

# The Fifth Generation Mobile Communications Promotion Forum (5GMF)

## 5GMF activities for 2020 and beyond in Japan



The Fifth Generation Mobile Communications Promotion Forum

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5G International Workshop 2015

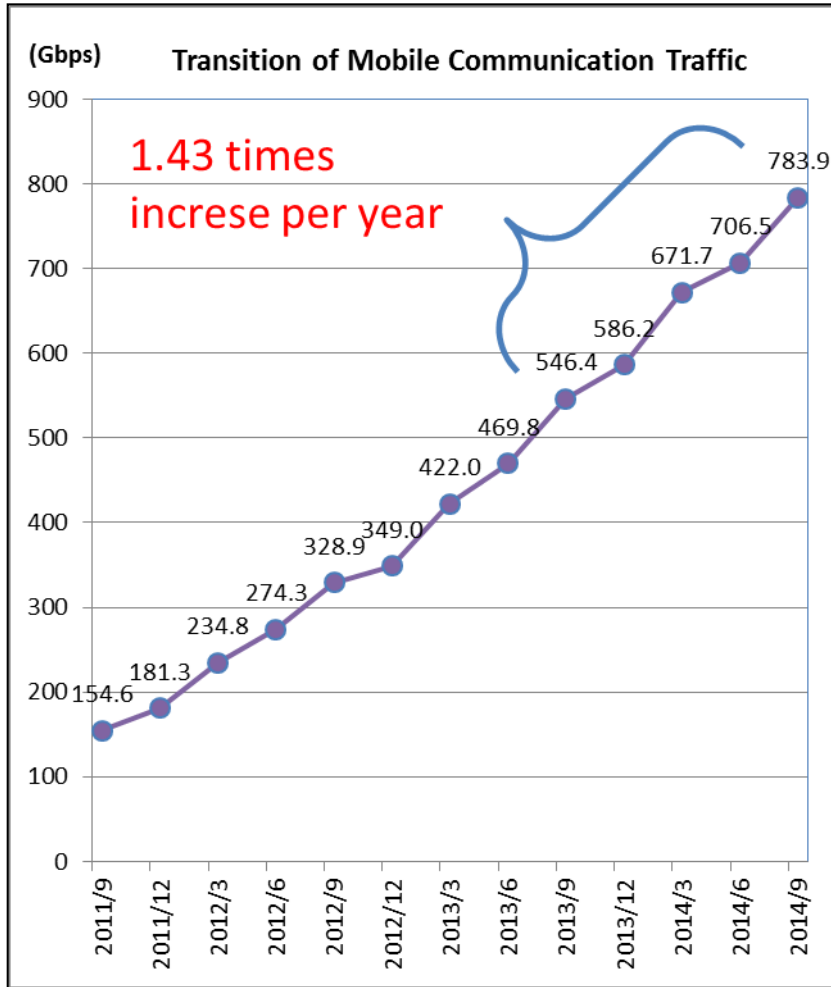
Makuhari, Japan

October 8, 2015

1. Background
2. Organization of 5GMF
3. 5G mobile concept in 5GMF
4. Action Plan toward 5G mobile
5. Global collaboration on 5G mobile
6. Summary

