Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

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Abstract: [Tutorial presentation on Sep. 21]

Ministry of Internal Affairs and Communications

Radio Policy in Japan

September 21, 2011

Radio Policy Division
Ministry of Internal Affairs and Communications

Today's Contents

Ⅰ
- **Outline of Frequency Management in Japan**

Ⅱ
- **Development of Mobile Broadband**

Ⅲ
- ICT responses to The Great East Japan Earthquake

Ⅰ. Outline of Frequency Management in Japan

International Frequency Allocation

(1) Background

1) Ensuring international interest (stable use of radio waves).
2) Achieving efficient use of frequencies in the world by internationally agreeing on the use of radio waves according to their characteristics.
(Ex. To ensure frequencies for broadcasting service and satellite service)
3) Increasing convenience to users by designating a common frequency band for a specific system.
(Ex. Frequency band for IMT-2000).

(2) WRC processes

1) The international frequency allocation is described in Article 5 of the ITU Radio Regulations.
2) The international frequency allocation is reviewed at a World Radiocommunication Conference (WRC) which is held every three or four years.
3) At WRC, administrations and other bodies participate in discussions. In recent years, there is a trend for regional groups to input their common proposals to the conference and to gain power in discussions. Japan positively contribute to the preparatory work of Asia Pacific Telecommunity (APT) and other activities, while making efforts to have Japanese views reflected in decisions on the international frequency allocation.

Structure of Radio Regulations

Articles related to the International Frequency Allocation

Article 1: Terms and definitions (radio services, type of radio station, intended use, etc)

Article 2: Nomenclature (unit, date and time)

Article 4: Regulations on the assignment and use of frequencies

- No. 4.4: Stipulates that the Administrations shall assign frequencies according to the Table of Frequency Allocations and other regulations.

Article 5: Frequency allocations

- Nos. 5.2 - 5.9: Divides the world into three regions (Region 1/2/3)
- Nos. 5.23 - 5.33: Definition of the primary and secondary services
- Nos. 5.46 - : Table of Frequency Allocations

3230 -5003kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
3230 - 3400	FIXED MOBILE except aeronautical mobile BROADCASTING 5.113 5.116 5.118	
3400 - 3500	AERONAUTICAL MOBILE (R)	

5.116 Administrations are urged to authorize the use of the band 3 155-3 195 kHz to provide a common worldwide channel for low power wireless hearing aids. Additional channels for these devices may be assigned by administrations in the bands between 3 155 kHz and 3 400 kHz to suit local needs.

It should be noted that frequencies in the range 3 000 kHz to 4 000 kHz are suitable for hearing aid devices which are designed to operate over short distances within the induction field.

National Frequency Allocation

(1) Background

1) Although the international frequency allocation is reviewed every three or four years, a national frequency allocation may need to be flexibly changed to meet changing demands for frequencies without waiting for international decisions.

2) To achieve more efficient domestic frequency use.

(2) National frequency allocation

1) To determine frequency allocation domestically based on the international frequency allocation (Article 5 of Radio Regulations).

2) To review the allocation in a timely manner based on current frequency demands and medium and long-term prediction.

3) Reallocation of frequencies may require considerations on compensation for existing users, transition period to allow them to use the frequencies for a certain period, and depreciation period of radio equipment.

Frequency Assignment Plan

- ○ Japan establishes Frequency Assignment Plan in accordance with international allocation and meeting the trends of frequency demands and the situations of technology development in Japan.
- ○ Frequency Assignment Plan clarifies the services to which frequencies are allocated, the purpose of radio stations and the conditions for use of frequencies.
- ○ Frequency Assignment Plan is reviewed every year in response to the changing needs.

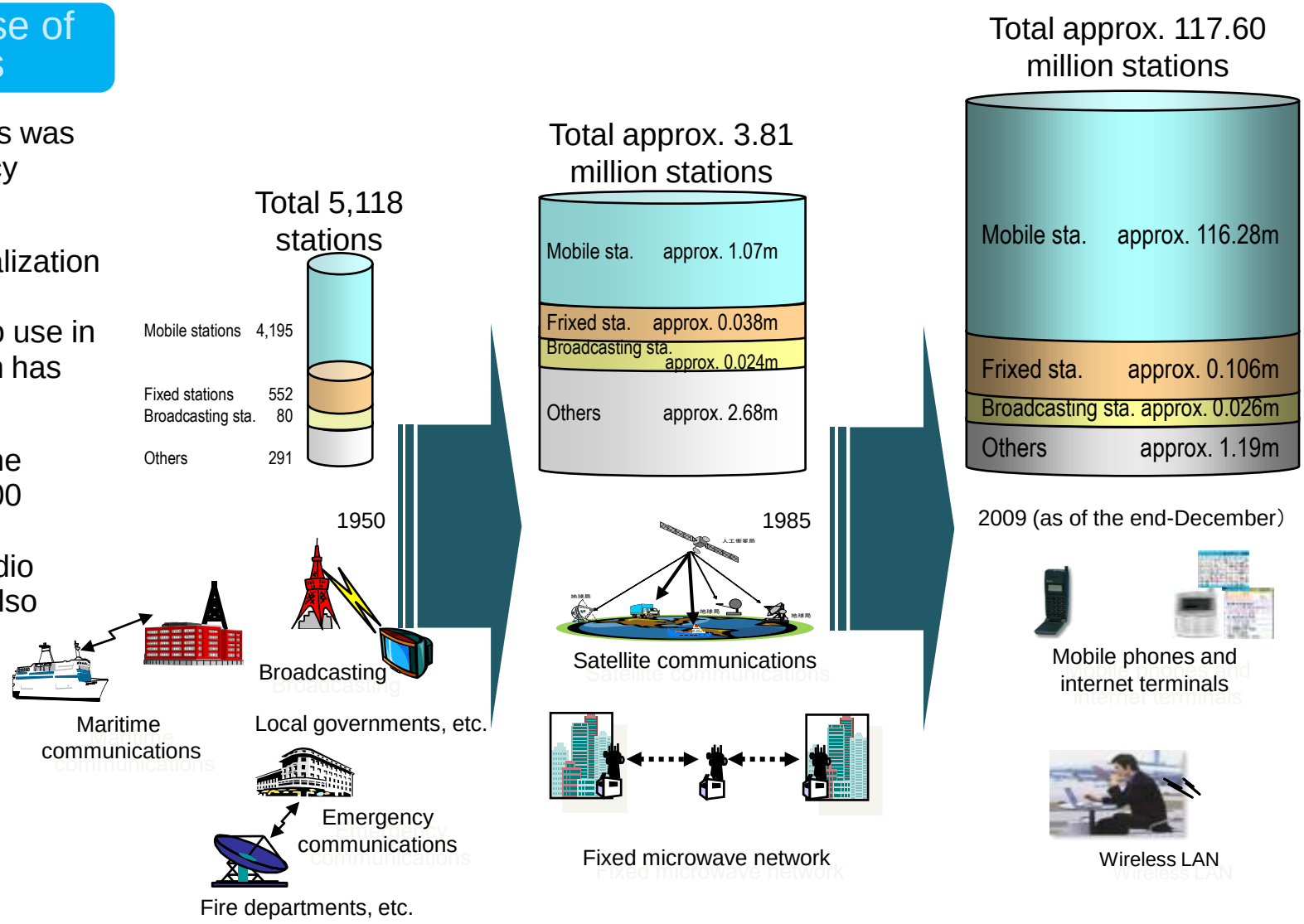
2110-2170 MHz band (extract from Frequency Assignment Plan)

International assignment			JAPAN (MHz)		Purpose of Radio Stations	Conditions for Use of Frequency
Region 1	Region 2	Region3				
2110-2120	FIXED MOBILE 5.388A 5.388B SPACE RESEARCH (deep space) (Earth-to-space) 5.388		2110-2120 J99	MOBILE J99A J99B	Commercial Telecommunications Service (Portable Radio Communications)	An assignment to the *Commercial Telecommunications Service (Portable Radio Communications)* is subject to Annex 10-2.
				SPACE RESEARCH (deep space) (Earth-to-space)	Public Service General Service	
2120-2160 FIXED MOBILE 5.388A 5.388B 5.388	2120-2160 FIXED MOBILE 5.388A 5.388B Mobile-Satellite (space-to-Earth) 5.388	2120-2160 FIXED MOBILE 5.388A 5.388B 5.388	2120-2170 J99	MOBILE J99A J99B	Commercial Telecommunications Service (Portable Radio Communications)	An assignment to the *Commercial Telecommunications Service (Portable Radio Communications)* is subject to Annex 10-2.
2160-2170 FIXED MOBILE 5.388A 5.388B 5.388	2160-2170 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.388 5.389C 5.389E	2160-2170 FIXED MOBILE 5.388A 5.388B 5.388				

