Introduction to operator challenges and wireless infrastructure economics

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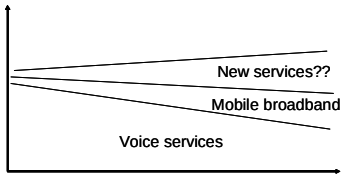
TODAY

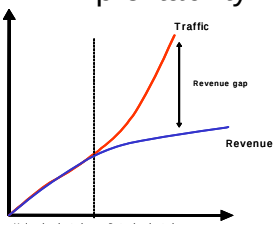
- 10-11: Jan
  - Intro to operator challenges
  - Info about part 2 and HW2
  - Some theory for HW2
- 11-12: Guest lecture Greger Blennerud, Ericsson
  - Mobile broadband

Operator challenges – business related

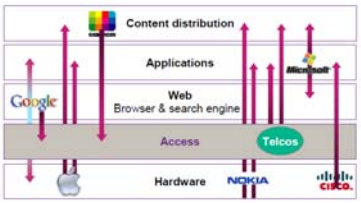
Revenue mix



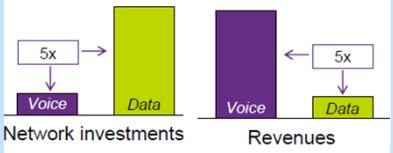
MBB profitability



The business landscape



Investments



3

WHAT IS
Wireless Infrastructure Economics?

Costs, Prices, Revenues, Profits

Money related to capabilities and resources
Distribution of costs, cost structure models and analysis

Trade-offs between

Capacity
Performance

⟺

Network Costs
Amount of spectrum

4

Two main parts

HW2 • First part is about overall picture, problems/ challenges related to operator busieness

HW3 • Second part is about network challenges, relationships cost, capacity, performance, spectrum

5

TODAY, the first part

- First part is about overall picture, problems and challenges
- **Where are the costs?**
- In the fixed/Broadband networks?
- In the Mobile Networks?
- In the Radio Access Network of the Mobile networks?
- In the Core Network of the Mobile Networks?
- For a Mobile Operator in general?
- **Where are the revenues? What kind of services?**
- Voice
- Messages
- Data
- Music
- Other services

6

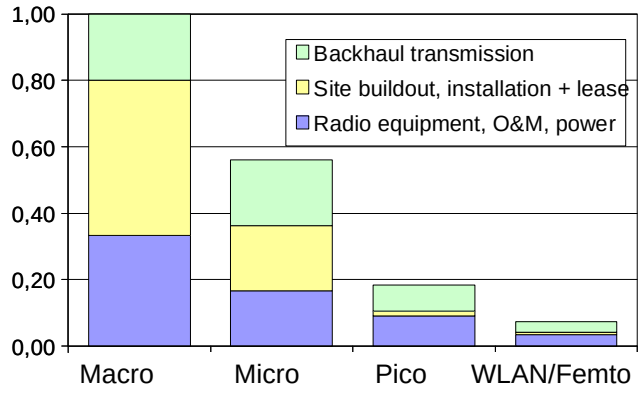
Cost structure

- Operator??
- Networks
- Radio access networks

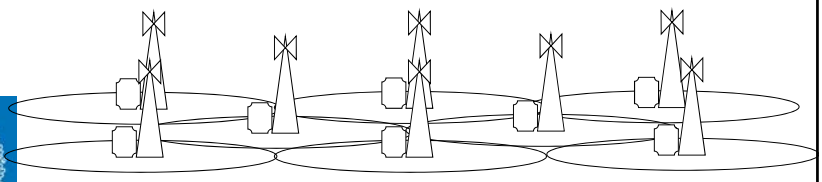
Cost structure of radio access networks

- It is not only costs for the base station equipment (the radio) but also for the transmission & sites

From
Klas Johansson
PhD thesis 2007



Cellular networks in rural areas
– large coverage areas per base station
- few base stations per area unit

