# Trends in Mobile Data

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# **Outline**

– Introduction

– What do we mean by mobile data?

– Mobile at high-speed

– Common mobile data applications

- Basic Connectivity
- Person-to-person communications
- Infotainment

– Market considerations

– A changing social sphere…

- The road to ubiquity
- Peculiarities of the youth market
- Human/social aspects

# Introduction

# General technology trends

- Innovation in digital mobile technology

- Ubiquity of the Internet

- Internet Protocol ("IP") technologies as strategic element in design, development and use of telecoms networks

- Proliferation of small, powerful, application-rich & connected user devices

- Growing importance & value of information

- Integration/convergence of voice and data

- Speed, speed and more speed: higher-speed mobile (3G), fixed-wireless networks (WLAN, BWA etc…), and fixed-line networks (ADSL…)

# Market trend (1): Internet and mobile's phenomenal growth
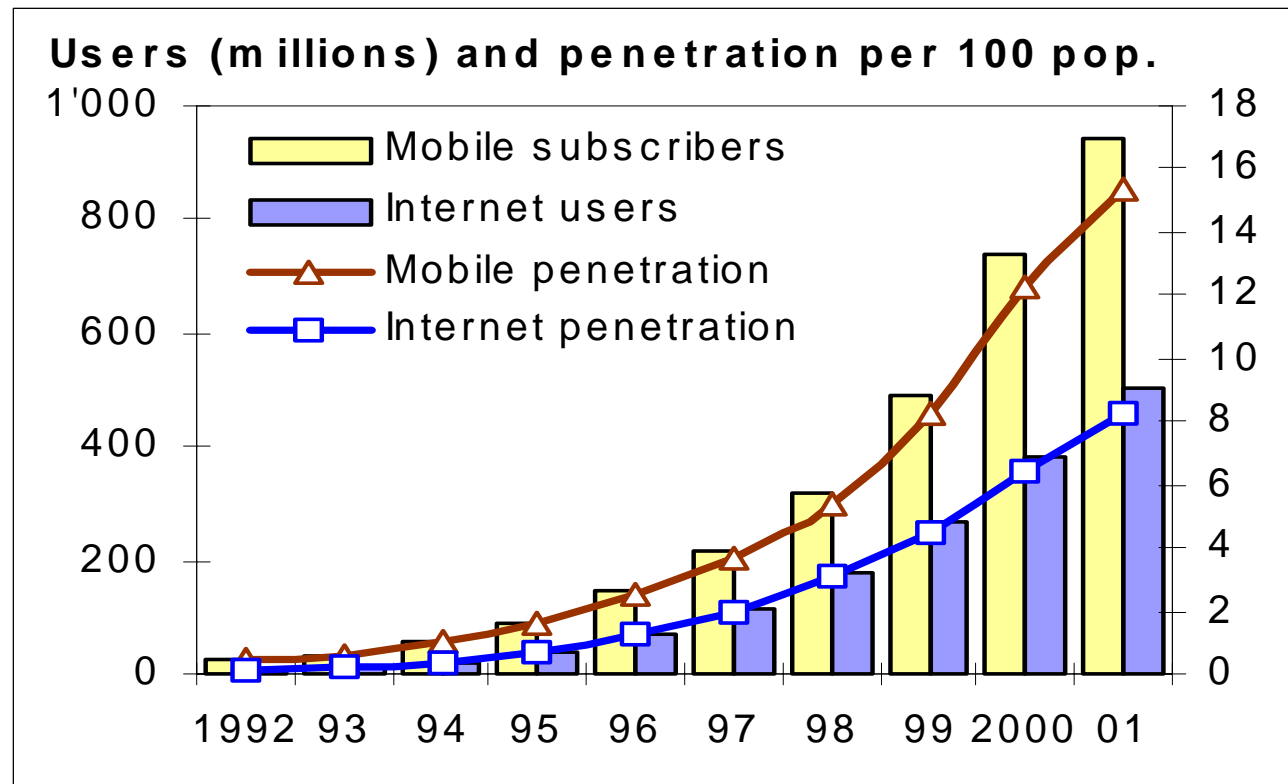


Source: ITU Internet Report 2002 "Internet for a Mobile Generation"

