



# Standardization Activities on International Mobile Telecommunications (IMT) in Japan

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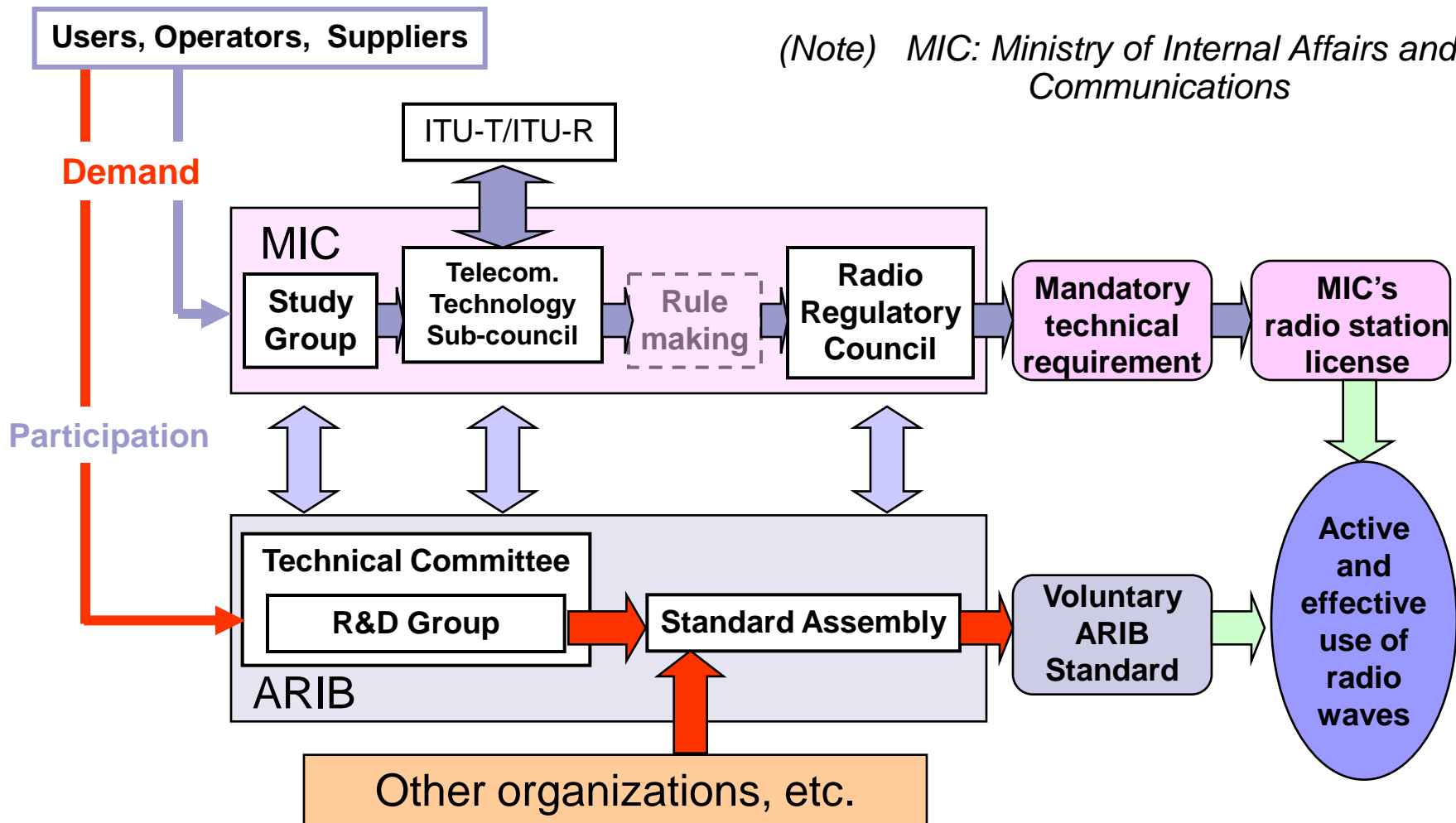
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# Standardization Flow in Japan

# Standardization Flow in Japan



# Government Regulations and ARIB Standards

	Government Regulations	ARIB Standards
Nature	Mandatory	Voluntary
Purpose	<ul style="list-style-type: none"> <li>◆ To promote efficient use of frequency</li> <li>◆ To prevent interference occurring</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>◆ 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>◆ Sensitivity</li> <li>◆ Carrier to Noise ratio</li> <li>◆ Bit error rate</li> <li>◆ Measurement method</li> <li>◆ etc.</li> </ul>

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# Organization and Standardization Activities in ARIB

## ◆ **Organization:**

- ✓ A public service cooperation in the private sector chartered by the Minister of Posts and Telecommunications

## ◆ **Establishment:** 1995 by merger of two organizations:

- ✓ **Research & Development Center for Radio Systems (RCR)**
- ✓ **Broadcasting Technology Association (BTA)**
  - Both org. were established in 1985 as a consequence of **Deregulation**.
  - Standardization work started in 1886.

