

# **5G licenses and commercial deployment in China**

**Huang Yuhong**  
**Secretary General, GTI**

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# CONTENT

**1** 5G Spectrum in China

**2** CMCC's 5G progress

**3** Experience from practice in china

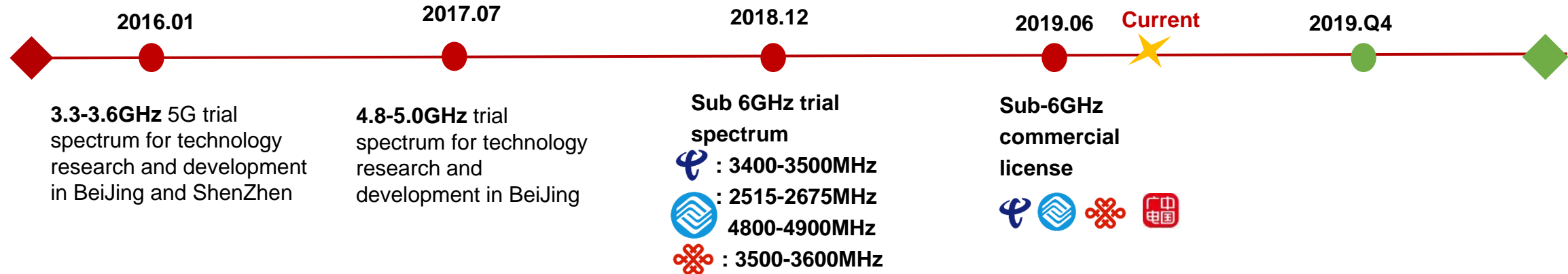
**4** Proposals to regulator

# 5G Spectrum in China

## mmWave

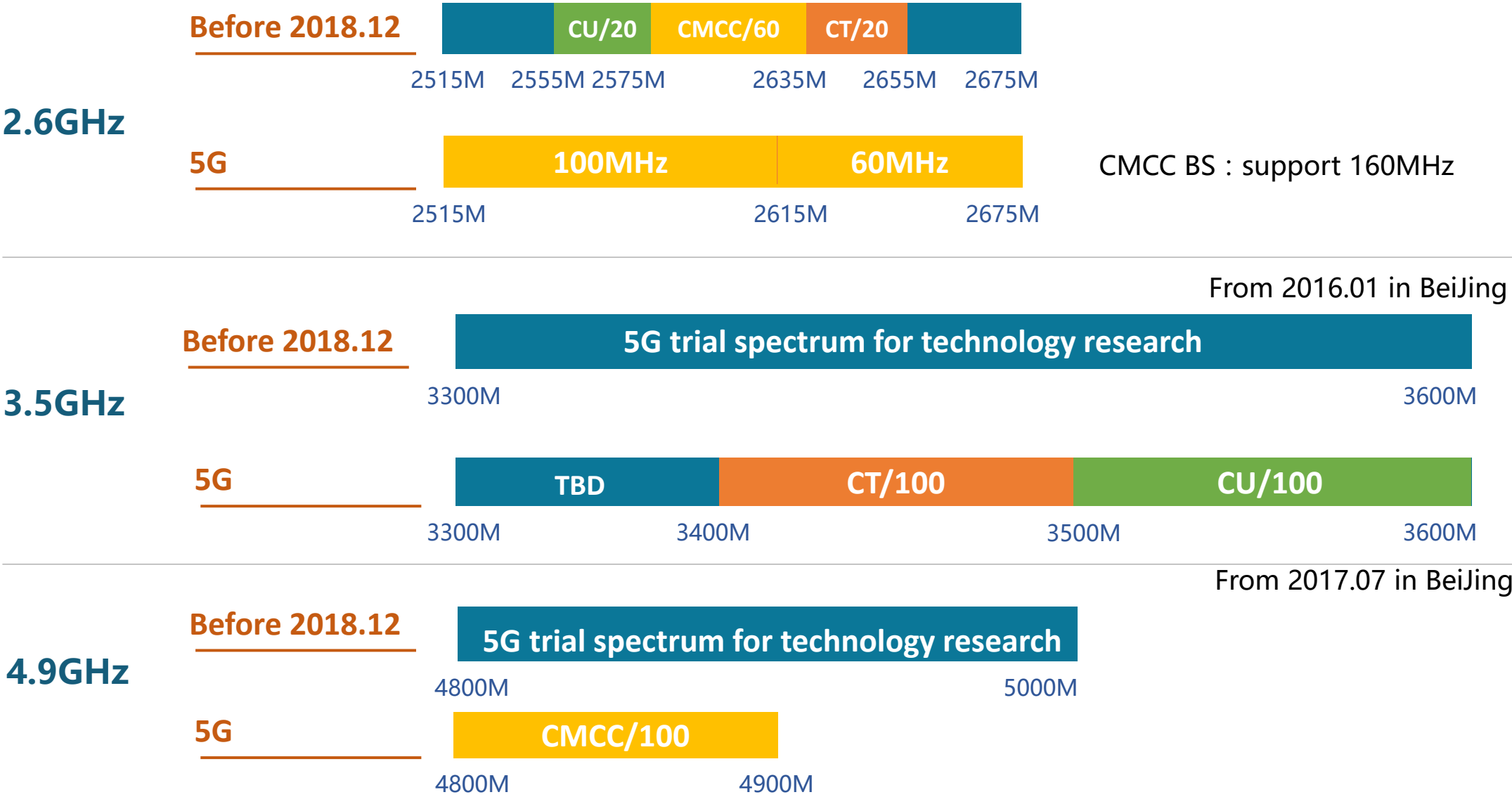
24.25-27.5 and 37-42.5GHz  
trial spectrum for technology  
research and development

