

Digital Terrestrial TV in Japan

October 14, 2004

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Ministry of Internal Affairs and Communication
JAPAN**

Topics

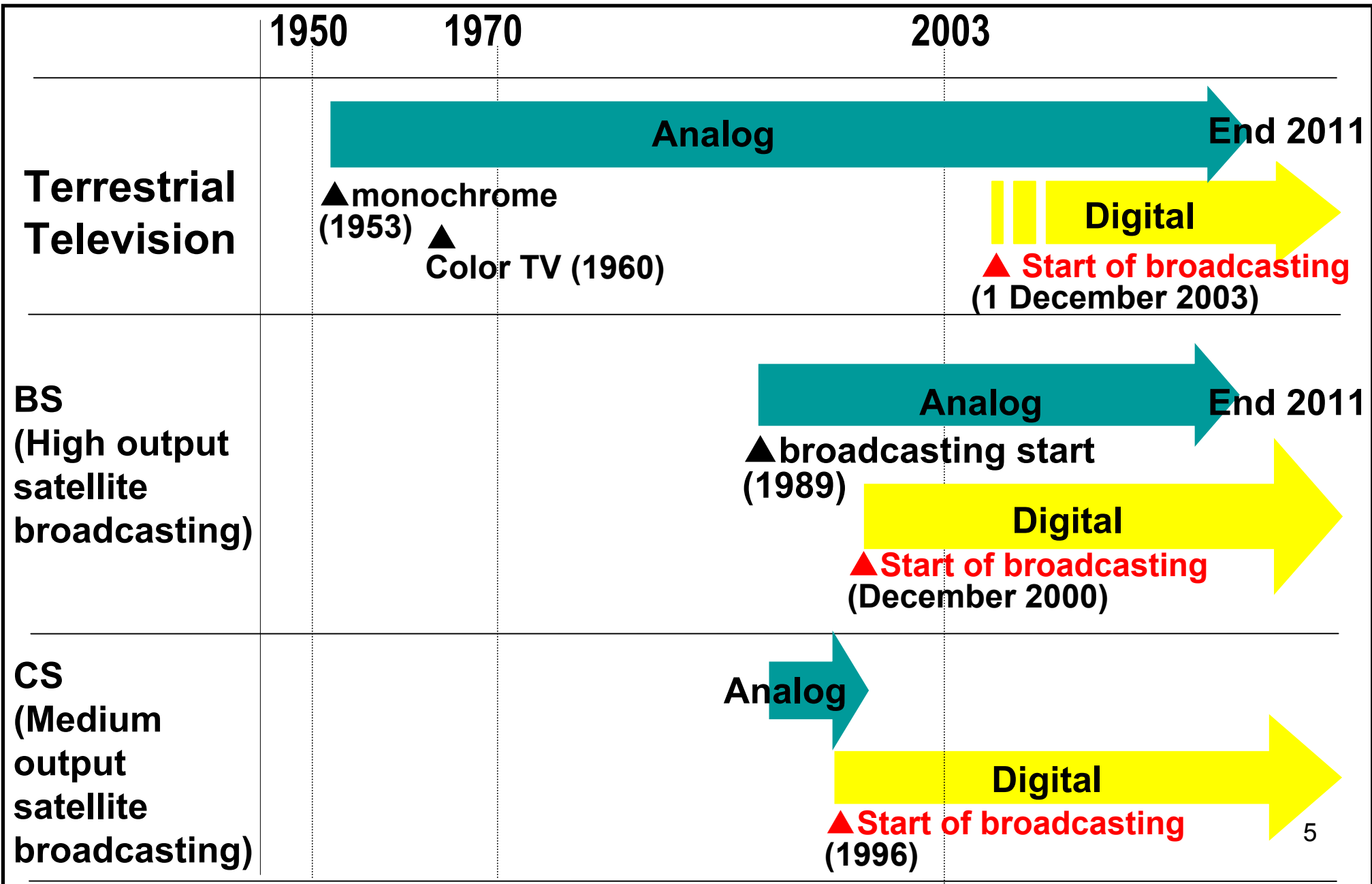
- 1. Overview of Broadcasting in Japan**
- 2. Strategy for Digital Terrestrial Television Broadcasting**
- 3. Promotion of Digital Broadcasting**
- 4. ISDB-T as DTTB systems**
- 5. Service Features of DTTB**
- 6. World Trend of Digital TV Broadcasting**

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 2 channels 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**

Strategy for Digital Terrestrial Television Broadcasting

Policies and Bottleneck for DTTB

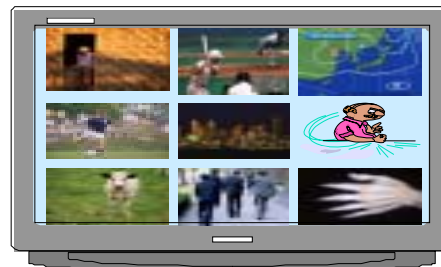
- Assign 6MHz channels for incumbent terrestrial broadcasters
- Simulcast of Analog, but something more values ; i.e. HDTV, SDTV multichannels, datacast, etc
- Different and additional value more than satellite digital TV (SDTV more channel)
- Digital Television set as integrated home information terminal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

The Merits of Digital Broadcasting

HDTV



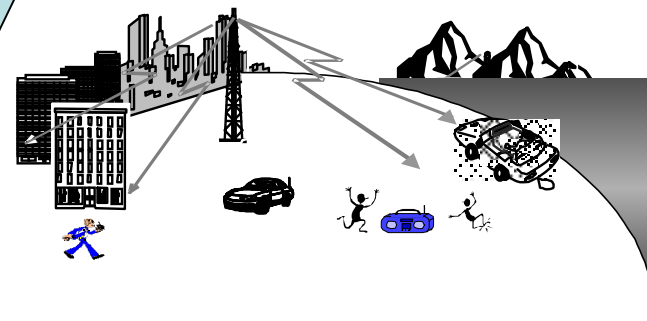
Multiple programs



Data broadcasting



Mobility

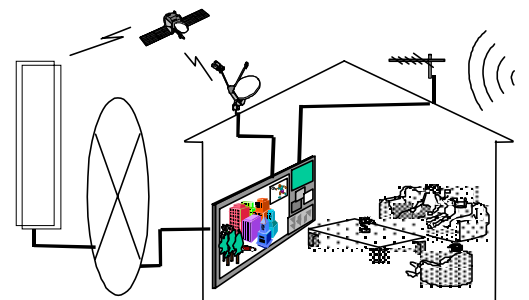


Merits

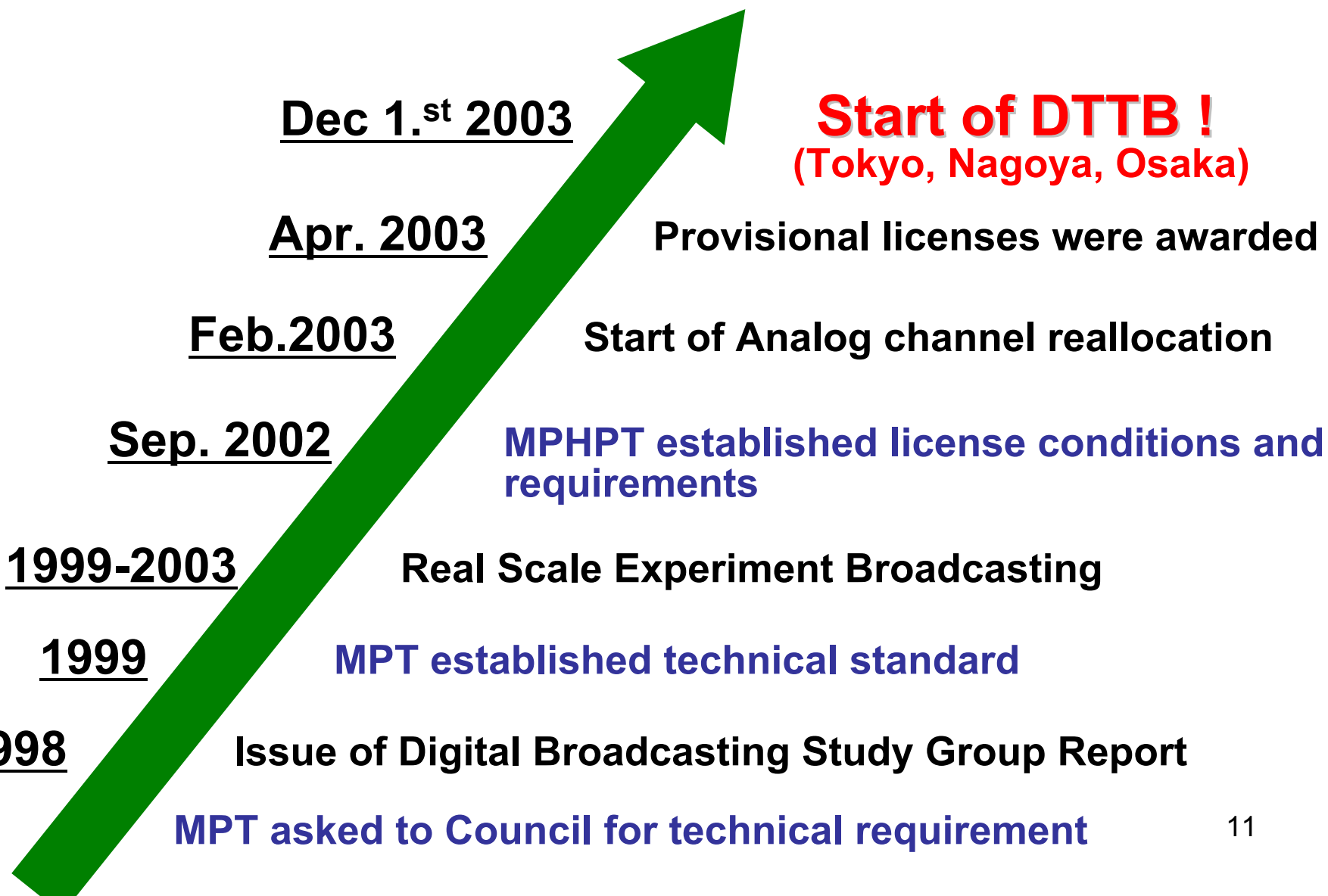
Advanced caption etc.