# 1. Background

# Traffic trend of mobile communication



n 1.5 ~ 2.0 times increase trend per year

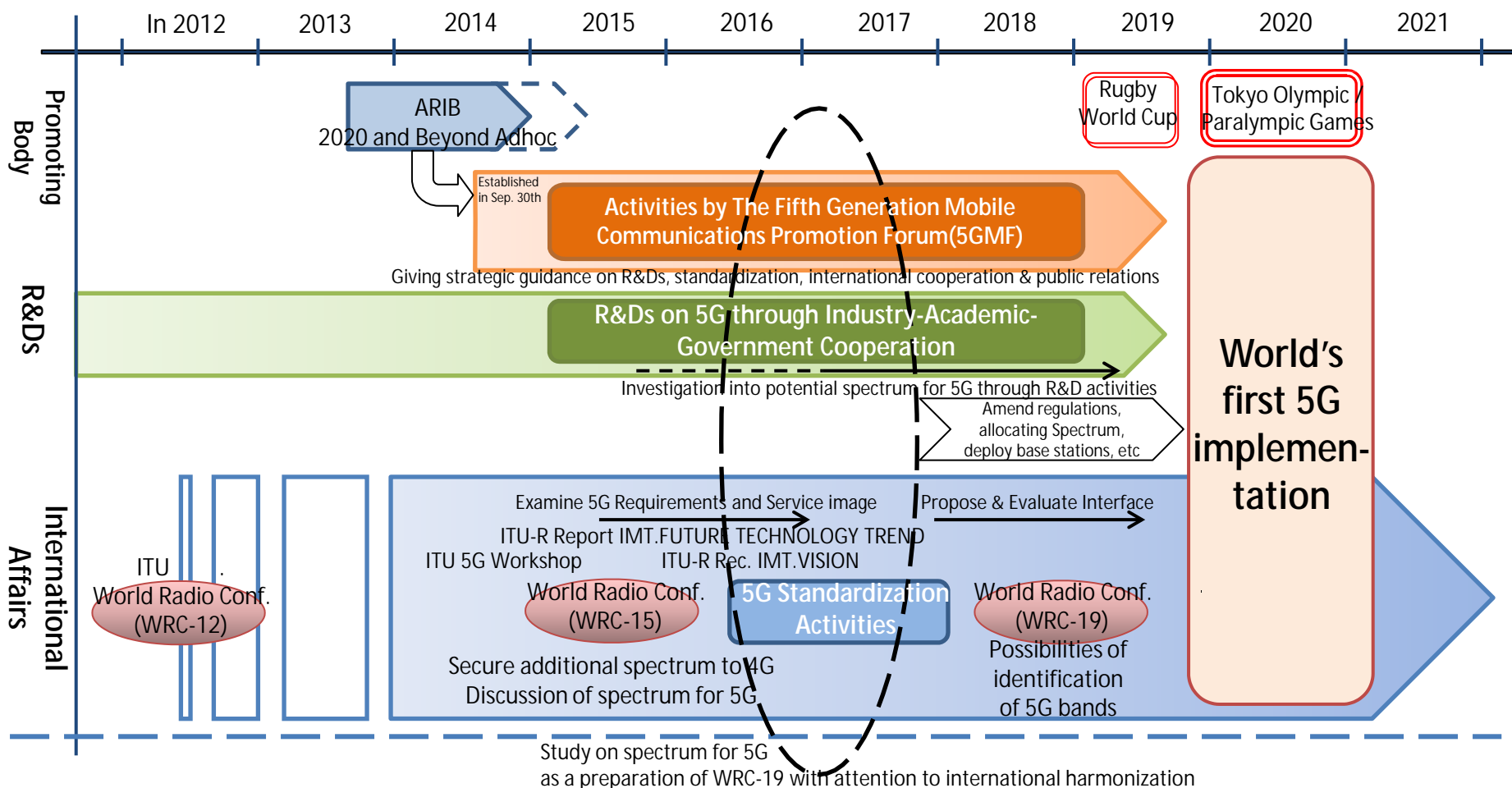


a 2.0 times increase per year equals

n 1,000 times increase within 10 years!!

Translated from "Final Report from the Radio Policy Vision Council", Ministry of Internal Affairs and Communications, Japan, December 2014.

# Roadmap towards implementation of 5G mobile in Japan



Translated from "Final Report from the Radio Policy Vision Council", Ministry of Internal Affairs and Communications, Japan, December 2014.

# Organization and output of the ARIB 2020 and Beyond Ad Hoc

## ARIB ARIB 2020 and Beyond Ad Hoc (20B AH)

- n Established in September 2013
- n Leader: Takehiro Nakamura (NTT DOCOMO)
- n 31 ARIB Members joining (as of 1 March 2015)
- n Organizational Structure

2020 and Beyond AdHoc

Service and System  
Concept WG (WG-SC)

System Architecture &  
Radio Access Technology  
WG (WG-Tech)

### n White Paper

“Mobile Communications Systems for 2020 and beyond”

<http://www.arib.or.jp/ADWICS/20bah-wp-100.pdf>

5GMF takes over  
and advances the  
20B AH's output.