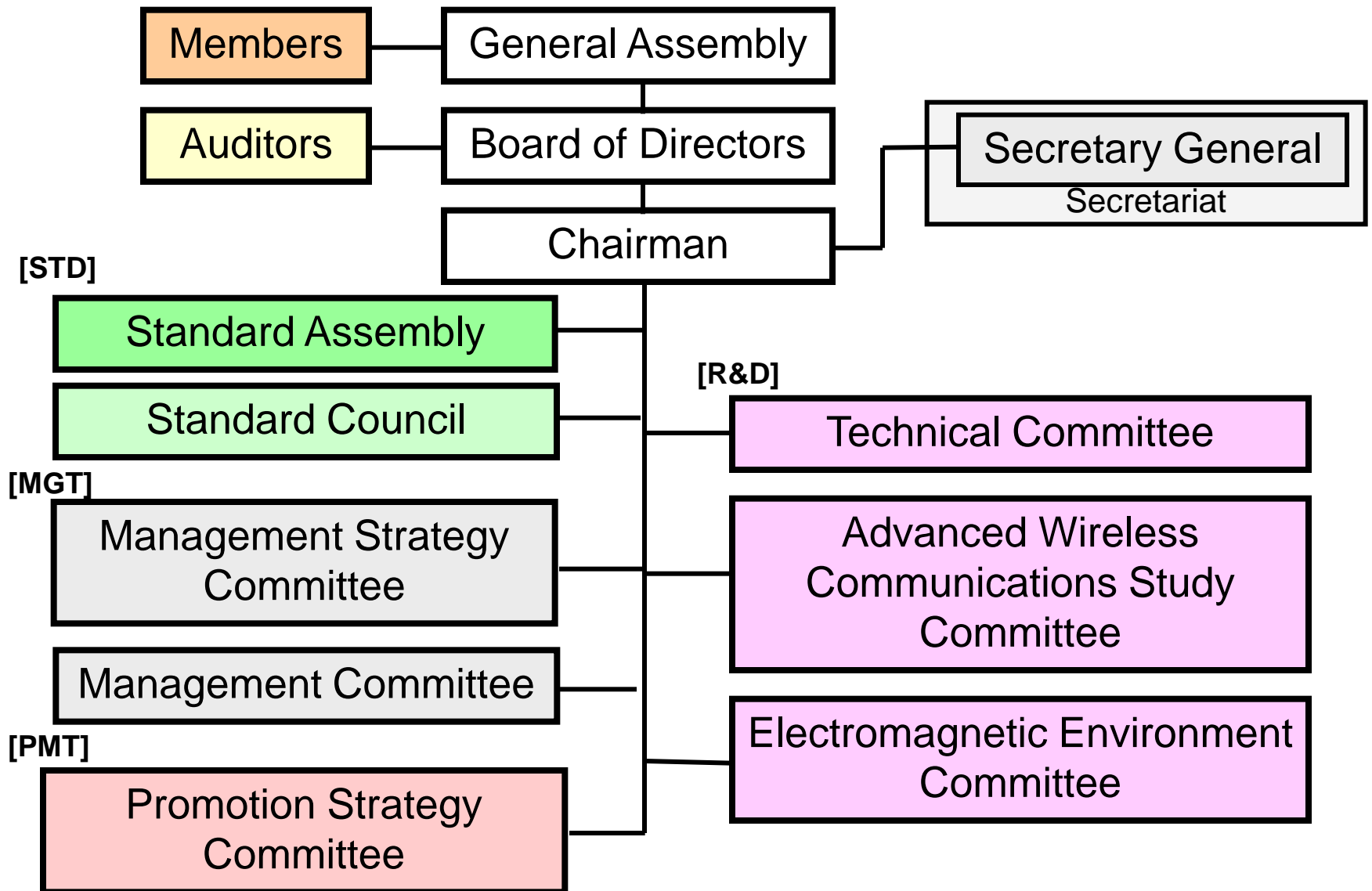
## ◆ **Members:**

- ✓ 247 members (as of 1<sup>st</sup> February 2010), including telecom operators, broadcasters, manufacturers, etc.

## ◆ **Main Activities:**

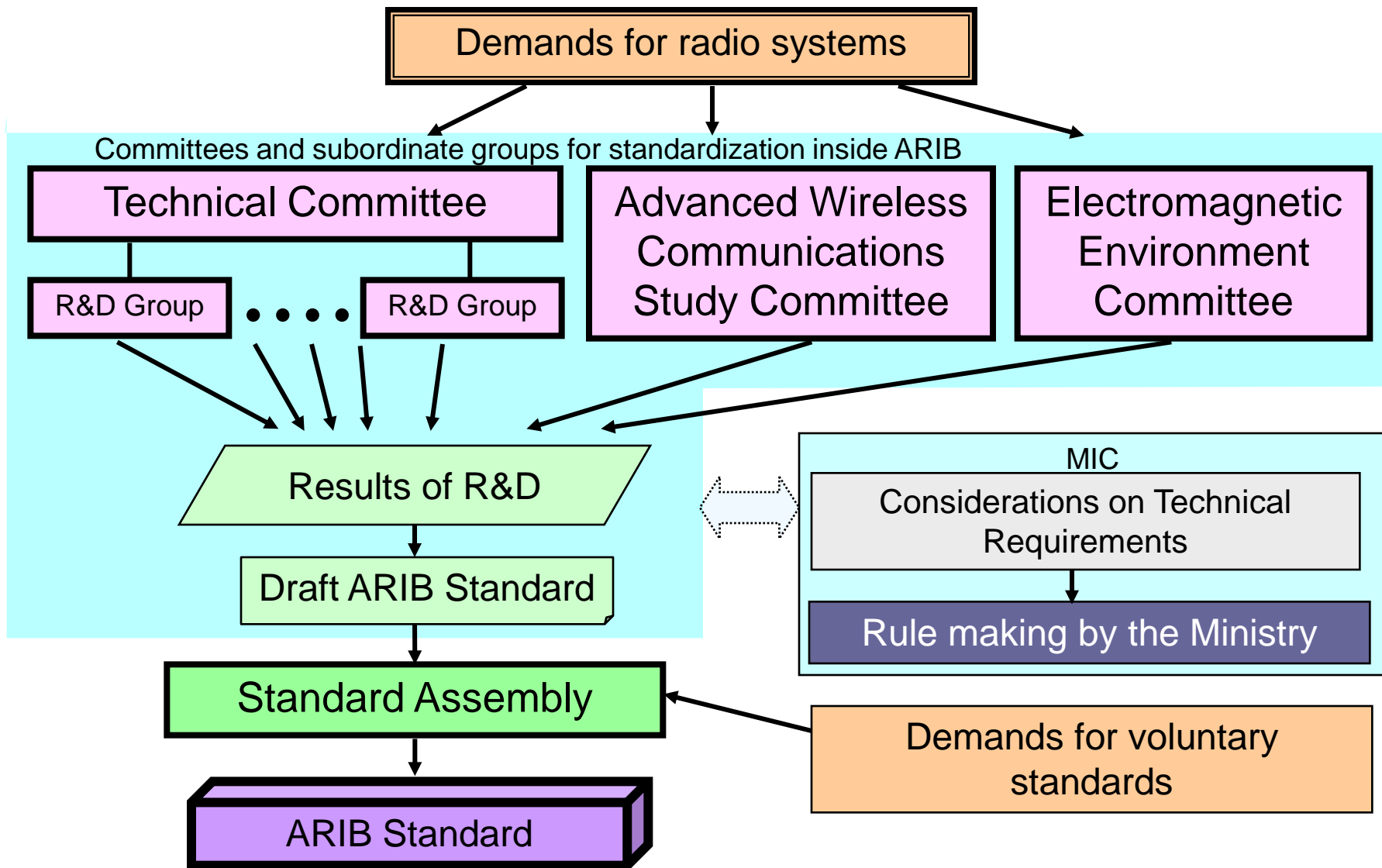
- ✓ investigation and R&D on utilization of radio waves
- ✓ consultation, dissemination, collection and publication of information on utilization of radio waves
- ✓ establishment of voluntary technical standards for radio systems
- ✓ frequency change support for terrestrial digital TV broadcasting
- ✓ frequency expiration support for re-allotment of radio spectrum

