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Learning Initiatives on Reforms for Network Economies

# The Challenges and Opportunities of VoIP

**William H. Melody and Tim Kelly**

**LIRNEasia** Training Course on

**Strategies to Achieve Connectivity and Convergence**

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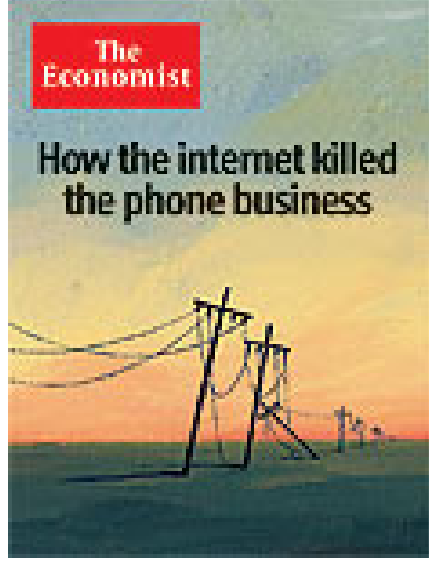
# VoIP: What is it?

- VoIP (or IP Telephony) is a generic term describing voice or fax carried over IP-based networks, such as the Internet.
- IP Telephony is important because:
  - In the short-term, it cuts the cost of calls, especially if routed over the public Internet
  - In the longer-term, telecoms carriers (telcos) are migrating their separate voice and data networks to converged IP-based networks
- Examples of IP Telephony Service Providers include Skype, Vonage, Net2Phone etc., but also BT, KPN, Verizon




# How the Internet killed the phone business

"It is now no longer a question of whether VOIP will wipe out traditional telephony, but a question of how quickly it will do so. People in the industry are already talking about the day, perhaps only five years away, when telephony will be a free service offered as part of a bundle of services as an incentive to buy other things such as broadband access or pay-TV services."

**The Economist, Sept. 17, 2005**

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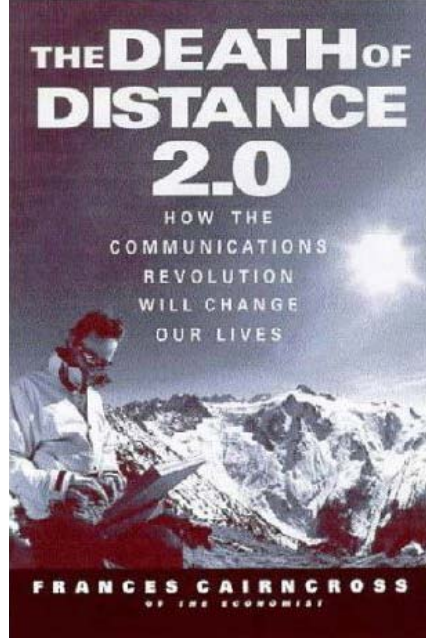
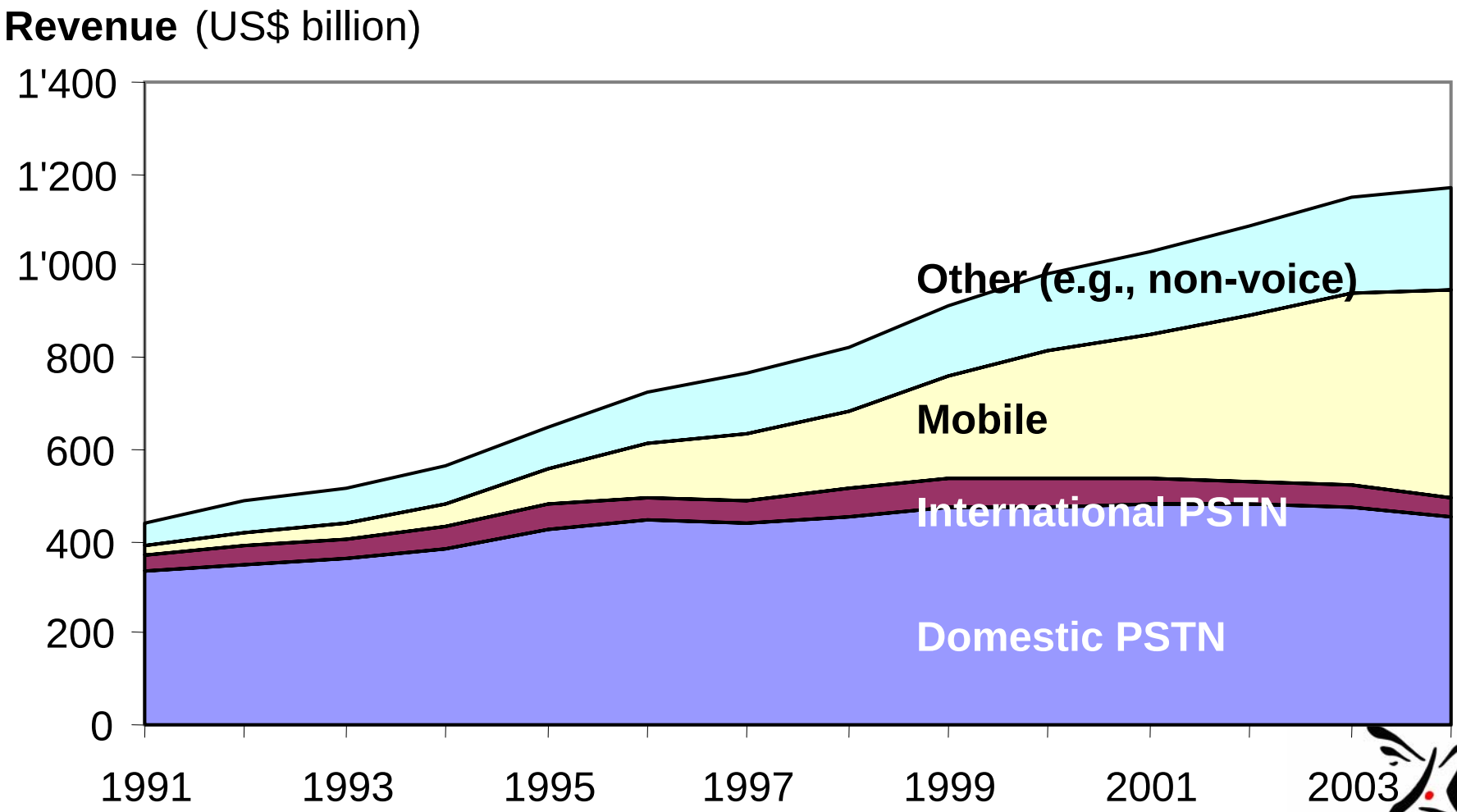
# Is the Economist Right?



