Activities of mobile IT Forum (mITF) on Systems beyond IMT-2000

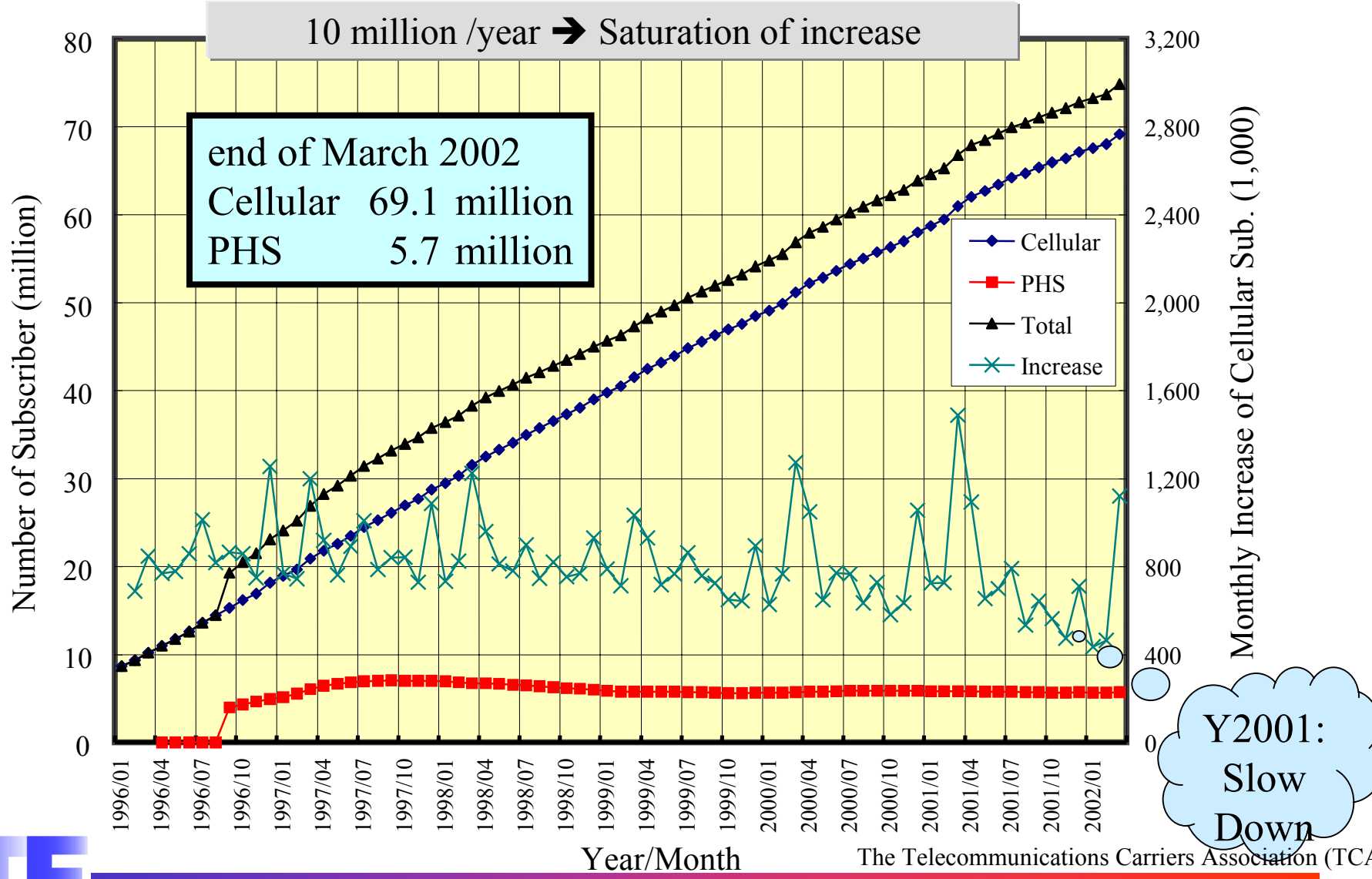
28 May, 2002
Ottawa

mITF System sub-committee
Chairman
Dr. Fumio Watanabe
(KDDI corporation)

Contents

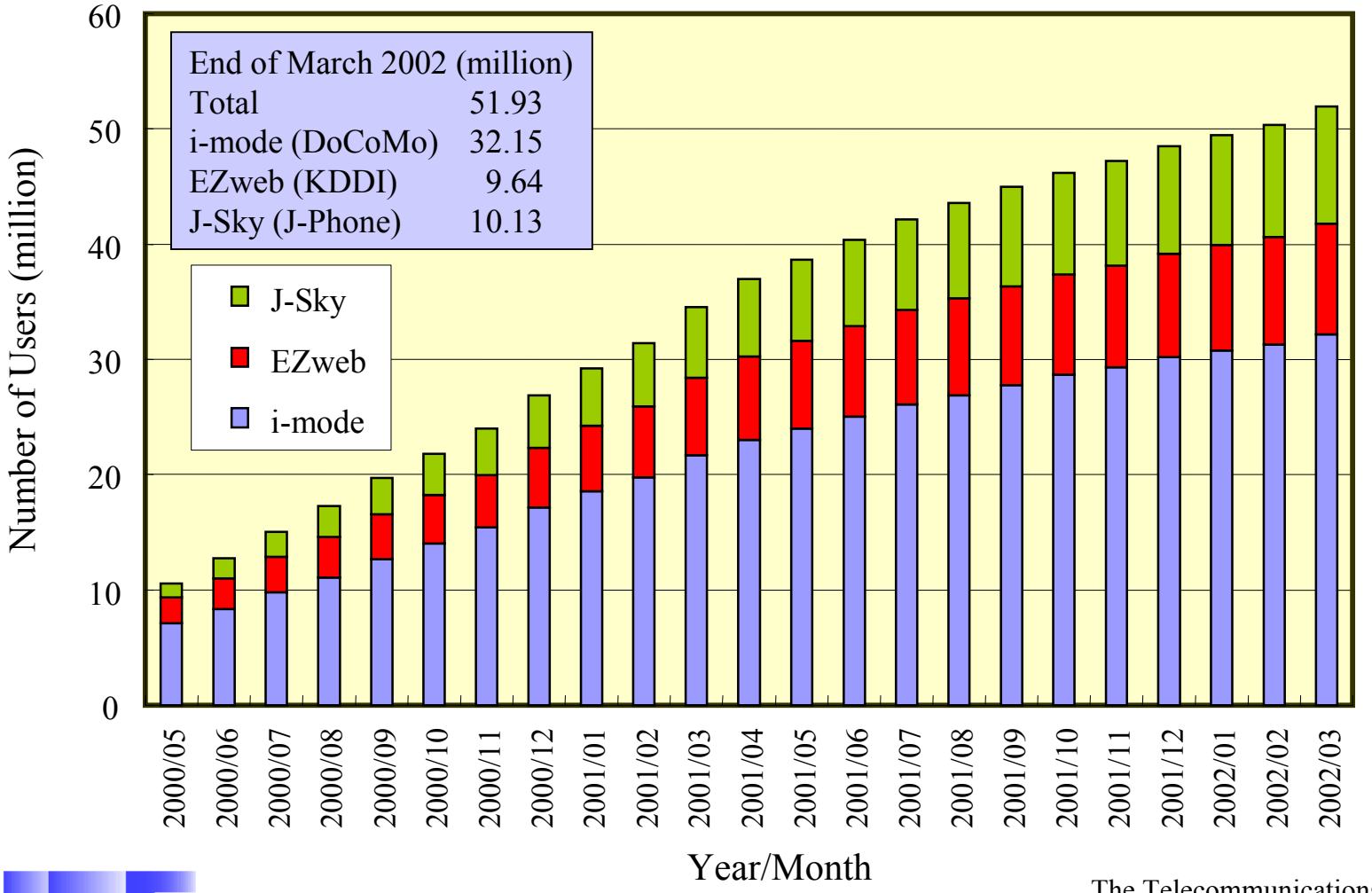
Outlook for Japanese Mobile Market

Number of Mobile Subscribers



Number of Users using Mobile Web Service

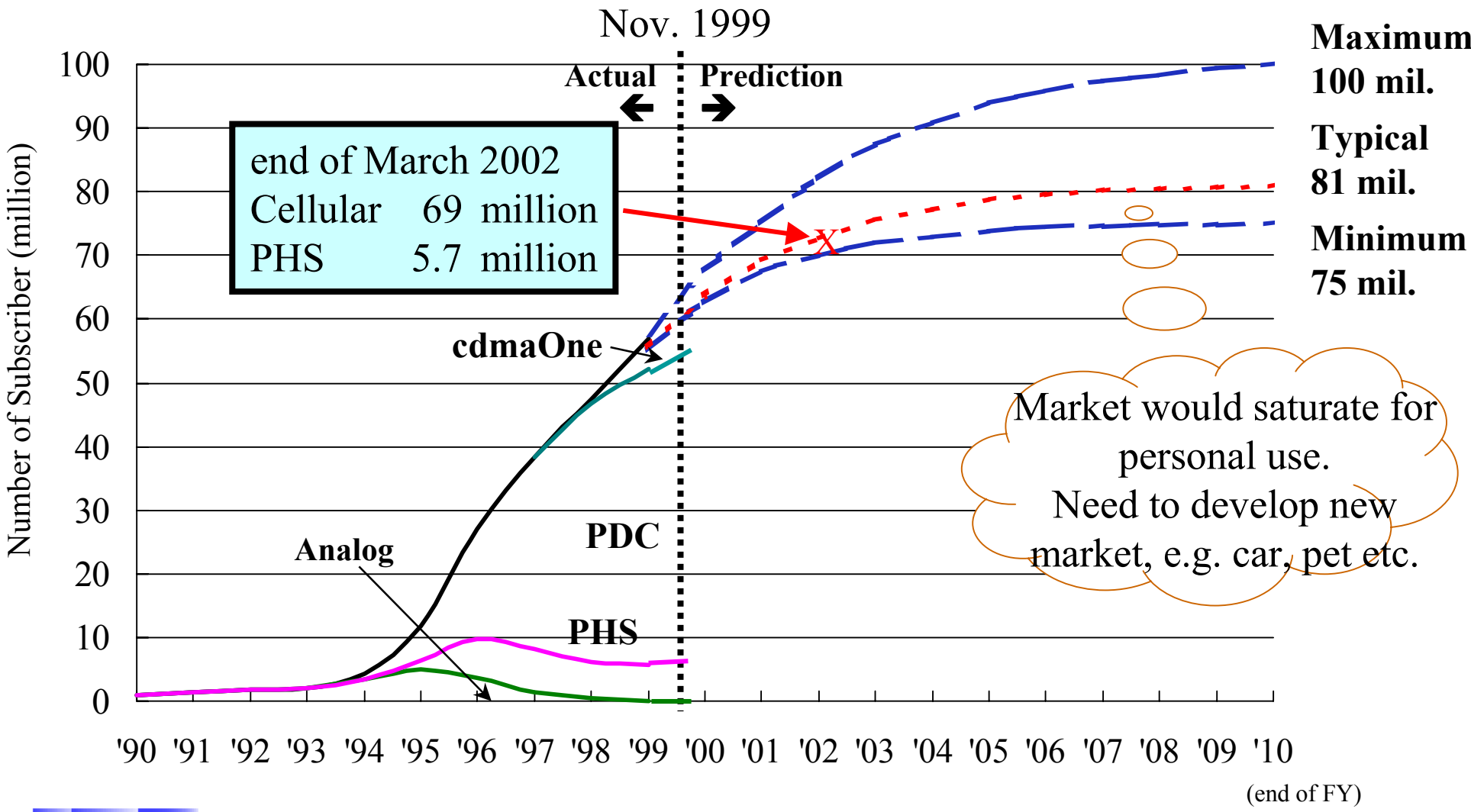
75% of cellular users use “Mobile Internet Services.” (March 2002)



