



This Presentation is prepared by Ministry of Internal Affairs and Communications (MIC) in Japan

Digital TV Broadcasting in Japan

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Manila, Philippines

Digital Broadcasting Expert Group
(DiBEG)

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Only Pick up key points

- **Advanced Features of Japans' Digital Terrestrial TV Broadcasting System (named ISDB-T).**
- **Comparison of 3 DTTB Systems**
- **Special Advantages of Japan's System for Mobile Reception.**
- **Summaries.**



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



- 1997** ▪ Technical Standards for DTTB were established in E.U (DVB-T) and U.S.(ATSC)
- 1998** ▪ DTTB started in E.U (DVB-T) and U.S.(ATSC)
- 1999** ▪ **Technical Standards for DTTB were established in Japan (ISDB-T).**
 - Support center for R&D of DTTB in Japan opened.
(Shared use of facility, Organization of Communications and Broadcasting)
- 2000** ▪ Technical standards for Digital Terrestrial Sound Broadcasting were established in Japan.
 - Planning of DTTB station channels.
- 2001** ▪ Development of institutions for digitization of Terrestrial Television Broadcasting.
(Revised part of Basic Plan Popularization of Broadcasting and Use of Broadcasting Frequency)
- 2003** ▪ **DTTB started in Japan** (in three metropolitan areas).
 - Start of trials for practical application of Digital Terrestrial Sound Broadcasting in part of Kanto and Kinki areas.

ISDB-T is the newest DTTB system and as such includes the latest technology



Diffusion of Digital Broadcasting Receivers



Digital Terrestrial Broadcasting Receiver Shipments

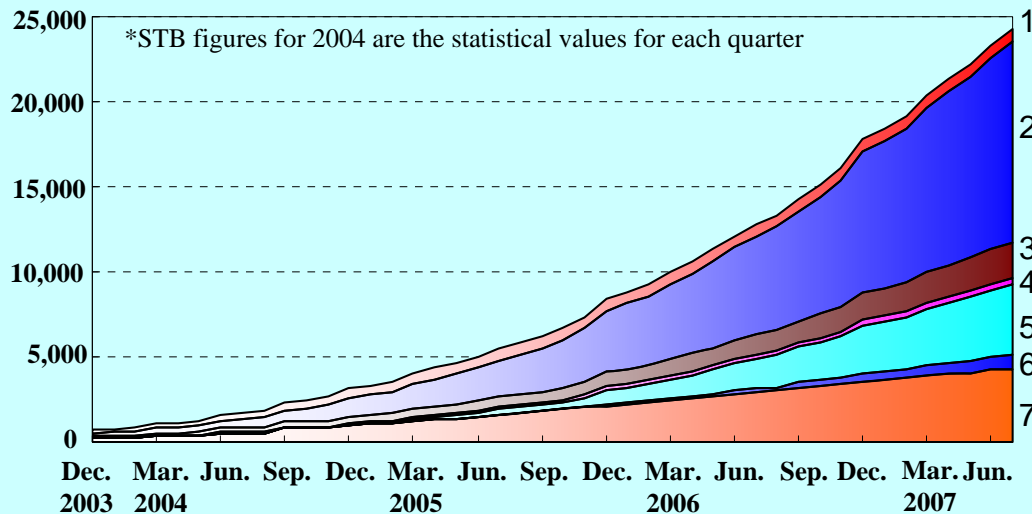
24,150,000

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

(Unit: thousand)

1 CRT	720
2 LCD	11,807
3 PDP	2,082
4 Tuner	349
5 Digital Recorder	4,176
6 Personal Computer	788
7 CATV STB	4309

(Unit: thousand)



Access to Digital Broadcasting Satellite

27,470,000

Jun 2007 Source: NHK

Digital Broadcasting Satellite Receiver Shipments

25,930,000

CRT	1,860
PDP & LCD	14,420
Tuner (including Digital Recorder)	5,370
CATV STB	4,280

