

Digital TV Broadcasting in Japan

12th. Mar. 2008

Koji TODA

Broadcasting Technology Division,
Ministry of Internal Affairs and
Communications Japan

- **Digitization of Terrestrial TV broadcasting.**
- **Advanced Features of Japan's Digital Terrestrial TV Broadcasting System (named ISDB-T).**
- **Implementing Schemes for Expanding Digital Terrestrial TV in Japan.**
- **Special Advantages of Japan's System for Mobile Reception.**
- **Summaries.**

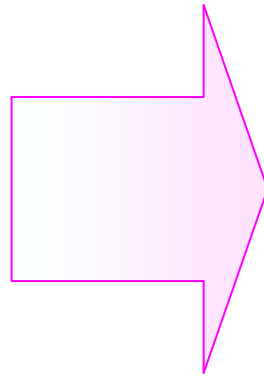
Digitization of Terrestrial TV broadcasting



1. High information capacity broadcasting



Analog TV



...



Multi-channel SDTV

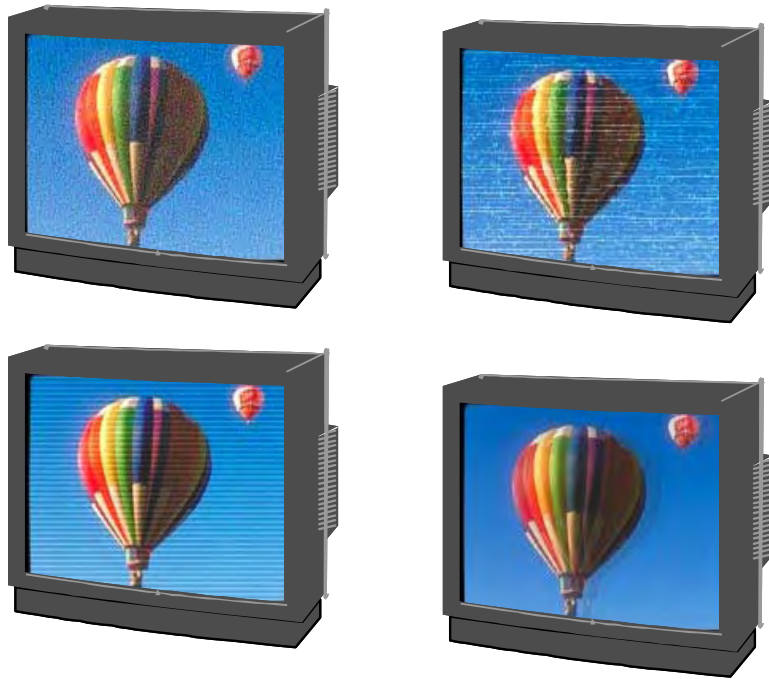


HDTV



2. Robustness

Analog TV



Ghost and Noise

Digital TV



High quality image and sound



3. High functionality

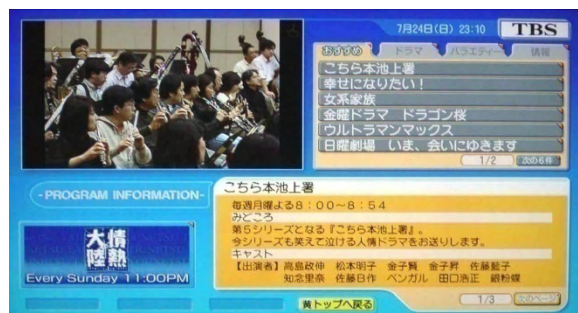
Data Broadcasting



Weather forecast



News



Information linked to on-air program

Interactive TV, e.g. interactive shopping

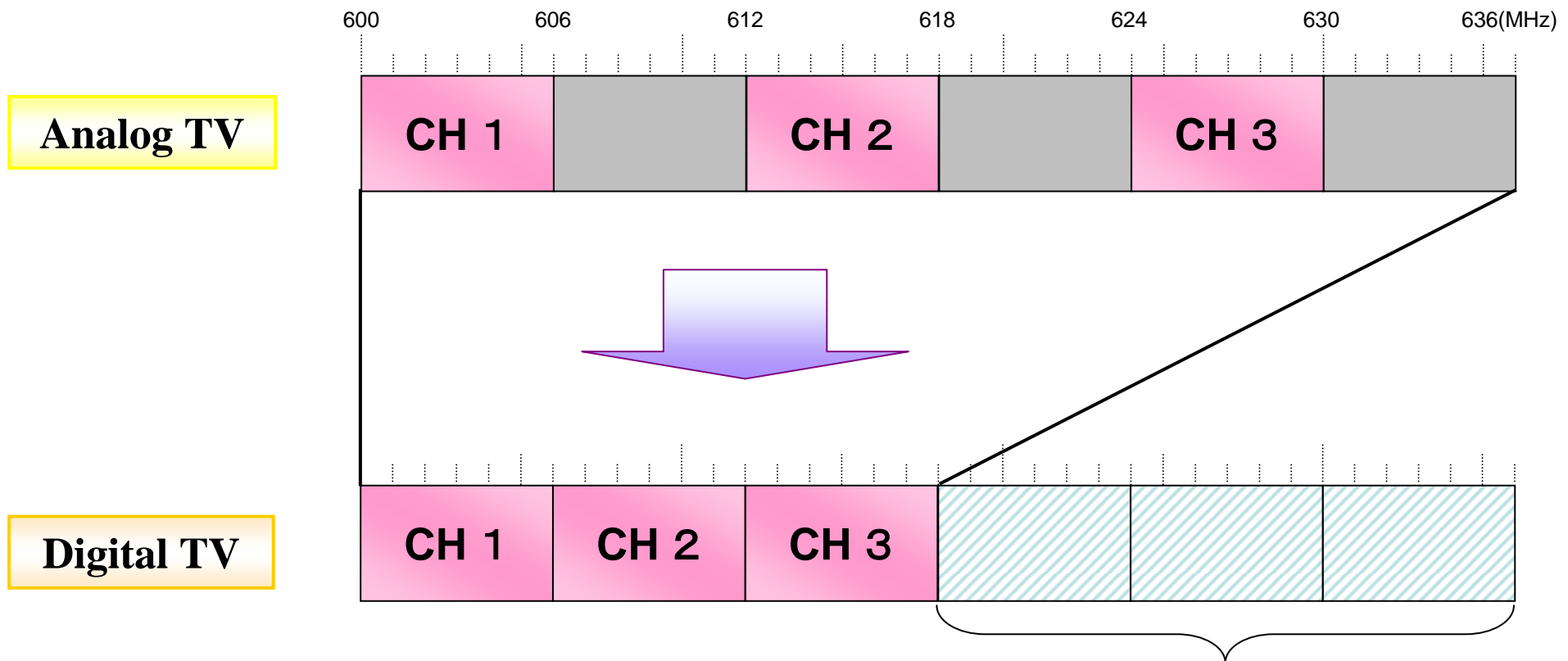


You can see the products and you can buy them directly.



4. Efficient use of radio frequencies

Frequency (UHF)



Another system can use this bandwidth.

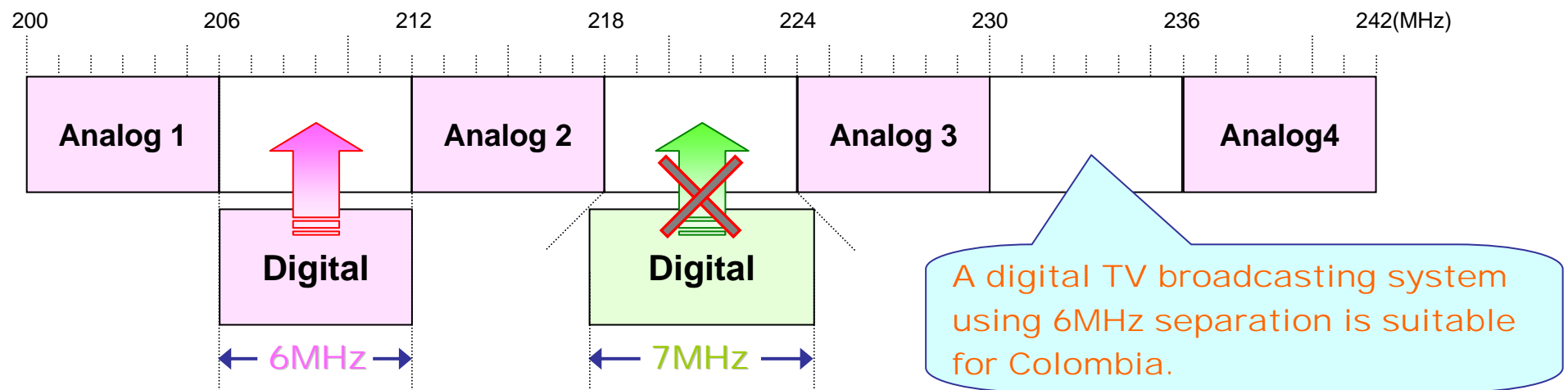


TV Channel Separation 2

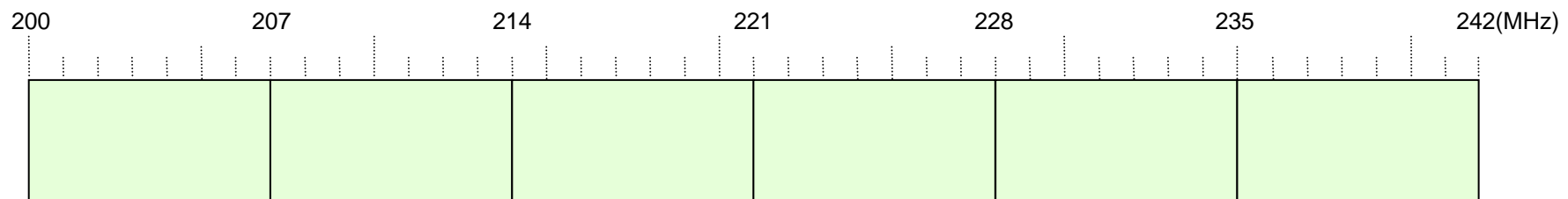


- The analog TV broadcasting system of Venezuela is M / NTSC.
- The bandwidth of one analog TV channel in Colombia is 6MHz.

6MHz Separation : South American countries, Japan, USA, Philippines etc.

