



The Future of Mobile Communications

April 2, 2003

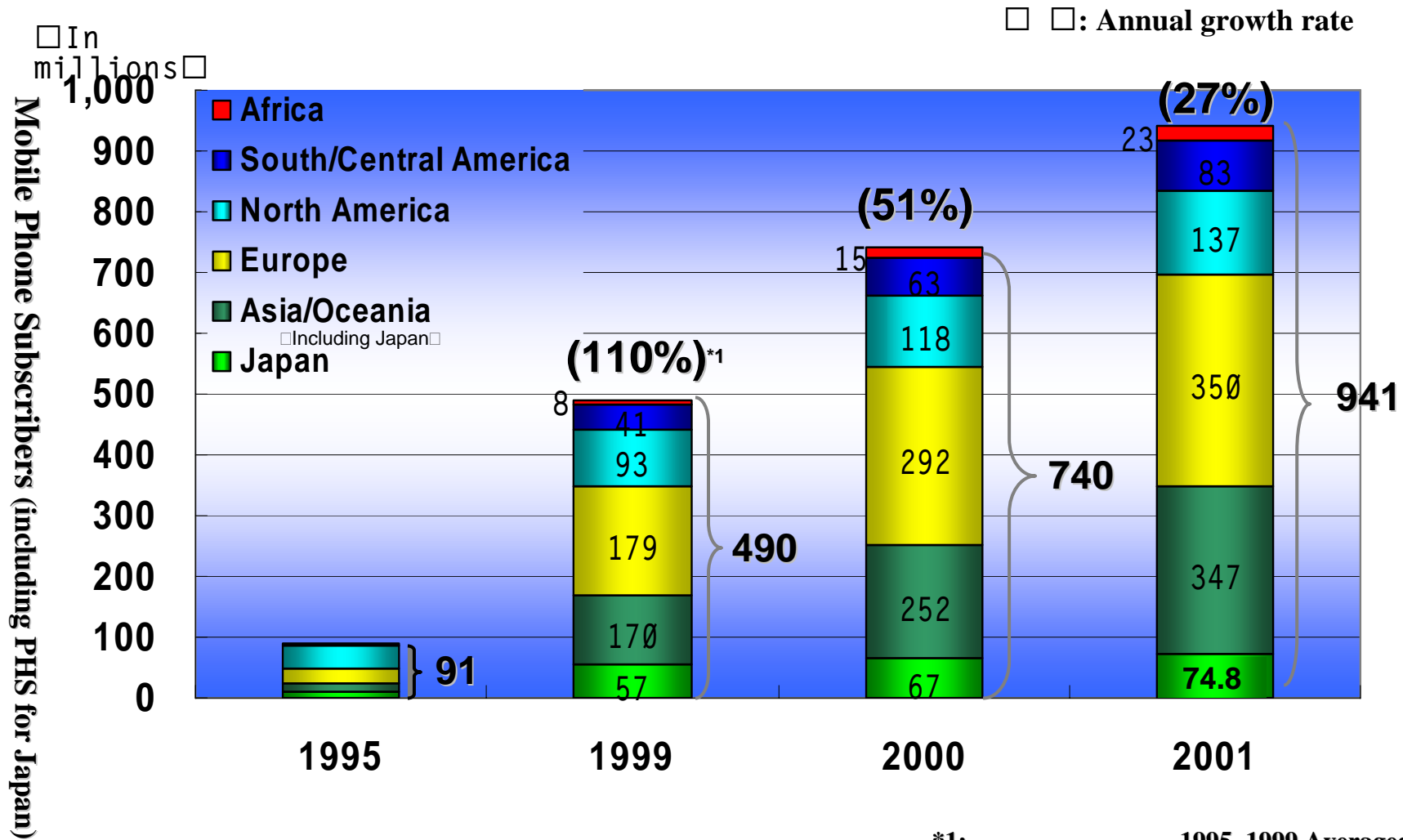
Keiji Tachikawa

President & CEO

NTT DoCoMo, Inc.

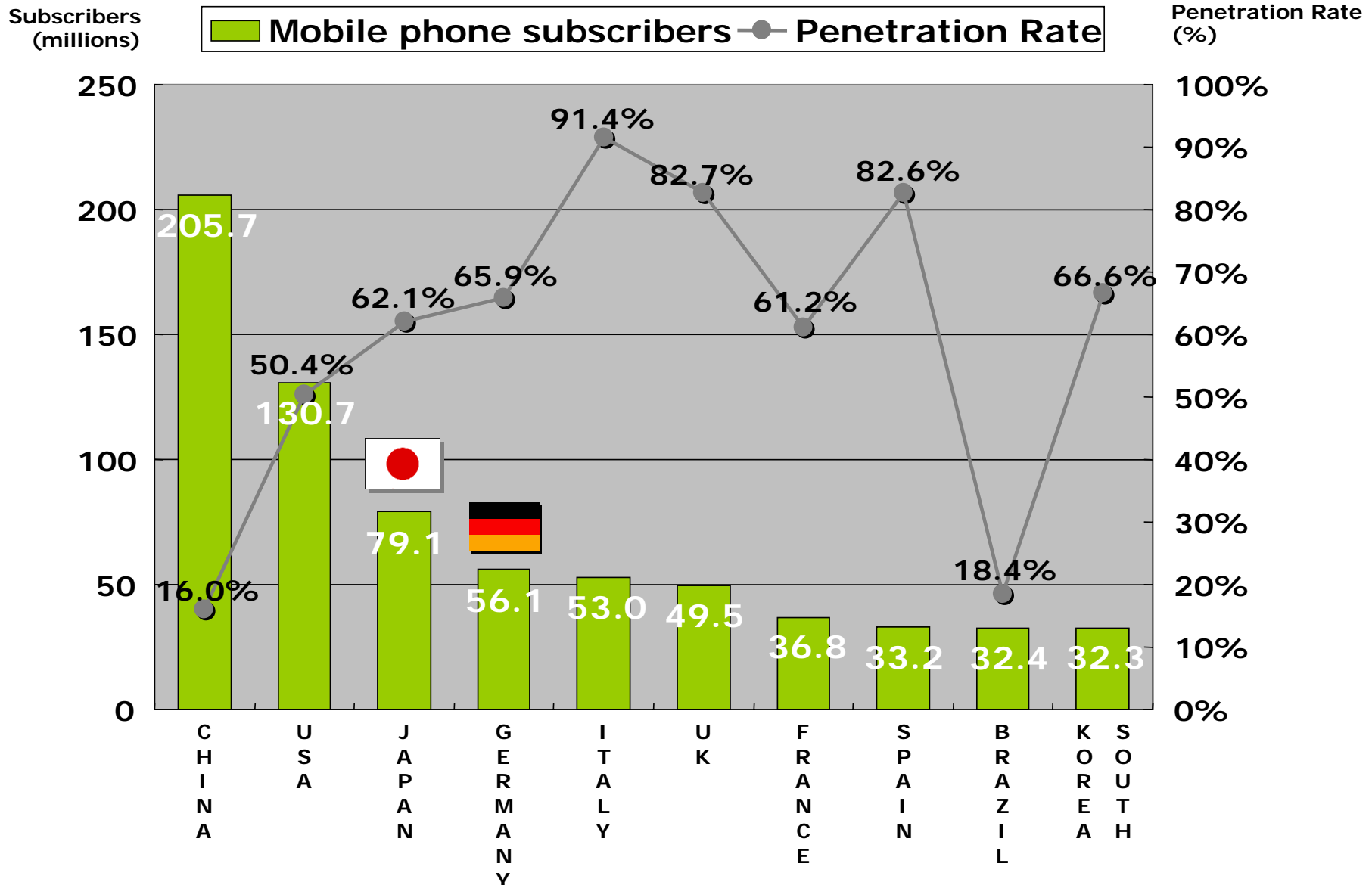
Historical Growth of Mobile Communications

