mad for mobility:
global wireless development and future trends

Visions for the Wireless World in 2020 and Beyond

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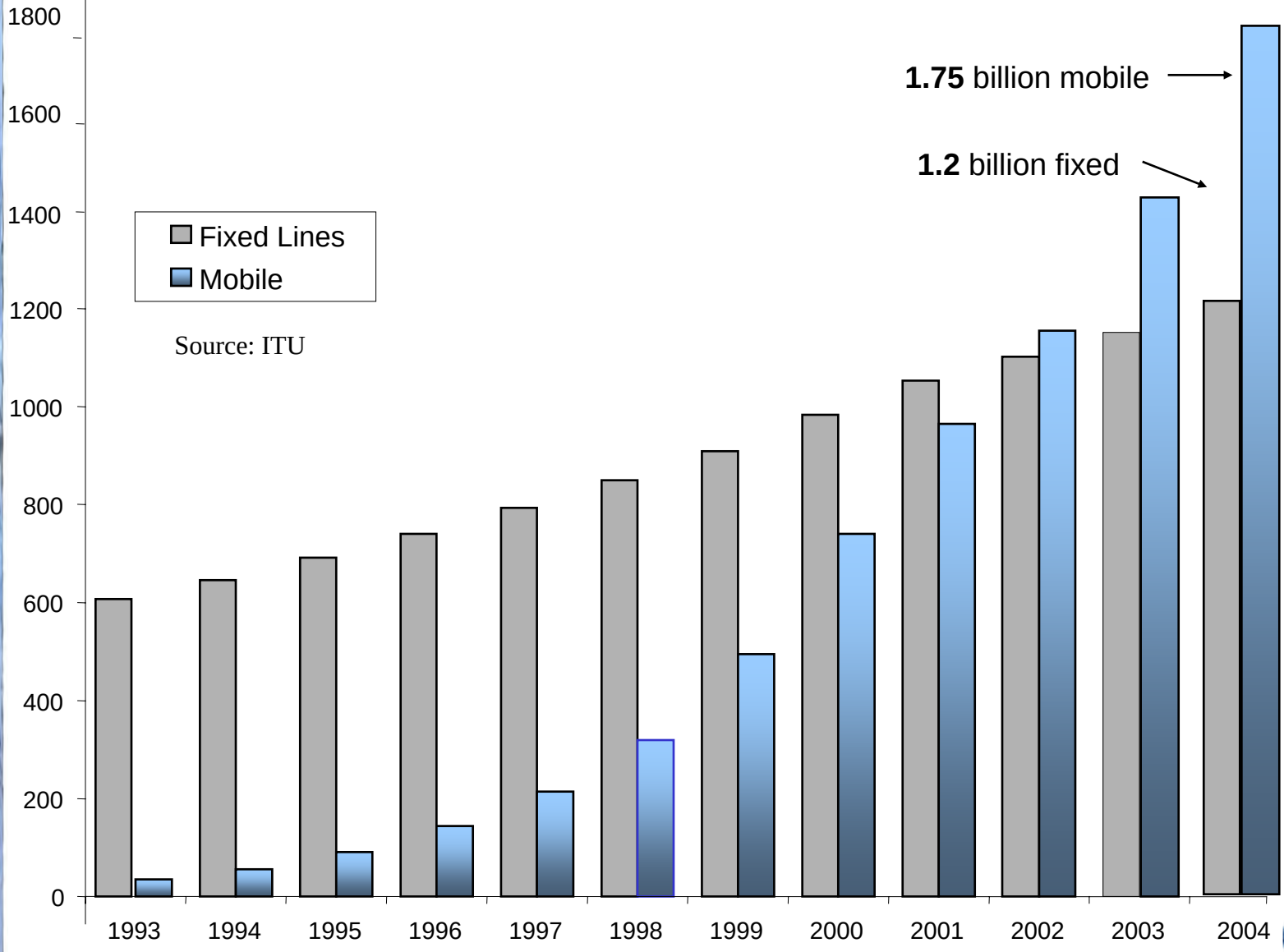
today's industry transitions… industry tensions?

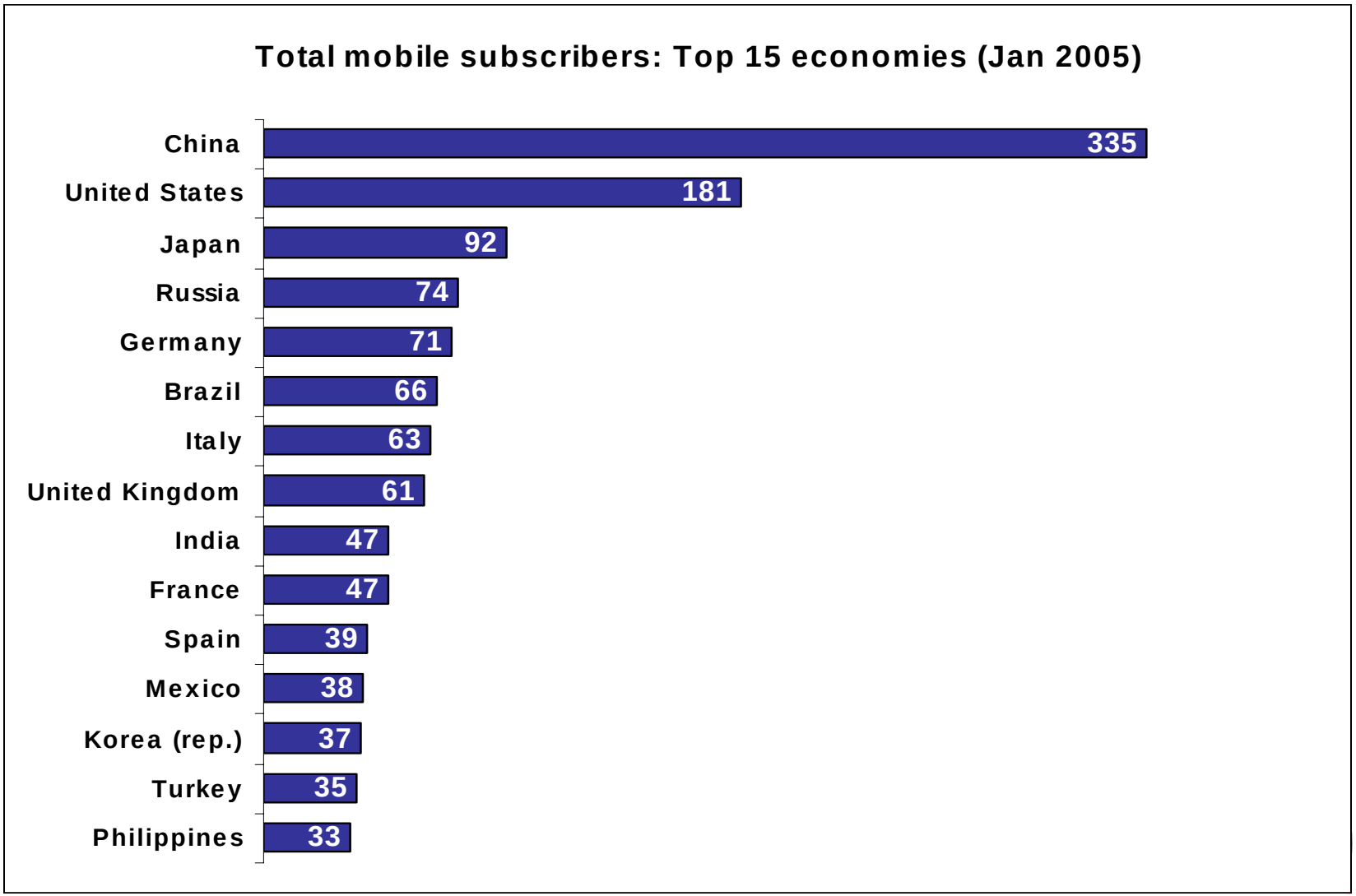
- from static market environments to dynamic fast-paced innovation
- from low-speed to high-speed
- from distinct to converged
- from local to global
- from sometimes-on to always-on
- from fixed to mobile
- from wired to wireless

more mobile than fixed

2002 was the turning point

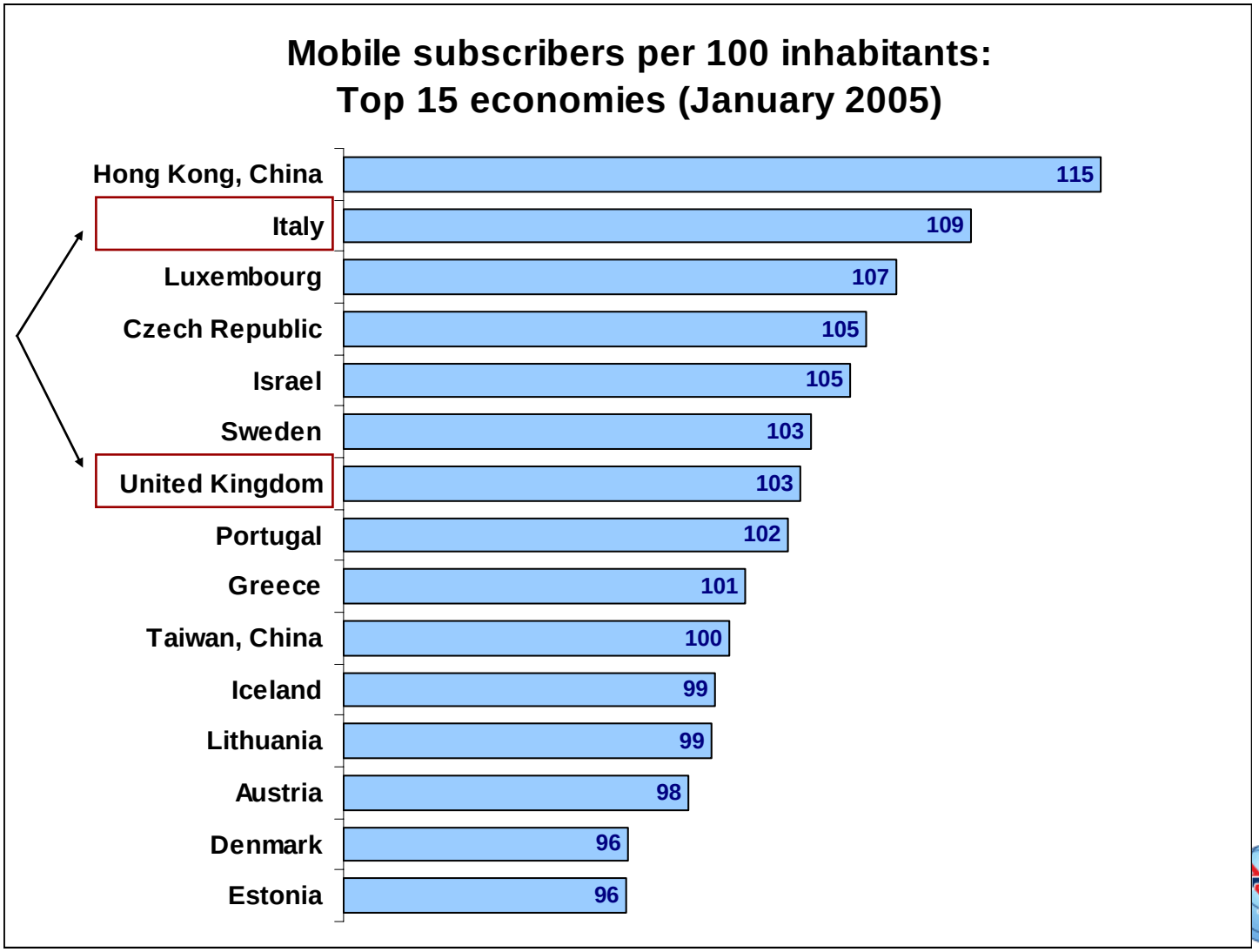


the 15 **leaders** in **mobile by total subscribers** (Jan 2005)

