

# 5G Spectrum Related Activities of Japan

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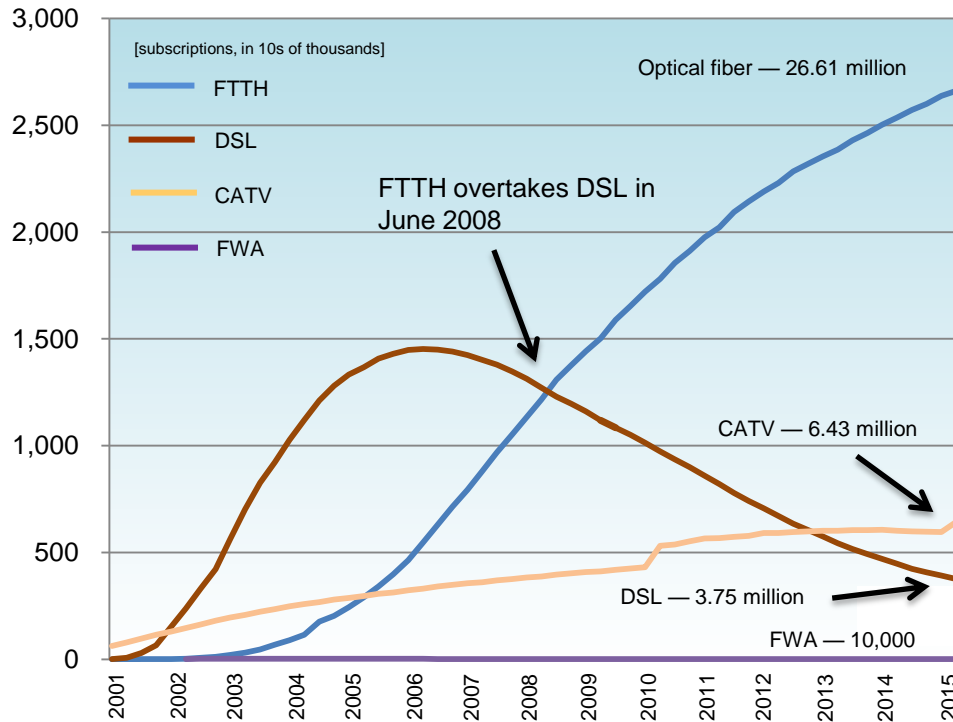
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# Increase in subscribers to ultra-high-speed broadband services in Japan

- **87.25 million subscribers to ultra-high-speed mobile broadband services** (as of Mar. 31, 2015), an increase of approximately 1.6 times in one year.
- In FY 2013, the number of subscribers to ultra-high-speed mobile broadband services surpassed the number to fixed-line services

## Fixed-line services

**FTTH (optical fiber) subscriptions surpassed DSL subscriptions in June 2008 and now account for about two-thirds of all fixed-line broadband subscriptions**

