ARIB's Activities On IMT-2000 and Beyond

May 10th to 13th, 2004

Association of Radio Industries and Businesses (ARIB)

Outline of the Presentation

- **Japan's Cellular Market and Current Status of IMT-2000**
- **Recent Activities on Systems beyond IMT-2000**
  - Outline of Mobile IT Forum
  - Activities of Fourth Generation Mobile Communications Committee
  - Activities of Mobile Commerce Committee
- **CJK B3G Standards Collaboration**

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

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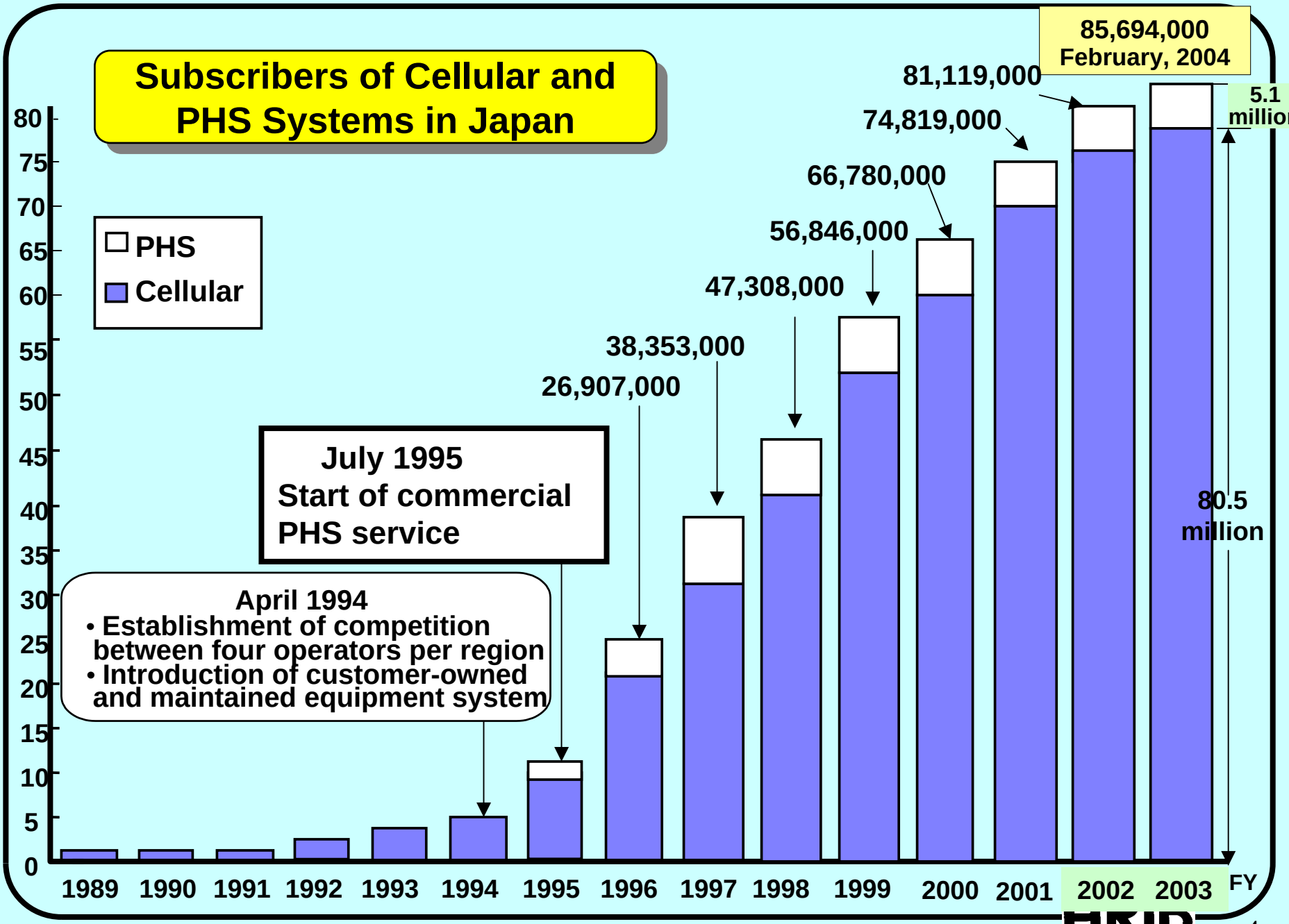
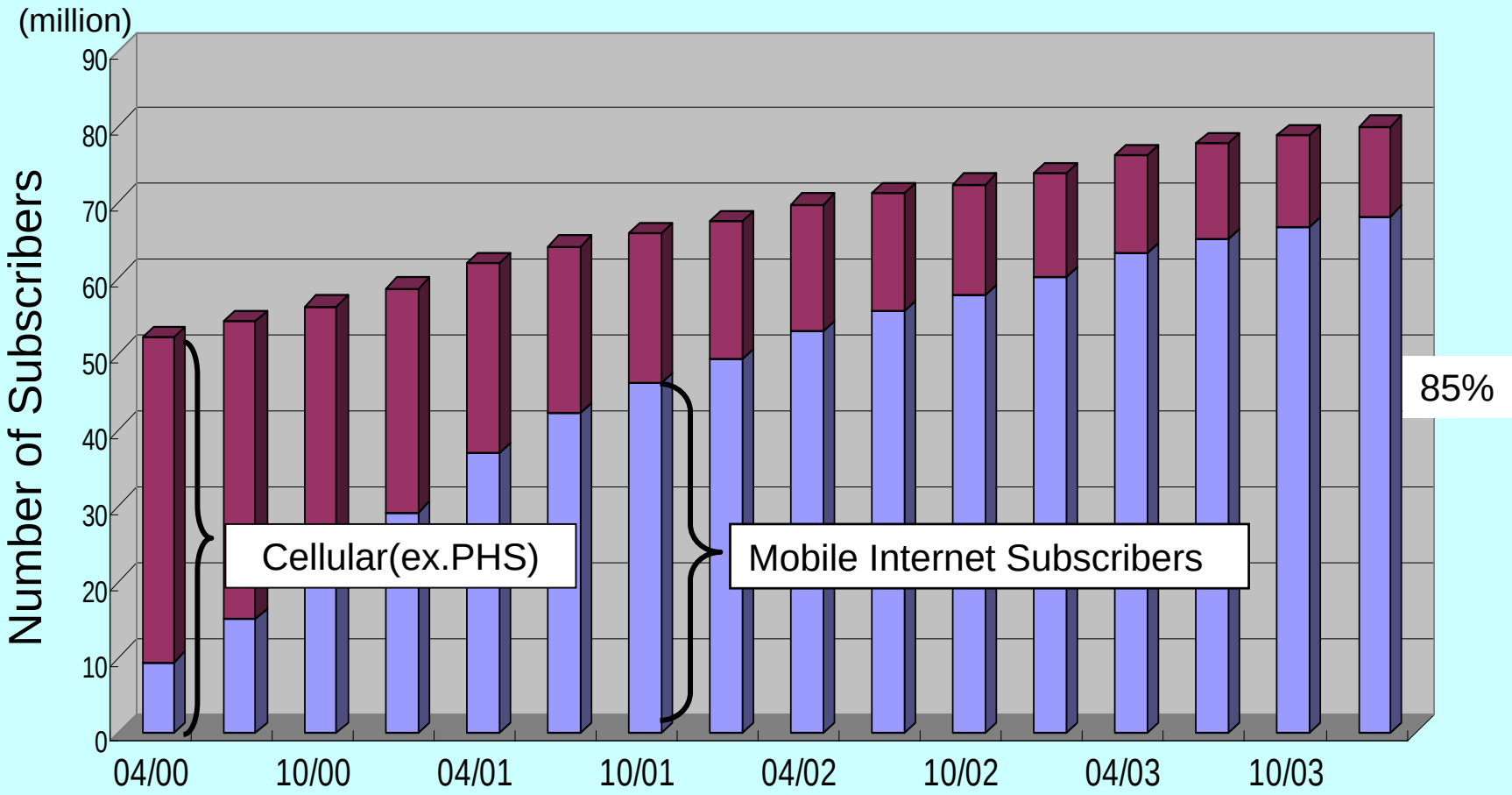
Subscribers of Cellular and PHS Systems in Japan



