



BOOMING BROADBAND ***for a wireless world***

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ITU New Initiatives Programme

International Telecommunication Union (ITU)



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Note: The views expressed in this paper are those of the author and do not necessarily reflect the opinions of the ITU or its Membership
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outline



- Important trends and tendencies of the digital age
- Global growth of fixed broadband
- 3G: wire-free and on the go
- More of the high life: high mobility & high speed
- Converging trajectories
- Focus Asia
- Policy and regulatory priorities for wireless broadband

important trends and tendencies

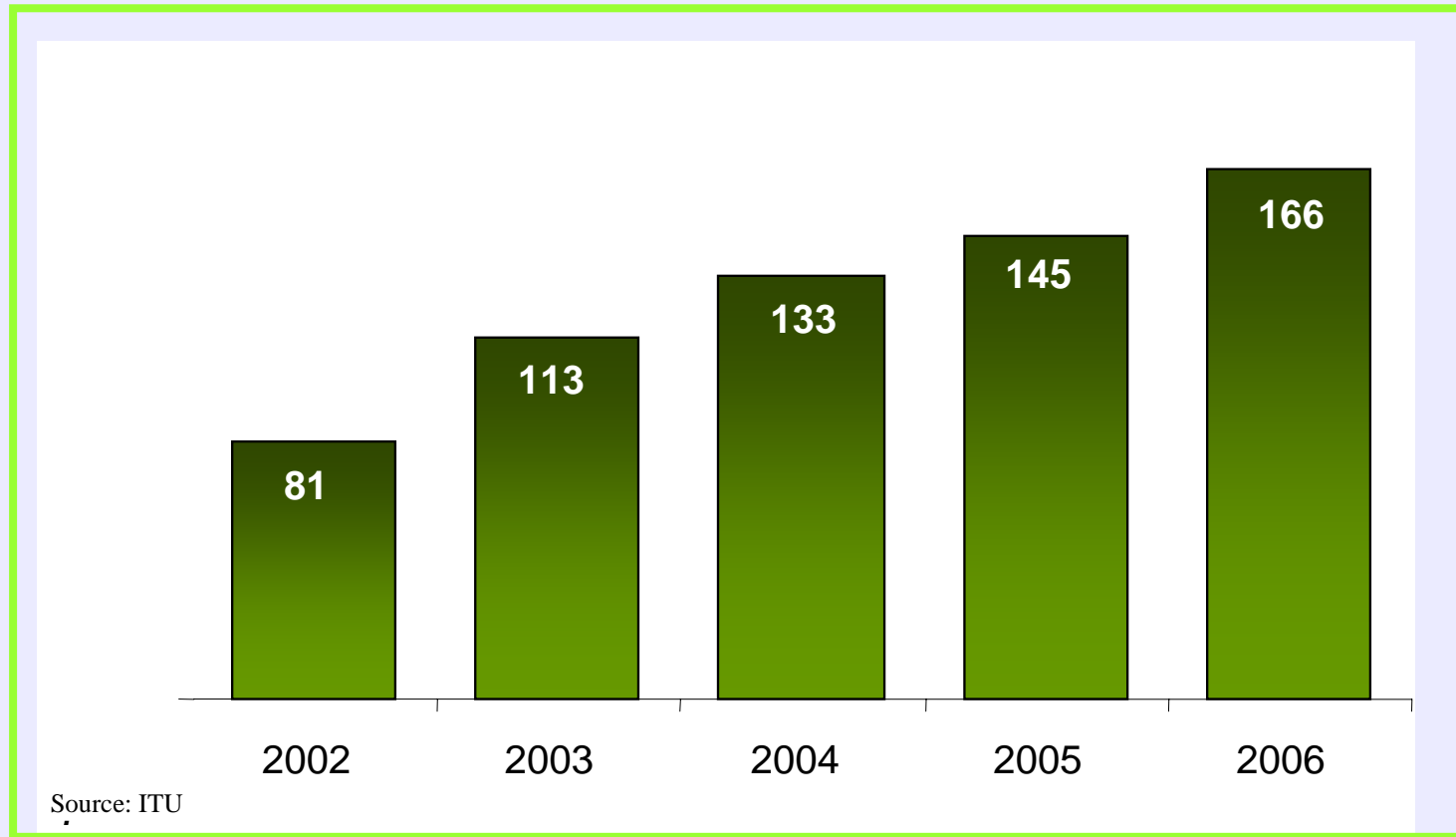
- Innovation and transition to **digital** technologies
- **IP (internet protocol)** as a critical network enabler
- Growing value of **information**, especially timely and on-the-go information: “**always on**”
- **Speed**, speed and more speed
- **Mobility** as an integral element of networks
- Popularity of **portable ICT** devices
- **Convergence** at multiple levels: technologies, networks, devices/terminals, but also regulatory and corporate convergence

global growth of fixed broadband



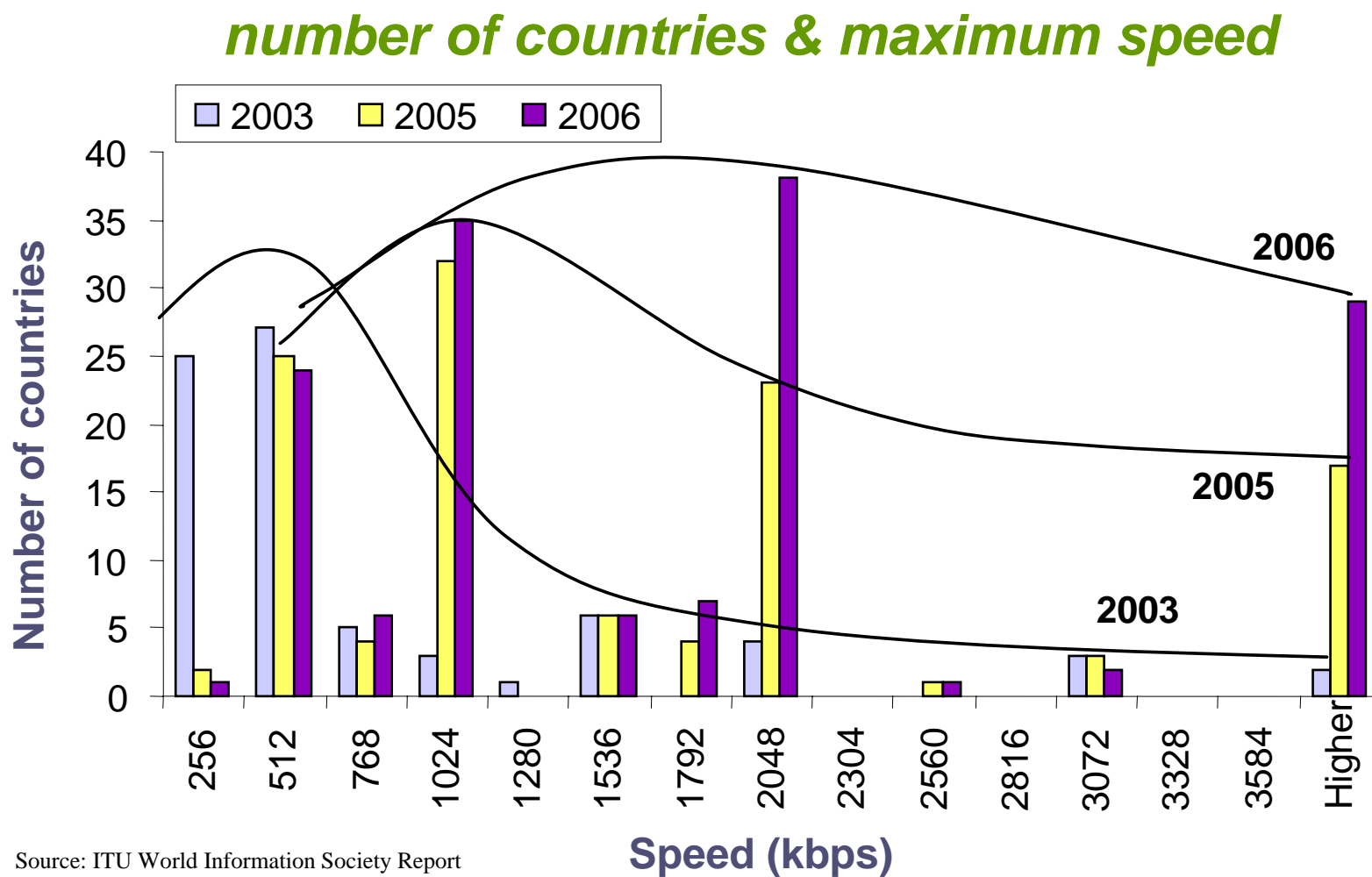
number of economies with commercial fixed broadband* offerings

