

ISDB-T seminar in Brazil

Seminar #1-b

Outline of Digital Broadcasting in Japan/ Outline of ISDB-T System

28th March, 2005

Digital Broadcasting Expert Group (DiBEG)

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8. Current DTTB service in Japan

(note) Main part of Chapter 1. – 3. and 5. are presented by MIC (Ministry of Internal Affairs and Communication)

(note) main part of Chapter 4. is presented by DTV workshop held in Inter BEE last November at Makuhari

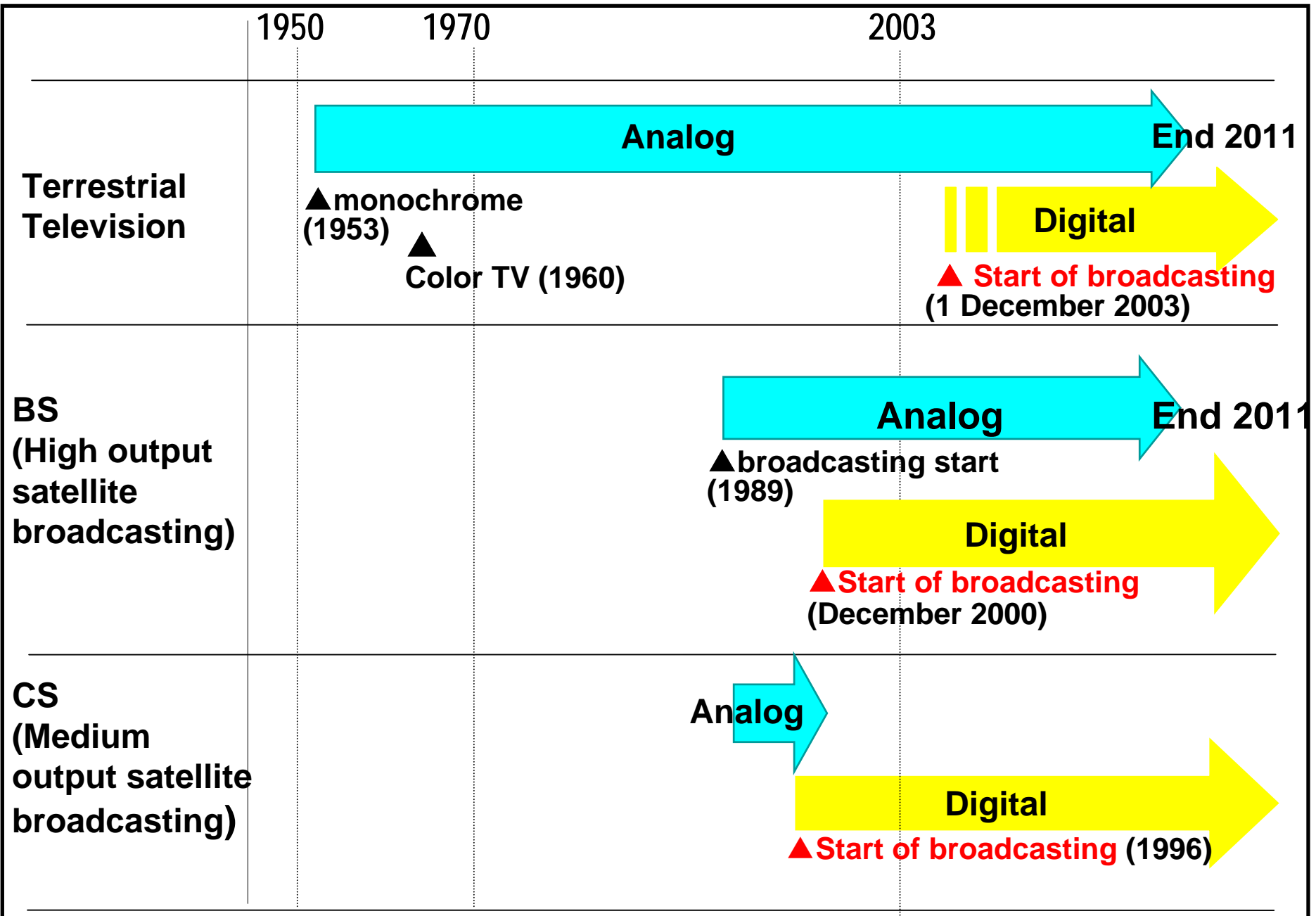
(note) main part of chapter 7. is presented by ARIB separately

1.Overview of Broadcasting in Japan

Japan's Profile

- **Population** **127 million**
- **Number of households** **48 million**
- **Area of Japan** **378,000 km²**
- **TV receivers** **100 million**
- **Terrestrial TV networks**
 - **3-9 stations/region with many relay stations (including 2channels by public broadcaster, NHK)**
 - **NHK: reception license fee based, nation wide network**
 - **Private broadcasters: regional based (30 regions in Japan)**
 - **5 major networks + independent stations**

Schedule for Digital Broadcasting in Japan



Cable Televisions Broadcasting

- **Cable and community reception penetration 47%**
- **Cable TV with own programming penetration 32%**
- **Cable TV operators are shifting full service; more channels, internet services**

- **Legislation**
- **Cable TV law: must carry rule of terrestrial TVs.**
- **Internet service subject to Telecommunication business law**

Satellite Television Broadcasting

- **Analog Satellite BS, SDTV 3ch 12 million subscribers
(25% penetration)**
- **Digital BS Satellite, HDTV 7ch 5.25 million
subscribers
(10%) since 2000 including cable reception**
- **SkyPerfecTV, digital SDTV 200plus ch
3.5 million (7%)
subscribers since 1996**

1.Strategy for Digital Terrestrial Television Broadcasting

Policies and Bottleneck for DTTB

- Assign 6MHz channels for incumbent terrestrial broadcasters
- Simulcast of Analog, but something more values ; i.e. HDTV, SDTV multichannels, datacast, etc
- Different and additional value more than satellite digital TV (SDTV more channel)
- Digital Television set as integrated home information terminal
- Massive reallocation of existing relay station channels

The Merits of Digital Broadcasting

HDTV



Multiple programs



Data broadcasting

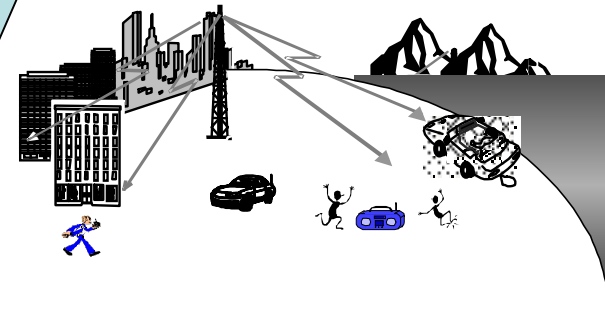


Advanced caption etc.

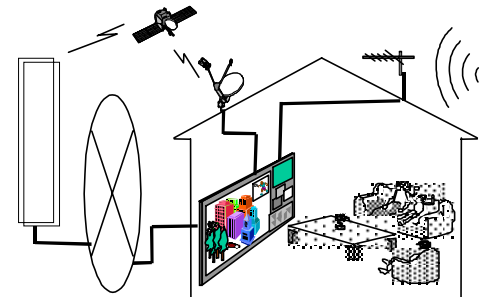


Merits

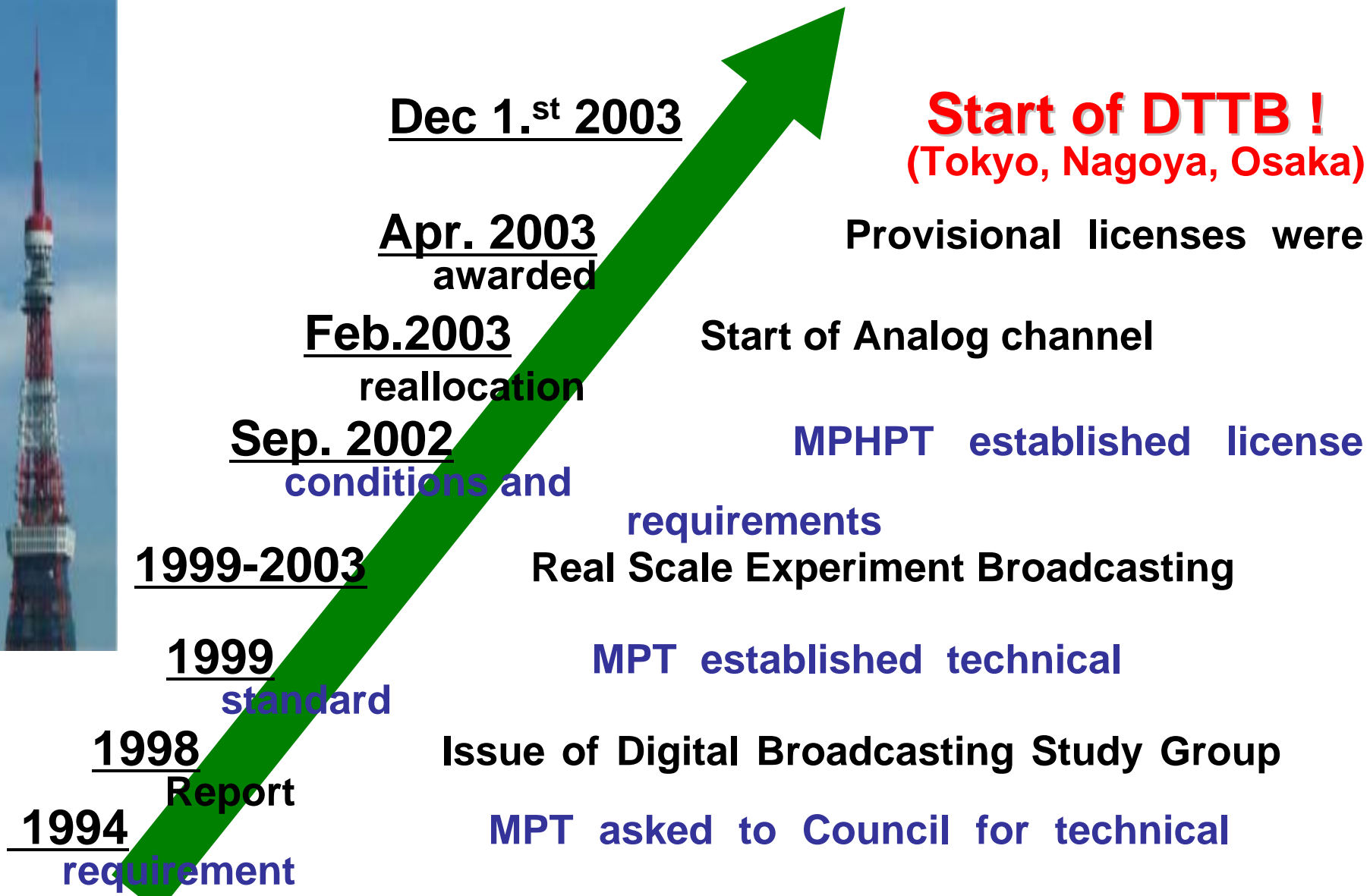
Mobility



Interactive TV



Actual schedule of implementing Digital Terrestrial Television Broadcasting in Japan