“J-sky” :
number of Web terminals

“i-mode” & “EZweb” :
number of contracted use

Market Prediction (by 1999 Telecommunications Council)



Report of the Telecommunications Council (Nov. 1999)

IMT-2000 commercial service in Japan

1. NTT DoCoMo
   - W-CDMA, 2GHz band
   - Started commercial service October 2001 at Tokyo and Yokohama
   - April 2002: major cities in the nation wide
   - Number of Subscriber: 89 thousand (end of Mar.)
2. KDDI (au)
   - CDMA2000 1x, 800MHz band
   - Started commercial service April 2002 at major cities in the nation wide
   - Number of Subscriber: 280 thousand (end of April)
3. J-Phone
   - W-CDMA, 2GHz band
   - Will start trial service June 2002 at metropolitan area
   - Will start commercial service December 2002 at major cities in the nation wide

Telecommunications Council Report

- Outlook for Future Mobile Communication Systems-

June 25, 2001

Committee of Future Mobile Communication Systems
Telecommunications Technology sub-Council
Telecommunications Council

Telecommunications Council Report

Outlook for Future Mobile Communication Systems

- Role of mobile communications in the 21st century
- Image of future mobile communication systems
  - Usage scenes of the future mobile communications
  - Functional requirement
  - Development target
  - System perspective
  - Expected characteristics
- Milestones towards future systems
- Spectrum consideration
- Strategy for promotion of future systems
  - Promotion of R&D activities
  - Global cooperation and standardization

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
  - General members 120
  - Individual members 9
  - Special members 2
  - Secretary ARIB (Association of Radio Industries and Businesses
- Current main activities
  - Future Mobile Communication Systems (Systems beyond IMT-2000)
  - Mobile Commerce

General Members

ACCESS CO., LTD.,
Baltimore Technologies Japan Co.,Ltd.,
Communications Research Laboratory,
DC CARD CO., LTD.,
Dentsu Inc.,
Fuji Electric Co., Ltd.,
FURUNO ELECTRIC CO., LTD.,
Hitachi Ltd.,
INFOCITY, Inc.,
JAPAN BROADCASTING CORPORATION (NHK),
JAPAN TELECOM CO.,LTD.,
KDDI CORPORATION,
KYOCERA CORPORATION,
Liberate Technologies K.K.,
MASPRO DENKOH CORPORATION,
Matsushita Electric Works, Ltd.,
Mobile Internet Services., Inc.,
Muzuho Financial Group, THE FUJI BANK LIMITED,
NEC Infrontia Corporation,
Nihon Enterprise Co.,Ltd.,
Nippon Shinpan Co.,Ltd.,
NISSAN MOTOR CO., LTD.,
NTT COMMUNICATIONWARE CORPORATION,
Oki Electric Industry Co.,Ltd.,
RICOH Company, Ltd.,
SecuGen Japan, Ltd.,
Siemens K.K.,
SPC ELECTRONICS CORPORATION,
Systems Engineering Consultants Co., LTD.,
The Tokyo Electric Power Company,Incorporated,
TOKYO TELECOMMUNICATION NETWORK CO.,INC.,
TOYOTA MOTOR CORPORATION,
VeriSign Japan K.K.,
ZENRIN CO., LTD.,

ALPINE ELECTRONICS,INC.,
BANDAI NETWORKS Co., Ltd.,
Independent Administrative Institution,
Denki Kogyo Co., Ltd.,
DWANGO Co., Ltd.,
FUJI TELEVISION NETWORK,INC.,
HAKUHODO Inc.,
Hitachi Metals, Ltd.,
InterDigital Communications Corporation,
JCB CO.,LTD,
Keihin Electric Express Railway Co.,Ltd.,
KYOCERA COMMUNICATION SYSTEMS Co., Ltd.,
Logica Japan Co.,ltd,
Matsushita Communication Industrial Co., Ltd.,
Microsoft Product Development Limited,
Mobile Broadcasting Corporation,
NEC Mobiling ,LTD,
Nihon Unisys, Ltd.,
NIPPON TELEGRAPH AND TELEPHONE CORPORATION,
NOKIA-JAPAN CO.,LTD.
Orient Corporation,
ROHM CO., LTD.,
Seiko Instruments Inc.,
SnapTrack Japan, Inc.,
SUMITOMO MITSUI CARD CO.,LTD.,
TU-KA Cellular Tokyo Inc.,
VICTOR COMPANY OF JAPAN, LIMITED,

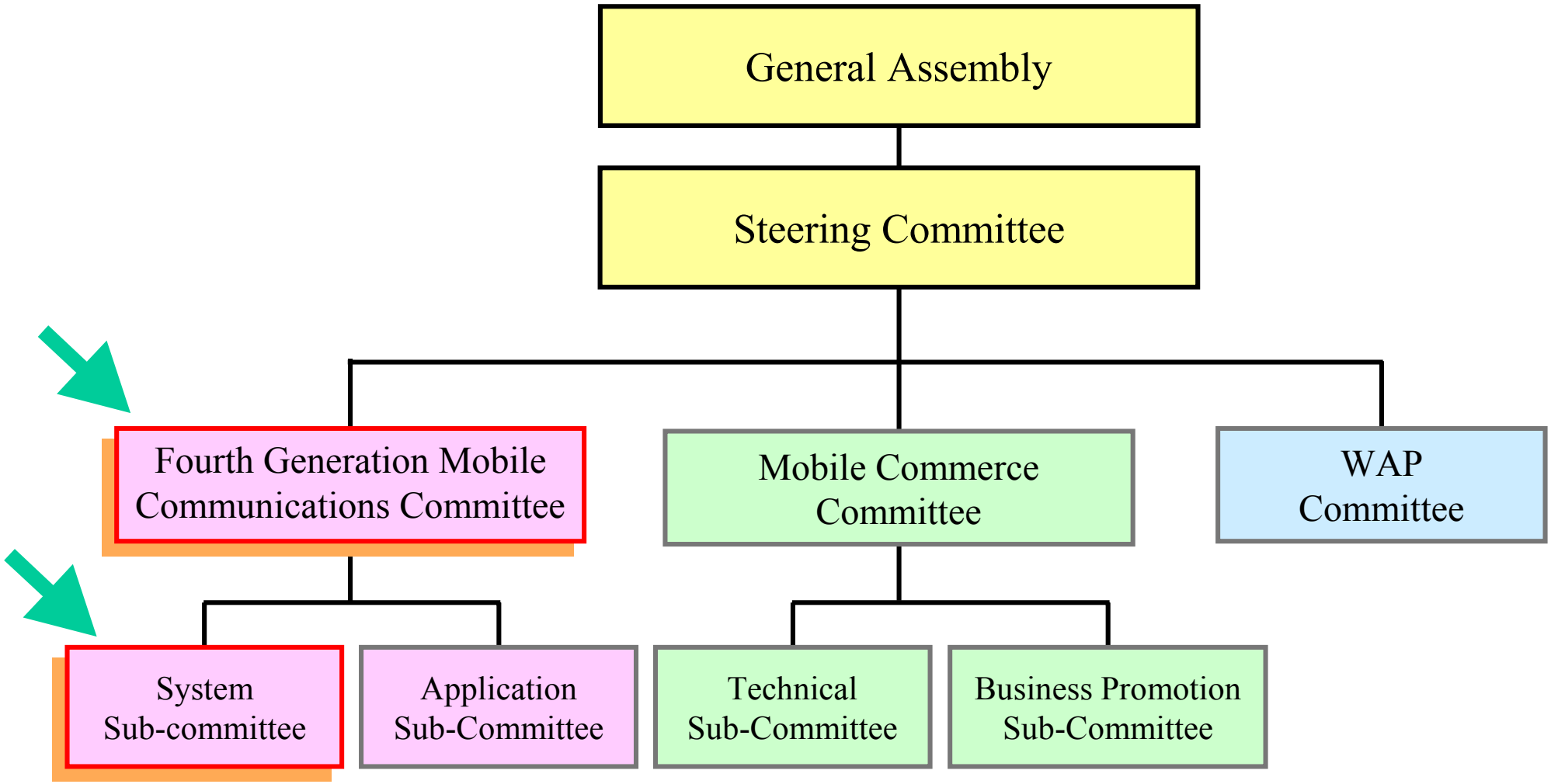
ANTEN Corporation,
CATS CO.,LTD.,
Commuture Corp.,
DENSO CORPORATION,
EIDEN Co.,Ltd. ,
FUJITSU LIMITED,
Hewlett-Packard Japan,Ltd.,
Hitachi Software Engineering Co., Ltd.,
Internet Research Institute, Inc.,
Japan Communication Equipment Co., Ltd ,
J-Phone Co., Ltd,
KENWOOD CORPORATION,
Lucent Technologies Japan Ltd.,
Mitsubishi Electric Corporation,
Motorola Japan Limited,
NEC Corporation,
NHK Integrated Technology Inc.,
NIPPON ANTENNA Co.,Ltd,
Nomura Research Institute, Ltd.,
NTT DATA CORPORATION,
PIONEER CORPORATION,
SANYO Electric Co., Ltd.,
SHARP CORPORATION,
Sony Corporation,
SUN CORPORATION,
Telecom Engineering Center,
Tokyo Broadcasting System, Inc.,
Toshiba Corporation,
UC CARD Co.,Ltd.,