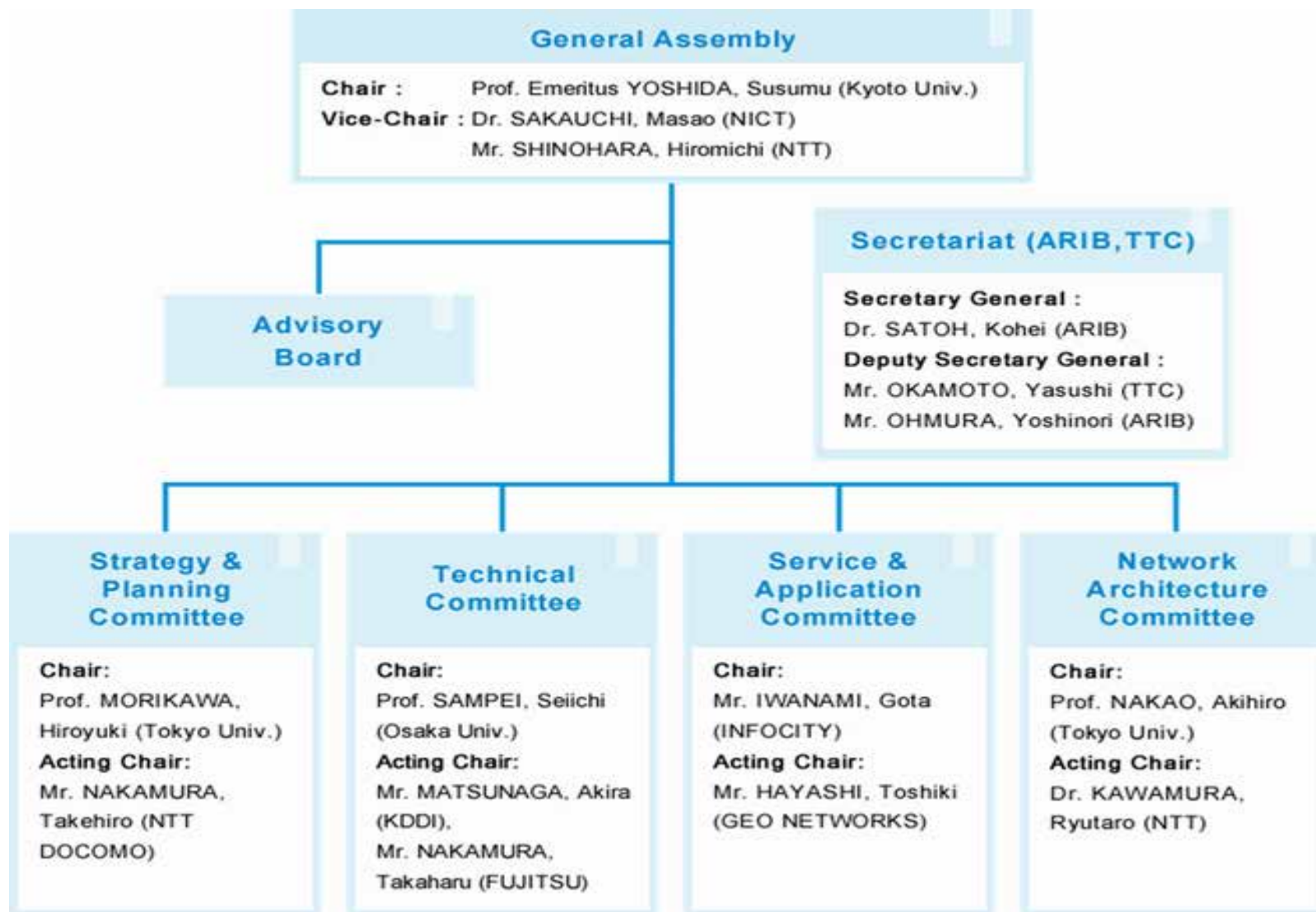
## 2. Organization of 5GMF

## n Objectives of 5GMF:

- u To promote R&D in 5G mobile technology and research and study of 5G mobile standardization
- u To collect information relating to 5G mobile and exchange thereof with other organizations
- u To correspond and coordinate with related organizations on issues related to 5G mobile
- u To promote awareness and disseminate information related to 5G mobile