# Organization of ARIB

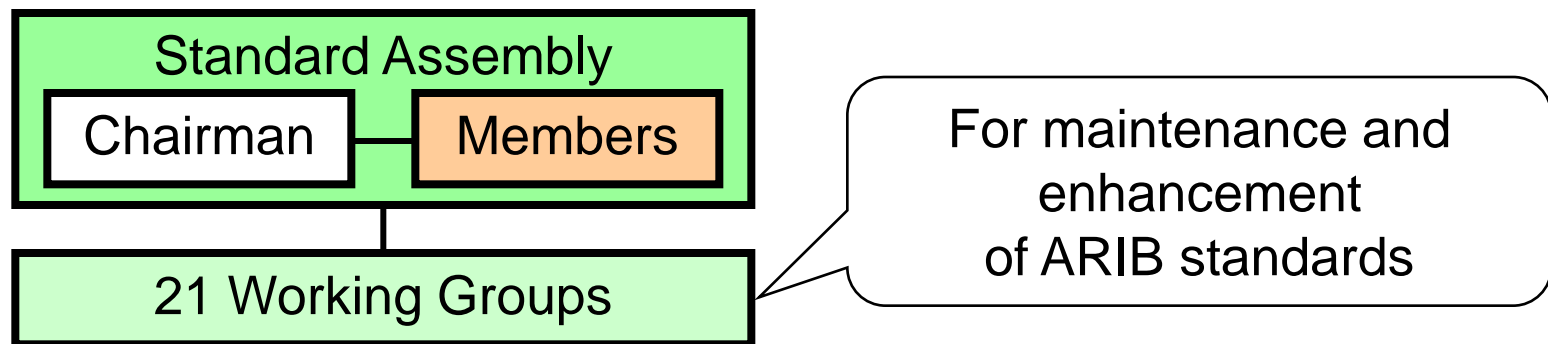




# ARIB's R&D and Standardization **ARIB**



- ◆ **Establishment:** 1995  
(reorganized from the RCR Standard Assembly and the BTA)
- ◆ **Members:** 247 (as of 1<sup>st</sup> February 2010)
  - ✓ open to any entity, organization and person
  - ✓ no limitation on nationality
  - ✓ independent from ARIB membership
- ◆ **Organization:**



# 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**

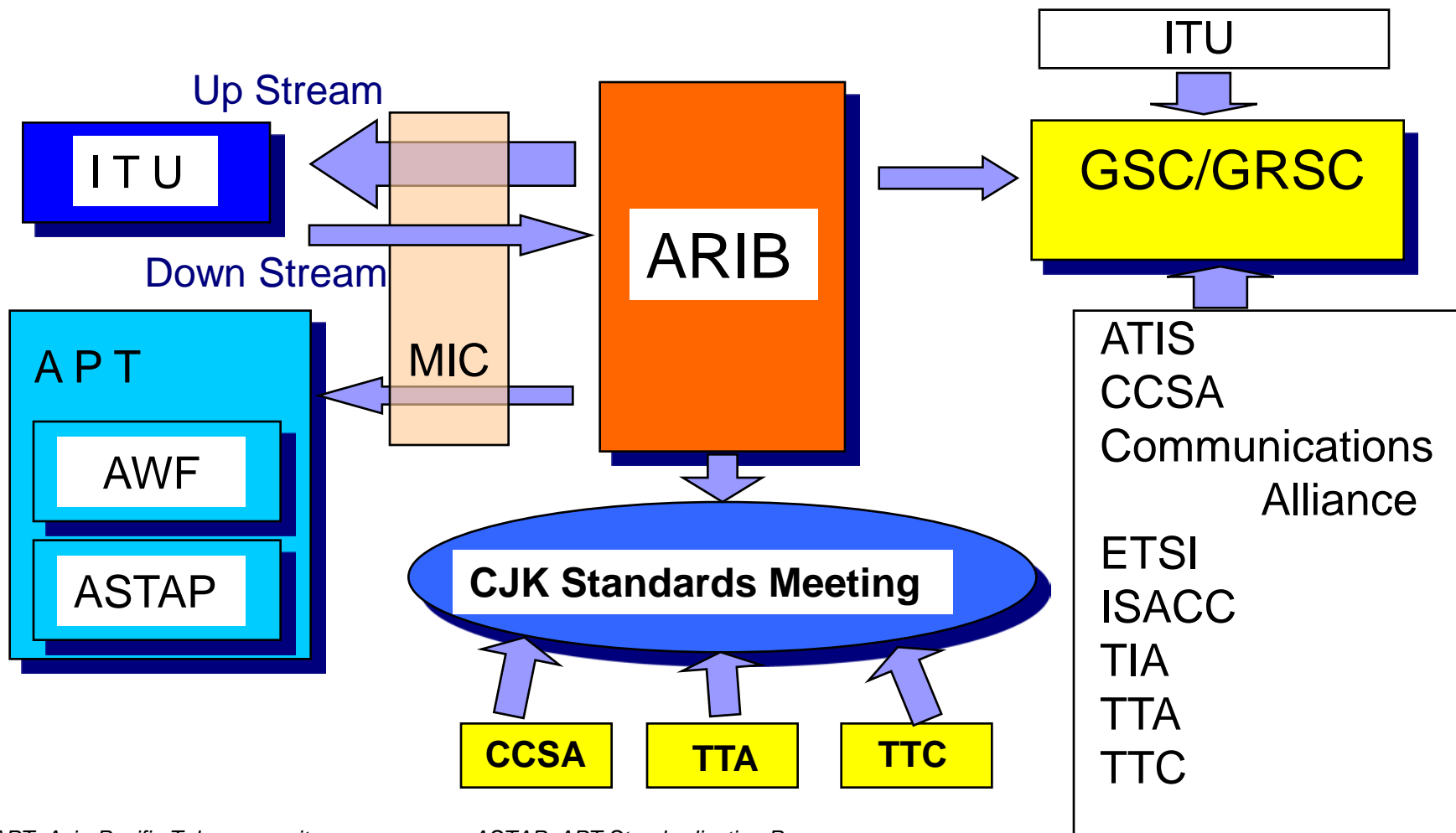
Telecommunications	80	20
Broadcasting	53	40
General	0	1

