

The Challenges and Opportunities of VoIP

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VoIP: What is it?

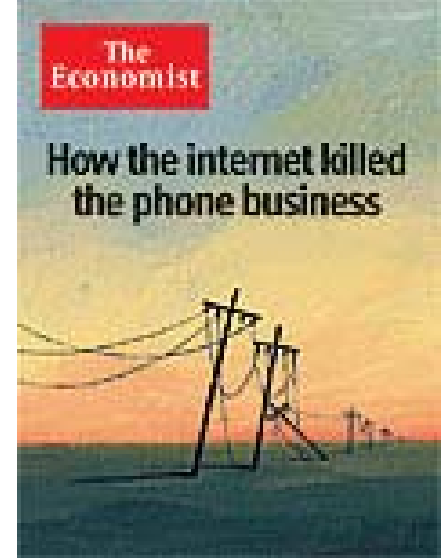
- VoIP (or IP Telephony) is a generic term describing voice or fax carried over IP-based networks, such as the Internet.
- IP Telephony is important because:
 - In the short-term, it cuts the cost of calls, especially if routed over the public Internet
 - In the longer-term, telecoms carriers (telcos) 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

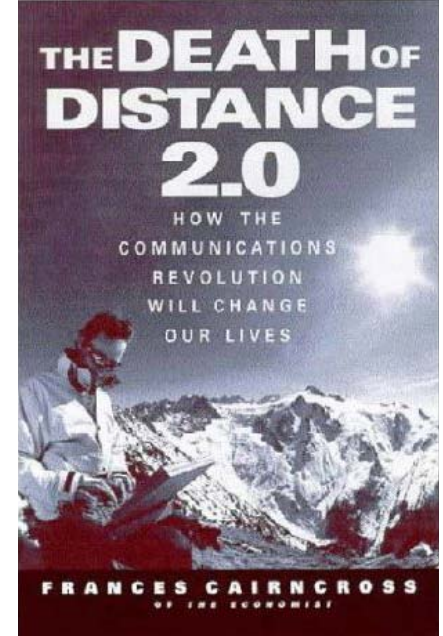
“It is now no longer a question of whether VOIP will wipe out traditional telephony, but a question of how quickly it will do so. People in the industry are already talking about the day, perhaps only five years away, when telephony will be a free service offered as part of a bundle of services as an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

