heat dissipation**
- **Support up to 8 BBUs**

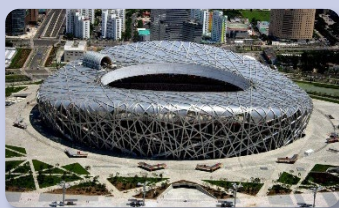
# ■DRAN Configuration



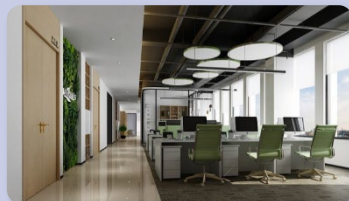
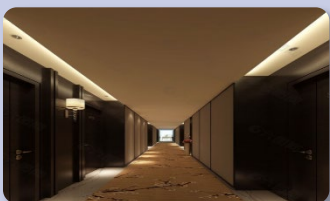
# Indoor Coverage Solution

## Different indoor scenes

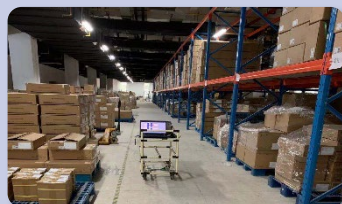
### High Capacity



### Medium capacity



### Low capacity



## Indoor coverage plan

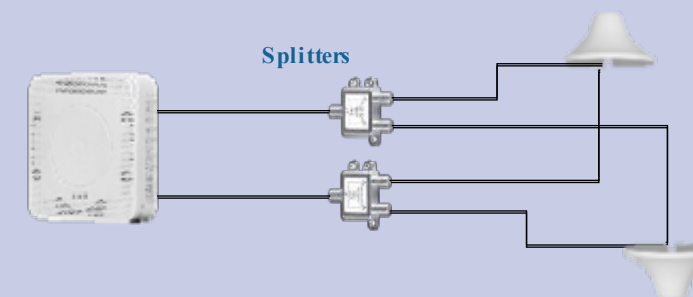
- Single Pico deployment



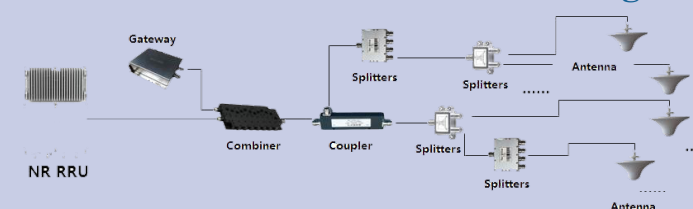
- Pico + shaped antenna



- Pico + DAS Combination networking

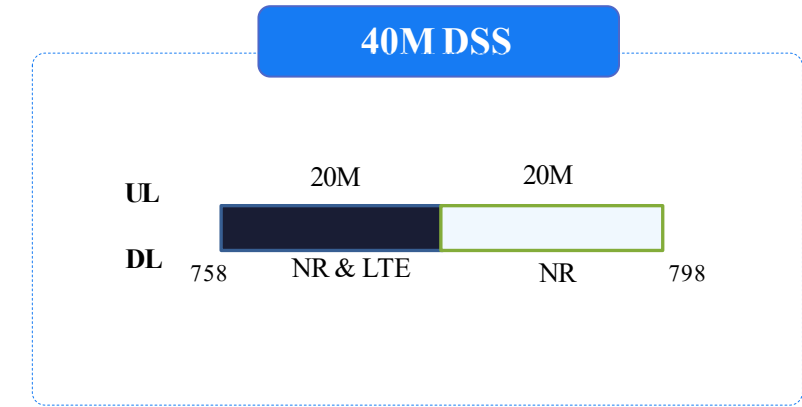
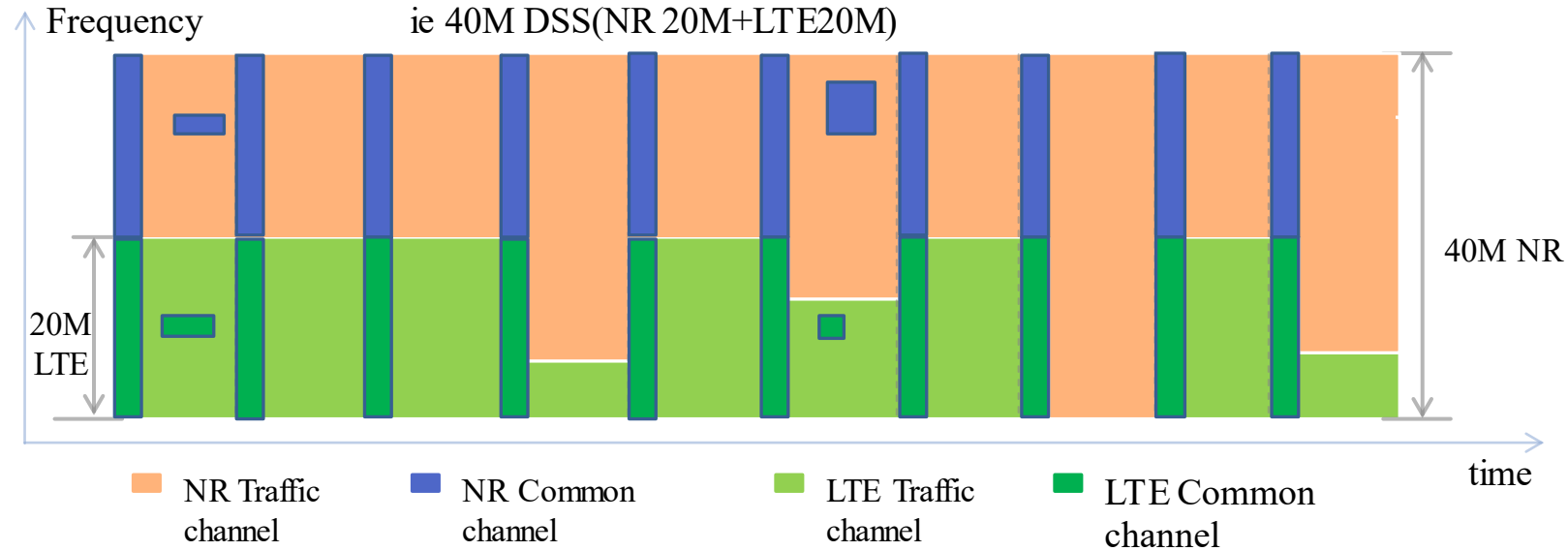


- Traditional Passive Indoor coverage



# RAN Features ---- DSS

DSS technology can improve the Spectrum Efficiency by about 50%. Here take 700MHz as an example.

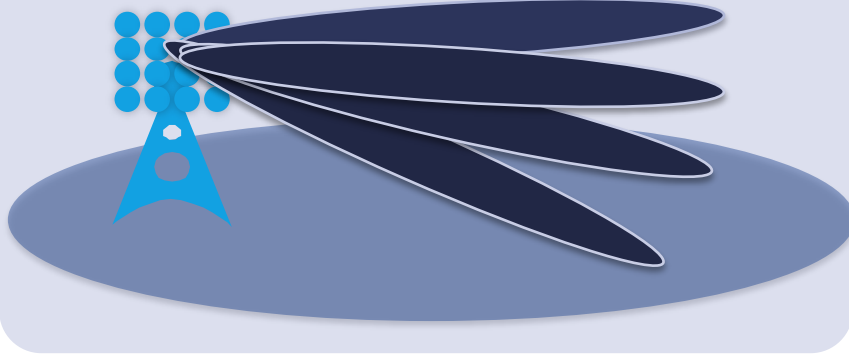


- Both 4G UE and 5G UE can access the 700MHz cell;
- Software allocates 4G resource and 5G resource according to 4G/5G traffic requirement;
- Largely improving UE networking experience due to the excellent coverage of 700MHz;

|                            | 20M NR + 20M LTE                                  | 20M NR + 20M LTE DSS                                  | 40M NR ONLY                                       |
|----------------------------|---------------------------------------------------|-------------------------------------------------------|---------------------------------------------------|
| NR Capacity                | 50%                                               | UL: 92.2%<br>DL: 89%                                  | Base line:100%                                    |
| LTE Capacity               | 20M LTE                                           | Max capacity approximate<br>20M LTE                   | No LTE                                            |
| Advantages & Disadvantages | Simple configuration &<br>Low spectrum efficiency | Compatible NR and LTE,<br>Maximum Spectrum Efficiency | Only 5G<br>unable to compatible<br>existing 4G UE |

