

5G Progress Status in Japan

(Spectrum Harmonization and Regulatory Issues)

November 28, 2018

Gaku Nakazato
Ministry of Internal Affairs and Communications(MIC)



Connect
future

5Gでつながる世界

■ R & D and comprehensive demonstration tests towards implementing 5G

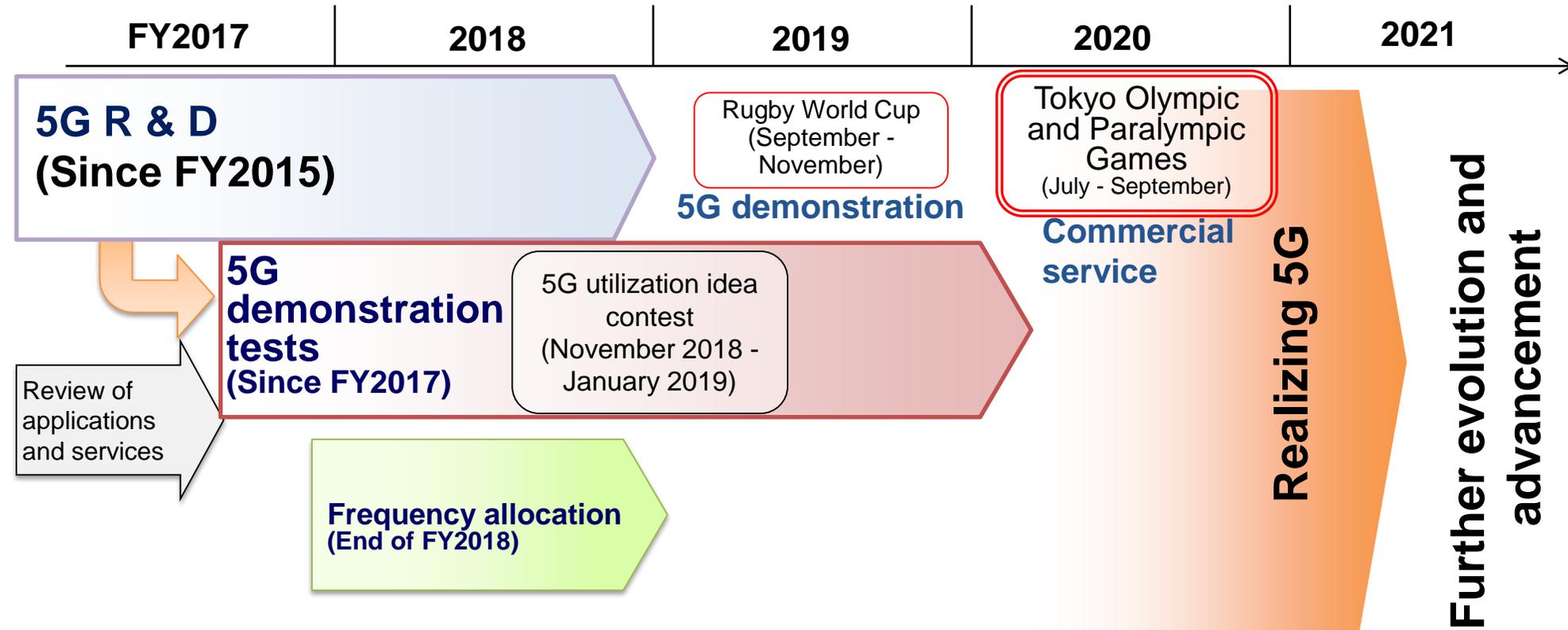
R & D aimed at establishing element technologies and demonstration tests have been conducted

■ Promotion of international collaboration and international standardization

International standardization activities and frequency examinations of 5G technology have been conducted in cooperation with other countries.

■ Frequency allocation

Frequency for 5G will be allocated to operators around the end of fiscal year 2018.