Access to Digital Broadcasting Satellite using CATV

1,540,000 households

One-Seg Mobile Phone Shipments

11,780,000

Jul 2007

In-car DTTB Receiver Shipments

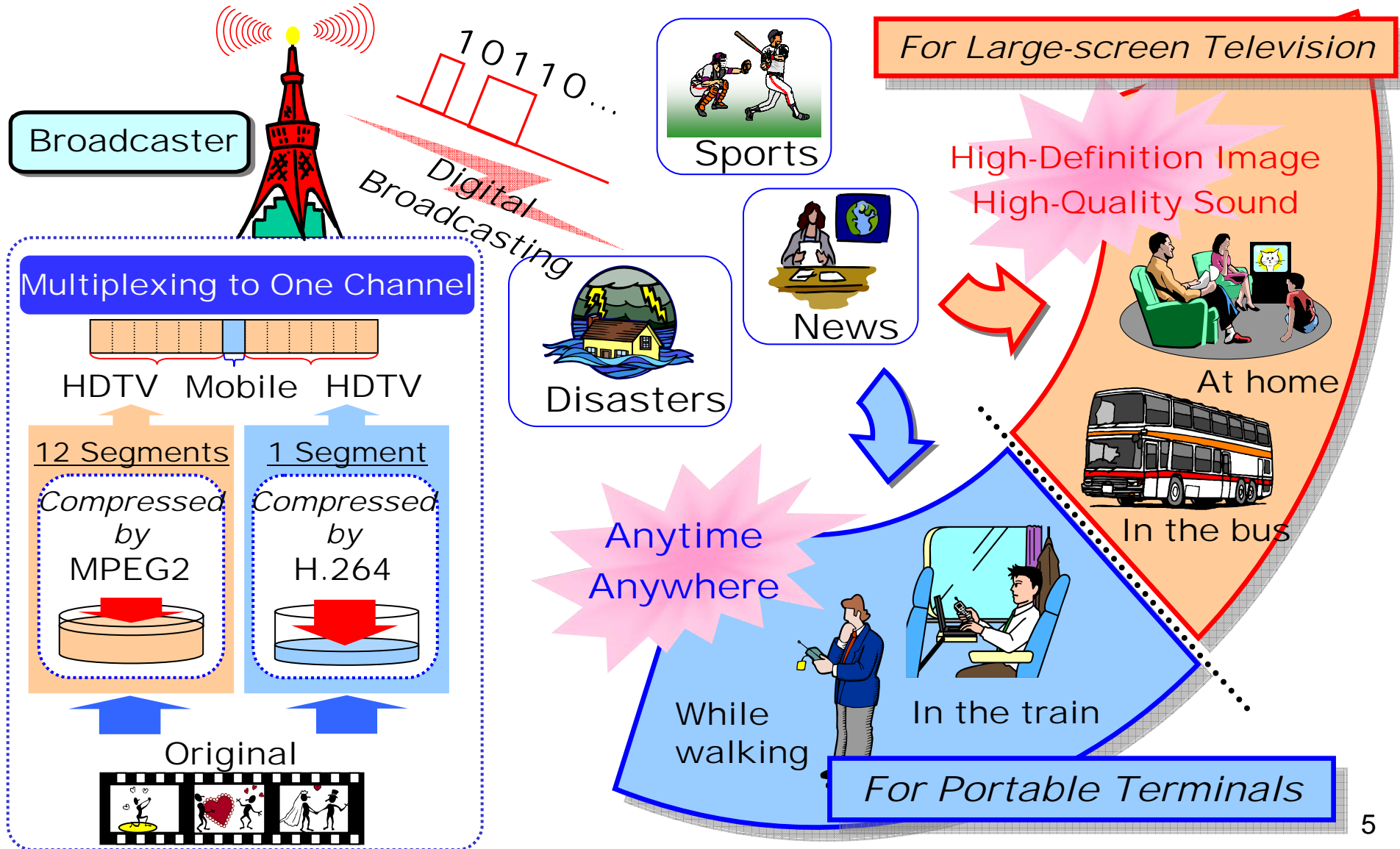
650,000

Jun 2007

Source: Japan Electronics and Information Technology association (JEITA)

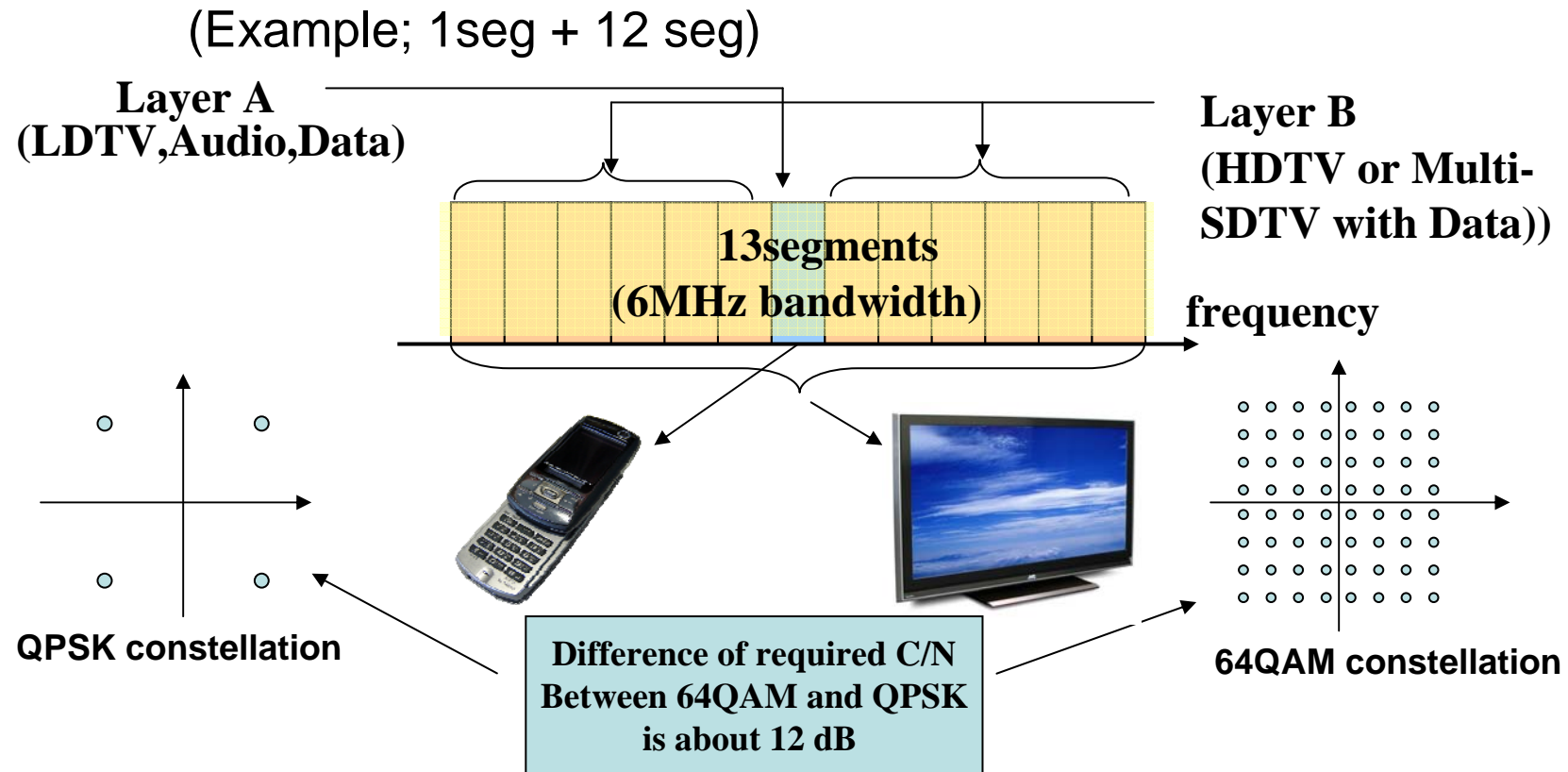


HDTV, Mobile Reception, and Data (Multimedia) Broadcasting are necessary for Next Generation Broadcasting.





