

# VoIP

## Voice over Internet Protocol

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# Why is VoIP a Challenge?

- By-pass = threat
- New markets = opportunity

**Today < 20% traffic by VoIP, by 2007 > 75%?**

The Threat = arbitrage

- Call-back = connected reverse routing
- Refile = connected rerouting
- The Internet = connectionless routing

The Opportunity = NGN services

# Internet Routing

- Routing over the Internet = by-pass nodes on the PSTN, e.g., national long distance tolls, International gateways
  - Many telcos offer calling cards using VoIP (= if you can't beat them, join them)
  - Best Effort
- Routing over Managed Networks = keep traffic on the network
  - Leverage corporate customer relations
  - QoS guarantees

# Voice over Broadband

- Vonage, HKBN, etc., offer VoBB using any suitable BB network for flat rate monthly fee
  - VoBB service provider by-passes near-end PSTN but pays far-end PSTN interconnection charges
- Offer PSTN numbers (buy or allocation?)
- VoBB recognizes the IP address of the device, not the location of the number – number translation relates the IP address and PSTN
- Emergency calls require pre-registration (needed for billing anyway) and re-registration if caller moves location – but what if call is made from a WiFi hotspot?

# IP Telephony

- PSTN-PSTN: IP handsets – standards not yet settled = expensive
  - ISPs holding off for this reason?
  - Next Generation Networks just starting
- PC-PC: Skype software the most successful ('viral marketing') – no payments
- PC-PSTN: Skype-Out – monthly subscription
- PSTN-PC: Skype-In – monthly subscription

# Regulation

- Is VoIP a substitute for PSTN (*EU: public access telephone service or PATS*) or new set of services?
  - Minnesota Public Utilities Commission (MPUC) appealed a federal court ruling (October 2003) in the USA that Vonage was not a “common carrier” but an information service” - and the FCC made a ‘preemptive ruling’ (November 2004) that VoIP was a federal, not a state issue.
- Broadband = defined in USA as anything over ISDN 128 Kbps (*Note: ISDN-B = 144kbps*)

# Regulation

- Network Issues
  - Integrity of networks, e.g, no independent power supply
  - Emergency services, VoIP device not location specific
- Numbering Issues
  - Electronic number mapping (ENUM) will involve numbers for new services (such as personal numbering/digital identity) so are there sufficient numbers?
  - Should there be pre-selection? Should new services be given new numbers?
  - Off-shore use of local numbers will exhaust supply?
  - Off-shore number translation of universal resource identifiers (URI) such as URL into IP addresses - can be done in other jurisdictions beyond regulation?

# Regulation

- Other Issues
  - CLI and CLI blocking
  - Interconnection regimes (to PSTN, to VAS)
  - Contributions to universal service fund and obligations?
  - Directories - separate islands of directories?
  - Interconnecting party access to databases? Can offer to withhold name and address from public directory?
  - Impact on lawful intercept?
  - Etc.

# Responses to VoIP

- Legal Challenge – keep the wolf from the door
- Adopt VoIP – Can't beat them, then join them
  - AT&T in 2004 began offering VoBB 'all-you-can eat' for US\$39.99 (promotion = US\$19.99) vs. Vonage and others
  - SingTel + SIPphone + calling cards = free global calling between SIPphones + cheap calling from SIPphone to PSTN.
- VoIP as superior managed data network service (outsourcing – cf. Centrex) for corporate customers
  - Replace PABX location-specific extension numbers with IP addresses for person-specific communications
  - Replace corporate multiple country nodes with 2 or 3 regional hubs
  - HGC offers V-Phone for video conferencing (HKBN's response = first mover advantage in residential market)

# Future Influence of VoIP?

- Next Generation Networks (NGN) and services = all IP
  - Write-down of legacy networks (perfectly good ATMs)
- Triple Play = telecom, fast Internet, TV - e.g., PCCW, iCable
- Quadruple Play = wired and wireless telecom, fast Internet, TV e.g., Time-Warner + Sprint?  
(Unlimited calling offered by TW @ US\$39.95)

# Future Influence of VoIP?

- NGN Soft Switch - call control software that houses most of the network's intelligence - manages the gateways at the edge of the network
- SIP (Session Initiation Protocol) - manages the IP addressing in a peer-to-peer (P2P) architecture = directs traffic to devices not locations
- From cost-driven to application and service driven innovation

# Future Influence of VoIP?

- Three Layers of Convergence
  - Application convergence - e.g., messaging, alerts and forwarding between phones, PCs, PDAs, etc.
  - Service convergence - e.g., continuous handoff between wired phone, wireless phone; unified billing
  - Network convergence - e.g., strip out separate layers for mobile, frame relay, PSTN, broadband, fast Internet, etc.
- Integrated handset devices and 4G +
  - 4G + = devices are mobile P2P transceivers that automatically grow the network when in use

# The End

Please also refer to:

- TIF Briefing Paper 'IP Telephony and Voice over Broadband' at:
  - [http://www.trp.hku.hk/tif/papers/2004/dec/briefing\\_041206.pdf](http://www.trp.hku.hk/tif/papers/2004/dec/briefing_041206.pdf)
- TIF Proceedings at:
  - <http://www.trp.hku.hk/tif/papers/2004/dec/041206summ.pdf>