The Economist, Sept. 17, 2005



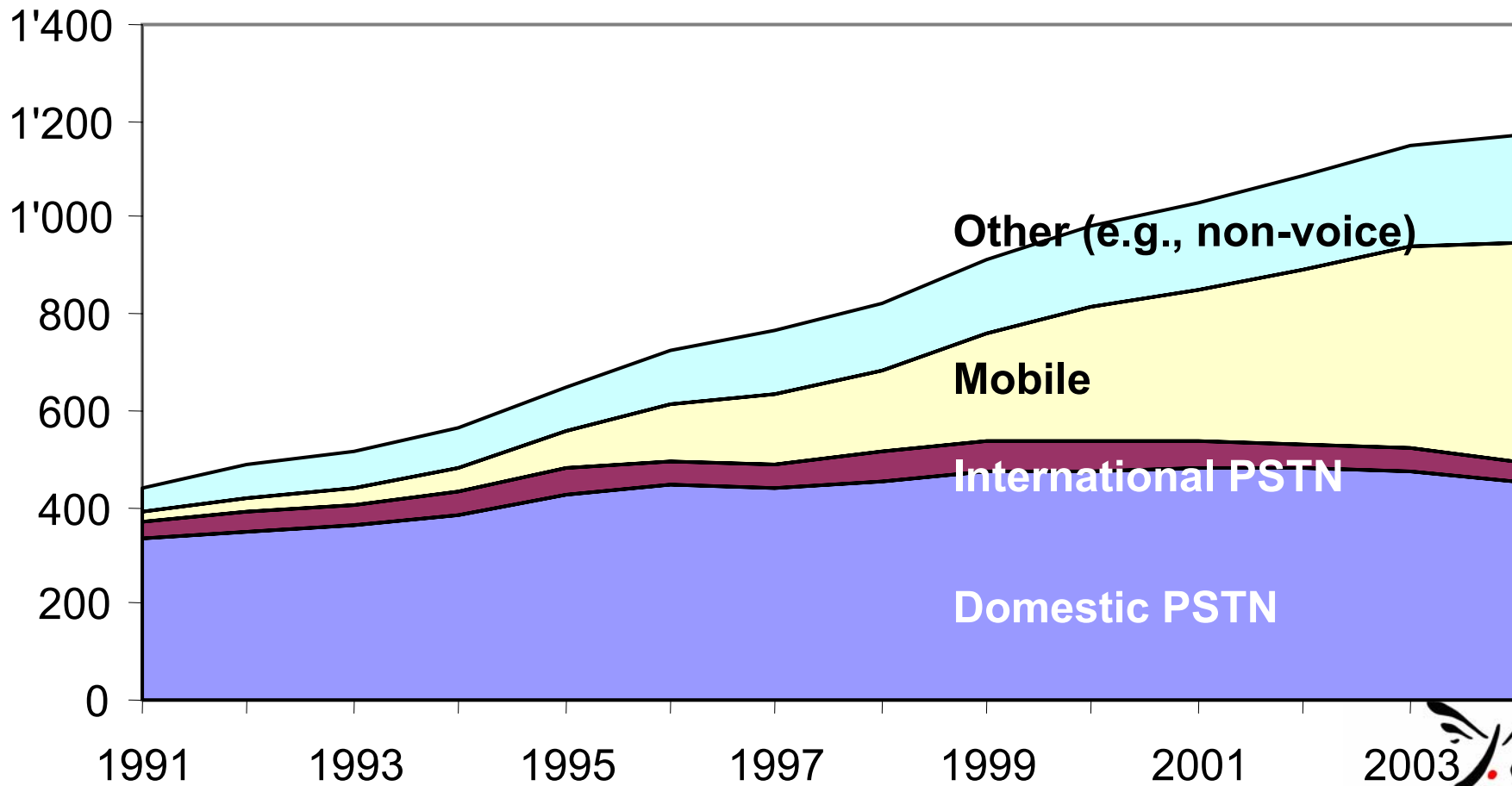
Is the Economist Right?