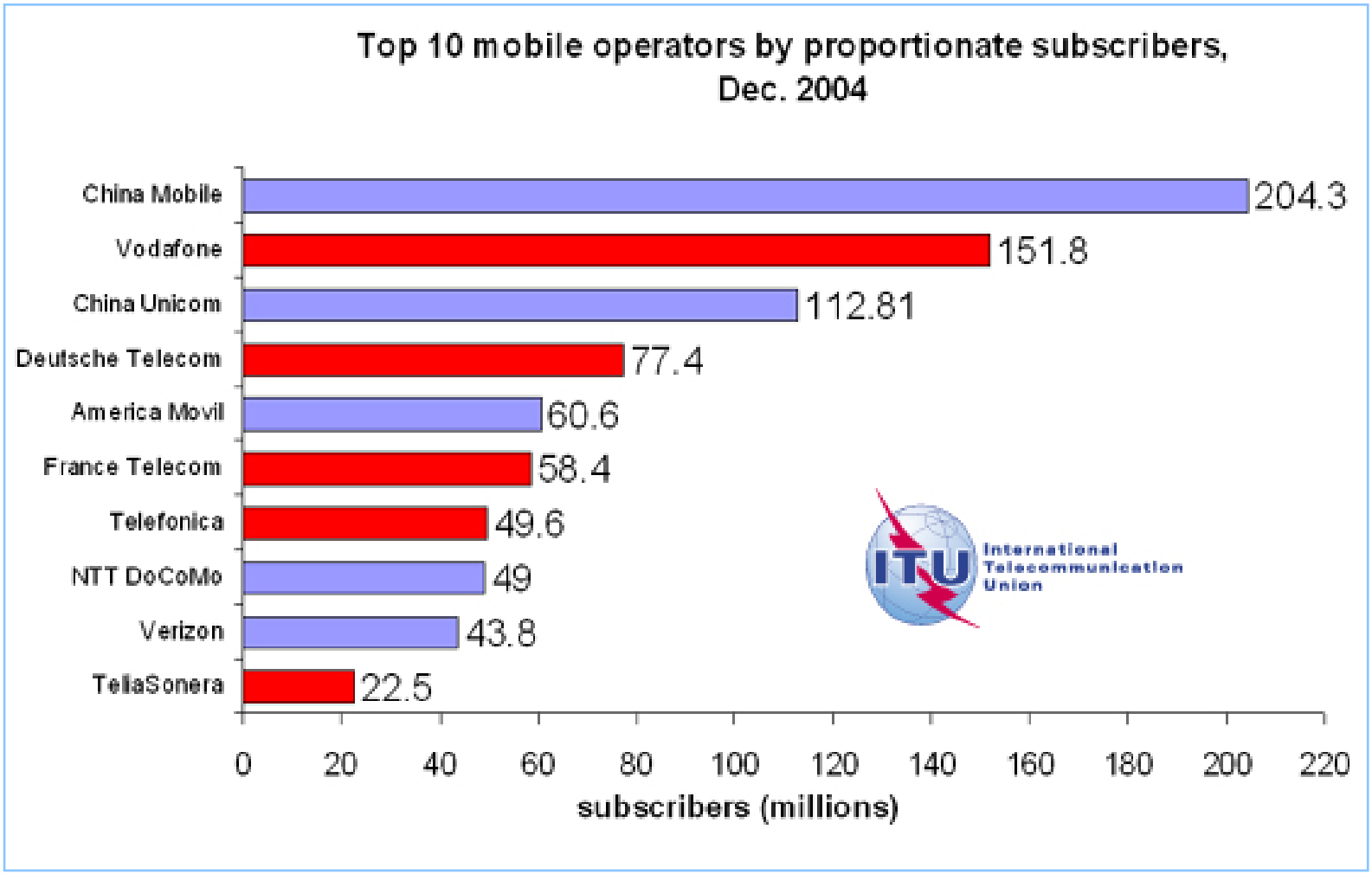


the 15 **leaders by mobile teledensity** (Jan 2005)

Italy & UK also in Top 15 for TOTAL subs



top ten operators worldwide

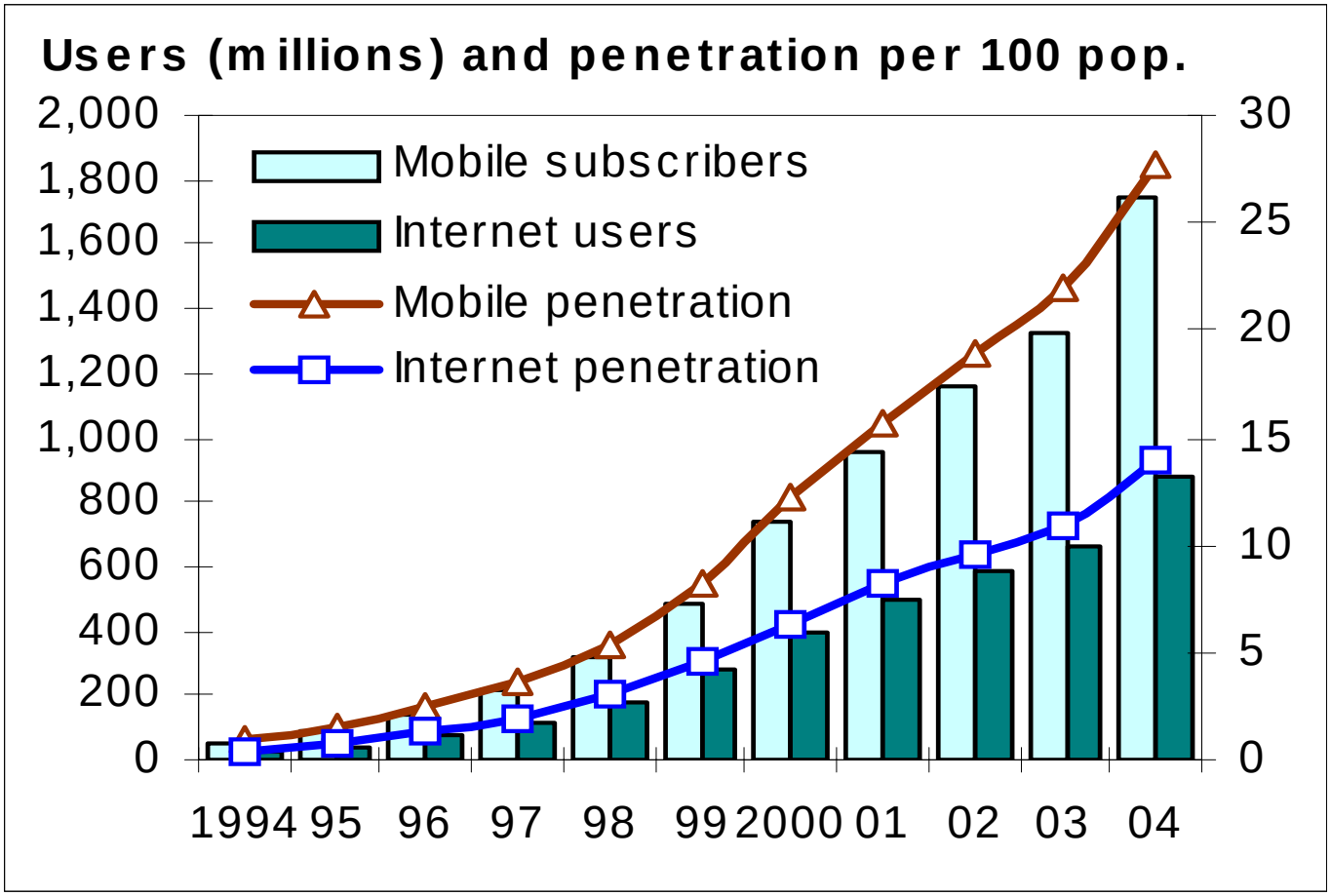


mobiles for development

- Developing countries have seen the greatest impact of mobile communications on access to basic telecommunication services
- Cellular networks can be built faster than fixed-lines networks and can cover geographically challenging areas
- Mobile services have served to boost competition, and prepaid models have opened access to mobile cellular for those who would otherwise not qualify for telephone subscription plans

one revolutionary technology meets another

Mobile and Internet: Twins born two years apart



Source: ITU

What is the “mobile Internet”?

- A merger of:
  - mobile (wireless) technologies
  - and information and data communications services
  - with the flexibility of IP networks
- Convergence of:
  - terminals
  - networks
  - services and applications
  - corporate structures

What is driving it?

