Pricing the Internet

Geoff Huston
Issues Covered

Cost Identification

Pricing Policies
Cost Identification

Cost elements for an Internet Service

- technical staff
- operational and support staff
- administrative overheads
- capital equipment
- data transmission costs
  - domestic line leases
  - international line leases
  - ISP transit costs
Cost Profile - non US

- Typical recurrent costs
  - national backbone carrier
  - non-US
  - staff & admin
    - 10%
  - domestic leases
    - 30%
  - international leases
    - 60%
  - international transit
    - <1%
Cost Profile - non US

- Int'l Leases: 60%
- Domestic Leases: 30%
- Staff & Admin: 9%
- Int'l Transit: 1%
Cost Profile

- US profile has proportionally:
  - lower international lease cost ($0!)
  - lower domestic lease cost
  - higher relative support staff cost
Cost Profile - US

- typical recurrent costs
  - access provider
  - non-backbone
  - non US
  - customer support and marketing
    50%
  - access infrastructure
    20%
  - domestic access to backbone
    25%
Cost Profile - US

- Customer support & marketing: 50%
- Backbone access: 30%
- Access infrastructure: 20%
Cost Profile - Backbone Net

- Determining the unit cost of passing traffic over the network
  - sum of unit costs for traffic over each circuit
  - normalised by average end to end traffic profile
Cost Profile

- determining the unit cost of passing traffic over a circuit
- bidirectional or unidirectional?
- line occupancy pattern (peak to average)
- average sustainable line occupancy
Cost Strategy

- avoid congestion on the circuit as a priority
- (actual unit cost of delivered data)
**Cost Strategy**

- leased circuit cost
  - circuit lease cost must be fully defrayed at average circuit occupancy of 55% for a stable operating network.
  - higher average occupancy is possible at the cost of peak load inefficiency
  - lower average occupancy is under-subscription of the circuit resource.
Worked Example

- 2Mbps circuit - lease cost of $150,000 per month

- Unit cost of data is 28.2 cents per Megabyte
Worked Example

- 2Mbps can deliver 663,552 Mb in each direction per month
- Total possible traffic level is 1,327,104 Mb in both directions
- 40% target line occupancy is 530,842 Mb
- $150,000 divided by 530,842 is $0.28
Worked Example

- International line has double the cost
  - you can’t get the other side to pay!
- From previous example the unit cost of data is 56.4 cents per Megabyte
## Cost Profile Example

<table>
<thead>
<tr>
<th>Type</th>
<th>Proportion of traffic</th>
<th>unit cost</th>
<th>%total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intnl</td>
<td>65</td>
<td>1.00</td>
<td>89%</td>
</tr>
<tr>
<td>Dom</td>
<td>20</td>
<td>0.32</td>
<td>10%</td>
</tr>
<tr>
<td>Local</td>
<td>15</td>
<td>0.08</td>
<td>1%</td>
</tr>
</tbody>
</table>
Cost Strategy

- minimise International Lease costs
  - tariff structure of decreasing unit cost with
    - longer lease commitment
    - higher volume circuit
  - Note that the Minimum Investment Unit (MIU) of international cable systems is an E1 bearer
    - major cost break leading to E1 size
    - reduced cost break thereafter
Cost Strategy

- quantity over quality
  - Frame Relay for lower speeds
- quantity over diversity
Cost Strategy

- terminate at the cheapest useful full circuit location
  - high volume termination locations are cheaper
  - distance is not a significant factor

- maximise useful circuit capacity
  - secondary goal
  - avoid the long delay pipe protocol behaviour
  - use cable if marginal premium over satellite is small
  - tend to cable for higher bandwidths
Cost Strategy

- Minimising International Lease cost is the most significant cost factor
- Domestic lease cost can be significant
  - Similar factors apply here as with International leases
International Access Costs

Connection Options

- Connect to “upstream” ISP
  - Import default route
  - Contract ISP to advertise your routes to Internet
  - Cost highly variable
  - Quality of default can be variable
  - Purchase carefully!
International Access Costs

