



# 6GHz IMT OPPORTUNITY FOR SOCIETY

## 6GHz for 5G in APAC

**Jesada Sivaraks**

Head of Government & Industry Relations, Ericsson Thailand

Powered by:



May 13, 2021

THE TELECOMMUNICATIONS ASSOCIATION OF THAILAND UNDER THE ROYAL PATRONAGE

# Mobile broadband drives economic development

- \$4.1 trillion of economic value generated globally in 2019 by mobile technologies and services (4.7% of GDP)<sup>1</sup>
- On average, 10% increase in mobile broadband adoption drives a 0.8% increase in GDP, equivalent to \$702 billion based on world GDP in 2019<sup>2</sup>
- 10 percentage points increase in the growth of IoT connections per inhabitant is associated with 0.23 percentage points growth in Total Factor Productivity (TFP), \$202 billion based on world GDP in 2019<sup>3</sup>



<sup>1</sup>GSMA: The mobile economy 2020

<sup>2</sup>Edquist et. al: How important are mobile broadband networks for the global economic development

<sup>3</sup>Edquist et. al: The Internet of Things and economic growth in a panel of countries



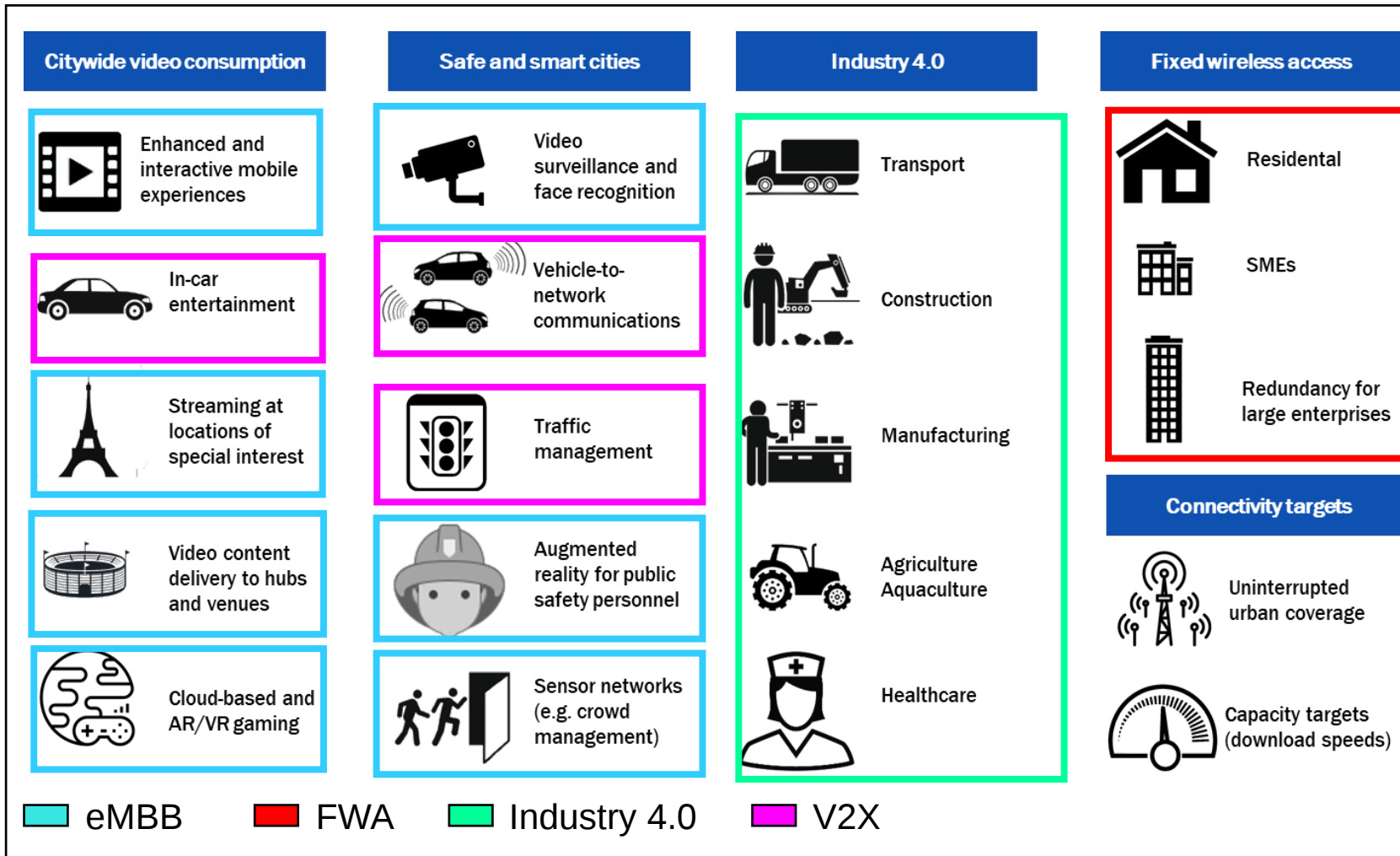
# Why 6 GHz?

