

Presentation 2

Current state of digital broadcasting of Japan

Oct. 14th 2004

Digital Broadcasting Expert Group (DiBEG)

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1. Outline of Digital Broadcasting

(1) Background of Digitalization & Comparison of Analog and Digital

Explain the requirement of digital broadcasting, technical solutions and comparison table between analog broadcasting and digital broadcasting

(2) Structure of Digital Broadcasting & Examples of Service

Explain the structure of digital broadcasting, especially for the backbone of technical standard, and the feature of ISDB-T system. Also show the outline of digital broadcasting service (details are described at following item 3.

Requirements for Digitilization

Multimedia-service

High-Quality TV/ Multi-Channels

Flexible/Versatile

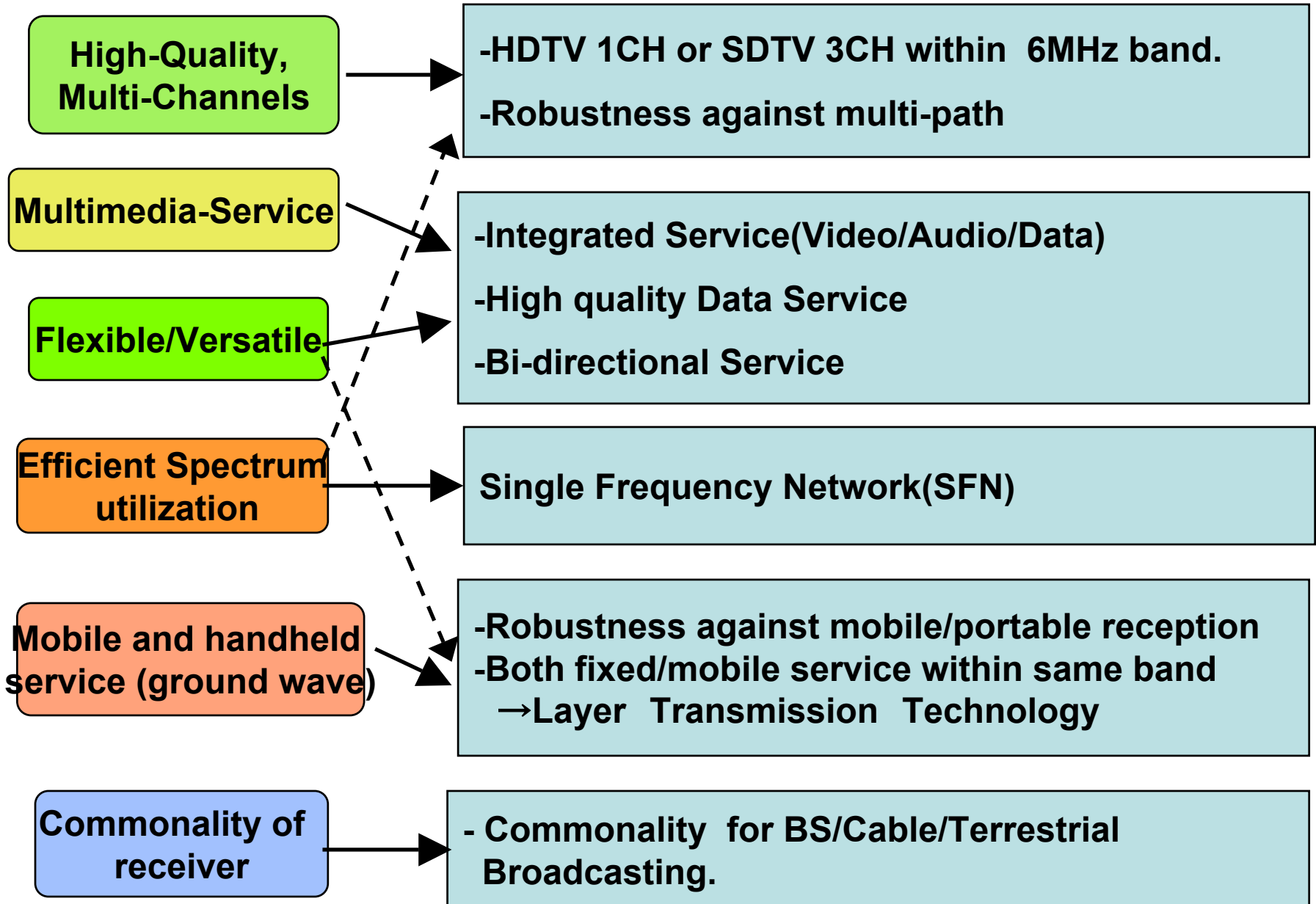
Effective frequency utilization

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



Analog/Digital Comparison (1/2)

Limits of Analog Broadcasting

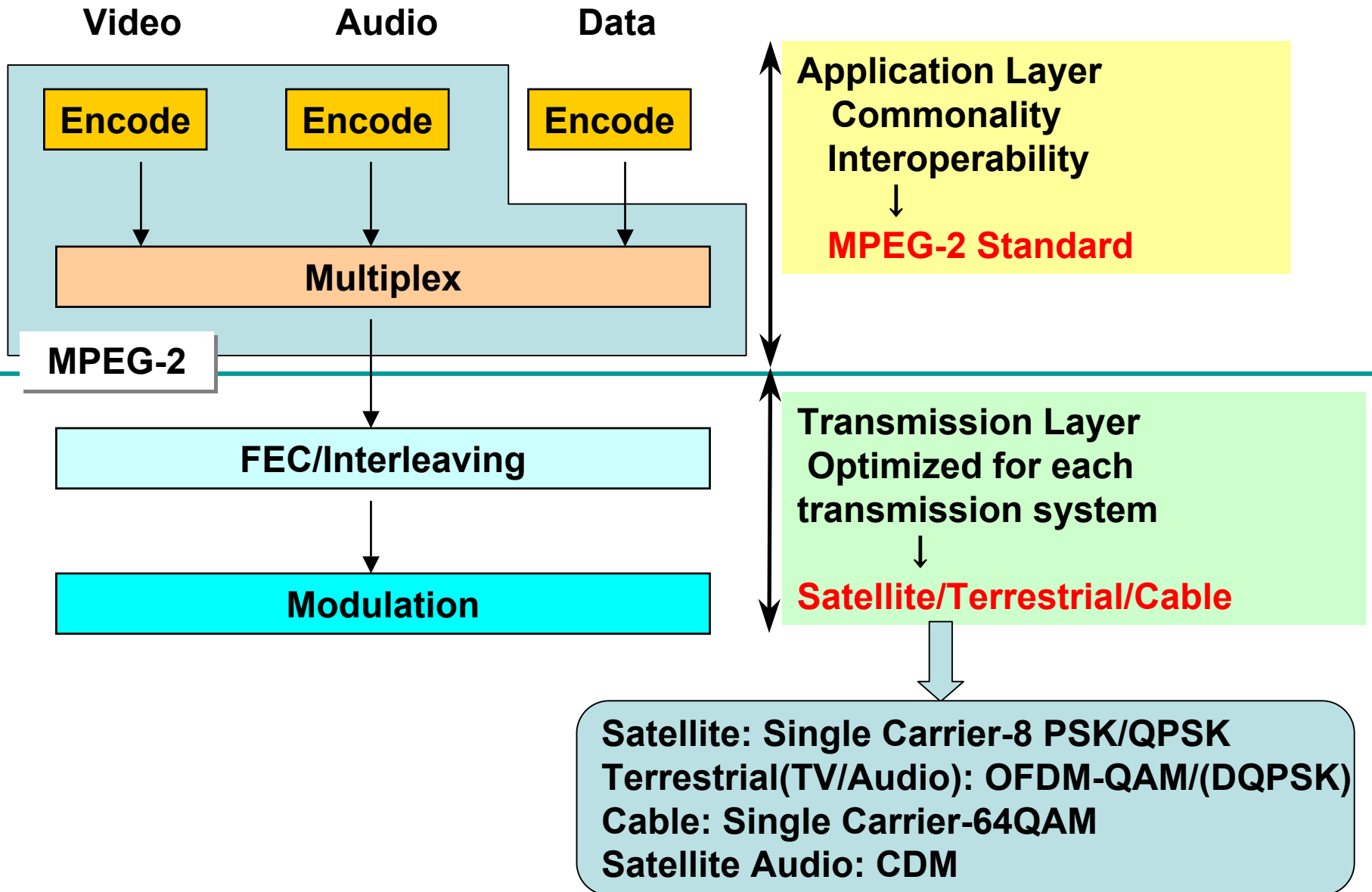
Items	Yes/No	Comments
Multi-channel service	No	-Limit of bandwidth -Limit of Modulation system
HDTV service	No	Same as above
5.1 CH Stereo	No	Same as above
Data Broadcasting service	Limited (Tele-text)	-Same as above -Limit of Receiver system
Multi-Media Service	Limited	Same as above
Mobile Reception	Limited	-AMFM available, But TV difficult

Analog/Digital Comparison (1/2)