Recent trends in radio use

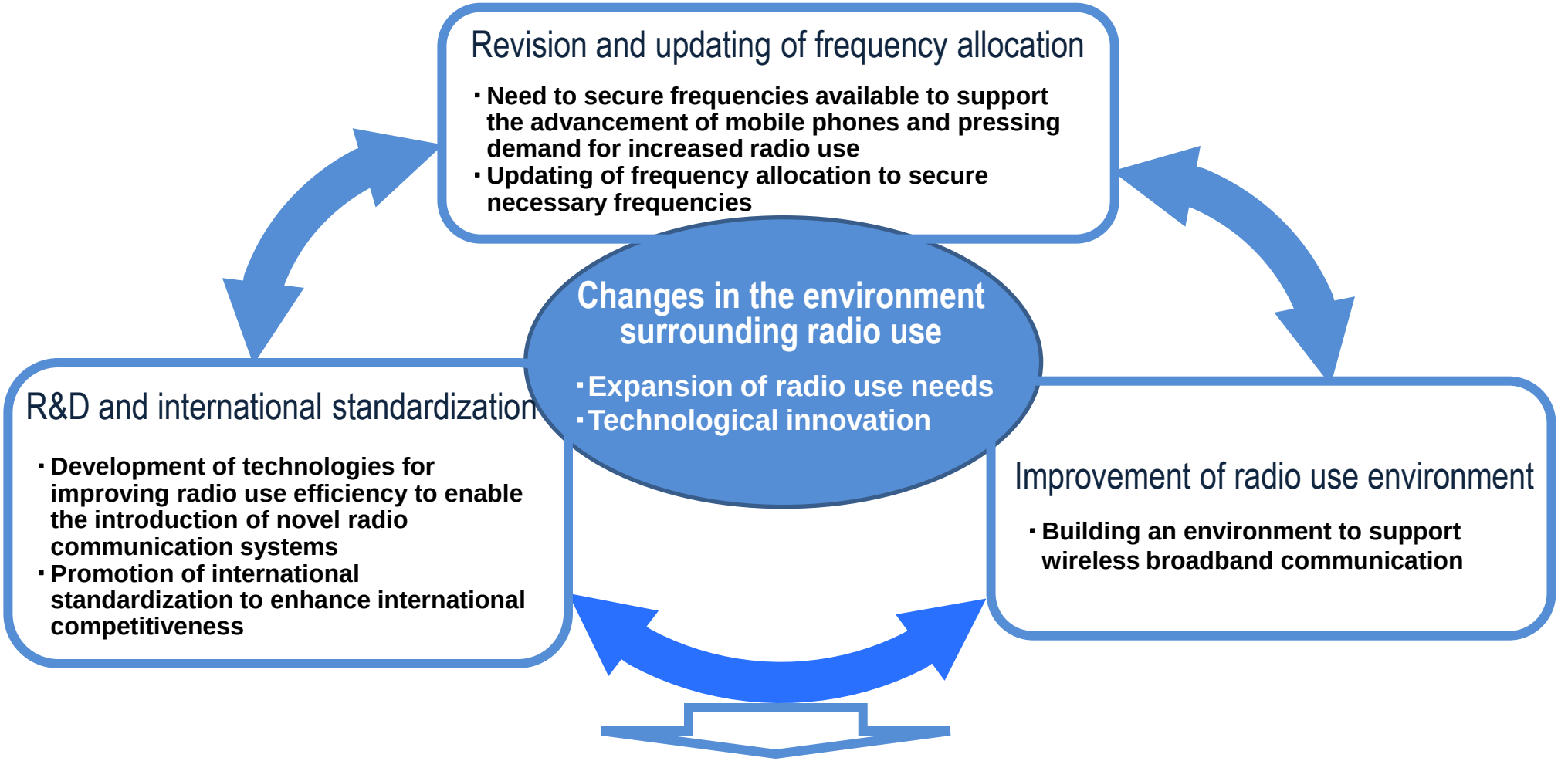
Explosive increase of radio stations

- Radio use in the 1950s was mainly in low frequency bands, such as VHF.
- Triggered by the liberalization of telecommunication services in 1985, radio use in mobile communication has explosively expanded.
- Currently, mobile phone subscribers exceed 100 million in Japan. In addition, the use of radio access systems has also spread.



Efforts to further advance radio use

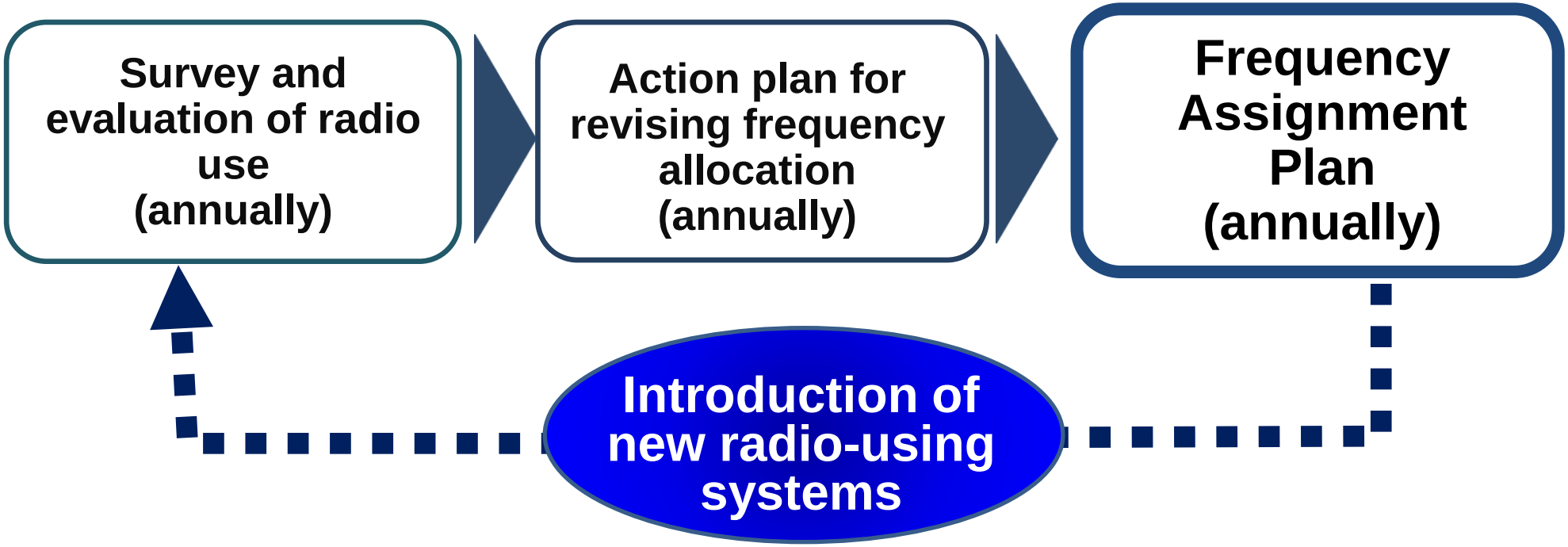
To build a state-of-the-art wireless broadband society, we are now working to integrally promote:
1) Revision and updating of frequency allocation; 2) Improvement of radio use environment; 3) R&D and international standardization



Specific steps for updating frequency allocation

- Survey and evaluation of radio use are carried out every year to secure frequencies available for new radio-using systems. An action plan to indicate the direction of the revision of frequency allocation is drawn up annually.
- Based on these, the Minister of MIC develops the frequency allocation plan.

The procedure and cycle for revising frequency allocation



Radio use survey (desk research)

Survey is implemented each year on one of the following three frequency bands (in a cycle of 3 years).
①Above 3.4GHz ②Above 770MHz and below 3.4GHz ③770MHz and below