- Additional mid-bands spectrum will be needed by 2025-2030 to address the IMT-2020 user experience requirements (100Mbit/s in DL and 50Mbit/s in UL) in the most populated cities – depending on the specific assumptions (e.g. end user activity factor, high bands offloading, ...)
- The 6GHz band is ideally suited to meet 5G future capacity needs:
  - Globally allocated already to the mobile service on a primary basis
  - Good balance between coverage and capacity
  - Similar possibilities in terms of coverage to 3.5 GHz
  - Large contiguous blocks available supporting 5G services
  - Potential for wide economies of scale

The 6GHz band has potential in terms of providing coverage and capacity with a healthy ecosystem, leading to satisfy the projected citizens' connectivity needs.



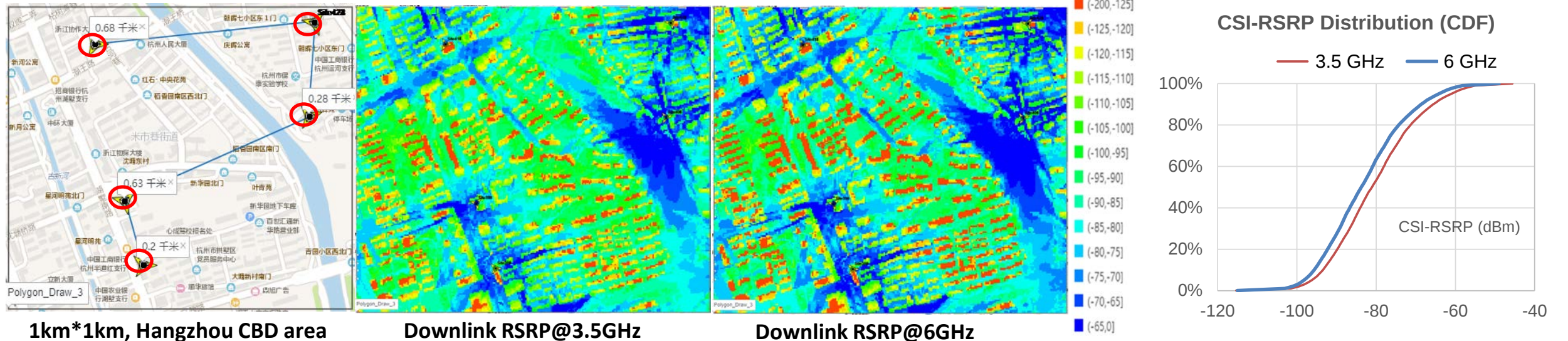
# High capacity citywide (urban/suburban) coverage



- Important to assess the needs of the city of the future.
- Each use case contributes to the spectrum needs
- Licensed IMT spectrum can:
  - Provide **predictable QoS**
  - Provide **seamless mobility access**
  - **Guarantee the reliability**, e.g., 99.999%

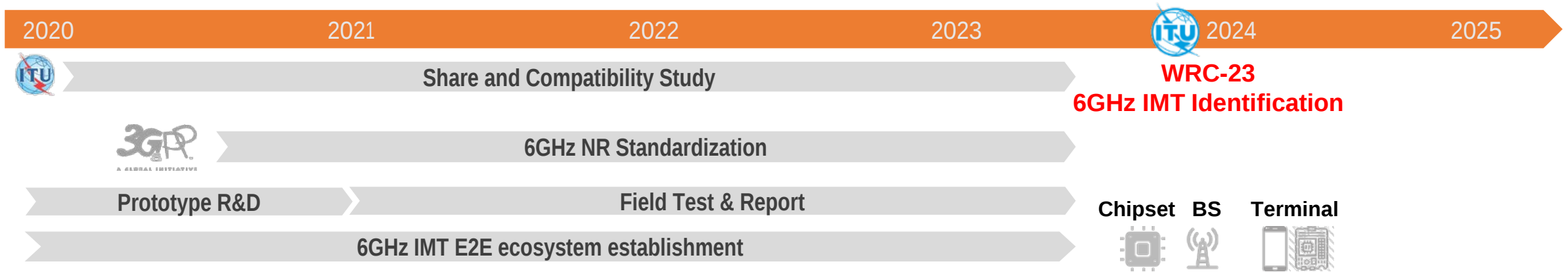
# IMT (5G-NR) provides similar area coverage in the 6 and 3.5 GHz bands

