SOURCE:	ARIB
TITLE:	ARIB's Activities on IMT-2000 and IMT-Advanced
AGENDA ITEM:	Joint 4.1
CONTACT:	Kohei SATOH (satoh@arib.or.jp)

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ARIB's Activities on IMT-2000 and IMT-Advanced

Association of Radio Industries and Businesses (ARIB)

May 29th, 2006

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Outline of the Presentation

- **Japan's Cellular Market and Current Status of IMT-2000**
- **Activities on IMT-Advanced in mITF**
  - Outline of Mobile IT Forum
  - Activities of Fourth Generation Mobile Communications Committee
- **Overview of Advanced Wireless Communications Study Committee**
  - Back Ground of New Study Committee
  - Structural Organization of Study Committee
  - Activities on Study Committee

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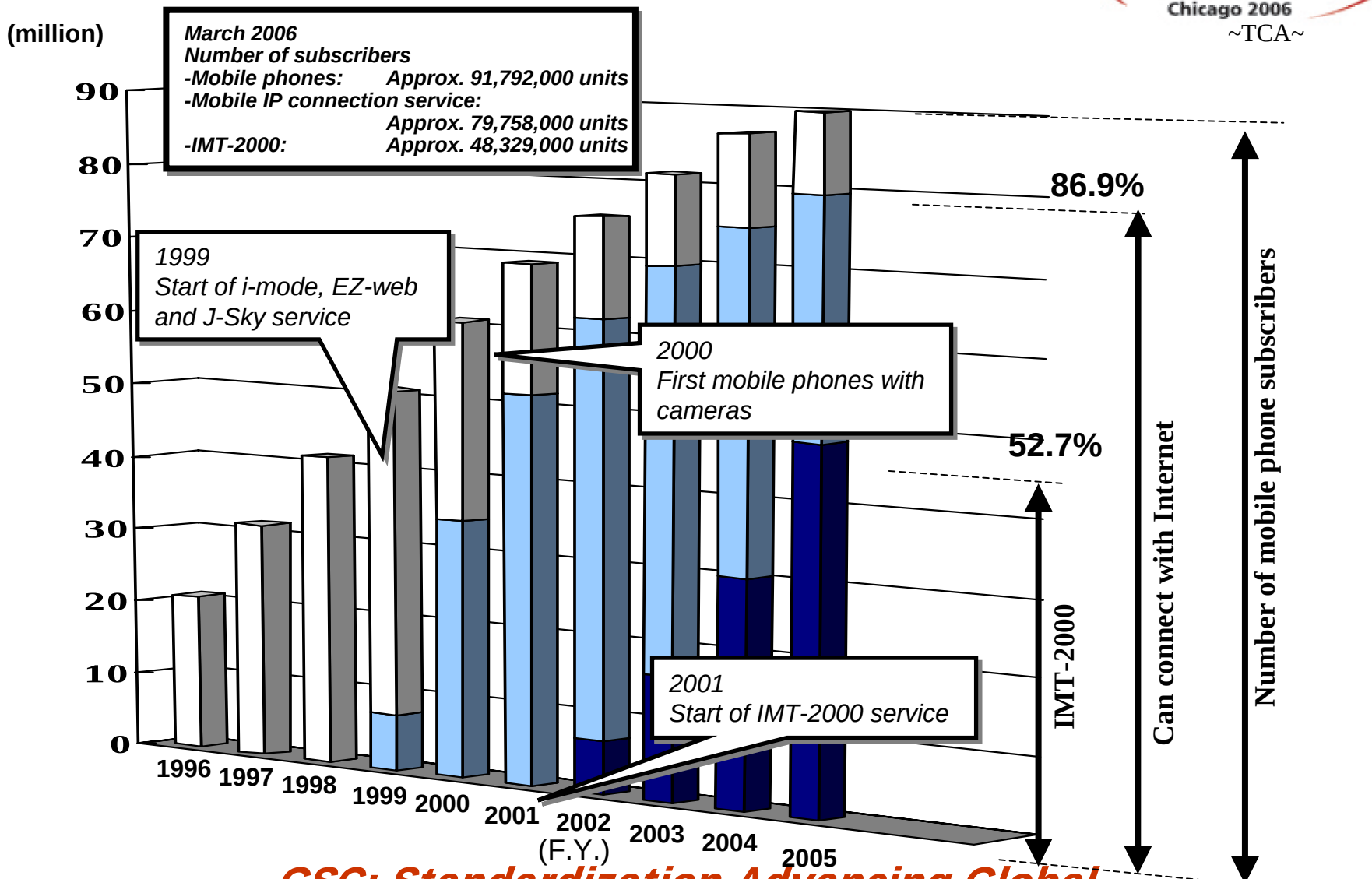
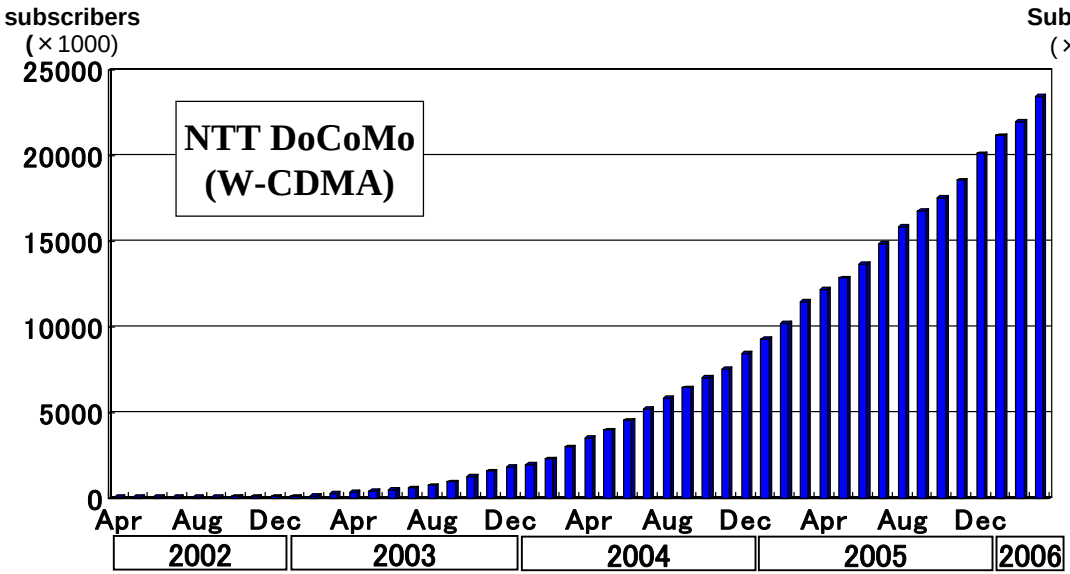
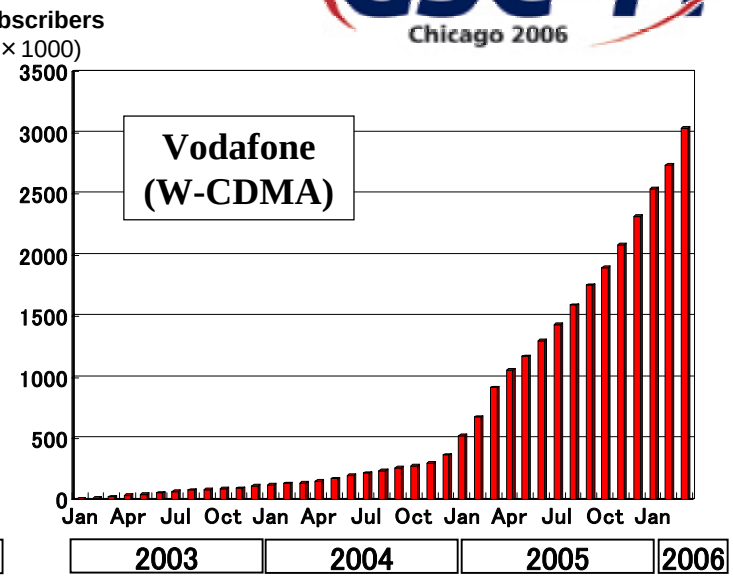
◆ Japan's Cellular Market and Current Status of IMT-2000

