



S-38.3192 Verkkopalvelujen tuotanto

S-38.3192 Network Service Provisioning

Lecture 12: Pricing

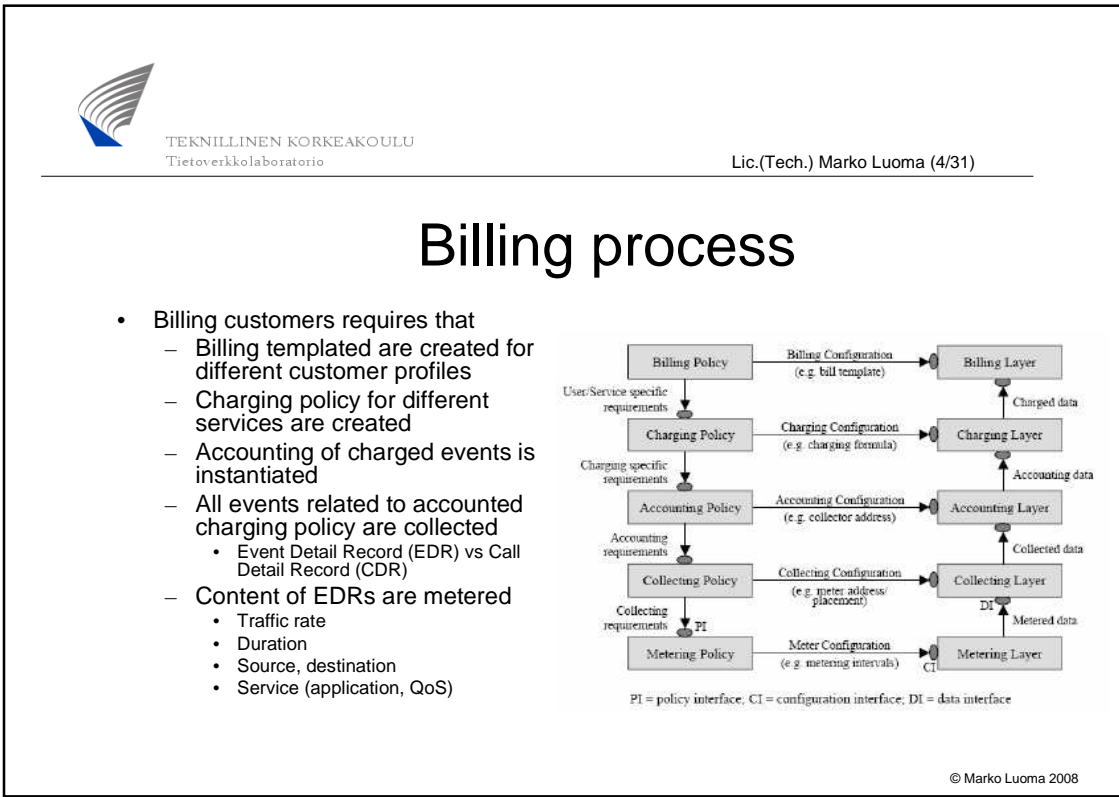
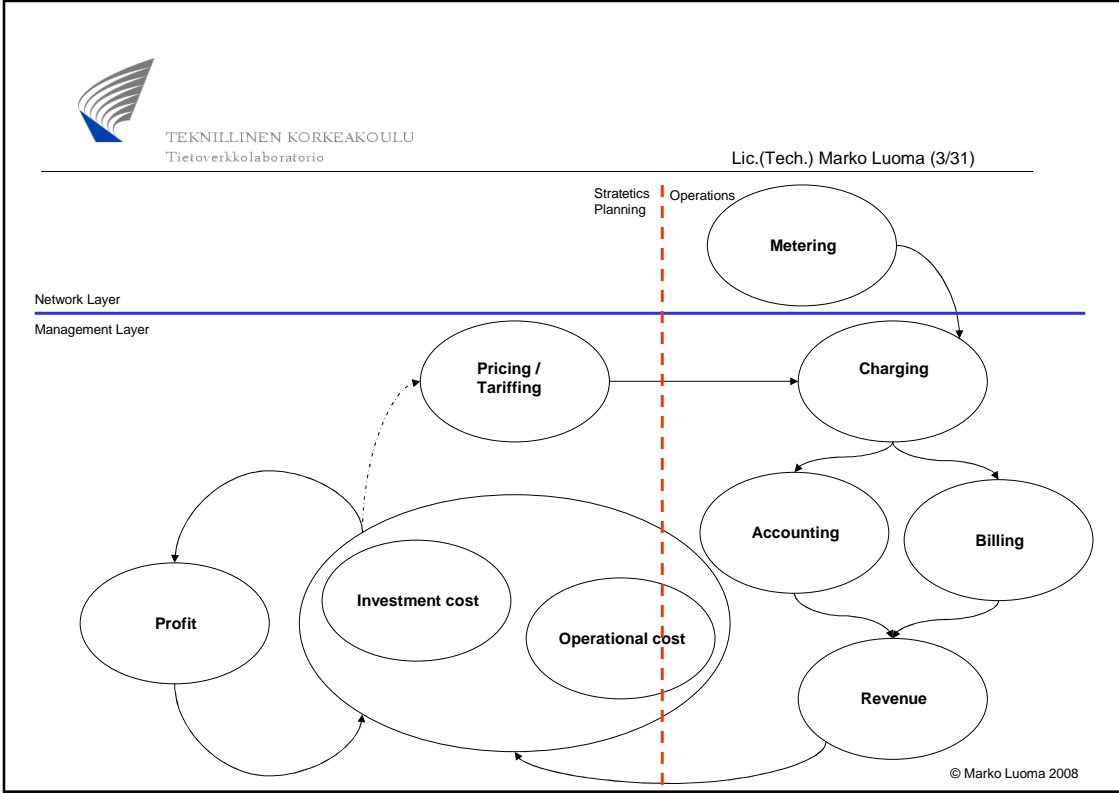
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Background