mmWave  
spectrum plan



## Sub 6GHz: PRIOR

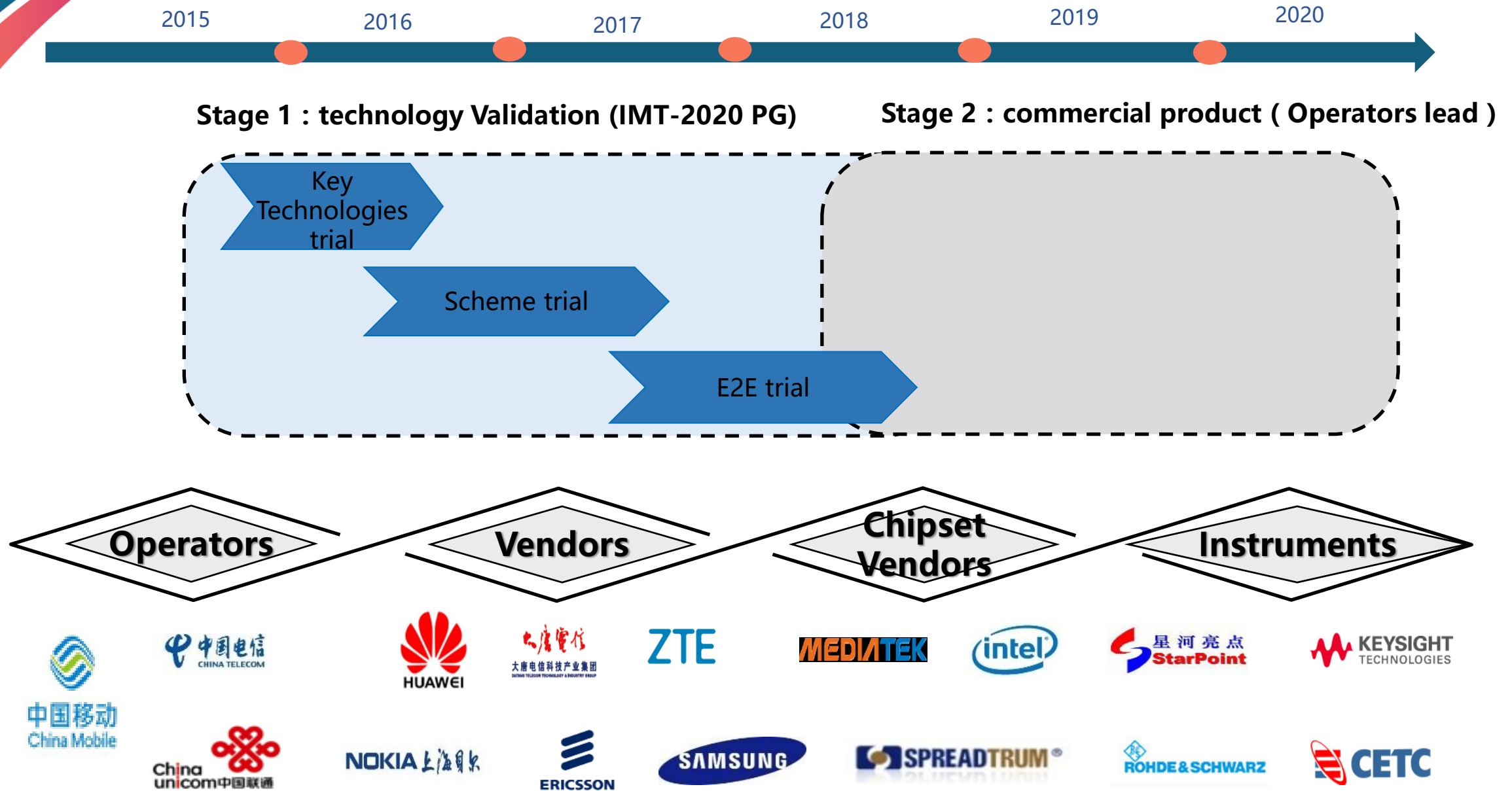
# 5G Spectrum in China



# 5G Licenses granted to operators



# 5G industrilization : IMT-2020 5G trial schedule



# Chinese Operators' 5G trial and service showcases



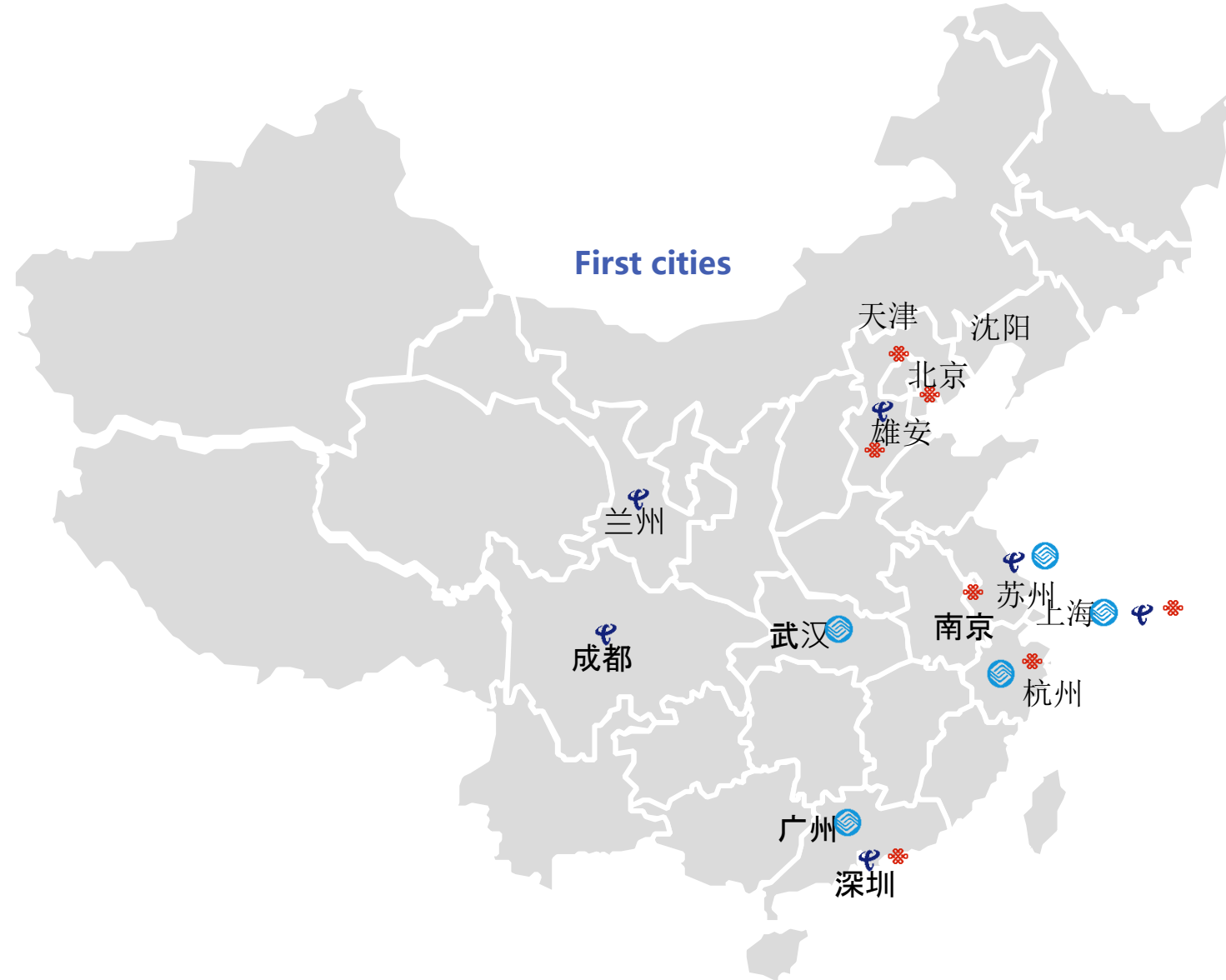
6+6



5+12



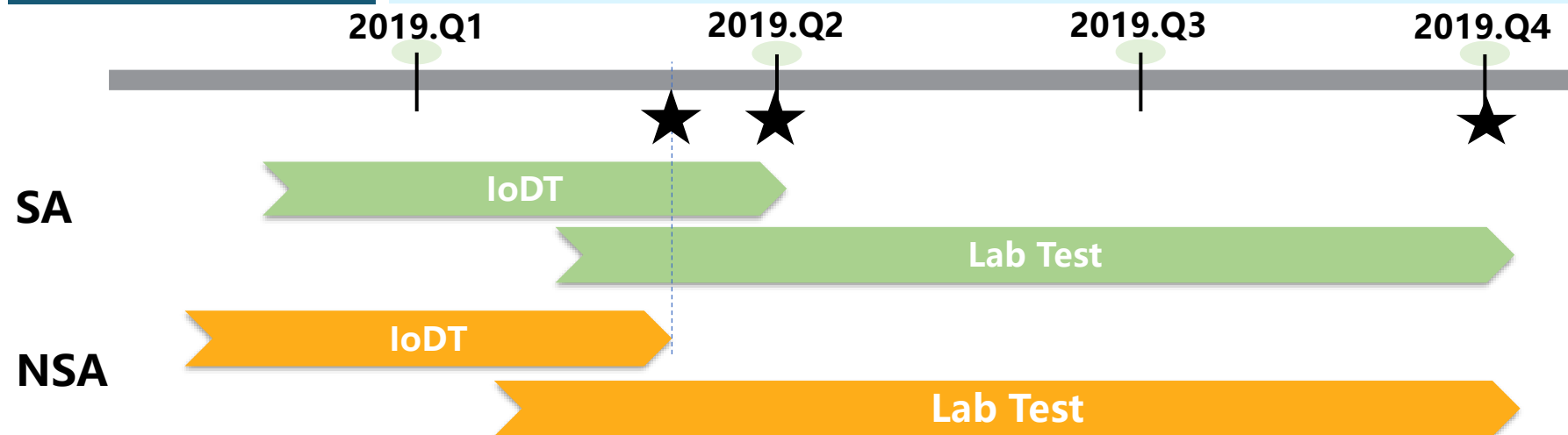
16