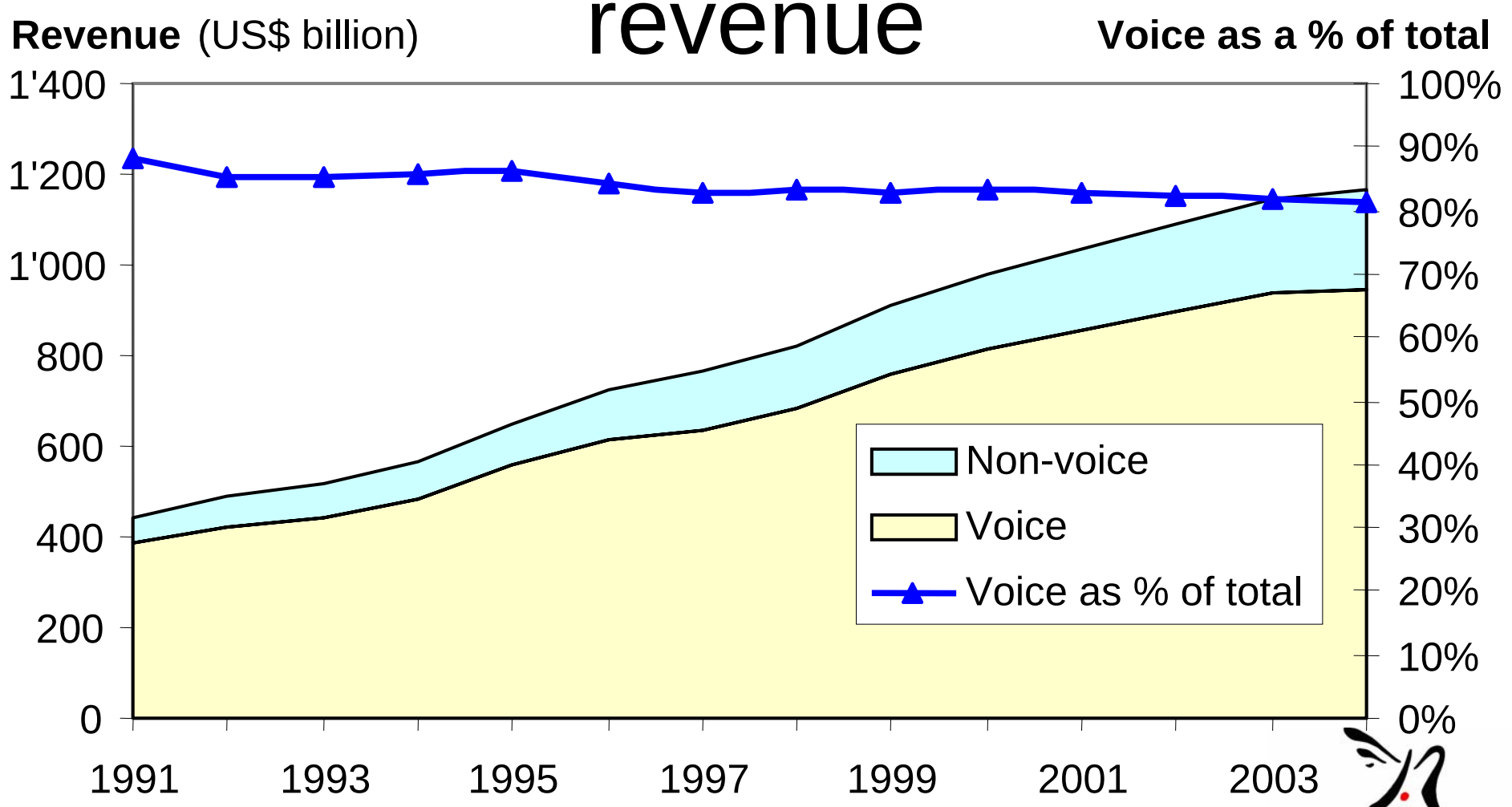

- In 1995 it predicted ”the death of distance”
- As Samuel Clemens (Mark Twain) ”reports of my death are premature!”
- But he died a few years later!
- The timing may be optimistic, but the direction is correct
- The speed and the benefits will be heavily influenced by regulation
- Telephony may be dying, but not ”voice”

# Long-term telecom revenue trends




*Source:* ITU Information Society Statistics Database.

# Voice revenues stable as % of total revenue




*Source:* ITU Information Society Statistics Database.

