Interoperability in Multimedia and Data Broadcasting

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by

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WP 6M Activities for Multimedia-and-Data Broadcasting

- ITU-R Working Party 6M and ITU-T Study Group 9 established Joint Rapporteur Group 1 (JRG-1) as the first joint studying body between ITU-R and ITU-T in March 2001
- There are four major SDOs for multimedia and data broadcasting systems;
    - ARIB (STD-B.24)
    - ATSC (A/65, A/90, DASE) for terrestrial television
    - DVB (MHP)
    - SCTE (OpenCable/OCAP) for cable television
- WP 6M is seeking interoperable mechanisms between these multimedia and data broadcasting systems

Digital Broadcasting Systems for Fixed Reception and Mobile Reception

		ARIB	North America	DVB/ DAB
Fixed Reception	Terrestrial	System C in BT.1306	System A in BT.1306	System B in BT.1306
	Satellite	System D in BO.1516	System B, C in BO.1516	System A in BO.1516
Mobile Reception	Terrestrial	System F in BS.1114	System C in BS.1114	System A in BS.1114
	Satellite	System E in BO.1130	System D_H in BO.1130	System A in BO.1130

Physical layers of all broadcasting systems are designed to satisfy the different requirements of respective regions

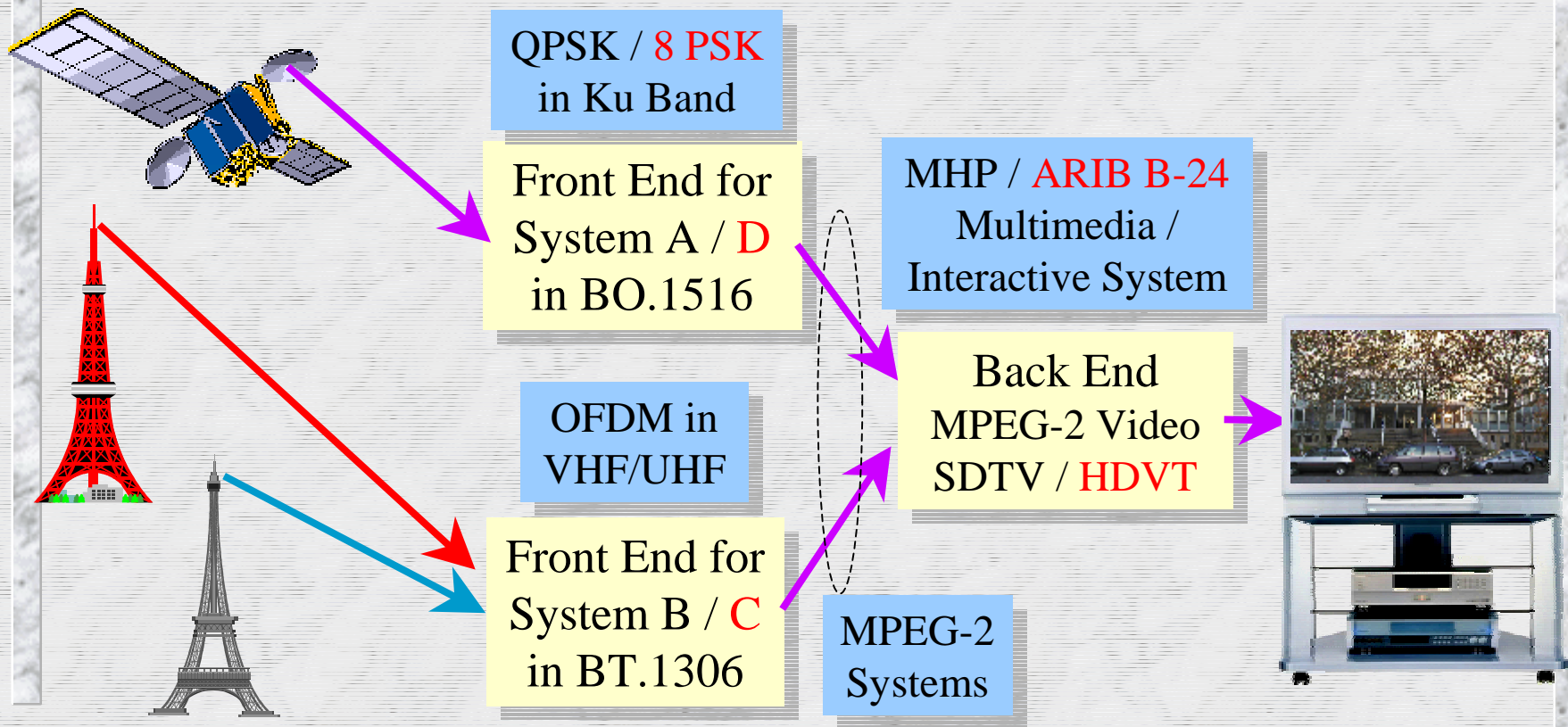## Table 1 Physical Layer Specification

Multimedia-and-Data Broadcasting System for Several Physical Broadcasting Systems

		ARIB	North America	DVB/ DAB
Fixed Reception	Terrestrial	STD-B.24	ATSC-DASE	DVB-MHP
	Satellite	STD-B.24	Proprietary	DVB-MHP
	Cable	(STD-B.24)	OCAP	DVB-MHP
Mobile Reception	Terrestrial	STD-B.24	Proprietary	DAB-MOT ETSI EN 301 234
	Satellite	STD-B.24	Proprietary	DAB-MOT ETSI EN 301 234

Table 2 Multimedia and Data Broadcasting Specification

Interoperability between Fixed Terrestrial and Satellite Television

There is no interoperability between System B and C in BT.1306 or System A and D in BO.1516 regarding physical layer architecture