ISDB-T Hierarchical service in Japan (HDTV + One-seg service)



- *13 segments are divided into layers, maximum number of layers is 3.
- *Any number of segment for each layers can be selected (totally 13 segment)
- ***Transmission parameter sets of each layer can be set independently**
(In above example, modulation index of each layer are different)

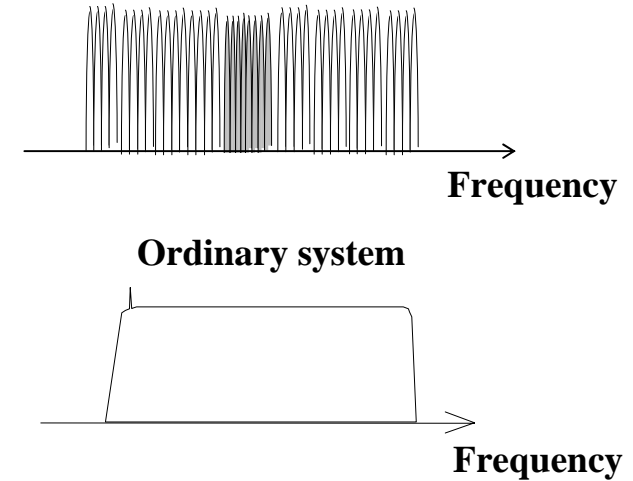
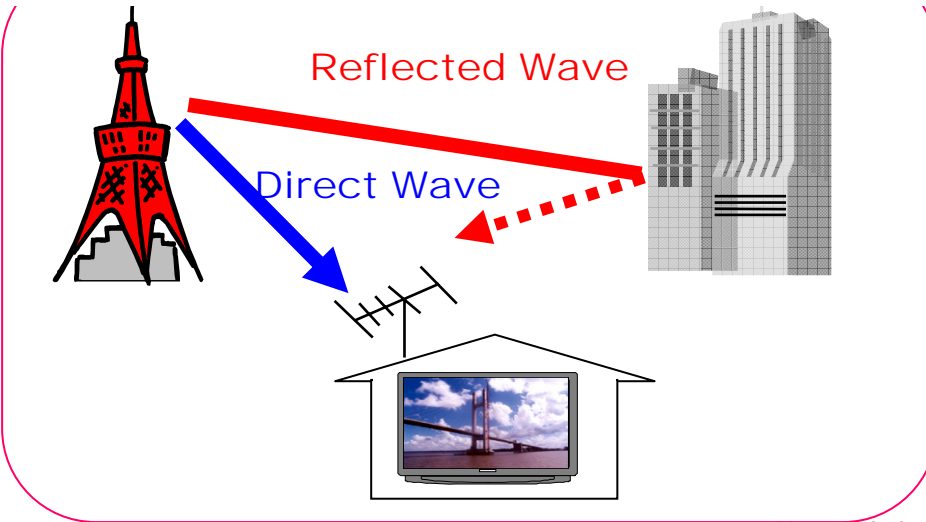


Technical Features of ISDB-T 1 & 2



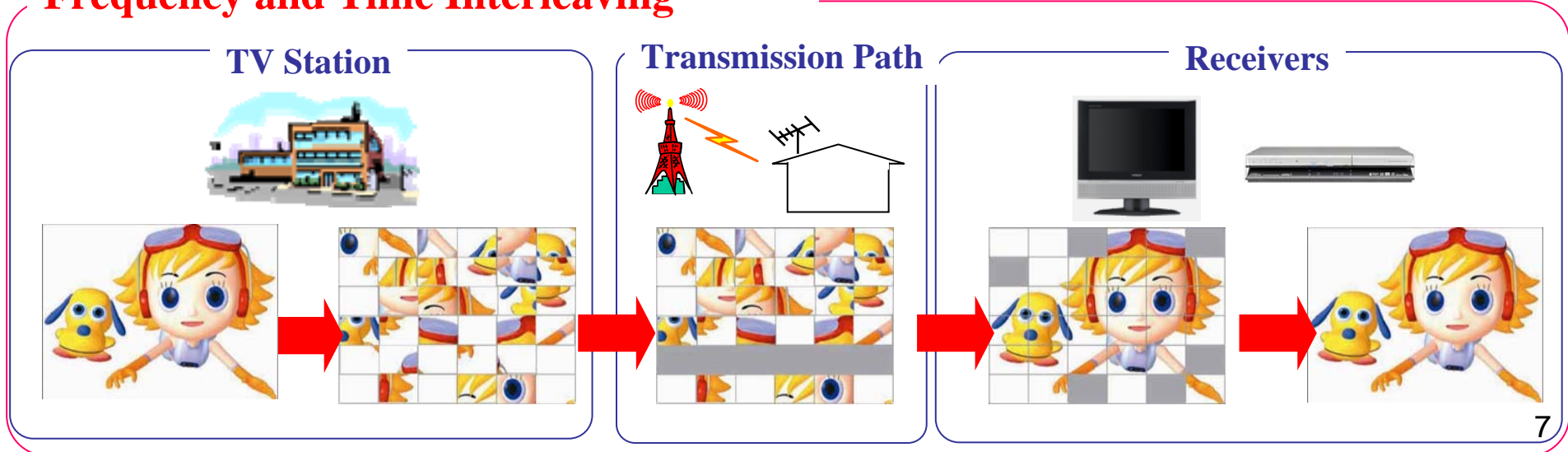
**Robustness to Radio Interference by Multi Path.
Because of OFDM system is adopted .**

OFDM: Orthogonal Frequency Division Multiplex



Stability of reception for mobile HDTV reception !