# CMCC's commitment to IODT

## Pre-commercial in 2019 and commercial in 2020

|                 |   |
|-----------------|---|
| <b>Vendors</b>  | ✓ NSA & SA : 5 network vendors , 5 commercial chipset vendors   |
| <b>Progress</b> | ✓ NSA : 5 network vendors and 3 commercial chipset vendors have completed the lab IODT and started the field trial<br>✓ SA : Some of the network and chipset vendors have completed the lab IODT and started the field test |
| <b>Plan</b>     | ✓ NSA : Complete 5 network vendors *2 chipset vendors by the end of May and 5*3 by the end of June<br>✓ SA : Complete 5*2 by the end of June  |

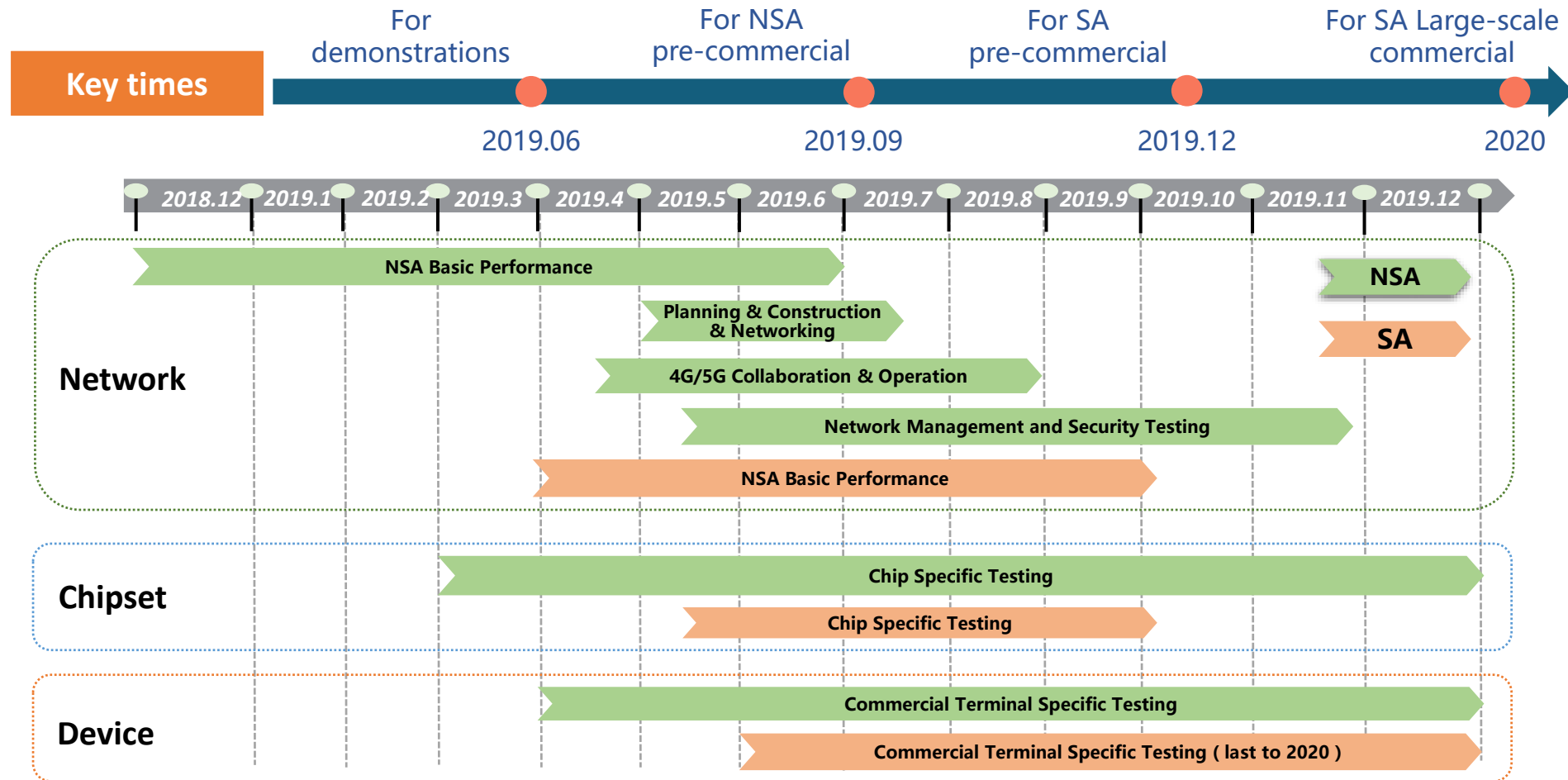


*IODT has been basically completed, but the progress of some operators is still needed to be further promoted.*