# Market trend (2): Mobile overtook fixed in 2002 – the network of choice?
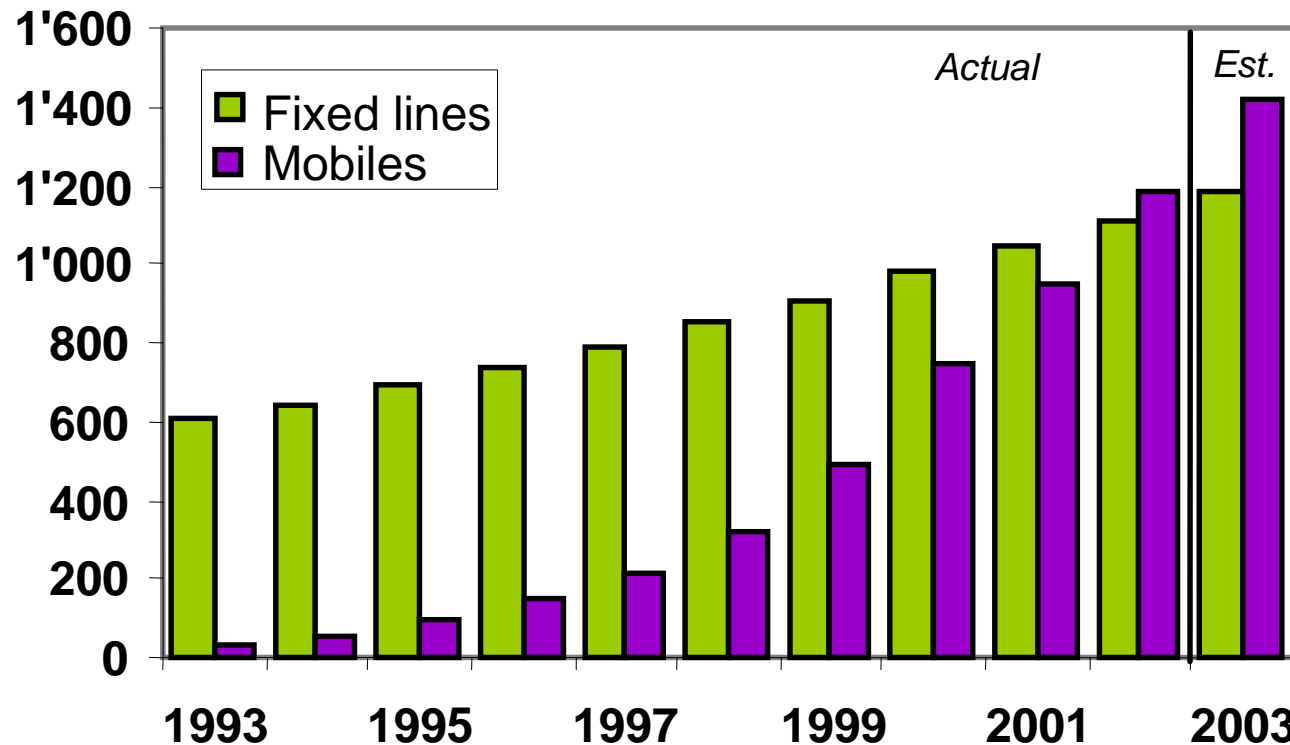


Source: ITU World Telecommunication Development Report 2002: Reinventing Telecoms

# So what do we mean by the "mobile Internet" or "mobile data"?

# Towards a definition…

- The mobile Internet or mobile data is the convergence of

  a) mobile technology;

  b) with information and data communications services (e.g Internet & Internet-like services);

  c) and in some cases, the flexibility of IP networks;

  d) …enhanced by higher-speed networks such as 2.5G, 3G etc…

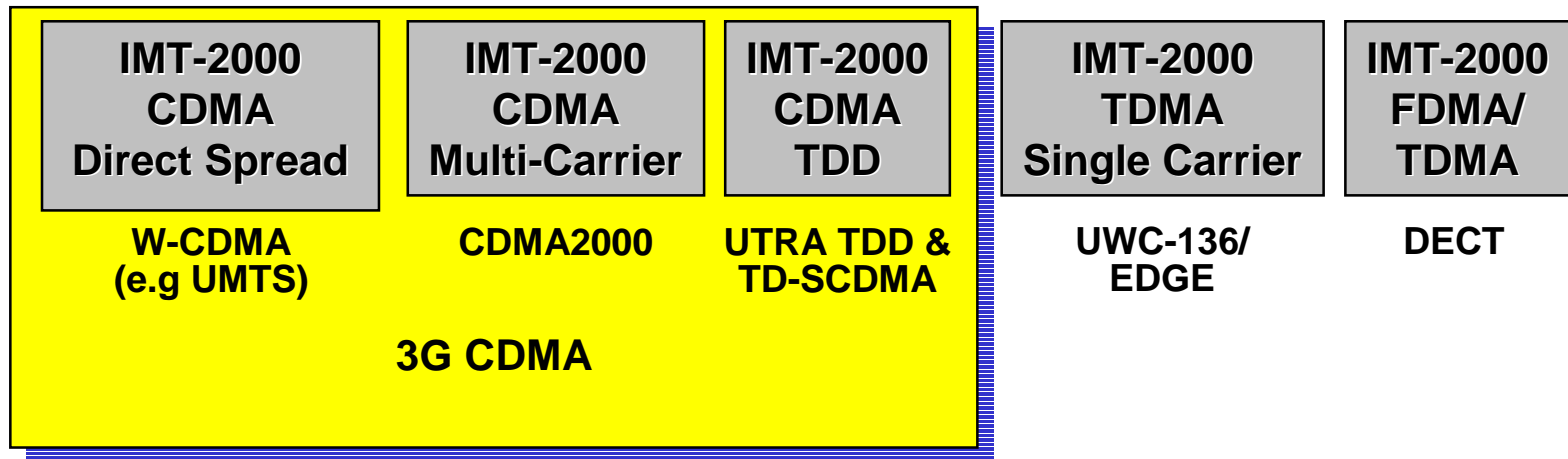# Mobile at high speed:
# 3G or IMT-2000

# From generation to generation

- Development of mobile communications described in terms of "*generations*"

    - 1G : analog cellular systems (1970s and early 1980s), mostly IMTS (Improved Mobile Telephone Service)

    - 2G : today's digital cellular systems (end 1980s), such as GSM and PDC. Number of regional & proprietary standards

    - 3G : refers to standards developed at a global level under the IMT-2000 banner and under the leadership of the ITU

# A 'family' of systems:
# Five (5) Radio Interfaces



| IMT-2000 CDMA Direct Spread | IMT-2000 CDMA Multi-Carrier | IMT-2000 CDMA TDD | IMT-2000 TDMA Single Carrier | IMT-2000 FDMA/ TDMA |
|---|---|---|---|---|
| W-CDMA (e.g UMTS) | CDMA2000 | UTRA TDD & TD-SCDMA | UWC-136/ EDGE | DECT |

**3G CDMA**

*Although there are five terrestrial standards, most of the attention and energy in the industry has been toward the CDMA standards*

# IMT-2000/3G characteristics

➢ high data rates at a minimum of 144 kbit/s in motion and 2 Mbit/s in low-mobility and indoor environments;

➢circuit-switched and packet-switched services, such as Internet Protocol (IP) traffic, enabling multimedia services such as real-time video;

➢greater capacity & improved spectrum efficiency;

➢global roaming between different 3G operational environments;

➢an open international standard.

