**ISDB-T seminar in Brazil( 2007)**
**in Argentina**

# Seminar #6

# Brief Presentation for Video/Audio/ data casting system in Japan

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Digital Broadcasting Expert Group (DiBEG)

Japan

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# Contents

# 1. Video Coding System

In Japan, HDTV had been developed since 1980's, and analog HDTV trial service, named MUSE, has already started. Because of this situation, video coding system for DTV should support many video format and has capability of video format change according to display aspect ratio.

because of above reasons, specifications of video coding should have following features

(1) Video coding system; adopt most popular system MPEG2

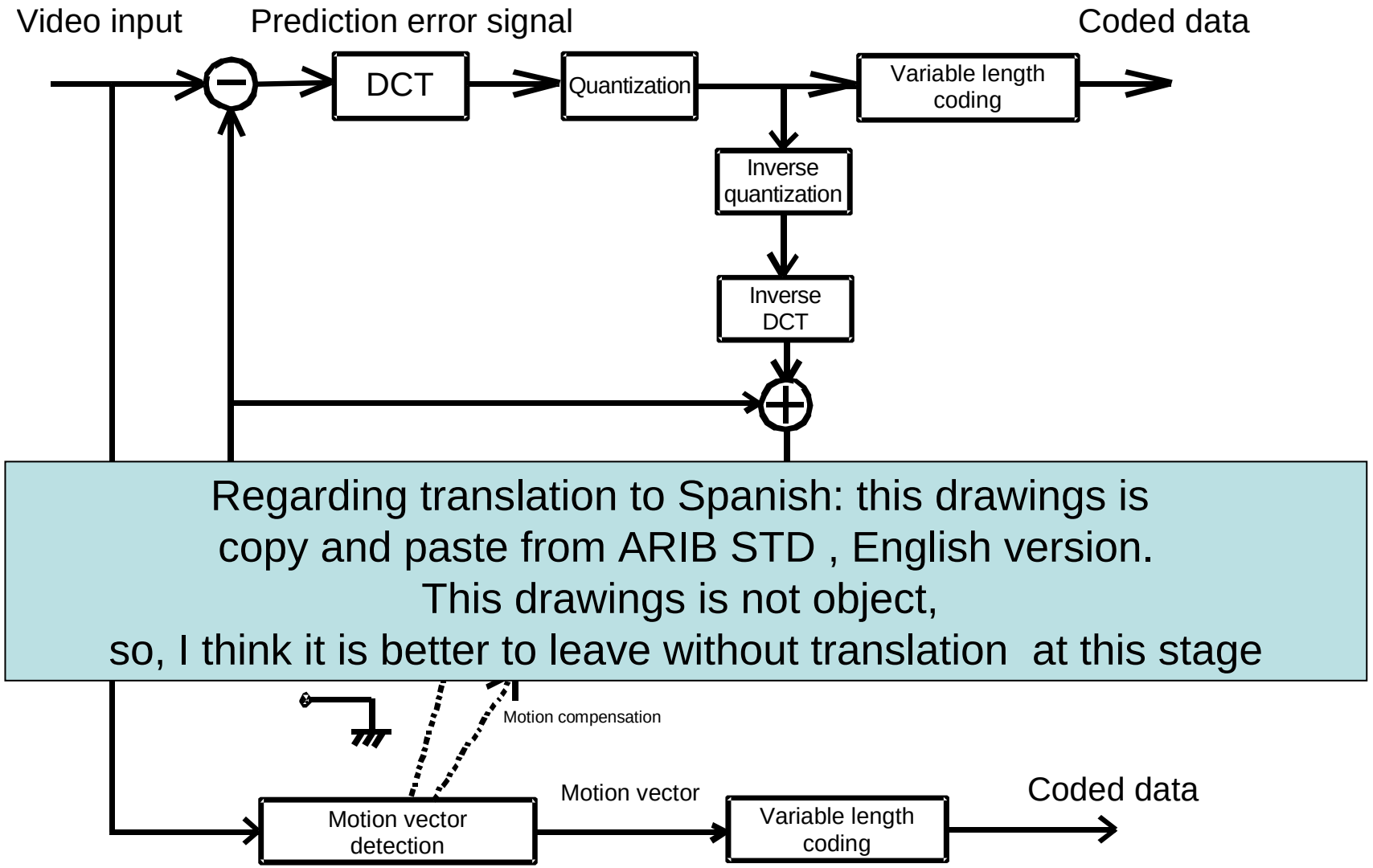
(2) Support many types of video format; 480i/480p/1080i/720p