Mobile Internet 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)
  (CDMA-MC:STD-T64, TR-T13)
- September 2003 version of Release6 3GPP specifications and ReleaseB Ver.1.0. of 3GPP2 specifications have already been transposed to ARIB standards.(except HSDPA)
- ARIB has transposed 1xEV DO specification in May 2002

IMT-2000 Introduction in Japan

- NTT DoCoMo: 2GHz-band, CDMA-DS(WCDMA)
  - May/2001 : Trial Service
    Metropolitan Tokyo Area
  - Oct./2001 : Commercial Service
    Up to 30km from the Center of Tokyo
  - April/2002: Major Cities in Nationwide
- KDDI: 800MHz/2GHz-band, CDMA-MC (CDMA2000 1x)
  - April/2002: Major Cities in Nationwide
  - April/2003: Trial Service(CDMA2000 1xEV-DO)
    Metropolitan Tokyo Area
  - October/2003: Commercial Service(CDMA2000 1xEV-DO)
    Metropolitan Tokyo Area
- Vodafone: 2GHz-band, CDMA-DS (WCDMA)
  - June/2002: Trial Service
    Metropolitan Tokyo Area
  - Dec./2002: Commercial Service Nationwide

Recent Activities on Systems beyond IMT-2000

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Outline of Mobile IT Forum (mITF)

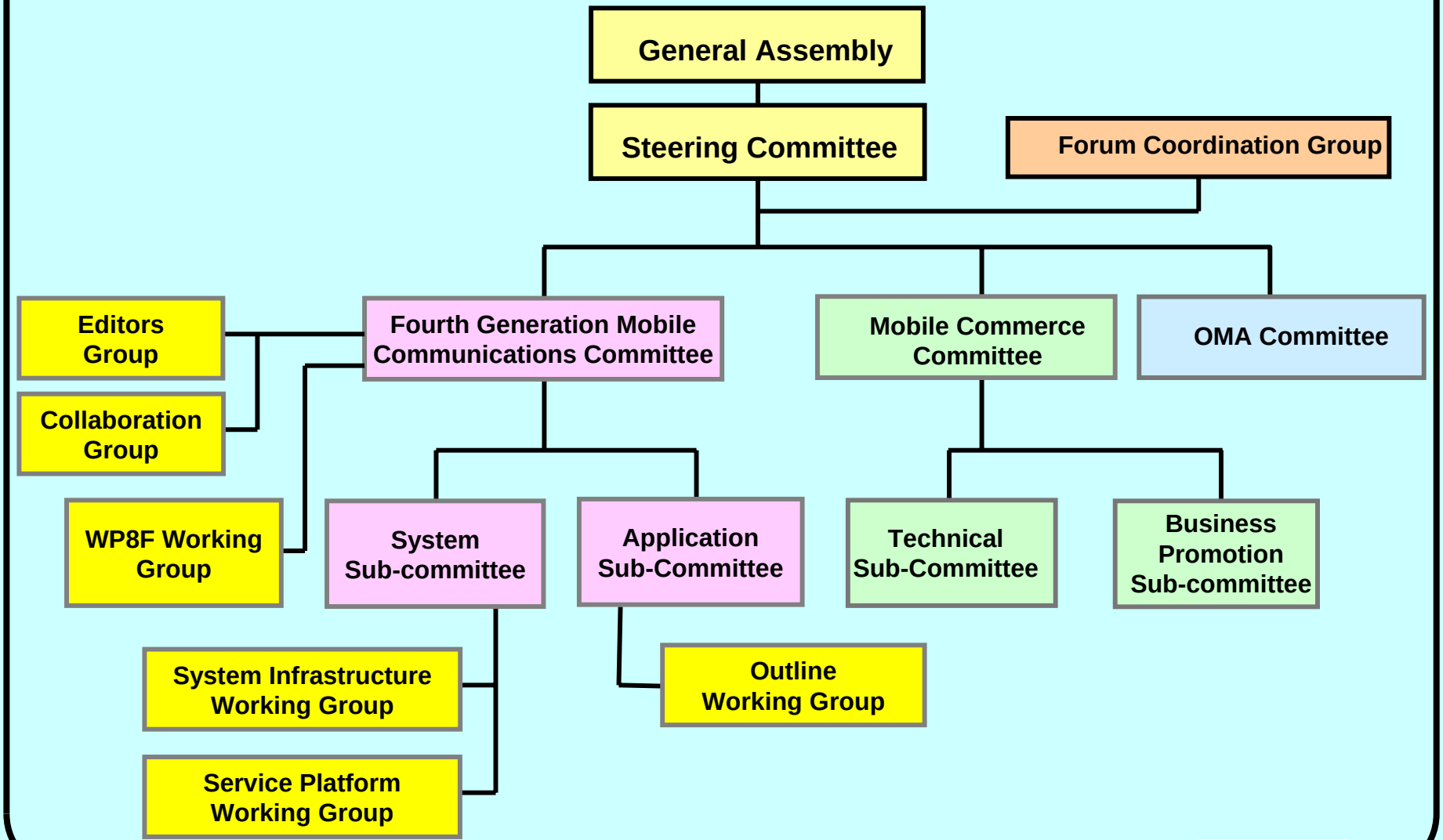
Mobile IT Forum (mITF)