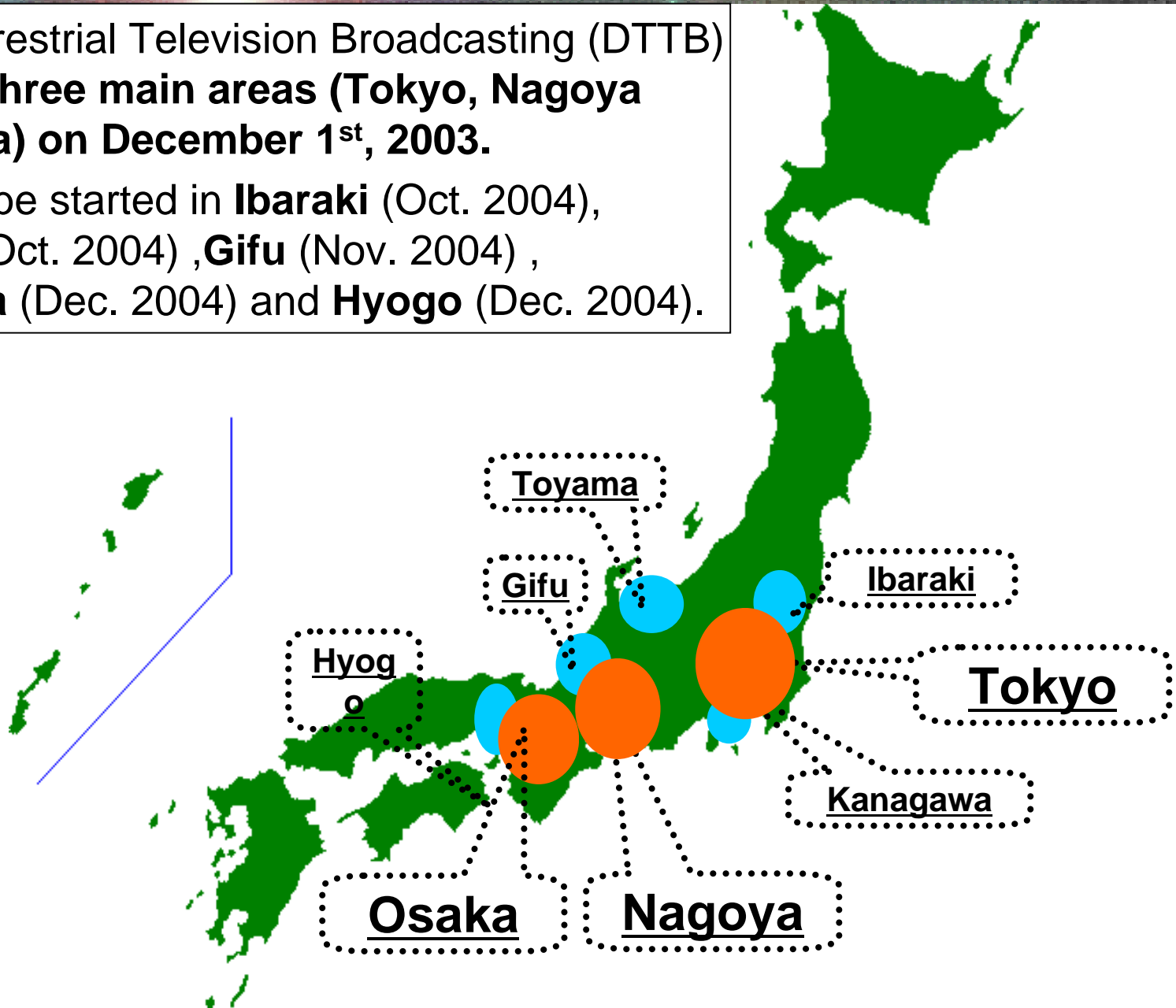
Conditions and Requirements for DTTB licensee in Japan

- Over 2/3 simultaneous per day
- **HDTV is more than 50% of all programs**
- Broadcasting using subtitles and commentary
- Covered same areas as analog
- Updating the receiver's by data broadcast

Service area of DTTB in Japan

Digital Terrestrial Television Broadcasting (DTTB) started in **three main areas (Tokyo, Nagoya and Osaka)** on **December 1st, 2003**.

DTTB will be started in **Ibaraki** (Oct. 2004), **Toyama** (Oct. 2004), **Gifu** (Nov. 2004), **Kanagawa** (Dec. 2004) and **Hyogo** (Dec. 2004).



Population Coverage of DTTB in Japan

Approximately over **12 million** households
(**25%** of total household in Japan)

Expansion of population coverage (households)

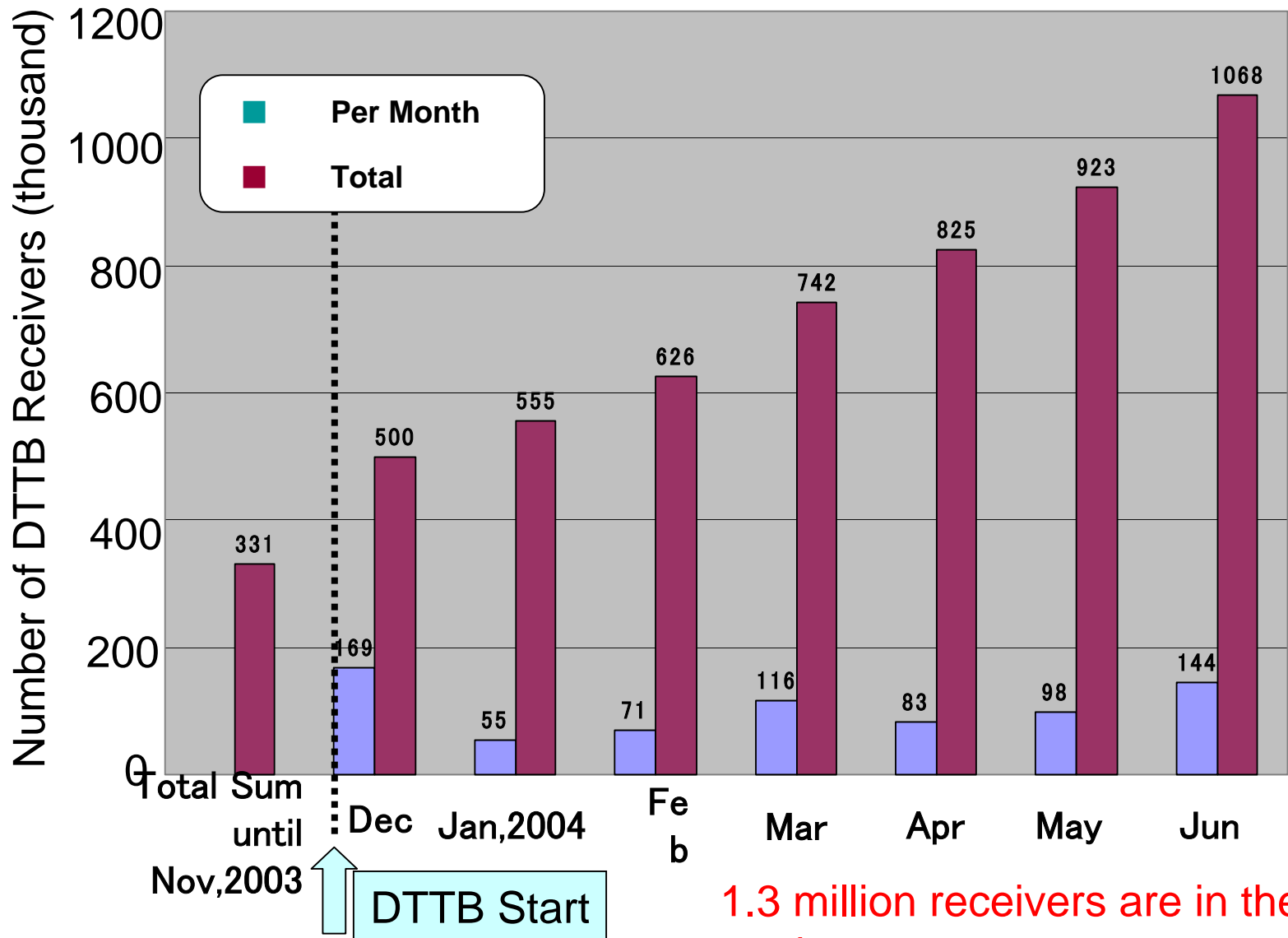
2004 17 million (35%)

2005 23 million (48%)

2006 available at all prefectures (80%)

Number of potential households via CATV networks
7 million households in total

Rapid increase of DTTB Receiver Shipment



1.3 million receivers are in the market now

All-in one DTTB Receiver

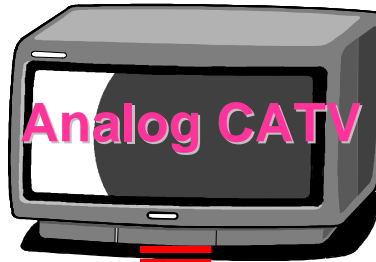
1.3 million of DTTB receiver are All-in one DTTB receivers

- Equipped with Digital Terrestrial and Satellite Tuner
- Compatible with HDTV (1080i)
- Equipped with Data Broadcasting decoder
- Capability to connect Network

Some models have internet web browsing function

In addition, more than **3 million of HDTV ready TV** (HDTV display without digital tuner) are in the market

DTTB transmission by CATV



**Update Digital CATV for
DTTB transmitting**

Systems	Modulation Schemes	Advantages
Pass-through System	DTTB format (ISDB-T, OFDM)	Direct connection to DTTB receiver
Transmodulation System	Digital Cable format (256 or 64 QAM)	Mix with Satellite Programming Digital Cable STB is available in the market

3.Promotion of Digital Broadcasting

Status of Terrestrial Digital Television Broadcasting at its Initial Stage

1. Services provided during the initial stage of terrestrial digital broadcasting (October 2004)

<Number of potential households by aerial>

Approximately over 14 million

【Reference】 Number of potential households via CATV networks:
9.8 million households in total

