ARIB Activities related to Digital Broadcasting

- R&D, Standardization, etc. -

Association of Radio Industries and Businesses (ARIB)

February 7, 2005

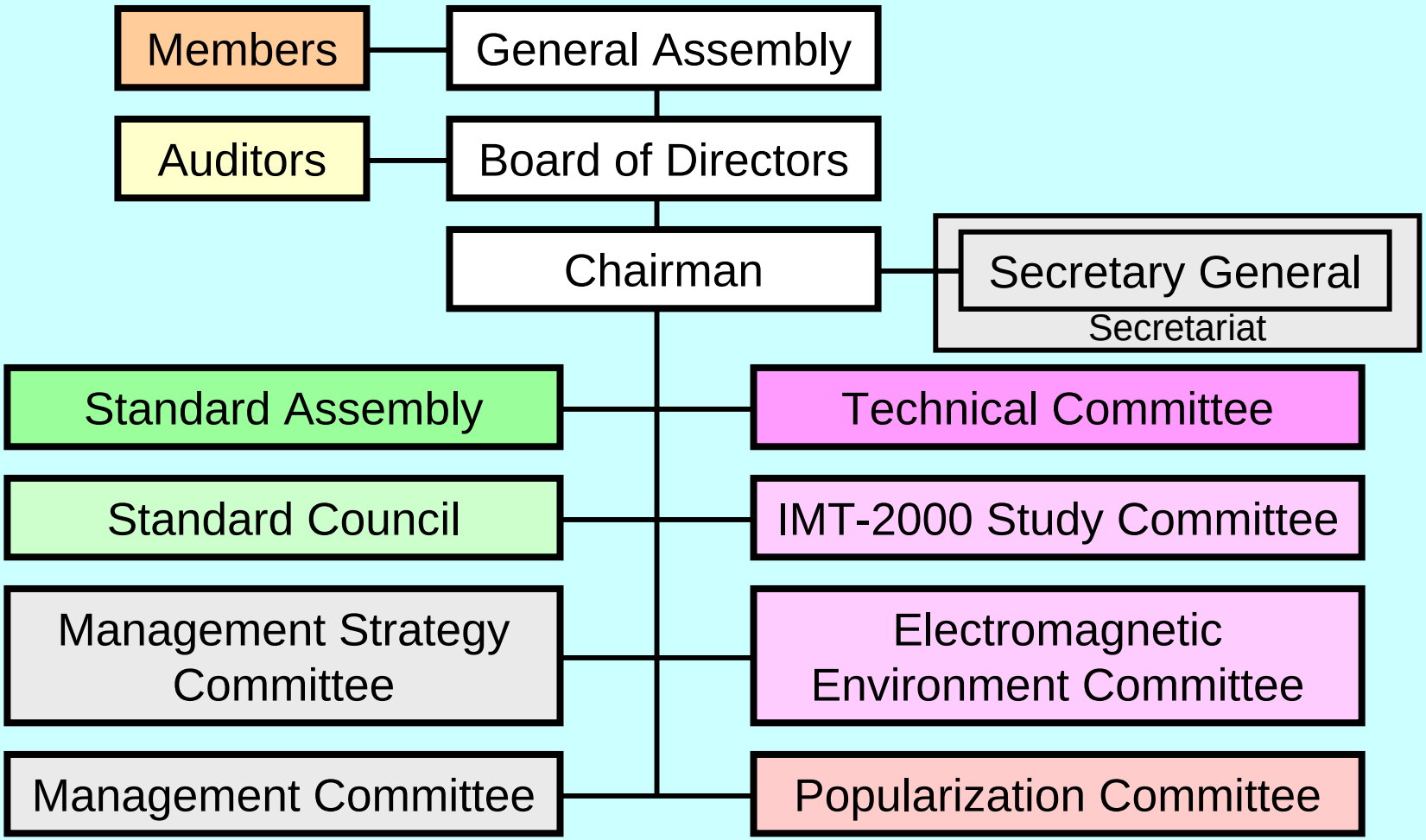
CONTENTS

- Outline of ARIB
- Recent ARIB Activities related to Digital Broadcasting
- Reorganization of R&D Groups for Broadcasting
- Comparison of ISDB-T, DVB-T and ATSC
- International activities of ARIB
- [Information] Analog TV Frequency Change Support