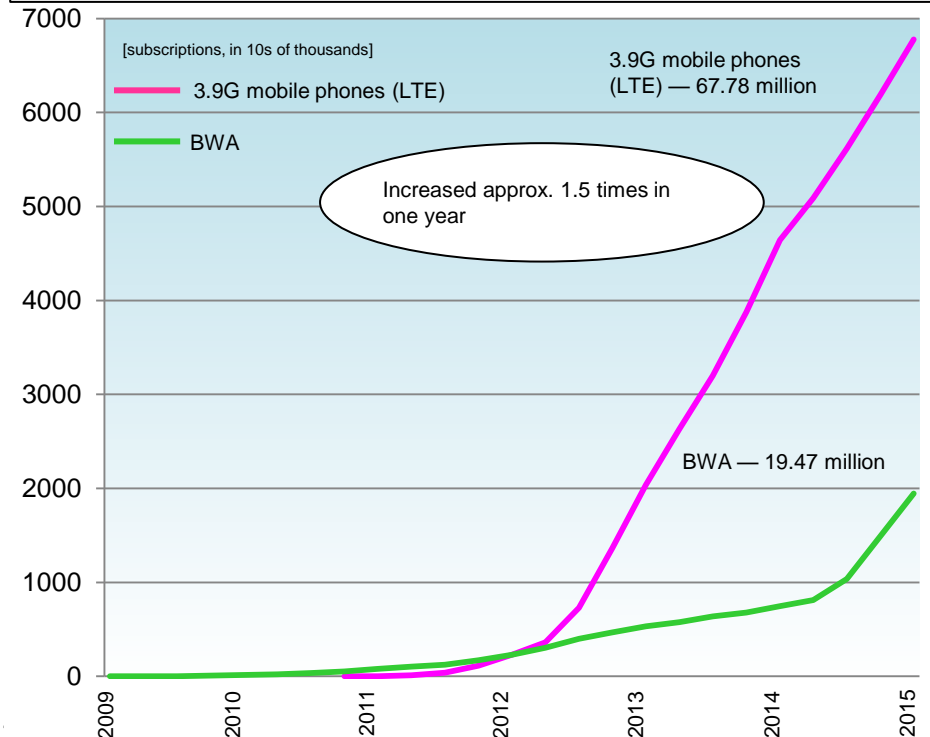


Note: Some carriers changed the calculation method for CATV access services at the end of March 2010 and the end of March 2015  
 Note: FWA: Fixed Wireless Access  
 Note: DSL: Digital Subscriber Line

