Opening Session

総務省
Ministry of Internal Affairs and Communications

5G Progress Status in Japan

(Government Policies for 5G)

November 28, 2018

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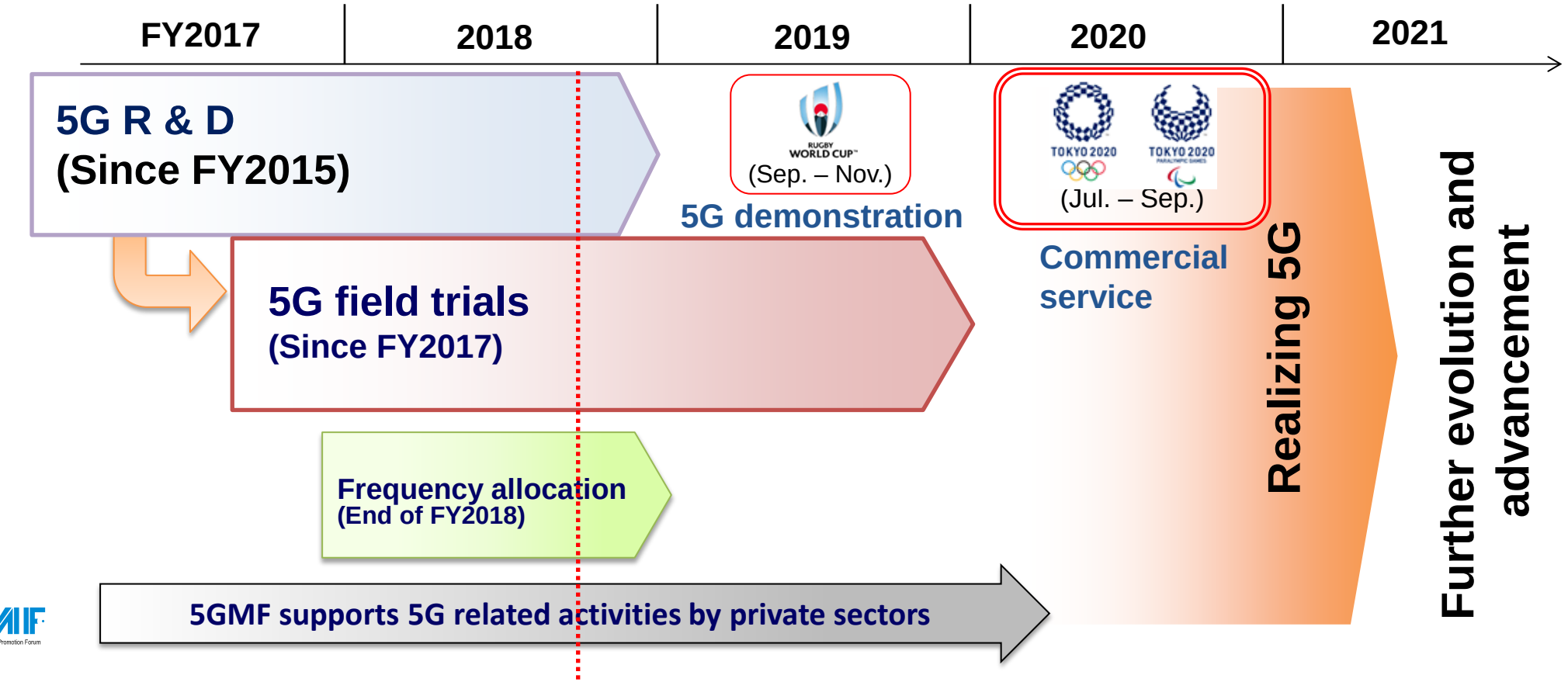
Image movie: the world connected by 5G

Implementation of 5G towards 2020

- **R & D and comprehensive field trials towards implementing 5G**
  R & D and field trials are closely related, giving feedback each other
- **Promotion of international collaboration and international standardization**
  International standardization activities and frequency examinations of 5G technology have been conducted in cooperation with other countries.
- **Technical standards and frequency allocation**
  Frequency for 5G will be allocated to operators around the end of FY2018.