2. Terrestrial digital broadcasting receivers

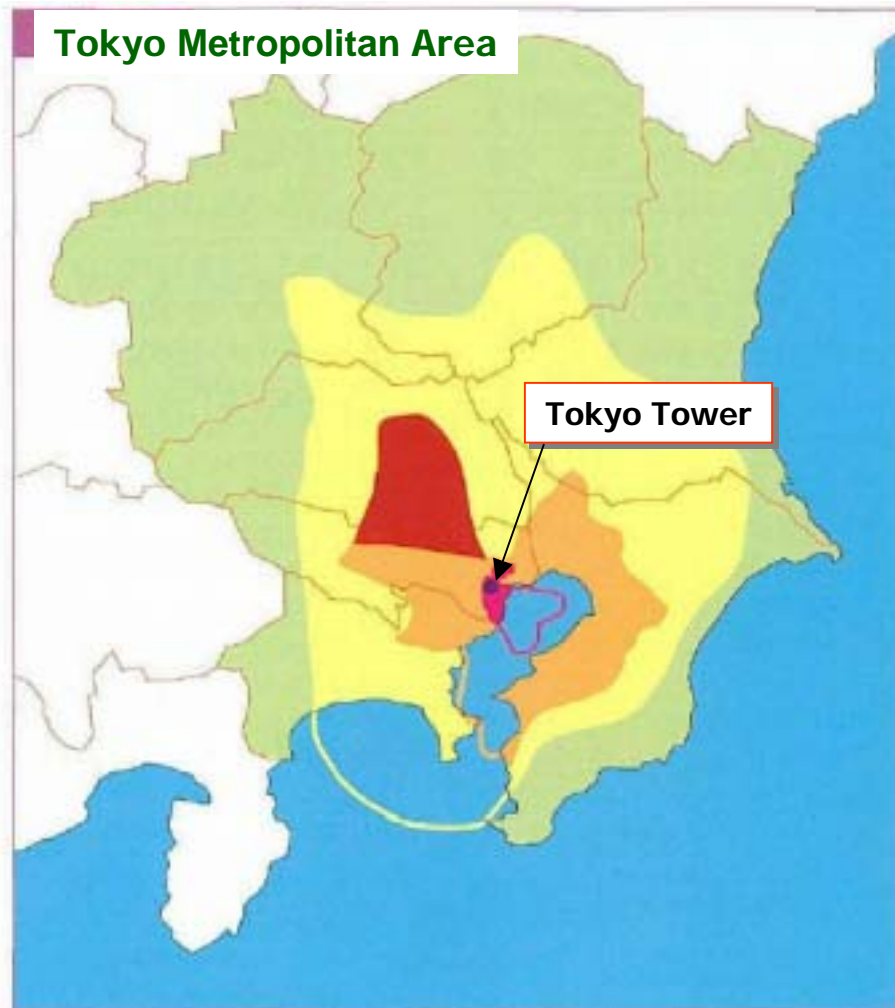
<Number of shipped units>

Total of approximately 1,346,000 units

(as of end of

August)

Approach to the DTTB in Tokyo



Dec.1st,2003

NHK General

NHK Educational
Private Network(6)

End of Dec,2004

NHK General

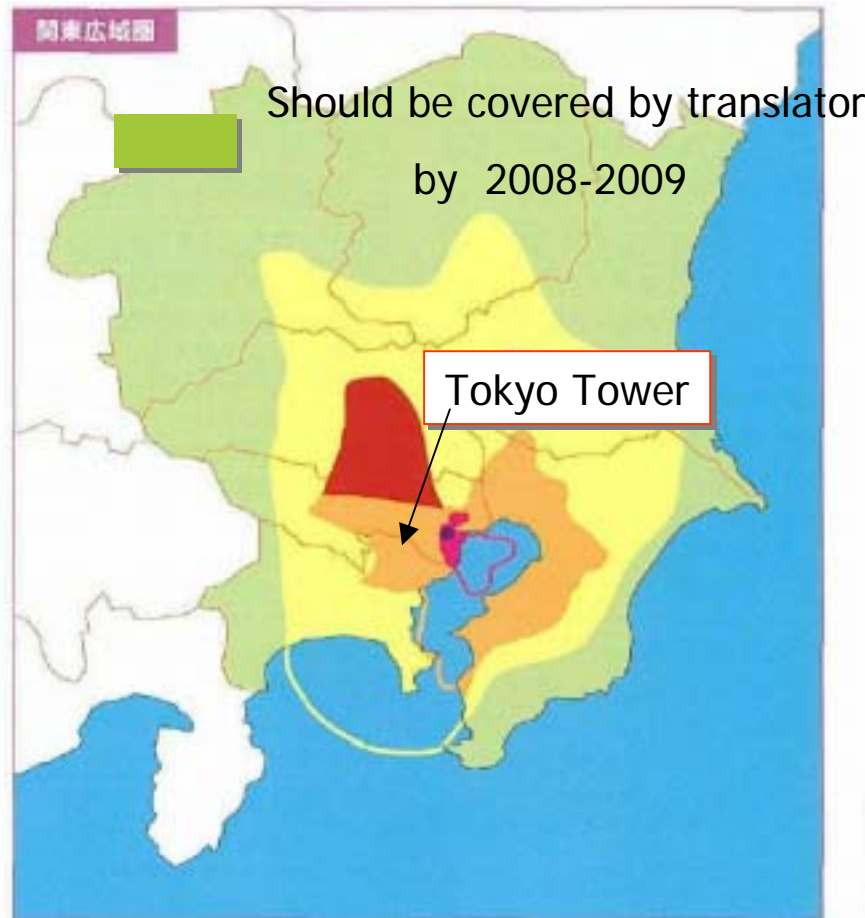
NHK Educational
Private Network(6)

**End of Dec,2005
(maximum
output)**

All Broadcasters

Stage by Stage Enlargement of DTTB Service Area(1/3)

Kanto wide Area



Dec.1st,2003

- NHK General
- NHK Educational
- Private Network(6)

End of 2004

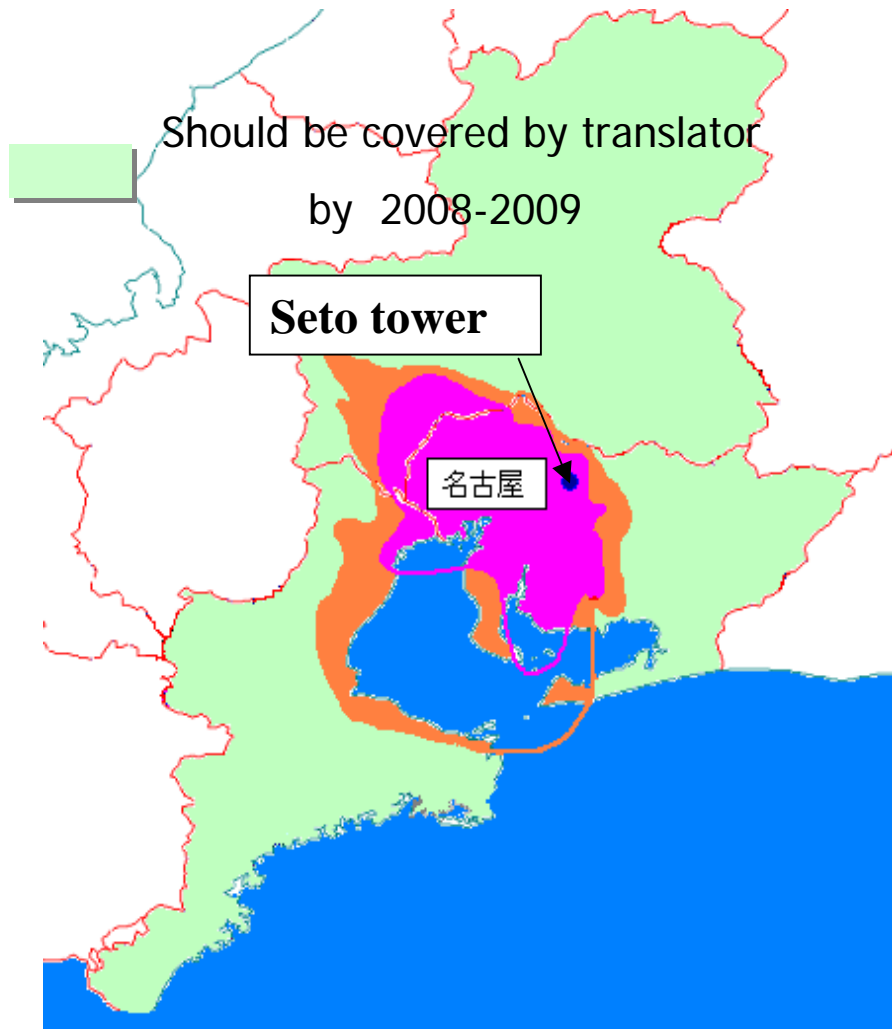
- NHK General
- NHK Educational
- Private Network(6)

**End of 2005
(maximum output)**

- All Broadcasters

Stage by Stage Enlargement of DTTB Service Area(2/3)

Chukyo wide Area



Dec.1st,2003

NHK and
Private Network

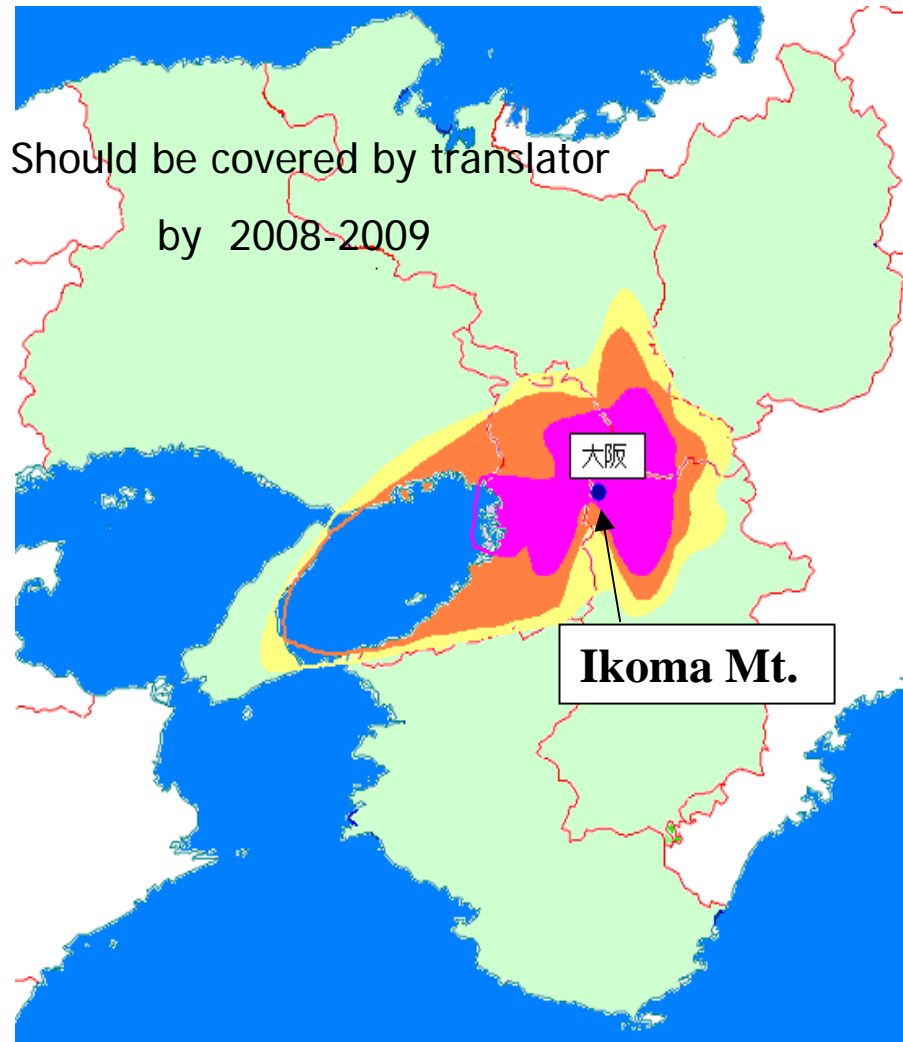
End of 2005

(maximum output)