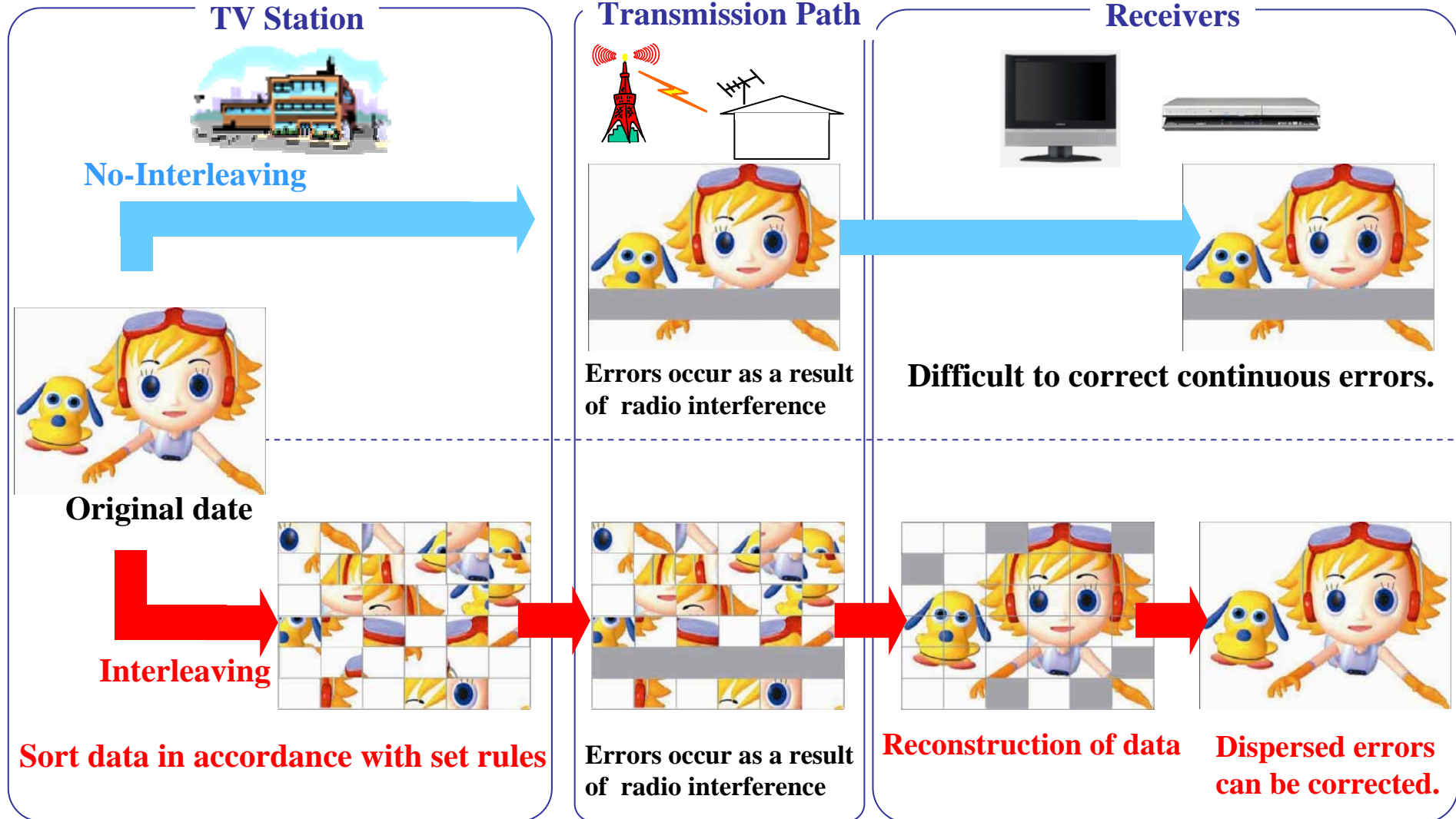
Frequency and Time Interleaving





[Reference]

Comparison of Interleaving and No-Interleaving





Features of ISDB-T transmission system



1. Efficient frequency utilization

- (1) Adopt OFDM transmission system; SFN operation
- (2) Adopt hierarchical transmission; service for different type of reception in one frequency channel

2. Mobile/ handheld service in one transmission standard

- (1) Time interleave; Improve mobile reception quality
- (2) Partial reception; handheld service in same channel

3. Robustness against interference

- (1) Adopt concatenated error correction with plural interleave
- (2) Time interleave; very effective for impulse noise (urban noise)

4. Flexibility for several type of service/ reception style

- (1) Any of HDTV/Multi-SDTV
- (2) Fixed/Mobile/Portable service in same channel

5. Commonality of TV/audio transmission standard

6. Data Casting/Interactive Service



Features of ISDB-T



HDTV



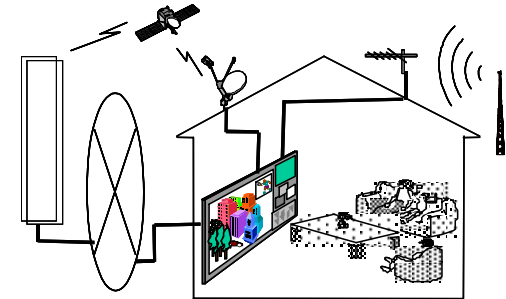
High quality image and sound service

Multi-Channel Service



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

Interactive TV



Communication linked services with TV

High quality image



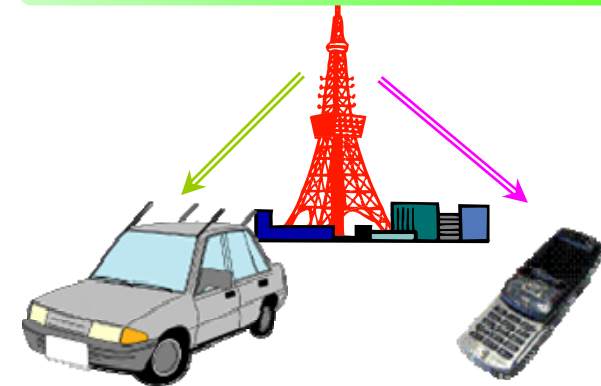
High Robustness to ghost image interference

