CFP Broadband Working Group: Broadband Usage Cost Recovery

Sharon E. Gillett, MIT
John Watlington, France Telecom

January 2005
Residential Broadband Usage Cost Recovery

- A Problem Statement presented as a short White Paper

- The Problem Statement:
  - States assumptions which lead us to believe there is a critical problem
  - Lists commonly proposed solutions, and begins to address their impact on the virtuous cycle

Growing use of Internet applications & services drives demand for enhanced broadband access networks

Investments in broadband access networks support innovation in applications & services
Assumption: Innovation is Good

• Innovation is fostered by improvements in residential broadband access
  – Peer to Peer filesharing
  – BitTorrent
  – Personal publishing (blogging, photo sharing, video sharing)

• The problem is that current pricing and business models may suppress innovation
  – If Access providers don’t profit from improvements in broadband access, they have little incentive to upgrade
  – Flat-rate pricing provides operators with an incentive to minimize usage

• Residential Broadband Cost Recovery is a problem for the entire industry, not just the access providers
Assumption: Services are Interchangeable

• Access providers face competition for most services they provide, including basic transport

• Few services offered by providers cannot be interchanged with those available from third parties
  – Few services are core, or integrally tied to the broadband access service
  – IP number assignment, Routing, and QoS are still core services

• Examples of interchangeable services:
  – Telephony services provided through VoIP
  – Domain Name Service provided through Dynamic DNS
  – Content purchase and download

• Prices not aligned with services used by a user may drive user to competitor
Assumption: The Average User?

- As the access bandwidths increase, it is more difficult to identify an “average user”
  - New applications enabled by increased access bandwidth appear
  - Greater difference between average and high-use users
  - The customer as an aggregator: multiple users and applications sharing a connection

- Technology-based constraints on usage are vanishing
  - High-use users limited by peak rate of access
  - The difference between the peak rate and the average rate is increasing rapidly

- Pricing based on average usage becomes difficult to sustain
Assumption: Different Rates of Growth

- Equipment and backhaul prices are dropping
  - Every doubling of volume drops the price per unit of bandwidth to roughly 80% of previous price

- Demand for bandwidth is increasing
  - Driven by new, broadband-enabled, applications

- But, if the rate of price decline is slower than the rate of bandwidth demand growth
  - Either bandwidth demand is throttled, or traffic-sensitive operating costs increase

![Graph showing Sustainable "stagnation" and Demand unsustainable without increased revenue]
Assumption: Traffic Costs are Significant

- Traffic-sensitive costs are already an important part of a provider’s cost structure

- Mainly due to traffic transferred to/from the general Internet
  - When associated with non-affiliated services, the provider receives no direct revenue

- Overprovisioning doesn’t help

- Questions of Validity
  - Both the internal provisioning and the general Internet costs have a granularity which complicates cost estimates
  - Nature of the information needed to validate assumption
Assumption: Connectivity is the Product

- Access to third party services on the general Internet will continue to be a significant portion of traffic
  - Provider receives no revenue from these services
  - Increasingly difficult to recover costs with flat-rate pricing as volume of this traffic increases
Solutions

• Some commonly proposed solutions and their impact are briefly discussed
  – In particular, those with adverse impact on innovation

• Two approaches to solving the problem (sometimes used together):
  – Solutions that constrain cost
  – Solutions that increase revenue

• This is not a complete list or taxonomy of solutions
Solution: Throttle Traffic

• Throttle bandwidth to constrain growth rate
  – Shaping of aggregate and/or individual user bandwidth

• Implementation Problems
  – How to throttle fairly
  – Over what averaging interval?
  – User irritation

• Inhibits new applications and supresses new usages
  – Negative effects on remainder of value chain
**Solution: Reduce Interdomain Traffic**

- Re-architect the network to reduce volume of traffic exchanged with other networks
  - Caches or mirrors of popular content within provider network

- Only works for “broadcast” traffic, not communications
  - Popular movie and music downloads, web sites
  - No effect on traffic used for communicating between individuals
Solution: Smooth the demand

- Pricing or Architectural changes which alter the time pattern of traffic
  - Typical traffic shows significant variation over time
  - User interface issues

- Backhaul costs determined by traffic volume at peak usage levels
  - Smooth peak demand into acceptable aggregate levels

Traffic on an OC-192 link
Solution: Subsidizing the connection cost

• Recover cost of increased traffic by charging for another service offered by the access provider
  – Web hosting, email, customer service, etc.
  – Local or affiliated content distribution

• Better alignment between usage costs and prices is critical
  – Inefficient methods for recovering cost will reduce incentive to improve broadband access available for general Internet traffic
  – Incentive to discriminate against general Internet traffic, either through traffic shaping or lack of investment

• Other problems
  – Competition for other services may make this difficult
  – Regulatory constraints
Solution: Charge for Usage

• Recover the cost of increased traffic by charging for it directly

• Higher flat rates not a solution
  – Increasing variance with access capability implies difficulty in establishing one flat rate across all users
  – Providers increasingly face competition for access offering

• User experience issues
  – Like mobile carrier “minutes”, but much harder to quantify

• Other disadvantages
  – Cost of metering usage
  – Usage charges may actually lower costs (through reduced traffic) more than they increase revenues
Solution: Charge Third Parties

- Recover Usage Costs through charging third parties
- Examples currently in use:
  - Local ad insertion in television
  - Call termination fees in telephony
  - Recommended devices
- Improved delivery of content from “affiliated” content providers
- Competition from Edge
  - Adware on personal computers
Validating the Problem Statement

• Desire for pooled database, allowing analysis by researchers to validate assumptions and problem statement
  – But Industry information on user behavior is considered highly confidential

• For now, validation through comments on white paper draft from providers

• Approaches to Solutions
  – Which solutions foster innovation?
  – Are there other solutions we should consider?