# …but 3G is not the only radio access system for mobile data

- Other network technologies for the transmission of mobile data exist [e.g. Wireless LANs (e.g. 802.11b or Wi-Fi) & Bluetooth]. The debate is on whether these are complementary or competitive!
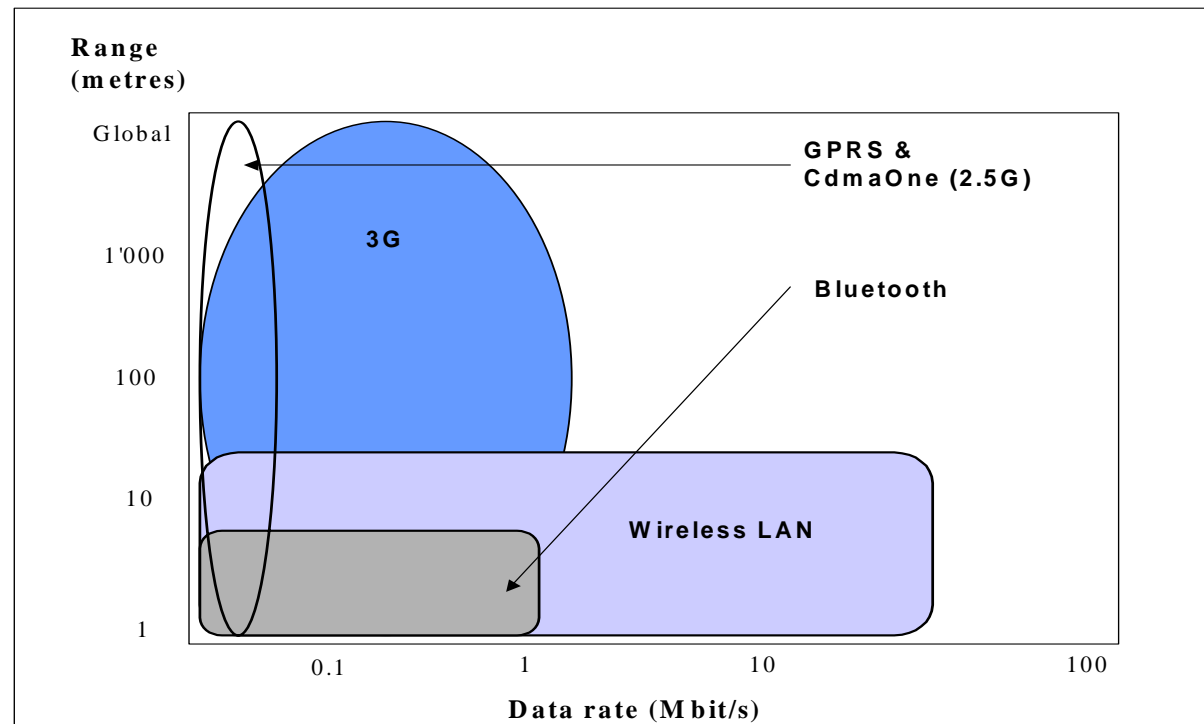


Source: Adapted from EITO 2002

# 3G/IMT-2000 service launch

**First-movers:**

- Korea
  - CDMA 20001x launched in April 2001 (KT Freetel)
- Japan
  - W-CDMA launched in Oct 2001 (NTT DoCoMo)
  - CDMA 2000 1x launched in April 2002 (KDDI)

**Since then:**

  - CDMA 20001x: has been deployed in many countries. E.g. Canada (Bell Mobility 02/02), US (MetroPCS 02/02), Puerto Rico (04/02), Brazil (Telefonica 04/02)…
  - W-CDMA: has been slower to deploy. In Europe, ③ in UK and Italy was the first to offer 3G services