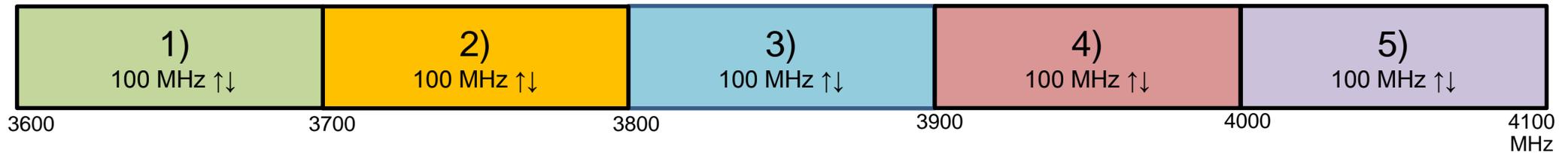
<Basic idea>

- Utilization of existing network resources is important, and allocation quotas are prepared for **business operators** so that **each of them can fully demonstrate 5G characteristics**.*

* Internationally, allocation in units of 100 MHz width (about 2 Gbps) in the 3.7 GHz/4.5 GHz band and 400 MHz width (about 4 Gbps) in the 28 GHz band is the basis.

- **Setting up quotas available for private communication for implementing a diverse 5G utilized environment.**

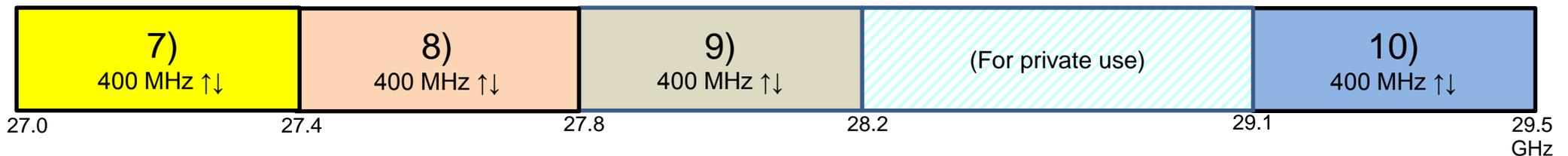
[3.7 GHz band] (shared with satellite communications)



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



[28 GHz band] (shared with satellite communications)



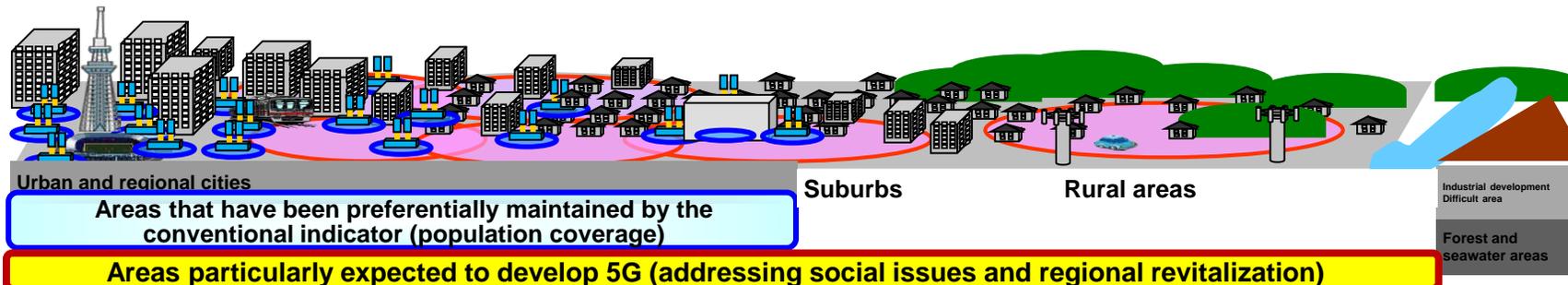
Basic concepts

- In the 5G era, not only people but also everything will be the targets of 5G services.
- => It is important to **set indicators to allow flexible expansion of 5G into areas with the potential of industrial development**, regardless of urban areas or rural areas.
- It is expected to use 5G for addressing regional issues and for regional revitalization.
- => It is important to **set indicators to evaluate deployment of 5G networks in rural areas in the early stage**.



Points of the establishment guidelines (draft)

- **Instead of conventional indicators that evaluate the extent of coverage, such as the size of population, setting indicators to evaluate the following points** and promoting an early 5G expansion not only to urban areas but also to rural areas.
 - 1) **Securing the deployment possibility to all over the country**
 - Evaluating whether the possibility of deploying 5G is widely secured
 - 2) **Starting the service early in rural areas** → Evaluating service start period in all prefectures
 - 3) **Securing the diversity of services**
 - Evaluating plans for the number of base stations deployed nationwide and for the utilization 5G.