Worldwide Subscriber Growth



*1: 1995~1999 Averaged growth rate
Source: International Telecommunication Union

Subscribers & Penetration Rate by Nation

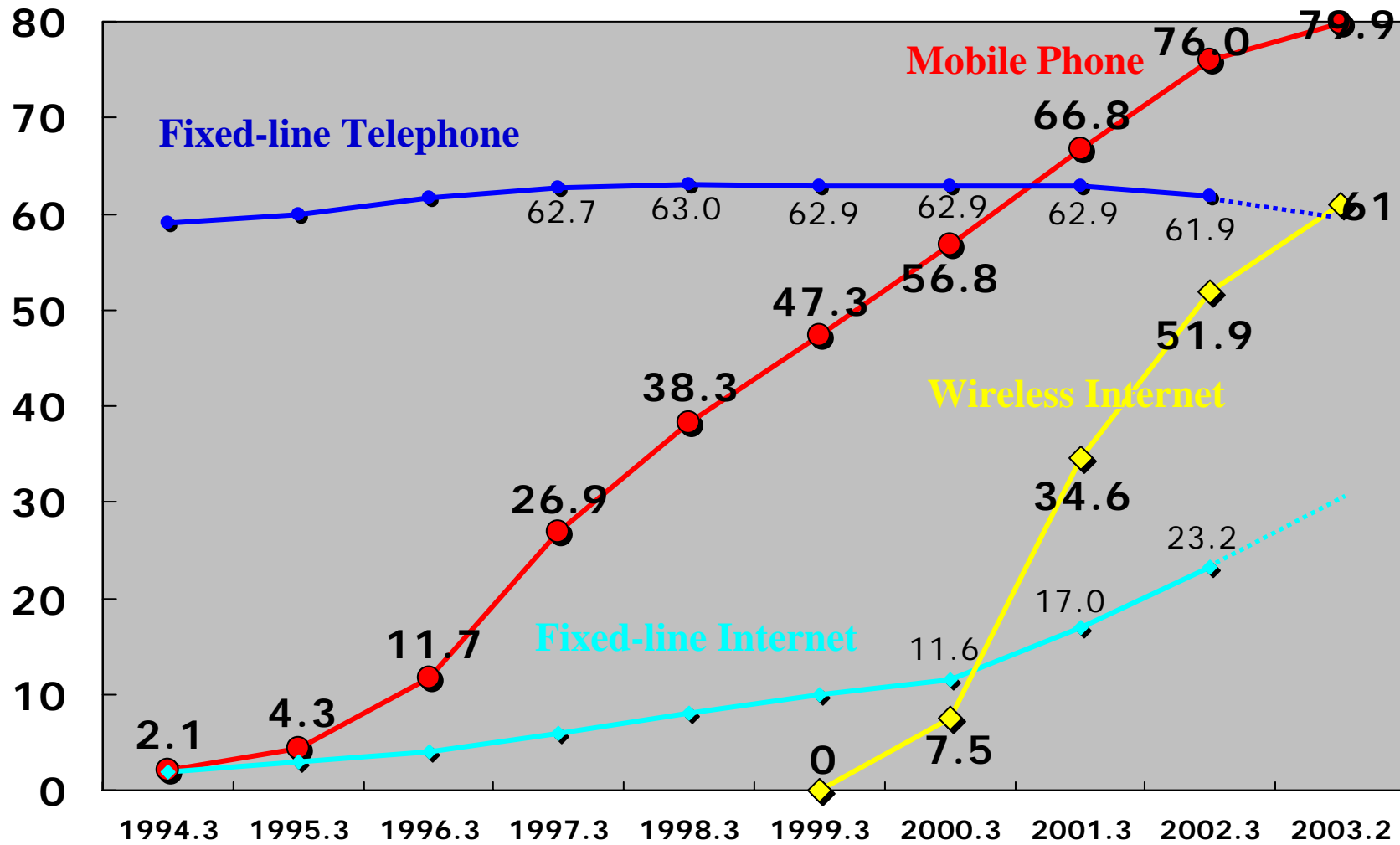


(As of December 2002 / Source: EMC World Cellular Database and TCA)

The Telecom Market in Japan

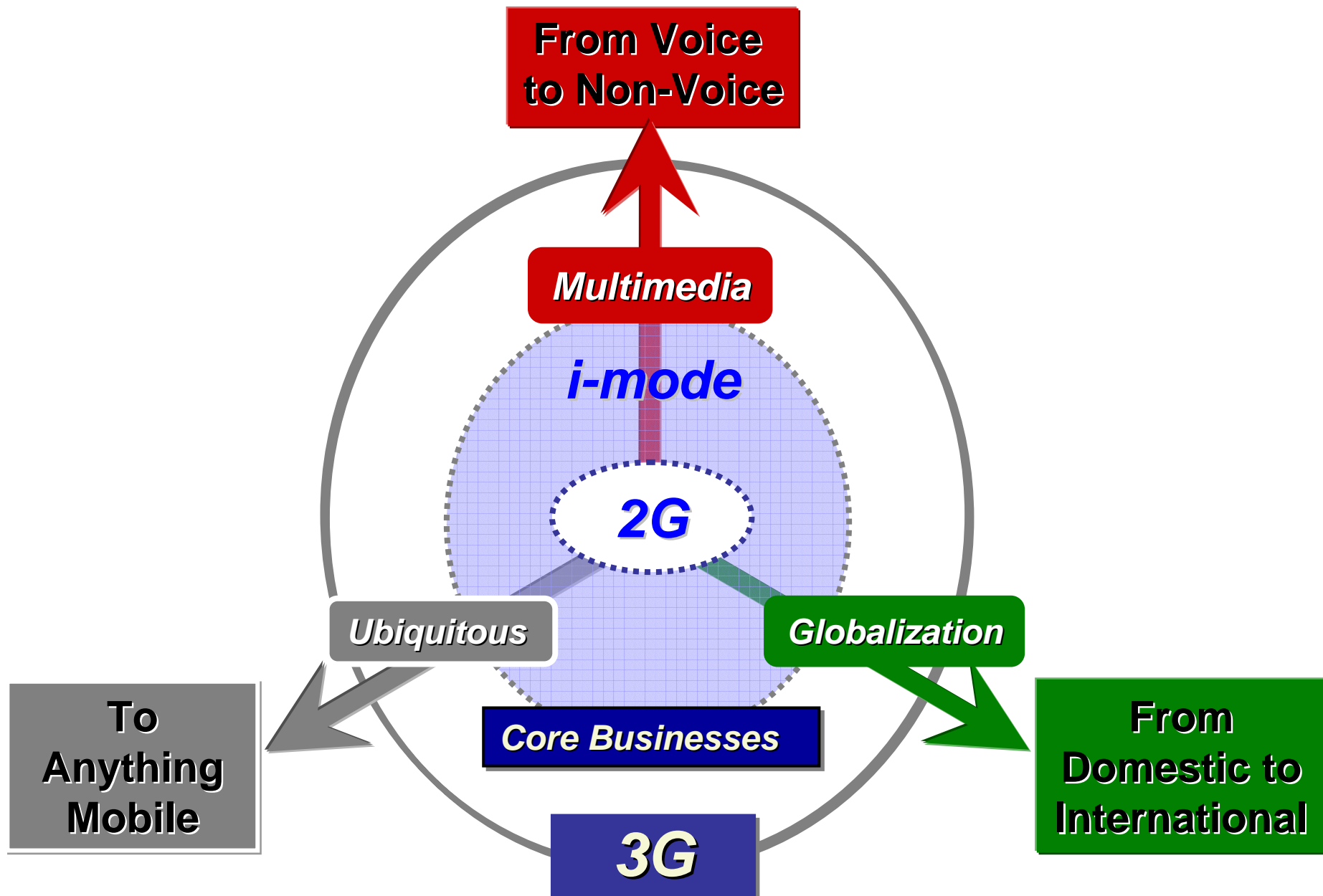


Subscribers
(millions)



Mobile Communications for the 21st Century

Directions of Mobile Communications



Mobile Communications Services



**Person-
Person**

- Cellular phone (voice communications)
- Mail
- Videophone

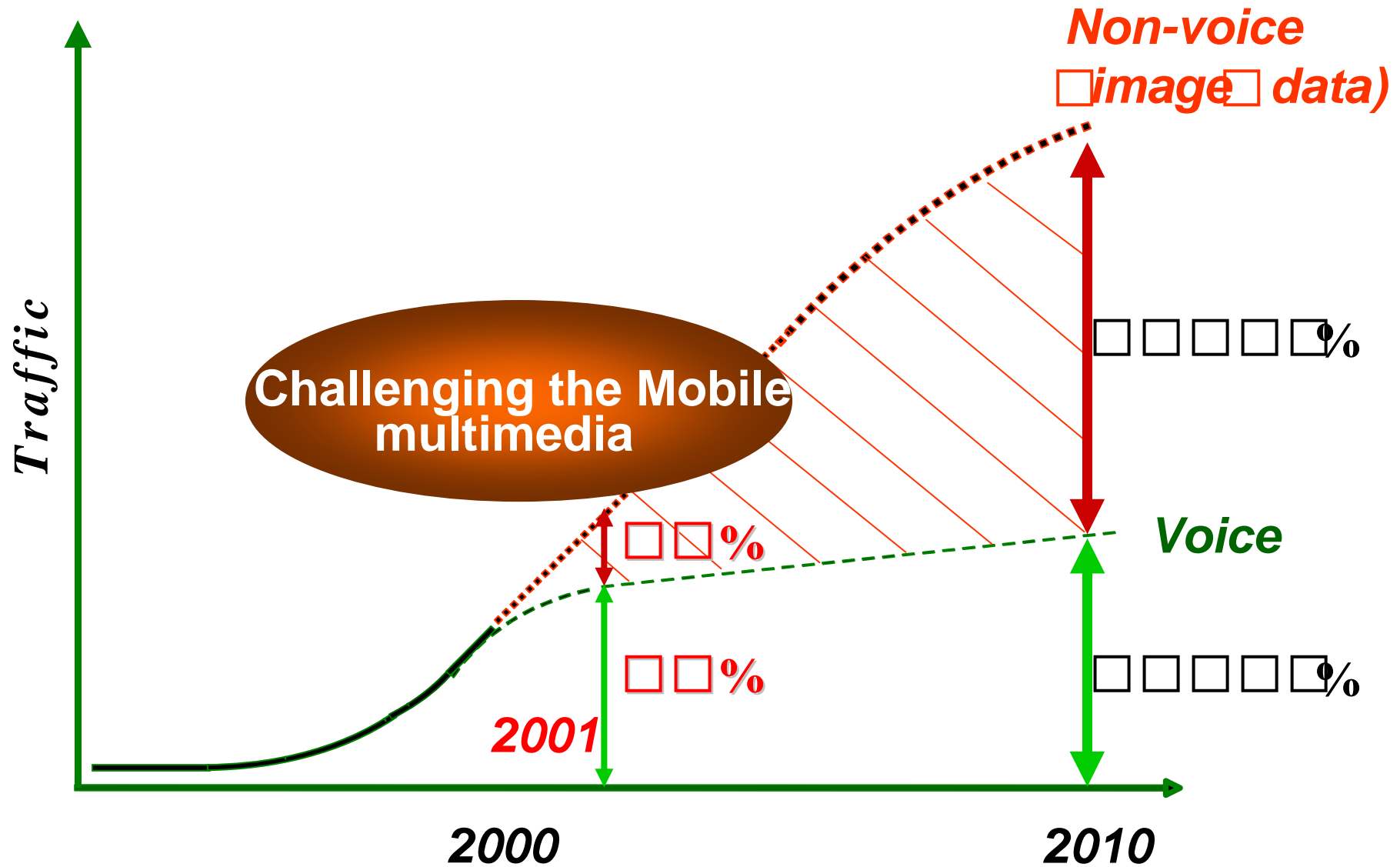
**Person-
Machine**

- Browsing (i-mode)
- Location information distribution (GPS)
- E-newspaper/advertisement, video distribution (ex.Cinema Pre-view)
- Music distribution/Games
- Mobile e-Commerce (ex.C-mode)