NHK and
Private Network

Stage by Stage Enlargement of DTTB Service Area(3/3)

Kinki wide Area



Dec.1st,2003

NHK and
Private Network

End of 2004

NHK and
Private Network

**End of 2005
(maximum output)**

NHK and
Private Network

Strategy to promote DTTB

- **End of Analog Broadcasting; July 2011 mandated by Radio Law**
- **Replace all analog receiver into digital by the time**
- **Promote DTTB receivers**
- **DTV as integrated home information terminal**
- **Need of collaborative work among government, broadcasters and industry**

Gateway to the ICT Society

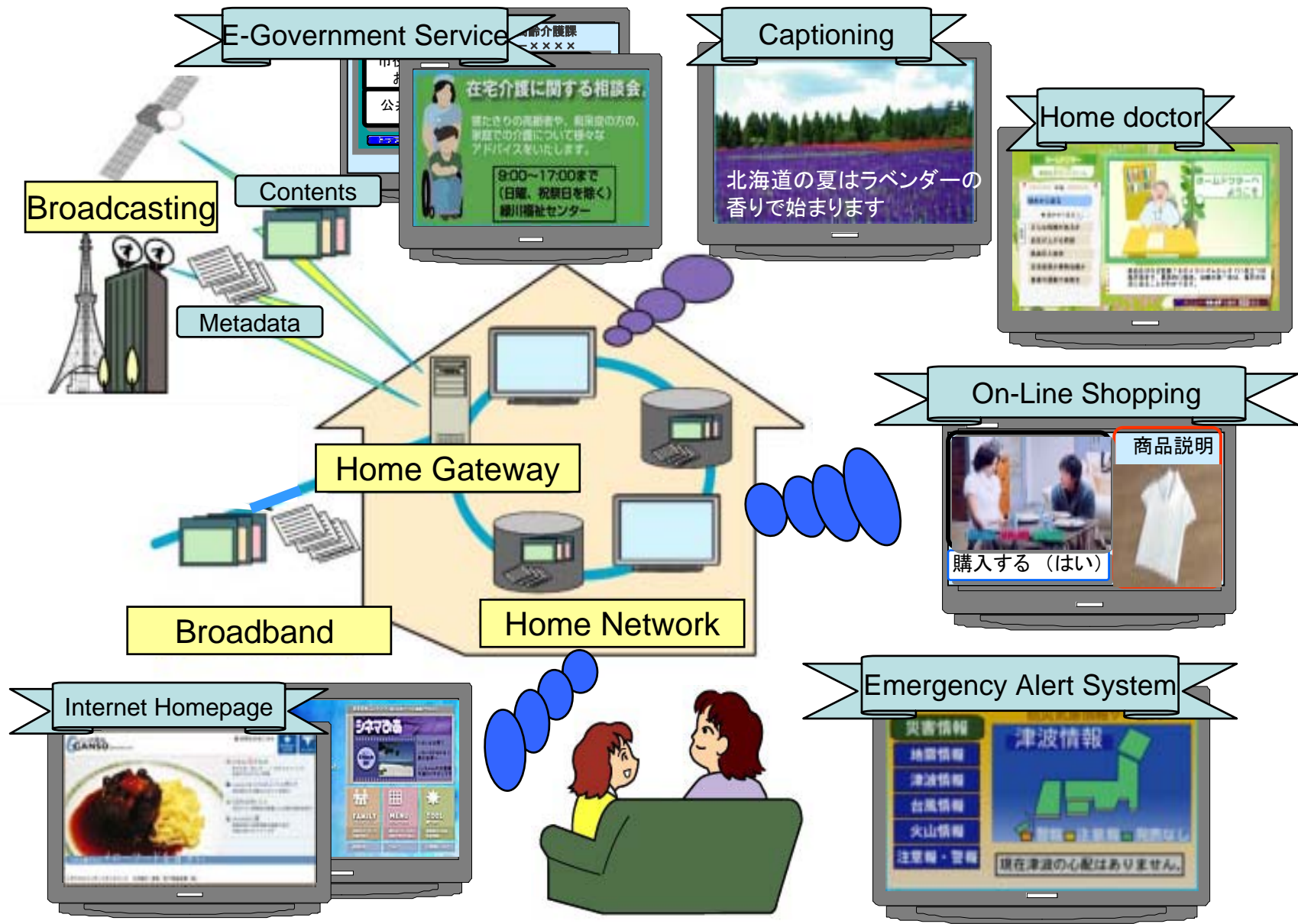
- 1. Digitalization of terrestrial TV broadcasting promotes the formation of accessible and convenient ICT foundations in all households.**
- 2. Digital broadcasting will be available for Interactive and two-way services in conjunction with the Internet.**

[Examples for Digital broadcasting services]

TV programs		Internet
• General information from municipalities	Select a desired event in the region using TV remote control. (Detailed information on the event such as contents, time and date, location, etc.)	Make an application via the Internet
• Travel information program	Select a hot-spring hotel of choice using TV remote control. (Detailed information on the hotel such as vacancies, types of rooms and rates)	Make a reservation via the Internet

Digital Broadcasting

~ Home gateway to the ICT society ~



Digitalization of Broadcasting in e-Japan Strategy

e-Japan Strategy II (July, 2 2003 by IT Strategic Headquarters)

completed and an environment to receive digital broadcasting programs throughout the country will be put in place.

e-Japan Priority Policy Program - 2004 (June 15, 2004 by IT Strategic Headquarters)

- (1) In order to promote digitization of broadcasting as **the basis of the IT revolution at home**, terrestrial digital broadcasting is set to start **in the three major areas** of Kanto, Kinki and Chukyo **in December 2003** and **in other areas by CY2006**.
- (2) With this in mind, **readjust frequencies for analog broadcasting** along with digitization of broadcasting.
- (3) For the smooth transition to digital broadcasting, **widely publicize merits, schedule and how digital broadcasting can be received**, and **the timing of analog broadcasting termination, etc.**

Promotion of New Service Utilization by Terrestrial Digital Broadcasting

For the advanced utilization of terrestrial digital broadcasting as one of the measures to promote telemedicine and remote education etc., and for the promotion of the practical use of broadcasting services for portable devices by 2006 and of server type broadcasting and related new application services by 2008, consider how to promote utilization of terrestrial digital broadcasting in the public sector, such as education, medical services or disaster prevention.

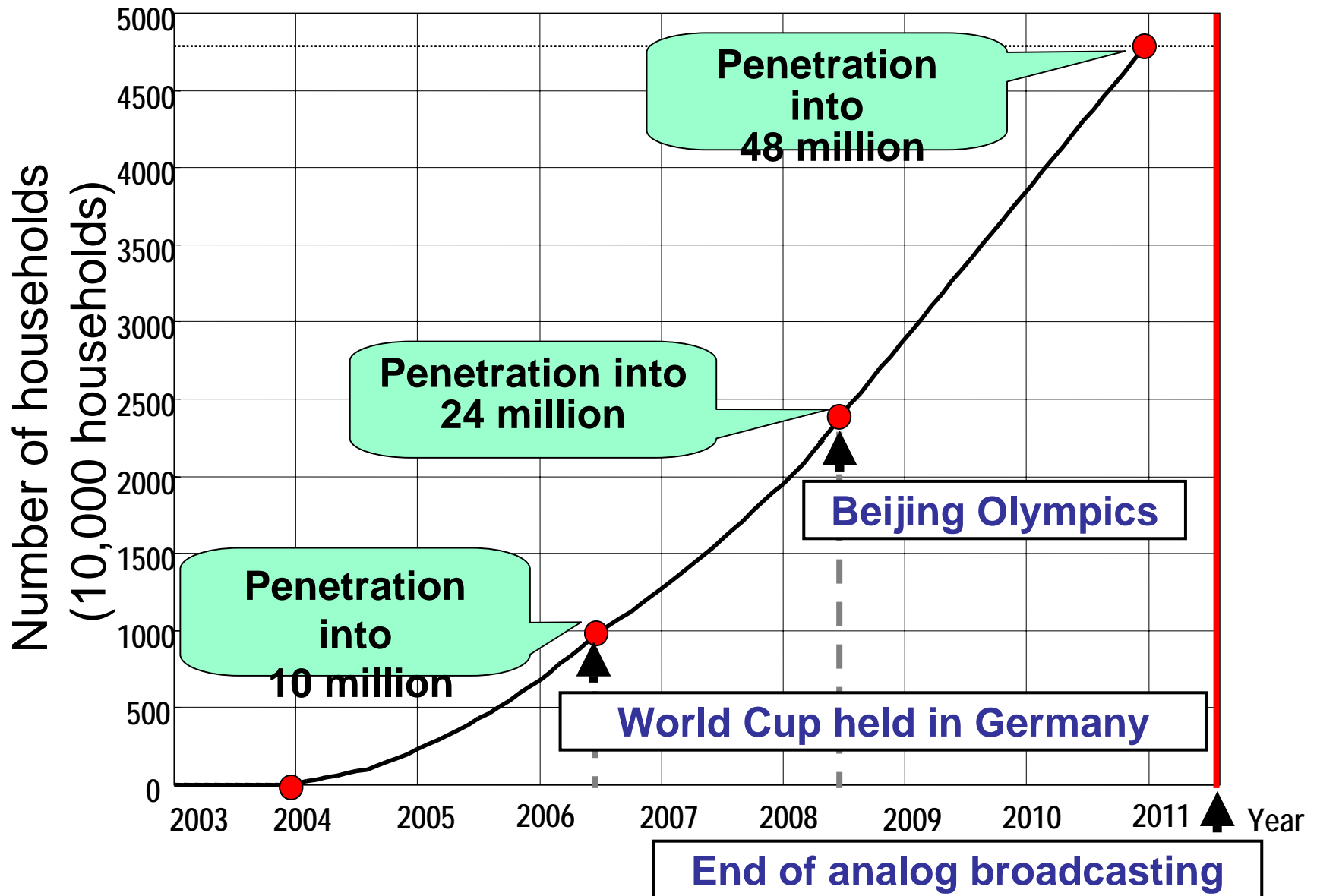
(* unofficial translation)

