

ISDB-T: Outline and Characteristics



Ministry of Internal Affairs and Communications

September 2009



Comparing with three digital TV systems



System	Japan/Brazil (ISDB-T)	China * (DTMB)	EU (DVB-T)	USA (ATSC)
Characteristics				
Transmission System	<p>Bandwidth For mobile reception</p> <p>For fixed reception</p> <p>Frequency</p> <p>Multi-Carrier</p>	<p>Bandwidth</p> <p>Multi-Carrier</p>	<p>Bandwidth</p> <p>Multi-Carrier</p>	<p>Bandwidth</p> <p>Single-Carrier</p>
	Technology against multipath interference (currently implemented)	Technology against multipath interference (insufficient in places geographically complex)	Technology against multipath interference (currently implemented)	Technology against multipath interference (insufficient in places geographically complex)
	Time Interleaving	Time Interleaving		
	Segmented Structure			
Performance at reception (between buildings or mountains)	Excellent	Good	Medium	Poor
Portability (HDTV + Mobile with a transmitter)	In service	Not available	Not available	Not available

Japanese Standard Has Various Attractive capability !!



HDTV



SDTV Multi-programs Service



Data Broadcasting



Interactive TV



High quality image and sound service

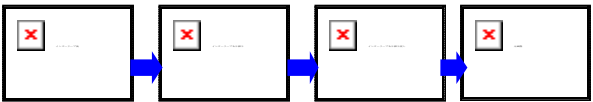
Realization of multi-SDTV programs service in 1ch bandwidth

Useful data information anytime

Communication linked services with TV

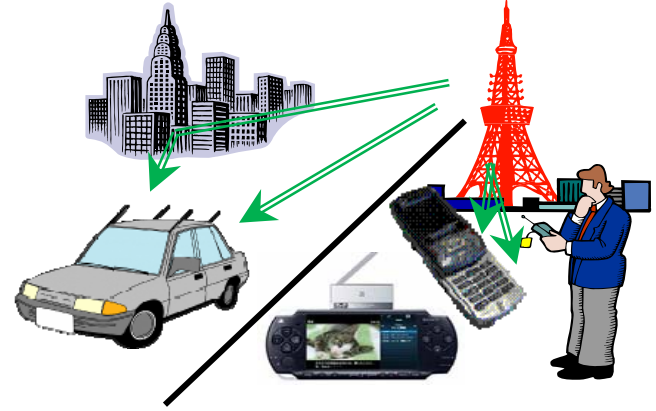
Japanese Standard only

High Robustness with Time Interleaving



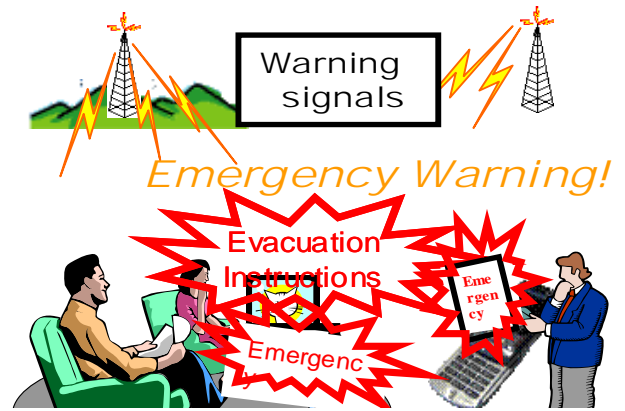
Time Interleave Technology realizes High Robustness against Noises.

Mobile Reception



Mobile TV on Car and mobile terminal, Portable Game device and so on.

Emergency Warning System



People receive Emergency Warning in case of disasters anytime anywhere.

TV Station



Time Interleave
ISDB-T



Sort data in accordance with set rules

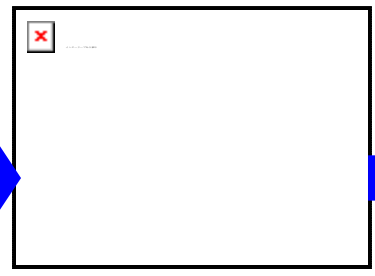
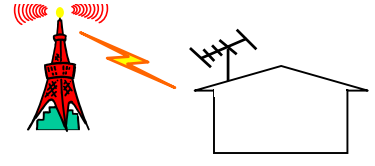


Original data

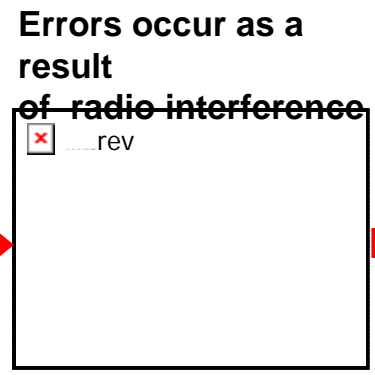
DVB-T

No Time Interleave

Transmission Path

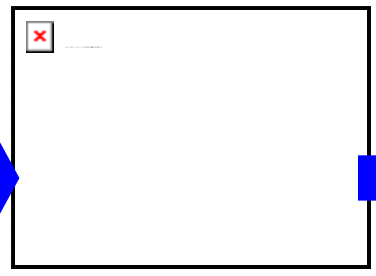


Errors occur as a result of radio interference

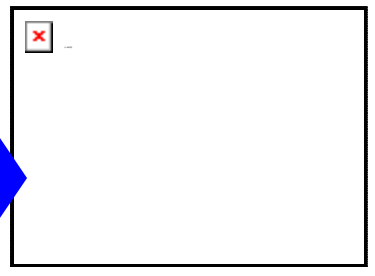


Errors occur as a result of radio interference

Receivers

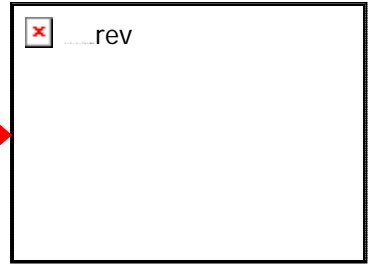


Reconstruction of data



Dispersed errors can be corrected.

Difficult to correct continuous errors.







Japanese Standard (ISDB-T)

Image is **Clear**

withstands Noise!

Thanks to Time Interleave Technology!!



European Standard (DVB-T)

Image is **Unclear**

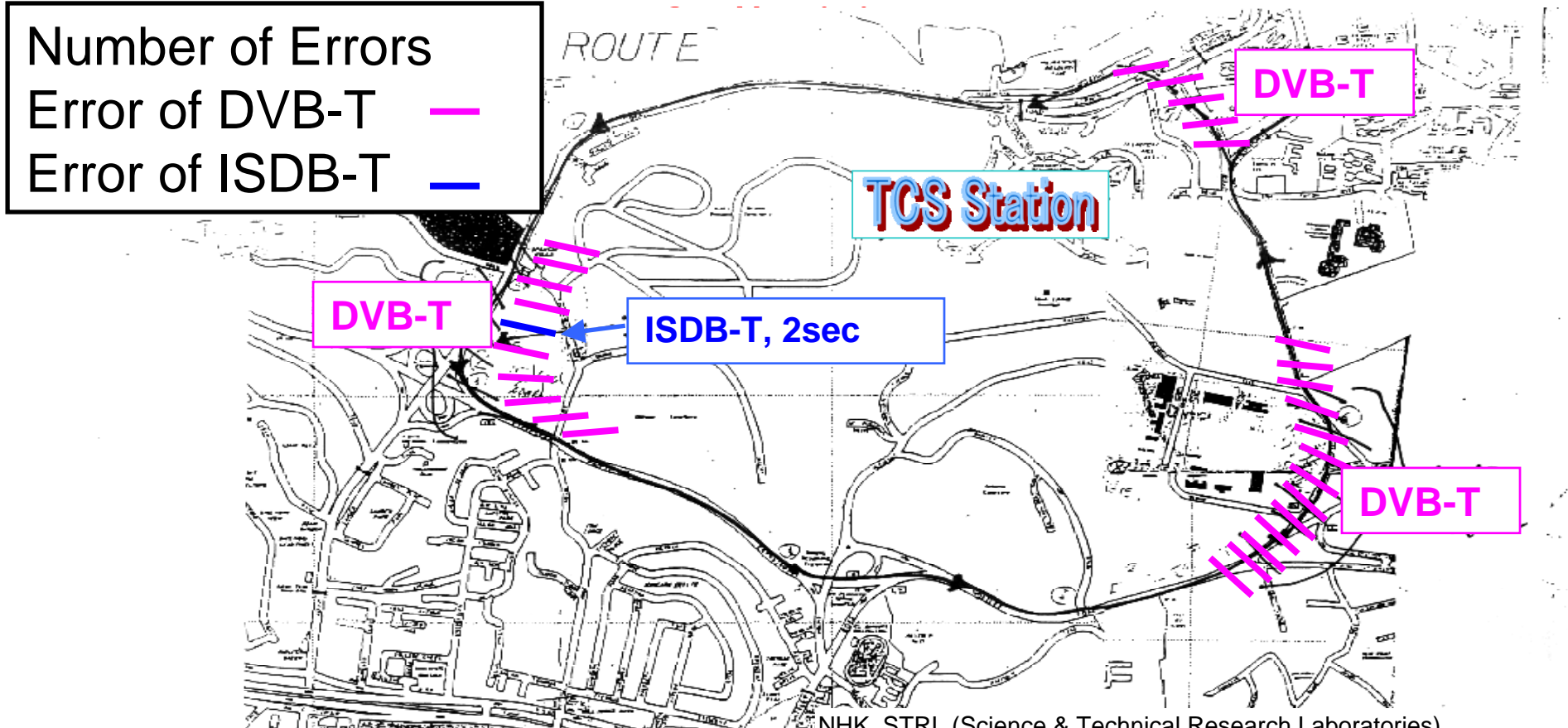
Not withstands Noise!