- 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 April 16, 2004)
  - General members 97
  - Individual members 11
  - Special members 2
- Current main activities
  - Future Mobile Communications Systems (systems beyond IMT-2000)
  - Mobile Commerce

http://www.mitf.org/

Organizational Structure of mITF



Activities of Fourth Generation Mobile Communications Committee

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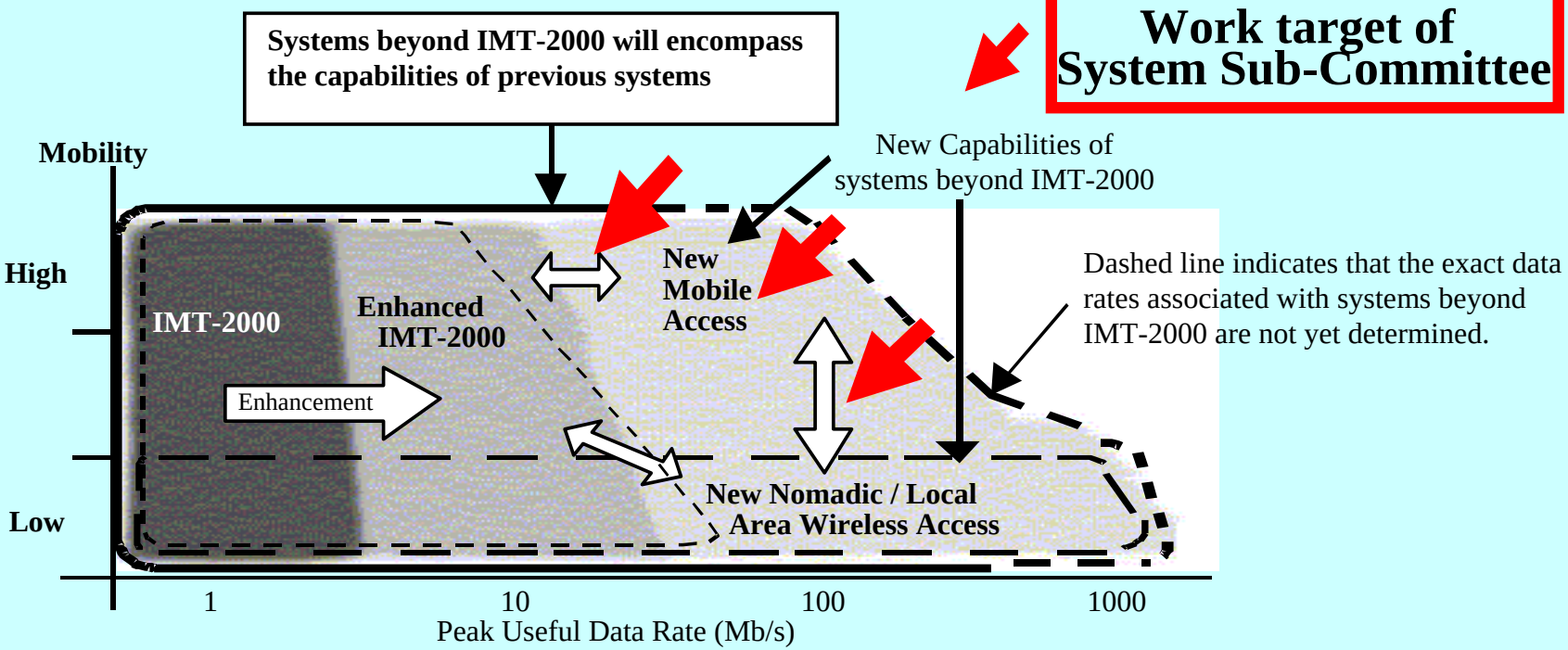
Fourth Generation Mobile Communications Committee

- Objectives:
  - Clarify the system configuration and applications of 4G systems
  - Propose concrete activities envisioning its commercial introduction around 2010
  - Facilitate R&D activities and standardization activities by the industry and academia
- Near-Term Activities:
  - Establish a framework for R&D and standardization, with a view to create new business markets (in 10 years)
  - Study the desired architecture and development scenarios of 4G
  - Select, study and evaluate research themes on new element technologies
  - Coordination with related entities in the world
  - Analyze the business schemes ten years ahead, and clarify the requirements for the mechanisms and tools that enable such schemes

System Sub-Committee

- Goals of Activities
  - 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
- Near-Term Activities
  - Clarify the system configuration for the fourth-generation mobile communications systems which realize advanced mobile IT
  - Survey, study and evaluate required technologies, e.g.
    - Ultra broadband mobile communication technologies,
    - Wireless ad hoc network technologies,
    - Software radio technologies,
    - User oriented application technologies,
    - Mobile platform technologies, etc.
  - Coordinate with related institutes in the world
  - Study possible framework of the standardization
  - Clarify the technical requirements and performance objectives