Technical Possibility of Digital Broadcasting

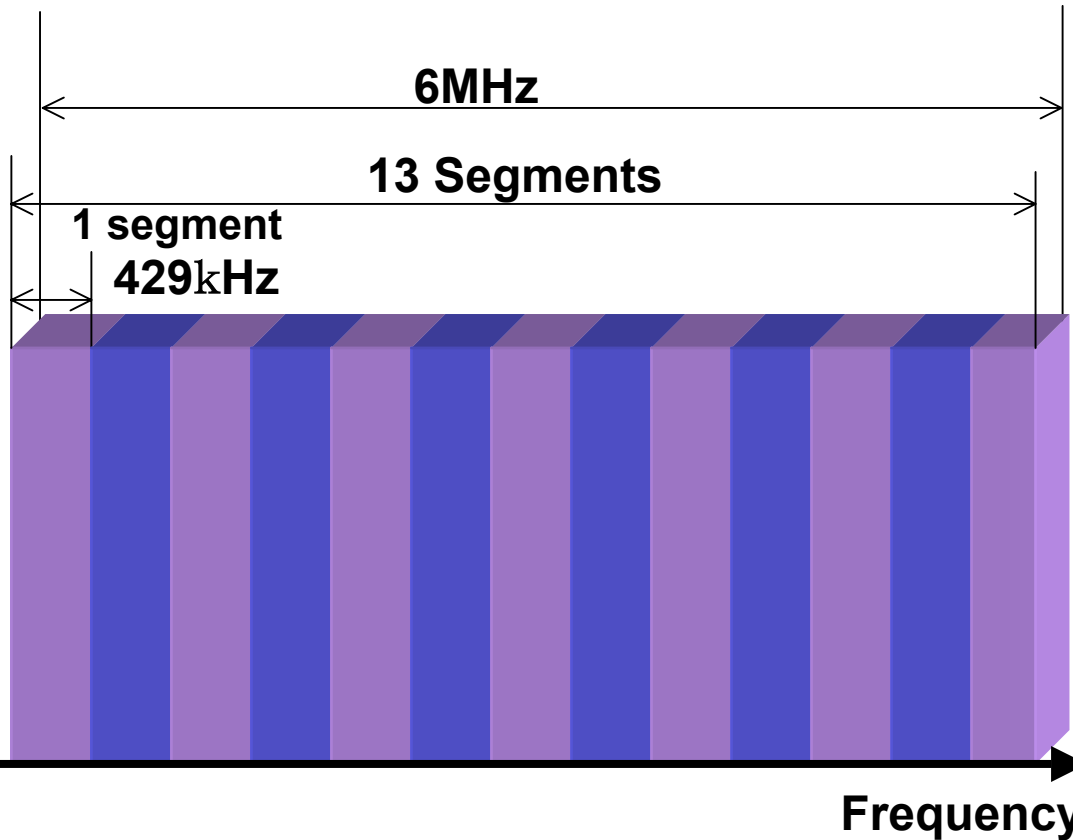
Items	Technical Possibility	Comments
High Quality TV	480i - 1080i	Fixed Reception
Multi-Channel TV	3 SDTV CH/6MHz	Fixed Reception
5.1 CH Stereo	Possible	
Data Broadcasting	Various services are available within Standard	
Mobile/Portable Reception	Possible	Terrestrial Broadcasting
Multi-Media Service	Various services are available within Standard	
Inter-Operability	Possible	

Layered Structure for Digital Broadcasting



Features of ISDB-T system (1)

Band Segmented OFDM : Orthogonal Frequency Division Multiplexing



Features

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

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

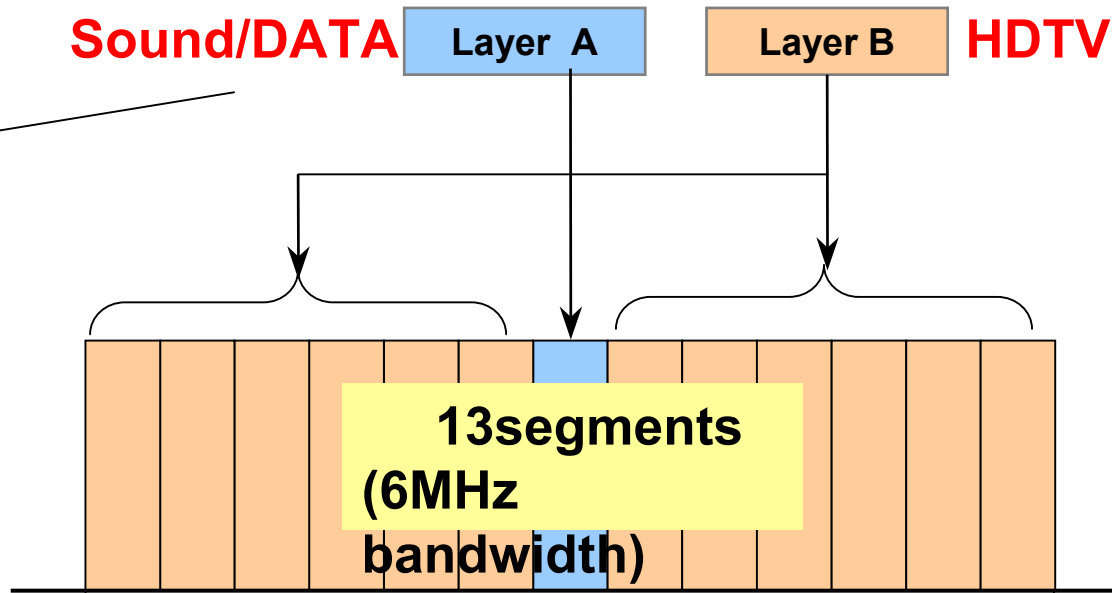
Segmented Structure and Partial Reception

HDTV + mobile reception within one 6MHz channel

Sound/DATA Layer A Layer B HDTV (or 3 SDTV)



Mobile reception



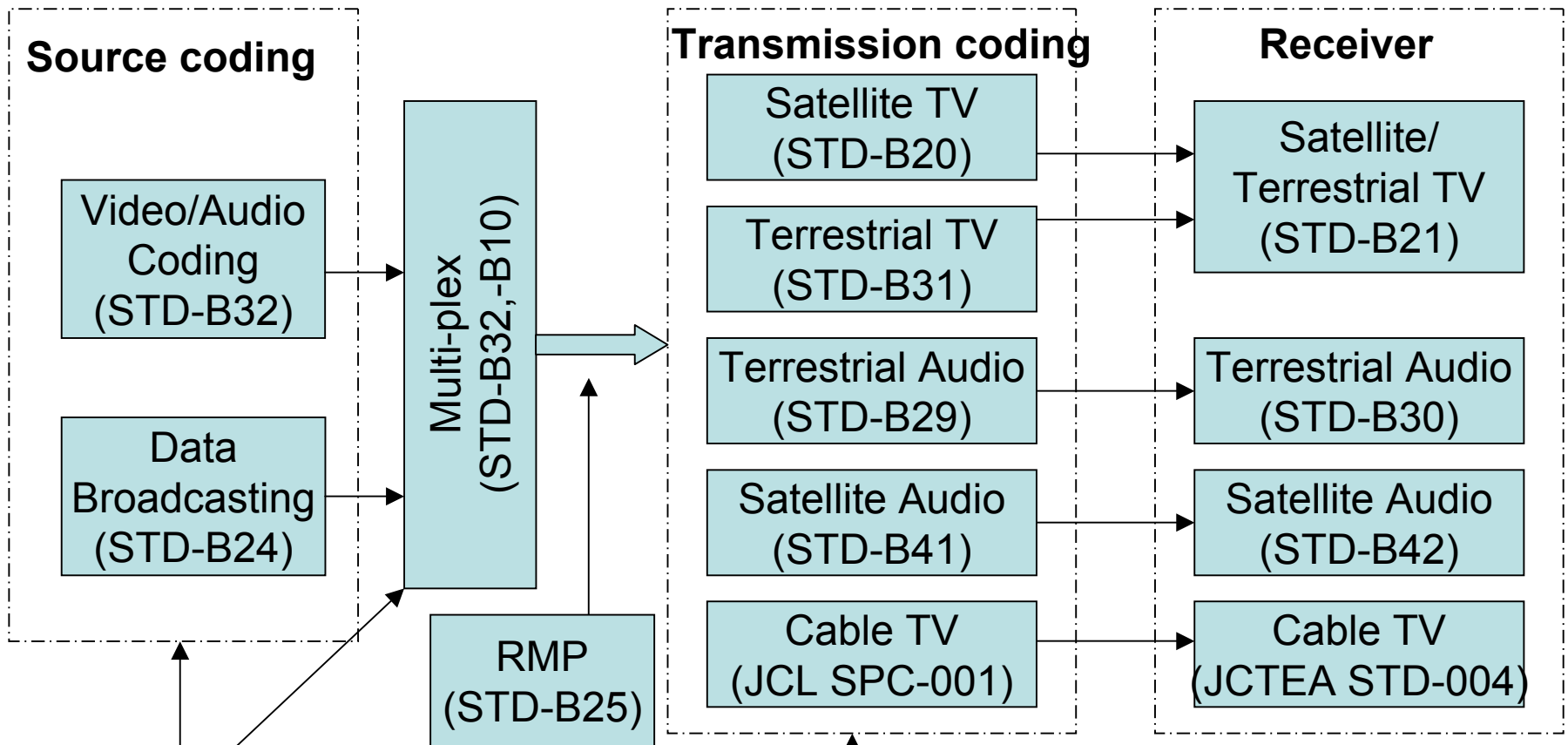
HDTV reception

2. 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.

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

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

3. Current DTTB Service of Japan

In this section, explain current DTTB service started from Dec. 2003, at 3 mega-police wide service area.(note)

(note) Tokyo, Nagoya and Osaka wide service area

Following services are introduced as the examples of DTTB.