※Reference to the comparative tests conducted in Peru



The ISDB-T recorded the highest rating in more than 70% of the sites measured, while the other standards averaged only 55%.

The difference will Affect the quality



DVB-T has a lot of Errors!!

ISDB-T has only one!!

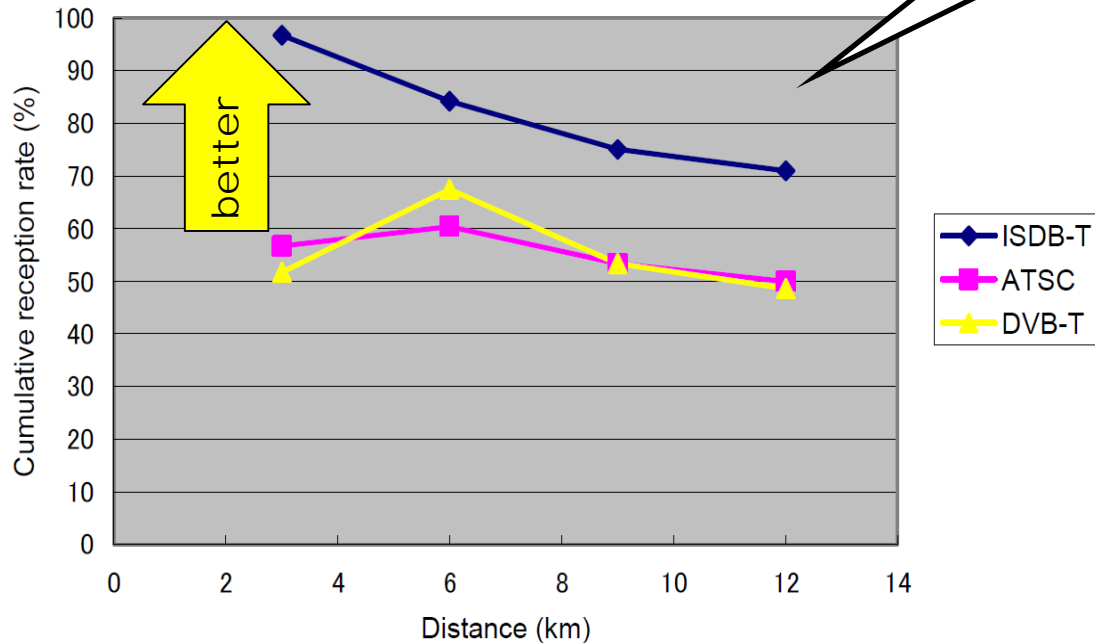


ISDB-T signals were received with keeping viewers' satisfaction rate of "Excellent Performance", 20% more than that of DVB-T

Result of the comparative tests between 3 digital TV Standards conducted in Chile

ISDB-T signals were well received farther than DVB-T signals

(Ratio of "Excellent Performance")

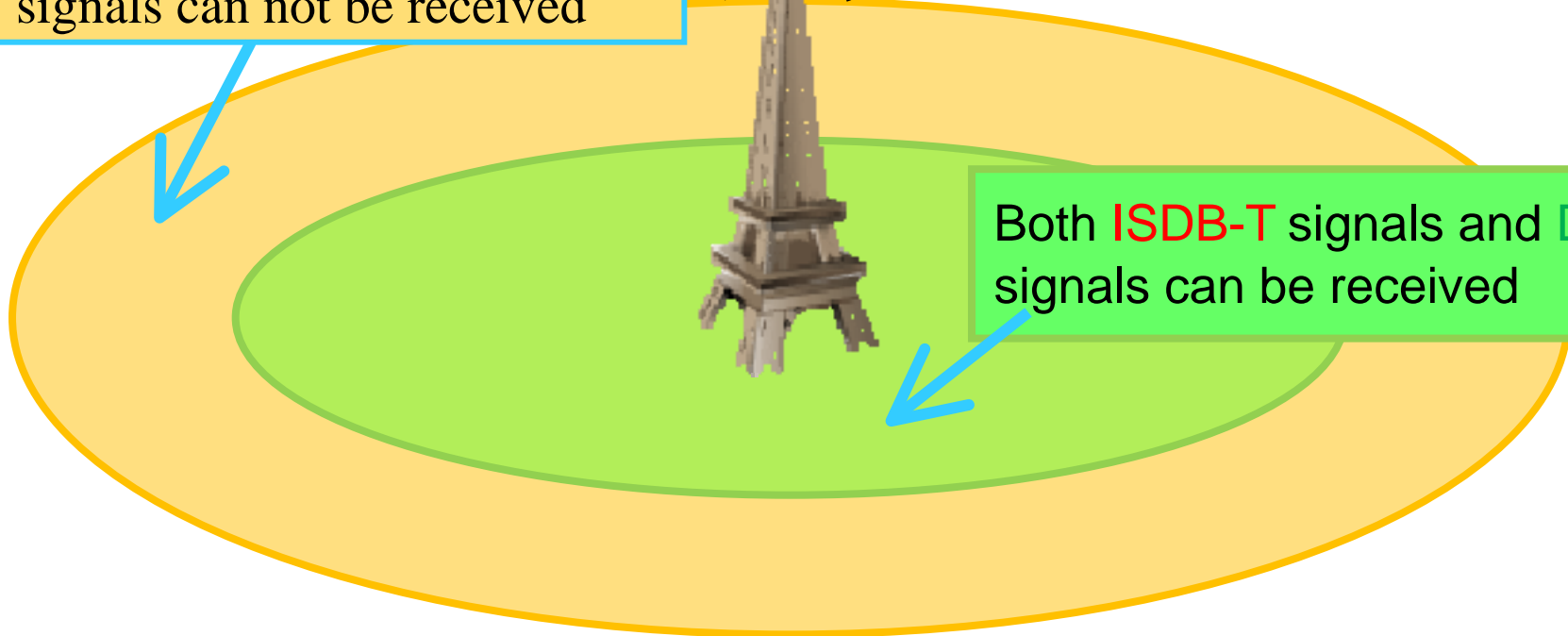


→ ISDB-T is more cost effective than DVB-T because wider service area is covered by a ISDB-T transmitter than DVB-T transmitter at the same transmitting power.



Thanks to Time Interleave Technology, Coverage of ISDB-T is larger than that of DVB-T under same transmitter condition.