Scope of System Sub-Committee



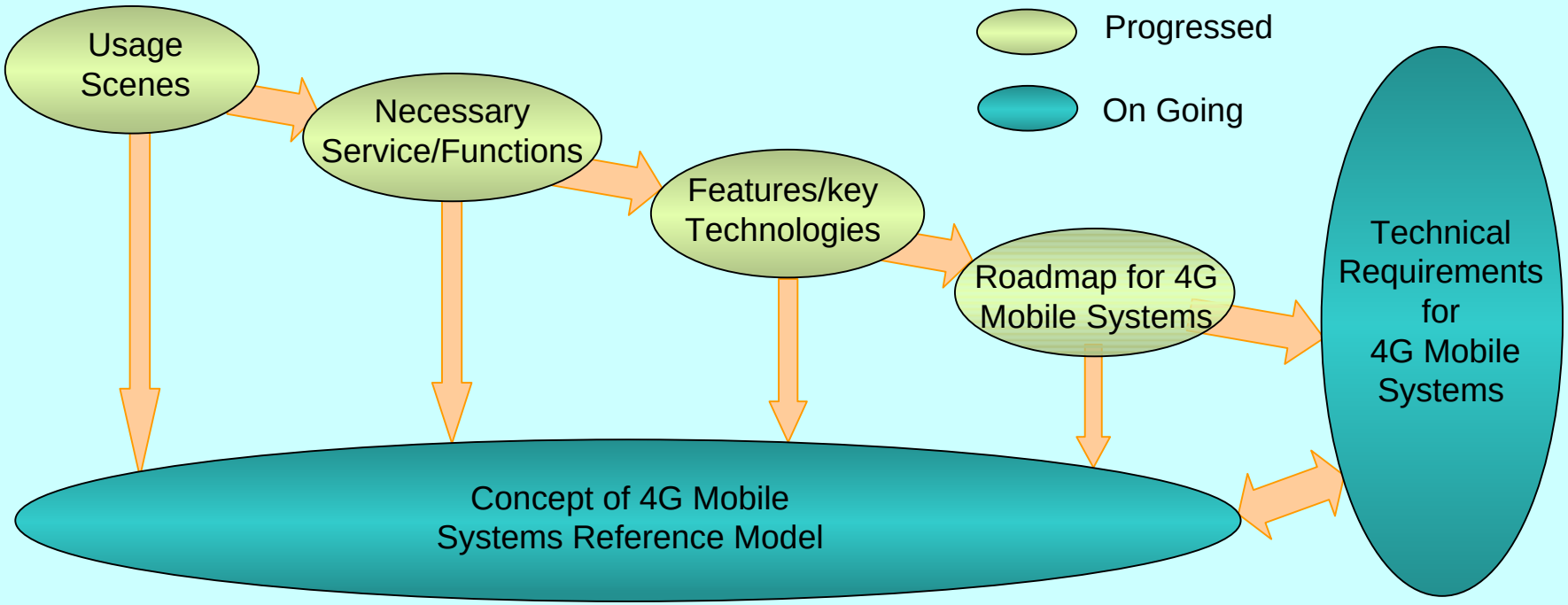
Dark shading indicates existing capabilities, medium shading indicates enhancements to IMT-2000, and the lighter shading indicates new capabilities of Systems Beyond IMT-2000.

The degree of mobility as used in this figure is described as follows: Low mobility covers pedestrian speed, and high mobility covers high speed on highways or fast trains (60 km/h to ~250 km/h, or more).

Illustration of Capabilities of IMT-2000 and systems beyond IMT-2000

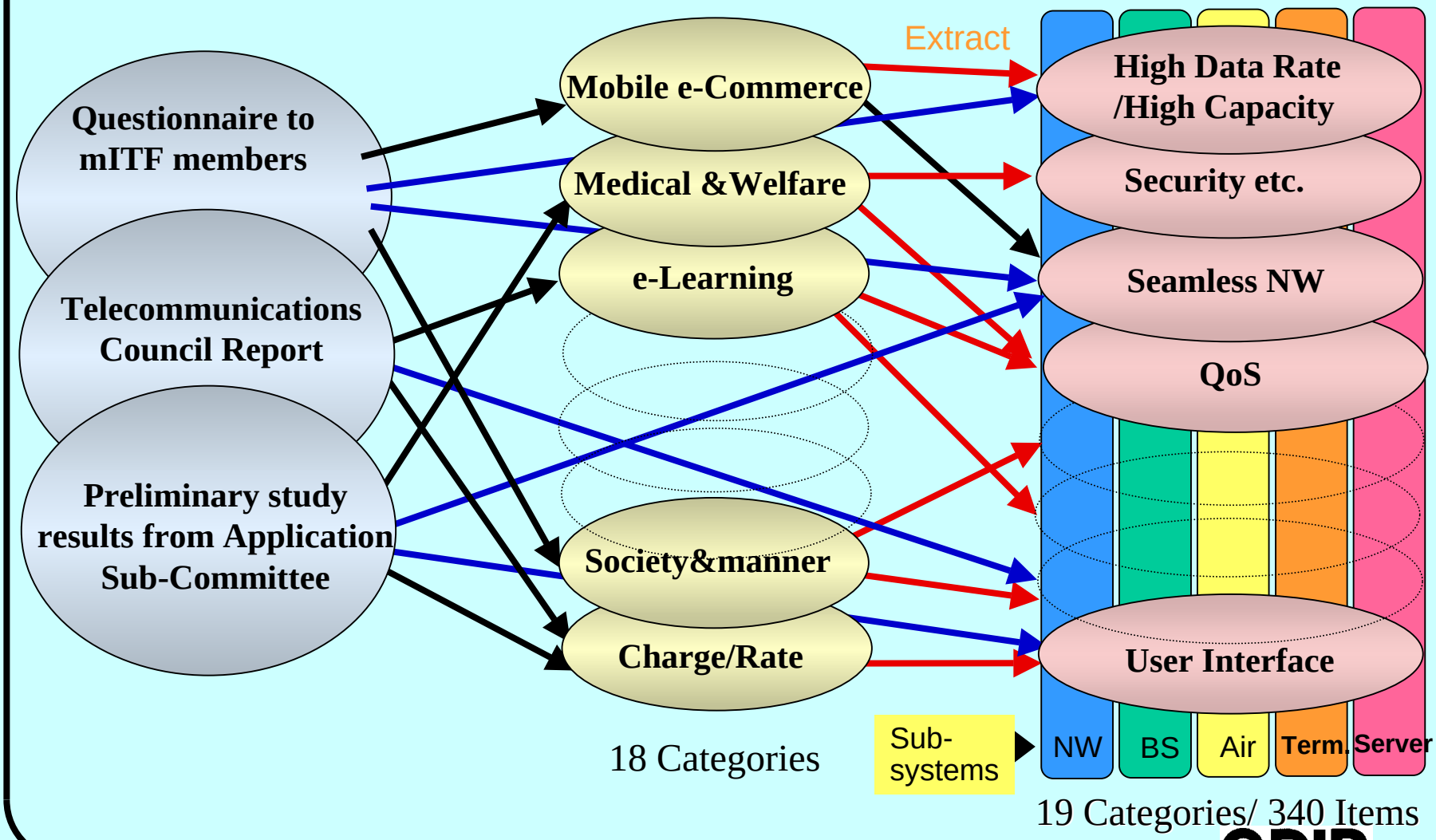
(from output document of the 9th meeting of WP8F)

Work Procedure in the System Sub-Committee



Service Platform WG
System Infrastructure WG

Services and Function Analysis



Major Research Issues

- Importance of each technical issue has been evaluated putting utmost emphasis on the following points;
  - technologies that could provide a breakthrough,
  - globally unprecedented or extremely leading-edge technologies that are important in terms of technical strategies, and
  - technologies that are indispensable (with no alternatives) for realizing the system.