QPSK / 8 PSK in Ku Band

Front End for System A / D in BO.1516

MHP / ARIB B-24 Multimedia / Interactive System

OFDM in VHF/UHF

Back End MPEG-2 Video SDTV / HDVT

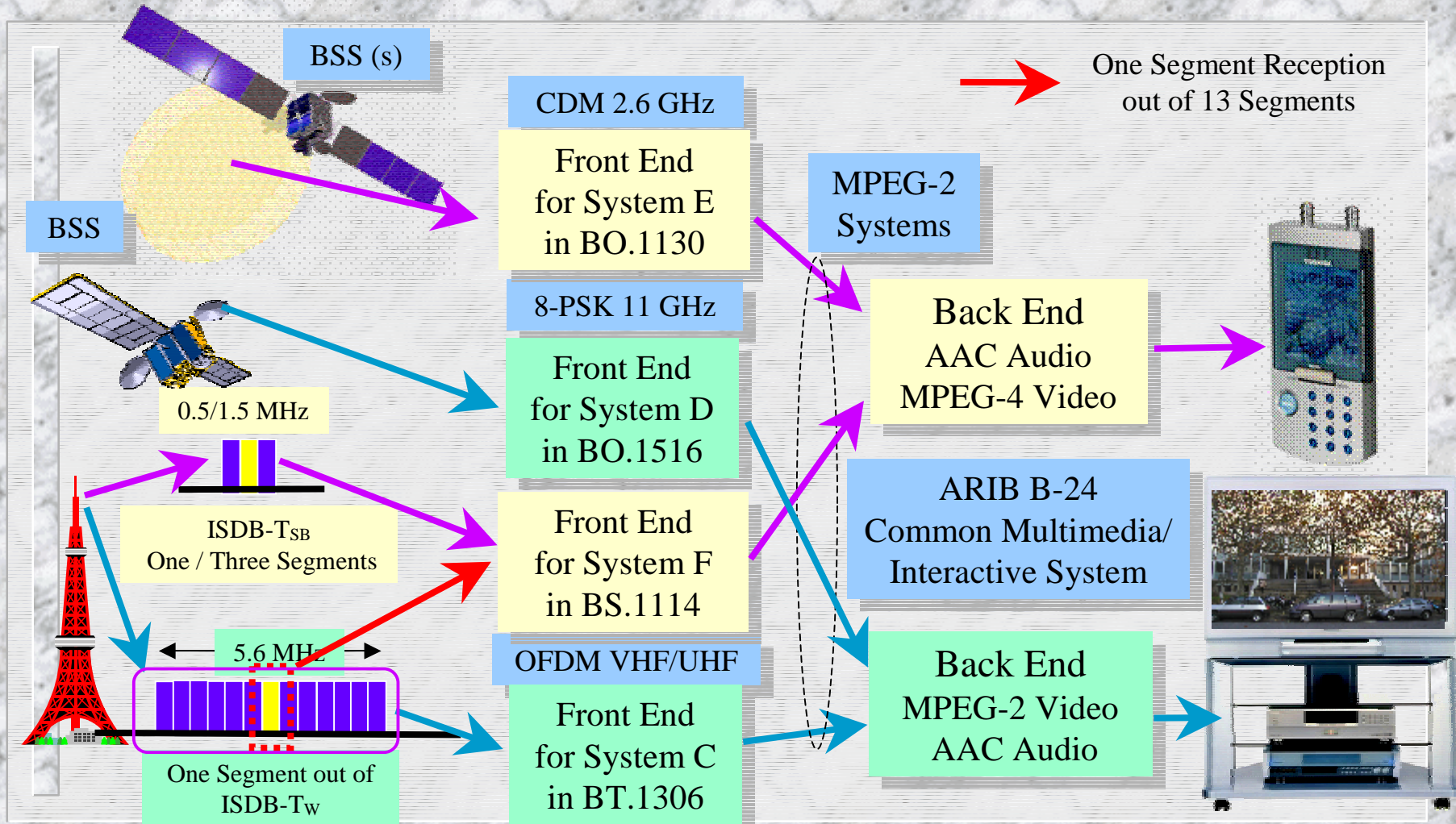Front End for System B / C in BT.1306

MPEG-2 Systems

Interoperability between Fixed/Mobile and Sound/Television Systems (1/3)

- All broadcasting systems for various distribution media such as Satellite Television, Terrestrial Television, Satellite Sound and Terrestrial Sound adopt the same transport mechanism, i.e., MPEG-2 Systems

- Terrestrial television signal has 13 segments of its frequency domain format

- Each of these segments could have a different physical parameters

- Up to three kinds of parameter sets could be selected in order to satisfy different requirements

- The centre part of 13 segments could be received by terrestrial sound broadcasting receiver

- This segment usually uses QPSK or 16 QAM with high forward error correction capability for mobile reception

Interoperability between Fixed/Mobile and Sound/Television Systems (2/3)

- Table 2 shows the interoperability between the different systems for multimedia and data broadcasting systems
- All ARIB broadcasting systems use MPEG-2 Systems for service multiplexing and Standard B.24 for multimedia and data broadcasting
- Terrestrial sound broadcasting receiver could handle the centre segment of 13-segmented terrestrial television signal
- Both centre segment of terrestrial television broadcasting signal and the whole part of a terrestrial sound broadcasting signal could be received by portable receivers
- By adding a front end of BSS (s) signal, a portable receiver could also decode BSS (s) data streams because all broadcasting systems adopt the same multimedia and data broadcasting standard

# Interoperability between Fixed/Mobile and Sound/Television Systems (3/3)

BSS (s)