Coverage simulation with Ray-tracing model in dense urban area



- 3400-3800 might not be sufficient in the longer run.
- The 6GHz band could be a good complement to address the forecasted capacity needs.
- There is a small gap between 6GHz and 3.5GHz coverage (DL and UL); It could be compensated with new BS architectures and UE capability enhancements.

# E2E Ecosystem is in shape



**ITU-R:** Coexistence study with incumbents for WRC-23



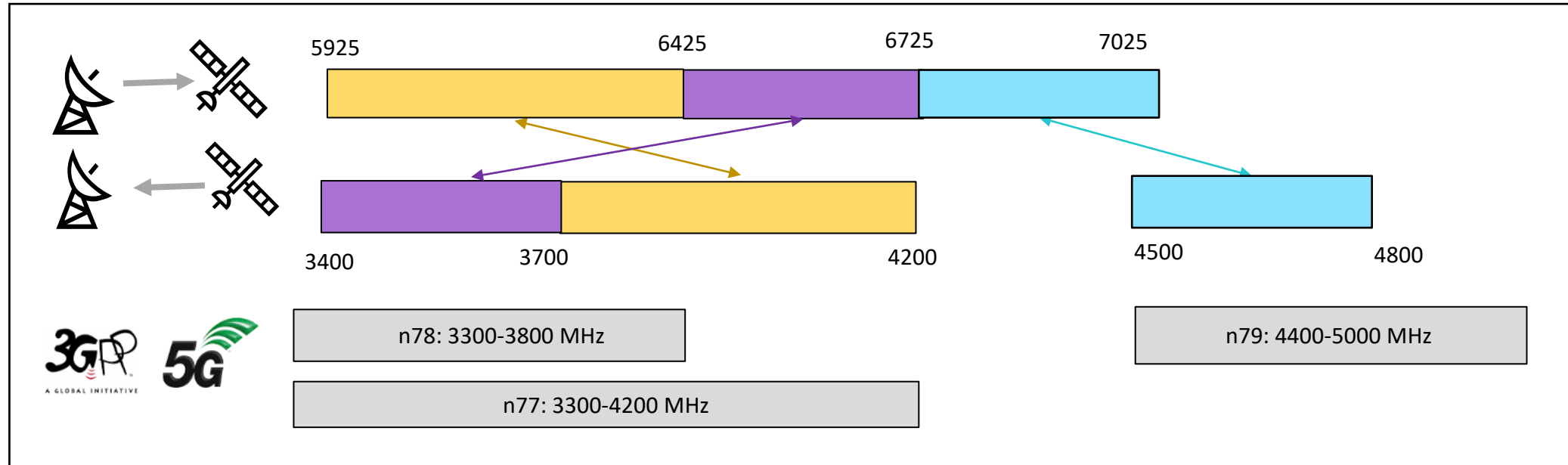
**3GPP:** 6GHz band definition and other necessary enhancements for coverage and capacity improvements

- Study item (RP-200513) for providing the system parameters to ITU-R is due to complete in December 2020.
- Work item for “Introduction of 6GHz NR licensed bands” (RP-202114) has started, covering 6425-7125 MHz and 5925-7125 MHz
- RCC Commission on Spectrum and Satellite Orbits liaised with 3GPP (RP-201438) expressing their intent to submit a proposal to WRC-23 for use of 6425-7125 MHz for IMT system



**R&D:** Prototype was developed and is now ready for trials.

# Sharing with Incumbent : fixed satellite services



- FSS UL protection is a global issue and thus agreement on protection at ITU level is important
- 3GPP ecosystem available for the 3.3-4.2 GHz and 4.4-5.0 GHz ranges
- Observations for studies towards WRC-23
  - Coexistence may be facilitated by the adoption of Active Antenna Systems with beamforming (Massive MIMO)
  - Sharing studies need to apply and use recent developed and accurate clutter loss, building entry loss and propagation models