- 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"**

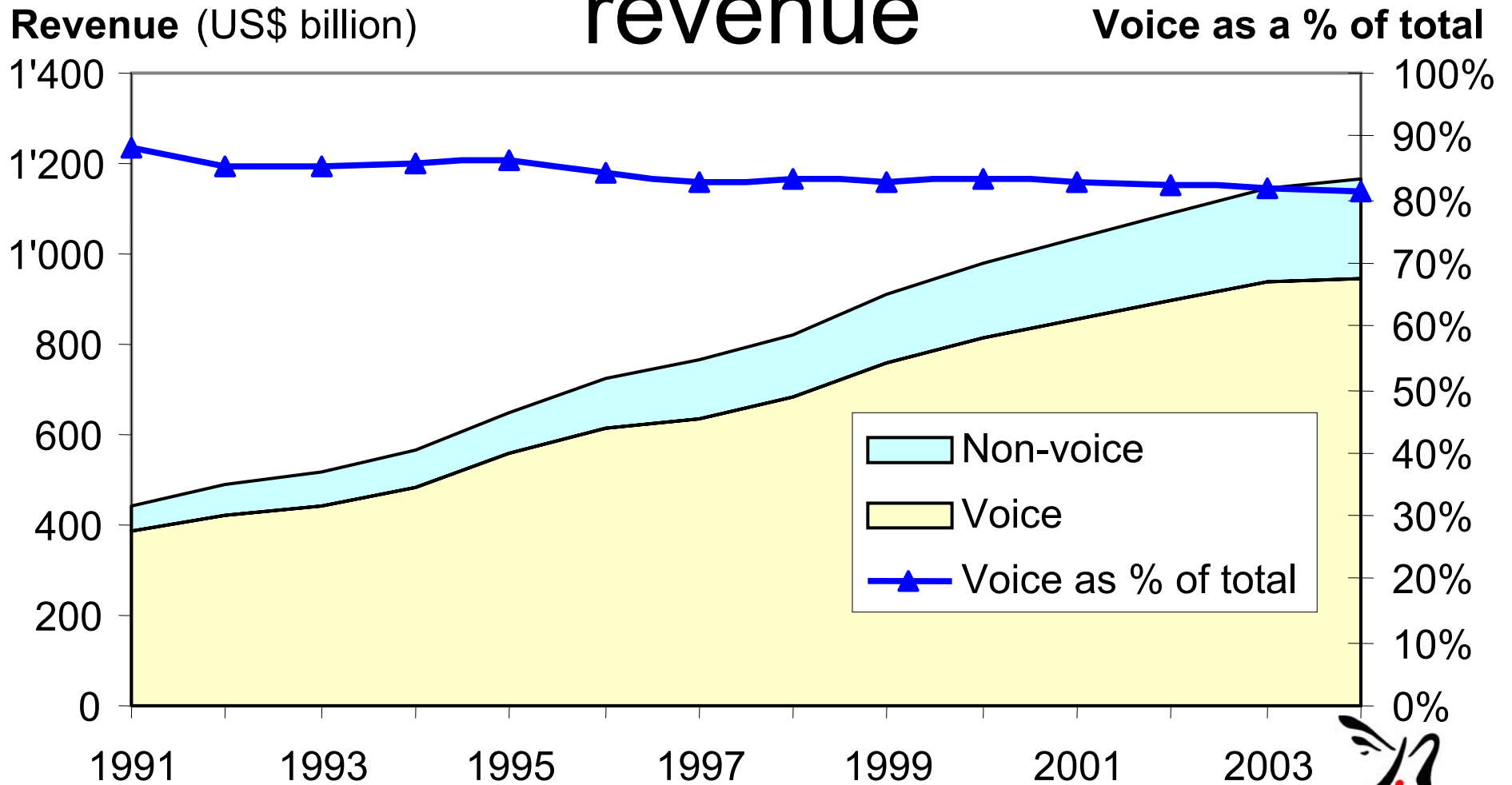


Long-term telecom revenue trends

Revenue (US\$ billion)



Voice revenues stable as % of total revenue



I think I'm losing my ...



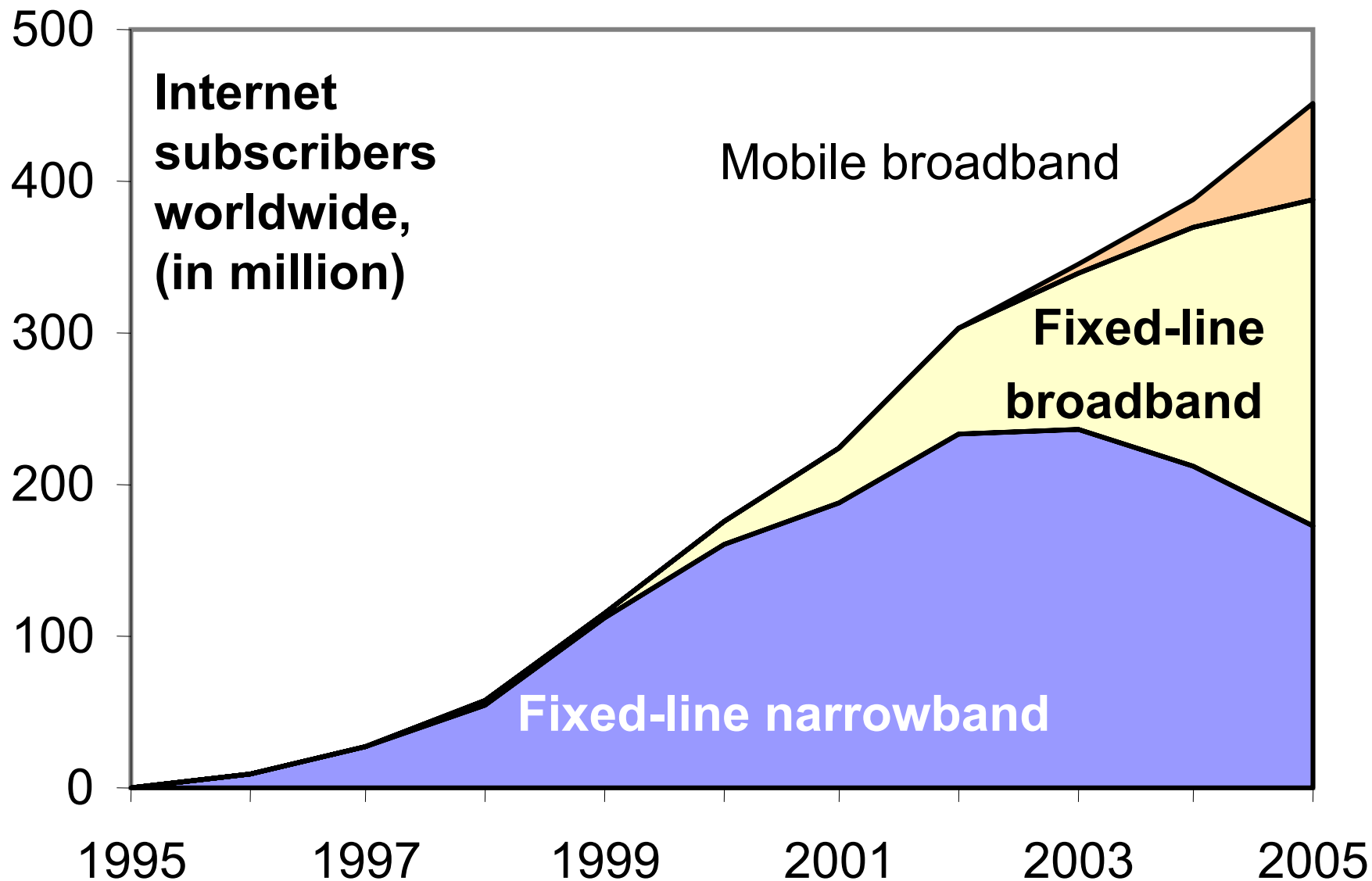
- Voice remains a trillion dollar business (fixed and mobile combined)
- Telcos still heavily dependent (e.g., Verizon US\$75 bn revenues are 86% voice)
- Telco investment would be difficult to justify without voice revenues
- But, the “price per minute” business model is harder to sustain due to shift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