# Mobile data applications
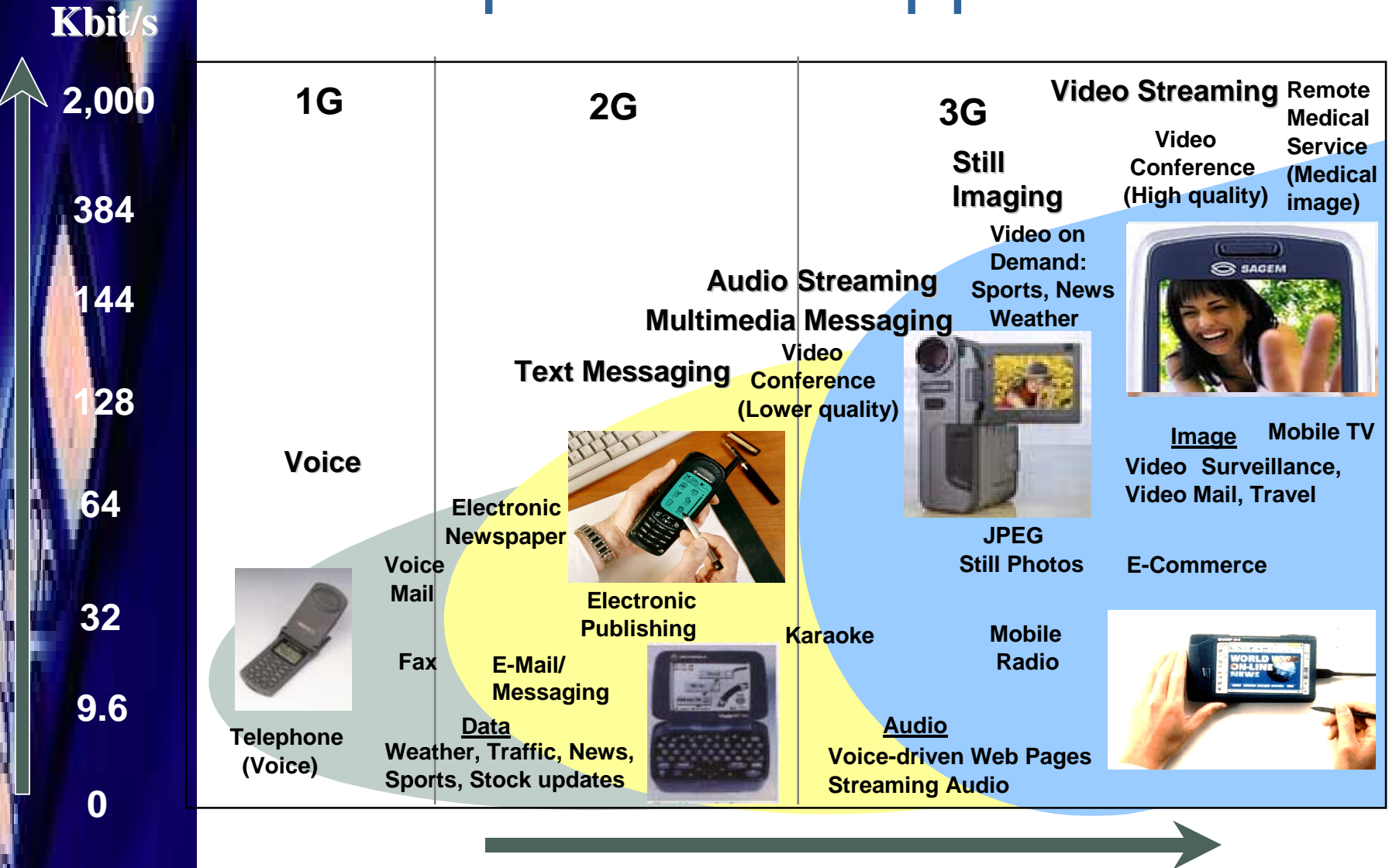
# Speed and Applications

**Kbit/s**

2,000

384

144

128

64

32

9.6

0

**1G**

**2G**

**3G**

**Voice**

**Telephone (Voice)**

Voice Mail

Fax

**Electronic Newspaper**

**Electronic Publishing**

**E-Mail/ Messaging**

**Data**
Weather, Traffic, News, Sports, Stock updates

**Text Messaging**

**Audio Streaming**

**Multimedia Messaging**

Video Conference (Lower quality)

Karaoke

**Audio**
Voice-driven Web Pages
Streaming Audio

**Still Imaging**

Video on Demand: Sports, News Weather

JPEG Still Photos

Mobile Radio

**Video Streaming**

Video Conference (High quality)

**Remote Medical Service (Medical image)**

**Image** **Mobile TV**
Video Surveillance, Video Mail, Travel

**E-Commerce**

*Source: Adapted from Motorola.*

# Higher speeds certainly are music to mobile ears

## Approx. transfer times for a 3-minute MP3 song

| Data Rate | Download Time |
|-----------|---------------|
| 9.6 kbps | 41 minutes |
| 14.4 kbps | 31 minutes |
| 45 kbps | 8.8 minutes |
| 56 kbps | 7 minutes |
| 307 kbps | 1.3 minutes |
| 306 kbps | 1.3 minutes |
| 2-5 Mbps | 6-12 seconds |

# Wide-scale 3G will fully enable mobile data, but it is is already here...
## *the 2G way*

- Internet access/connectivity
  - Low take-up: WAP
  - High take-up: i-mode

- Person-to-Person messaging ("txting")
  - SMS

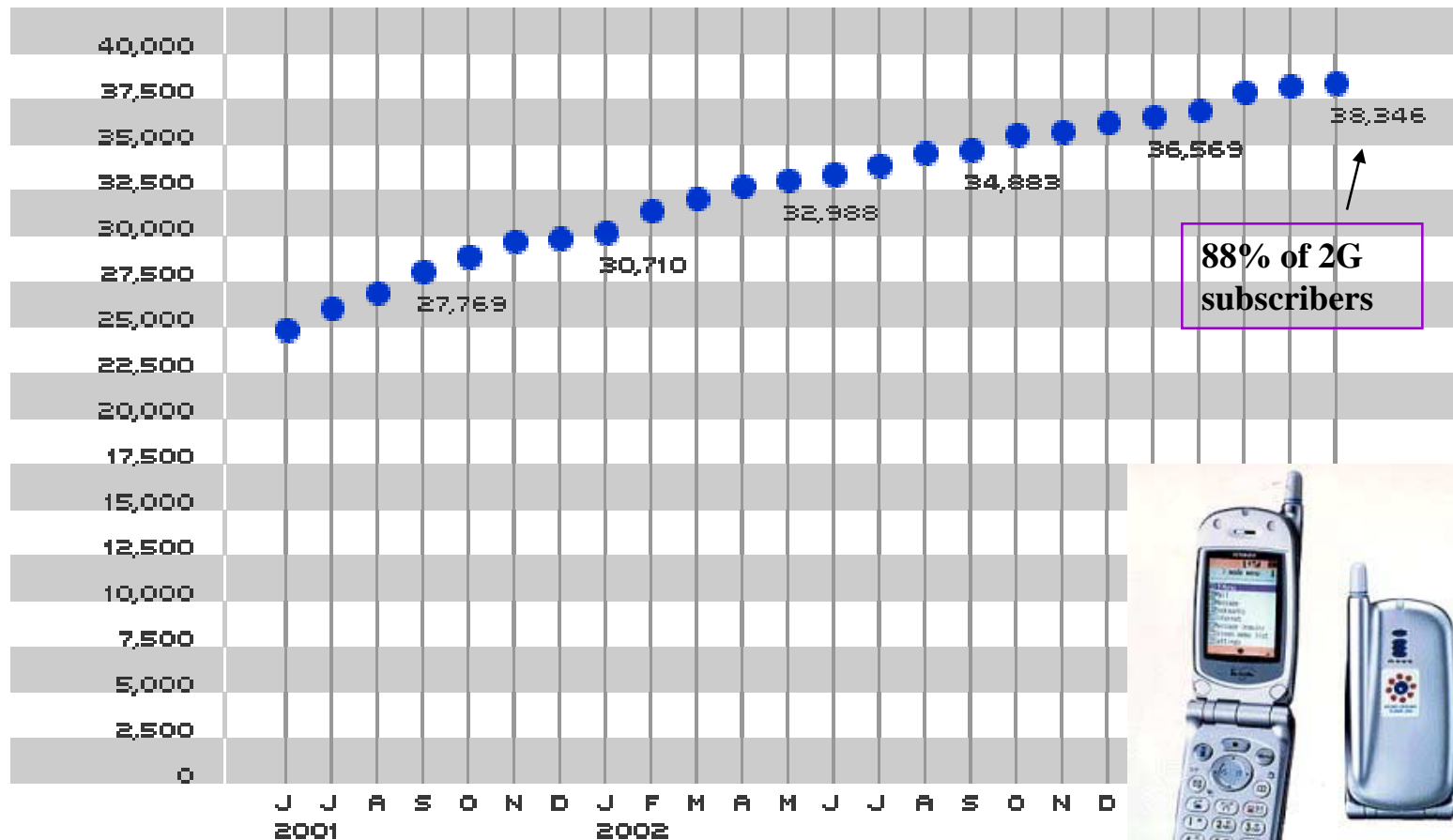# Basic Connectivity (1): WAP, a.k.a "Wait and Pay"?