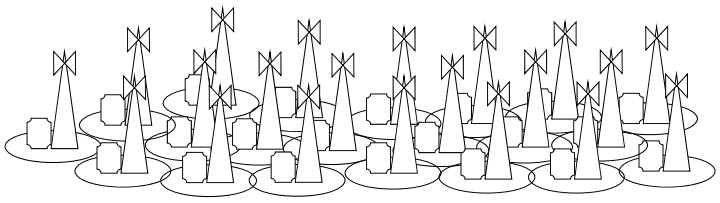


Range limitations

- Typical ranges (NLOS):
  - 10 kbit/s (GSM) 25+ km
  - 500 kbit/s (EDGE) 5-10 km
  - 2 Mbit/s (UMTS/) 2-3 km
  - 10 Mbit/s (HSPA) 500 m
  - 100 Mbit/s (LTE/WLAN) 50-150 m
- Coverage limited system

$$N_{BS} = \frac{A_{tot}}{A_{cell}} \propto \frac{1}{R^2}$$

Cellular networks in urban areas – many base stations per area unit



11

The infrastructure cost for capacity limited systems

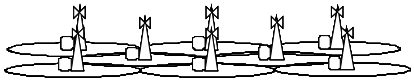
- Spectrum limitation
  - B_{tot} available bandwidth
  - Spectral /reuse efficiency K

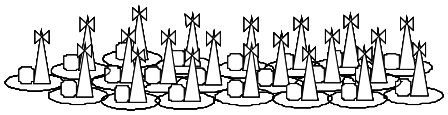
$$Cost \propto N_{BS} \propto \frac{N_{user} B_{user} K}{B_{tot}} A_{tot}$$

12

Spectrum, capacity and cost

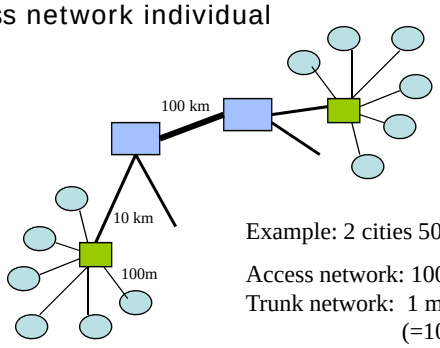
- High bandwidth means high capacity per site, i.e less number of base station sites





The “last mile” problem: Most investments in Access Networks

- Backbone network shared by many
- Access network individual



Example: 2 cities 50.000 user each

Access network: 100 m/user
Trunk network: 1 m/user
(=100 km/100.000 users)

TODAY, the first part

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- Data
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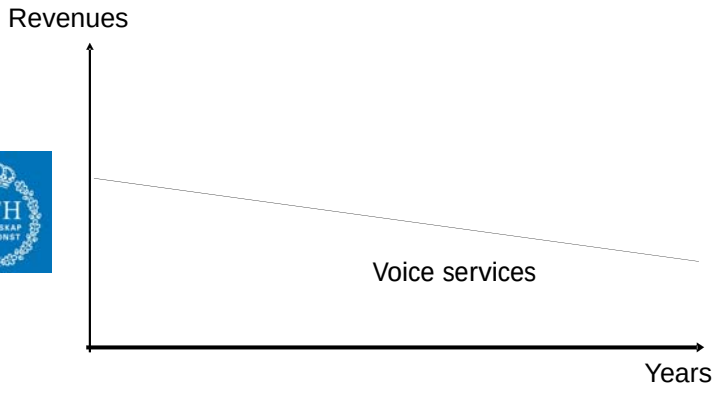
15

