

**ISDB-T technical seminar(2008)  
in Philippines**

**Presentation 5**

**Features/Standard Structure of  
ISDB-T**

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Digital Broadcasting Expert Group (DiBEG)

Japan

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## A. Features of ISDB-T

## Requirement for ISDB-T in Japan

No.	Item	Requirement	Note
1	<b>High quality</b>	HDTV should be possible in 6MHz bandwidth	
2.	<b>Robustness</b>	Robustness against multi-path, urban noise, fading and any other interference	
3.	<b>Flexibility</b>		
3(1)	<b>Service Flexibility</b>	Any kinds of service are possible in 6MHz bandwidth	HD/SD possible
3(2)	<b>Reception flexibility</b>	Any kinds of reception system are possible, fixed/mobile/portable in same bandwidth	
4	<b>Effective utilization of frequency resource</b>	SFN(Single Frequency Network) is possible to reduce frequency.	
5.	<b>Interactivity</b>	Harmonization with network	
6	<b>Data casting</b>		
7.	<b>Commonality</b>	Maximum commonality is need to reduce receiver cost. Especially, to digital radio, common standard is desirable.	

## High quality/ service flexibility

Following technologies are adopted in ISDB-T; (a)Flexible multiplex technology (MPEG-2 systems), (b)Flexible and high efficiency video/ audio coding system (MPEG-2 and MPEG AAC).

As a result, many kinds of broadcasting service, such as (a)HDTV, (b)HDTV+SDTV, (c)Multi-channel SDTV, are possible in one standard. ISDB-T receiver receives any type of service described above.



**For Coding/Multiplexing system, Outlines are explained in presentation 9**

## ISDB-T transmission system

ISDB-T adopts very unique and high performance transmission technology, named “OFDM Segmented Transmission with Time Interleave”. This transmission technology enables many advantages shown below compared to other DTTB system



**Details of transmission system will be explained in presentation 7**

## **Robustness/ reception flexibility**

To give the robustness against such degradation factor, ISDB-T adopts OFDM transmission system with “Time Interleave” technology.

As a result, ISDB-T gives following features compare to other DTTB systems; (a) lower transmitter power, (b) possibility of indoor antenna reception, (c )mobile/portable reception service, etc.

## **Effective utilization of frequency resource**

By adopting OFDM transmission system, it is possible to construct Single Frequency Network(SFN). As a result, possible to reduce frequency resource for relay transmitter(repeater). Further more, using same frequency for plural transmitters of same network, mobile/ portable receiver is not required to change receiving channel.

## **Mobility/ Portability**

To enable fixed/ mobile/portable reception service in same channel, ISDB-T developed new transmission technology, named “Segmented OFDM transmission system”.