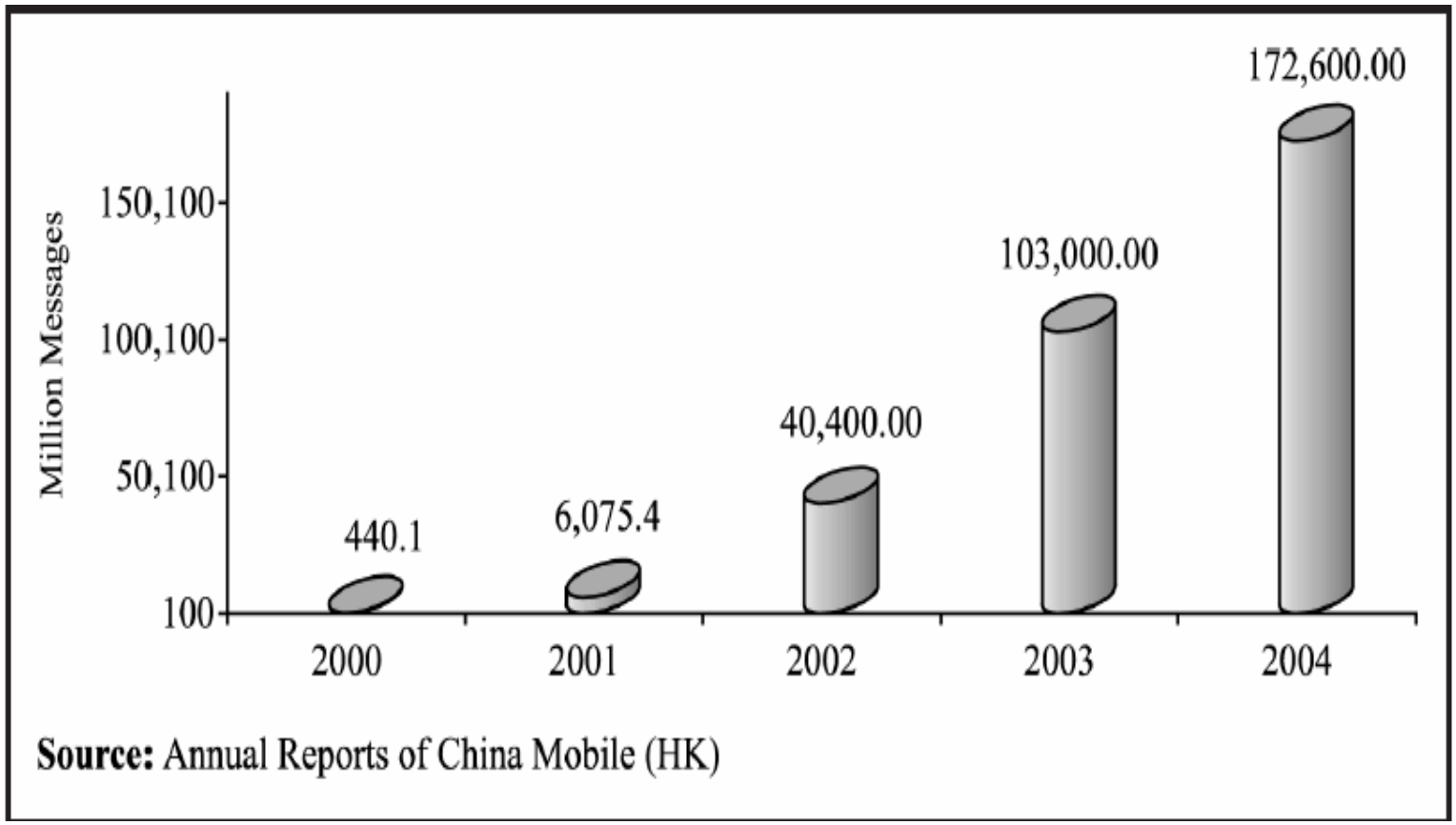
- User requirements
  - on-the-go access to information
  - communication & sending attachments
  - thirst for multimedia
- Market trends
  - the mobile revolution
  - rapid take-up of internet and broadband
  - Increased use of portable and palmtop computers, and multimedia devices
- Technological Innovation
  - high speed, cost effective mobile systems
  - integrated computing applications
  - small, powerful, application-rich user devices

Mobile messaging mania

- *Korea*: mid-2005 – 90 million text message sent a day
- *United States*: youth sending around 1.6 billion text messages a month (mid-2005), but with convergence of TV and messaging in formats such as 'American Idol,' analysts predict this to increase to 2.5 billion messages a month, over 30 billion messages sent a year.
- *United Kingdom*: 2005 saw 29 billion SMS sent

1999	2000	2001	2002	2003	2004
1.1 Billion	6.1 Billion	12.2 Billion	16.8 Billion	20.5 Billion	26.2 Billion

Phenomenal SMS growth in China

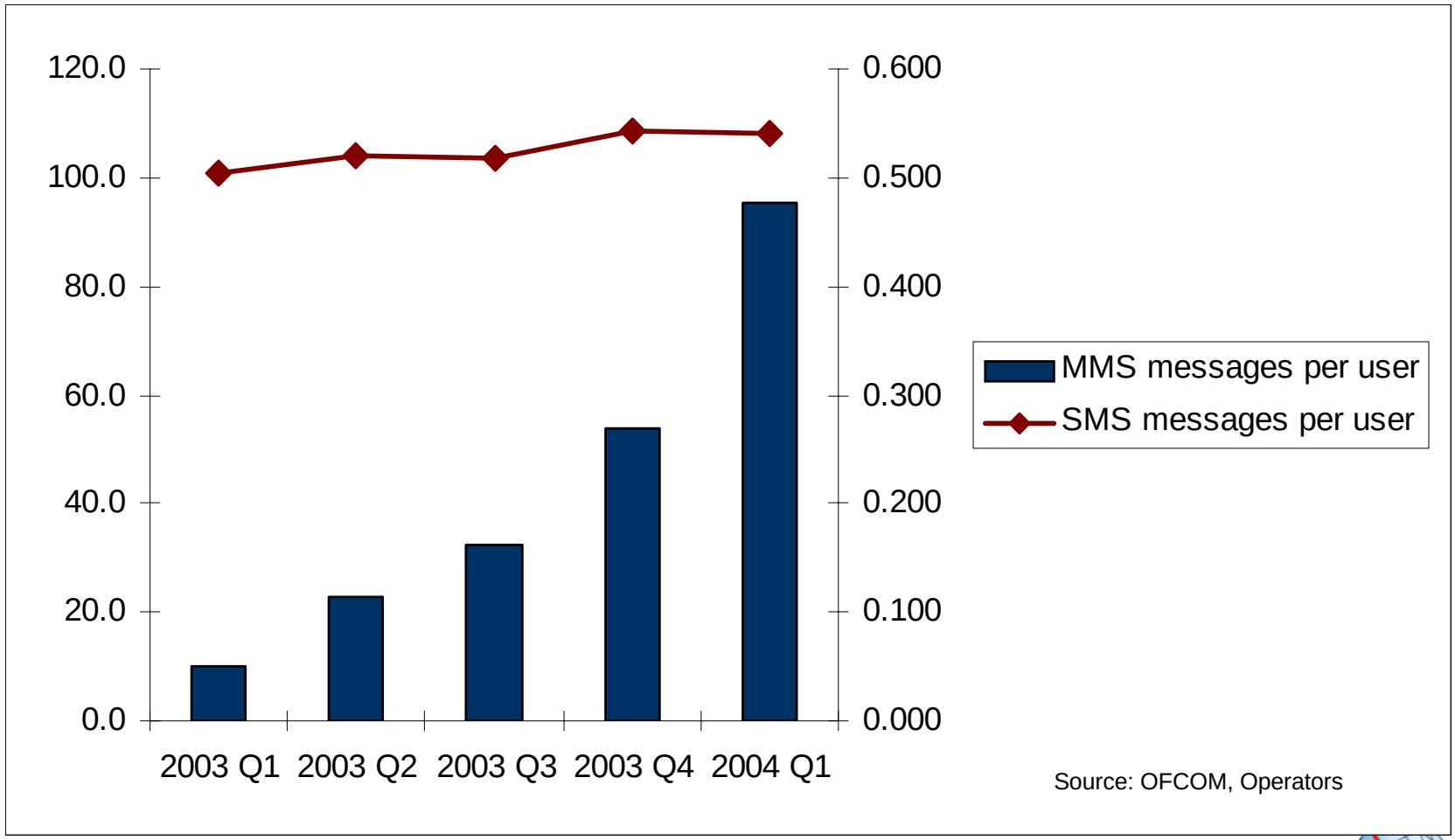


Source: XuYan,MinGong ,JamesY.L.Thong, INFO, VOL.8, NO.1, 2006

and in 2005: over 300 Billion SMS messages !

MMS now taking off…

(e.g. UK SMS vs MMS per user)

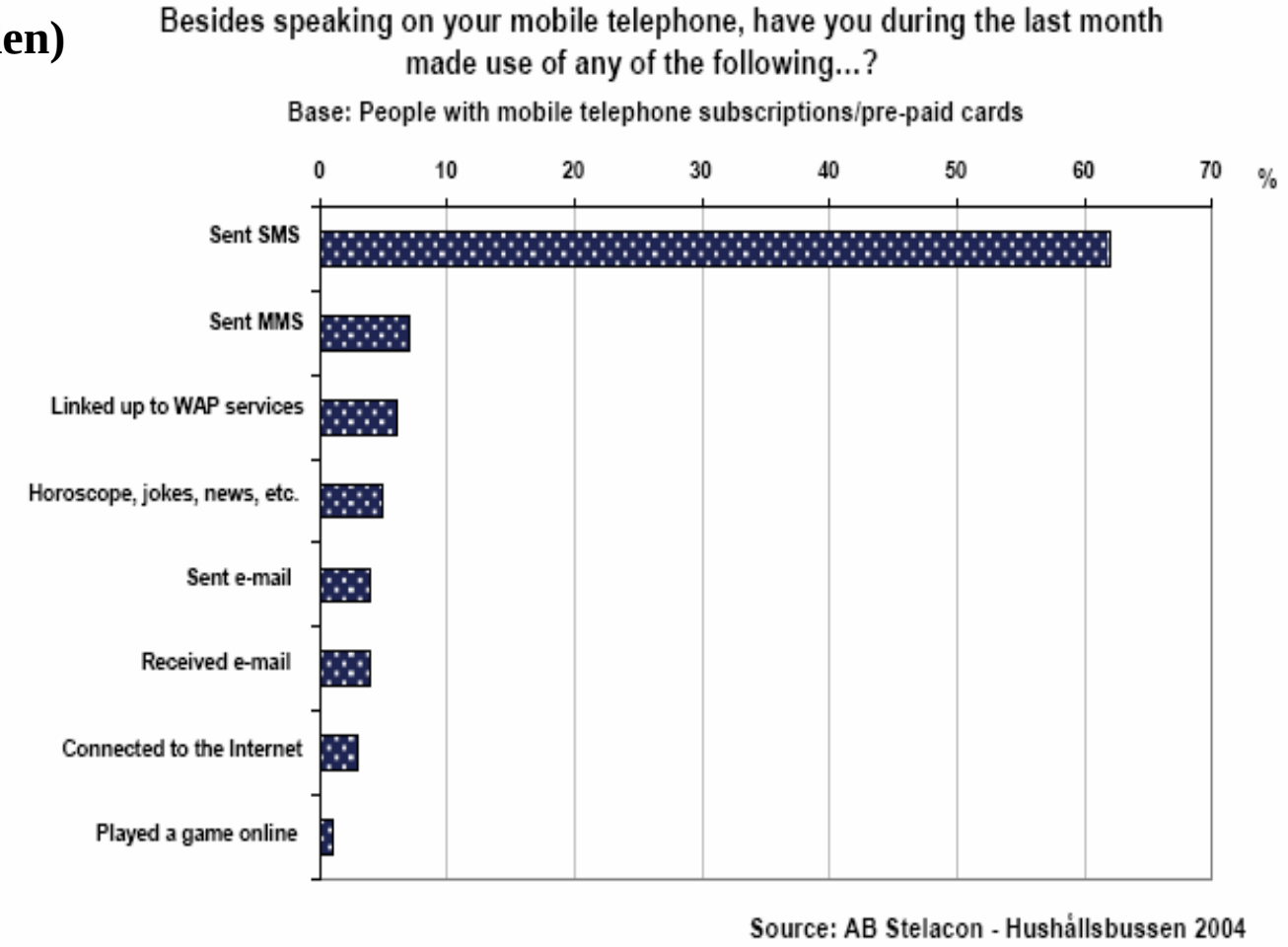


money in the pocket: but whose pocket?