from 2002 to 2006



**where broadband = combined throughput of 256 kbit/s in both directions and above*

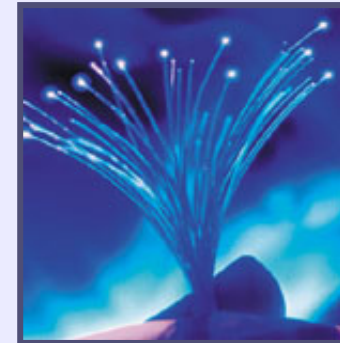
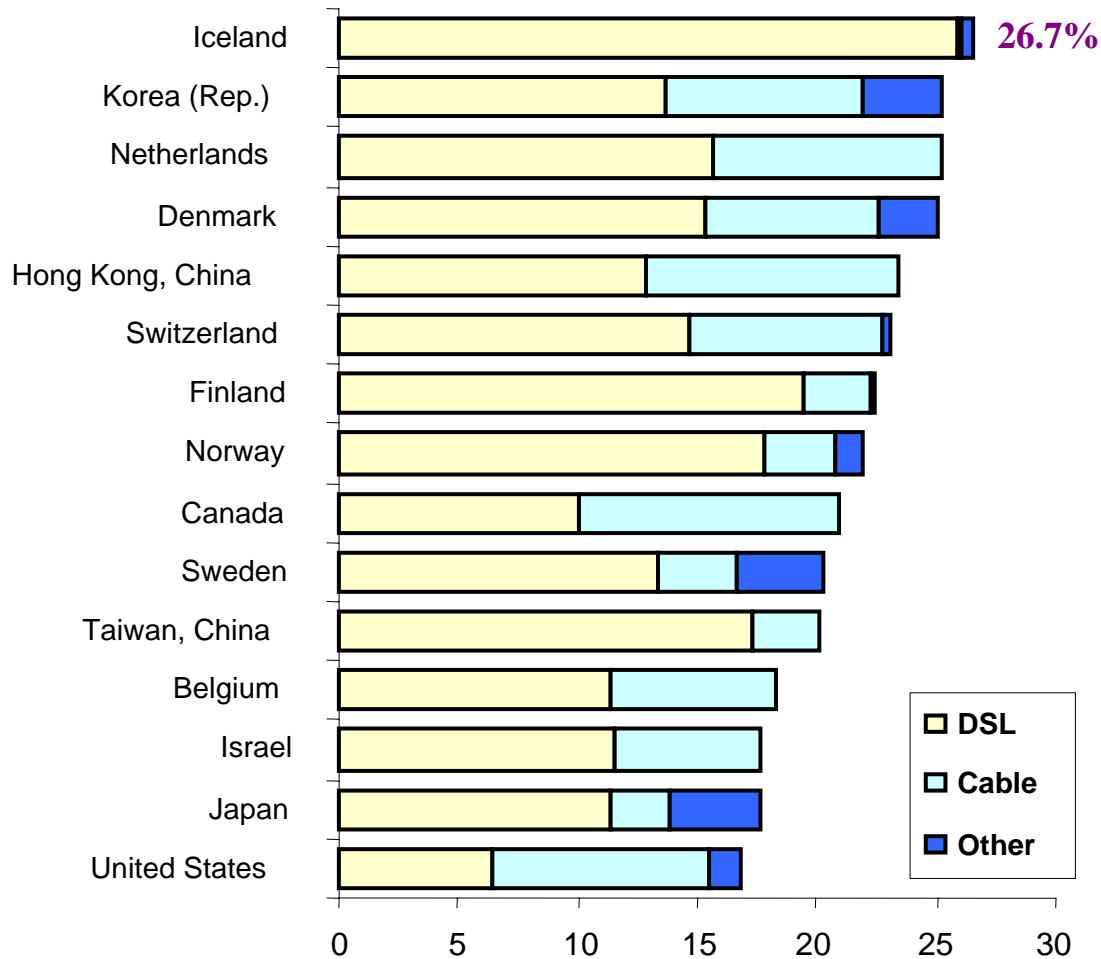
speed for fixed broadband on the rise



the top 15 economies by penetration of fixed broadband

Top 15 Broadband economies, Jan 2006

Total penetration (per 100 capita), by technology



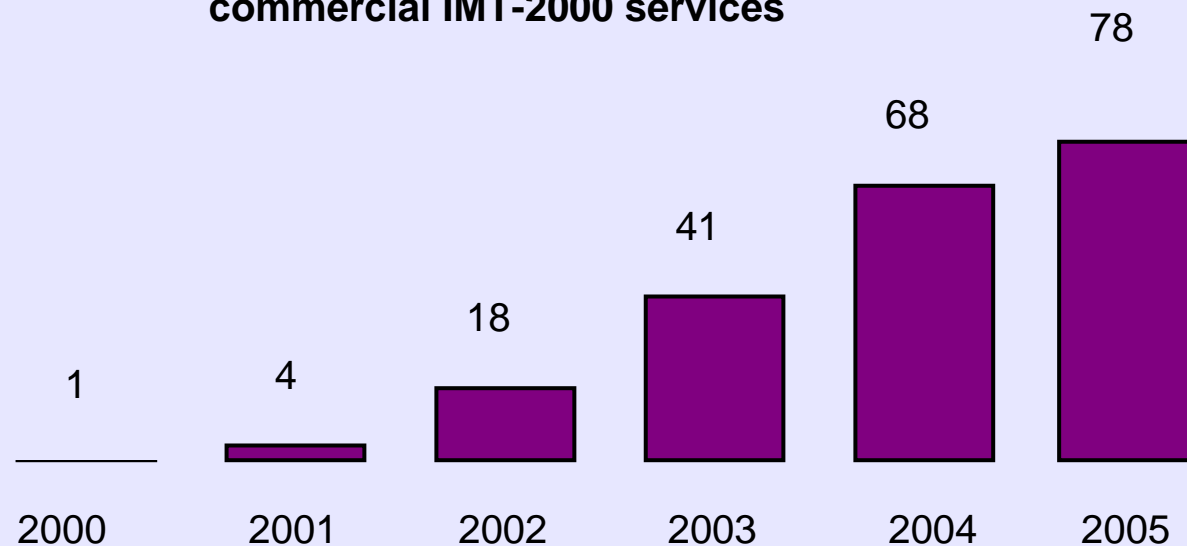
3G: wire-free and on the go



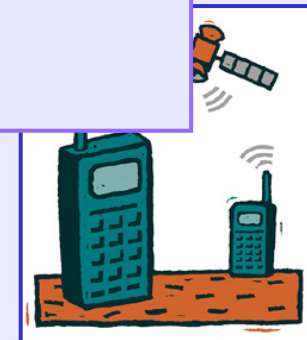
more countries are deploying IMT-2000 (i.e. CDMA 2000 1x & W-CDMA)



Number of countries with
commercial IMT-2000 services



Source: ITU



IMT-2000: W-CDMA, CDMA 2000 1x, CDMA 2000 1x EV-DO

- **IMT-2000 Subscribers:**

- 324 million “IMT-2000” users in total in March 2006

- **A head start for CDMA 2000?**

- CDMA2000 1x seems to have a head start on **W-CDMA** for now
- CDMA 2000 1x was a more natural shift from 2G cdmaOne - the jump from GSM to **W-CDMA** was a more substantial upgrade
- another reason cited is the high licensing fees for 3G in Europe (UMTS)



- **Classification:**

- Although ITU includes CDMA2000 in the IMT-2000 family, it can be said that it is more appropriate to classify CDMA 2000 1x EV-DO when talking about mobile broadband