**Machine-
Machine**

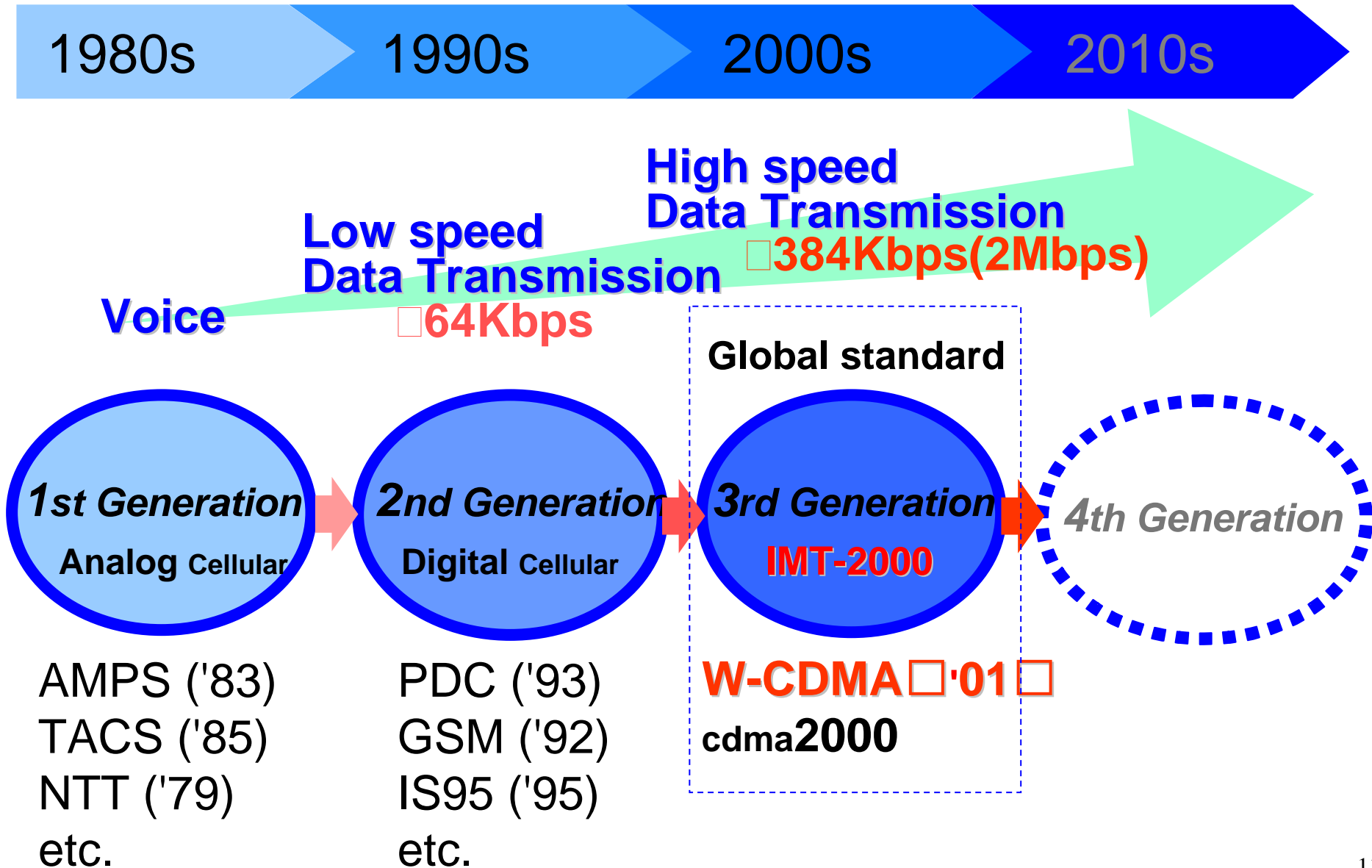
- Environment monitoring
- Remote monitoring/control (vehicle, POS of vending machine, home appliances)
- Car multimedia (ITS)

Projected Growth of MM Traffic

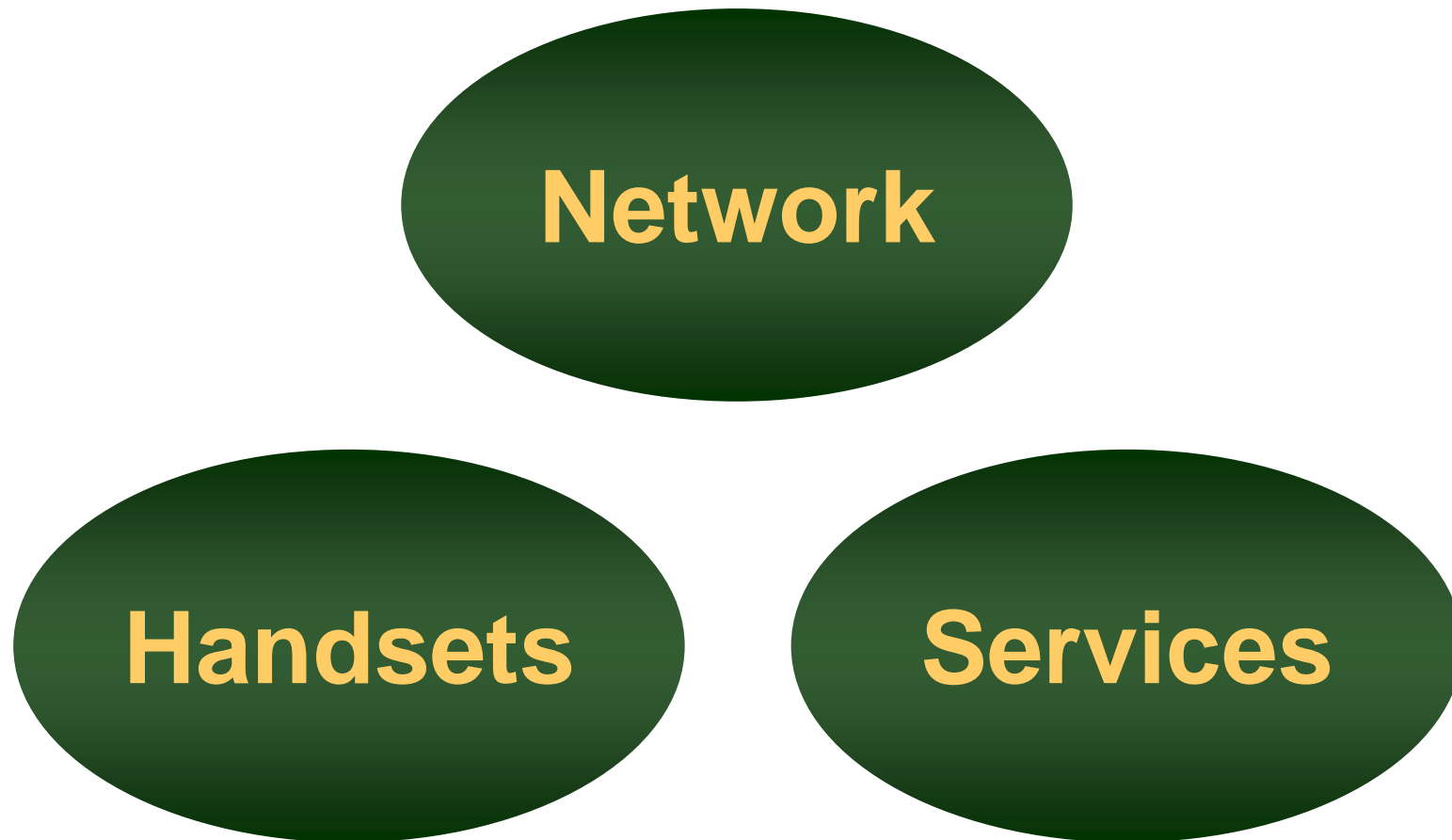


3rd Generation Mobile Communication System

Evolution of Mobile Networks



Main Issues for 3G Introduction



FOMA Network Construction



	Year	Coverage
Outdoor	Oct.2001	
	March.2003	91 <input type="checkbox"/>
	March.2004	97 <input type="checkbox"/>

	Year	Buildings
Indoor	March.2003	140
	March.2004	1600
	March.2005	3000

Variety of FOMA Handsets



Standard type

Previous model



- Smaller & lighter
- Longer battery life
- Compatible with video mail service
- Enhanced i-motion service
- Built-in camera

Latest model



Released '03.1

Card type



Visual type

Previous model



- Smaller & lighter
- Longer battery life
- Compatible with video mail service
- Enhanced i-motion service