As of March, 31, 2015

## Mobile services

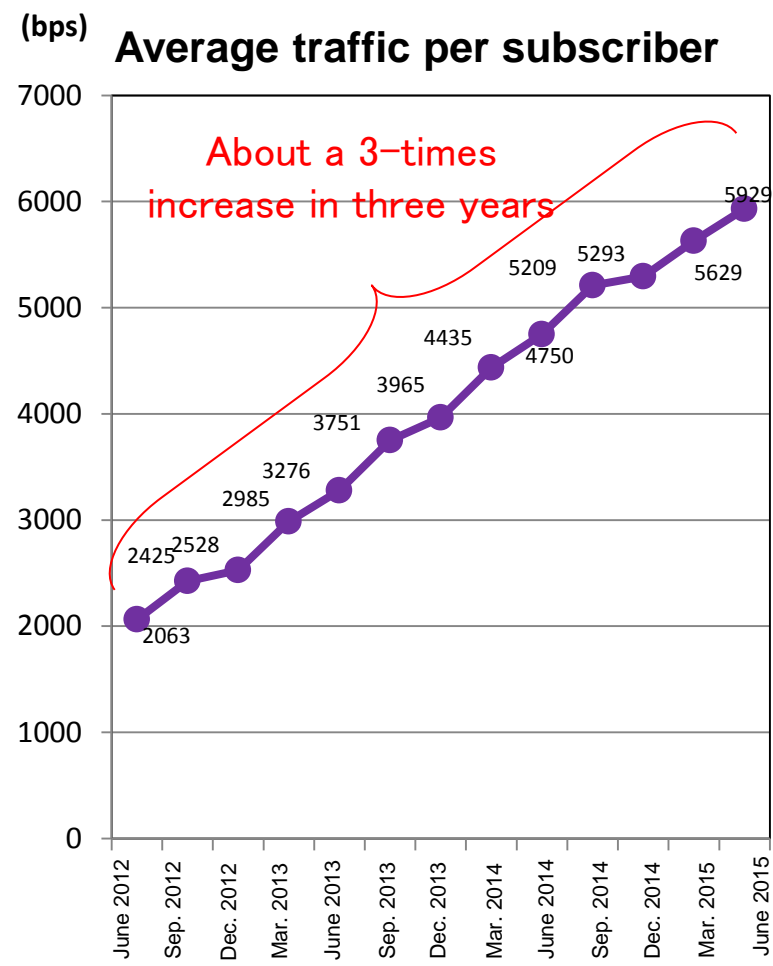
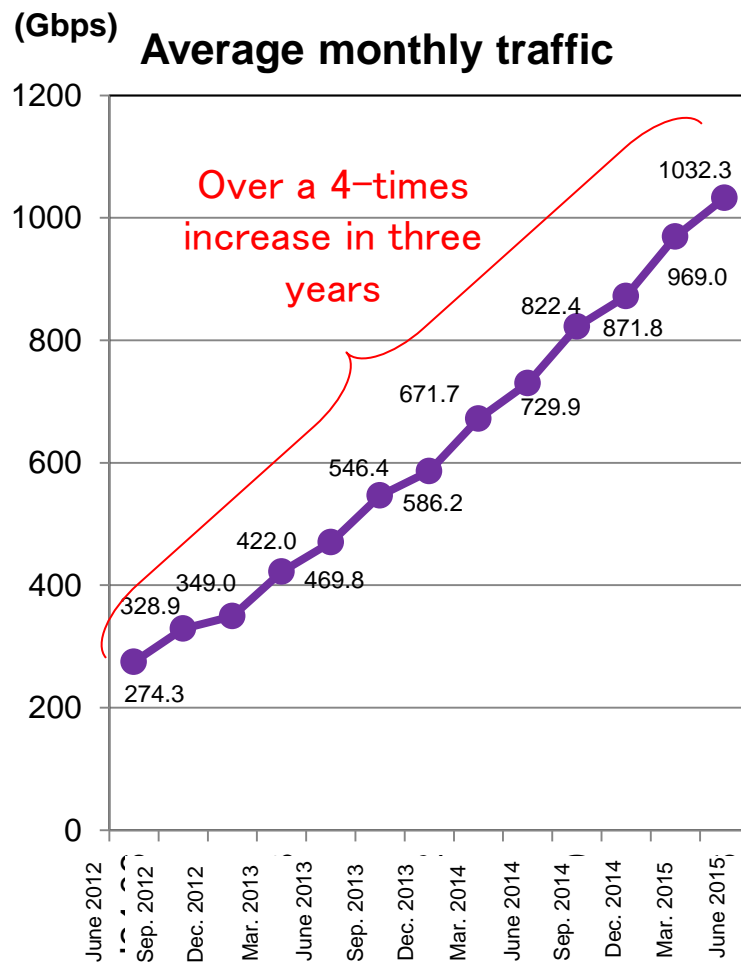
**Subscriptions to 3.9G mobile phone (LTE) access services increased approximately 1.5 times over the previous year.**