- Connect to an exchange point
  - Can advertise your routes to all exchange peers
  - Can import all announced routes to your network
- This is not the same as importation of default
  - You need to purchase transit at the exchange point in order to reach other exchange points
  - Same conditions apply
Costs and Revenue

- This is a growth industry
- Cost containment is subsidiary to revenue growth
- Effective marketing leads to
  - higher revenue
  - greater purchasing power
  - lower unit costs
Client Pricing

Objectives
- service provision
- cover costs?
- generate revenue?
- constrain / encourage use?
- competitive positioning
Revenue Generation

- constrained by policy objective of the network
- initial revenue levels need to be offset against future growth potential within competitive environment
- maintain revenue levels in line with investor expectation
Constrain / Encourage Use

- Must constrain use within a fixed funded or subsidised environment
  - unrestricted growth of subsidised environment implies fundamental business failure within a cross-subsidised environment
- Must constrain use if increased use does not generate increased funding and/or revenue
Constrain / Encourage Use

- Should encourage use within parameters of constant or improving
  - income
  - delivered quality of service
  - unit cost of service provision
Competitive Pricing

Must set pricing at a level which is comparable to competitive networks set by delivered service profile, quality of delivered service, investment profile, and desired return on investment.

Opportunity pricing is inherently unsafe as a longer term strategy.
Internet Service Pricing

- Unit pricing is variable against target congestion level
- The discriminent is quality
- Variable perception of value of quality
Pricing Elements

- Access
- Time & Duration
- Volume
- Distance

Retail Price =

\[ f(\text{Access}) + g(\text{Time}) + h(\text{Volume}) + j(\text{Distance}) \]
Access Price

- Normally varied by bandwidth
- If used as sole price parameter then the provider relies on averaging across the client base
  - Sophistication of client base implies increased usage at constant price
  - Must be offset by constant growth
  - ie access pricing must be offset by increased marketing costs and / or access to lower unit costs of bandwidth
Access Pricing

- flat fee based on bandwidth
  - widely used (well, not so now)
  - predictable billing for the customer
  - low administrative overhead for provider
  - increased marketing costs for provider
  - no traffic shaping
    - no incentive for shared caching to offset intnl lease costs
Time-Based Pricing

- only applicable to dial-up operation
- scales with growth in dial-up market
- widely used for dial access
  - monthly access schemes are generally risk prone to over consumption
  - per unit time charging difficult to market as the market matures
  - monthly access plus timed overflow very common
Volume Pricing

- cannot measure “calls”
- Sent or Received traffic?
- Sent Volume
  - reduces incentive to populate network with services
    (information provider pays to pass information to receiver)
- Received Volume
  - matches ftp & html usage
  - poor match for email & telnet
  - low incentive for cooperative infrastructure
    - provider undertakes all dns, named, caches, etc
Volume Pricing

- Decision on Volume unit
  - tens of gigabytes (virtual access bandwidth)
  - megabytes (high sensitivity)

- Traffic shaping by time of day
  - peak / off peak pricing
  - congestion / burst pricing
Volume Pricing

- Unit price on received gigabytes per month
- Off Peak volume discount?
- Increasing adoption within the Internet
- Scaleability
- Allows increasing revenue with increasing use to ensure constant delivered quality
  - I.e. allows constant service integrity
Distance-Based Pricing

- Typically applied to volumes measured on a source to destination basis:
  - local switching
  - domestic transit
  - international transit
- Requires traffic sniffing (scaling issues)
- Weakly manageable within the client environment
Pricing Conclusions

- No pricing (funding by external agencies or by multilateral client agreement) is typical starting position, but is very weak.
- Access Pricing is effective starting position, but is difficult to produce a stable outcome under growth pressure.
- Volume Pricing is stable, but requires careful positioning within current / future competitive market.
Discussion

- Marketing Internet Services
  - Cost containment vs revenue growth
  - Marketing as a measure to support pricing strategy
  - Plan ahead on demand levels, revenue and expenditure
- Issues of marketing capabilities vs marketing data switching services
Discussion

- Pricing strategies in a competitive marketplace
- What’s the objective?
- What’s the regulatory position?