Data Broadcasting



Simple retrieval of program and information at any time

Mobile Reception



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



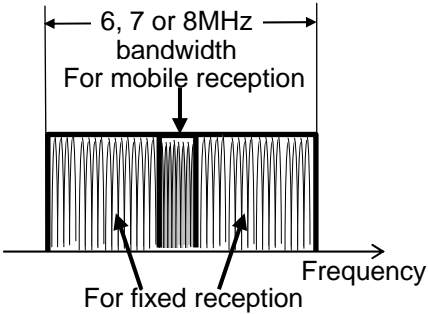
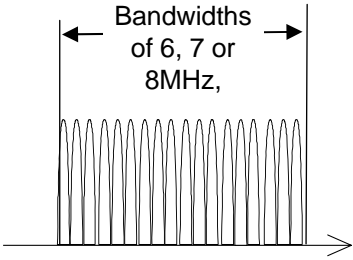
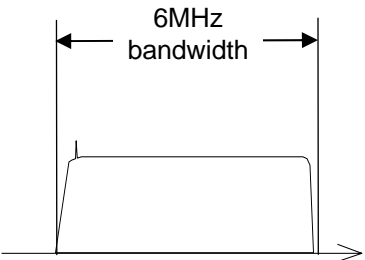
Comparison of 3 DTTB Systems



Comparison of Three DTTB Systems



Results of fair evaluation by a third country (Federative Republic of Brazil)

System Items	Japan (ISDB-T)	EU (DVB-T)	U.S (ATSC)
Robustness to ghost image	Effective against ghost image interference using advanced technique. BEST	Effective against ghost image interference. BETTER	The same degree of analog TV broadcasting. POOR
Feasibility of Single Frequency Network (SFN)	A channel plan including SFN has already been prepared. BEST	Some countries such as Germany, Australia, and Singapore, are operating this. BEST	Being tested in the U.S. and Canada. However, no prospect for commercialization has emerged. IMPOSSIBLE
Feasibility of portable reception	<u>One channel</u> can carry portable reception service simultaneously with HDTV service. BEST	<u>DVB-H, another channel</u> is necessary for portable reception. POOR	Portable reception is not available in the current system. Other systems are not being considered. IMPOSSIBLE
Transmission system	 <p>It is possible to designate the modulation system of the segment group unit according to the service purpose.</p>		 <p>Improved system based on analog TV broadcasting system.</p>



Reference Only

Experiment of field mobile in Brazil

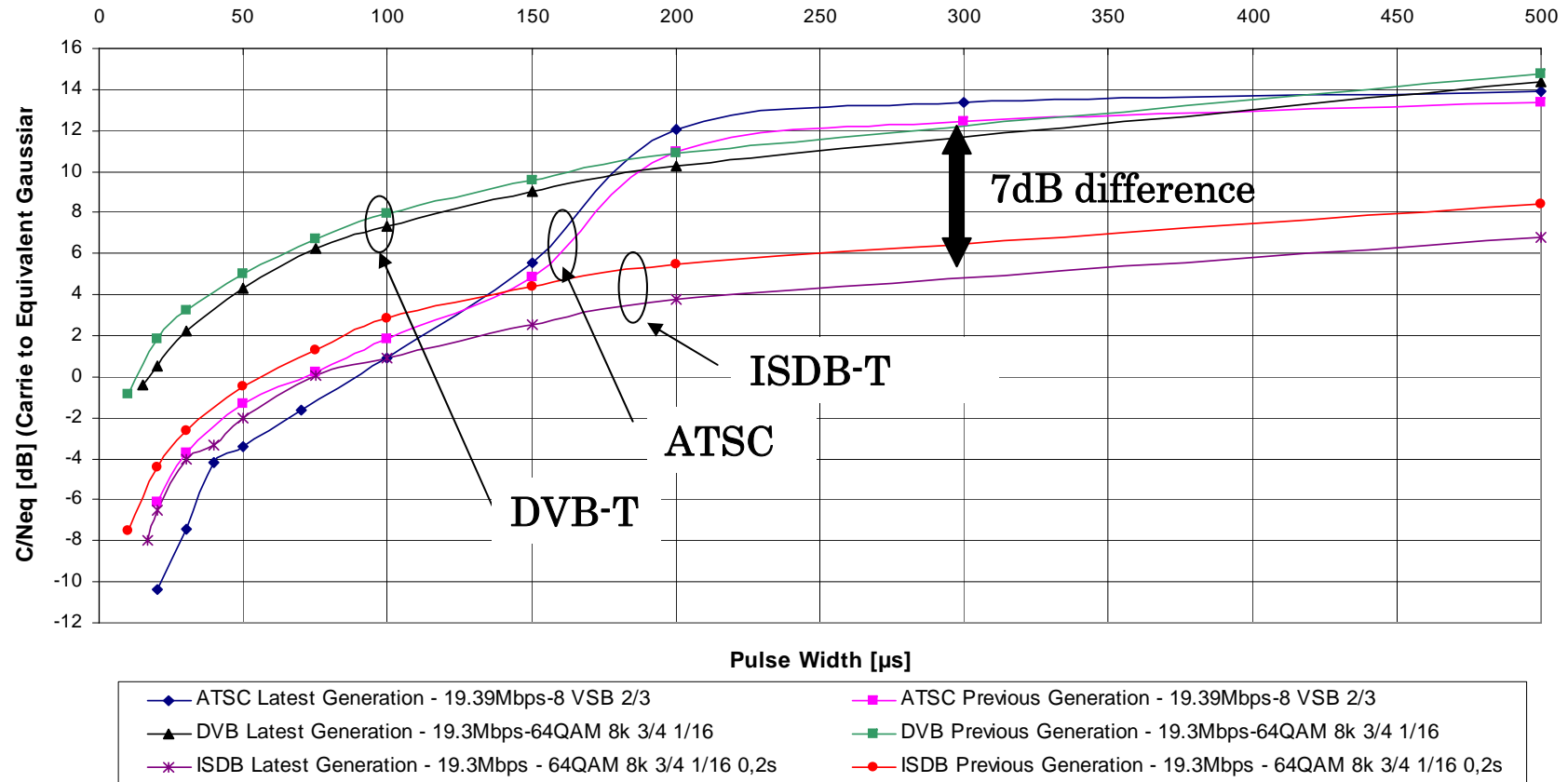
Standard	Parameter				Transmission Rate (Mbps)	Errors (Times)
	Modulation	Convolution	Guard Length	Carrier		
ISDB-T	16QAM	2/3	1/16	2k	11.45	0
	64QAM	2/3	1/16	2k	17.18	6
	16QAM	2/3	1/16	4k	11.45	0
DVB-T	QPSK	1/2	1/16	2k	4.39	1
	QPSK	2/3	1/16	2k	5.85	Many
	QPSK	1/2	1/32	8k	4.52	Many
ATSC	8VSB				19.39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