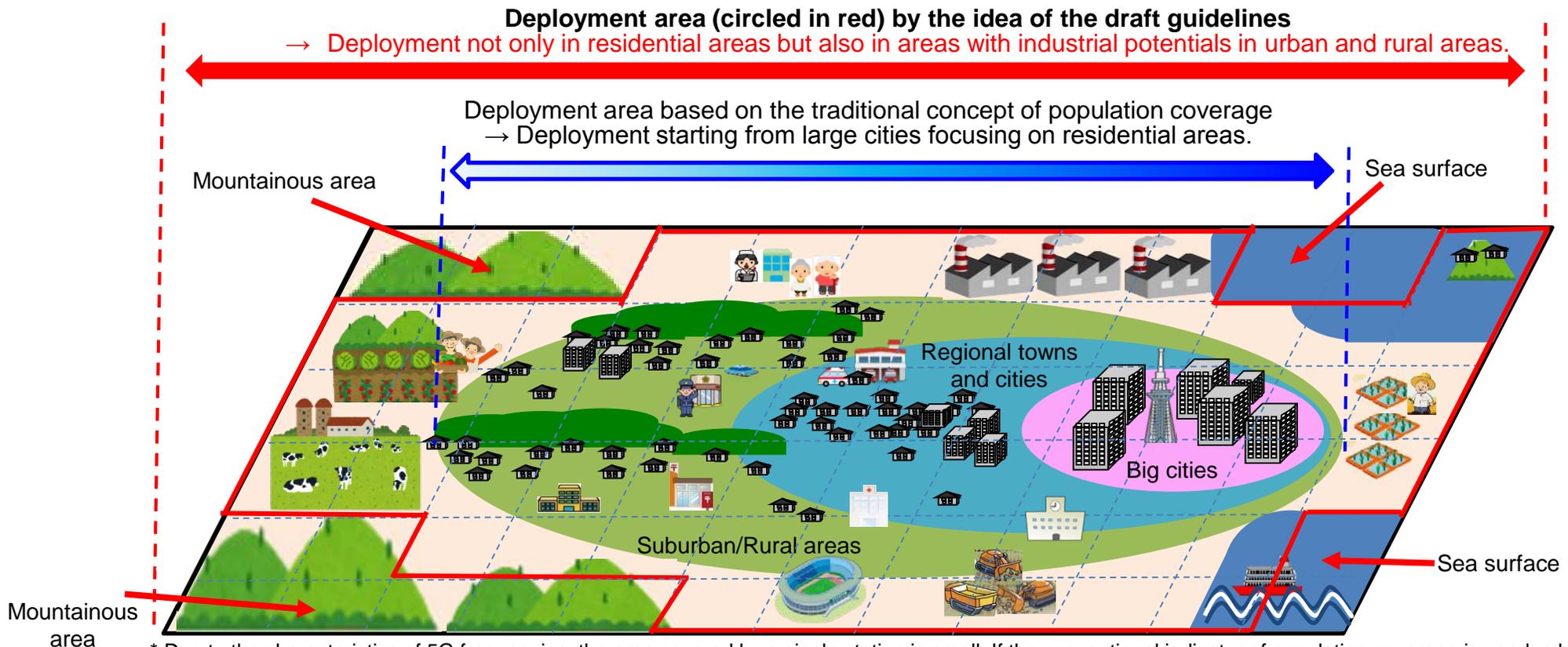


■ **Dividing the whole country into meshes of 10 km square** (secondary meshes specified by the Geographical Survey Institute) and **covering a wide range of areas with industrial possibilities in both urban and rural areas.***

