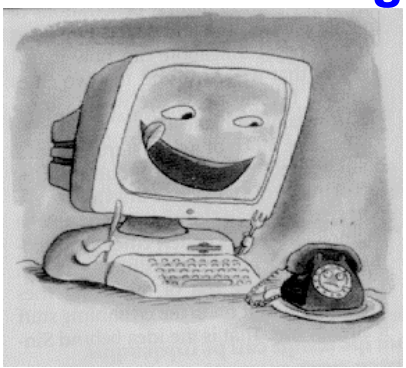
Costing and Pricing of Internet services

Dr Tim Kelly, International Telecommunication Union (ITU)

Concluding seminar on costing and pricing for the Arab States, Tunis, 29 Nov. - 2 Dec. 1999

Note: The views expressed in this presentation are those of the author and do not necessarily reflect the opinions of the ITU or its membership. Dr Tim Kelly can be contacted by e-mail at Tim.Kelly@itu.int.

"We started out running the Net on top of the phone system, and we'll end up with telephony running over the Net."



The Economist
May 2nd 1998

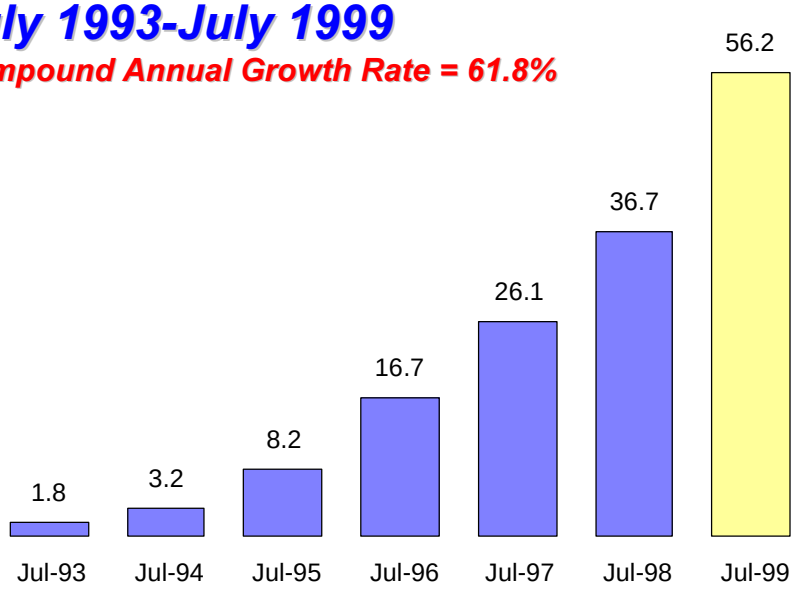
Eric Schmidt,
CEO, Novell,
Quoted in
Wired, August 1997

Agenda

- The phenomenal growth of the Internet
  - ⇨ Worldwide
  - ⇨ Arab States
- Retail pricing models
- Wholesale pricing models
- Developing country concerns
  - ⇨ Winners and losers?
- Scenarios
  - ⇨ New business models, or old ones in disguise?

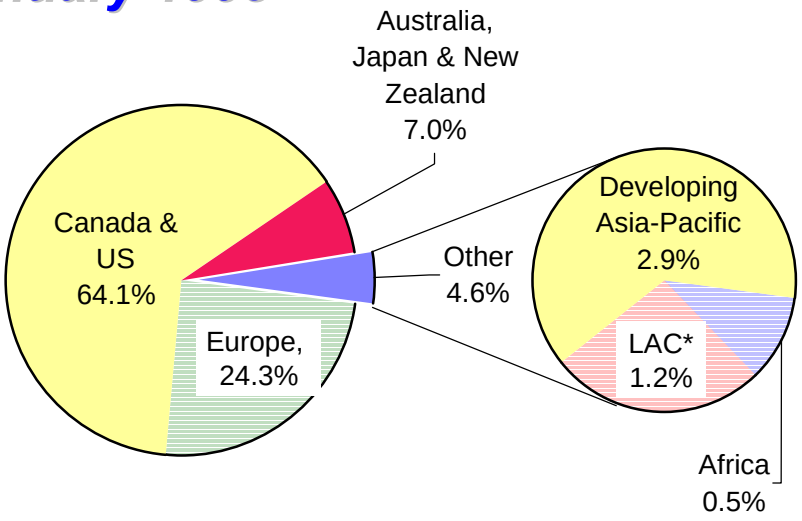
Internet hosts, worldwide (million) July 1993-July 1999

Compound Annual Growth Rate = 61.8%



Source: ITU "Challenges to the Network: Internet for Development, 1999", Network Wizards.

