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 - non US

- Typical recurrent costs
  - national backbone carrier
  - non-US
  - staff & admin

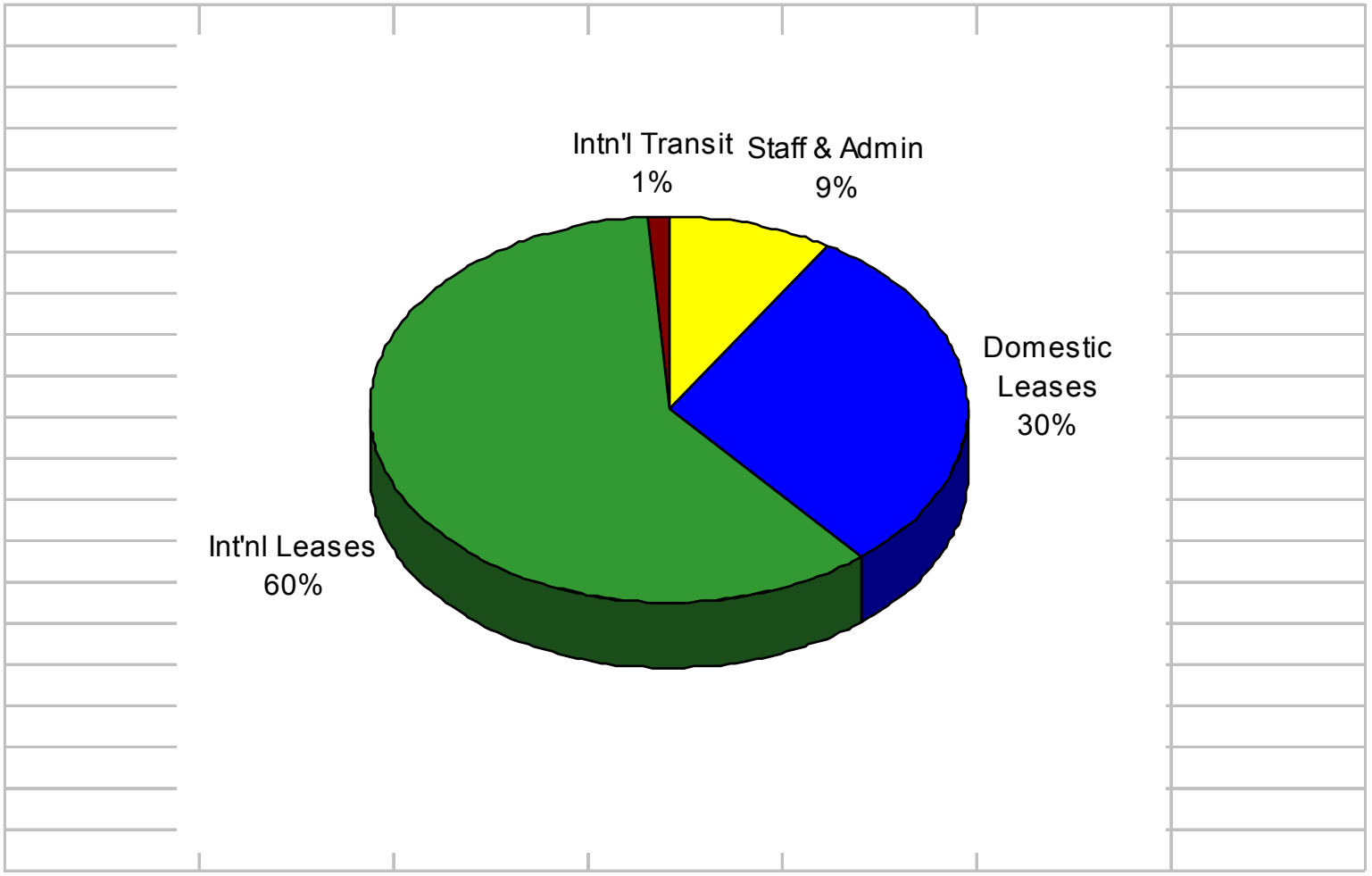
    10%
  - domestic leases

    30%
  - international leases

    60%
  - international transit