Action Plan to Promote DTTB

*Decision of the “DTTB promotion conference (Oct 31th 2003)
composed by government, broadcasters and industries*

- **Set objectives for the penetration of DTTB receivers including cable reception**
- **Set objectives for expansion in the coverage rate of digital broadcasting in the three main areas (Tokyo, Osaka, Nagoya)**
- **Action items for government, broadcasters, manufactures, retailers**

Objectives for the penetration of terrestrial digital broadcasting receivers (households)



Penetration of HDTV receivers

The number of shipment HDTV receivers now

- **HDTV integrated receiver (with DTTB tuner)**
0.7 million sets since 2003
- **HDTV ready receiver (without DTTB tuner)**
2 million sets since 2000

Subject for promotion of Terrestrial TV Broadcasting

Key of promotion of DTTB

> **"10C"**

1. Contents
2. Customer cognition
3. Copyrights
4. Cable standard
5. Cable retransmission
6. Cost of receiver
7. Common service = ubiquity
8. Cinch to operate
9. Certain to buy everywhere
10. Connection to the network

4. Migration pass to digital

As mentioned in section 3., digital terrestrial TV broadcasting was standardized, and by 2011 analog TV will be changed.

In this section, the process of digitalization program has been done are explained mainly.

Because of copyright, the text for this section(note) should be prepared separately

(note) the text of this section is a part of “The migration pass and the experiences to the digital terrestrial broadcasting”, which is presented by DTV workshop held in Inter BEE last November at Makuhari

5. ISDB-T as DTTB standard

Requirements for Digitilization

Multimedia-service

High-Quality TV/ Multi-Channels

Flexible/Versatile

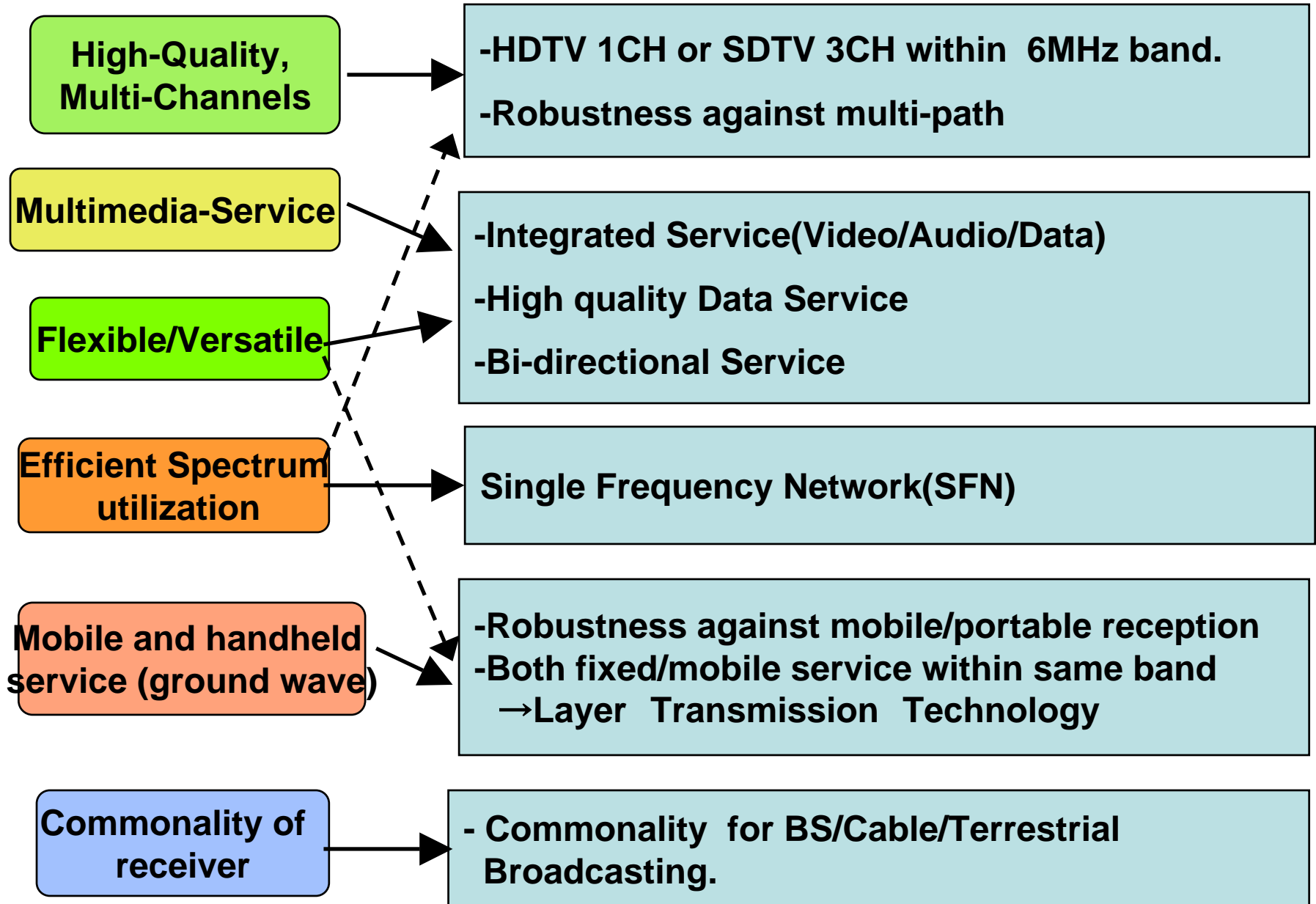
Effective frequency utilization

Mobile and handheld service (ground wave)

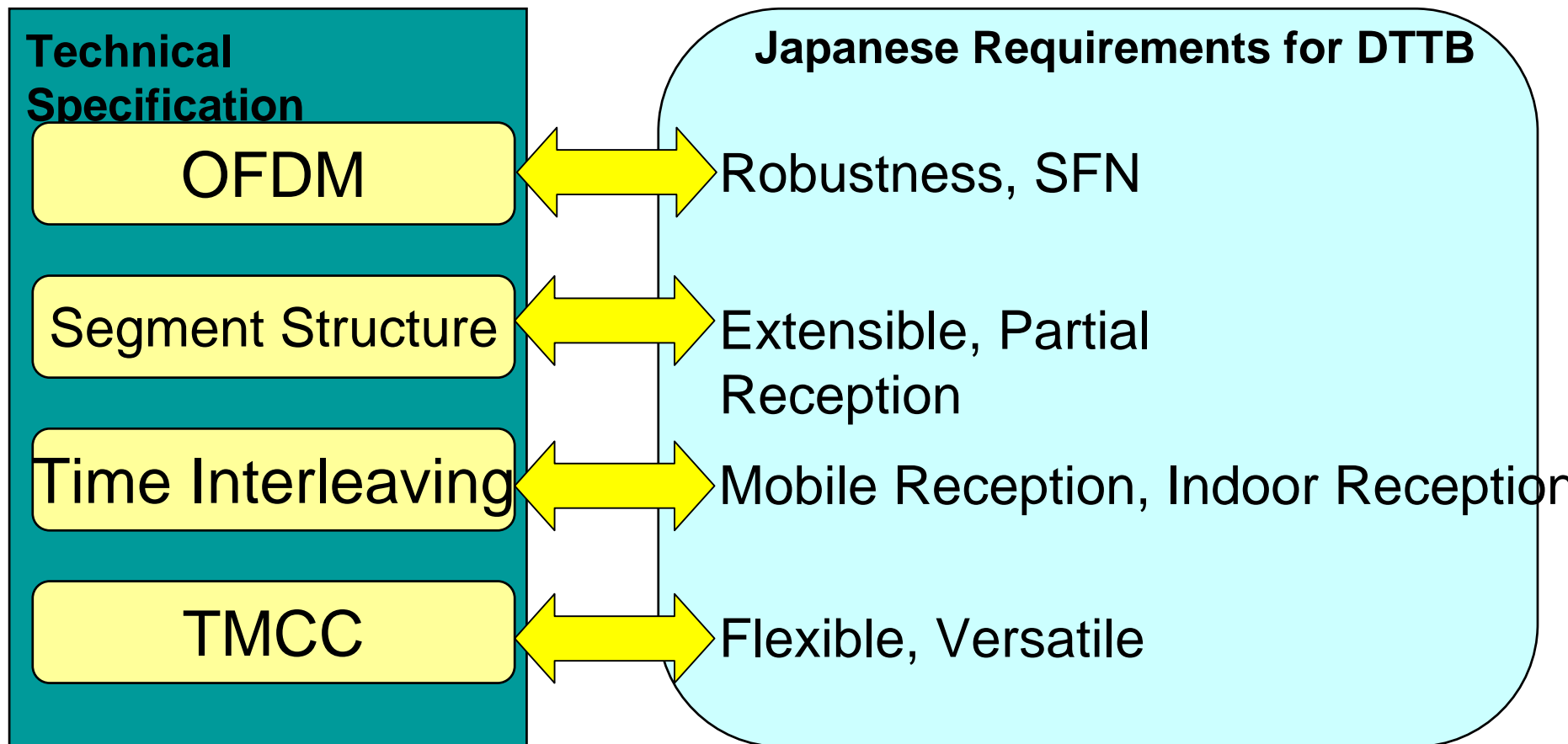
Commonality of receiver

At first, the requirement of digital broadcasting should be established.
The requirements described above are for digitalization in Japan.