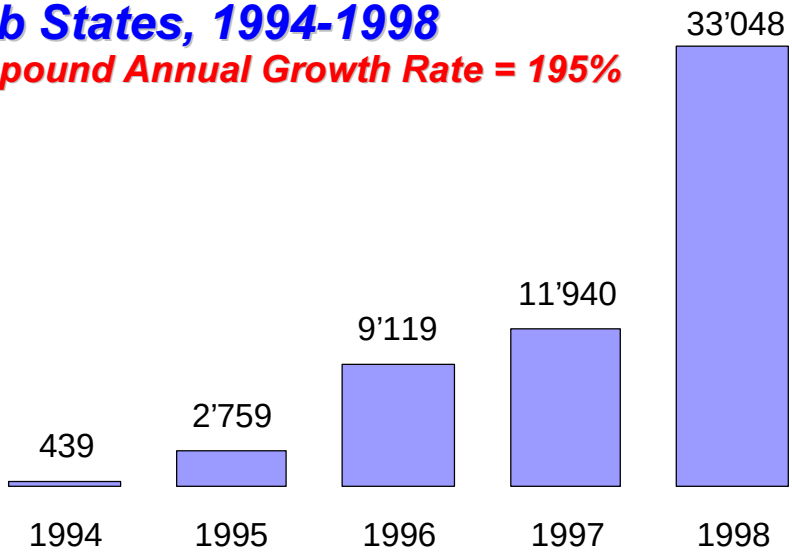
Distribution of Internet hosts, January 1998



Source: ITU "Challenges to the Network: Internet for development, 1999".

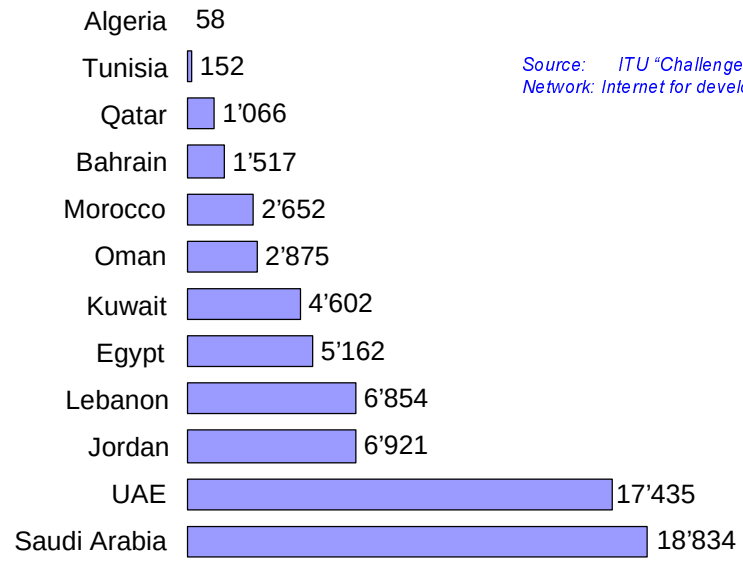
Internet host computers, Arab States, 1994-1998

Compound Annual Growth Rate = 195%



Source: ITU "Challenges to the Network: Internet for development, 1999".