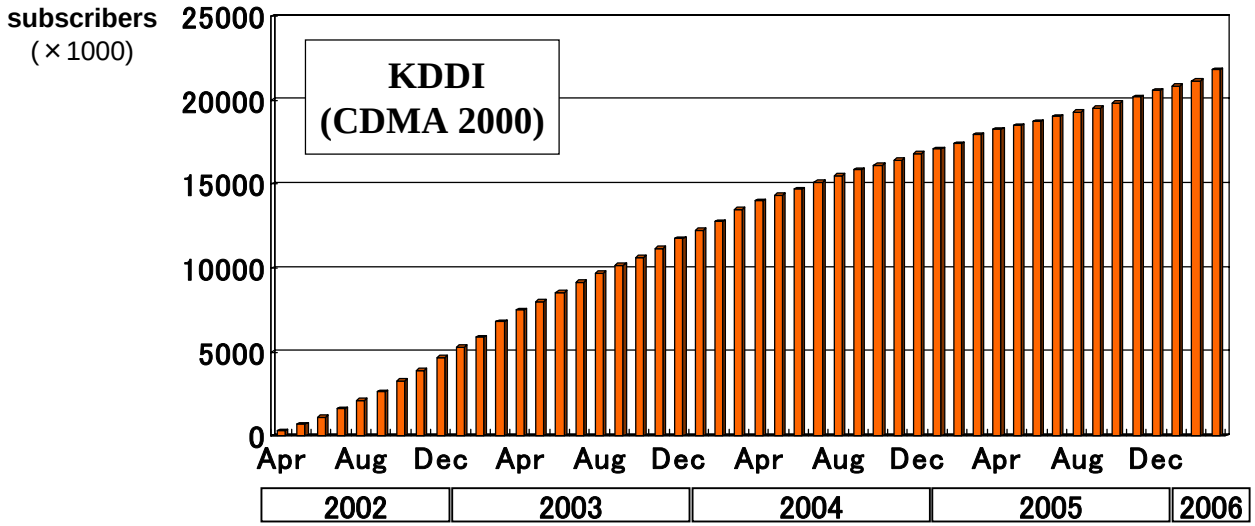
Mobile phone subscribers in Japan



Growth of IMT-2000 subscribers







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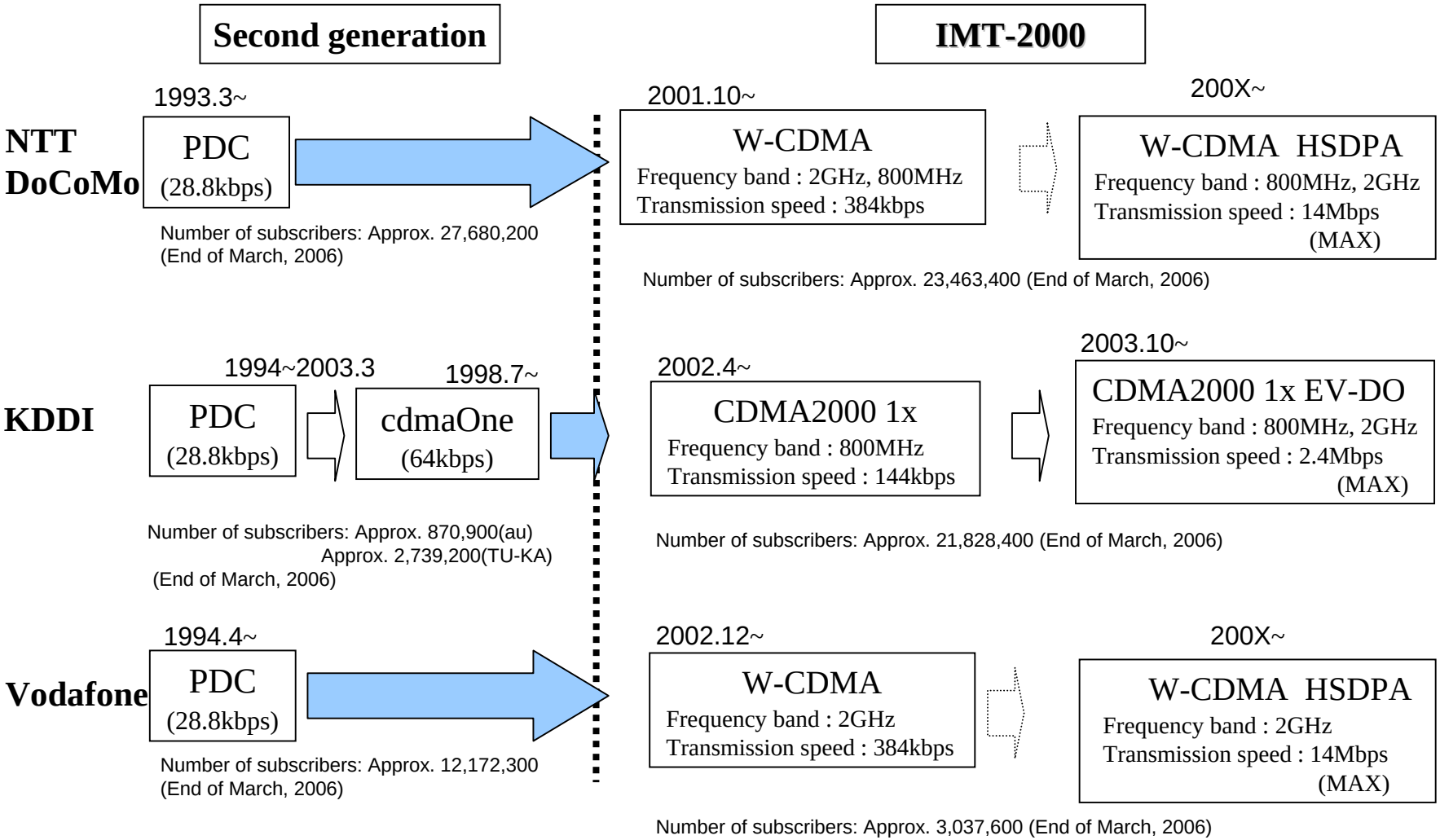
Deployment of IMT-2000 in Japan



IMT-2000 Standardization Activities in ARIB

- ARIB establishes its standards on CDMA-DS and CDMA-MC based on 3GPPs specifications around every 3-4 months.