* Number of target meshes: About 4,600

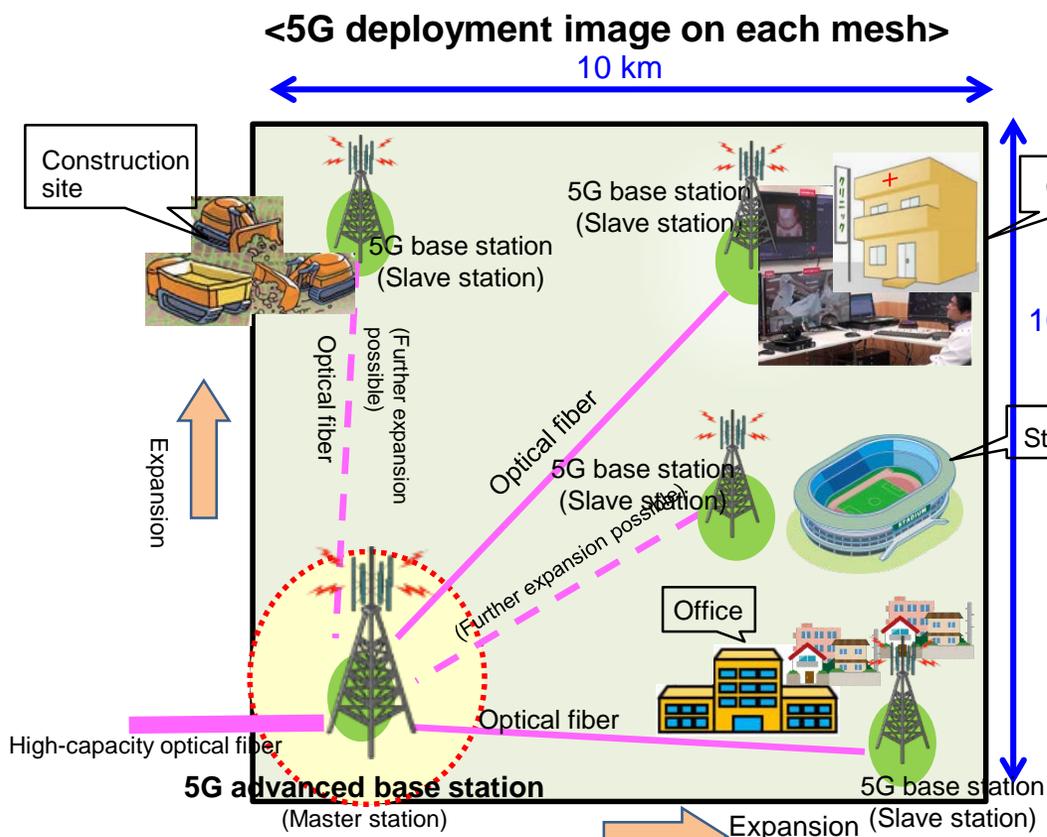
- 1) **Developing 5G advanced base stations* for over 50% meshes within five years** nationwide and per regional block. (Securing possibility of deployment to the whole country.) * Refer to *2. on page 9.
- 2) **Starting services in all prefectures within two years** after frequency allocation. (Early service start in each area)
- 3) Establishing **as many base stations as possible across the country.** (Securing diversity of services)

Note: Evaluation of a plan to provide services to MVNO, in particular (Evaluation of provision results at the time of additional allocations).



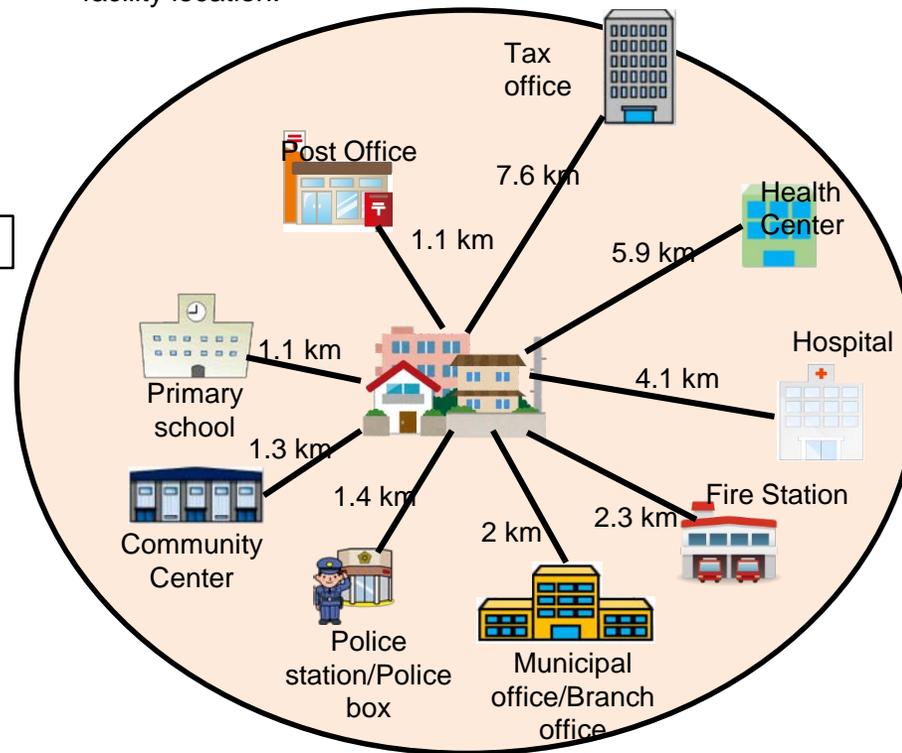
* Due to the characteristics of 5G frequencies, the area covered by a single station is small. If the conventional indicator of population coverage is used, a base station investment about several dozens of times will be required, which may result in the postponement of 5G introduction to areas with less population.