5GMF The Fifth Generation Mobile Communications Promotion Forum

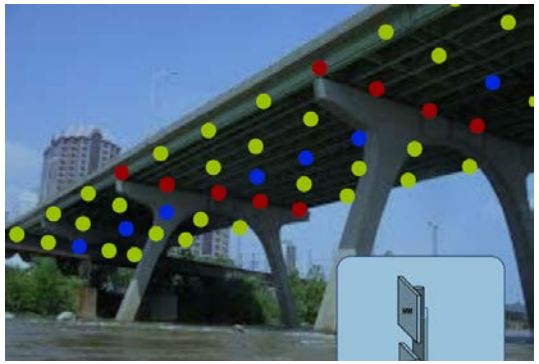
5G Field Trial Projects in FY2018

Techno logy	Technological target	Mobility	Environ ments	Frequency	Responsible organization	Overview	Main locations
eMBB	Avg. 2-4 Gbps (user terminal) ※Avg. 4-8Gbps (base station)	Up to 30km/h	Rural/ Urban/ Dense urban	4.5GHz 28GHz	NTT DOCOMO/ TOBU TOWER SKYTREE/ ALSOK/ PLAT EASE	・AR/VR ・Safety and Security ・Telemedicine ・Moving Satellite Offices	・Kyoto ・Gunma ・Fukushima ・Tokushima ・Wakayama
	Avg. 1 Gbps (mobility)	60-120 km/h	Rural/ Urban	4.5GHz 28GHz	NTT Communications/ Tobu Railway/ JR West/ NEC/ INFOCITY	・Transport (High definition video/ Safe operation support)	・Ibaraki ・Tokyo ・JR West Railside
	Avg. 2 Gbps (indoor)	—	Indoor	28GHz	ATR/ Kyushu Inst. of Tech./ Keikyu Corp./ Waseda Univ./ Maehara E.S.	・Smart Factory ・Safety and Security ・School Education	・Fukuoka ・Tokyo
URLLC	10ms latency (End-to-End)	Up to 90km/h	Rural/ Urban	4.5GHz 28GHz	Softbank/ Advanced Mobility	・Transport (Platooning Trucks)	・Yamaguchi ・Shizuoka
	URLLC with Avg. 300 Mbps (terminal uplink)	Up to 60km/h		3.7GHz/ 4.5GHz 28GHz	KDDI/ Obayashi Corp./ NEC/ Univ. of Tokyo/ Ritsumeikan Univ./ TV Asahi	・Construction ・Drones ・Snowplows ・TV broadcast	・Osaka ・Hiroshima ・Nagano ・Chiba
mMTC	1 million devices/km^2 density	—	Indoor and Rural/ Urban	4.5GHz	Wireless City Planning/ Pacific Consultants/ Maeda Corp./ NICT/ SHARP/ ITOKI	・Smart Highway ・Smart Office	・Aichi ・Hiroshima

5G Field Trials (overview)

massive Machine Type Communications (mMTC)

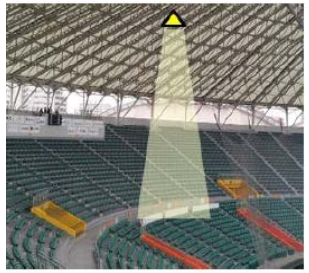
(stock management)



(bridge inspection)

enhanced Mobile BroadBand (eMBB)

(multi-transmission of 8K video)



(sports)

(transmission to car/train@over 60mph)

Ultra-Reliable Low Latency Communications (URLLC)

(remote machinery control)

(telemedicine)

(truck platooning)

