Network Architecture and Content Provision

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What explains Internet vs. Cable TV?

- *Internet*: multiple applications, diverse and rapidly growing content
- *Cable TV*: one application, limited content
- Less drastic: WWW vs. America OnLine or Microsoft Network

Internet has fundamentally different service architecture

- Network provides only bit transport
- End hosts freely construct applications
- Network provider is *blind*
- Alternative architectures
  - *application-blind*: Internet
  - *application-aware*: telephony, online services (AOL, MSN, et al.)
  - *content-aware*: cable TV, online services

Implications

- common carrier regulation
- interconnection rules
- digital convergence and competition policy

Architecture and Content Provision

- Examples:
  - *Blind*: anyone can implement new apps
  - *Aware*: network as editor
  - net prices differ by application and content
- Questions we address:
  - which content offered?
  - what incentives for content creation?
- Key features:
  - price differentiation
  - service and user cost differences

Modeling Assumptions

- network service provider: unregulated monopolist
- competitive content provision, zero marginal cost
- consumers
  - α buys at most one unit, values good *i* at v_i^{α}

Price Differentiation: Content Provision

- Provision (fixed costs only)
  - aware provides all goods
  - blind provides high-value goods

- Price differentiation vs. price discrimination
  - with heterogeneity *between* users looks like usual discrimination problem
    - architectural effects on welfare ambiguous
    - welfare and consumers' surplus may be in conflict
  - heterogeneity only *within* users (between goods) is a different problem:
    - welfare higher under aware
    - consumer's surplus higher under blind

Price differentiation with gateway costs

- Aware selects content offerings by *maximum profit*; blind orders by *maximum willingness-to-pay*
  - aware offers low-value *mass market* goods
  - blind instead offers high-value *niche* goods

- Inefficiencies and conflicts
  - sometimes aware has higher *profit*, but blind has higher *welfare*
  - consumer surplus is always higher in blind

Price differentiation and content creation

- *aware* can extract all profit; *blind* leaves more for creator
- *aware* can mimic blind pricing, but only *blind* can commit to not expropriate creator's returns
- *aware* requires "double betting": both creator and network must be willing to gamble
  - discourages experimentation

Experimentation example

- *blind*: create if $E[R_i(p^{max}) > I_i]$ for any creator
- *aware*: create if $E_{net}[R_i(p_i^{max}) > C_i + I_i]$ for net
- Let: Pr[believe high | creator or net] = δ, i.i.d.
- Then: Pr[create | blind] = $1 - (1-\delta)^K$, for K creators
  Pr[create | aware] = δ

Observations

- Comparison
  - Aware net better for static welfare (content selection)?
  - Blind better for content creation?
- Expect differentiated networks?
  - “clubs” serving different tastes for mass and niche goods?
  - but: networkconsumption externalities push for interoperability, favoring blind internetwork
- Strategic shift by online services
  - repositioning as Internet gateways
  - shift from content differentiation to value-added service differentiation?

Network Provider as Editor

- Clutter has similar effects as gateway cost:
  - *externality*:
    - too much content offered
    - aware can internalize and solve this problem
  - *profit vs. WTP ordering*

- Very different with attention costs, not clutter
  - clutter cost increases with goods*offered*, attention depends on goods*purchased*
  - no externality
  - both order content offerings by WTP
  - welfare effects
    - profit higher, more goods offered in aware
    - but welfare ambiguous