- By developing a 5G advanced base station (base stations serving as the basis for deploying additional base stations with flexibility) for each mesh of 10km square, achieving nationwide deployment of 5G.



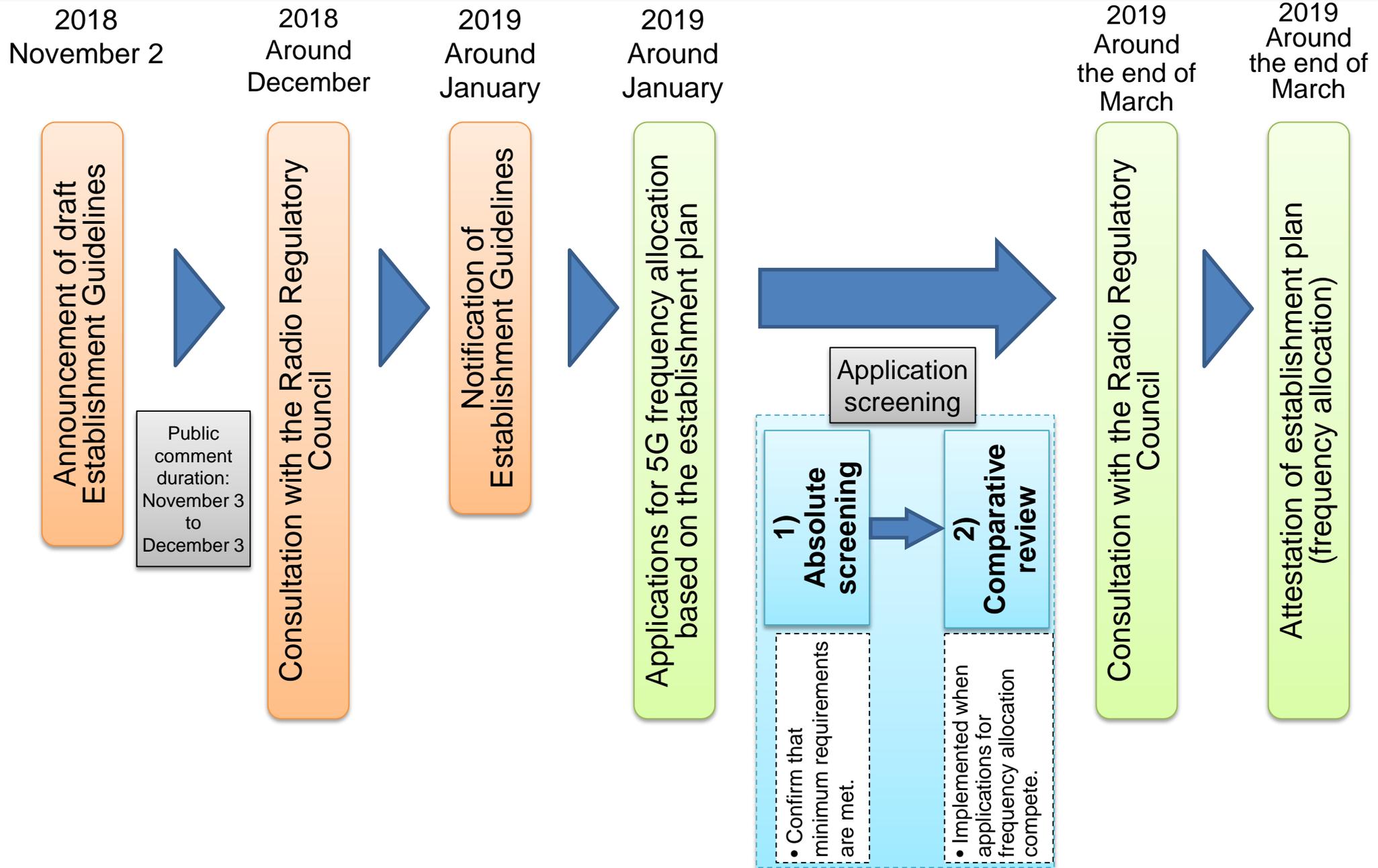
Reference: **The average living/industrial area is within about 10 km from the residential area.**

- As shown in the figure below, the average distance (nationwide average) from a residence to each public facility location is around 10 km even in the case of the furthest public facility location.