As of December 2009

- ◆ **Free Download**

<http://www.arib.or.jp/english/html/overview/index.html>

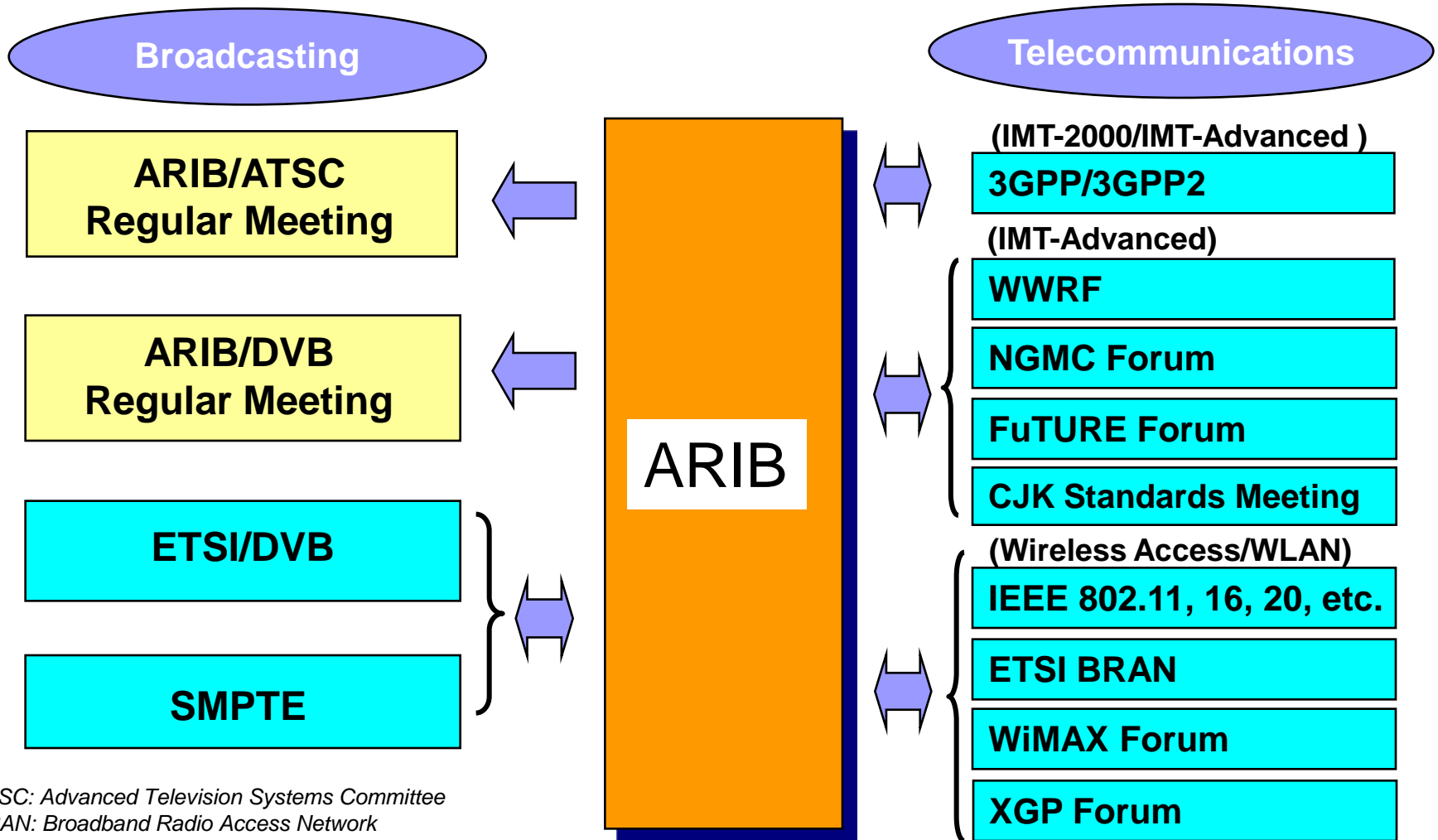
# Standards Collaboration (General) **ARIB**



APT: Asia-Pacific Telecommunity  
 AWF: APT Wireless Forum  
 GSC: Global Standards Collaboration  
 MIC: Ministry of Internal Affairs and Telecommunications

ASTAP: APT Standardization Program  
 CJK: China, Japan and Korea  
 GRSC: Global Radio Standards Collaboration

# Relation with other organizations (Specific Projects)



ATSC: Advanced Television Systems Committee  
BRAN: Broadband Radio Access Network  
DVB: Digital Video Broadcasting  
SMPTE: Society of Motion Picture and Television Engineers  
XGP: eXtended Global Platform

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# Trends in Mobile Radio Systems in Japan

# Trends of Mobile Communication Systems in Japan

- ◆ The number of mobile phone subscribers including PHS in Japan: **115.267 million** (as of January 2010)
- ◆ Rapid shift from 2G to 3G (IMT-2000) : **96.3%** (*3G penetration in mobile phone*)
- ◆ Active studies on IMT (IMT-2000 and IMT-Advanced)
  - ✓ Report by Telecommunications Council to Ministry of Internal Affairs and Communications (MIC) on technical conditions for 3.9G including enhanced 3.5G in December 2008
  - ✓ Submission of two candidate IMT-Advanced radio interface technology proposals to ITU-R in October 2009
  - ✓ Report by Telecommunications Council to MIC on technical conditions for enhanced CDMA high speed data mobile communication system (cdma2000 1X EVDO) in December 2009
  - ✓ Start to study on usage of 700/900MHz bands for mobile communication systems in December 2009
- ◆ 2.5GHz Band Mobile BWA (Broadband Wireless Access) systems licensed (nation wide) to 2 operators based on mobile WiMAX(IEEE802.16e) and XGP(eXtended Global Platform) technologies in December 2007
  - ✓ UQ Communications Inc. started mobile WiMAX commercial service in July 2009
  - ✓ Willcom Inc. started XGP commercial service in a part of Tokyo in October 2009

# Introduction of 3.9G system in Japan (1) **ARIB**

In 2008, Telecommunications Council under MIC has conducted the following studies;

- ◆ Study on technical measures for the enhancement of the third-generation mobile communications system
- ◆ Study on conditions to coexist with other systems for the introduction of the enhanced third-generation mobile communications system
- ◆ Spectrum bands of 2GHz, 800MHz, 1.5GHz and 1.7GHz considered



Candidate Enhanced Systems (FDD) studied by the council including 3.5G

- ◆ LTE, UMB and Mobile WiMAX for 3.9G system  
Note: Mobile WiMAX was studied, but was not included in the final report because its FDD mode specs had not been completed yet
- ◆ HSPA Evolution and DC-HSDPA for enhanced 3.5G system



# Introduction of 3.9G system in Japan (2) **ARIB**

## Study process

- ◆ April 21, 2008: Study started by Telecommunications Council
- ◆ Oct. 27, 2008: Draft technical measures for advancement of IMT-2000
- ◆ Oct. 31, 2008: Public comment invited on the draft report
- ◆ Dec.11, 2008: Final report on technical measures by the council

## Schedule for introduction

- ◆ Jan. 21, 2009: Consulting Radio Regulatory Council (RRC) on radio regulations
- ◆ Jan. 23, 2009: Draft license policy released and public comment invited
- ◆ March 11, 2009: Report on radio regulations by RRC
- ◆ March 11, 2009: Consulting RRC and report on draft license policy by RRC
- ◆ April 3, 2009: Public announcement of license policy, etc.
- ◆ April 3 - May 7, 2009: Approval application period / 4 applications received
- ◆ June 10, 2009: All of 4 applications and their deployment plans approved