ISDB-T signals can be received
DVB-T signals can not be received

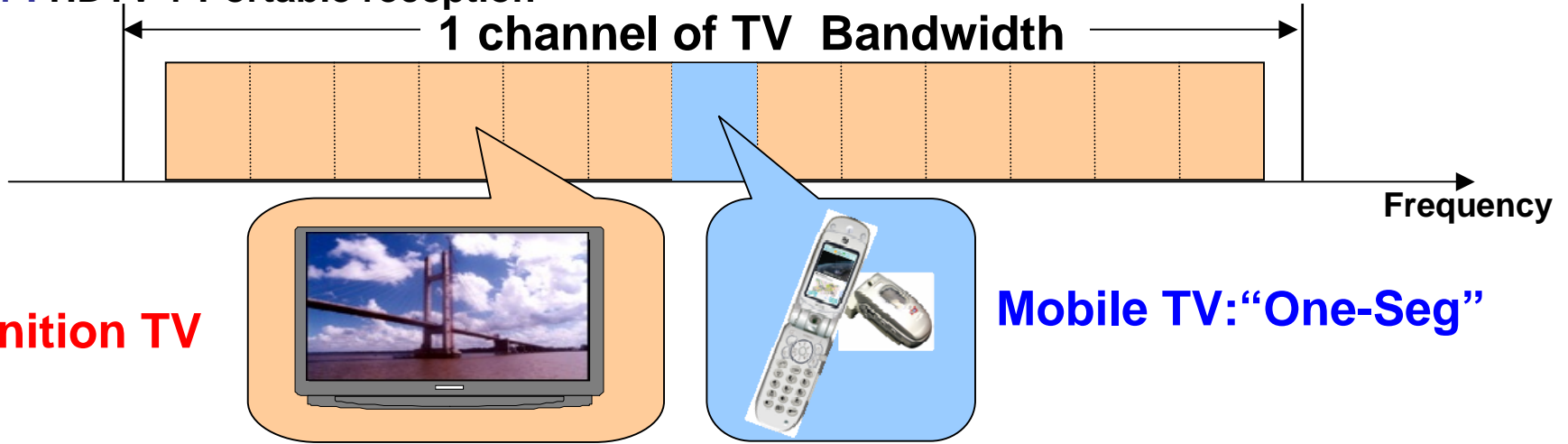


Both **ISDB-T** signals and **DVB-T** signals can be received

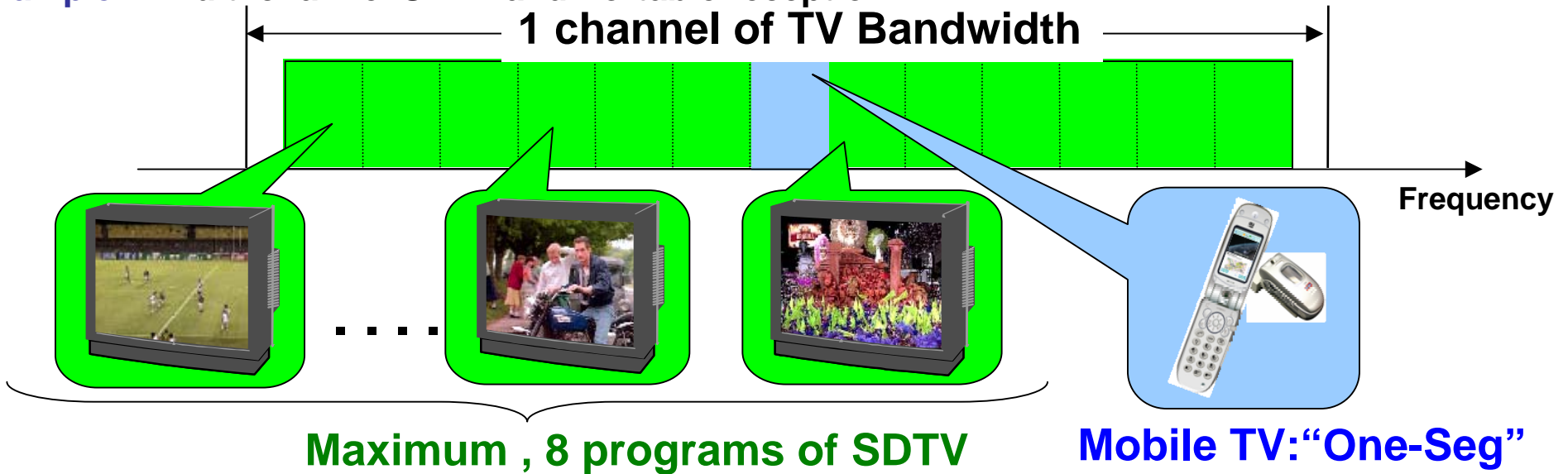


Flexibility of ISDB-T for Broadcasters

Example 1 : HDTV + Portable reception



Example 2: Multi channel SDTV and Portable reception



Band segmentation: Unique feature of ISDB-T

Planning the structure of each digital channel Bandwidth

Example of channel usage in Bandwidth (MPEG2)

example

1CH Bandwidth

1HDTV + 1 Mobile TV

Pattern A



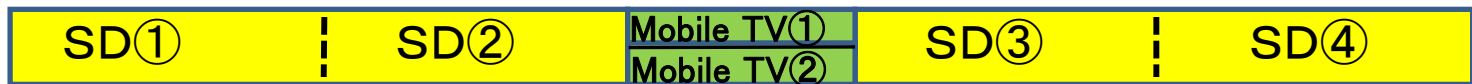
4 SDTV + 1 Mobile TV

Pattern B



SDTV 4 ch + Mobile TV

Pattern C



⋮

If Broadcasting companies would like to share Bandwidth with one TV station facility, of course they can do.



Planning the structure of each digital channel Bandwidth

Example of channel usage in Bandwidth (MPEG4)

example

1CH Bandwidth

2HDTV + 1 Mobile TV

Pattern A



4SDTV + 1 Mobile TV + 1HD

Pattern B



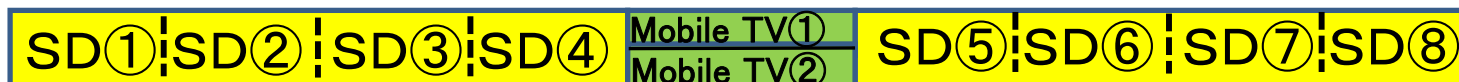
8 SDTV + 1 Mobile TV

Pattern C



8 SDTV + 2 Mobile TV

Pattern D



⋮

If Broadcasting companies would like to share Bandwidth with one TV station facility, of course they can do.



Merits of ISDB-T for People

- People can watch TV anytime anywhere free of charge (or at low cost) because of Broadcaster's unnecessary of additional investment for mobile TV.
- ISDB-T realizes smooth and rapid expanding of mobile TV service area. People can watch mobile TV immediately when broadcasters start Digital TV broadcasting.
- ISDB-T can provide Emergency Warning to people who are under inclement conditions.
- ISDB-T affordable Set Top Box(STB) is available for both HD Signal and SD Signal. So people don't need to buy additional STB for HD Signal in the future.



*People can watch TV Anytime Anywhere
for FREE or at low cost*

*because of Broadcaster's unnecessary of additional
investment for mobile TV*

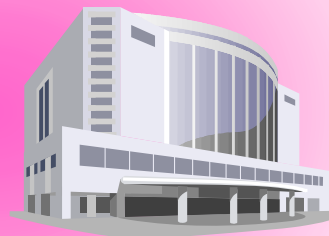
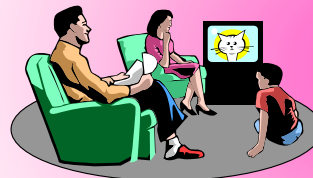
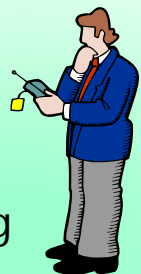
※The free of charge is up to the broadcasters.

outside a building

inside a building



While walking



In a train

In a car

In a bus

At home

in a department store



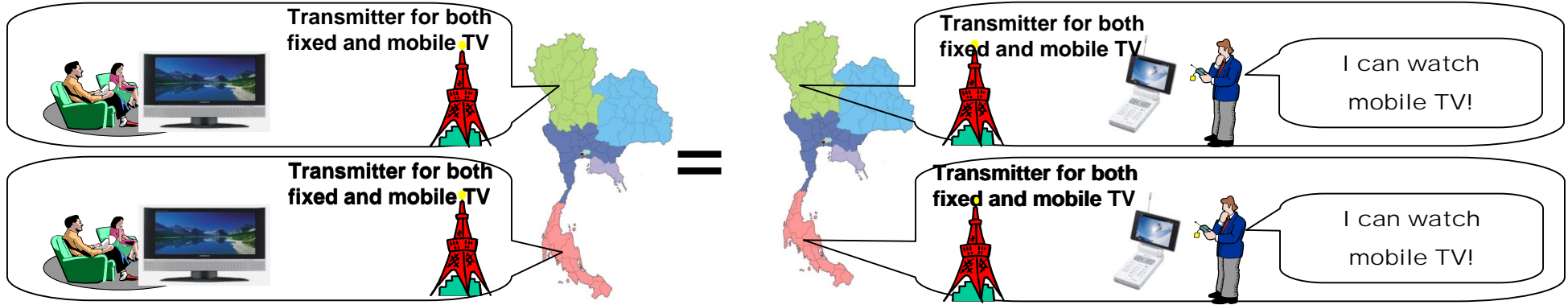
People can watch mobile TV immediately when broadcasters start mobile TV broadcasting.



Example 1) With ISDB-T

People can watch Mobile TV as soon as Broadcasters start Digital broadcasting service because the area being available for fixed receivers is also available for mobile receivers.