(3) Specify the relationship of video source and display aspect ratio

Video coding system is specified in ARIB STD-B32 Part 1(note)

(note) Video coding system for LDTV is specified in ARIB STD-B24 separately

# Video compression, coding block diagram




Regarding translation to Spanish: this drawings is copy and paste from ARIB STD , English version. This drawings is not object, so, I think it is better to leave without translation at this stage

(ARIB STD-B32 Part 1, chapter 4.1 )

# Video signal parameters

| | | | | | |
|---|---|---|---|---|---|
| Number of lines | | 525 | 525 | 750 | 1125 |
| Number of active lines | | 483 | 483 | 720 | 1080 |
| Scanning system | | Interlaced | Progressive | Progressive | Interlaced |
| Frame frequency | | 30/1.001 Hz | 60/1.001 Hz | 60/1.001 Hz | 30/1.001 Hz |
| Field frequency | | 60/1.001 Hz | | | 60/1.001 Hz |
| Aspect ratio | | 16 : 9 or 4 : 3 | 16 : 9 | 16:9 | 16 : 9 |
| Line frequency $f_H$ | | 15.750/ 1.001kHz | 31.500/ 1.001 kHz | 45.000/ 1.001 kHz | 33.750/ 1.001 kHz |
| Sampling frequency | Luminance signal | 13.5 MHz | 27 MHz | 74.25/1.001MHz | 74.25/1.001MHz |
| | Color-difference signals | 6.75 MHz | 13.5 MHz | 37.125/ 1.001MHz | 37.125/ 1.001MHz |
| Numbers of samples per line | Luminance signal | 858 | 858 | 1650 | 2200 |
| | Color-difference signals | 429 | 429 | 825 | 1100 |
| Number of samples per active line | Luminance signal | 720 | 720 | 1280 | 1920 |
| | Color-difference signals | 360 | 360 | 640 | 960 |
| Filter characteristics | | See Fig. 1 | See Fig. 2 | See Fig. 3 | |
| Line synchronizing signal | | See Fig. 4 | | See Fig. 5 | See Fig. 6 |
| Field synchronizing signal | | See Fig. 7 | See Fig. 8 | See Fig. 9 | See Fig. 10 |

(ARIB STD-B32 Part 1, chapter 2.4 )

# (a) Outline of video coding

(1)Compression system; MPEG2(MP@HL)

(2) Video format

| No. of line | No. of pixel | quality |
|---|---|---|
| 1080i | 1920*1080 | HDTV (interlace) |
| 720p | 1440*720 | HDTV (progressive) |
| 480p | 720*480 | SDTV (progressive) |
| 480i | 720*480 | SDTV (interlace) |

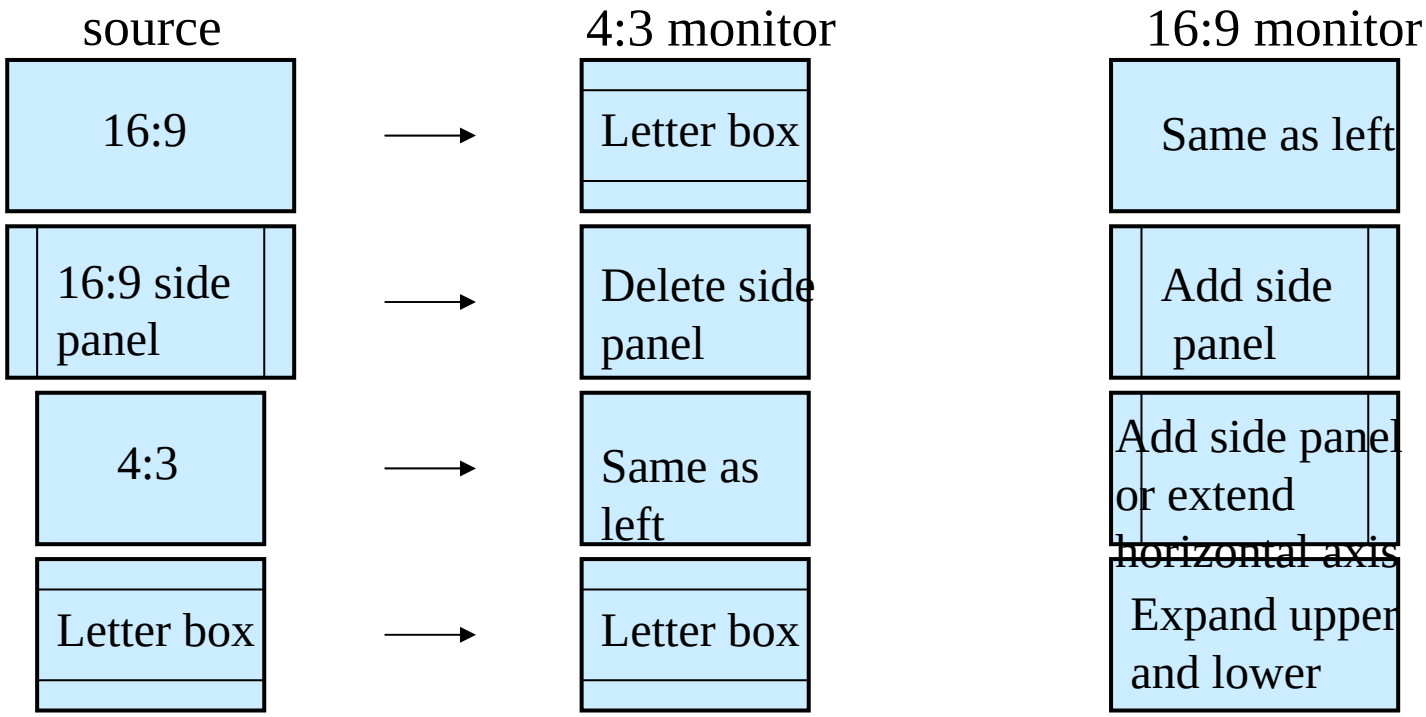
D terminal: D1:480i, D2:480p, D3:1080i, D4:720p