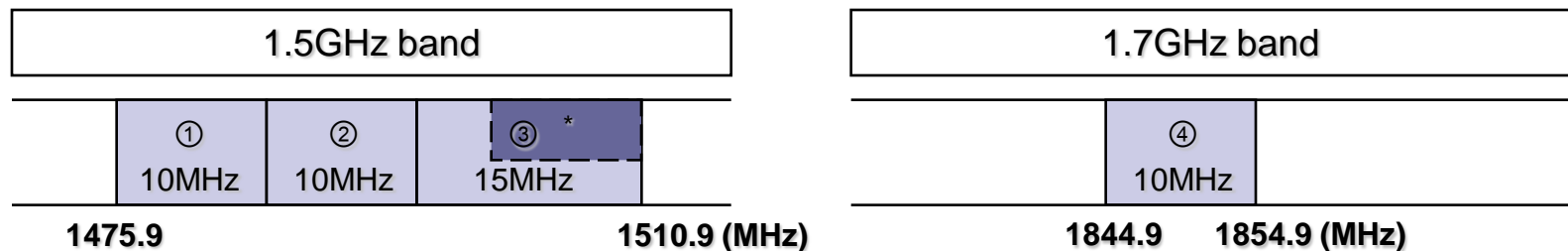
# Introduction of 3.9G system in Japan (3) **ARIB**

## ◆ RRC report on draft license policy on 11<sup>th</sup> March 2009

Draft license policy titled “Draft guidelines for establishment of specified base stations for the introduction of the 3.9-generation mobile Communications system” states

- (1) 2 blocks of 10MHz and 1 block of 15MHz in 1.5GHz band and 1 block of 10MHz in 1.7GHz band will be newly allocated to 4 applicants regardless of the incumbent operators and new entrants
- (2) Within 5 years from the date of approval, more than 50 % population coverage by 3.9G and enhanced 3.5G systems using newly allocated frequency band should be realized
- (3) 3G and 3.5G system can also be used in order to flexibly cope with various scenarios of 3.9G system introduction

Note: texts shown above are unofficial translations from original material in Japanese



\* The band 1503.35MHz -1510.9MHz is prohibited from being used until end of March 2014 in some regions of Japan

# Introduction of 3.9G system in Japan (4) **ARIB**

## Deployment plans proposed by applicants (unofficial translation)

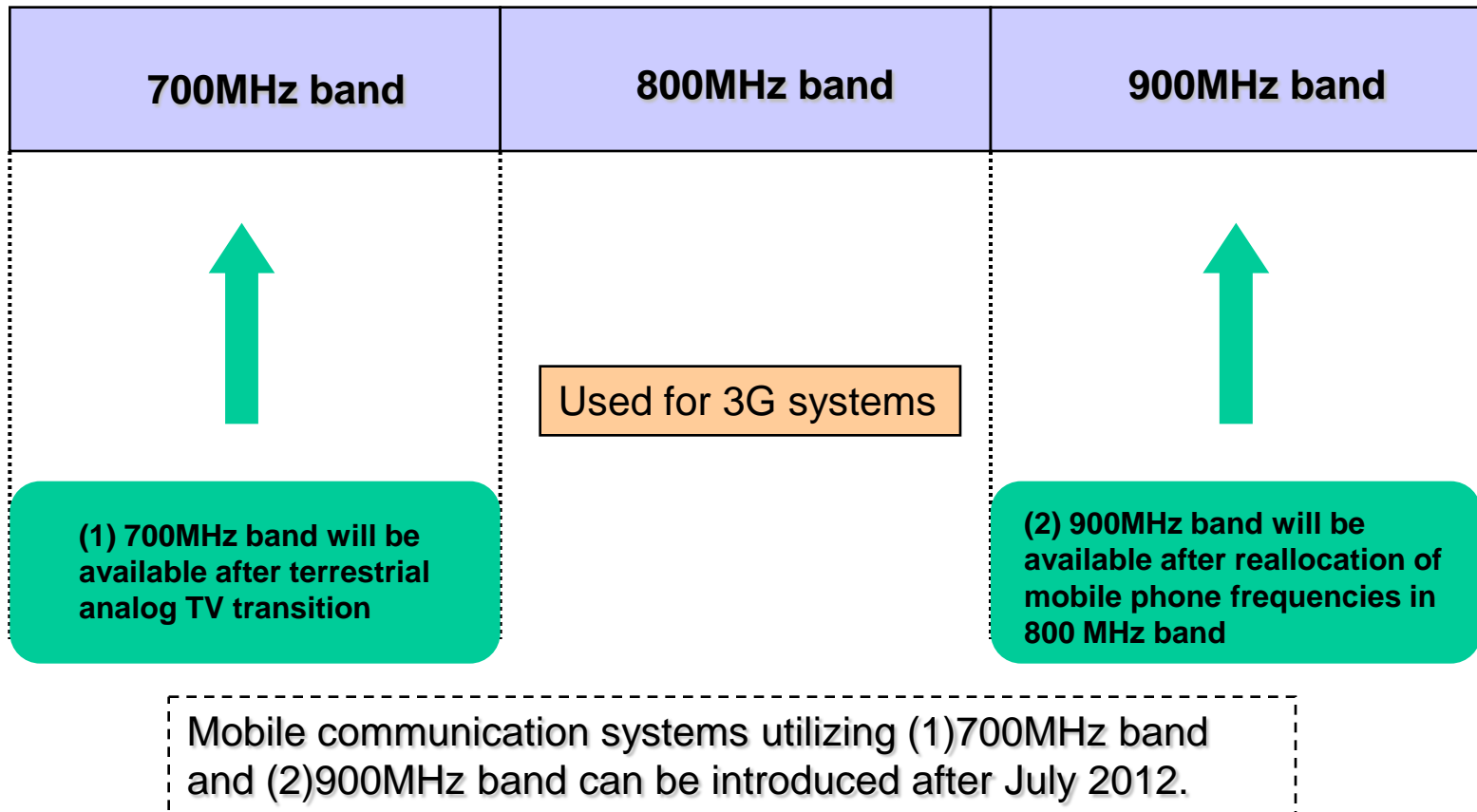
Operator		EMOBILE	NTT DOCOMO	SOFTBANK MOBILE	KDDI
Frequency band applied for		1.7GHz band / 10MHz	1.5GHz band / 15MHz	1.5GHz band / 10MHz	1.5GHz band / 10MHz
3.9G /e3.5G system	System	DC-HSDPA LTE(5MHz,2X2MIMO)	LTE(15MHz,2X2MIMO)	DC-HSDPA LTE(5MHz,2X2MIMO)	LTE (10MHz,2X2MIMO)
	Freq. band	1.7GHz band (DC-HSDPA,LTE)	1.5G/2GHz band (LTE)	1.5GHz (DC-HSDPA) 2GHz band (LTE)	800M/1.5GHz band (LTE)
	Service launch date	September 2010	December 2010	July 2011	December 2012
	Area deployment By Mar. 2015	75.2% 6,388 base stations	51.10% 20,700 base stations	60.63% 9,000 base stations	96.5% 29,361 base stations
	Estimated number of subscribers by Mar. 2015	2.95M	17.74M	5.41M	9.84M
1.5GHz /1.7GHz band usage	System	HSPA, DC-HSDPA LTE	LTE	HSPA, DC-HSDPA	LTE
	Service launch date	January 2010	4Q 2012	April 2010	December 2012
	Area deployment By Mar. 2015	75.2% 6,676 base stations	50.62% 5,700 base stations	81.47% 10,000 base stations	53.0% 6,361 base stations