- 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 in order to prevent
 - Monopolism or too low competition
 - Over charging
 - Barriers of market introduction from new players

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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

- | | |
|---|---|
| <ul style="list-style-type: none"> • Mobile call <ul style="list-style-type: none"> – Used link resources per minute <ul style="list-style-type: none"> • Rate: 13kbps • 780 000 bits in a minute – Hard-real-time requirement <ul style="list-style-type: none"> • Voice channel reservation – price: 7 cents | <ul style="list-style-type: none"> • SMS <ul style="list-style-type: none"> – Used link resources per message <ul style="list-style-type: none"> • 160 characters • 8 bits per character • In total: 1280 bits – Non real-time requirement <ul style="list-style-type: none"> • 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

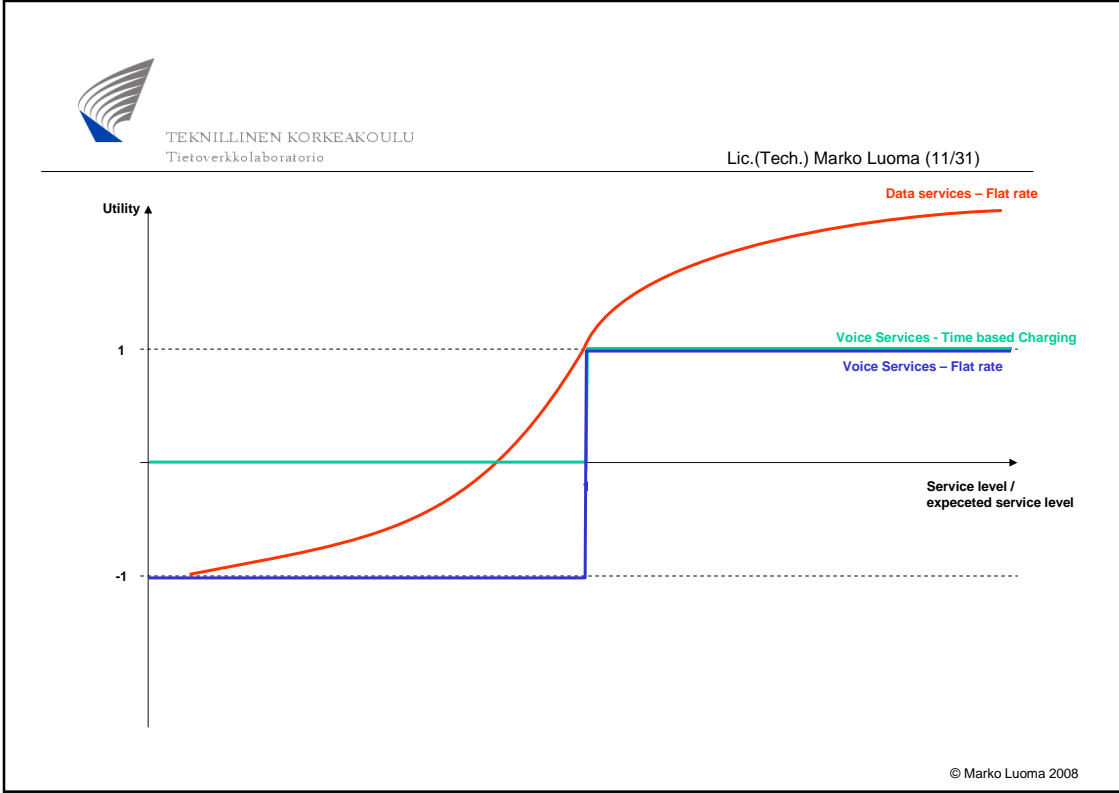
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Utility

- **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

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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 be charged in order to cope with litigations
 - Support services are usually labor intensive
 - Increase the opex very fast
 - Where is the demarcation point of the service
 - Toll trucks

Availability	Out of order	
	Per annum	Per week