- WAP = Wireless Application Protocol

  ➢ one of the first attempts to develop a standard for viewing web content on wireless devices

- Low user adoption due to :

  ➢ Slow downloading (9.6 kbit/s)
  ➢ Circuit –switched
  ➢ Availability of content
  ➢ WML (wireless mark-up language)

- Is there hope?

  ➢ Introduction of new version WAP 2.0 & xHTML
  ➢ Higher transmission speeds offered by 2.5G/3G
  ➢ But recently… not much talk of WAP…

# Connectivity (2): i-mode (Japan)

**May 2003: 38.4 million subscribers**

**Growth of i-mode subscribers 2001-2003**

Monthly

40,000
37,500
35,000
32,500
30,000
27,500
25,000
22,500
20,000
17,500
15,000
12,500
10,000
7,500
5,000
2,500
0

38,346

36,569

34,883

32,988

30,710

27,769

**88% of 2G subscribers**

J J A S O N D   J F M A M J J A S O N D
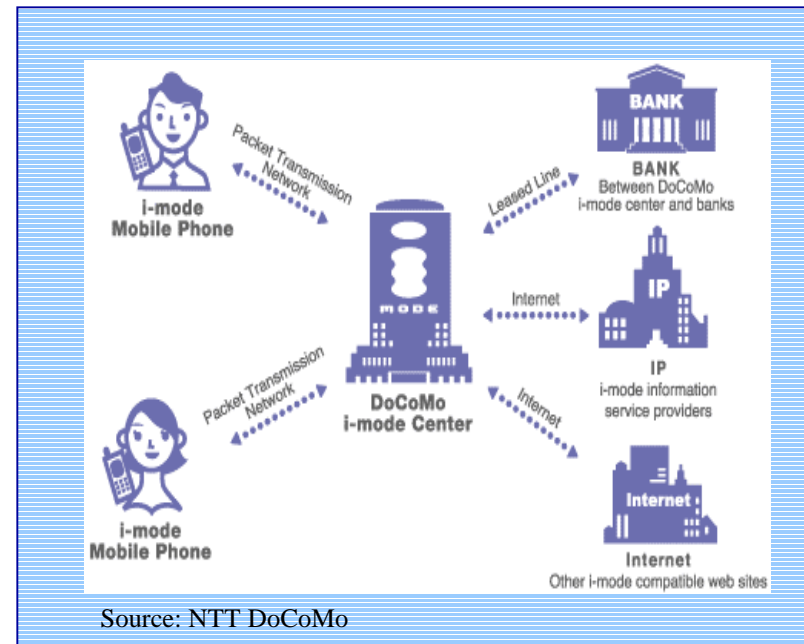2001                2002

Source: NTT DoCoMo

UNITS - THOUSAND

# i-mode: behind the success

- ## Key factors:
  - ### Content Availability
    - Locally relevant
    - Over 60'000 sites
  - ### cHTML
  - ### Packet-based network
  - ### Billing model



Source: NTT DoCoMo

- ## High-speed?
  - ### Offered over 3G
  - ### Enhanced 3G service: i-motion
  - ### i-mode network/specification now open to other companies, (e.g. ISPs) for content development
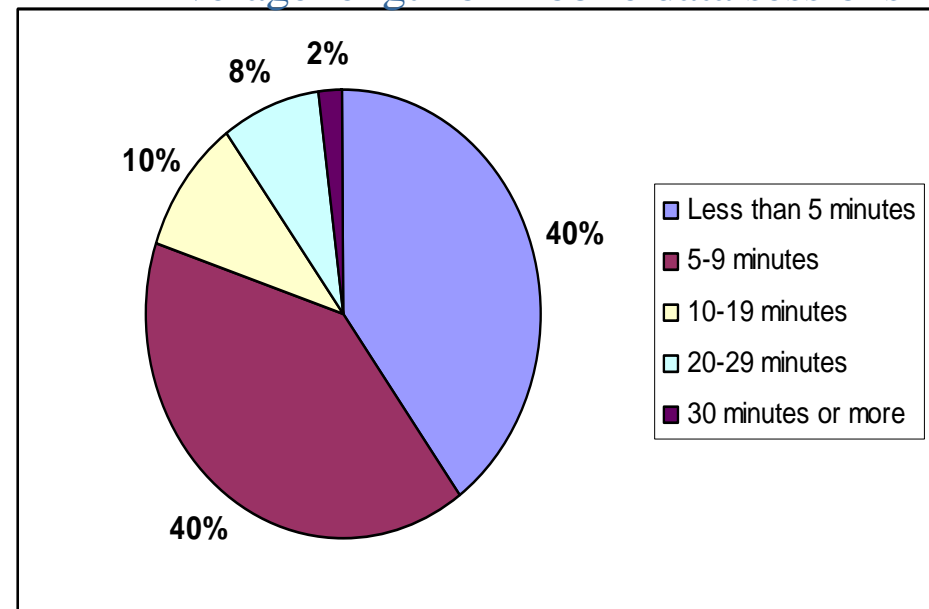
# Person-to-person messaging

- **SMS**
  - Unexpected, phenomenal growth

- **MMS**
  - Now being launched
  - Number of photos sent to & from mobiles is growing (more than WAP…)