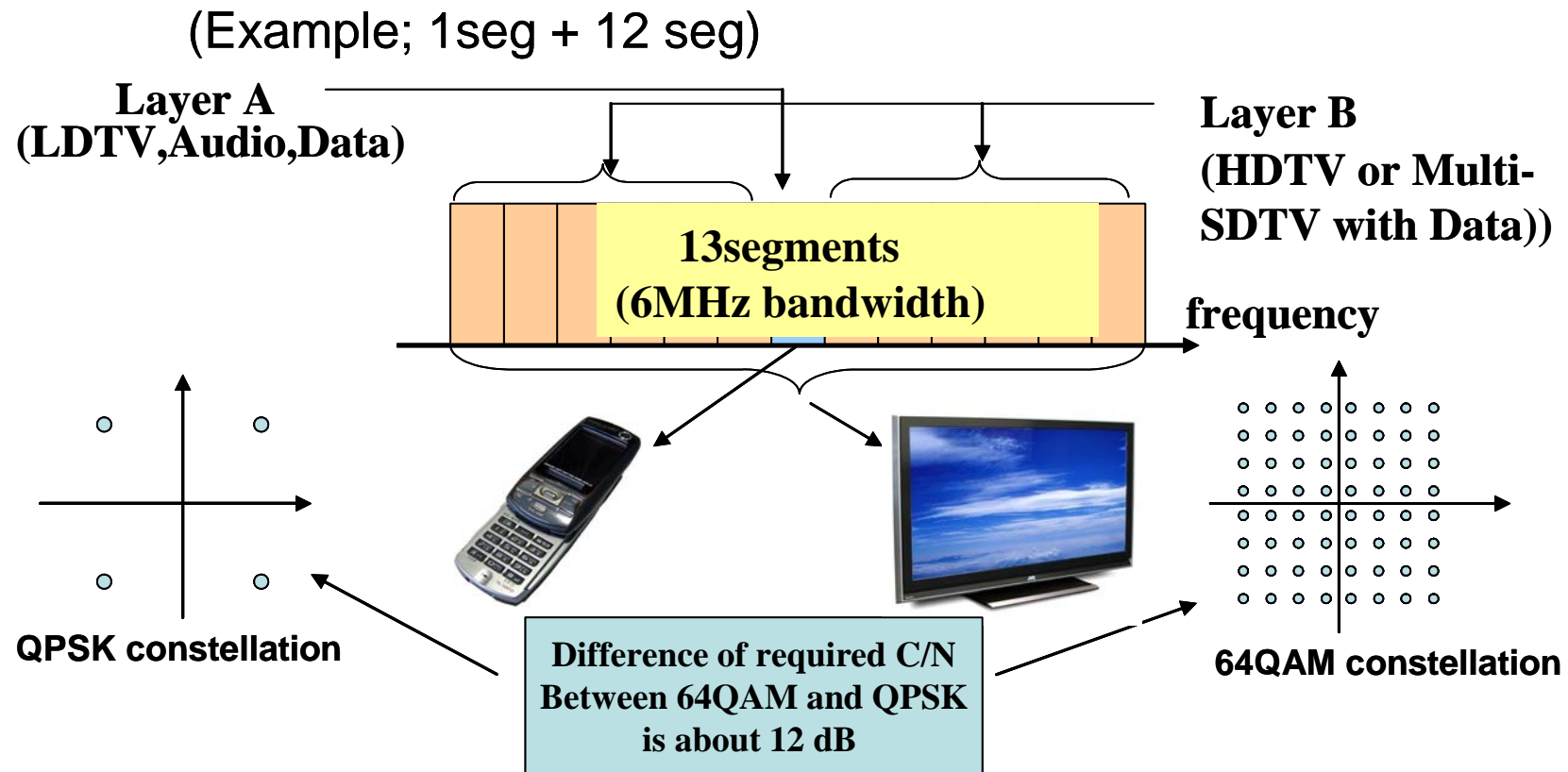
As a result, fixed/mobile & portable service in same channel is possible.

“One-seg” service, its unique portable service of ISDB-T, uses 1 segment of 6MHz.

One seg receiver is easily mounted into mobile-phone, portable PDA, USB tuner ,etc, so it enable the broadcast service of “Any time, Any place”