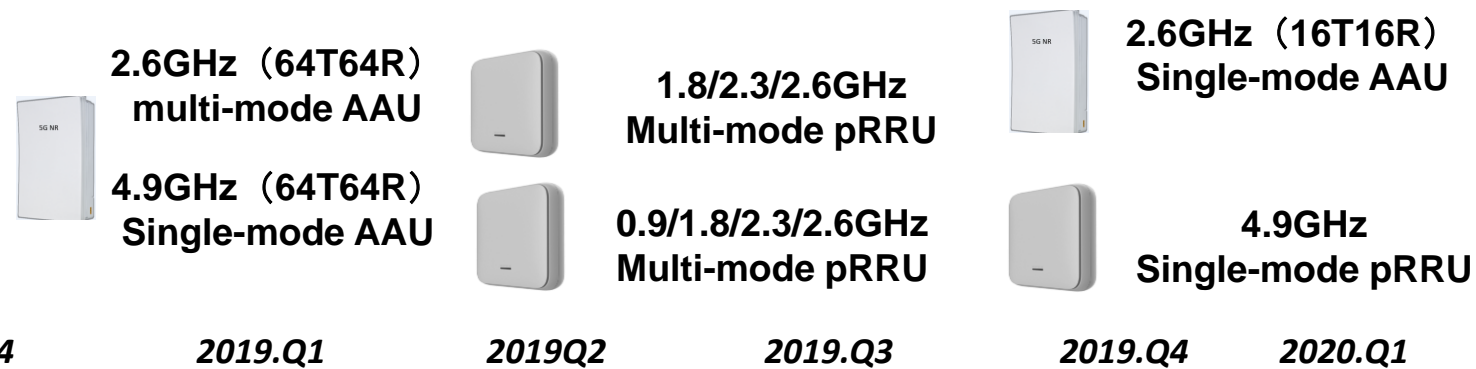
# CMCC's Field Trial

Pre-commercial in 2019 and commercial in 2020

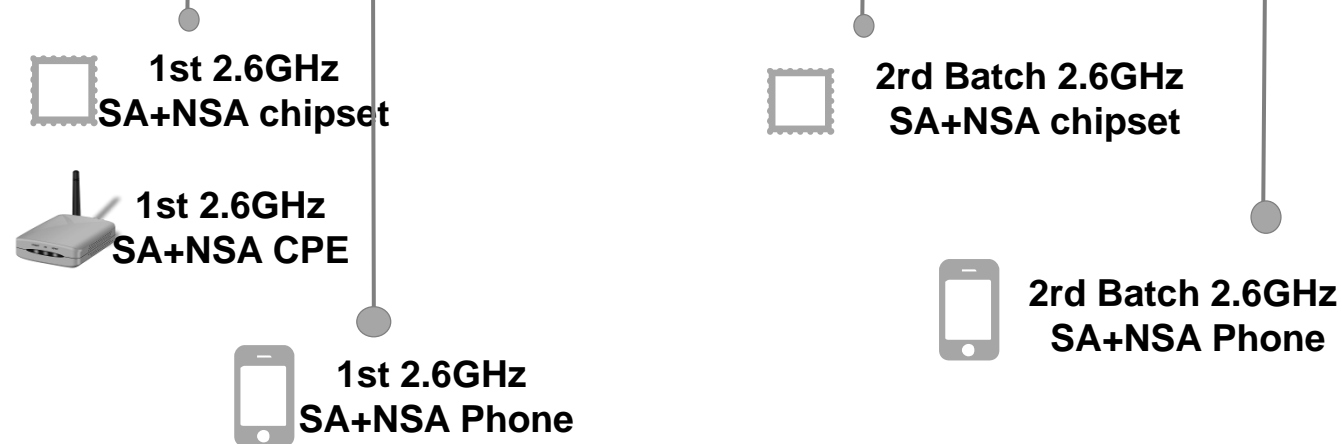


# CMCC's Vendor Roadmap

## Base Station



## Chipset & Device



*Product can be commercially supported, but the industry maturity (such as power consumption and weight) still need to be further enhanced.*