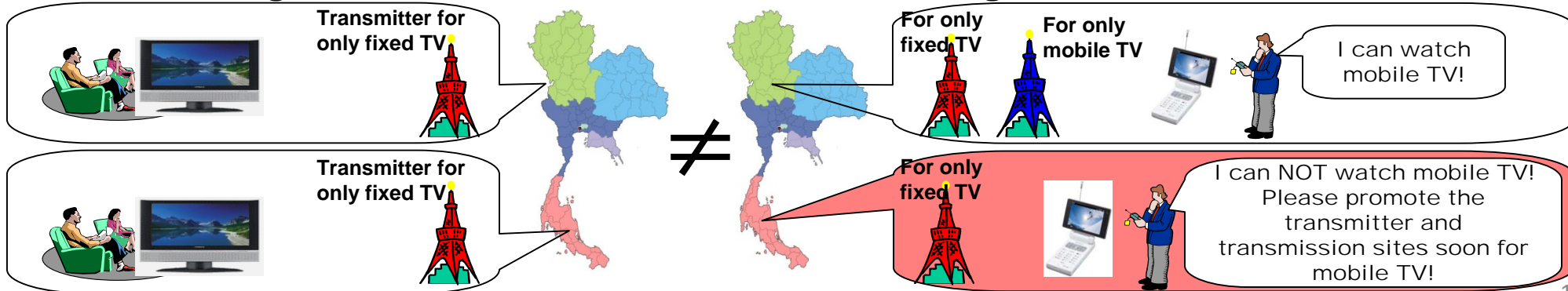
The area being available for fixed TV = The area being available for mobile TV



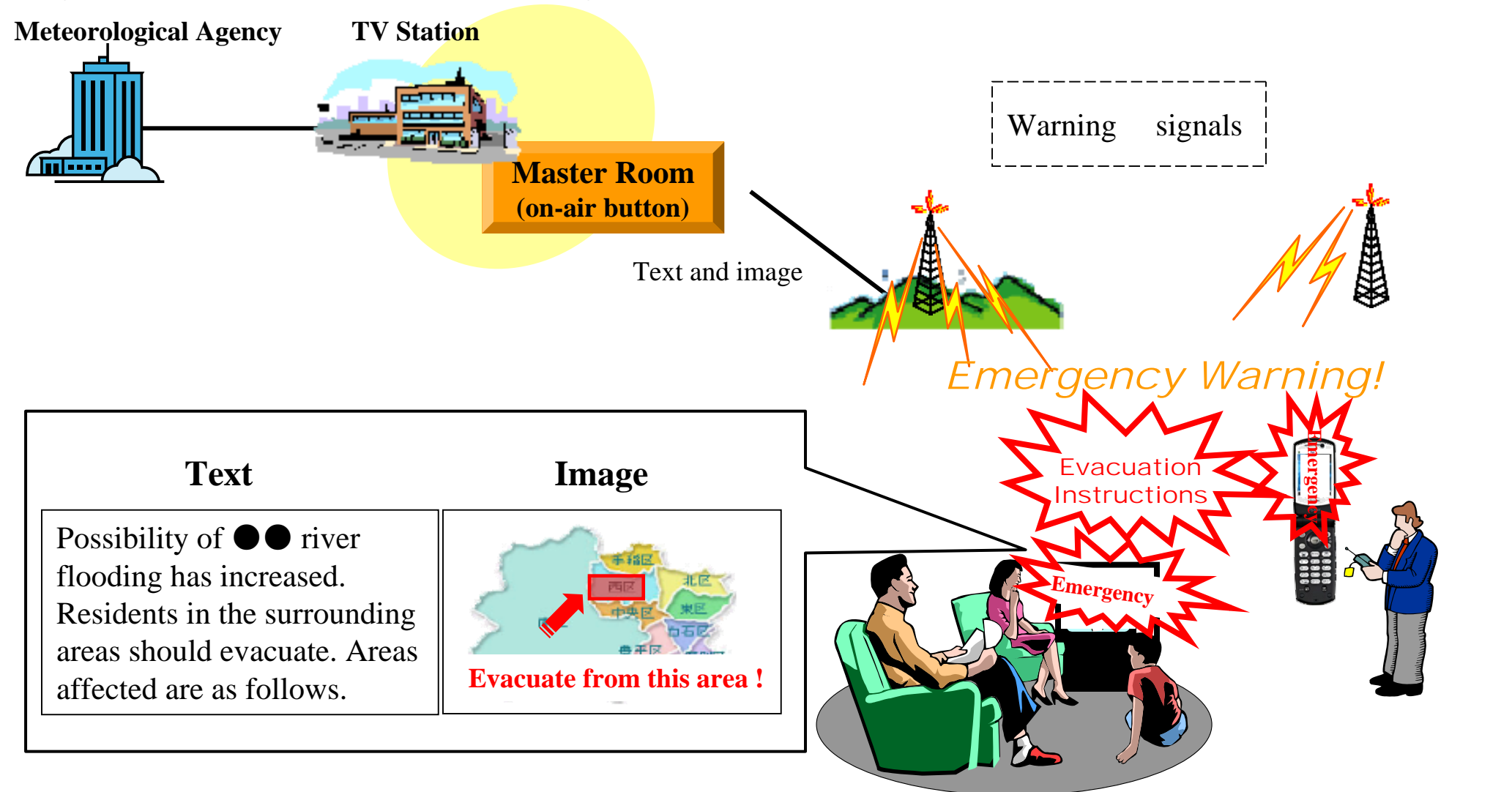
Example 2) With another standard

People in some regions can't watch Mobile TV even if Broadcasters start Digital broadcasting service because Mobile TV service is independent from fixed TV services. To provide Mobile TV needs additional transmitter and transmission sites

The area being available for fixed TV ≠ The area being available for mobile



People can get Emergency Warning under such inclement conditions as typhoons and tsunamis. Many lives would be saved with ISDB-T.

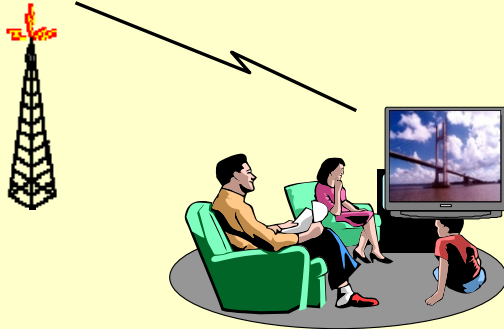




People don't need to buy additional STB for HD Signal in the future.

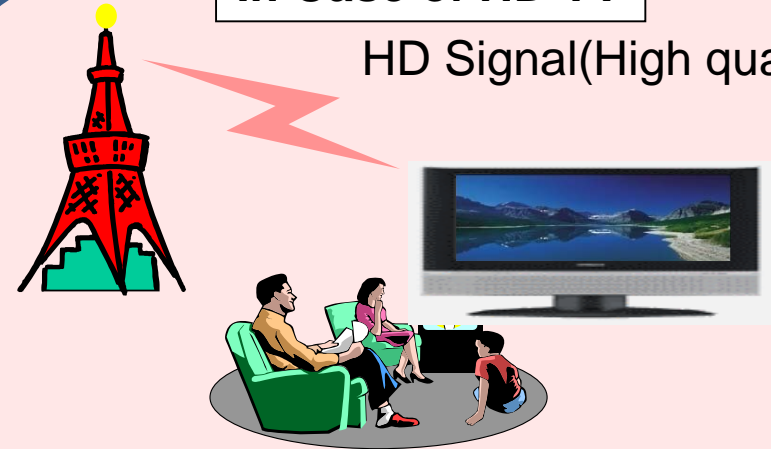
In Case of SD TV

SD Signal (Standard quality)

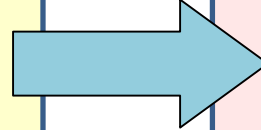


In Case of HD TV

HD Signal (High quality)



World trend



ISDB-T Affordable STB is available for BOTH SDTV and HDTV

ISDB-T STB is available for SD Signal



Same STB is available for HD Signal



DVB-T STB (SD signal input) is applied to ONLY SDTV

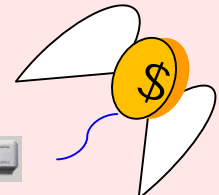
DVB-T STB is available for SD Signal



Same STB is NOT available!
Replacement required!!



