MIC
Ministry of Internal Affairs and Communications

Japan's Radio Policies Towards 5G

November 9, 2016

New-Generation Mobile Communications Office
Land Mobile Communications Division
Radio Department, Telecommunications Bureau
Ministry of Internal Affairs and Communications (MIC), JAPAN

Frequency Allocation for Mobile Communication Systems

Company	Total		Bands							
			700 MHz	800 MHz	900 MHz	1.5 GHz	1.7 GHz	2 GHz*	2.5 GHz	3.5 GHz
			FDD 30MHz x 2	FDD 30MHz x 2	FDD 15MHz x 2	FDD 35MHz x 2	FDD 35MHz x 2	FDD 60MHz x 2 TDD 31.2MHz	TDD 100MHz**	TDD 120MHz
NTT docomo	200 MHz	200 MHz	LTE 20MHz	3G/LTE 30MHz	—	LTE 30MHz	3G/LTE 40MHz Only in some areas	3G/LTE 40MHz	—	LTE 40MHz
au	150 MHz	200 MHz	LTE 20MHz	3G/LTE 30MHz	—	LTE 20MHz	—	3G/LTE 40MHz	—	LTE 40MHz
UQ Communications	50 MHz		—	—	—	—	—	—	WiMAX /WiMAX R2.1 50MHz	—
SoftBank	211.2MHz	241.2 MHz	LTE 20MHz	—	3G/LTE 30MHz	3G/LTE 20MHz	3G/LTE 30MHz	3G/LTE 40MHz PHS 31.2MHz	—	LTE 40MHz
Wireless City Planning	30MHz		—	—	—	—	—	—	AXGP 30MHz	—

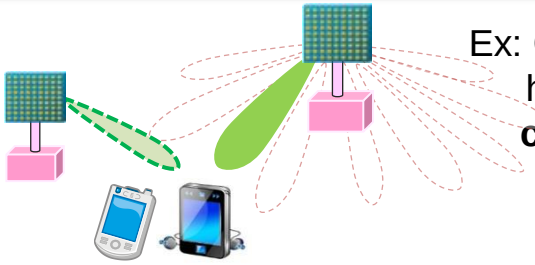
* Others, such as pending systems (2GHz-MSS:60MHz, 2GHz –TDD:15MHz)
** including Regional WiMAX(20MHz)

Total : 641.2MHz

Key Capabilities of 5G

✓ Key Capabilities for 5G (IMT-2020) :
1 Ultra high speed data **(eMBB)** ➡ Peak data rate **10 (20) Gbps** (100 (200) x current LTE)
2 Ultra Low Latency **(URLLC)** ➡ Ultra Low Latency **1ms**（1/10 of current LTE system）
3 Massive Machine Type Connections **(mMTC):**
➡ Connection Density **1 million devices/km²**（100 x current LTE）

✓ 5G is expected to **create a new market as a key infrastructure of IoT**

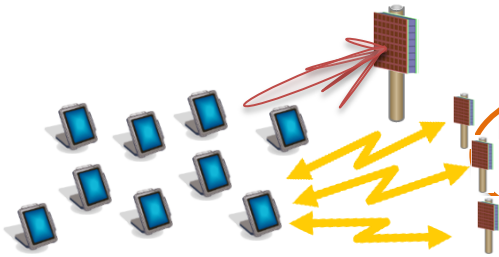


Ex: Quick transmission of Ultra high definition TV (4K/8K). **comparable to optic fiber**

Ultra High Speed Data (eMBB)

Key Capabilities for 5G

Large numbers of devices, sensors and terminals

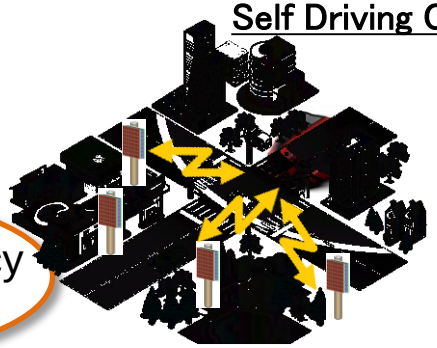


Massive Machine Type Connections **(mMTC)**

Ex: Massive Simultaneous **Connections for sensor networks** in small area, Smart Meters, Infrastructure Maintenance etc.