ANRITSU CORPORATION,
Communications Industry Association of Japan,
Cryodevice Inc.,
DENSO IT LABORATORY, INC.,
FM802 Co., Ltd,
FUJITSU TEN LIMITED,
Hitachi Kokusai Electric Inc.,
INDEX CORPORATION,
ITOCHU Corporation,
Japan Radio Co.,Ltd.,
KANSAI TELECASTING CORPORATION,
KOZO KEIKAKU ENGINEERING Inc.,
KYOWA EXEO CORPORATION,
Magic Mail Inc.,
Matsushita Electric Industrial Co., Ltd.,
MITSUBISHI MATERIALS CORPORATION,
Murata Manufacturing Co., Ltd.,
NEC Engineering,Ltd.,
NIHON DENGYO KOSAKU CO.,LTD.,
Nippon Ericsson K.K.,
nippon television netwok corporation,

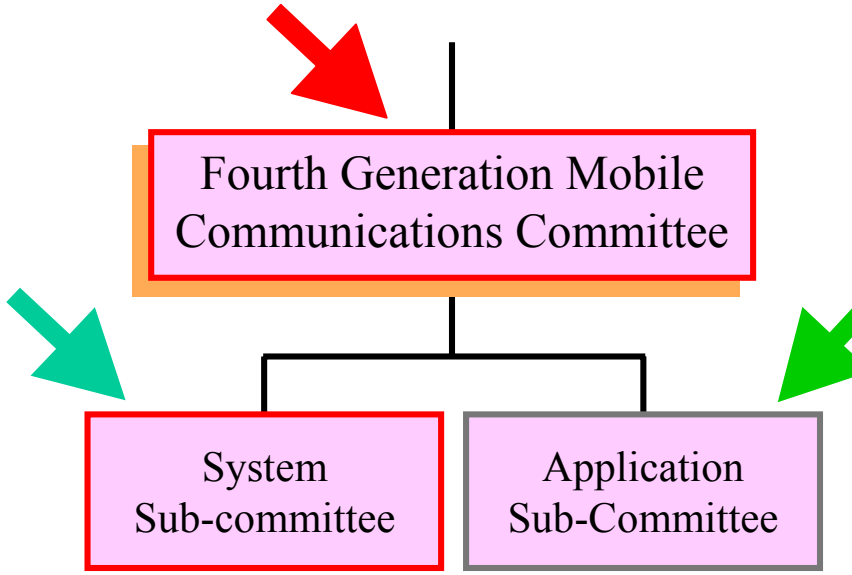
NTT DoCoMo, Inc.,
QUALCOMM JAPAN Inc.,
SECOM Trust.net Co.,LTD,
ShibaSoku CO., LTD.,
Sony/Tektronix Corporation,
Sun Microsystems K.K.,
The Sanwa Bank Limited,

TOSHIBA TEC CORPORATION,
UFJ Card., Co Ltd.,
VISA INTERNATIONAL ASIA PACIFIC LTD

Organizational Structure of mITF

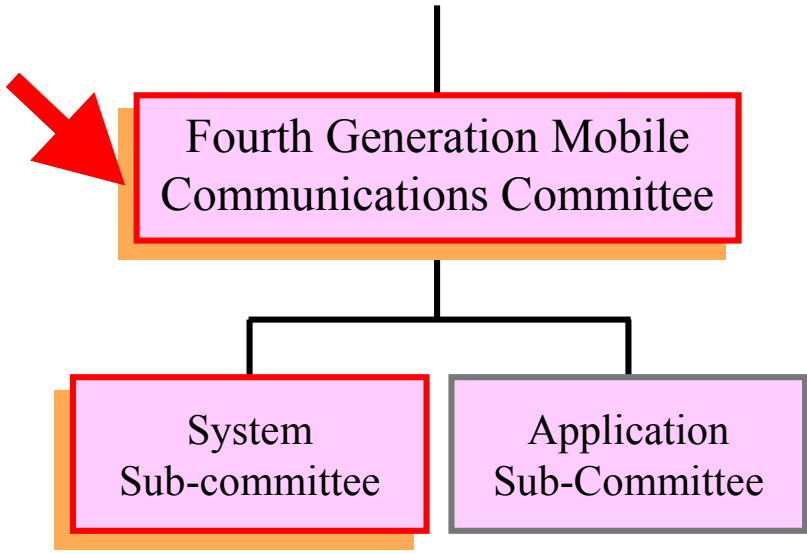


Activities of Fourth Generation mobile Communications Committee



Fourth Generation Mobile Communications Committee

1. 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



Fourth Generation Mobile Communications Committee

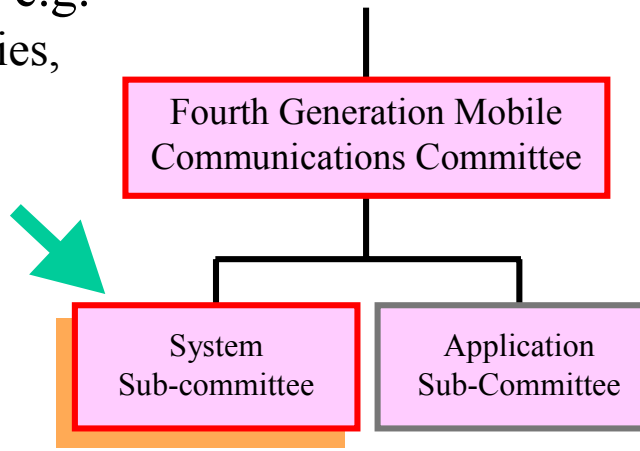
(continued)

2. Near-Term Activities:

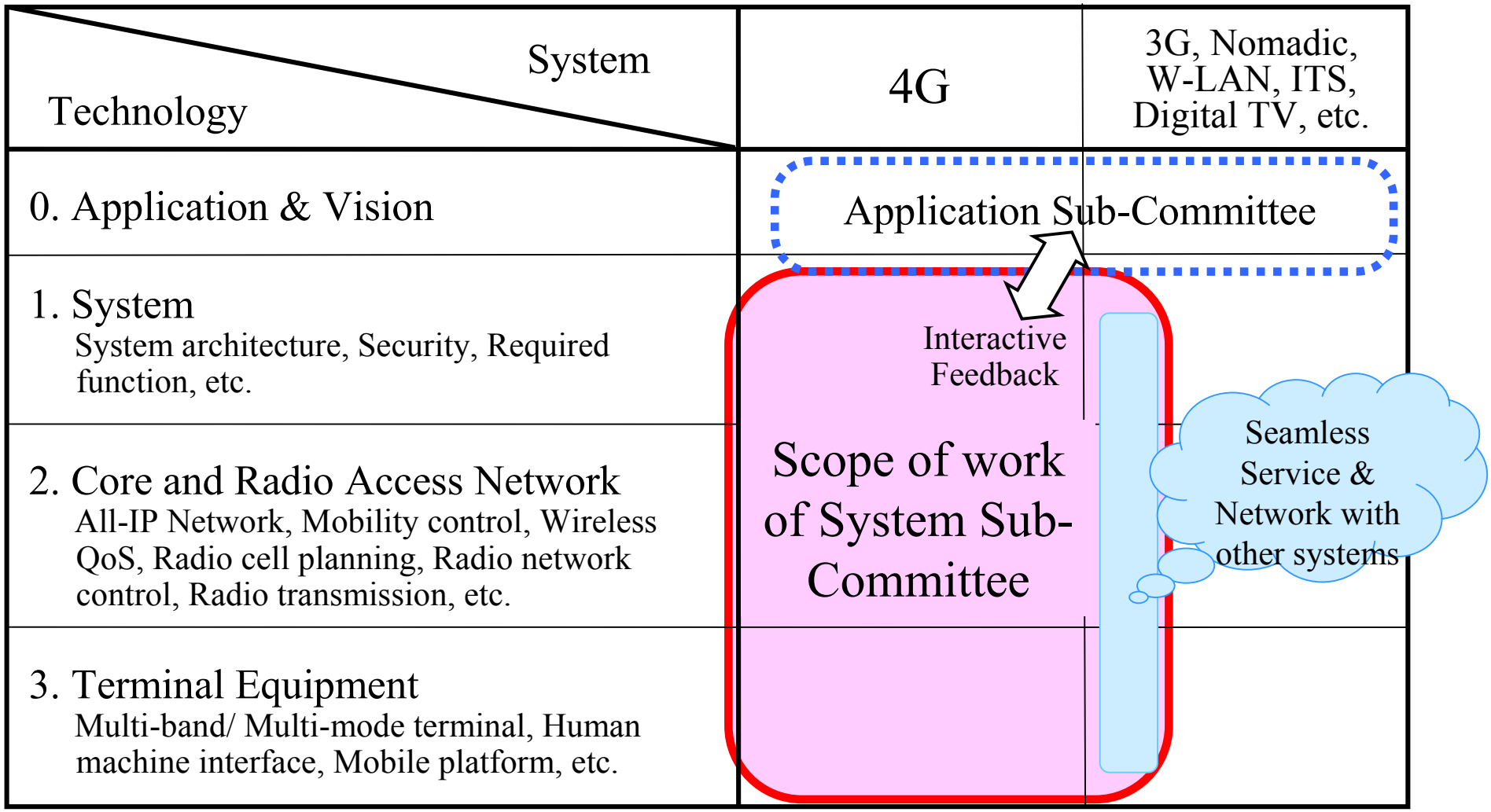
- Establish a framework for R&D and standardization, with a view to create new business markets (in 10 years)
- Study the desired architecture and development scenarios of 4G
- Select, study and evaluate research themes on new element technologies
- Studies on interworking with other systems toward a seamless world
- 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