# (b)Actual video bit rate

| No. of line | profile | actual bit rate |
|---|---|---|
| 1080i | MP@HL | BS:12-24Mbps<br>DTTB:8-20Mbps |
| 720p | MP@H-14 | |
| 480p | MP@H-14 | BS:4-24Mbps<br>DTTB：4-20Mbps |
| 480i | 720*480 | 1.5-15Mbps |
| 240p | 720*480 | 0.2-4Mbps |

# Video decoding processing in TV receiver

Decode HL, H14, ML, LL of MPEG-2 main profile. The output format is either of 1125i, 750p, 525p, 525i format.



# 2. Audio Coding System

## (a) Audio Input Format

| Parameter | Restriction |
|---|---|
| Audio mode Possible audio modes | Monaural, stereo, multichannel stereo (3/0, 2/1, 3/1, 2/2, 3/2, 3/2+LFE) (Note 1), 2-audio signals (dual monaural), multi-audio (3 or more audio signals) and combinations of the above |
| Recommended audio mode | Monaural, stereo, multichannel stereo (3/1, 3/2, 3/2+LFE) (Note 2), 2-audio signals (dual monaural) |
| Emphasis | None |

| | |
|---|---|
| (Note 1) Number of channels to front/rear speakers: | Example:3/1 = 3 front + 1 rear<br>3/2 = 3 front and 2 rear |
| (Note 2) LFE = Low frequency enhancement channel | |