(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



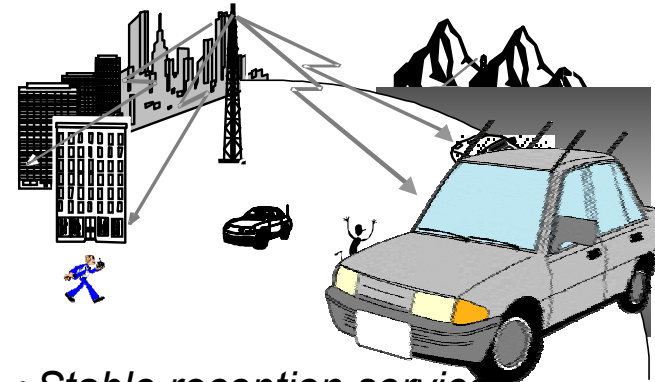
- *High quality image and sound services*

Data broadcasting



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

Mobile



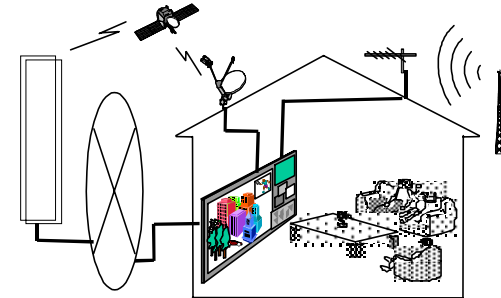
- *Stable reception services*

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

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

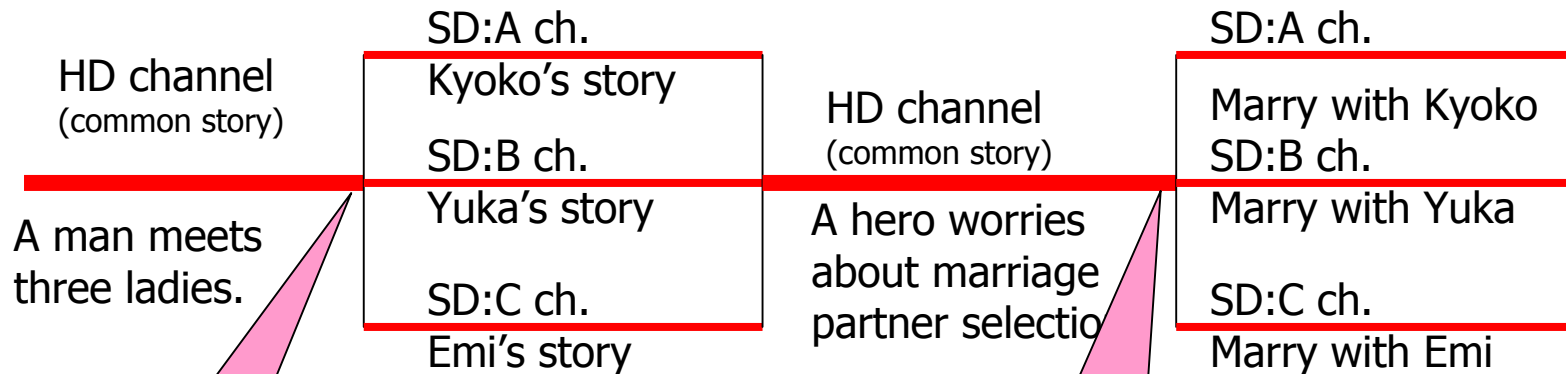


Multiple SDTV programs within one channel(2)

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

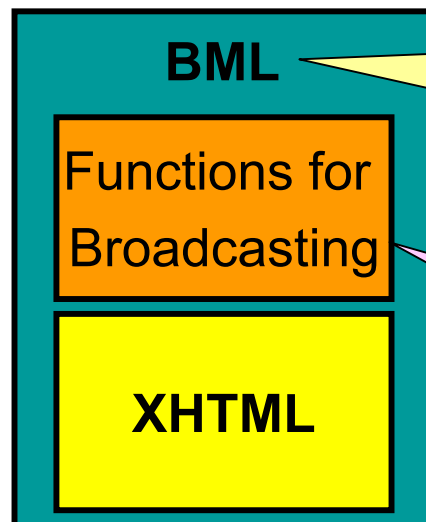
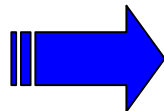
All DTTB Broadcasters are providing
Data broadcasting (datacast) now

Program related information
Weather information

Anytime news
Report of sports game etc,

Currently the description language is BML format

Based on
XHTML



Features
Easy creation of contents
Facilitate convergence
of internet

**Additional
capability**

Example for Data Broadcasting (1)

Top menu



Example for Data Broadcasting (2)

Weather news



Example for Data Broadcasting (3)

Program related data



Example for Data Broadcasting (4)

EPG (Electronic Program Guide)

The screenshot displays the NHK EPG interface on a television screen. At the top, the title "NHKおすすめ番組" (NHK Recommended Programs) is shown in large white characters. Below this, a green banner reads "今日のおもな番組" (Today's Main Programs). The main content area is divided into four program cards, each with a title, a small image, a description, and a "予約" (Reservation) button.

生きものの地球紀行 (Living Things Earth Expedition) - 予約
「ヒメコウイカ不思議な繁殖作戦」... 8:00~8:45 総合

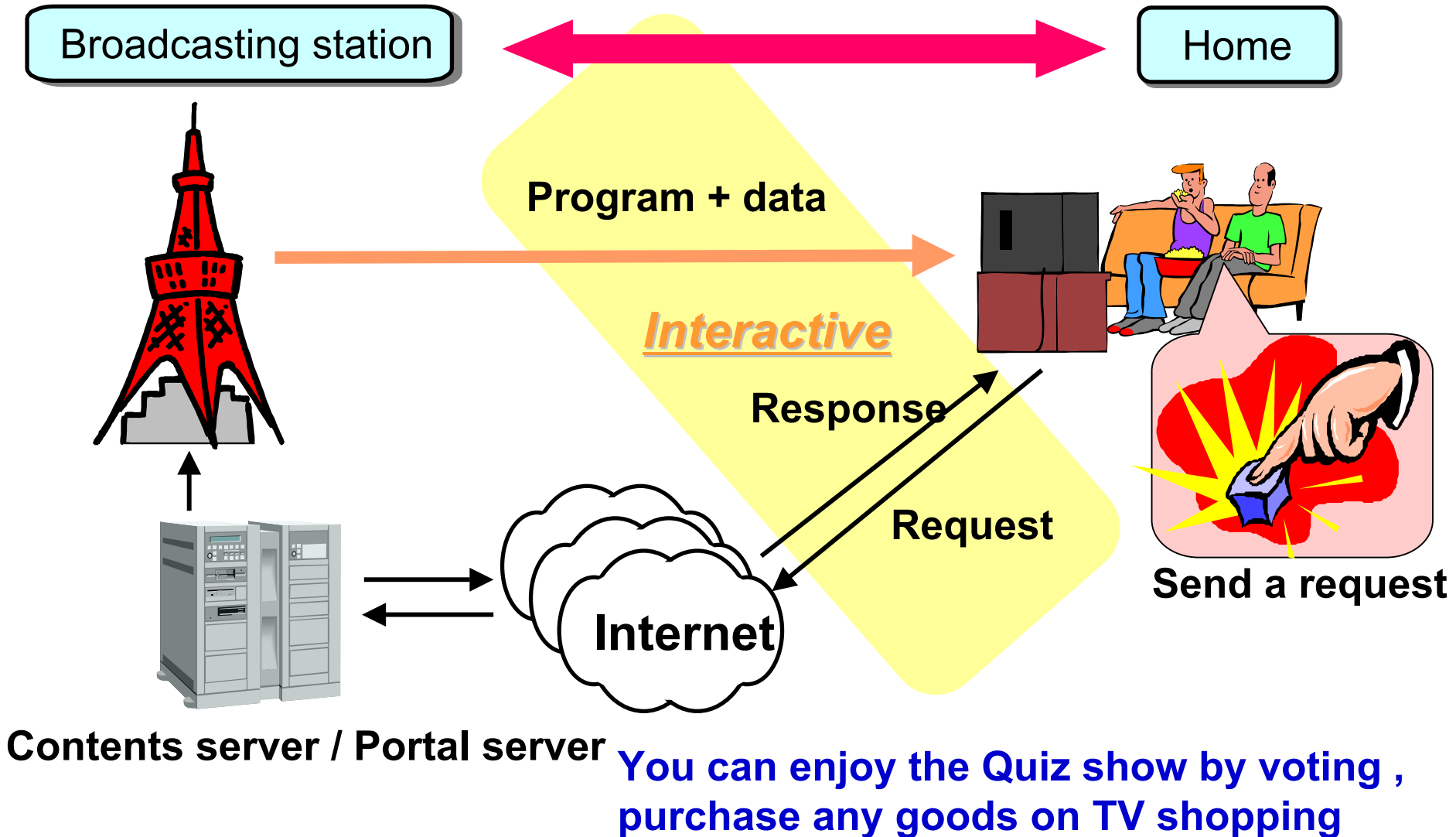
ポップジャム (Pop Jam) - 予約
今回は、3年ぶりに番組に登場する... 11:00~11:40 総合

青春探検 (Youth Expedition) - 予約
「女の一生 サッカーに賭けます」... 11:45~前0:05 総合

コメディ決定版! (Comedy Decision Edition!) - 予約
「Television」... 深夜0:30~0:55 総合

On the right side of the screen, there is a vertical column of navigation buttons: "今日" (Today), "1週間" (1 Week), "特集 サッカーW杯" (Special Soccer World Cup), "映画" (Movie), "ドラマ" (Drama), "スポーツ" (Sports), "ドキュメンタリー" (Documentary), "音楽" (Music), "アニメ" (Anime), and "EPGに戻る" (Return to EPG) with a "戻る" (Back) button.