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?

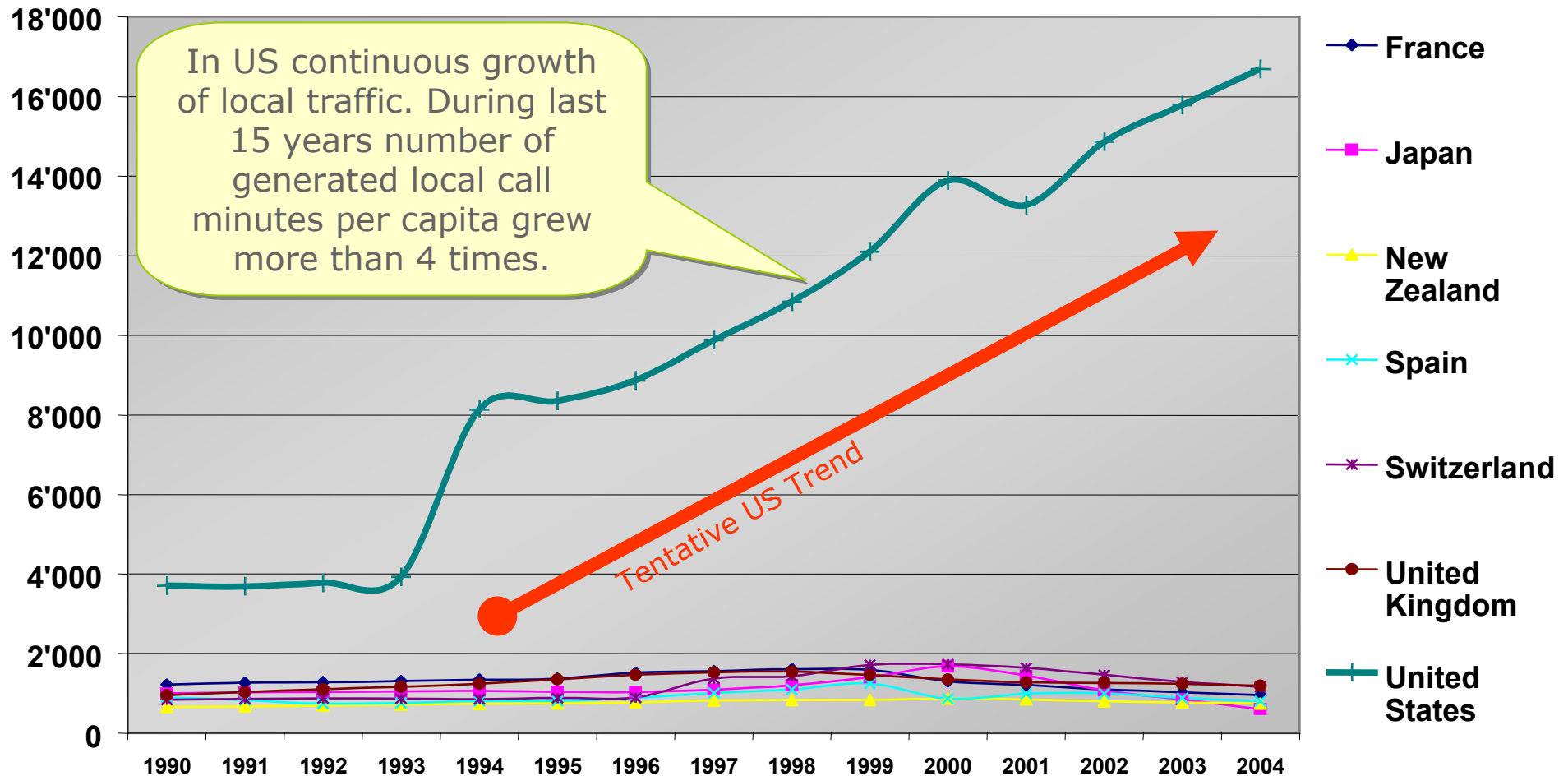


From narrowband to broadband



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

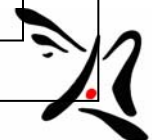
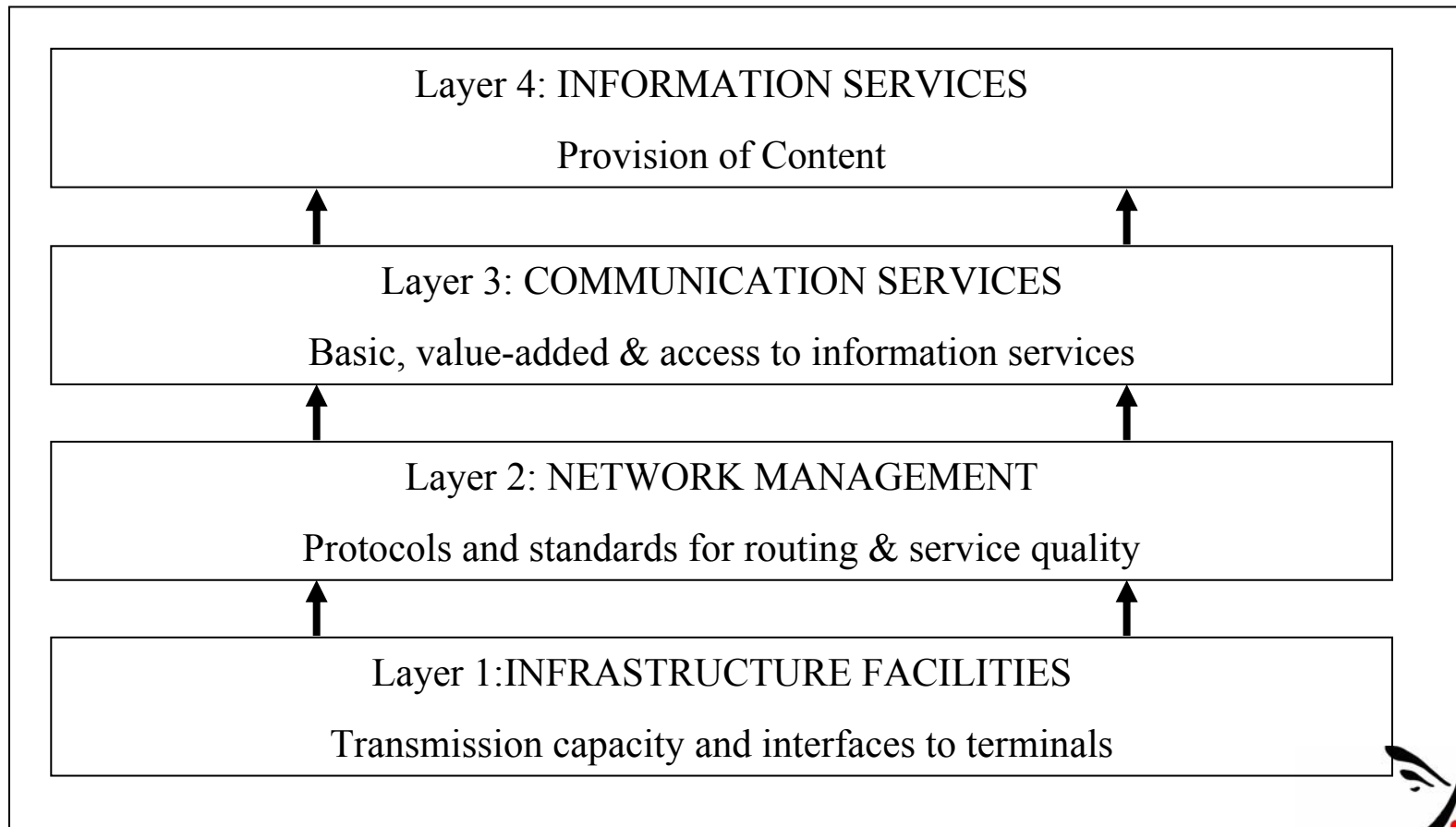
Local Calls Minutes, per capita per year, in US and selected other economies