Internet host computers, selected Arab States July 99



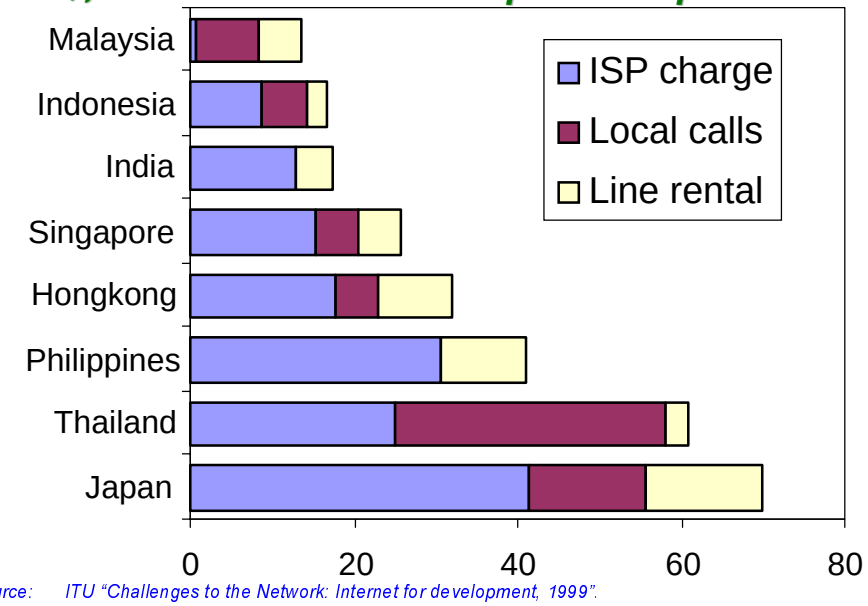
Source: ITU "Challenges to the Network: Internet for development, 1999".

Pricing Internet services

Alternative retail pricing models

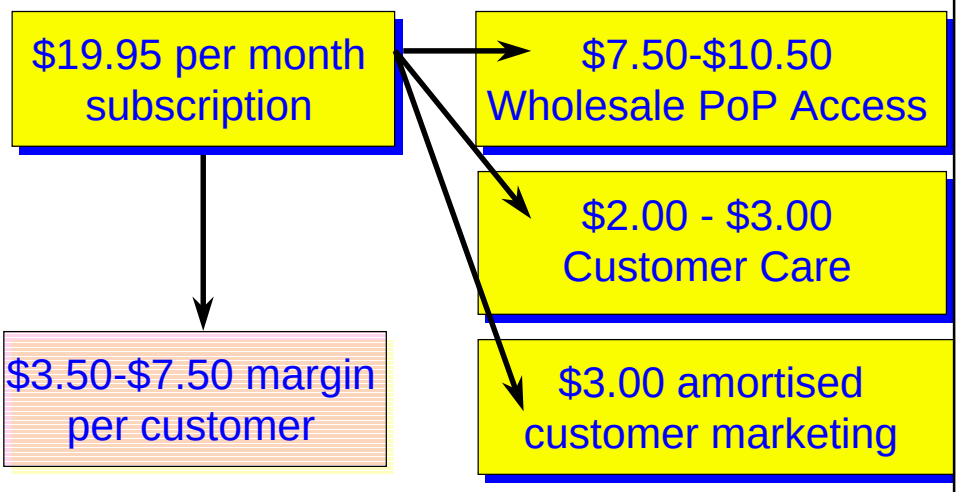
- **Flat-rate per month**
  - ⇨ **e.g., AOL (America OnLine) charges US$22.95 per month for unlimited Internet Access. To this must be added line usage and rental charges.**
- **Usage-based**
  - ⇨ **e.g., Freeserve in the UK offers "free" Internet access. Users pay only line rental and usage. Freeserve takes a percentage of the per minute call charge in an agreement with the service provider (Energis)**
- **Advertising-based**
  - ⇨ **e.g., Hotmail offers a "free" email service, funded by advertising**

Asia-Pacific, comparative prices,
In US$, based on 20 hours off-peak use per month



Source: ITU "Challenges to the Network: Internet for development, 1999".

Where does the money go? Typical Internet Service Provider cash-flow



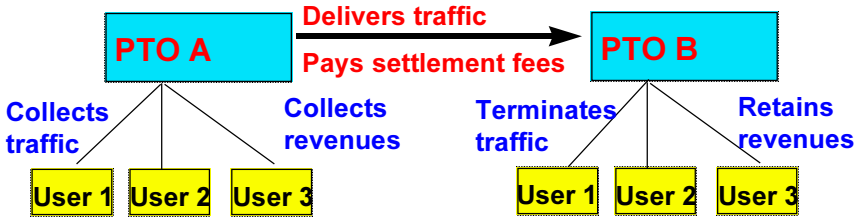
Source: Adapted from Paul Stapleton, ISP$ Market Report, Boardwatch Magazine.