5G Spectrum Allocation in Japan

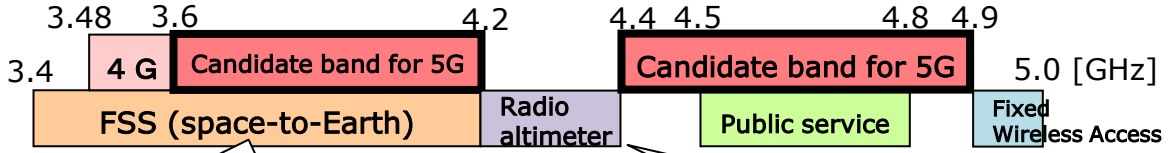
- Toward the launch of 5G in spring of 2020;
  aiming to allocate 3.7GHz band (3.6-4.2GHz) and 4.5GHz band (4.4-4.9GHz) and 28GHz band (27.0-29.5GHz) by around the end of FY 2018 (around the end of March 2019);

Frequency band	Direction of 5G spectrum allocation
3.6-4.2GHz	●Aiming to allocate 500MHz bandwidth at the maximum in 3.7GHz band and/or 4.5GHz band, considering the frequency sharing with incumbent radio systems
4.4-4.9GHz	
27.0-29.5GHz	●Aiming to allocate 2GHz bandwidth at the maximum in 28GHz band, considering the frequency sharing with incumbent radio systems
WRC-19 Agenda Item 1.13 bands (totally 11 bands)	●Addressing identification and/or allocation as many bands as possible, considering other countries situation; ●In particular, promoting sharing studies in the bands below 43.5 GHz, which are also considered in other countries and/or regions.

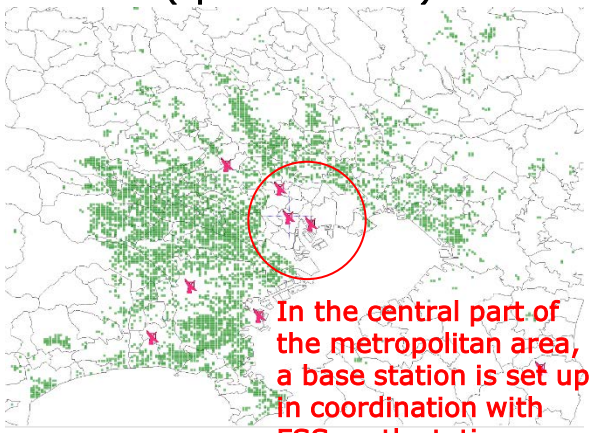
Sharing and Compatibility Studies for the Candidate Bands

- In the same or adjacent radio frequency band as the candidate frequency band for 5G, the following radio services exist.
  - 3.7GHz/4.5GHz band : FSS (space-to-Earth), Radio altimeter, Public service, etc.
  - 28GHz band : FSS (Earth-to-space), etc.

Incumbent systems and examples of the sharing and compatibility studies



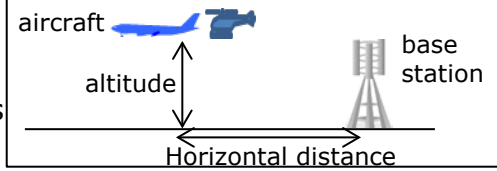
5G → FSS (space-to-Earth)

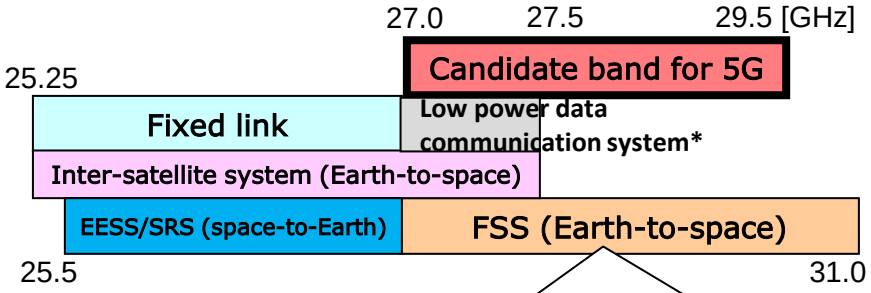


Green : Assumed locations for 5G stations
Red : Location of the FSS earth stations