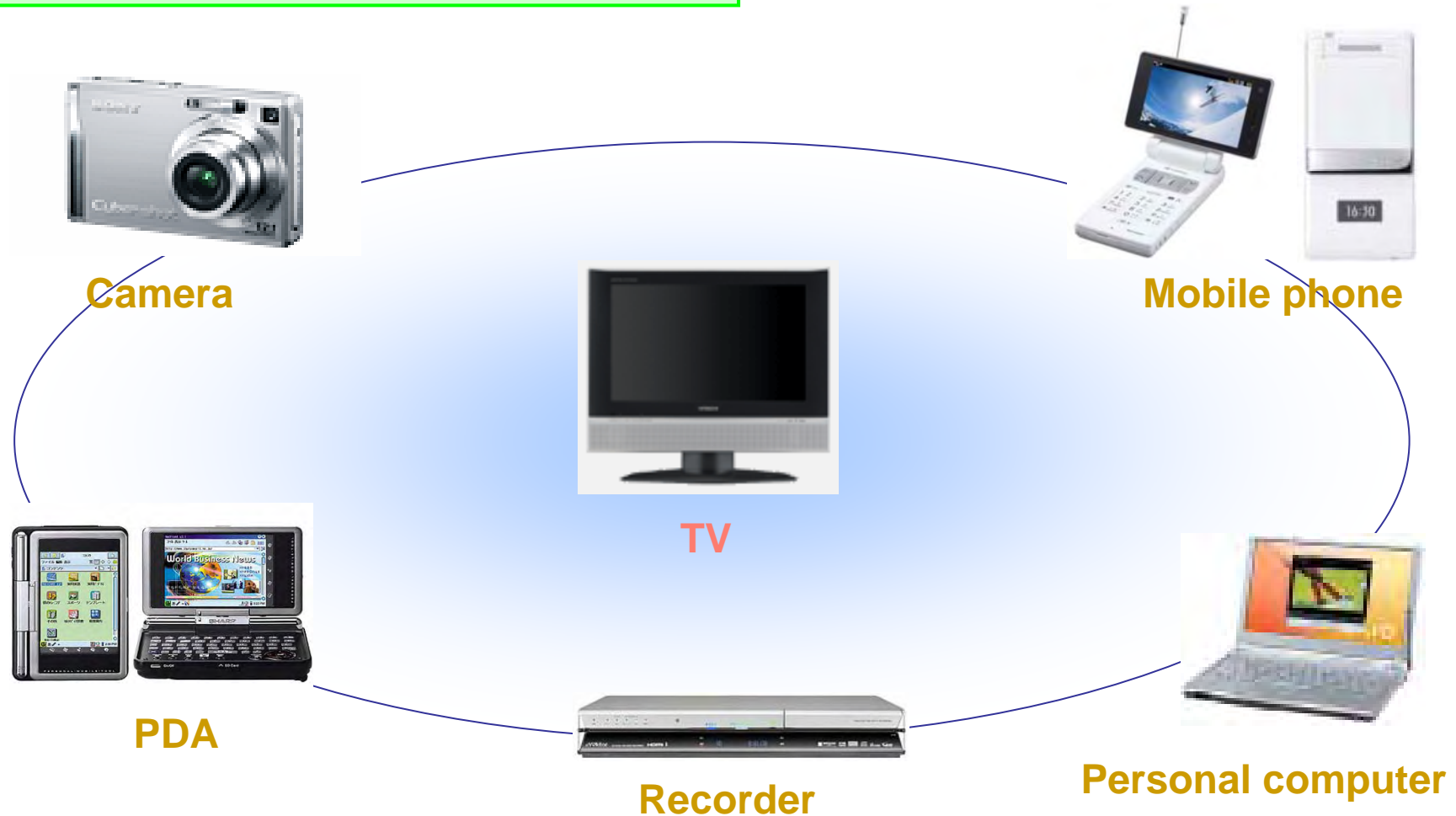


7MHz Separation : Europe (DVB-T) etc.





5. Affinities with other ICTs

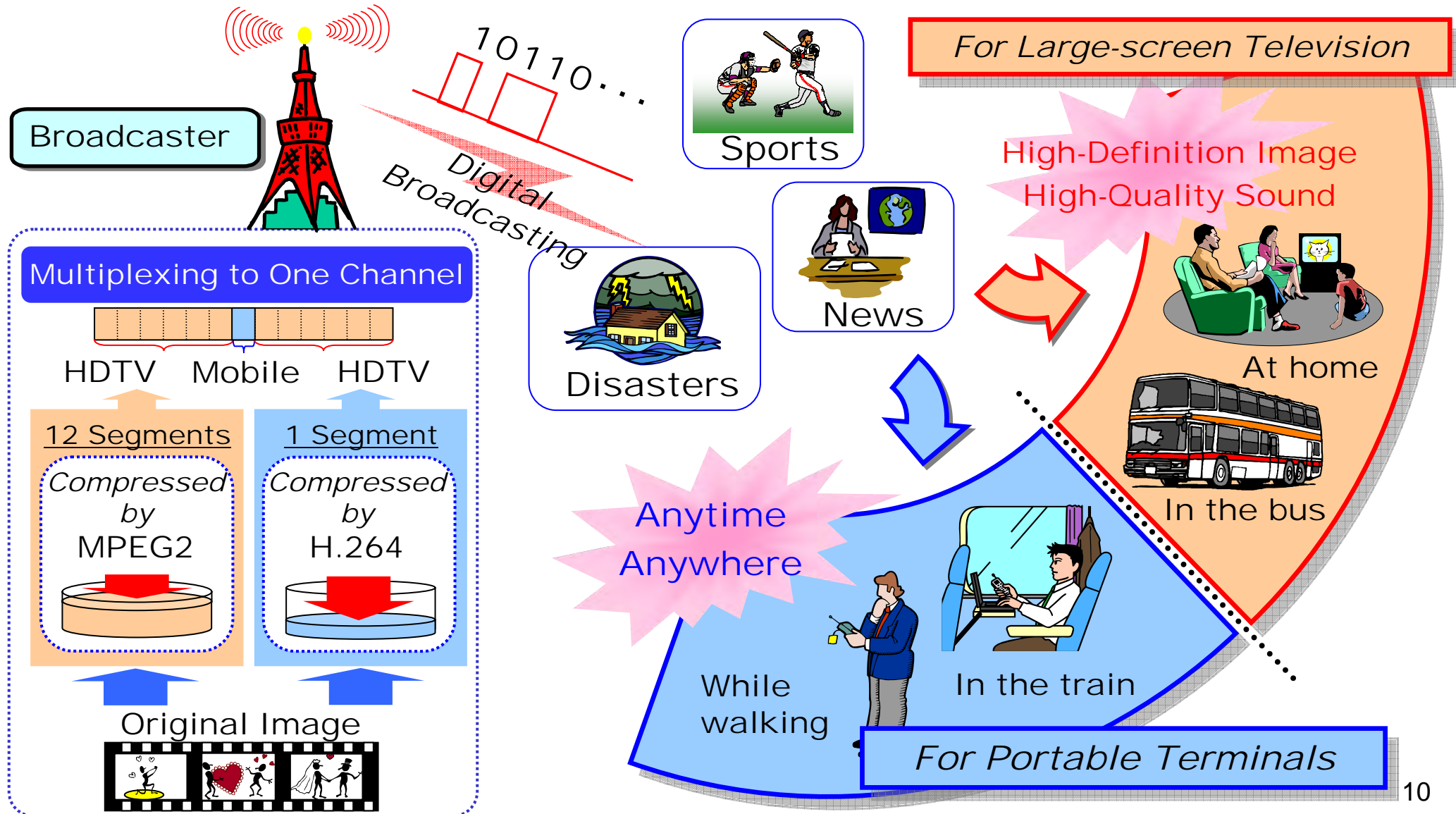


All other ICT products are digitized.

Advanced Features of Japans' Digital Terrestrial TV Broadcasting System (named ISDB-T)



HDTV, Mobile Reception, and Data (Multimedia) Broadcasting are necessary for Next Generation Broadcasting.





Features of ISDB-T



HDTV



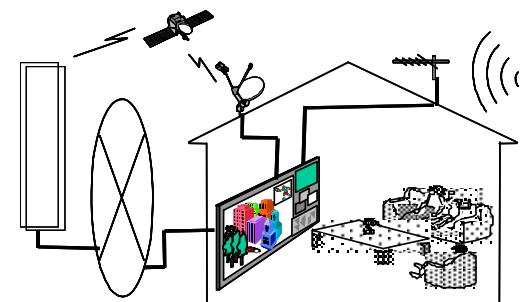
High quality image and sound service

Multi-Channel Service



Realization of multi-SDTV program service on 1ch bandwidth (6MHz)

Interactive TV



Communication linked services with TV

High quality image



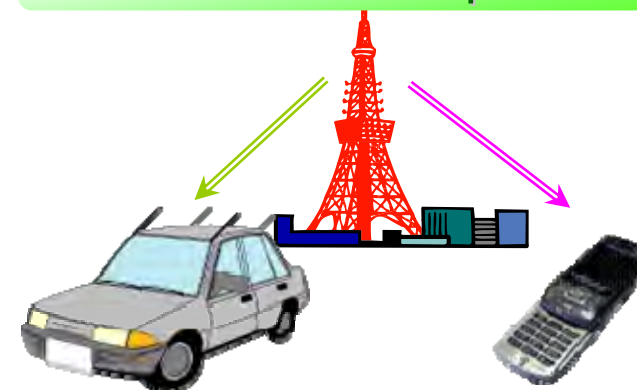
High Robustness to ghost image interference

Data Broadcasting



Simple retrieval of program and information at any time

Mobile Reception

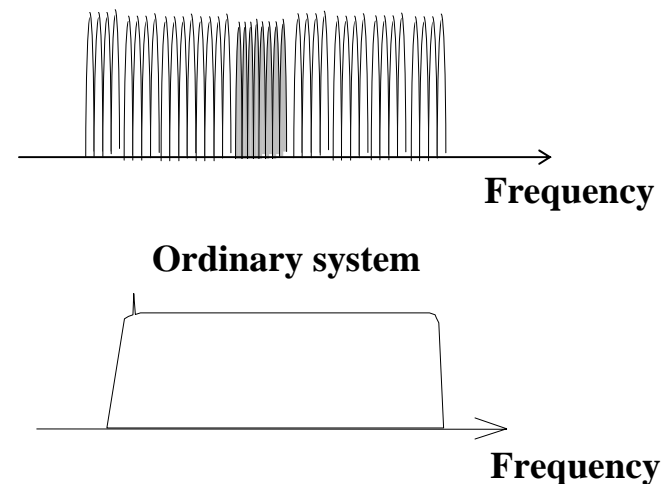
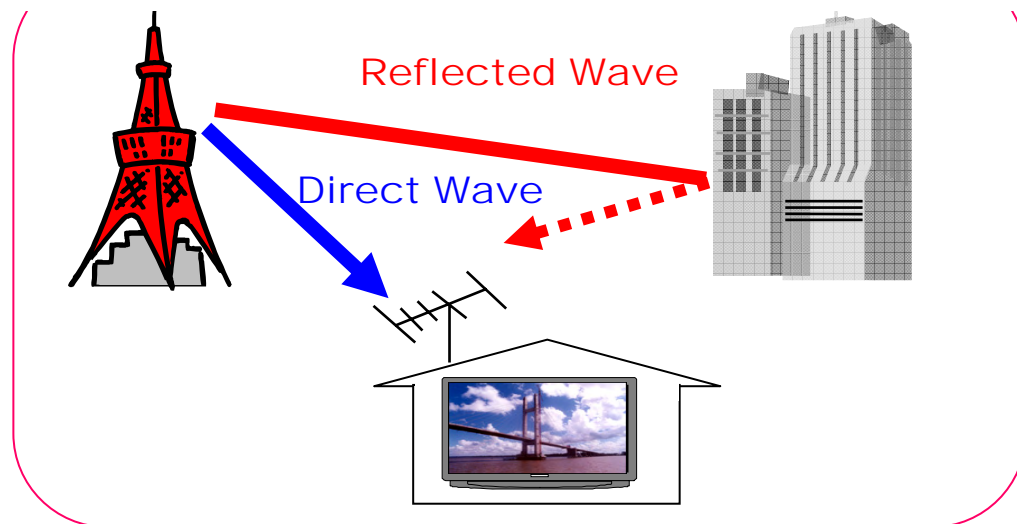