ARIB STD-B32 part 2 Chapter 5.1

## (b) Main parameters of audio coding

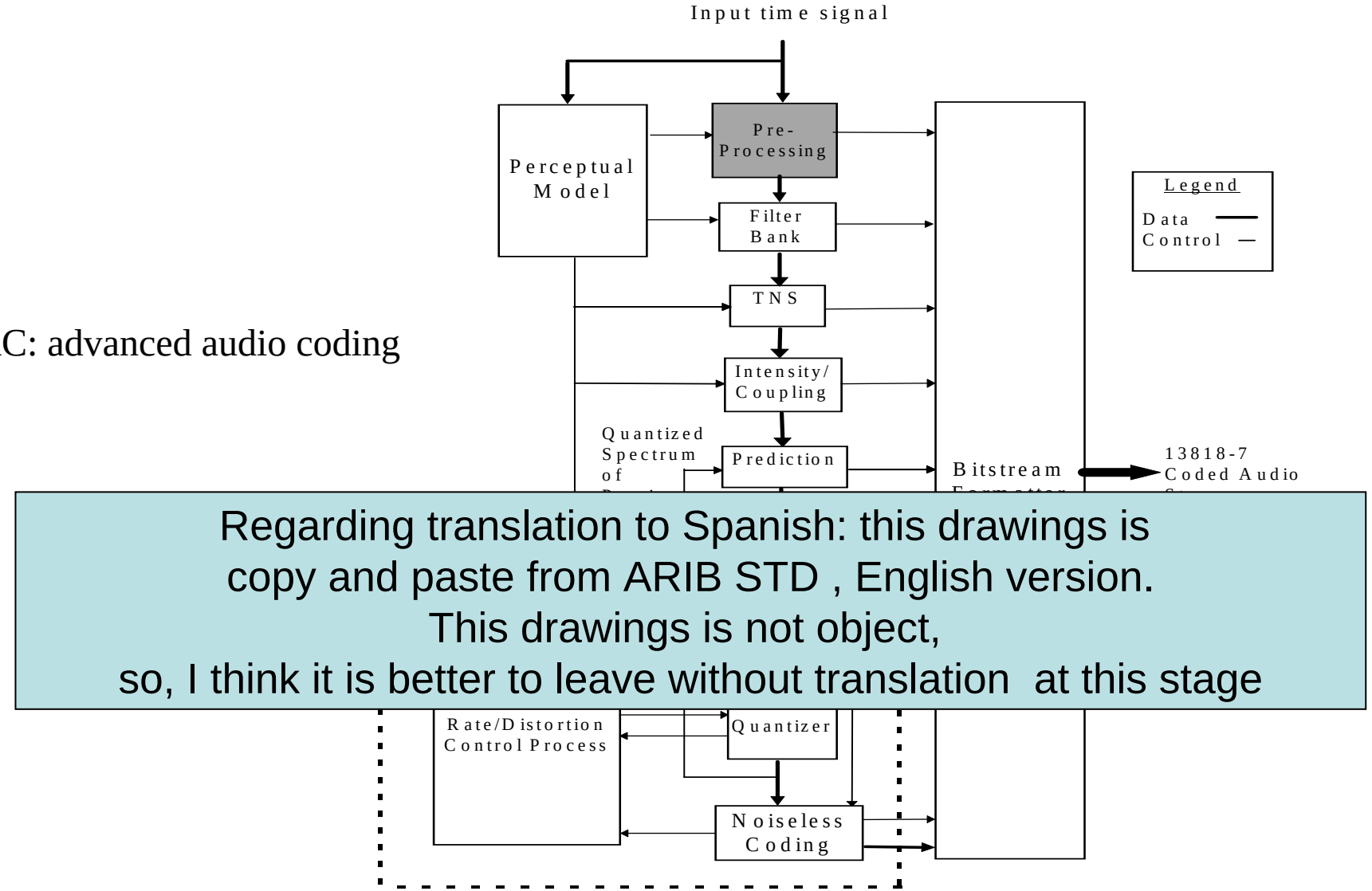
| Parameter | Restriction |
|---|---|
| Bit stream format | AAC Audio Data Transport Stream (ADTS) |
| Profile | Low Complexity (LC) profile |
| Max. number of coded channels | 5.1 channels(Note) max. per ADTS |
| Max. bit rate | As per ISO/IEC 13818-7 |