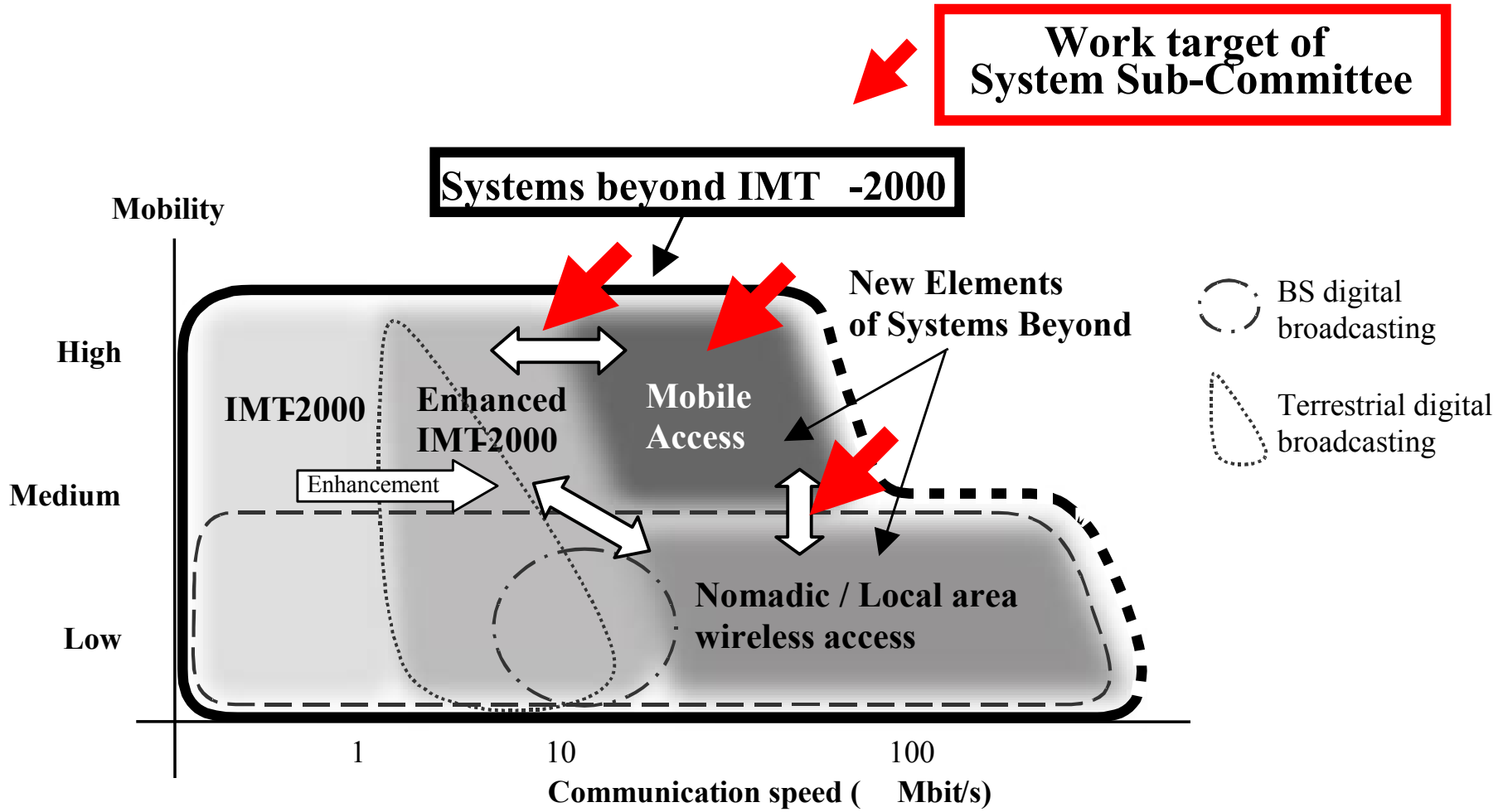
- Goals of Activities
  - Facilitate the R&D and standardization of the 4G systems to realize a world's leading mobile IT
  - Contribute to creating mobile business markets ten years ahead
- Near-Term Activities
  - Clarify the system configuration method for the fourth-generation mobile communications 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 (1)



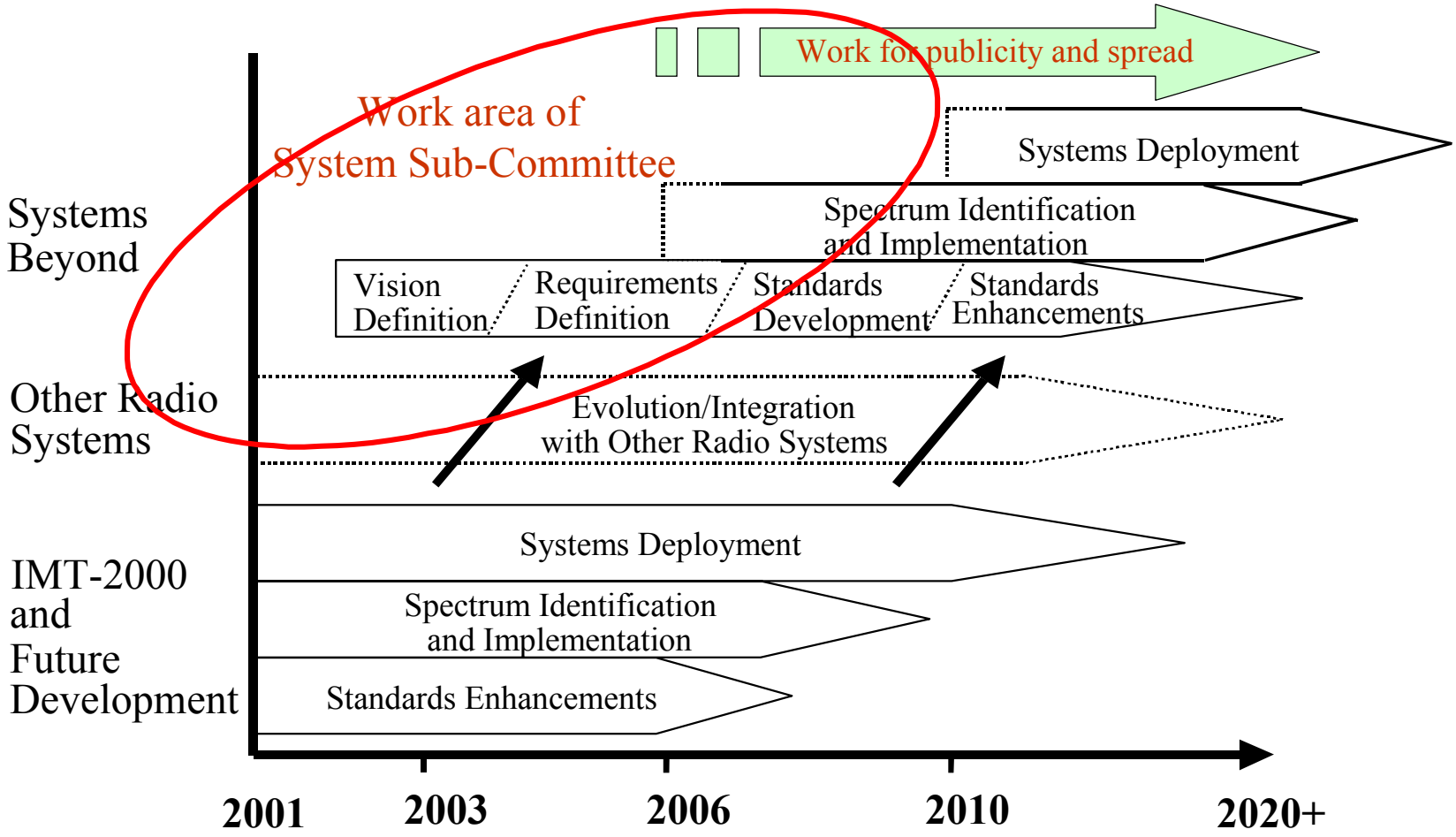
Scope of System Sub-Committee (2)



⇔ denotes interconnection between systems via networks or the like , which allows flexible use in any environments without making users aware of c onstituent systems.

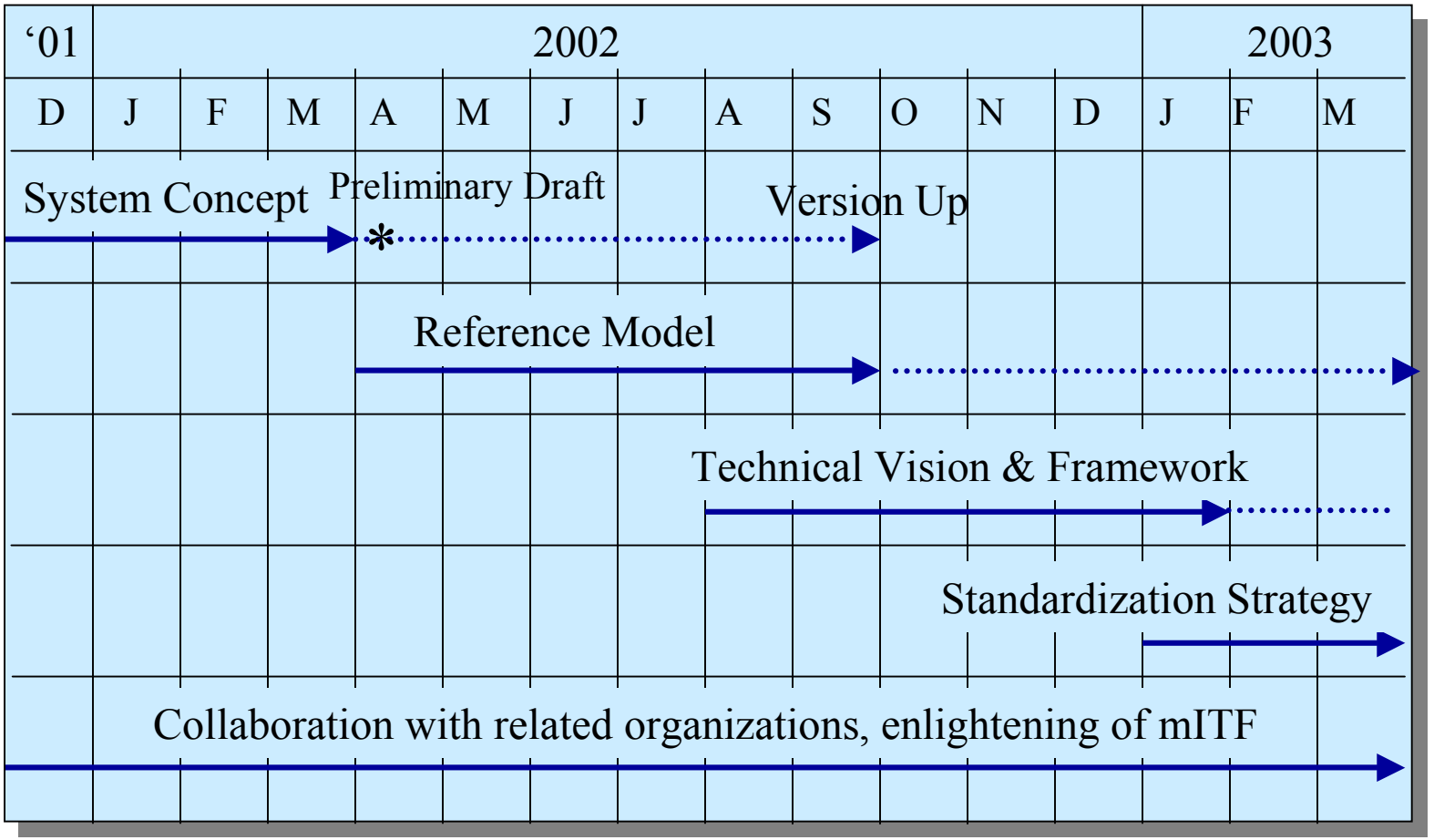
Source: Output of the 6th ITU-R WP8F, Oct. 2001, 8F/TEMP/205 Rev. 1