BSS

0.5/1.5 MHz

ISDB-T$_{SB}$
One / Three Segments

5.6 MHz

One Segment out of
ISDB-T$_W$

CDM 2.6 GHz

Front End
for System E
in BO.1130

8-PSK 11 GHz

Front End
for System D
in BO.1516

Front End
for System F
in BS.1114

OFDM VHF/UHF

Front End
for System C
in BT.1306

MPEG-2
Systems

One Segment Reception
out of 13 Segments

Back End
AAC Audio
MPEG-4 Video

ARIB B-24
Common Multimedia/
Interactive System

Back End
MPEG-2 Video
AAC Audio

Interoperability in Multimedia and Data Broadcasting Systems

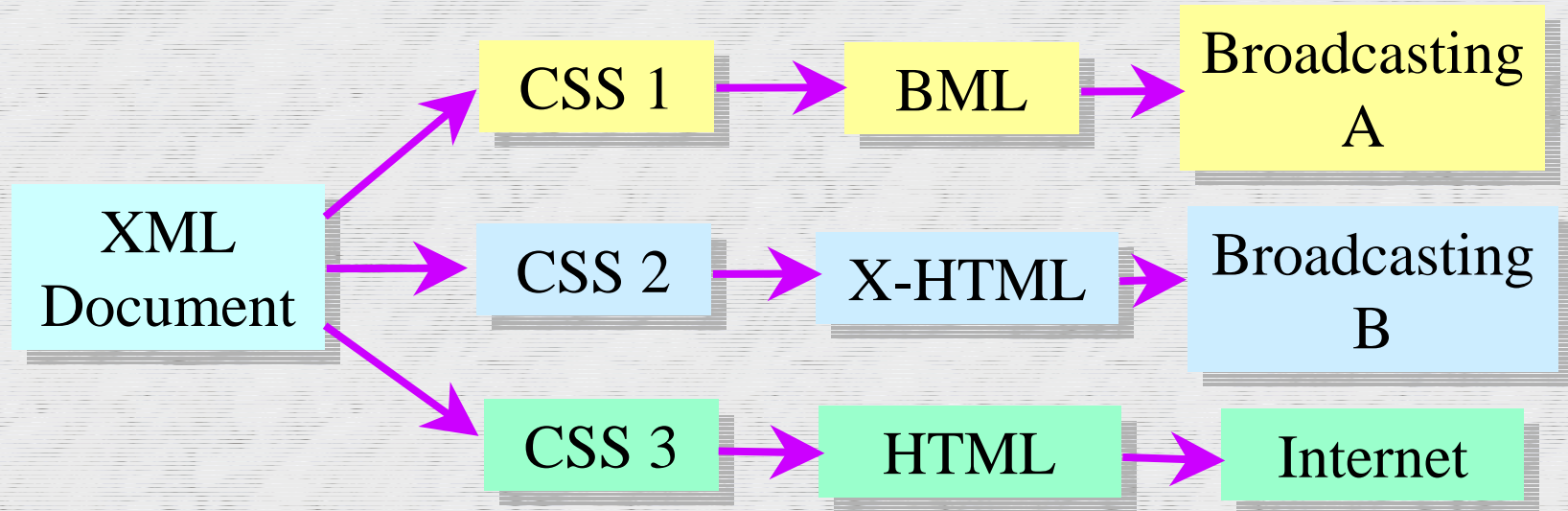|	ARIB STD B.24	DVB MHP/ OCAP	ATSC DASE
Data Transmission	Data Carousel	Object Carousel	Data Carousel
Presentation	BML	X-HTML	X-HTML
Execution	ECMA Script (+ JAVA)	JAVA	JAVA