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# I think I'm losing my …

- Voice remains a trillion dollar business (fixed and mobile combined)
- Telcos still heavily dependent (e.g., Verizon US$75 bn revenues are 86% voice)
- Telco investment would be difficult to justify without voice revenues
- But, the "price per minute" business model is harder to sustain due to shift to higher capacity networks with flat-rate pricing
- VoIP on mobiles is what telcos fear most …

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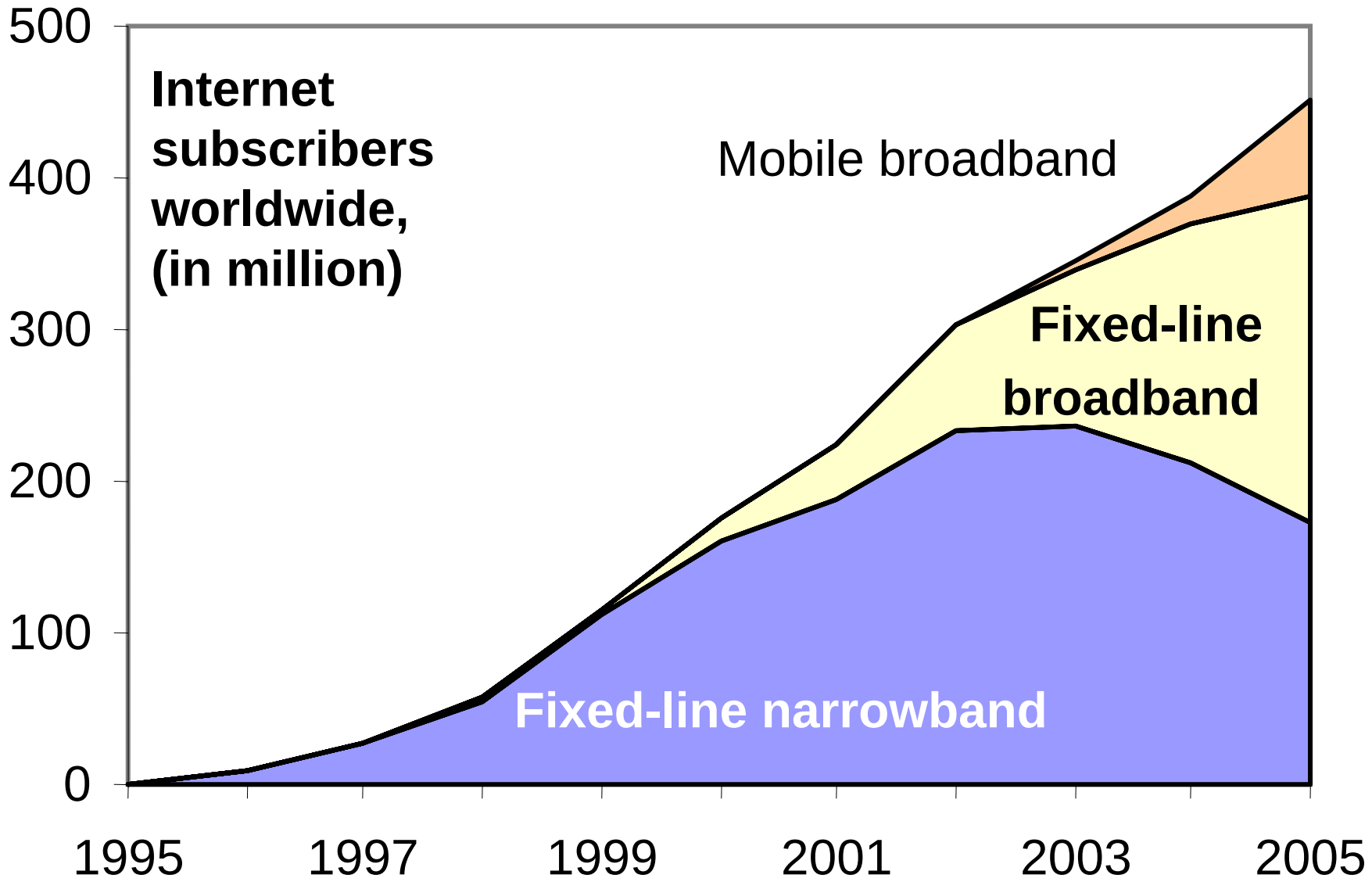
# VoIP or Everything Over IP?

