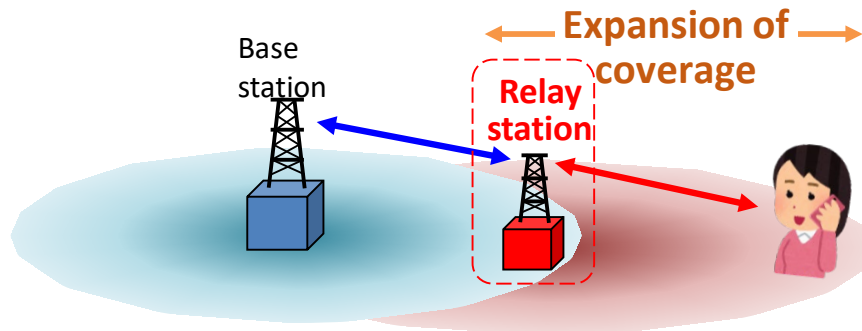


- The nationwide institutional improvements for 5G require effective means to cover wide areas, including the interiors, due to the characteristics of the frequencies used for 5G. This issue was considered by the Information and Communications Council. In June 2023, MIC received a partial report from the Information and Communications Council regarding "Technical Requirements for Relay Stations and High-Power User Equipment for Expanding the Utilization of 5G, etc."
- In response, MIC will conduct institutional improvements that enable: **[1] the introduction of land mobile relay stations**, **[2] the introduction of femtocell base stations and low-power repeaters**, and **[3] higher power output from User Equipment**.

[1] Land mobile relay station

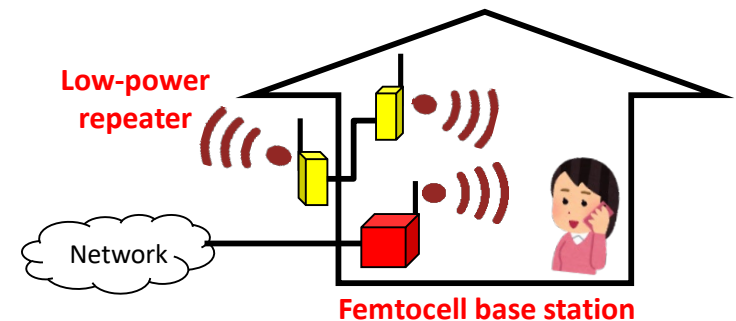
Can expand **5G coverage to dead zones**



* For land mobile relay stations in the Sub6 band, only the 3.4-3.6 GHz band (nationwide 5G) and the 4.8-4.9 GHz band (local 5G) will be introduced.

[2] Femtocell base stations and low-power repeaters

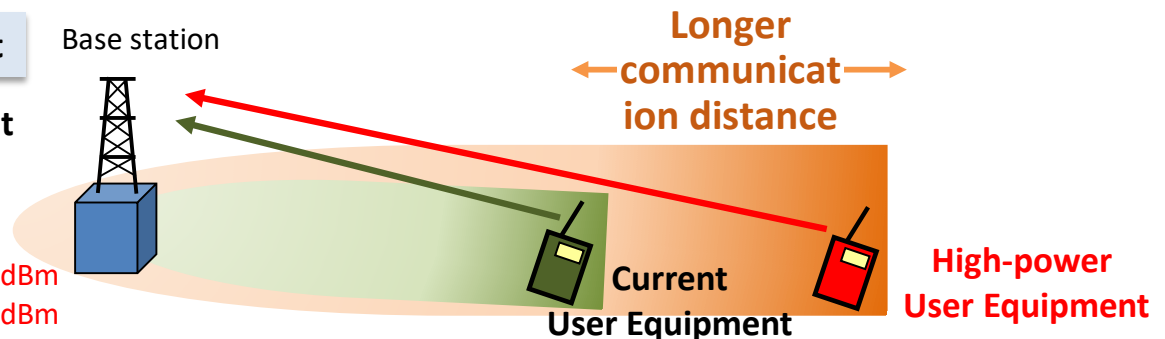
Can **expand 5G coverage inside buildings**, where it is difficult to receive radio waves from outside



[3] Higher power output from User Equipment

The higher power output from User Equipment improves the communication distance and quality of mobile User Equipment.

