

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

RWS-150038

## 5GMF activities for 2020 and beyond in Japan

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**5GMF Technical Committee**

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The Fifth Generation Mobile Communications Promotion Forum

3GPP RAN workshop on 5G

PLACE: Phoenix, AZ, US

DATE: Sep. 17-18, 2015

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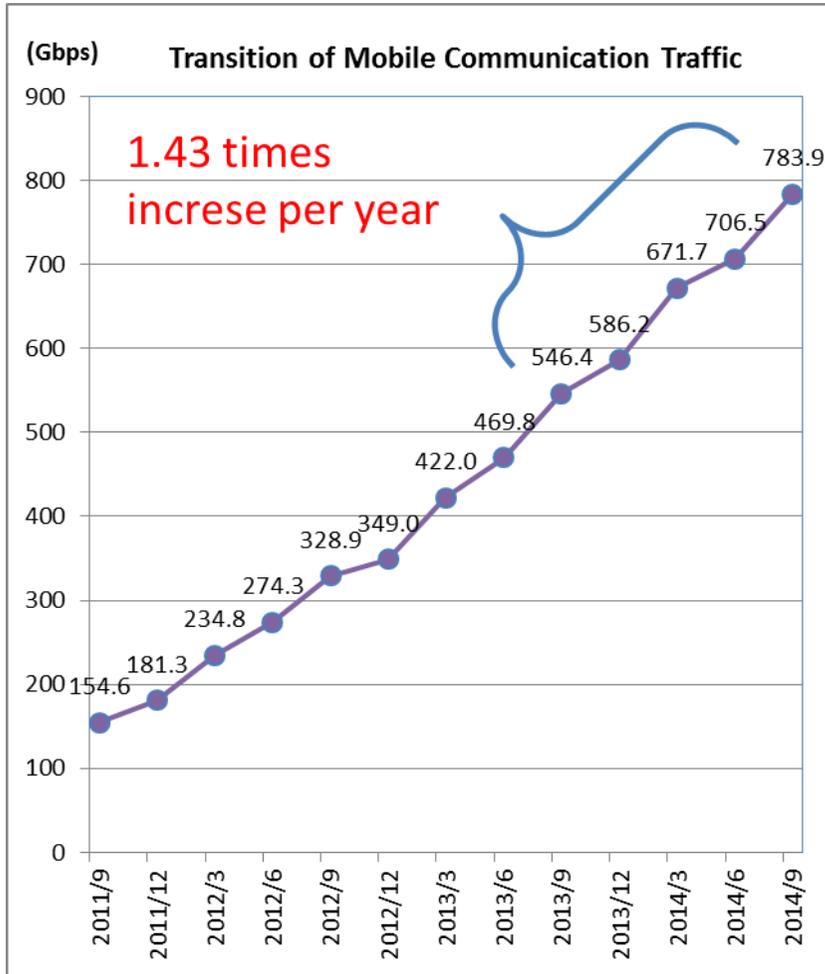
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# 1. Background

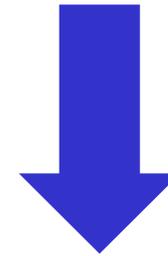
# Background

- In July 2014, the Radio Policy Vision Council organized by Ministry of Internal Affairs and Communications(MIC) showed the road map of 5G mobile under “Mid-term arrangement”.
  - ◆ Traffic trend of mobile communications within 10 years
  - ◆ Roadmap towards implementation of 5G mobile in Japan
  - ◆ Establishment of a promotion organization within 2014 to strongly promote collaborative initiatives among Industry, Academia and Government