# ■ RAN Features ---- Massive MIMO

8 broadcast beam, 9dB gain VS 4G



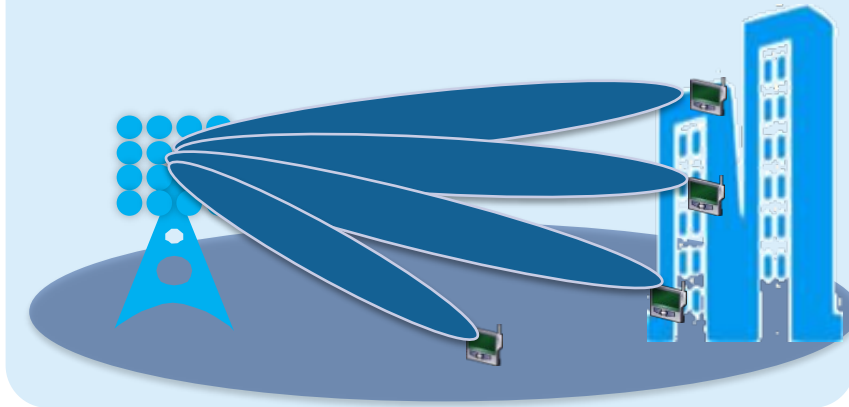
64T64R



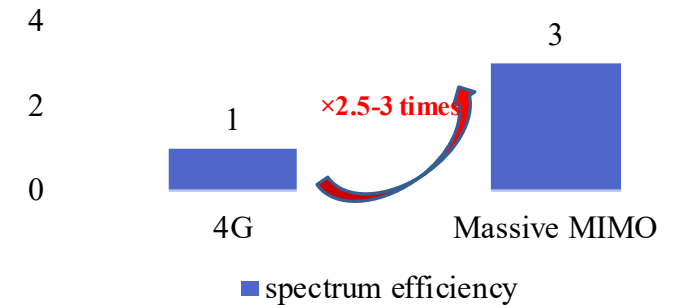
3 arrays on a vertical plane can form a 1 TR Antenna unit

Vertical plane 4TR can realize vertical plane 2-4 beam shape

DL MU-MIMO, 2.5~3 \* 4G Cell Throughput



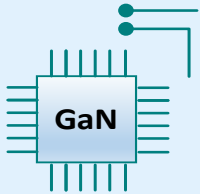
Spectrum efficiency



# ■ RAN Features ----Base Station Energy Saving Solution

## New Material

GaN



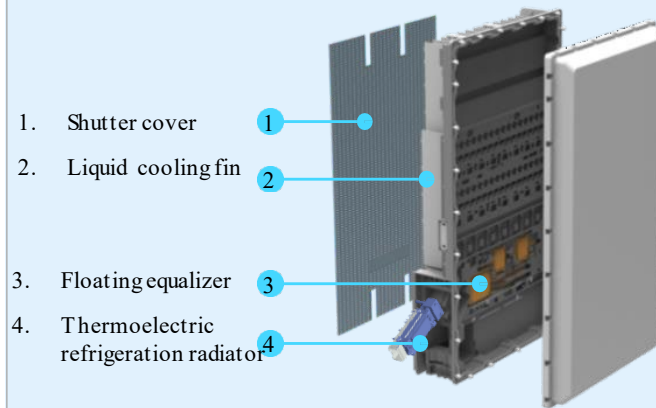
- High power amplifier efficiency (60%)
- Reduce the power consumption by 5%~8%

## New Algorithm

**DPD + CFR Algorithm**

- Decrease the peak to average power ratio
- Improve efficiency by 5%

## New Design



- Reduce device temperature and power consumption
- Reduce the volume and weight of equipment (10%)

## Enhanced Features

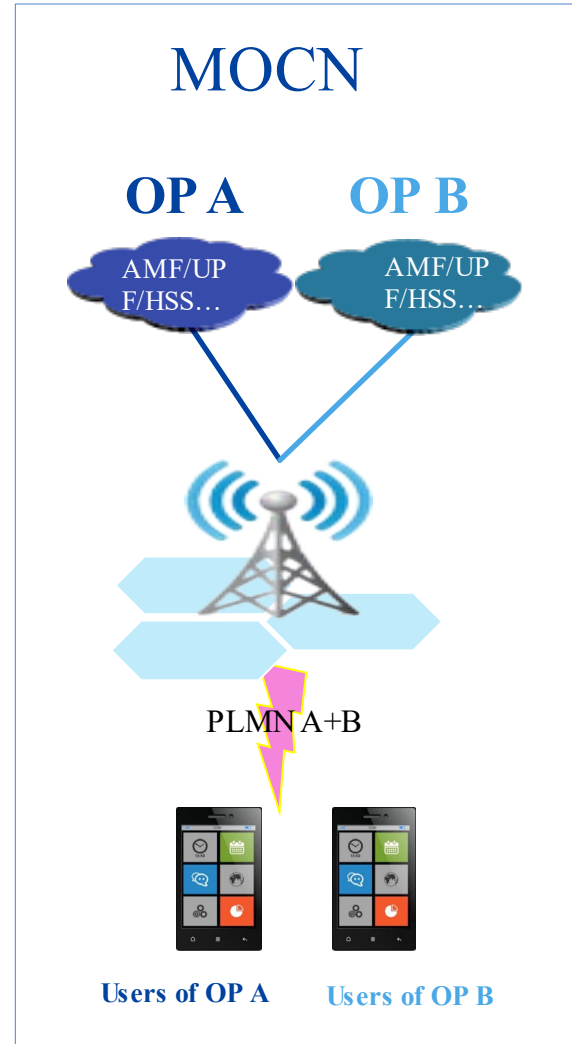
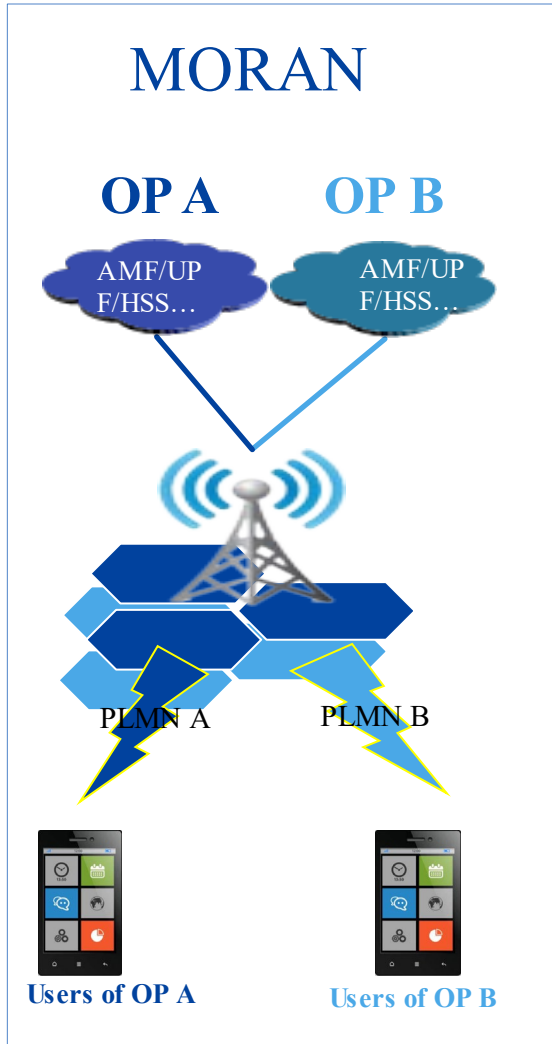
Energy saving features

- Symbol off
- Channel off
- Carrier/Cell cutoff
- Deep sleep
- The electricity fee of BTS reduces by 25%

## Easy Deployment

- C-RAN+Radio Cascade;
- Multimode mixing saves fiber cost
- 35% reduction in Baseband power consumption
- Save 50% room space
- 30% reduction in forward Resources