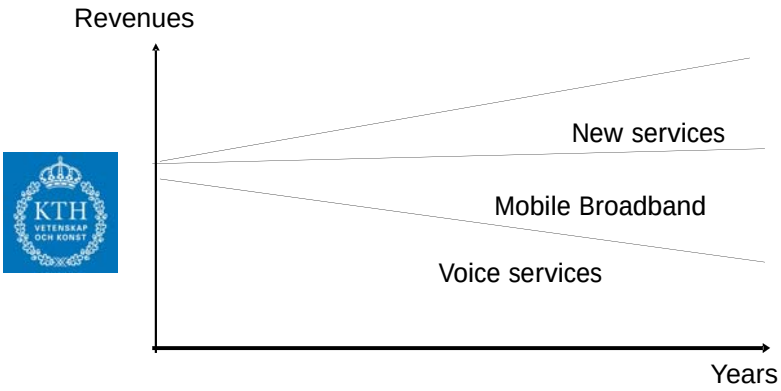
One motivation for our research

Declining voice revenues for mobile operators



16

One motivation for our research
New services require new solutions



17

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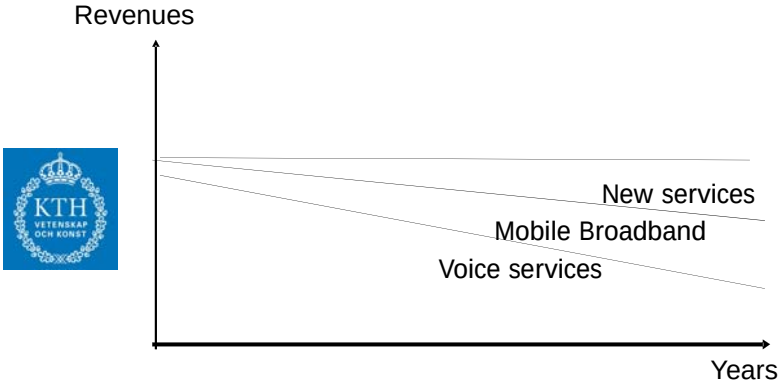
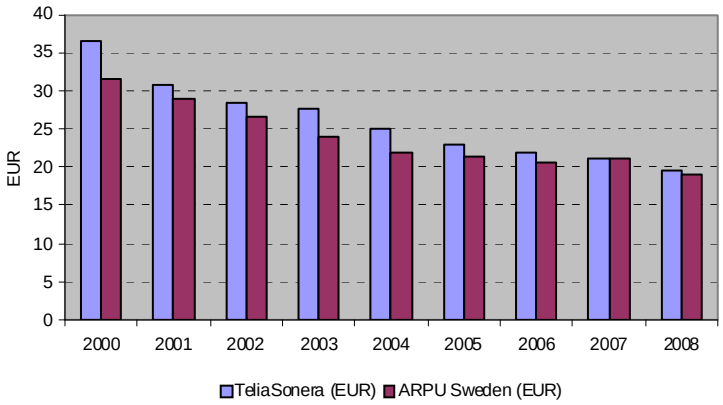


18

Revenues for mobile voice services in Sweden 2000-2008

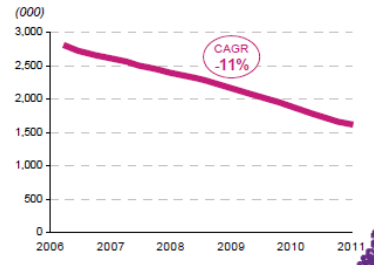


From Mölleryd, Markendahl, Werding and Mäkitalo conference paper presented at CTTE 2010, May 2010

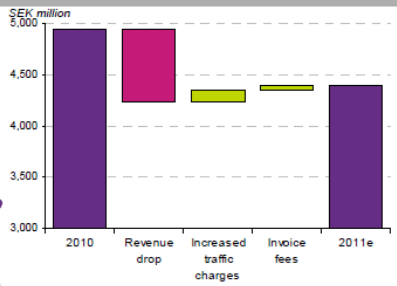
19

Controlled decline in consumer PSTN

Consumer PSTN development*



Initiatives to increase revenues*



* Example from Consumer segment Sweden

25

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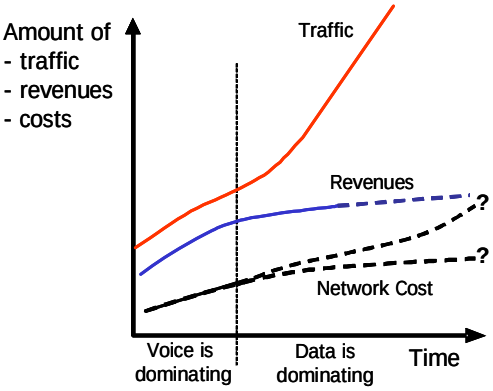
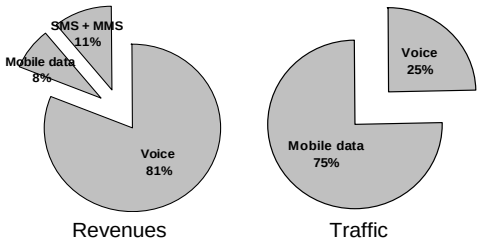
The revenue gap
”de-coupling” of traffic and revenues”

- Flat rate tariffs create large increase of data traffic
  - –Many GB per user per month
  - –Data traffic up >100 % per year
  - –Revenues do not follow