## **One-seg service**

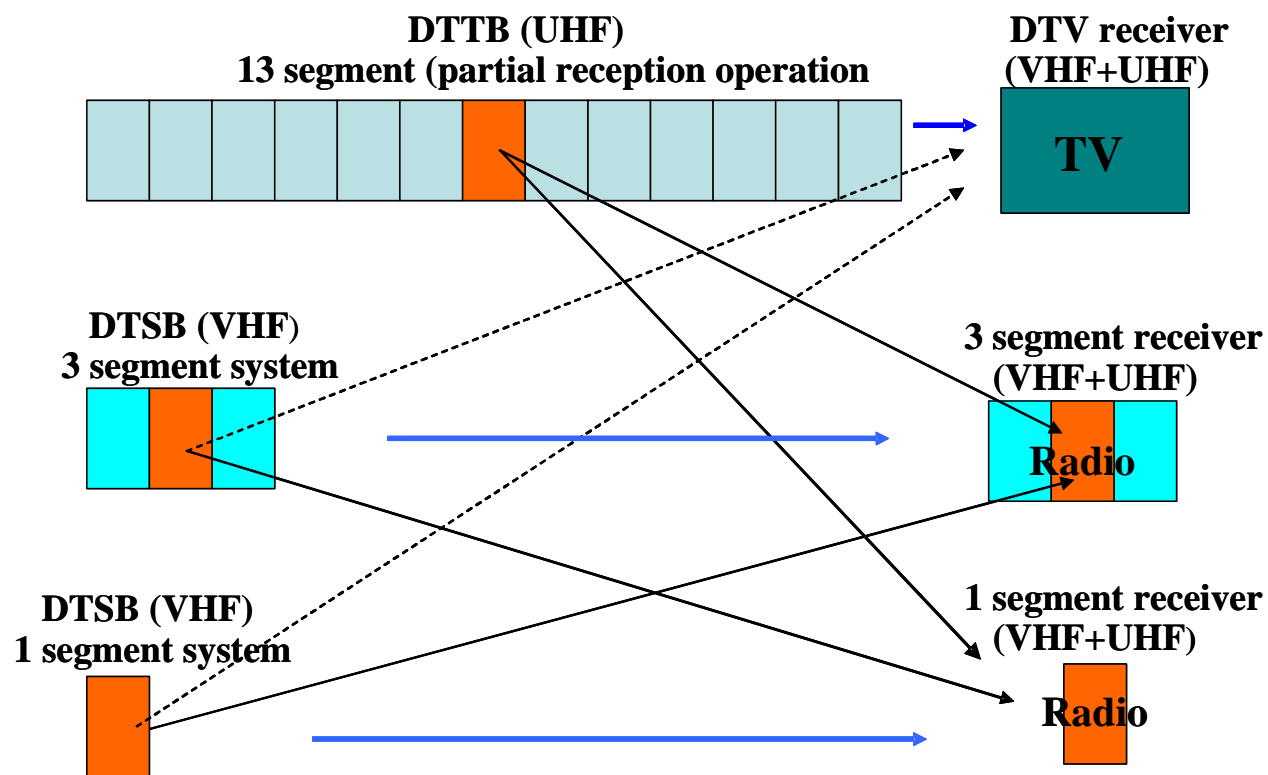
One-seg service, uses 1 segment of 6MHz, dose not need another channel, so not need more transmitter.. it leads save of frequency resource and broadcaster’s infrastructure cost. And more, One-seg receiver operates as narrow band reception, this operation saves consumption power. As a result, long time reception is possible by battery.



**Image of “One-seg “ service in same channel**

## Commonality

Japanese digital audio broadcasting, named ISDB-Tsb just now trial service stage, adopts common standard of ISDB-T for coding/transmission system. As a result, common receiver for One-segment audio service and One-seg TV service has been on market.