+

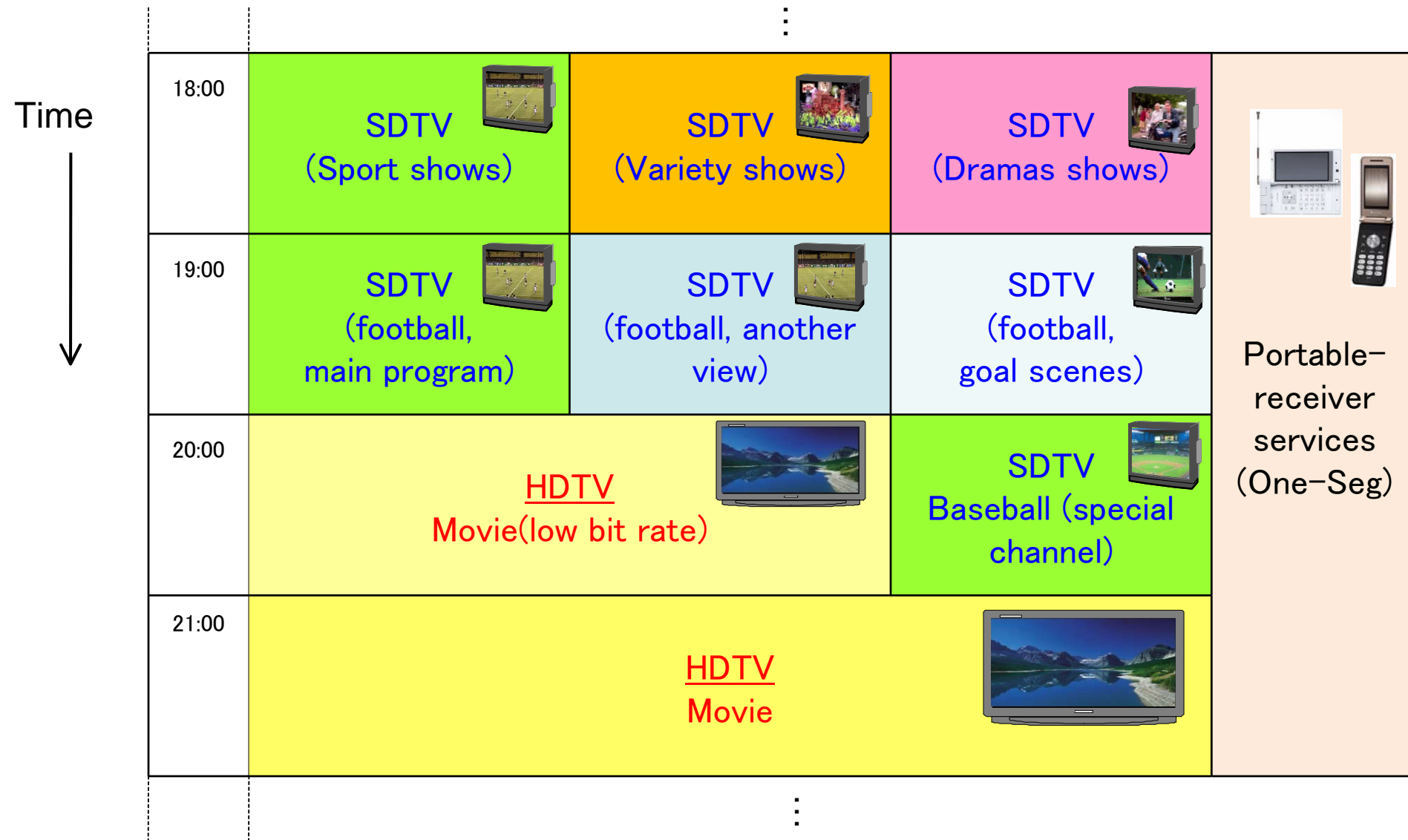


People have to buy New STB for HD signal

Merits of ISDB-T for Broadcasters

- Broadcasters can choose HD broadcasting or SD multi broadcasting according to their needs.
- ISDB-T can broadcast to both fixed and mobile TV receivers with **One** transmitter, **One** frequency.
- With ISDB-T, broadcasters can start broadcast to mobile TV receivers without additional investment, so broadcasters may get new opportunities to get Mobile TV advertisement revenue.
- Broadcaster can get new audiences as soon as they start to broadcast to mobile receivers because the area being available for fixed receivers is also available for mobile receivers
- Broadcaster can get New Businesses Opportunities

Example of TV program





JAPANESE STANDARD

EUROPEAN STANDARD

ISDB-T(Terrestrial)



One Transmitter is enough

SD Multi TV



HD TV



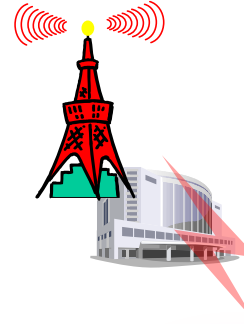
fixed

Portable TV handset



mobile

DVB-T(Terrestrial)



One Transmitter

SD Multi TV



HD TV



fixed

DVB-H(Handheld)

The other standard needs Additional transmitter for Mobile TV (DVB-H)



**Additional Transmitter
Additional Frequency**

Portable TV handset



mobile

Broadcaster need additional investments for mobile TV broadcasting(DVB-H)!

Double-price!!

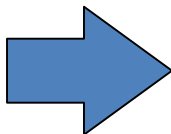
Broadcaster don't need additional investments for mobile TV broadcasting!

Economical

Broadcasters get new opportunities of broadcasting advertisement with ISDB-T mobile TV.

Example 1) With ISDB-T

We want to broadcast both Fixed and mobile TV



We CAN earn advertising fee on both Fixed and mobile TV with ISDB-T.



+



+

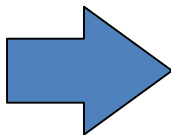


+



Example 2) With other standard

We can't broadcast to mobile TV



We CAN earn advertising fee on only Fixed TV audiences.



+



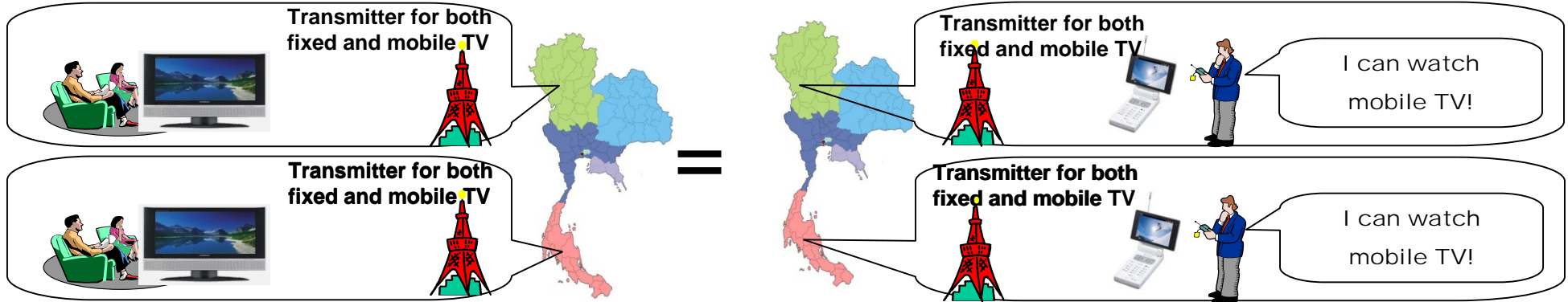
+



Example 1) With ISDB-T

Broadcaster can get new enough audiences as soon as they start to broadcast to mobile receivers because the area being available for fixed receivers is also available for mobile receivers.

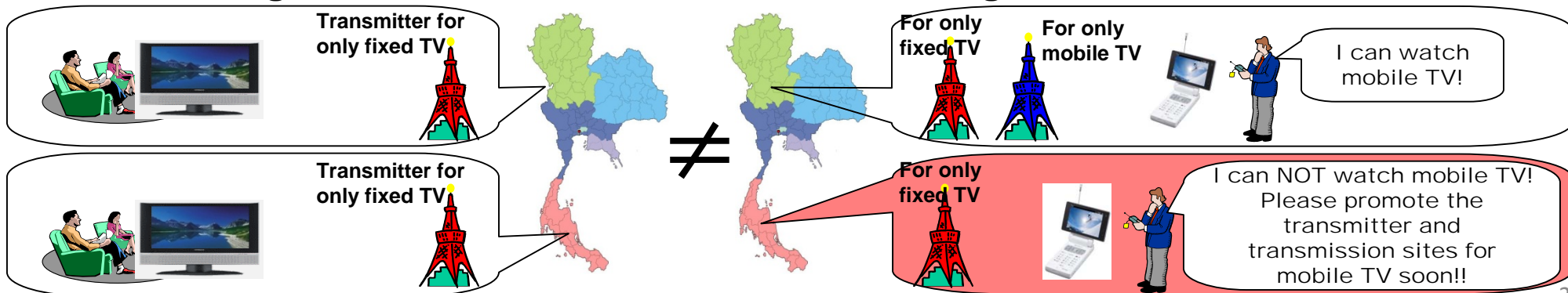
The area being available for fixed TV = The area being available for mobile TV



Example 2) With another standard

Broadcaster need additional transmitter and transmission sites for mobile TV if the Thai adopts other standard. Broadcaster would have difficulty to extend new audiences.