Tests Results Under Imulse Noise in Brazil



Reference Only



Reception performance under Impulse noise condition
(3 DTTB systems)



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.



Special Advantages of Japan's System for Mobile Reception

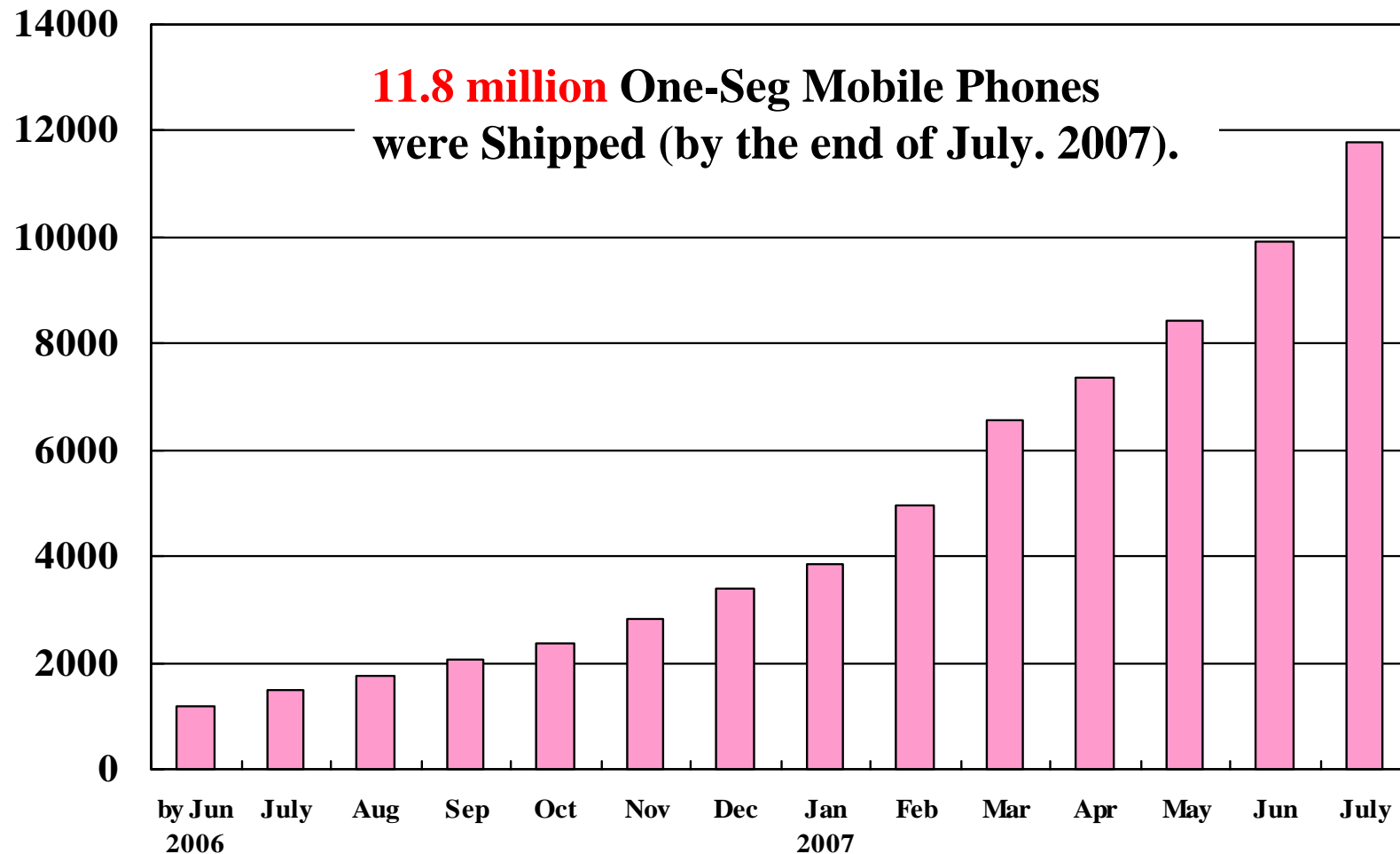


Demand Expansion for One-Seg Mobile Phones



- **One-Seg service started in April 2006.**
- **One-Seg Mobile Phone Shipments have been expanded and reached 10,000,000 for the first time in June 2007.**

(Unit: thousand)





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.