Survey on ③	Survey on ②	Survey on ①
2005	2004	2003
2008	2007	2006
2011	2010	2009

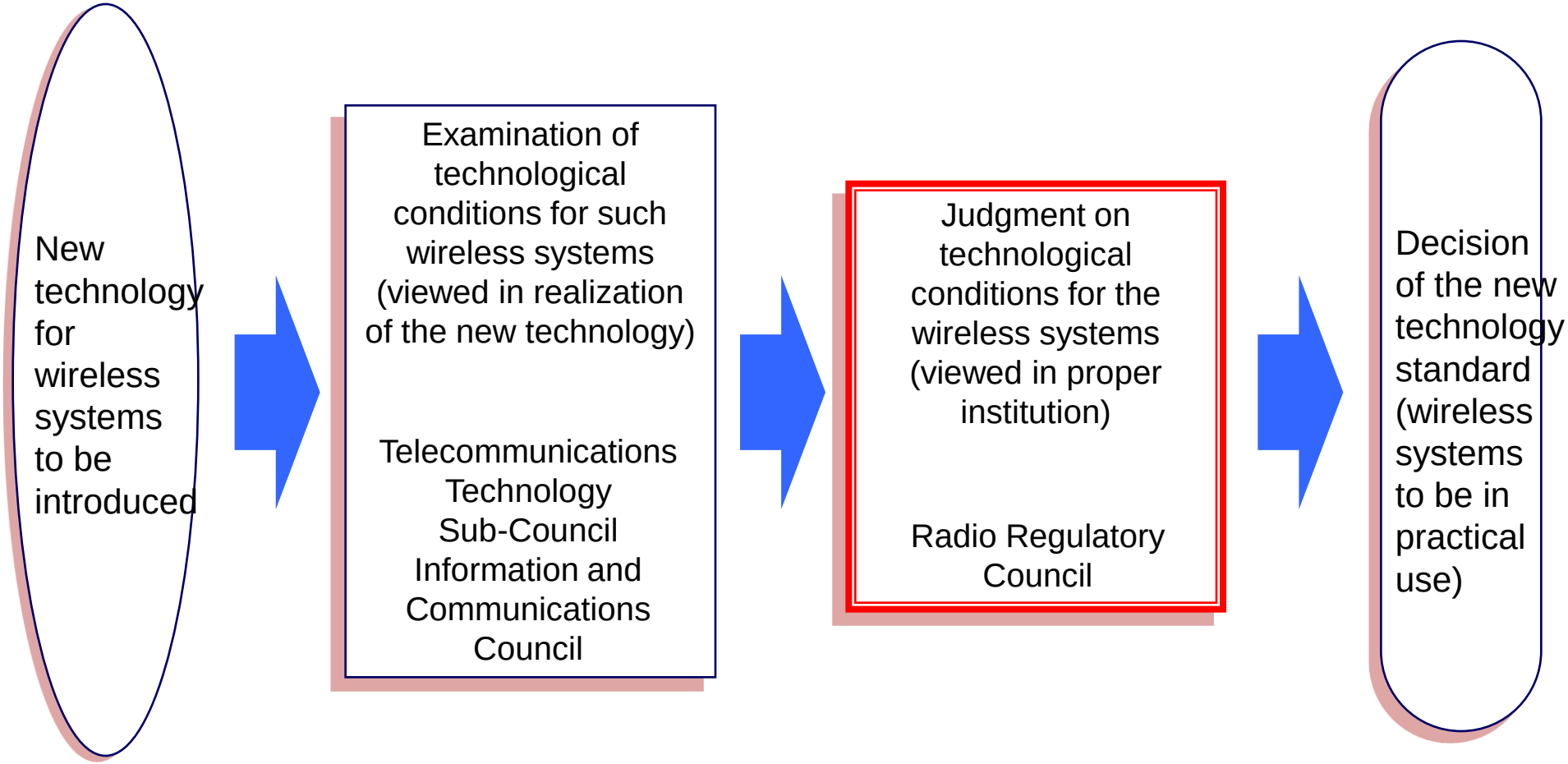
Radio use survey is based on MIC database and reports from licensed users instead of a field survey. Effectiveness of radio use was evaluated taking into account the trends in radio use demand.

【Items extracted from the MIC database】
① number of licensed users, ② number of licensed radio stations, ③ purpose and usage of the radio stations, ④ radio technologies employed, etc.

【Items reported by licensed users】
① specific and actual state of use, ② possibility to switch to an alternative telecommunications means, ③ any plans for effective radio use, ④ any plans to change operating frequency, etc.

Development and revision of Frequency Assignment Plan
based on the results of the survey and evaluation

Flow until the technology standard for wireless systems is decided

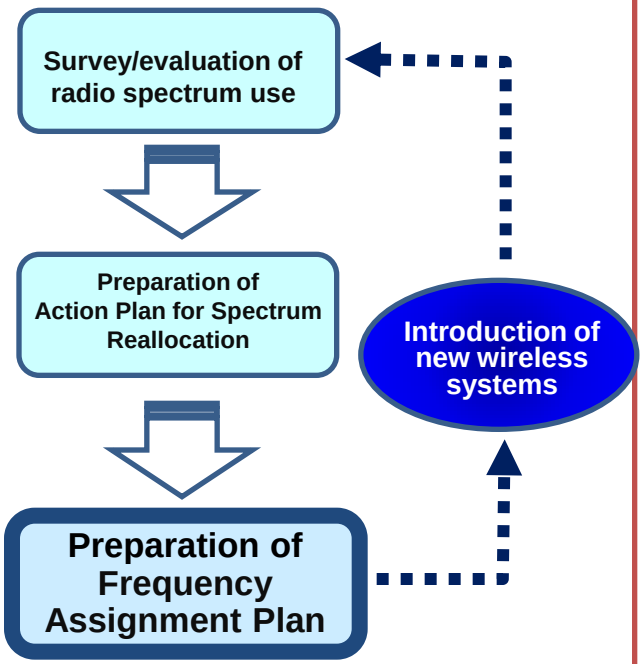


Current Initiatives for Promoting Development of Radio Spectrum Usage

Japan has implemented various initiatives for promoting development in radio spectrum usage, in tandem with the growth and progress of actual spectrum usage.

Relocation/Reallocation of Frequencies

- **In order to secure frequencies to introduce new wireless systems, radio spectrum usage is surveyed and evaluated every year. The Action Plan for Spectrum Reallocation defining relocation/reallocation policies is then prepared.**
- **Based on the results of the above and others, the Minister for Internal Affairs and Communications prepares the Frequency Assignment Plan.**



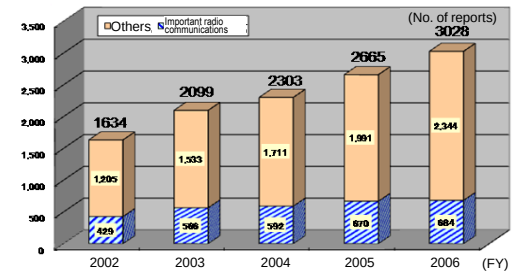
Improvement of Environment for Usage

Measures to Prevent Interference with Important Radio Communications

Development of a radio monitoring system to protect the nation's safety and security

1. Appropriate response to reports of interference
2. Enhancement of monitoring for important events

Number of reports regarding interference/jamming of radio stations



Initiatives regarding the effects of radio waves on human health and medical equipment

Initiative regarding effects on human health

"Radio Radiation Protection Guidelines" indicating the level of exposure that would not affect human health was formulated based on research around the world, as well as trends within WHO, ICNIRP and others.

Initiative regarding effects on medical equipment

Research is conducted continuously to release guidelines to prevent adverse effects from mobile handsets and other devices using radio waves on implanted medical devices.

Promotion of R&D/International Standardization

R&D on technology to enable efficient use of frequencies

- Technology that will enable efficient use of spectrum by compressing the currently allocated frequency bands

R&D on technology to promote shared use of frequencies

- Technology that will enable the shared use of frequencies in the densely allocated frequency bands without adversely effecting existing radio systems

R&D on technology to promote relocation to higher frequencies

- Technology that will enable the radio systems that use frequencies under 6 GHz to relocate to high microwave frequencies or frequencies not in use (millimeter wave frequencies), in order to alleviate the scarcity of available frequencies under 6 GHz

Progress of the Spectrum Reallocation

- **Following to the digitalization of analog television broadcasting in 2011 for more efficient use of radio spectrum, the frequency allocation will be repeatedly executed according to the mid-to-long term reform plans, so that (i) the number of capacity can be expanded, and it can correspond to an increase in the demand . (ii) the unused frequencies can be allowed to new applications.**
- **Our commitment to dynamic spectrum reallocation will never conclude.**

【Progress of Spectrum Reallocation】

MCS (Mobile Communication System)

- Approx. 270 MHz bandwidth (2003 actual)
- Approx. 340 MHz bandwidth (Planned for 2008)

Approx. 500 MHz bandwidth (2008 actual)

- VHF/UHF band→【**revising**】 After digitalization of analog TV broadcasting(July, 2011), reallocate some frequency to commercial telecommunication services and independent services.
- 800MHz band→ 【**revising**】 In order to reallocate the band to the 3G mobile phones, regional disaster prevention wireless system (till May, 2011)
- 1.5GHz band→ 【**finalized**】 In May, 2007, frequencies for the 2G mobile phones were reallocated for the 3G mobile phones.
- 1.7GHz band→ 【**finalized**】 In November, 2005, the frequencies for public services radio stations were reallocated to the 3G mobile phones.
- 2GHz band → 【**finalized**】 In November, 2005, the frequencies for public services radio stations were reallocated to the 3G mobile phones.
- 2.5GHz band→ 【**finalized**】 August, 2007, the band was assigned to wide-band mobile radios including WiMAX.
- 4G/5GHz band→【**revising**】 The band for the fixed micro line is being reallocated to telecommunication services.

Wireless LAN

- Approx. 160 MHz bandwidth (2003 actual)
- Approx. 480 MHz bandwidth (Planned for 2008)

Approx. 515 MHz bandwidth (2008 actual)

- 4.9～5.0GHz band → 【**finalized**】 In September, 2002, the fixed micro lines for commercial telecommunication services was reallocated to the wireless LAN.
- 5.25～5.35GHz band→ 【**finalized**】 In May, 2005, the vacant frequencies produced by the narrowed band of weather radar (public services) and the sharing technologies were relocated to the wireless LAN.
- 5.47～5.725GHz band→【**finalized**】 In January, 2007, the vacant frequencies produced by the technologies avoiding radio interfering between the public radar and wireless LAN were relocated to the wireless LAN.

RFID(Radio Frequency ID tag)

- March 2006, added 950 MHz band to the 135 KHz, 13.5 MHz and 2.4 MHz. 【**finalized**】
- December 2006, added 433 MHz for international logistics use. 【**finalized**】

UWB (Ultra-wide-band)

- Micro wave band (3.4～4.8GHz、7.25～10.25GHz) → 【**finalized**】 In August, 2006, installed the UWB system for communication use.