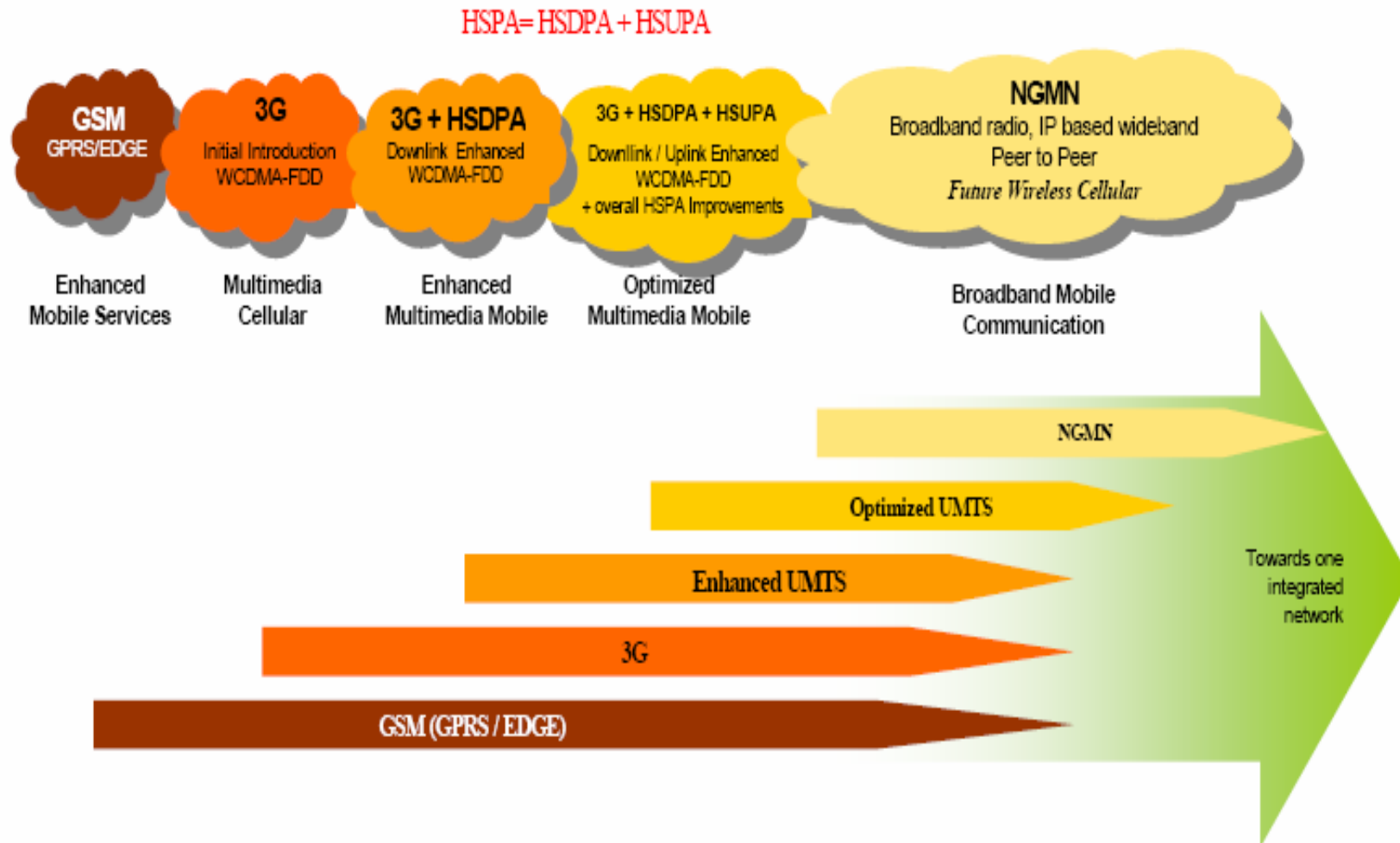
- **Speeds:**

- **W-CDMA:** Average 250-300 kbit/s, theoretical 2 Mbit/s
- **W-CDMA HSDPA:** Average 2 Mbit/s, theoretical 14 Mbit/s
- **CDMA 2000 1x:** Average 60-100 kbit/s, theoretical 153 kbit/s
- **CDMA 2000 1x EV-DO:** Average 400-800 kbit/s, theoretical 2.4 Mbit/s

next-generation mobile networks (NGMN)

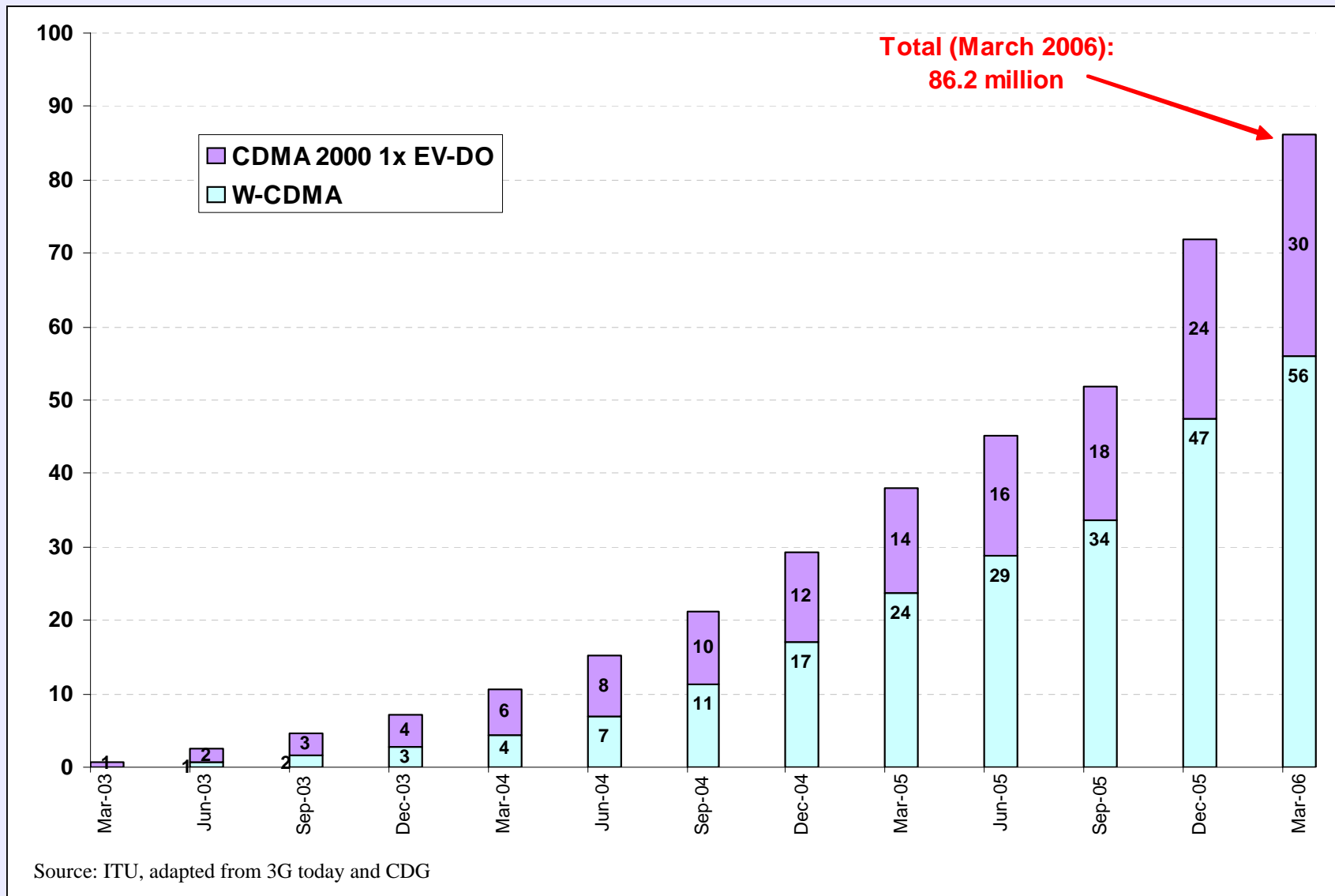
Year				
2002 - 3	2003 - 4	2005 - 6	2007 - 9	Next decade
64 - 144 kbps	64 - 384 kbps	0.384 - 4 Mbps	0.384 - 7 Mbps	20+ to > 50 Mbps

DL Throughput



Source: NGMN White Paper - T-Mobile, Vodafone, Sprint Nextel, KPN, Orange (March 2006)

growth in EV-DO and W-CDMA



Source: ITU, adapted from 3G today and CDG

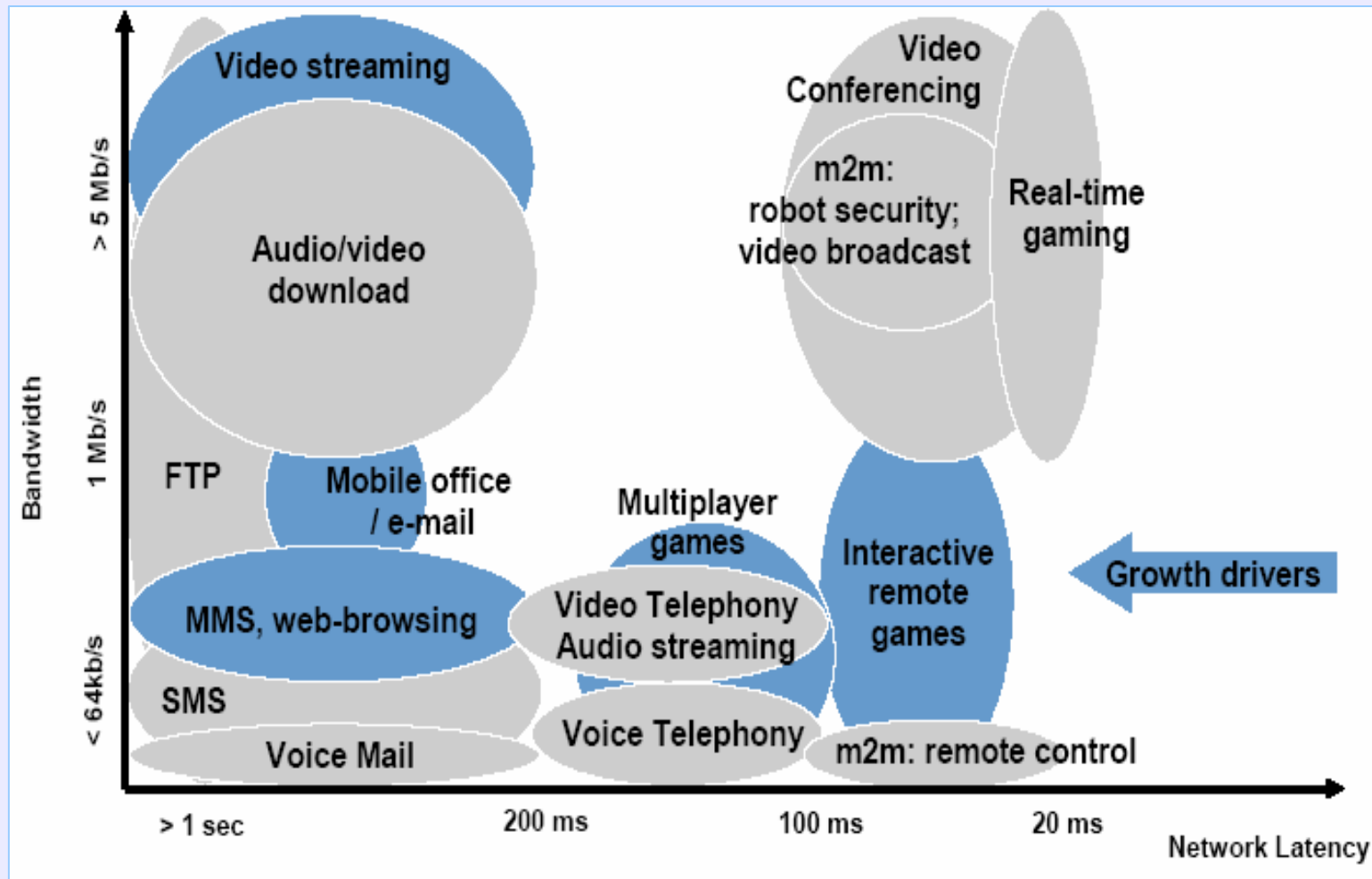
as high-speed mobile networks are deployed, services will diversify

e.g. on mobile phones:

- on the go information and web browsing
- audio/video streaming (e.g. mobile TV)
- audio/video download (e.g. mobile TV on demand)
- video telephony
- ticketing and transaction services
- multiplayer gaming

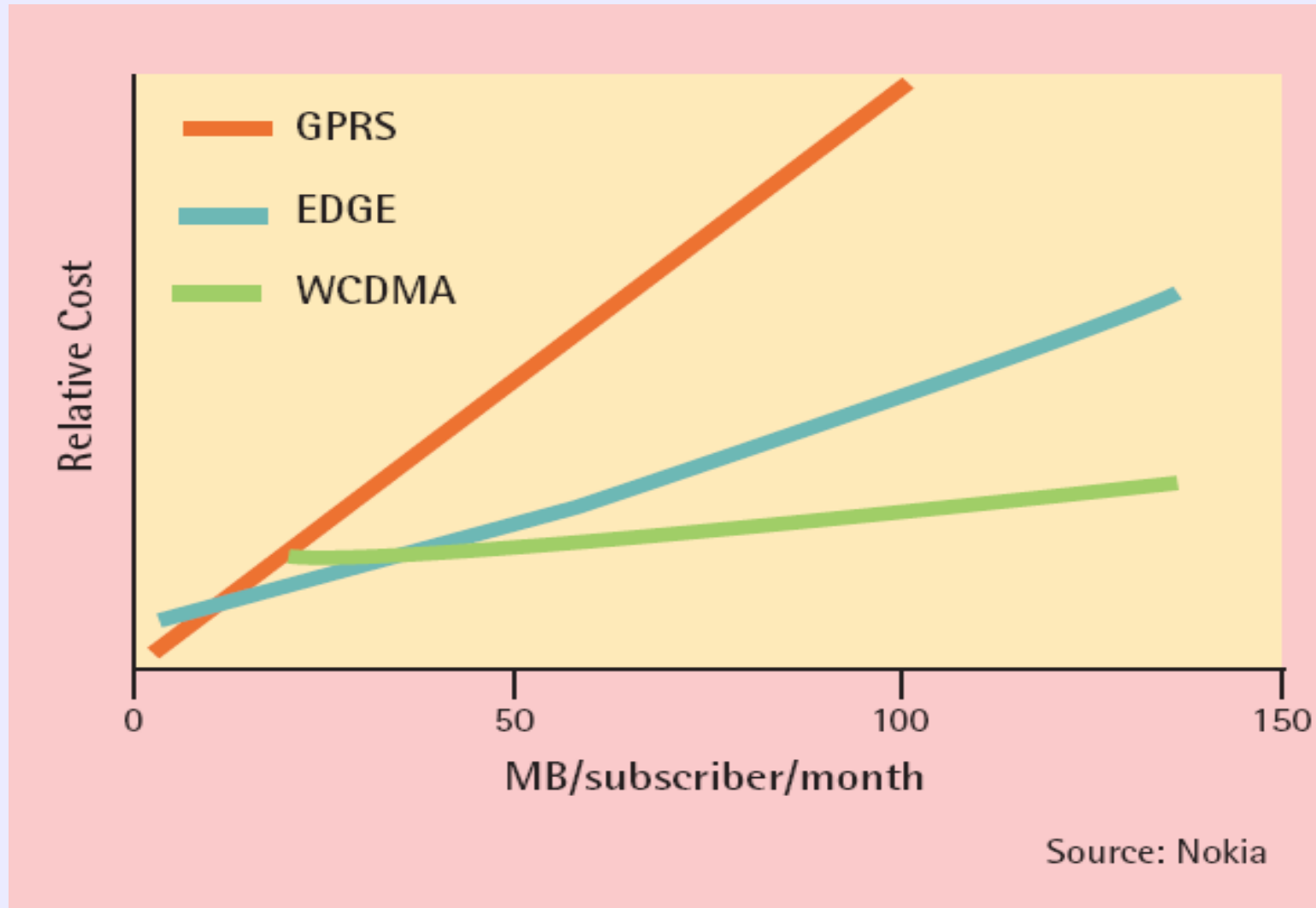


growth drivers, latency & bandwidth requirements



Source: WINNER,, Final usage scenarios. 30/06/2005; "Parameters for Tele-traffic Characterization in enhanced UMTS2" and University of Beira, Portugal, 2003, as cited by Siemens, NGMN Technical White Paper, 2006

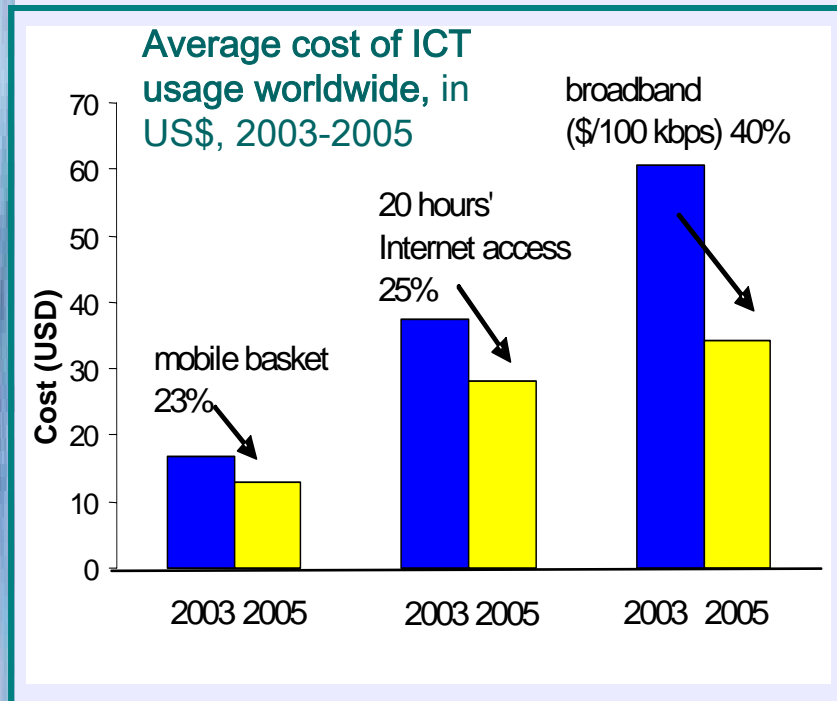
as the cost per MB drops...



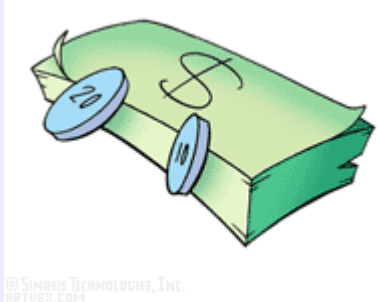
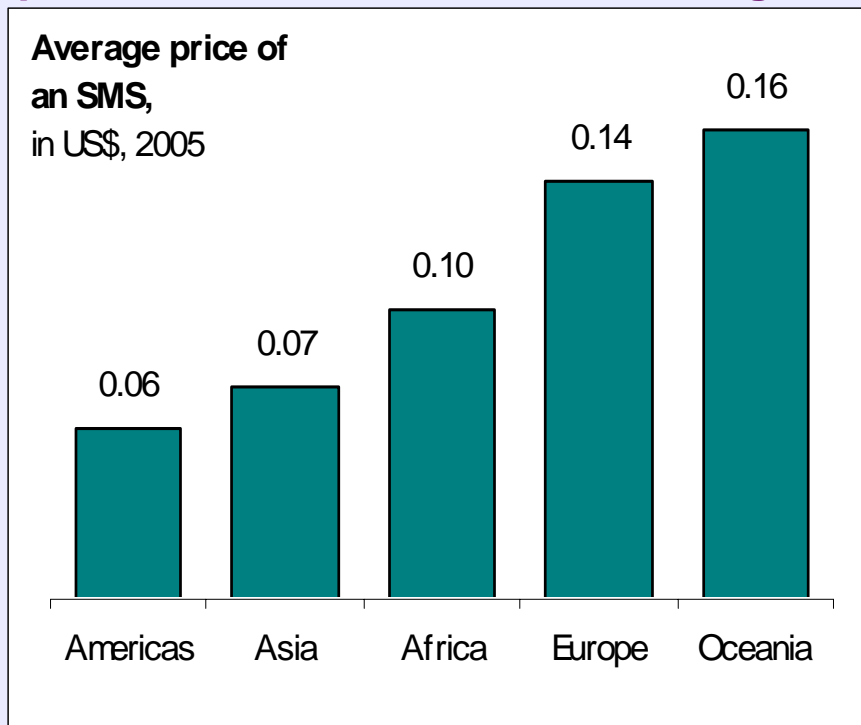
Source: Nokia, as cited by UMTS Forum

...who benefits?