  (CDMA-DS: STD-T63, TR-T12 Ver.4.80)

  (CDMA-MC:STD-T64, TR-T13 Ver.4.00)

- December 2005 Version of Release 6 3GPP specifications and April 2006 of Release 4 3GPP2 specifications have already been transposed to ARIB standards.

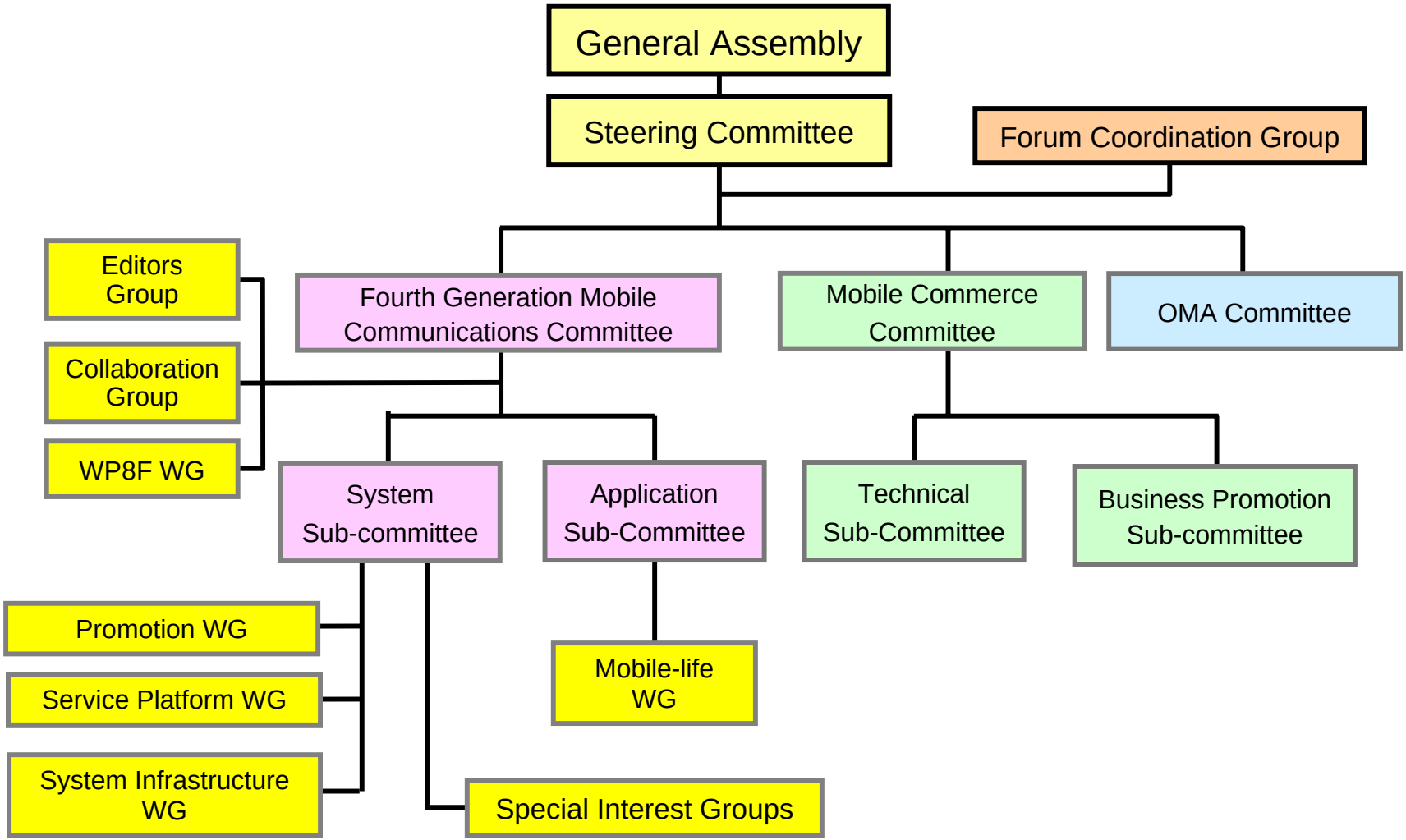
- **Activities on IMT-Advanced in mITF**

Mobile IT Forum (mITF)

- **Objectives:**
  To realize an early implementation of Future Mobile Communication Systems including Systems beyond IMT-2000 and mobile commerce, the Forum conducts studies and researches on technologies and standardization.
- **Established on June 25, 2001(Secretary:ARIB)**
- **Members (As of End of March 2006)**
  - General members 86
  - Individual members 12
  - Special members 2 (ARIB and TTC)
- **Current main activities**
  - Future Mobile Communications Systems (IMT-Advanced)
  - Mobile Commerce