# Traffic trend of mobile communication



- 1.5~2.0 times increase trend per year

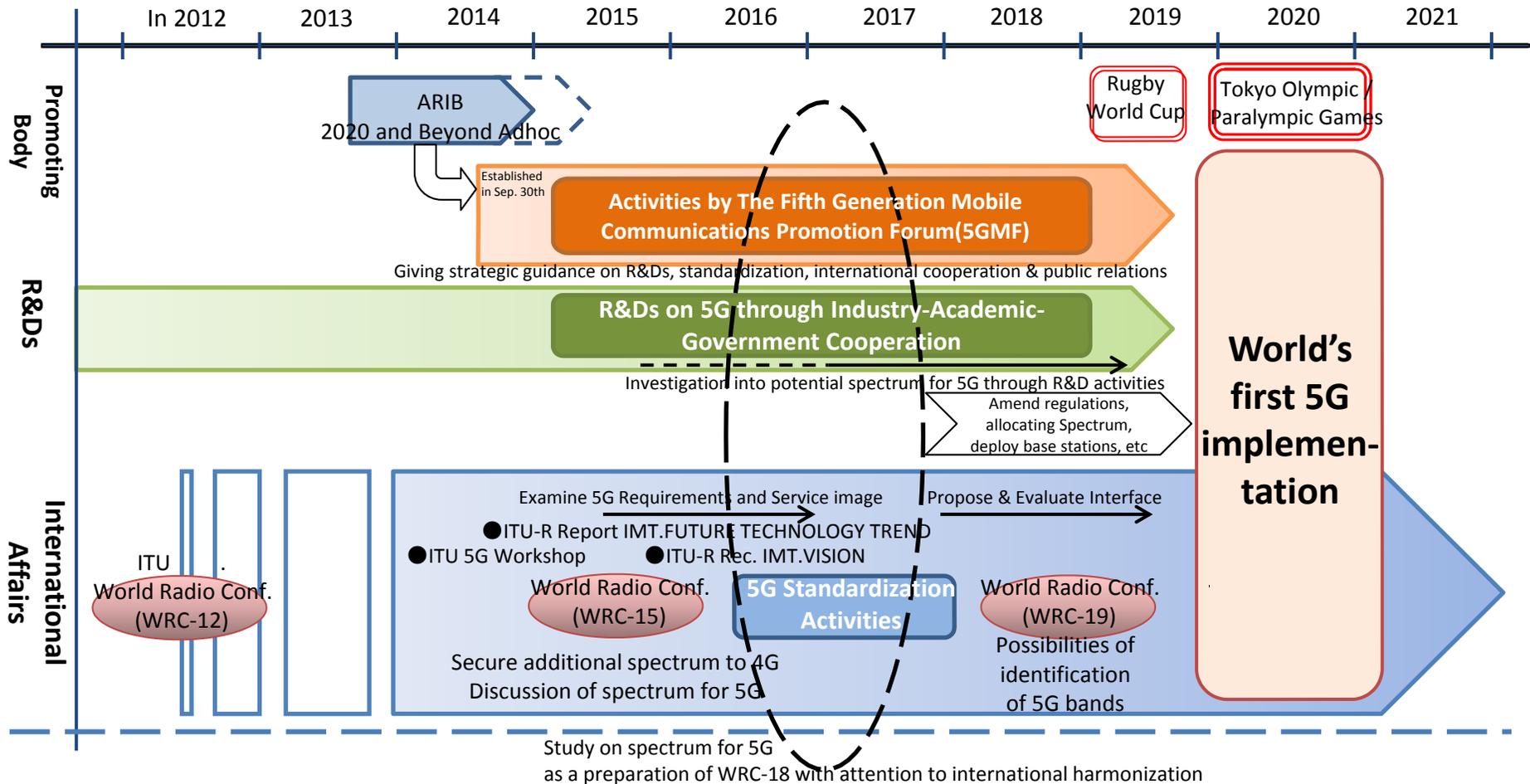


In case factor of 2.0 times,

- 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.

# 2. Organization of 5GMF

# Organization

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Establishment : 30 September 2014

Chairman : Professor Emeritus Susumu Yoshida (Kyoto University)

Vice-Chair : Dr. Masao Sakauchi

(National Institute of Information and Communications Technology (NICT))

Vice-Chair : Mr. Hiromichi Shinohara (NTT)

Members : 76 (as of 20 May 2015)

Ordinary member: 58, Individual member: 15

Special member: 3 (MIC, ARIB, TTC)

Secretary : Association of Radio Industries and Businesses (ARIB)

Telecommunication Technology Committee (TTC)

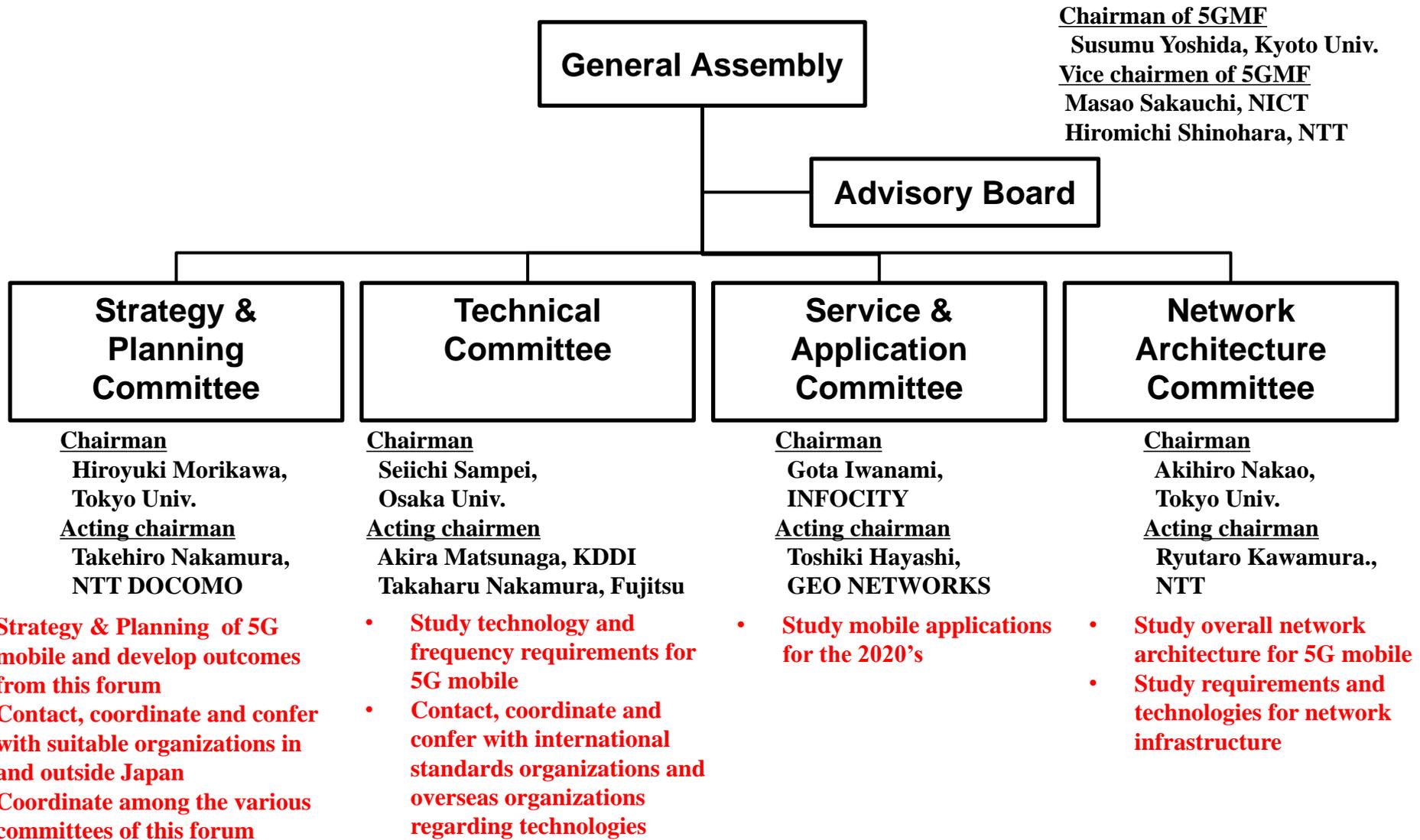
Web site : <http://5gmf.jp/en/>

## ■ Objectives of 5GMF:

- ◆ To promote R&D concerning 5G mobile, research and study on 5G mobile standardization
- ◆ To collect information relating to 5G mobile and exchange thereof with other organizations
- ◆ To correspond and coordinate with related organization concerning 5G mobile
- ◆ To conduct dissemination and enlightenment pertaining to 5G mobile

5G mobile = The 5th generation mobile communications systems

# Organizational Structure of the 5GMF



# **3. Pre-studies on 5G mobile in ARIB 2020 and Beyond Ad Hoc**

# Market and user trends

1. “Everything can be done via the Internet” and people will enjoy its benefit.
2. ICT will be used in much more cases and will be applied for vast variety of services.