Latest model



PDA type



FOMA Handset -Future Development Plan-



	2002 New Model	2003 Spring Model Fall Model		2004 <input type="checkbox"/>
Max. standby time	Approx. 180 hours <input type="checkbox"/> Approx. 250 hrs in static standby)	→ <input type="checkbox"/> To be further enhanced in 2002 Models <input type="checkbox"/>	300 hours or more	To be further enhanced
Weight/Size	Approx. 130g/120cc	110g/110cc	100g or less/ 100cc or less	To be smaller & lighter
Camera features	Built-in camera in all models	→ <input type="checkbox"/> Cameras to be installed as standard feature <input type="checkbox"/>		
	100,000-300,000 pixels	Higher resolution and quality to be supported		
Videophone	Visual type handset limited to 1 model	Videophone capability to be installed as standard feature <input type="checkbox"/> Including "simple videophone" capability)		
Service offerings	"Video mail" ("i-motion mail") (100KB) "High-quality photo" <input type="checkbox"/> VGA <input type="checkbox"/> transmit to PCs (100KB) "Enhanced i-motion" (300KB) "Enhanced i-appli" (200KB)	"V-Live" "e-authentication" "Global roaming" <input type="checkbox"/> with chip-embedded card <input type="checkbox"/> "PDC/FOMA dual mode handsets"	"Global roaming" <input type="checkbox"/> with actual handset <input type="checkbox"/>	"e-commerce" "Location information" Expand variety of handsets/devices

3G Services

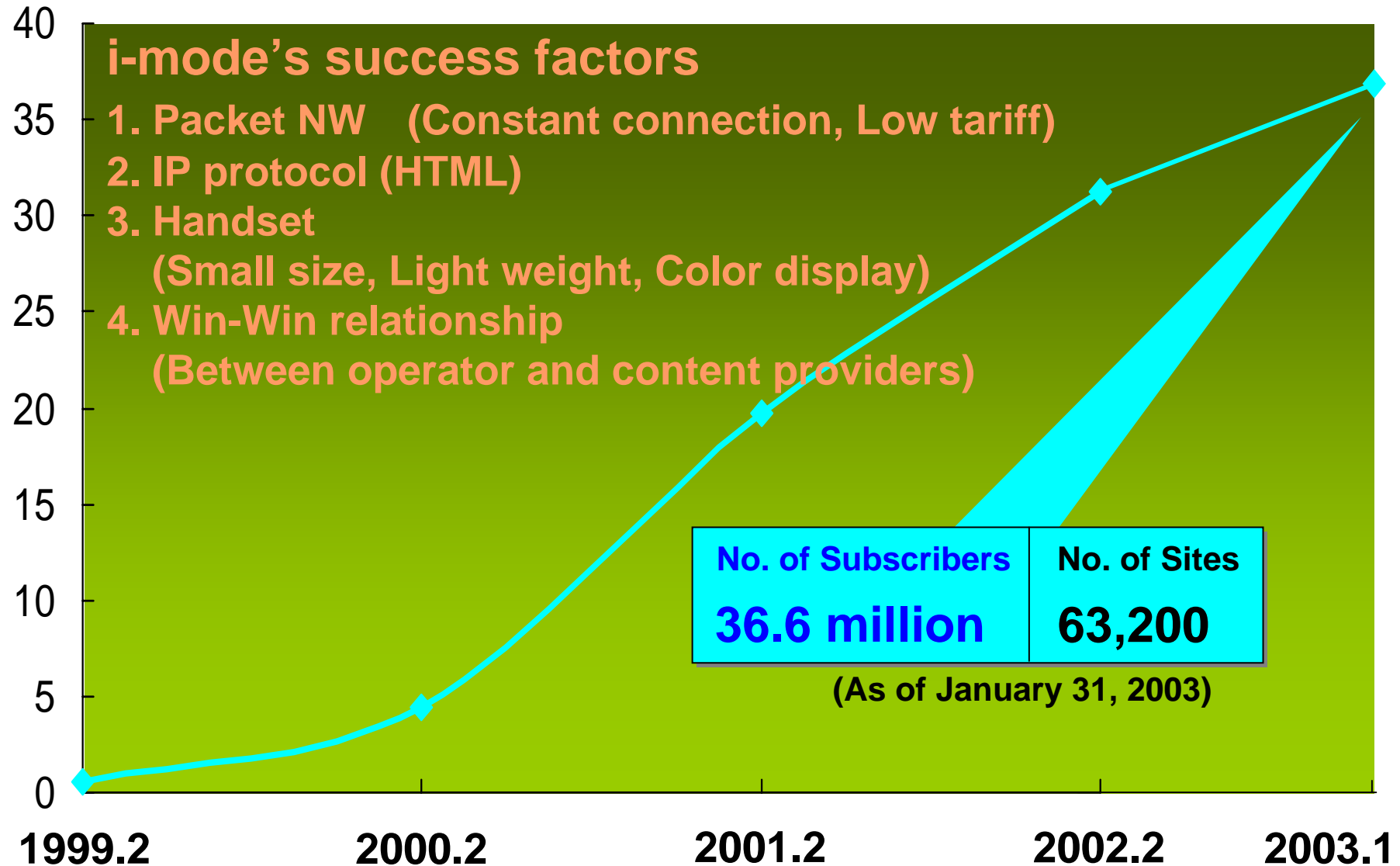


Internet	i-mode, i-motion
Visual com	Videophone , Visual mail
Content Distribution	M-stage Music, Cinema, Games
Positioning	Location, Navigation
Remote sensing & control	Video monitoring/control
Settlement	Mobile e-commerce

i-mode Service



(millions)



Launched in November 2001

i Motion Service



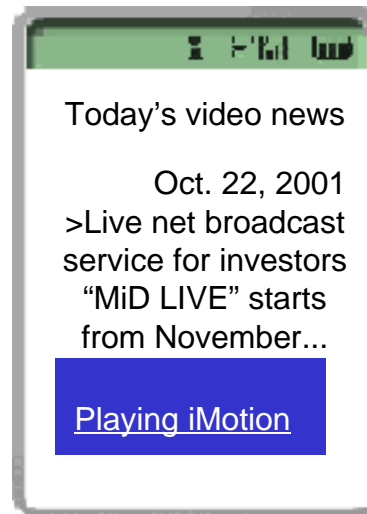
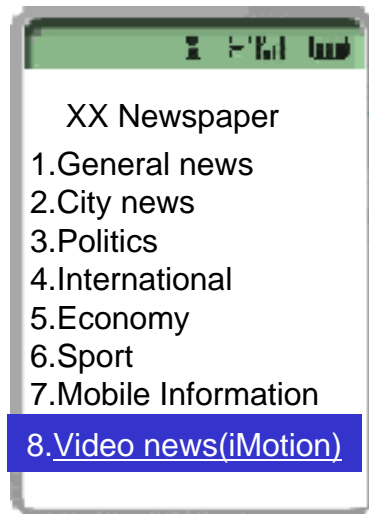
News

(News highlights or pictures, etc.)

Movie/Music Promotion Videos

(Music video or movie trailers)


Playback sport highlights or news with video + sound



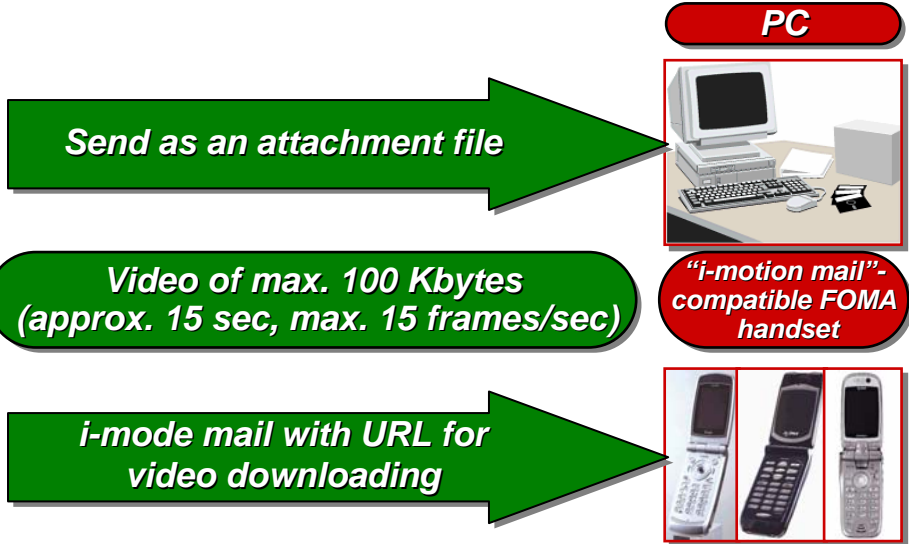
i-motion mail

Launch of Video Mail -- "i-motion mail"

"i-motion"-compatible FOMA handset

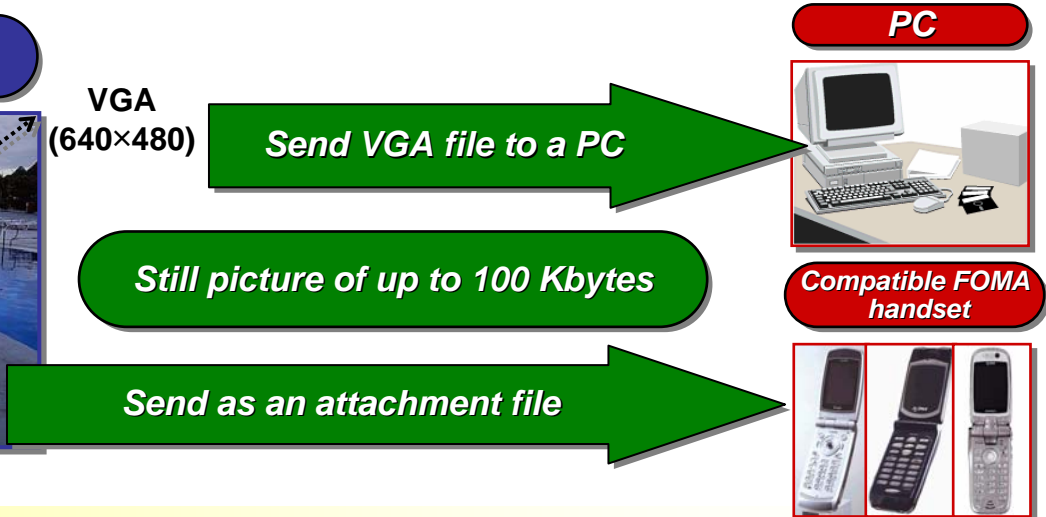


- Video file taken by a FOMA handset
- "i-motion" video file downloaded from web site