# Organizational Structure of the 5GMF



# 5GMF Members

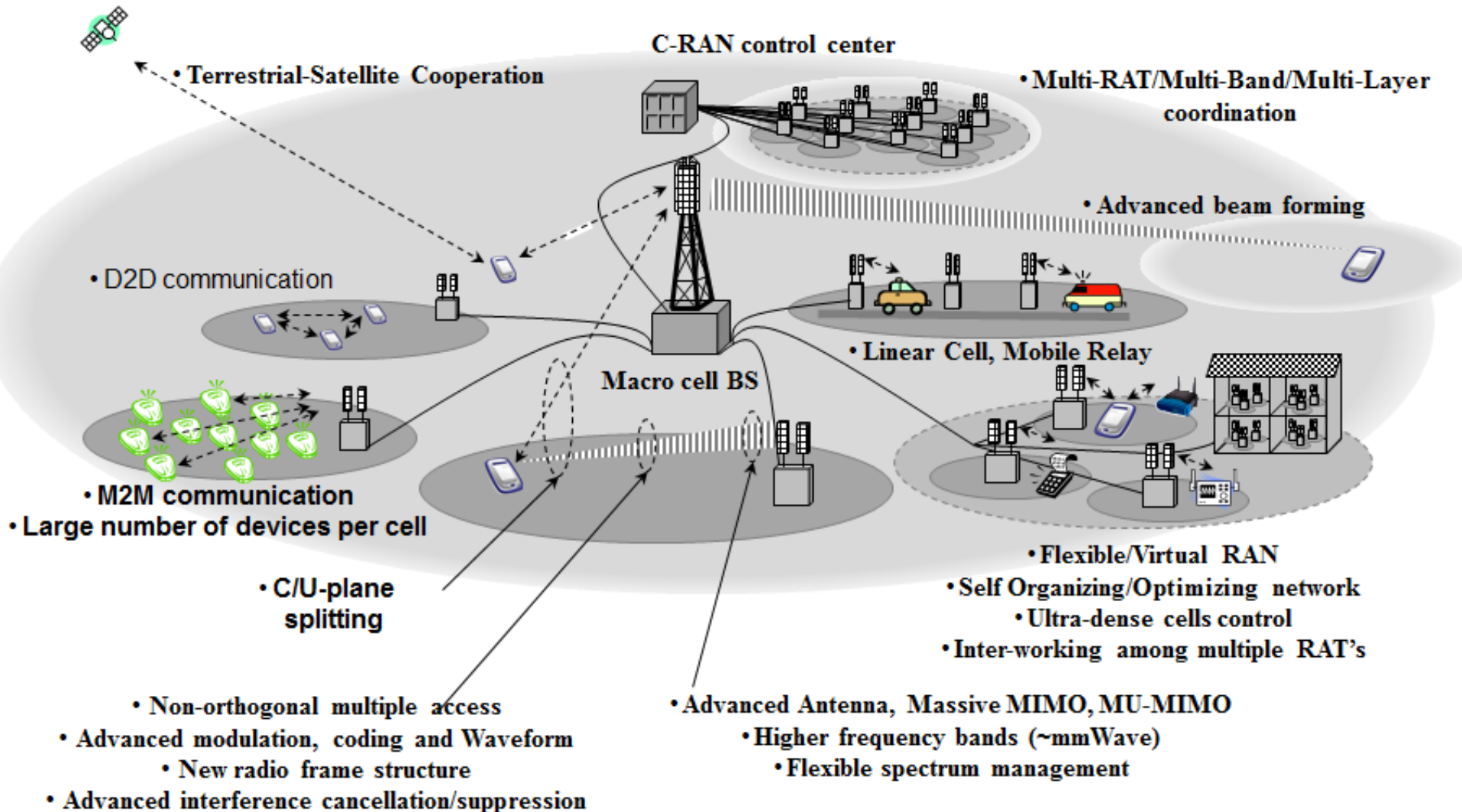


Members:84 (as of 7 Oct. 2015)

Ordinary members:67, Individual members:14,  
Special members: 3 (MIC, ARIB, TTC)