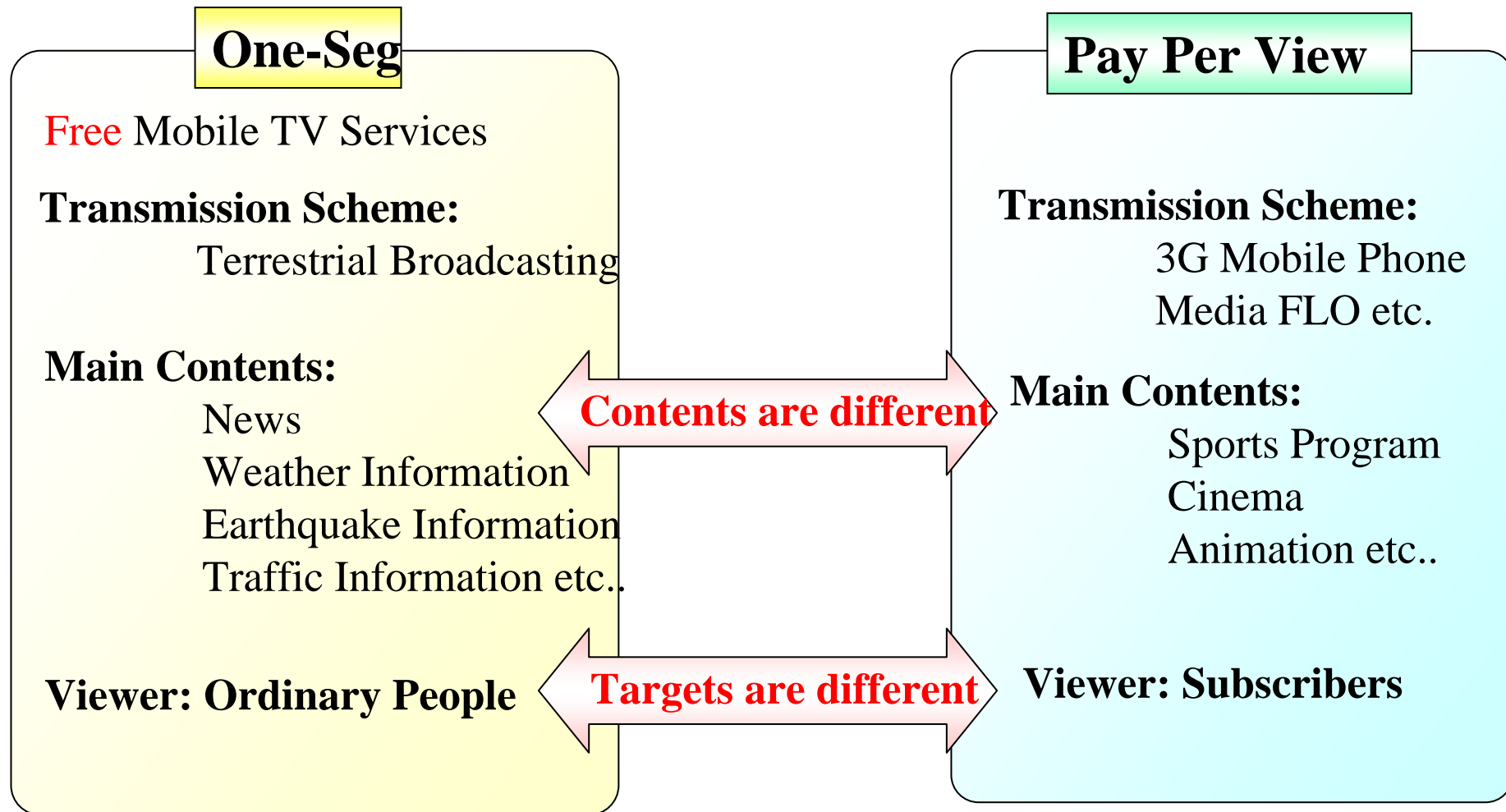
One-Seg has no relation with mobile phone systems.



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

In fact, these GSM phones correspond to One-Seg will go on sale in this November.

These phones can be used in over 140 countries.



One-Seg service leads to develop new Subscribers for PPV in Japan .



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
(Jun 2007)



D903iTV
(2007)



P903iTV
(2007)



SH903iTV
(2007)

NTT DoCoMo



905SH
(May 2006)



911SH
(Nov 2006)

SoftBank



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)

PIXER



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)

Logite



SDIO Tuner
(2007 OEM supplied)

**ZENITE
K**



Express Card
MonsterTV 1D for DELL
(Nov 2006)

DELL



USB connective Tuner
PCTV-hiwasu (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)



axion
AXN6709TD
NAGASE (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
(scheduled in 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