TV service to In-car DTTB Receiver and cell-phone

Technical Features of ISDB-T ① & ② *mic*

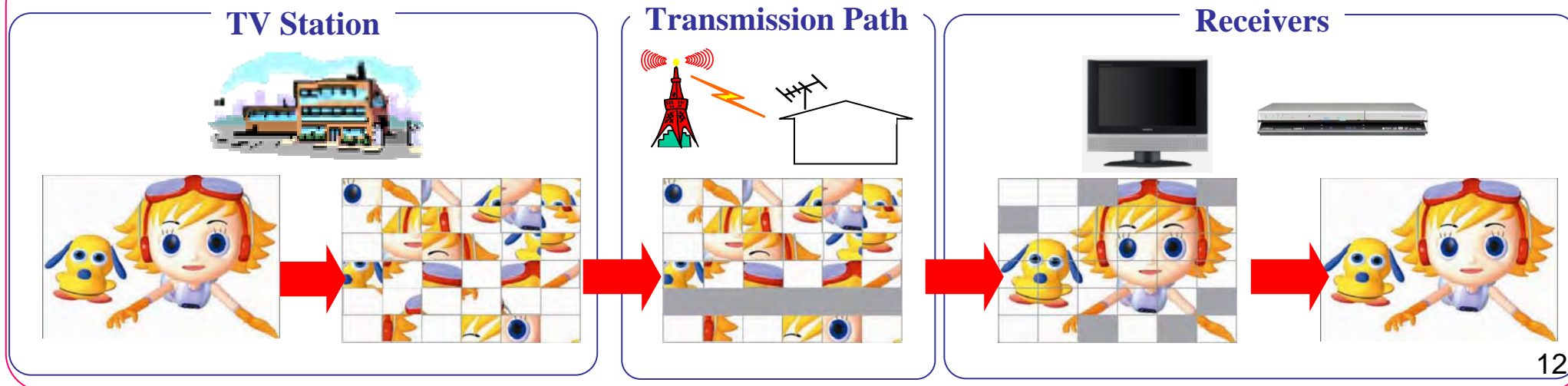
① Robustness to Radio Interference by Multi Path. Because of OFDM system is adopted .

OFDM: Orthogonal Frequency Division Multiplex



Stability of reception for mobile HDTV reception !

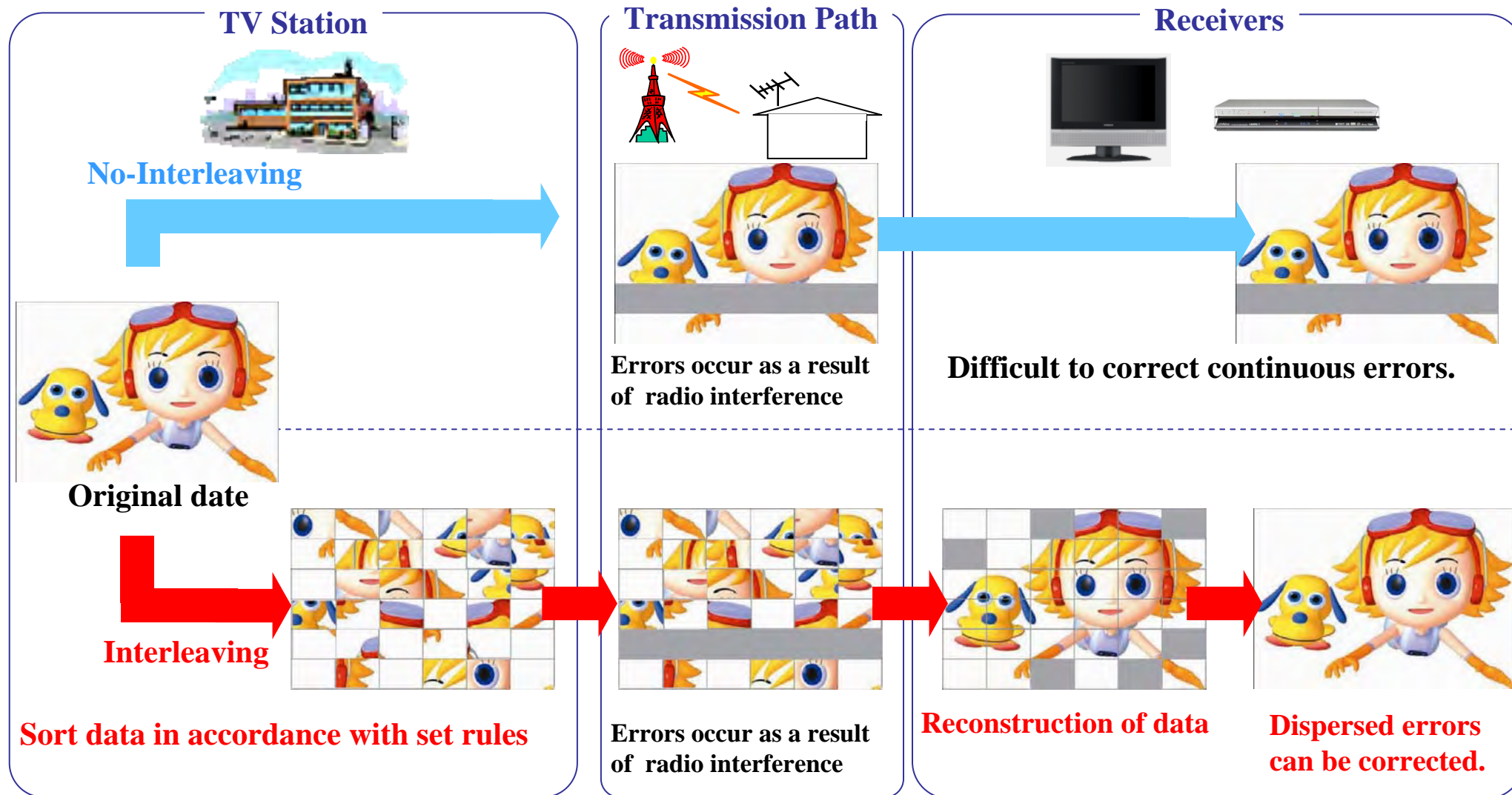
② Frequency and Time Interleaving





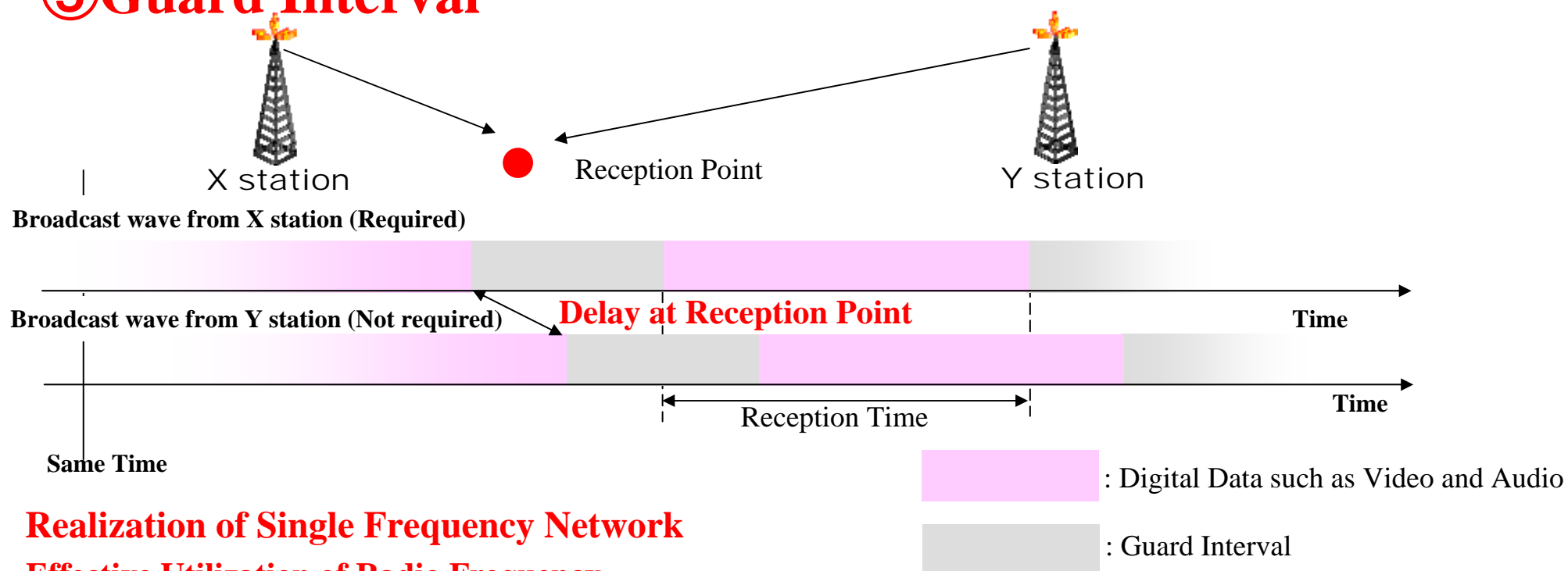
[Reference]

Comparison of Interleaving and No-Interleaving





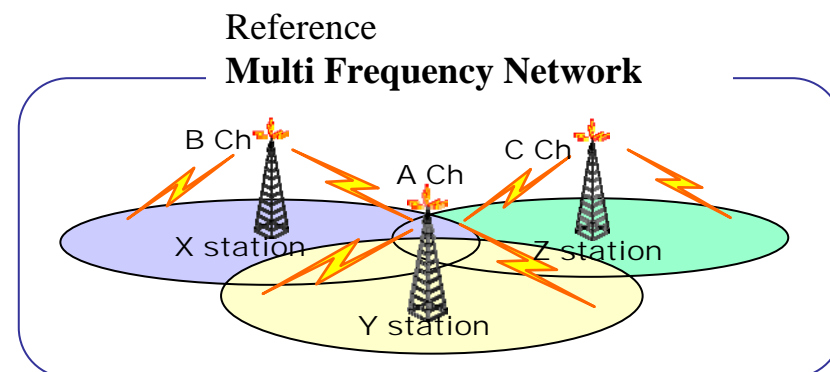
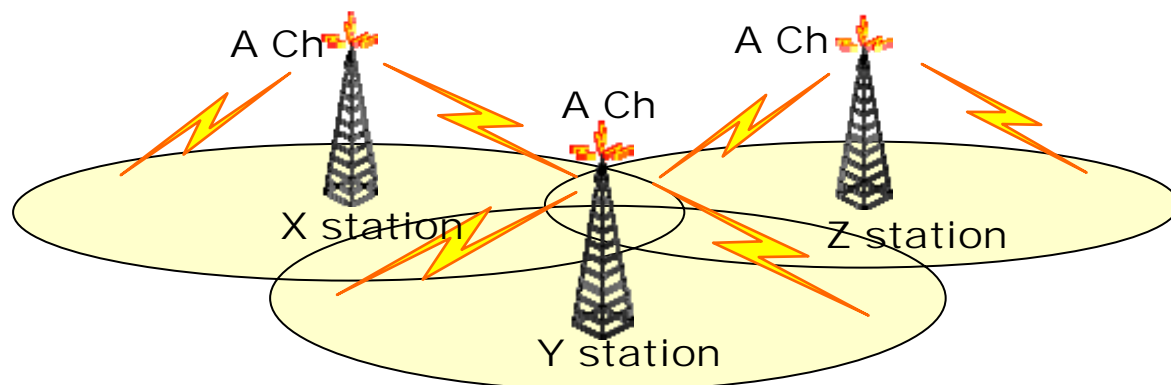
③ Guard Interval