- The gradual digitalization of the network has been a steady march to providing all forms of electronic communication over a compatible set of protocols, now called IP

- From terminals to transmission, switching and local distribution. Network protocols applicable to data, graphics, music, video and finally voice

- So, why are we surprised and poorly prepared for VOIP?

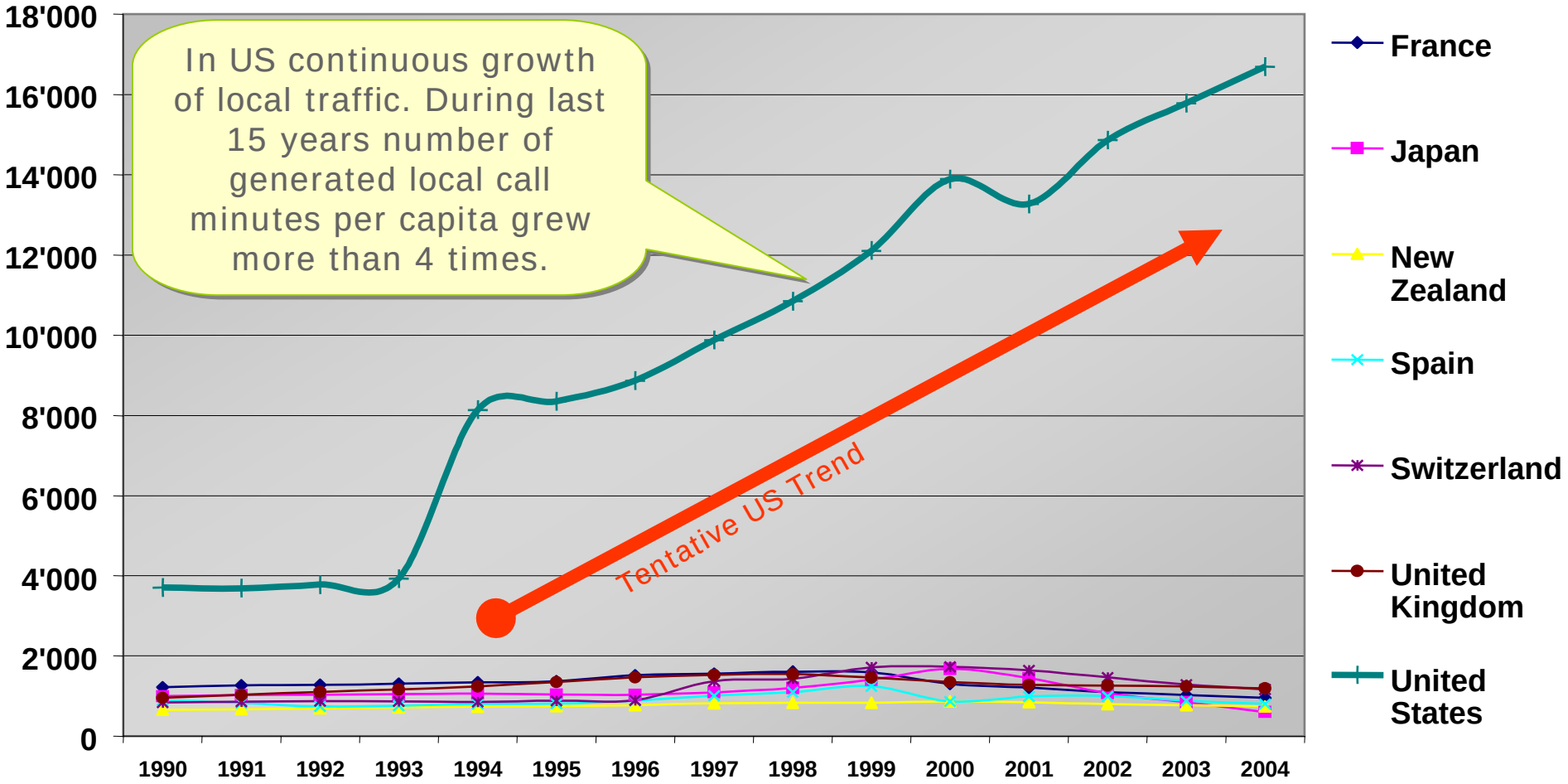
# From narrowband to broadband




Source: ITU Internet Reports 2006: *Digital.Life.*

# “Free” or unmetered calls remain very popular! (But US is odd one out)

Local Calls Minutes, per capita per year, in US and selected other economies