Interactive TV



Actual schedule of implementing Digital Terrestrial Television Broadcasting in Japan



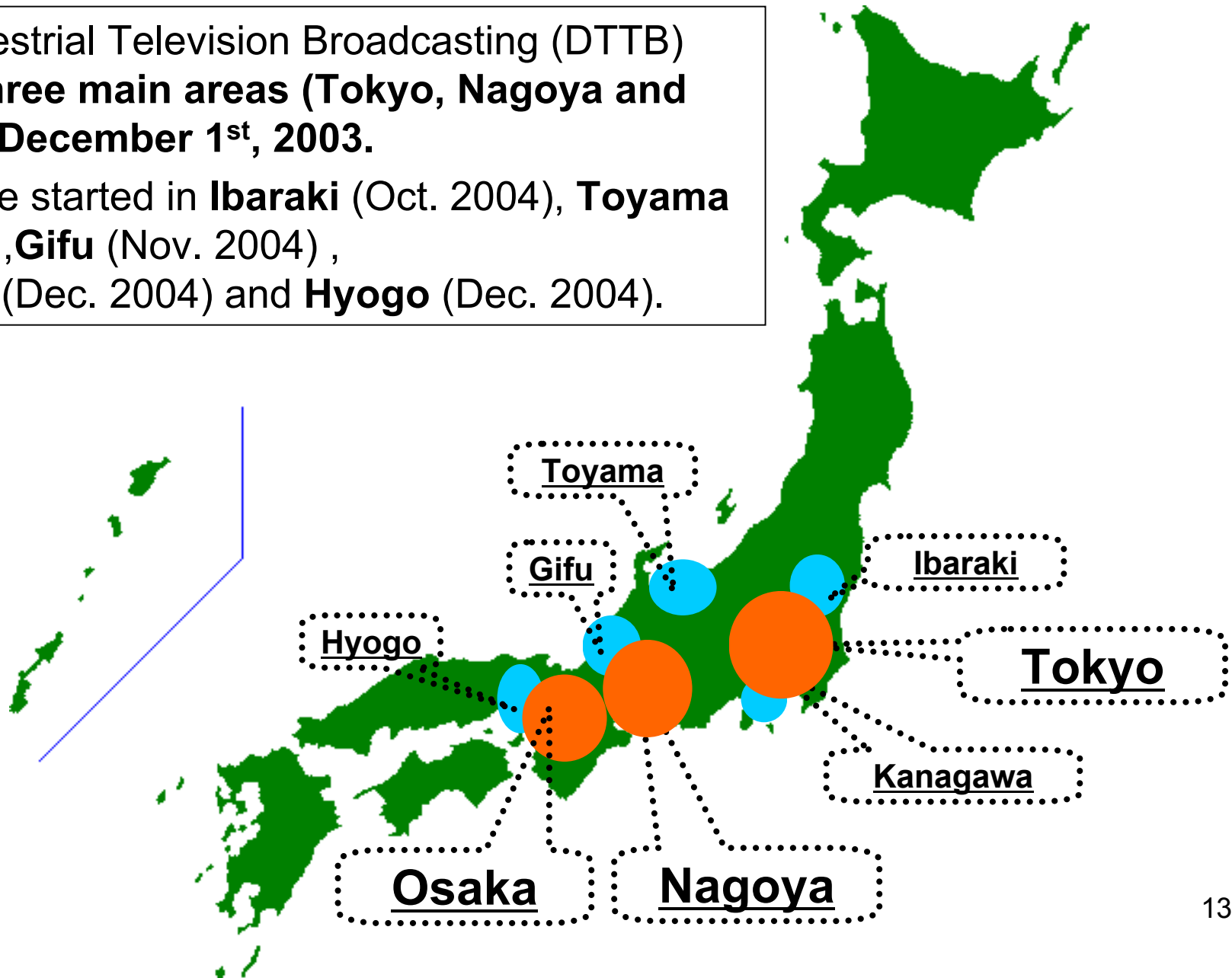
Conditions and Requirements for DTTB licensee in Japan

- **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)

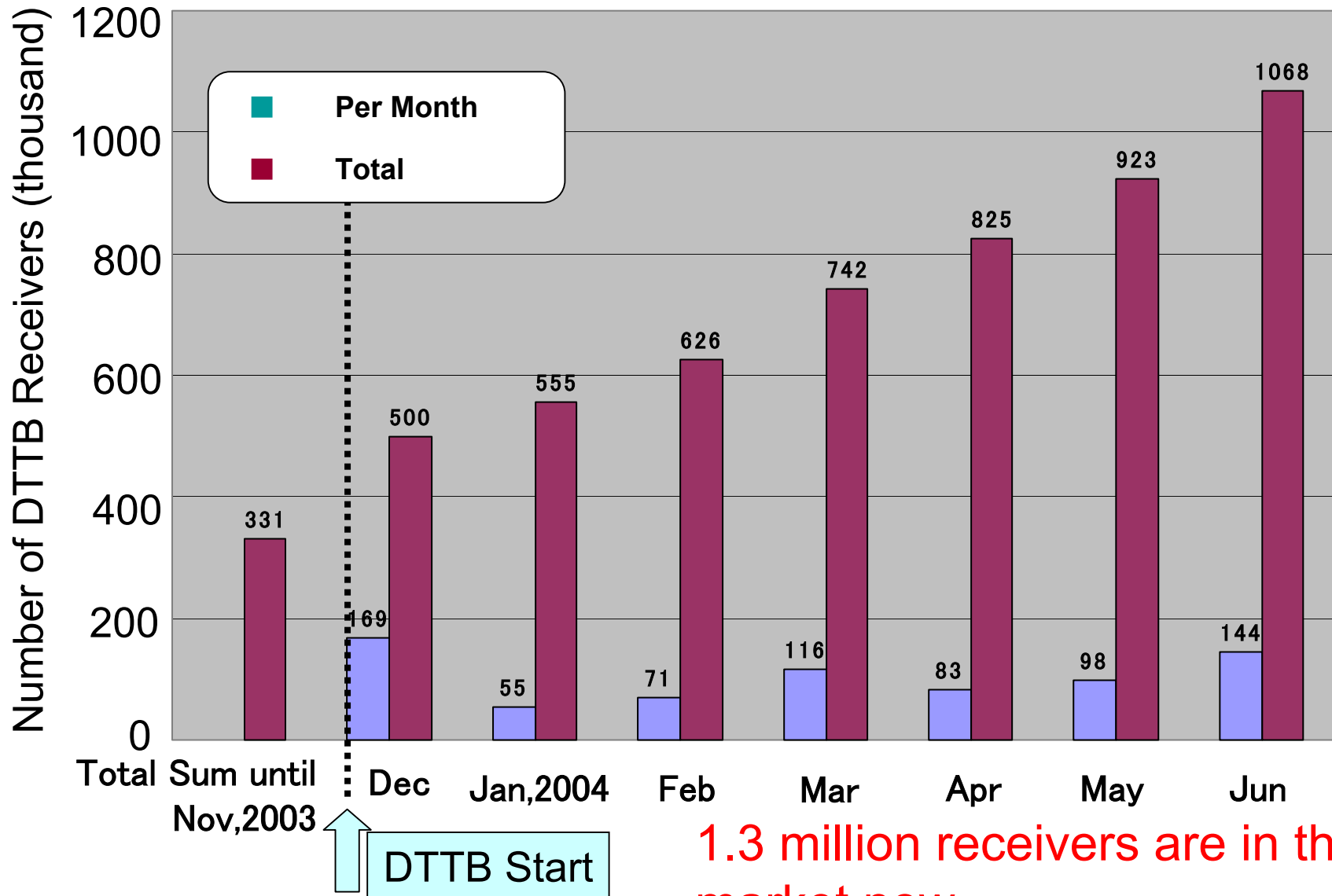
2004 17 million (35%)

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

Digital TV Products (1)

Plasma
PDP



HITACHI



SONY



Panasonic



Pioneer



Victor-JVC



SANYO



TOSHIBA

Digital TV Products (2)

LCD



Panasonic



SONY



SHARP



TOSHIBA



Victor·JVC



SANYO



mitsubishi



HITACHI

Digital TV Products (3)

CRT



Panasonic



SONY



mitsubishi



TOSHIBA

STB type



SONY



Panasonic

More manufactures are entering the market!

All-in one DTTB Receiver

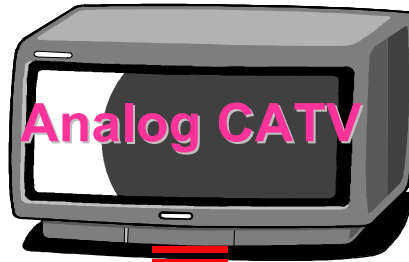
1.3 million of DTTB receiver are All-in one DTTB receivers

- 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

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

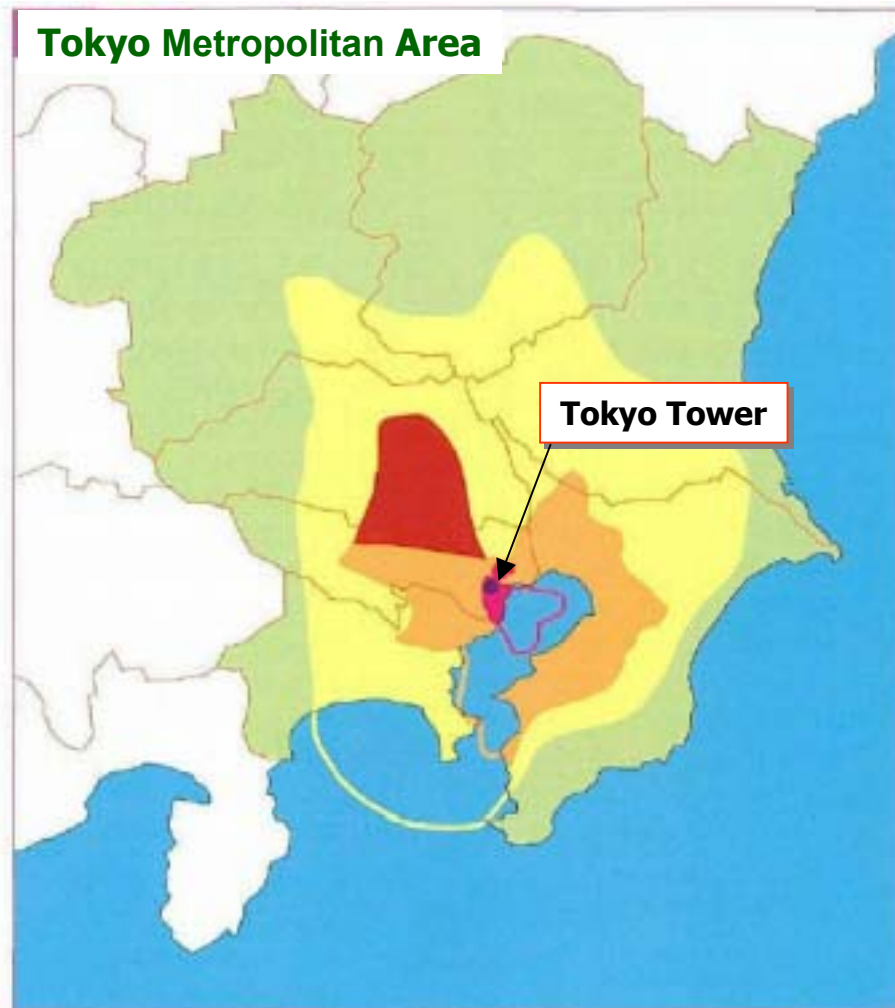
2. Terrestrial digital broadcasting receivers