**Monthly SMS traffic**


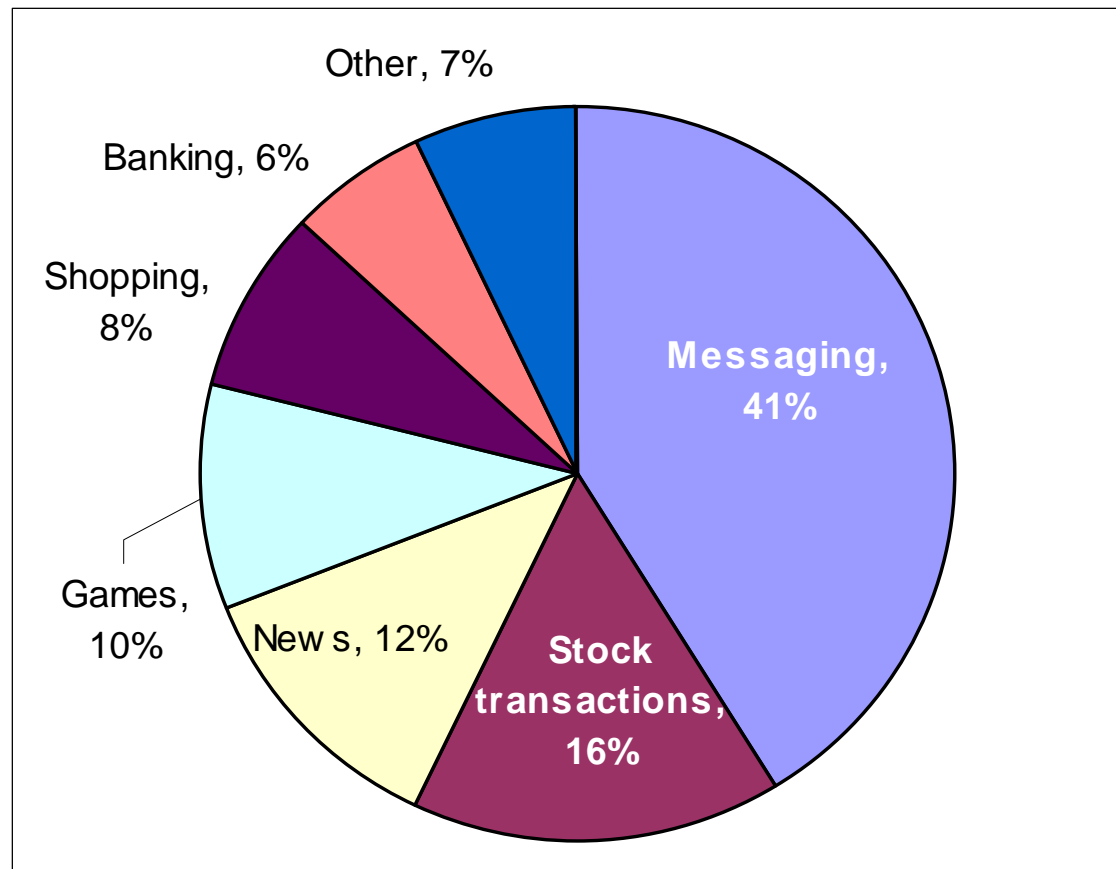
Source: EMC Research/GSM Association
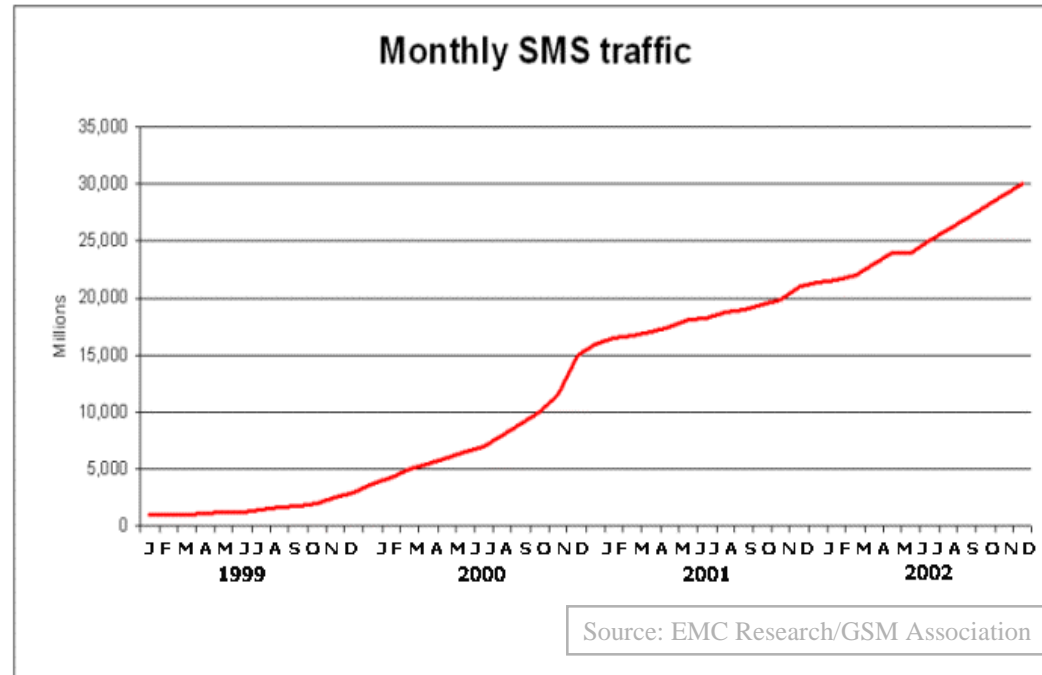
# Mobile Information & Entertainment

- Evolving content geared at infotainment
  - e.g. Gaming, audio/video services, transaction services (m-commerce), location-based services, phone 'personalization', etc…

- Usage patterns
  - Short bursts of activity

- Key elements
  - ✓ On the move
  - ✓ Timeliness
  - ✓ Location

**Average length of mobile data sessions**



Legend:
- ☐ Less than 5 minutes
- ☐ 5-9 minutes
- ☐ 10-19 minutes
- ☐ 20-29 minutes
- ☐ 30 minutes or more

40%, 40%, 10%, 8%, 2%

# Popular 2G/2.5G applications in a low-speed market: China



Other, 7%
Banking, 6%
Shopping, 8%
Games, 10%
News, 12%
Messaging, 41%
Stock transactions, 16%