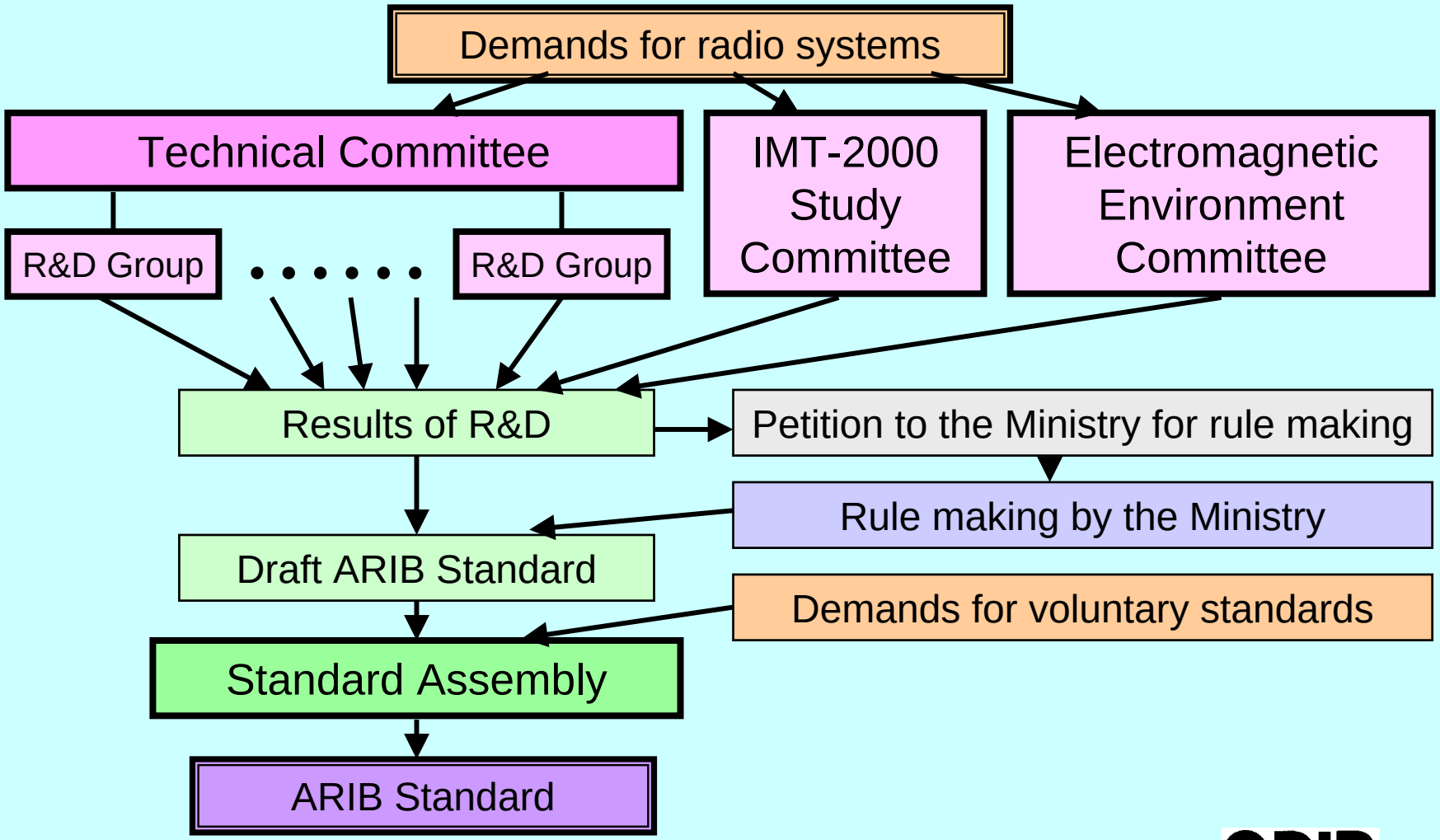
Outline of ARIB

- **Establishment**: merge of two organizations in 1995:
  - **R**esearch & Development **C**enter for **R**adio Systems (**RCR**)
  - **B**roadcasting **T**echnology **A**ssociation (**BTA**)
- **Objective**: promotion of pubic welfare by means of:
  - conducting investigation, R&D and consultation of utilization of radio waves
  - promoting realization and dissemination of new radio systems
- **Main Activities**:
  - investigation and R&D on utilization of radio waves
  - establishment of voluntary technical standards for radio systems
  - consultation, dissemination, collection and publication of information on utilization of radio waves
  - frequency change support for terrestrial digital TV broadcasting
  - frequency expiration support for re-allotment of radio spectrum