price of mobile services hasn't decreased
at same rate as broadband, internet



cheap-to-produce services, e.g. SMS,
priced well-above cost in some regions

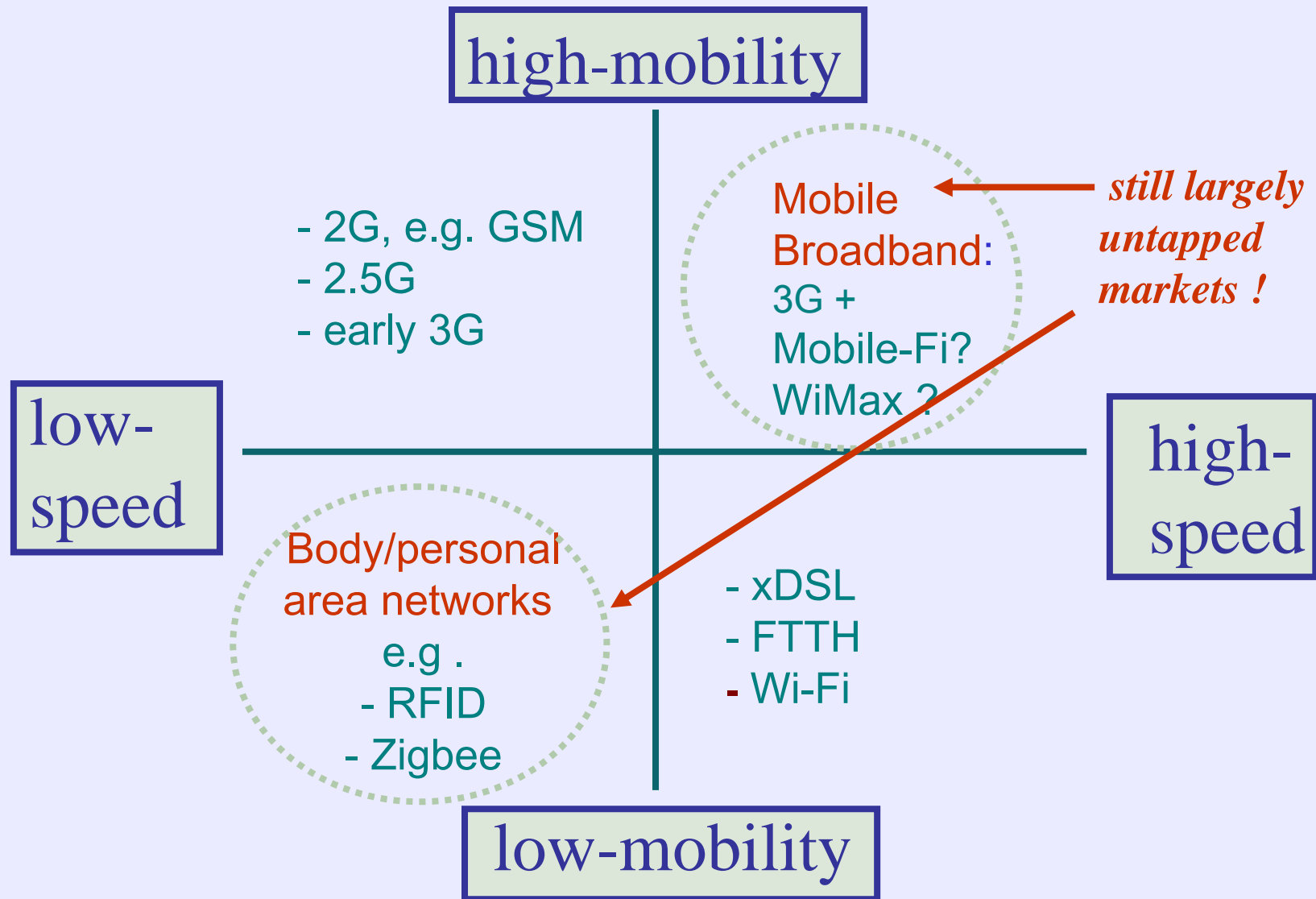


Source: ITU World Information Society Report

**more of the high-life:
high-mobility & high-speed**



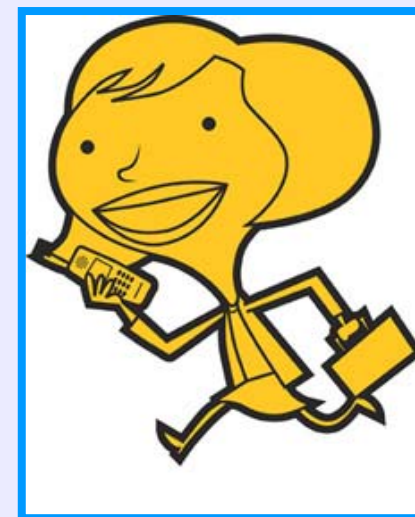
wanting it all...



higher mobility, lower speed been there, done that...

- **Early 2G**

- dominated by GSM
- characterized by fragmented market
- some information mobility, but limited in most markets
- Success story: Japan's i-mode & similar services
- Not such a success story: Early WAP in europe

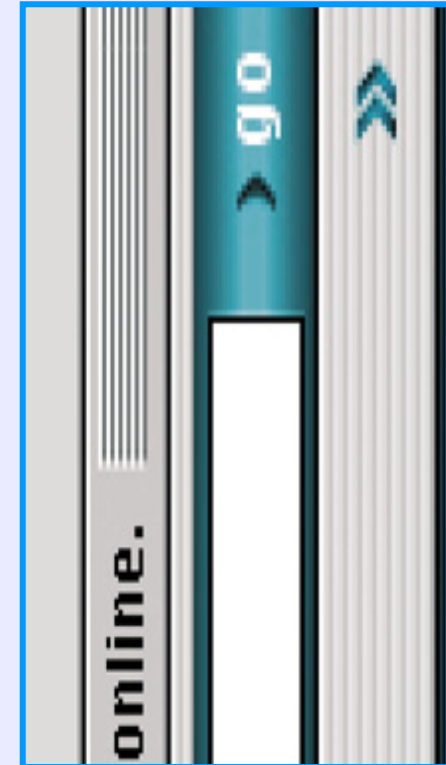


- **2G -> 2.5G -> early 3G**

- messaging goes mobile and multimedia
- increased accessibility, through e.g. services like Vodafone live!
- still limited in take-up

higher speed, lower mobility we know all about it...

- **“classic broadband” offers no mobility but high speeds**
 - Fibre technologies - FTTx
 - Digital subscriber lines - xDSL
 - Cable modem technologies
- **IEEE’s Wi-Fi (Wireless Fidelity), 802.11 series, offers limited mobility:**
 - Range is limited (100m) but speed is high (up to 11 Mbit/s).
 - Mostly for stationary environments
 - Advantages:
 - unlicensed spectrum
 - easy to deploy
 - Disadvantages: no dedicated bandwidth, security concerns, high power consumption
 - User base (2004): 115 million users worldwide, est.



higher speed, higher mobility: ...underlying the wireless broadband revolution

- **enhanced 3G**
 - HSDPA, 3G LTE,
 - CDMA 2000 1x EV-DV, EV-DO
 - NGMN...
- **802.16e or WiMax**
 - (Worldwide Interoperability for Microwave access)
 - higher capacity: max 70 Mbit/s over 50 km
 - Type of WMAN
- **802.20 also known as “Mobile-Fi”**
 - Optimized for high-mobility environments



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

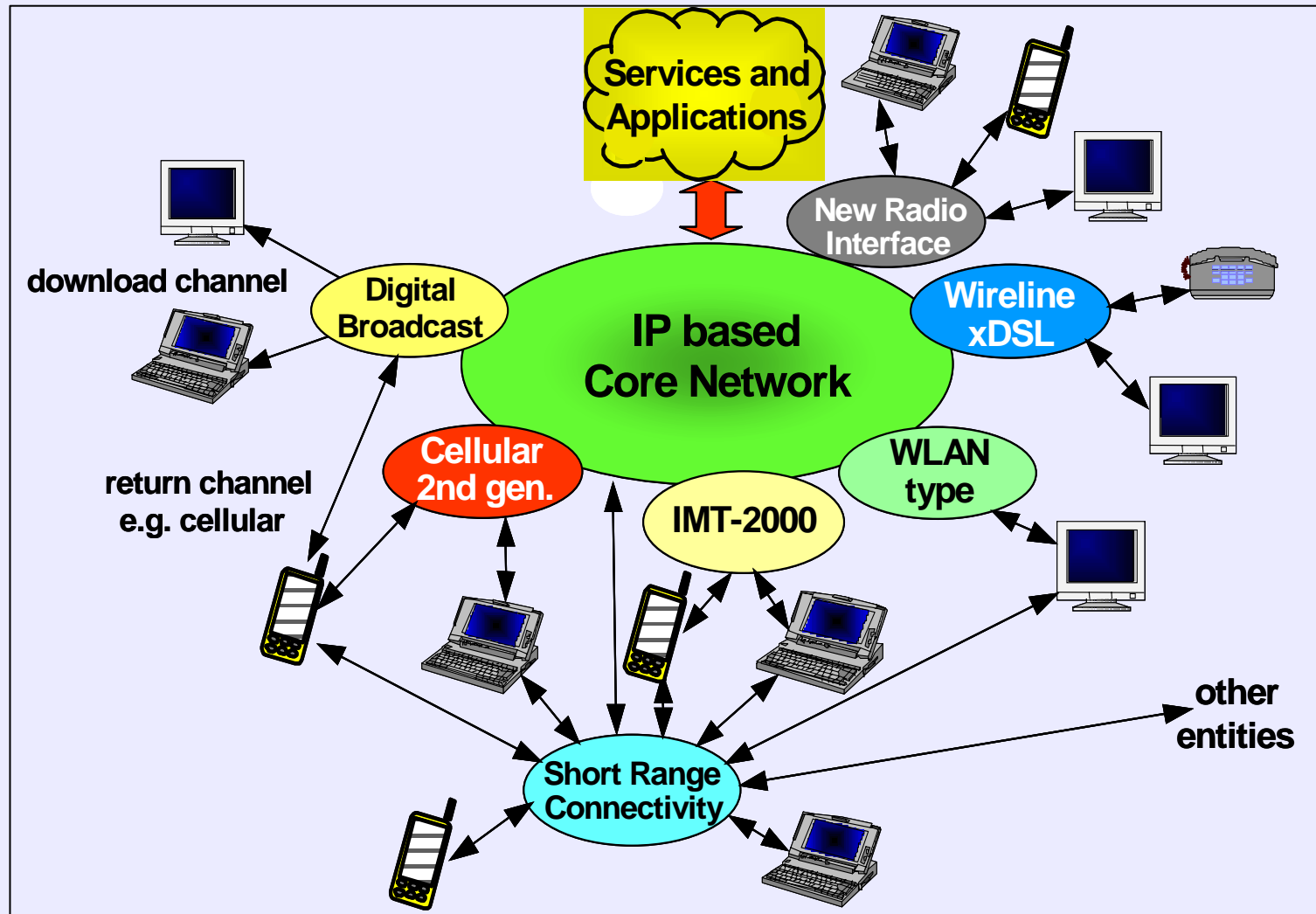
- *Economies of scale*
 - the relatively lower cost allows
 - 2 billion and growing
- *Wide Appeal*
 - young, old, male, female, rich, poor...
- *Size and portability*
 - Smaller than the laptop
- *Emotional Attachment*
 - many can't leave home without it
- *Fashion and identity*
 - Accessory, personal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