Sub6 band: 23 dBm => **Maximum 29 dBm**
Millimeter wave band: 23 dBm => **Maximum 35 dBm**



[Reference] Systems to Be Newly Introduced

1

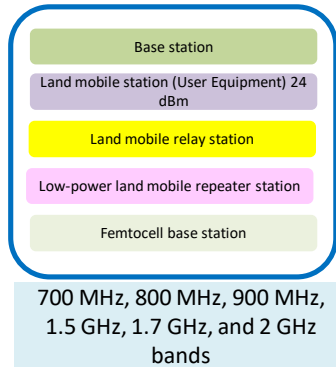
3rd generation, etc.

4th generation

5th generation

Portable radio communication stations

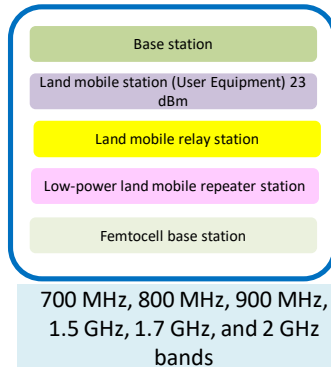
CDMA2000/W-CDMA /HSDPA/EV-DO



Article 49-6-4 (Article 3, Item 3)*
Article 49-6-5 (Article 3, Item 4)*

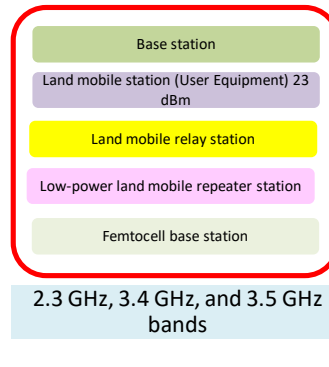
* FDD relay stations (including land mobile relay stations and low-power land mobile repeater stations) are commonly specified for the 3rd to 5th generation in Article 49-6.

LTE (FDD) (including eMTC/NB-IoT)



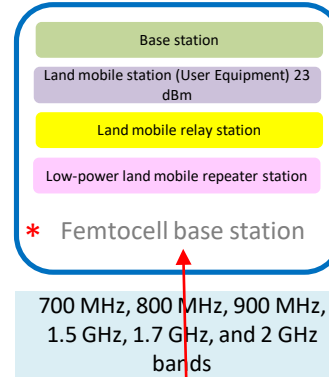
Article 49-6-9*
(Article 3, Item 4-5)

LTE (TDD)



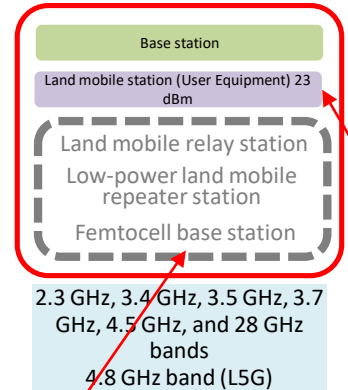
Article 49-6-10
(Article 3, Item 4-5)

5G NR (FDD)



Article 49-6-13*
(Article 3, Item 4-7)

5G NR (TDD) (Specified separately for the Sub6 and quasi-millimeter wave bands)



Article 49-6-12
(Article 3, Item 4-7)

Higher power output

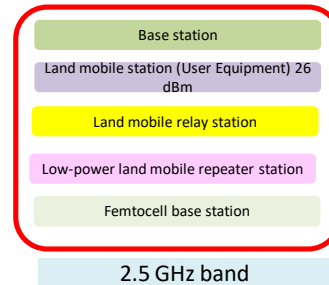
WiMAX R1.0

Standard different from that for mobile phones (IEEE802.16e)



Article 49-28
(Article 3, Item 11)

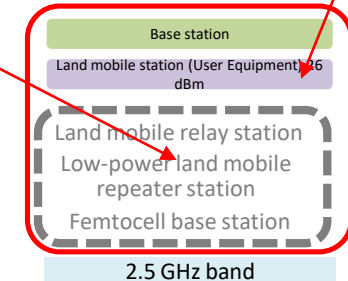
XGP Ver2.3/WiMAX R2.1AE (including eMTC)