The area being available for fixed TV \neq The area being available for mobile



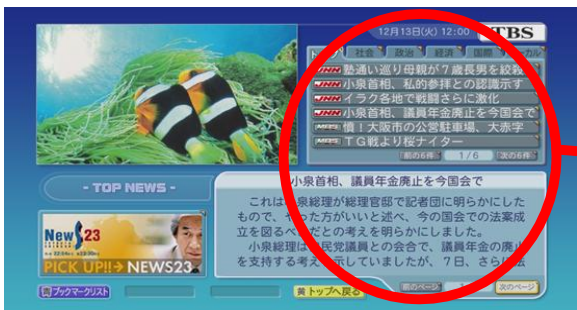
High functionality

Interactive TV over 60 million receivers,
e.g. interactive shopping

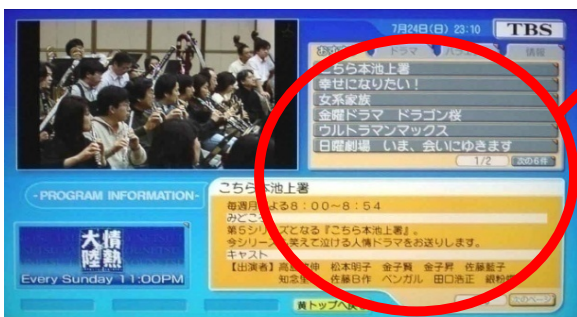
Data Broadcasting



Weather forecast



News



Information linked to on-air program



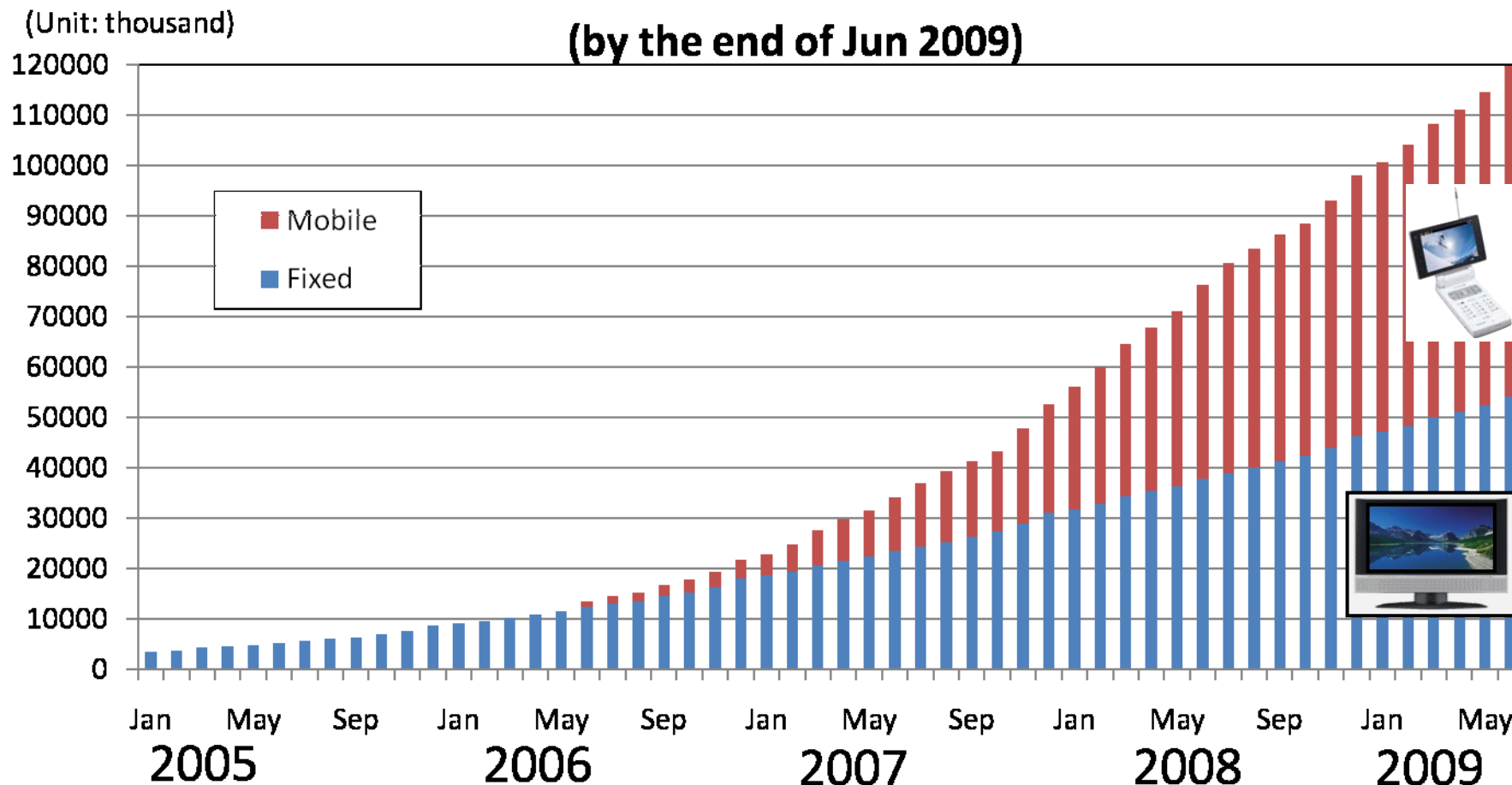
You can see the items and you can buy them directly.

ISDB-T succeeds in creating those New businesses



ISDB-T Receiver Shipments

More than 119 millions receivers have been shipped

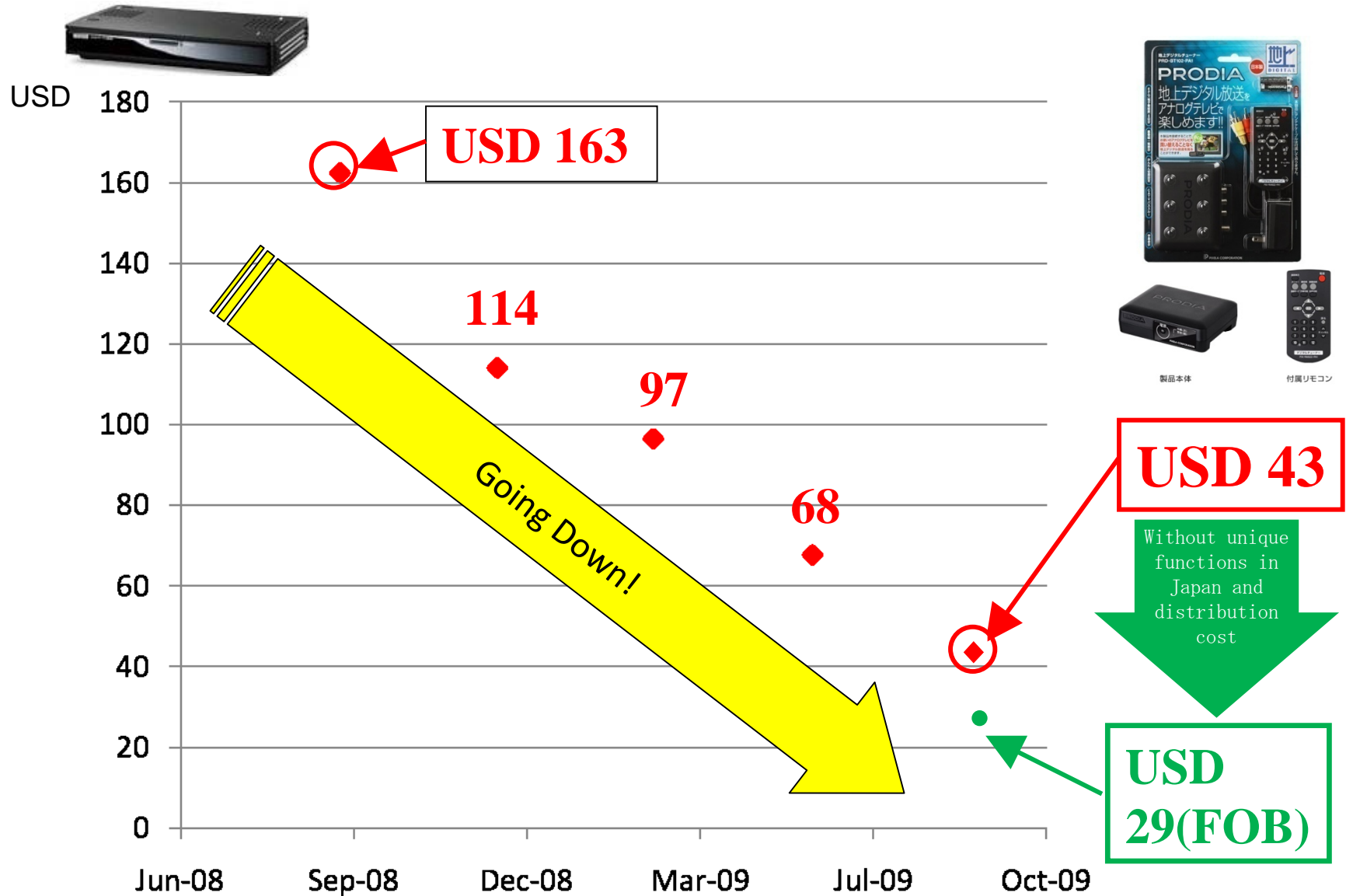


65.6 millions mobile receivers were shipped by the end of Jun 2009.

