ARIB Activities related to Digital Broadcasting - R&D, Standardization, etc. -

Association of Radio Industries and Businesses (ARIB)

February 7, 2005
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- Recent ARIB Activities related to Digital Broadcasting
- Reorganization of R&D Groups for Broadcasting
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- [Information] Analog TV Frequency Change Support
Outline of ARIB

- **Establishment**: merge of two organizations in 1995:
  - Research & Development Center for Radio Systems (RCR)
  - Broadcasting Technology Association (BTA)

- **Objective**: promotion of public 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

Members → General Assembly

Auditors → Board of Directors

Chairman → Secretary General

Standard Assembly

Standard Council

Management Strategy Committee

Management Committee

Technical Committee

IMT-2000 Study Committee

Electromagnetic Environment Committee

Popularization Committee
ARIB’s R&D and Standardization

Demands for radio systems

Technical Committee

IMT-2000 Study Committee

Electromagnetic Environment Committee

R&D Group

R&D Group

Results of R&D

Petition to the Ministry for rule making

Rule making by the Ministry

Demands for voluntary standards

Draft ARIB Standard

Standard Assembly

ARIB Standard

Demands for radio systems

Discussion with President R. Franco of SET, February 7, 2005
(Note) MIC: Ministry of Internal Affairs and Communications
## Government Regulations and ARIB Standards for radio systems

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

Number of ARIB Members

(As of Oct. 1st)

262 276 297 304 310 306 295 280 279

Discussion with President R. Franco of SET, February 7, 2005
**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:**

  - **Chairman**
  - **Members**
  - **20 Working Groups**

For maintenance and enhancement of ARIB standards
Discussion with President R. Franco of SET, February 7, 2005

Members of ARIB Standard Assembly

Ref.: ARIB Members

- 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)

Total: 279

Total: 207
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**

<table>
<thead>
<tr>
<th></th>
<th>STD</th>
<th>TR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telecommunications</td>
<td>71(68)</td>
<td>18(17)</td>
</tr>
<tr>
<td>Broadcasting</td>
<td>51(51)</td>
<td>37(35)</td>
</tr>
</tbody>
</table>

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

- Digital Terrestrial (Sound) (Oct. 2003)
- Digital Satellite (Sound) (Oct. 2004)

Discussion with President R. Franco of SET, February 7, 2005
## ARIB Standards for Digital Broadcasting

<table>
<thead>
<tr>
<th></th>
<th>Digital Television</th>
<th></th>
<th>Digital Sound</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BS / wCS</td>
<td>Terrestrial</td>
<td>Terrestrial</td>
<td>Satellite</td>
</tr>
<tr>
<td>System</td>
<td>STD-B20</td>
<td>STD-B31</td>
<td>STD-B29</td>
<td>STD-B41</td>
</tr>
<tr>
<td>Multiplex</td>
<td>Coding &amp; Multiplexing</td>
<td>Service Information</td>
<td>STD-B32</td>
<td></td>
</tr>
<tr>
<td>Source coding</td>
<td>Coding &amp; Multiplexing</td>
<td>STD-B32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Broadcasting</td>
<td>Presentation Engine (BML)</td>
<td>Execution Engine (GEM-based)</td>
<td>STD-B24</td>
<td>STD-B23</td>
</tr>
<tr>
<td>CAS</td>
<td>Conditional Access</td>
<td>STD-B25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home servers</td>
<td>System based on Home Servers</td>
<td>STD-B38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receivers</td>
<td>STD-B21</td>
<td>STD-B30</td>
<td>STD-B42</td>
<td></td>
</tr>
<tr>
<td>Operational Guidelines</td>
<td>TR-B15</td>
<td>TR-B14</td>
<td>TR-B13</td>
<td>TR-B26</td>
</tr>
</tbody>
</table>
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 1125/60 Television System (STD-B27)
- Digital Program Exchange Specification for Data Broadcasting (STD-B35)
- 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

(till March 2004)

- Terrestrial digital TV
- Digital Receiver
- Satellite digital Sound
- Satellite digital TV
- Terrestrial digital Sound
- Studio Equipment
- Program Material Transmission

(from April 2004)

- Digital Broadcasting System
- Studio Equipment
- Program Material Transmission
## Comparison of ISDB-T, DVB-T and ATSC

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

Proponent: Japan, Europe, U.S.A.

These DTTB systems are recommended in ITU-R Rec. BT.1306.
Features of ISDB-T

Technical Specification
- OFDM
- Segment Structure
- Time Interleaving
- TMCC

Japanese Requirements for DTTB
- Robustness, SFN
- Extensible, Partial Reception
- Mobile Reception, Indoor Reception
- Flexible, Versatile
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.
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.
[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.