Timeframe & SoW of System Sub-Committee



Source: Output of the 6th ITU-R WP8F, Oct. 2001, 8F/TEMP/205 Rev. 1

Near-term activities

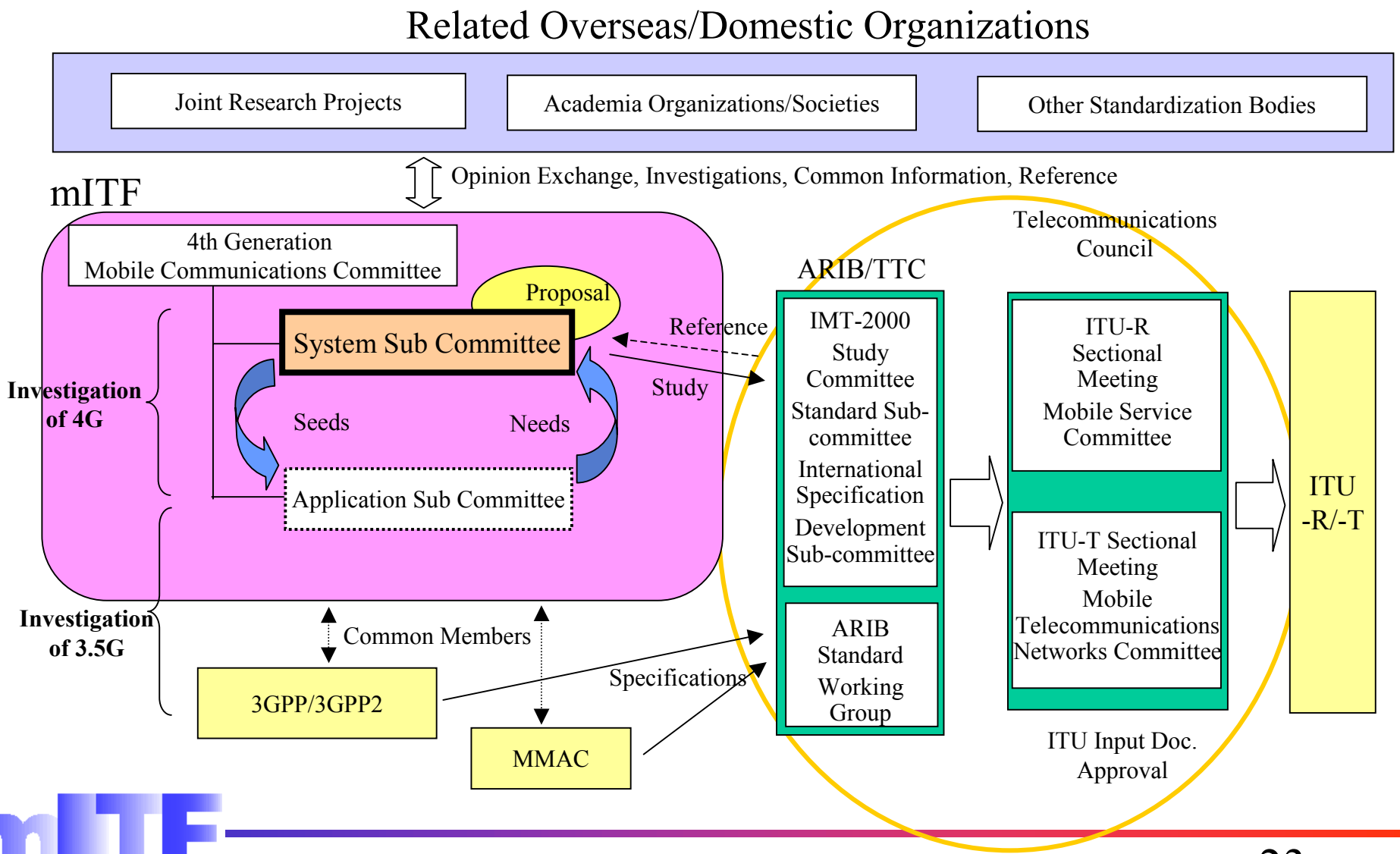


Collaboration Ad-Hoc

- Collaboration Ad-Hoc was established in System Sub-Committee on March 2002
- Objective:
  - Make guideline how to collaborate with other organizations
  - Handle requests for presentation and cooperation from other organizations
- Actions
  - Information exchange with various organizations
  - Appoint a contact person
  - Standardization bodies (WP8F, ARIB/TTC, CWTS, TTA, • • •)
  - Forum and consortium (WWRF, mobile VCE, • • •)
  - Academia

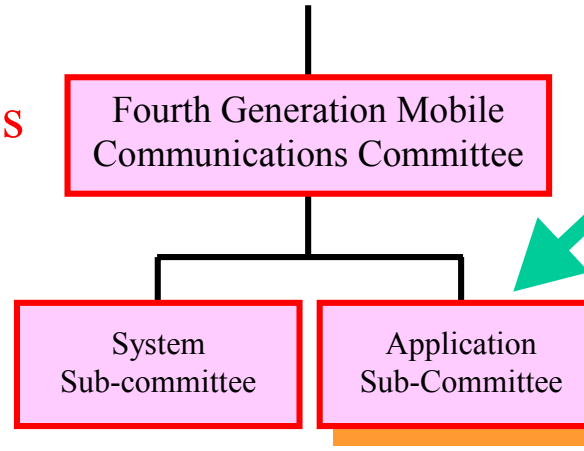
Tentative group until "Publicity and Promotion Ad-Hoc" under Steering Committee takes off.

Relations between mITF and Related Parties

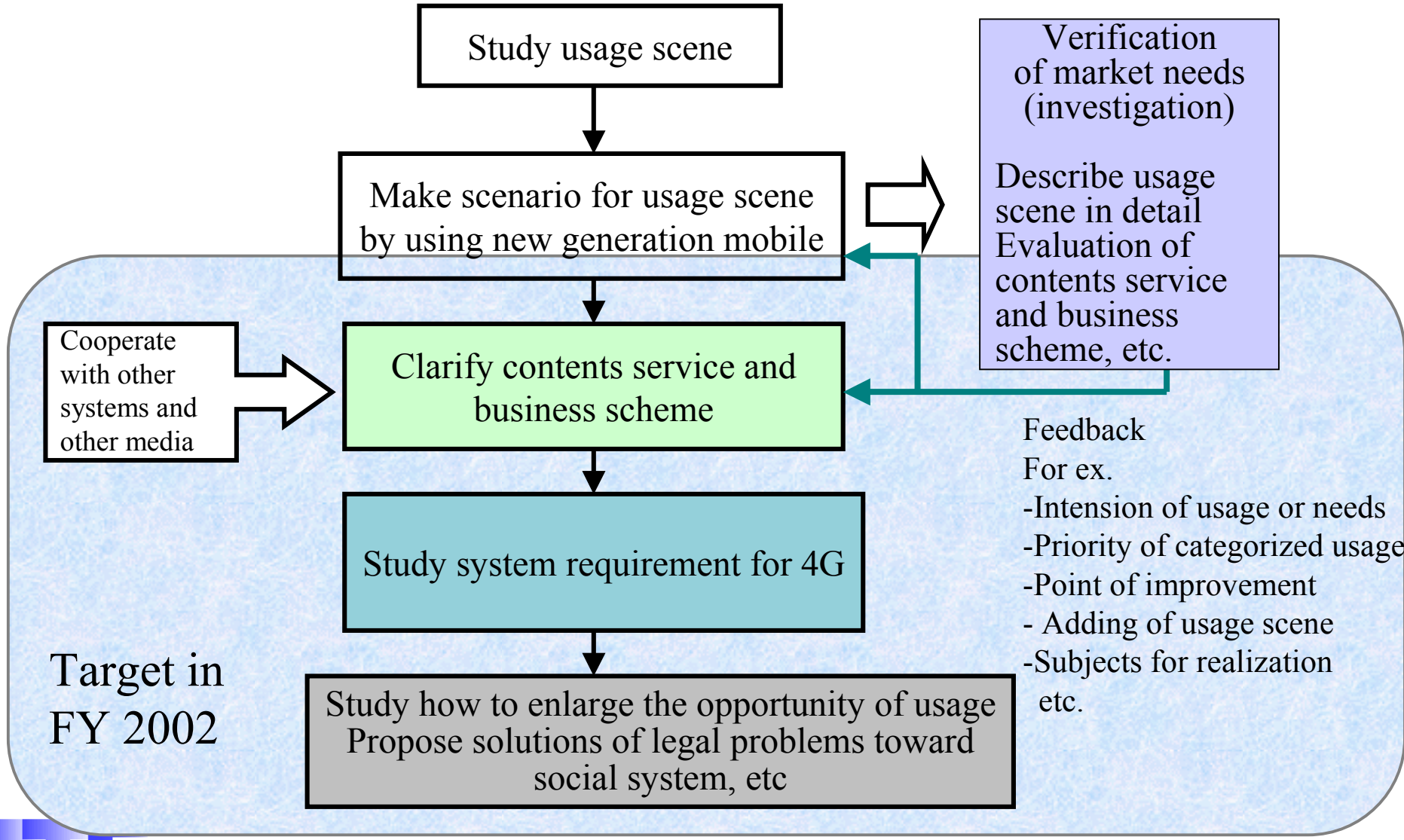


Application Sub-Committee

- 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
  - Make "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



Activities and Plan of Application Sub-Committee



Preliminary study results

- Analysis of usage scene described in the Telecommunication Council Report by market research
  - find general acceptance for each usage scene
  - find apparent needs for “safety”, “health”and “convenience”.
- Interview to well-informed sources
  - Wider bandwidth does not mean more fun nor more convenient.
  - User’s merits of 4G except for higher bit-rate should be clarified.
  - Acceptance of new services will depend upon cost/price.
  - Real communications between people, that capable to transmit sensitivity and feeling of users, will be most promising. Not a high resolution display nor a high bit-rate motion picture is to be “Real”.
  - “Agent” function will be essential.