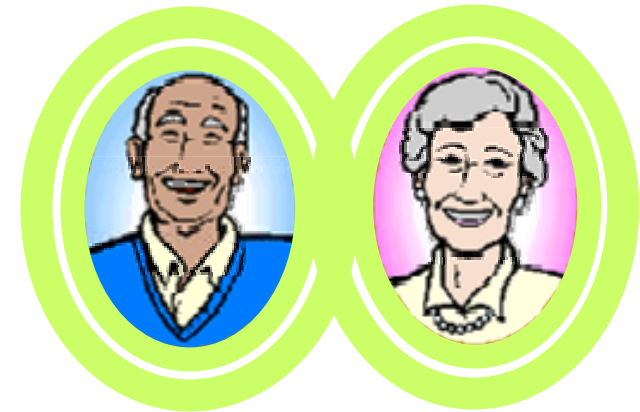
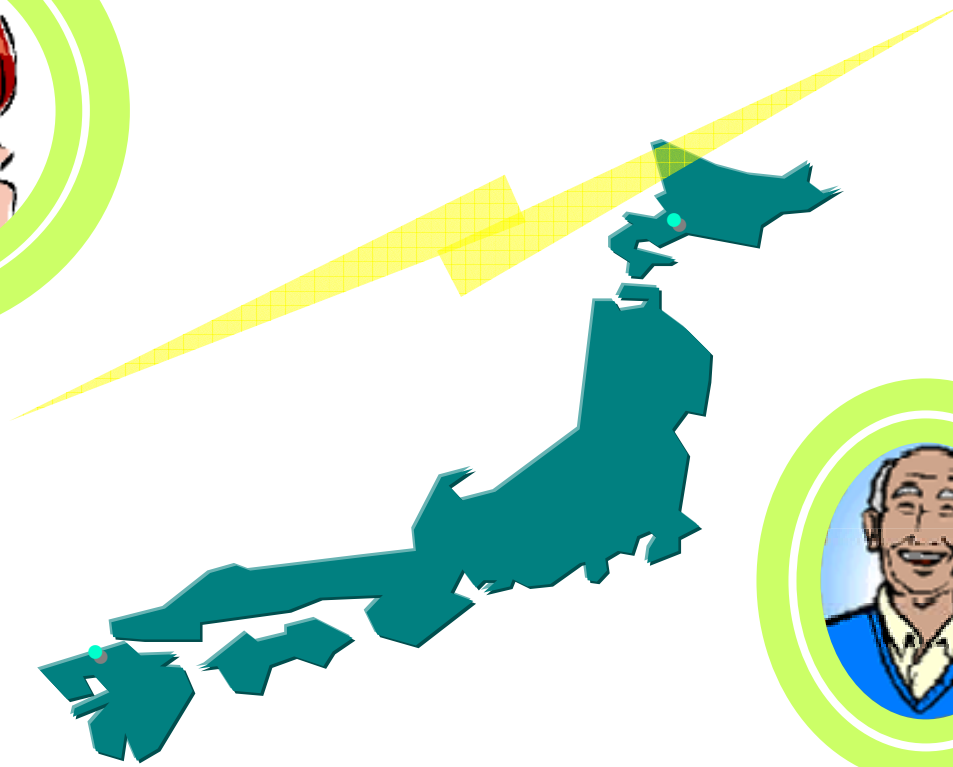


Transmission of large-volume, high-resolution photos (VGA)

Compatible FOMA handset



Videophone

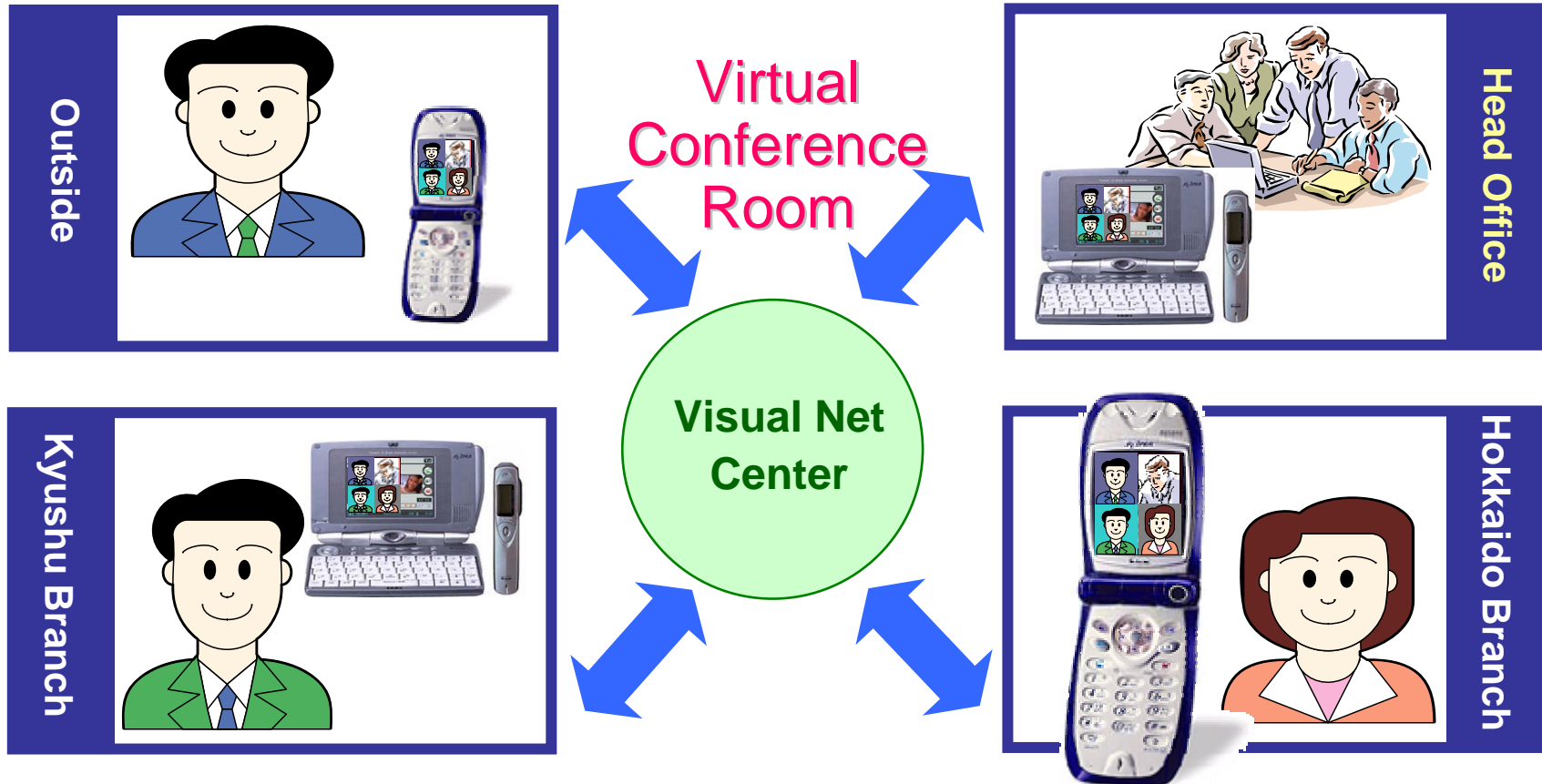


Certain things cannot be communicated just by voice and mail.

Video Phone Service

Business Applications facilitate the adoption of 3G Service

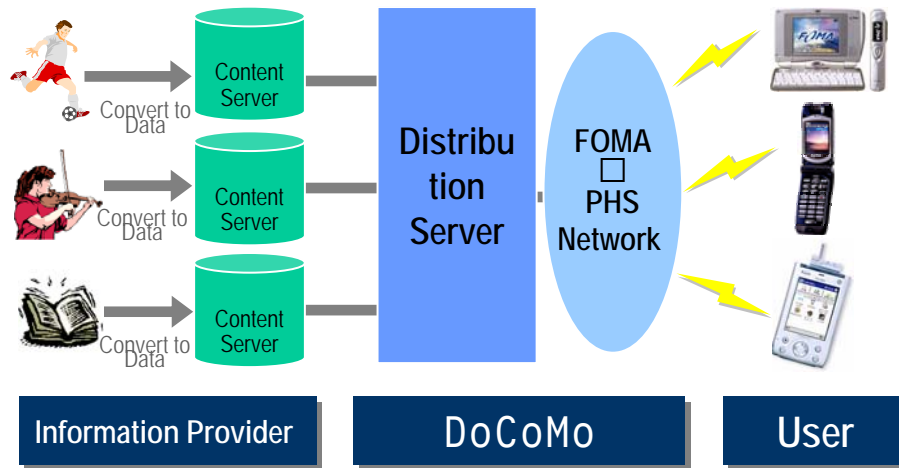
Videoconference



Communications between Building construction site and Headquarters

etc.

