Information Goods and Networks: Economic Issues

Jeff MacKie-Mason
Hal Varian

Dept. of Economics, University of Michigan

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`http://www.ipps.lsa.umich.edu/` (esp. for telecomm)

`http://gopher.econ.lsa.umich.edu/` (esp. for Internet)

Information goods

- Information goods
  - medical databases, photos, recordings, movies
  - medical software, books, journals, newspapers, etc.
- Problems
  - Don't know what you are buying
  - Public good problems
    - nonexcludable -- copying is almost free
    - nondiminishable -- no degradation
  - Public utility problems
    - minimum efficient scale (MES) is large relative to market size

Information goods Cont d

- What you are buying?
- How to recover high fixed costs?

What you are buying?

- subscription pricing: repeated interaction
- two-part tariffs: connect/subscription fee + usage fees
- pricing various dimensions of product
  - immediacy
  - archive
  - indexing and organization of data
  - format of data
  - ways to privatize public goods...

How to recover high fixed costs?

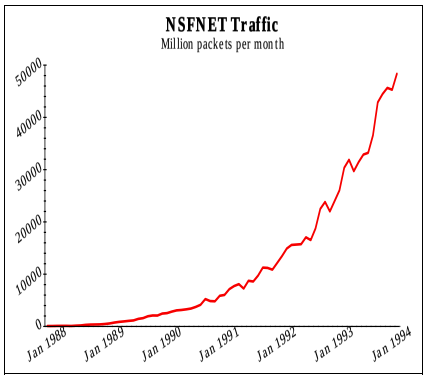
- price discrimination
  - yield management
  - policies of current on-line services
- make sure accounting and billing system can handle flexible pricing schemes
- how to make the information providers competitive?
  - artificial shopping agents
  - mechanism design

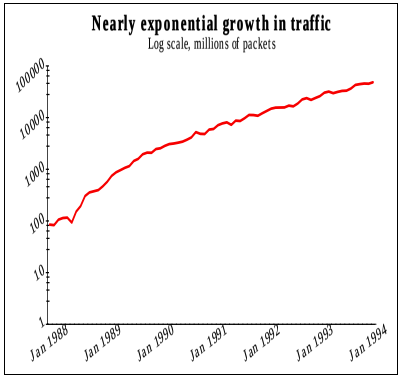
Information networks

- Problems
  - Allocating congested resources
  - Investment
    - how much?
    - what type?
  - Competition
    - pricing discipline
    - innovation and customer choice

Congestion: Growth?

- 89 billion packets per month (packet ≈ 200 bytes) (Sept 94)
- Increase by a **factor of 860** in under 7 years (8.8% / month)





Congestion: Growth in multimedia -- WWW?

- 0.002% of traffic in Jan '93
- 8.6% in Sept '94

- **61% / month** compound growth rate!

Congestion Experiences?

- congestion at content archives (e.g., Archie, Simtel, UM's Mac & Dos archives)
- multimedia (WWW/Mosaic, multicasts)
- advertising on Usenet
- transshipment

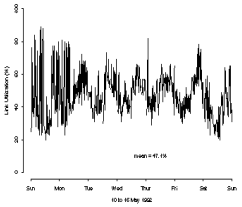
Congestion: Approaches?

Altruism	Rationing	Throw Money
Selfish win, suckers lose	Soviet model: Who sets priorities?	Should I pay for GE's corporate communications? What about AIDS research?

Pricing

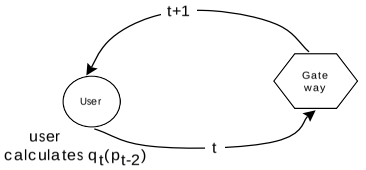
Posted (Time-of-Day)

- Shifting peaks: smart devices
- High frequency variation --> Need high frequency prices

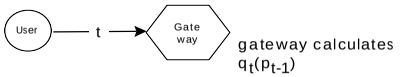


Responsive

Centralized: Closed loop

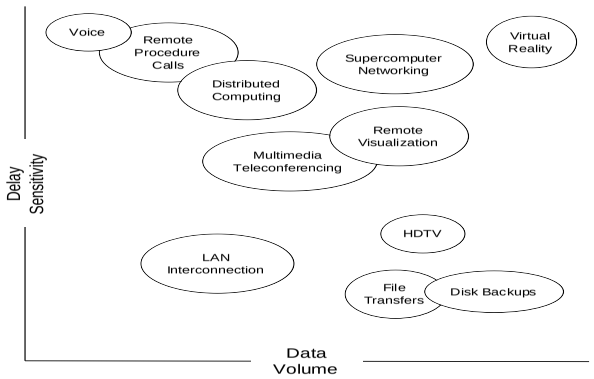


Decentralized: "Smart Markets" Open loop



Congestion: Multiple qualities of service?

Many Applications, Varied Qualities of Service



Other Service Quality Dimensions:

Holding time
Sensitivity to dropped packets

Congestion: Accounting?

- distributed
  - move the intelligence and effort to the periphery
  - postage meter metaphor
- authentication and authorization
  - client-server paradigm
- verification and trust
  - statistical sampling
  - verification of responsive prices

Investment?

- How much?
- What type?
- High fixed costs, low marginal costs: how to recover investment?
  - single provider
  - subscription fee and/or price > marginal cost
- Congestion prices provide correct investment signal

Competition?

- Benefits
  - pricing discipline
  - innovation and customer choice
- How?
  - vertical integration!
  - open, standard interfaces

Open Integrated Services Architecture?