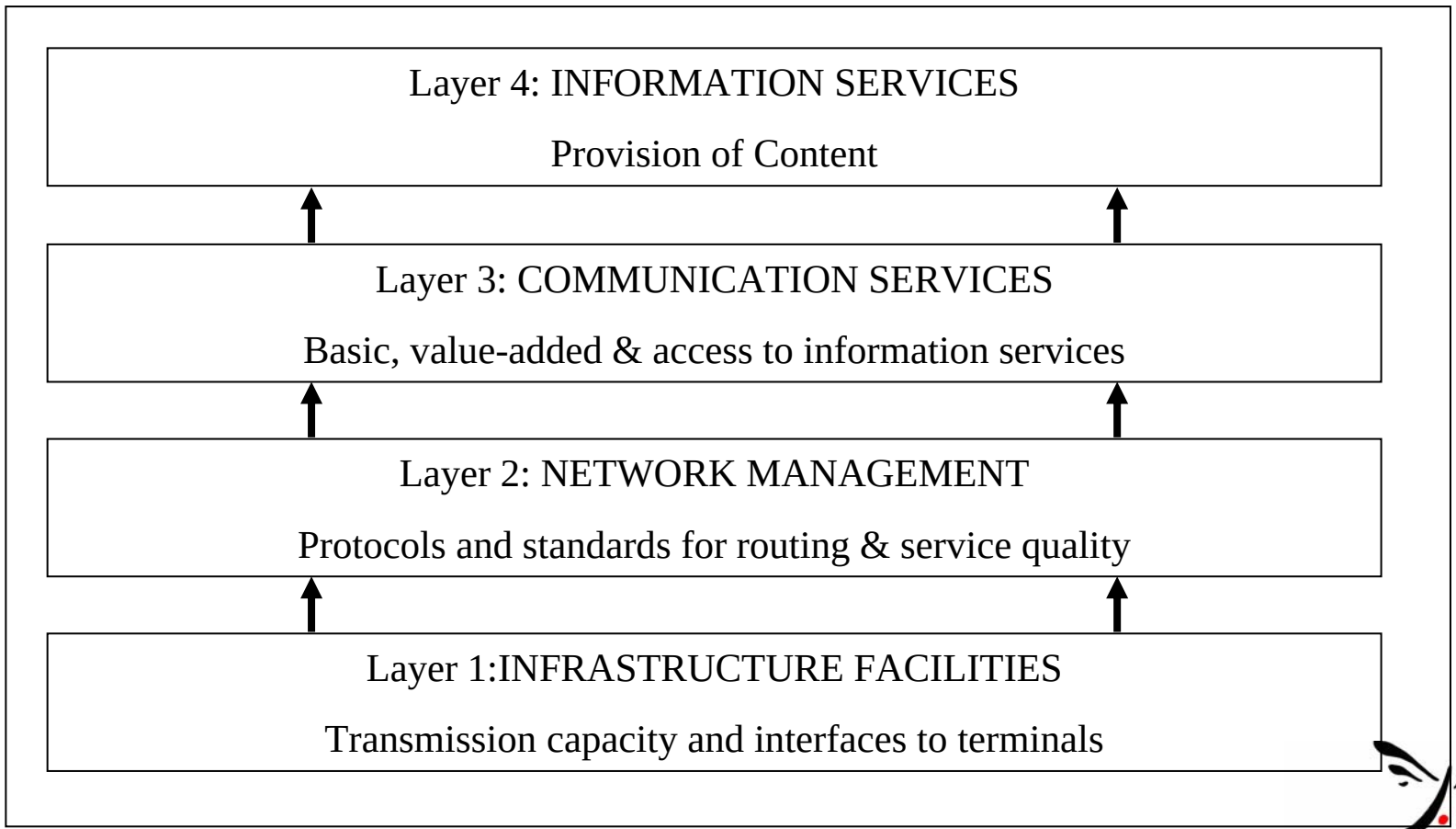



*Source:* ITU World Information Society Statistics

# Essential Characterictics of IP

- VoIP is a disruptive technology, threatening traditional revenues from public voice services
- It reduces costs dramatically for all services
- It provides for the integration of services, i.e., convergence
- It facilitates the application if IP services to a wide range of activities, e.g. E-commerce
- Biggest users are incumbent telcos
- But, neither Quality of service (QoS) nor security can currently be controlled as reliably as on traditional POTS network services