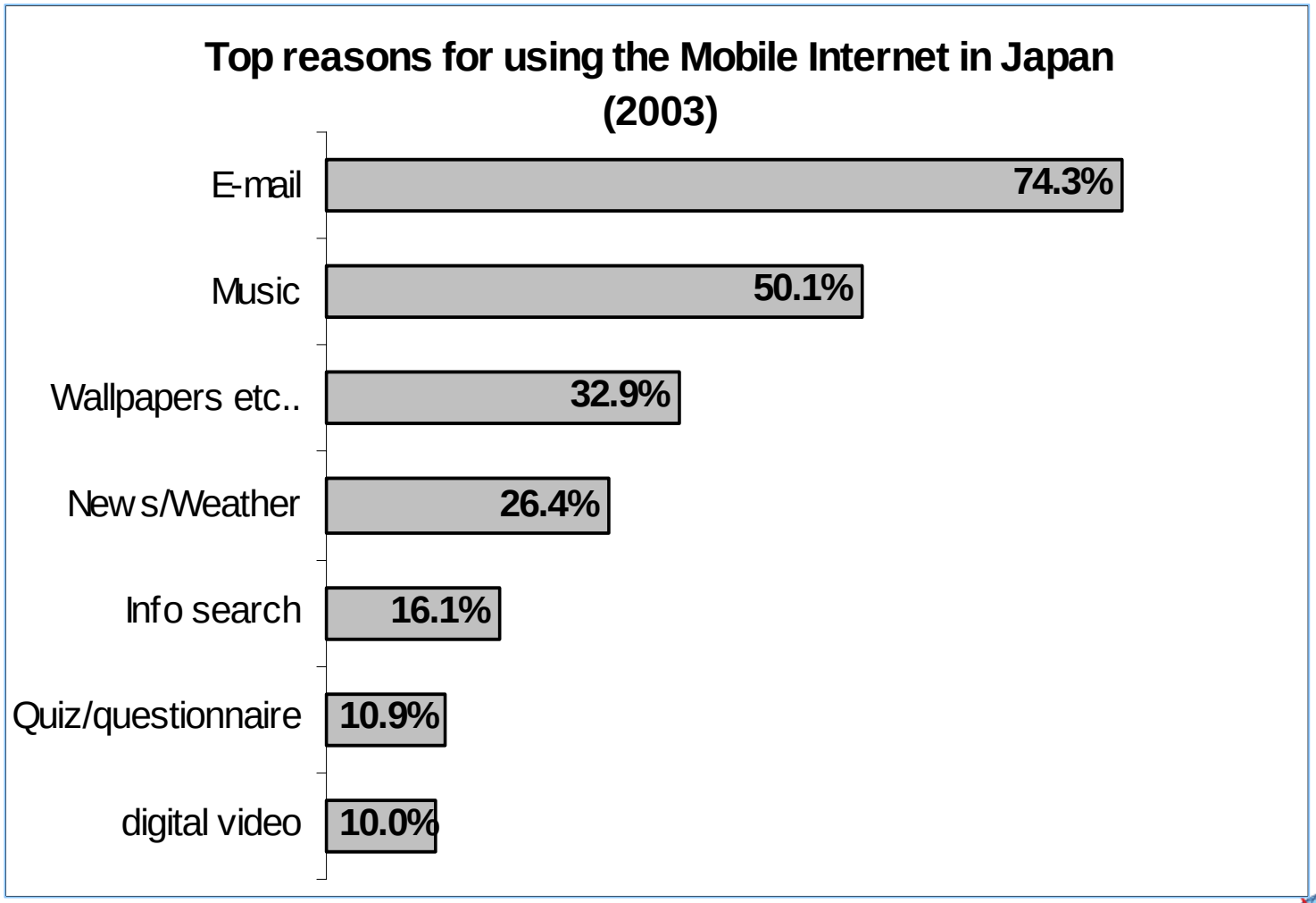
- By some estimates, the total SMS revenues in 2005 were about 75 Billion USD. Compare this to:
  - *Global box office ~ 25-30 billion USD (US only 9 billion).*
  - *Global music industry revenues ~ 35 billion.*
  - *Videogaming, consoles and all software ~ 40 billion*
- SMS outdoes them all
- However, SMS is still priced above cost!
- Operators have in fact been increasing the retail price of SMS instead of decreasing it (e.g. roaming premiums introduced after SMS became "popular")
- How will this encourage future services?

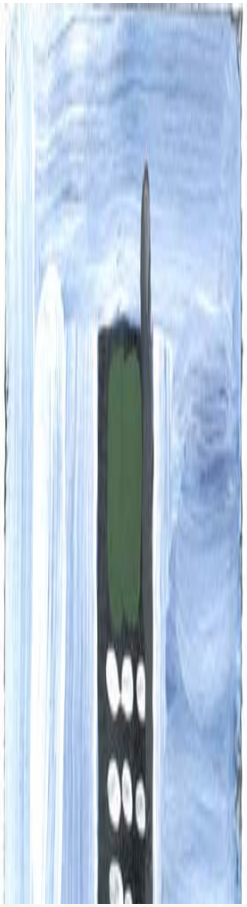
Typical European situation

(Sweden)