http://www.mitf.org/

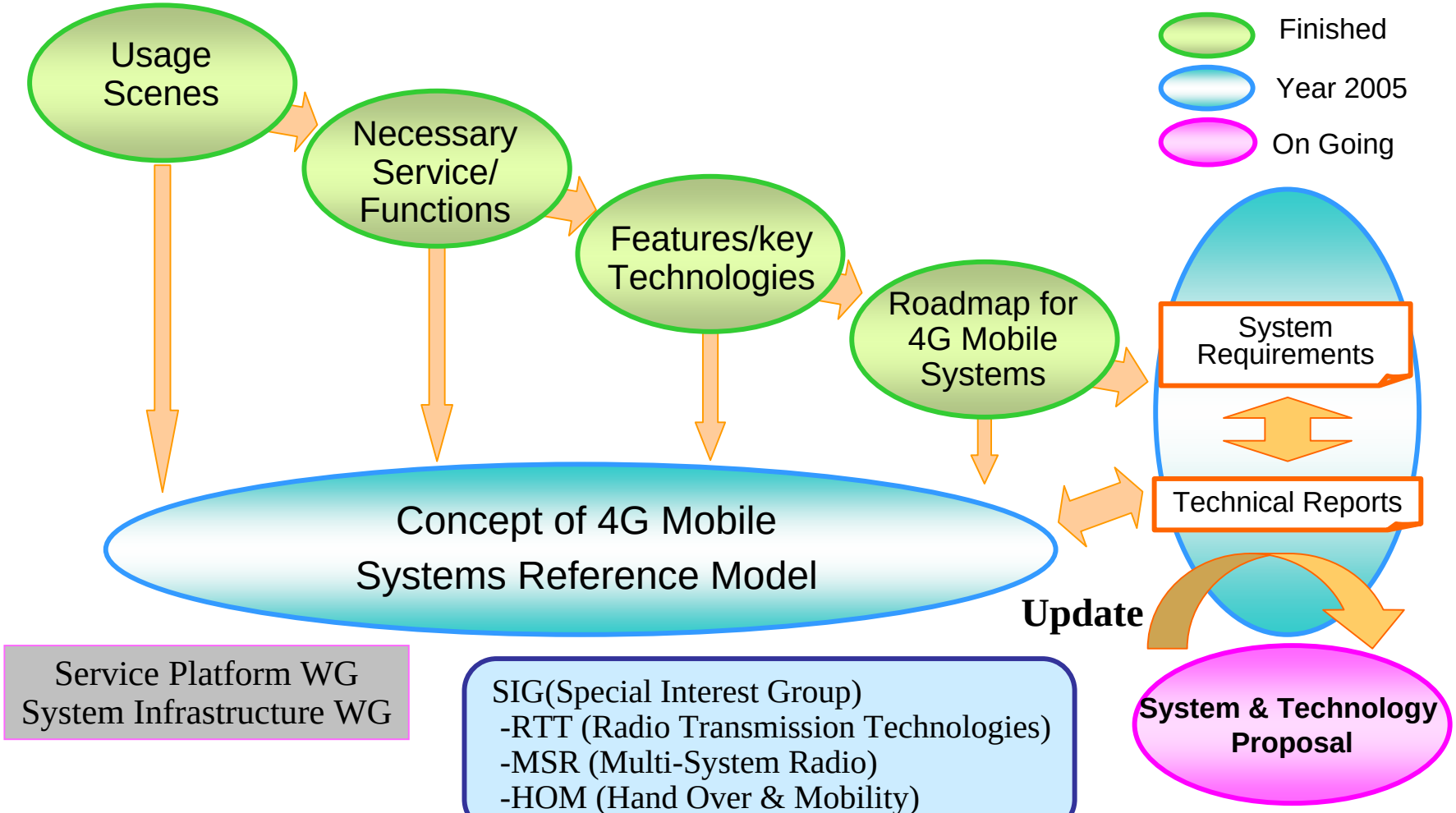
Organizational Structure of mITF



Fourth Generation Mobile Committee

- **Objectives**
  - Clarify the system configuration and applications of 4G systems
  - Propose concrete activities envisioning 4G commercial introduction around 2010
  - Facilitate R&D activities and standardization activities by the industry and academia
- **System Sub-Committee**
  - Facilitate the R&D and standardization of the 4G systems to realize a world's leading mobile IT
  - Contribute to creating mobile business markets ten years ahead
- **Application Sub-Committee**
  - Analyze the business surrounding the 4G system ten years ahead, envisioning mobile life style from users' point of view
  - Clarify requirements for system, functions and other aspects

Work Procedure in the System Sub-Committee



Four Domains of Reference Model

1. **Service & Application**
   - Commonly accessible both from the New and existing access systems
   - Agent supports smooth provisioning of services and applications
2. **Service Platform**
   - Provides the service foundation to help realize the services and applications offered by Service & Application Domain
   - multimedia features
   - high-speed/large-capacity network features
   - network QoS features
3. **Packet-based Core Network**
   - Independent from the access systems
   - Enables interconnection between 4G mobile systems as well as other access systems (e.g., 2G/3G cellular, W-LAN, DSRC, digital broadcasting, and other IP networks, etc.), to provide uses with seamless access
4. **New Radio Access**
   - New Mobile Access Capability
   - New Nomadic Wireless Access Capability
   - Moving Network Capability

Three Categories of Service Platform Reference Model

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1. **User Convenience**
   - User interface
   - Agent
   - Terminal processing capability / usable hours / external interface
   - Terminal reconfigurability
2. **Advanced Service**
   - High-quality multimedia
   - Information input
   - Location/navigation
   - Remote sensing/control
3. **System Management**
   - QoS
   - Security / authentication / authorization / accounting
   - Database / remote server
   - Society / environment adaptation feature

System Infrastructure Reference model

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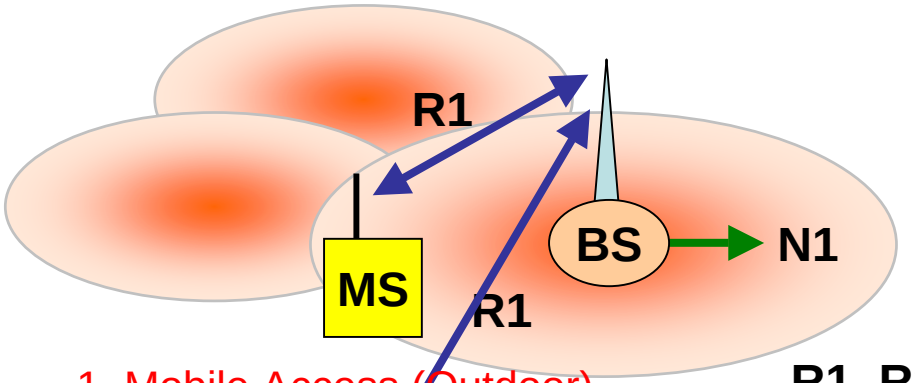
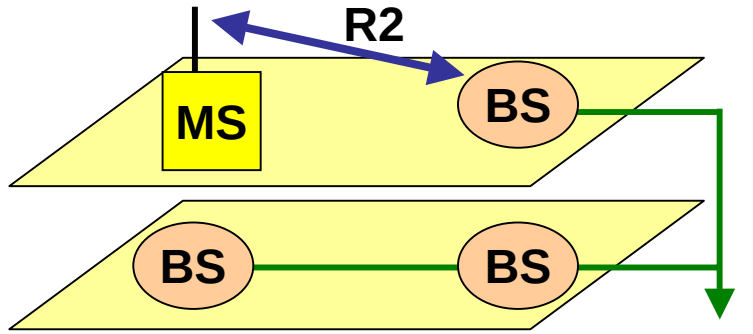
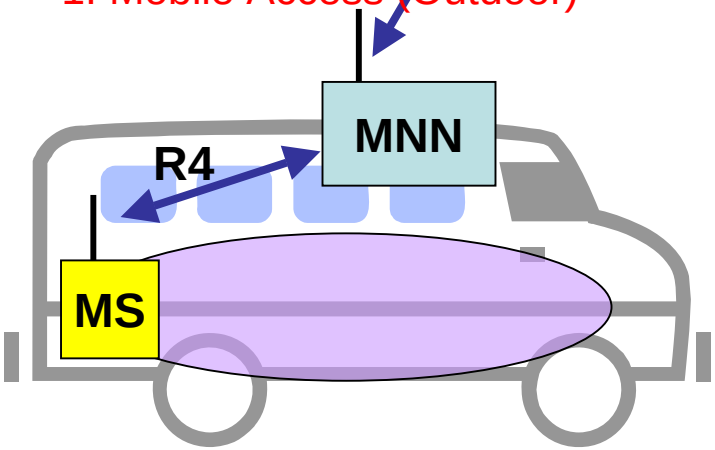
5 Scenarios for Radio Access (example)



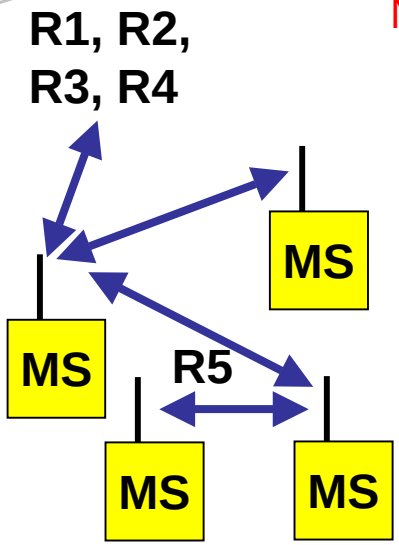
1. Mobile Access (Outdoor)