<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

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

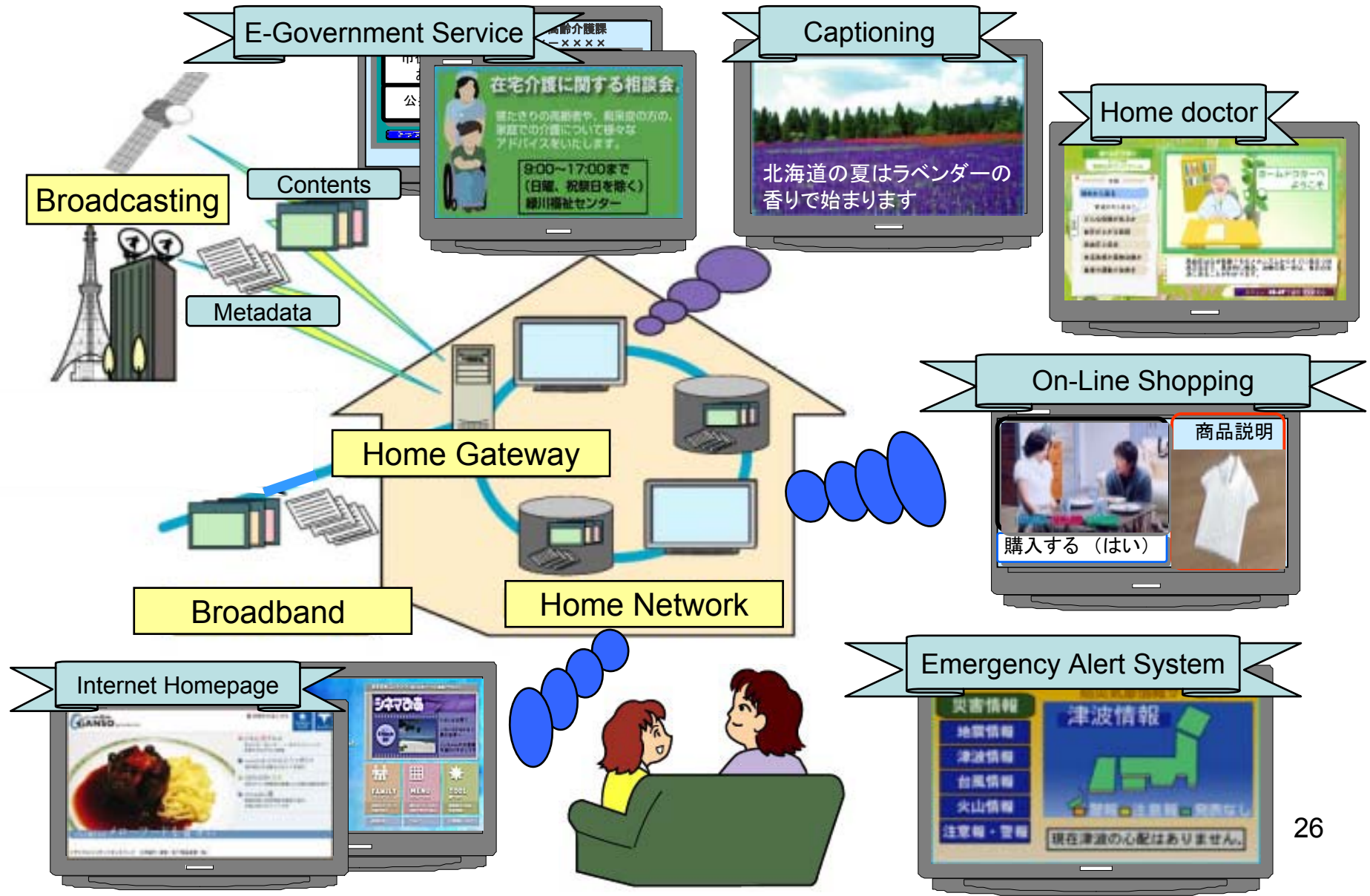
- 1. Digitalization of terrestrial TV broadcasting promotes the formation of accessible and convenient ICT foundations in all households.**
- 2. Digital broadcasting will be available for Interactive and two-way services in conjunction with the Internet.**

[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)

By 2011, the digitalization of terrestrial broadcasting will be 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)

Digitalization of Broadcasting

- (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

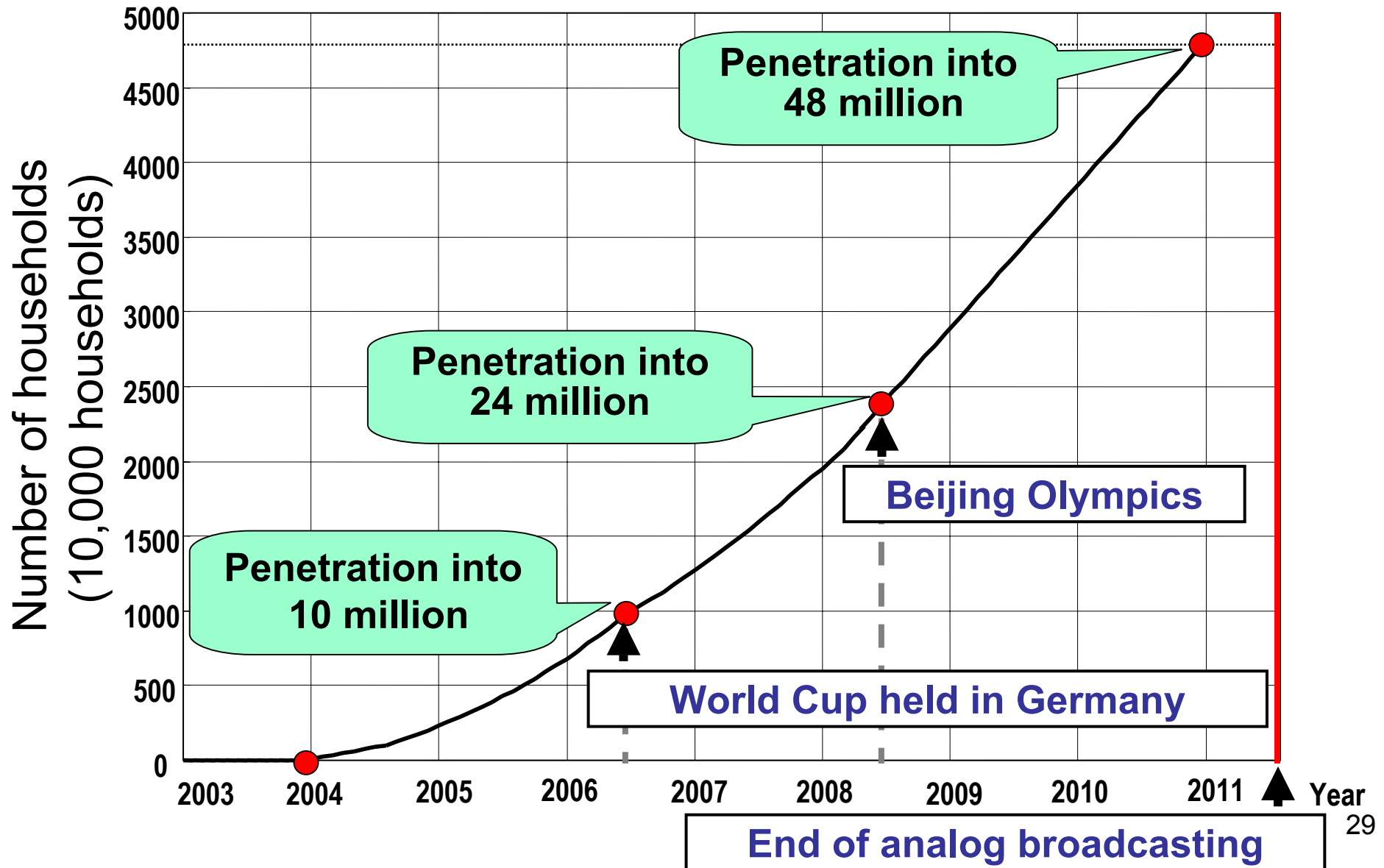
For the advanced utilization of terrestrial digital broadcasting as one of the measures to promote telemedicine and remote education etc., and for the promotion of the practical use of broadcasting services for portable devices by 2006 and of server type broadcasting and related new application services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