Wide variety of applications, thereby fostering every industry innovation



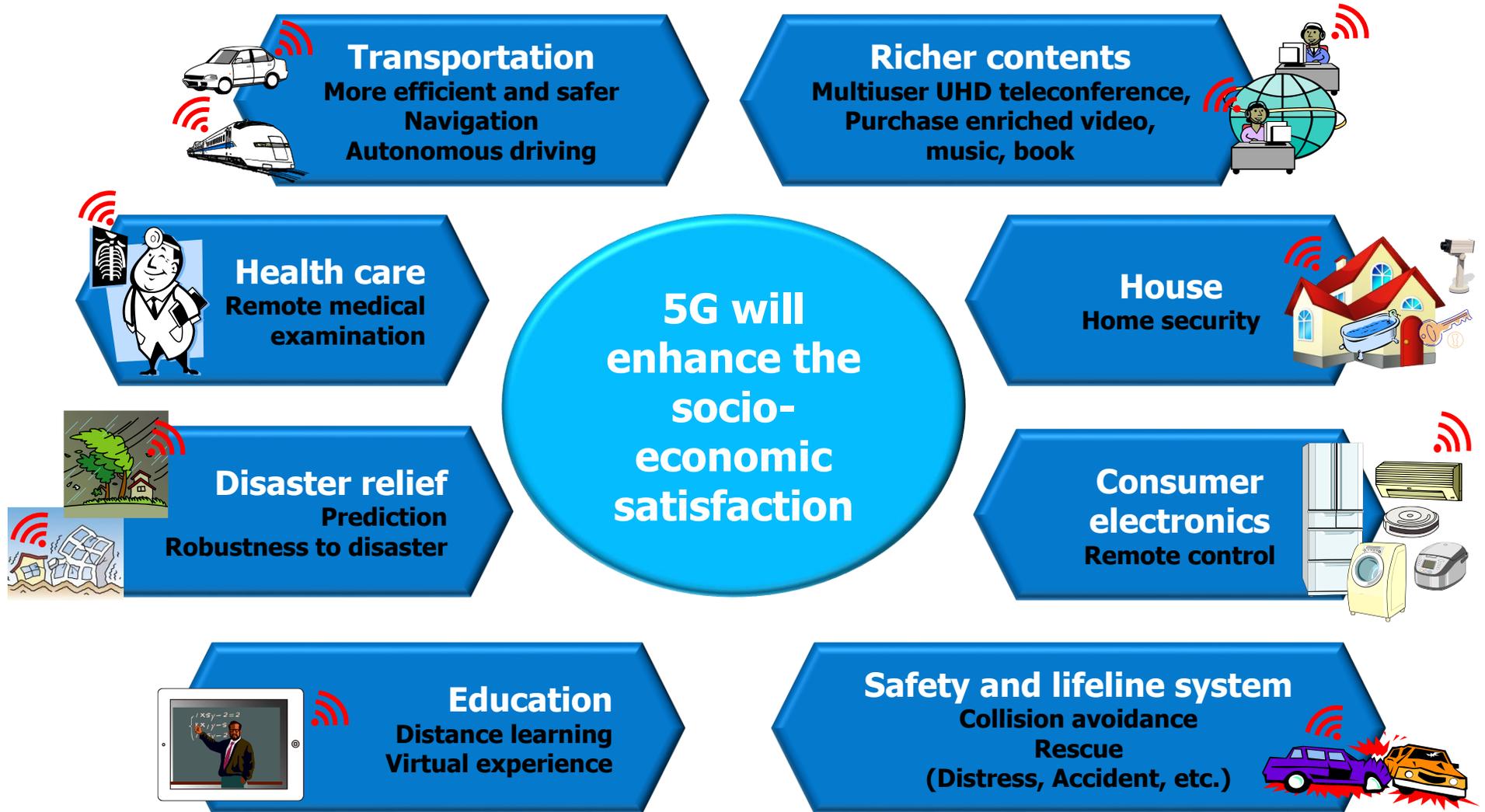
Supporting flexible life styles



Serve numerous socio-economic requirements (Disaster prevention, Medical Care, Energy saving, Environmental problem)

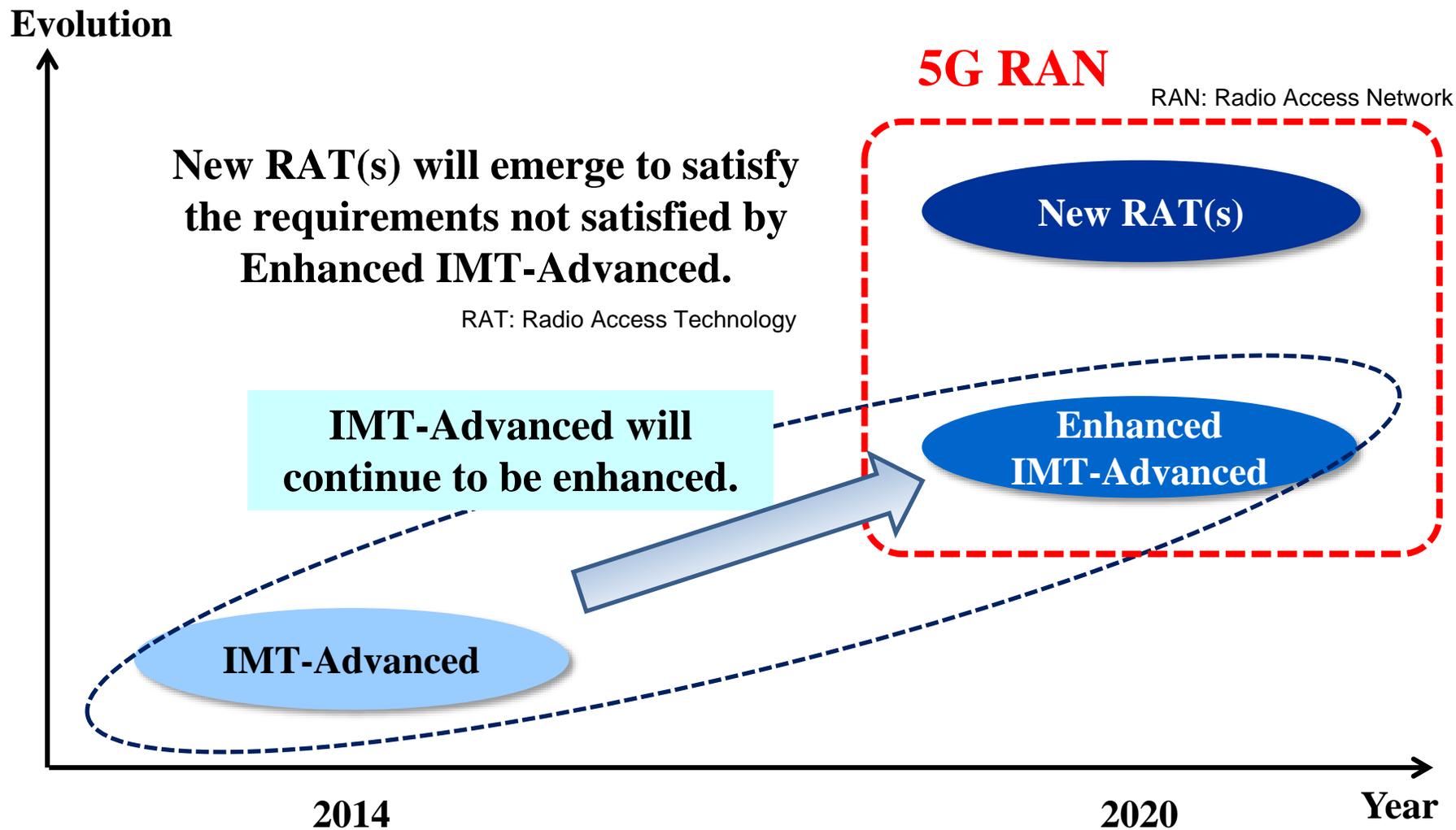
"Mobile Communications Systems for 2020 and beyond", ARIB 2020 and Beyond Ad Hoc Group White Paper, October 2014.