5G ⟷ Radio altimeter

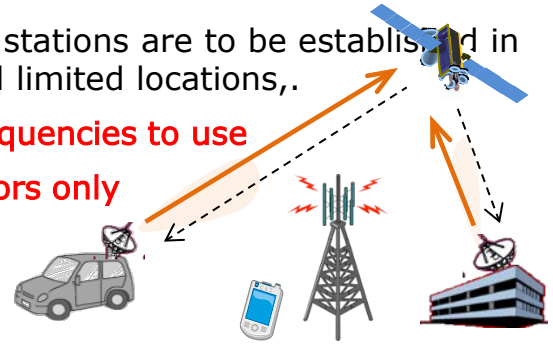
- In the airport area (around 1 km), it can be shared by the following method.
  - Establishment of the base station **avoiding the range around 200 m around the aircraft approach route**
  - Secure **guard band of about 100 MHz** with aircraft radio altimeter.
  - **Insert filter foe base station**





5G → FSS (Earth-to-space)

- Sharing is feasible through the coordination below.
- As the earth stations are to be established in specified and limited locations,.
  - **Separate frequencies to use**
  - **Use 5G indoors only** in the same frequencies.

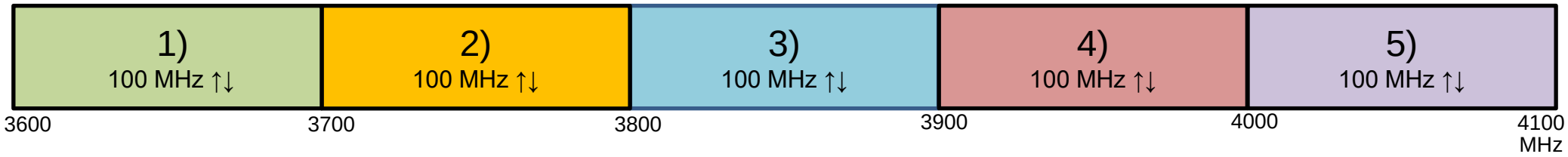


Draft Allocation Frame

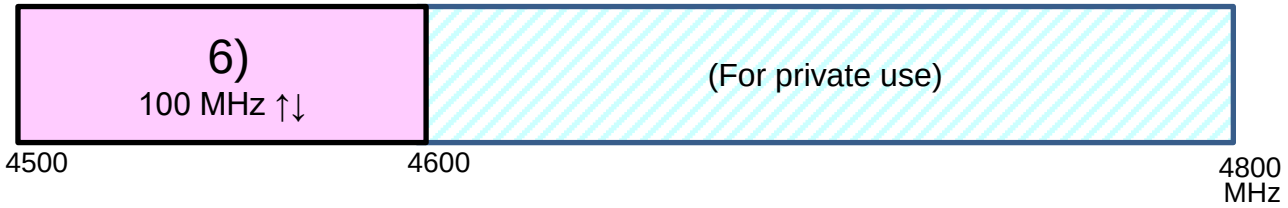
<Basic idea>

- Allocation quotas are prepared for **nationwide service operators** so that **each of them can fully demonstrate 5G characteristics**.
- Specifically, **5 quotas in 3.7GHz band** (100MHz bandwidth x 5)
  1 quota in 4.5GHz band (100MHz bandwidth x 1)
  4 quotas in 28GHz band (400MHz bandwidth x 4)
  will be allocated around the end of FY2018 (i.e. march 2019)
- **Setting up quotas available for private use for implementing a diverse 5G environment.**

[3.7 GHz band] (shared with satellite communications)



[4.5 GHz band] (shared with public service communications)



[28 GHz band] (shared with satellite communications)