Interactive Broadcasting (1)



Interactive data service (1)

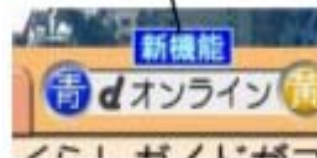
NHK Data Online service available from April 2004



Top menu of Data broadcasting

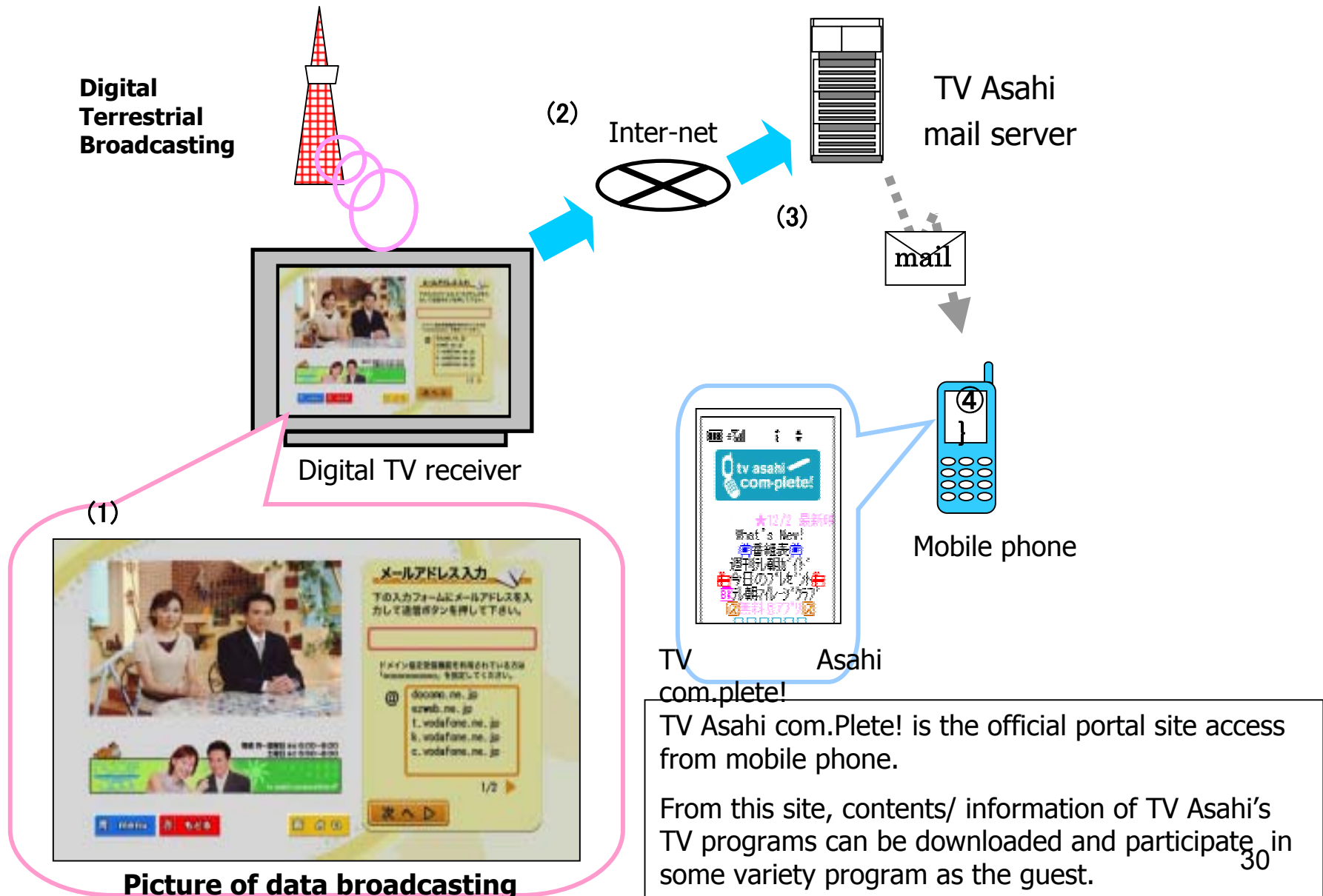


Data Online image

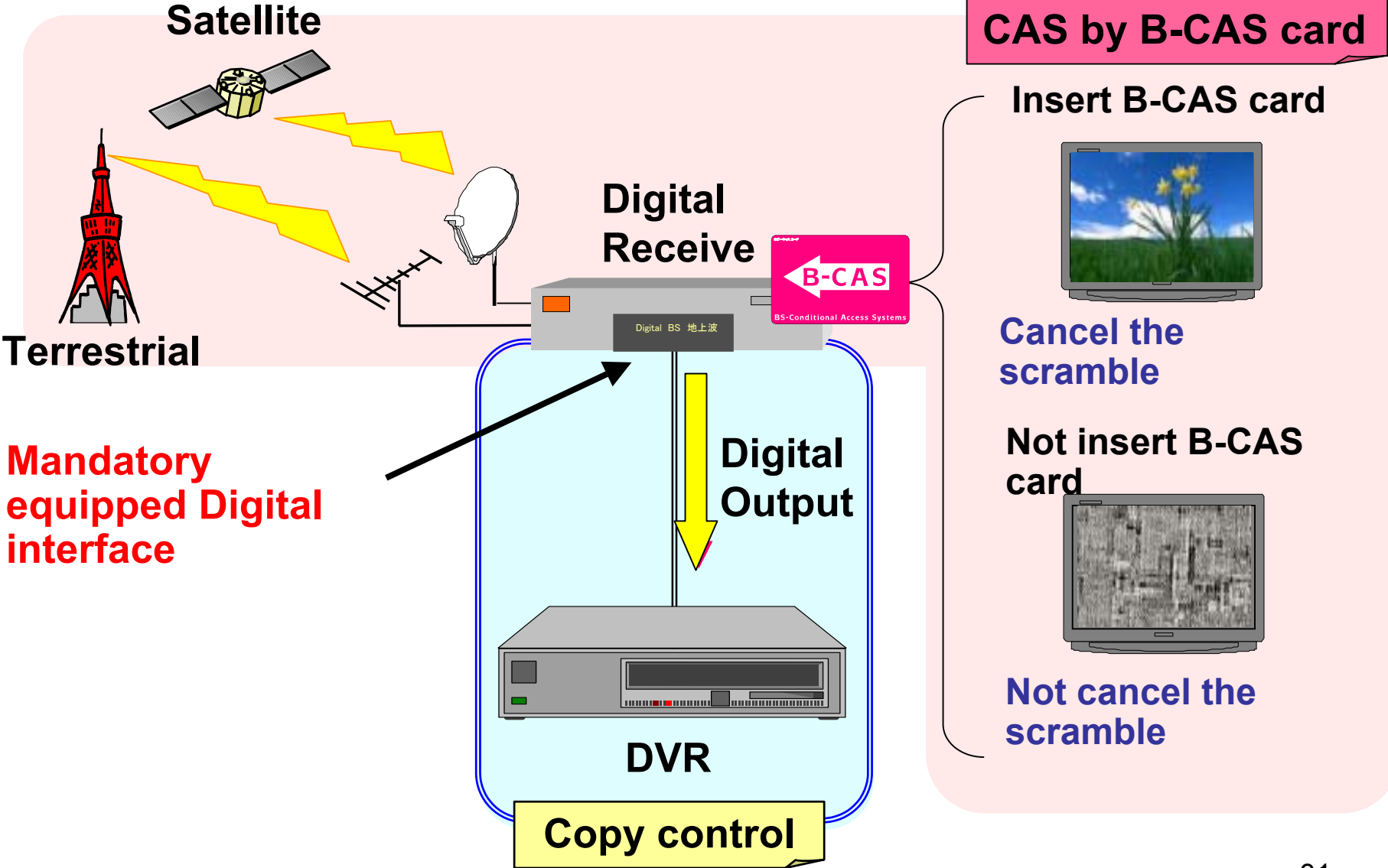


Access to Data server

Interactive data service (2)