Source: China Mobile (2002)

# Popular 3G mobile content in high-speed early adopter: Korea



Stocks/banking 5.6%

Email/chatting 5.2%

Other, 2.9%

Location/travel/traffic 7.2%

Ringtone/picture download 44.9%

Games/entertainment 34.2%

**Mobile data content breakdown** (%), Dec. 01
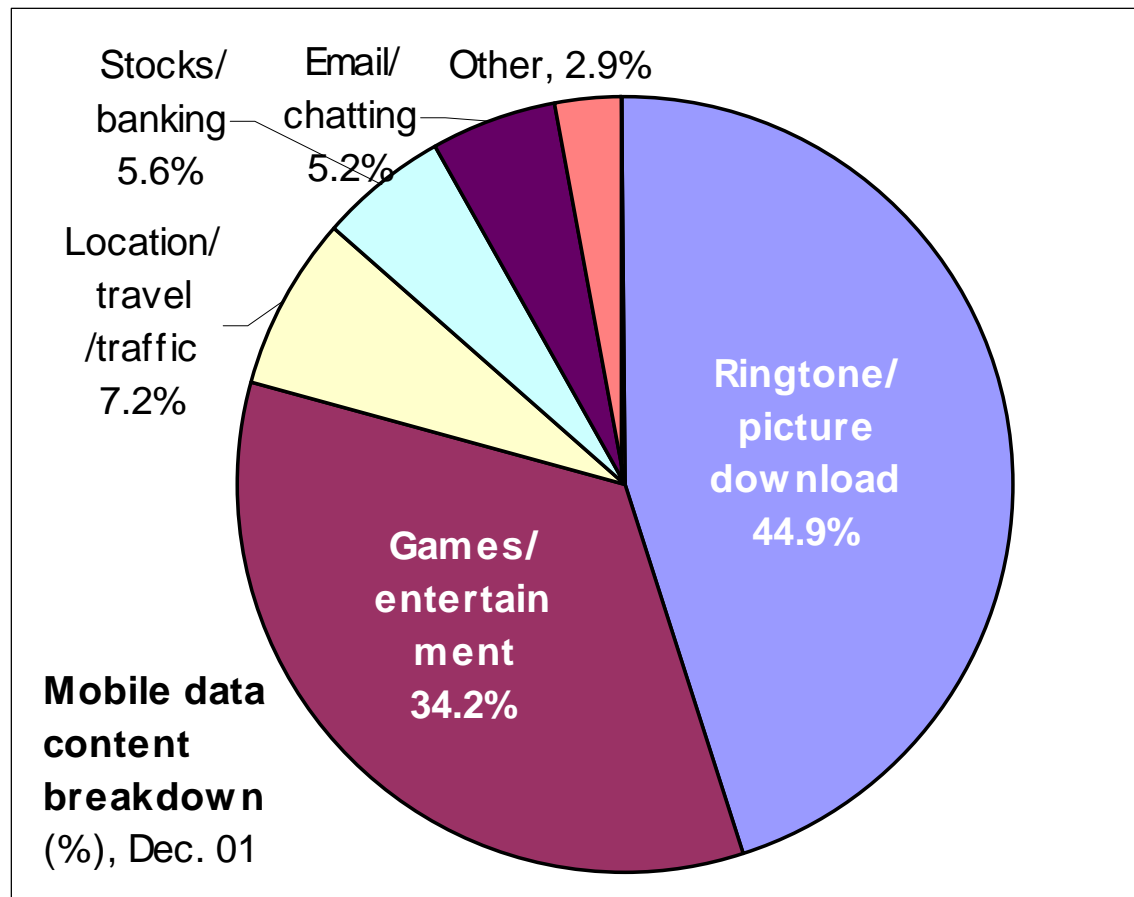
Source: SK Telecom (Dec 2001)

# Market considerations

# A changing landscape…

- New players, new roles



Application Providers

Network Operators

Network Equipment Manufacturers

Portal Operators

Application Developers

Device Manufacturers

Content Providers

Virtual Operators

Consumer

**End user**

Business

Source: EITO

Service area

Application area

Technology area
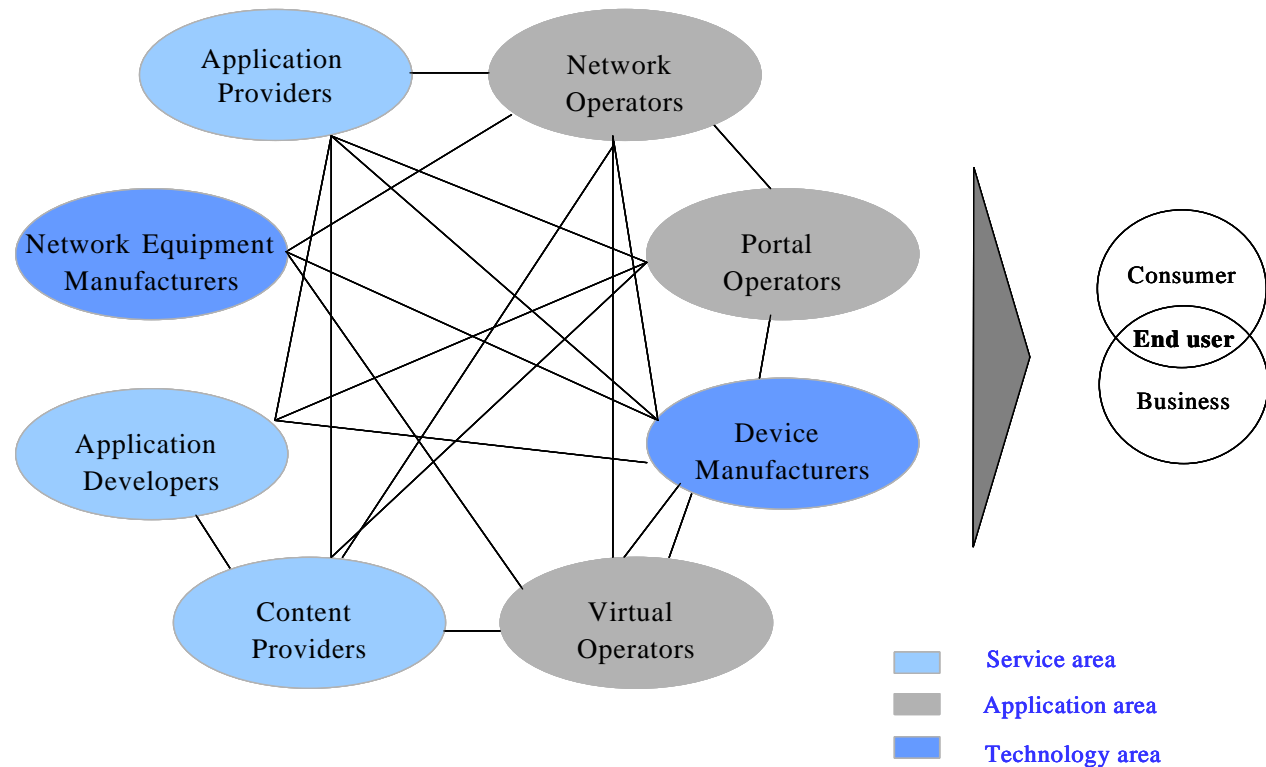
- Partnerships for a converged world