# Industry voice on 6GHz

## 6GHz webinars



## 6GHz IMT statement

### 6GHz Band for IMT - Industry Statement

- The International Mobile Telecommunications (IMT) system is the efficient way to provide broadband wireless connectivity on a **worldwide** scale and greatly contribute to global **economic** growth and **social** development;
- The **IMT** technology development and deployment continue contributing to creating a large amount of **new jobs** and **GDP** growth;
- **5G** is a pillar of **digital transformation**, enhancing mobile broadband and enabling new use cases;
- **5G connectivity** is essential for the development of **new information technologies**, such as IoT, cloud computing, big data, artificial intelligence, etc.;
- The user **mobile data consumption** is increasing and will keep growing rapidly and not only by human users;
- **More spectrum** is needed for 5G to meet the future network **capacity** and **coverage** demand for citywide use cases;
- in particular, the **6GHz** frequency band is a **strong candidate** to offer seamless high capacity citywide with licensed spectrum;
- The **WRC-23** preparatory work has started in the ITU-R in relation to the possible IMT identification of the 6GHz band, the standardization work in **3GPP** is on its way.

We therefore recommend policy makers and stakeholders to carefully assess the opportunity of IMT identification at the WRC-23 within the 6GHz band which will be important to establish the large scale ecosystem for this band.



- 4 webinars on “6GHz IMT opportunity for society” were held. Two more webinars are planned for RCC and MENA.
- 23 partners co-signed 6GHz IMT statement: to carefully assess the opportunity of IMT identification at the WRC-23 within the 6GHz band which will be important to establish the large scale ecosystem for this band.
- More details can be found on: [www.6GHzopportunity.com](http://www.6GHzopportunity.com)

# Trials on 6GHz IMT are planned

## China

### 6GHz Band Macro eNB Trial



2021

2022

2023

- IMT-2020(5G) Promotion Group plans to launch the 6GHz Trial on high power macro base station
- In 2021, initiate the 6GHz Prototype Test & Field Trial, including:
  - ✓ Coverage Test
  - ✓ Capacity Test
  - ✓ Coexistence interference

**gNB**  
6GHz RF  
CPRI  
BBU

**UE**  
6GHz UE  
RF  
RF Cable  
BBU

Source: LATAM 6GHz Webinar, 15<sup>th</sup> Dec, 2020

## Russia



### 6425-7125 MHZ FREQUENCY BAND IN RCC



Currently the RCC countries are conducting study for further harmonization of 6 GHz frequency bands.

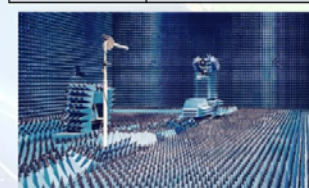
RCC will prepare proposals for WRC-23 for the IMT identification of the frequency band 6425-7125 MHz under AI 1.2, taking into account the conditions ensuring the compatibility of IMT systems with other radio systems using this frequency range.

RCC countries are also in liaison with 3GPP: RCC is preparing regulatory requirements for IMT licensed use in 6 GHz to assist 3GPP NR-licensed

In the RCC countries in the 6425-7125 MHz band the following usage:

| Service / systems         | Sharing opportunities                                                                                                                                                                                    |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FS microwave links        | 1050 links (ECC Report 173). FS links are located mostly outside cities in the middle and northern parts of Russia; coordination may be required                                                         |
| FSS (GSO)                 | Current usage in 6425-6525 MHz; limited usage in 6525-6725 MHz; limited usage in 6725-7025 MHz (UL), paired with with 4500-4800 MHz (DL) which is considered for 5G in Russia (as part of 4400-4990 MHz) |
| FSS (NGSO)                | Limited number of stations                                                                                                                                                                               |
| SOS (FN 5.459)            | Space Operation Service (TTC): current and future usage to be protected                                                                                                                                  |
| EESS (passive) (FN 5.458) | Future use of passive microwave sensors over the oceans is considered by the national space agency                                                                                                       |
| RAS                       | Limited number of stations                                                                                                                                                                               |

In accordance with questionnaire on 5G spectrum plans in RCC countries (Sep.2020), Russia has identified 6425-7125 MHz band