Development of base stations equipped with super high-speed lines capable of deploying multiple base stations (slave stations) for each mesh.

Flow of frequency allocation to mobile phone operators



Absolute screening criteria		
Area Expansion	Criteria 1)	To allocate 5G advanced base stations*2 so that the development rate of 5G infrastructure*1 in national and regional blocks will be 50% or more within five years after the attestation.
	2)	To start the operation of 5G advanced base stations*2 in all prefectures within two years after the attestation.
Equipment	3)	To have a plan to secure the locations of base stations, equipment procurement, and installation work.
	4)	To have a plan on measures to ensure the safety and reliability of telecommunications facilities necessary for the operation of base stations.
Finance	5)	To have a plan for financing necessary for capital investment and an income and expenditure plan to achieve a single-year surplus before the expiration of the valid period (five years) of attestation.
Compliance	6)	To have a plan on measures for legal compliance, protection of personal information, and protection of users' interests (including communications speed and service area indication in advertisements) and a system to implement the measures.
Service	7)	To have a plan on promoting the use of base stations by wholesale telecommunications service by interconnecting telecommunications facilities for those who have no mobile phone licenses, i.e., mobile virtual network operators (MVNOs). (The results of this plan will be subject to screening at the time of future allocation.)
	8)	To have a plan on setting various charges for services to be provided according to users' demand for communications.
Counter-measures against interference	9)	To take concrete measures to prevent interference and other obstacles to radio stations established by existing licensors.
	10)	To consult and agree with all 3.7 GHz band attested establishers on matters concerning cost burdens necessary for the prevention or elimination of interference to 3.7 GHz band earth stations. [3.7 GHz band only]
Others	11)	Not to accept multiple applications from companies in the same group.
	12)	Not to allow business operators who were allocated 5G frequency to perform business transfer to existing mobile communications companies.

*1. Development rate of 5G infrastructure maintenance: Refers to a value obtained by dividing the total sum of meshes in which 5G advanced base stations are established in the whole country by the total number of target meshes (about 4,600).
 *2. 5G advanced base station: Refers to a base station that uses a line theoretically having a communications speed of approximately 10 Gbps and to which other base stations can be connected.
 *3. Mesh: Refers to a secondary regional section specified by a standard regional mesh used for statistics and standard region mesh code (Notification No. 143 of the Administrative Register of Japan, July 12, 1973).

Draft comparative screening criteria at competitive applications for 5G frequency allocation [common to the three bands]

Comparative screen criteria at the time of competition		
Area Expansion	Criteria 1)	The development rate of 5G infrastructure*1 nationwide after five years from the attestation is higher . [Additional points]
	2)	The number of established base stations after five years from the attestation is higher. [Additional points]
	3)	More concrete plan is provided on the number of base stations and locations that enable communication in indoor areas including public spaces such as underground shopping malls and subway stations.
	4)	Enriched countermeasures are provided, including those for the establishment of base stations in the case of an obvious demand increase in meshes where 5G advanced base stations have been developed and in other meshes.
Equipment	5)	A more concrete plan is provided on measures to ensure the safety and reliability of telecommunications facilities.
Service	6)	A more concrete plan is described on providing wholesale telecommunications services to a large number of MVNOs or connecting telecommunications facilities and promoting the use of base stations by various methods. [Additional points]
	7)	A more concrete plan is provided on advanced applications making full use of the features of 5G and an expansion of 5G application needs.
Others	8)	Not existing mobile operators, the rate of subscription to allocated frequencies is higher, etc.
	9)	A more concrete plan is provided to cover areas where no mobile service is available. [For existing operators only]

*1. Development rate of 5G infrastructure maintenance: Refers to a value obtained by dividing the total sum of meshes in which 5G advanced base stations are established in the whole country by the total number of target meshes (about 4,600).

*2. 5G advanced base station: Refers to a base station that uses a line theoretically having a communications speed of approximately 10 Gbps and to which other base stations can be connected.

*3 Mesh: Refers to a secondary regional section specified by a standard regional mesh used for statistics and standard region mesh code (Notification No. 143 of the Administrative Register of Japan, July 12, 1973).