# Consideration on diverse deployment scenarios



## Urban outdoor

- Mainstream: 2.6GHz 64T64R
- Hot spot: 4.9GHz 64T64R



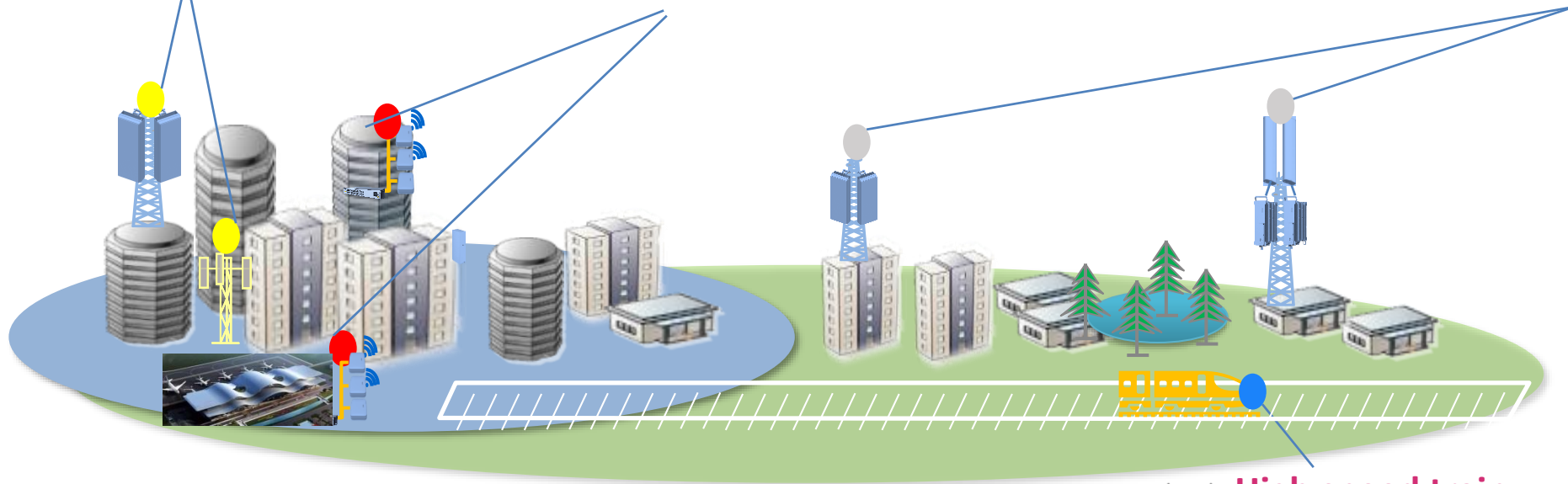
## Indoor coverage

- New:
  - 2.6GHz distributed Pico BS
  - 4T4R or 2T2R
- Existing: 2T2R



## Rural outdoor coverage

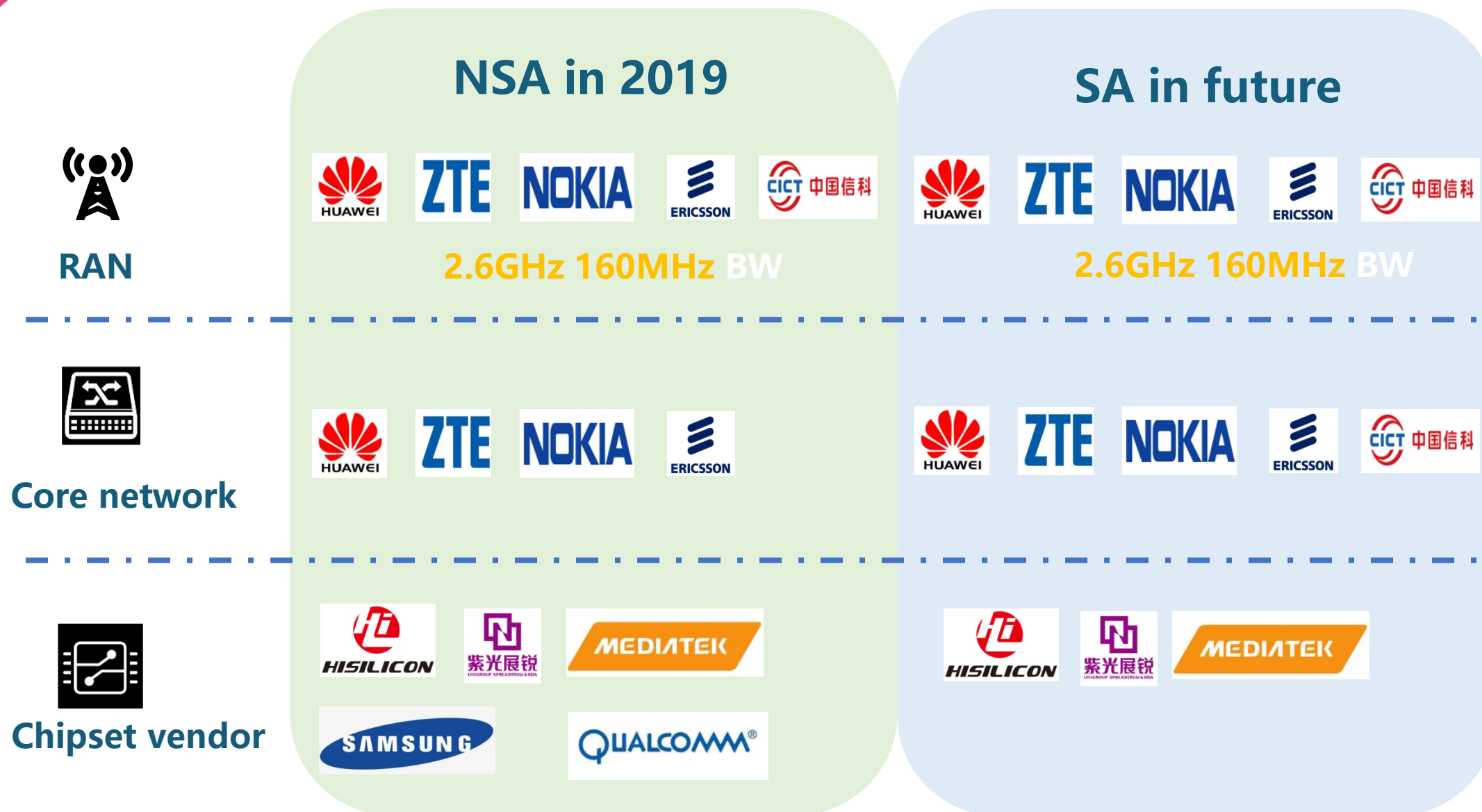
- 16T16R
- 32T32R



## High speed train

- 8T8R
- 2T2R

# CMCC has built a healthy ecosystem



# Latest 5G Deployment status of CMCC

- ◆ More than 10000 5G BS in nearly 300 cities
- ✓ Downlink trial peak data rate:
  - 1.2-1.4Gbps
- ✓ Downlink theoretical peak data rate:
  - 1.53 Gbps
- ✓ average downlink download rate :
  - over 800Mbps