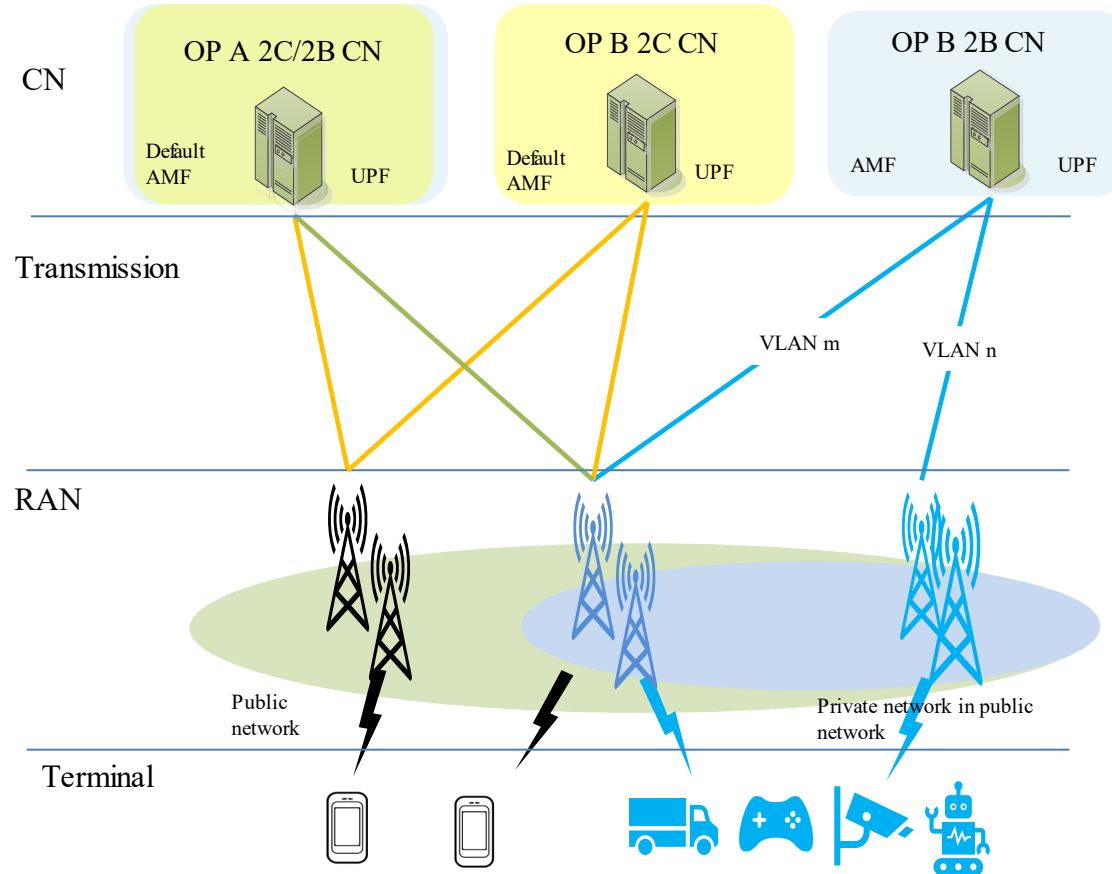
# ■ Network Sharing



|              |                                                                                                                                                       |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MORAN</b> | <ul style="list-style-type: none"> <li>• Independent carriers</li> <li>• Different cell parameters</li> <li>• Different QOS strategies</li> </ul>     |
| <b>MOCN</b>  | <ul style="list-style-type: none"> <li>• Shared carriers</li> <li>• Broadcast multiple PLMNs</li> <li>• QOS strategy need to be negotiated</li> </ul> |

# Network Sharing ---- Slicing

## Slicing Architecture Of Network Sharing



## Slicing Technology Scheme

### Slicing for Independent Carriers

- Completely separating 2B service from 2C service

### Slicing for PRB Resource Reservation

- By configuring the slice threshold with maximum available resource to reduce the impact of 2B service on 2C service

### Slicing for Resource Sharing

- 2B service and 2C service share resources, and the service scheduling priority is determined according to the QoS requirement

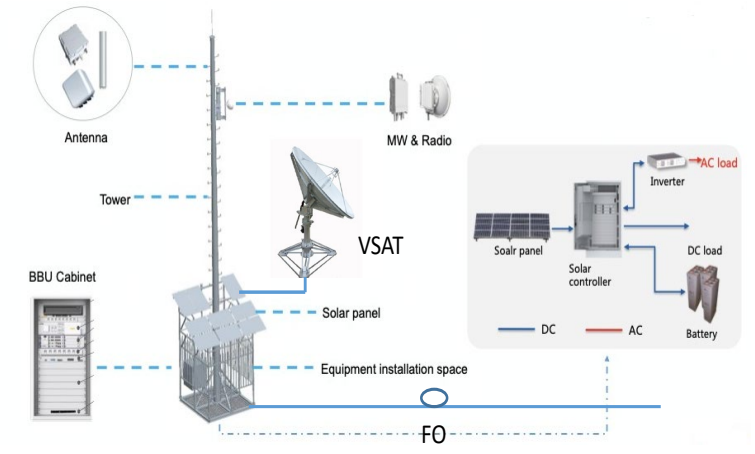
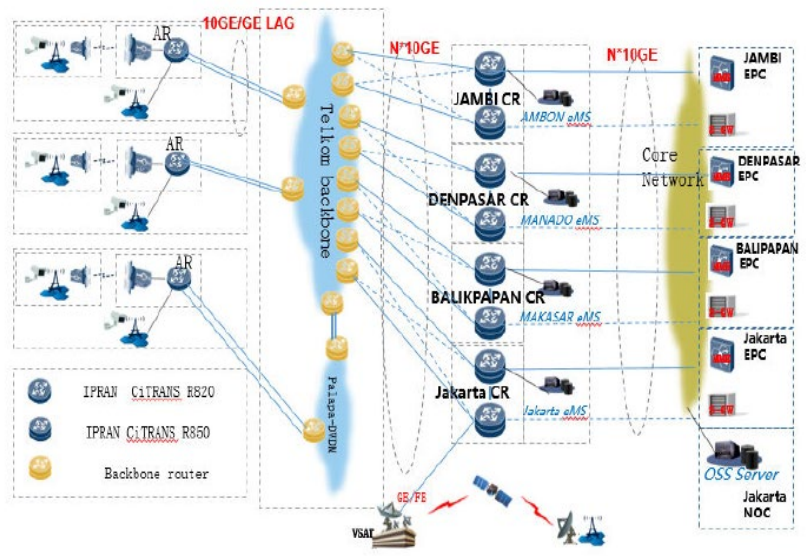
You can choose slicing scheme according to the QoS guarantee and security requirements of 2B service.

# IOT With 5G Core Experience

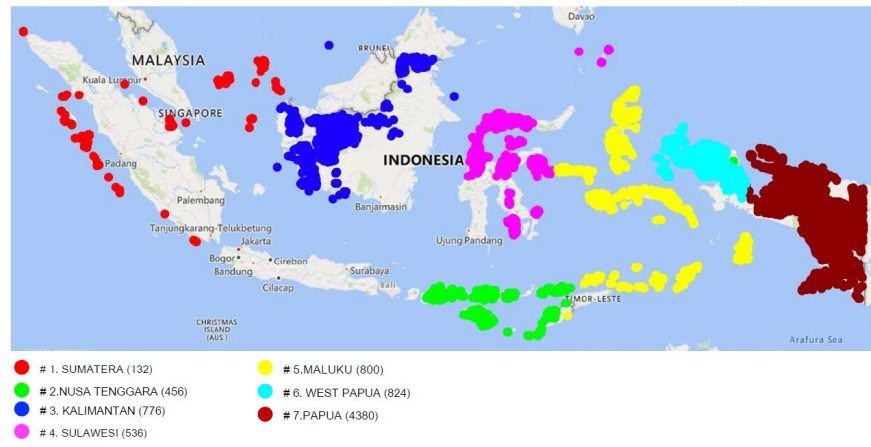
In CMCC / CT / CU 5G Commercial network, FH 5G base stations have already done IOT test with other 5GC vendors.