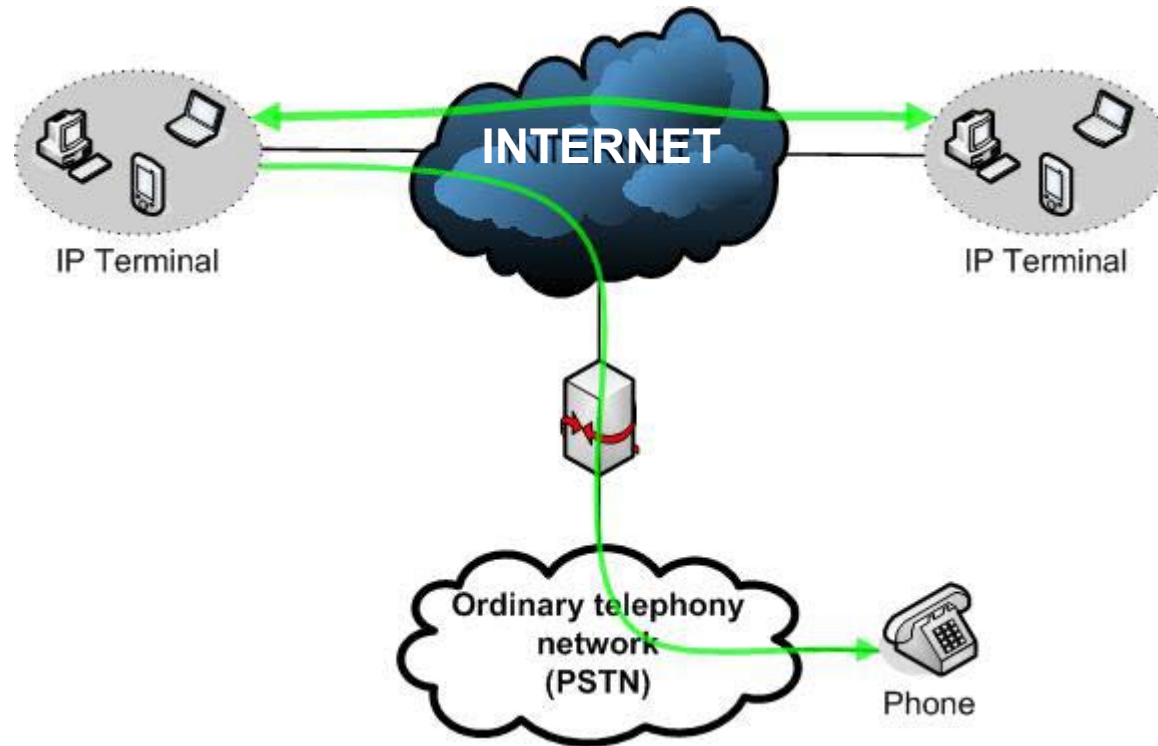
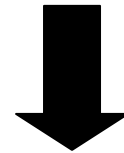
Essential Characteristics of IP