Currently, JRG-1 is extracting the common parts of these systems
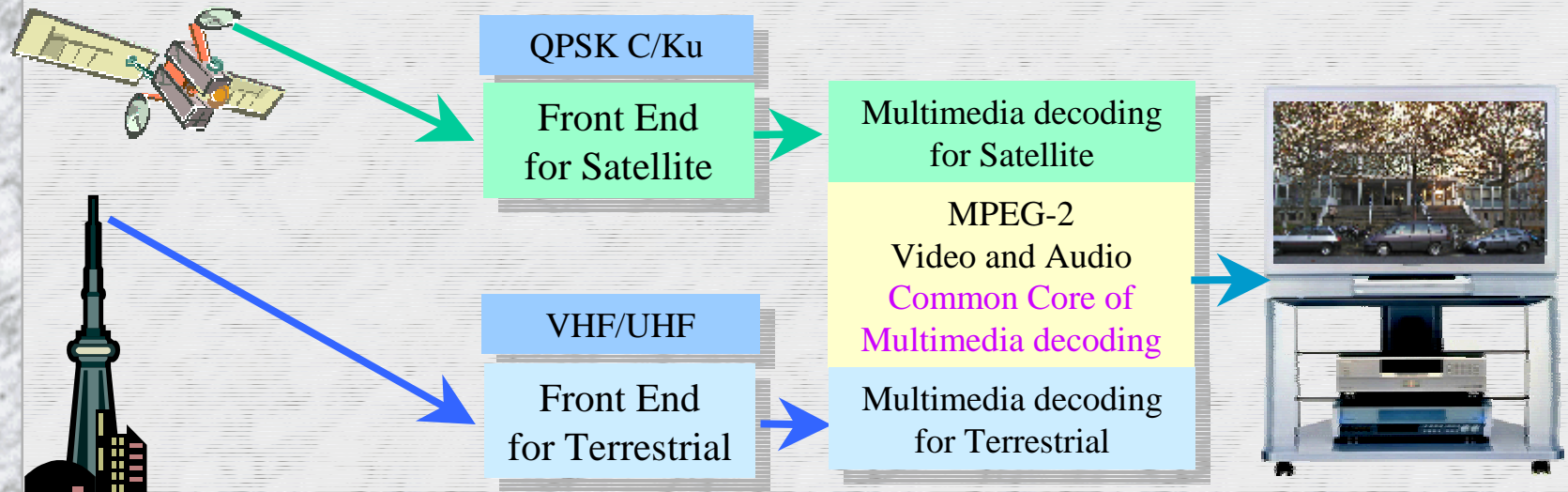
Interoperability using Transcoding
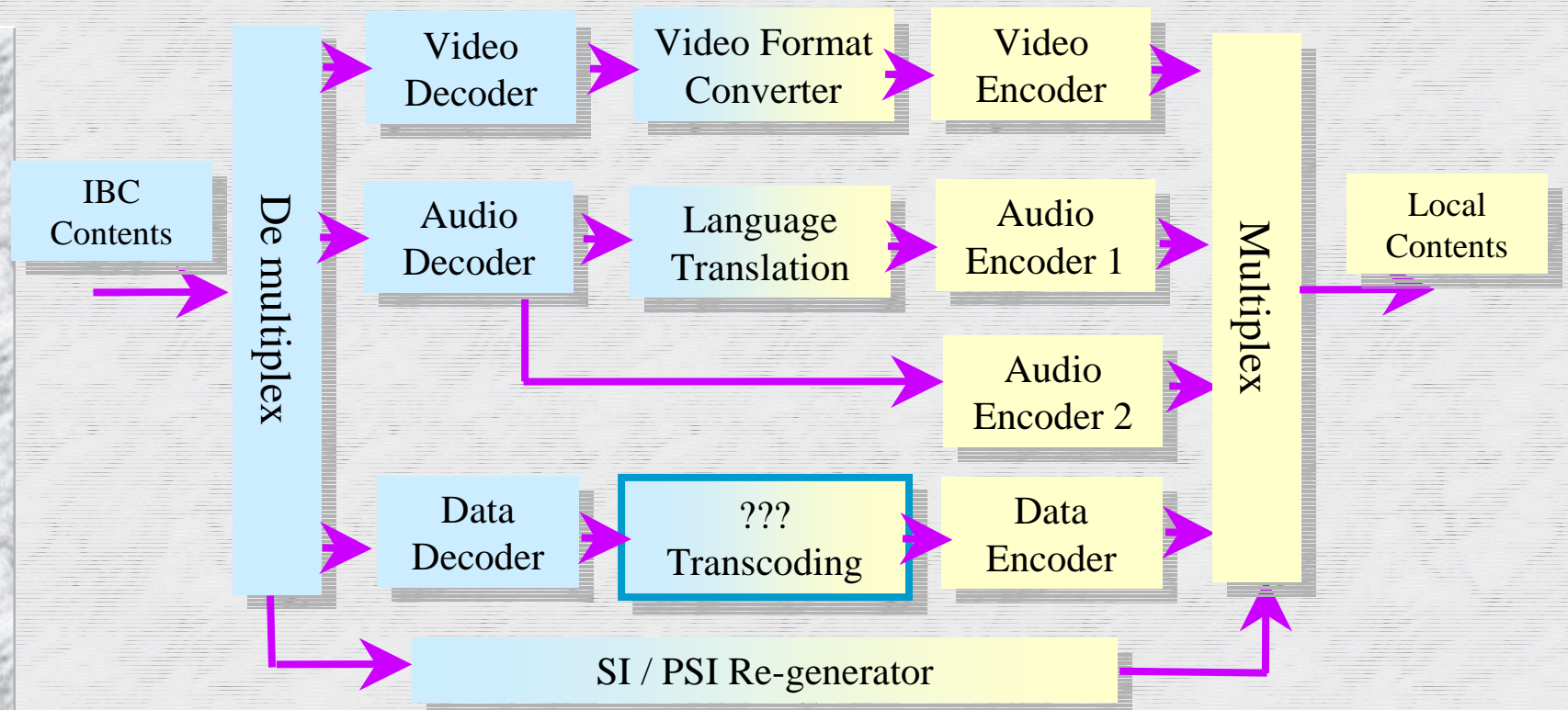
- The first solution is a transcoding method converting original contents to a local format
- It is better to prepare the well-formed original contents considering the limitation of transcoding capabilities if required a smart outputs