Information Distribution M-stage visual/music/book Do Co Mo



Visual

- News
- Sports
- Movies
- Cooking
- Shopping

Music

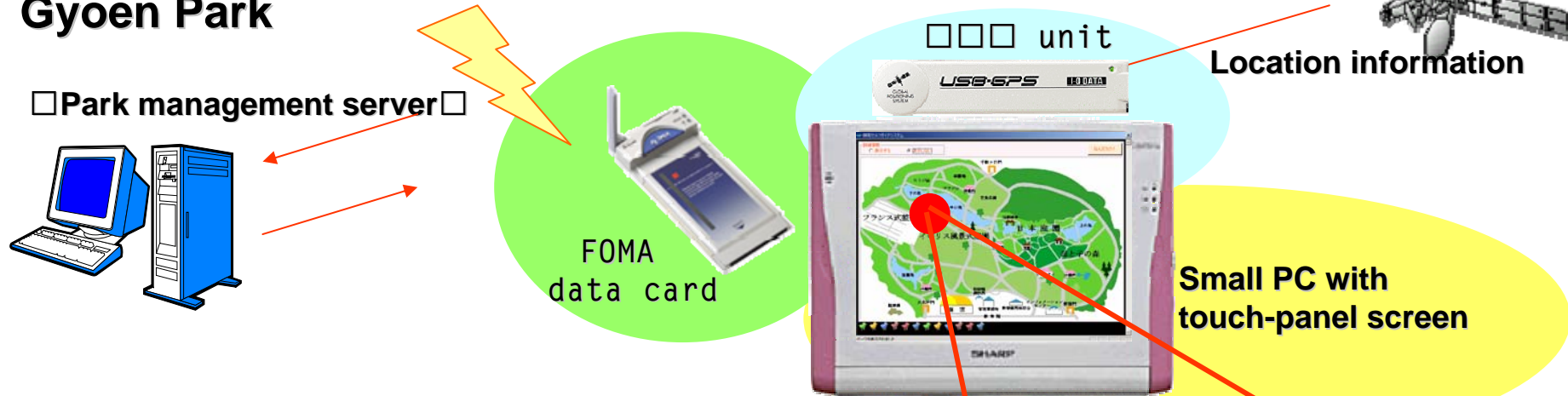
Search → Listen to Sample → Download

Book

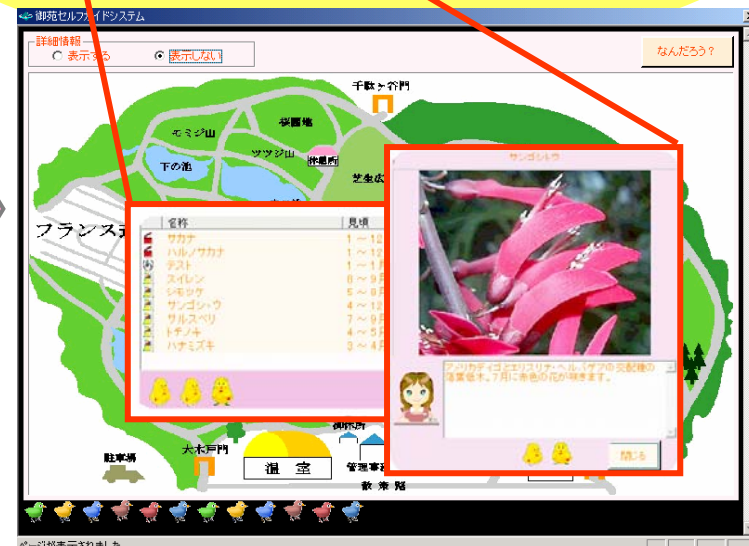
- Read a business publication in the train on your way to work.
- Read a book on English conversation at lunchtime.
- Read in bed the book that bothered you during the day.
- Read a mystery novel while you are waiting for someone.

Navigation Service

Easy-to-follow navigation for first-time visitors to Shinjuku Gyoen Park




□ When visitors arrive at a particular spot in the Park, guidance pertaining to the spot begins automatically □ in video or voice □

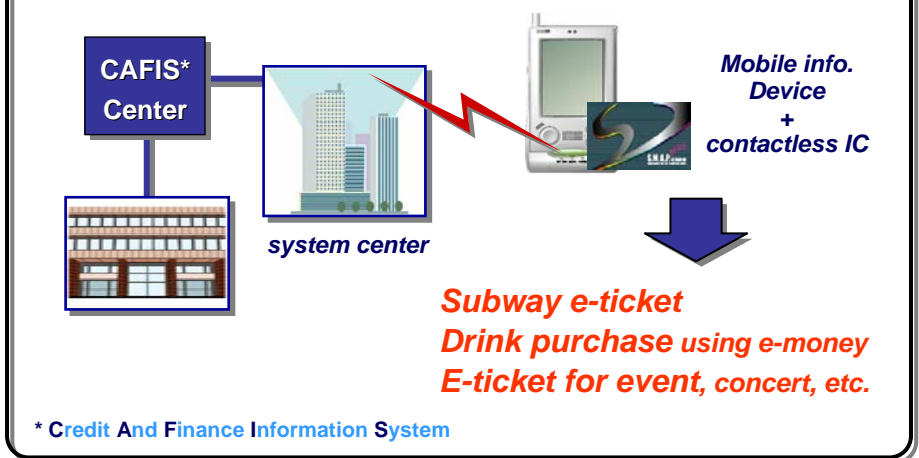


Mobile e-commerce

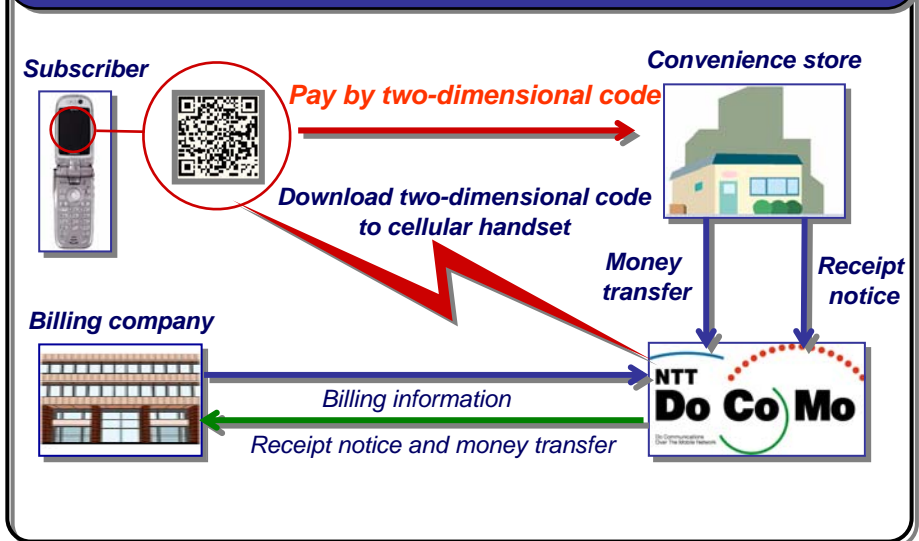
"i-mode" combined with infrared data transfer

 <p>On a street corner</p>  <p>"Club Cmode"</p> <p>Drink purchase</p>  <p>Earn points</p>	 <p>At a video shop</p> <p>"Mobile GEO"</p>  <p>Membership certificate</p> <p>Earn points</p>
 <p>Convenience store</p> <p>"iLAWSON"</p>  <p>Coupon</p> <p>Coupon (external use)</p>	 <p>Karaoke</p> <p>"clubDAM.com"</p>  <p>Request input</p> <p>My song list</p> <p>New release list</p>

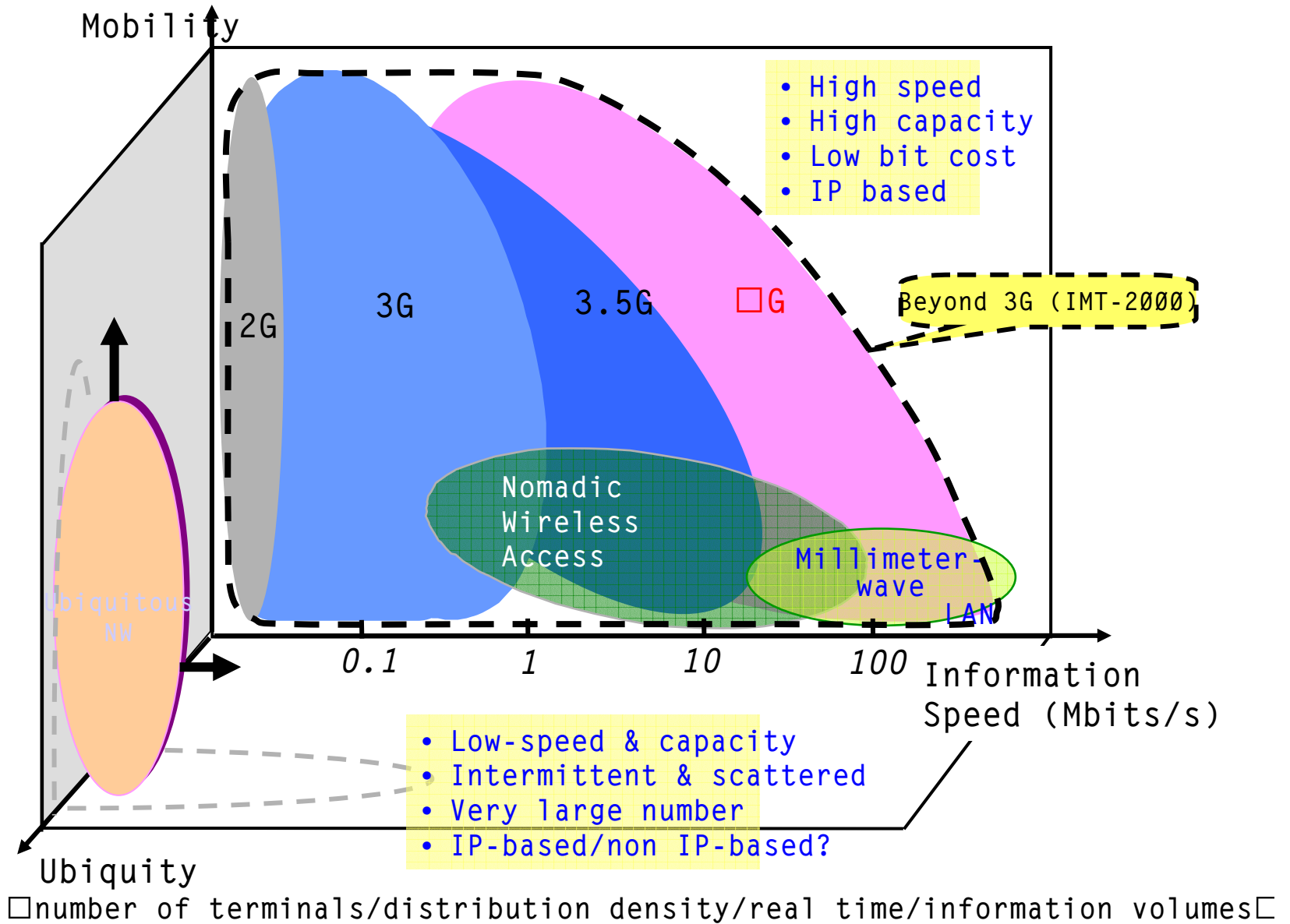
"e-value" field trials using contactless IC cards