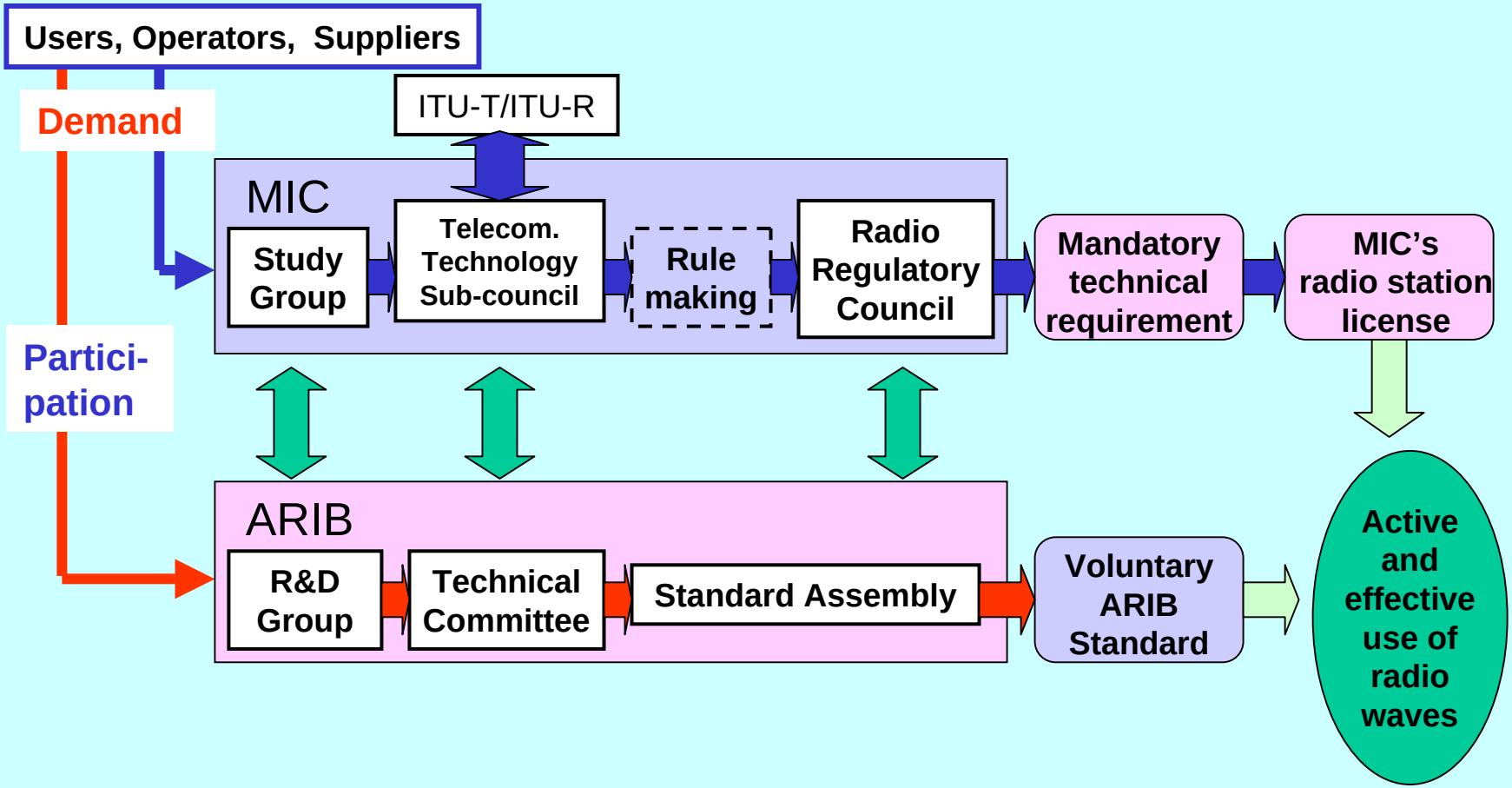
Organization of ARIB



ARIB's R&D and Standardization



Standardization Flow in Japan

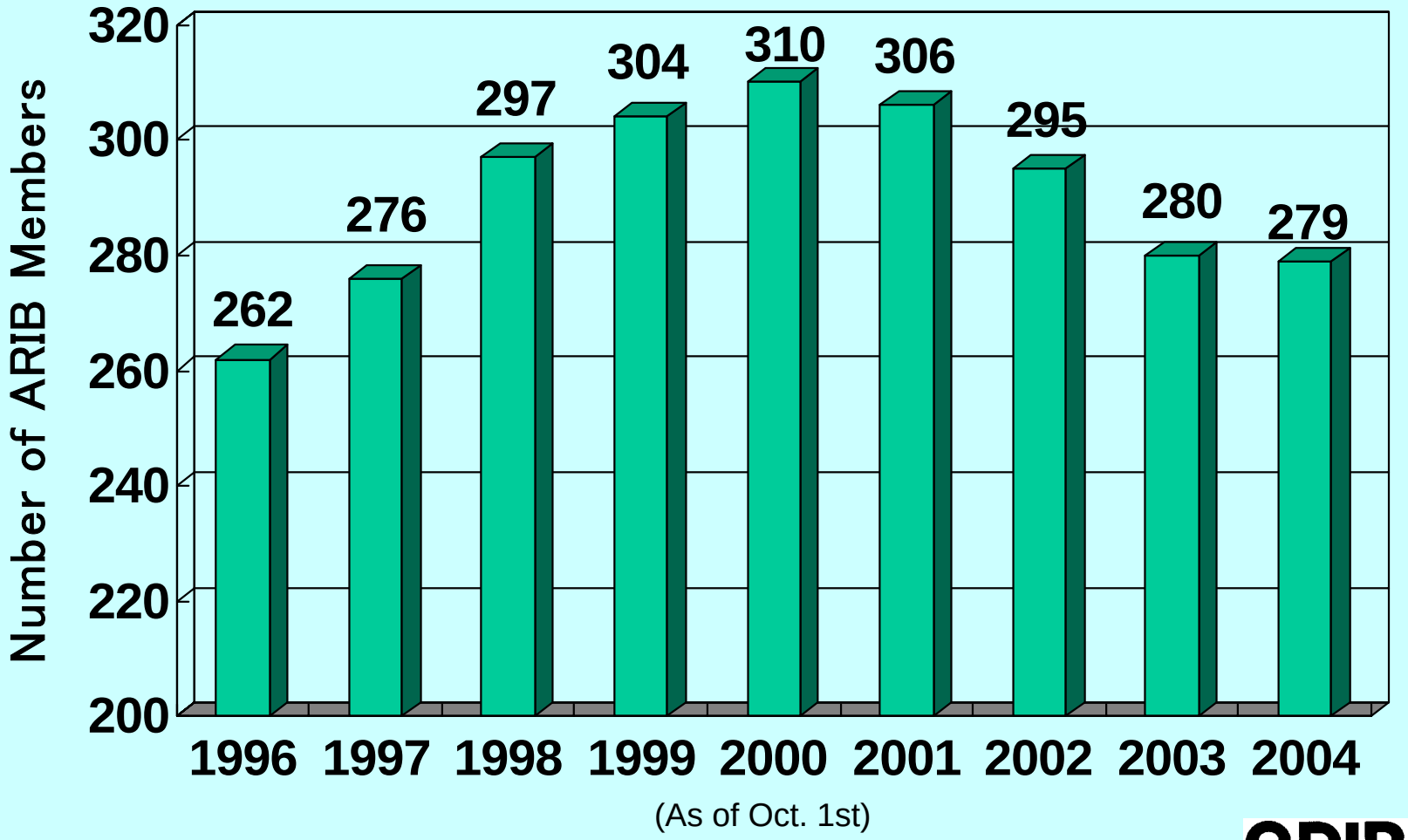


(Note) MIC: Ministry of Internal Affairs and Communications

Government Regulations and ARIB Standards for radio systems

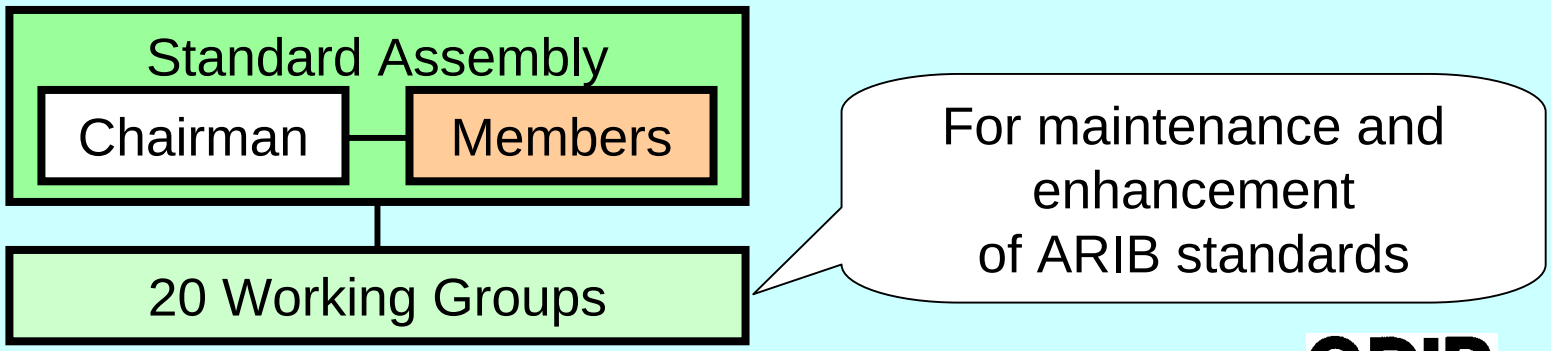
	Government Regulations	ARIB Standards
Nature	Mandatory	Voluntary
Purpose	♦ To promote efficient use of frequency ♦ To avoid interference ♦ etc.	♦ To ensure common air interface ♦ To ensure suitable quality ♦ For greater convenience to manufacturers and users ♦ etc.
Technical items	♦ Frequency band ♦ Spurious emission ♦ Frequency tolerance ♦ Occupied bandwidth ♦ etc.	♦ Communication protocol ♦ Sencitivity ♦ Carrier to Noise ratio ♦ Bit error rate ♦ Measurement method ♦ etc.