21

Traffic, prices and revenues



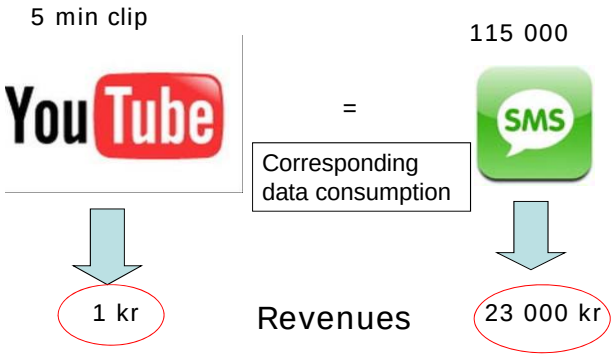
Traffic and revenue for different services at the Swedish market Q4 2008

EUR per MB	2007	2008
Voice	1,46	1,36
SMS	439,5	351,6
Mobile data (laptop)	0,014	0,011

Estimated price per MByte for voice, SMS and data for one Swedish operator

22

One big data challenge
(Thanks to Bengt Mölleryd)



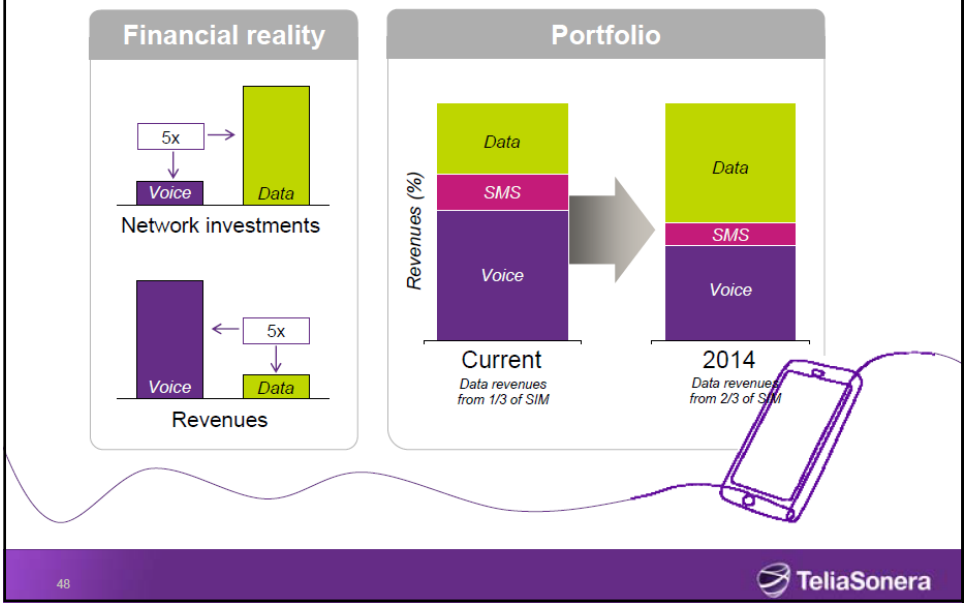
Antagande: YouTube 0.5 Mbit/s och med 5 min clip, 60 * 0.5/8*5 = 19 MB. Pris ca 0,05 kr per MB. SMS 160 bytes = 6250 SMS per MB. Pris 0,20 kr per SMS.

Vidare är SMS mycket lönsam med EBITDA på 90%. Om man antar 15% av omsättning är SMS och en total EBITDA marginal på 35% skulle ett tapp av SMS innebära att marginalen faller till ca 25%

Traffic, prices and revenues

- Amount of voice data 10-20 MB per month
- Amount of mobile broadband data 1–20 GB per month
  - The number of mobile broad band bits are 100 – 1000 more than the number of voice bits
- But we pay more or less the same, i.e. the price per data bit is 100 – 1000 times lower => the cost per bit must be 100 – 1000 lower