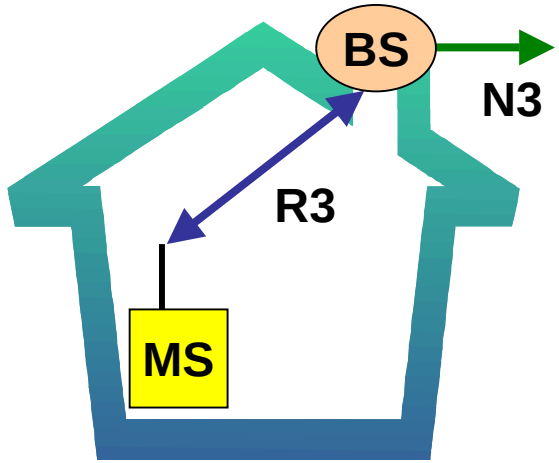
2. Mobile Access (Indoor) / Nomadic Wireless Access



4. Moving Network



5. Ad Hoc Network



3. Nomadic Wireless Access

MNN: Moving Network Node
Rn: Radio Interface
Nn: Network Interface

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Technical Survey Report

- **Objective**
  By analyzing currently available technologies and developing technologies in the near future, the study report will be used as a reference materials for requirement document.
- **Technical roadmap** is attached.
- **Status**
  The Japanese version is available in
  http://www.mitf.org/public_j/archives/index.html
  The English version is available in
  http://www.mitf.org/public_e/archives/index.html

Contents of Technical Survey Report (1/2)

- **Service Platform**

➢ **Terminal related technologies**
  – User interface/ Multimedia / Terminal agent & Intelligent processing / Processing capability / Reconfigurability

➢ **Transport technologies**
  – QoS control / Policy routing / VPN / Adhoc network / Network security

➢ **Service platform technologies**
  – Authentication and security / Location / Agent / Semantic web / Information appliances and WLAN / Broadcast

➢ **Application technologies**
  – User interface / Location based application / Virtual reality / Ubiquitous application / Mobile agents

➢ **Application on social and environmental requirements**
  – Emergency medical / Disaster relief / Environment / Trends in emergency communication

Contents of Technical Survey Report (2/2)

- **System Infrastructure**

➢ High-speed large-capacity wireless transmission
  – VSF-OFCDM / SCS-MC-CDMA / OFDMA / IFDMA / Ad hoc network / Adaptive-antenna / MIMO

➢ Multi system wireless terminal technologies
  – E2R / SDR / multi-band RF

➢ Quality of Service
  – Scheduler / Wireless-QoS

➢ Handover & Mobility control
  – High speed HO / Mobility control / Mobile IPv6

➢ Seamless networking

➢ Interworking

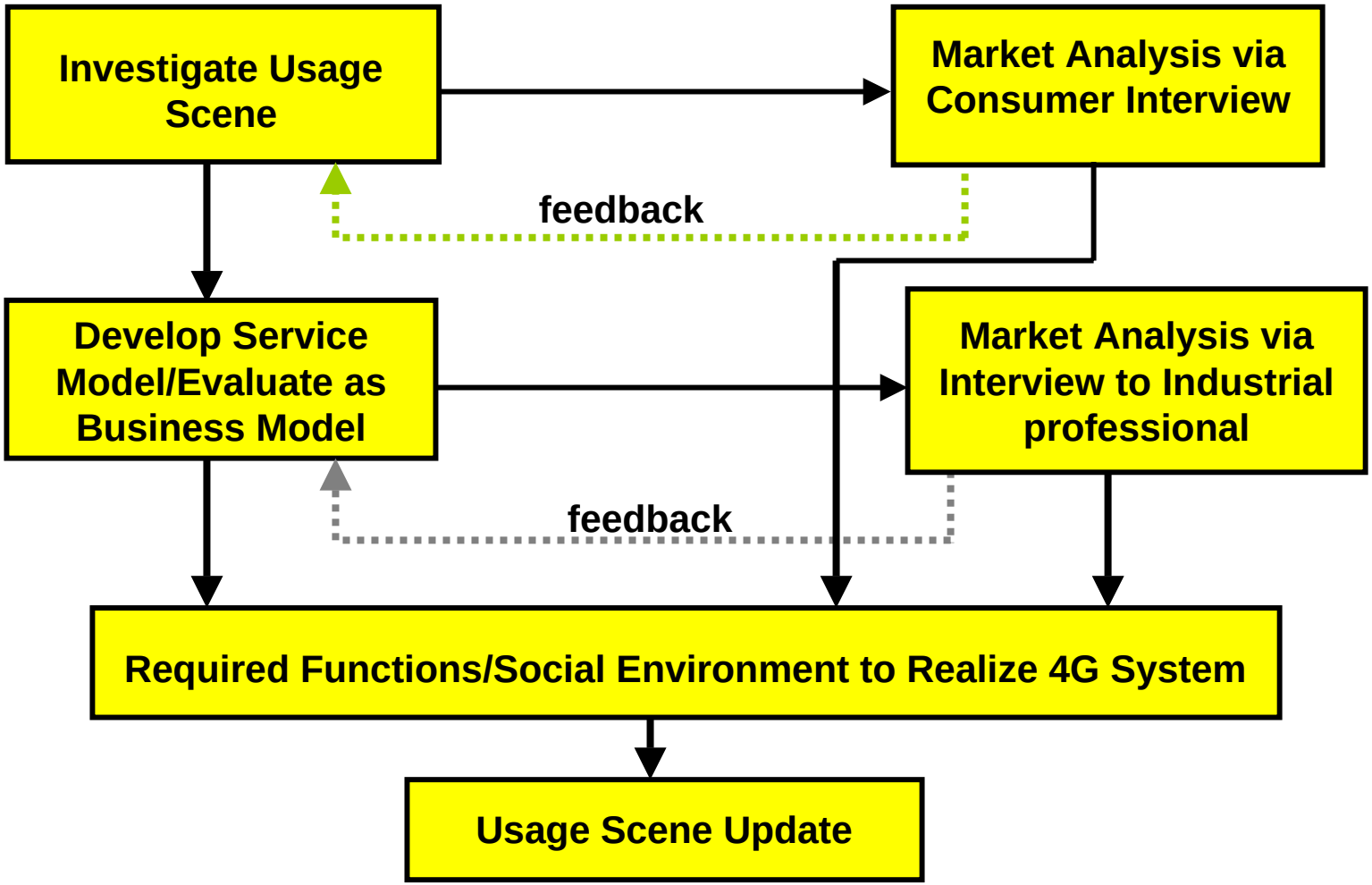
➢ Multicast / Broadcast

4G Mobile System Requirement Document

- **Objective**
  "4G system requirement document" will include the requirements for four domains of the mITF reference model for 4G mobile system.
- **Status**
  The English version (V1.1) is available in
  http://www.mitf.org/public_e/archives/index.html
  The Japanese version (V1.1) is available in
  http://www.mitf.org/public_j/archives/index.html

Contents of 4G Mobile System Requirements Doc.