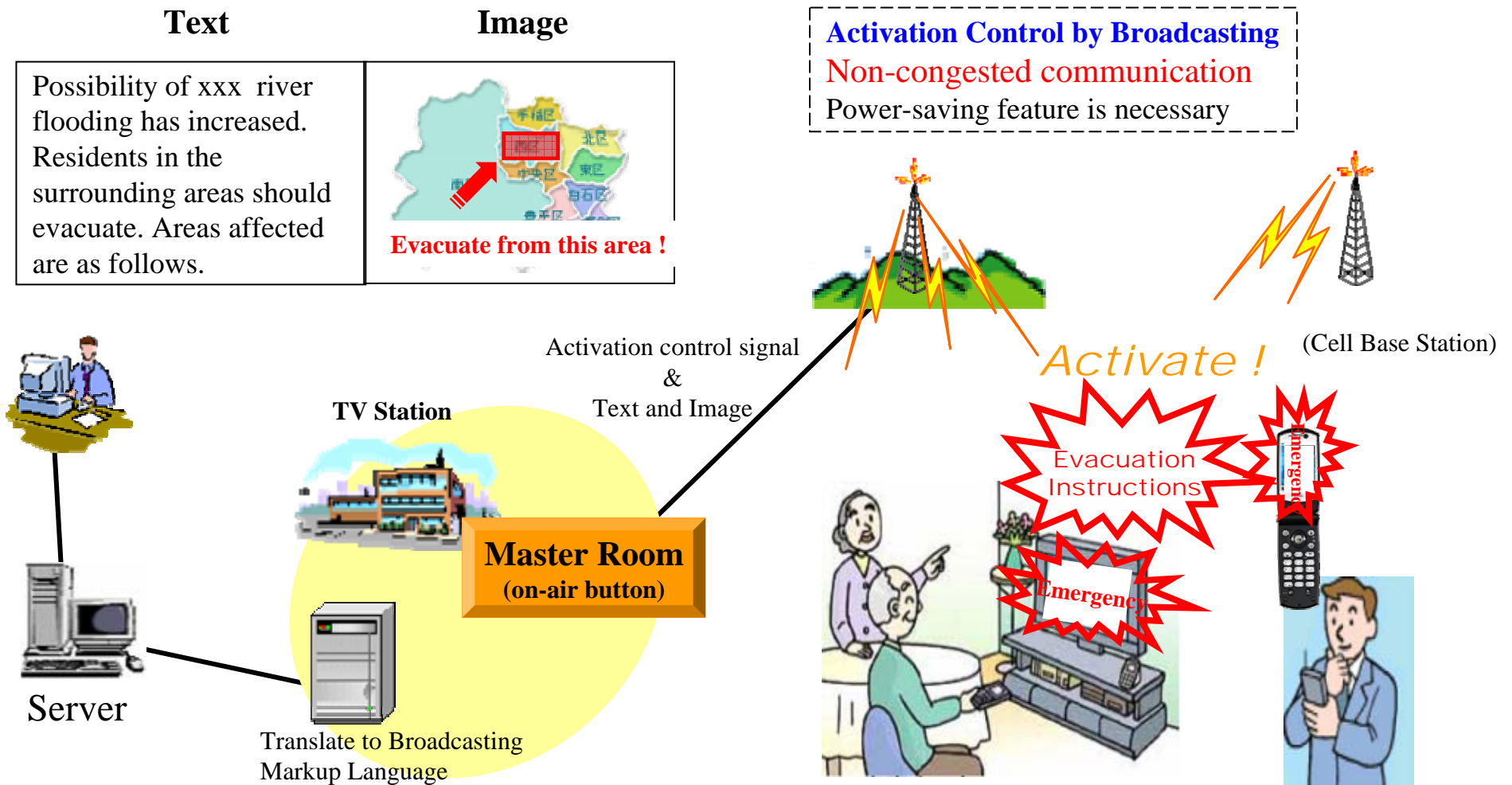
Super One-seg TV Watch
(campaign prize)
Asahi Beer



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



1. Realization of non-congested communication even in times of disaster.
2. Ensure conveying information by automatic activation even in times of disaster and/or in emergency.
3. Able to convey information according to area and objectives.





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

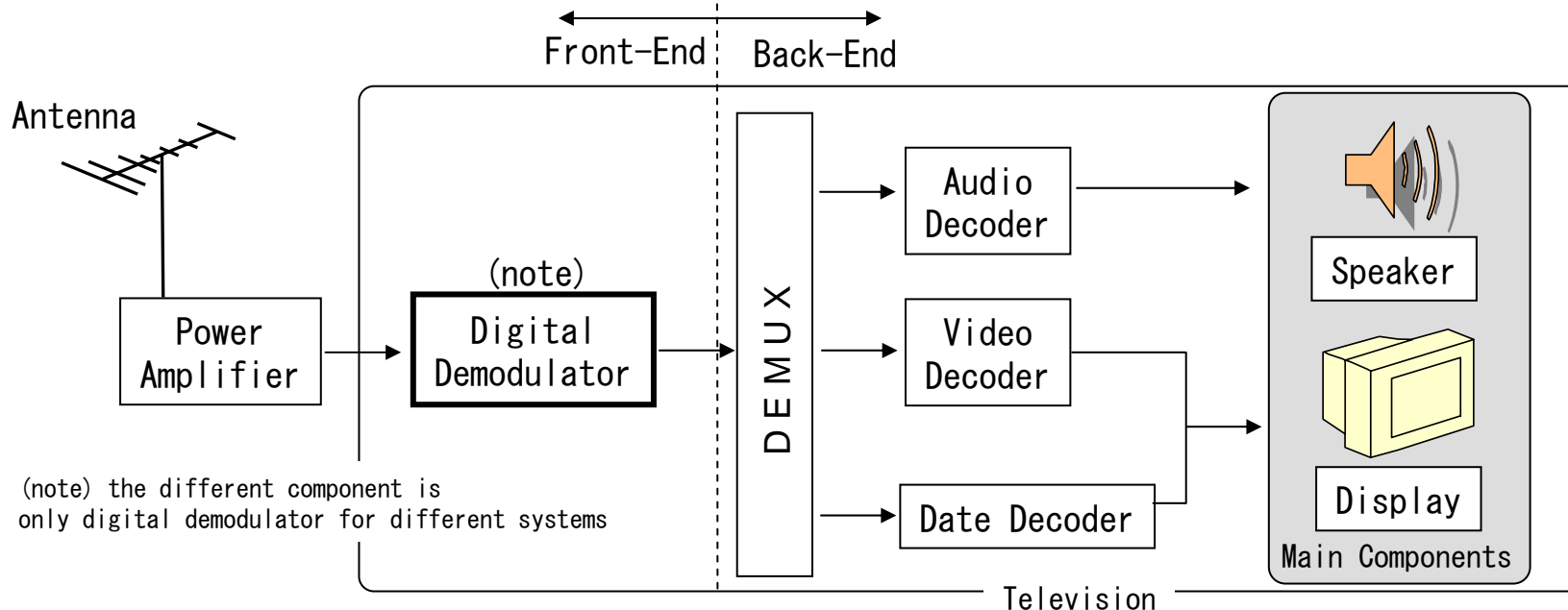
Because almost component of digital television receivers are same.

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, Date broadcasting, interactive function. etc



General Block Diagram of Digital Receivers



Very Low Price and Small STB



This STB is now under developing !



[main spec]

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



Summaries

- 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 .

➤ **Digital Broadcasting Experts Group
(DiBEG) in ARIB**

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