    <1%

Cost Profile - non US



Cost Profile

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

Cost Profile - US

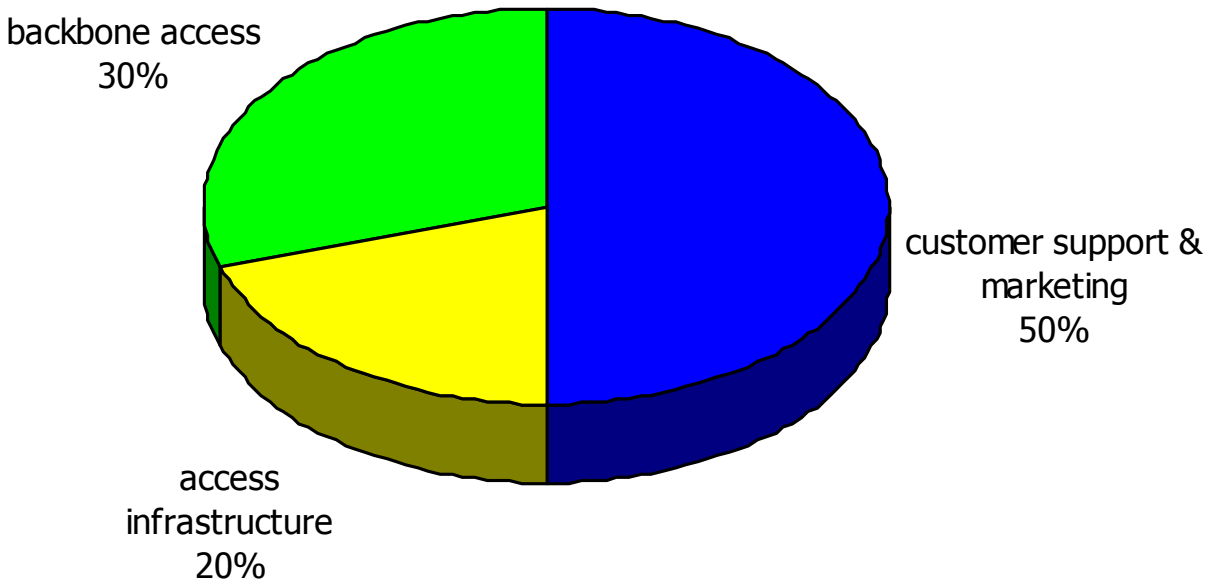
- typical recurrent costs
  - access provider
  - non-backbone
  - non US
  - customer support and marketing