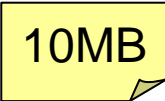
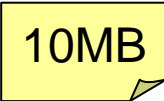
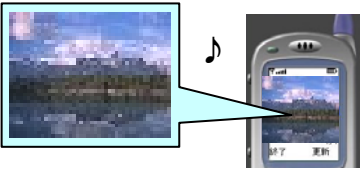

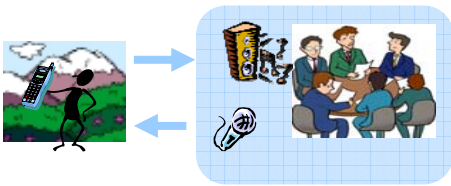
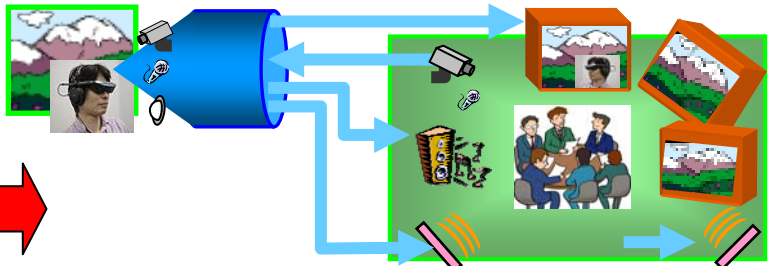
e-billing service based on two-dimensional codes



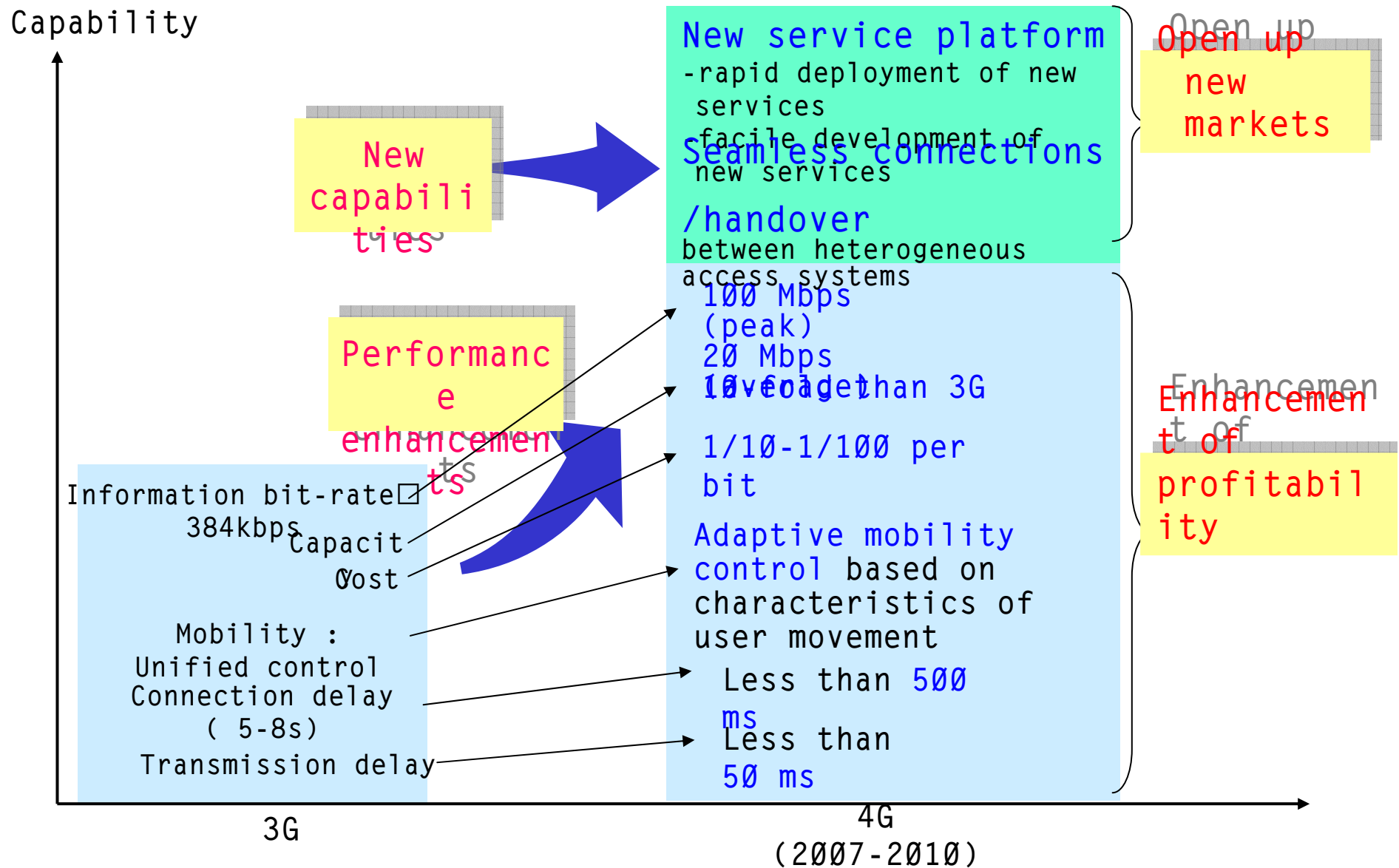
Mobile Systems beyond 3G (IMT-2000)



Service Evolution from 3G to 4G

	3G (IMT-2000)	4G
File Download Time	 about 200 sec.	 about 1 sec.
Image Image (Resolution) Bit rate	 352 x 288 pixels (CIF) 384 kbps	 1024 x 1920 pixels (Hi-Vision) 24 Mbps x 2 (Stereo)
Awareness Kinds of Information Bit rate	 Voice 3.4 kbps	 3-D Audio-Visual-Air pressure 50 Mbps

Major System Capability/Performance Targets



Human Interface for 4G System

Red Text: Technology
Black Text: Service Image

Biological Interface
Silent voice: Talk without vocalization

- Recognition of nerve signals around mouth
- Recognition of nerve signals relating to limb control and sensation
- Real-time biological signal recognition technologies

Pervasive Interface
Chaser Phone: Talk over a mobile without holding anything

- Ubiquitous I/O technologies
- Personal identification technologies
- Sensor network

Avatar Interface
As if you are actually there

- Mobile controller
- Expression control technologies
- Humanoid robot

Analysis of Biological Signals

- Measurement and analysis of peripheral nerve signals based on ultra-sensitive magnetic sensor (SQUID)
- Measurement and analysis of biological reactions when operating terminal