# IP is the Foundation of a Shift from Vertical to Horizontal Markets



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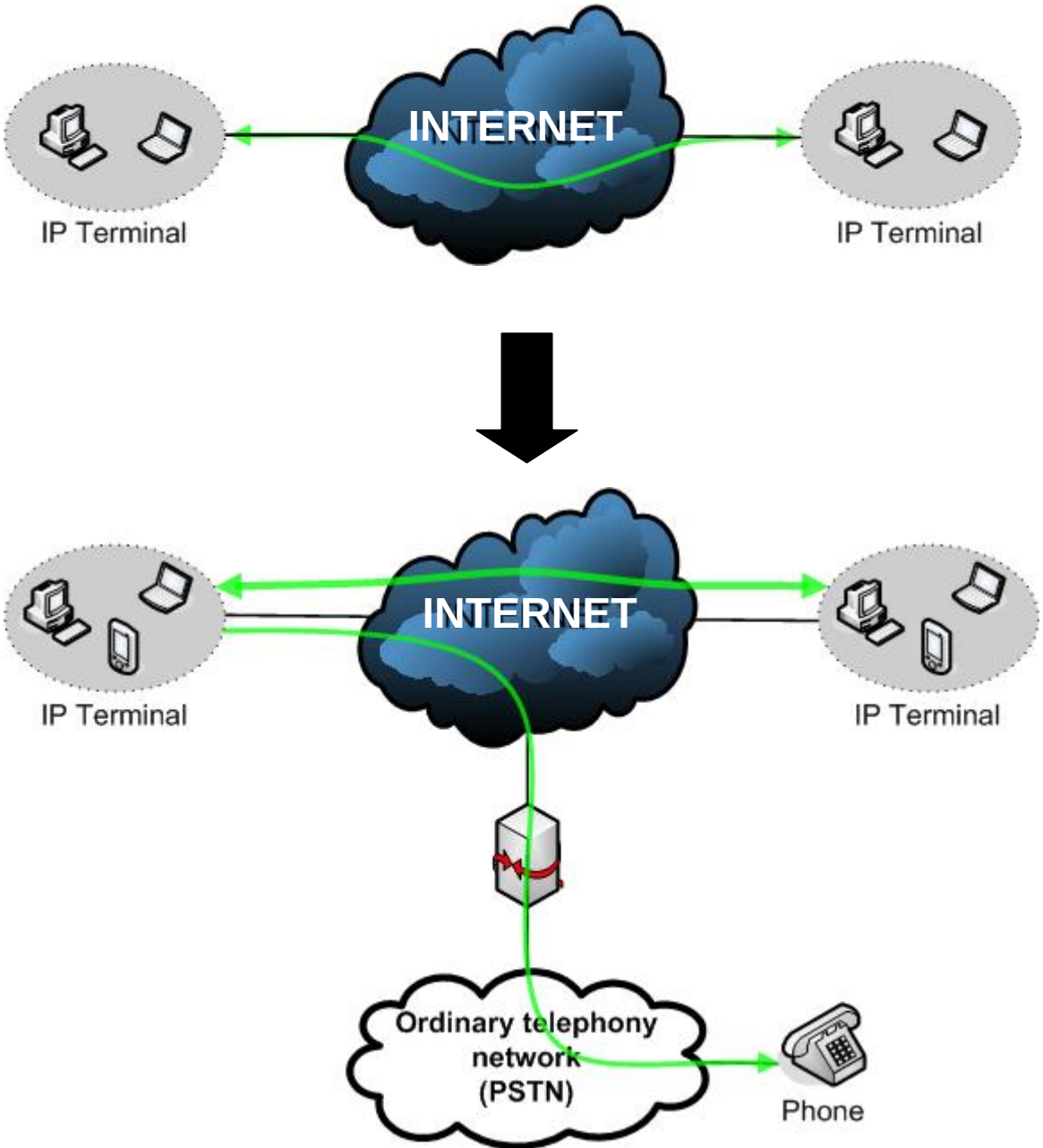
# Evolution of VoIP

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# The "third coming" of IP Telephony

- 1995-1999:
  - "Internet phone", offered primarily over the public Internet (e.g. FreeWorld Dial-up, DialPad)
- 2000-2002
  - "VoIP", offered as discounted telephony over IP-based networks (e.g. Net2Phone, iBasis)
  - Collapse of dot.com bubble left many VoIP companies struggling as incumbent PTOs also offered VoIP services or acquired VoIP operators (e.g. China Telecom, Teleglobe)
- 2003-present
  - "Voice over broadband", offered as free or flat-rate chat plus discounted calls to PSTN/mobile users (e.g. Vonage, Skype)
  - "Corporate IP", as users shift both data and voice to a unified IP platform

# VoIP as an Internet Software Application

- Simple to download
- Integrated with instant messaging (ICQ, Yahoo etc.)
- Shows status/availability of network users
- Can be connected to PSTN
- Integrated with gaming consoles (and WiFi) e.g. Nintendo, Xbox, Sony PSP
- Is VoIP a communication service or a software application?

# VoIP in a triple-play bundle: The example of Free.fr (Iliad)

- 29.99 Euros per month (US$40; SG$60)
- DSL Internet at 28 Mbit/s (down) 1Mbit/s (up)
- Unlimited VoIP calling to 49 countries worldwide (+domestic calls in France)
- 100 video channels (+ 150 options)
- But … only available in France

# Challenges for fixed network operators

- New carriers have lower cost structures
- Gradual Loss of traditional voice service revenue
- In developing countries:
  - Limited national network infrastructure
  - Lack of resources, skills and capital
  - “grey market” growing around restrictions
  - Bundling with broadband and video not financially significant yet
  - New IP-based services strengthen the economic justification for major network expansion
  - But incumbent operators are most unlikely to do it!

# Skype: Public VoIP Service

- Founded in August 2003
- Reported 9.5 Million users in first year
- Downloaded more than 300 million times
- Purchased by EBay in Oct 2005 for around US$4bn
- Around 10% of users based in US, but Poland and Israel have highest % of users
- More than 8 million subscribers using its service at any given moment

# Integrating Mobile Networks: (MoIP)

- Convergence: WiFi and 3G mobile networks
- Handsets being developed for smooth roaming between WiFi and 3G (e.g., Nokia E series)
- Increasing integration of mobile and fixed networks through IP services and applications

# Regulatory Issues

- Should VoIP be regulated? Why? What form of regulation is appropriate?
- Should some existing requirements of voice telephone services be abolished or changed?
- Should there should be regulatory forbearance to allow VoIP to develop in the market?
- What happens to telephone numbers?
- How can universal service obligations, emergency call features, lawful access etc. be achieved in this environment?

