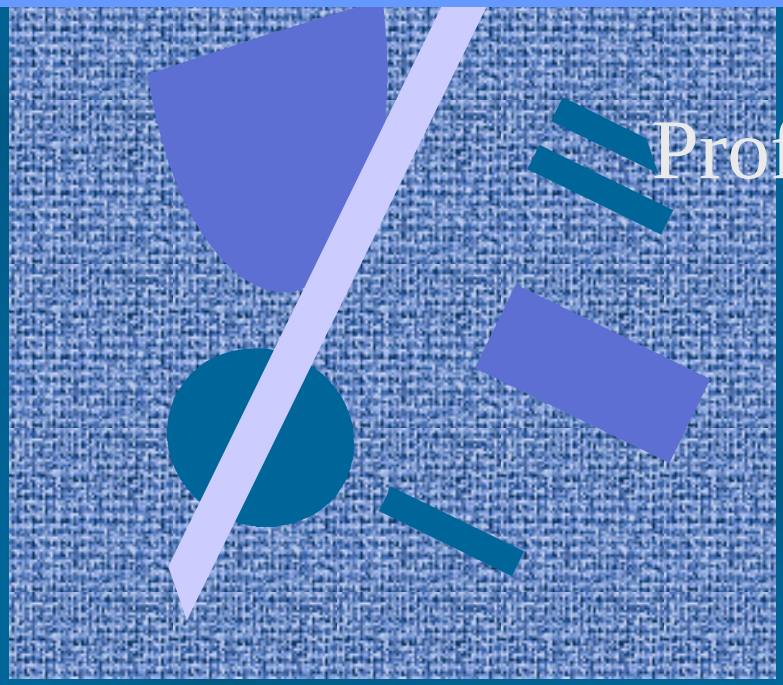
Economics and the Future Internet



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Follow the (relative) scarcity

- Non-economists are overly fond of absolutes
- But something is always *relatively* scarce
- "Bandwidth scarcity is over" means relative to, say, attention scarcity. So what?
  - The market driver is the relatively scarce resource
  - Solutions to new scarcity will relatively "waste" bandwidth -- cf. use of CPUs

Second look at bandwidth scarcity

- But look deeper: “bandwidth” needs nodes and links.
  - Relative scarcity of lines (cheap switches) has been the driver
  - If fiber makes lines relatively cheap then big changes -- e.g., Paul Green’s broadcast model

What is scarce?

- Telecom was links and nodes:
  - nodes were expensive, so hierarchical topology with long cheap lines connecting them
    - call office mate via downtown substation
  - as switches became cheap (thank you, Gordon Moore), they moved towards periphery of network
    - PBXs, mainframes, packet switches, mobile switches, multiple IXCs, &c.
    - proliferation of distributed network intelligence
    - plethora of services, bypass opportunities (competition)

What's different with digital info?

- nonrivalrous: I use, you use, we all use
- nonexcludable: I don't want you to use? Tough.
- Key context: Copying
  - 100% fidelity (nonrivalrous)
  - $0 incremental cost (nonexcludable)

Simple economics of copying

- Copy if

  [benefit(copy) - cost(copy)] - [benefit(original)-cost(original)] > 0

Example: Public “Non-Key” Protection

- Let everyone copy, but personalize:
- Make copy value low compared to value of a personalized original
- Type of economic steganography

What do we expect to see?

- Investments in effort to:
  - lower benefit(copy): deny access to value-added service
  - raise cost(copy): Cryptolopes, Digiboxes, copyright enforcement
  - raise benefit(original): personalize/versioning
  - lower cost(original): seller doesn't want to lower price received, all else equal

What is different about information networks?

- Positive externality: Network externalities: user value increases as number of other participants increases
- Negative externality: Convergent nets are shared-resource nets. Shared resources get congested

Pricing to allocate congestion

- "Congestion pricing" is a continuum, and it is already practiced:
  - if Internet congestion unacceptably high, go outside to buy higher QoS: e.g., a VPN
  - even within Internet, can pay to get higher QoS: e.g., time-shifting, fatter pipes
  - and now, MCI/BT "Internet Gold Card" (parallel, limited access turnpike)
- Should the boundary (between what is and is not priced for congestio) should shift