# Study on the usage of 700/900 MHz bands for mobile communication systems in Japan (1)

In December 2009, Telecommunications Council under MIC started the following studies;

- ◆ Study on technical conditions for the introduction of mobile communication systems utilizing 700/900MHz bands
- ◆ Followings are taken into account:
  - ✓ Effective frequency arrangement utilizing 700/900MHz bands
  - ✓ Conditions to coexist with other systems for the introduction of the mobile communication systems utilizing 700/900MHz bands
- ◆ Spectrum bands of 700/900MHz (scheduled to be available after July 2012) are considered
  - ✓ 700MHz band will be available after the termination of analog broadcasting
  - ✓ 900MHz band will be available after the reallocation of mobile phone frequencies in 800MHz band

# Study on the usage of 700/900 MHz bands for mobile communication systems in Japan (2)



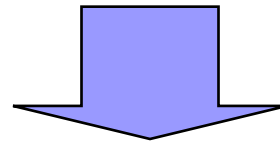
Note: The picture shown in this page is extracted and unofficially translated from the MIC press release written in Japanese dated 18<sup>th</sup> December 2009.

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# Organizational Structure and Activities on IMT in ARIB

## ◆ Background

- ✓ International standardization activities for the future development of IMT-2000 and systems beyond IMT-2000 are currently undertaken by the ITU-R and other institutions.
- ✓ Activities on Broadband Wireless Access (BWA) systems have been accelerating both in Japan and abroad.
- ✓ The Study Group for Wireless Broadband Promotion under the Ministry of Internal Affairs and Communications said in its Final Report in December 2005 that it “expects to see further developments in systematic activities for the standardization and practical implementation of wireless broadband systems by private standardization bodies, etc.”



Establishment of

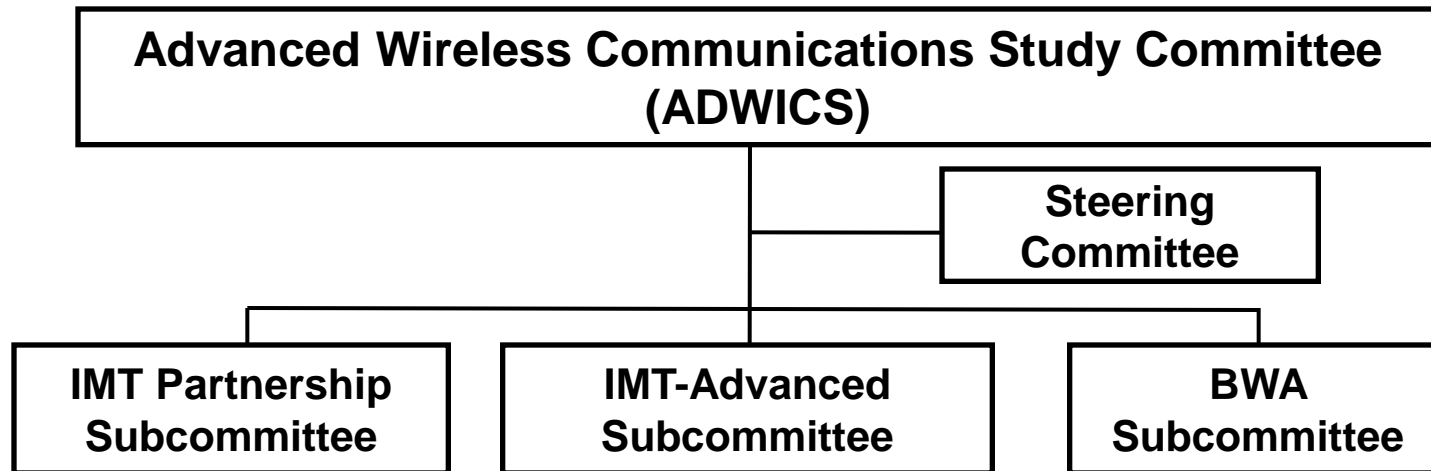
**“Advanced Wireless Communications Study Committee”**

# Advanced Wireless Communications Study Committee (ADWICS)

## ◆ Responsibilities

- ✓ To conduct technical studies on advanced wireless communication systems in cooperation with other related international/domestic organizations
- ✓ To contribute to the global standardization


## ◆ Structure of the Study Committee



*Committee was established in April 2006, through extending the scope of former IMT-2000 Study Committee*