Peering: What's on the menu?

- Peer-to-peer bilateral
  - ⇨ Each Internet Exchange Point (IXP) has similar size, traffic flow, technology
- Hierarchical bilateral
  - ⇨ IXPs in "Mother/Daughter" relationship with ISPs and smaller IXPs
  - ⇨ "Mother" may require capacity-based traffic settlements from "Daughter"
- Third-Party Administrator
  - ⇨ Network Access Points (NAPs)
  - ⇨ Metropolitan Area Networks (MAEs)
- Co-operative agreement

Settlements-based traffic

PTO = Public Telecommunications Operator

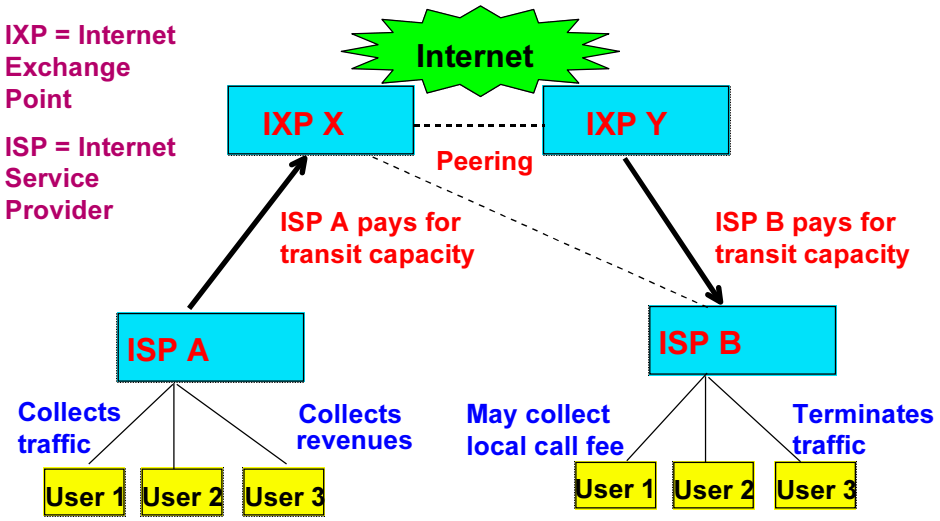


For accounting rate traffic, a direct bilateral relationship is established between the origin and termination operators. Intermediate transit operators are compensated from the accounting rate which is usually split 50:50. PTO B retains net settlement.

Internet telephony traffic

IXP = Internet Exchange Point

ISP = Internet Service Provider



Different wholesale pricing arrangements

Public switched telephone service

- Per minute wholesale pricing of end-to-end int'l traffic
- International accounting rate and settlements system applies
- Domestically-regulated interconnect regimes
- Access charges payable for call origination and termination
- Some transparency

Public Internet service

- Usage-based wholesale pricing is rare (NZ and AUS are exceptions)
- Peering arrangements, usually based on capacity or traffic exchanged
- No end-to-end int'l settlement payments
- No regulation of peering arrangements
- No access charges payable for IP traffic in US
- No transparency

Settlements and Peering: What's the difference?

- Settlement-payment traffic
  - ⇨ Substantial revenue transfers, from core to periphery of network
  - ⇨ Promotes "organic" network growth
  - ⇨ BUT, Operators generating less traffic than they receive have an incentive to keep prices high
- Peering traffic
  - ⇨ Some revenue transfers, from periphery to core of network
  - ⇨ Promotes "spontaneous" network growth
  - ⇨ BUT, ISPs generating less traffic than they receive have an incentive to force prices down