Evolution of ARIB membership

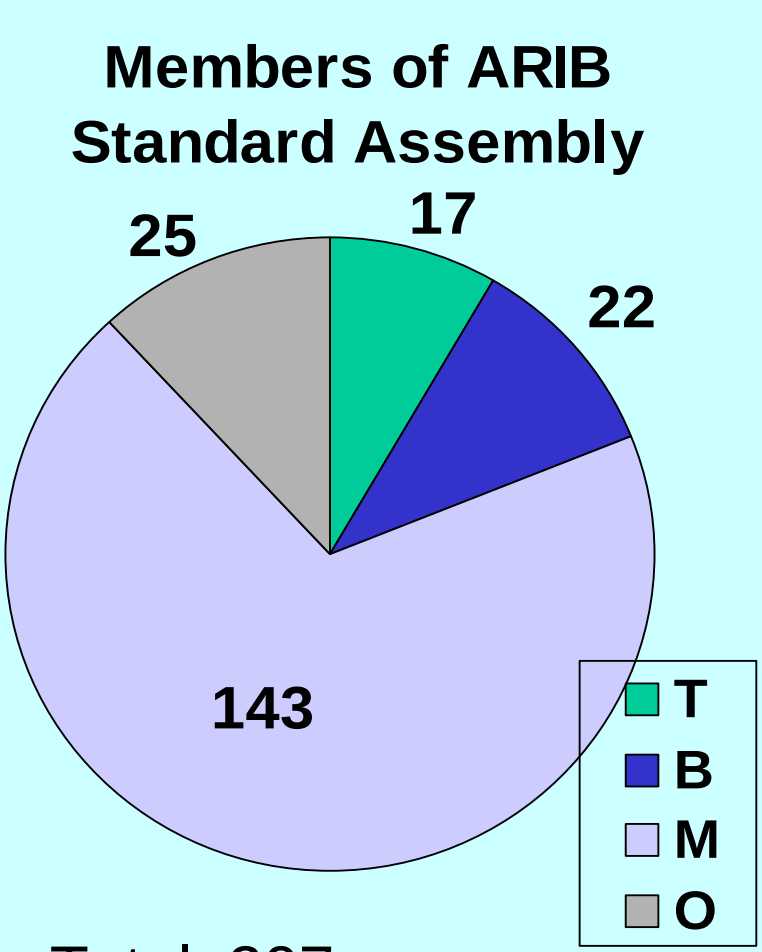


ARIB Standard Assembly

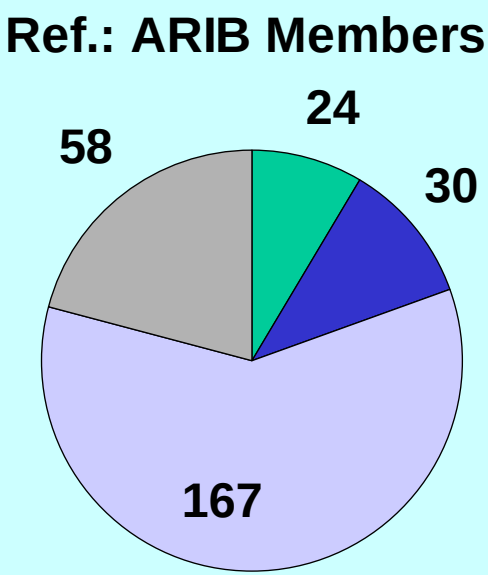
- **Establishment**: 1995
  (reorganized from the RCR Standard Assembly and the BTA)
- **Members**: 207 (including 20 foreign affiliated members, as of Oct. 1, 2004)
  - open to any entity, organization and person
  - no limitation on nationality
  - independent from ARIB membership
- **Organization:**



Members of ARIB Standard Assembly



Total: 207



Total: 279

T: Telecommunications companies
B: Broadcasting companies and organizations
M: Research, Development and manufacture companies of radio equipment
O: Wholesaler, bank, electricity, gas and service companies and corporations
(as of Oct.1, 2004)

Outcome from Standard Assembly

- **ARIB Standards** (STDs):
  – voluntary standards of private sector
- **ARIB Technical Reports** (TRs):
  – technical information not including standards
- **Number of STDs and TRs in force**

	STD	TR
Telecommunications	71(68)	18(17)
Broadcasting	51(51)	37(35)

As of Oct. 1, 2004 (Oct. 1, 2003)