Interoperability using XML

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                      ┌─────────┐      ┌─────────┐      ┌──────────────┐
                   →  │  CSS 1  │  →   │   BML   │  →   │ Broadcasting │
                      └─────────┘      └─────────┘      │      A       │
┌──────────┐                                            └──────────────┘
│   XML    │          ┌─────────┐      ┌─────────┐      ┌──────────────┐
│ Document │  →       │  CSS 2  │  →   │ X-HTML  │  →   │ Broadcasting │
└──────────┘                                            │      B       │
                      └─────────┘      └─────────┘      └──────────────┘
                   →  ┌─────────┐      ┌─────────┐      ┌──────────────┐
                      │  CSS 3  │  →   │  HTML   │  →   │   Internet   │
                      └─────────┘      └─────────┘      └──────────────┘
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- The second solution is the adoption of XML for authoring multimedia and data broadcasting contents
- These XML contents may be converted suitable for more than one distribution media by using different CSSs

Interoperability using Multi-Standard Set-Top-Box

QPSK C/Ku

Front End for Satellite

Multimedia decoding for Satellite

MPEG-2
Video and Audio
Common Core of
Multimedia decoding

VHF/UHF

Front End for Terrestrial

Multimedia decoding for Terrestrial

- The third solution for interoperable multimedia and data broadcasting is the adoption of multi-standard STB
- Even in this case, the common core should be maximised for minimising the complexity of STB

UNI for nation wide contribution and primary distribution network

- Broadcasters are preparing primarily distribution and contribution networks for digital terrestrial television broadcasting services in three major populated arias from the end of 2003 in Japan

- Two types of User Network Interface (UNI) are now considered, non-compressed baseband interface and MPEG-2 Transport Stream (TS) packets interface

- Major commercial broadcasters are considering to adopt non-compressed transmission services for 1.45 Gbit/sec HDTV contribution networks between three most populated areas (Tokyo, Nagoya and Osaka)

- In this case, UNI is HDTV-SDI for HDTV digital video interface and AES/EBU for digital audio interface

- Special signalling mechanism is provided for accommodating cueing information in order to switch from remote to local contents, and vice versa

- Another major broadcaster is considering to use packetised video, audio and data transmission systems for primary distribution services