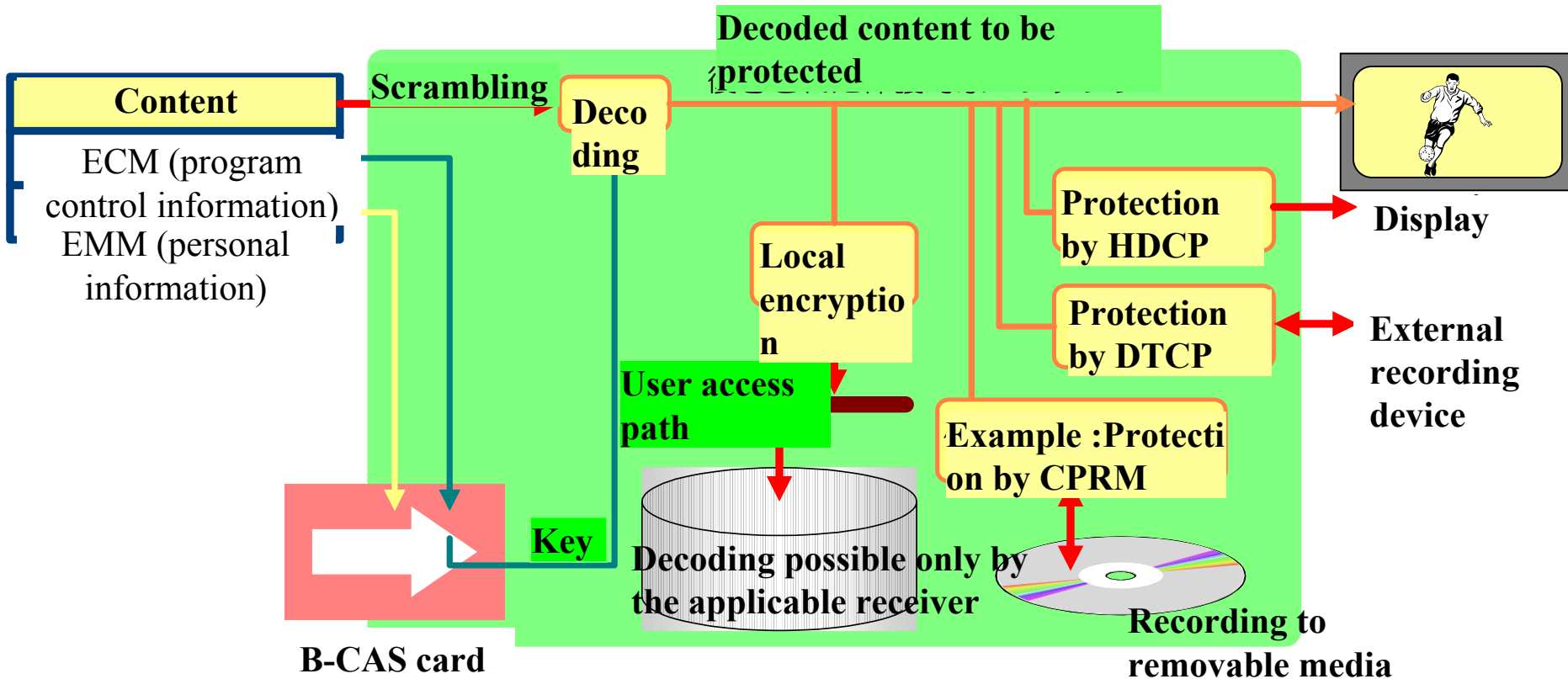


Content Protection



In operation from April 2004

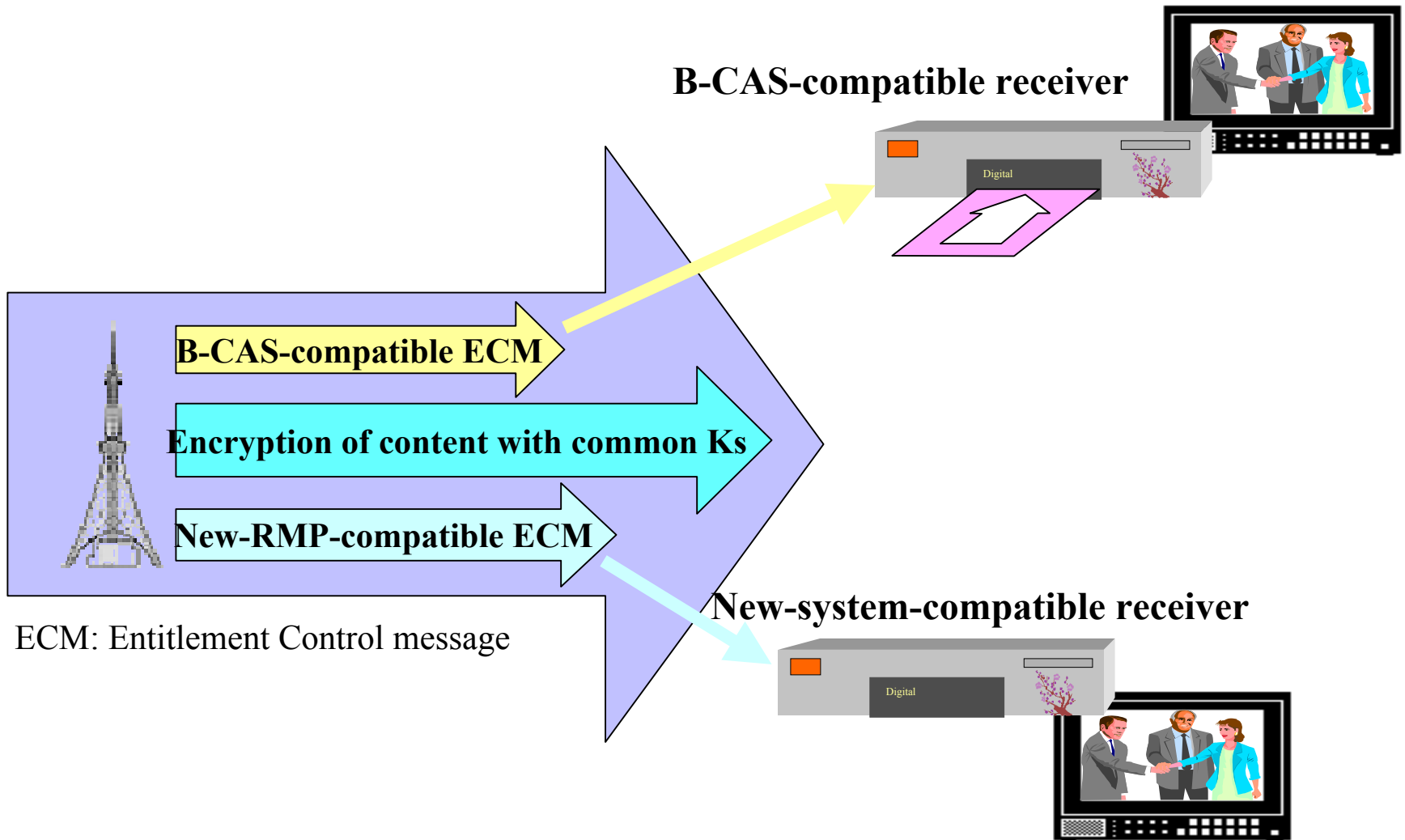
Outline of content protection receivers



Analog output: Copy Generation Management System (CGMS-A) or Macrovision

ECM: Entitlement Control Message
EMM: Entitlement Management Message

Concept of Simulcrypt management



The new system is under consideration in a preparatory work group of the RMP Council.

4. Cover Area of DTTB in Japan

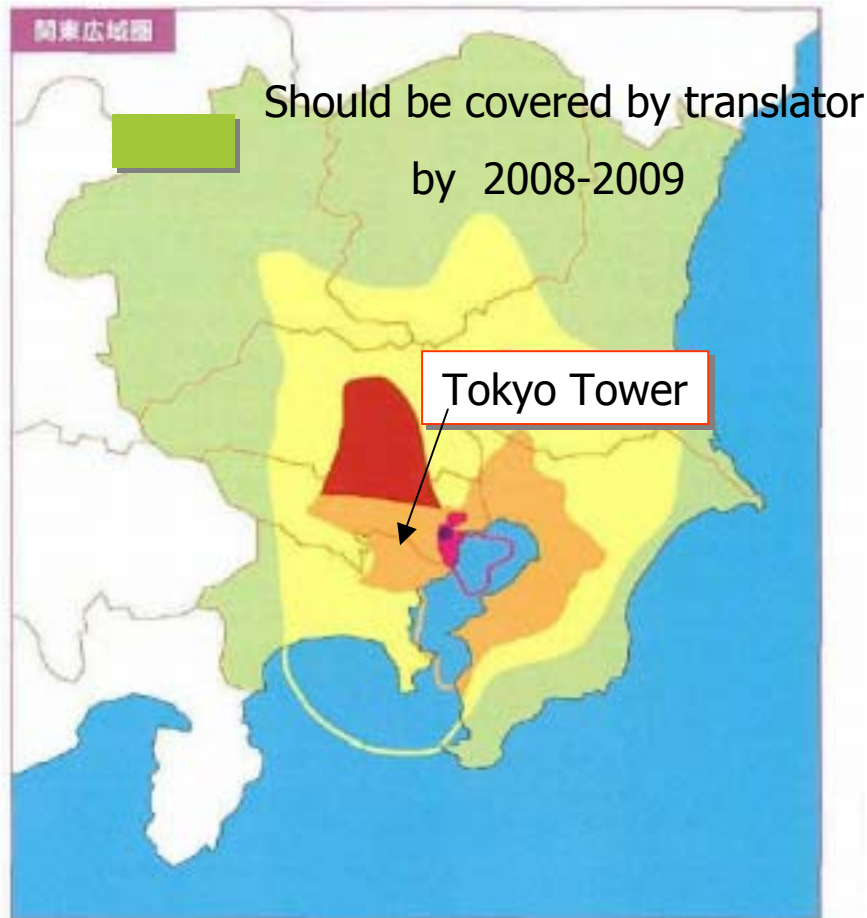
Digital Terrestrial Broadcasting has start in 3 area (Tokyo(Kanto), Nagoya(Tyukyo), Osaka(Kansai)) on Dec. 1, 2003

At early stage, transmitter power is suppressed to avoid interference to analog TV channel, but step by step increase the transmitter power and finally reach to full power operation.

In other area, Digital terrestrial broadcasting will start during 2004-2006.