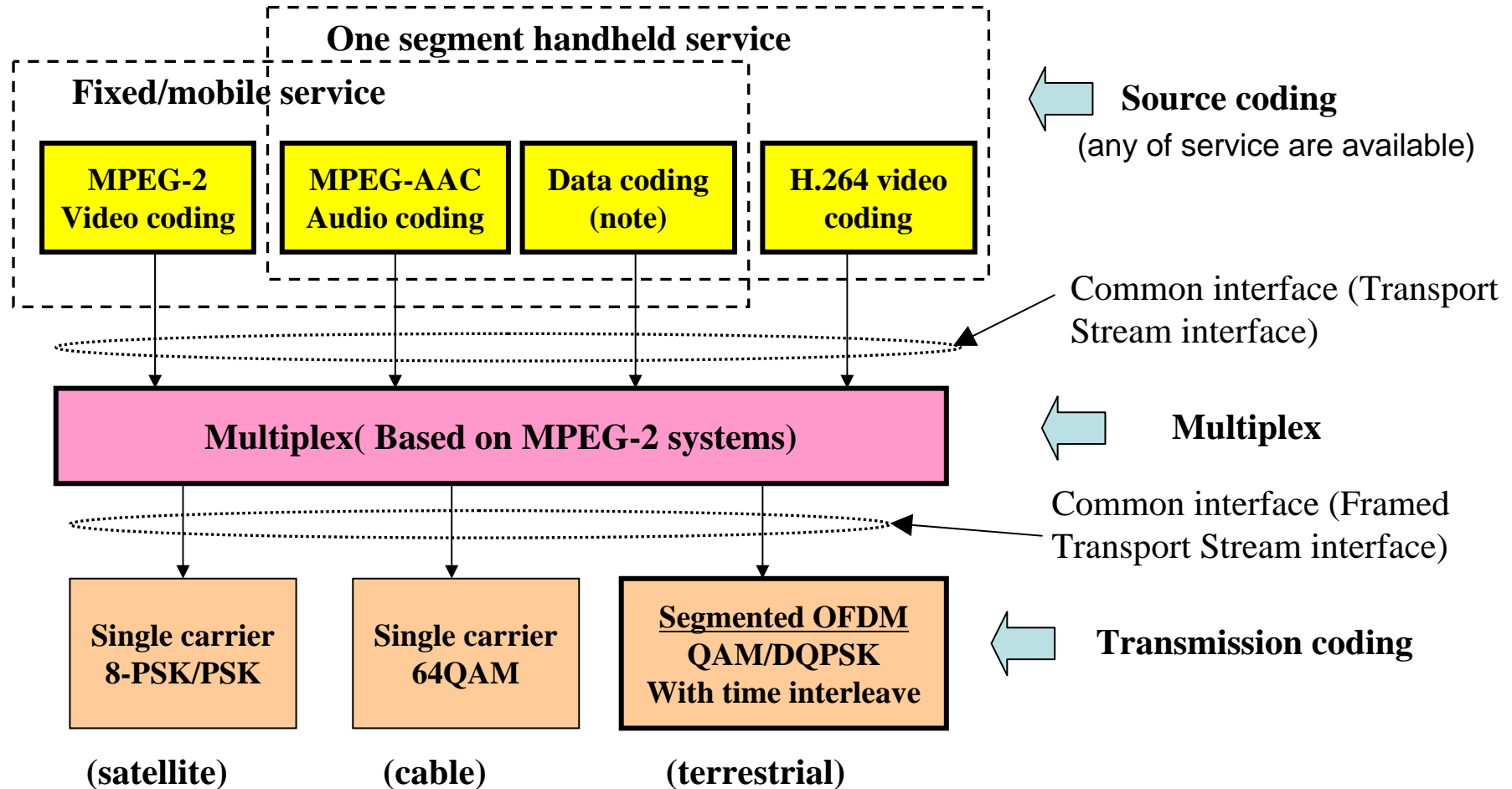


**Relation between digital TV and Digital Audio**



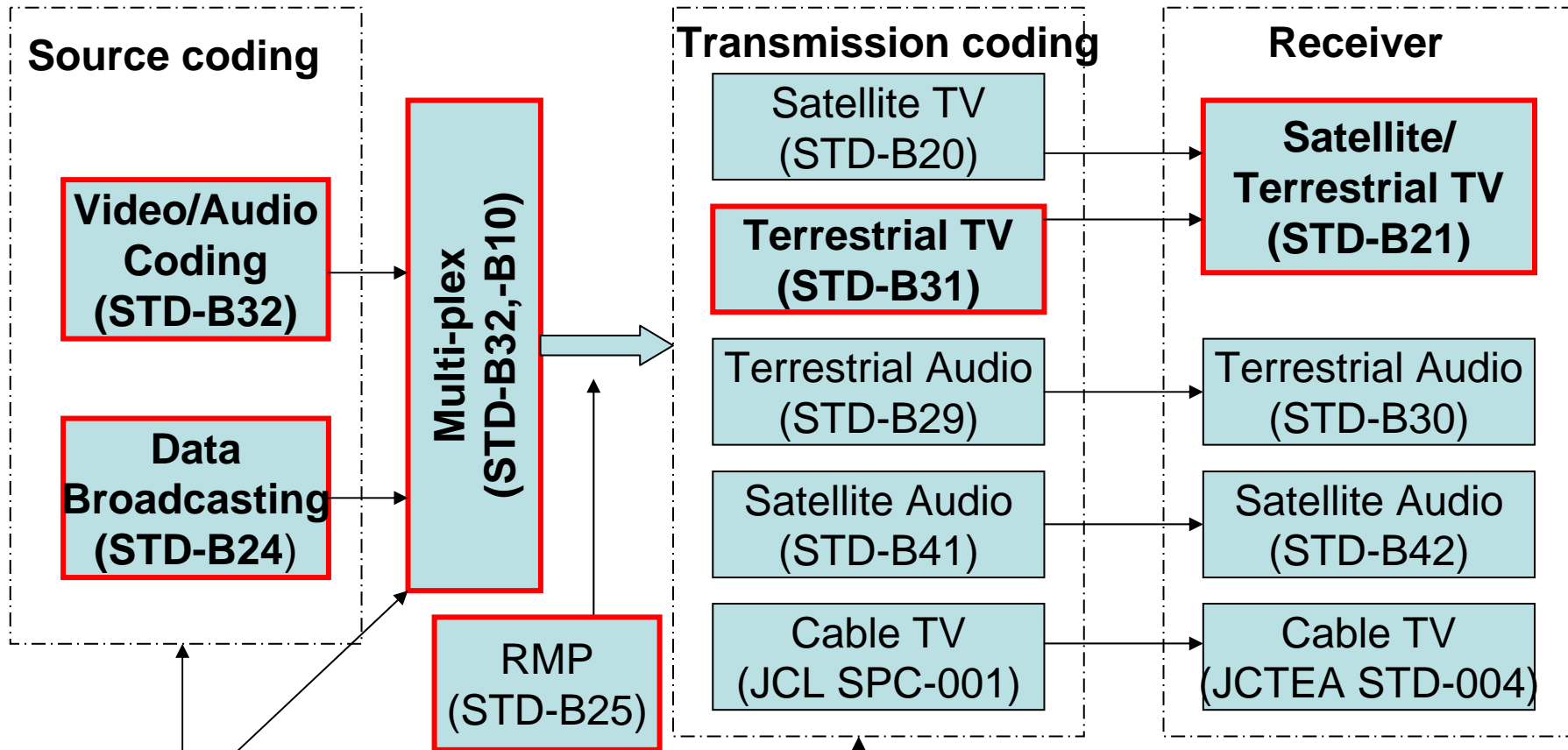
## **B. Structure of ISDB-T Standard in Japan**

# 1. Structure of Digital Broadcasting



(note) both BML and MHP are available,  
But in Japan now BML is only service in.