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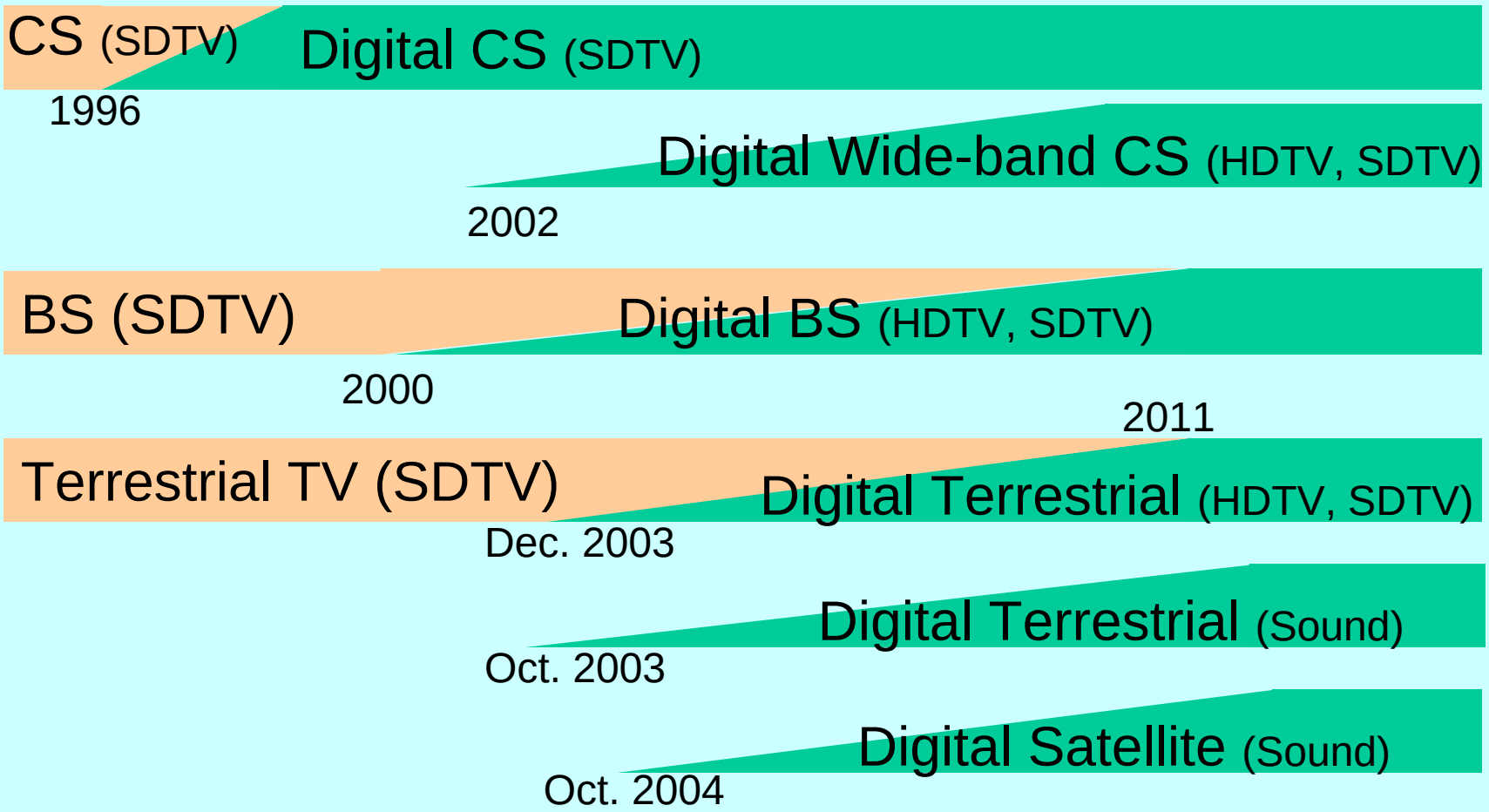
Recent ARIB Activities related to Digital Broadcasting

- **STDs and TRs for Digital Broadcasting Systems**
  - STD for each of Satellite TV, Terrestrial TV, Satellite Sound and Terrestrial Sound Broadcasting systems: ready
  - STDs for Receivers: ready
  - TR (Operational Guidelines) for each digital broadcasting system: ready but to be slightly revised for mobile reception and new RMP
- **System-independent STDs**
  - STDs on “Source Coding”, “Conditional Access”, “Service Information” and “Data Coding”: to be revised
  - STD on “Coding,Transmission and Storage Specification for Broadcasting Systems based on Home Servers”: to be revised
  - STD for GEM (Globally Executable MHP)-based Data Broadcasting: approved