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

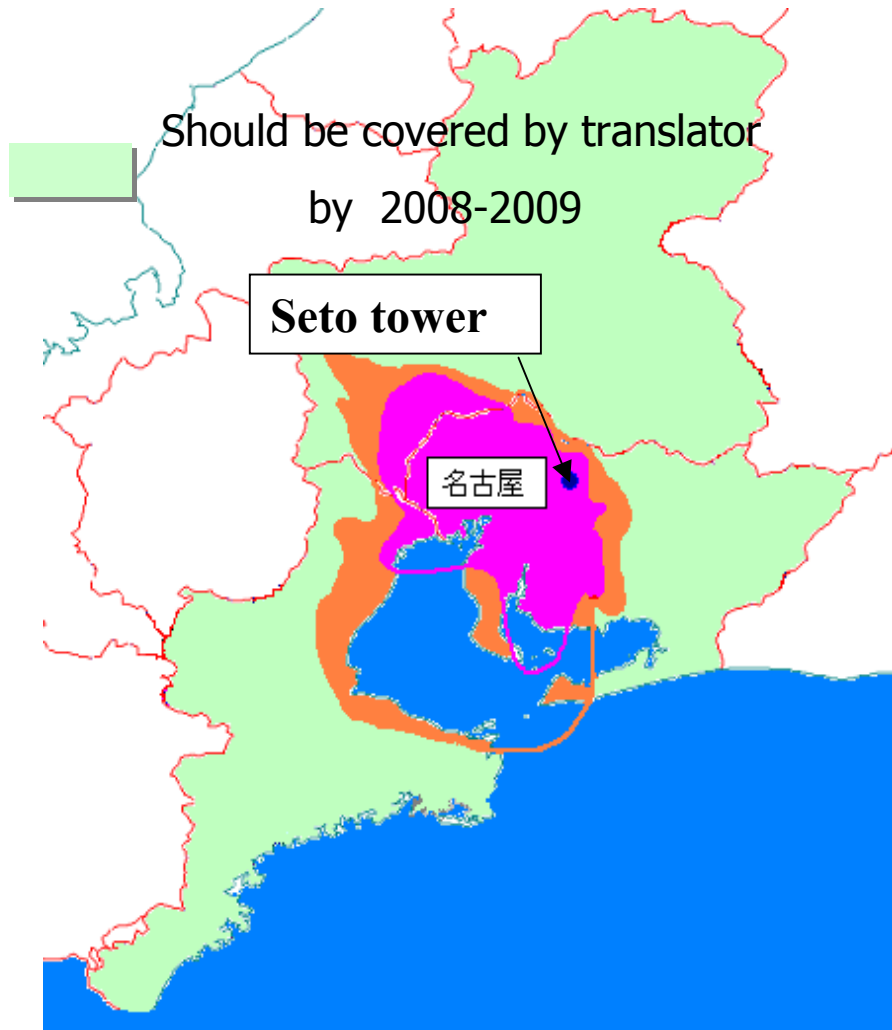
- NHK General
- NHK Educational
- Private Network(6)

**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

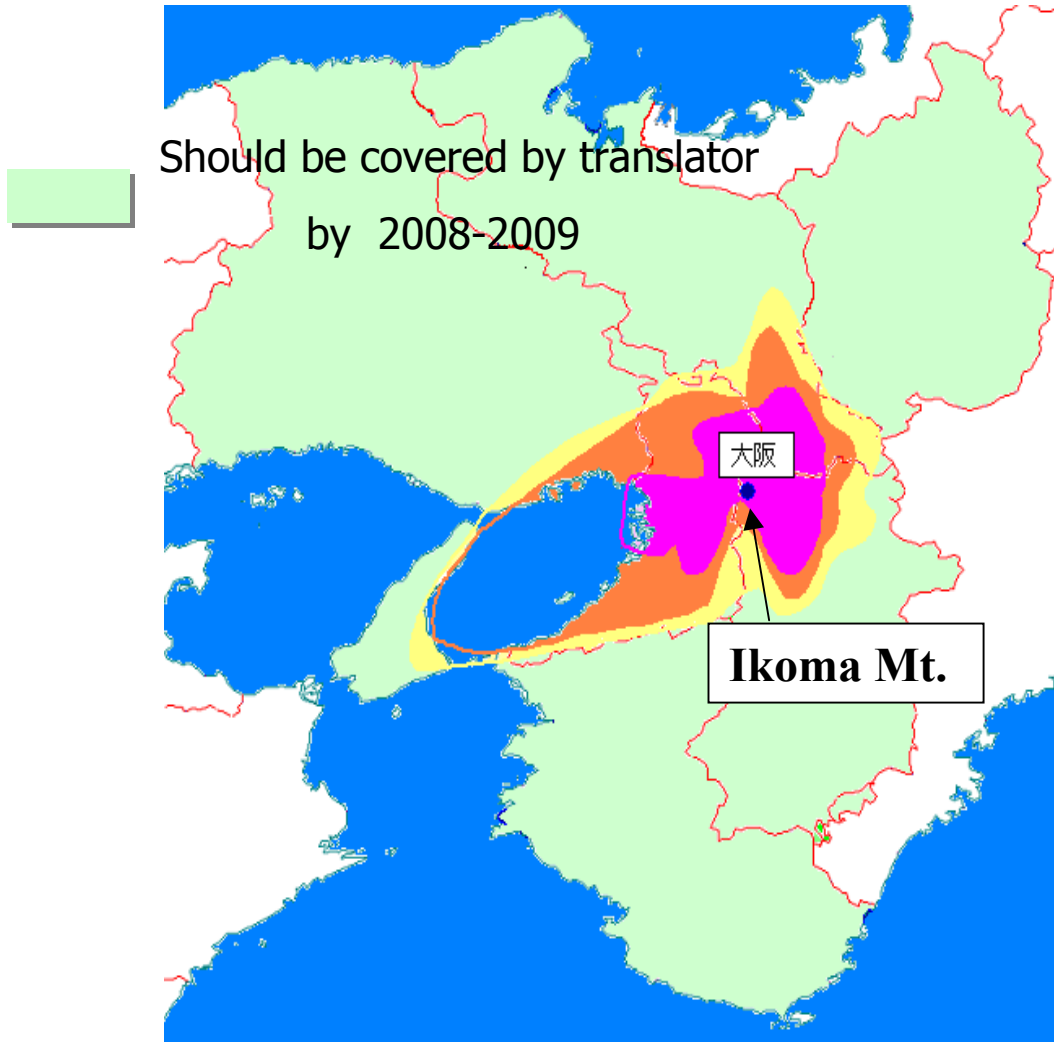
End of 2005

(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

5. Current state of Digital Receiver in Japan & Forecast of Market

-**Background**; Digital terrestrial broadcasting has started Dec.2003. BS and 110 CS digital broadcasting has already started.

-**Main current of digital receiver in Japan**

(1) **All in one type**; Analog, 110 CS digital, BS digital and DTTB tuners are mounted)

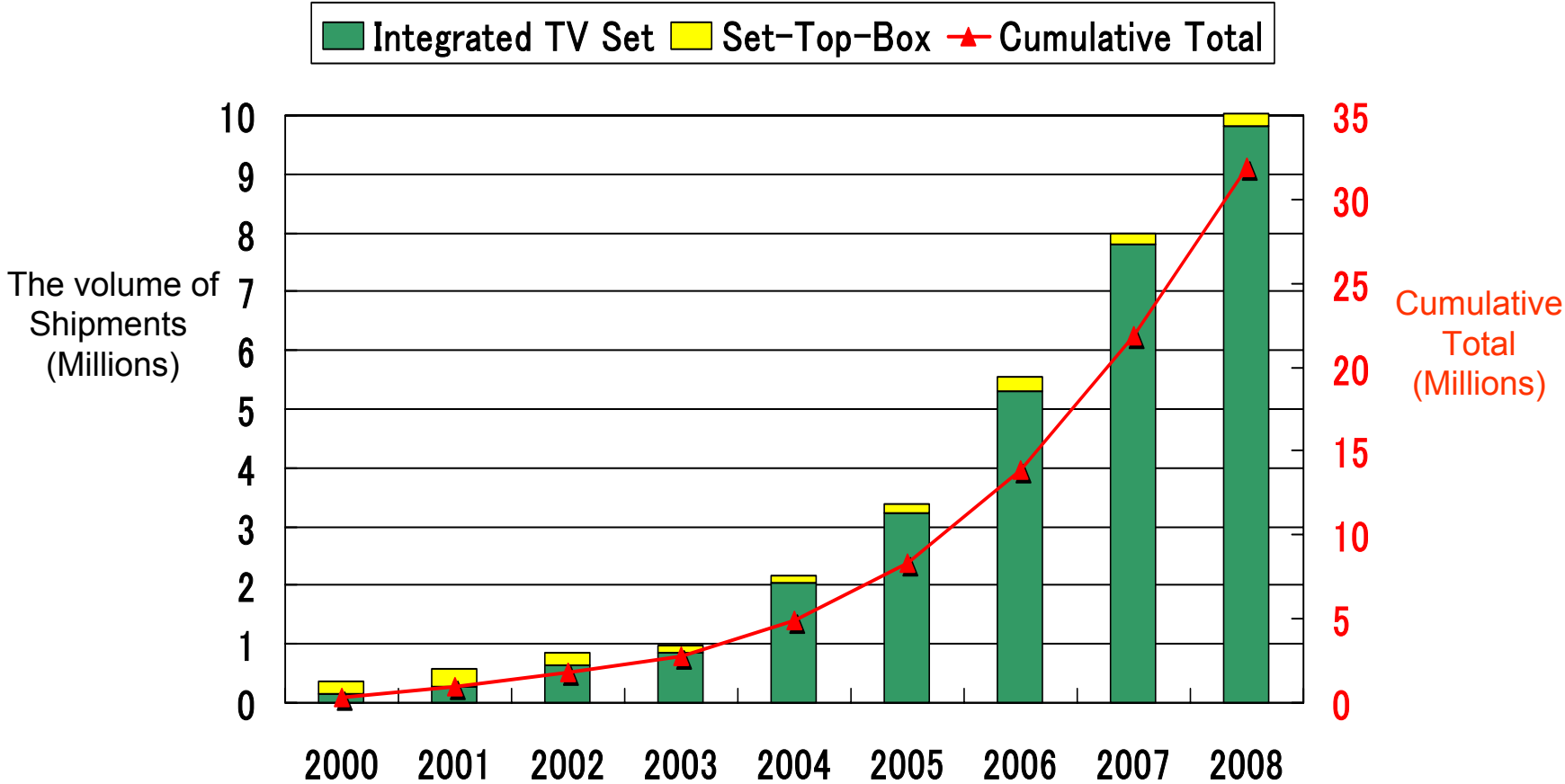
(2) **Wide Screen**; wider than 30" up to 50" screen type are popular to enjoy HDTV.