In Japan, on the other hand



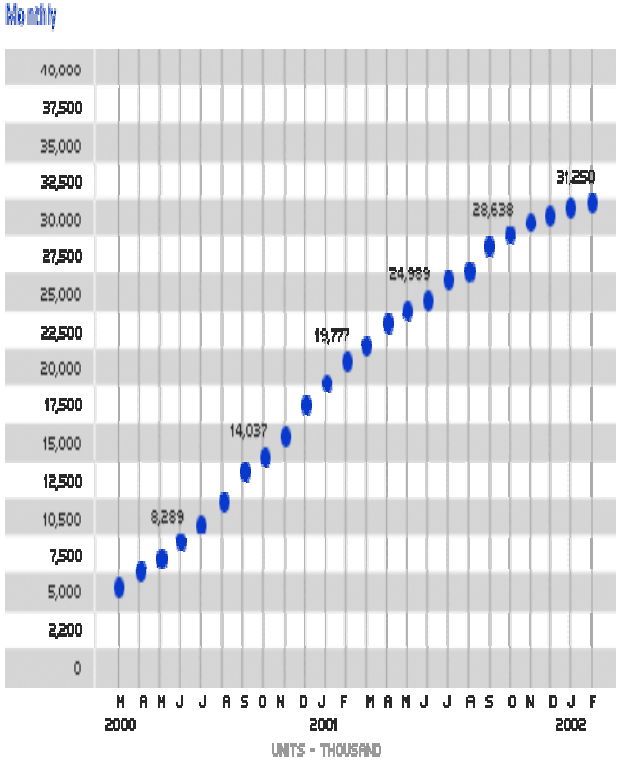


Japan's i-mode service

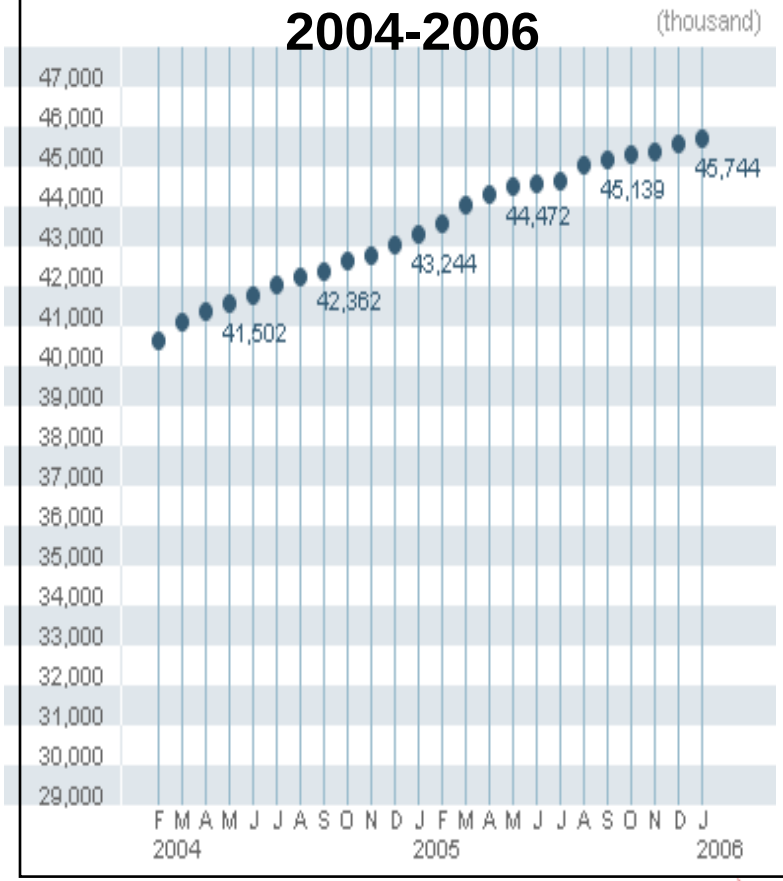
April 2002: 32 million subscribers

December 2005: 85.6 subscribers

Growth of i-mode subscribers 2000-2002



Growth of i-mode subs 2004-2006



Source: http://www.nttdocomo.com

making the internet mobile

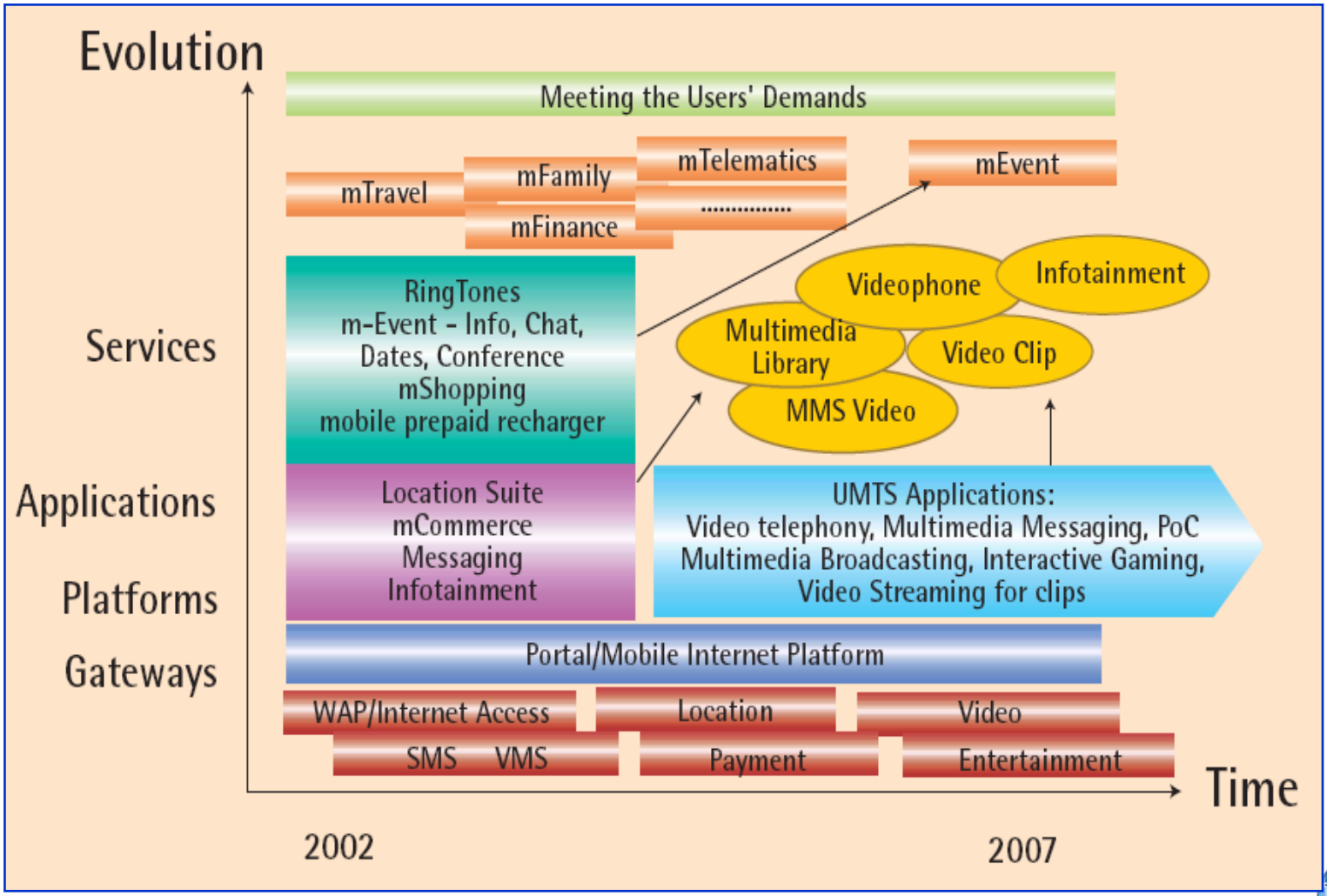
- Avoiding the replication of the fixed-line internet access experience
  - awareness of issues such as screen size
- Harmonization of content
  - Open source, open access
    - e.g. Japan
- Cultural and locally-relevant content
- Affordable, cost-based pricing
- Appropriate policy/regulatory framework
  - including the protection of IP rights

the next G

Benefits of Globally Harmonized 3G Networks

- Increased 3G penetration and usage
- Manufacturers' development costs spread out across a larger installed base
- Ability for customers to roam with their services across regions, countries and systems
- Increased ability of the IT industries industries to provide mobile applications, solutions and subscriber devices
- Smooth and compatible evolution path from existing 2G infrastructures

Platforms, applications/services from 2G to 3G…

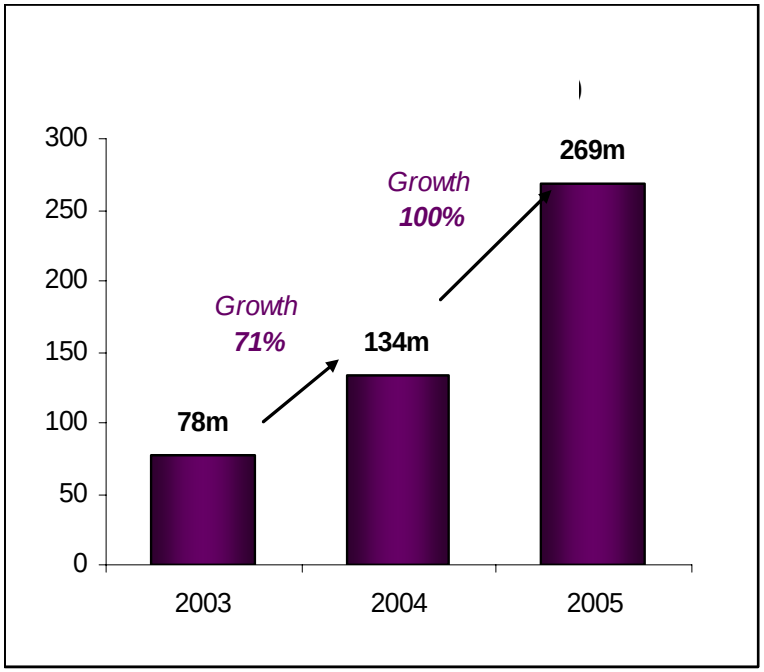


Source: ITU/UMTS Forum

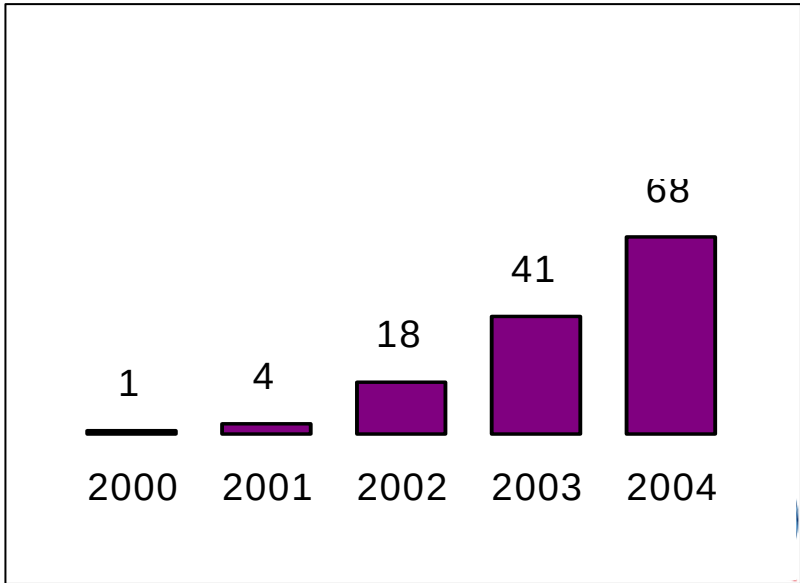
the numbers on 3G /IMT-2000

Growth of W-CDMA and CDMA 20001x

Users



Countries with networks



W-CDMA subscriber growth (Jan 2005 – December 2005)