Work Flow of Application Sub-Committee



4G Application Research Seminar

Whole Theme

Background of theme setting

The present and future of "mobile" that user requests.
What is the breakthrough requested from the user side for 4G mobile systems?

The generation change of cellular phone/mobile is progressing towards increasing the flexibility of communication.

2G	from line to surface,from analog to digital	Expansion of freedom in space
2.5G	from voice to data	Expansion of freedom in information form,toward information service
3G	from data to multimedia	Expansion of freedom in expression

4G

Hypothesis as a basis for discussion

- ◆ What kind of features expansion will be required for the realization?
- ◆ What are challenges that even the third generation mobile cannot achieve?

Best-effort ⇨ Real-time	Expansion of freedom in space
On-demand use ⇨ Concurrent use	Expansion of universality in services
Enterprise Oriented ⇨ User Oriented	Expansion of freedom in use of features
Convenience ⇨ Intelligent	connection⇨information services ⇨ Expansion of user assistance services

Requirements from User's Perspectives

- **End User**
  - Standardization of protocols
  - Easy-to-use HMI
  - Voice recognition/synthesis
  - Agent feature
  - Multi-connectivity
  - Database/search engine
  - Highly reliable information communication
  - Personal authentication and data disclosure
- **Maker**
  - Copyrights
  - Standardization
- **Operator**
  - Advanced authentication
  - System compatibility
  - Information communication with high level of security
- **Service Provider**
  - User authentication
  - User authentication
  - Copyrights
  - Protection of intellectual property rights
  - Mechanism that prevents image storage
  - Privacy protection
  - Security
  - QoS
  - Highly reliable information communication
  - Information communication with high level of security and reliability
- **Public Service Provider**
  - Safety
  - Cryptography features
  - Unification between various models
  - Ubiquitous environment
  - Authentication system
  - Highly reliable information communication
  - Mobile networks that works in disasters

New illustrations of 4G Mobile Service (Example)

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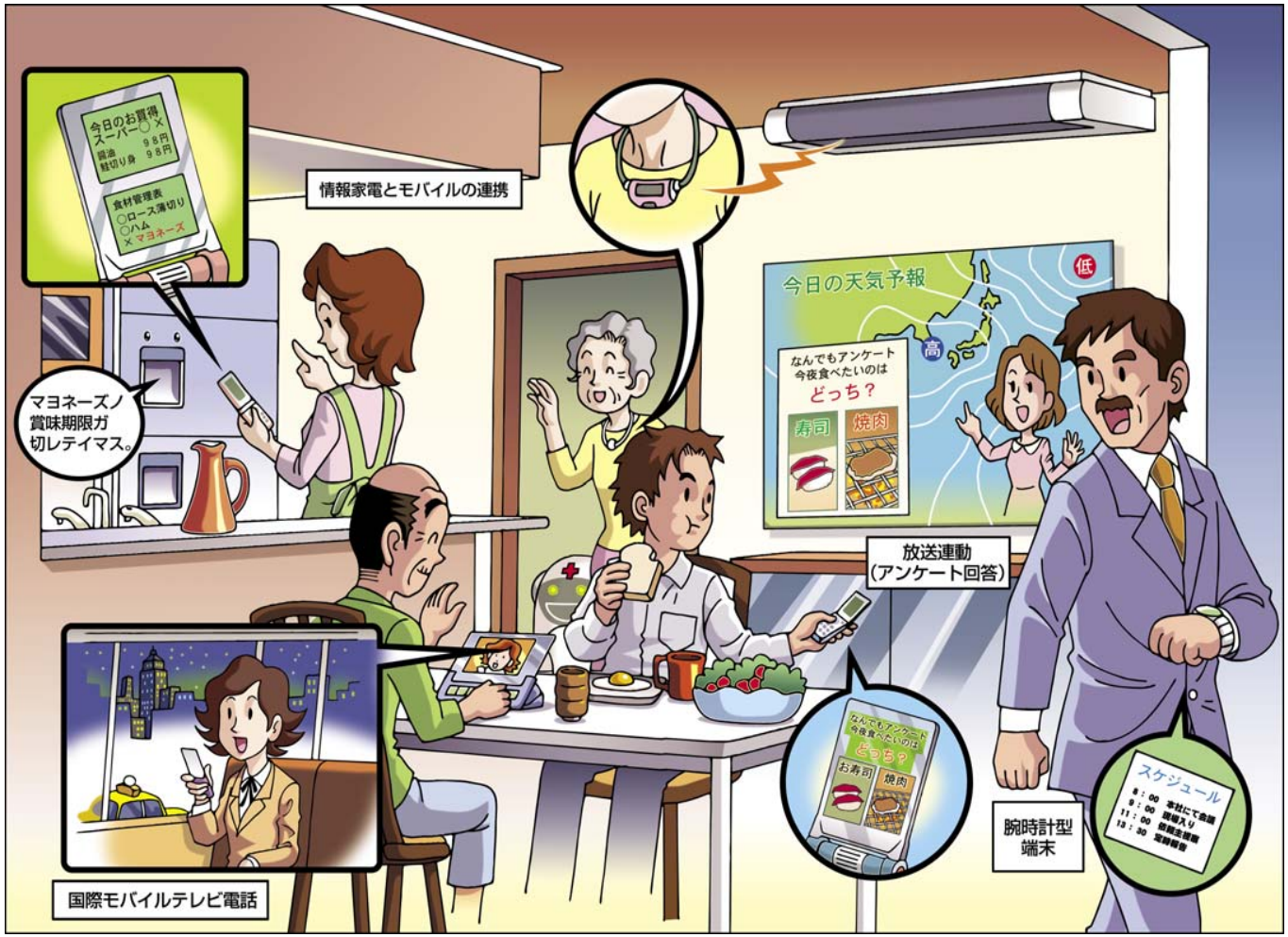
In the morning



- Interaction of mobile with home information appliances, digital TV
- Interaction of RFID
- Presence function
- Wearable terminal
- Download of broadcasting contents to mobile communication system
- Real time monitoring of physical conditions

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Report of the Committee

Flying Carpet II

-Towards the 4th Generation Mobile Communications Systems-

This brochure was named “Flying Carpet” because we thought with its magical power to fly the sky, we might be able to foresee our new lives and the underlying mobile technologies in a decade from now.

http://www.mitf.org/public_e/archives/index.html

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◆ Overview of Advanced Wireless Communications Study Committee

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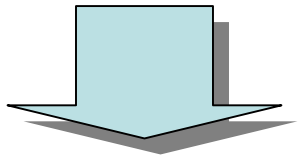
New Organizational Structure for Next Generation Wireless Communications Technologies