(3) **Ratio of flat panel increased**; in digital receiver market, flat panel get over than 50% this year

(4) **Digital receiver market extremely grow** ; JEITA forecasts the shipment of digital receiver (note) increase over than 50% of total TV set shipment within a couple of year

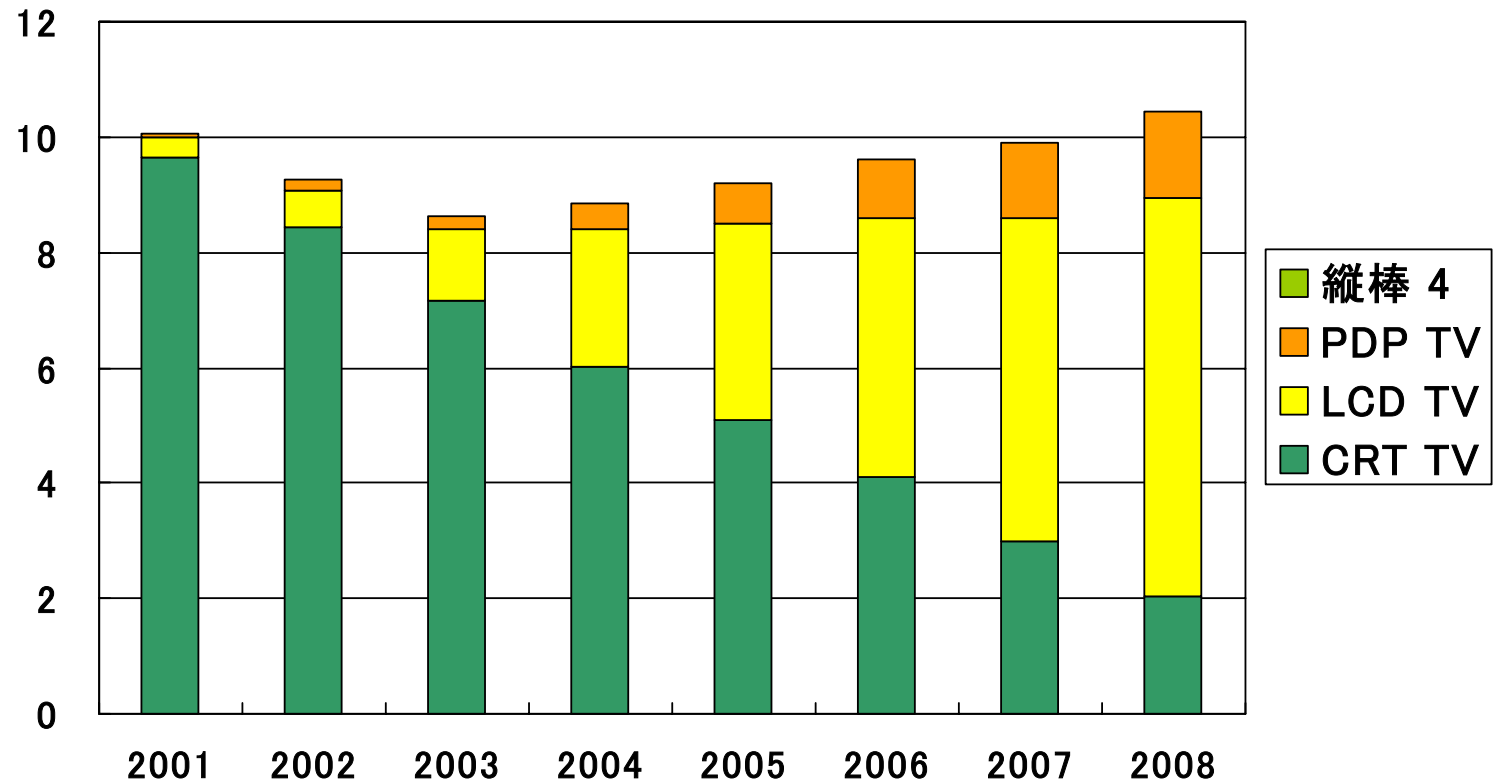
(note) analog receiving function is also equipped

Volume of Shipments of Digital TV Sets and Set-Top-boxes --Sales Achievements and Projections--



Source: JEITA Electronics and Statistics Committee AV Forecast Working Group

Ratios between Flat Panel Displays TV and CRT TV



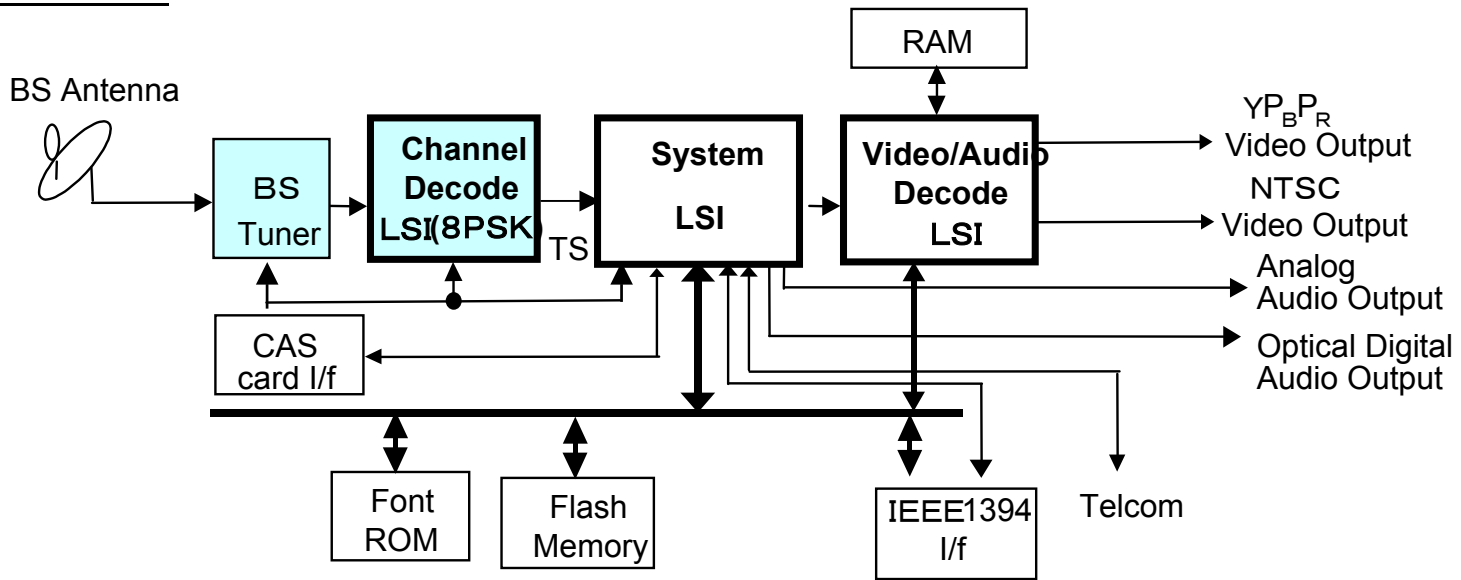
Source: JEITA Electronics and Statistics Committee AV Forecast Working Group