Realization of Single Frequency Network

Effective Utilization of Radio Frequency

Over 10,000 stations can be set up using 40 Ch in Japan

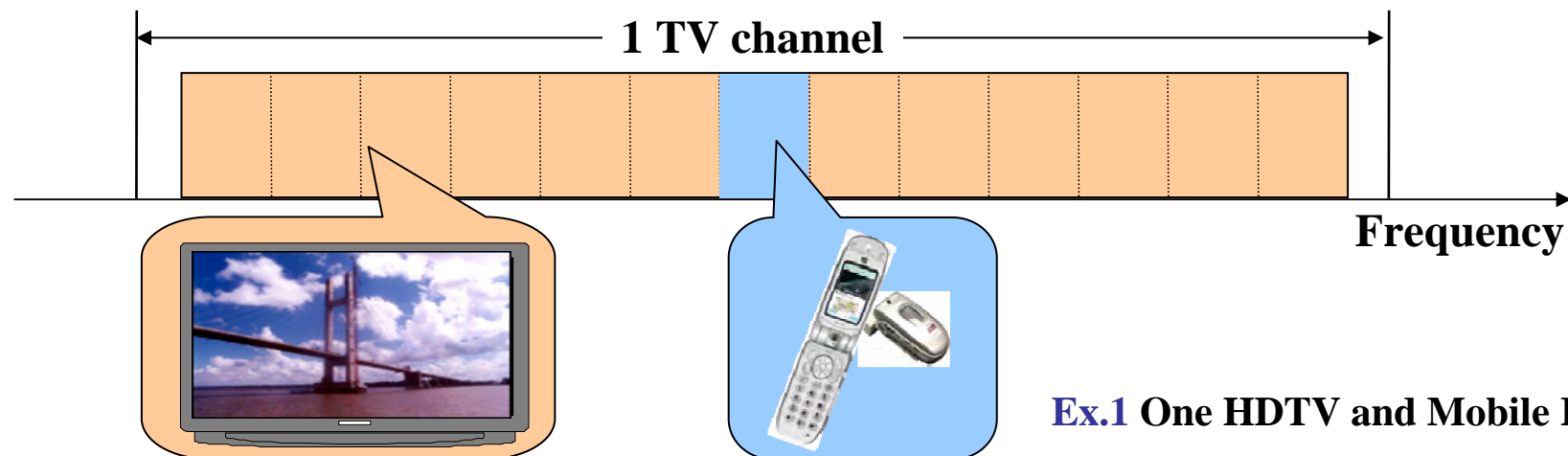




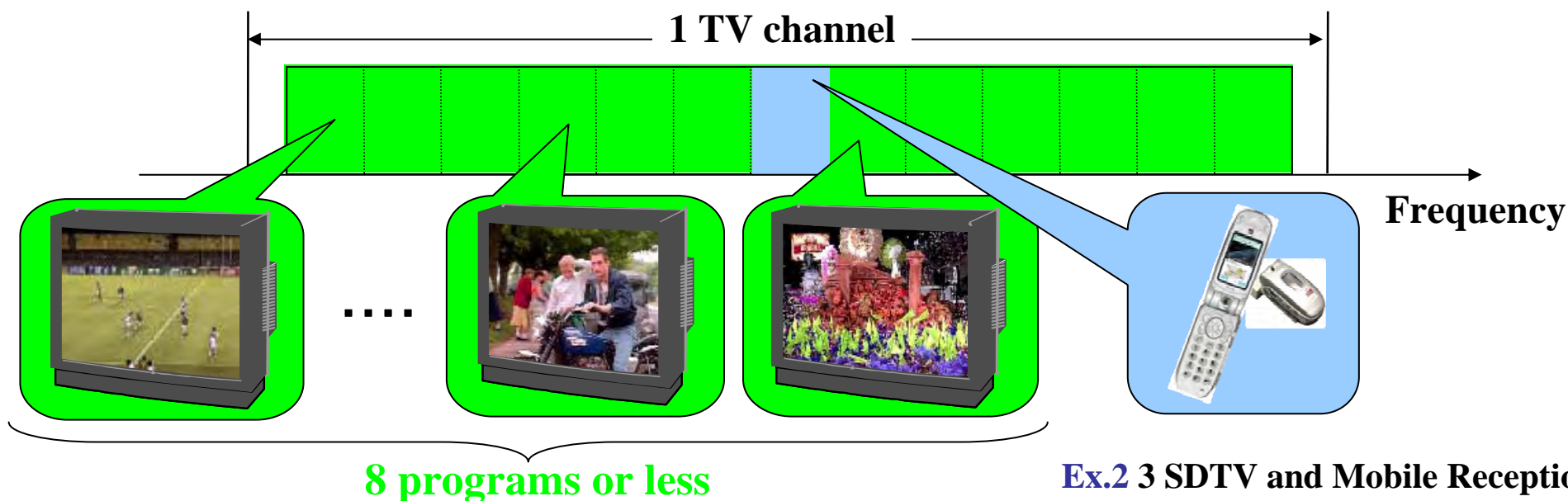
Technical Features of ISDB-T ④



④ Segmented Frequency



Ex.1 One HDTV and Mobile Reception.



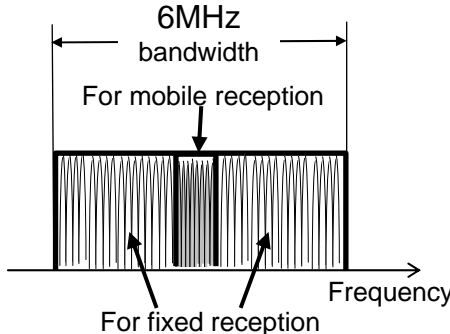
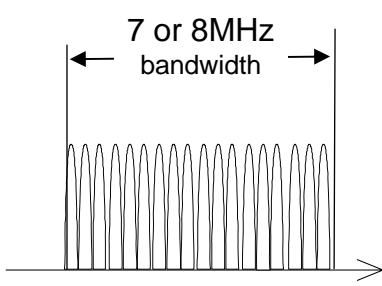
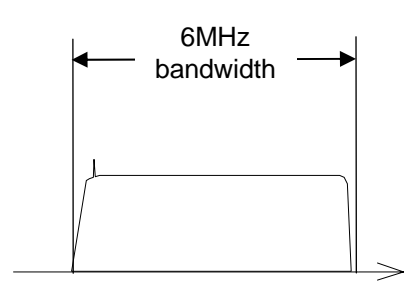
Ex.2 3 SDTV and Mobile Reception.

The segmented frequency structure is unique system of ISDB-T.



Comparison of Three DTTB Systems



System Features	Japan (ISDB-T)	EU (DVB-T)	U.S. (ATSC)
Transmission system	 <p>6MHz bandwidth For mobile reception For fixed reception Frequency</p> <p>It is possible to designate the modulation system of the segment group unit according to the service purpose.</p>	 <p>7 or 8MHz bandwidth</p>	 <p>6MHz bandwidth</p> <p>Improved system based on analog TV broadcasting system.</p>
HDTV reception while moving	possible	impossible (only SDTV)	impossible
Portable reception using the same system as fixed reception	possible	impossible	impossible
Emergency Warning Broadcasting System	possible	impossible	impossible



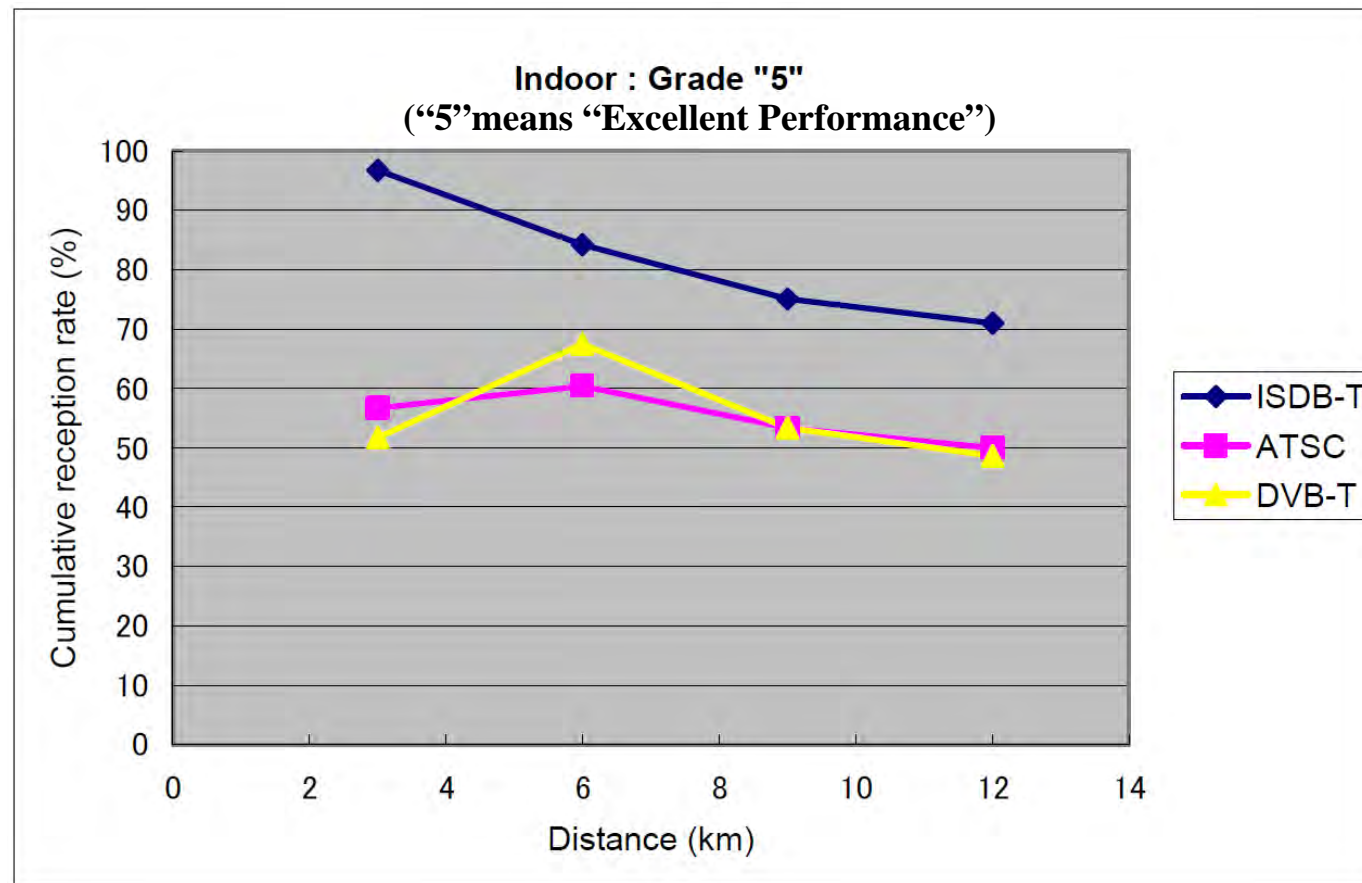
This table shows that ISDB-T is only system enables to watch TV in place where radio wave is weak such as fringe of service area or behind buildings.