# Typical usage scenarios of 5G



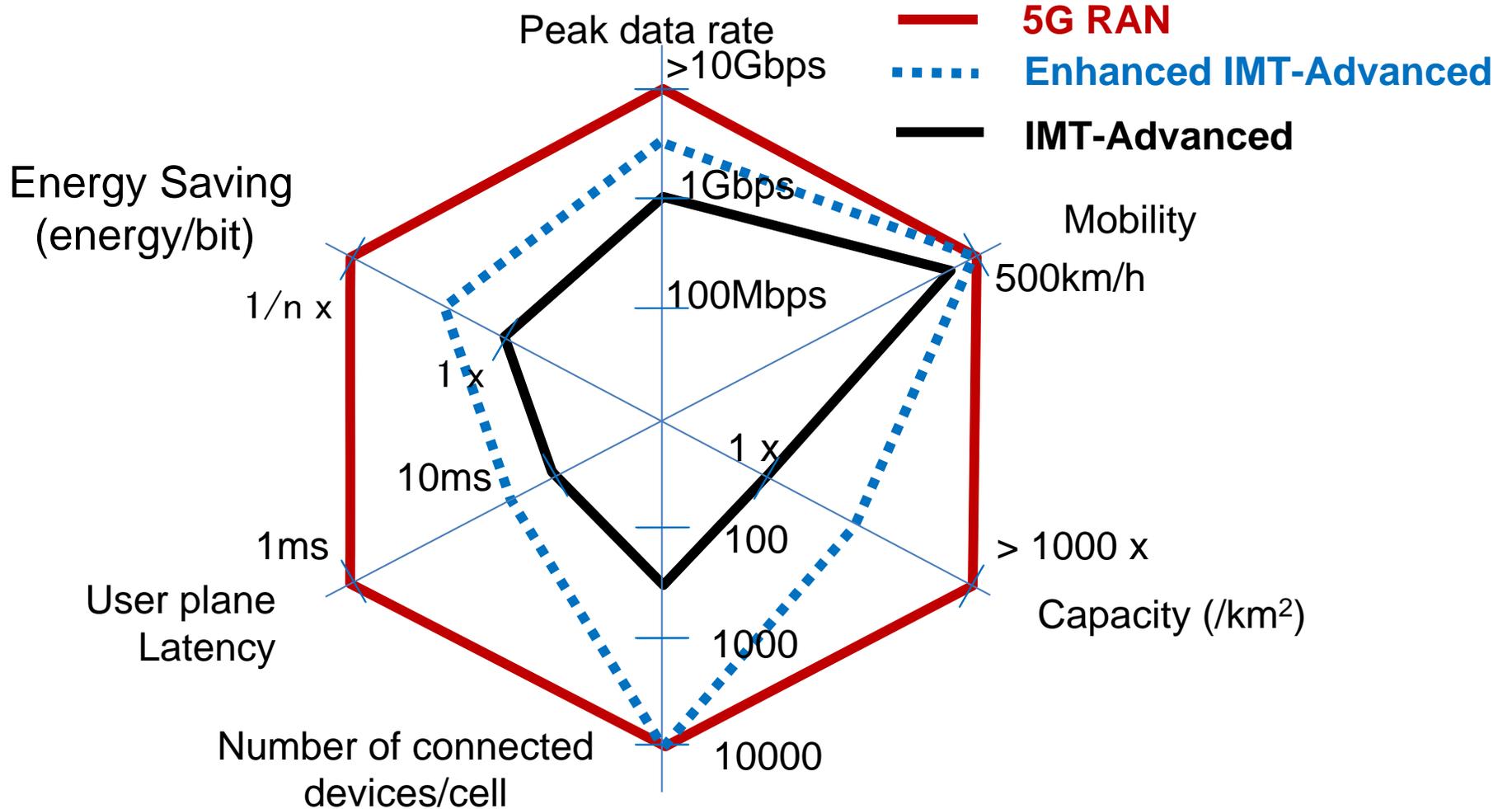
"Mobile Communications Systems for 2020 and beyond", ARIB 2020 and Beyond Ad Hoc Group White Paper, October 2014.