| Province  | Frequency      | 5G Core             | Neighbors Site (IOT) |
|-----------|----------------|---------------------|----------------------|
| Hu Bei    | 2.1G/2.6G/3.5G | Huawei/ZTE/Ericsson | Huawei               |
| Gan Su    | 700M/2.6G      | Huawei/ZTE          | Huawei/ZTE           |
| Nei Meng  | 3.5G           | Huawei/NOKIA        | Huawei               |
| He nan    | 2.1G/3.5G      | Huawei/ZTE          | ZTE                  |
| Liao ning | 3.5G           | Huawei/ZTE          | Huawei/ZTE           |
| Gui zhou  | 2.6G/3.5G      | Huawei              | Huawei/ZTE           |
| Jiangxi   | 3.5G           | Huawei              | Huawei               |
| Shan Xi   | 2.6G           | Huawei/ZTE          | Huawei/ZTE           |
| Ningxia   | 3.5G           | Huawei/ZTE          | Huawei/ZTE           |

# ■ Case 1: 4G Outdoor Coverage\_Indonesia Universal Service Obligation

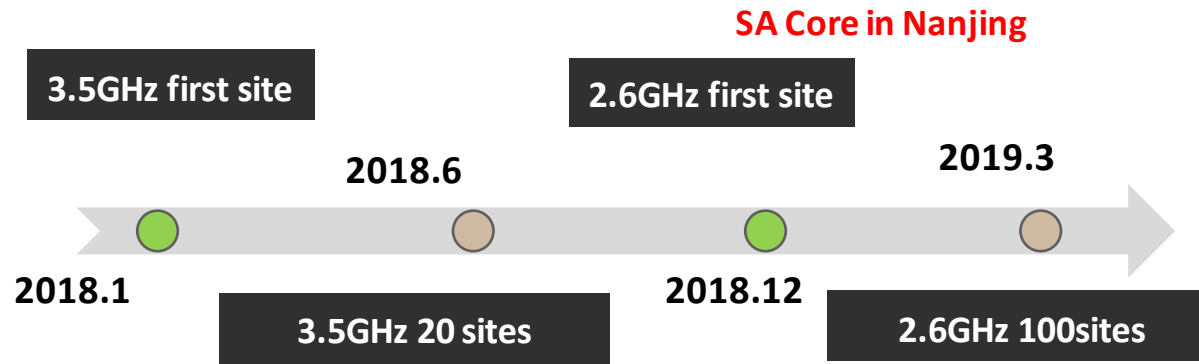


4G, Directional Antenna, Hybrid Power  
Transmission: FO/MW/VSAT



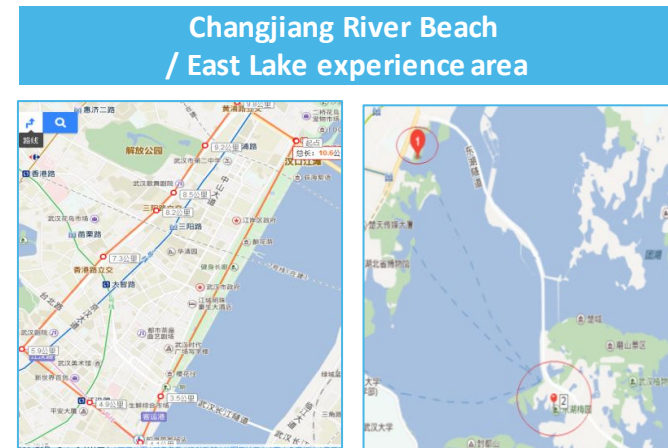
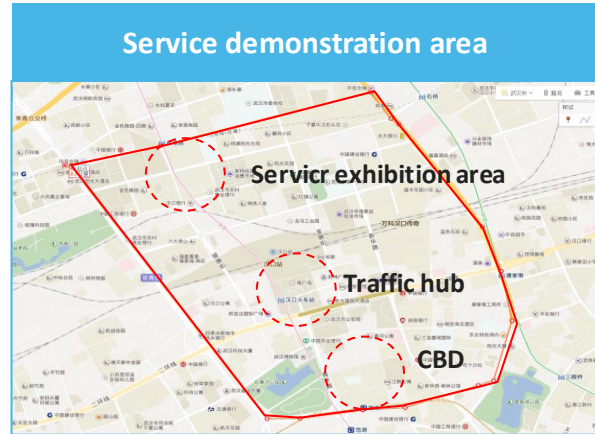
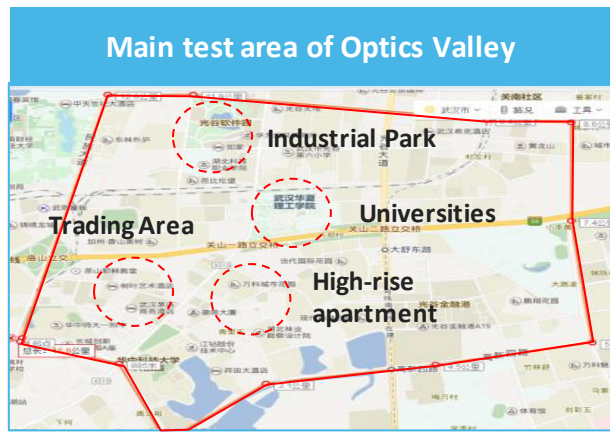
- ✓ National Project led by KOMINFO, 7904 4G sites, 5 bids
- ✓ FH, Telkom, MTD as an alliance
- ✓ FTK 4G LTE outdoor coverage, including eNodeB, tower, power system, MBH(Mobile backhaul), surveillance, OSS, etc
- ✓ IOT with existing 4G core
- ✓ FH won bid 1 & 2, 2700 4G sites, 670M USD