Measurement Place	Distance & Reception		Surroundings
	22 km, weak field strength, Behind mountains, Reflection & diffraction		Middle traffic
System	ISDB-T	DVB-T	ATSC
Yagi antenna	5	3+	2+
Impulse noise	5	1	1
Vehicle noise	5	1	1



In the case of ISDB-T, the ratio of the points having value of “5” within 12 km of the transmitter is more than 70%, but the other two systems do not have this ratio of 70% even within 3km of the transmitter.

This fact shows that ISDB-T is definitely superior to the other two systems as a terrestrial digital broadcasting system.





Experiment of field mobile in Brazil

Standard	Parameter				Transmission Rate (Mbps)	Errors (Times)
	Modulation	Convolution	Guard Length	Carrier		
ISDB-T	16QAM	2/3	1/16	2k	11.45	0
	64QAM	2/3	1/16	2k	17.18	6
	16QAM	2/3	1/16	4k	11.45	0
DVB-T	QPSK	1/2	1/16	2k	4.39	1
	QPSK	2/3	1/16	2k	5.85	Many
	QPSK	1/2	1/32	8k	4.52	Many
ATSC	8VSB				19.39	Out of measurement



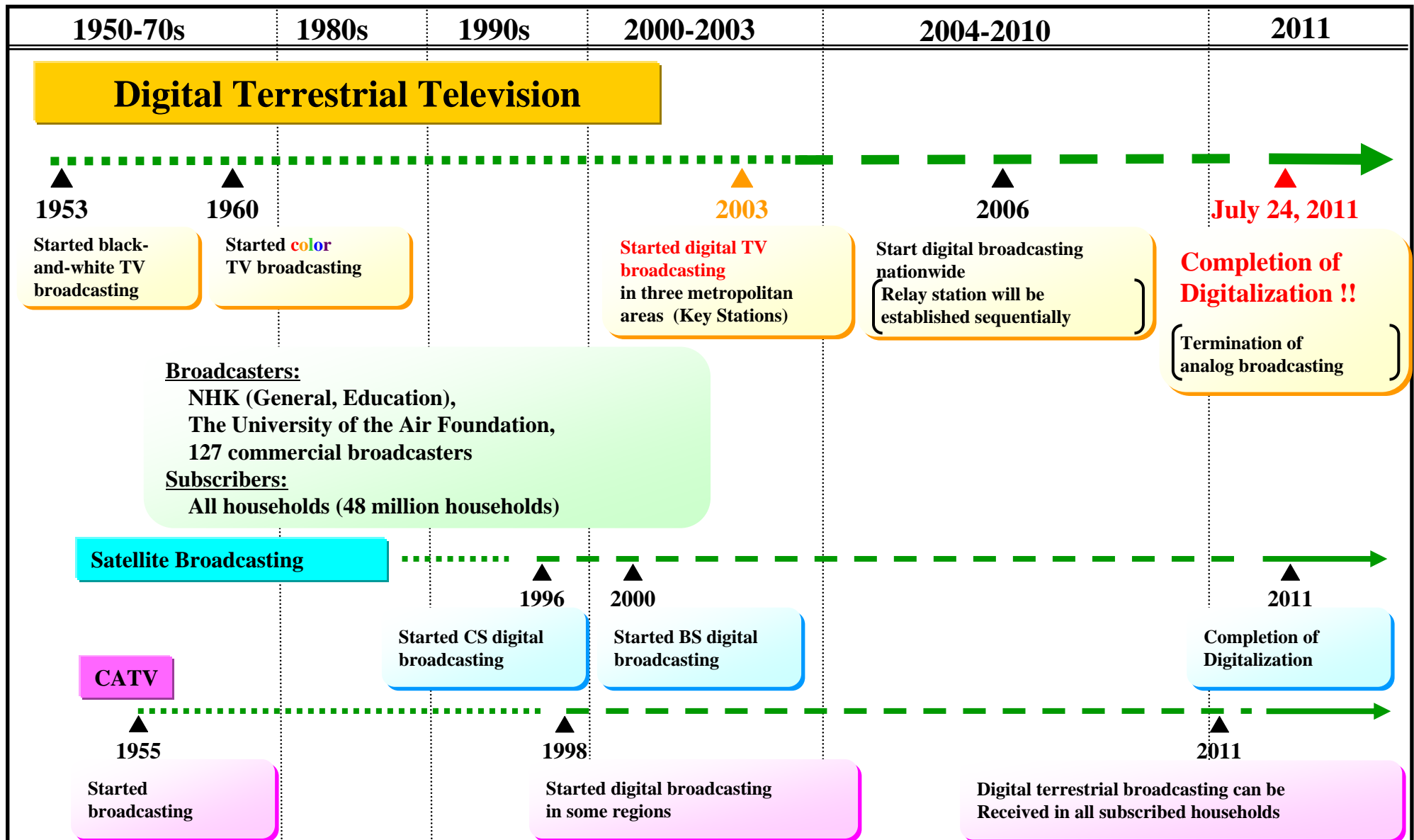
Reason for adopting ISDB-T in Brazil

- Brazil confirmed the advantage of ISDB-T by fair technical tests.**
- ISDB-T has the highest robustness to interference and can provide a mobile reception service.**
- Only ISDB-T can provide stationary and mobile reception services using the same TV channels and transmitters.**
- The channel separation of Brazil is 6MHz.**

Implementing Schemes for Expanding DTTB in Japan



Schedule for Digitalization of Broadcasting in Japan





Expansion Schedule for DTTB in Japan



 already started by Dec. 2004

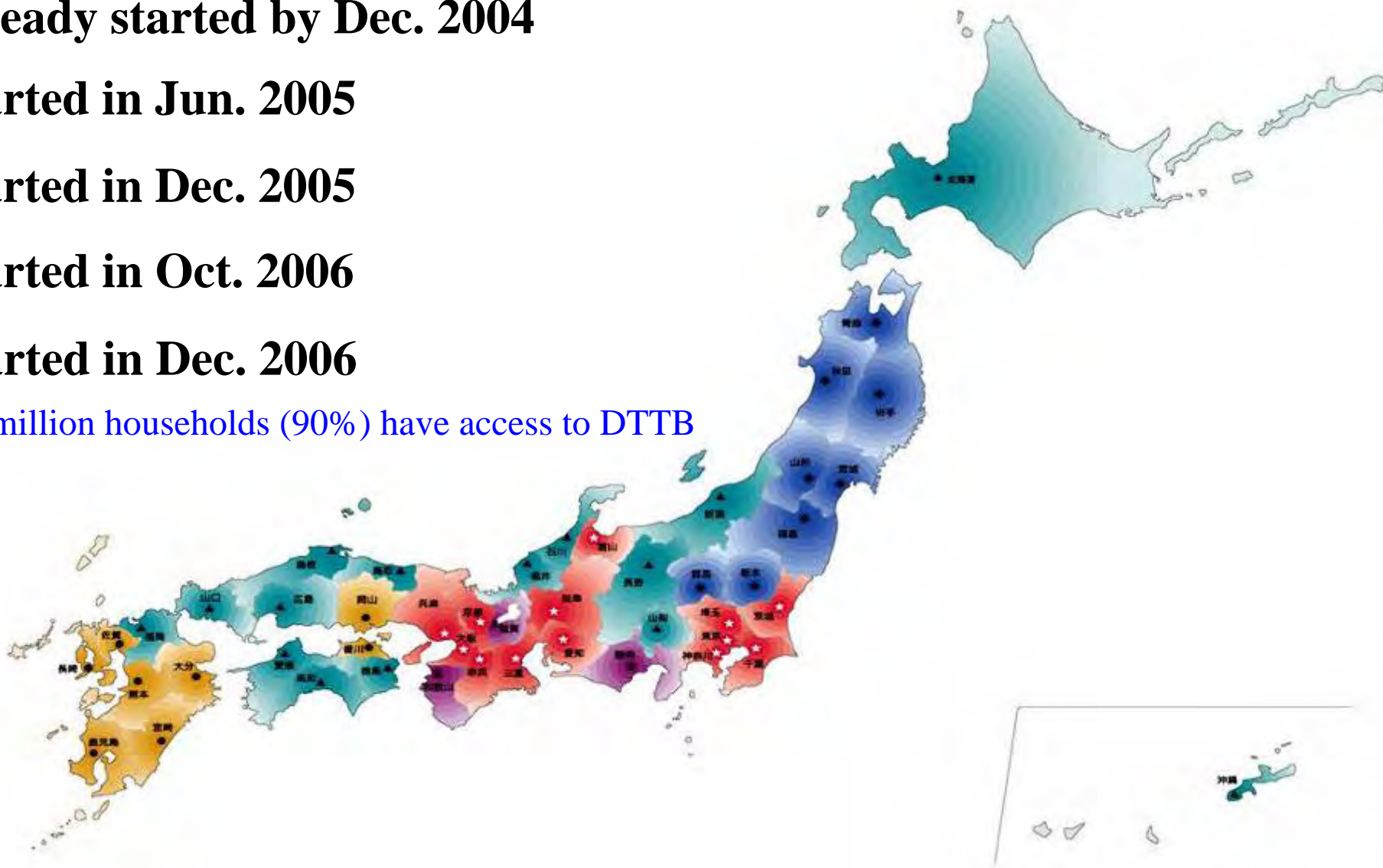
 started in Jun. 2005

 started in Dec. 2005

 started in Oct. 2006

 started in Dec. 2006

Over 40 million households (90%) have access to DTTB





Diffusion of Digital Broadcasting Receivers



Digital Terrestrial Broadcasting Receiver Shipments

31,425,100

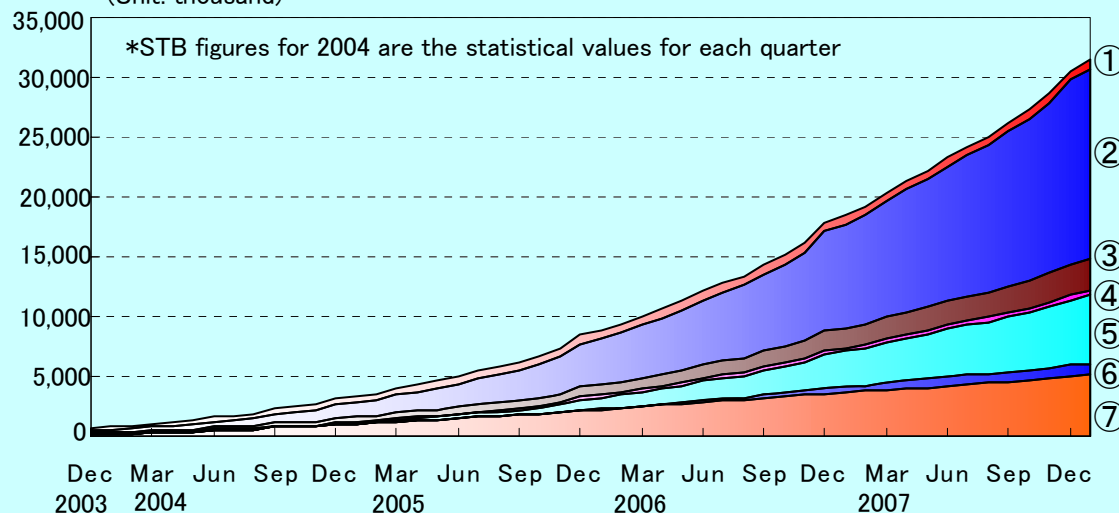
Jan. 2008

Source: Japan Electronics and Information Technology association (JEITA), Japan Cable Laboratory