ITS(Intelligent Transport Systems)

- UHF band → 【**revising**】 After digitalization of terrestrial TV broadcasting (July, 2012), some frequencies in this band will be reallocated to the ITS(Intelligent Transport Systems) .

Implementation through the reallocation of frequencies.

Example of new assignment: BWA@2.5GHz

(Telecommunications Council in Dec.2006)

Technical Requirements

-Downlink Speed: 20-30 Mbps (equivalent to ADSL or Wireless LAN)
-Uplink Speed: 10 Mbps (faster than HSUPA)
-Spectrum Efficiency: 0.8bps/Hz or more (better than 3G and 3.5G)
-Mobility: 120km/h or more

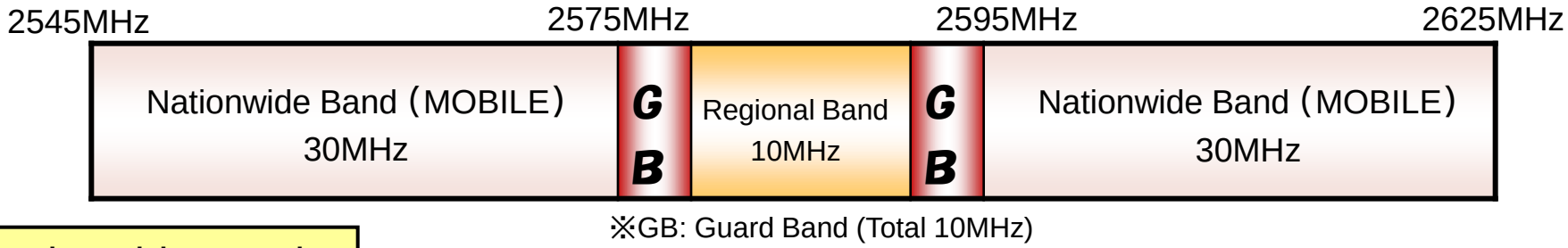
Adopted Systems

Four systems are proposed to the Council and all proved to satisfy the above requirements:

(1) Mobile:
-IEEE 802.16e-2005 (Mobile WiMAX)
-XGP
-IEEE 802.20 Wideband (Qualcomm)
-IEEE 802.20 625kMC (enhanced i-Burst ; Kyocera)

(2) FWA:
-IEEE 802.16e-2005

2.5GHz Bands Licensing Policies for BWA Introduction



※GB: Guard Band (Total 10MHz)

Nationwide Band

- Allocate 30MHz each, maximum 2 operators.
- Restriction of incumbent cellular operators share (less than 1/3) .
- To launch the service within 3 years after the spectrum allocation.
- To cover 50% or more of each planned service area within 5 years after the spectrum allocation.
- To set up plans for MVNOs to use the BWA networks.

▽ Competition among four Applicants

Willcom(XGP), UQ Communications(Mobile WiMAX) (Dec 21, 2007)

- Willcom : Trial Service(from April 27,2009), Commercial Service(from Oct,2009)
- UQ com : Free Pilot Service (from Feb 26, 2009), Commercial Service(from July 1,2009)

Regional Band

- Allocate 10 MHz to local operators (including CATV), principally city by city.
- Requirement of plans to contribute to enhancing the local welfare, such as serving in digital devided areas to secure broadband access in rural areas.

▽

42 operators got licenses (41 CATV operators,1 telecom operator) (June 16, 2008)

Proceedings of the competition for 2.5GHz band licenses

Official Announcement of Deployment Guidance — Public Consultation: May 15 - Jun 15, 2007

(Deployment guidance ≒ Licensing policy)

Inquiry and Deliberation at Radio Council — Approval report to the Minister on July 11, 2007

Public Notice of Deployment Guidance and Application Period — Aug 10, 2007

Application of Deployment Plans — Application Period; Sep 10 – Oct 12, 2007
Four Applications; Willcom, Open Wireless Network, Wireless Broadband Planning, Acca Wireless

Hearings from Radio Council Members — Four Hearings;
Nov 9, Nov 14, Nov 16, and Nov 27, 2007

Open Conference for BWA Introduction — Nov 22, 2007

Pre-deliberation at Radio Council — Dec 12, 2007

Deliberation at Radio Council — Dec 21, 2007

- Deliberation with “masked” documents
  (Ex: anonymous applicants)
- Documents for the judgment are open to public.

Approval of BWA Operators; Wireless Broadband Planning (now UQ Com) & Willcom

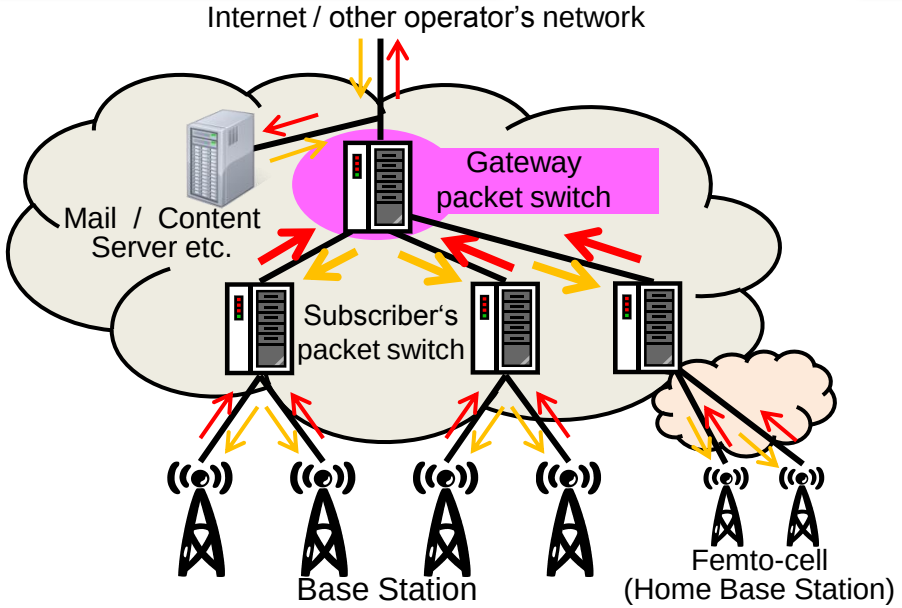
Ⅱ. Development of Mobile Broadband

Mobile Data Traffic in Japan (June 2011)

○Growth of mobile data traffic causes frequency crowding of the mobile telecommunication system.

○MIC aggregated and analyzed mobile data traffic in cooperation with the 5 operators: NTT DOCOMO, KDDI, Softbank Mobile, E-Access, UQ communications.

Method of investigating



○Measuring at Gateway packet switch
- uplink / downlink , monthly, hourly

○Including the following traffic
- Data traffic of IMT-2000 (include LTE)
- Mobile internet content, mobile text-messaging
- Femto-cell (Home Base Station)(except Wi-Fi)
- Mobile Virtual Network Operator

○Excluding the following traffic (it doesn't go through a Gateway)
- Call (voice) traffic
- 2G (PDC) mobile

Mobile Data Traffic Summary

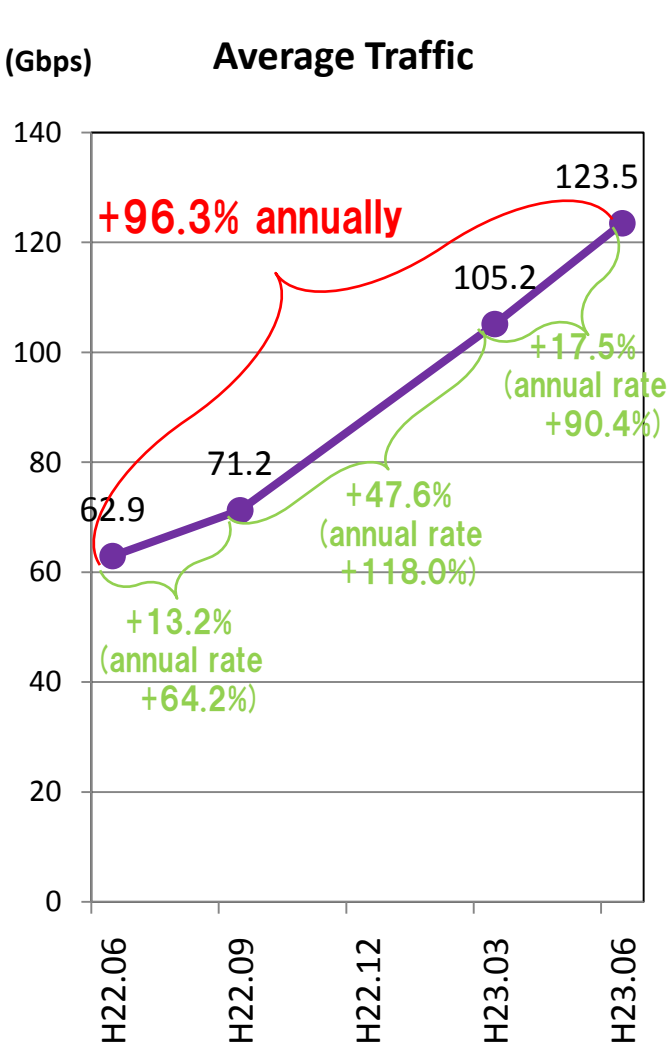
Traffic	Uplink	Downlink	Total
Monthly			
Average (increase since Jun. 2010)	11.9 Gbps (+113.2%)	111.6 Gbps (+94.7%)	123.5 Gbps (+96.3%)
Monthly total traffic	3,867 TB	36,156 TB	40,023 TB
Per subscriber (121,307,600 subscribers)			
Average (increase since Jun. 2010)	98 bps (+96.1%)	920 bps (+79.1%)	1,018 bps (+80.6%)
Monthly total traffic	32 MB	298 MB	330 MB