- Technical issues ranked as highly important research issues have been summarized into 27 advanced key technologies in the following four major categories;
  (1) High speed and large capacity wireless transmission technologies,
  (2) Network constructional technologies,
  (3) High performance and advanced-function terminal technologies, and
  (4) Mobile system technologies.

Work Items of System Infrastructure WG

- **Technology roadmaps**
  - Function roadmap,
  - Major Technology roadmap
- **System requirement for 4G**
  - Defining scope and TOC of system requirements document
- **Reference model**
  - Detailed reference model of Radio Access System
  - Consolidation with SP-WG model

Major Technologies Roadmap

Category – High-speed and large-capacity wireless transmission technologies

Tech-nology	Keywords	2003 (3G)	2005-2006 (Enhanced 3G)	2010- (4G)
Multi-carrier technology	Improvement in multi-path tolerance	OFDM for mainly indoor environment (WLAN/NWA) OFDM for land digital broadcasting	OFDM base system also for outdoor mobile systems	Multi-carrier technology such as OFCDM counter outdoor broadband multi-path environment
	Higher spectrum efficiency			
	⋮			
⋮				

Work Items of Service Platform WG

- Investigation of features for service platform
  - List high level functions required for 4G
  - Take account of outputs from Application Sub-comittee
- Service platform feature table
  - Functions
  - Main features and their descriptions
  - Sub features and their descriptions
  - Relating entities
  - System level requirements from service platform
- Service platform reference model
  - Extraction of functional entities correspond to each feature
  - Preliminary reference model for studying service platform

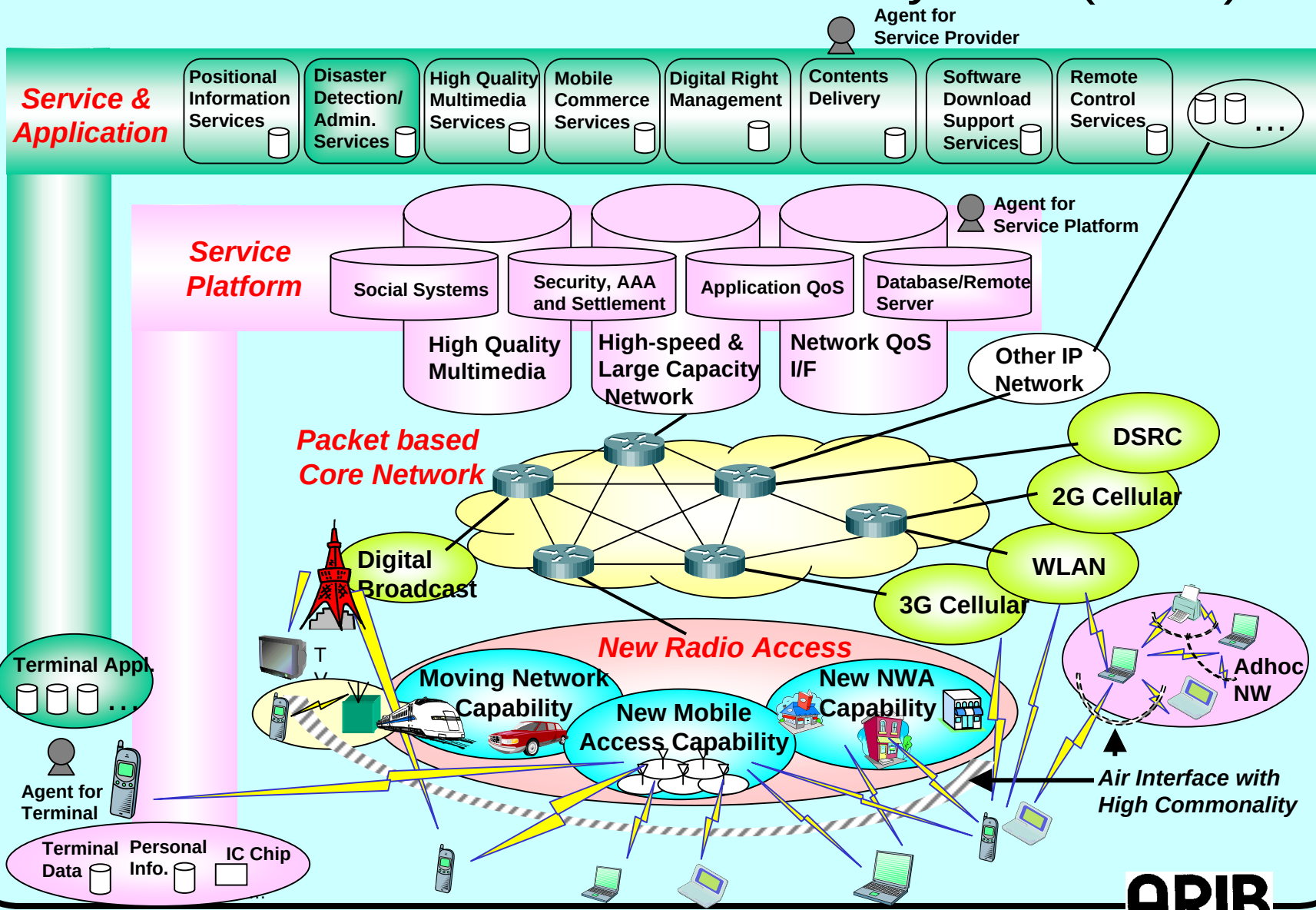
Service Platform Reference Model

- Preliminary model was produced
- Collected identified technical features and compiled them into one picture
- Major difference from third-generation systems
  1. More capabilities are implemented on the terminal side
  2. Terminals can be connected with a variety of external devices through a local I/F
  3. A number of servers places in the network to provide various services to the users

Function Roadmap

Function	Keywords	2003 (3G)	2005-2006 (Enhanced 3G)	2010- (4G)
Seamless	Support for variety of systems and functions	Limited systems and functions	Expansive support for existing radio access schemes and systems Receiving function of land digital broadcasting	Flexible support for future systems Common core network, broad commonality among radio access schemes
QoS				