converging trajectories...

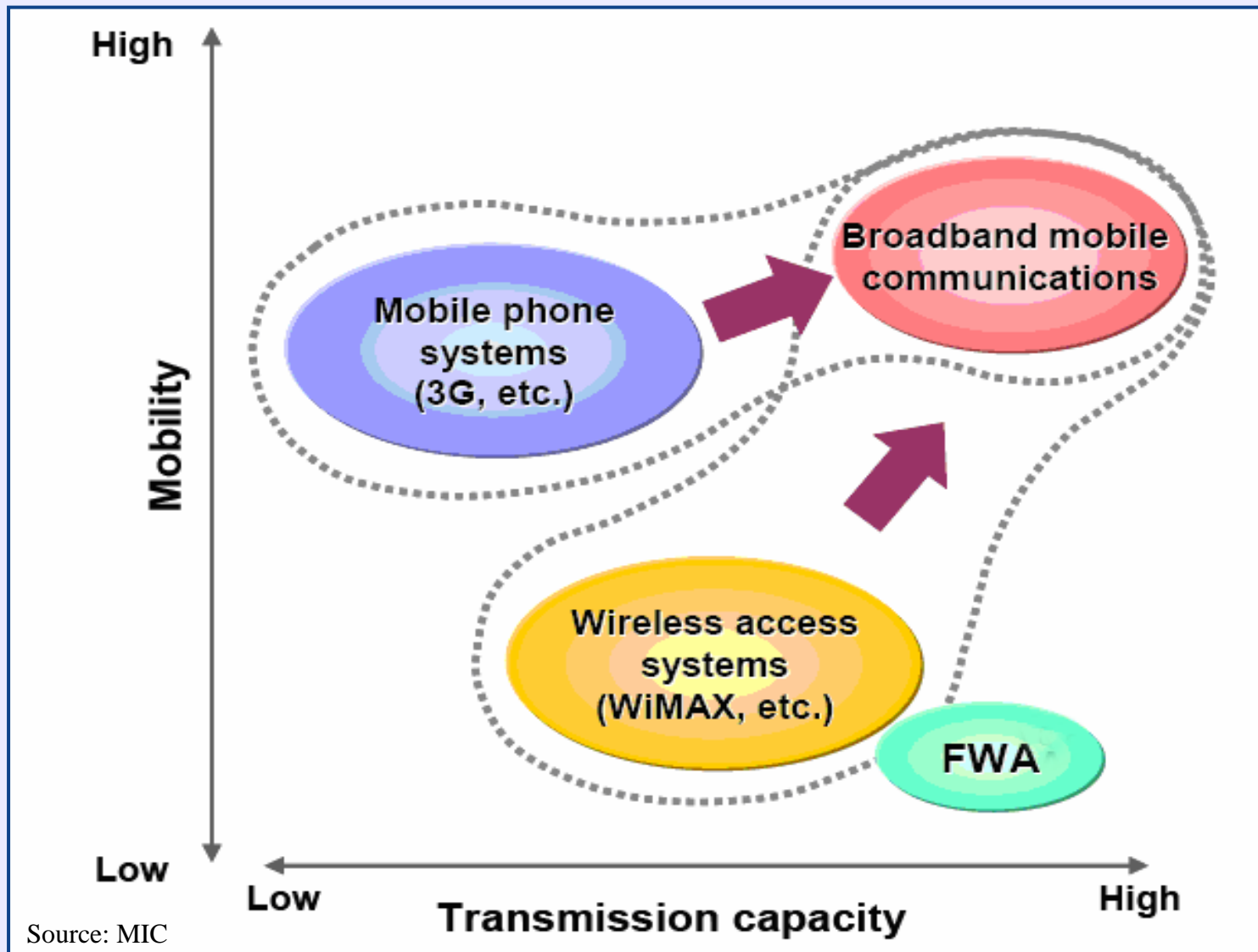


the original vision of IMT-2000...