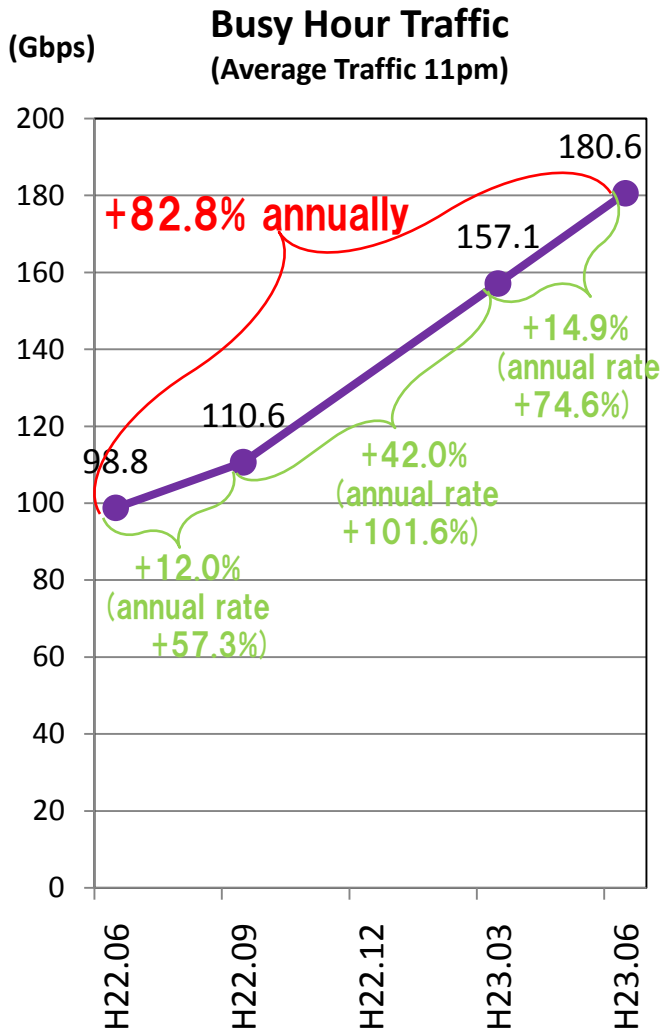
○Average traffic : 123.5Gbps.

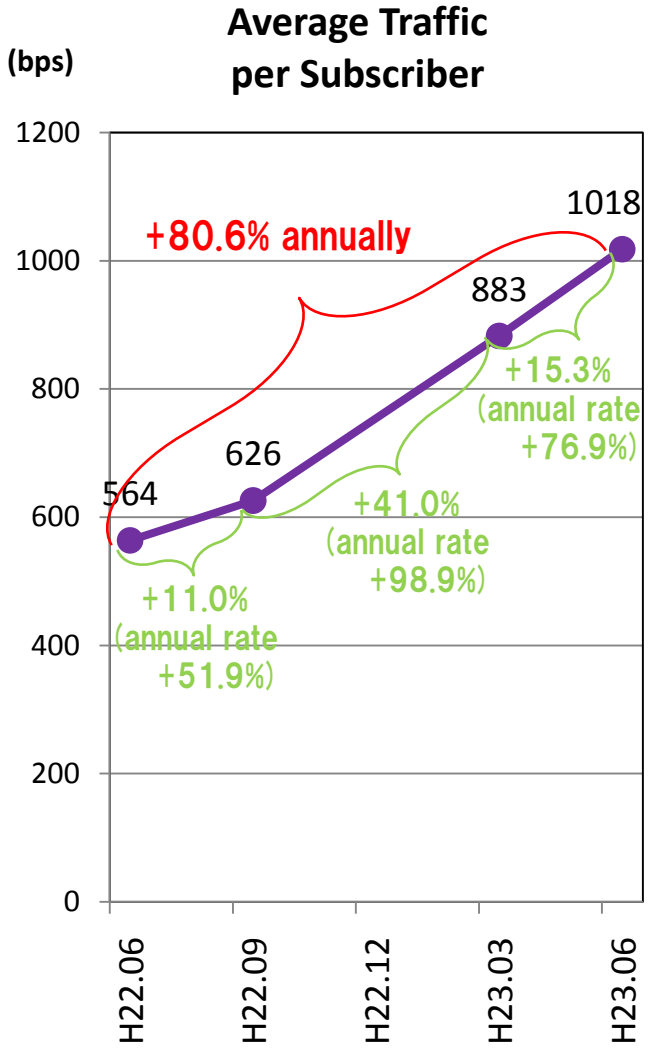
○Average traffic has roughly doubled in one year.

○Traffic per subscriber : 330MB/month.

Transitions of Mobile Data Traffic





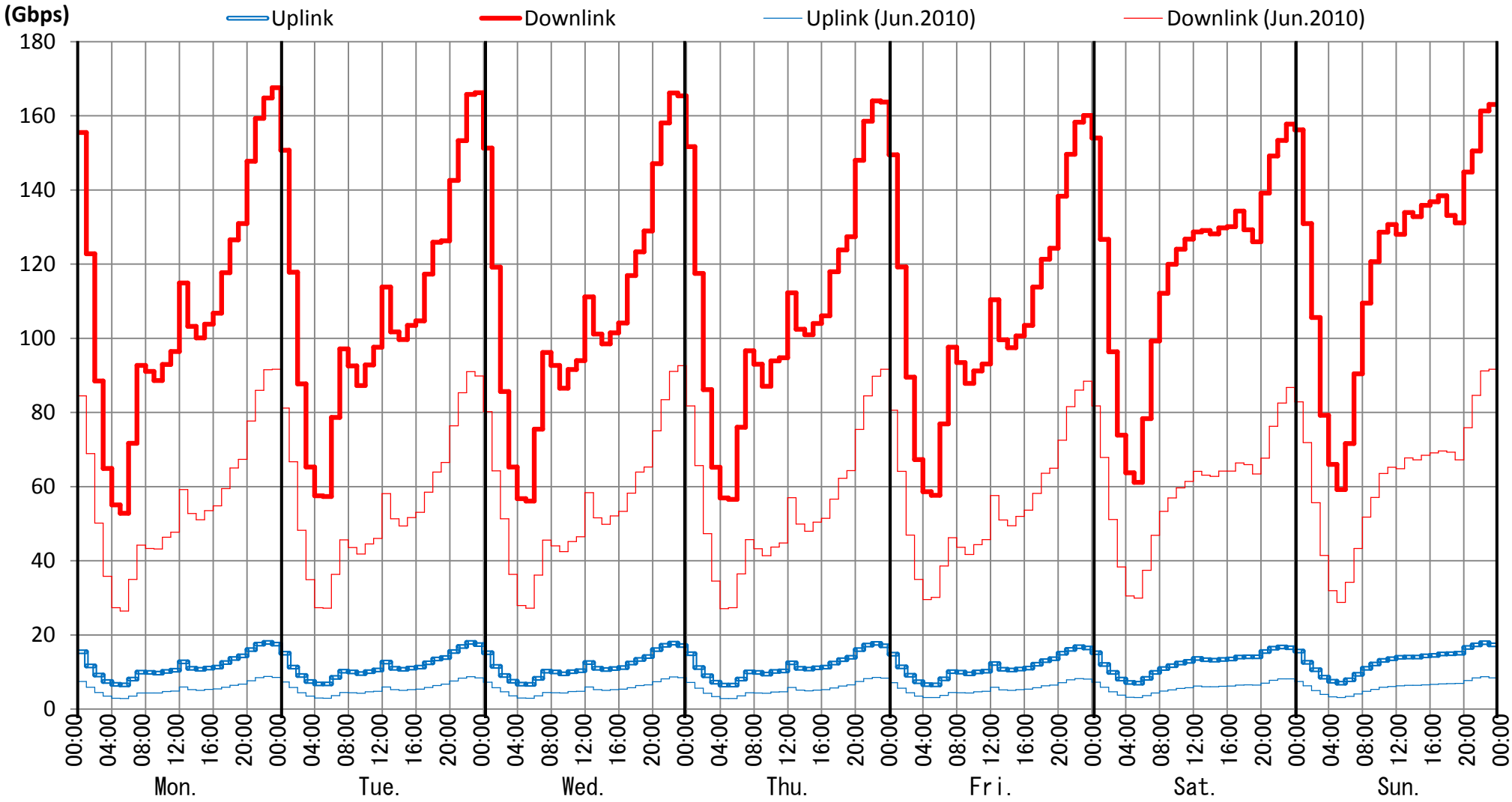


○Mobile data traffic has been increasing at a rate of about 100% per year.