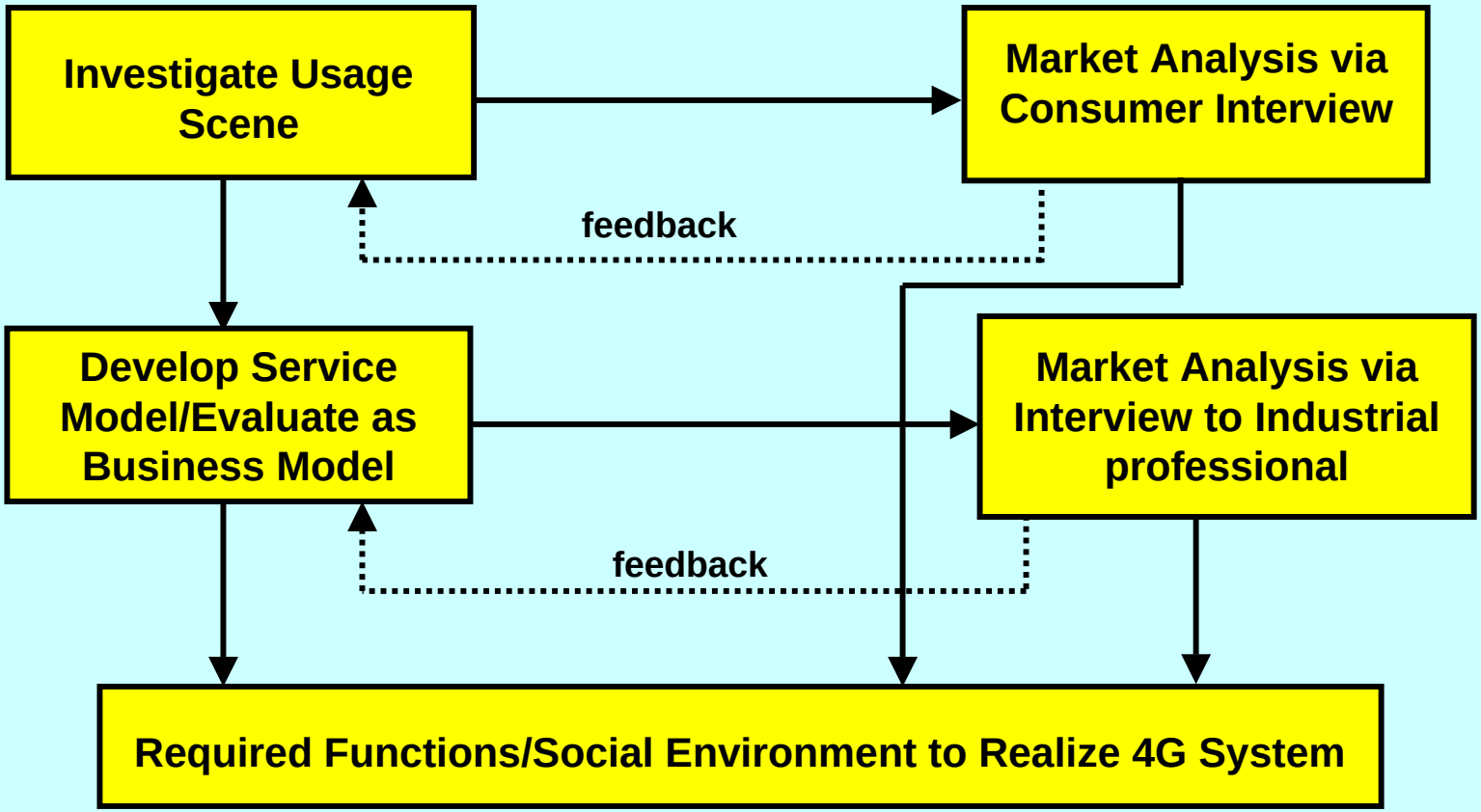
Reference Model of 4G Mobile System (2003)



Application Sub-Committee

- Goals of Activities
  - Analyze the business schemes surrounding the mobile industry ten years ahead
  - Clarify the requirements for the system models and required functions, etc. to contribute to creating new business markets
- Near-Term Activities
  - Depict “dreams” indicating usage scenes and visions to push challenges toward new world of mobile communications
  - Study and analysis on content services and business schemes
  - Study to expand usage opportunities
  - Study the requirements for the new-generation mobile communication systems

Work Flow of Application Sub-Committee



User's Expectations for 4G Mobile Systems

Service and features expected for 4G Mobile

- **Freedom in Time**
- **Freedom in Space**
- **Freedom in Use of Features**

New Lifestyles Realized by 4G Mobile

Enriched and Cultural Life

- Enriched life – able to communicate with friends and families anytime
- A cultural life – able to receive information of your choice and easily obtain the right entertainment anytime you like

More Flexible and Diversified Life

- Flexible and Diversified Life – able to work regardless of home circumstances
- Environment that enables various people to freely participate in social activities