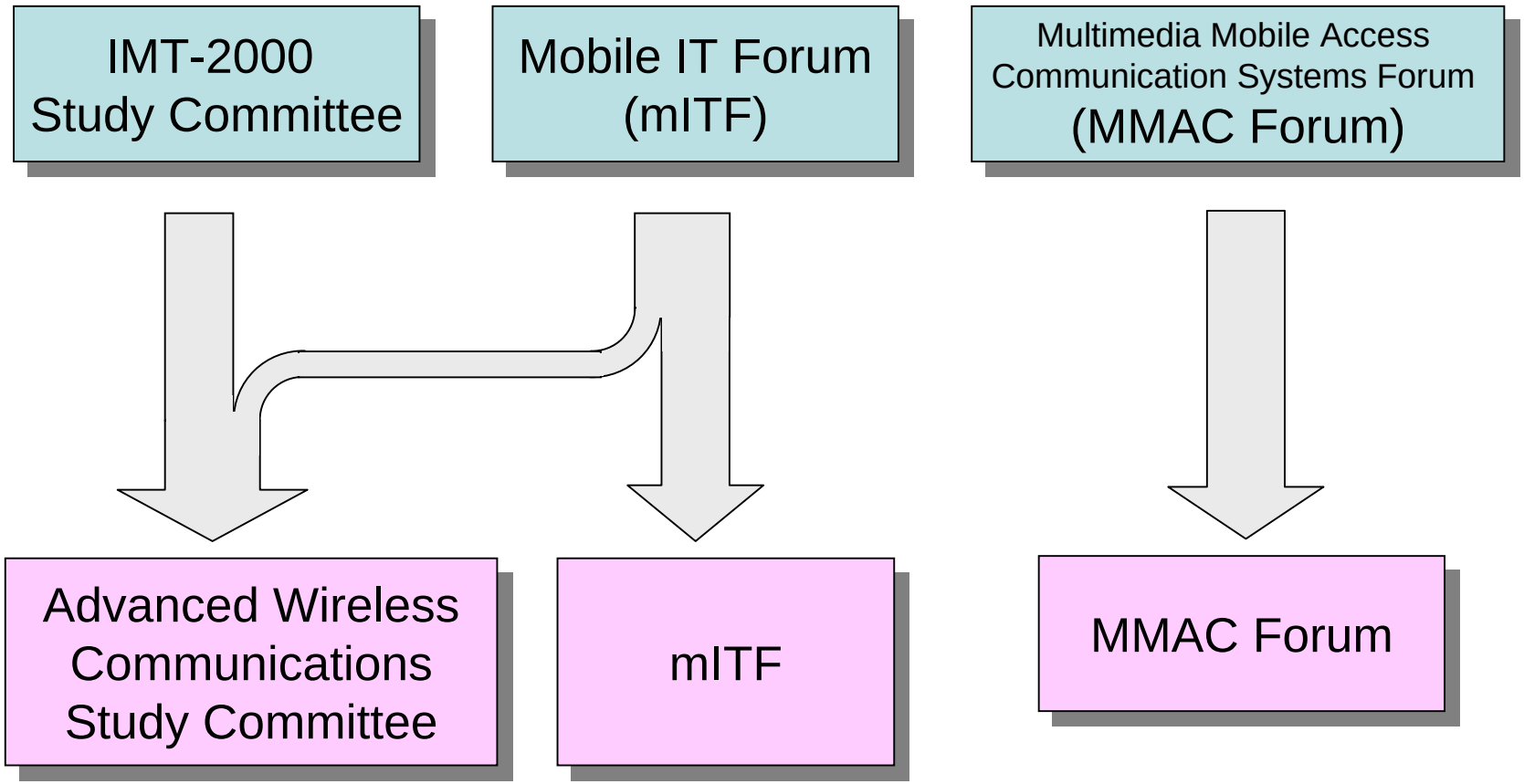
- **Background**
  - **International standardization activities for the future development of IMT-2000 and systems beyond IMT-2000 are currently undertaken by the ITU-R and other institutions.**
  - **Activities on Broadband Wireless Access (BWA) systems have been accelerating both in Japan and abroad.**
  - **The Study Group for Wireless Broadband Promotion under the Ministry of Internal Affairs and Communications says 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

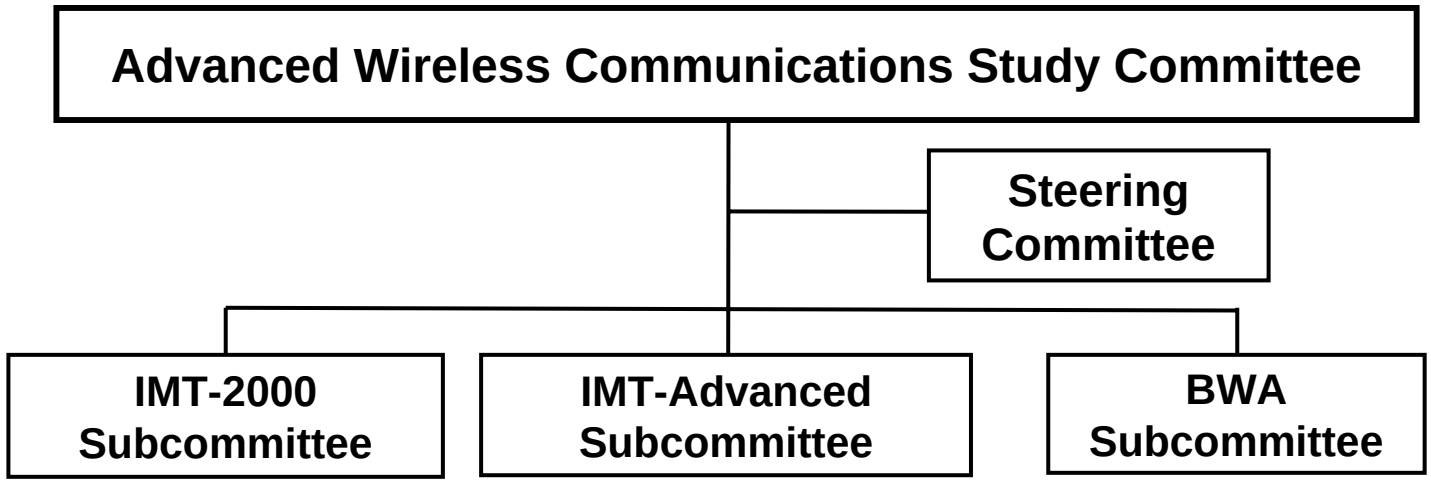
"Advanced Wireless Communications Study Committee"