# Initial Responses to VoIP

- Some regulators have removed restrictions; in developing countries, most regulators have applied restrictions
- VoIP competition has reduced prices significantly
- In developed countries, incumbent operators response is to bundle:
  - National tariffs, but excluding fixed to mobile
  - DSL plus telephony (video etc.)
  - Offering in-bound numbers in other countries
- In developing countries, most incumbents have tried to restrict VoIP

# Regulatory treatment of VoIP, 2006

Explicitly banned (23 countries+)

Yet to be made legal "Twilight Zone of regulatory ambiguity"

Public Consultation (22 countries+)

"Under consideration" by gov't/regulator (30 countries+)

License required (26 countries+)

Explicitly deregulated or "light regulatory touch" (19 countries+)

Explicitly legal (57 countries+)

*Source:* ITU Telecom Regulatory Questionnaire, 2006

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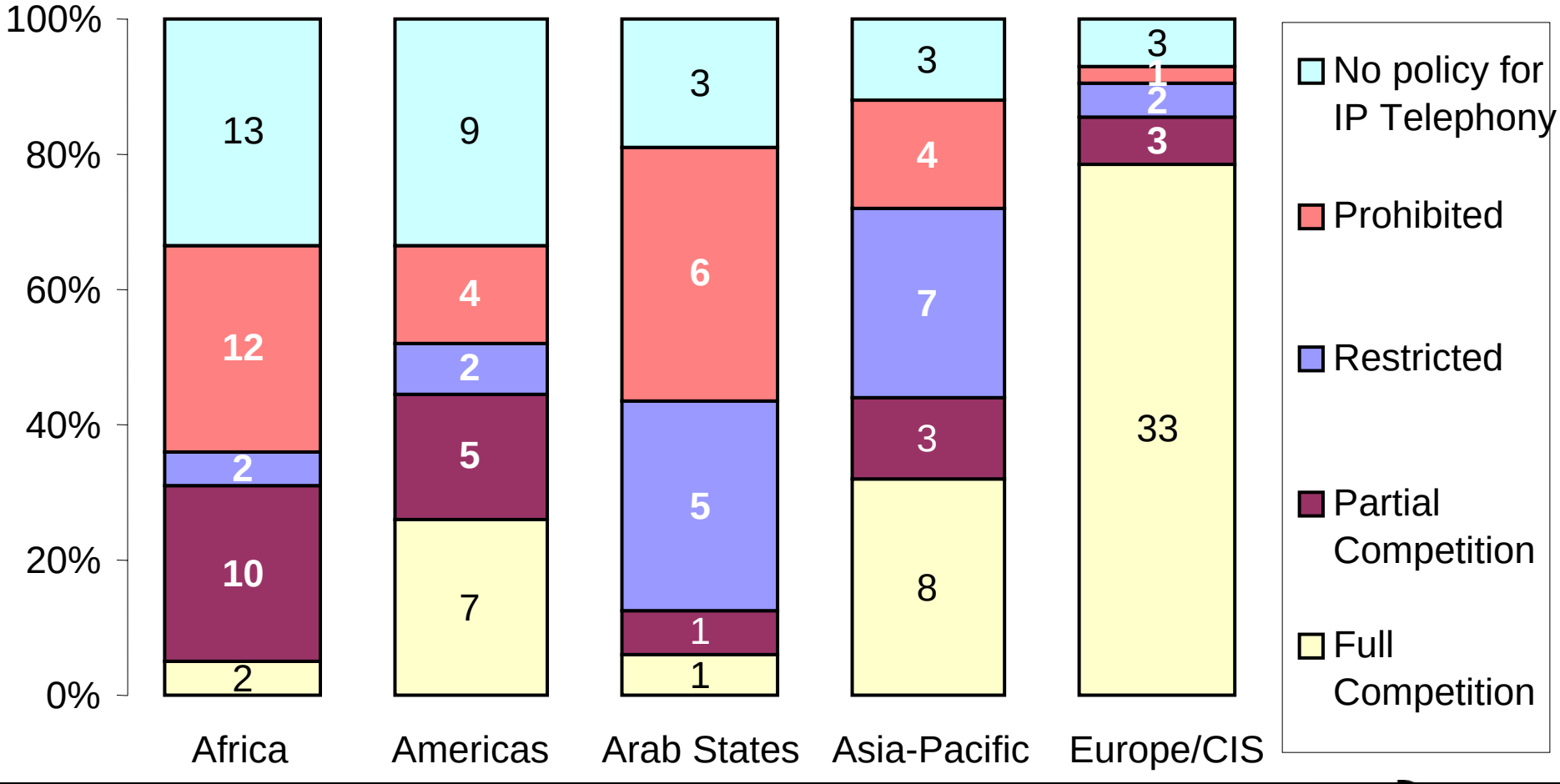
# Regulatory status of IP Telephony, 2005