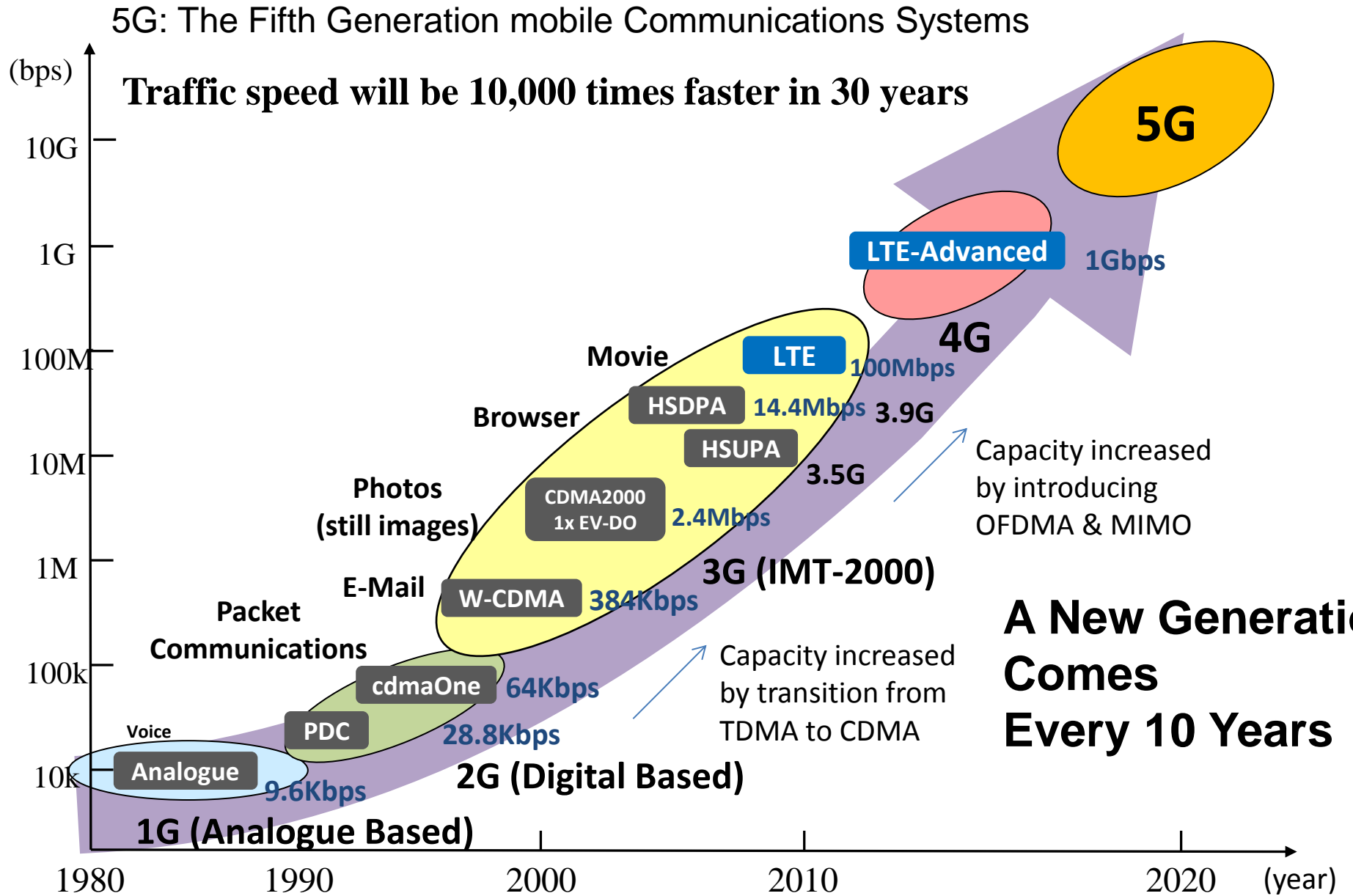
As of March, 31, 2015

# Increase in Mobile Communications Traffic in Japan

- The number of smartphone subscribers on March 31, 2015 was 68.50 million (an increase of approximately 2.6 times over three years).
- Because of the increase in smartphone users and other reasons, **the average monthly mobile communications traffic (per second) has risen more than 4 times in three years**, reaching 1032.3 Gbps in June 2015.