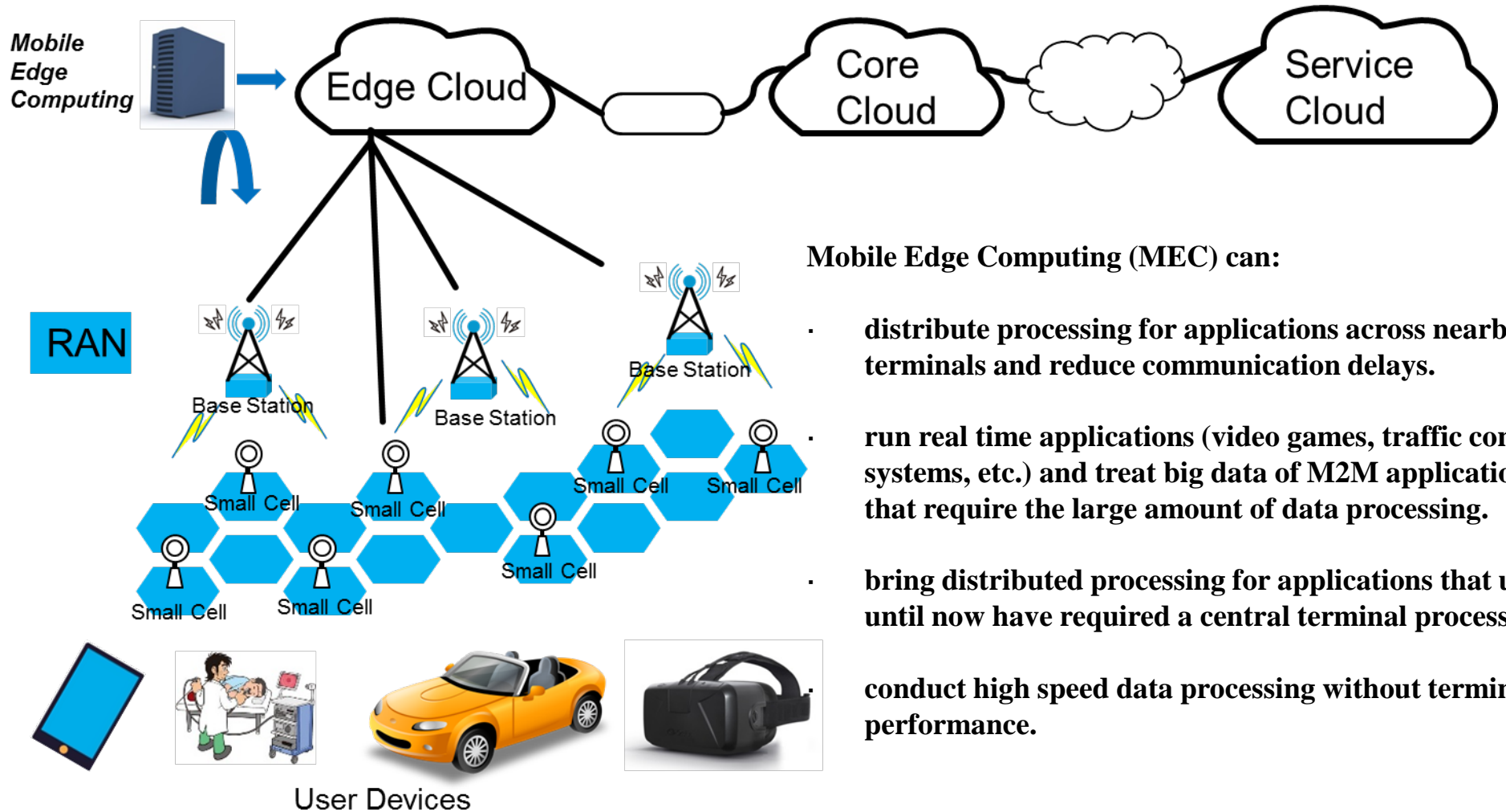
## **3. 5G mobile Concept in 5GMF**

# Radio Access Technologies for 5G mobile

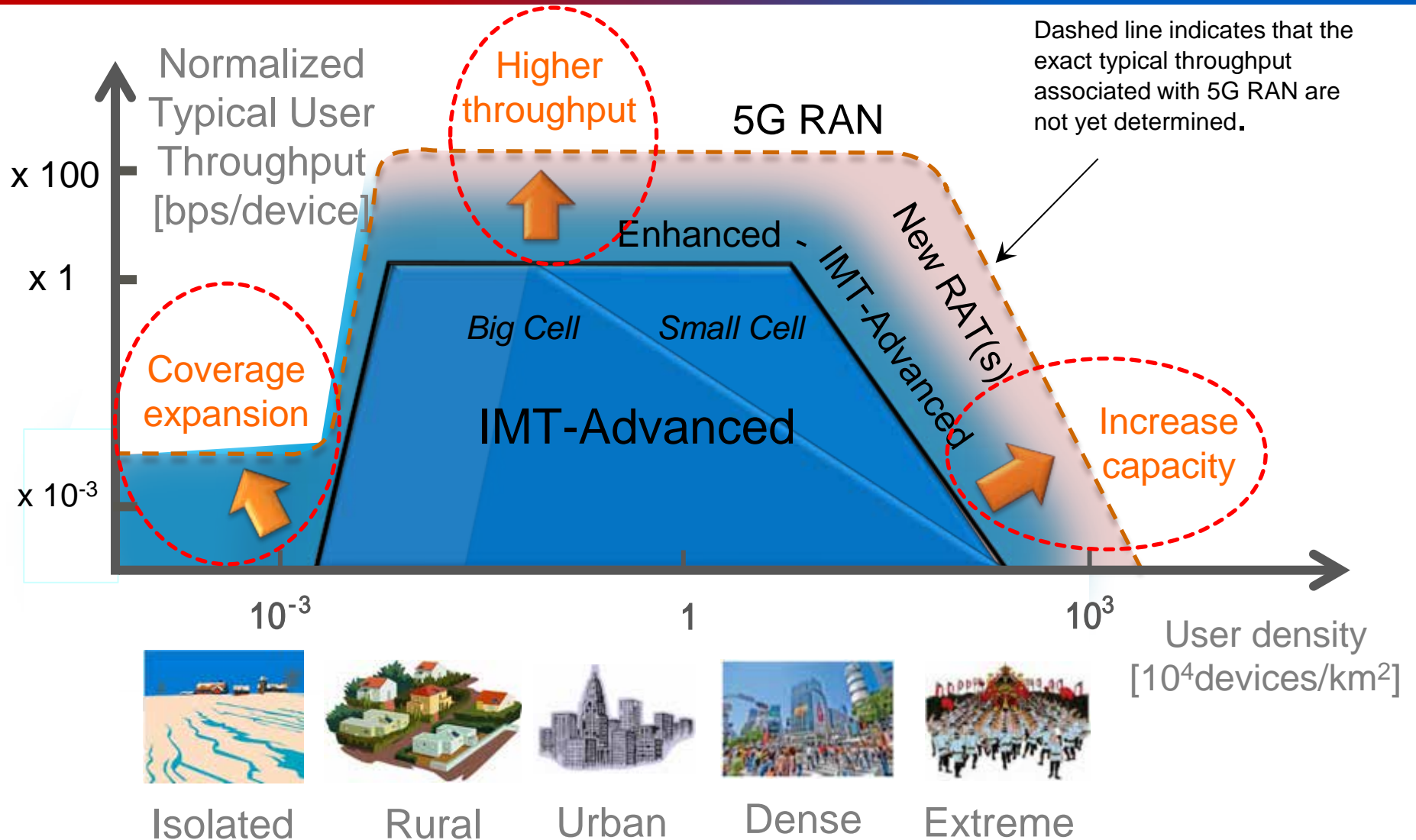


"Mobile Communications Systems for 2020 and beyond", ARIB 2020 and Beyond Ad Hoc Group White Paper, October 2014.