44.42 million W-CDMA subs worldwide at year-end 2005

Source: 3G today

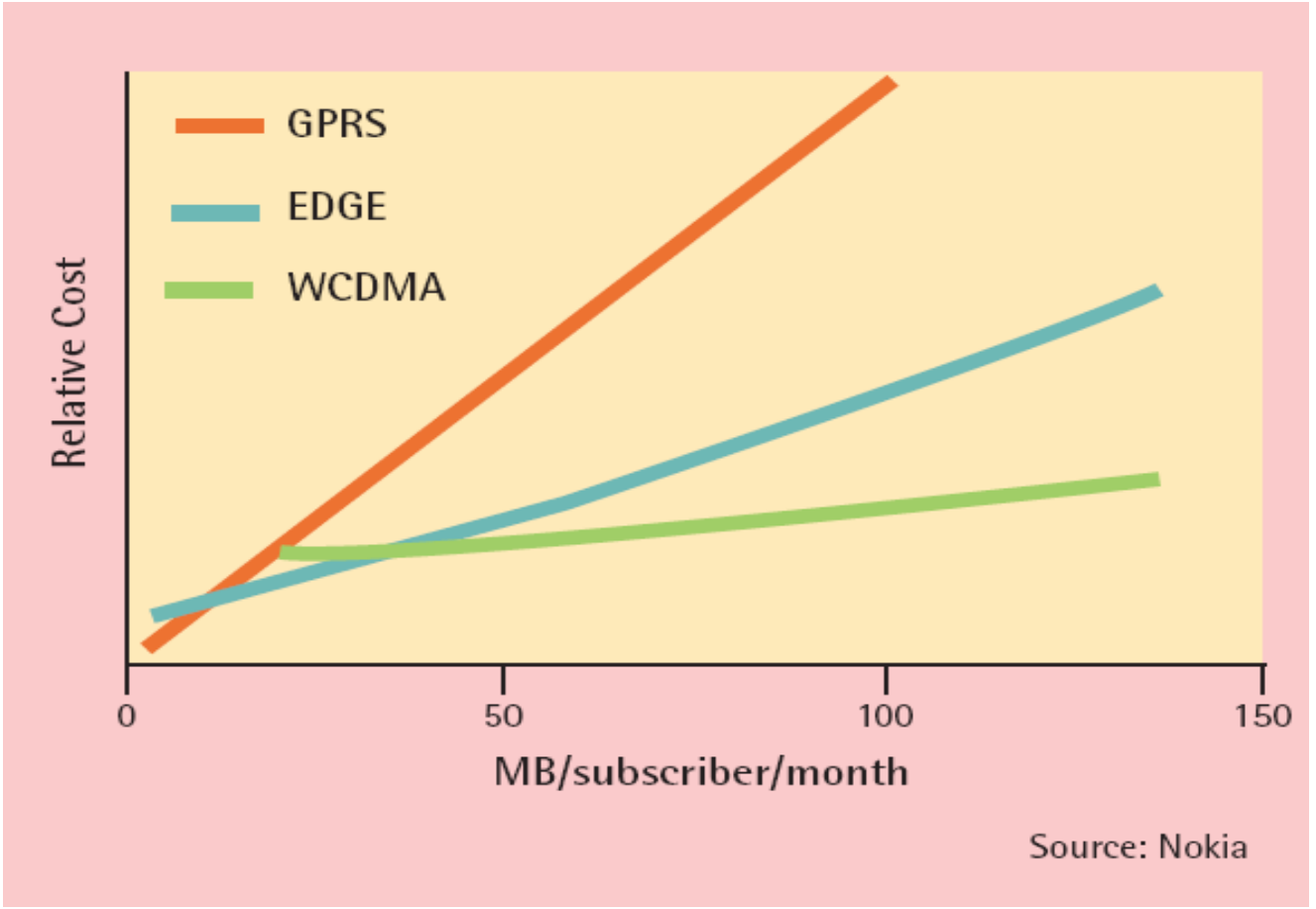
W-CDMA vs CDMA 2000

- 269.5 million IMT-2000 users in total at the end of 2005
  - 225.1 million **CDMA2000** & 44.4 million **W-CDMA**
- CDMA2000 seems have a head start than **W-CDMA** for now
  - CDMA 2000 was a more natural shift from 2G cdmaOne - the jump from GSM to **W-CDMA** was a more substantial upgrade
  - another reason is the high licensing fees for 3G in Europe (W-CDMA or UMTS)
- Furthermore, although ITU includes CDMA2000 in the IMT-2000 family, it can be said that it is more appropriate to compare W-CDMA with the faster CDMA2000 1x EV-DO

HSDPA – Enhanced 3G for W-CDMA networks

- HSPDA = high-speed downlink packet access, offers a smooth cost-efficient upgrade to existing W-CDMA networks at low cost
- W-CDMA enables streaming video, broadband Internet access and video conferencing, but…
  - HSDPA offers peak downlink data rates of up to 14 Mbps - dramatically more than the 384 kbps that is typical of today's 3G and the highest data rate of any available mobile WAN technology.
- According to a new survey by GSA (Global mobile Suppliers Association) 94 HSDPA networks are planned, in deployment or commercially launched in 47 countries.
  - 18 networks commercially launched in 14 countries

As high-speed networks are deployed, costs are dropping…

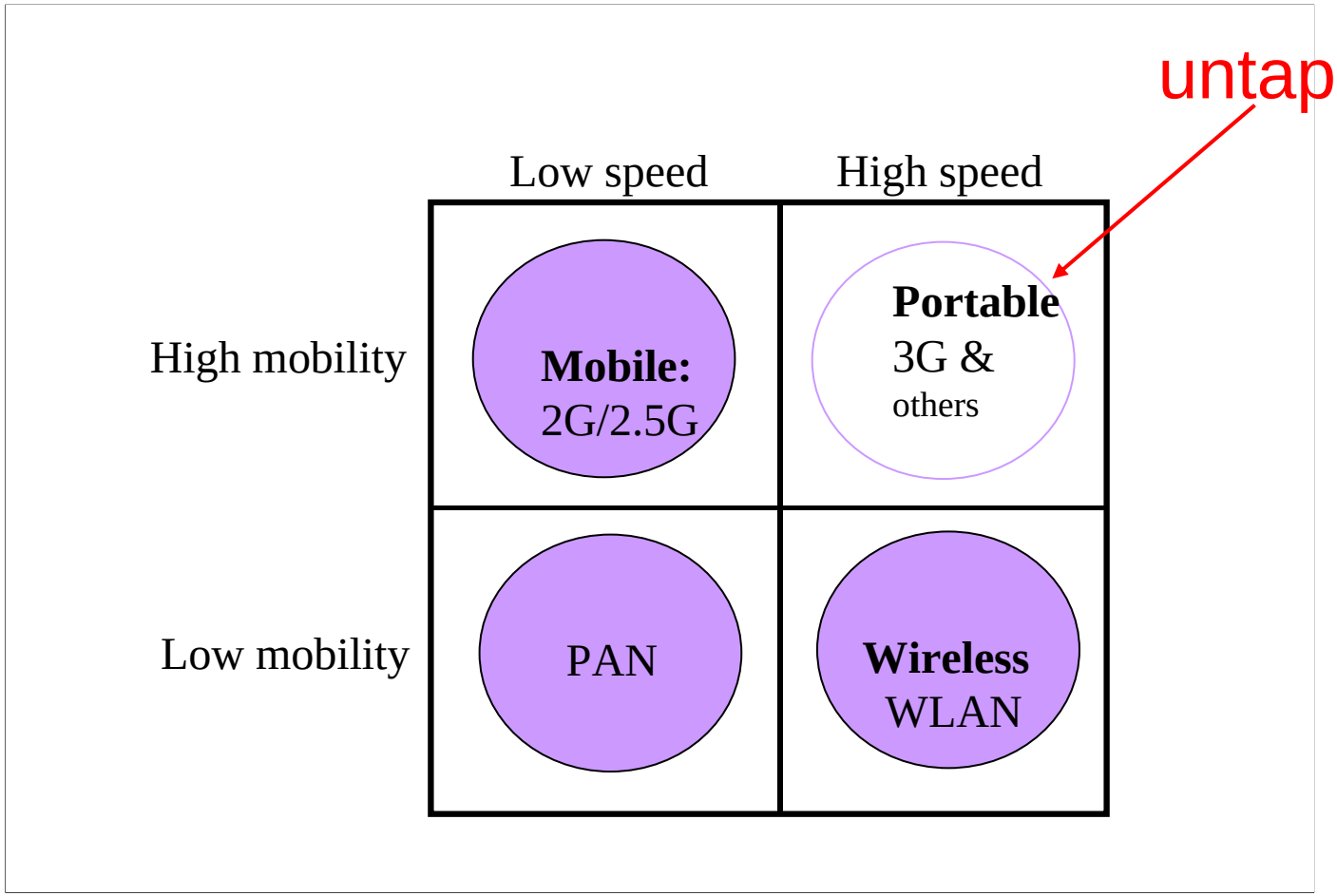


Source: As cited by UMTS Forum

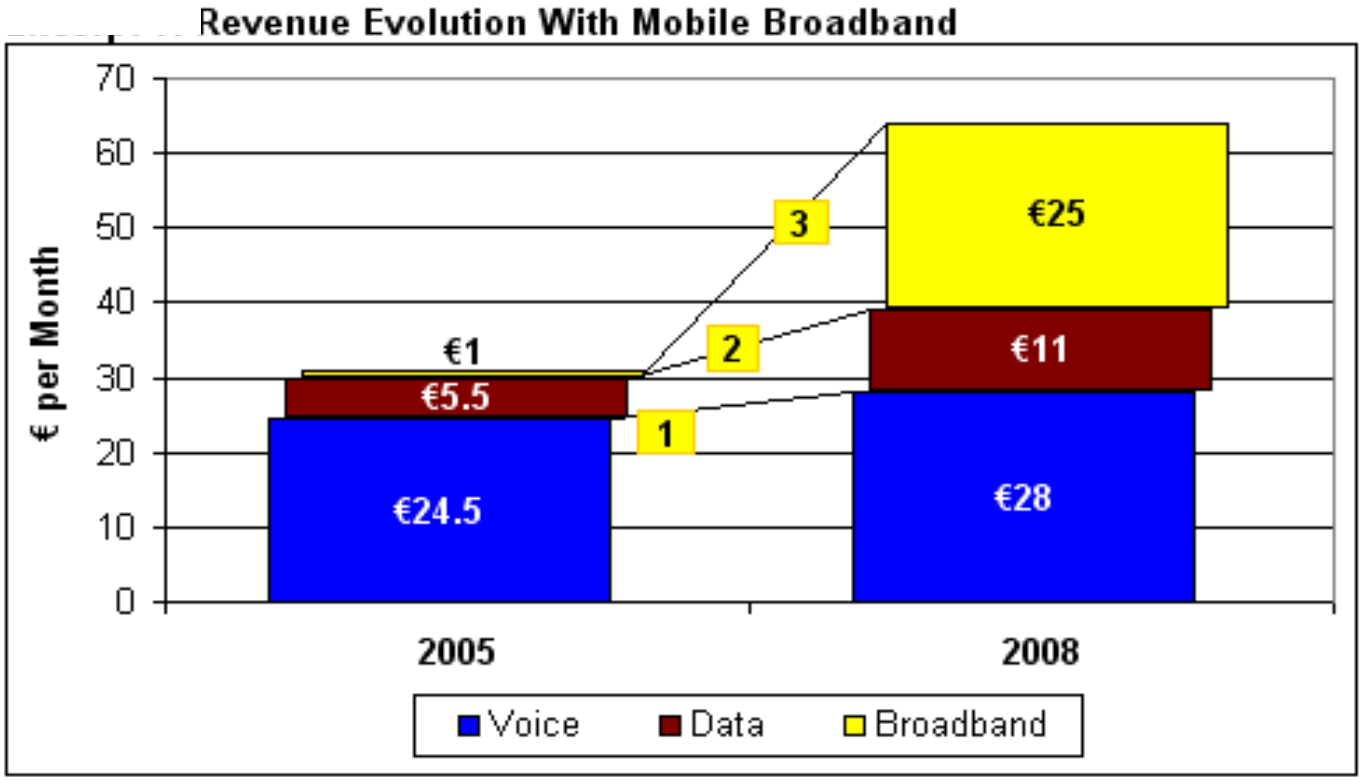
but are prices (e.g. SMS)?