(Note) 5 channels + LFE channel

ARIB STD-B32 part 2 Chapter 5.2

# AAC encoder Block Diagram

AAC: advanced audio coding

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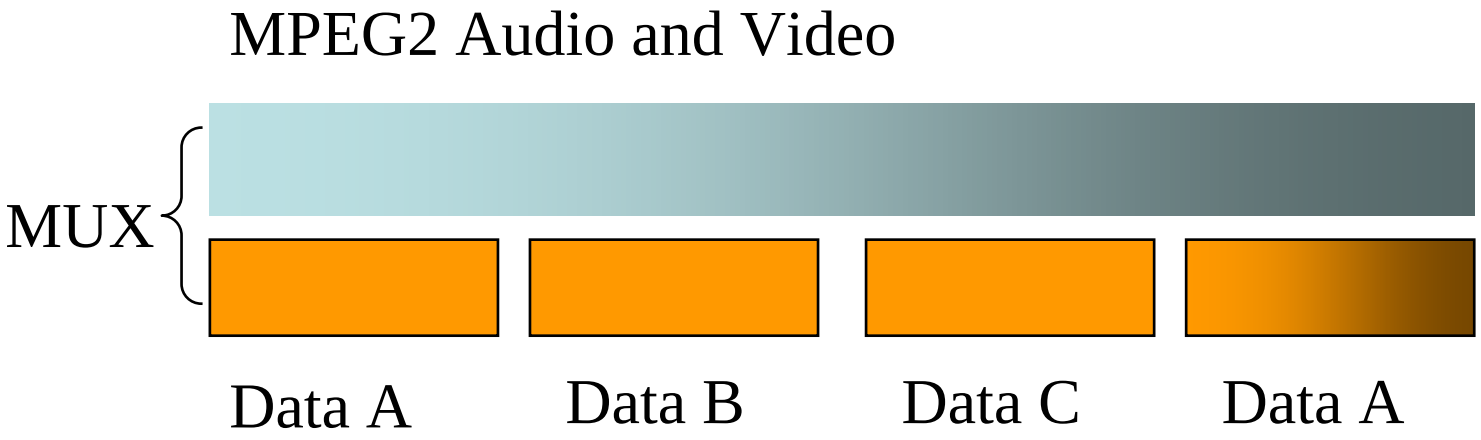
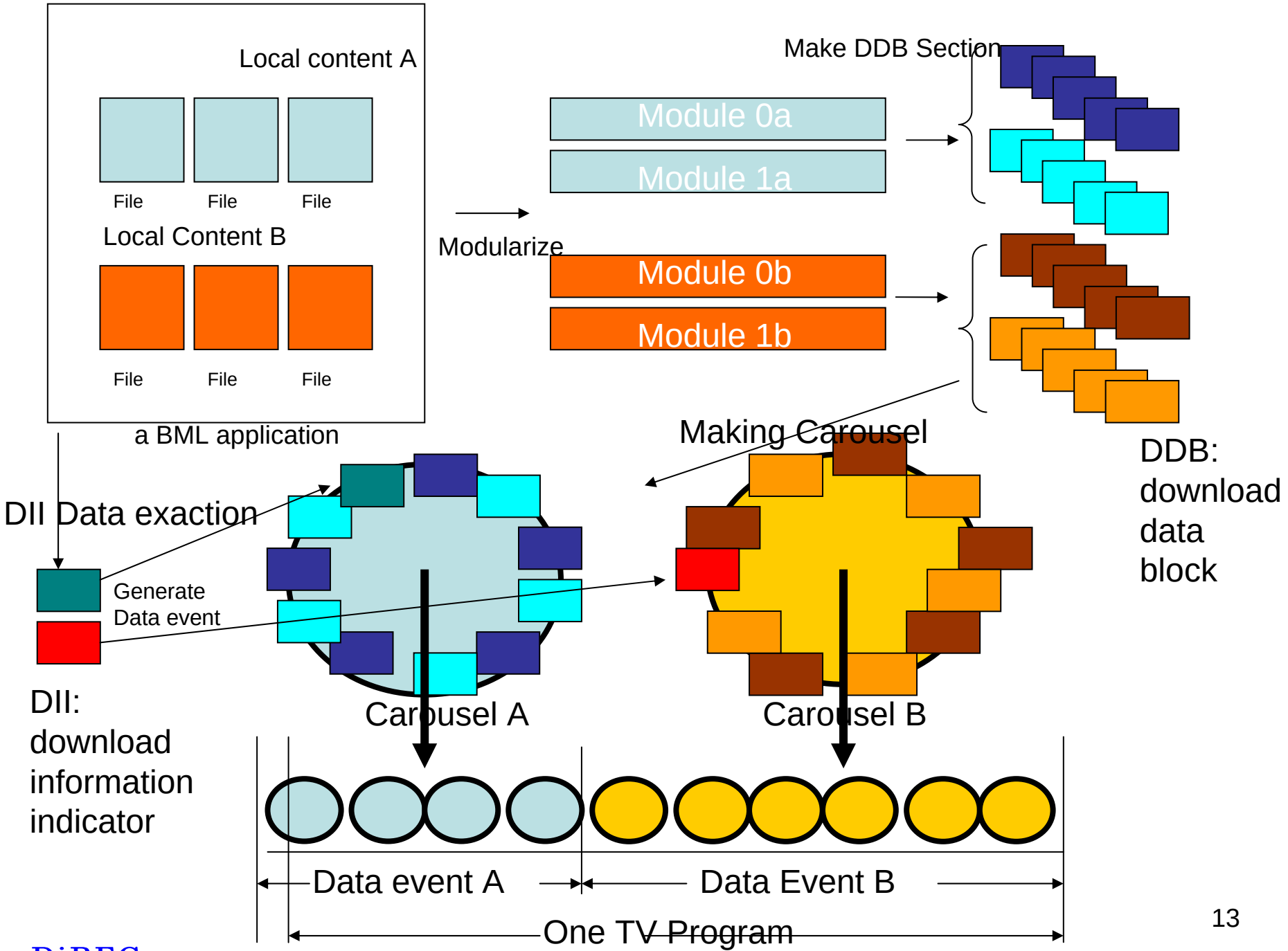
# 3. Data casting

## Data Composition




Each data broadcast as module repeatedly.
Same module will appear in some period.
(MPEG / DSM-CC Data Carousel)