# RAN and Backhaul joint operation model

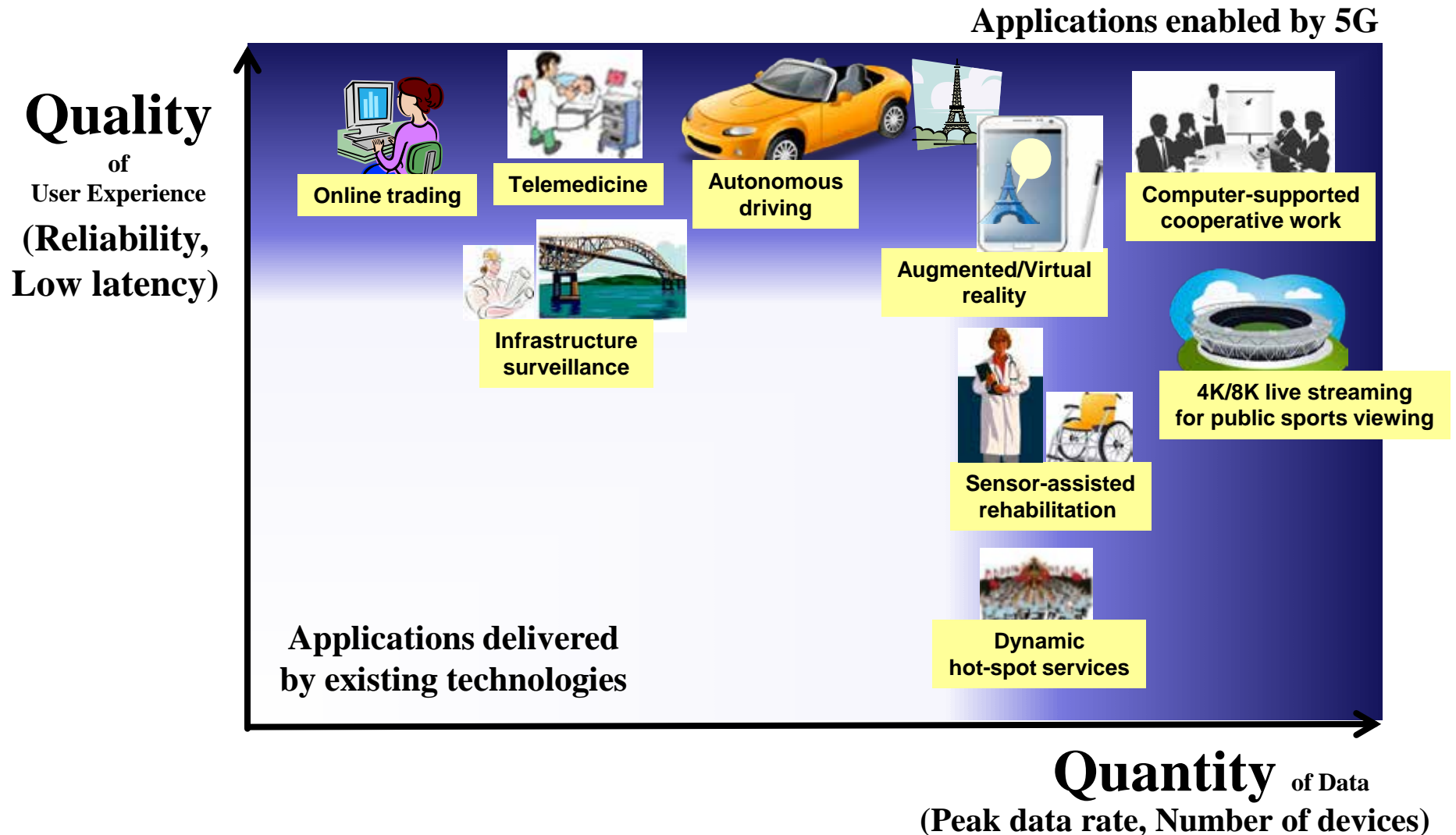


# Framework for 5G RAN



"Mobile Communications Systems for 2020 and beyond", ARIB 2020 and Beyond Ad Hoc Group White Paper, October 2014.

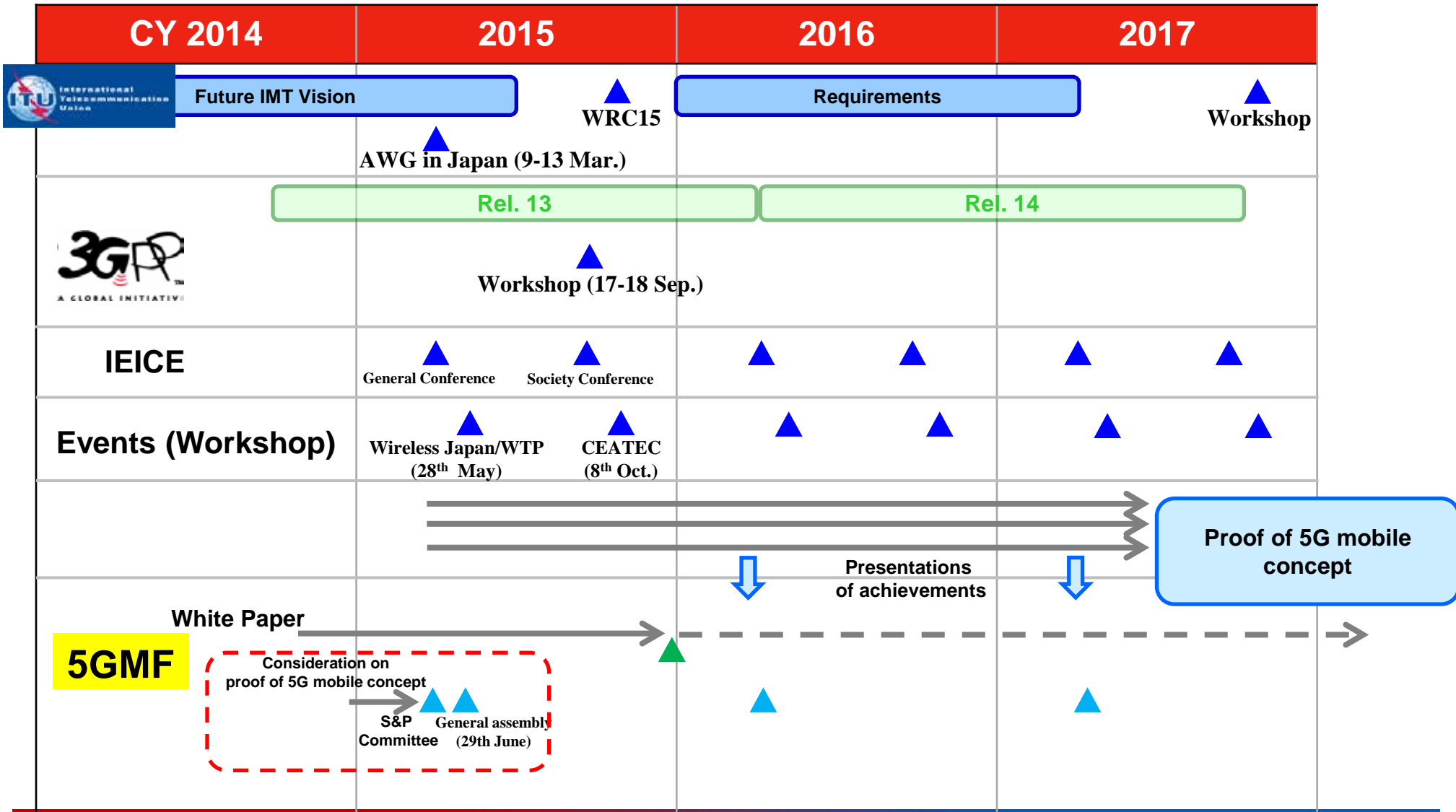
# Potential Application enabled by 5G mobile