Rebalancing of pricing model needed



48

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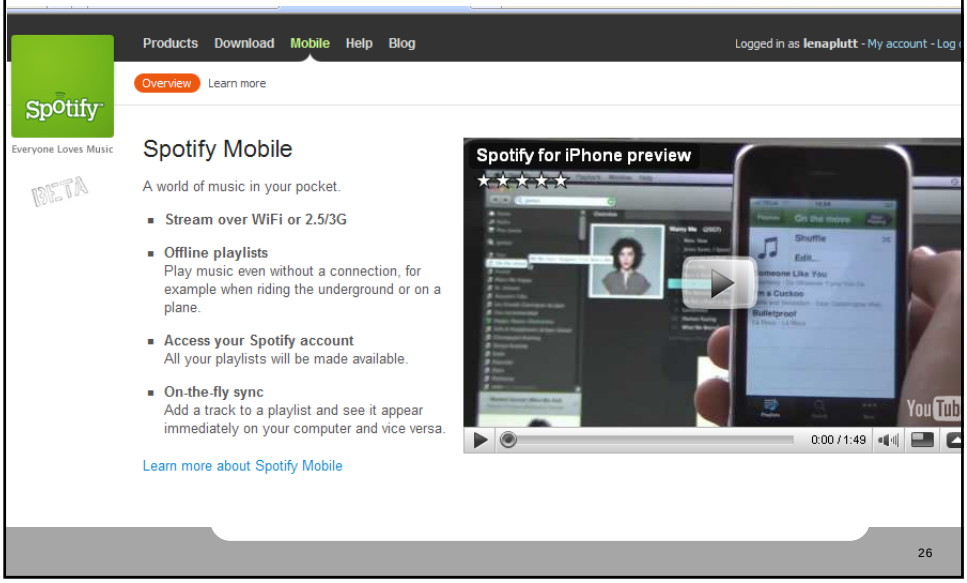
"New" services



26

Source: IDATE

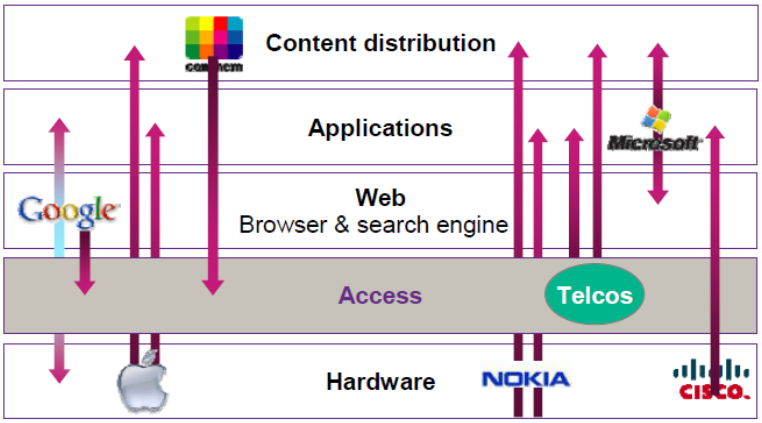
Revenue sharing for Apps?

Revenues from applications

	Previous	Now
Developer	20%	70%
Publisher	20%	0%
Aggregator	20%	0%
Operator	40%	0%
Handset supplier	0%	30%
	Type I-Mode	***Apple***

28

Changing competitive dynamics
Investor Day 2009



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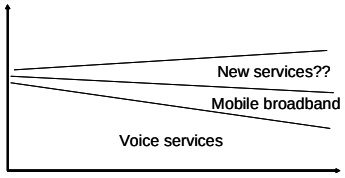
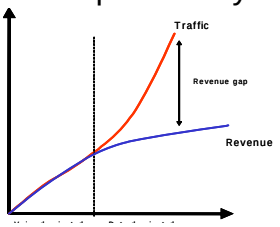
Operator challenges – business related