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 communication 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.
- mITF is pleased to have this opportunity to exchange information on Systems beyond IMT-2000. mITF would like to seek a way to collaborate with other organizations and academia.

http://www.mitf.org/

Annex

Telecommunications Council Report
- Outlook for Future Mobile Communication Systems-

June 25, 2001

Committee of Future Mobile Communication Systems
Telecommunications Technology sub-Council
Telecommunications Council

Background of the Discussion

Development of Mobile IT

- High-speed transmission that can handle multimedia mobile communications
- All IP system with higher levels of security and reliance
- Software Defined Radio that lets software alter frequency or radio transmission technology

International Activities

ITU initiated study on Systems Beyond IMT-2000
- June 2001 evaluation of concept and framework of system
- June 2002 evaluation of demand and requirements for system

Trends in Research

Japan: Promote research and development of high-speed mobile access technology at communications and broadcasting infrastructure-related research institutions.

Telecommunications Council's "Outlook for Future Mobile Communication Systems" (October 2000 to June 2001)

- Basic system concepts
- Technology development and standardization issues
- Measures to promote system actualization

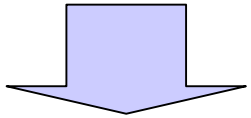
Contribute to International Telecommunications Union (ITU)

Promote research and development projects

Roles of Mobile Communications in the 21st Century

Progress of Mobile Information Technologies

Ultra high-speed communication, Wireless IPv6, Software defined radio



Future mobile communications

- Users can access the Internet as they do in the office, anywhere, anytime, without any restrictions.
- Anything can be a mobile-communication terminal.
- Users can freely choose services, applications, and networks, and take advantage of number portability.
- Highly advanced mobile E-commerce will be achieved.
- New technologies will be flexibly introduced to systems and services.

Functional Requirements for Future Mobile Communications

Very high-speed and high-quality transmission

Future mobile communication systems should be able to handle a large volume of multimedia information.

Max. rate 50-100 Mbit/s, Asymmetric Up/Down link speeds, Continuous area coverage, QoS mechanism, Low bit cost, etc.

Flexible and varied service functions

Future mobile communication networks should be "seamless" regarding media, corresponding hosts, and inter-connectivity with other networks.

Media transformation, Inter-network mobility management and authentication, Ad-hoc networking, Agent function, etc.

Open platform

Future mobile communication systems should be "open" regarding mobile terminal platform, service nodes, and mobile network mechanisms.

User can freely select protocols, applications and networks.
ASPs and content providers can provide their services and contents independently of operators.
Location and charging information can be used among networks and among applications.
Improved security measures enabling wide functional range.

Image of Future Mobile Communication Systems

Telecommunications Council in Japan issued a report on Outlook for Future Mobile Communication Systems on June 25, 2001

Image of Future Mobile Communication Systems

- Users can access the Internet environment as they do in the office, anywhere, anytime, without any restrictions.
- Anything can be a mobile-communication terminal.
- Terminals has outstanding number portability and users can choose services and applications freely.
- Highly advanced mobile EC (Electronic Commerce) will be achieved.
- There is the flexibility to introduce new technology to systems.

Outline of Future Mobile Communication Systems

- Capability to handle high speed multimedia
- Service portability, seamlessness among networks
- Ability to support highly advanced application such as mobile EC
- The Systems are collective entities, consisting of Systems beyond IMT-2000, Enhanced IMT-2000, High-speed wireless access, etc.
- The above systems interworks to provide seamless environment to user.
- Phased development corresponding to ITU-R 8F activities (about 30Mbps(down link) around 2005, 50-100Mbps around 2010)

Development Targets

	2005	2010
	Enhancement of IMT-2000 (Expansion stage)	Systems beyond IMT-2000 (4G) (Mature stage)
Transmission bit rate	30 Mb/s (8-10 Mbps x3)	50 to 100 Mbps
Service	Advanced applications	Further enhancement of advanced applications with authentication and security functions
Anticipated user	Aggressive users	Universally popularized
Functions	Basic (but more functional than those at present)	Full range
Seamless connectivity	User-assisted seamless connectivity with other systems	Autonomous seamless connectivity (User is unaware of handover)
Role in society	Part of social functions (Replaceable)	Infrastructure for social functions (Indispensable)

Expected Characteristics of Future Systems

IMT-2000 is an all-around mobile communications system like a "department store"

Future mobile communications will be a system like a "shopping mall"

Users can flexibly select the optimum wireless service according to the usage environment

- Very high speed communications in cellular environments with high mobility
  - **Enhancement of 3G mobile systems** and/or **4G mobile systems**
- Wireless access in hot spots or indoor environments
  - **High speed wireless-access systems**
- Short-range connectivity, e.g. Bluetooth, Digital broadcasting and other media.

Seamless accessibility will be achieved using next-generation mobile communication technologies, e.g. Software Defined Radio, etc.

Property of Future mobile communications

Future mobile communication systems will be ***Functional Integration*** of the **Advanced Cellular System** and **High-speed Wireless Access System.**

System Perspective

System Perspective

Advanced cellular systems and high speed wireless access systems will be functionally integrated into the future mobile communications system.

1 Future cellular systems

- Downlink (base station to terminal) transmission peak bit rate will be around 30 Mb/s in 2005 (3.5G) and 50 to 100 Mb/s in 2010 (4G).
- Software-defined radio technologies will be introduced to the future generation systems.

2 High-speed wireless access systems

- Hot spot services as well as FWA will be introduced by high-speed wireless access systems that offer bit rates exceeding 100 Mb/s.

3 Integrated and advanced functions

- Realize multimedia mobile communications including high resolution video transmission
- Adapt to IPv6 (Customers can choose services and applications based on their own needs)
- Connect seamlessly with other transmission media such as next generation Bluetooth and Digital Broadcasting
- Realize higher levels of security and authentication