○Compared with the growth rate from June to September, traffic has increased more rapidly since September.

(The main reasons are presumably an increased number of smart phone users in each company and the use of large content, like videos.)

Weekly Changes of Mobile Data Traffic



○ The tendency of traffic has been constant since last June.

* Changes of Uplink and Downlink traffic show the same tendency.
* On weekdays, traffic increases slowly from morning to evening, and peaks during lunchtime.
* During weekends, traffic increases rapidly from morning to daytime, then increases slightly toward evening.
* On both weekdays and weekends, traffic spikes during the night, and peaks from 22:00 to 24:00

Increase of the mobile communication traffic with the spread of smartphones

■ According to「Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2010–2015」which American Cisco company (the main office:State of California San Jose) of U.S.A. announced in this February,

○ **The world mobile data traffic rises 26 times from 2010 through 2015**（An average of 96% a year of growth）and reachs 6.3EB (exa-byte) per a month in 2015.

※ data traffic of Japan occupies 40TB/ a month, 17% of the whole in 2010, 9.2%(578TB) of the whole in 2,015

※ The mean connection speed of the mobile network is (2010) 1.4Mbps of Japan. (world mean 215kbps (smartphone : 1Mbps)

○ Net books and smartphones will increase future traffic. **It is estimated that the smartphone produces data traffic 24 times as large as a basic cell-phone.**

■ **According to the result of another research,**

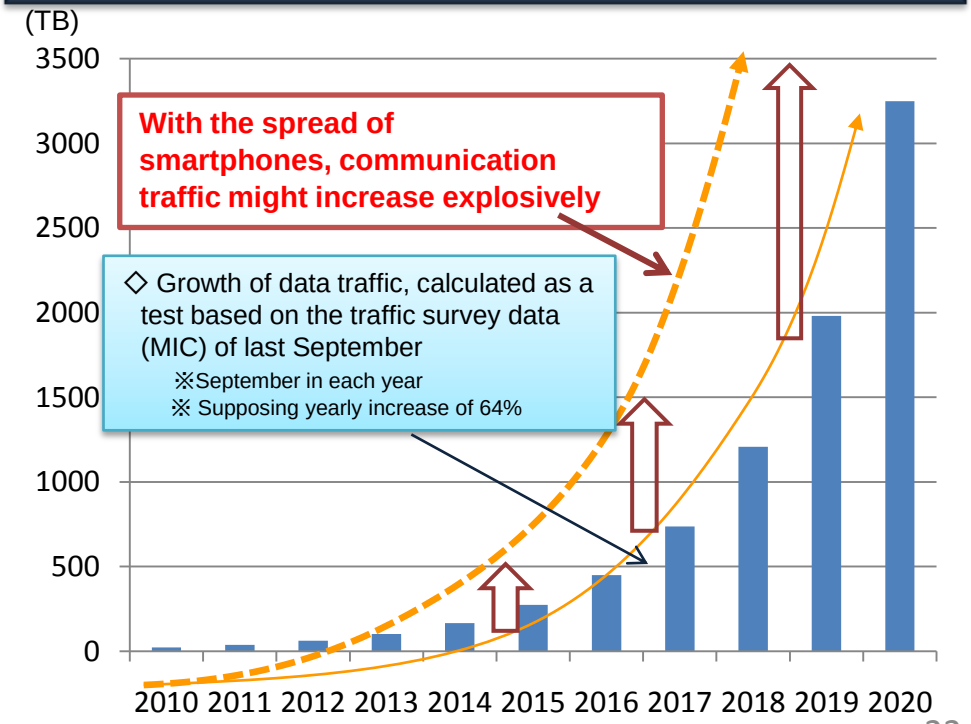
○ It is expected that **the ratio of smartphones in the cell-phone market will rise rapidly in the future**. In the domestic market, it will reach **more than 60% on the basis of shipment numbers**, and **about 50% on the basis of the number of the contracts at the end of 2015**.

(Announcement documents by MM Research Institute, Ltd. (2009.12))

○With the rapid expansion of smartphones, an explosive increase of mobile communication traffic is expected, which is a concern.

The introduction of an advanced system for efficient frequency use and the securing of new frequencies will become more indispensable

Future cell phone communication traffic (in Japan)



Working Group to Discuss Spectrum Issues for Implementation of Wireless Broadband Environments

1. Purpose

On the basis of an international trend including the use situation and the standardization of the mobile broadbands such as cell-phones, this WG examined a policy for security of the frequency for wireless broadbands to realize the world's most advanced wireless broadband environment.

2. The examination system

○ Installing working group

- In the ICT Taskforce of MIC, we installed working group consisting of the people of learning and experience.

○Chairpeson

Hideyuki Tokuda (Professor, Faculty of Environment and Information Studies,Keio University)

"The correspondence examination sectional meeting to the environmental change of the telecommunications market" in ICT Taskforce

Working Group to Discuss Spectrum Issues for Implementation of Wireless Broadband Environments

3. The examination situation

・WG announced the final report last November.

- Action Plan for Spectrum Reallocation toward Realizing Wireless Broadband -

Basic Policies for Securing Spectrum toward 2015/2020

Goals for securing spectrum toward 2015/2020

<Goals by 2015>

With regard to mobile communication systems and sensor network systems, frequencies of over 300 MHz below 5 GHz will be newly secured, and other frequencies with also be secured to improve the broadband environment, etc.

<Goals by 2020>

Frequencies of over 1500 MHz will be secured to facilitate introduction of the 4G system and the development of broadband environments in airplanes, ships, and trains, etc.

Frequency band to be secured by 2015

(1)Further increase speed/capacity of mobile communication systems

700/900 MHz band: Immediately formulate frequency allocation policies <100 MHz bandwidth at maximum>
1.7 GHz band: Additional allocation of frequencies for mobile phones <10 MHz bandwidth>
2.5 GHz band: Advanced BWA (Broadband Wireless Access system) < 30 MHz bandwidth at maximum>
3 - 4 GHz band: Frequencies for 4G systems (IMT-Advanced) <200 MHz bandwidth>

(2) Improved wireless broadband environment

60 GHz band: Development of broadband environment at homes and offices <2 GHz bandwidth>
400 MHz band: Deployment of broadband in train radio wave systems, etc.
<expand to approx. 3 MHz bandwidth>

(3) Introduction of sensor systems

[1] Introduction of smart meters, etc.

900 MHz band: Immediately determine reallocation schedule of 900 MHz bandwidth and implement
<5 MHz bandwidth>
280 MHz band: For covering wide areas <5 MHz bandwidth>

Basic Policies for Securing Spectrum toward 2015/2020

Frequency band to be secured by 2015 (cont.)

[2] Improved safety of automobile transportation

700 MHz band: Immediately allocate frequencies for ITS with consideration given to the status of discussions on 700 MHz band frequency allocation plan <10 MHz bandwidth>

79 GHz band: Put high-resolution radar to practical use <4 GHz bandwidth>

[3] Use in medical/healthcare fields

400 MHz band: Introduction of new medical systems with consideration given to trends in international standardization, including vital data collection systems, etc. <10 MHz bandwidth>

(4) Development of new services, etc. through utilization of white spaces

(5) Response to advanced broadcasting systems

Frequency band to be secured by 2020

(1)Further increase speed/capacity of mobile communication systems

3 - 4 GHz band: Frequencies for 4G systems (IMT-Advanced) <approx. 1.1 GHz bandwidth>

(2) Improved wireless broadband environment

40 GHz band: Development of environment for the use of broadband in airplanes, ships, and trains <approx. 1.2 GHz bandwidth>

* In addition, frequencies will also be allocated in response to increased use of smart meters, etc. and implementation of experimental broadcasting of super-hi-vision satellite broadcasting

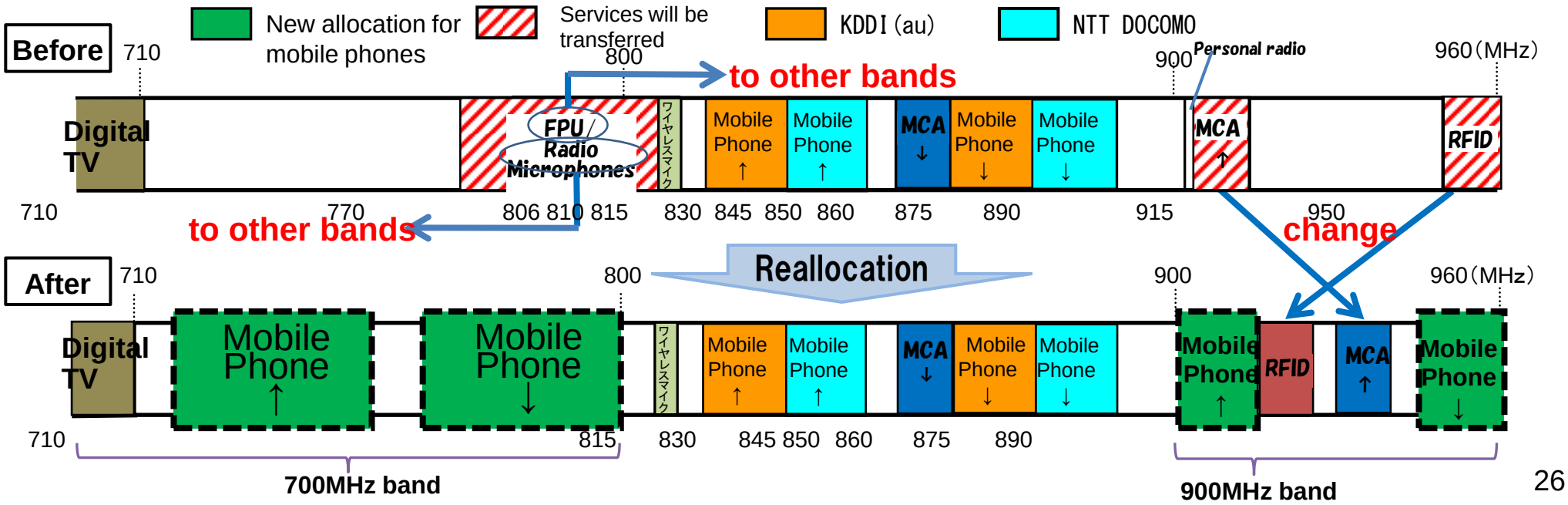
Basic Policies for spectrum reallocation of 700/900MHz band