the *mobile* internet, the *wireless* internet, the *portable* internet

Of course, 3G is not the only radio access system for mobile data…



untapped market, untapped revenue opportunities



Source: Unstrung Insider

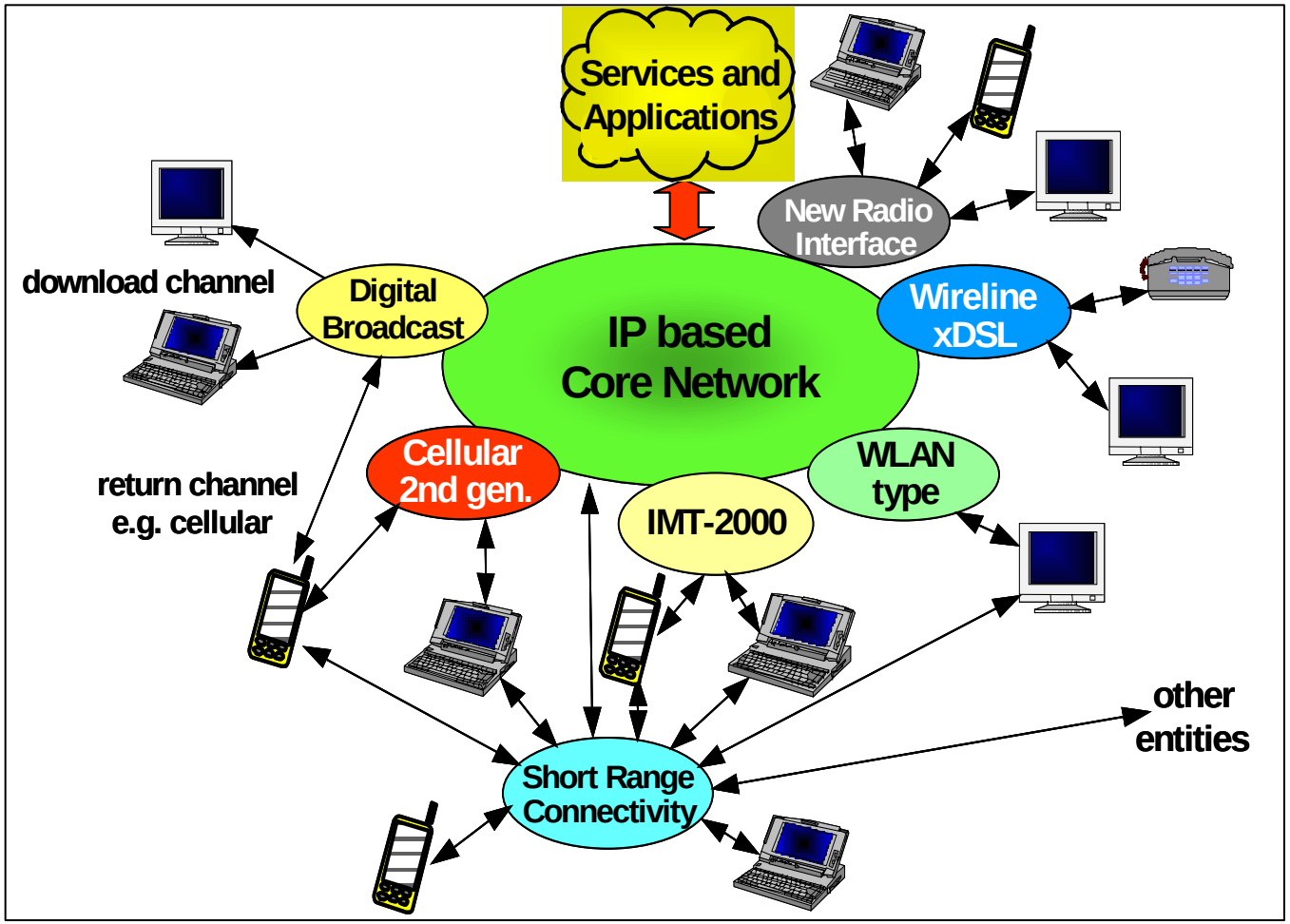
Longer-range for mobile data: 802.16 and 802.20

- 802.16 or WiMax
  - Worldwide Interoperability for Microwave access
  - Capacity: max 70 Mbit/s over 50 km
- 802.20 also known as “Mobile-Fi”
  - Optimized for high-mobility environments
  - In terms of marketing, WiMax has a stronger push

End-user devices: the mobile still dominates – why?

- *Economies of scale*
  - 2 billion and growing
- *Wide Appeal*
  - young, old, male, female, rich, poor…
- *Size and portability*
  - Smaller than the laptop
- *Emotional Attachment*
  - many can't leave home without it
- *Fashion and identity*
  - Accessory, personal diary, status symbol
- *Physical proximity*
  - At day, at night, standing still, on the move

substitutes or complements?



Source: ITU WP 8F

the mobile internet, the wireless internet, the portable internet…

next:

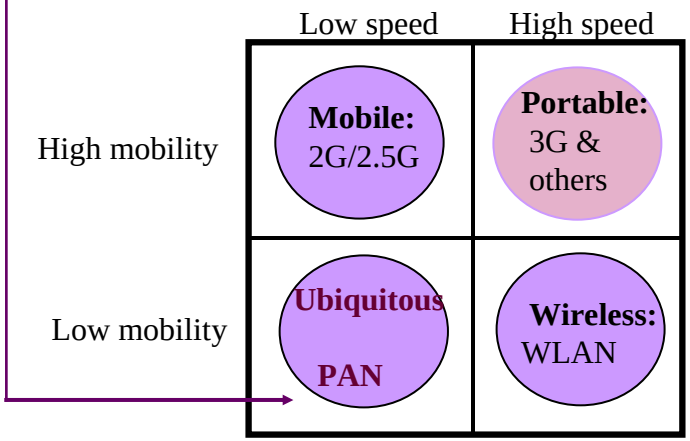
THE UBIQUITOUS INTERNET

Ubiquitous Networks and Ubiquitous Computing

- Ubiquitous computing
  - Embedding computational power into everyday items
  - "intelligence" moves to the edges
    - e.g. smart objects/structures, intelligent appliances
- Ubiquitous networks
  - always-on, anyone, everywhere network access
  - Giving network access to "anything"
  - In this way, everything becomes 'networked'
  - NGN networks will most likely be the core/backbone infrastructure for deploying ubiquitous networks

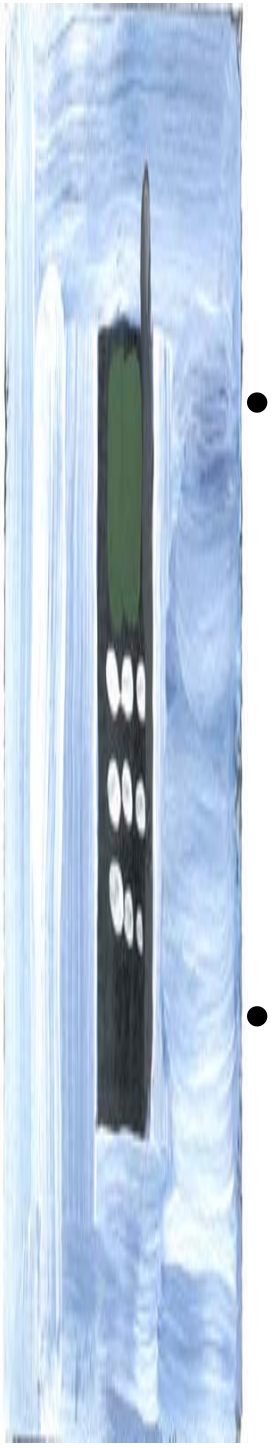
Short-range technologies key to ubiquitous networking

- typically in the “low-mobility, low speed” area
- Some replace wires, other serve to multiply network connections
- Examples:
  - Bluetooth
  - Ultra Wide Band
  - Zigbee
  - RFID (radio frequency ID)
  - Sensors



the new radio revolution

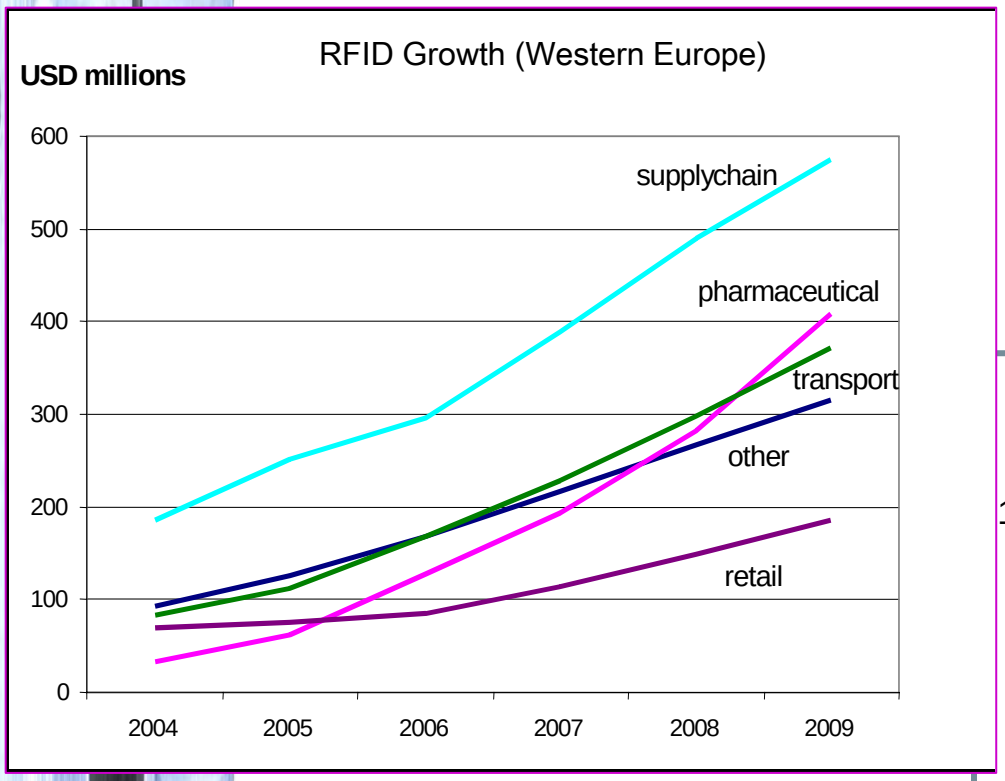
- densest radio systems in the world are terrestrial radio and cellular
- …but we are soon entering a new era:
  - the ratio of radios to humans is nearing 1 to 1
  - in which this ratio could exceed 1000 to 1
- radios would be all around us, becoming "ambient" in the environment , through technologies like RFID
- … thereby radically transforming technology access
  - Making it "indistinguishable" from daily life