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# Data Broadcasting

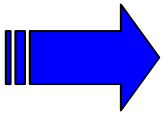
**All DTTB Broadcasters and BS Broadcasters providing Data broadcasting (datacast) now**

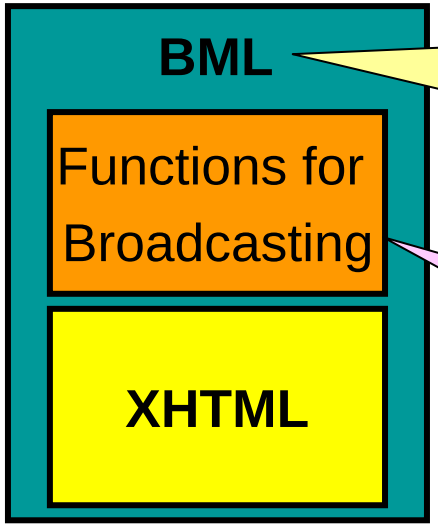
| | |
|---|---|
| Program related information | Anytime news |
| Weather information | Report of sports game etc, |

**Currently the description language is BML format**

**Based on**

**XHTML**






**Features**

**Easy creation of contents**

**Facilitate convergence of internet**

**Additional capability**



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# Example for Datacasting(1)

## Top menu

# Example for Datacasting(2)

## Weather news




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# Example for Datacasting(3)

## Program related data




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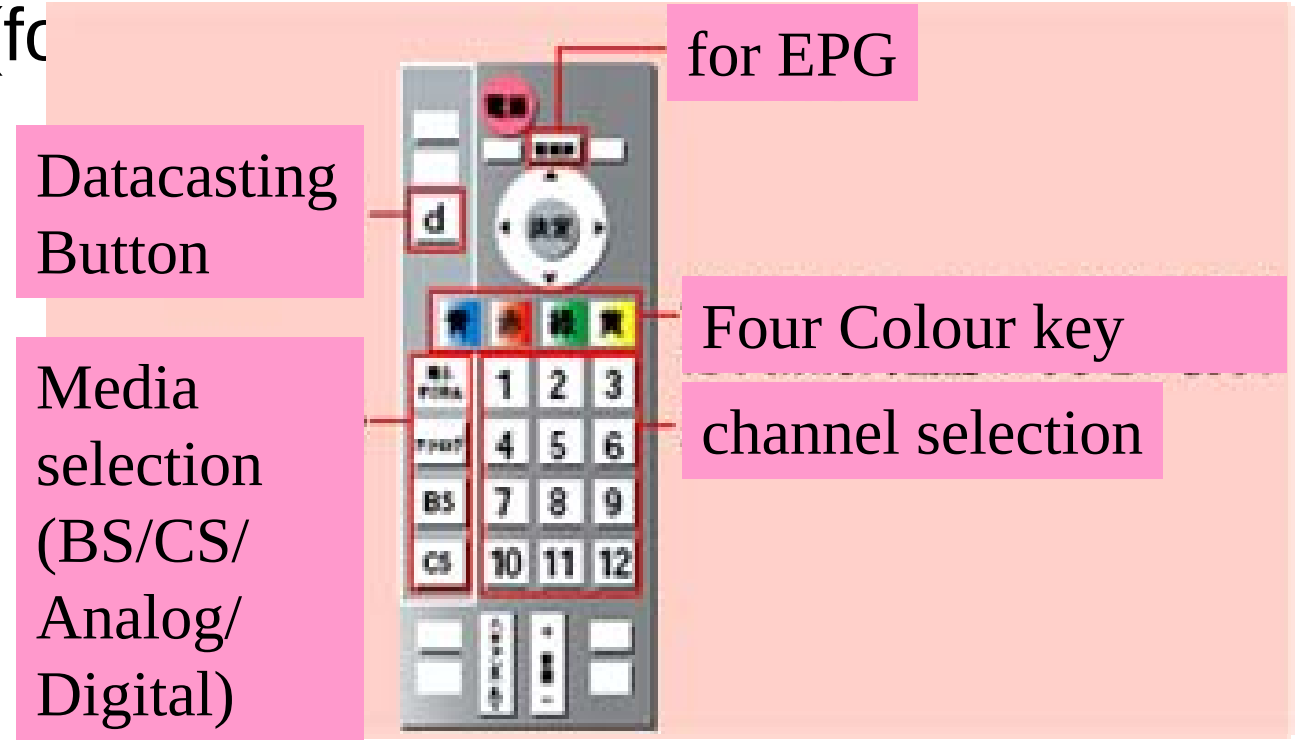
# Remote Controller for Datacasting