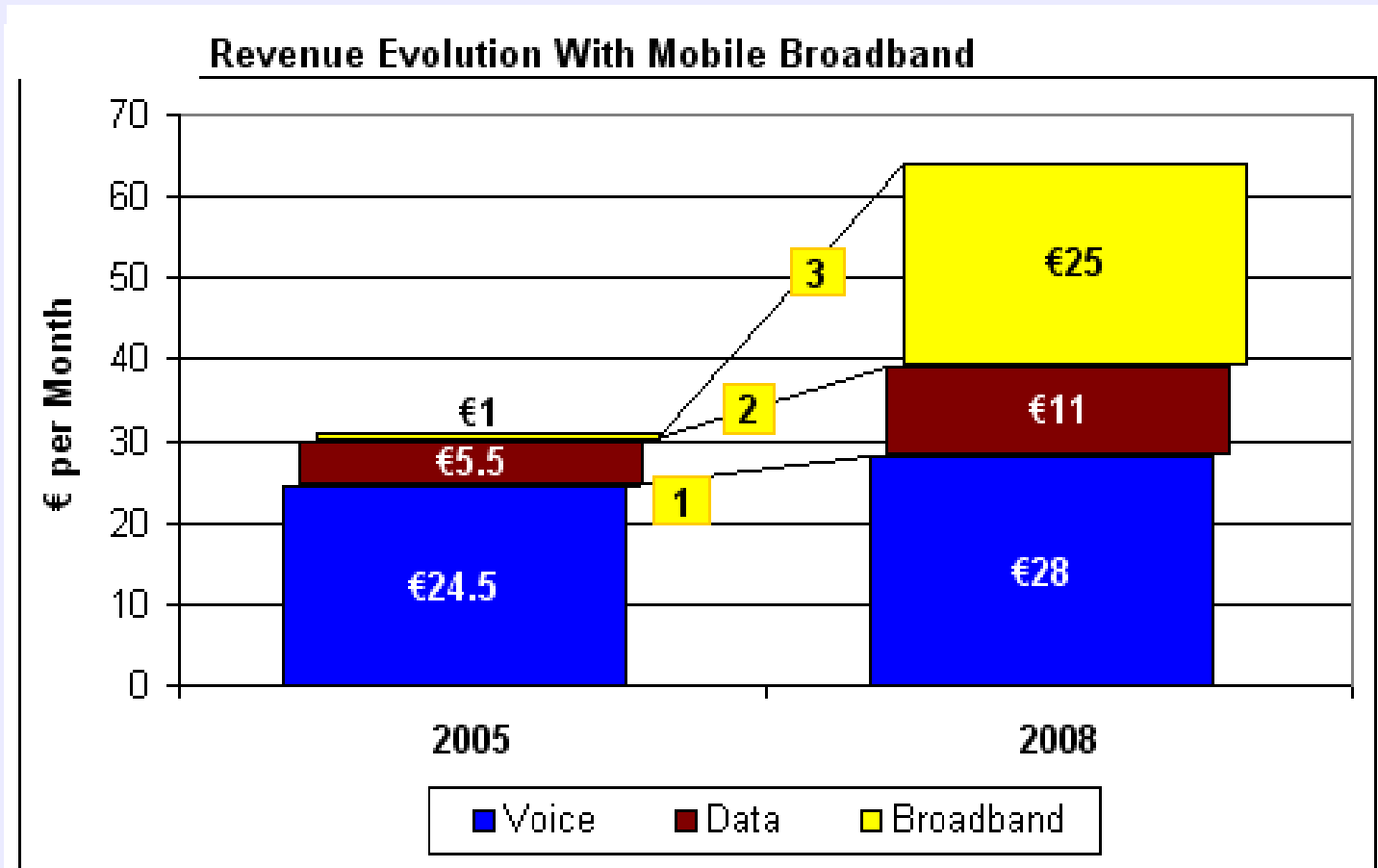
Source: ITU WP 8F

... first demonstrated a “converged” objective



Source: MIC

untapped markets, untapped revenue opportunities



Source: Unstrung Insider

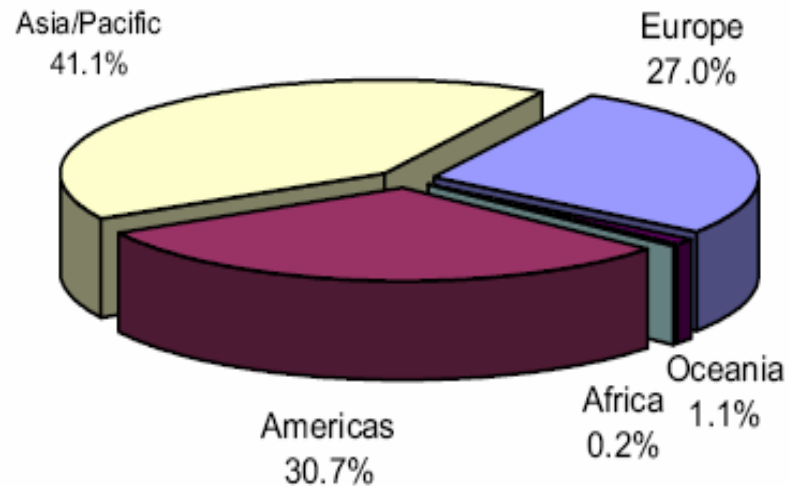
but it would seem that no one player can go it alone...

focus Asia



Asia-pacific region leads the pack in both mobile and broadband

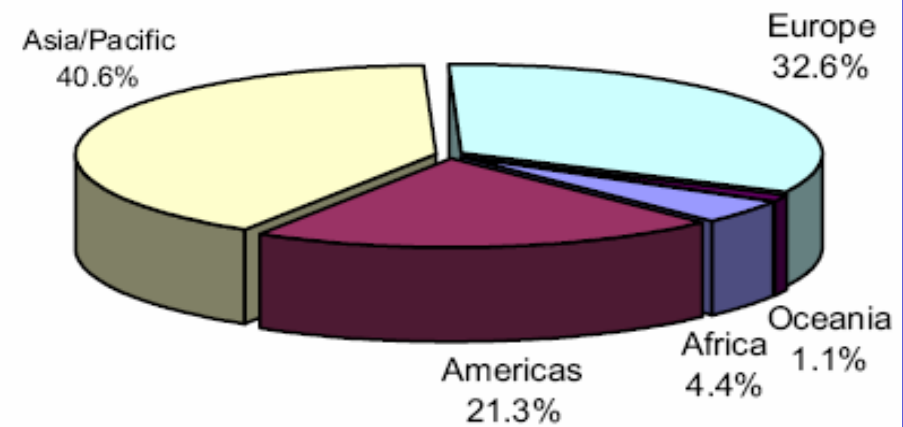
Broadband subscribers, by region, 2005



Source: ITU



Mobile subscribers, by region, 2005



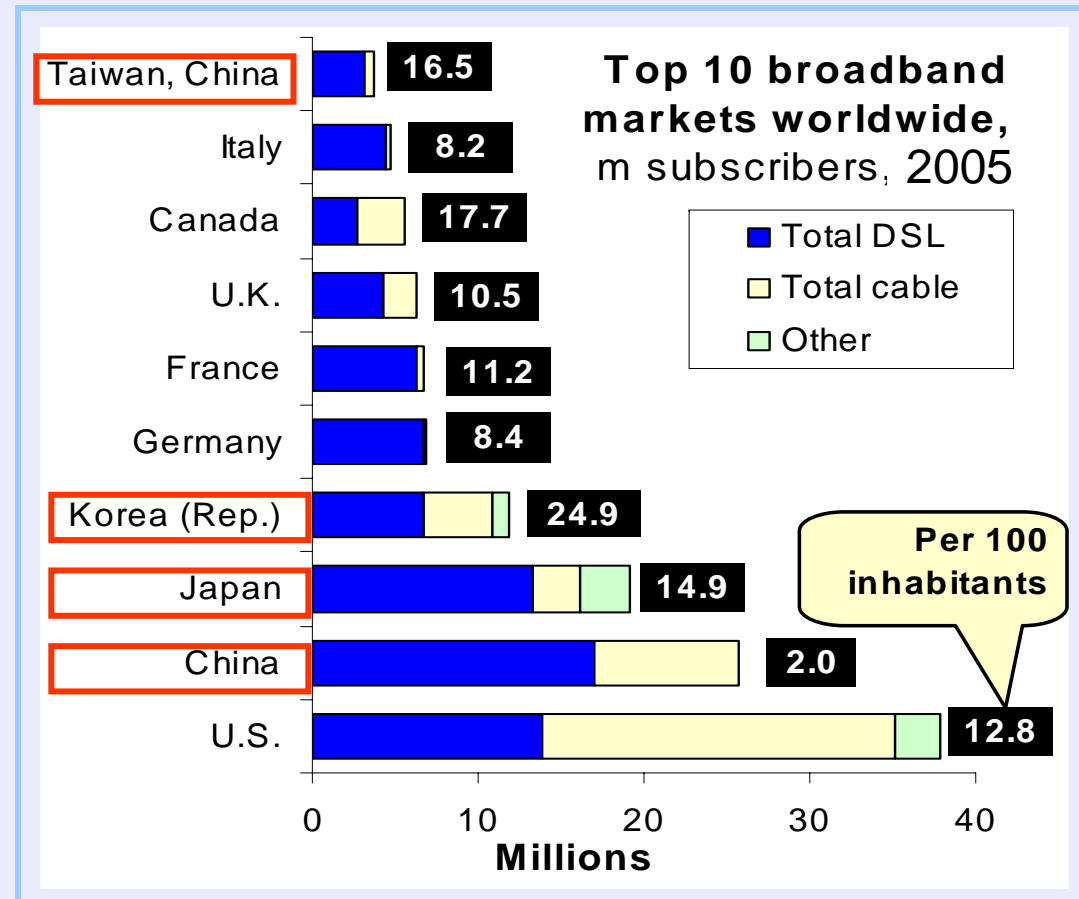
Source: ITU



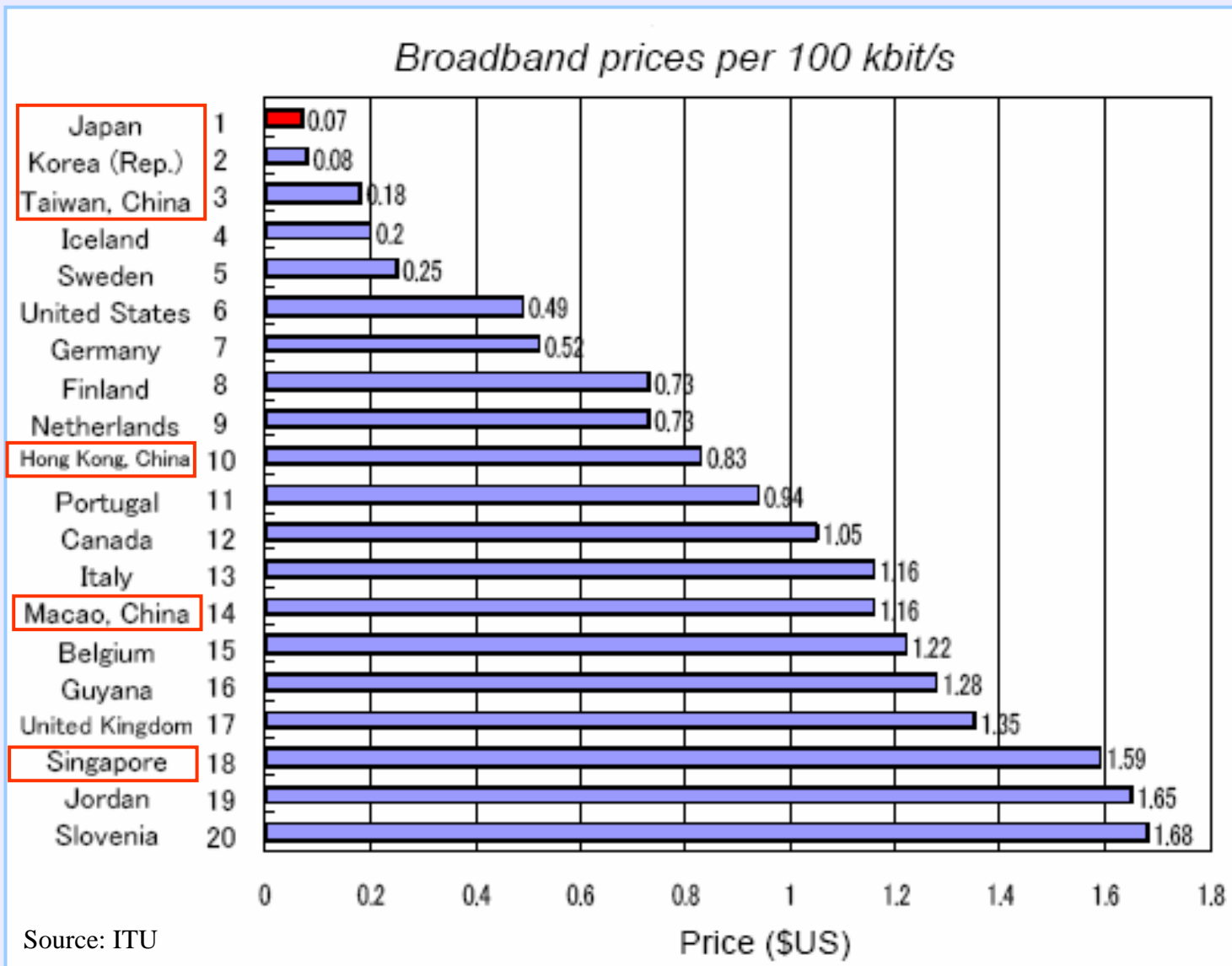
4 out of top 10 markets by total fixed broadband subscribers are in Asia