Schedule

2001 Report from the council on basic concept

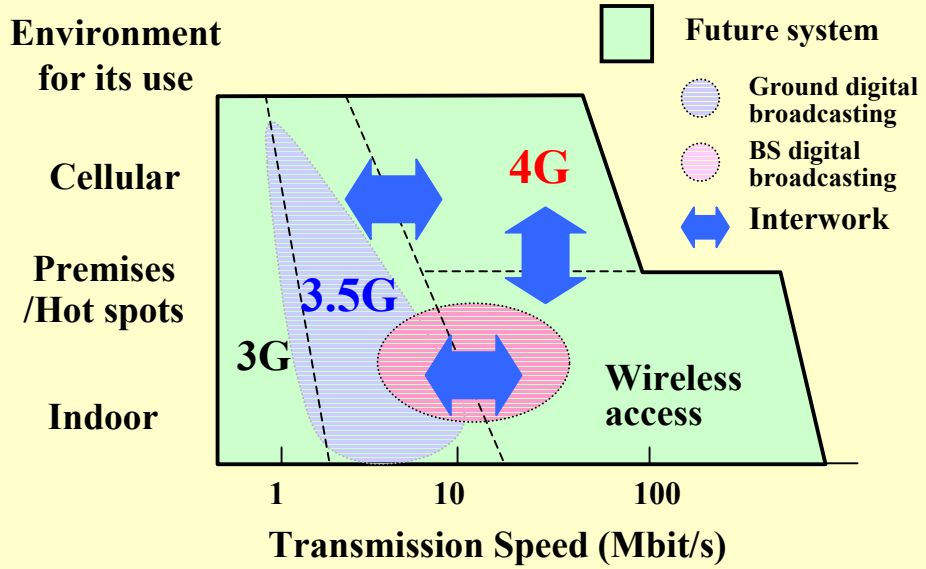
2005 Complete development of 3.5G

Establish key technologies for 4G

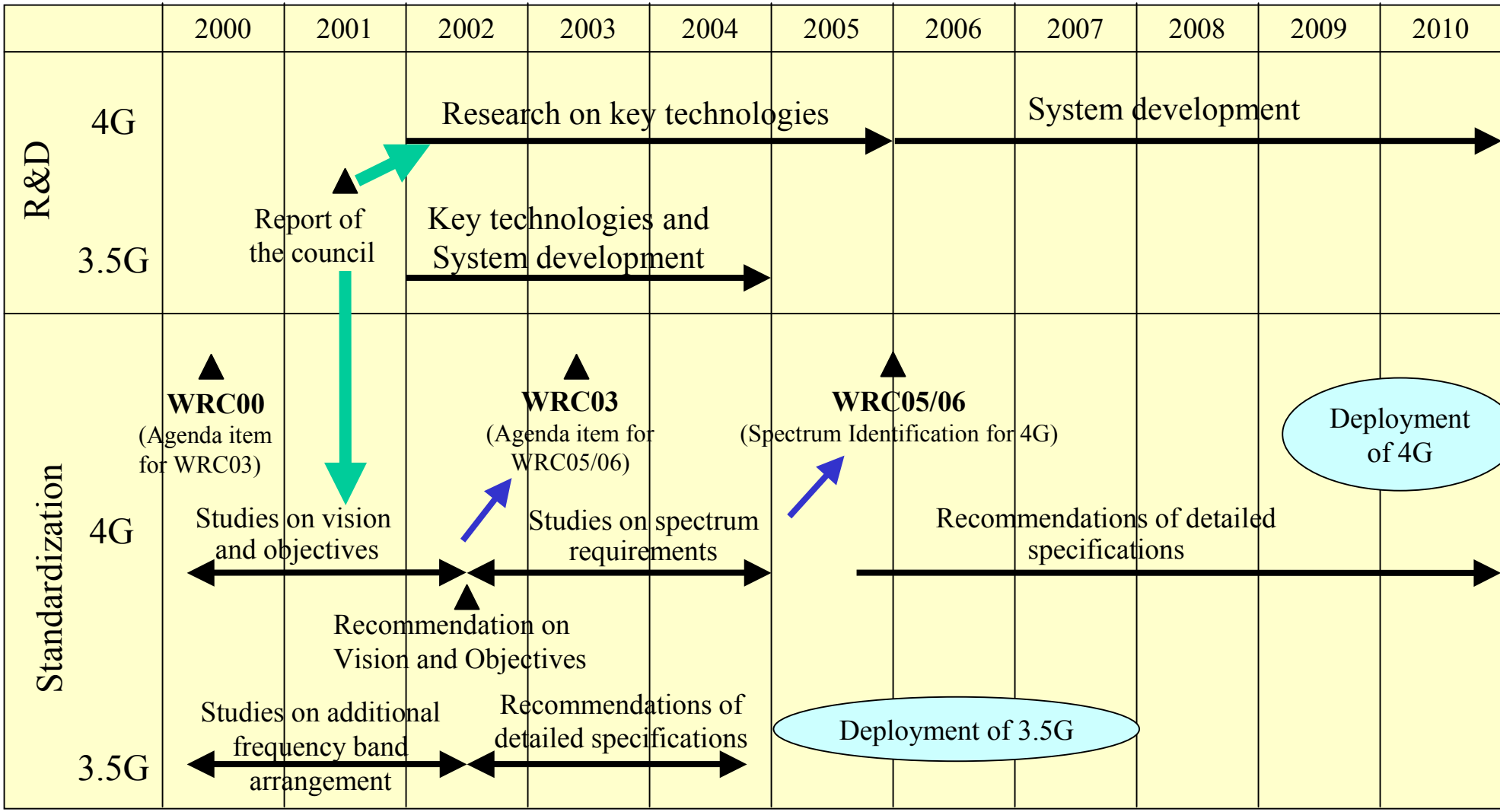
2006 Identify the spectrum for 4G (WRC-2006)

2010 Introduce 4G

Target Area of Future Mobile Commun. Systems



Milestones Toward Future Generation System



Spectrum

Bandwidth

Additional spectrum of 1.2~1.7 GHz bandwidth will be required in 2015.

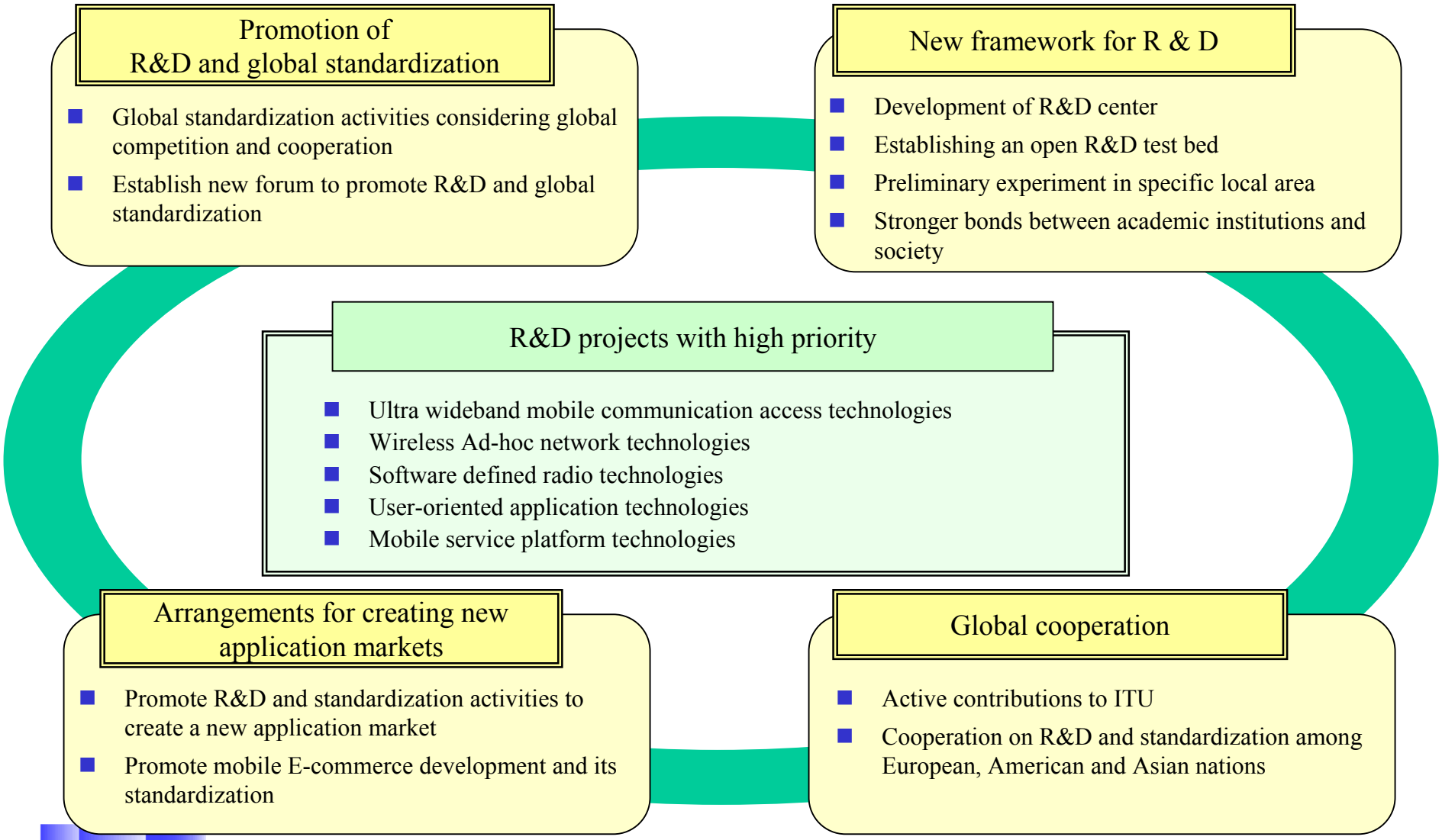
- Estimation is based on ITU-R M.1390 method.
- Introduction of Ultra High Speed Multimedia (Down 100 Mb/s, Up 30 Mb/s) and Very High Speed Multimedia (Down 30 Mb/s, Up 3 Mb/s) services is assumed.
- Rate of increase in traffic is assumed to be 50% per year.
- Spectrum utilization efficiency is assumed to be 1.1-fold at 2010 and 1.5-fold at 2015 compared with IMT-2000.
- Indoor traffic is excluded.

Frequency band

Frequency band below 5~6 GHz is suitable for the 4G mobile system.

- The number of cells increases according to the increase in operating frequency band.
  - 1.7~2.5 -fold at 5 GHz, 2.4~4.5 -fold at 7 GHz (reference 3 GHz)
- Loss caused by the shadow of a human body increases significantly when the operating frequency band is above 5~6 GHz .

Synthetic Strategy for Promotion of New Generation Mobile Communication Systems



Usage Scenes of the Future Mobile Communication Systems

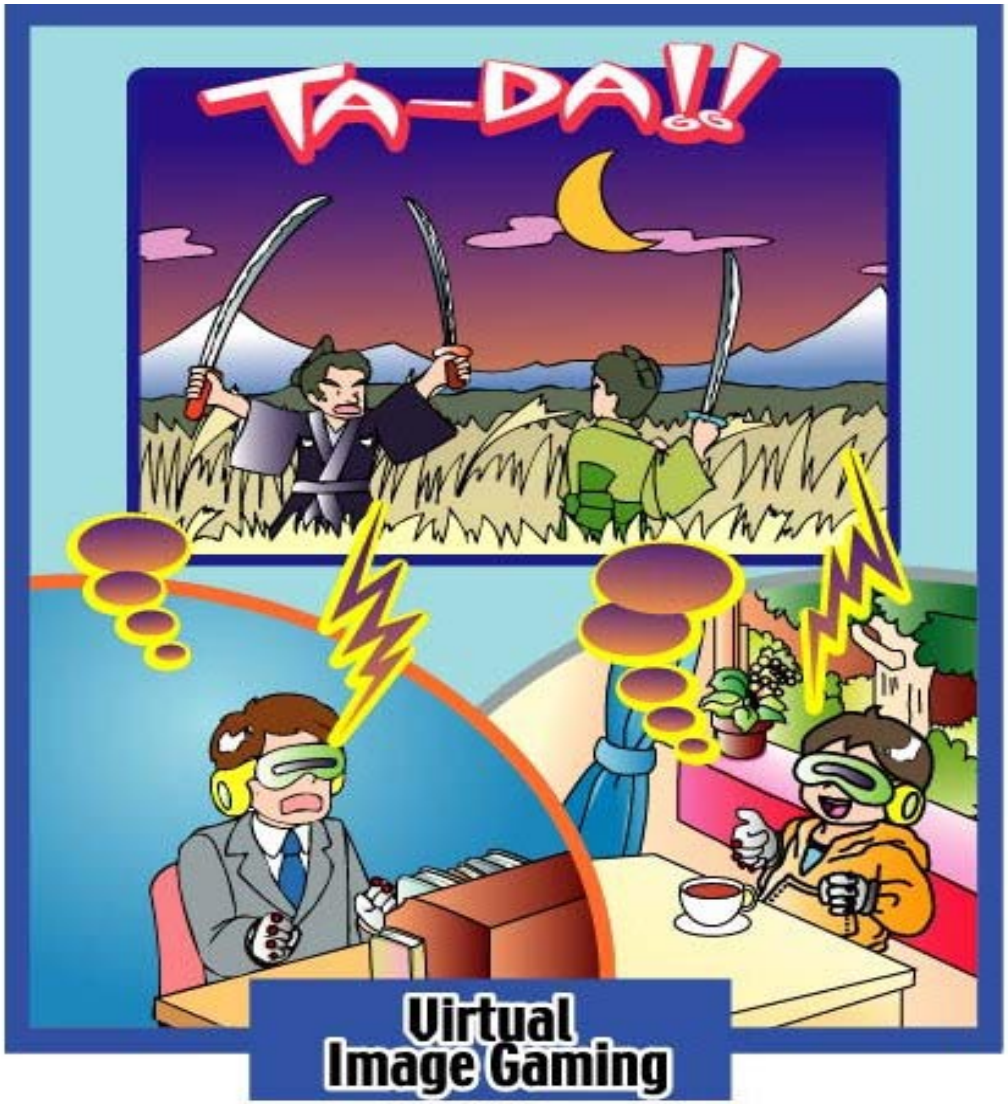
- Education, Art & Science
- Business Use
- Entertainment
- Visual Communication
- Mobile Commerce
- Life
- Work
- Emergency Medical Treatment
- Nursing and Health Care