# Experience from 5G Practice in China



**Contiguous** TDD spectrum allocation with large blocks



**Synchronization** operation to avoid the potential interference

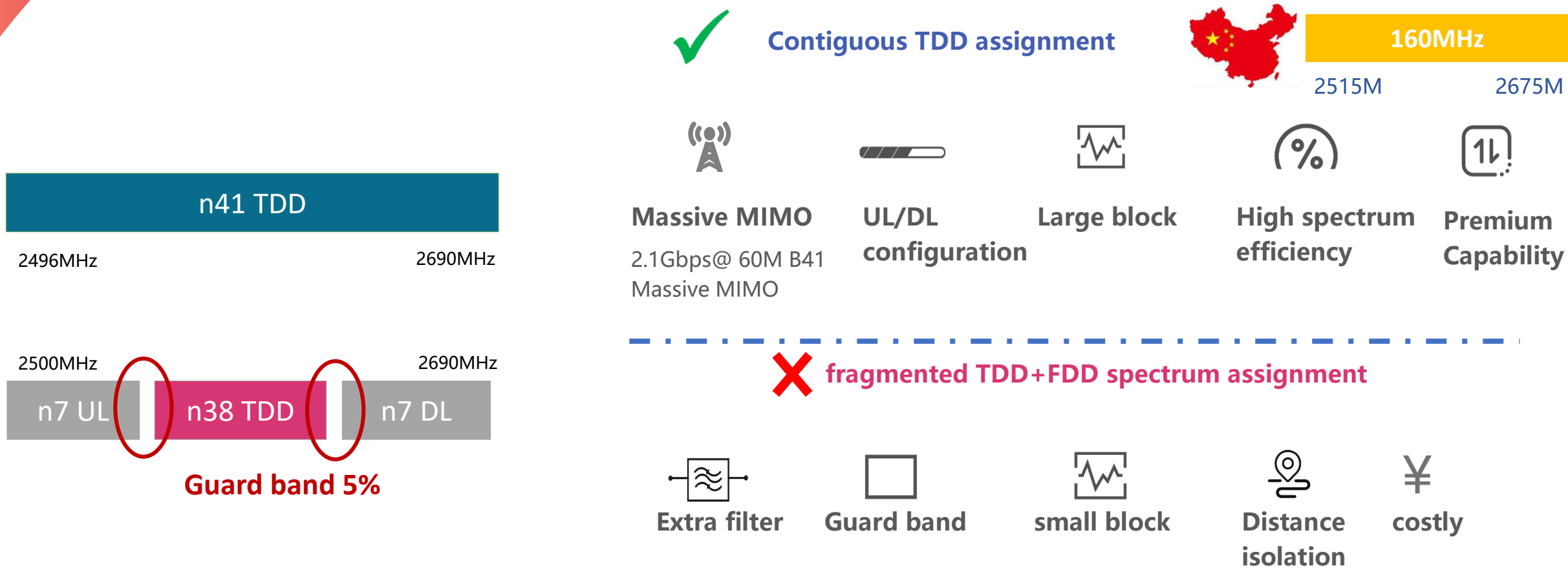


TDD spectrum **Global** harmonization    2.6GHz    3.5GHz    4.9GHz



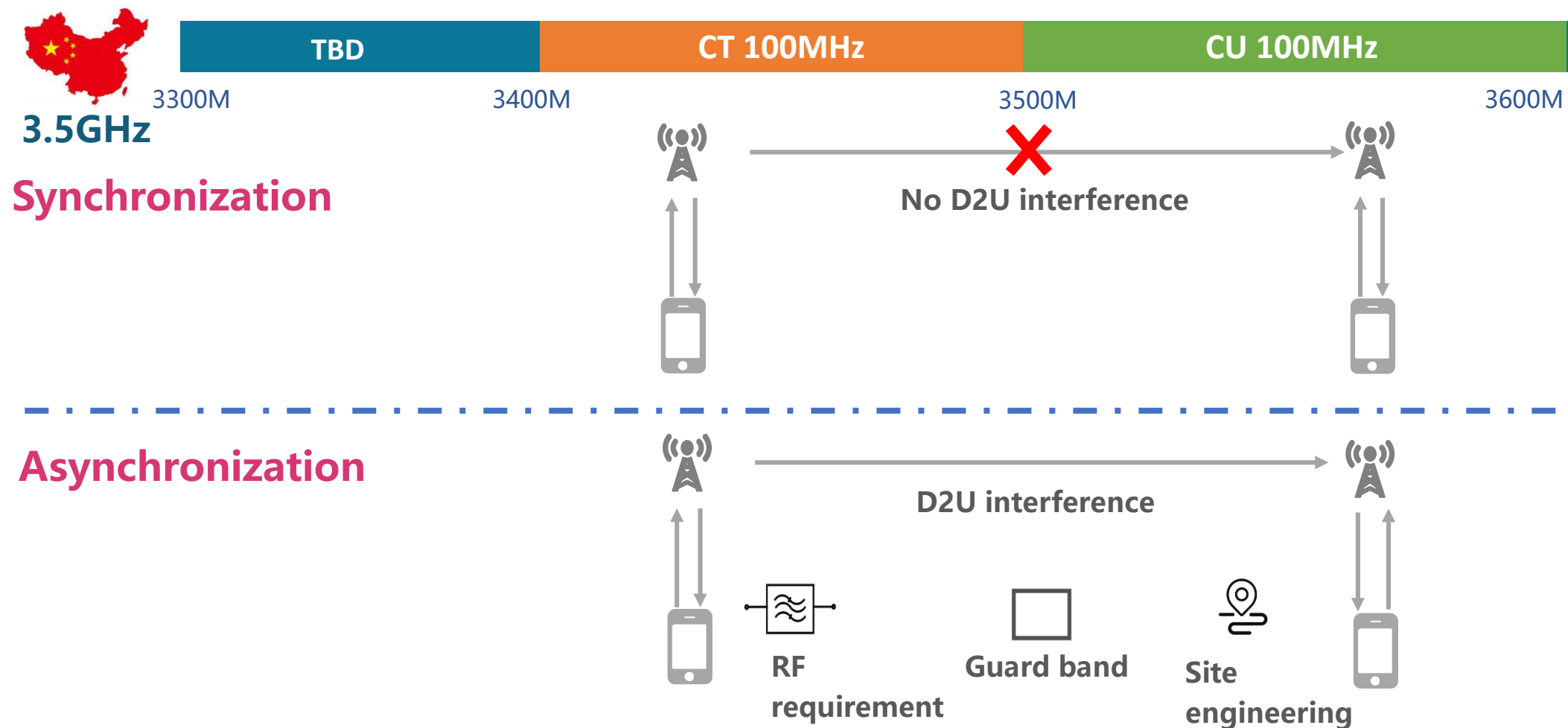
**Fast** process of the spectrum allocation

# Observation 1 : Contiguous 2.6GHz spectrum



**n41** **Contiguous 2.6GHz** TDD spectrum assignments

## Observation 2 : Syn simplify the deployment



**Synchronization operation between operators**



# Observation 3 : 2.3GHz for 5G



| Band<br>(MHz) | Footnotes identifying the band for IMT |          |          |
|---------------|--|----------|----------|
|               | Region 1                               | Region 2 | Region 3 |
| 2 300-2 400   | 5.384A                                 |          |          |

| TDD LTE BANDS & FREQUENCIES |                  |                     |
|-----------------------------|------------------|---------------------|
| LTE BAND NUMBER             | ALLOCATION (MHZ) | WIDTH OF BAND (MHZ) |
| 40                          | 2300 – 2400      | 100                 |

| NR operating band | Uplink (UL) operating band<br>BS receive / UE transmit<br>$F_{UL\_low} - F_{UL\_high}$ | Downlink (DL) operating band<br>BS transmit / UE receive<br>$F_{DL\_low} - F_{DL\_high}$ | Duplex Mode |
|-------------------|--|--|-------------|
| n40               | 2300 MHz – 2400 MHz  | 2300 MHz – 2400 MHz  | TDD         |



2.3GHz spectrum in the world



Complex  
Licensed shared access(in discussion)