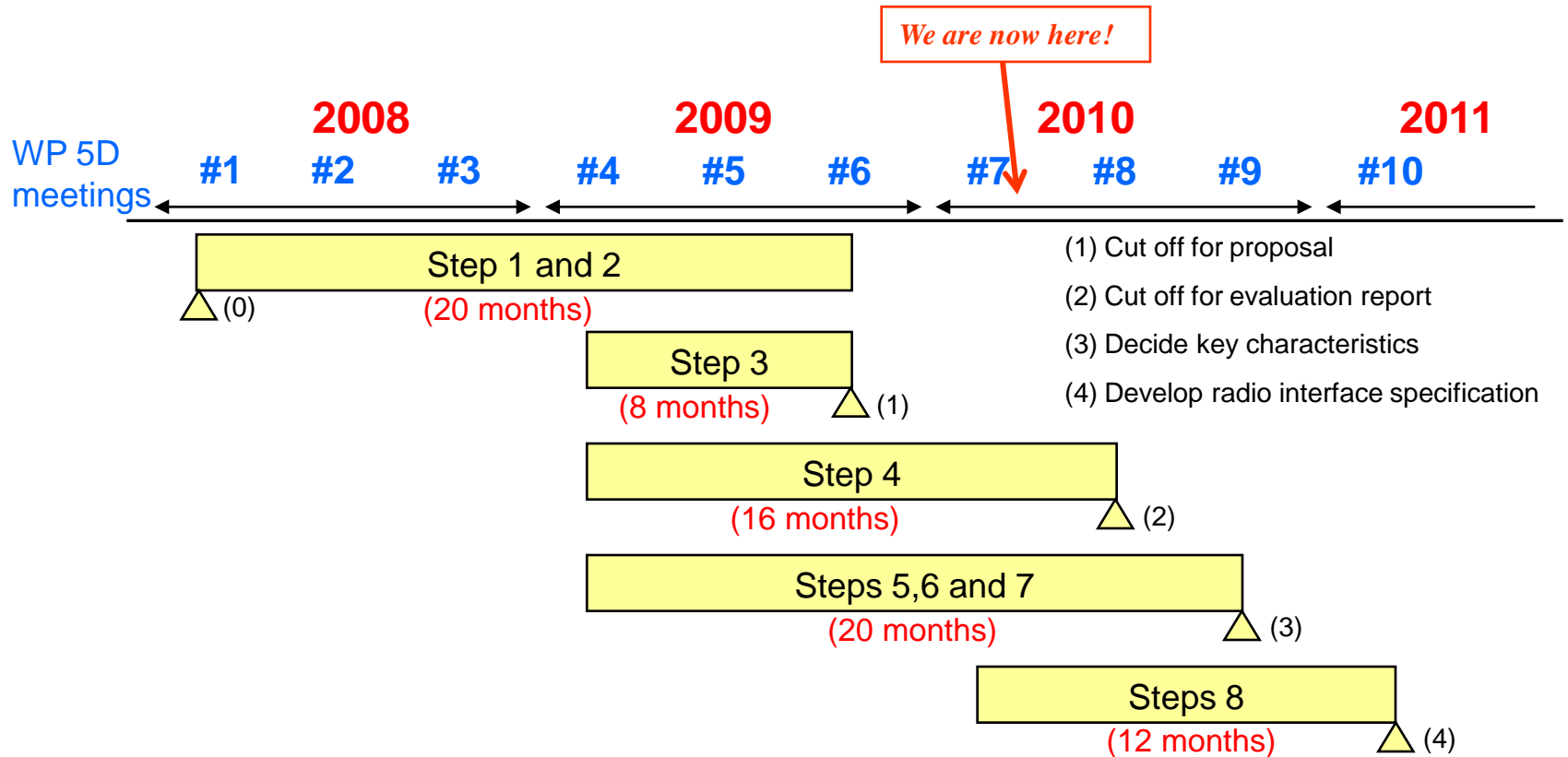


- ◆ **IMT Partnership Subcommittee**
  - ✓ Operate 3GPPs as one of an Organizational Partner
  - ✓ Prepare contribution to 3GPPs on national regulatory requirements aspects
  - ✓ Downstream activities of the specification developed by 3GPPs for ARIB Standards
  
- ◆ **IMT-Advanced Subcommittee**
  - ✓ Conduct technical studies on IMT-Advanced
  - ✓ Promote its standardization through contributions to ITU-R and other activities
  
- ◆ **BWA Subcommittee**
  - ✓ Produce national standards for WiMAX, Next Generation PHS and IEEE802.20 referring to relevant international standards.

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# Recent Activities on IMT-Advanced in ARIB and Japan

# Schedule for Development of IMT-Advanced Radio Interface in ITU-R WP5D



- Steps in Radio interface development process:

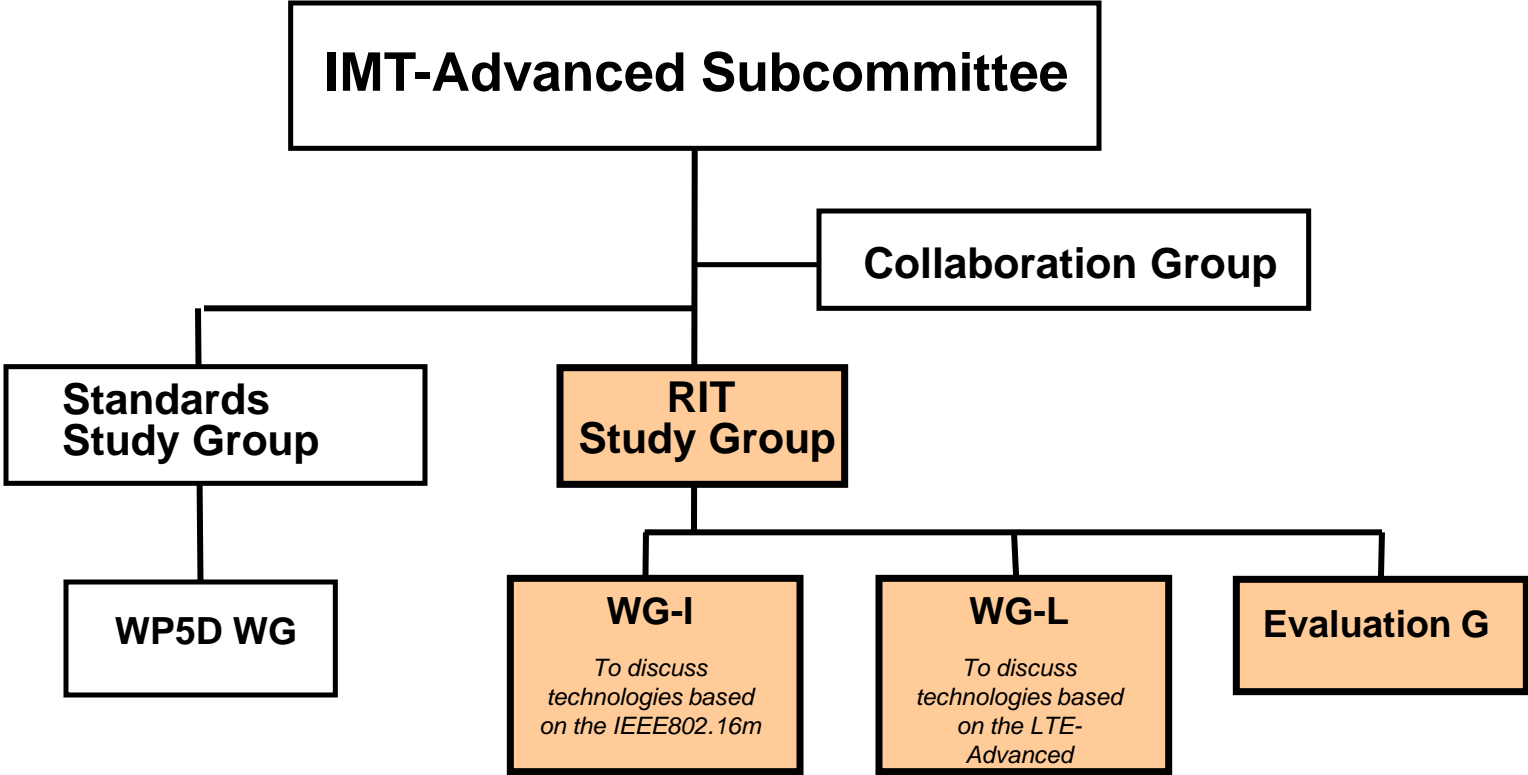
- Step 1: Issuance of the Circular Letter
- Step 2: Development of candidate RITs
- Step 3: Reception of the submissions and issuance of an acknowledgement for RIT
- Step 4: Evaluation of candidate RITs by evaluation groups

- Step 5: Review and coordination of outside evaluation activities
- Step 6: Review to assess compliance with minimum requirements
- Step 7: Consideration of evaluation results, consensus building and decision
- Step 8: Development of Radio Interface Recommendation(s)

# IMT-Advanced Subcommittee



(Structure as of Oct. 2009)



RIT: Radio Interface Technology

 : Established in 2008

# Scope of Groups in IMT-Advanced Subcommittee (1)

## ◆ **Standardization Study Group**

- ✓ Preparation for ITU-R WP 5 D meeting
- ✓ Cooperation and coordination on IMT-Advanced standardization with related international/domestic bodies

## ◆ **Collaboration Group**

- ✓ Develop basic strategies for collaboration with external related bodies
- ✓ Conduct communication and collaboration with them
- ✓ Current main activities are CJK-B3G collaboration under the framework of cooperation among 4 SDOs