53.9 millions fixed receivers were shipped by the end of Jun 2009.

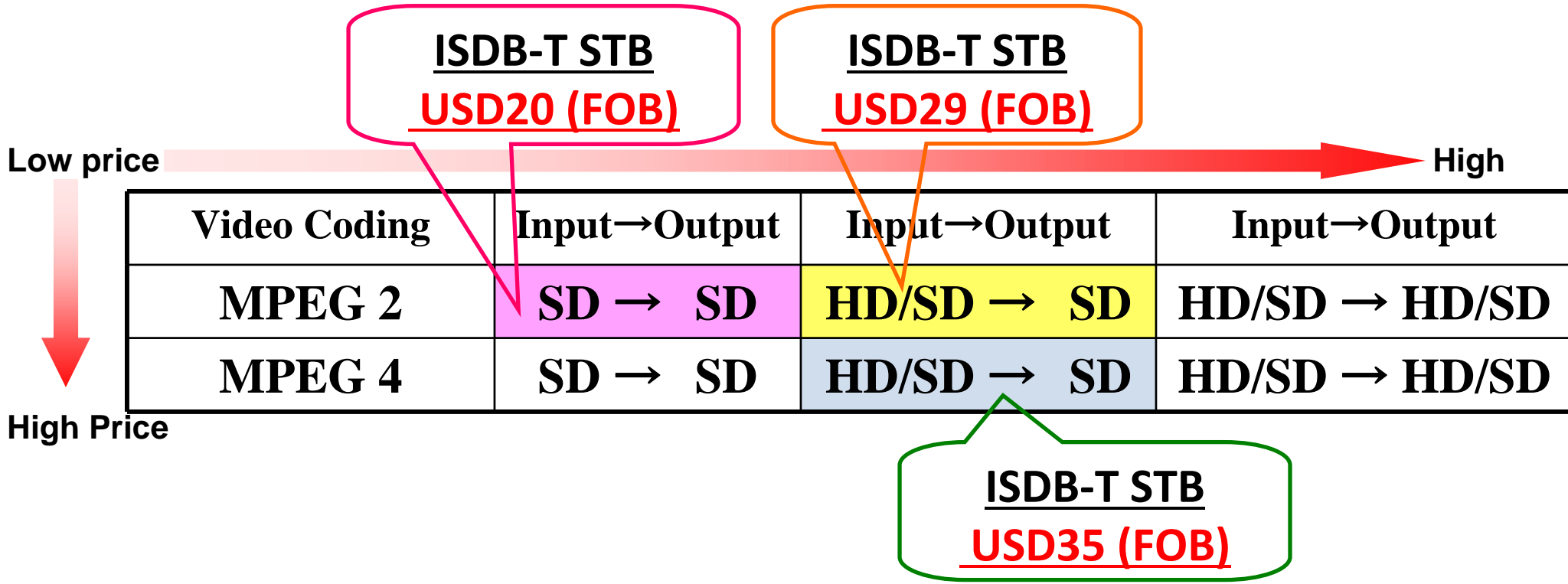


Set Top Box in Japan - transition of price -



*USD-JPY Average Exchange rate in 2008 : 1 USD = 103.37JPY

- The specification is different → Price is different.
- The price comparison among different specs does not make sense.



ISDB-T STB can be provided at affordable prices in each spec.

➔ ISDB-T STB is already affordable!!



World wide international manufactures provide Variety of Recovers for ISDB-T markets.

- Gradiente
- Philips
- Positivo
- Tec Toy
- Semp Toshiba
- Ebcom
- Samsung
- LG
- Envisio
- Aiko
- Amplimatic
- Thevear
- Visiontec
- Zinwell
- Panasonic
- Sony
- Olévia
- Telesystem
- Plasmatic
- Coship



GSM / 3G+TV Digital



LCD & PLASMA



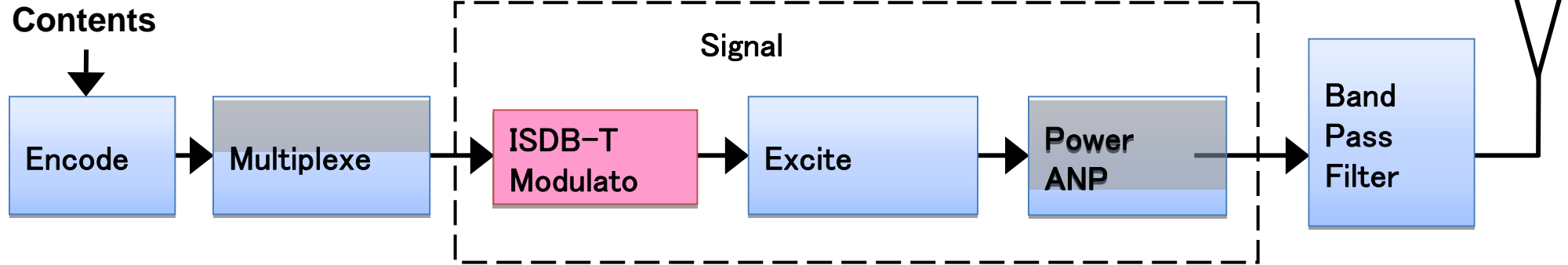
STB

USB One-Seg receiver

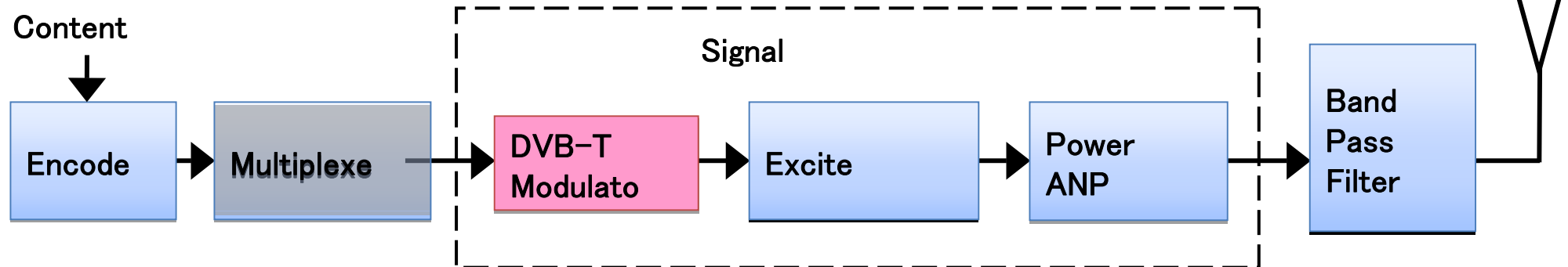
In Japan: Sony, Panasonic, Hitachi, Toshiba, NEC, Sanyo, Sharp Philips, Samsung, EWD, Dynaconnective, Maspro, Pixela, etc.....



Block diagram of ISDB-T Transmitting



Block diagram of DVB-T Transmitting System



➔ Difference between Digital TV systems is only a part of function implemented in modulator.

➔ The difference is a small part of whole cost of the equipments.

•TOSHIBA 

Company headquarters are in Tokyo, Japan.

http://www3.toshiba.co.jp/snis/ovs/broadcast_top.htm

•NEC 

Company headquarters are in Tokyo, Japan.

<http://www.nec.com/global/prod/nw/broadcast/index.html>

•ROHDE & SCHWARZ 

Company headquarters are in Munich, Germany.

http://www2.rohde-schwarz.com/en/products/broadcasting/tv_transmitters/tv_transmitter_power/

•HARRIS 

Company headquarters are in Melbourne, Florida, USA

http://www.broadcast.harris.com/product_portfolio/product_listing.asp?cat=12652

•LINEAR 

Company headquarters are in Santa Rita do Sapucaí, Brazil.

<http://www.linear.com.br/ing/index2.php?abrir=digital#vhf>

ISDB-T has the coverage of the population of 74% in South America.