Requirements for Digitization → Solutions

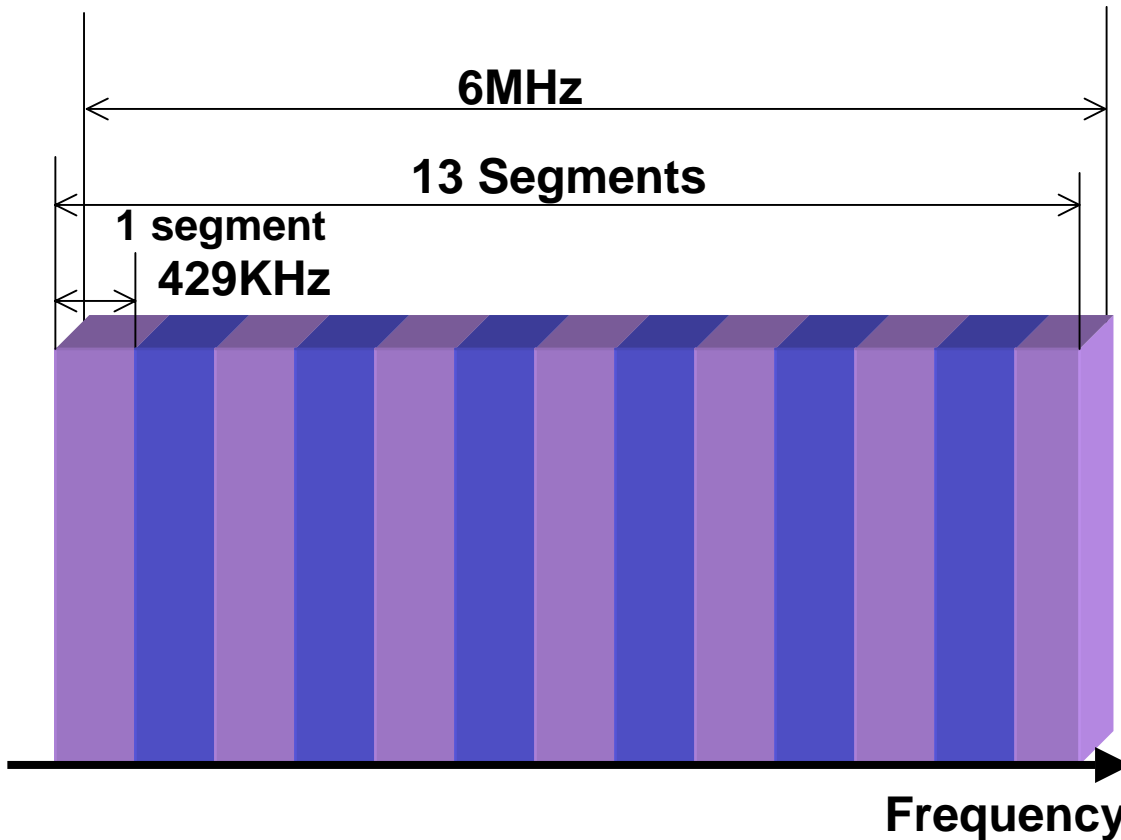


Features of ISDB-T



ISDB-T system

Band Segmented OFDM : Orthogonal Frequency Division Multiplexing



Features

- Modulation: DQPSK, QPSK, 16QAM, 64QAM
- 1HDTV or 3 SDTV/channel
- Net data rate: 23.42Mbps
- Single Frequency Network (6MHz)
- Mobile reception (time interleaving)

Segmented Structure and Partial Reception

HDTV + mobile reception within one 6MHz channel

Sound/DATA

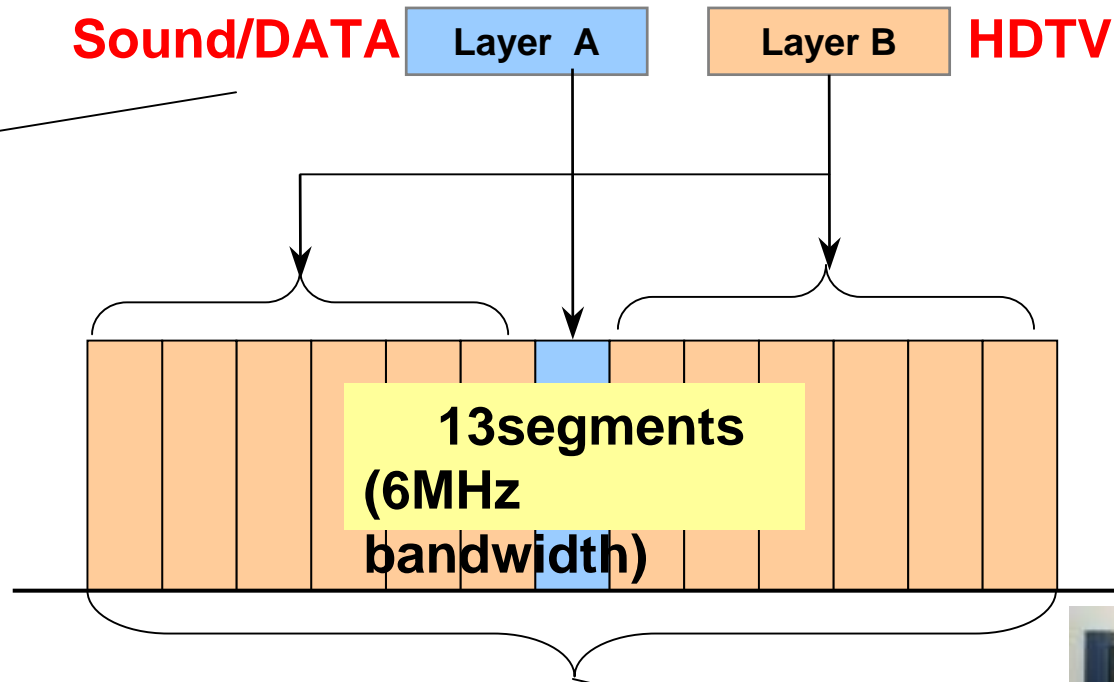
Layer A

Layer B

HDTV (or 3 SDTV)



Mobile
reception



HDTV reception

Features of ISDB-T system (2)

Comparison with other system

Robustness against Impulse
Noise(time interleave)

ISDB-T > DVB-T

Mobile Service (time interleave):