Report
by Committee of Future Mobile Communication Systems
Telecommunications Technology sub-Council
Telecommunications Council

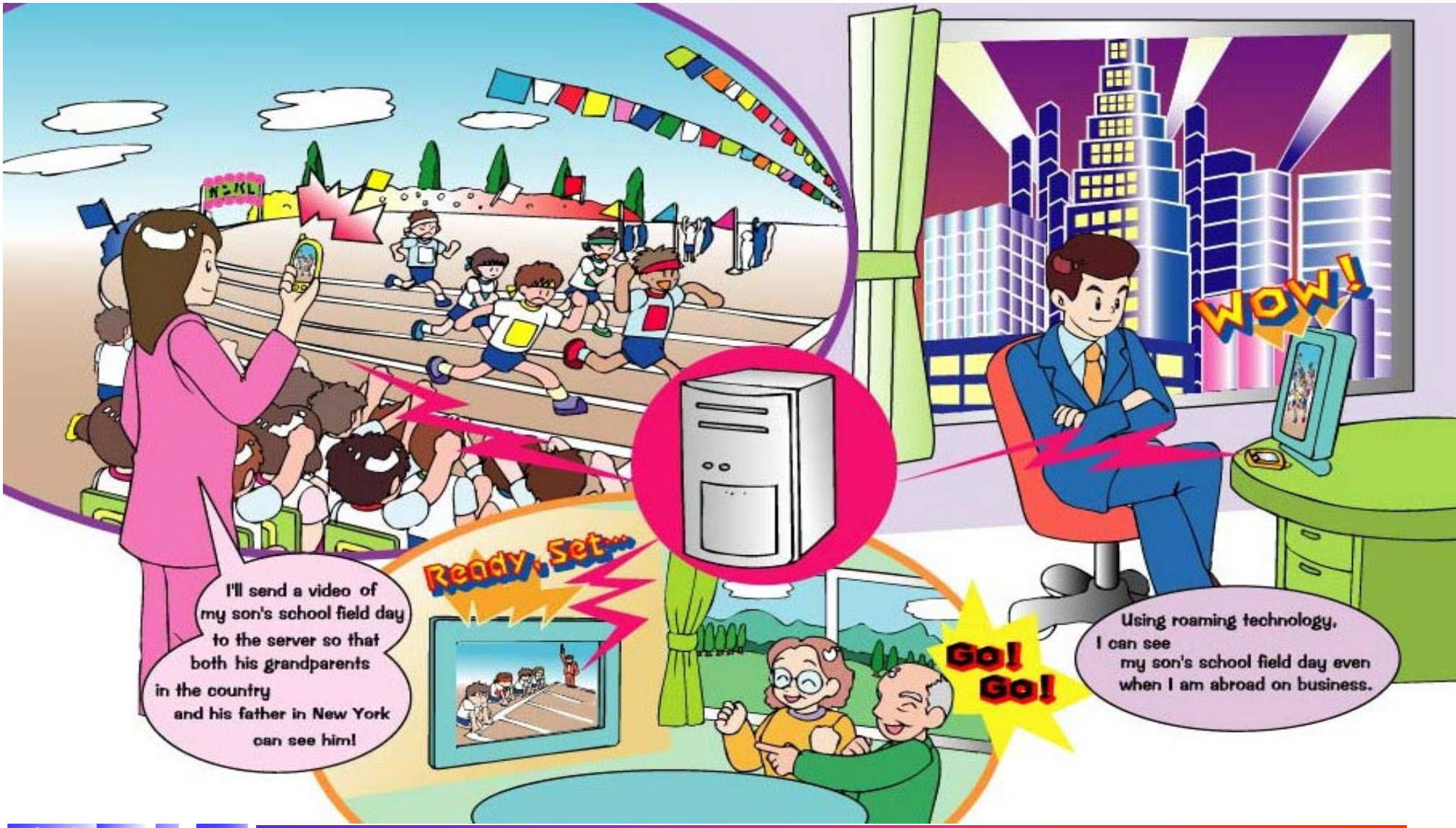
Education, Art & Science

Business Use

Entertainment

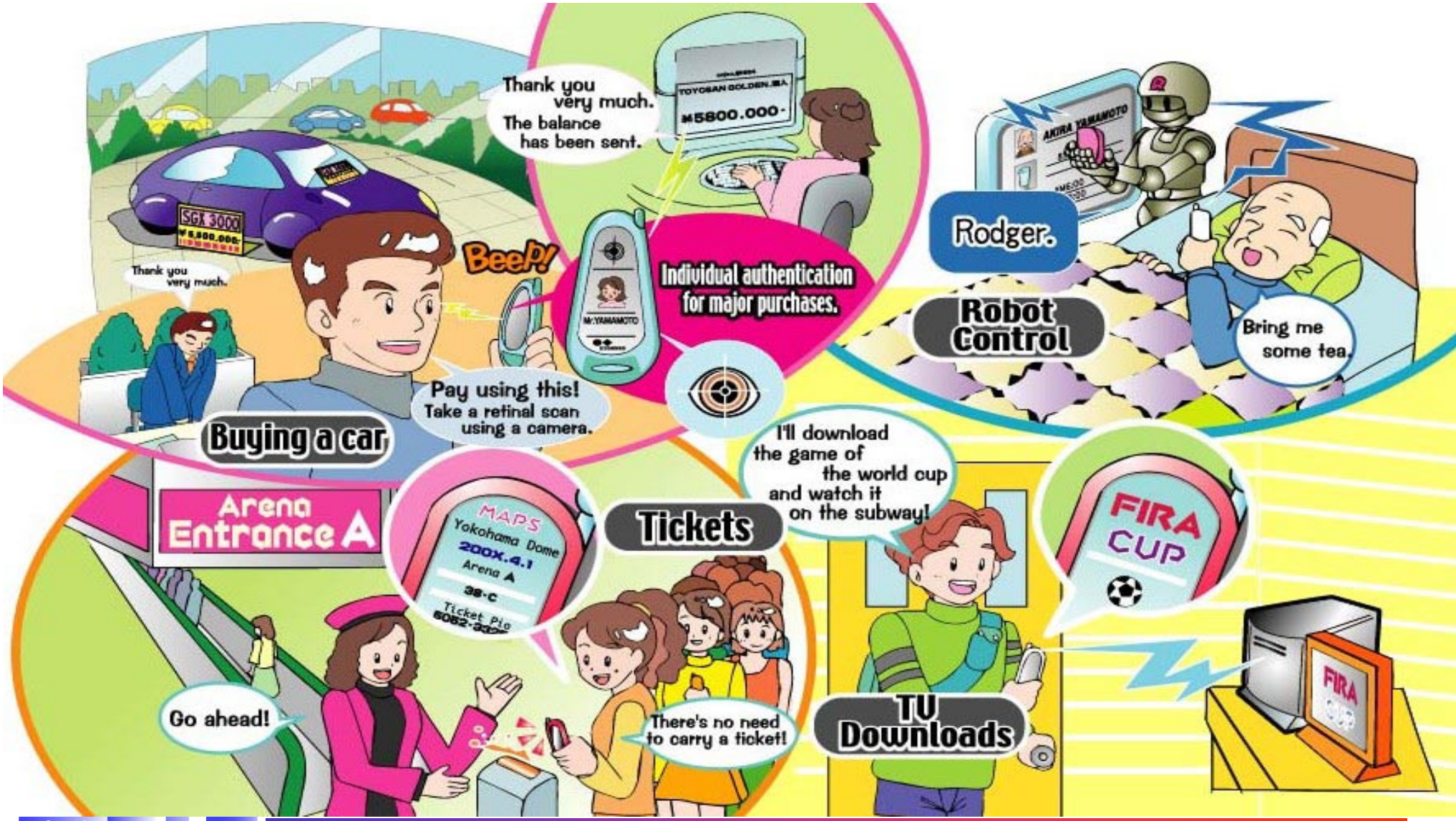


Visual Communication



Mobile Commerce

Life


Thank you very much. The balance has been sent.
¥5800.000-
Beep!
Individual authentication for major purchases.
Thank you very much.
Pay using this! Take a retinal scan using a camera.
Buying a car
Rodger.
Robot Control
Bring me some tea.
Arena Entrance A
MAPS
Yokohama Dome
200X.4.1
Arena A
38-C
Tickets
I'll download the game of the world cup and watch it on the subway!
FIRA CUP
Go ahead!
There's no need to carry a ticket!
TV Downloads

Work


Next Generation Wireless Tickets
Tokyo
Yokohama
200x.4.25
JL East Japan
ABC-01234
Ground Wave Digital TV
NEWS
Stock Info
300
360
Household LAN remote control
Please send to Sales Department XO Inc.
Department Chief Tanaka
MAIL
Customization
for the businessman's day
Carrier A
Portable C
Mobile B
CALL
Select your carrier.
AVEX NONY
Music Fan's Setup!
OXTV MOVIE
AOV MOVIE
Movie Fan's Setup!
Katherine
200x.3.4
Hi!
How are you?
Connected
Good at translation!

Emergency Medical Treatment

Nursing and Health Care