(Unit: thousand)

① CRT	720 (± 0)
② LCD	15,876 (+430)
③ PDP	2,623 (+ 44)
④ Tuner	430 (+ 9)
⑤ Digital Recorder	5,702 (+211)
⑥ Personal Computer	975 (+ 37)
⑦ CATV STB	5,099 (+118)

(Unit: thousand)



Access to Digital Satellite Broadcasting

34,320,000

Jan. 2008 Source: NHK

Digital Satellite Broadcasting Receiver Shipments

32,830,000

CRT	1,860 (± 0)
PDP & LCD	18,990 (+470)
Tuner (including Digital Recorder)	6,910 (+240)
CATV STB	5,070 (+120)

Access to Digital Satellite Broadcasting using CATV

1,490,000 households

One-Seg Mobile Phone Shipments

20,473,000

Dec. 2007

In-car DTTB Receiver Shipments

1,085,000

Jan. 2008

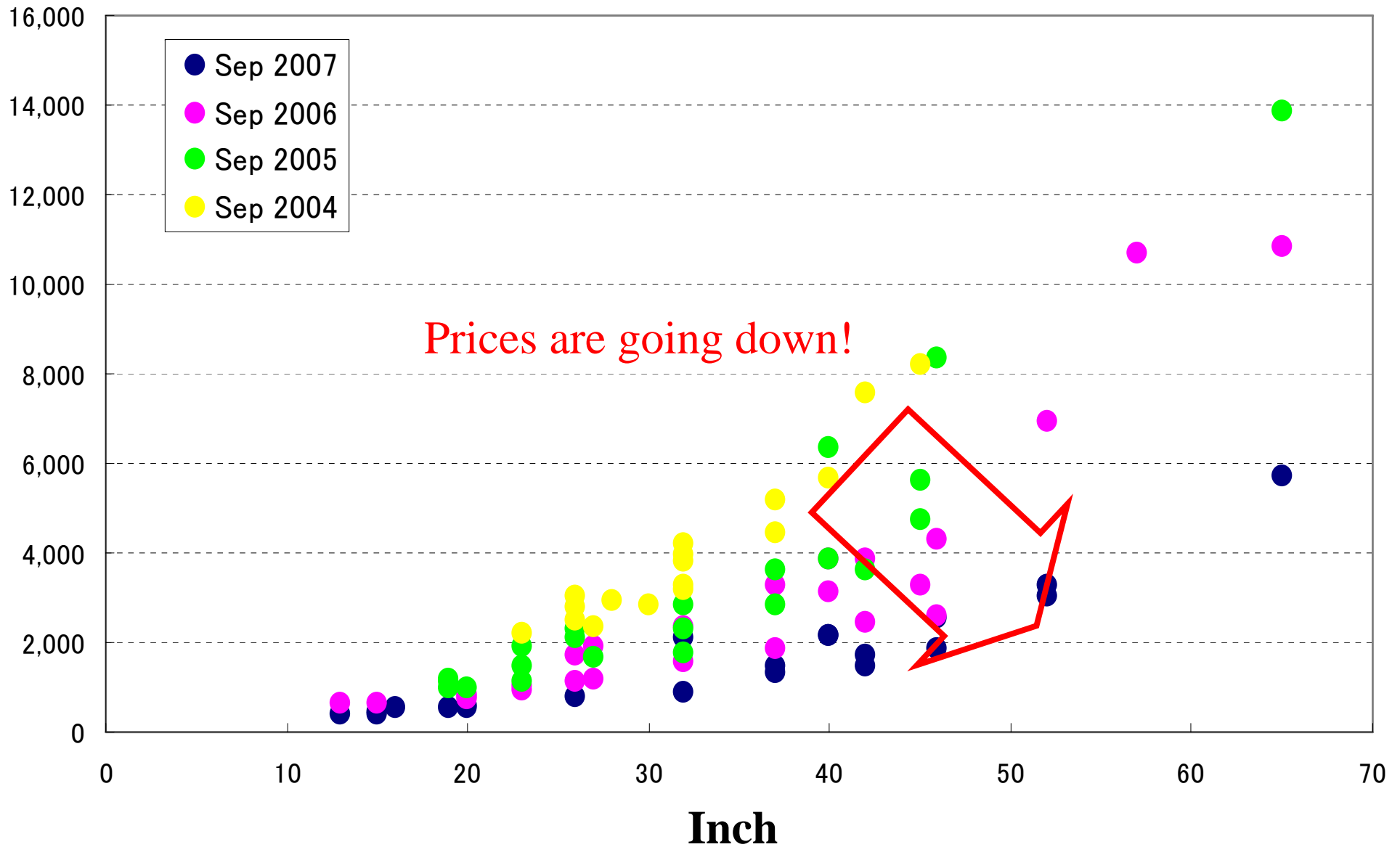
Source: Japan Electronics and Information Technology association (JEITA)



Distribution of LCD Price



Price (U.S.\$)





Varied LCD Digital Receivers



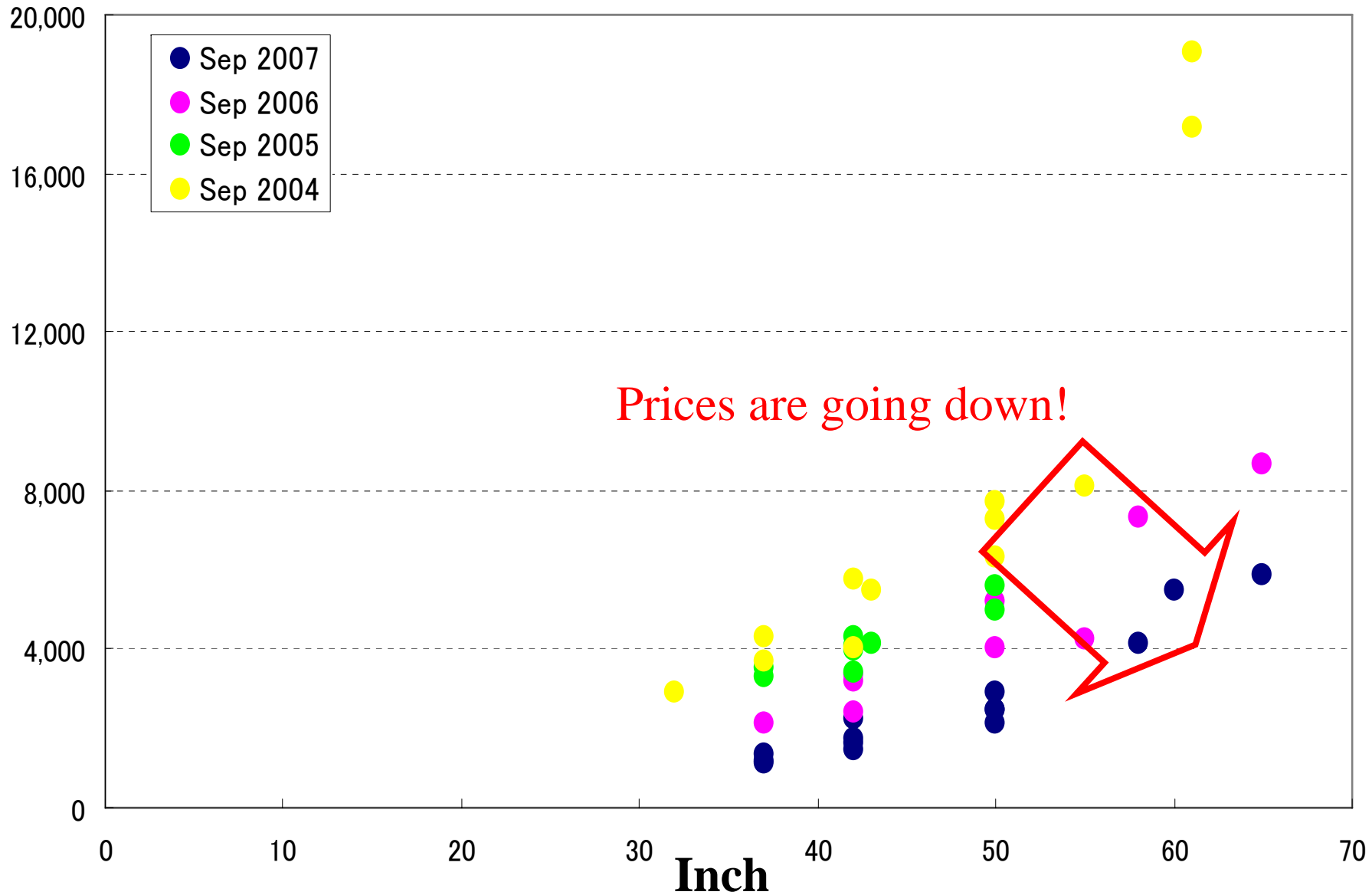
PHOTO	TYPE	PRICE	URL
	ORION LD15V-TD1 (15-inch)	44,850 JPY (≒388 U.S.\$)	http://www.orion-electric.co.jp/jp/products/index.html
	Victor-JVC LT-20LC8-S (20-inch)	59,800 JPY (≒517 U.S.\$)	http://www.jvc-victor.co.jp/tv/lt-20lc8/index.html
	TOSHIBA 37C3500 (37-inch)	135,800 JPY (≒1,175 U.S.\$)	http://www.regza.jp/product/tv/lineup/c3500/concept.html
	SHARP LC-46GX2W (46-inch)	225,800 JPY (≒1,953 U.S.\$)	http://www.sharp.co.jp/aquos/lineup/gx2/index.html



Distribution of PDP Price



Price (U.S.\$)





- **There is no difference in price of the television receivers among DTTB systems.**