New Material for Display

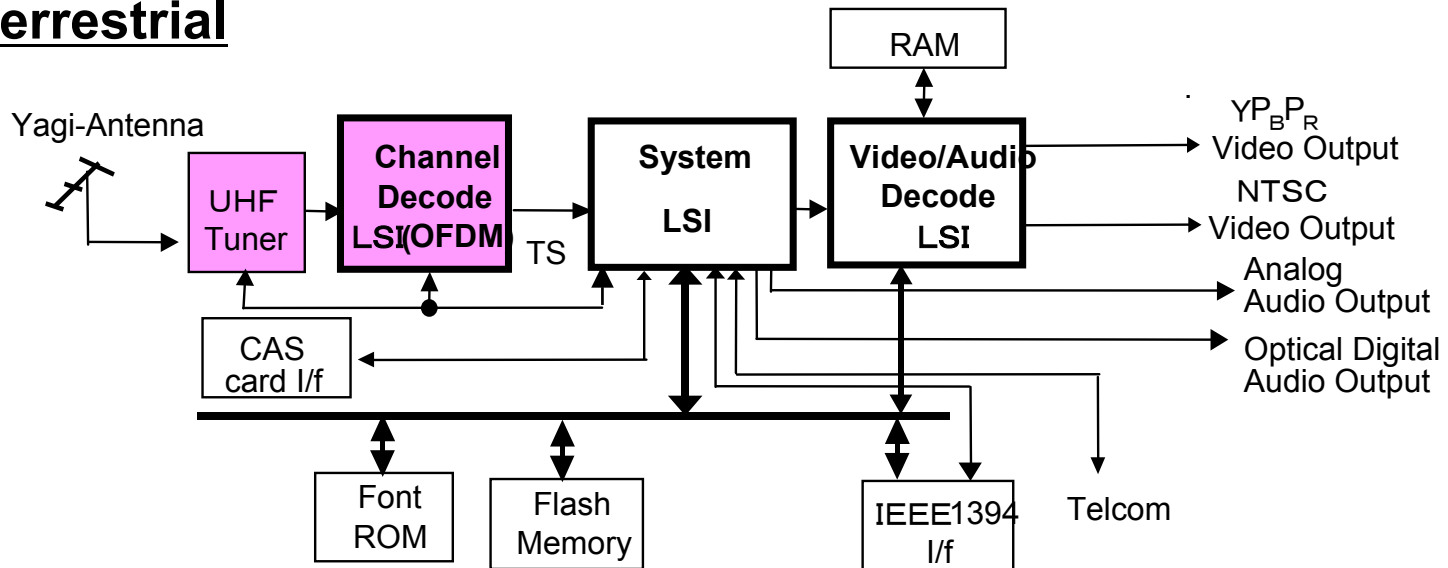
- OLED(Organic Light Emitting Diode)
 - Expected as next generation display
 - Self-luminous
 - Low power consumption
 - Wide-angle vision
 - High switching-speed
 - Possibility of low-price panel
 - Eastman Kodak and Sanyo developed 15” full-color OLED panel last year.
- FED(Field Emission Display)
 - Basic principle is same with CRT
 - Economical advantages for display over 30”
 - Development of cold-cathode is one of key factors

Block Diagram of ISDB-S and ISDB-T

ISDB - Satellite



ISDB - Terrestrial

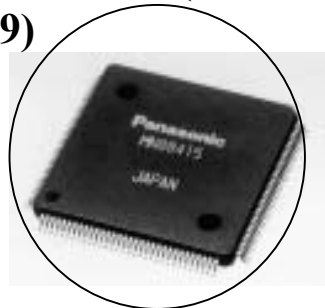


Key Technology for DTV Systems

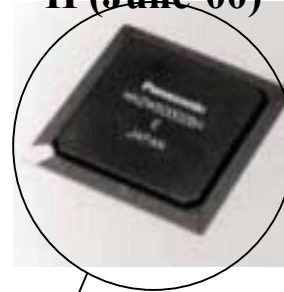
BS-Tuner
QF20(July'00)



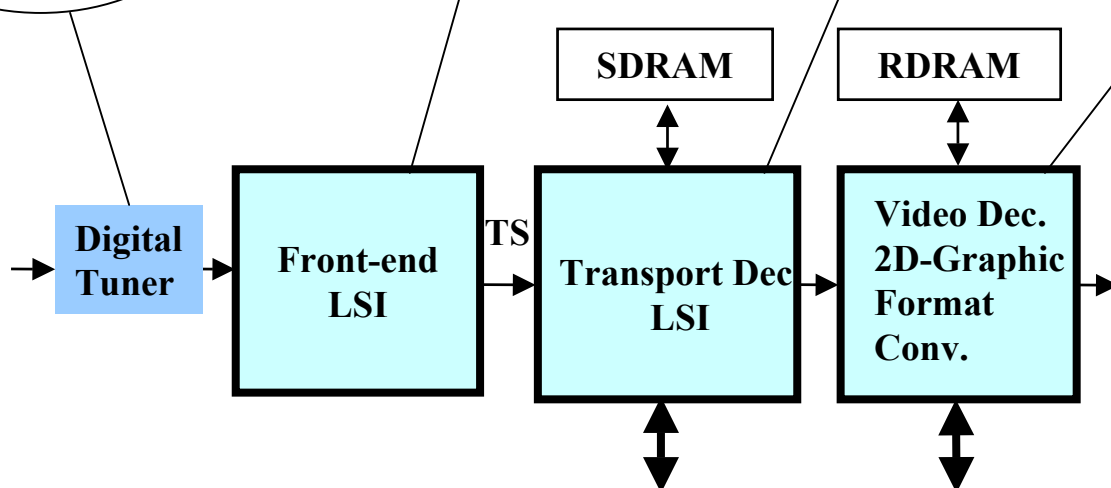
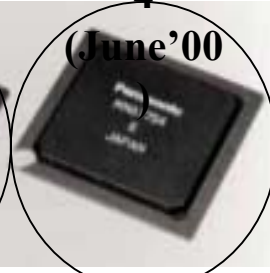
MN88415(June'99)



MN2WS0002B
H (June'00)



MN6775
4 (June'00)

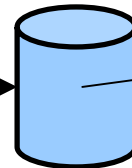


News Release
(May'00)
Core Software PiE-OS Operating System for DTV

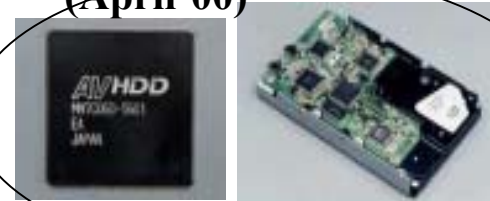
MN864602(Jun'01)



IEEE1394
I/F



News Release
(April'00)



Toshiba Launched the Sale of New TV Sets

- Four tuners (ISDB-T, ISDB-S for BS, ISDB-S for CS110, Analog terrestrial) are installed.
- Equips LAN terminal for interactive TV
- Upgraded software can be installed by a customer .

Sep. 2003

Feb. 2004



PDP type



LCD Type

Panasonic Launched the Sale of New TV Sets on Sep. 1

- Three types: TH-36D50 (36"), and TH-32D50(32") and TH-28D50 (28")
- Four tuners (ISDB-T, ISDB-S for BS, ISDB-S for CS110, Analog terrestrial) are installed.
- Equips LAN terminal (10BASE-T) for **Tnavi**.
- Browser for **Tnavi** is installed.
- EPG for all tuners is installed.



<http://www.sanyo.co.jp/koho/hypertext4/0308news-j/0806-2.html>

Sharp Launched the Sales of New LCD TV Sets on July 9

- **LC-37AD1 and LC-37AD2**
 - 37" LCD display
 - For HDTV (1366 X 768 pix)
 - Separated tuner (NTSC analog, ISDB-S and ISDB-T)
- **LC-30AD1 and LC-30AD2**
 - 30" LCD display
 - For HDTV (1280 X 768 pix)
 - Display is provided with tuner
- **LC-22AA1**
 - 22" LCD display
 - For wide TV (854 X 480 pix)



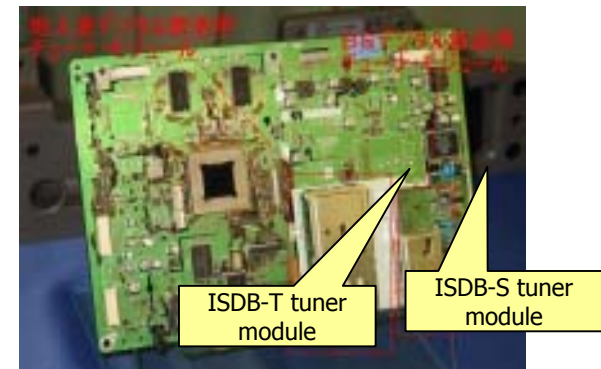
(左)LC-22AA1 < 中 > LC-30AD1 < 右 > LC-37AD1
※LC-37AD1に標準装備のチューナー部は掲載されていません。

Installed Video processing Board

LC-37AD1 and LC-30AD1



LC-37AD2 and LC-30AD2



Sanyo Announced the sales of New TV Sets

Aug 6

- PDP(42", 37") and LCD (30")
- Four tuners (ISDB-T, ISDB-S for BS, ISDB-S for CS110, Analog terrestrial) are installed.
- Pixel
 - PDP 1024 X 1024
 - LCD 1280 X 768
- Sanyo will launch the sales on Oct. 2003



<http://www.sanyo.co.jp/koho/hypertext4/0308news-j/0806-2.html>

Panasonic Launched the Sale of ISDB-T STB by Subscription

- Customers who have or will buy Panasonic TV set can buy it.
- This STB is able to be connected to only Panasonic TV set.
- For ISDB-T and ISDB-S(BS and 110 CS)
- The list price is open.

Jun. 2004



地上・BS・110度CSデジタルハイビジョンチューナー
TU-MHD500
(2003年8月 松下電器)

Sony announced ISDB-T STB

Aug 7

- For ISDB-T and ISDB-S (BS +CS110)
- Though open-priced, the STB is likely to be sold for about 600\$.
- Sony will launch the delivery on October 21.



SONY announced all in one type LCD TV

Jan. 2004

- Analog, Digital Satellite(BS/110 CS) & Digital Terrestrial
- LCD Display
- High Quality Sound



VEGA series

NEC announced new Desk Top PC

- DTTB receiver function is equipped
- Large HDD for Video recording is also equipped
- Support Inter-net ,and bi-directional entertainment
- Wide screen (23")

Jan. 2004



Thank you!
For your attention

Digital Broadcasting Expert Group

<http://www.dibeg.org>