Basic policies for spectrum reallocation

1. In view of ensuring consistency with the spectrum allocation status of other countries, an "allocation method that makes respective use of the 700 MHz band and 900 MHz band" would be considered appropriate.

2. Spectrum reallocation to be implemented rapidly in enabling the entry of mobile phone businesses of 700 MHz in 2015 and 900 MHz in 2012.

3. In implementing the spectrum reallocation, the necessary measures along with bearing the expense of changing the frequencies of existing systems need to be taken.



Introduction of New Measures for Rapid and Smooth Spectrum Reallocation

Basic idea

(1) Smooth reallocation is required according to the expansion of the new system's service areas while sharing frequencies with existing system in a geographical/time-based manner.

(2) To accelerate spectrum reallocation through the user who use reallocated spectrum (e.g. Mobile operators) bears the expense of changing the frequencies of the existing radio systems.

[Current Methods of reallocation existing frequencies]

[1] Implement reallocation in approximately 5 to 10 years with consideration given to the facility renewal period of existing systems (expenses required for the frequency change will be self-borne).

[2] Introduce new systems after frequency change had completed.

Incentives for bearing the expenses of frequency changes need to be provided for the new users who use reallocated spectrum.

Introduction of the new method that the government licenses the operator who will bear the expenses required for the spectrum reallocations .

Revising Radio Low to introduce the frameworks for bearing the expenses of spectrum reallocations

Summary of a new Spectrum reallocation scheme (image)

Government

Development and publication of the establishment guideline

This prescribes target frequencies, introduction systems, the lowest level of the area coverage, systems to be changed frequencies, necessary cost for the reallocation.

Receiving the application of the plan to establish the base stations

MIC decides the operator with taking into account the plan (e.g. time of beginning services, the solvency of the expense)

Operator B WINs!!
(authorization of the B's plan)

The procedure for the frequency change

existing users

Entry applicant: the Operator A

The application of the establishment plan
※ Burdens for the shift expense are listed in this plan

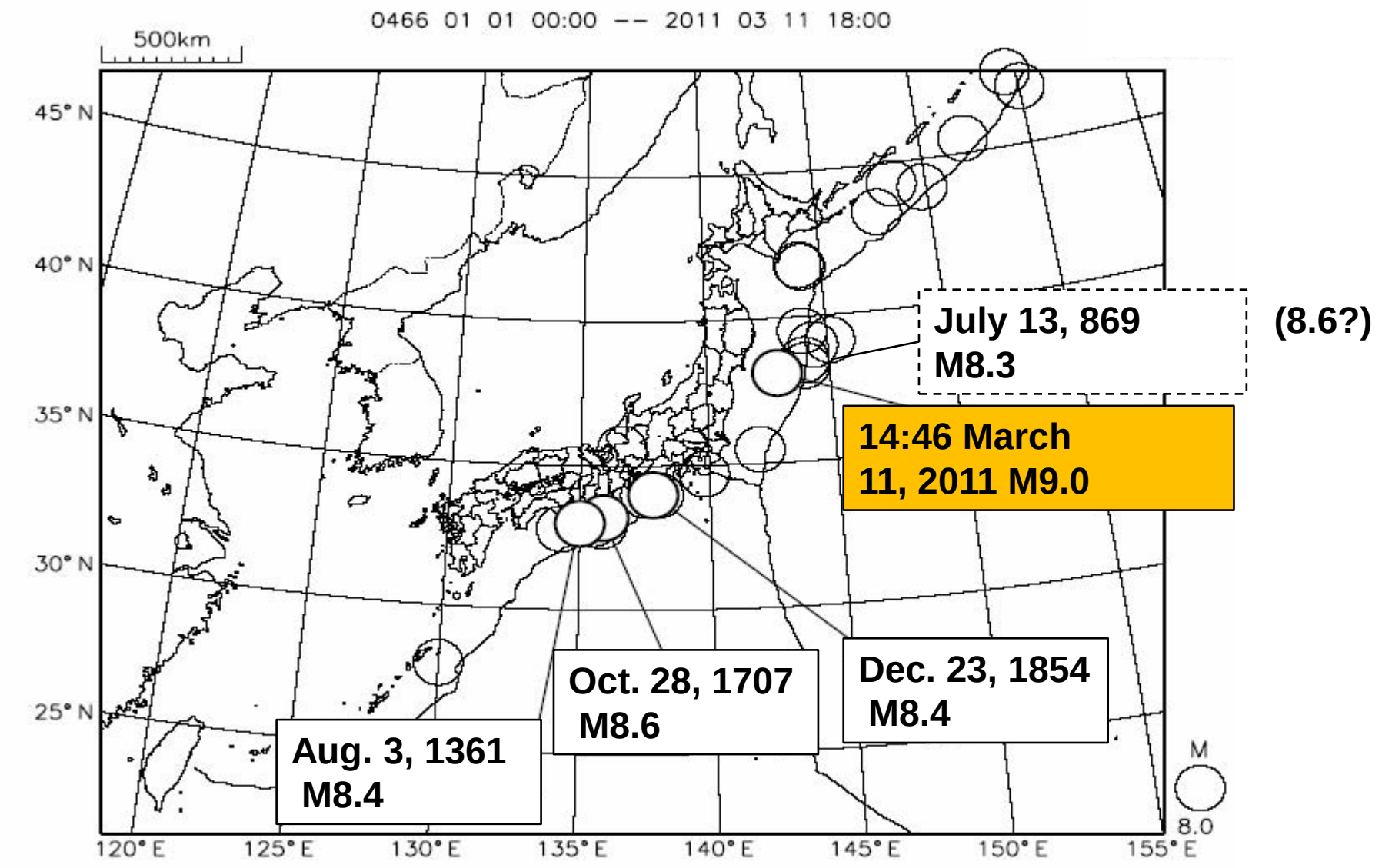
Entry applicant: the Operator B

The enforcement of the frequency change (payment of the expense)