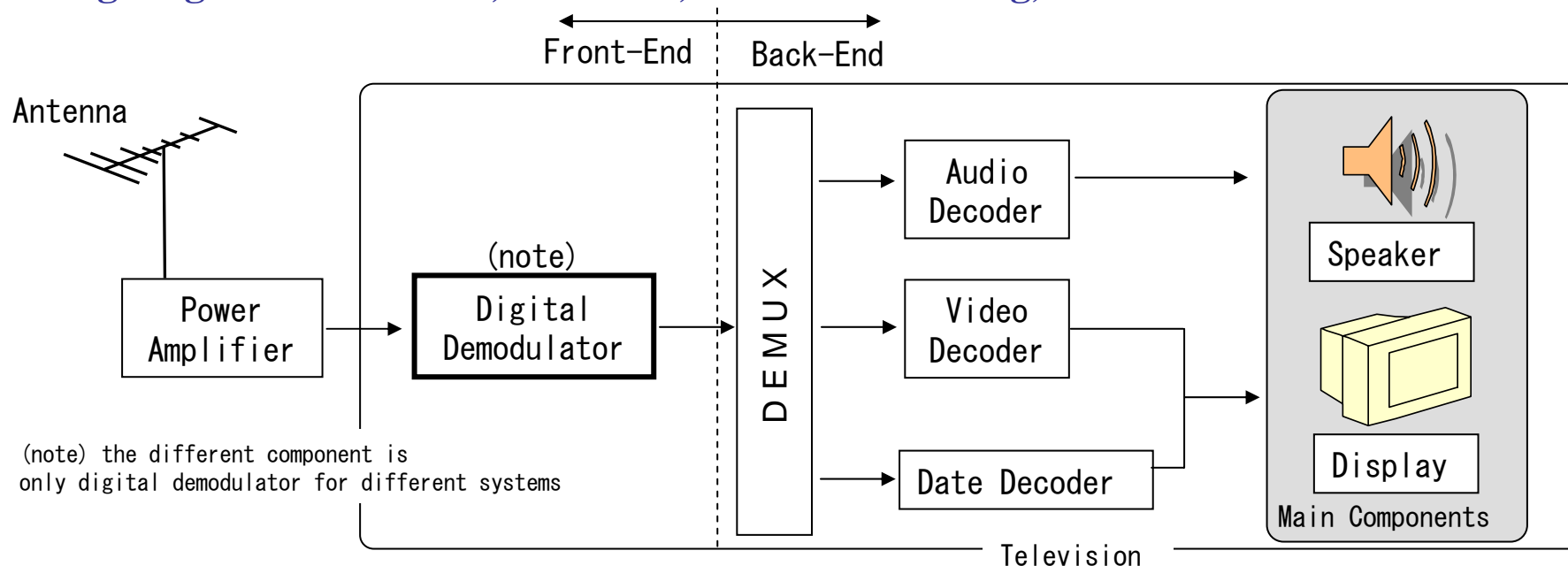
Because almost component of digital television receivers are same.

As for the difference depend on DTTB systems is just modulation part which is negligible against price of TV set.

As proof, price of the television receivers are same among PAL, NTSC and SECAM.

- **Price of the television receivers is depend on functions.**

e.g. High Definition TV, Multi SD, Data broadcasting, interactive function. etc






General Block Diagram of Digital Receivers



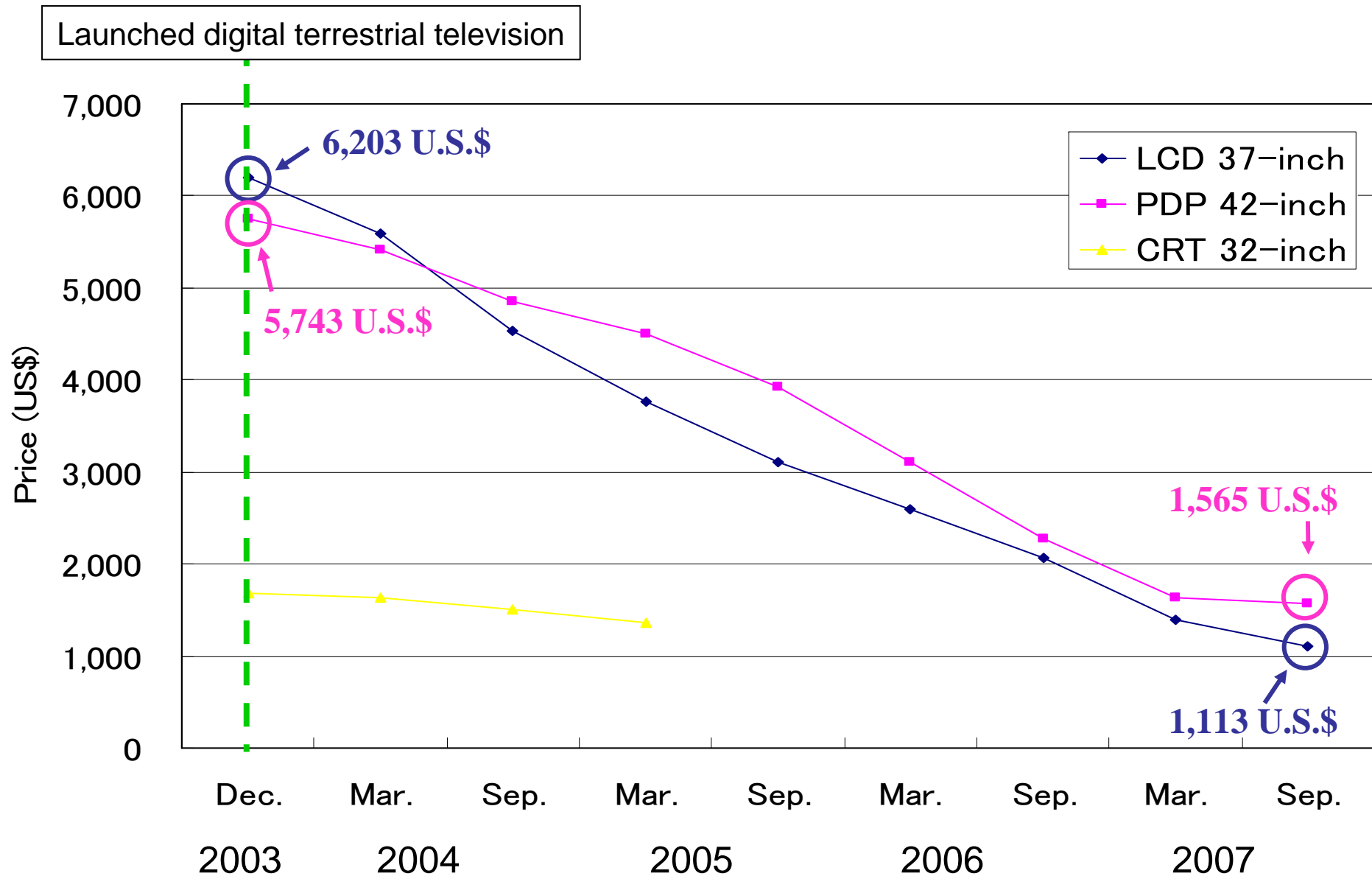
Varied PDP Digital Receivers



PHOTO	TYPE	PRICE	URL
	HITACHI P37-H01 (37-inch)	123,900 JPY (≒ 1,072 U.S.\$)	http://av.hitachi.co.jp/tv/plasma/01/index.html
	bydsign PH-5000DFK (50-inch)	239,800 JPY (≒ 2,074 U.S.\$)	http://www.bydsign.jp/Form/Product/ProductDetail.aspx?shop=0&cat=101&swrd=&pid=PH-5000DFK&vid=
	Panasonic TH-65PZ750SK (65-inch)	719,800 JPY (≒ 6,227 U.S.\$)	http://panasonic.jp/viera/products/pz750/index.html




Change in Price of Major Flat Panel Displays (FPD)





High-Performance Set Top Box







PHOTO	TYPE	PRICE	URL
	Panasonic TU-MHD600	45,800 JPY (≒396 U.S.\$)	http://ctlg.panasonic.jp/product/info.do?pg=04&hb=TU-MHD600
	SONY VGF-DT1	42,987 JPY (≒372 U.S.\$)	http://www.ecat.sony.co.jp/vaio/acc/acc.cfm?PD=26654
	SHARP TU-HD200	28,489 JPY (≒246 U.S.\$)	http://www.uniden.jp/support/manualdl.html
	MASPRO DT400	27,842 JPY (≒241 U.S.\$)	http://www.maspro.co.jp/new_prod/dt400/dt400.html

These products also correspond to BS and CS digital broadcasting services.



Low-Price Set Top Box



PHOTO	TYPE	PRICE	URL
	AVOX YDIT-10	15,213 JPY (≒ 132 U.S.\$)	http://www.c-mex.co.jp/tuner.html
	YAGI DTC10	16,097 JPY (≒ 139 U.S.\$)	http://www.yagi-antenna.co.jp/products/home/tuner/index.html
	MASPRO DT610	17,444 JPY (≒ 151 U.S.\$)	http://www.maspro.co.jp/products/dt610/tokuyto.html
	I-O DATA HVT-ST200	19,300 JPY (≒ 167 U.S.\$)	http://www.iodata.jp/rod/multimedia/tuner/2006/hvt-st200/

The price of STB

Very Low Price and Small STB



This STB is now under developing !

Less than 50 US\$ STB will be on sale next year.



[main spec]

Item		Spec
Signal output	Video Audio	Video; Standard Definition Audio; (L, R) two devices (close-captioned)
Frequency band		VHF and UHF
Electric power		21W
Size		H100 × W25 × D131 (mm)





➤ **The National Council for Promotion of Terrestrial Digital Broadcasting
(Broadcasters and MIC)**

- Studying challenges (both institutional and technical) involved in the transition to digital television broadcasting

➤ **The National Conference for Promotion of Terrestrial Digital Broadcasting
(broadcasters, manufactures, electrical appliance shops, consumer
organizations, local governments, MIC, etc.)**

- Updating/revising “Action Plan for Promotion of Digital Broadcasting,” describing items to be implemented by its members and the schedule thereof
- Developing/updating and publicizing “Roadmap of Construction of Broadcasting Stations” with the cooperation of the above mentioned Council
- Driving forward the activities for promoting digital broadcasting by announcing December 1st as “Digital Broadcasting Day”

➤ **The Association for Promotion of Digital Broadcasting (Dpa)
(broadcasters, Manufactures, etc.)**

- Publicizing broadcasting areas
- Responding to questions and inquiries from viewers



- All parties concerned work together based on this action plan. “National Conference on Promoting Terrestrial Digital Broadcasting” (Established in May 2003) promotes this plan. The Conference finalized the “Seventh Action Plan for Promotion of Digital Broadcasting” on December 2006.

Specific efforts by concerned organizations

■ Terrestrial TV Broadcasters

○ Development of a road map for DTTB Stations.

- ① This road map indicates a schedule for the construction of as many DTTB stations as possible , including small scale stations.
This road map shows when access becomes possible and in which areas.
- ② TV broadcasters make sure they can meet this schedule

○ Diffusion and promotion of the unique DTTB service

- ① TV Broadcasters try to increase the ratio of HDTV programs.
- ② Clarification of plans to provide enhanced services, such as a DTTB service for mobile reception.