Overview of Reorganization



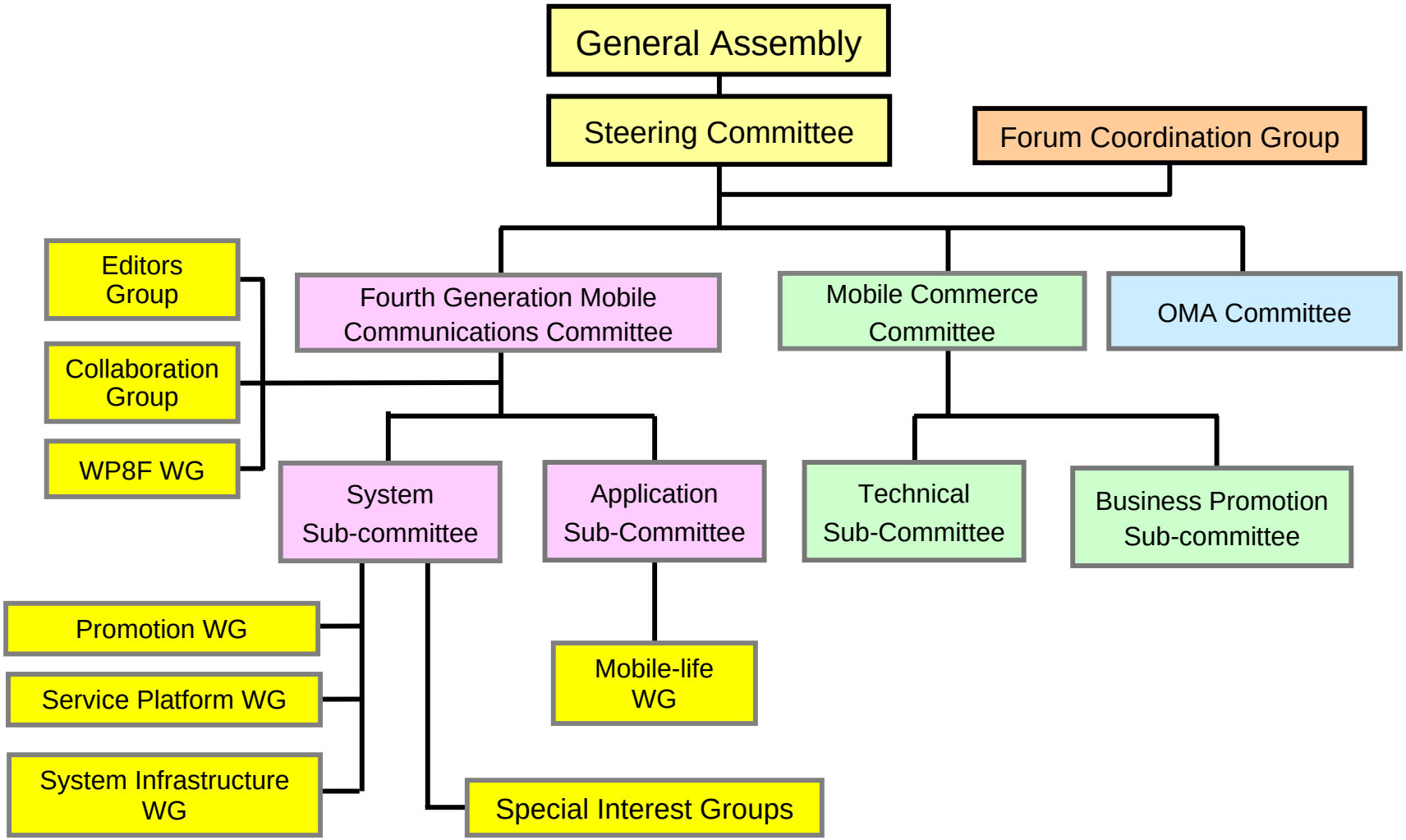
Overview of Advanced Wireless Communications Study Committee

- **Responsibilities**
  - To perform the technical studies on advanced wireless communication systems in cooperation and coordination with other related institutions in Japan and overseas
  - To contribute to their international standardization activities
- **Structure of the Study Committee**

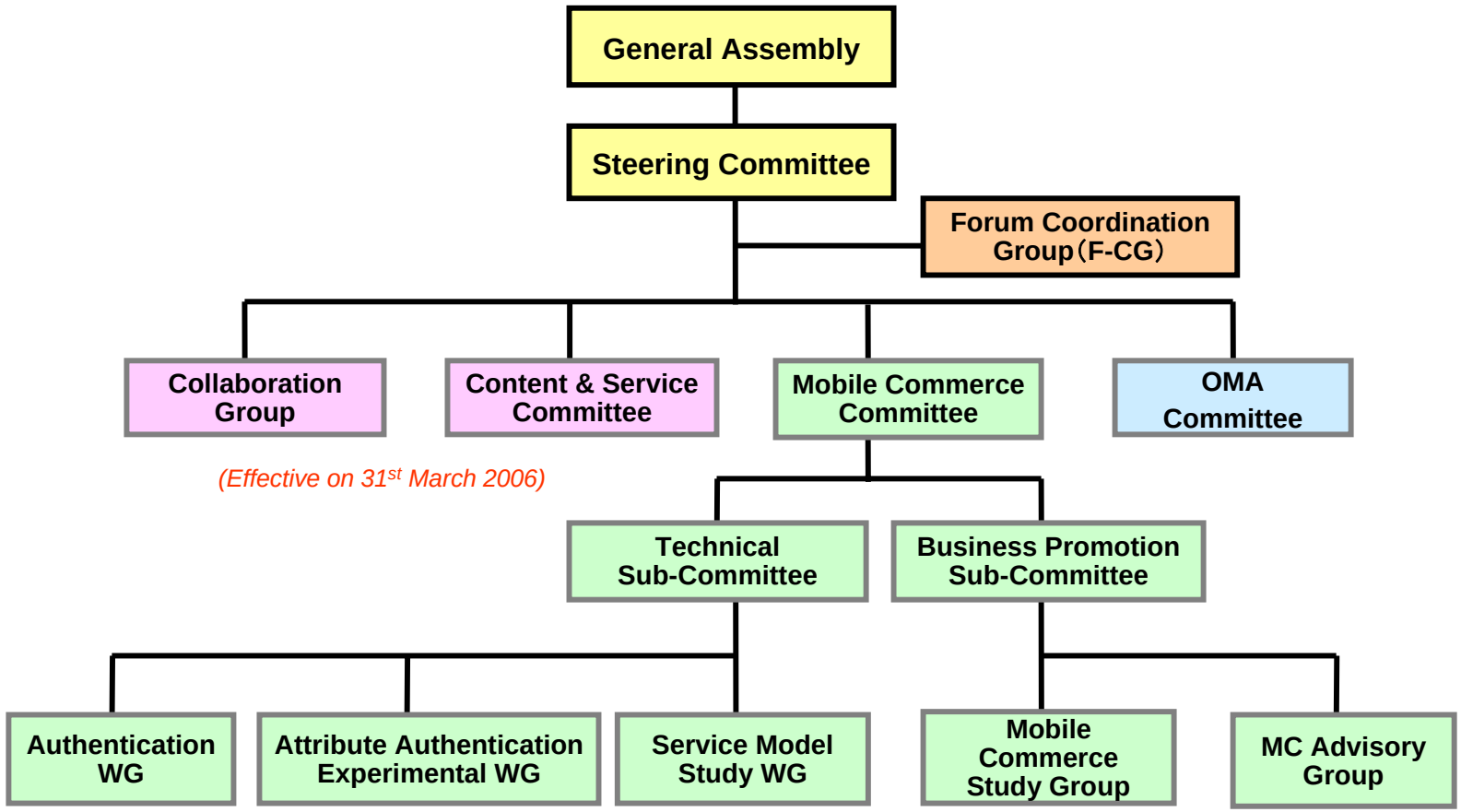


(Effective on 1st April 2006)

Organizational Structure of mITF before Reorganization



Organizational Structure of mITF after Reorganization



(The 2006 Workplan of mITF was approved at the 10th meeting of mITF Steering Committee held on 28th April 2006)

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Concluding Remarks

Concluding Remarks

- **The future mobile communications systems beyond IMT-2000, which create an ultra fast-speed mobile Internet environment and enables seamless communications services, hold 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 future mobile communications 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.**