More Comfortable and Safer Life

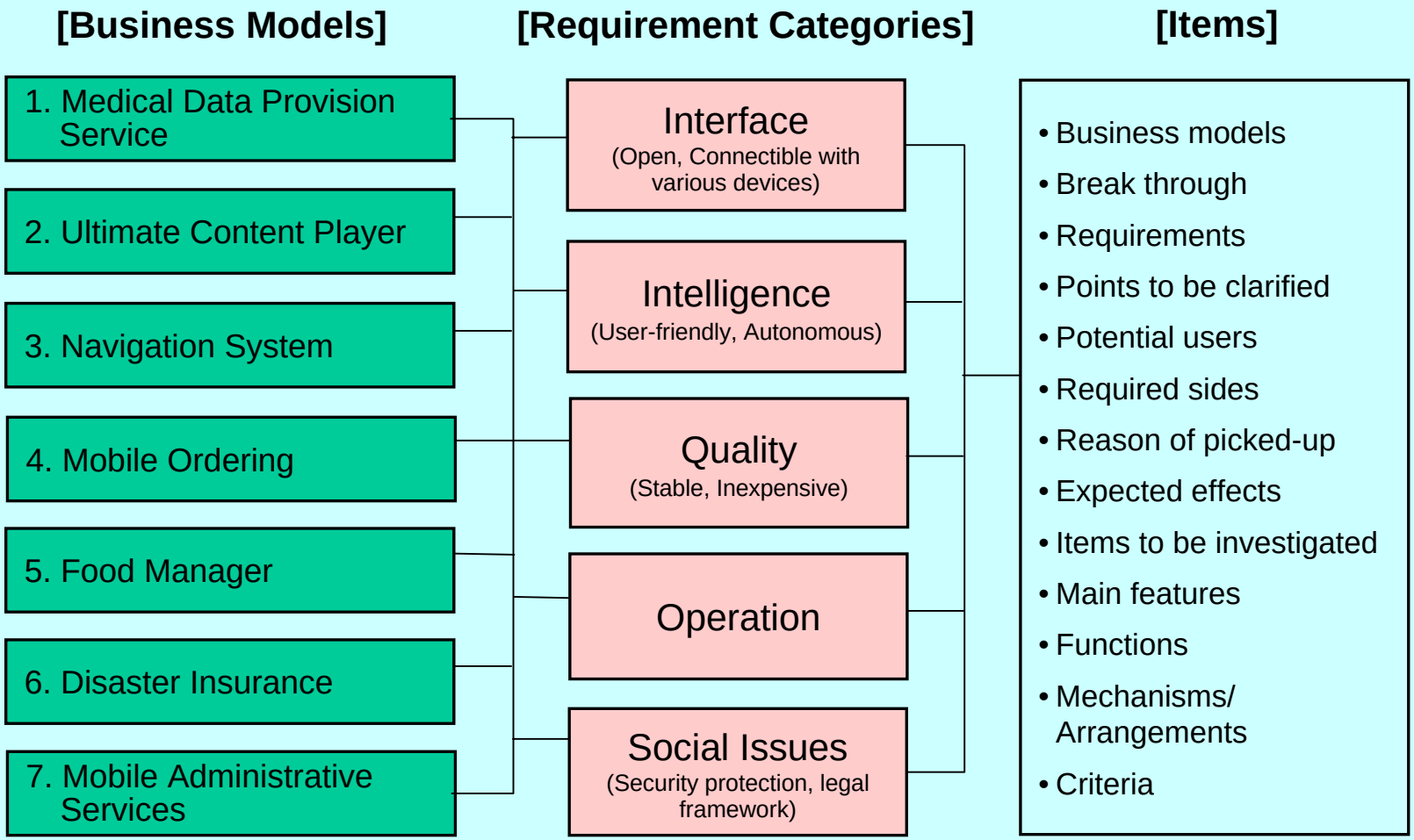
- More Comfortable and Safer Life – safety is ensured anytime, anywhere
- Convenient and Comfortable Life – able to access services on highly convenient networks in a secure manner

More Personal and Convenient Life

- Personal Life – possible to freely select from a wide range of services based on individual preferences
- Extremely convenient life – what you want to do now can be done right away

Studies on the Requirements to Realize Applications

◆ Requirements from the Perspective of Business Models



FLYING CARPET 2

- Contents
  - 1. Visions for Future Mobile Communications Systems
  - 2. Images and Acceptability of Future Mobile Communications Systems
  - 3. Studies on the Requirements to Realize Applications
  - 4. Features and Social Environments Required for the Realization 4G Mobile Systems
  - 5. Requirements and Technical Challenges in Realizing a Service Platform
  - 6. Requirements and Technical Subjects Required for the System Infrastructure
  - 7. Roadmap of Features and Element Technologies of Important Research Subjects toward 4G Mobile Systems
  - 8. Reference Model and Proposals for 4G Mobile Systems
  - 9. Toward the Future
- http://www.mitf.org/public_e/archives/index.html

Activities of Mobile Commerce Committee

Mobile Commerce Committee

- Objectives
  - To contribute to the promotion and dissemination of mobile commerce by creating an industry standard at an early date
- Near-term Activities
  - Perform studies on the necessity of standardization particularly for mobile EC, and conduct profiling based on standard technologies
  - Development and standardization of mobile commerce services

Technical Sub-Committee

- Technical studies targeting electronic commerce on remote and local environment
- Technical studies from the following perspectives are continued under the structure of the Reference Model Working Group, Payment Working Group and Authentication Working Group
  - Technical studies for technology widely used in mobile commerce with spreading of mobile commerce
  - Mainly study the technical requirements for using standardized element technology in mobile commerce

Business Promotion Sub-Committee

- Case studies on mobile commerce business model from a wide variety of perspectives with the objective of extracting requirements of the business model and conditions for success
- Studies on debit payment and electronic money payment as examples of diversifying payment methods
- Studies on payment centering on infrared ray communications and other wireless communication environments

CJK B3G Standards Collaboration

ARIB

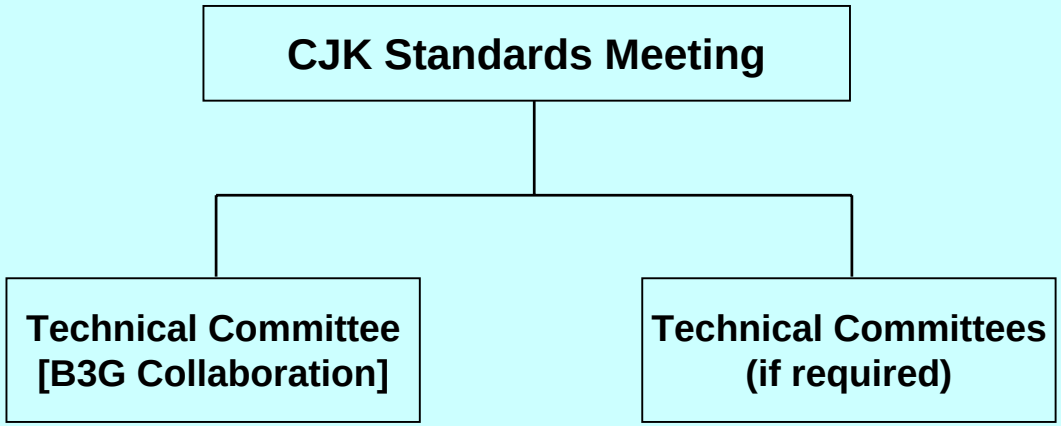
CJK Standards Meeting

- **Background**
  - Economic, technological and social factors are highly pertinent to the region encompassing the three countries
  - The three countries can make an important roll for the development of IT technologies and markets
- **Objectives**
  - To exchange views and information on the status of IT industries
  - To address the market needs by monitoring the developments of standards issues in IT fields within the three countries
  - To encourage mutual support & assistance among standards organizations and contribute to the regional and global standards bodies

(quoted from TTA's document contributed to *1st Meeting of CJK 3G & NG Mobile Communications Working Group*)

CJK Standards Meeting (Cont'd)

- **Participating Organizations : ARIB, CCSA, TTA, TTC**



- **Collaboration Methods**

non periodical opportunities for consultations and discussion about key concerns in standardization such as the information exchange meeting at the technical committee level, mutual visits or email forum operation, etc

(quoted from TTA's document contributed to *1st Meeting of CJK 3G & NG Mobile Communications Working Group*)

Objectives of CJK Collaboration(quoted from MoU)

- To mutually exchange views and information on the status of IT industries in the three countries,
- To contribute to the works of standards organizations of regional and global levels including mutual cooperation in
  - Drafting technical documents in common interested standardization problems
  - Recommending specification documents to international standardization organization
  - Exchanging know-how, research outcomes, and research manpower, market and policy issues of standardization
- To encourage mutual support and assistance in order to ensure balanced and mutually beneficial development of standardization and to attend to market demands in effective and concerted ways,
- To sustain commitment and contribution to the regional and global standards bodies, while making efforts to address the needs of markets and industries of three countries.