    50%
  - access infrastructure

    20%
  - domestic access to backbone

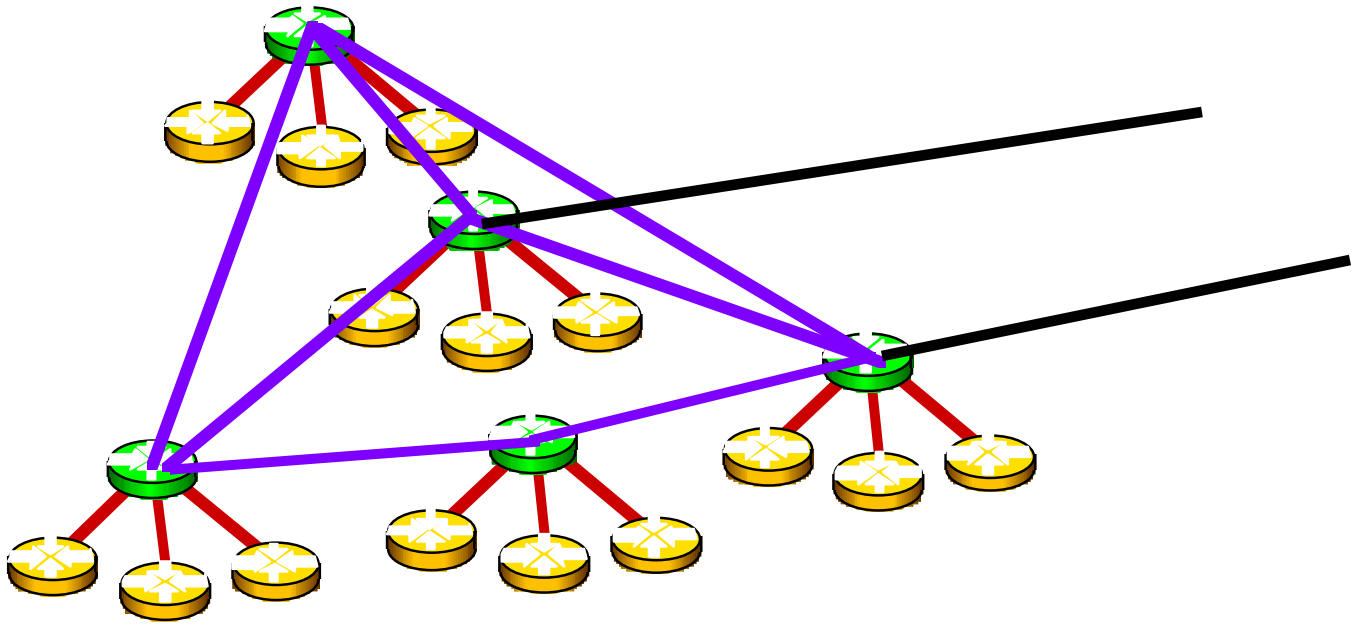
    25%

Cost Profile - US



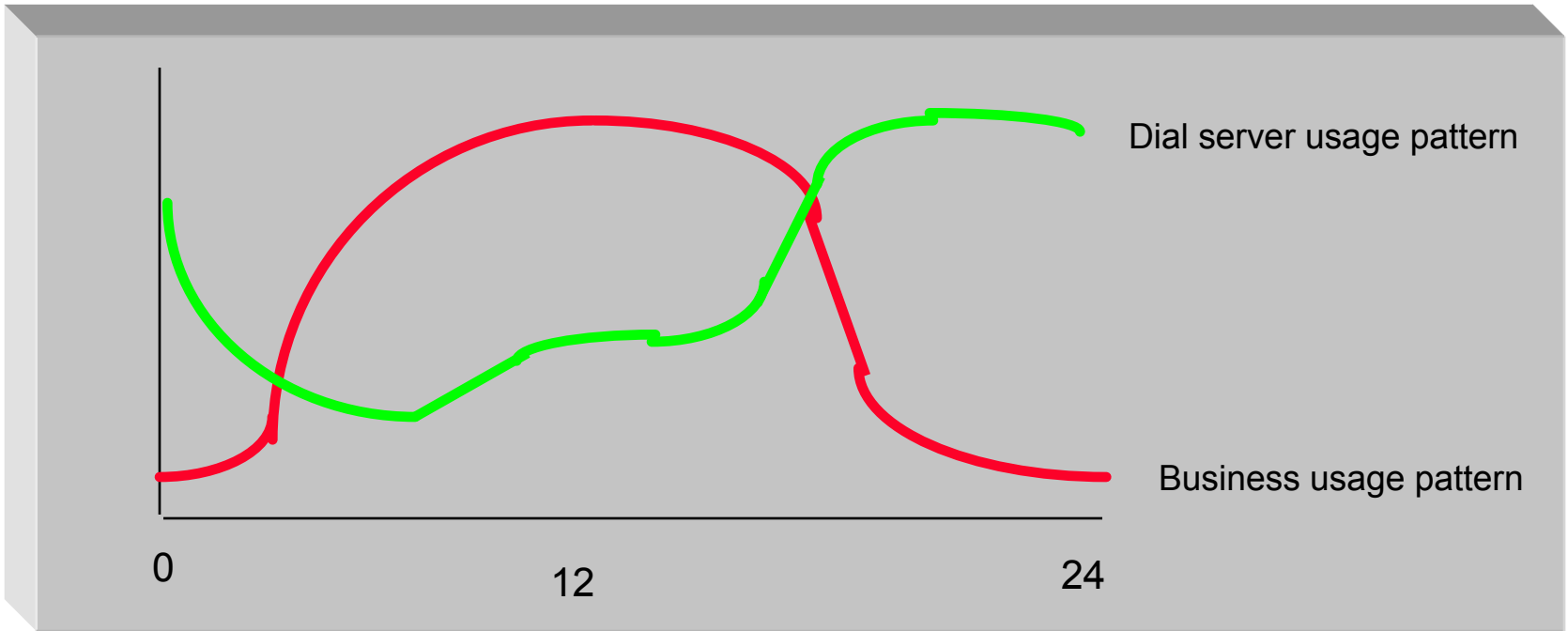
Cost Profile - Backbone Net

- 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



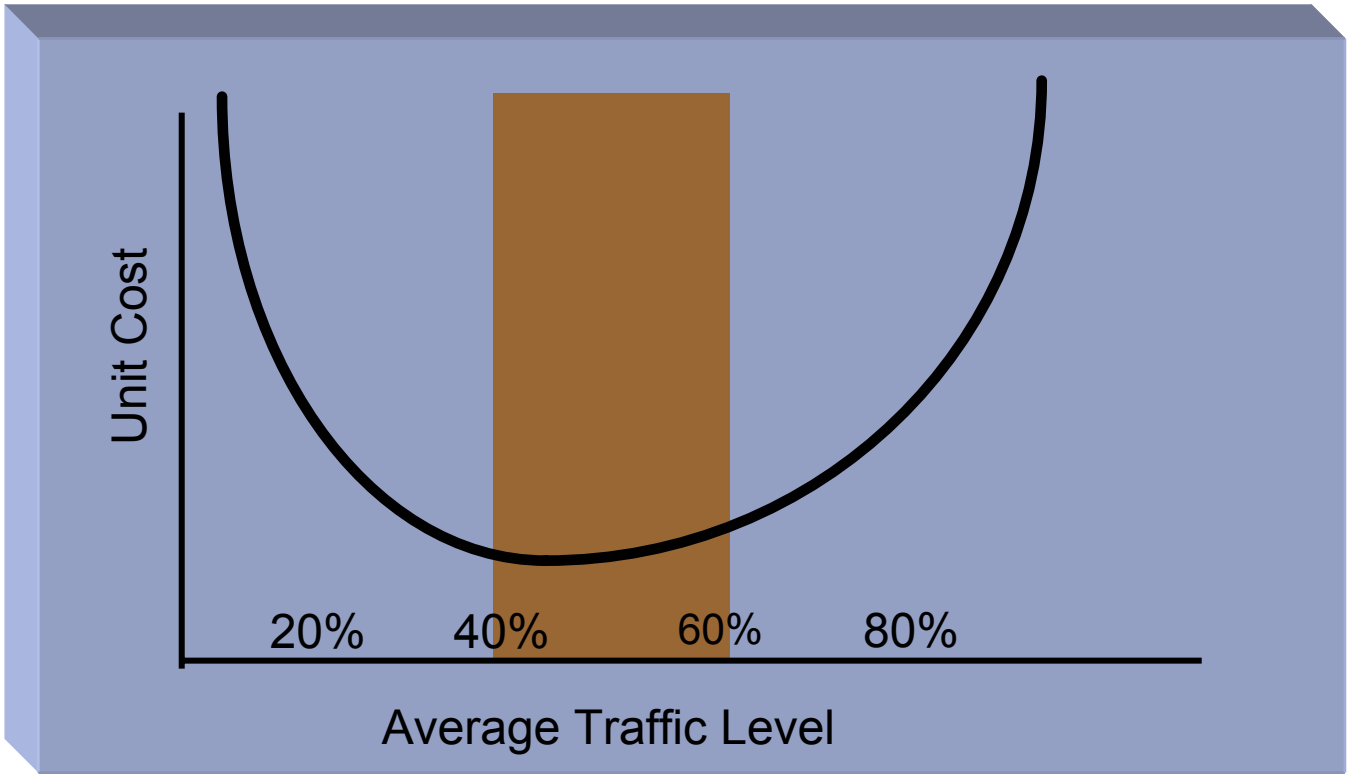