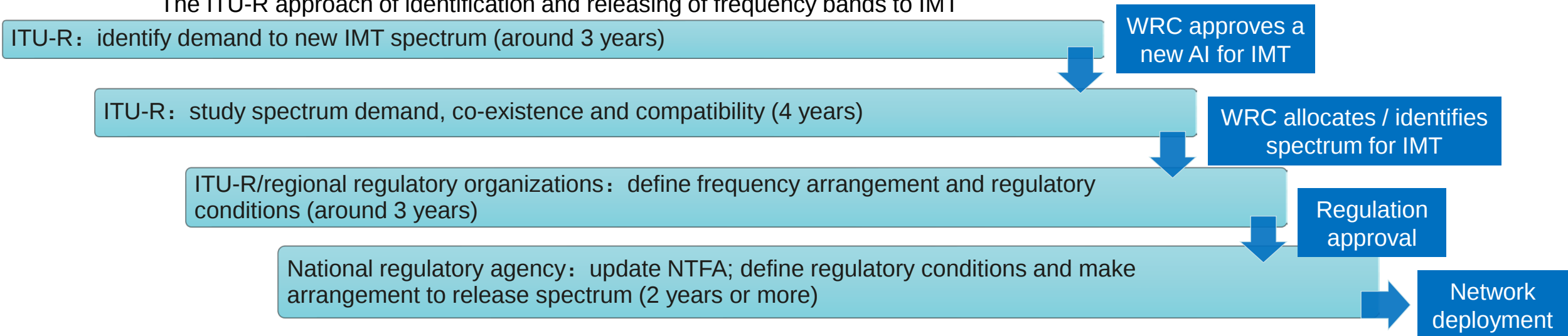
In the Russian Federation, full-scale tests of 6 GHz IMT equipment are planned, included in the Regulator's work plan for 2021

Source: APAC 6GHz Webinar, 19<sup>th</sup> Jan,2021

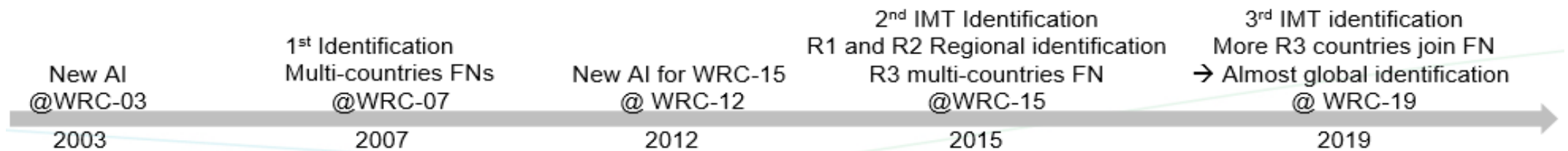
## WRC-23 AI 1.2: great opportunity to ensure spectrum harmonization for IMT

- WRC-23 AI 1.2:** to consider identification of the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **245 (WRC-19)**;