Article 49-29
(Article 3, Item 12)

Newly introduced

XGP Ver4.0/WiMAX R3.0



Article 49-29-2
(Article 3, Item 12-2)

Blue frame: FDD scheme

A scheme in which base stations and land mobile stations use separate frequencies

Red frame: TDD scheme

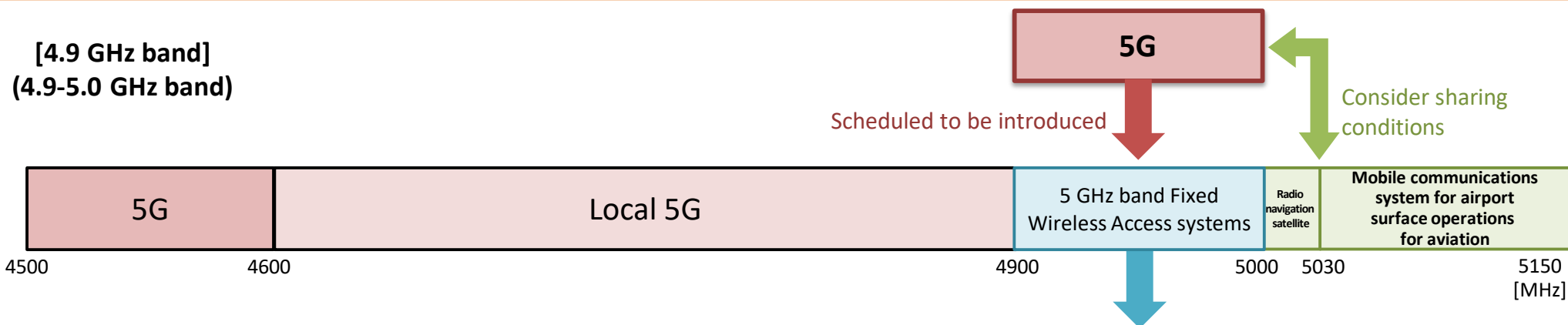
A scheme in which base stations and land mobile stations alternately use the same frequency

* The 2.3 GHz band is not included this time.

Broadband mobile wireless access systems (BWA) radio stations

Introduction of 5G in the 4.9 GHz Band

- For the **4.9 GHz band** (4.9-5.0 GHz), the frequency reorganization action plan stipulates that the "**frequency assignment to 5G will be completed by the end of FY 2025**". In response, MIC has set the deadline for establishing new existing 5 GHz band fixed wireless access systems (registered stations) to be the end of FY 2025. MIC has finalized the technical standards for 5G to be introduced in this frequency band by the end of FY 2023. For existing wireless systems, MIC is considering transitioning them to other wireless systems using termination promotion measures. "
- To achieve that, the Information and Communications Council studied the technical requirements. In March 2024, MIC received a partial report from the Council on "Technical Requirements for 5th-Generation Mobile Communications Systems in the 4.9 GHz Band."
- Based on this report, MIC will conduct institutional improvements, such as **adding the 4.9 GHz band to the frequency bands covered by the 5G technical standards**.



The deadlines for installing a new radio station (March 31, 2026) and for using the frequency (March 31, 2036) are specified in a ministerial ordinance, etc.