# Mobile data −
# Barriers to Development

- Limited availability of handsets
- Lack of Open Platforms
- Plethora of mark-up languages and media formats
  - − xHTML, cHTML, WML
  - − MPEG-4, ActiveMovie,realplayer, mp3…
- Lack of effective revenue-sharing
- Existence of inadequate billing models

# Mobile data –
# Factors for success

- Fast effective deployment of high-speed mobile networks
- Development of installed base of data-enabled handsets
- Availability of relevant content and applications and content harmonization
- Evolution of billing models
- Collaboration and co-operation
- Open source
- Consumer protection initiatives

# The mobile information society: A changing social sphere…?

# The road to ubiquity: anywhere, anytime…

- **Preserving your health**: Swallowing a tiny mobile device helps track a patient's vitals remotely and diagnoses illnesses without intrusive surgery
- **Showing you the way**: Always-on navigation systems gets you where you're going – efficiently
- **Taking inventory**: Tiny RFID tags track inventory, reducing business overheads
- **Keeping safe**: Location technologies keep small children or the elderly out of harm's way
- **Keeping dry**: Wearable computing adjusts your clothing to weather/forecasts
- **Saving your morning cereal**: An intelligent fridge pre-orders milk for you *before* you run out

# The road to ubiquity: …anyone, anyhow?

- But…can *anyone* have access to information about your health (e.g. employers)?

- And *who* can/should track your every move?

- Should *anyone* know exactly what, when, how much you eat?

- Do RFIDs remain active once an item is purchased? What kind of information are they collecting? Who can have access to it and for *what purpose*?

- Can high-resolution footage of you be taken by a stranger with a phone and then posted on the Web?

- Can your personal documents be scanned by anyone with a portable mobile device without your knowledge? And used *anyhow* by *anyone*?

# Peculiarities of the youth market: The case of *keitais* in Japan

- *Keitai* ownership
  - Students (12 years+): 75.7%
- Subscribers to mobile internet
  - Student mobile users: 94.3%
  - All mobile phone users: 81%

*Source: Video Research Survey July 2002*

- Average *keitai* monthly payments
  - Students: ¥7186 (US$59)
  - Overall: ¥5613 (US$46)

*Source: IPSe Marketing Inc. Survey December 2002*

# More *keitai* statistics

- Short message/email users
  - Students: 95.4%
  - Overall: 75.2%
- Sends over 5 messages/day
  - Students: 91.7%
  - Overall: 68.1%
- Teenagers send 2X more mobile messages than 20 something's
- Views message immediately
  - Students: 92.3%
  - Overall: 68.1%



*Source: Video Research Survey July 2002*
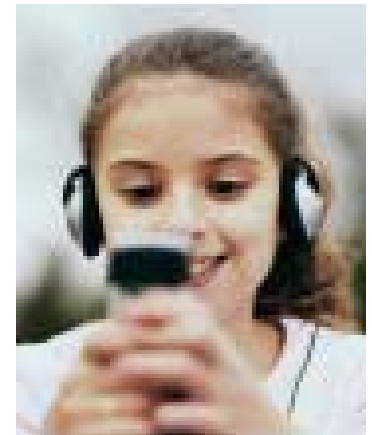
# Right place@Right time

- The politics of place
  - Home: separated from peers, but freedom of action
  - School: co-presence with peers, but limitations on their contact
  - Public place: freedom of motion but limitations on mobile use
- Mobile messaging is akin to note passing/paging:
  - For lightweight contact
  - When recipient may not be available (e.g. late night, classroom)
  - When there are limits to voice calls
- Youths generally keep open channel with 2-5 intimate friends. Couples, in particular, maintain ongoing exchanges when apart
- Expectation: these friends/partners are *always* available, and reply *immediately* to messages
- Text-messaging creates virtual place of continuous connectivity and peripheral awareness

*Source: Mizuko Ito, Keitai Ethnographic Study*

# Messaging Motivator:
# The continuity of contact

- ## Enhancing co-presence
  - "This lecture is boring…"
  - "Where are you standing?"
  - "Ask him if he is coming with us"

- ## Extending the period of co-presence
  - "Thanks for the lift"
  - "I forgot to give you back your CD"

- ## Enhancing peripheral awareness
  - "Are you up yet?"
  - "I'm walking up the hill right now"
  - "Good night – see you tomorrow"

*Source: Mizuko Ito, Keitai Ethnographic Study, 12/2002*

# Social and human considerations for the mobile information society

- Protecting our youth
  (e.g. literacy, dangers of access)
- Health considerations
- Mobiles as a source
  of socio-political change
- Nuisance factors
- The new mobile etiquette?

tks 4 yr attn ☺

www.itu.int/spu

www.itu.int/mobileovertakes

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