## 2. Digital Broadcasting Standard in Japan



Source coding and MUX systems are common for each system

Transmission systems are different

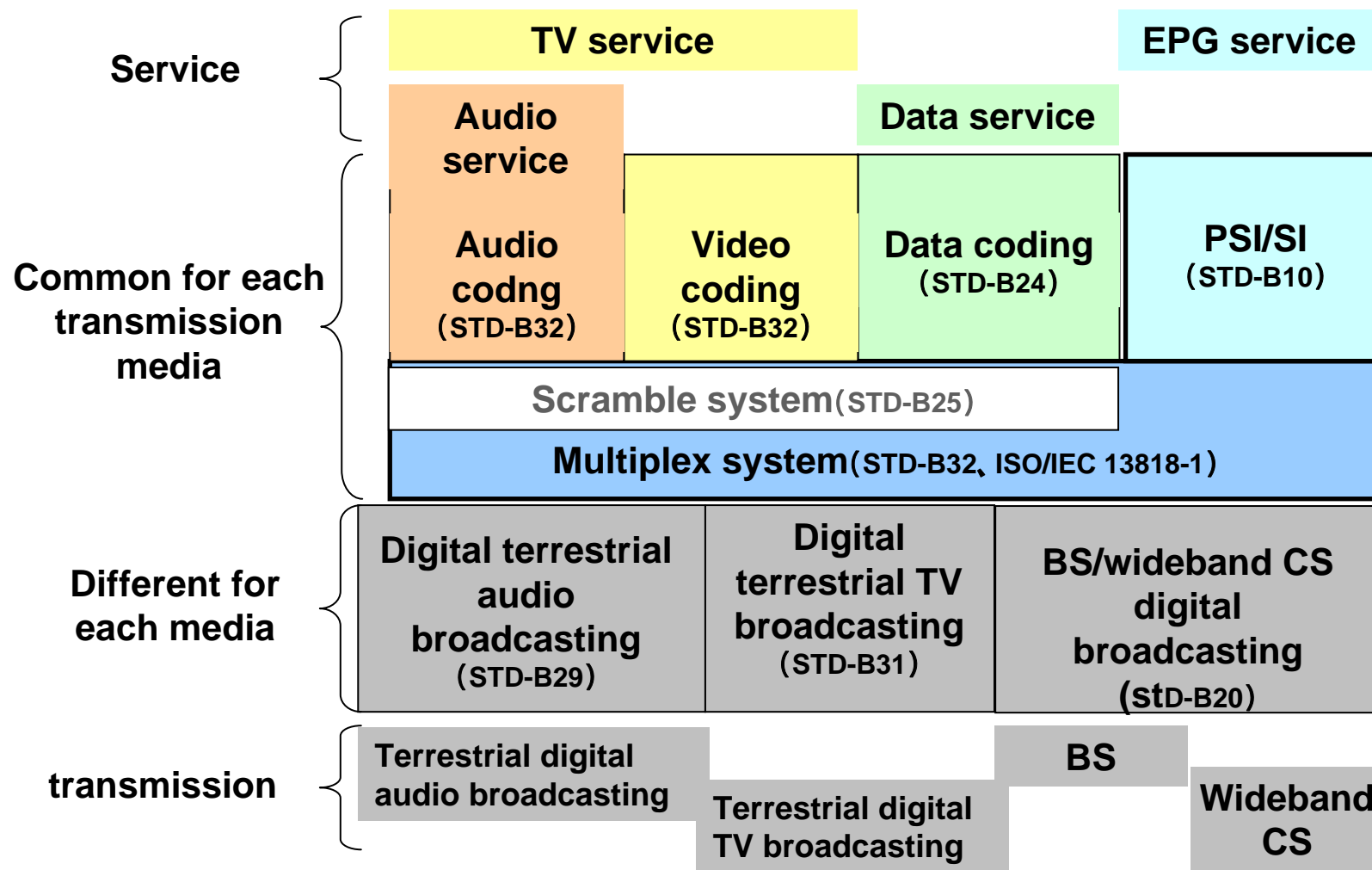
Note: Cable transmission system standards are defined at another consortium

## 2. Digital Broadcasting Standard in Japan( continued)

	Digital Television		Digital Sound	
	BS / wCS	Terrestrial	Terrestrial	Satellite
System	STD-B20	<b>STD-B31</b>	STD-B29	STD-B41
Multiplex	Coding & Multiplexing		<b>STD-B32</b>	
	Service Information		<b>STD-B10</b>	
Source coding	Coding & Multiplexing		<b>STD-B32</b>	
Data Broadcasting	Presentation Engine (BML)		<b>STD-B24</b>	
	Execution Engine (GEM-based)		<b>STD-B23</b>	
CAS	Conditional Access		<b>STD-B25</b>	
Home servers	System based on Home Servers		STD-B38	
Receivers	<b>STD-B21</b>		STD-B30	STD-B42
Operational Guidelines	TR-B15	<b>TR-B14</b>	TR-B13	TR-B26