# ■ Case 2: NSA/SA Dual Mode in China

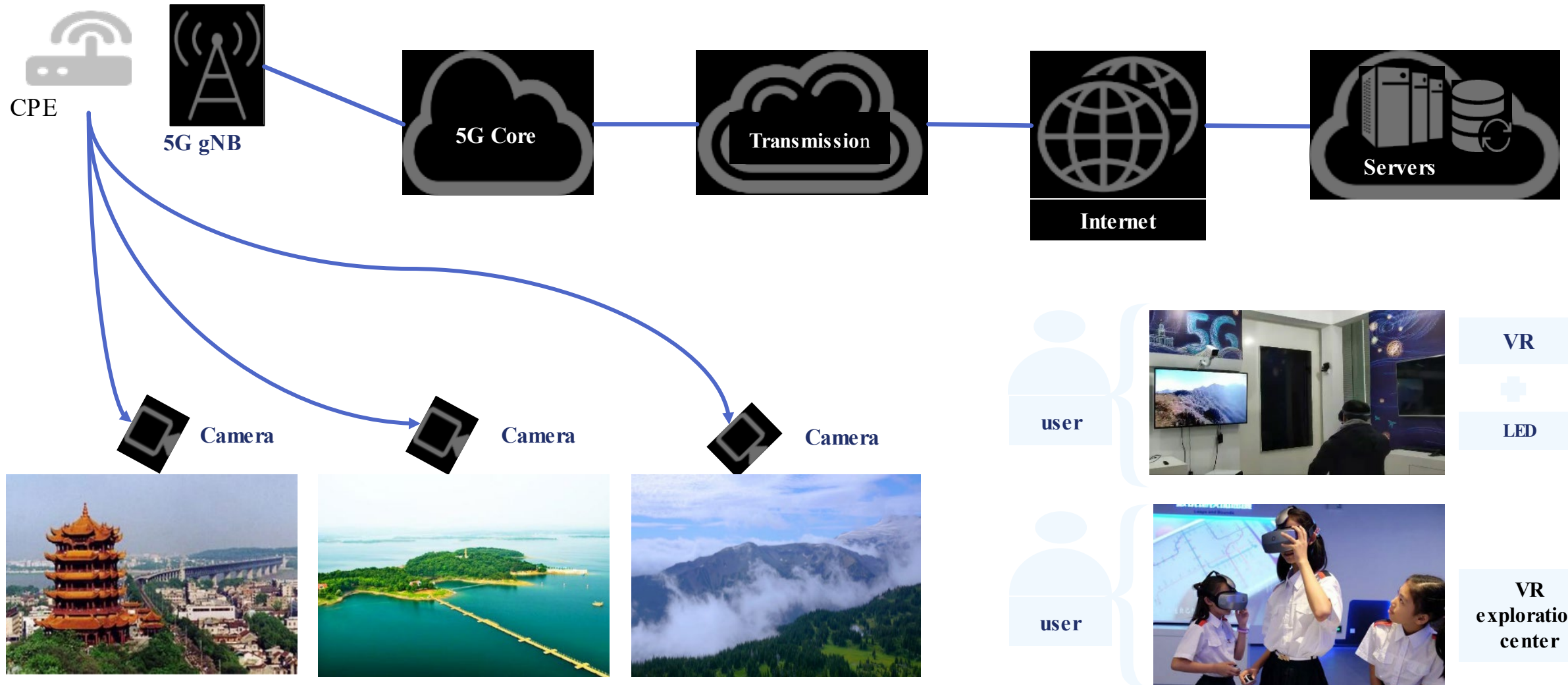


- ◆ 2.6GHz DL throughput 1.7Gbps, UL throughput 190Mbps
- ◆ SA/NSA network performance, NSA performance with 1.9GHz TDD or FDD 1.8GHz as the anchor
- ◆ IOT with qualcomm, Hisilicon terminals
- ◆ 1Gbits service experience at anytime and anywhere, 20 times the 4G network throughput

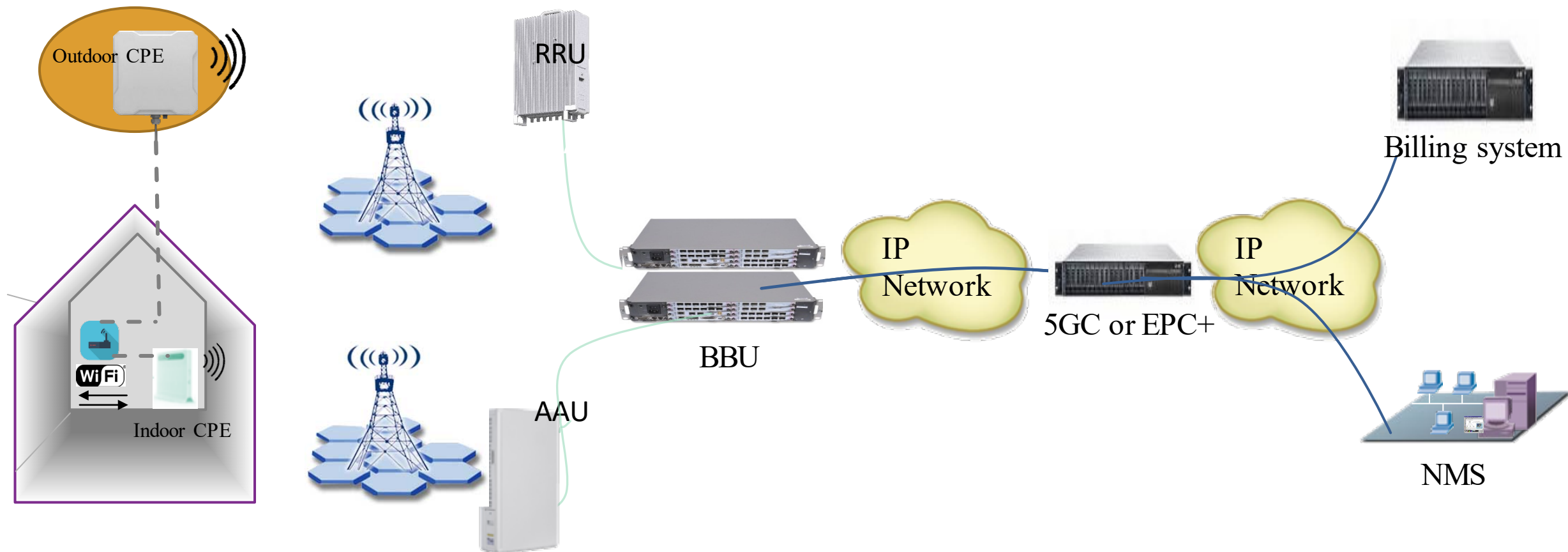
**20** km<sup>2</sup> **3** areas **100** SA base stations **23** NSA base base stations in Wuhan



## ■ Case 3\_ Panoramic live Wu Dang



# ■ Case 4\_ FWA solution



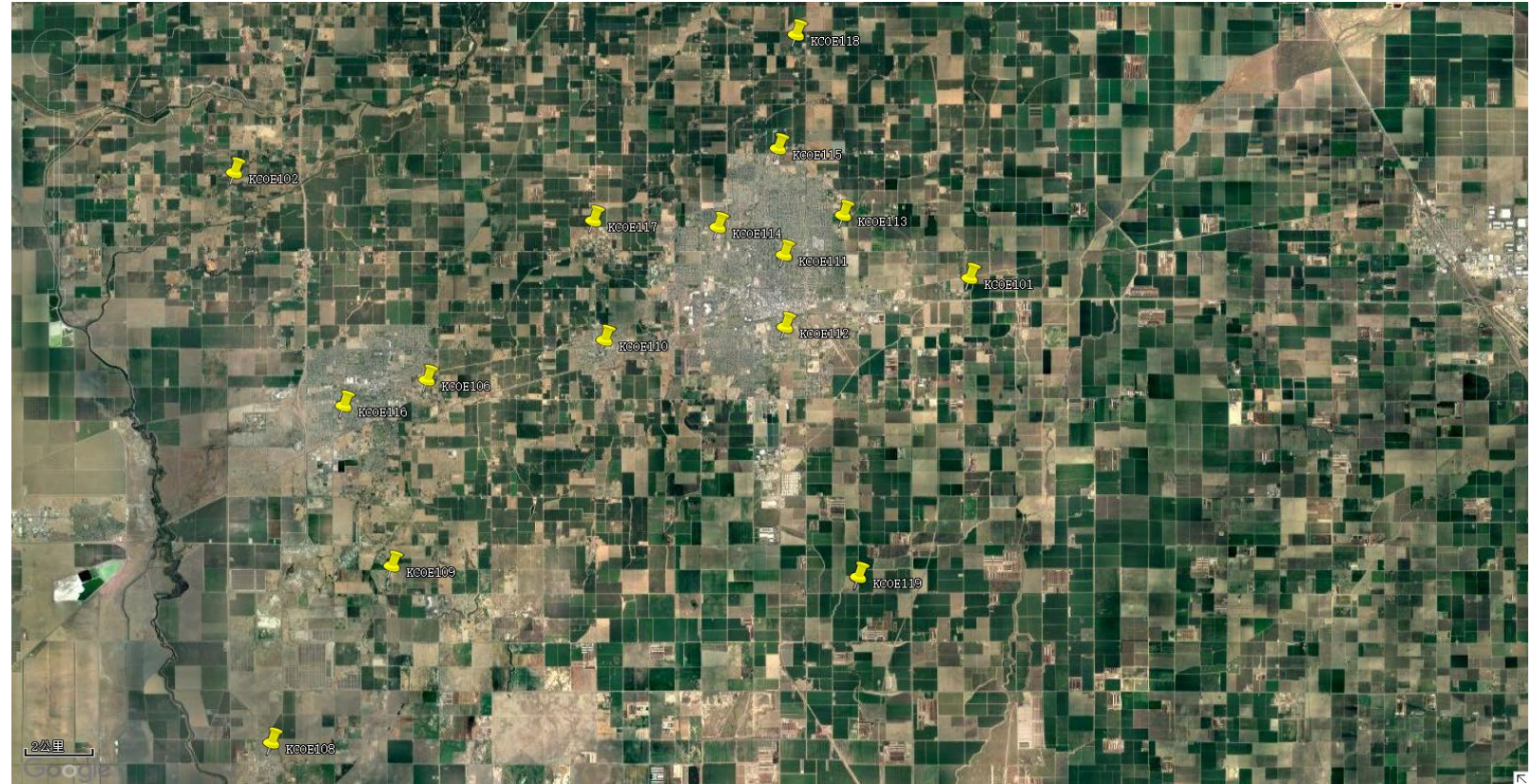
## ■ Case 4\_ FWA solution for “XX ISP\*\*”