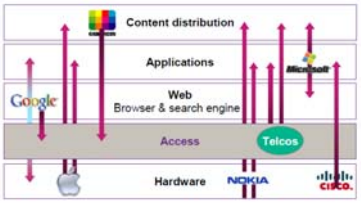
Revenue mix



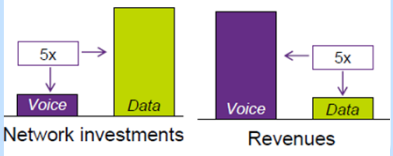
MBB profitability



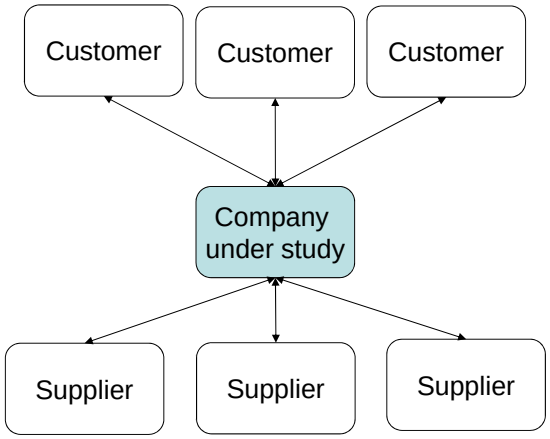
The business landscape



Investments

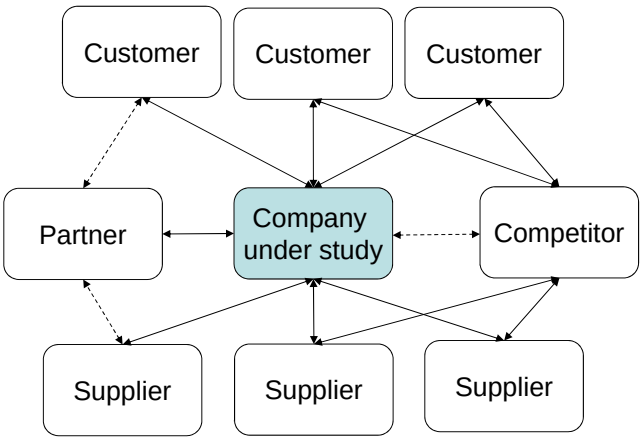


Cooperation:
Market Actors and Relations



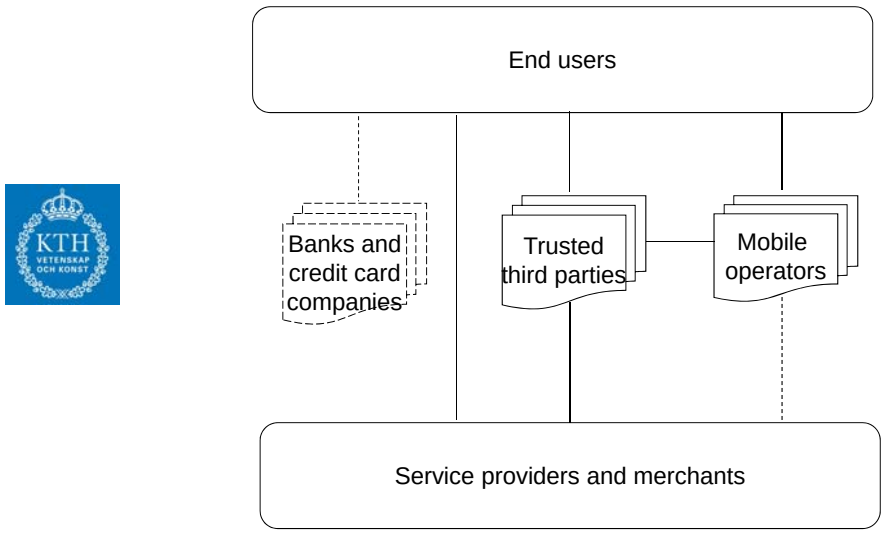
31

Cooperation:
Market Actors and Relations



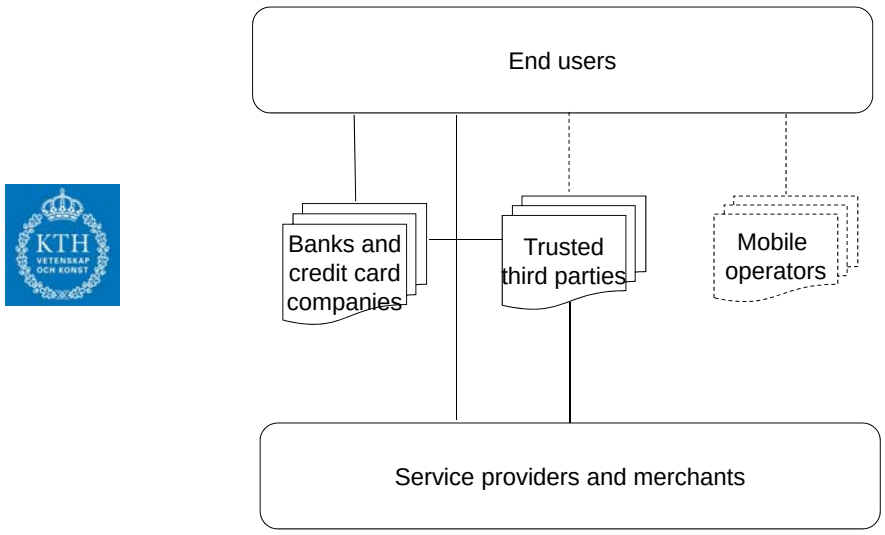