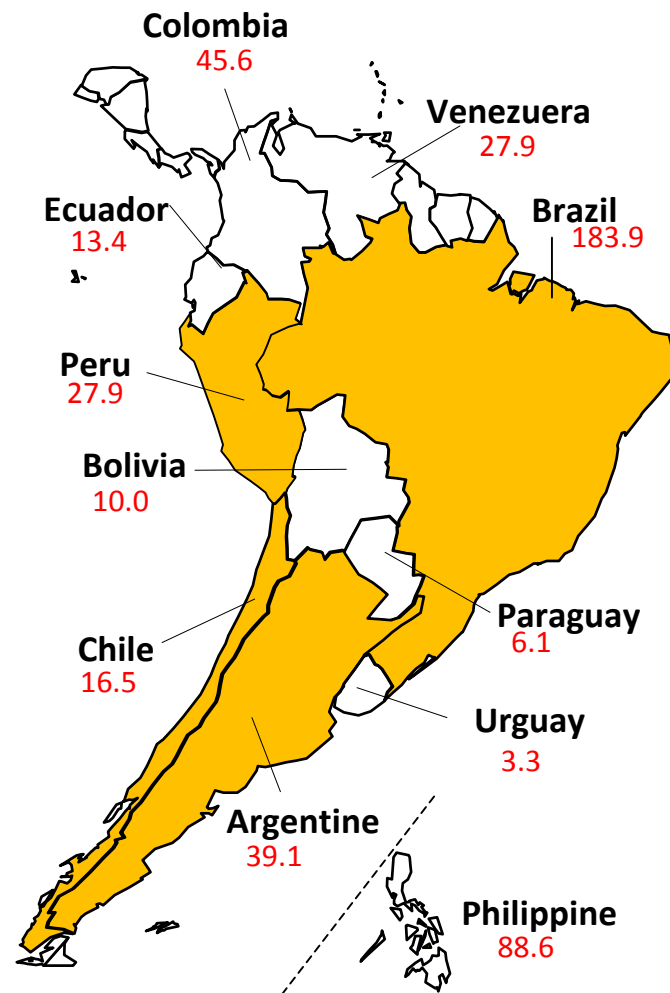
ISDB-T Family Countries

○Brazil:	June 2006	Adopted ISDB-T
	December 2007	Start DTTB service
○Peru:	April 2009	Adopted ISDB-T
	March 2010	Start DTTB service
○Argentina:	August 2009	Adopted ISDB-T
○Chile:	September 2009	Adopted ISDB-T

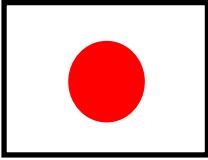
ISDB-T International Forum Has Launched !



(Center: Minister Haraguti from Japan Others from left side, Secretary Salas from Argentina, Minister Costa from Brazil, Minister Cornejo from Peru and Minister Cortazar from Chile)



※The red value shows "population".
(million)



ISDB-T

Japan will terminate analog TV and complete the digitalization of broadcasting in July 2011.



- 1999 Japan established the technical standard
- Sep. 2002 Japan established license conditions and requirements
- Dec.2003 **Start of DTTB !** (Tokyo, Nagoya, Osaka)
- Apr. 2006 **Start of One-Seg Broadcasting**
(Broadcasting Service for mobile reception)
- Dec. 2006 **All main cities started DTTB**
- Mar. 2009 **Coverage of population reached 97%**





1. The Japanese system, ISDB-T, is the most advanced system.
Because it can provide :
 - a. TV programs to both fixed and mobile receivers in the SINGLE channel (or in the SINGLE bandwidth).
 - b. stable and high quality reception even with indoor antenna (robust against impulse noise).
 - c. better reception in wider area than other systems.

2. We are now preparing detailed comments on the NTC's report.
Our comments on Technical Factors, Economic factors, and the 10 reasons to adopt DVB-T are on the next slide.

3. It is very important to evaluate systems by carrying out reception tests.



1. Comments on the NTC's report "Technical factors (Page 2-2)"

- **Maturity:**
More than 97 % of population has been already covered by Terrestrial Digital TV Broadcasting in Japan, toward completely termination of Terrestrial Analog TV Broadcasting in 2011. The regular broadcasting with ISDB-T system has been also inaugurated in Brazil, and the system is enough matured.
- **Spectrum efficiency:**
The ISDB-T system, which can provide "One-Seg" mobile broadcasting in the single channel, is more efficiency in occupying spectrum.
- **Robustness:**
The ISDB-T system, which has the Time-interleaving function, is more excellent than the DVB-T system (robust against impulse noise).
- **Wider usability:**
The ISDB-T system, which can provide "One-Seg" mobile broadcasting simultaneously with HDTV/SDTV service, is wider usability than the DVB-T system, because the DVB-H system is different.
- **Flexibility:**
The ISDB-T system, which parameters are selectable depending on programs, is also excellent.
- **Interoperability:**
The ISDB-T system is also excellent in the view of interoperability with other systems. It is remarkable that the DVB-T system is not interoperable with the DVB-T2.



- **Cost of migration and impact on the public**

There are no differences of the STB prices between the ISDB-T and the DVB-T systems, any more. ISDB-T STB already can be provided at a affordable price.

- **Social issues related to national security**

Only the ISDB-T system can provide the Emergency Warning System. The ISDB-T system can provide interactive services via telephone line or the Internet.

- **International popularity**

Not only Japan and Brazil but Peru, Argentina, and Chile are adopted the ISDB-T system. Other countries are also considering to introduce the ISDB-T. The members of ISDB-T are Expanding.



3. Comments on the NTC's report "10 reasons (Page 2-3)"



10 reasons to adopt DVB-T	System Japan/Brazil (ISDB-T)	EU (DVB-T)
1. Available for PAL B/G 625 line 50 Hz.	Implemented Argentine introduces ISDB-T for replacing PAL N 625 line 50Hz	Implemented
2. Efficiency for Channel Plan	Excellent Mobile TV can be provide in 1 bandwidth	Medium
3. robust against echo and multi-path interferences.	Excellent Time Interleave Technology	Medium
4. Better reception with mobile and portable receivers.	Time Interleave Technology	Medium
5. SDTV, HDTV and SDTV/HDTV multiple service provision are possible.	Excellent Mobile TV is also available in 1 bandwidth	Implemented
6. Receiving both fixed (DVB-T) and mobile (DVB-H) in the single channel is possible.	Excellent Mobile TV is in service!!	no running system
7. Frequency allocation is easy due to Single Frequency Network (SFN).	Well experienced	Implemented
8. Various parameters are selectable.	Implemented	Implemented
9. Data broadcasting is possible simultaneously with other services.	Various Services	Implemented
10. Television receivers and set-top box are cheaper.	Affordable and High Spec. (Available for HD/SD input)	Affordable (Available for SD)



Reference "System Flexibility" (1/2)



Flexibility	Examples of ISDB-T	Examples of DVB-T(reference)
1.Service Flexibility	(1) HDTV, (2) Multi-SDTV (3) Selectable of (1) and (2) (4) with data-casting service → Band Segmentation	(1) Multi-SDTV (note) many countries have Multi-SDTV service only (note) DVB-T data-casting (MHP) is not popular
2.Harmonization with communication network	(1)interactive service in home (fixed reception) (2)interactive service out of home (mobile/portable reception) → Band Segmentation	MHP service is not so popular, therefore, these business model is limited. In addition, mobile reception performance is not good.
3.Hierarchical transmission	(1) Mobile TV in TV(note 1) (2)Pocket TV out of home (3)variety of reception style(note 2)	No actual service
4.Robustness against urban noise and fading	(1)TV in any place(note 3) (2) easy migration(note 4) (3)expansion of cover area even though mobile/portable reception service(note 5) → Time Interleave	Inferior compare to ISDB-T
5.additional service for mobile/portable reception	(1)EWS(early warning system) service (note 6)	No actual planning
6.Capability of future upgrade service	As described above, broadcaster can expand and/or up glade of service after starting broadcast service	As described above, kinds of service of DVB-T is not so many, so, future expansion may be limited. (note 7)



(note 1) In ISDB-T, simulcast service to fixed reception and portable reception using hierarchical transmission technology. One-seg service is very popular service example. Any viewer enjoy your program both in/out of home

(note 2) for indoor reception service, hierarchical transmission is also useful, same contents transmit in more robust hierarchy.

(note 3) same image as (note 1)

(note 4) Robustness enable a easy indoor reception, therefore, viewer's investment (install roof top antenna) will be reduce. As a result, urgent migration of digital broadcasting will be expected

(note 5) In SFN operation, a mobile/portable reception performance have to be degraded without time-interleave

(note 6) EWS requests not only in home reception but also out of home reception. One-seg is best service model for EWS

(note 7) DVB-T propose that DVB-H and DVB-T2 for another service, but these standards are different from DVB-T. therefore another transmitter/ receiver/ frequency should be requested for DVB-H and DVB-T2 service.