System considered for band sharing	Sharing conditions	Results of study	Conditions, etc.																								
Radio navigation satellite system (5.0-5.03 GHz)	Adjacent	Sharing possible	<div><div>(1) Impact of interference on Earth stations<ul style="list-style-type: none">Installing a 5G base station requires licensees to coordinate interference with each other. The following table provides guidance.If the intensity of unwanted emissions from a 5G base station is reduced by filter insertion, the range requiring interference coordination can be reduced for some Earth stations.Similarly, interference coordination among licensees is necessary for Earth stations that are expected to be installed in the future.</div><table><tr><th>Earth station location</th><th>Small cell base station</th><th>Macrocell base station</th></tr><tr><td>Hitachi Ota</td><td>Approx. 30 km</td><td>Approx. 70 km</td></tr><tr><td>Tanegashima Island</td><td colspan="2">Approx. 35 km (within the same island)</td></tr><tr><td>Okinawa main island</td><td>Approx. 70 km (within the same island, Iejima Island and Agunijima Island)</td><td>Approx. 115 km (within the same island, Iejima Island and Agunijima Island)</td></tr><tr><td>Kumejima Island</td><td colspan="2">Approx. 100 km (within the same island, Okinawa main island)</td></tr><tr><td>Miyakojima Island</td><td colspan="2">Approx. 25 km (within the same island)</td></tr><tr><td>Ishigaki Island</td><td colspan="2">Approx. 50 km (within the same island, Iriomote Island, Hateruma Island)</td></tr><tr><td>Amami Oshima</td><td>Approx. 35 km (within the same island)</td><td>Approx. 106 km (Within the same island, Tokunoshima Island, Kikaijima Island, Tokara Island)</td></tr></table><div>(2) Impact of interference on space stations<ul style="list-style-type: none">To ensure that aggregated interference from multiple 5G base stations does not exceed the allowable interference power for space stations, it is necessary to manage the number of installed 5G base stations, including land mobile relay stations.</div></div>	Earth station location	Small cell base station	Macrocell base station	Hitachi Ota	Approx. 30 km	Approx. 70 km	Tanegashima Island	Approx. 35 km (within the same island)		Okinawa main island	Approx. 70 km (within the same island, Iejima Island and Agunijima Island)	Approx. 115 km (within the same island, Iejima Island and Agunijima Island)	Kumejima Island	Approx. 100 km (within the same island, Okinawa main island)		Miyakojima Island	Approx. 25 km (within the same island)		Ishigaki Island	Approx. 50 km (within the same island, Iriomote Island, Hateruma Island)		Amami Oshima	Approx. 35 km (within the same island)	Approx. 106 km (Within the same island, Tokunoshima Island, Kikaijima Island, Tokara Island)
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Aeronautical Mobile Airport Communication System (5.0-5.15 GHz)	Adjacent	Sharing possible	<div><ul style="list-style-type: none">Installing a 5G base station requires a separation distance of 40 km from the airport land edge for small cell base stations and 120 km for macrocell base stations.If the intensity of unwanted emissions from a 5G base station is reduced by filter insertion to levels below those specified with parameters in the sharing considerations (small cell base stations: -16 dBm/MHz, macrocell base stations: -4 dBm/MHz), the required separation distance can be reduced.<ul style="list-style-type: none">For small cell base stations, reducing the intensity of unwanted emissions by 10 dB, 20 dB, and 24 dB will decrease the required distance by 10 km, 4.3 km, and 4.1 km, respectively.For macrocell base stations, reducing the intensity of unwanted emissions by 10 dB, 20 dB, and 28 dB will decrease the required distance by 40 km, 12 km, and 5 km, respectively.</div>																								

- The Information and Communications Council studied items [1] to [3]. In June 2023, the Council issued a partial report on "Technical Requirements for Relay Stations and High-Power User Equipment for Expanding the Utilization of 5G, etc." In response, we will improve the regulations.

[1] Relaxation of the provision on maximum antenna power for uplink carrier aggregation (CA)

Based on the standardization trend in 3GPP, we will not impose an upper limit on the total antenna power for uplink CA and will allow output up to the maximum performance of the power amplifier for each frequency band.

[2] Relaxation of the provision on Sub6 band antenna gain

The provision on the millimeter wave band stipulates that the antenna gain should, in principle, be 20 dBi or less. However, if the gain is constant and equal to or less than the EIRP, the reduction in antenna power may be compensated for by the antenna gain. This also applies to the Sub6 band. The reduction in maximum antenna power can be compensated for by antenna gain provided that the predetermined EIRP is not exceeded.

[3] Elimination of the provision of data modulation schemes

Currently, all modulation schemes that can be applied by base and mobile stations are specified. However, since modulation schemes have no particular impact on frequency sharing considerations, the provision on modulation schemes will be removed from the technical standards.