(note) Documents marked by red color can be downloaded from DiBEG HP  
<http://www.dibeg.org/aribstd/ARIBSTD.htm>

## 2. Digital Broadcasting Standard in Japan( continued)



### 3. Outline of ARIB Standards

#### Source coding & Multiplexing

Name	Outline	note
<b>Video/Audio coding (STD-B32)</b>	<ul style="list-style-type: none"><li>-Based on MPEG-2 video coding</li><li>-Cover 1080i,720p,480p,480i</li><li>-Based on MPEG AAC audio coding</li><li>-Up to 5.1 Stereo audio</li><li>-Based on MPEG systems multi-plex</li></ul>	
<b>Data Broadcasting (STD-B24)</b>	<ul style="list-style-type: none"><li>-Data broadcasting description</li><li>-Data transmission format</li><li>-Small size Video coding(MPEG-4,H.264)</li></ul>	
<b>Program line-up information (STD-B10)</b>	<ul style="list-style-type: none"><li>-PSI/SI description</li><li>-EPG description</li><li>-Necessary for program selection</li></ul>	

### 3. Outlines of Standards (continued)

#### Transmission coding

Name	Outline	note
<b>Satellite TV (STD-B20)</b>	<ul style="list-style-type: none"> <li>-Slot structure</li> <li>-Trellis+RS(Concatenated coding)</li> <li>-Single carrier 8 PSK modulation</li> </ul>	<b>2 HDTV programs are muliti-plexed into 1 transponder</b>
<b>Terrestrial TV (STD-B31)</b>	<ul style="list-style-type: none"> <li>-Segment structure</li> <li>-Viterbi+RS (Concatenated coding)</li> <li>-Multi-carrier(OFDM) transmission</li> </ul>	<b>1 segment transmission is available</b>
<b>Terrestrial Audio (STD-B29)</b>	<ul style="list-style-type: none"> <li>-1 and 3 segment transmission</li> <li>-Others are almost same as STD-B31</li> </ul>	<b>1 segment system is compatible to 1 segment of TV</b>
<b>Satellite Audio (STD-B42)</b>	<ul style="list-style-type: none"> <li>-Multiplex 64 CDM channel</li> <li>-Viterbi+RS (Concatenated coding)</li> <li>-CDM-BPSK/QPSK transmission</li> </ul>	<b>Adopt “AAC+SBR” 2.6GHz Band</b>

## 3. Outlines of Standards (continued)

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### 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