- Colour key and Arrow Key (four directional)
- Datacasting Trigger Button
- Back key (fo



# ARIB STD-B24

- B24 consist of three volumes (four books)
  - Volume 1: Mono media
  - Volume 2 (book1/book2): BML
  - Volume 3: Transmission
- Volume 2 consist of six parts
  - Main context (Standard)
  - Appendix 1 (Supplement of standard)
  - Appendix 2 (Basic profile)
  - Appendix 3 (Advanced profile)
  - Appendix 4 (Profile for Mobile phone)
  - Appendix 5 (Profile for Vehicle)

# Overview of datacasting services

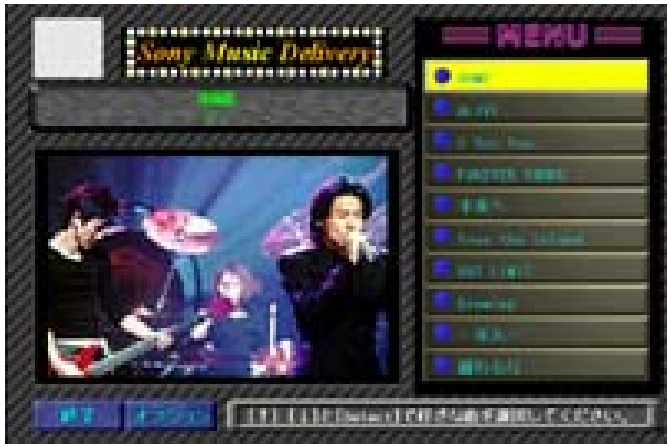
See STD B24 Vol.1 Informative explanation 1

- Example of services
  - EPG：TV Program selection
  - Index: Choice of TV program, contents
  - Subtitle: Synopsis subtitle, multi-language
  - Commentary audio: for vision-impaired
  - Program supplemental information: Additional information of TV Program (ex. brief)
  - Multi-view television (Multi angle)
  - User interaction program: Shopping, Questionnaire

# BML

- Multimedia data representation coding scheme for Digital broadcasting
  - Specified in XML
  - Textual notation
  - Extension for broadcasting feature
- XHTML1.0 + ECMAScript + CSS1/2 + DOM1+ Broadcast Extension
  - All component defined by W3C, which is main stream for the internet content specification.
  - difference between broadcast content and internet content
    - bi-directional communication
    - hardware platform (CE vs PC)

# Difference between BML and HTML

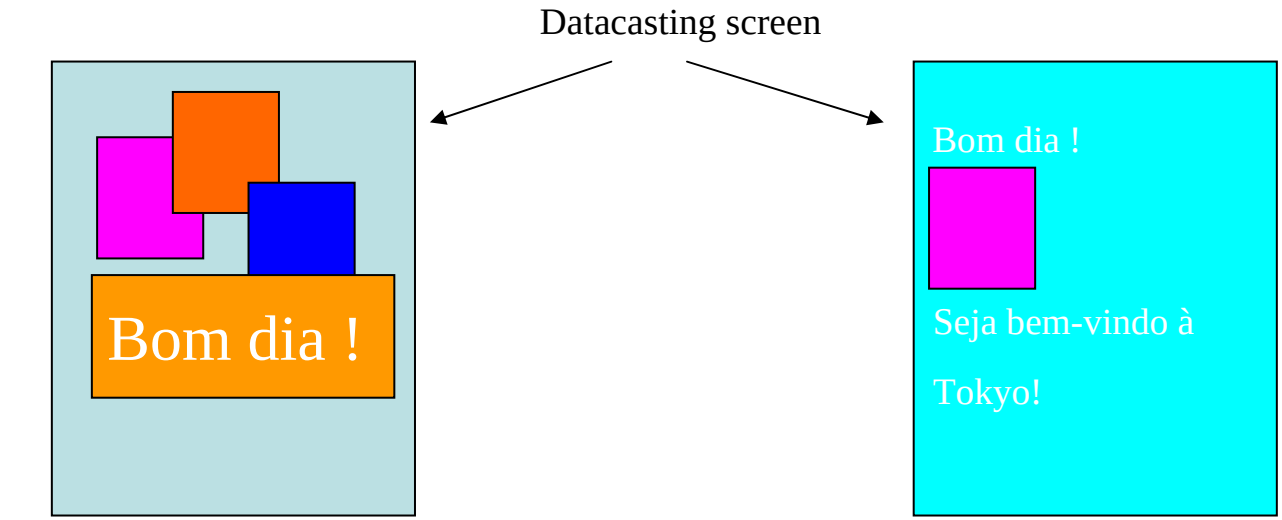
| | BML | HTML |
|---|---|---|
| Sample |  <br>Suitable operation for TV |  |
| Feature | • Few hyperlinks per one screen<br>• Intuitive providing information by using bitmap and video<br>• Scroll is optional<br>• Update latest information automatically<br>• Synchronize between TV and Radio program | • Many hyperlinks in one screen<br>• Text centric information providing by small letter presentation<br>• Suppose to scroll functionality<br>• Need to push “reload” button for retrieving latest information generally |