# 4. Action plan toward 5G mobile



# 4.1 Action plan (mid-term) of 5GMF



### n Objectives :

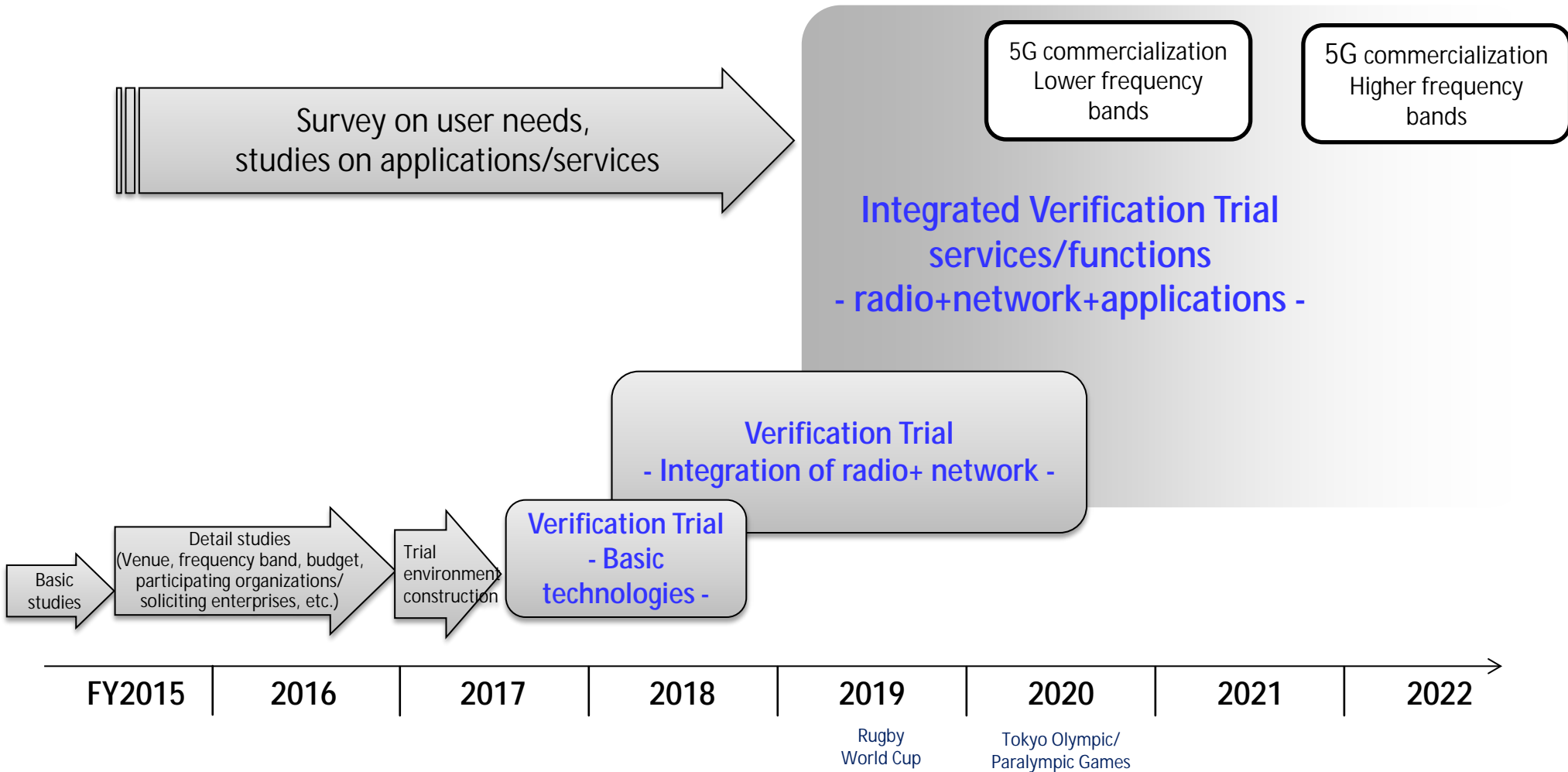
- u Estimation of research and development result in 5GMF activities
- u Estimation of the operation of an overall 5G mobile
- u Demonstration of outputs on 5GMF to domestic and international organizations
- u Promotion for practical use of 5G mobile