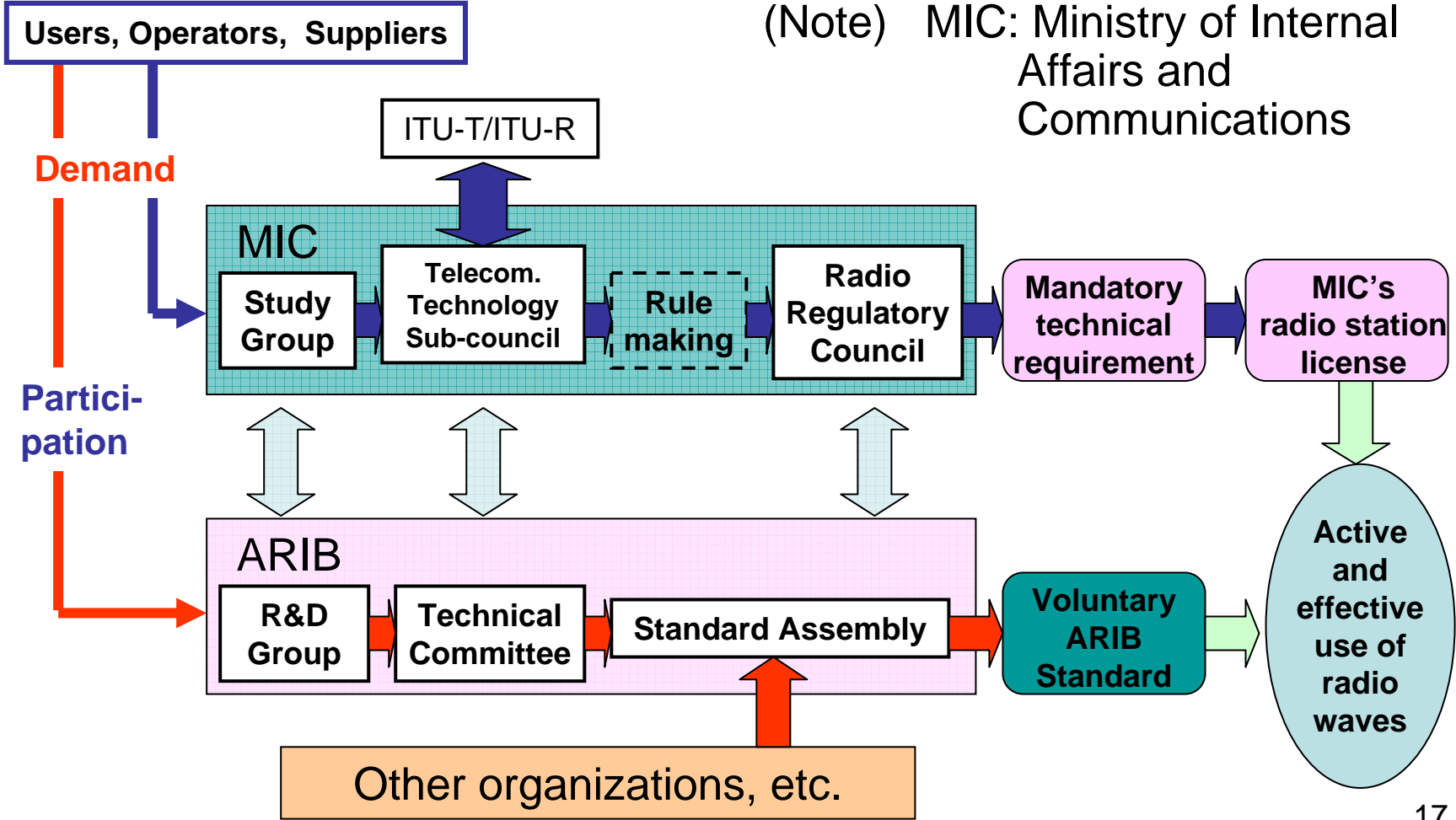
ARIB TR-B15; BS/wideband CS broadcasting operational guideline

ARIB TR-B26; Satellite Audio broadcasting operational guideline



# Reference: Relation between Government Regulations and ARIB Standards

## Standardization Flow in Japan



## Reference: Continued

# Government Regulations and ARIB Standards for radio systems

	Government Regulations	ARIB Standards
Nature	<b>Mandatory</b>	<b>Voluntary</b>
Purpose	<ul style="list-style-type: none"> <li>◆ To promote efficient use of frequency</li> <li>◆ To prevent interference</li> <li>◆ etc.</li> </ul>	<ul style="list-style-type: none"> <li>◆ To ensure common air interface</li> <li>◆ To ensure suitable quality</li> <li>◆ For greater convenience to manufacturers and users</li> <li>◆ etc.</li> </ul>
Technical items	<ul style="list-style-type: none"> <li>◆ Frequency band</li> <li>◆ Spurious emission</li> <li>◆ Frequency tolerance</li> <li>◆ Occupied bandwidth</li> <li>◆ etc.</li> </ul>	<ul style="list-style-type: none"> <li>◆ Communication protocol</li> <li>◆ Sencitivity</li> <li>◆ Carrier to Noise ratio</li> <li>◆ Bit error rate</li> <li>◆ Measurement method</li> <li>◆ etc.</li> </ul>

**END of Presentation 5**

Thank you for your attention