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

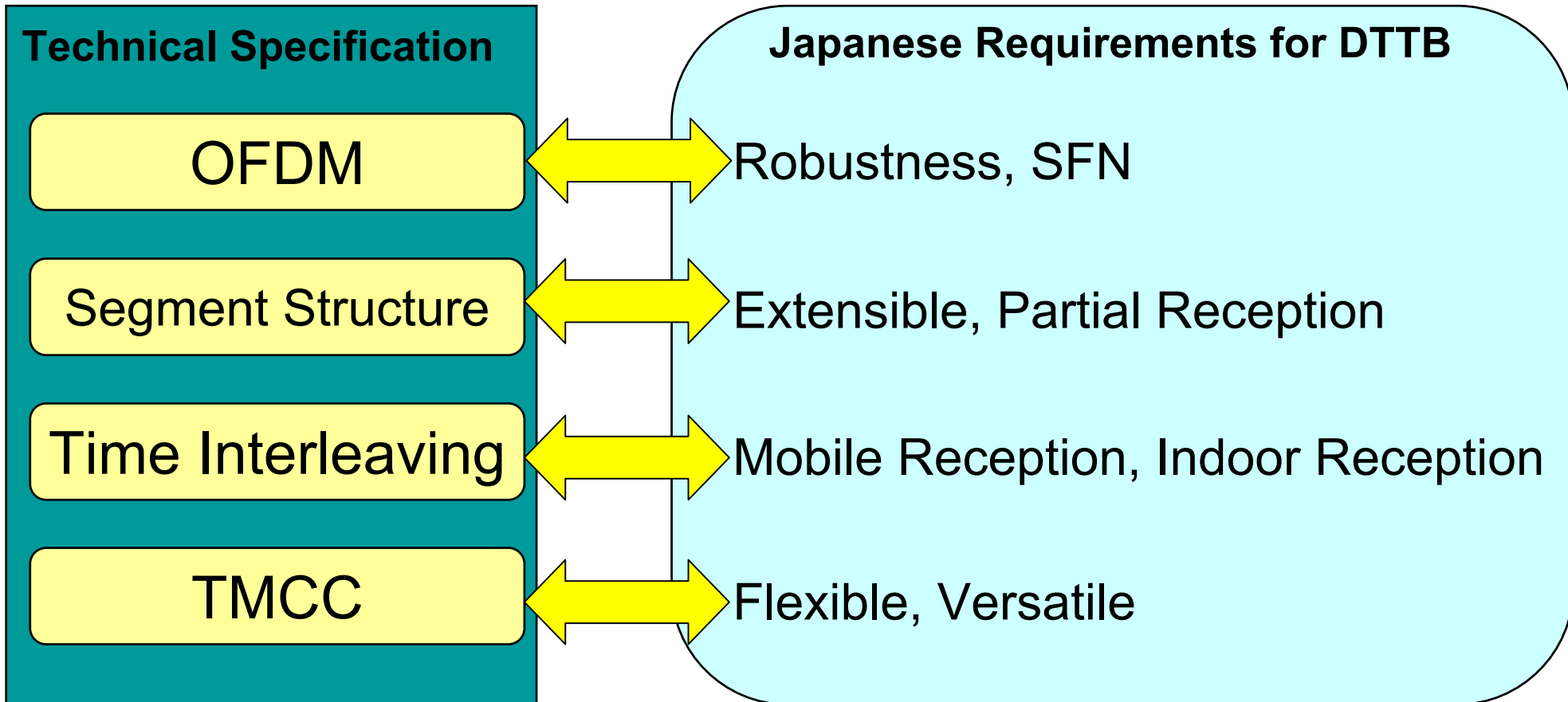
Key of promotion of DTTB

> "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

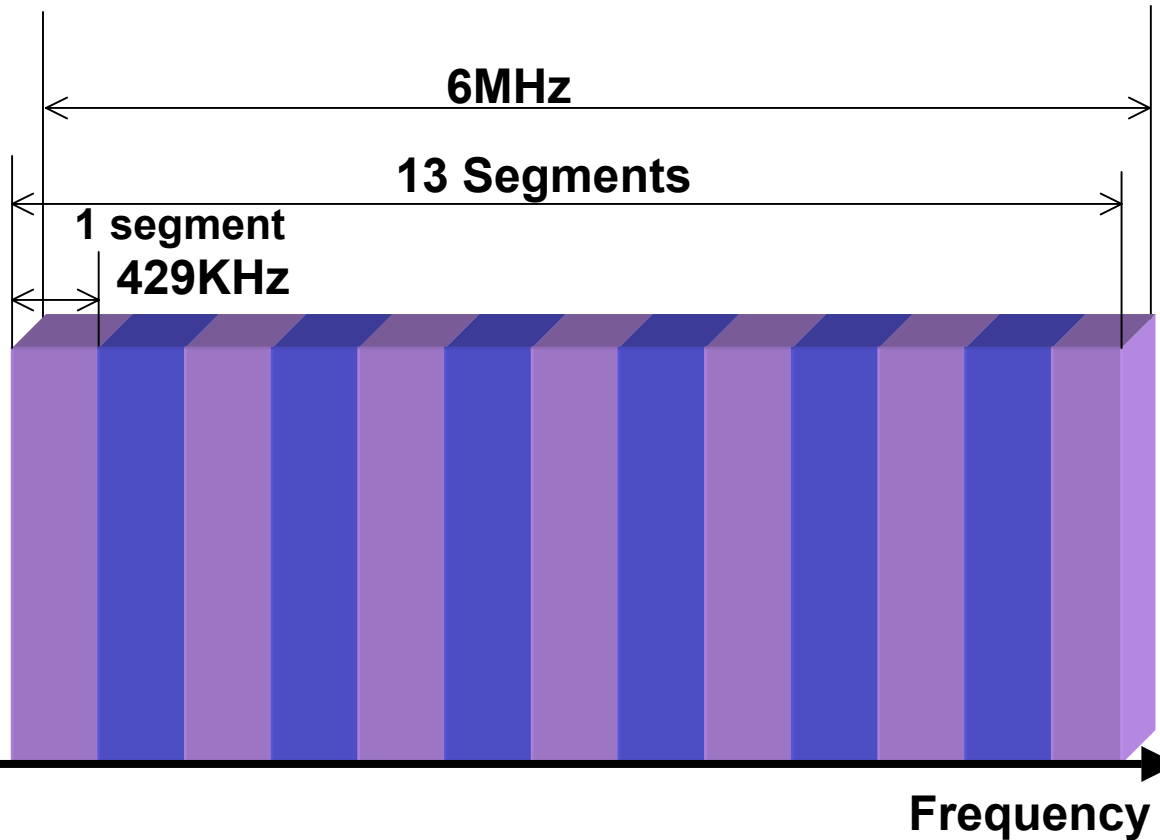
ISDB-T as DTTB standard

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 (6MHz)
- Single Frequency Network
- Mobile reception (time interleaving)

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**

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.

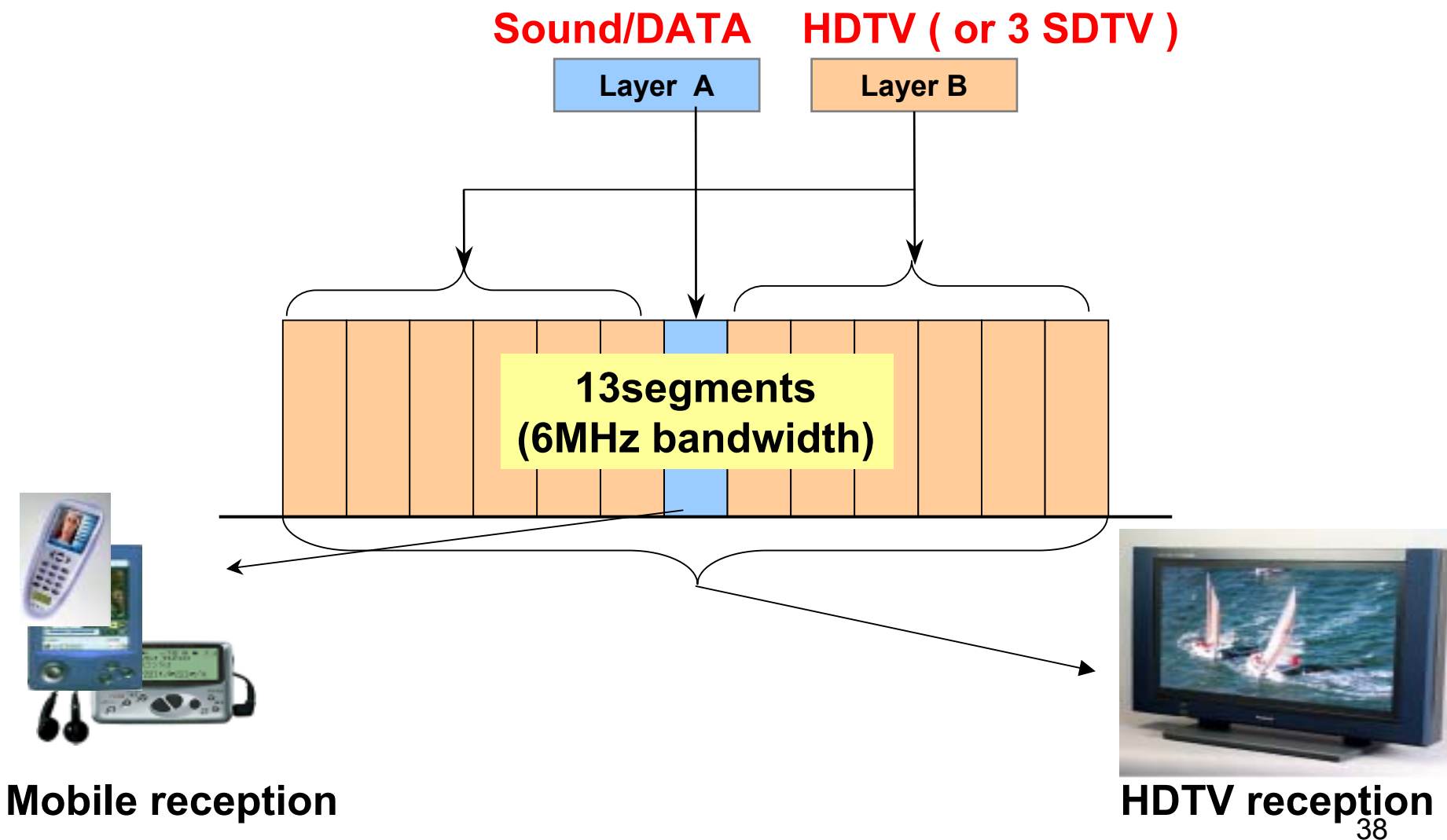
Activities

- ◆ 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 .

