S-38.3192 Verkkopalvelujen tuotanto
S-38.3192 Network Service Provisioning
Lecture 12: Pricing

Background

- Providers are companies that operate on normal business logic
  - Maximize stock value and profit of the company
    - Cover the costs from
      - Investments (capital expenditure - capex)
      - Operation (operational expenditure - opex)
  - Their operation regime is somewhat regulated
    - Certain telecom services are regulated inorder to prevent
      - Monopolism or too low competition
      - Over charging
      - Barriers of market introduction from new players
Billing process

- Billing customers requires that
  - Billing templates are created for different customer profiles
  - Charging policy for different services are created
  - Accounting of charged events is instantiated
  - All events related to accounted charging policy are collected
    - Event Detail Record (EDR) vs Call Detail Record (CDR)
  - Content of EDRs are metered
    - Traffic rate
    - Duration
    - Source, destination
    - Service (application, QoS)
Accounting

- Is parallel stream for billing
  - Revenues stream that is exchanged between fellow providers
    - Cost sharing
    - Revenue sharing
  - Virtual operators cost allocations
    - Originated costs and depreciations

Background

- There are no direct implications from costs to price
  - Market dictates the price of the sold goods
    - Price should always cover the costs that were originated from the manufacturing and selling the good
      - This is not always true
  - Regulation may also set standards for the pricing
    - Cost of the selling the good forms the basis for price
      - Virtual network operators are charged based on originated costs
      - Cable plants are leased based on fraction of originated cost of whole cable plant
    - Limits of pricing are regulated
      - Roaming costs
      - International call pricing
Market price

- Based on the utility of used service
  - Value of the service is dependent on
    - properties of communication system/protocol
    - what is the purpose of communication
  - Some services are more profitable than others
    - Rarely used and therefore not heavily competed
      - SMS (cheap but profitable)
      - Conferencing (expensive but not so profitable)
    - Well accepted charging model
      - Time based for voice calls
      - Flat rate for data
    - Complexity of control
      - Flexible: data service
      - Difficult: video delivery

Valuation example

- **Mobile call**
  - Used link resources per minute
    - Rate: 13kbps
    - 780 000 bits in a minute
  - Hard-real-time requirement
    - Voice channel reservation
    - price: 7 cents

- **SMS**
  - Used link resources per message
    - 160 characters
    - 8 bits per character
    - In total: 1280 bits
  - Non real-time requirement
    - Signalling channel
    - price: 7 cents

- 1:600 price difference based on originated costs from providing the service
  - Including only the air interface resource usage
  - Cost of the SMS-subsystem should be included into figure
Market price

- Is a game where there is a NxM situation
  - N customers
  - M providers
- Each individual player tries to maximize his/her utility
  - Customers get their service as cheap as possible
  - Providers maximize their profit
- In optimal situation system has maximal utility
  - Nash equilibrium
    - Every one takes into account other player group incentives
      - Customers compare offerings of providers and select the one that offers services at the best price/quality
      - Providers offer services that gain best market value for the operation

Utility

- Describes the value of the service offering
  - Increases with the function of level of service in contrast to expected service
  - Decreases with the function of cost of service
- Shape of the utility curve is dependent on the service type
  - Data service (tcp):
    - Throughput is inverse proportional to
      - RTT
      - Squareroot of packet loss
  - Voice service (udp):
    - Quality is
      - Inverse proportional to one-way delay and packet loss
      - Step-function of throughput to codec-rate
      - Function of codec
**Price vs SLA**

- **SLA has direct implication to price**
  - Availability of service indicates how
    - The network and access has to be engineered
    - The service has to charged inorder cope with litigations
  - Support services are usually labor intensive
    - Increase the opex very fast
  - Where is the demarcation point of the service
    - Toll trucks

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Communication costs

• Costs for the communication depends on
  – Where the customer is
    • Is there already access device
    • Is there already cable plant and who owns it
  – Where the customer communicates
    • Only in own network (marginal cost per bit: low)
    • Through peering relationships (marginal cost per bit: medium)
    • Through transit providers (marginal cost per bit: high)

Communication costs

• Marginal cost of a bit
  – Within own network infrastructure
    • When network is build the investment is done
      – Marginal cost per bit is zero
    • If we take into account depreciation of the network investment
      – Marginal cost per bit is not zero
  – Outside own infrastructure
    • Premium is paid
      – Based on the negotiated contracts with other providers
        » Transit
        » Peering
Network originated costs

- Network structure and delivered services cause variable costs
  - New network is always cheaper due to lack of legacy support
    - Integration of old and new leads to sub-optimal operation
  - Slogan: Router port is expensive – switch port is cheap
    - Holds for certain extent – should not be mantra
  - Transport technology and network technology should be well aligned
    - Not competing technologies
      - Large intelligent transmission and large intelligent switching
  - Cost reduction methods
    - Minimize the amount of vertical layers for service delivery
    - Minimize the amount of supported technologies and devices
    - Minimize the amount of different service types

Network originated costs

- IP centric network design
Network originated costs

- Transport centric network design