# Road to 5G mobile



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

# Maximum system capabilities

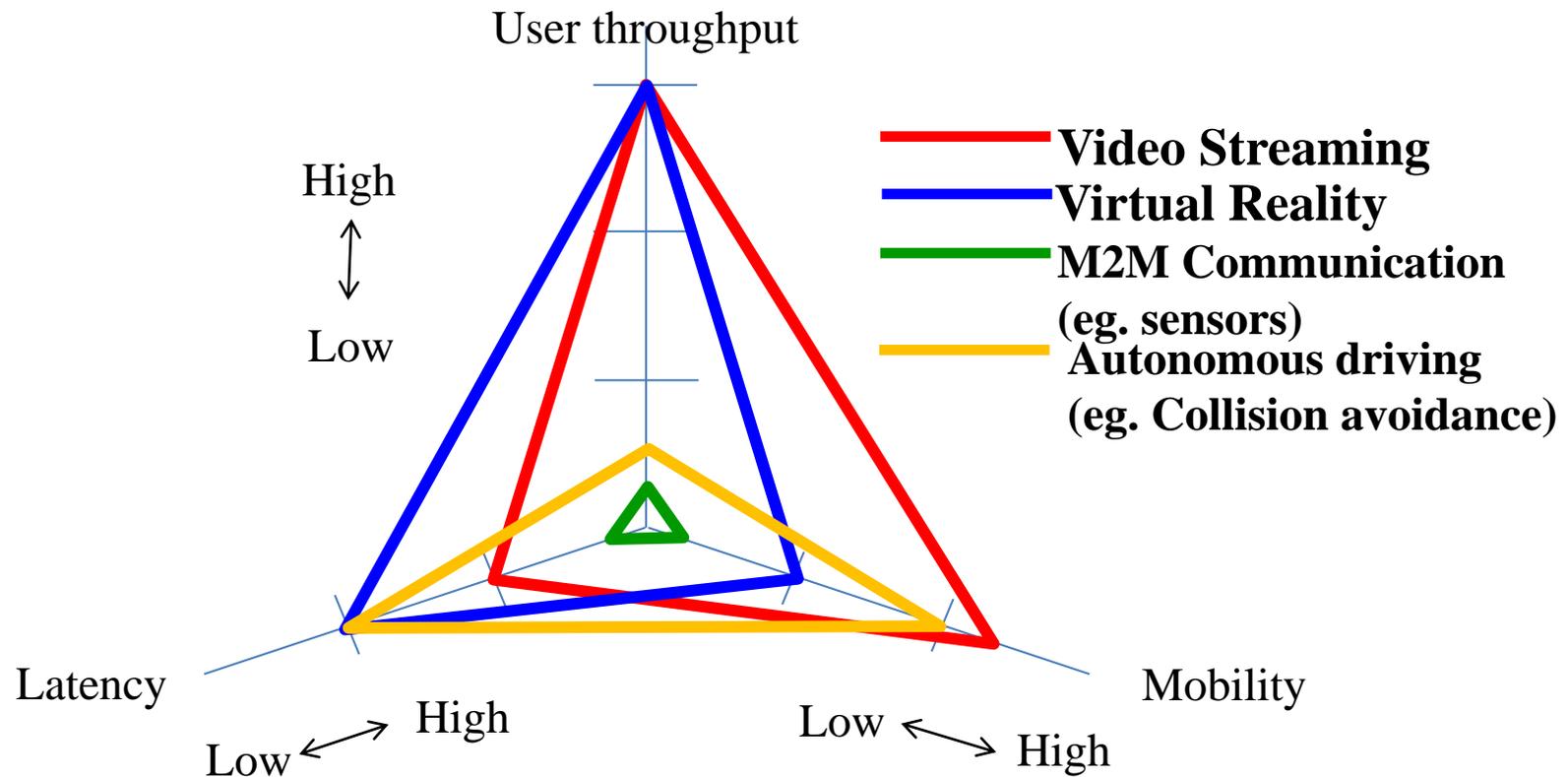


"Mobile Communications Systems for 2020 and beyond", ARIB 2020 and Beyond Ad Hoc Group White Paper, October 2014.

# Required capabilities

Required capabilities vary depending on applications from a user perspective.

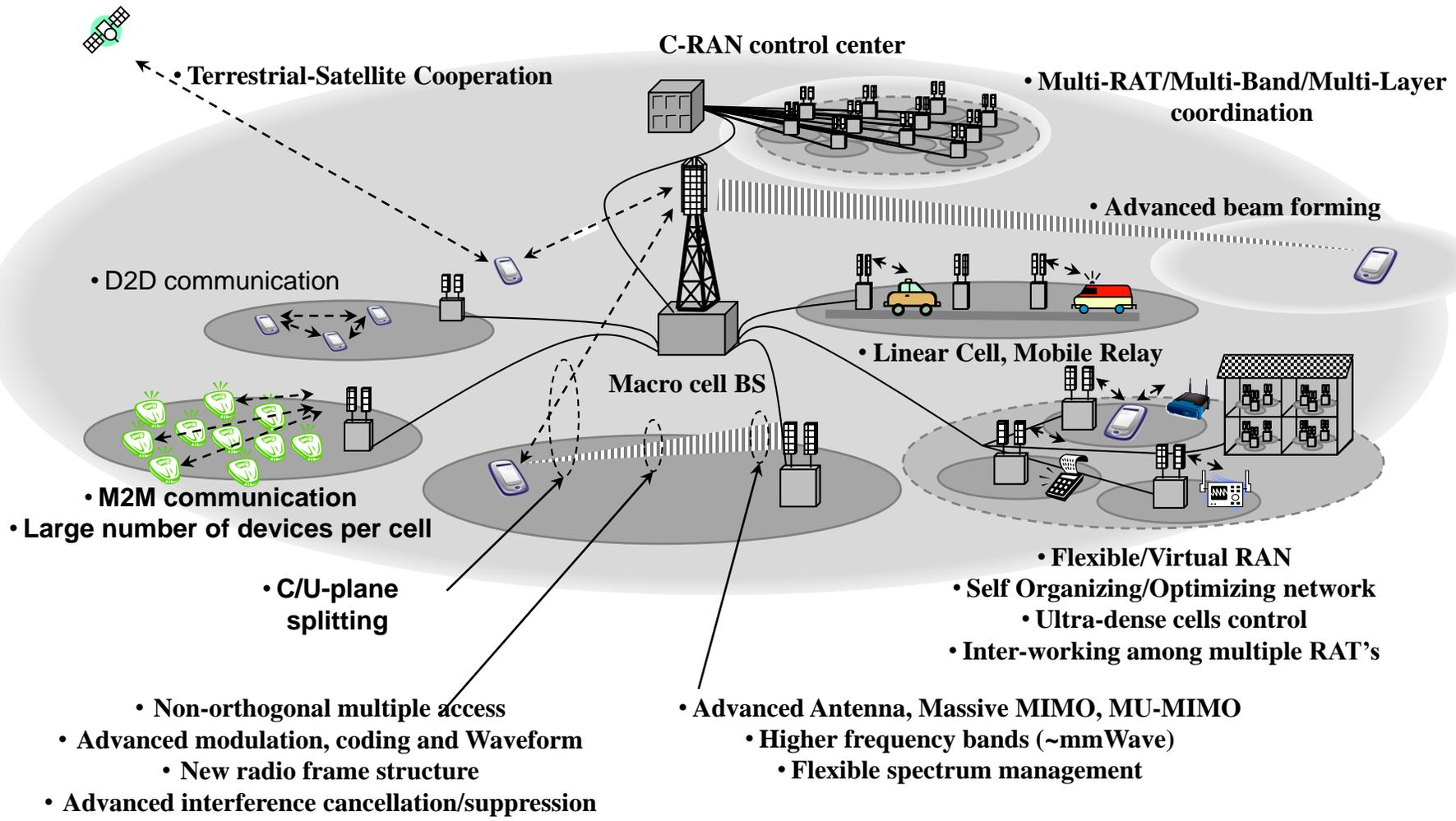
Efficient use of resources will be desirable.



