Economic Issues in Building a National Information Infrastructure

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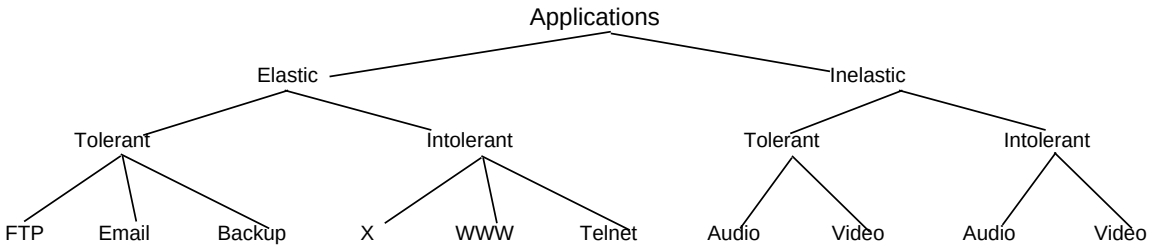
July 21, 1994

Overview

- **Vision: Open Integrated Services Network**
- **Allocating Scarce Resources**
- **Role for Public Policy**
- **Industry Structure**
- **Information Goods**

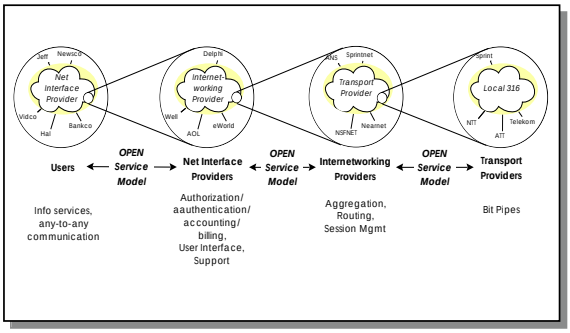
I. Vision: Open Integrated Services Network

Integrated Services



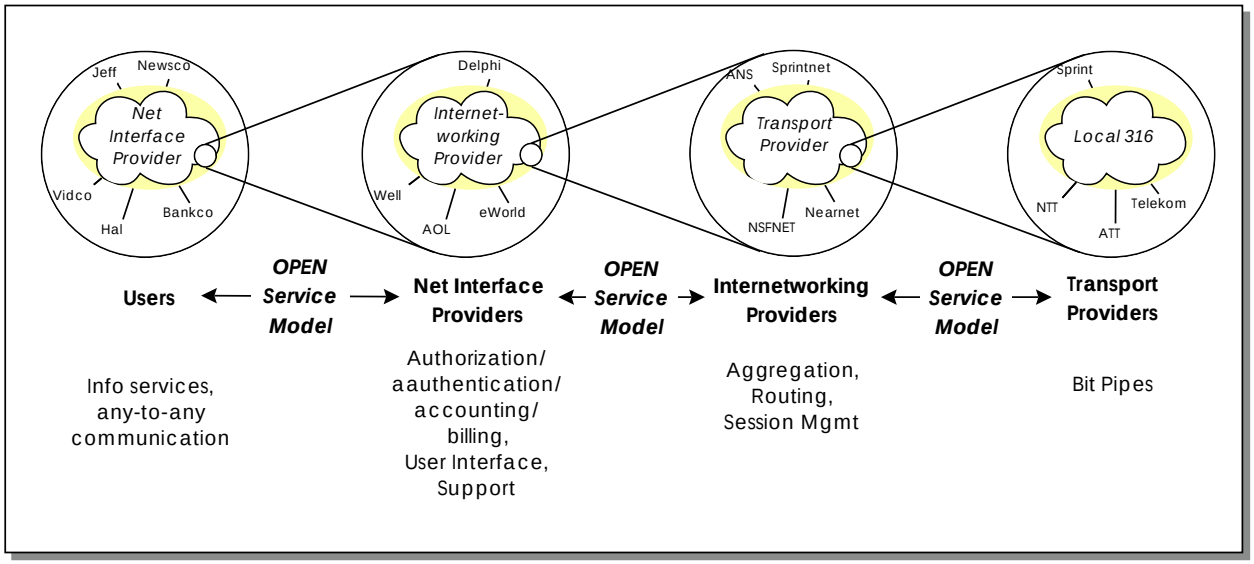
Open Architecture

- **Open to network providers**
- **Open to information providers**
- **Open to new network devices**