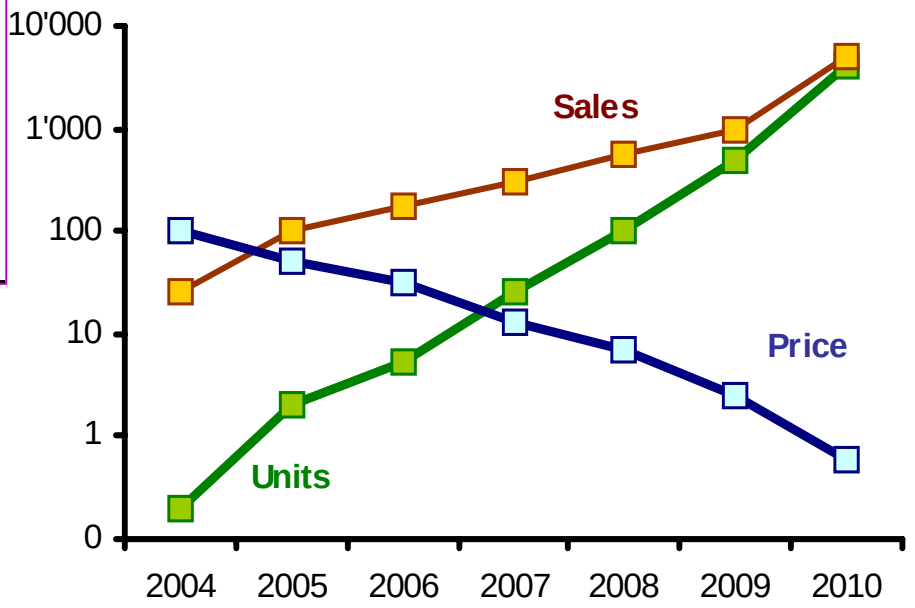
RFID, sensors at the core of this revolution

- RFID
  - Through systems including tags and readers, RFID can identify and track items
  - RFID tags can be very small (~ a grain of rice and even smaller)
  - Networked RFID allows for smaller and smaller things to be connected
- Sensors
  - Sensors and networks of sensors can complement RFID by enabling the collection of additional and relevant data, e.g. temperature, pressure, presence of bacteria etc…

growth of radio & sensors



Source: ITU Internet

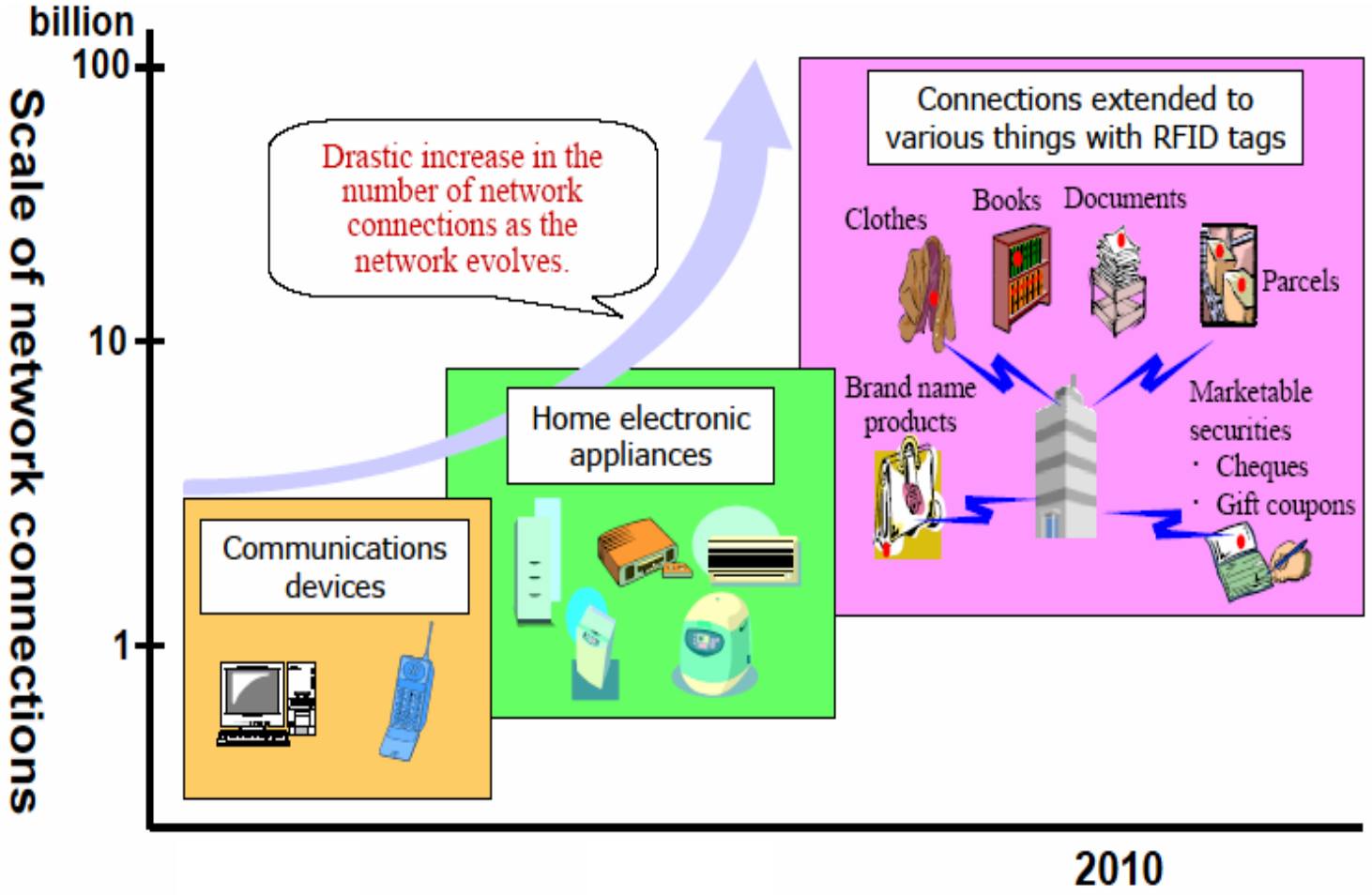


Source: ITU Internet Reports 2005: The Internet of Things, adapted from Harbor Research

Mobile RFID

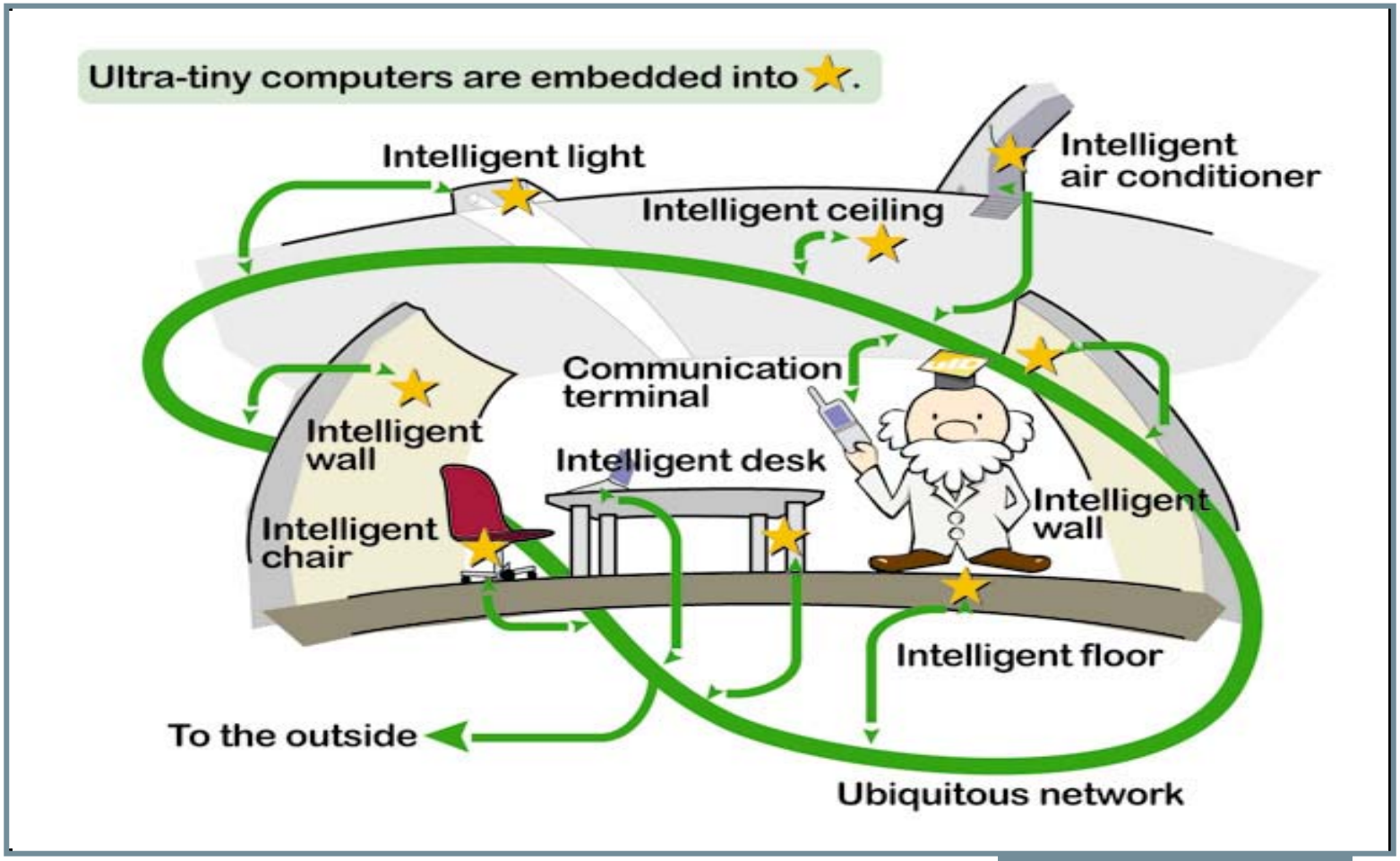
- Mobility is a natural extension of RFID deployment
  - Ability to track and monitor everyday things using a device one would carry anyway
  - data verification at the point of delivery and real-time data transfer (where fixed readers can't reach)
  - extends the reach of the "ubiquitous internet"
- The integration of RFID capabilities in mobile phone is already underway, e.g .
  - the release a couple of years ago of Nokia mobile RFID kit
  - the US DoD planning to purchase mobile RFID devices
  - standards setting advancing in forums such as NFC

radio expanding the network



Source: Adapted from Murakami, ITU-T NGN Forum

Creating smart, mobile spaces



Source: Ubiquitous ID Center

Key challenges ahead

- Pricing, affordability and new billing models
- Fostering healthy content market
- Spectrum coordination, flexibility
- Standards for mobile ubiquity (RFID, NFC etc.)
- Governance of resources
- Privacy and data protection,
- Network integrity/security

t h a n k y o u !

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