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

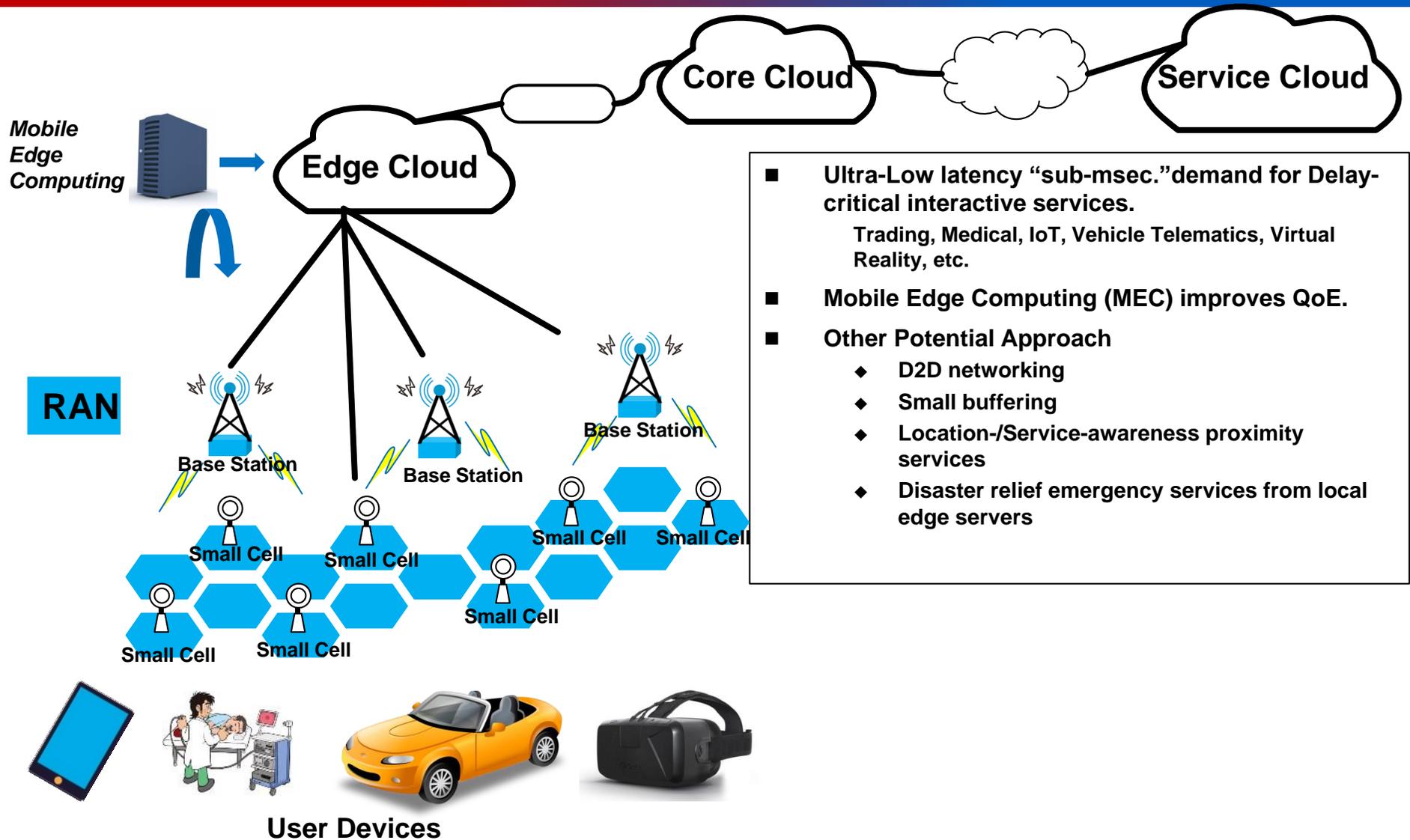
# 4. Example of 5G mobile Concept

# Radio Access Technologies for 5G mobile



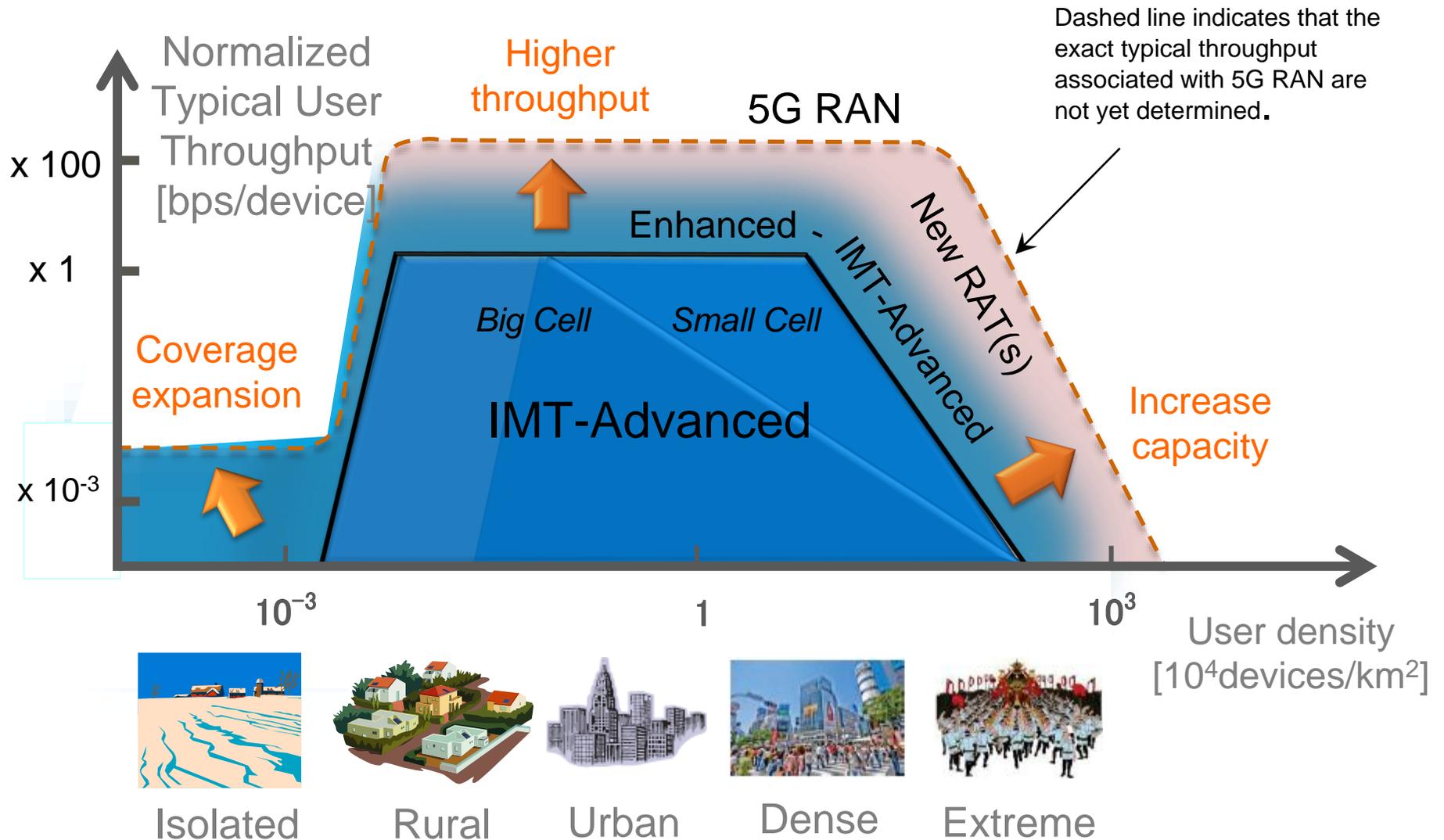
"Mobile Communications Systems for 2020 and beyond", ARIB 2020 and Beyond Ad Hoc Group White Paper, October 2014.

# RAN and Backhaul joint operation model



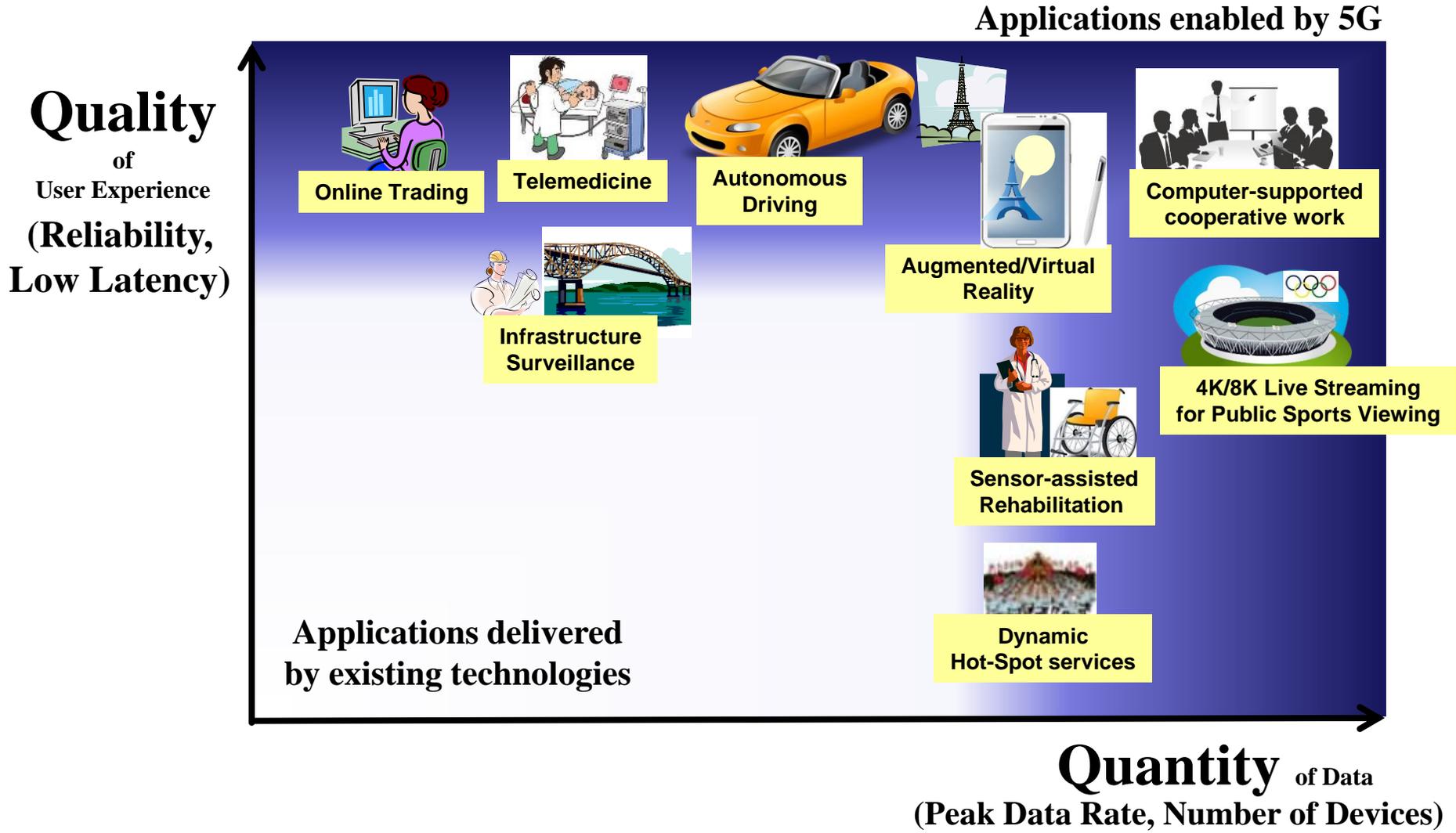
- **Ultra-Low latency “sub-msec.” demand for Delay-critical interactive services.**  
Trading, Medical, IoT, Vehicle Telematics, Virtual Reality, etc.
- **Mobile Edge Computing (MEC) improves QoE.**
- **Other Potential Approach**
  - ◆ D2D networking
  - ◆ Small buffering
  - ◆ Location-/Service-awareness proximity services
  - ◆ Disaster relief emergency services from local edge servers