Service features of DTTB

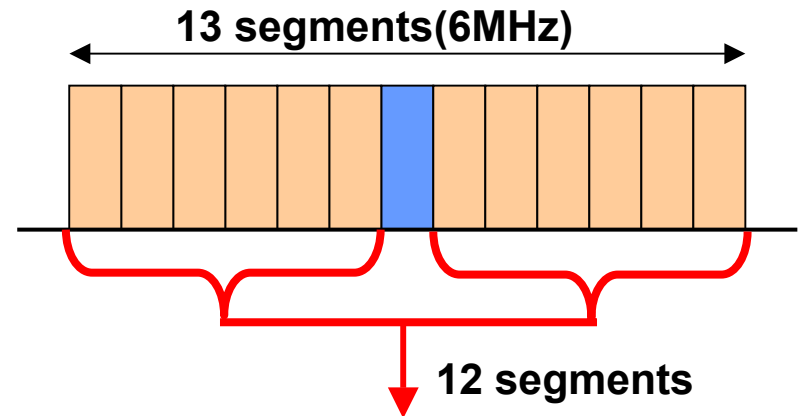
Segmented Structure and Partial Reception

Example of Hierarchical Multiplexing



HDTV service

Example : modulation 64QAM
code ratio 3/4
guard interval 1/8
bit rate 16.9 Mbps



	SDTV	HDTV
aspect ratio	4:3	16:9
scanning line	525	1125

HDTV and Multiple programs

● High- Definition programs



● Multiple programs



Situation of HDTV broadcasting by DTTB

All broadcasters providing **pure HDTV programs*** now

* **Recorded and transmitted by 1080i HDTV format**

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

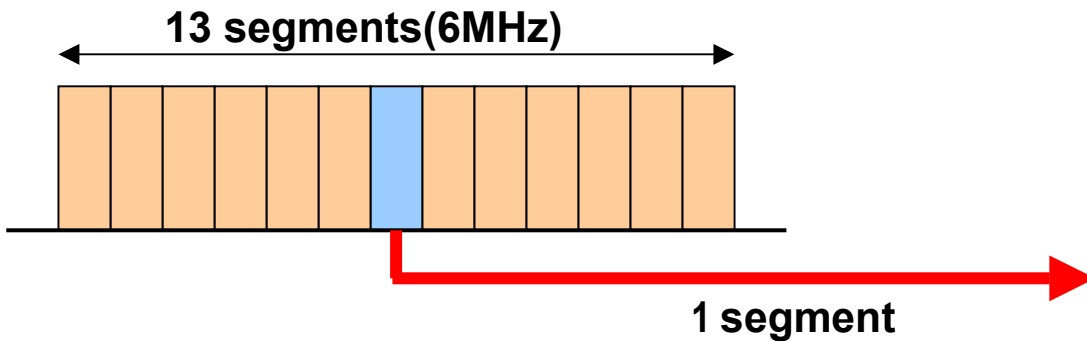
Prime time : more than 90%

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

Prime time : more than 50%

Broadcasting to Portable Terminals

Example : modulation 16QAM
code ratio 1/2
guard interval 1/4
bit rate 630 kbps



Display image

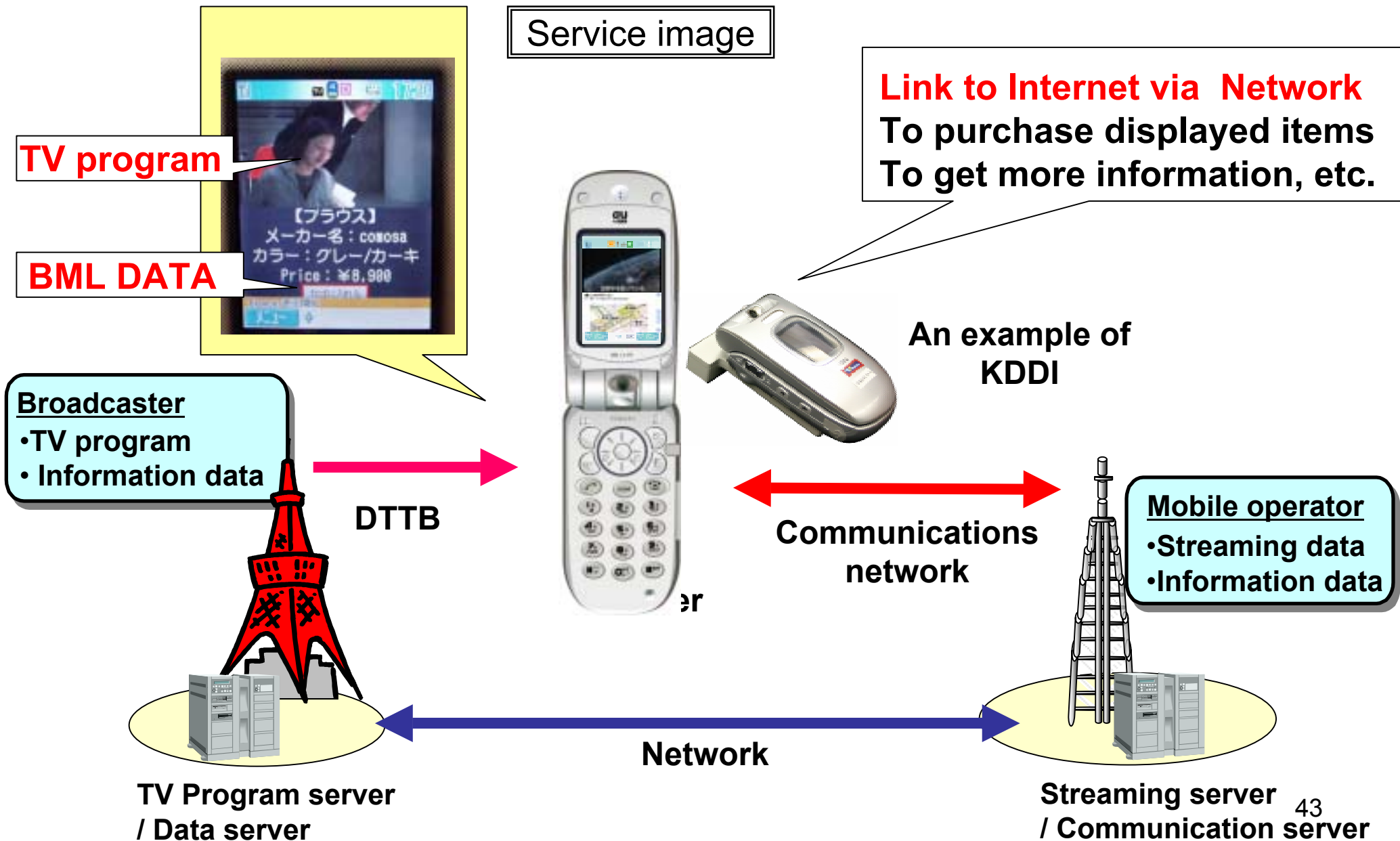
Visual data

Text data



Prototype Mobile Phone receiver

Mobile reception of Digital broadcasting



Example for mobile phone receiver



Feature

- DTTB receiver
- GPS chip
- Browser

Developed by **KDDI**

Hardware Specification	
WEIGHT	140g
SIZE	50mm(W) × 100mm(H) × 38mm(D) (Except for OFDM receiver)
BATTELY	2 Hours
CPU	SH-Mobile
MEMORY	64MB
LCD	QVGA
Broadcasting Specification	
SYSTEM	MPEG-2 TS
VIDEO	MPEG-4 Visual Simple Profile
AUDIO	MPEG-2 AAC LC
DATA	ARIB STD-B24+KDDI Profile

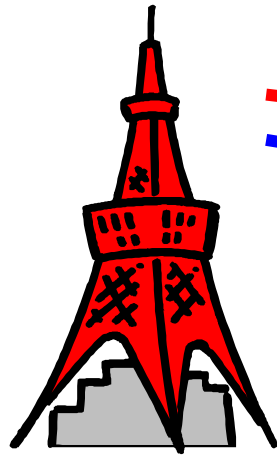
Actually MPEG-4 AVC/H.264 will be used for video codec system

Implementation Schedule toward portable reception of DTTB

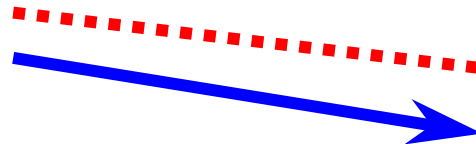
- **Video compression system: MPEG4 AVC/H.264**
- **Patent agreed in March 2004**
- **Prototype receivers developed by manufactures**
- **Service will start in 2005**
- **TV viewing on Cellular phone while commuting**

HDTV mobile reception (1)

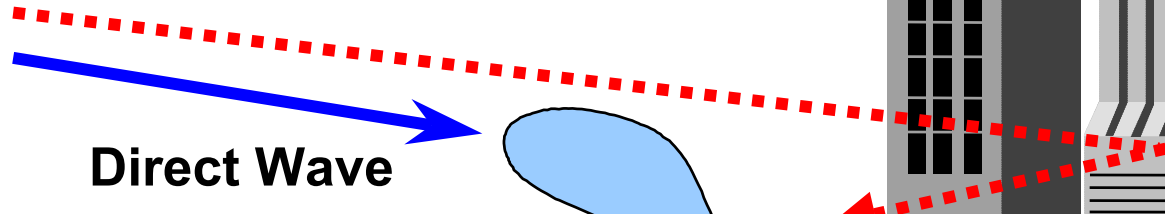
Broadcasting station



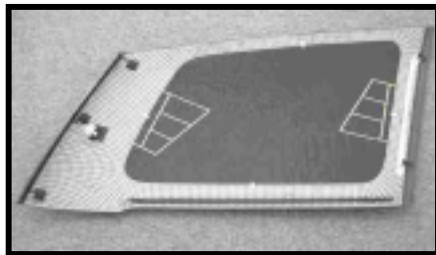
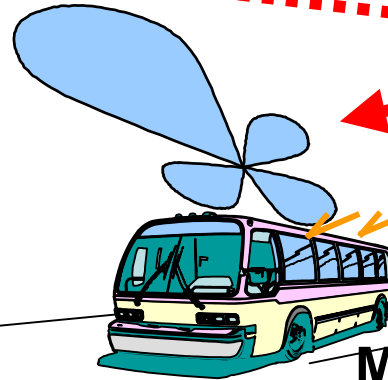
Direct Wave



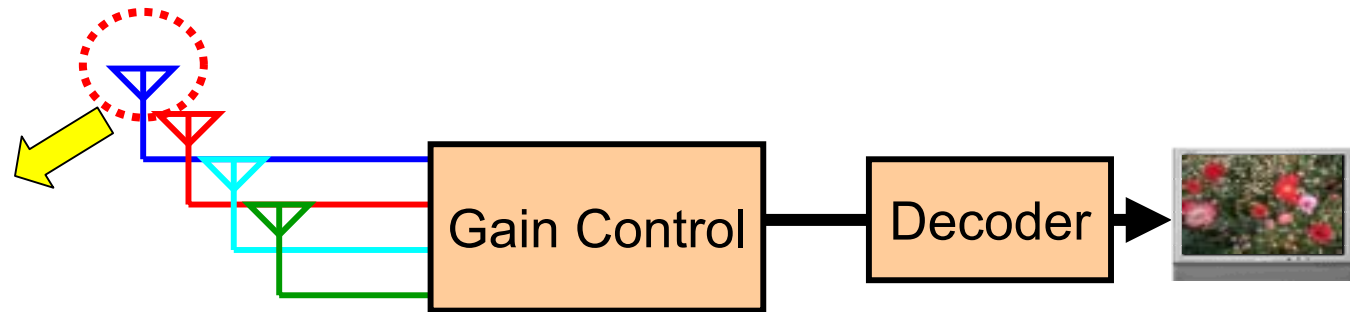
Reflection Wave



Mobile Receiver



Adaptive Array Antenna
on the vehicle's window



Antenna Gain Control Technic

HDTV mobile reception (2)