Ultra Low Latency **(URLLC)**

Self Driving Cars



Ex: Self Driving, Remote control Robots (**real-time remote control**, IoT for mission critical)

Source: MIC, Nikkei Communications 4/2015

International Cooperation on Frequency Allocation for 5G①

- Toward 5G realization by 2020, it is necessary to consider and identify candidate frequencies for 5G as early as possible in order that telecom equipment manufacturers can start to develop new devices and equipment.
- It is necessary to cooperate with major countries who share their views about frequency demands for 5G and to consider and identify candidate frequencies towards 5G deployment by 2020.

<Frequency bands under consideration>

Bands		Attitude
1 . Below 6GHz [3.6 ~ 4.2 GHz, 4.4 ~ 4.9 GHz]		Promote consideration in terms of making frequencies which have features such as wide coverage etc. below 6GHz available toward 5G realization in accordance with international harmonization, prospect of procuring device and status of considering frequency sharing with existing systems (Ref.) ・ 3.6GHz-3.8GHz band： 3GPP bands and is identified for IMT in U.S. etc. However it is necessary to share frequency with satellite communication systems in Japan ・4.4GHz-4.9GHz band: It is desirable to consider securing frequency and to promote international harmonization and cooperation
2 . Above 24GHz	(1) Frequency bands to be considered at WRC-19 (IMT-2020) [24.25 GHz ~ 86 GHz (11bands)]	Ensure enough bandwidth for mobile communication system securing international harmonization in accordance with progress of R&D and frequency sharing with existing systems
	(2)Frequencies considered in U.S. and Korea etc. [27.5 GHz ~ 29.5 GHz]	Encouraging international harmonization, promote consideration in accordance with progress of R&D and capability of securing wide band toward early 5G realization

International Cooperation on Frequency Allocation for 5G

(2)

Below 6GHz

… Proposed Frequencies for IMT in WRC-15
…Wireless LAN
…Wireless LAN (indoor use only)

3.6 ~ 4.2 GHz Band, 4.4 ~ 4.9 GHz Band

Wireless LAN

Above 24GHz (IMT Candidate Frequencies at the WRC-19 and 28GHz)

… Candidate Frequencies for IMT at the WRC-19
… Frequencies considered in U.S. and Korea etc.

	6-10GHz	10-20GHz	20-30GHz	30-40GHz	40-50GHz	50-60GHz	60-70GHz	70-80GHz	80-90GHz
Japan Proposals includes joint proposals with APT	6 8.5 10 10.5 14.4 15.35		25.25 25.5 29.5 31.8 33.4	37 39	47 47.2 50.2 50.4 52.6		66 76	81 86	
CEPT Proposals (Europe)			24.5 27.5	31.8 33.4	40.5 43.5 45.5 48.9		66 76	81 86	
CITEL Proposals (USA)	10 10.45		23.15 23.6 27.5	31.8 33 37	40.5 45.5 47 47.2 50.2 50.4 52.6	59.3	76		
Candidate Frequencies			24.25 27.5 29.5	31.8 33.4 37	40.5 42.5 43.5 45.5 47 47.2 50.2 50.4 52.6		66 76	81 86	

Sources: Radio Policy 2020 Vision Committee Mobile Service TF (volume 1)

Study of the 5G Technical Specifications

- Inquiry on the technical specifications of next-generation mobile communication system [October 12, 2016]

- Information and Communications Council (Telecommunications Technology Sub-Council) started its study

(Study Items)

- Basic Concepts
- Network Architecture
- Service Images
- Requirements
- Migration Scenario (4G to 5G)

Technical Specifications for various Frequency Bands

- Results of the study at the Council will be reported to the Minister for Internal Affairs and Communications around Summer 2017 and afterwards