ISDB-T > DVB-T

**Mobile/Stationary Hybrid
Reception(segment transmission):**

ISDB-T > DVB-T

**Commonality between Digital
TV/Radio(segment transmission):**

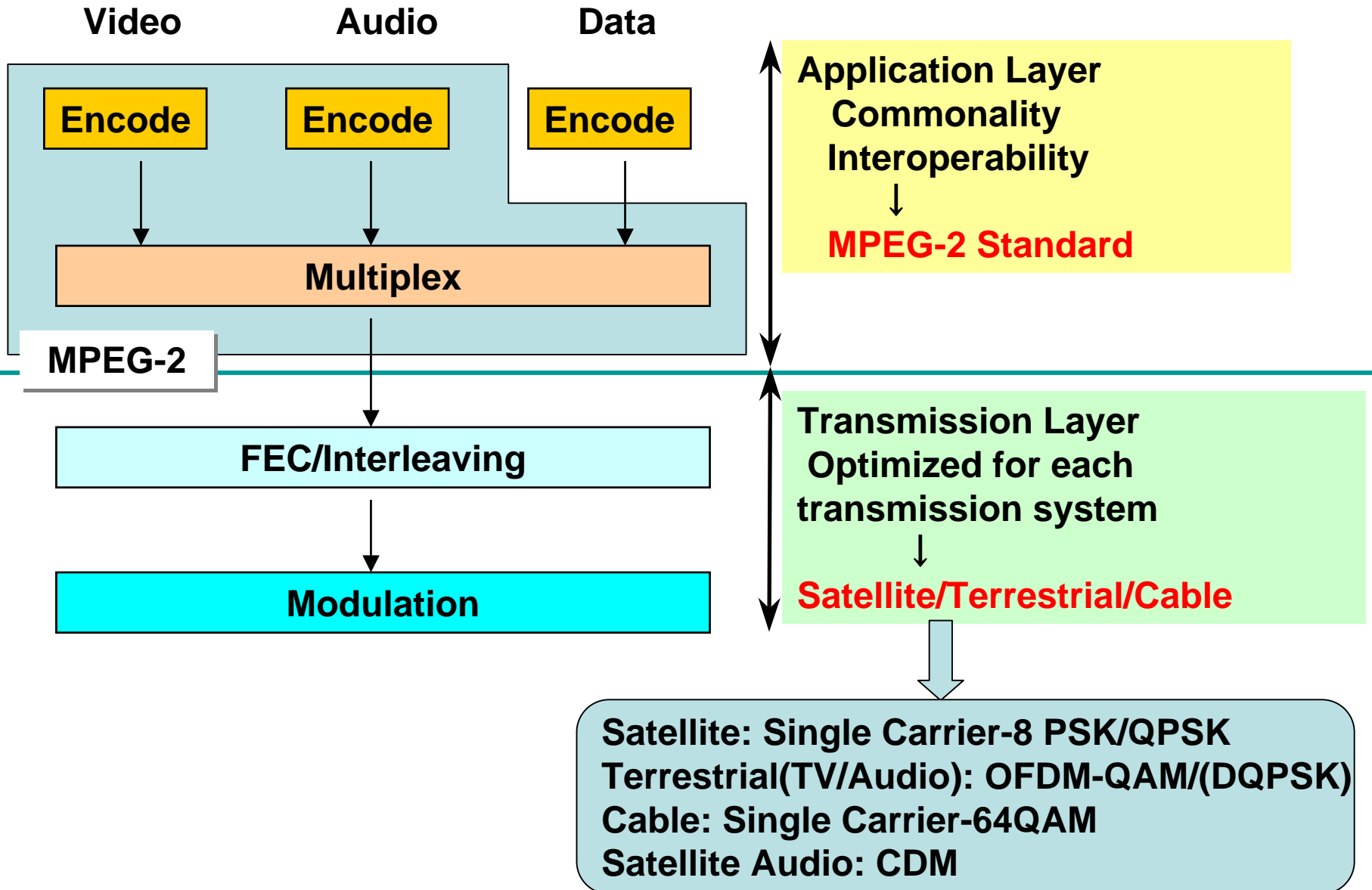
ISDB-T OK DVB-T:
Impossible

6. Standardization Structure of Digital broadcasting

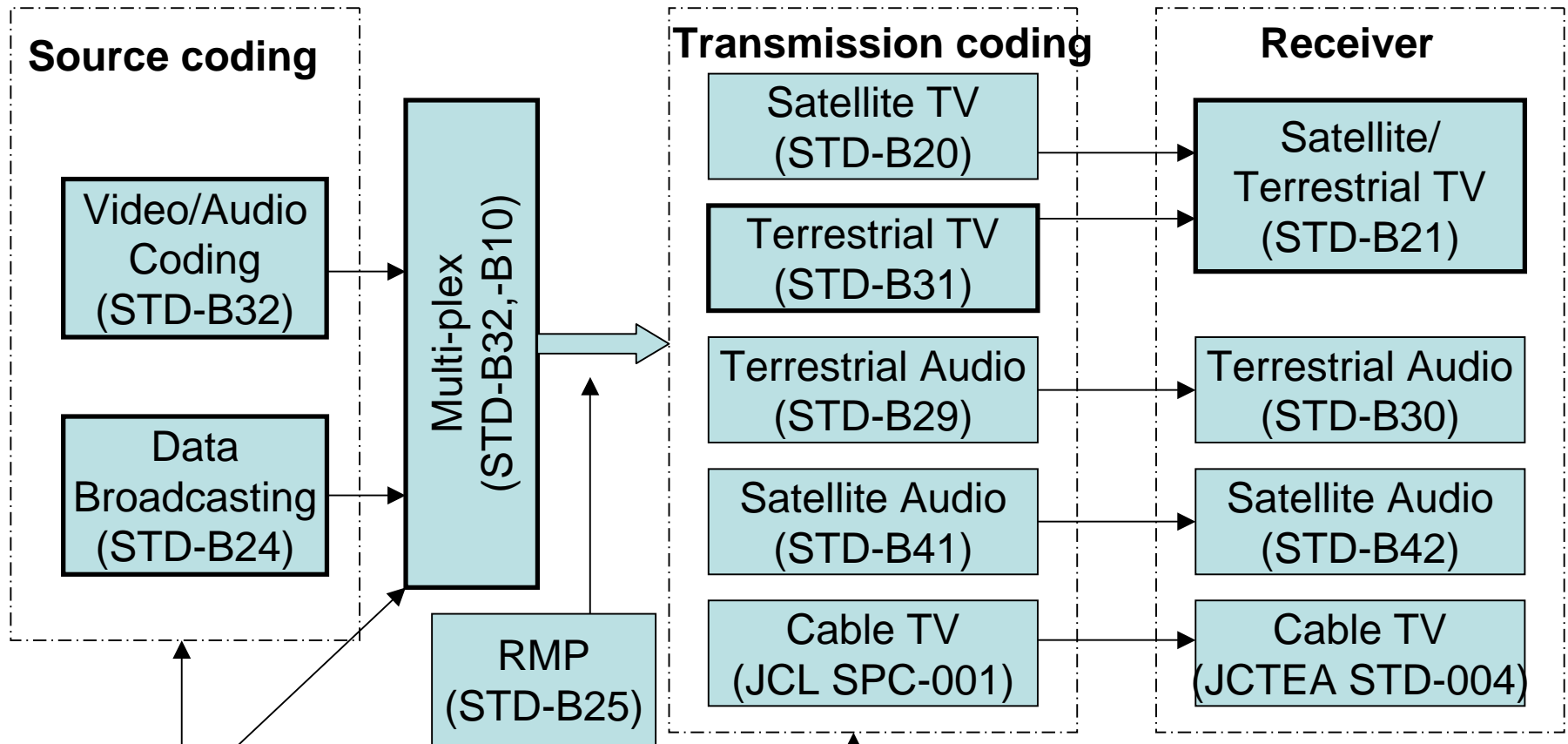
ARIB standards (ARIB STD)

private technical standards which are to supplement the MPHPT regulations for telecommunications and broadcasting radio systems and are set for the purpose of guaranteeing compatibility of radio facilities and transmission quality as well as offering greater convenience to radio equipment manufacturers and users.

Layered Structure for Digital Broadcasting



Digital Broadcasting Standard in Japan



Source coding and MUX systems are common for each system

Transmission systems are different

Note: Cable transmission system standards are defined at another consortium

DTTB Standards

Technical Standards for DTTB

ARIB STD-B32 image encoding, sound encoding and multiplexing formats	established 2001.5
ARIB STD-B24 Data broadcasting encoding formats and transmission formats	1999.10
ARIB STD-B25 Restricted reception formats	1999.10
ARIB STD-B10 Program lineup information	1997.6
ARIB STD-B31 transmission formats	2001.5
ARIB STD-B21 receiver device	1999.10
ARIB TR-B14 Terrestrial TV operation specification	2002.1

ARIB:
Association of Radio
Industries and
Businesses
Private
standardization
body in Japan

Outline of ARIB Standards

Source coding & Multi-plex

Name	Outline	note
Video/Audio coding (STD-B32)	<ul style="list-style-type: none">-Based on MPEG-2 video coding-Cover 1080i,720p,480p,480i-Based on MPEG AAC audio coding-Up to 5.1 Stereo audio-Based on MPEG systems multi-plex	
Data Broadcasting (STD-B24)	<ul style="list-style-type: none">-Data broadcasting description-Data transmission format-Small size Video coding(MPEG-4,H.264)	
Program line-up information (STD-B10)	<ul style="list-style-type: none">-PSI/SI description-EPG description-Necessary for program selection	

Outlines of Standards (continued)

Transmission coding

Name	Outline	note
Satellite TV (STD-B20)	<ul style="list-style-type: none"> -Slot structure -Trellis+RS(Concatenated coding) -Single carrier 8 PSK modulation 	2 HDTV programs are muliti-plexed into 1 transponder
Terrestrial TV (STD-B31)	<ul style="list-style-type: none"> -Segment structure -Viterbi+RS (Concatenated coding) -Multi-carrier(OFDM) transmission 	1 segment transmission is available
Terrestrial Audio (STD-B29)	<ul style="list-style-type: none"> -1 and 3 segment transmission -Others are almost same as STD-B31 	1 segment system is compatible to 1 segment of TV
Satellite Audio (STD-B42)	<ul style="list-style-type: none"> -Multiplex 64 CDM channel -Viterbi+RS (Concatenated coding) -CDM-BPSK/QPSK transmission 	Adopt "AAC+SBR" 2.6GHz Band

Outlines of Standards (continued)

What is the operational guideline?

All the technical elements required are written in ARIB STD. But, the details for operation of broadcasting are defined separately, even though based on ARIB STD. These documents are called “Operational Guideline”

Examples

ARIB TR-B13; Terrestrial Audio broadcasting operational guideline

ARIB TR-B14; Terrestrial TV broadcasting operational guideline

ARIB TR-B15; BS/wideband CS broadcasting operational guideline

ARIB TR-B26; Satellite Audio broadcasting operational guideline

DiBEG

Purpose

- The Digital Broadcasting Experts Group (DiBEG) was founded in September 1997 for the key forces to promote the Japanese Digital Terrestrial Broadcasting System ISDB-T and ISDB-T_{SB} into the world.
- Today, DiBEG has 23 members, including broadcasters, broadcast equipment manufactures and consumer electronics manufactures etc.
- DiBEG is one committee of ARIB.

Activities

- ◆ Research of the trend toward digital broadcasting in the world .
- ◆ Exchange of digital broadcasting technologies and facilitation of common understanding .
- ◆ Exchange of technologies and ways for interoperability toward smooth exchange of program .

8. Standardization organization in Japan

In this section, as representative organization for digitalization we will introduce Association of Radio Industries and Business (ARIB) and its activities.

Text for this section is presented by ARIB separately
(note)

(note) “ARIB Activities related to Digital Broadcasting - R&D, Standardization, etc. –”

9. Current DTTB Service in Japan

In this section, only introduce outline of current DTTB service.
Details will be presented in seminar #9.

(1) Hivision TV service

(2) Multiple SDTV(Standard Definition TV) service

(3) Data Broadcasting service

(4) Interactive Broadcasting service

(7) Contents Protection

Applications of Digital Terrestrial Television Broadcasting

HDTV



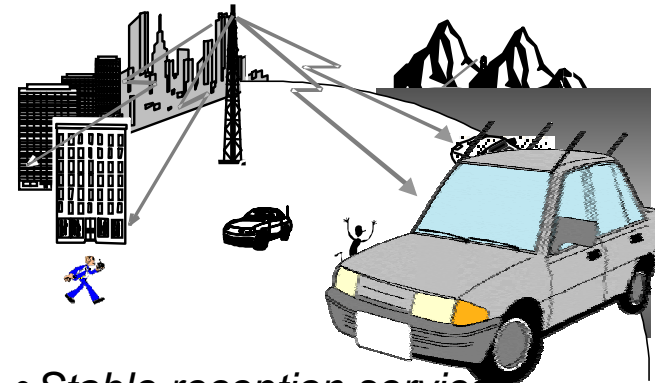
- *High quality image and sound services*

Data broadcasting



- *Simple program searching and retrieval of information at any time*

Mobile



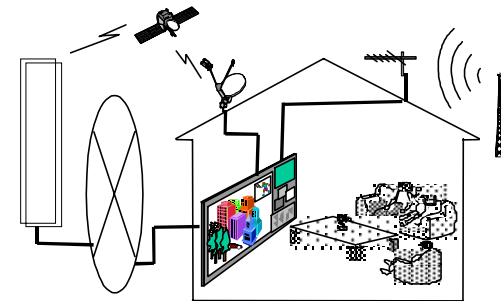
- *Stable reception services*

Multiple SDTV programs



- *Realization of multiple channels*

Interactive TV



- *Communication services and linked services*

HDTV is the mainstream of digital TV(1)

HDTV services

- Wide screen
- High quality image
- High quality audio program
- 5.1ch surround audio program



HDTV is the mainstream of digital TV(2)

● High- Definition programs



Pure HDTV: produced by HDTV 1080i format

- NHK provides pure HDTV more than **90%** of all programs in the three metropolitan Area.

Prime time : more than **90%**

- Commercial Network stations provide pure HDTV about **50%** of all programs in Tokyo Area.

Prime time : more than **50%**

Multiple SDTV programs within one channel(1)

- Digital TV makes transmission of three different programs possible within one channel independently.

SD-1



SD-2



SD-3

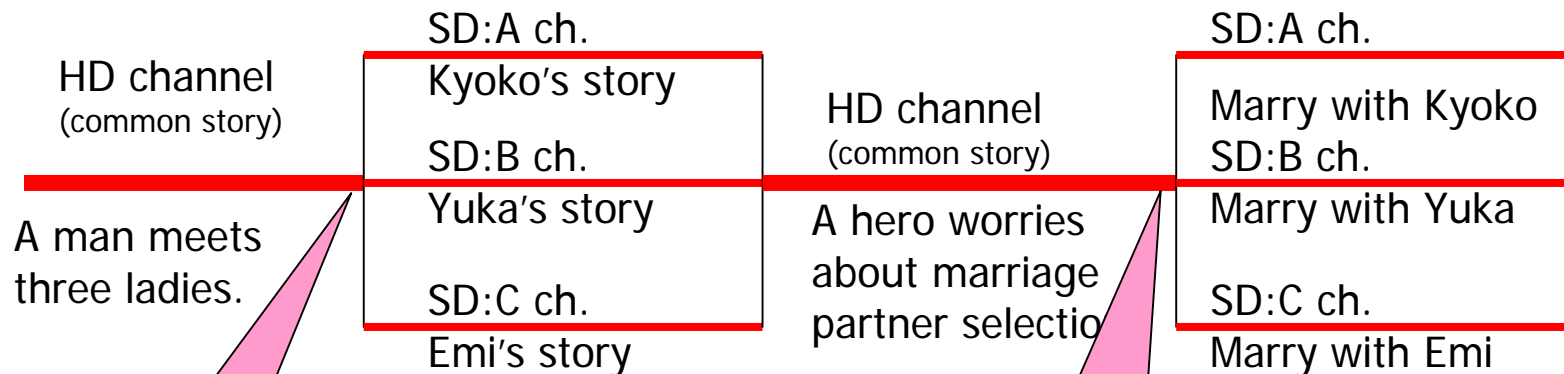


Multiple SDTV programs within one channel(2)