HDTV Broadcasting



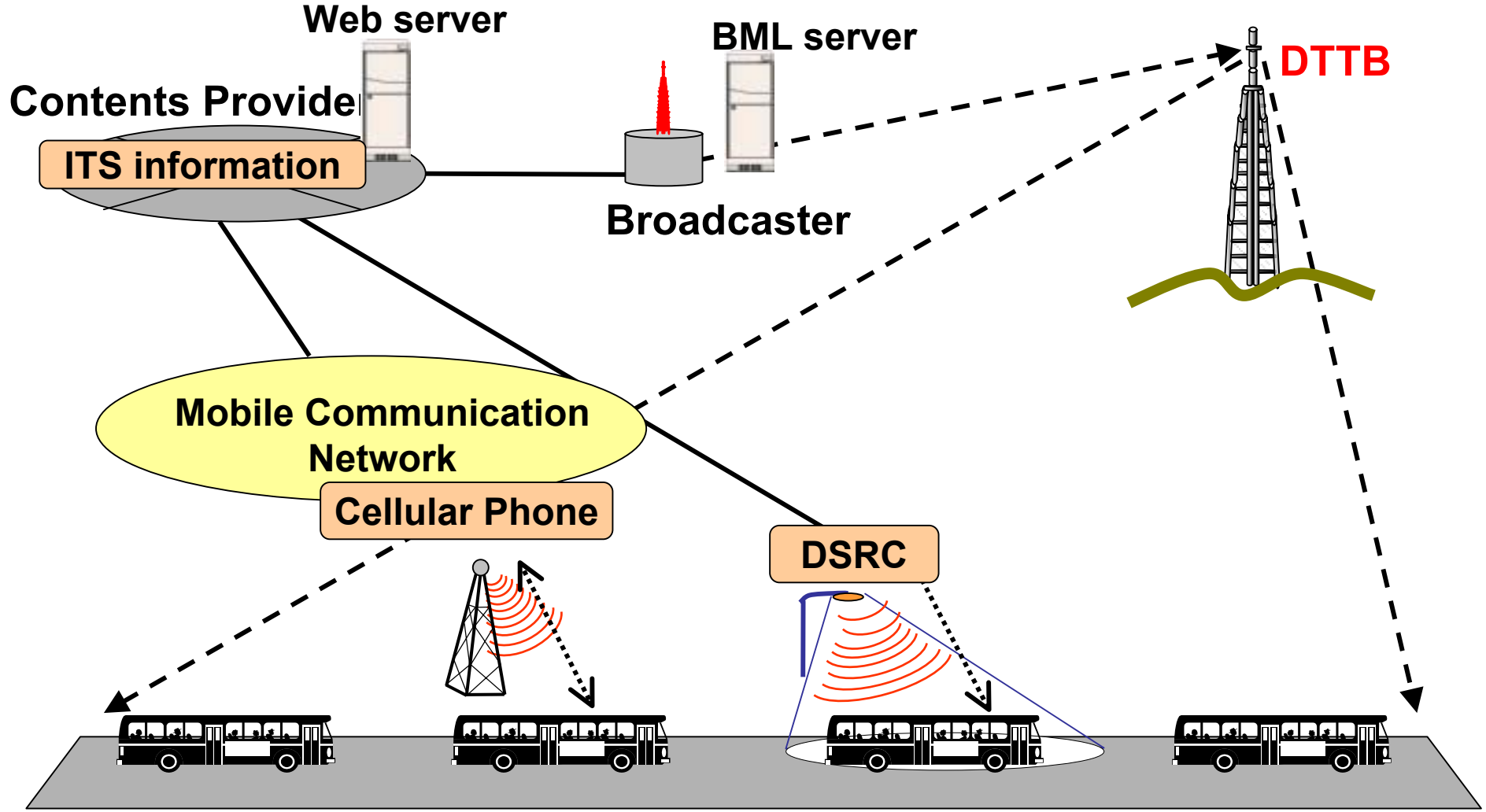
Data Broadcasting



Demonstration will be provide at ITS World Conference in Oct. 2004 in Nagoya

Integrated Transport System (ITS) using DTTB

Demonstration will be provide at ITS World Conference in Oct. 2004 in Nagoya



Data Broadcasting

All DTTB Broadcasters and BS Broadcasters providing Data broadcasting (datacast) now

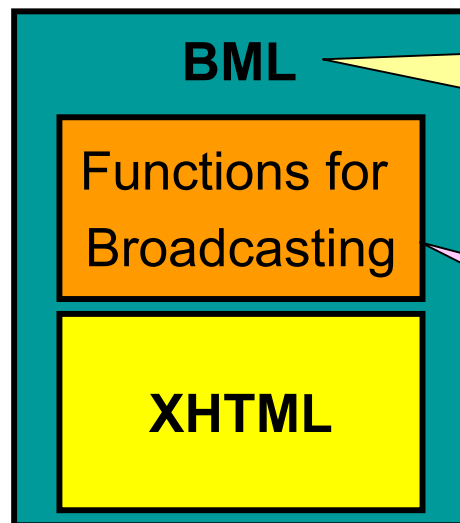
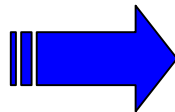
Program related information
Weather information

Anytime news
Report of sports game etc,

Currently the description language is BML format

Based on

XHTML



Features

Easy creation of contents

Facilitate convergence of internet

Additional capability

Example for Data Broadcasting (1)

Top menu

首都圏 NHK

ニュース

首都圏の気象

首都圏くらしガイド

放送中番組データ

かんたん登録

気象情報 東京都 渋谷区

気象警報が出ています

最高気温	30°C(-10)	21時	0	3	6	9	12	15
最低気温	25°C(-13)		☀	☀	☁	☁	☁	☀
降水確率	50%	20(°C)	20	18	25	27	22	22

お知らせ

首都圏くらしガイドがスタート
美術館や博物館の催事予定や行楽
情報、番組情報や健康体操まで！
生活にお役立ち情報満載です！！

Example for Data Broadcasting (2)

Weather news

天気予報 NHK あなたの気象情報

気象警報が出ています リモコンの赤ボタンを押してください

26(日) 東京都 渋谷区□□□

予想最低 25°C 予想最高 30°C

	21時	0	3	6	9	12	15
3時間ごとの天気							
降水確率(%)	40	50	50	50	60	60	40
(°C)	20	20	18	25	27	22	22

	27(月)	28(火)	29(水)	30(木)	31(金)	1(土)
週間天気						
最低/最高(°C)	22/24	22/24	22/24	22/24	22/24	22/24

現況

降水 00ミリ/時	いまの気温 22.5°C	きょうの最高 24.5°C きょうの最低 20.5°C
日照 30分/時	湿度 5%	風 10 m/s

音 気象メニュー 赤 警報・注意報 緑 べんり機能 黄 首都圏トップ

Example for Data Broadcasting (3)

Program related data

大リーグ オールスターゲーム 2003

投手 壘

投球数 100
被安打 10 奪三振 11

1
3
2

打者 壘

①安打 ②三振 ③三振

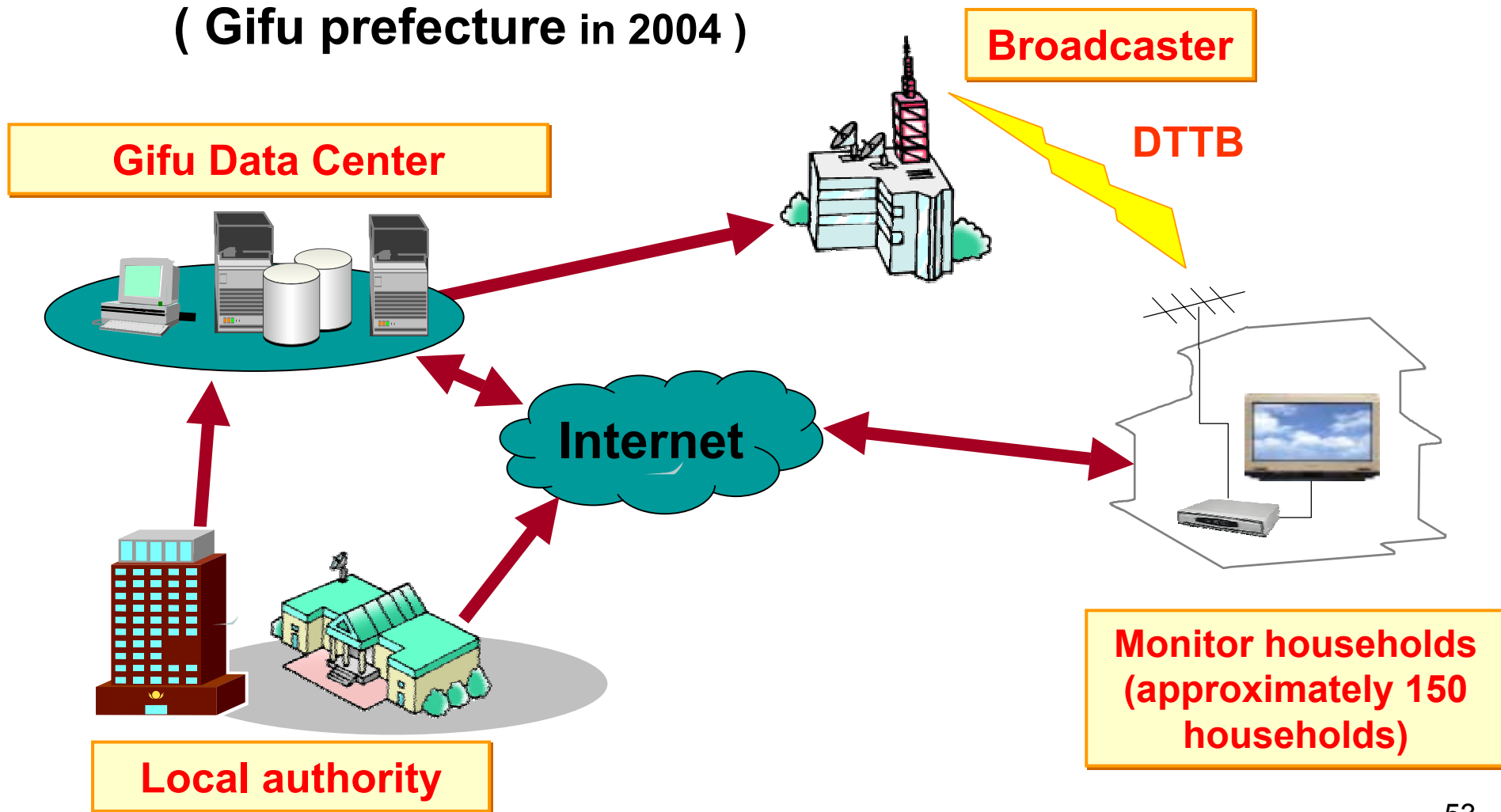
●スト레이트 ▲カーブ ◀スライダー
▶ツーシーム ■フォーク ▼シンカー
●チェンジアップ ◆カットボール ★その他

