Pricing the Internet

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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

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

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

- US profile has proportionally
  - lower international lease cost
  - lower domestic lease cost
  - higher support staff cost
- Non-US profile used in this presentation
Cost Profile

- typical recurrent costs - non-national backbone carrier, non-US profile
  - staff & admin - 20%
  - domestic leases and backbone services - 80%
Cost Profile

- Determining the unit cost of passing traffic over the network
  - sum of unit costs for passing traffic over each circuit
  - normalised by average end to end traffic flow 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 35% 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.
## Cost Profile Example

<table>
<thead>
<tr>
<th>Type</th>
<th>Proportion</th>
<th>Unit Cost</th>
<th>% Total Trans Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intnl</td>
<td>30</td>
<td>1.00</td>
<td>87%</td>
</tr>
<tr>
<td>Dom</td>
<td>3</td>
<td>0.12</td>
<td>12%</td>
</tr>
<tr>
<td>Local</td>
<td>37</td>
<td>0.00</td>
<td>0%</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
- Should encourage use within parameters of constant or improving
  - income
  - delivered quality of service
Competitive Pricing

- Must set pricing at a level which is
  - comparable to competitive networks
  - modulo:
    - delivered service profile
    - quality of delivered service
- Opportunity pricing is inherently unsafe as a longer term strategy
Internet Service Pricing

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

- Access
- Time
- Volume
- Distance

\[
\text{Price} = f(\text{Access}) + g(\text{Time}) + h(\text{Volume}) + j(\text{Distance})
\]
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 acces 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
  - predictable billing
  - low administrative overhead
  - increased marketing costs
  - no traffic shaping
    - no incentive for shared caching to offset int’l lease costs
Time Pricing

- only applicable to dial-up operation
- scales with growth in dial-up market
- widely used
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
  - reflects congestion price premium
Volume Pricing

- Unit price on received tens of gigabytes per quarter
- 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 Pricing

- Typically applied to volumes
  - unit cost for local switching
  - unit cost for intercity switching
  - unit cost for international switching
- Requires traffic sniffing
- Poorly understood within the client environment
Pricing Conclusions

- No pricing (funding by external agencies or by multilateral client agreement) is typical starting position, but
  - requires long lead times to set up!
- 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 content vs marketing data switching services