# Framework of 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



# Network Technology Roadmap

4K/8K Streaming    AR/VR    Autonomous driving    Online Trading    M2M/IoT

## End-to-end Quality of 5G Applications

Latency

10ms => 1ms

Data rate

1Gb/s => 10Gb/s

Number of Devices

500/cell => 10,000/cell

**Flexibility**

Support of diversified requirements  
in an efficient manner

Mobile Edge  
Computing

Fronthaul /  
Backhaul

Management /  
Orchestration

Network  
Softwarization

Security

E2E slicing

Autonomy

Intelligence

Analytics

Knowledge

Low Latency

Multi-Tenancy

Automation

Programmability

2018: Basic key functions  
2020: Proof-of-concept for  
emerging applications  
2022: Optimization of latency  
to meet application's  
requirements

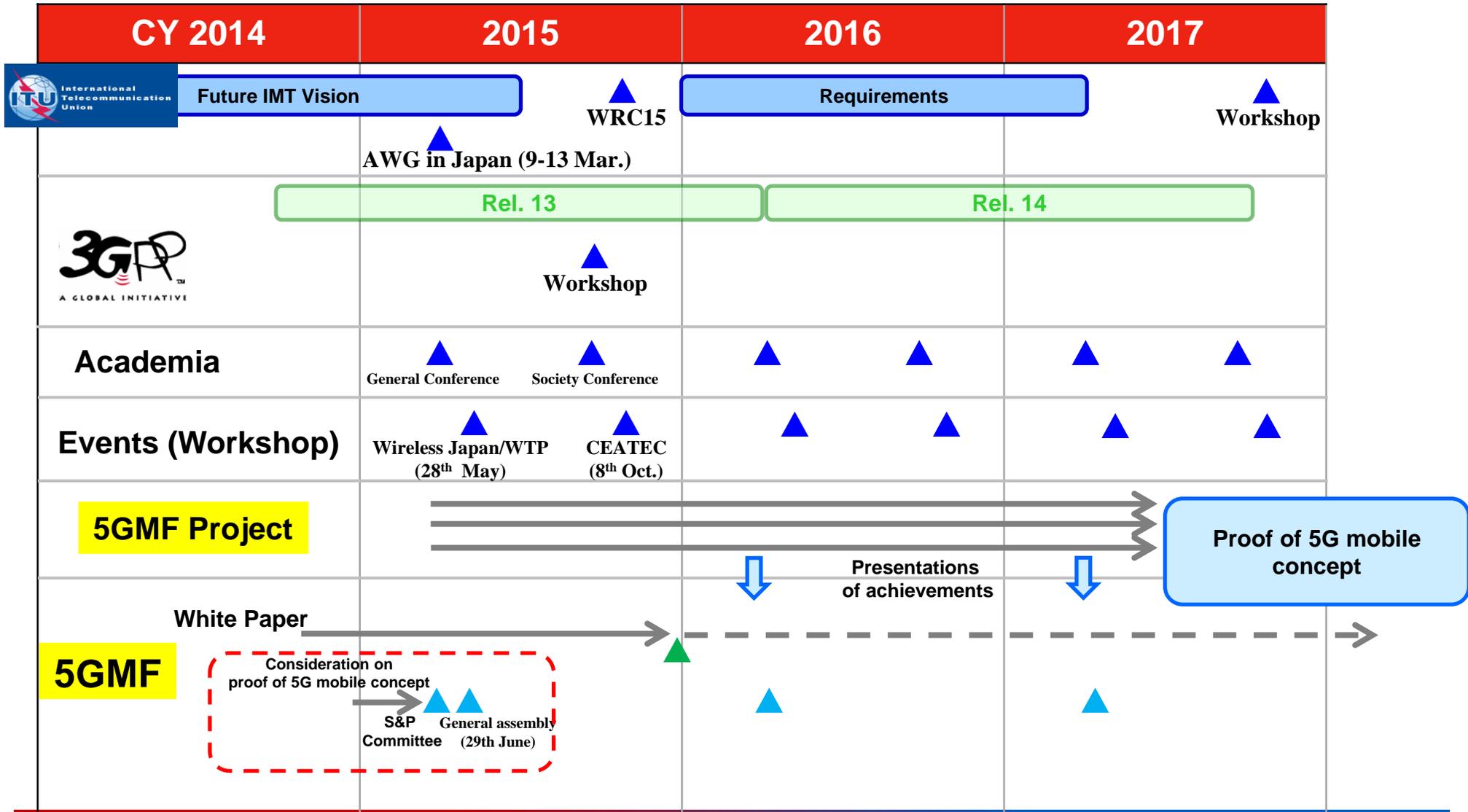
2016 Relay with packet  
classification (partially)  
2020 Optical transport for 5G  
RAN  
2022 Optical distribution  
networks for 5G BS

2018 Autonomous control  
and management  
2020 Management platform  
for optimizing service  
2025: Intelligence for  
endpoint identification

2018 NFV/SDN softwarization  
platform  
2020+ Elastic networks,  
Advanced SON  
2022 Application-driven  
programmable networks

# 5. Action plan toward 5G mobile

# Mid-term activities plan of 5GMF



# Proof of 5G mobile concept (1)

## ■ Objectives :

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

## ■ Tentative Schedule

- ◆ Start from CY 2017
  - To estimate fundamental features in CY 2017.
  - To estimate advanced features from CY 2018.
  - Terms of verification tests: TBD
- ◆ To confirm an overview of the proof of the 5G mobile concept (participating members, services and applications, network configuration, etc.) by the end of June 2015, and to proceed the approval procedure of 5GMF
- ◆ To consider press release after the approval of 5GMF Assembly in the end of June 2015

# 6. Summary

# Summary(1): Target of 5GMF

- **To lead R&D and International standardization to implement 5G mobile for 2020 and beyond**
  - ◆ **To make up the White Paper and Implementation roadmap**
- **To demonstrate verification tests on Proof of our concept**
  - ◆ **To summarize the overview of verification by the end of June 2015 and call for participating of 5GMF members**
  - ◆ **To perform the verification (mobile network + wired network + mobile application) from CY 2017**
- **To contribute actively to the international collaboration with international organizations**
  - ◆ **To promote sharing information and vision with overseas, Europe(5G-PPP), Korea(5G Forum), China(IMT-2020 PA, FuTURE Forum)**

# Members



Members:76 (as of 20 May 2015)

Ordinary member:58, Individual member:15,  
Special member: 3 (MIC, ARIB, TTC)

**Thank you  
for your attention.**

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