Network type: TD-LTE

Numbers of sites: 16

AAU: 64TR 2.6GHz

Serve People: about 10 000

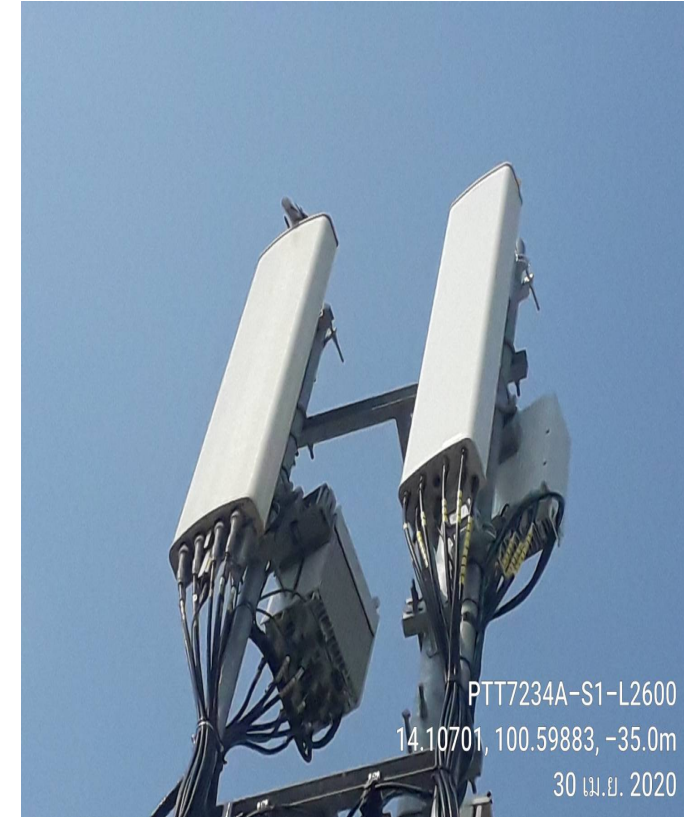


User DL Peak rate: > 90Mbps; UL peak rate: >9Mbps.

## ■ Case 5\_Antenna solution in Thailand



Dual beam Antenna achieve “4T6S” coverage



TDD 8T8R Antenna with Beam forming

## ■ Case 6\_Antenna solution in Malaysia



TDD 2300MHz 8T8R+FDD 850MHz 4T4R converged antenna saves the antenna space, and largely improve the network coverage and capacity.

## ■ Case 7\_Antenna solution in Russia



GSM900+WCDMA2100 +FDD 2300 4T4R converged antenna saves the antenna space, operator's renting cost of pole and easier to O&M.



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# ■ 4G/5G Product 1

## 4G/5G BBU



**EMB5116  
(4G)**



**EBB5326  
(4G Outdoor)**



**EMB6216(4  
G/5G)**

## OMC



**UEM5000 (X86 Universal Server)**

## 5GC



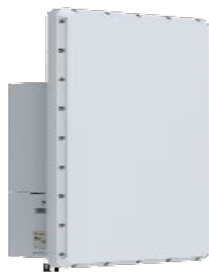
**UCC9500(X86 Universal Server)**

## Outdoor Macro Coverage--AAU

### 2.6G



**2.6GHz64TR  
240W/320W/160M/194M  
4/5G Dual mode**



**2.6GHz32TR  
320W/160M  
4/5G Dual mode**

### 3.5G



**3.5GHz64TR  
200M/320W/240W  
5G NR**



**3.5GHz32TR  
200W/320W  
5G NR**

### 4.9G

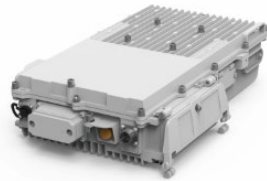


**4.9GHz64TR  
200W/100M  
5G NR**

# ■ 4G/5G BBU--EMB5116/EBB5326/EMB6216



**EMB5116(4G)**



**EBB5326(4G Outdoor)**



**EMB6216(4G/5G Dual Mode)**

| Product Model            | EMB5116                                              | EBB5326         | EMB6216                  |
|--------------------------|------------------------------------------------------|-----------------|--------------------------|
| Dimension                | 88×483×310mm                                         | 440x280x100mm   | 88x440x360 mm            |
| Weight (Max)             | 10Kg                                                 | 12Kg            | 18Kg                     |
| Power Consumption(max)   | 450W (S111)                                          | 110W (S111)     | 350W (S111)              |
| Capacity(carrier-sector) | 36*20MHz                                             | 6*20MHz         | 36×100M 64TR             |
| Mode                     | TD-LTE&LTE FDD                                       | TD-LTE &LTE FDD | NR&TD-LTE&LTE FDD&NB-IoT |
| Ir Interface             | 6*6*10G                                              | 6*10G           | 6*6*10G/25G              |
| Synchronization method   | Beidou/GPS/1588v2                                    |                 |                          |
| Power Supply             | -48V DC (-57V ~ -40V)<br>220V AC (140V ~ 300V)       |                 |                          |
| Temperature environment  | Long-term: -5°C ~ +55°C<br>Short-term: -20°C ~ +70°C |                 |                          |
| Humidity environment     | Long-term: 15%~85%<br>Short-term: 5%~95%             |                 |                          |
| MTBF                     | ≥200,000 Hours                                       |                 |                          |
| MTTR                     | ≤0.5 Hour                                            |                 |                          |

# ■ 4G/5G OMC-UEM5000



(a) single server OMC



(b) multi servers OMC

| Parameter name          | Parameter information                                        |
|-------------------------|--------------------------------------------------------------|
| Dimension(mm)           | 600(W)×1000(D)×2000(H)                                       |
| Power Supply            | AC/DC                                                        |
| Capability<br>(gNB/eNB) | single server case: 100 ;<br>multi servers case: 70000(max); |

## Features:

- 1、X86 Architecture;
- 2、Support cloud deployment;
- 3、Co-manage 4/5G base stations;
- 4、Large network management capability
  - A capacity of 20W carriers;
  - Flexible expansion ,by increaseing servers and array disks without downtime.
- 5、Microservice architecture, flexible function expansion and convenient upgrade
- 6、High reliability: 99.999%
  - Distributed architecture improves reliability;
  - Keep system stable and reliable,by monitoring the software and hardware environment.

Configure

performance

Alarm

Topology

SouthBound

NorthBound

Security

License

Microservice

# ■ 5G CoreNetwork-UCC9500

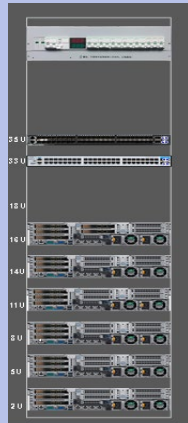
## UCC9500-I

- 5GC with lightweight;
- Quick to deploy;
- Easy to operate;
- Convenient to maintain.