- total Asia-Pacific broadband access service market revenue, which was **US \$20.7 billion** in 2005, will reach **US \$55.1 billion** by 2011
[Source: In-Stat]

- in terms of revenues, market leaders are **Japan & South Korea**, contributing more than 60% of total revenue in 2005, followed by Hong Kong, Taiwan, Australia, and Singapore, contributing around 15%



and the region also leads in (fixed) broadband affordability



the wireless broadband market in asia

- the wireless broadband market in Asia is of course relatively small compared to e.g. the low-speed mobile cellular market (2G, 2.5G)
- however, both **CDMA2000 1x EV-DO** and **W-CDMA** were first launched in Asia, and as such Asia has a head-start in the mobile broadband space
- **WLAN**, like in many regions, is not growing as fast as was originally expected
 - 40,000 public hotspots in Asia/Pacific at year end 2004
 - Lack of viable business models
 - Focused on business user and high-data usage
 - Major driving factors for WLAN is government support, e.g. in the case of Korea (Seoul) and Taiwan (Taipei)
- Commercial **WiMAX** services are expected to be deployed 2007
 - But services similar to **WiMAX**, like WiBro in Korea, have already made their appearance

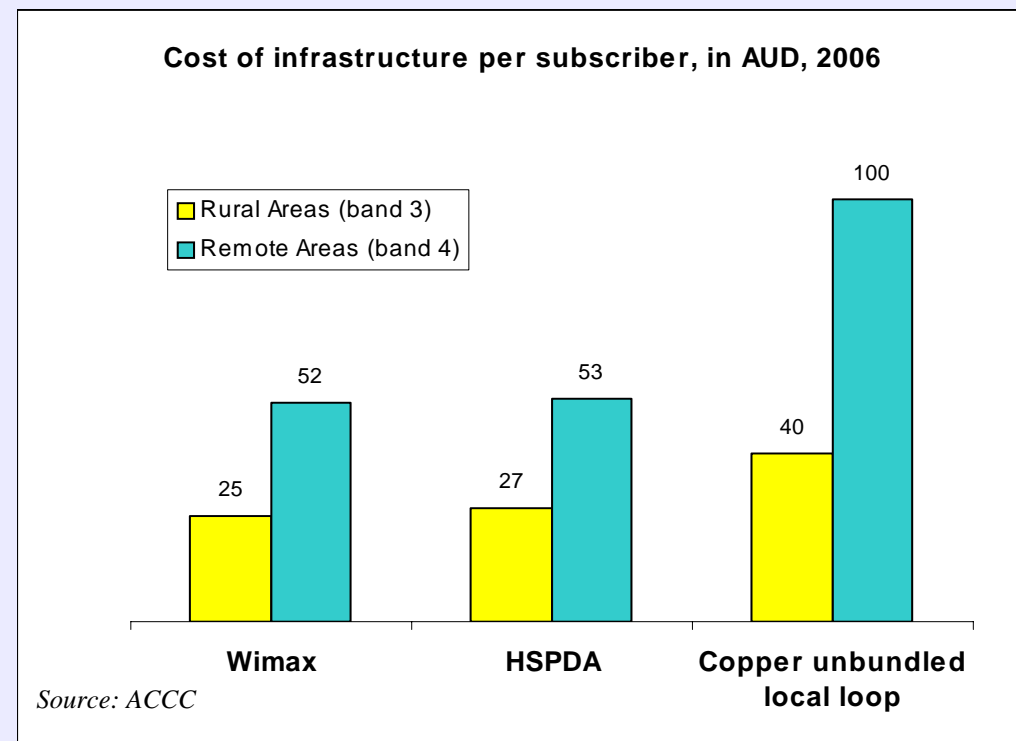
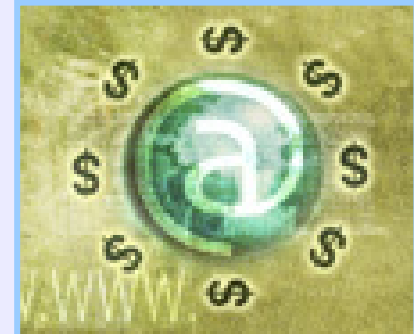
revenue potential and challenges for WiMAX

- Revenue in the WiMAX services market in 12 major Asia Pacific economies (Source: Frost & Sullivan), is forecasted to total **USD 165.3 million** by end-2006, and could reach **USD 5.4 billion** in 2010.
- Like in many other regions, economies in the region still face challenges in WiMAX deployment, due to, *inter alia*:
 - uncertain regulatory conditions;
 - strong commitment to 3G investments;
 - the “wait and see” approach adopted by many incumbent service providers in the region, in order to avoid duplication of existing broadband access infrastructure

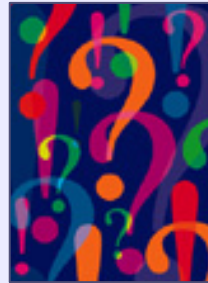
wait & see...

despite possibly lower roll-out costs

- **cost for deploying wireless broadband has been found to be lower** in some regions than fixed broadband
- e.g. a June 2006 report commissioned by Australian Competition and Consumer Commission (ACCC) concludes that both **3G HSDPA & WiMAX** → are cheaper options than copper for broadband, even in rural areas, based on Telstra's ULL prices which are claimed to reflect underlying costs



policy and regulatory priorities for wireless broadband



a favourable and enabling environment is required

- **Market liberalisation**

- Reducing barriers to entry, through market liberalization
- competition from new entrants to spur investment and innovation

- **Competition**

- A level-playing field should be ensured in which market forces can operate effectively
- no players should be driven out by anti-competitive conduct
- no class of operators should be unduly favoured or penalized
- In many economies, sector-specific regulation is giving way to greater reliance on gen. competition policy
- Access on fair terms and prices to all locations



a favourable & enabling environment is required (cont'd)

- **Predictable, transparent, consistent regulatory framework**
 - regulators and policy-makers should outline as clearly as possible their regulatory priorities and regime
 - An approach based on technological neutrality should be fostered
 - An assessment of availability based on market forces, in order to determine then need of government initiatives
 - provision of complementary government initiatives, e.g. wireless cities
- **Adequate investment in infrastructure, services and applications**
- **Targeted research & development programmes**
- **Public-private partnerships**

... but some specific challenges for wireless broadband must also be addressed

- **spectrum allocation**

- e.g. 3.5GHz band is the most widely available band allocated for broadband wireless access worldwide, except for US - but 3.5 GHz is mainly allocated to fixed services
 - so regulators are starting to revise their positions to allow portable services in a first step towards allowing full mobility at 3.5GHz
- line between 3G/4G environments and broadband wireless access is blurring and is set to converge
- availability of new bands?

- **licensing regimes**

- how to license future services? Who will provide services like WiMax:
mobile operators or fixed line providers? And why?

- **media convergence**

- how to regulate same services, different platforms (e.g. IPTV)

moreover, catering for a changing user...

The *World Summit on the Information Society* talked about a society in which everyone anywhere can “*create, share, access and distribute information*”

As such, today's user is evolving from:

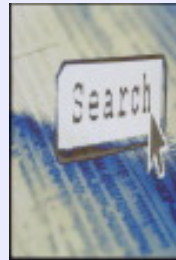
- from user to developer
- from observer to creator
- from follower to leader
- from consumer to producer
- from audience to player
- from reader to storyteller
- from a passive listener to active speaker
- from subject to participant



...may mean a re-visiting of content and identity management

- **affordability and availability**
- **content issues**
 - intellectual property rights and DRM
 - avoidance of Illegal/harmful content
- **data protection**
 - security and trust
 - privacy concerns (including freedom from interference)
- **digital identity management**
 - Who am I? Who are you? How can I be sure?
 - Rules for minimizing disclosure and allowing for anonymity and pseudonymity
 - thwarting fraud and cybercrimes like identity theft

a wireless world: concluding remarks

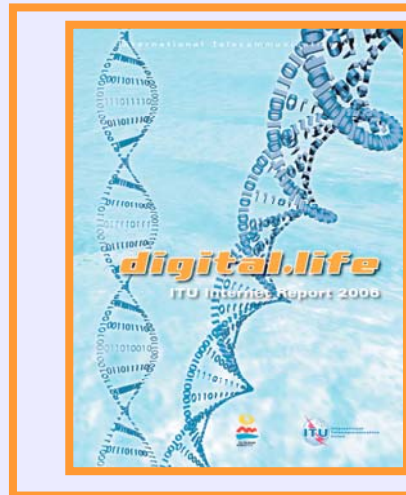


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“The man who removes a mountain begins by carrying away small stones”

- Chinese proverb



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