次ページ	1	2	3	4	5	6	7	8	9	計
ナ・リーグ	1	0	0	0	0	0	0	0	0	4
ア・リーグ	1	2	1	0	0	0	0	0	0	6

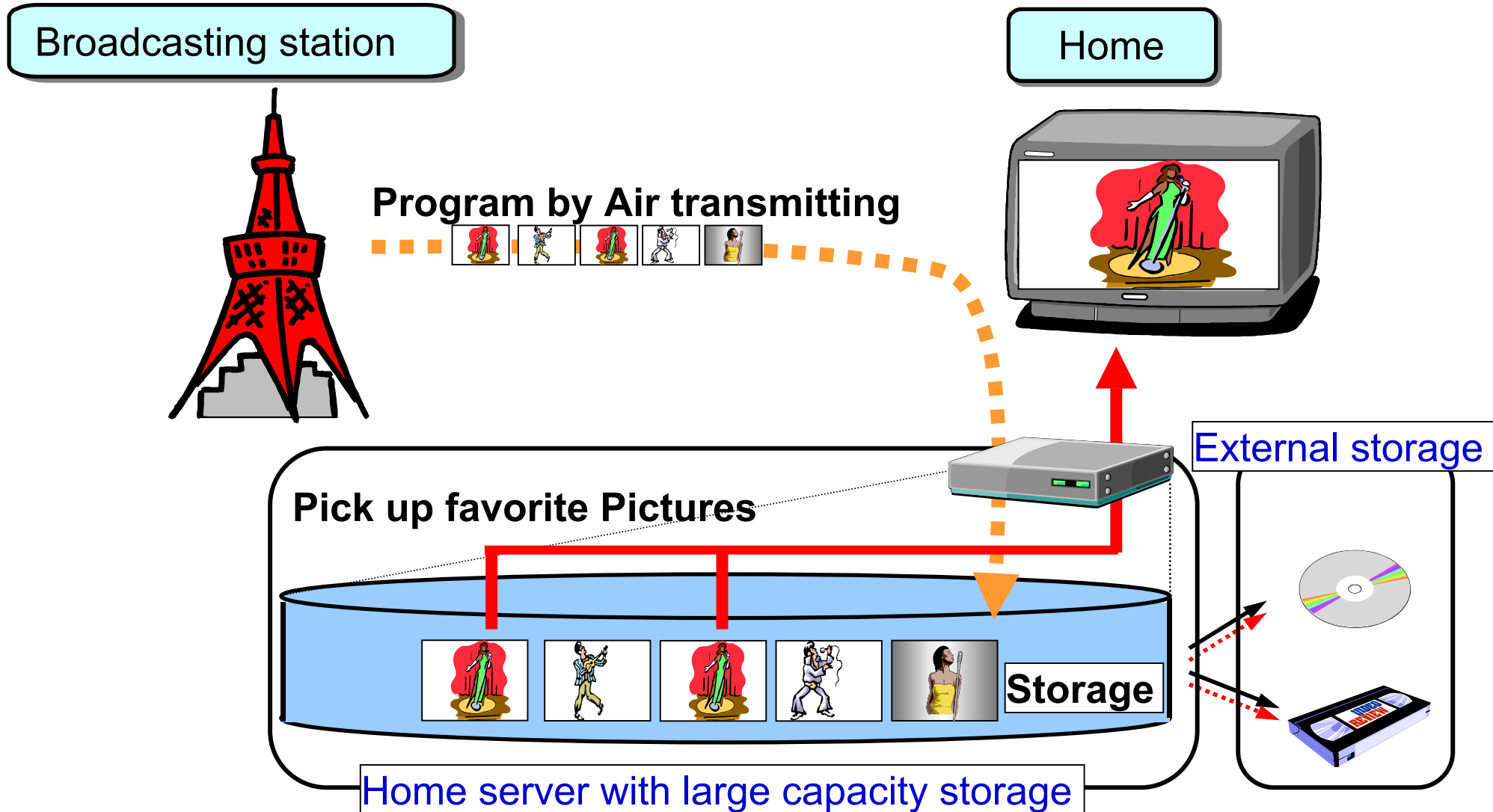
選手情報 スコア メンバー表 日本人選手 NHKトップ

E - government service trial using DTTB

Local governmental information service
using datacast of DTTB
(Gifu prefecture in 2004)

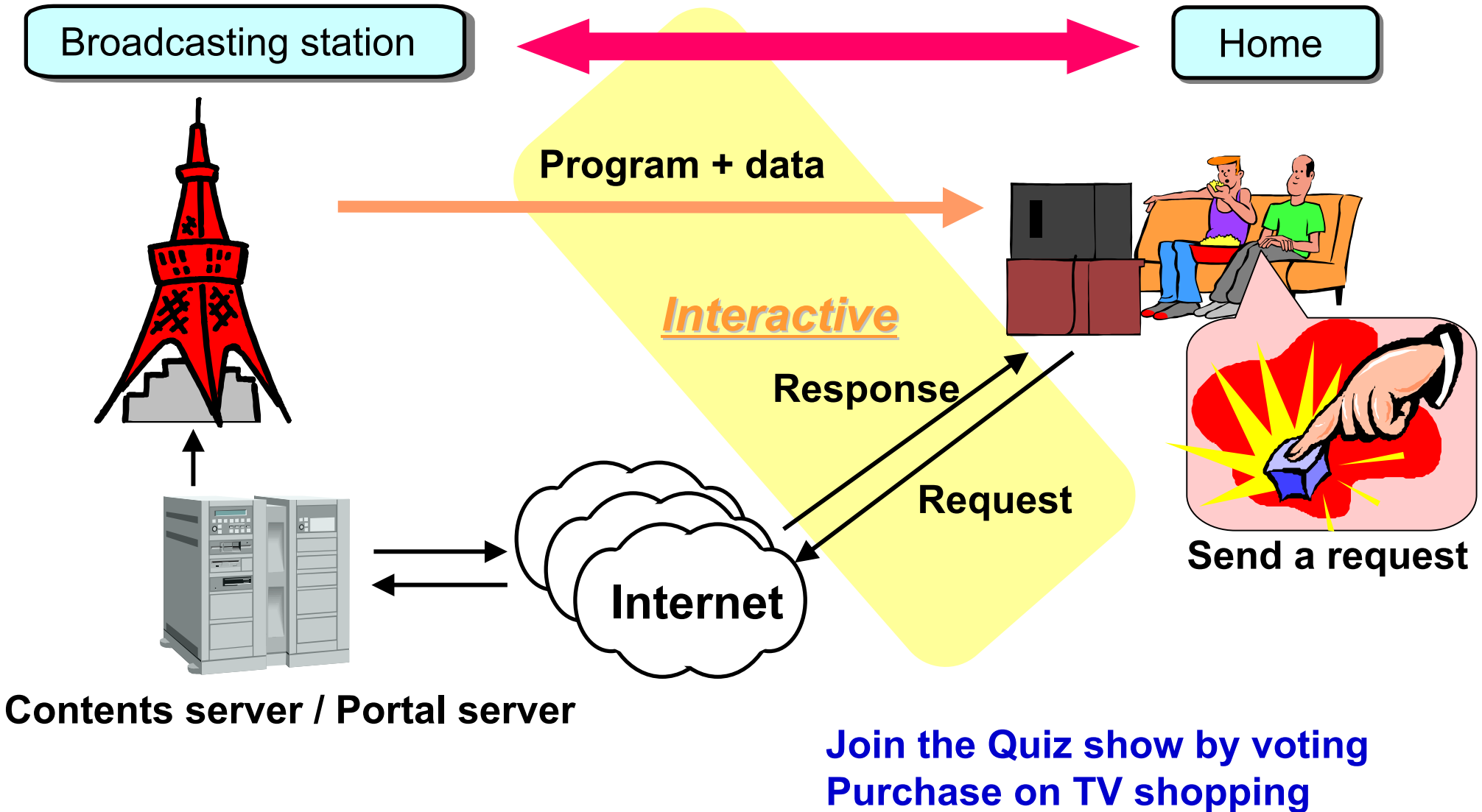


Server-type Broadcasting System



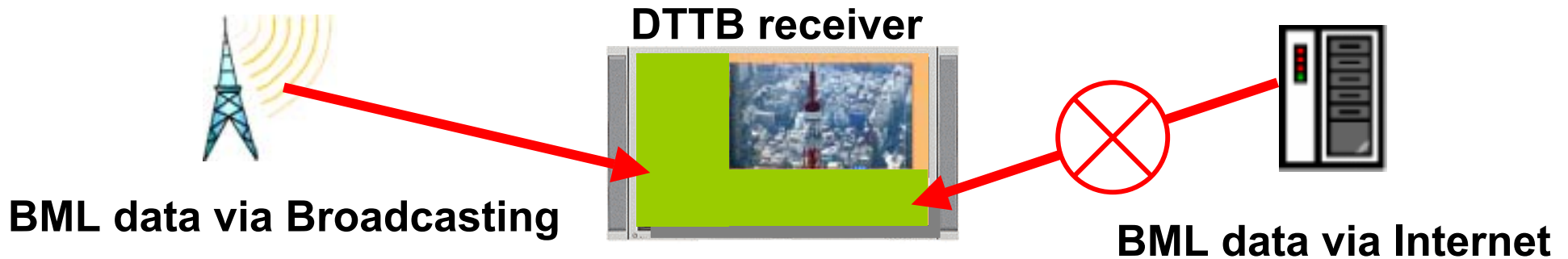
Service coming soon

Interactive Broadcasting



Interactive service

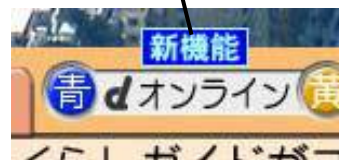
NHK Data Online service available from April 2004