Toward Digital Broadcasting in Japan



ARIB Standards for Digital Broadcasting

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

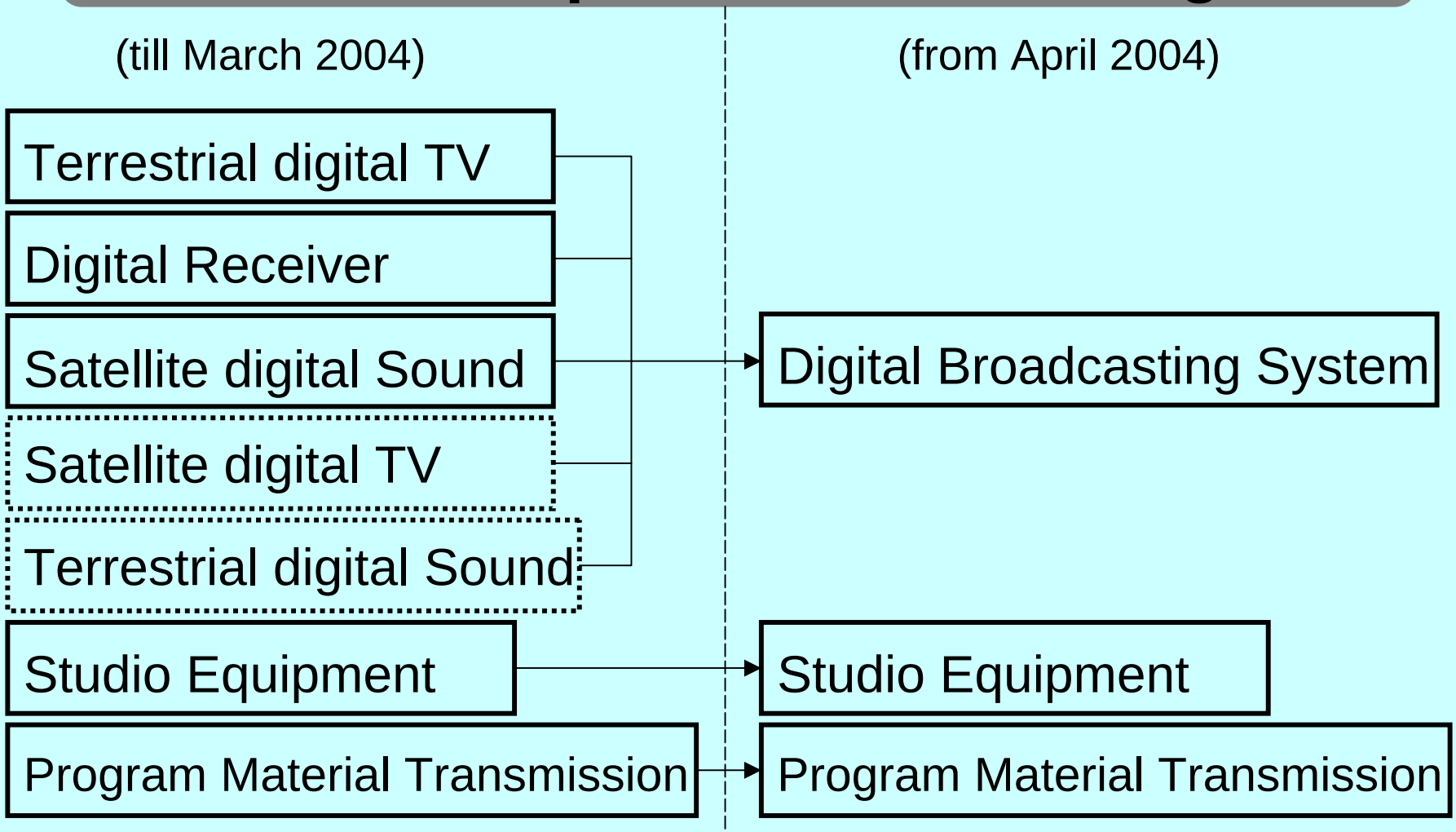
Other Standards (1/2)

- Systems for TV program contribution
  - Portable Microwave Digital Transmission System for Television Program Contribution (STD-B11)
  - Fixed Microwave Digital Transmission System for Television Program Contribution (STD-B12)
  - 800MHz-Band OFDM Transmission System for Television Program Contribution (STD-B13)
  - Portable OFDM Digital Transmission System for Television Program Contribution (STD-B33)
- Implementation Method of Digital STL/TTL Transmission for Digital Terrestrial Television Broadcasting (STD-B22)
- HDTV Digital SNG Transmission Systems (STD-B26)
- Serial Data Transport Interface (SDTI) (STD-B17)
- Multi format Color Bar (STD-B28)

Other Standards (2/2)

- Closed Caption Data Conveyed by Ancillary Data Packets for Component Bit-serial Digital Interface 525/60 and 1125/60Television System (STD-B27)
- Digital Program Exchange Specification for Data Broadcasting (STD-B35)
- Exchange Format of the Digital Closed Caption File for Digital Television Broadcasting System (STD-B36)
- Structure of Closed Caption Data Conveyed by Ancillary Data Packets (STD-B37)
- Structure of Inter-Stationary Control Data Conveyed by Ancillary Data Packets (STD-B39)
- PES Packet Transport Mechanism for Ancillary Data (STD-B40)
- Others (including a number of Technical Reports)

Reorganization of R&D Groups for Broadcasting



Comparison of ISDB-T, DVB-T and ATSC

Systems	ISDB-T	DVB-T	ATSC
Transmission System	Multiple carrier (OFDM)		Single carrier (8VSB)
Bandwidth	6/7/8 MHz		
Modulation scheme	DQPSK/QPSK/ 16QAM/64QAM	QPSK/ 16QAM/64QAM	8VSB
Error control	Convolutional code / RS		Trellis code + RS
Characteristics	- SFN capability - Effective against ghost - Segmented OFDM - Time interleaving	- SFN capability - Effective against ghost	- Analog based format

Proponent	Japan	Europe	U.S.A.

These DTTB systems are recommended in ITU-R Rec. BT.1306.