The ITU-R approach of identification and releasing of frequency bands to IMT

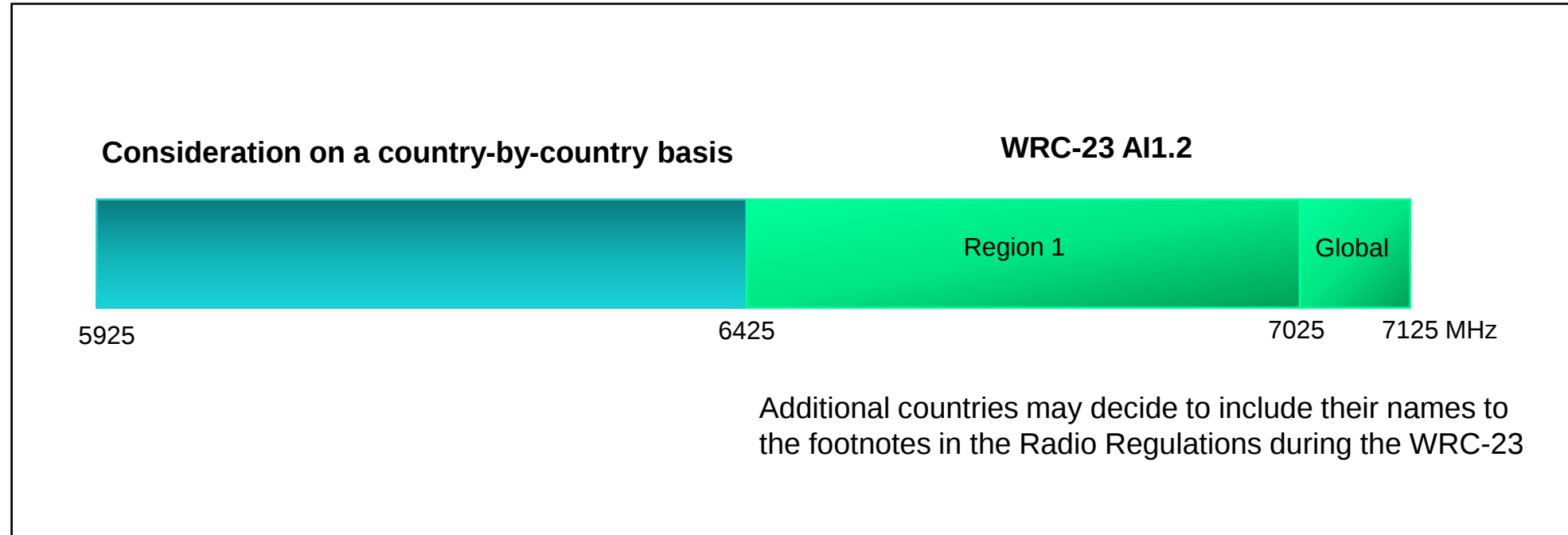


- History of C-band:** It took more than 16 years from initializing C-band work in ITU-R to releasing to commercial network deployment





# The recommendation for 6GHz



- **WRC-23 is a great opportunity** to ensure spectrum harmonization for IMT
- **Support 6GHz IMT identification at WRC-23** to ensure IMT sustainable evolution in a long term

# Thank you!

[amy.yemin@huawei.com](mailto:amy.yemin@huawei.com)

[cgomez@gsma.com](mailto:cgomez@gsma.com)

[guillaume.mascot@nokia.com](mailto:guillaume.mascot@nokia.com)

[hakan.ohlsen@ericsson.com](mailto:hakan.ohlsen@ericsson.com)

[tian.dao@zte.com](mailto:tian.dao@zte.com)



NOKIA

ZTE

# Sharing with Incumbent: Fixed Service

## FS Typical applications

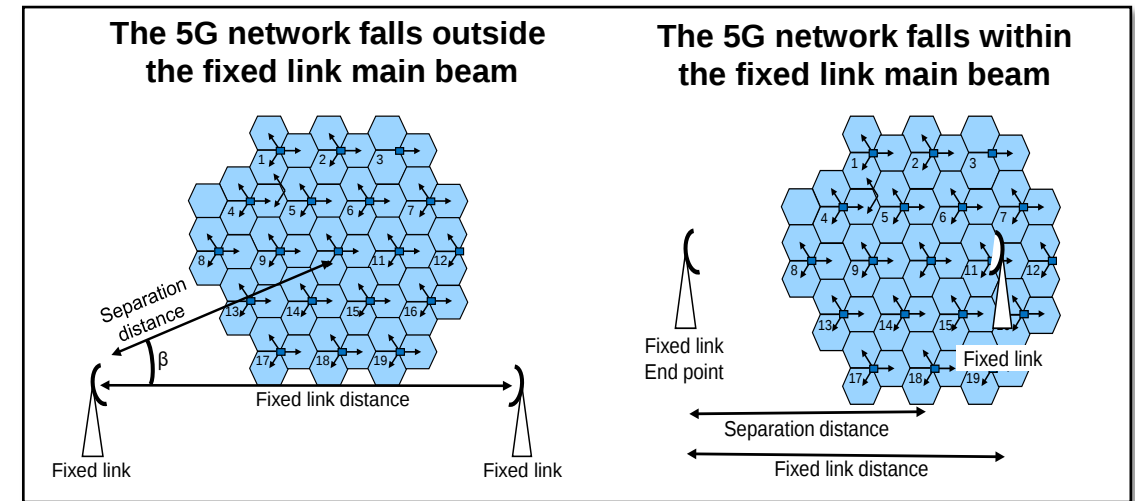
- **Long distance** P-P links / backbone links (12-65 km)
- **Mainly in rural** / remote areas (at least one hop )
- At **known locations** with **known characteristics**
- Mainly supporting **mobile and broadcasting** networks
- Mostly **link-by-link assignments** (block assignments in few cases)



## IMT – FS coexistence: Toolbox



- **Coordination** (spectrum sharing)
- on a case-by-case basis by network planning:



- The coordination zone depends on the antenna positions, parameters and FS protection criteria (co-channel and LoS operation assumed)
- As an alternative, depending on operators preference, migration of fixed links to other frequency bands could be a possibility