- 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 of 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



Evolution of VoIP



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



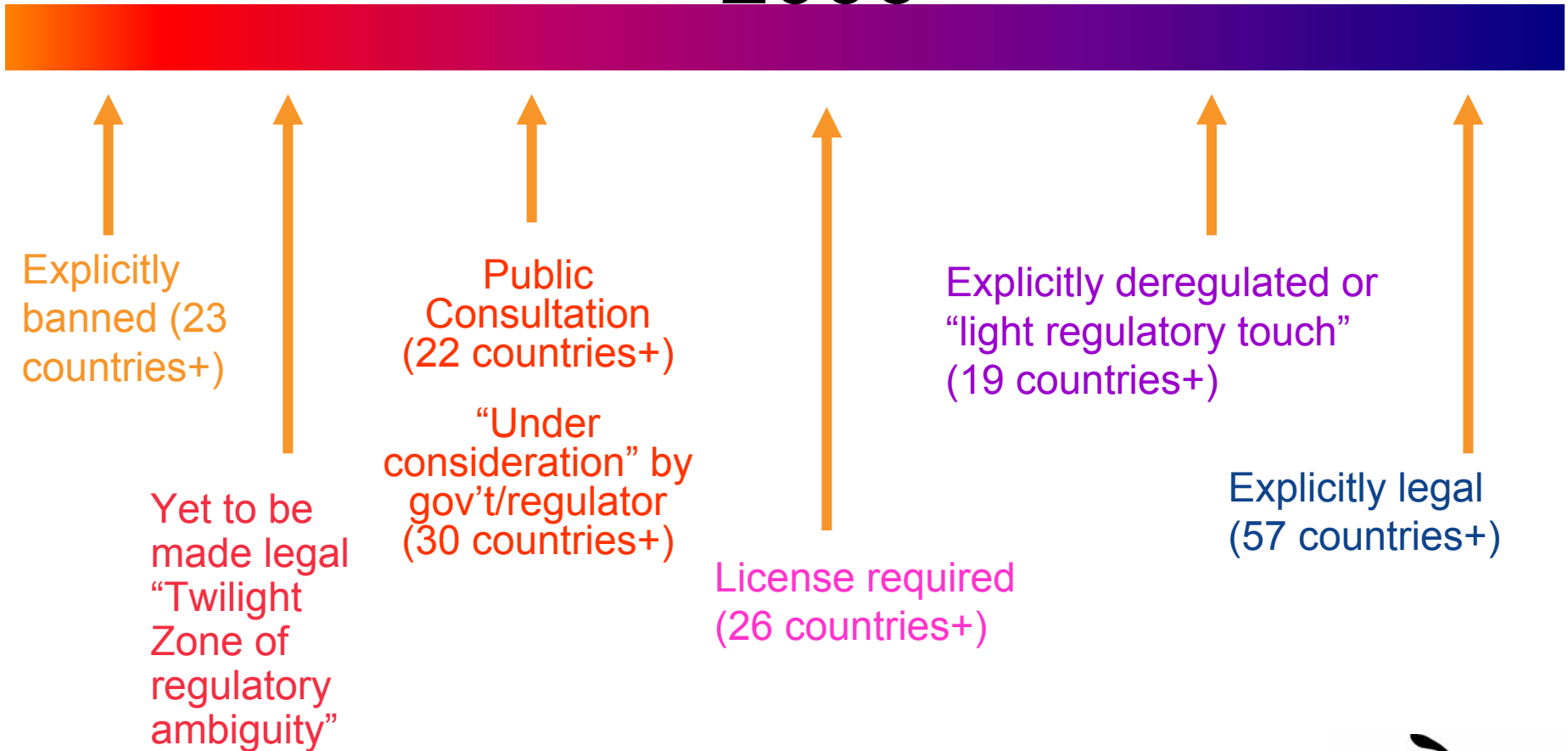
Regulatory Issues

- 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

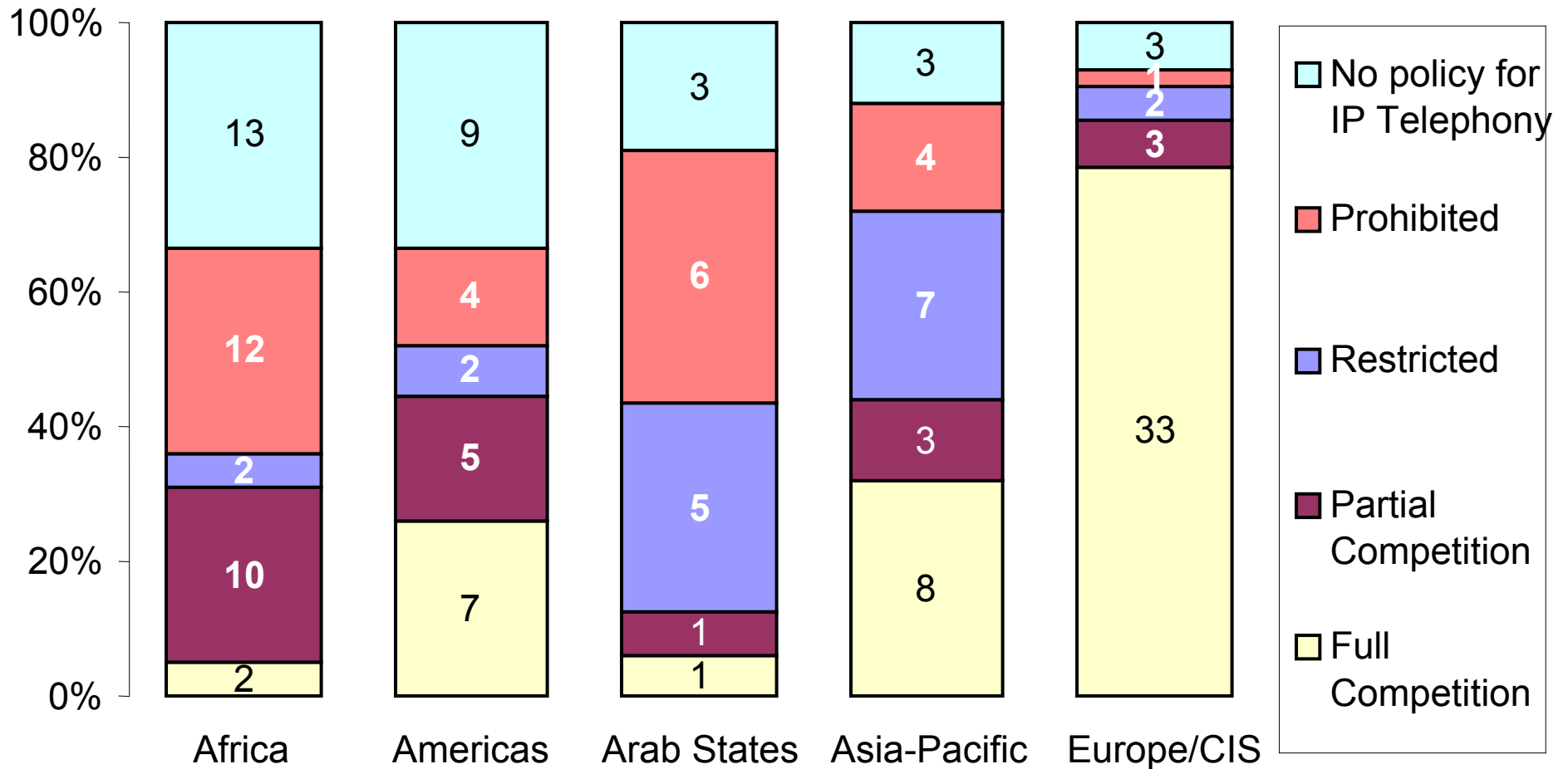
- Some regulators have removed restrictions; in developing countries, most regulators have applied restrictions
- VoIP competition has reduced prices significantly
- In developed countries, incumbent operators response is to bundle:
 - National tariffs, but excluding fixed to mobile
 - DSL plus telephony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

Regulatory treatment of VoIP, 2006



Source: ITU Telecom Regulatory Questionnaire, 2006

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 market 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 “Everything 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

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](http://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>