•Example of multiple programs

The drama you can choose as you like

The outline of story deployment of a drama



Selection point 1
Choose a lady
among three



Selection point 2
Choose a marriage
partner



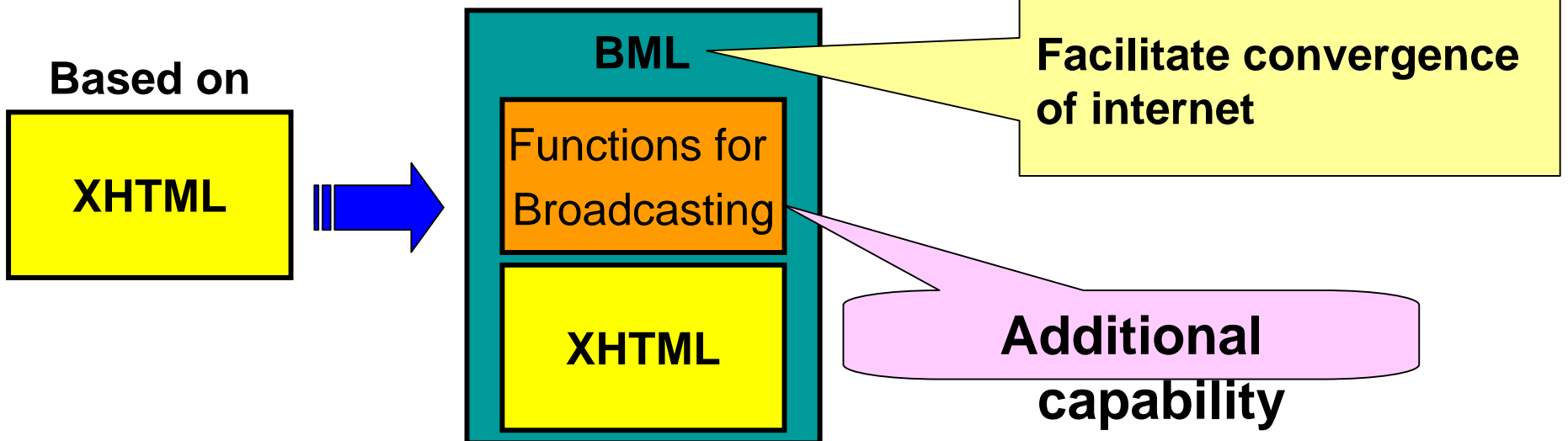
Data Broadcasting

All DTTB Broadcasters are providing
Data broadcasting (datacast) now

Program related information
Weather information

Anytime news
Report of sports game etc,

Currently the description language is BML format

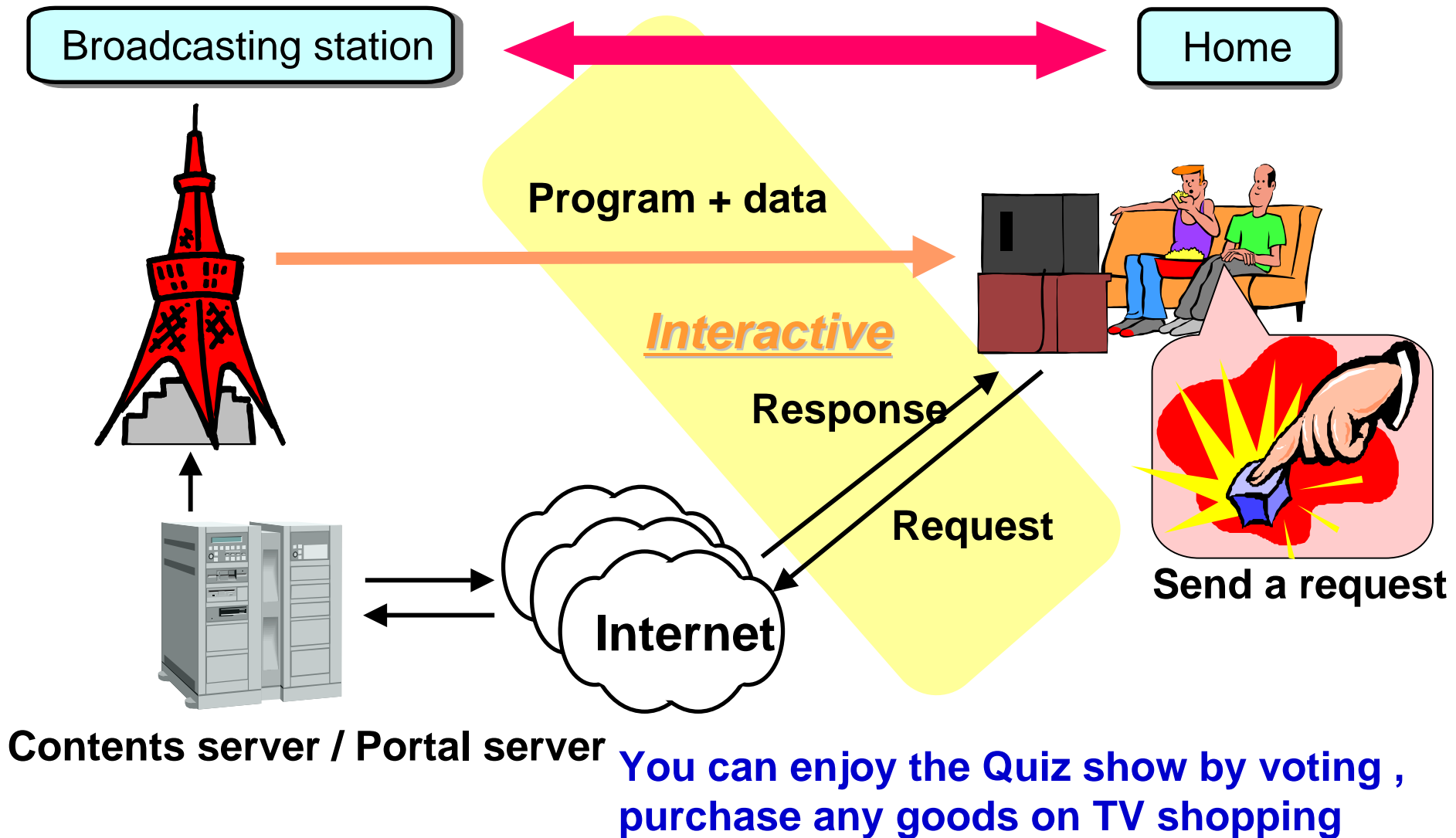


Example for Data Broadcasting (1)

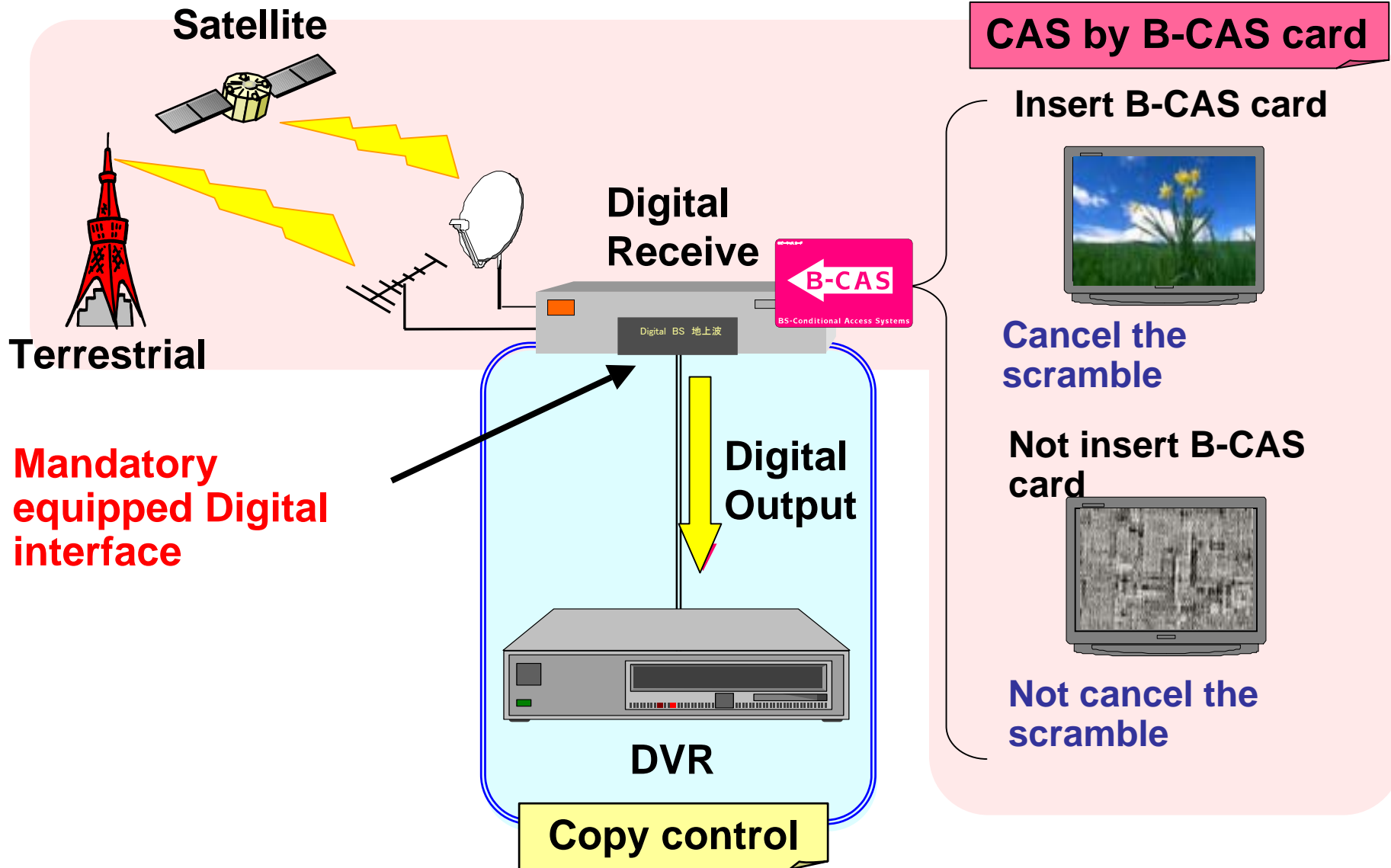
Top menu



Interactive Broadcasting (1)



Content Protection



END of
Seminar 1

Than you for your attention!