"Information Outlet"
"Open Data Network" (NAS)
"Open Platform" (EFF)

Open Architecture



II. Allocating Scarce Resources

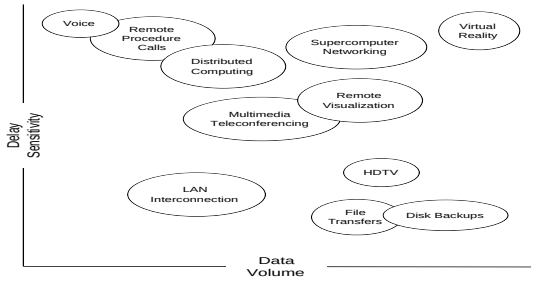
- **Allocation Problems**
- **Approaches To Allocation**
- **Pricing Research**

Allocation Problems

Congestion

- **net interface / call setup**
- **backbone cloud**
- **information server**
- **route server**

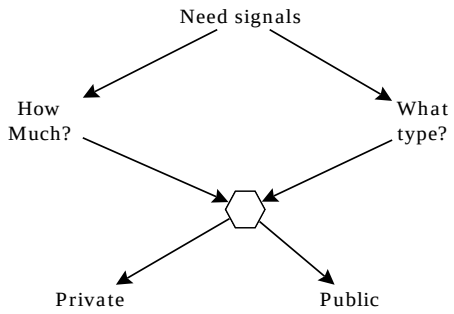
Many Applications, Varied Qualities of Service



Other Service Quality Dimensions:

Holding time
Sensitivity to dropped packets

Investment



Intellectual Property

Replication cost: $0

Reproduction fidelity: 100%

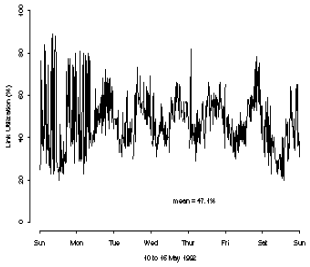
Approaches To Allocation

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

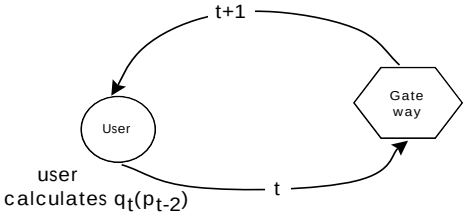
Posted (Time-of-Day)

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

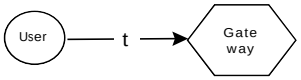


Responsive

Centralized: Closed loop



Decentralized: "Smart Markets" Open loop



gateway calculates $q_t(p_{t-1})$

Pricing Research

A single congested resource

- **short-run efficiency**
- **information revelation**
- **investment signal**
- **equity**

Interrelated network resources

- **externalities: congestion on one device affects costs on others**

Accounting

- **distributed**
- **authentication and authorization**
- **verification and trust**

Pricing Research Cont'd

- **Simulations**
  - **Pricing a single link: performance and welfare**
    - leaky bucket
    - posted pricing
    - responsive pricing
      centralized, decentralized
  - **Internet traffic profiling**
    - How bursty? (congestion intervals)
    - Traffic distribution by user, session type, session length
  - **Auctioning an Internet gateway**

III. Role for Public Policy

Regulation and the Service Model

- **Community or global networks? Cable or Internet?**
- **Choice of layer to regulate as common carrier determines access for:**
  network providers, service providers, attachable devices

Universal Access and Subsidies

- **Access to what?**
  terminal, narrowband, broadband, services?
- **Top down or bottom up subsidies?**
- **Who should pay?**

Standard Setting

- **Multiple layers, competing providers of services and devices, changing technology**
- **Need to define layers, access rights, rules and responsibilities**