## UCC9500-VI

- 5GC with standard rack;
- Full functionality;
- Edge calculation enhancement,
- UPF sink deployment;
- Flexible expansion.



| Product Model     | UCC95000-I                                    | UCC9500-VI      |
|-------------------|-----------------------------------------------|-----------------|
| Capacity(users)   | 10K                                           | 100K            |
| gNB number        | 500                                           | 2000            |
| Demention         | 2U                                            | 2200×600×1000mm |
| Throughput        | 10Gbps                                        | 40Gbps          |
| Interface         | GE/10GE                                       | 10GE/40GE       |
| Power Supply      | AC220V/DC-48V                                 | AC220V/DC-48V   |
| Power Consumption | 350W                                          | 2550W           |
| Envirement        | Temperature: -40℃ ~+85℃<br>Humidity: 5% ~ 95% |                 |

# ■ 4G/5G Product 2- 4G/5G dual Mode RRU

## Outdoor Marco Coverage--RRU

**700M**



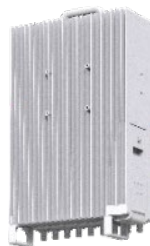
700MHz 4TR  
40M/4×60W  
4/5G Dual mode

**2.1G**



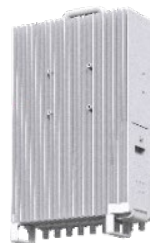
2.1GHz 4TR  
55M/240W/320W  
4/5G Dual mode

**2.3G**



2.3GHz 8TR  
320W/100M  
4/5G Dual mode

**2.6G**



2.6GHz 8TR  
320W/160M  
4/5G Dual mode

**3.5G**



3.5GHz 4TR/8TR  
200M/320W  
5G NR

## Outdoor Mirco Coverage

**2.6G**



2.6+1.8GHz 4TR/100W  
160M+25M  
Triple mode

2.6GHz  
4TR/80W  
160M  
Dual mode

## Indoor coverage

**3.5G**



1.8+2.1+3.5GHz  
100M/4×250mW

1.8+2.1+3.5GHz  
200M/4×500mW

**2.6G**



2.6+1.8+2.3GHz  
4TR/160M+25M+50M

2.6+1.8GHz  
4TR/2TR/160M+25M

2.6GHz  
4TR/2TR/160M



2.6GHz  
2TR/200W/160M



# 4G/5G Product Portfolio 3---4G RRU

**FDD**

**1.8G**



**2T4R**  
**FDRU3424B03**

- UL1710-1785MHz, DL1805-1880MHz
- 25MHz
- 2\*60W
- 14kg/12L



**4T4R**  
**FDRU344B03-U**

- UL1730-1785MHz, DL1825-1880MHz
- 40MHz
- 4\*50W
- 20kg/20L

**2.1G**



**4T4R**  
**FDRU344 B01**

- UL1920-1980MHz, DL 2110-2170MHz
- 40MHz
- 4\*50W
- 20kg/20L

**850M&900M**



**2T4R**  
**FDRU3424B26**

- UL 814MHz-849MHz
- DL 859MHz-894MHz
- 35MHz
- 2\*80W 20kg/20L



**2T2R**  
**FDRU342B08**

- UL 885MHz-915MHz
- DL 930MHz-950MHz
- 20MHz
- 2\*60W 15kg/14L



**2T4R**  
**FDRU3424B08**

- UL 885MHz-915MHz,
- DL 930MHz-960MHz
- 20MHz
- 2\*80W 20kg/19L



**2T4R**  
**FDRU3424B28**

- UL 703MHz-748MHz, DL 758MHz-803MHz
- 20MHz
- 2\*60W
- 15kg/14L

**700M**

**2.6G**



**TDRU358D-P**  
**8T8R**

- 2575-2675MHz
- 60M
- 8\*20W
- 18kg 18L



**TDRU342D**  
**2T2R**

- 2575-2635MHz
- 60M
- 2\*60W
- 15kg 15L



**TDRU348FA 85A30**  
**8T8R**

- 1885~1915/2010~2025MHz
- 30/15M
- 8\*20W
- 25kg 25L



**TDRU342FA 85A30**  
**2T2R**

- 1885~1915/2010~2025
- 30/15M
- 2\*40W
- 15kg 15L



**TDRU341FAE**  
**1T1R**

- 2575~2635MHz,
- 60M,1\*50W
- 1885~1915/2010~2025
- 30/15M
- 1\*24W 12kg 15L



**TDRU342E**  
**2T2R**

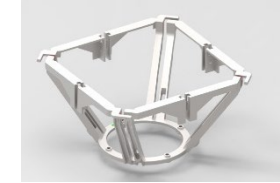
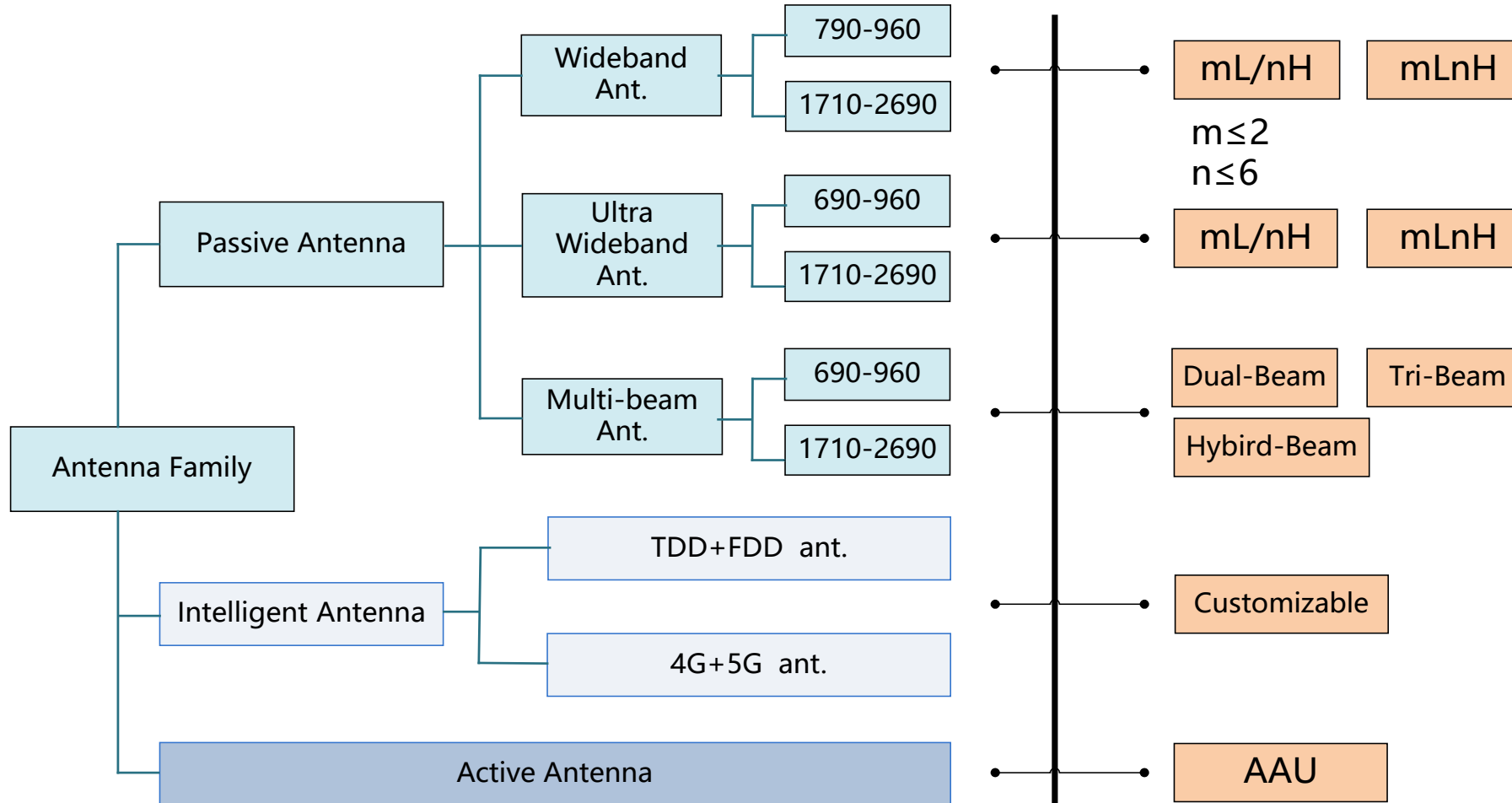
- 2320~2370MHz
- 50M
- 2\*50W
- 12kg 15L