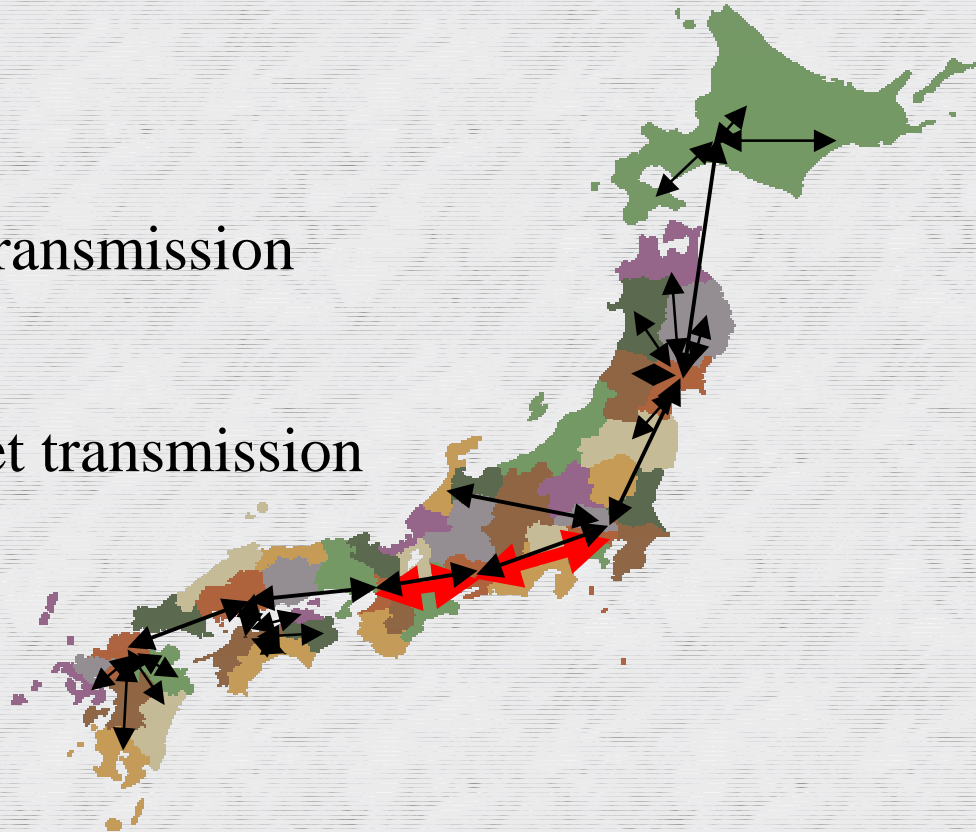- In this case, UNI is DVB-ASI for accommodating MPEG-2 TS packets

Nation-wide Contribution and Primary Distribution Networks
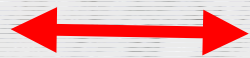
HDTV baseband transmission
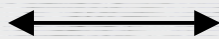
MPEG-2 TS packet transmission

Note: All systems are under consideration

Contents Distribution over Internet

- ITU-R develops a new Question 7/6 for 'Interface to webcasting and its supporting data services'
- Broadcasters should take care of rights of contents when they offer their contents to webcasting
    - Internet service could reach to all over the world while a broadcasting service is licensed only in limited areas
    - Some contents are produced supposing being broadcast only within limited areas
    - These contents may be replaced by 'safe' materials when broadcasters offer their contents to Internet
- Requirements from broadcasters to 'interface to webcasting' may include not only technical aspect but a mechanism for rights management

Conclusion

- In this presentation, interoperability of multimedia and data broadcasting systems are considered

- There are several multimedia and data broadcasting systems in order to respond deferent requirements

- ITU-R WP 6M and ITU-T SG 9 are jointly working to develop effective methods to exchange multimedia and data broadcasting contents between deferent systems

- Other related observations such as UNI between broadcasters and common carriers are discussed

- ITU-R WP 6M is now studying the Question for 'Interface to webcasting and its supporting data services'

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Thank you for your attention

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