# Evolution of Mobile Communications Systems (from 1G to 5G)

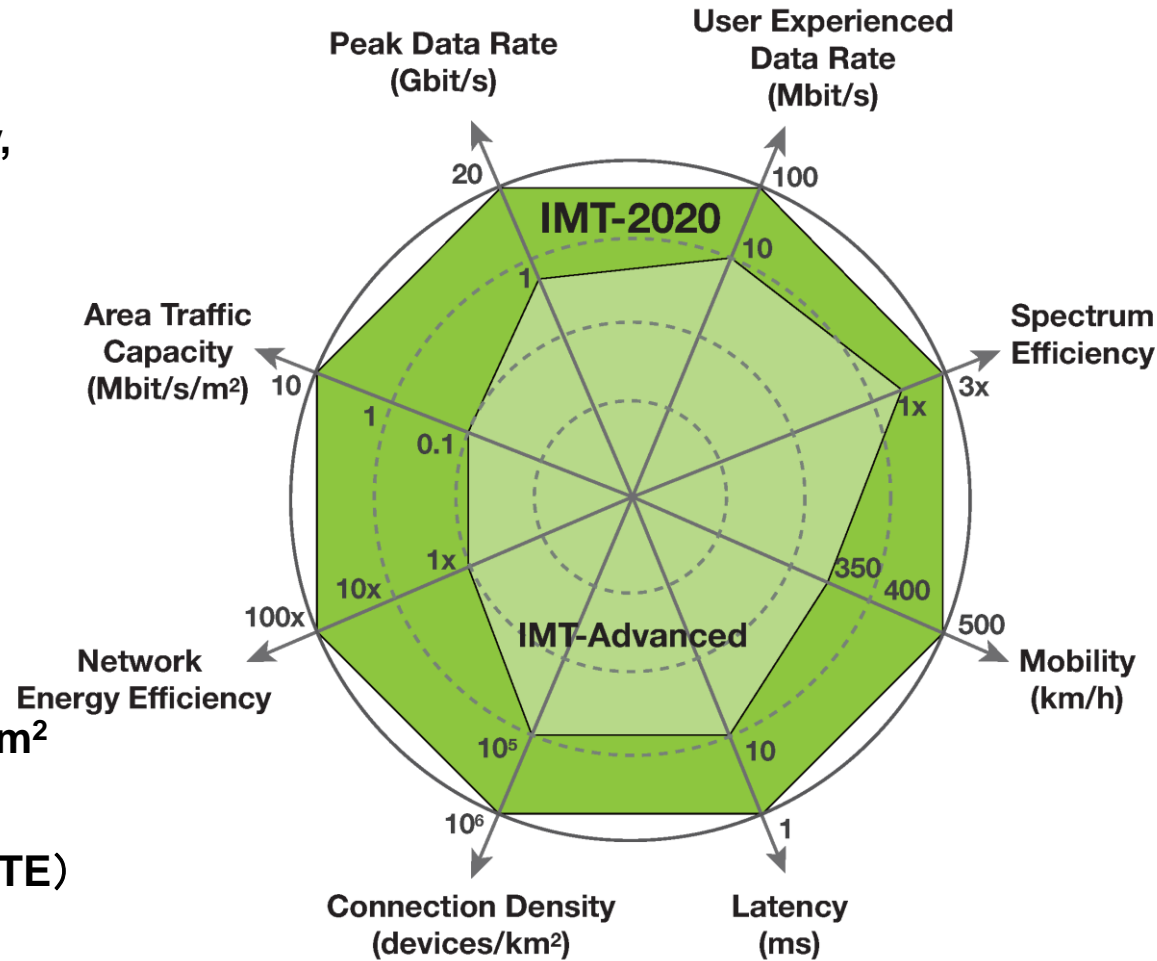


## ◆ Requirements of 5G

- High Data Speed and Ultra Low Latency, comparable to wire connections
- Multiple Simultaneous Connections in sensor networks

## <Key Properties>

- ✓ Peak Data Rate  $\geq 10\text{Gbps}$   
(100 x current LTE rate)  
\*under certain circumstances could reach 20Gbps
- ✓ Connection density  $\geq 1\text{M connections/ km}^2$   
(100 x current LTE)
- ✓ latency  $\leq 1$  millisecond (1/10 of current LTE)
- ✓ System Capacity  $\geq 10\text{Mbps/m}^2$   
(1,000 x current LTE)
- ✓ Low power consumption (Energy Efficiency)
- ✓ Effective Use of Spectrum Efficiency



# 5G mobile communications systems: from R&D and standardization to deployment

## Issues ahead of the smooth standardization and deployment of 5G

- It is important to ensure even broader frequency bands to realize faster communications and to handle 1000 times the traffic of 2010 levels
- 5G and subsequent systems do not use only signals on a single frequency band. Instead, they combine signals from multiple frequency bands, ranging from low VHF-band frequencies to high millimeter-band frequencies.