High-speed, Large-capacity File Server & High-speed Analysis CPU Server

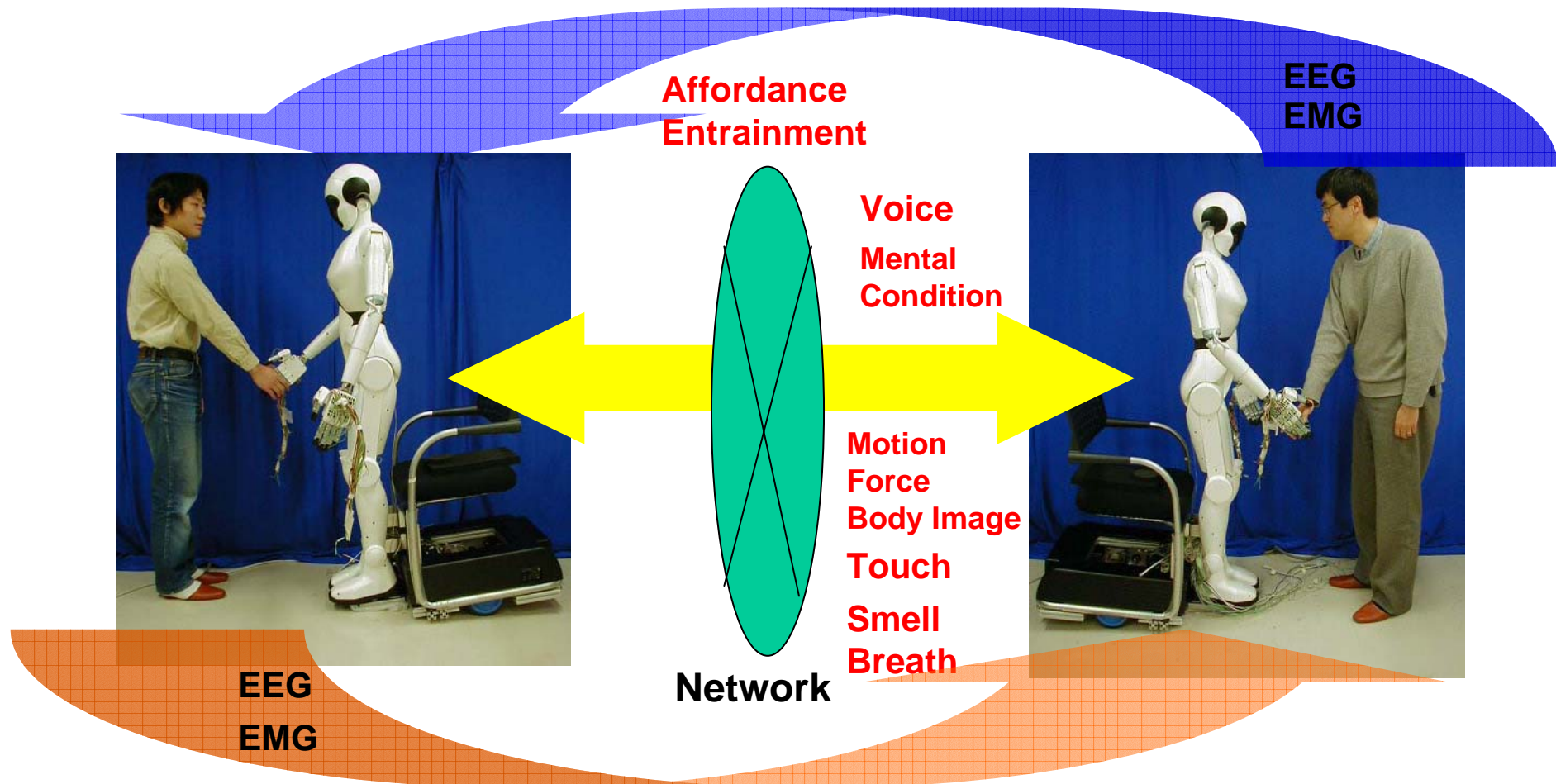
Biological Information Analysis Technologies
Everything is based on the understanding of humans

Wear-at-all-times Interface
Implanted devices and human body communications

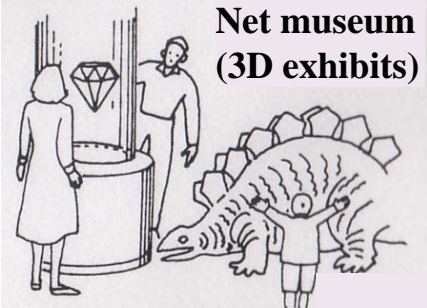
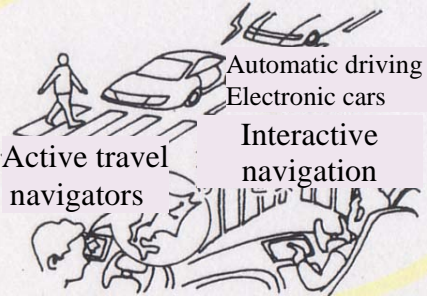
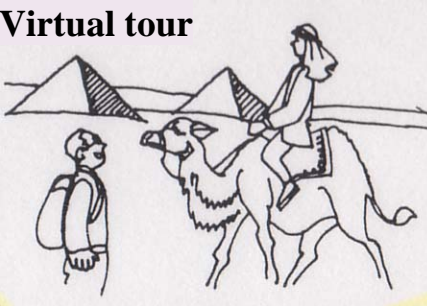
- Wearable device
- Implanted device
- Internal body communication technologies

Tele-Communication with Alter-ego-robots Using BUI

BUI: Biological signals User Interface



EMG : Electromyogram
EEG : Electroencephalogram

Directions of Research	Service Image	Research Themes
<p>Human Factor</p> <p>In addition to audio+visual, senses of touch, smell, and taste</p> <p>Higher quality/security</p>	 <p>Net museum (3D exhibits)</p>	<ul style="list-style-type: none"> -Intelligent communications -Research on five senses -Authentication using biotechnology
<p>Assist Human Ability</p> <p>Intelligence, Robots, Wearability</p>	 <p>Active travel navigators</p> <p>Automatic driving</p> <p>Electronic cars</p> <p>Interactive navigation</p>	<ul style="list-style-type: none"> -Alter-ego communications -Motor neuron research -Wearable devices -Intelligence/recognition modeling
<p>Expand Human Space</p> <p>From real environment to cyber space</p>	 <p>Virtual tour</p>	<ul style="list-style-type: none"> -Environment reproduction (nature, artificial objects) -Super reality communications -Knowledge processing

Analysis of Mobile Communications in Social Terms

Bright side **Creation of New**

Culture

- **Personalization of communications**
 - My own customized handset**
 - Always with you, 24hours a day**
- **Multimedia communications**
 - Text mail**
 - Mail with still-picture/video attachments**

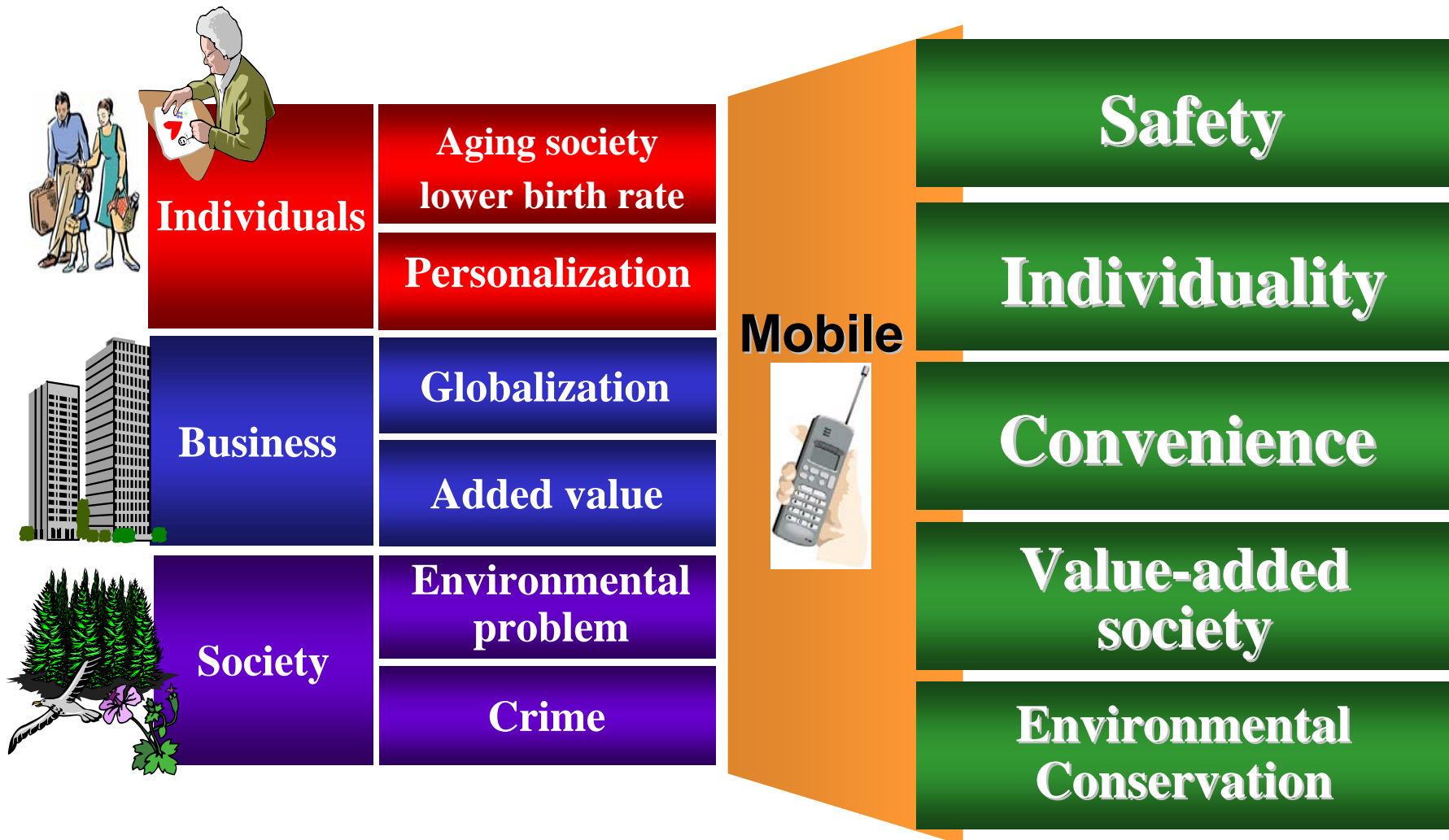
Dark side **New Problems**

- **Concerns of electromagnetic impact**
- **Improper usage manner**
- **Abuse of communication means**
 - Spam Mail**
 - Pornography**

Roles of Mobile Services

Social Trends

Roles of Mobile Services





NTT

Do Co Mo

Do Communications
Over The Mobile Network