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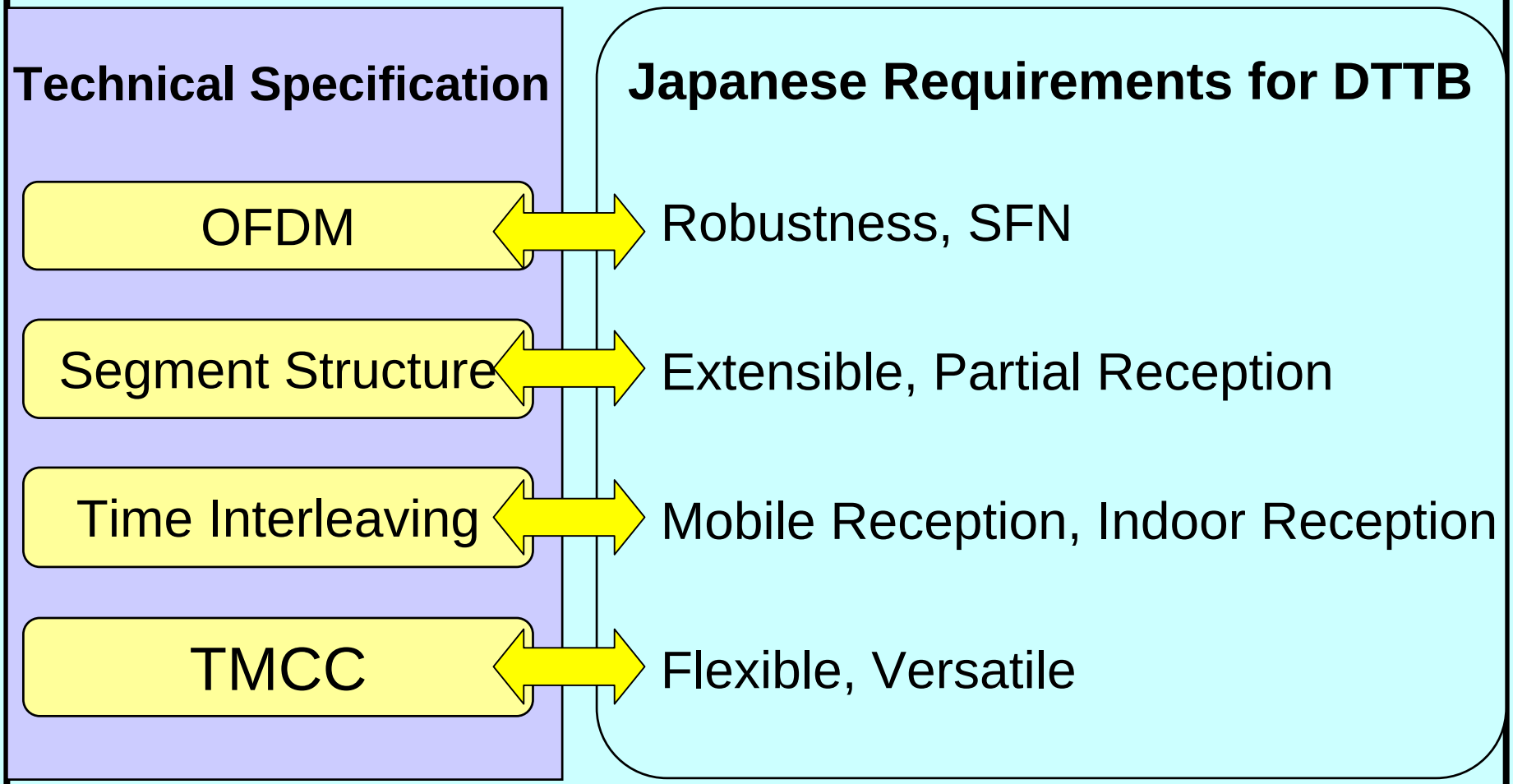
Features of ISDB-T



International activities of ARIB

- International activities of ARIB in the field of broadcasting includes the following:
  - Participation in the work of **ITU-R**, **ITU-T**, **APT/ASTAP** and **ABU**;
  - Participation in **GRSC**;
  - Consultations with **ATSC** and **DVB**;
  - Liaison with **SMPTE** and **TV Anytime Forum**;
  - Participation in **CJK Digital TV and Broadcasting WG**;
  - International promotion activities by **DiBEG**.

Digital Broadcasting Experts Group (DiBEG)

- The Digital Broadcasting Experts Group (DiBEG) was founded in September 1997 to promote the Japanese Digital Terrestrial Broadcasting Systems ISDB-T and ISDB-T_{SB} into the world.
- Today, DiBEG has 25 members, including broadcasters, broadcast equipment manufactures and consumer electronics manufactures, etc.
- DiBEG is one of the committees of ARIB.

Activities

- ◆ Research of the trend toward digital broadcasting in the world.
- ◆ Exchange of digital broadcasting technologies and facilitation of common understanding.
- ◆ Exchange of technologies and ways for interoperability toward smooth exchange of program.

Analog TV Frequency Change Support

[Information]

- ARIB acts for the Minister of MIC to support smooth introduction of terrestrial digital broadcasting.
- ARIB provides financial support to frequency change of broadcasting facilities at about 800 sites, adjustment of TV receiving sets and facilities of about 4 Million households, etc.
- Support to 46% of those households has already finished at the end of last year.
- Total cost will be about 180 Billion Yen for the period from 2002 to around 2007.