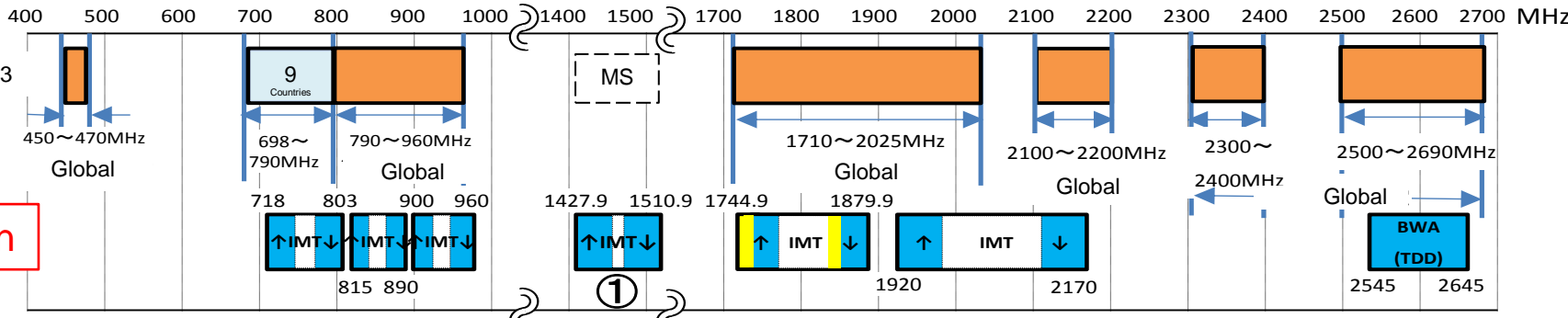
This permits flexible radio spectrum use, in which the best usage method is selected depending on the location, time, and application, and realizes more stable communications.

# WRC-15 Agenda 1.1

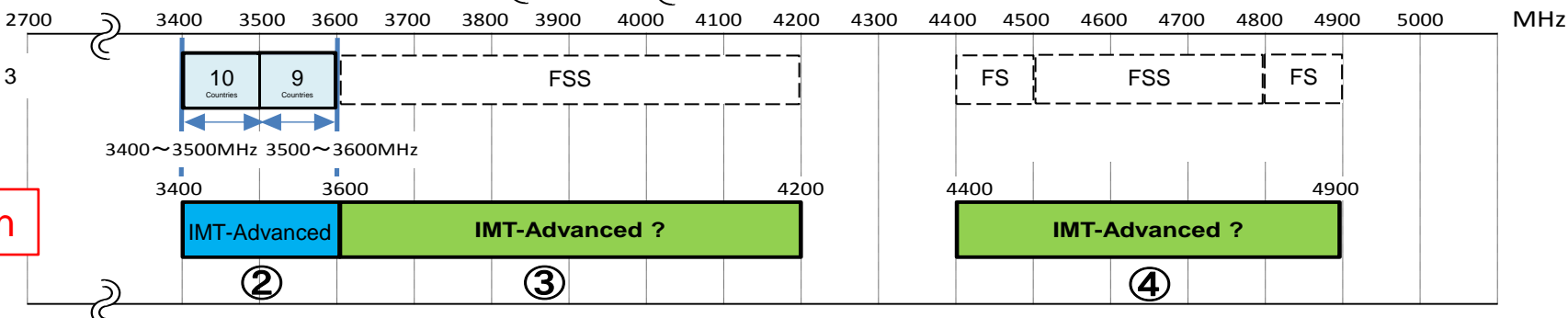
## Additional spectrum allocations to the MS on a primary basis and identification of additional frequency bands for IMT

Current Status in Region 3

Japan



Japan



Japan supports the following bands for IMT identification: **1427-1518MHz, 3400-4200 MHz, 4400-4900 MHz**

### Background

#### Agenda Item 1.1:

to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution 233 (WRC-12);

➤ **A list of potential candidate frequency bands (Underlined bands include Japan's supporting bands):** 470-694/698, 1350-1400, 1427-1452, 1452-1492, 1492-1518, 1518-1525, 1695-1710, 2700-2900, 3300-3400, 3400-3600, 3600-3700, 3700-3800, 3800-4200, 4400-4500, 4500-4800, 4800-4990, 5350-5470, 5725-5850, 5925-6425MHz