Assigned to WCS in 1997  
Part under consideration



Indoor scenario before  
Outdoor after permission in 2012.09



2.3GHz in 2019 Q4

Other countries:

Saudi Arabia, Thailand, Indonesia, South Africa, Australia, Peru....

## 2.3GHz Candidate 5G spectrum

# Observation 4 : 4.9GHz for 5G NR



ITU and 3GPP standardization

| Band<br>(MHz) | Footnotes identifying the band for IMT |          |          |
|---------------|--|----------|----------|
|               | Region 1                               | Region 2 | Region 3 |
| 4 800-4 990   | -                                      | 5.441A   | 5.441B   |

| NR operating band | Uplink (UL) operating band<br>BS receive / UE transmit<br>$F_{UL\_low} - F_{UL\_high}$ | Downlink (DL) operating band<br>BS transmit / UE receive<br>$F_{DL\_low} - F_{DL\_high}$ | Duplex Mode |
|-------------------|--|--|-------------|
| n79               | 4400 MHz – 5000 MHz  | 4400 MHz – 5000 MHz  | TDD         |



4.9GHz spectrum in the world



CMCC trial spectrum in 2018.12



4.8-4.99GHz 5G trial spectrum

4.9GHz 5G spectrum

# Proposals for global regulators



Fast process of spectrum allocation



**First** Release C-band, TDD 2.6GHz/2.3GHz/4.8GHz

Then release other bands step by step to meet different requirements



spectrum pricing & license



Reasonable spectrum pricing

New license granted for 15-20 years

Nationwide exclusive licensing



Spectrum occupied by other technologies



Speed up the reclaiming of TDD spectrum still occupied by the old technology or satellite

Nationwide exclusive licensing

# Thanks