# Aims of 5G Integrated Verification Trial

- n Launch an integrated verification trial in FY2017 connecting radio access, network, and applications to ensure smooth commercialization of 5G systems by 2020.
- n Evaluate 5G services in actual environments, after evaluating basic functions in the initial phase, in order that the views of application developers and users are reflected as research and development efforts progress.
- n Contribute to global R&D and standardization efforts of 5G systems by having an open environment for the verification trial in Japan, allowing for participation of relevant parties, enterprises and universities involved in 5G systems research worldwide, thereby accelerating the widespread adoption of 5G systems.

# Schedule Overview

## n Verification to commence from FY2017



## n Basic Technologies (Radio, network)

- u Capacity enhancement using massive user beam forming technique, etc.
- u Transmission speed enhancement using higher-order spatial multiplexing technique, etc.
- u Multiple access using uplink non-orthogonal multiple access, extended intermittent receiving techniques, etc.
- u Capacity enhancement using network technologies compatible with 5G radio access

## n Radio + Network Integration

- u Super-low latency through the use of mobile edge computing, etc.
- u Enhanced reliability using super-low latency device-to-device communication, etc.
- u Improving flexibility through the concept of "network softwarization", virtualization techniques, etc.

## n Radio + Network + Applications

- u Wide variety of 5G applications in new areas
  - ITS, medical/health/beauty/elderly support, security/resilience, signage, energy, agriculture, education, etc.
- u Applications developed in view of Tokyo Olympic/Paralympic Games

# Spectrum to be Used for Verification Trial

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- n Both lower frequency bands (frequency bands used in existing systems, below 6GHz) and higher frequency bands (centimeter, millimeter waves) to be included in the scope of verification trial.
- n The specific frequency bands to be used in the verification will be selected in the course of finalizing the details of the system to be evaluated.

- n Open to general participation by any enterprise agreeing to the “Aims of Verification” in Japan and abroad including:
  - u Parties involved in the research and development promoted by the Ministry of Internal Affairs and Communications
  - u 5GMF Members
  - u Other carriers, vendors, application developers, etc.
- n Broad participation of relevant parties is desired in light of the trial’s nature: an integrated verification trial combining radio, network and applications

- n Tokyo (In view of the 2020 Tokyo Olympic/Paralympic Games)
- n Local cities



- n Select typical urban indoor/outdoor environments as venues for the verification trial
  - u Outdoor: Vehicular areas, street canyons, open squares
  - u Indoor: Shopping mall, offices
- n Solicit experiments for speed/capacity enhancement and latency improvement in each environment
- n Antenna installations will be shared by multiple trial participants to the extent possible
- n Each trial participant will use different frequency bands. Frequency sharing conditions to be confirmed.

# 5. Global collaboration on 5G

## n Collaborate bilaterally with other organizations

### u 5G PPP

- Meeting, Munich, 11 April 2014
- MoU signed, Frankfurt, 25 March 2015

### u Korea 5G Forum

- Meeting, Tokyo, 19 August 2013
- Meeting, Tokyo, 3 July 2014
- MoU signed, Tokyo, 6 April 2015

### u Wireless World Research Forum ( WWRF )

- MoU signed , e-mail, 21 August 2015

### u Indonesia 5 G Forum

- MoU signed , Bali (Indonesia), 21 September 2015
- Meeting, Bali (Indonesia) , 22 September 2015

## n Hold workshops on 5G related issues

- u CEATEC-Japan, Chiba, 8 October 2014
- u 18th Meeting of the APT Wireless Group, Kyoto, 9 March 2015
- u Wireless Technology Park, Tokyo, 28 May 2015
- u CEATEC-Japan, Chiba, 8 October 2015

# Global Collaboration on 5G (3)

- n MOU exchange ceremonies with 5G associations worldwide
  - u 5G Infrastructure Association  : 25 March 2015
  - u Korea 5G Forum  : 6 April 2015
  - u Wireless World Research Forum(WWRF) : 21 August 2015 (e-mail)
  - u Indonesia 5G Forum  : 21 September 2015



# 6. Summary

# Summary

- n **Lead R&D and international standardization to implement 5G mobile for 2020 and beyond**
  - u Publish White Paper and Implementation roadmap
  
- n **Demonstrate verification tests on Proof of Concept**
  - u Summarized the results of pre-verification research by the end of June 2015 and call for the participation of 5GMF members
  - u Perform verification tests (mobile network + wired network + mobile application) from FY 2017
  
- n **Contribute actively internationally through collaboration with international organizations**
  - u Promote the sharing information and vision for 5G mobile with overseas organizations in Europe (5G-PPP), Korea (5G Forum), China (IMT-2020 PA, FuTURE Forum), etc

**Thank you  
for your kind attention!**

<http://5gmf.jp/en/>