➤ **Method(s) to satisfy the agenda item :**

- **Method A** – No change
- **Method B** – Make an allocation to the MS on a primary basis (Table of Frequency Allocations (ToA) / Footnote (FN) )
- **Method C** – To identify the frequency band for IMT

Japan's View:

- (1) To cope with rapidly increasing mobile traffic, taking into account the studies on spectrum requirement for IMT in ITU-R, **sufficient bandwidths should be secured to meet future IMT spectrum demand.**
- (2) **Technical studies conducted by ITU-R should be taken into account in order to protect existing services** when considering additional allocation to the mobile service and identification for IMT on a worldwide basis (or on a Regional basis, or by footnotes which contain a number of countries' names, depending on circumstances).
- (3) Results of studies on suitable frequency ranges for IMT in ITU-R WP 5D include but are not limited to the frequency ranges 1 427.9-1462.9/1 475.9-1 510.9 MHz, 3 400-4 200 MHz and 4 400-4 900MHz.
- (4) Considering the studies in ITU-R, **Japan supports that the 1 427-1 518 MHz, 3 400-4 200 MHz and 4 400-4 900 MHz bands are allocated to the mobile service on a primary basis and identified for IMT on a worldwide basis** (or on a Regional basis, or by footnotes which contain a number of countries' names, depending on circumstances).

Inputs to WRC-15

Contribution from APT

APT Common Proposals (ACPs) are developed for fifteen frequency bands under AI 1.1 (Underlined bands include Japan's supporting bands):

- To support additional identification for IMT (i.e. Method C) : 1 427-1 452 MHz and 1 492-1 518 MHz
- To support NOC to the Radio Regulations (i.e. Method A) : 470-694/698 MHz, 1 350-1 400 MHz, 1 518-1 525 MHz, 1 695-1 710 MHz, 2 700-2 900 MHz, 3 400-3 600 MHz, 3 600-3 700 MHz, 3 700-3 800 MHz, 3 800-4 200 MHz, 4 500-4 800 MHz, 5 350-5 470 MHz, 5 725-5 850 MHz, 5 925-6 425 MHz
- Not to develop ACPs: 1 452-1 492 MHz, 3 300-3 400 MHz, 4 400-4 500 MHz, 4 800-4 990 MHz

Contribution from Japan

Japan submits contributions for WRC-15 regarding the bands not included in the ACP.

✓ 1 452-1 492 MHz (with 11 APT countries)	✓ 3 600-3 700 MHz (with Australia)
✓ 3 700-3 800 MHz	✓ 3 800-4 200 MHz (with Sweden)
✓ 4 400-4 500 MHz, 4 800-4 900 MHz (with 3 APT countries)	✓ 4 500-4 800 MHz



Japan proposes the new Draft Agenda Items for WRC-19

## **Identification of IMT in the frequency band(s) above 6GHz**

Japan proposes a new agenda item for WRC-19 which considers identification of frequency bands for IMT between 6 to 100 GHz including possible additional allocations to the mobile service on a primary basis.

### **Inputs to WRC-15**

#### **Contribution from APT**

APT approved APT Common Proposal (ACP) for this new Draft Agenda Item for WRC-19 including some bands Japan proposed at the APG15-5 meeting.

- 25.25-25.5 GHz, 31.8-33.4 GHz, 39-47 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz, 81-86 GHz (Underlined frequency bands include the bands Japan proposed)

#### **Contribution from Japan**

Japan submits a multi country contribution with Singapore for WRC-15. In the contribution, in addition to the frequency ranges indicated in the ACP, Japan and Singapore also propose to include the following frequency ranges for study under this agenda item:

- ✓ 6-8.5 GHz, 10-10.5 GHz, 14.4-15.35 GHz, 25.5-29.5 GHz, 37-39 GHz