# Scope of Groups in IMT-Advanced Subcommittee (2)

## ◆ Radio Interface Technology (RIT) Study Group

- ✓ Study Group prepare draft proposal of IMT-Advanced radio interface technology
- ✓ Proposal will be submitted to ITU-R through Japan's national process

## ◆ WG-I and WG-L

- ✓ Prepares a draft submission package of IMT-Advanced RIT based on IEEE 802.16m and LTE-Advanced, respectively
- ✓ Sharing information regarding IMT-Advanced activity in IEEE 802.16 WG and 3GPP TSG-RAN WGs, respectively

## ◆ Evaluation Group

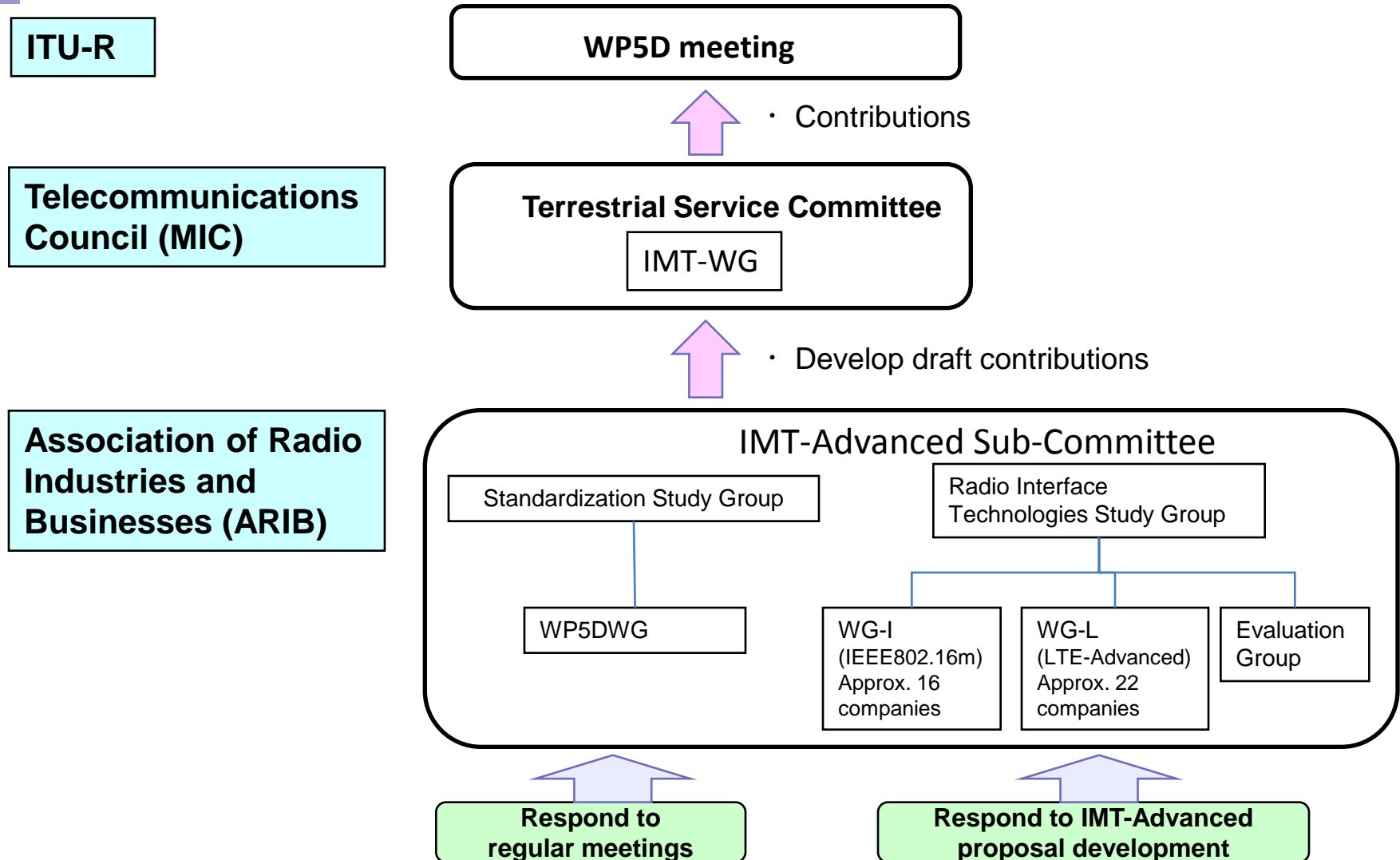
- ✓ Activities may include self-evaluation, endorsement of others' evaluation and/or evaluation of other proposed technologies

# Principles for the technology proposal in the Study Group

- ◆ Comply with the minimum requirements [IMT.TECH] agreed in ITU-R WP5D and outperform the enhancement of IMT-2000 being discussed in Japan
- ◆ Capable to harmonize and coexist with the enhancement of IMT-2000
- ◆ Supported by a large number of Standards Development Organizations (SDOs) and/or Individual Members (IMs)
- ◆ Endorsed by solid evaluation reports (self-evaluation and other evaluation groups)

*(Note) IMT.TECH: Report ITU-R M.2134*

# Structure of IMT Studies in Japan



Extract from the document of Terrestrial Service Committee, Telecommunications Council, MIC, Japan (January 30, 2009)



# Actions towards Submission of Candidate Radio Interface Technology for IMT-Advanced in Japan

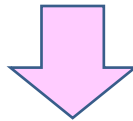
**(1) Facilitate Japanese enterprises to participate in SDOs' development of IMT-Advanced RITs**

(Jan-May, 2009)



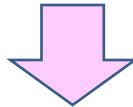
**(2) Express appreciation of SDOs' activities and notify Japan's further actions to WP5D**

(June 2009)



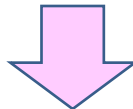
**(3) Review of SDO's self-evaluation results in Japan**

(Jun-Sept. 2009)



**(4) Deliberation on the adequacy of proposed SDOs' IMT-Advanced RITs**

(September 2009)



**(5) Submission of Japan's proposal to WP5D**

(October 2009)

*Extract from the document of Terrestrial Service Committee, Telecommunications Council, MIC, Japan (January 30, 2009)*

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# Concluding Remarks

# Concluding Remarks

- ◆ **IMT-Advanced system, which create an ultra fast-speed mobile Internet environment and enables seamless communications services, holds the key to realize a world's leading mobile IT environment.**
- ◆ **To achieve this goal, it is strongly required to promote research and development activities capitalizing on technologies and knowledge accumulated in various areas.**
- ◆ **To facilitate the R&D and standardization of IMT-Advanced systems and services in a smooth and efficient manner, it is indispensable for the concerned parties to work closely with one another, so that they can share information, and promote R&D and standardization activities.**



Association of Radio Industries and Businesses

**ARIB**

***Thanks for your attention!***

***<http://www.arib.or.jp>***