■ Receiver Manufactures and Shops ..etc

- Promotion of development and diffusion of cheaper, more varied DTTB receivers.
- Response to enhanced services such as DTTB for mobile reception and server-type broadcasting.
- Promotion of development of easy-to-use DTTB receivers for all users.
- Training for shop clerks ..etc

■ Government

- Clarification and publication of specific policy to ensure realization of the road map for DTTB Station and establishment of technical standards that enable swift and easy building of broadcasting stations.
- Publication of accurate information and schedule about DTTB in a way ordinary people can easily understand.

Support by the “Extraordinary Law for Measures to Promote the Construction of Advanced TV Broadcasting Facilities” etc.

- **Preference for the national tax (corporate tax)**
- **Preference for the local tax (fixed property tax, real-estate acquisition tax)**
- **Supply of low- or super-low-interest funds by the Development Bank of Japan**

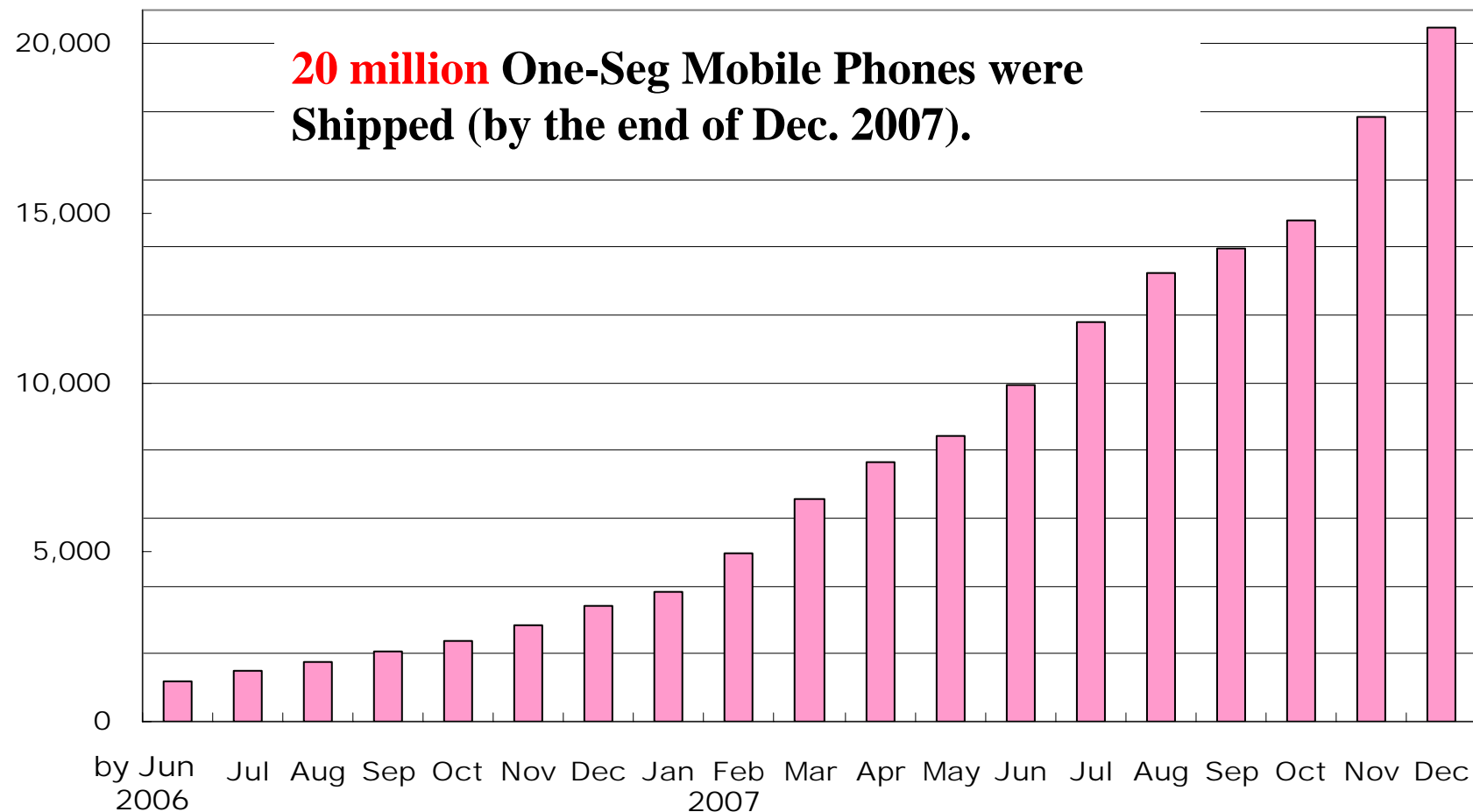
Financial support for the implementation of broadcasting stations in disadvantaged areas

Special Advantages of Japan's System for Mobile Reception



- One-Seg service started in April 2006.
- One-Seg Mobile Phone Shipments have been expanded and reached 1,000,000 for the first time in Jul 2007.

(Unit: thousand)





One-Seg Broadcasting Receivers Introduced to the Market (1/3)



Mobile Phones



W33SA
(Dec 2005)



W41H
(Feb 2006)



W33SA II
(Jun 2006)



W43H
(Sep 2006)



W43SA
(Oct 2006)



W44S
(Dec 2006)
Usable also as digital radio



W43H II
(Jan 2007)



MEDIA SKIN
(Jan 2007)



W51CA
(Jan 2007)



W51K
(Jan 2007)



W51SA
(Jan 2007)



W51SH
(Jan 2007)
Usable also as digital radio



W51T
(Jan 2007)
Usable also as digital radio



W52T
(Jan 2007)
Usable also as digital radio

KDDI



P901iTV
(Mar 2006)



D903iTV
(2007)



P903iTV
(2007)



D903iTV
(Jun 2007)



SH903iTV
(2007)

NTTDoCoMo



905SH
(May 2006)



911SH
(Nov 2006)

SoftBank



One-Seg Broadcasting Receivers Introduced to the Market (2/3)



Personal Computers



VGN-TX91PS, etc.
(from Jan 2006)

Sony



LesanceNB
CL206GW-GT/TV etc
(from Jul 2006)

Aro System



PC Card
(Mar 2006 OEM Supply)

PIXERA



USB connective Tuner
(DH-ONE/U2)
(Oct 2006)

BUFFALO



PC Card
MonsterTV 1D
(Nov 2006)

SKnet



T70S/V, etc.
(from Apr 2006)

Fujitsu



LavieA (LA700/GD)
(Sep 2006)

NEC



USB connective Tuner
(LDT-1S100U)
(Sep 2006)

Logitech



SDIO Tuner
(2007 OEM supplied)

ZENTEK



Express Card
MonsterTV 1D for DELL
(Nov 2006)

DELL



USB connective Tuner
PCTV-hiwasa (LOG-J100)
(Dec 2006)

LOGFARM



USB connective Tuner
VGA-TV1S
(Dec 2006)

SanwaSupply



USB connective Tuner
SEG CLIP (GV-1SG/USB)
(Dec 2006)

I.O.Data



USB connective Tuner
DigiTVe (LC-1SEGU)
(Dec 2006)

Live Creator



USB connective Tuner
QOT-W100
(Dec 2006)

Quick Sun



USB connective Tuner
DT-007
(Dec 2006)

TRYWIN



USB connective Tuner
K-ONESEG/U2
(2007)

KEIAN



USB connective Tuner
W-one (GH-1ST-U2K)
(Dec 2006)

GREEN HOUSE



USB connective Tuner
ON TIME TV (IM-1ST0001U/S)
(Dec 2006)

IMJ



One-Seg Broadcasting Receivers Introduced to the Market (3/3)



Portable DVD Players



DVD-LX97
(Mar 2006)
Panasonic



SD-P90DT
(Dec 2006)



SD-P50DT
(Dec 2006)

TOSHIBA



ROSSINI RPD7100SN-SV
(Nov 2006)

NAGASE



axion
AXN6709TD
(Dec 2006)

※ One-Seg tuner
only for portable DVD player



SD-PDT1
(Jul 2006)
TOSHIBA



DVF-DTV100
(Aug 2006)

SANYO

Electronic Dictionary



Papyrus
PW-TC900
(Dec 2006)

SHARP

Game Terminal



Nintendo DS
(Nov 2007)

Nintendo

Digital Audio Player



gigabeat V30T
(Jul 2006)



gigabeat V30E & V60E
(Nov 2006)

TOSHIBA

Exclusive Terminals, etc.

※Usable also as
digital radio



BTV-400K
(Feb 2007)

BLUEDOT



One-segment unit
Produced by Wilcom
(Dec 2006)

PIXERA



Prodia
(Sep 2006)

Others

Radio



XDV-100
(Apr 2007)

SONY



Super One-seg TV Watch
(campaign prize)
Asahi Beer



Original One-seg TV
(G I Challenge campaign prize)
Georgia

GSM+3G Phones Correspond to One-Seg*



***Japan's Mobile TV Reception Service is called “One-Seg”.**

GSM+3G and One-Seg can be combined.

One-Seg has no relation with mobile phone systems.



<http://www.nttdocomo.com/pr/2007/001372.html>

In fact, these GSM phones correspond to One-Seg now on sale from last November.

These phones can be used in over 140 countries.



Text

Possibility of ●● river flooding has increased. Residents in the surrounding areas should evacuate. Areas affected are as follows.

Image



Evacuate from this area !

Activation Control by Broadcasting
Non-congested communication
Power-saving feature is necessary

Meteorological Agency

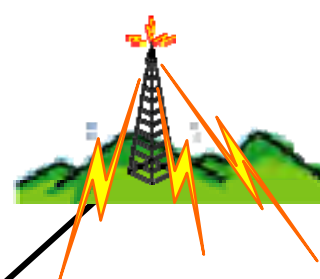


TV Station



Activation control signal
&
Text and image

**Master Room
(on-air button)**

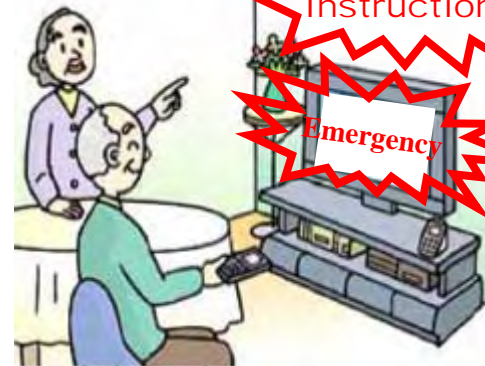


(Cell Base Station)

Activate !

Evacuation
Instructions

Emergency



Both in and outside the home.

- Digitizing broadcasting consists of not only upgrading existing analog TV systems but also achieving attractive broadcasting service is the key to expand digital terrestrial TV for viewers.
 - ISDB-T makes it possible to receive SDTV or HDTV while moving and provides the chance for enjoying new broadcasting service to users.
 - ISDB-T can provide a “free” mobile TV reception service like ordinary TV broadcasting.
- ISDB-T can be the most suitable system for expanding digital terrestrial TV .



Thank you !



➤ **Ministry of Internal Affairs and Communications
(MIC) :**

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

➤ **Presenter:**

Koji TODA

Deputy Director, Broadcasting Technology Division,
Information and Communications Policy Bureau, MIC

➤ **Contact us:**

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