CJK B3G Collaboration

■ Background of CJK B3G Collaboration

◆ 2nd CJK Standards Meeting (’02.11.7 ~ 11.8, Tokyo)

- ➢ Agreed on collaboration for key concerns in standardization at the technical committee level (ex : B3G, NGN, etc.)
- ➢ Contact persons of each SDO were appointed for B3G collaboration

■ Objectives of CJK B3G Collaboration

◆ To secure leadership on future mobile communication market based on collaborative standardization activities

◆ To cope with international standards issues together, to make technical documents, to develop common specifications based on the technical discussion

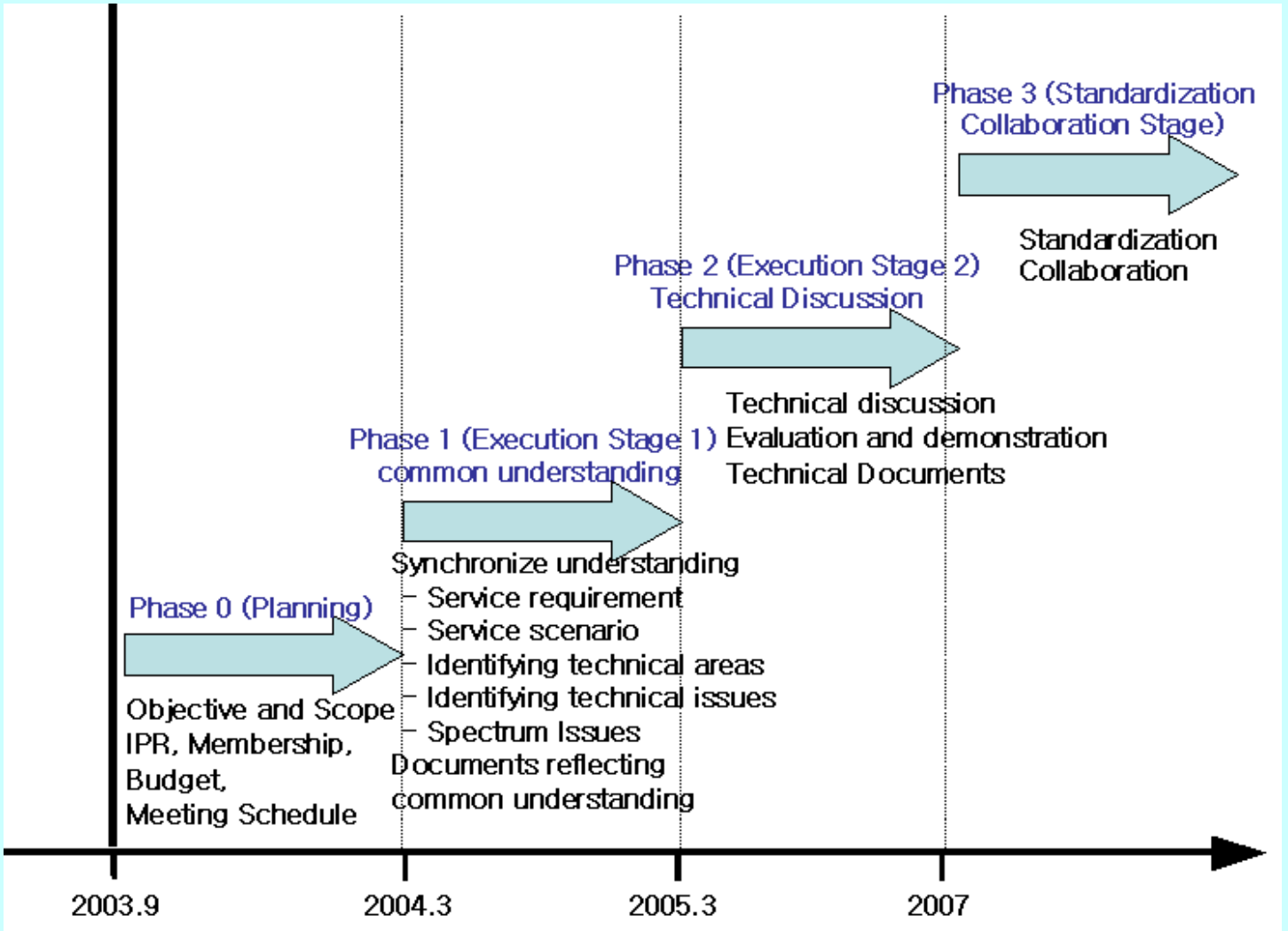
(quoted from TTA’s document contributed to *1st Meeting of CJK 3G & NG Mobile Communications Working Group*)

CJK B3G Collaboration Framework

- **Collaboration Framework on CJK B3G**
  - **Phase 0 (Planning)**
    - **Objective, IPR, Membership, Budget, Meeting Schedule. etc**
  - **Phase 1 (Execution Stage 1: common understanding)**
    - **Synchronize understanding on B3G perspectives**
    - **Service requirement**
    - **Service scenario**
    - **Identifying technical areas of interest**
    - **Identifying technical issues**
  - **Phase 2 (Execution Stage 2: Technical Discussion Stage)**
    - **Technical discussion**
    - **Evaluation and demonstration of technical solutions**
  - **Phase 3 (Standardization Collaboration Stage)**
    - **Standardization Collaboration**

(quoted from TTA's document contributed to *1st Meeting of CJK 3G & NG Mobile Communications Working Group*)

CJK B3G Collaboration Framework (Cont'd)



(quoted from TTA's document contributed to *1st Meeting of CJK 3G & NG Mobile Communications Working Group*)

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.**