Cost Profile

- 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

Type	Proportion of traffic	unit cost	%total cost
Intnl	65	1.00	89%
Dom	20	0.32	10%
Local	15	0.08	1%

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

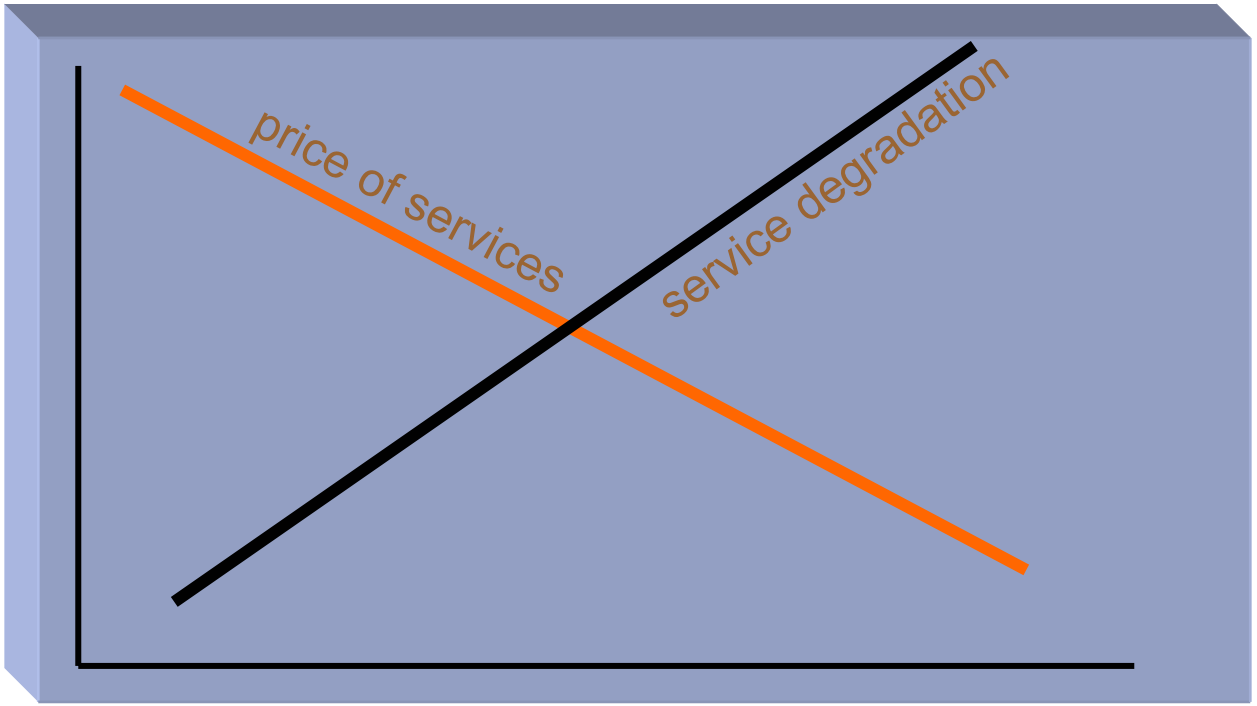
- Should encourage use within parameters of constant or improving
  - income
  - delivered quality of service
  - unit cost of service provision

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
    - 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 infrastucture
    - 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?