90%	36.5 d	16.85h
95%	18.25 d	8.42h
98%	7.3 d	3.37h
99%	3.65 d	1.68h
99.5%	1.83 d	50.54min
99.8%	17.52 h	20.22min
99.9%	8.76 h	10.11 min
99.95%	4.38 h	5.05 min
99.99%	52.56 min	1.01 min
99.999%	5.26 min	6.06s

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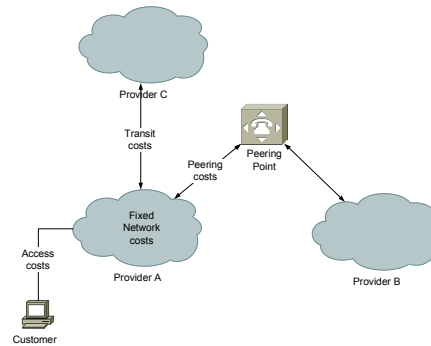
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Communication costs

- 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)



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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 deprecation of the network investment
 - Marginal cost per bit is not zero
 - Outside own ifrastructure
 - Premium is paid
 - Based on the negotiated contracts with other providers
 - » Transit
 - » Peering

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Network originated costs

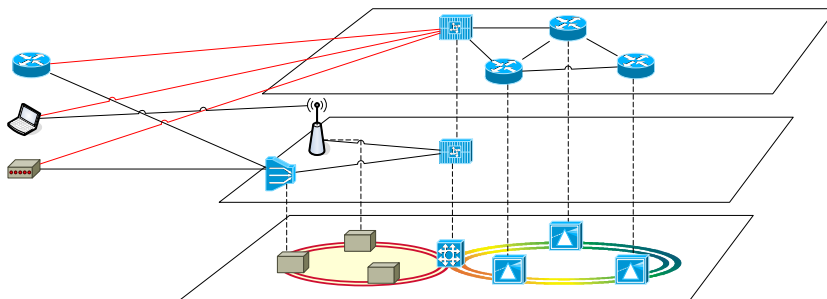
- Network structure and delivered services cause variable costs
 - New network is always cheaper due to lack of legacy support
 - Integration of old and new leads to sub-optimal operation
 - Slogan: Router port is expensive – switch port is cheap
 - Holds for certain extent – should not be mantra
 - 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

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Network originated costs

- IP centric network design



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Network originated costs

- Transport centric network design