# Difference between BML and HTML (cont.)

| | BML | HTML |
|---|---|---|
| Use case | • **Viewing distance: 1～3m**<br>• **Focus display: Focus of Hotspot**<br>• **Input device: Remote controller with colour key** | • **Viewing distance: 30～50cm**<br>• **Focus display: Free cursor**<br>• **Input device: Wheel mouse + keyboard or Touch panel + keyboard** |
| Functionality | • Synchronization with TV program (bevent)<br>• Accessibility of Set top box (Script API)<br>  • NVRAM, Tuner, device ID, etc.<br>• Absolute positioning with CSS<br>  • Fix display place at reading BML doc<br>• Multiple plane model including blending between planes | • No Sync. Mechanism (cf. SMIL)<br>• Accessibility of STB by plug-in module<br>• Relative positioning by brawser<br>  • Display place may change by context<br>  • position can change dynamically<br>• Single plane model basis, no transparent colour |

# Difference between BML and HTML (cont.)

| BML | HTML |
| --- | --- |




Only absolute positioning is permitted.

Layout are decided by browser dynamically

# 4. Video Coding for “One-seg” Service

- Video coding system; H.264/AVC( ITU-T Rec. H264|ISO/IEC 14496-10)

- Specified in ARIB-STD-B24, as one of Mono-media coding system

- Specified in Operational Guideline(TR-B14), as Video coding system for “One Seg” service

EXAMPLE

# Recommended Operational Guideline for Baseline Profile **(ARIB STD-B24 ANNEX G)**

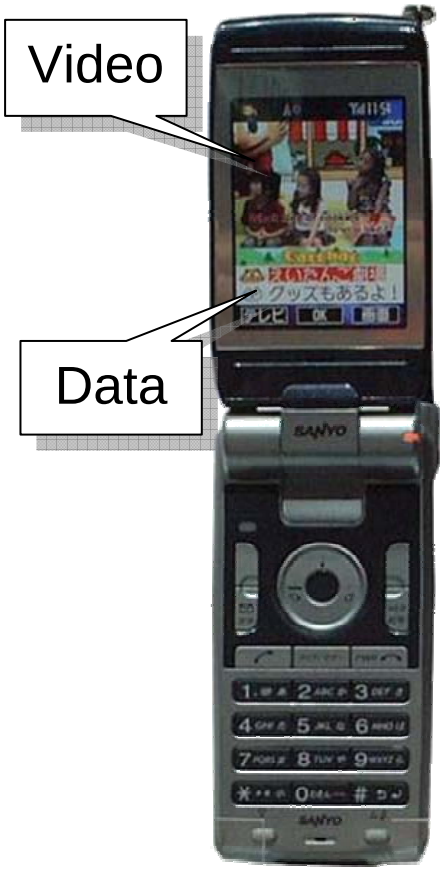
- Associated service requirement
  - **(1) Bitrate ; 64 – 384 Kbps**
  - **(2) Video format; SQVGA, 525QSIF, QCIF, QVGA, 525SIF, CIF**
  - **(3) Frame rate; 5,10, 12, 15, 24, 30 Hz (*1000/1001), no limitation for frame skip**
  - **(4) Aspect ratio of picture; 4:3, 16:9**
- **Operation level; any of level 1, 1.1, 1.2**

Parameter set of One-Seg broadcasting service

# One Seg Service video coding parameter set

| parameter | Specification |
|---|---|
| **Coding system** | **H264/AVC** |
| **Profile/level** | **Baseline profile, level 1.2** |
| **Video format** | **•320 Pixel * 240 line, or**<br>**320 pixel * 180 line**<br>**•Aspect ration of pixel; 1:1**<br>**•Minimum frame period; 1/15 second (video source; 30fps, or 24 fps)** |
| **others** | **Compatible to ARIB STD-B24** |

(specified in ARIB TR-B14)



# END of Seminar #6

Thank you for your attention