ICT responses to The Great East Japan Earthquake

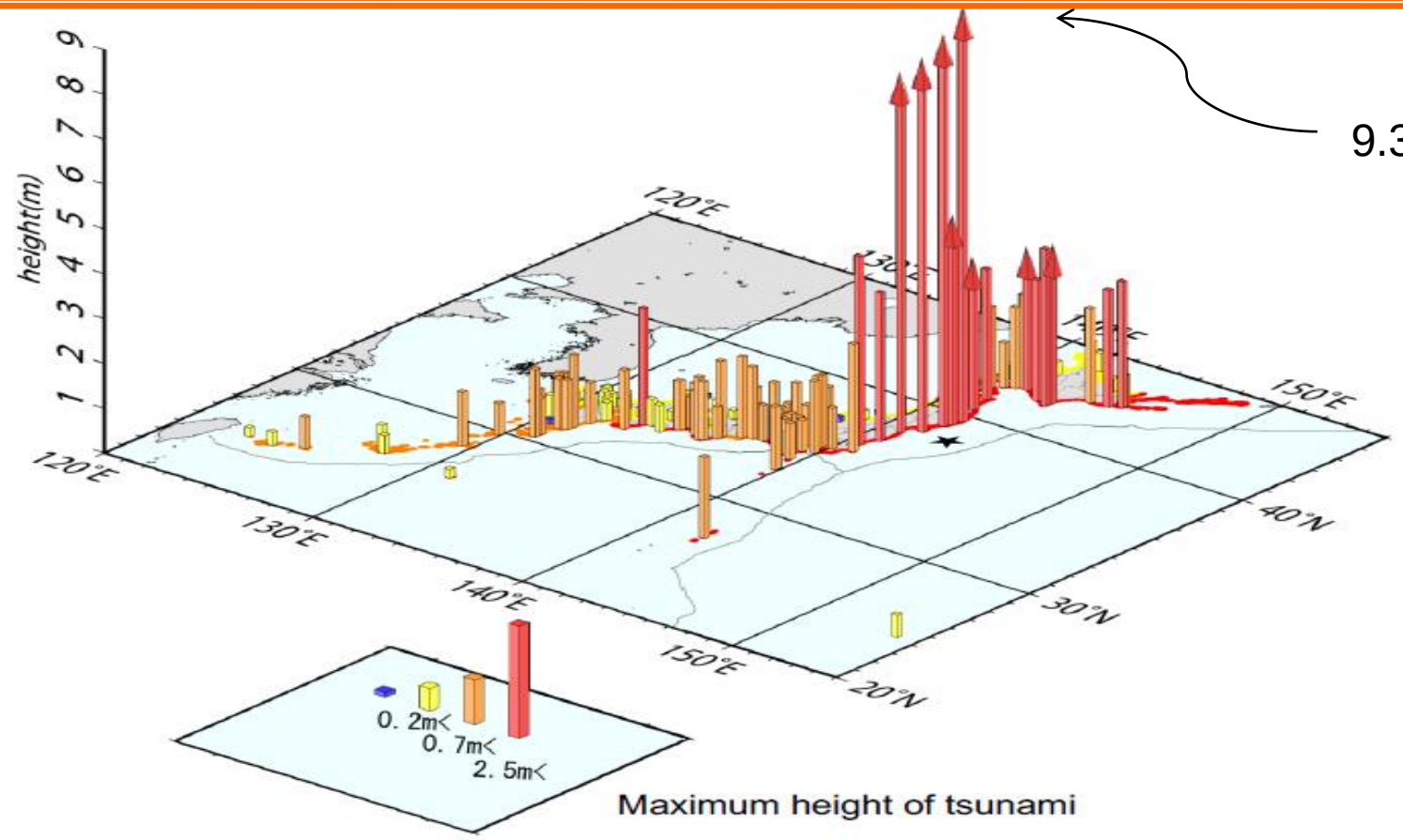
The Biggest Earthquake in Japan, EVER

Earthquakes with M 8.4 or above (466 -2011AD)



(source: Japan Meteorological Agency)

Higher Tsunami Than Expected



	First tsunami	Maximum height of tsunami
Miyako (Iwate)*	March 11, 14:48 JST +0.2m	March 11, 15:26 JST +8.5m<=
Ofunato (Iwate)*	March 11, 14:46 JST -0.2m	March 11, 15:18 JST +8.0m<=
Ishinomaki (Miyagi)*	March 11, 14:46 JST +0.1m	March 11, 15:25 JST +7.6m<=
Soma (Fukushima)*	March 11, 14:55 JST +0.3m	March 11, 15:51 JST +9.3m<=
Oarai (Ibaraki)	March 11, 15:15 JST +1.8m	March 11, 16:52 JST +4.2m
Kamaishi (Iwate)*	March 11, 14:45 JST -0.1m	March 11, 15:21 JST +4.1m<=
Mutsu (Aomori)	March 11, 15:20 JST -0.1m	March 11, 18:16 JST +2.9m
Nemuro (Hokkaido)	March 11, 15:34 JST slight	March 11, 15:57 JST +2.8m
Tokachi (Hokkaido)*	March 11, 15:26 JST -0.2m	March 11, 15:57 JST +2.8m<=
Urakawa (Hokkaido)	March 11, 15:19 JST -0.2m	March 11, 16:42 JST +2.7m

(source: Japan Meteorological Agency)

Actual maximum height might be higher.

ICT Infrastructures Damaged

- Facilities were destroyed by the earthquake and/or the tsunami.
- The commercial electricity shortage was long and batteries were drained.

FIXED NETWORKS

Lines out of service
(because of the nodes out of service)

NTT Onagawa Bldg
(Source NTT East)

PSTN+ISDN(NTT East) 1,000,000 (March 13)
<MAXIMUM>

FTTH (NTT East) 500,000 (March 13)
<MAXIMUM>

MOBILE NETWORKS

NTT DOCOMO transmission facilities in Iwate
(Source NTT DOCOMO)

Base Stations Damaged (4 carriers)

14,800 (March 12) <MAXIMUM>

NTT DOCOMO	6,600
KDDI (au)	3,800
SoftBank Mobile	3,800
eMobile	600

Supplying Temporary Capacities

(as of April 7)

- **MIC**
  - **Hundreds of transceivers, MCA radio terminals, satellite mobile phones have been lent out to local governments.**

- **Telecommunications carriers**
  - **Over 100 portable power generators and 37 mobile base station trucks have been provided.**
  - **Public telephone calls are not charged; approximately 2,300 new public telephones have been specially installed.**
  - **Free internet connections have been set up at evacuation centers.**
  - **Basic telephone rates have been reduced or waived altogether, and payment deadlines have been extended.**

- **Broadcasters and manufacturers**
  - **In cooperation with various manufacturers, NHK has been installing 750 televisions and 760 radios in evacuation centers. Manufacturers such as Panasonic and Sony have been supplied over 40,000 radios.**

・・・・・and more

Restoration of Capacities

•NTT group and KDDI announced respectively their plan to restore their capacities for services by the end of April.

FIXED NETWORKS

Lines OUT of service
(because of the nodes ouf of service)

PSTN+ISDN(NTT East)	1,000,000 (March 13) >>> 11,600 (May 2)
FTTH (NTT East)	500,000 (March 13) >>> 4,400 (May 2)

MOBILE NETWORKS

Base Stations Damaged (4 carriers)

14,800 (March 12) >>> 527 (May 2)

NTT DOCOMO	6,600	326
KDDI (au)	3,800	117
SoftBank Mobile	3,800	84
eMobile	600	0

The study group about the ideal method of the securing of communication in the emergency such as large-scale disasters

Purpose

On the basis of states such as congestion or the communication stoppage having occurred because of the happening of the Great East Japan Earthquake disaster over a wide area, this study group examines an ideal method of the security of the means of communication in the emergency

Study Items

- ○ How to secure necessary communications when the congestions of communications traffic are taking place in emergency
- ○ How to secure communications when base stations and exchanges are damaged by the earthquakes/tsunami
- ○ Future network infrastructure that can work at the time of serious disaster
- ○ Future internet usage at the time of serious disaster etc.

Members

Telecommunication carriers (fixed and mobile), vendors, ISPs, related parties, and experts

Schedule

- ●SG held its first meeting in April and made the intermediate report in August.
- ●Final report will be organized in December.

Opinions that were given by the study meeting(extract)

1. How to secure necessary communications when the congestions of the traffic are taking place in emergency

- The structure which gives priority to connectivity over call quality
- The structure in which SMS is not controlled even if the voice calls are
- Introduction of a new method including the limitation of each telephone call length
- Measures to endure the cell-phone traffic concentration (the way to lose quality to some extent, and to secure more lines).
- The control that areas and times are sorted.
- Congestion control by the cooperation among operators.

2. How to secure communications when base stations and exchanges are damaged by the earthquakes/tsunami

- Securing service areas for communications by on-vehicle model base stations
- The promotion of the mutual cooperation framework among operators, including the flexibility of facilities
- The enlargement of satellite entrance lines, increase of on-vehicle model / movable model satellite base stations
- Dualization by usage of micro-wave entrance lines
- The construction of omnidirectional large zone base stations and large zone base stations for important institutions

3. Future network infrastructure that can work at the time of serious disaster

- New methods to enable more communications under congestion control
- The service giving a voice message in packet communications when the line is controlled because of congestion
- Technologies to assign communication resources flexibly for services that need to be provided at all times
- Promoting to introduce the next generation cell-phone system which can secure communication by using multiple ways, such as automatic change to wireless LAN, BWA, at the time of disasters
- The setting of cell-phone base stations in relatively safe places, such as public buildings, the addition of satellite communications functions to the base stations, the redundancy of the line between the base stations and control stations (The ideal method of setting places / the functional enhancements of the base stations).
- Promoting the network common use assuming a disaster(e.g.: roaming, promotion of SIM-lock cancellation)

Structure of the Intermediate Report ①

Chapter 1 Introduction

Chapter 2	Alleviating congestion in emergency situations	1. Ensuring voice call capability 2. Expanding/improving means of communication other than voice calls 3. Keeping users informed of available means of communication during emergency 4. Designing robust networks to cope with congestion
Chapter 3	Minimizing disruption to communications in the event of damage to base and/or relay stations	1. Emergency repairs to damaged communication equipment 2. Providing communications capability to disaster-affected regions and evacuation centers 3. Ensuring stability of power supplies 4. Providing emergency updates and disaster damage reports
Chapter 4	Implications of the recent disaster for future network infrastructure	1. Improving the disaster resilience of networks 2. Setting up systems and structures for responding to disaster

Structure of the Intermediate Report ②

Chapter 5 — Implications of the recent disaster for future internet usage

1. Minimizing disruptions to internet access
2. Using the internet more effectively
3. Utilizing cloud services
4. Building collaborative frameworks among communication operators to prepare for disaster

Chapter 6 — Action Plan

Each item below is classified either as:

- **Issue to be addressed immediately by the various parties (national government, local governments, telecommunications operators, etc.) in response to the findings of the Study Group;** or
- **Issue requiring further deliberation by the Study Group.**

Thank You !

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