**2.3G**

**TDD**

**1.9G&2.0G**

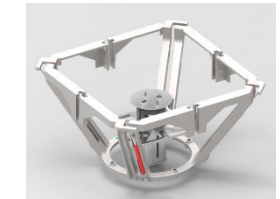
# 4G/5G Product Portfolio 4 ----Antenna



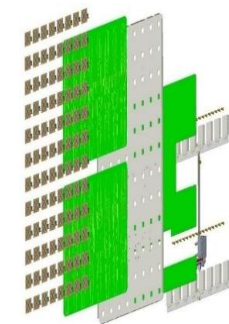
690-960MHz



1710-2690MHz



690-960/1710-2690MHz



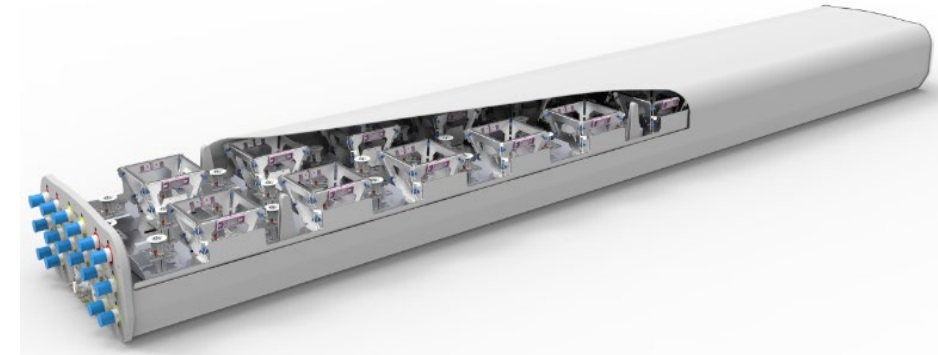
2.6GHz/3.5G/4.9G

**All series antenna are customized based on customer's demands.**

## ■ Products of Passive Antenna---nLmH Antenna



2\*698-960 MHz/ 6 \*1695-2690MHz  
17/18dBi  
65°/65°  
2-12°/2-12°



### Features:

- ◆ One Antenna can support FDD700/850/900/1800/2100/2600 TDD2600 system
- ◆ Built-in pluggable RET, independently adjustable
- ◆ Multiport design (4.3-10\* 16)
- ◆ Smaller size, lighter weight

# ■ Products of Passive Antenna---Multi Beam Antenna

## Dual-Beam Antenna



4\*1710-2690MHz  
 19/19/19/19dBi  
 33°/33°/33°/33°  
 2-12°/2-12°/2-12°/2-12°

## Hybrid-beam antenna

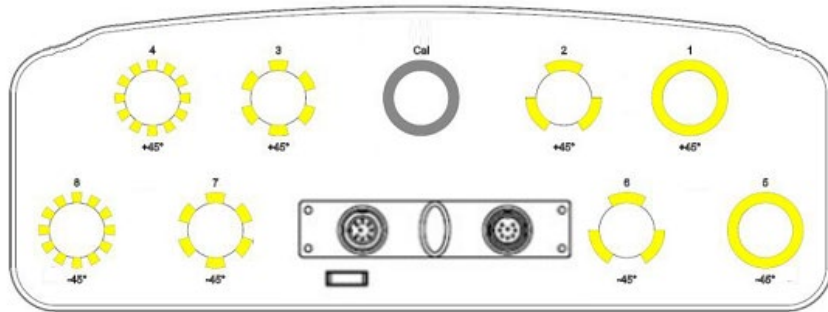


2\*690-960MHz / 4\*1710-2690 MHz  
 14/18/18dBi  
 65°/65° /32° /32° /32° /32°  
 2-12°/2-12°

3 set Dual-beam antennas are installed in one site to reach 6 sector's coverage.

# ■ Products of Passive Antenna---Intelligent antenna

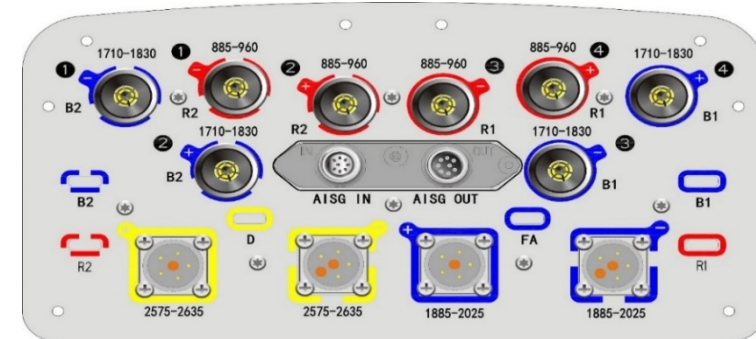
**TDD 8T8R Antenna**



**1710-2690Mhz**

**Beam forming function**

**TDD + FDD Converged Antenna**



**“ 4+4+8+8”**

**FDD: 900MHz 4T4R+1800MHz 4T4R**

**TDD: 2100MHz 8T8R+2600MHz 8T8R**

**“Intelligent”:** adopting Beam-forming to realize soft splitting & improve the network capacity



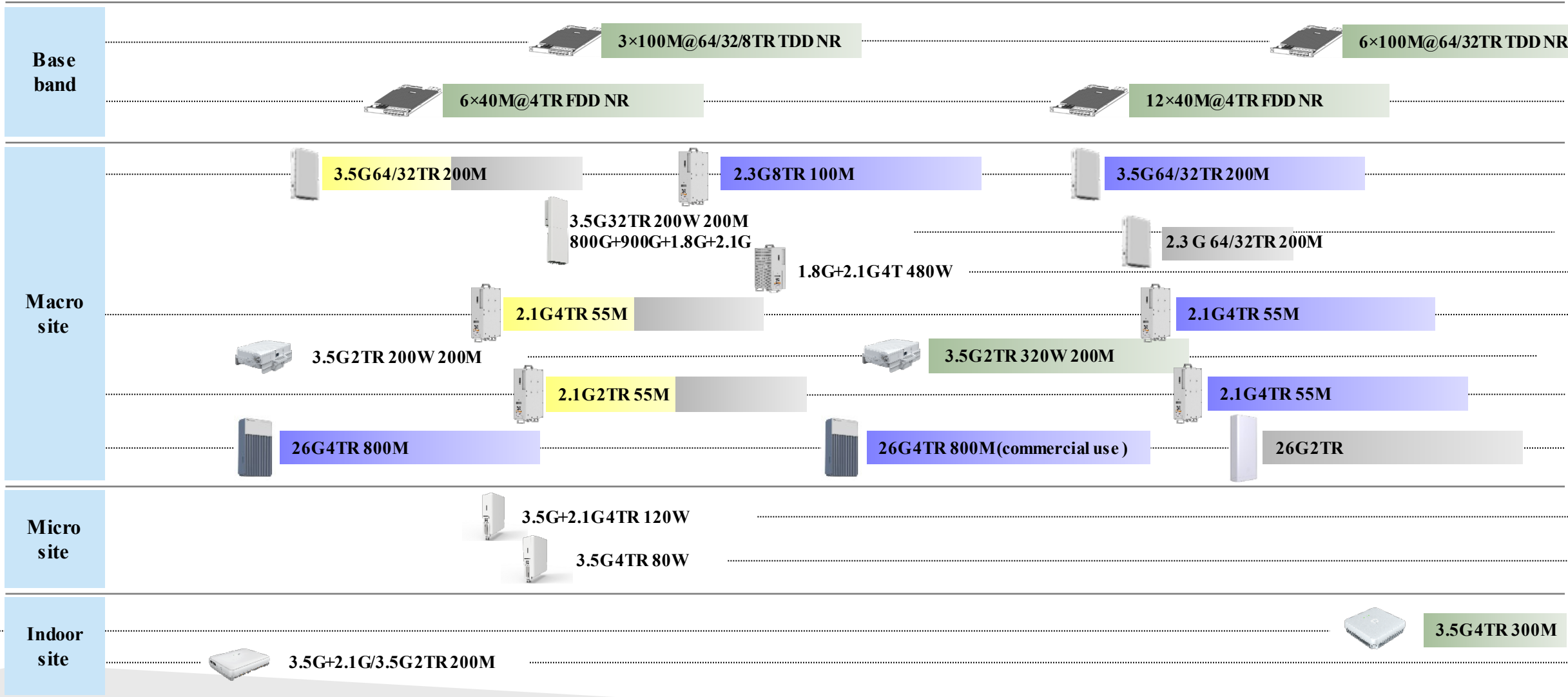
**I. Company Introduction**

**II. 4G & 5G Solutions**

**III. 4G & 5G Products**

**IV. 5G Products Roadmap**

# 5G Wireless Roadmap





THANK YOU !