***Note:*** **Based on responses from 149 economies. "Prohibited" = no service is possible. "Restricted" = only licensed PTOs can offer service. "Partial competition" = non-licensed PTOs may use either IP networks or public Internet. "Full competition" = anyone can use or offer service.**

***Source:*** **ITU World Telecommunication Regulatory Database (2005 questionnaire).**

# VoIP U.S.A.

- Supposedly a ‘light touch’ regulator, but
  - Contribution to universal service fund
  - Engineered to allow wire-tapping
  - Access to emergency services
- Call rates are not regulated
- On-going State-Federal dispute over ability to regulate and tax VoIP
- FCC has ruled against blocking VoIP
- Many legal challenges pending…

# Republic of Korea

- Telecommunications services divided into facilities based services and VAS
- VoIP has been classified as a facilities-based telecommunications service under the Telecommunications Business Act since September 2004
- Light regulation based on functional equivalence to traditional phone service

# Japan

- In 2000, Japanese Ministry (now MIC) introduced new rules on unbundling local loop and co-location
  - Rapid rise of DSL connections
  - Very low prices (<US$20 per month)
  - Service speeds in excess of 26 Mbit/s
- Yahoo BB! Entered marked in September 2001 with bundled DSL and VoIP
  - MIC defined numbering plan (prefix 050) for VoIP, allowing calls to be received on PCs
  - November 2002, >7m VoIP numbers allocated to ISPs
  - VoIP development consortium worked with MIC to establish standards for QoS, interconnection, tariffs, number allocation etc.

# India

- Deregulated IP telephony on 1 Apr. 2002
- DOT gave permission (Mar. 2005) to 121 ISP to provide internet telephony services
- Internet voice calls permitted using PCs between terminals using SIP and H.323.
- Both PCs in India and phones outside India
- TRAI has not prescribed QoS for VoIP
- Unified licence scheme would not restrict VoIP, provided it is offered by operators with a duly registered licence

# Other Asian Countries

- Indonesia: Five licences issued authorizing “Internet telephony for public services”
- Thailand: CAT has sole authority to use VoIP, employs for long-distance calls
- Vietnam:  Permits outbound PC-PC Internet based calls, prohibits inbound internet phone calls

# Challenges to Security

- Emergency Services:  Access and location information
- Personal/Corporate security
  - Denial of Services attacks
  - Viruses, worms, trojans etc.
  - SPIT – Spam over Internet Telephony
- Law enforcement
  - Lawful access (wire tapping)
  - Data preservation/retention

# VoIP and numbering

- There is no “geography” in an IP network (e.g., VoIP routes calls to Orange VoIP customers in Netherlands routed via Paris)
- A typical Skype address (e.g., “TimKellyatWork”) is geographically vague
- Should users be allowed to have geographically-independent telephone numbers?
- Is Skype a “terrorists charter”?

# VoIP and traffic prioritisation

- In an IP network, VoIP traffic tends to get auto-prioritised (because jitter, packet loss and lag makes the call incomprehensible)
- Should carriers be allowed to prioritise traffic streams? (Network neutrality debate)
- VoIP could be a big winner or big loser if traffic prioritisation becomes more widespread

# Consensus Predictions

- IP will provide a major boost in economic productivity and will enable local innovation: Most future networks will be IP-based
- VoIP may stimulate network development and significantly expand universal service coverage (affordability)
- Voice connectivity will continue to drive communication technologies; but our expectations regarding QoS and reliability will change
- Greater emphasis on flat rates for consumers to get access to services and service packages (bundling)
- Move toward the “Any device, Any place, Any network” communication model
- Regulation, particularly in developing countries, is more likely to be a barrier to, rather than a promoter of VoIP services and applications

# Conclusions

- Variety of approaches on regulating VoIP, some facilitating and some restricting its development
- Concerns relating to VoIP really relate to 'convergence' generally. VoIP is really "Everthing over IP"
- Regulating market entry through VoIP may act as a barrier to greater investment in IP networks
- IP Telephony can be a way of promoting greater affordability
- It presents unique challenges and opportunities for developing countries, especially telecom regulators
- Major regulatory issues raised by VoIP: market, entry, numbering, universal service, traffic prioritisation (net neutrality), VoIP on mobiles

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# Further Information

- Melody, W. Sutherland, E. & Tadayoni, R. (2005) **Convergence, Internet Protocol Telephony and Telecom Regulation**: ***Challenges and Opportunities for Network Development with Particular Reference to India.*** www.infodev.org/files/2476_file_WM.
- "**Future of voice**", ITU New Initiatives workshop, 15-16 January 2007, proceedings, chair's report, regional case studies, thematic papers and webcast available at: http://www.itu.int/spu/voice
- Biggs, Phillippa (2006), "**The status of VoIP worldwide**" (47pp) at: http://www.itu.int/osg/spu/ni/voice/papers/FoV-VoIP-Biggs-Draft.pdf

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