Top menu of Data broadcasting

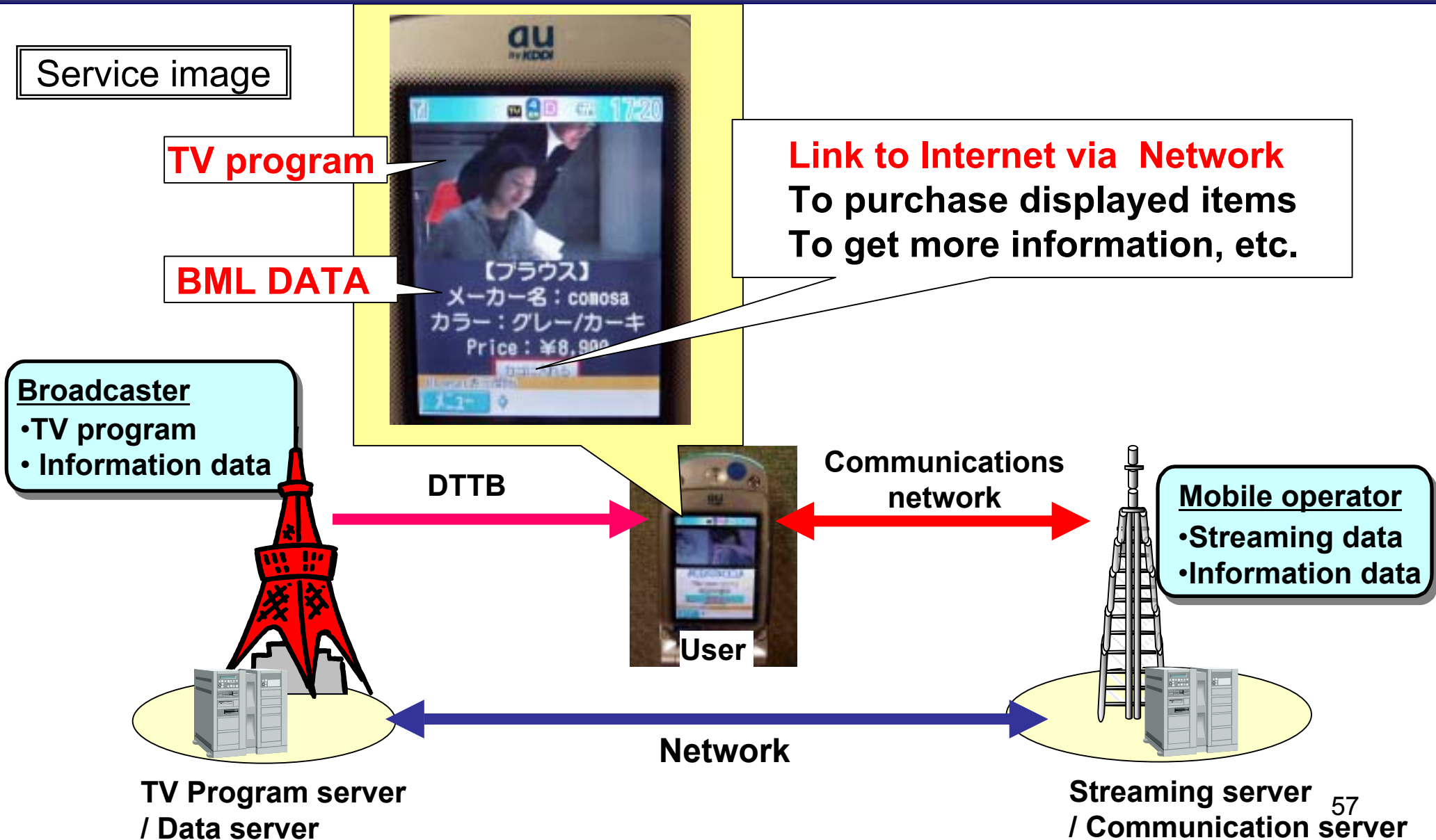


NHK Data Online image



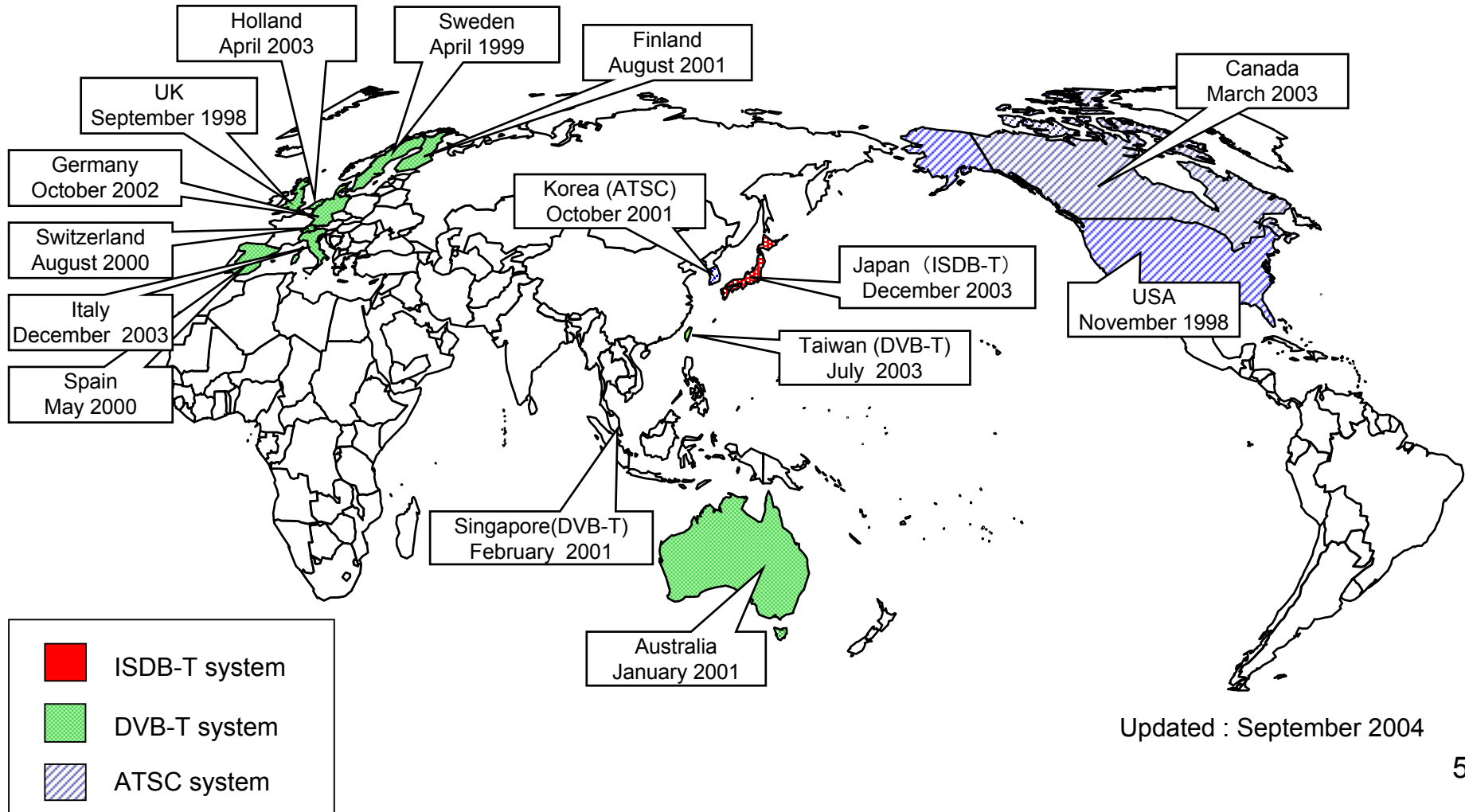
Access to NHK Data server

Fusion of communications and broadcasting



World Trend of Digital TV Broadcasting

Current Situation of Implementing Digital Terrestrial Television Broadcasting



Comparison of ISDB-T, DVB-T, ATSC

Systems	ISDB-T	DVB-T	ATSC
Transmission system	Multiple carrier (OFDM)		Single carrier (8VSB)
Bandwidth	6/7/8 MHz		6/7/8 MHz
Modulation Scheme	DQPSK/QPSK/ 16QAM/64QAM	QPSK/16QAM/ 64QAM	8VSB
Error control	Convolutional code/ RS		Trellis code + RS
Characteristic	SFN capability Effective against ghost Segmented OFDM Time interleaving	SFN capability Effective against ghost	Analog based format
Proposing country	Japan	Europe	U.S.A.

The DTTB systems are recommended in ITU-R Rec.BT.1306.

Digital Terrestrial TV in the World

	EU	Asia Pacific
	UK, Germany, Sweden, Finland, Spain etc.	USA, Canada, Australia, Korea, Japan
Regulatory framework	New license -Multiplex -Program (4-6 programs in 1 multiplex)	Give 6(7)MHz to incumbent analog operators Simulcast requirement
Services	Pay TV or Free to air More channels, no HDTV STB	Free to air HDTV Integrated digital TV set
System	DVB-T	ATSC (USA, Canada, Korea) ISDB (Japan) DVB-T (Australia)

HDTV as mainstream of digital TV

country	HDTV requirement and service
USA	No mandatory requirements Major terrestrial TV network started HDTV in primetime Satellite and cable operators started HDTV service
Canada	Market driven but emphasis on HDTV in CRCT licensing policy in 2002 Satellite, Cable and terrestrial TV providing HDTV
Australia	HDTV requirement: 20 hours per week, from July 2003 (including up-converted HDTV)
Korea	HDTV requirement: 14 hours per week for pure HDTV
Japan	HDTV requirement: more than 50% (including up-converted HDTV) NHK-G providing 90% pure HDTV

Summary

- **DTT should have more values than multi-channels; i.e. pure HDTV, datacast, interactive service, mobile**
- **All-in one HDTV sets are available in the market as thrusters of digital market, and integrated home information terminal.**
- **Collaborative work among government, broadcasters, industry to promote DTT**
- **DTT is growing rapidly since 2003 due to HDTV**
- **Attractive application of DTT, datacast is necessary.**

Reference

Thank you for your attention !!

MIC

http://www.soumu.go.jp/joho_tsusin/eng/

Contact point:

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Broadcasting Technology Division, MIC

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