Internet traffic flows are highly asymmetric

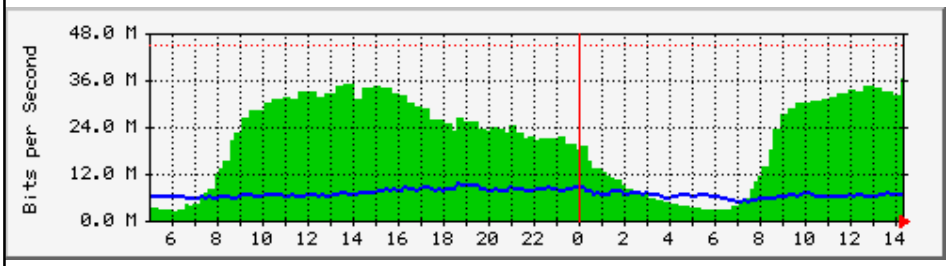
Public switched telephone service

- Traffic flows are bilateral and broadly match value flow in that caller, who initiates the call, also pays for it
- Call-back reverses the direction of the call, from a statistical viewpoint, but caller still pays & benefits
- Traffic flows unbalanced between developed and developing countries

Public Internet service

- Traffic flows are multi-lateral: A single session may poll many countries
- Web-browsing is dominant form of traffic: traffic flow is dominantly towards user who initiates the call. Web traffic highly asymmetric
- Newer forms of Internet traffic (telephony, push media, streaming video etc) reverses traffic flow to be from user which initiates the call

Traffic flows between Telia (Sweden) and US Internet backbone. By time of day



Traffic from the US

Traffic from Sweden

Source: Stefan@telia.net

If .... usage-based settlements were introduced on the Internet

- Different types of traffic would need to be identified and tagged (problematic)
- Traffic flows would need to be measured and billed on a bilateral basis between nodes (difficult)
- Correspondent relations would need to be established between nodes (very difficult)
- All intermediate transit providers would need to be compensated (extremely difficult)
- The system would need widescale agreement which could only be enforced, when necessary, by cutting off service (virtually inconceivable)

Pricing Internet services

Developing country concerns

- Developing countries receive no international settlement payments for IP traffic
  - ⇨ Increasingly, incoming IP traffic includes IP telephony and fax traffic which they must terminate
- They must pay to peer with US backbone
  - ⇨ Peering costs are rising as IP traffic continues to grow exponentially
- They must pay both half-circuits of the International Private Line to the USA
  - ⇨ Even though traffic flows in both directions over the circuit, once it is established
- Telephone and fax traffic shifting to the Internet

Gains and losses ...

	Gains / opportunities	*Losses / Threats*
Developed country Telcos	• Increased demand for leased lines • Additional subscriber lines • Higher value services / e-commerce	• Lower international fax and voice call charges • Markets for e-mail and content lost • Multiple new market entrants
Developing country Telcos	• As above, plus lower barriers to entry to developed country markets	• As above, plus significant reduction in net settlements • Requirement to pay full-circuit costs

Winners and losers ...

Factor	Winners	Losers
Erosion of settlements system	Telcos with big deficits (e.g., AT&T, Sprint, MCI/WorldCom)	Telcos with big surpluses (e.g., Nitel, Telkom SA, KPTC)
Increased demand for leased lines	Infrastructure suppliers (e.g., Project Oxygen, INTELSAT)	Developing country Telcos locked into long-term supply agreements
"All calls are local calls"	Telcos with measured local service	Telcos with "free" local calls
"Own" the customer	Local loop providers	Long-distance service providers

Pricing Internet services

Possible scenarios

- **USA sets the rules**
  - ⇨ USA continues to dominate, as home of most content and principal backbone, and continues to require all-comers to pay full-circuit costs plus peering charges.
- **Internet diffuses globally**
  - ⇨ Internet grows at a faster rate outside USA, with regional backbones being set-up and local content expanding. Leased line prices fall dramatically.
- **Internet converges with telephone network**
  - ⇨ Network access and quality of service become major issues. Separate Internets, largely owned by PTOs, are established with gateways to public Internet. PTOs offer to carry traffic at commercial rates and with traffic-based settlements between Internets.

For more information ...

- Updated version launch: 10 October 1999 (TELECOM '99)
- Available on paper and online (PDF format)
- World Telecom Indicators Database available online
- http://www.itu.int/ti

Other reports launched at TELECOM '99

- World Telecommunication Development Report 1999: Mobile Cellular
- Direction of Traffic 1999: Trading Telecom Minutes
- Trends in Telecom Reform 1999: Convergence