32

Premium SMS



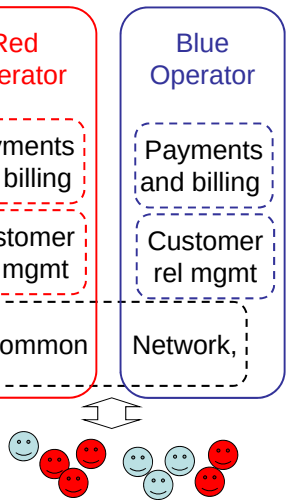
33

Bank SMS



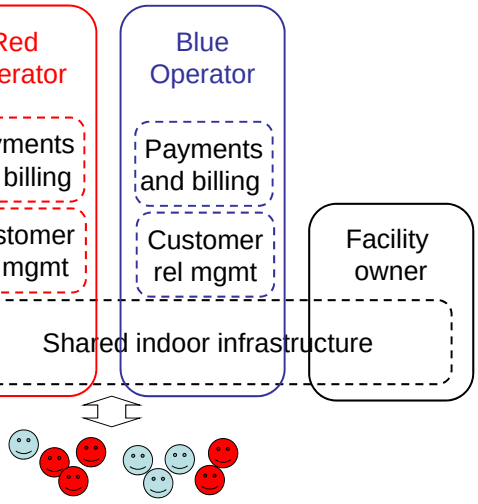
34

Network sharing



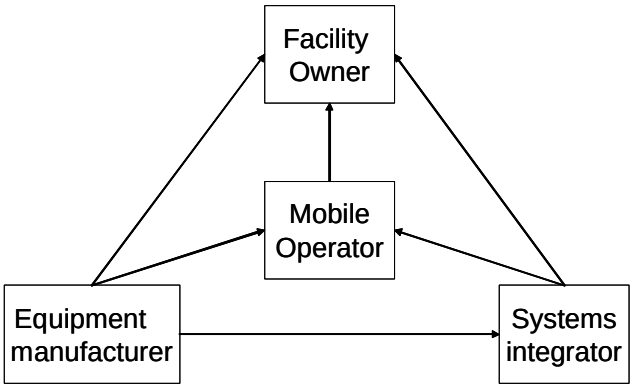
35

Shared indoor infrastructure



36

Actors and relations indoor wireless access systems



37

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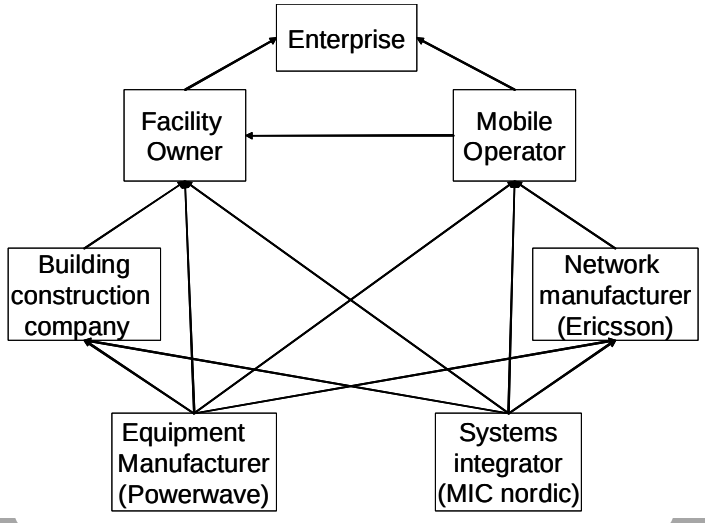
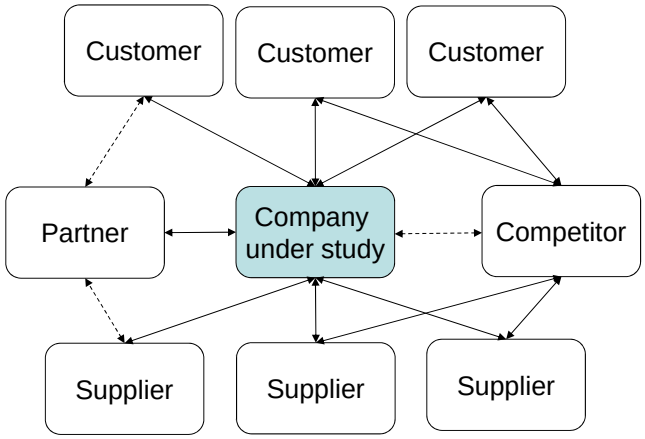


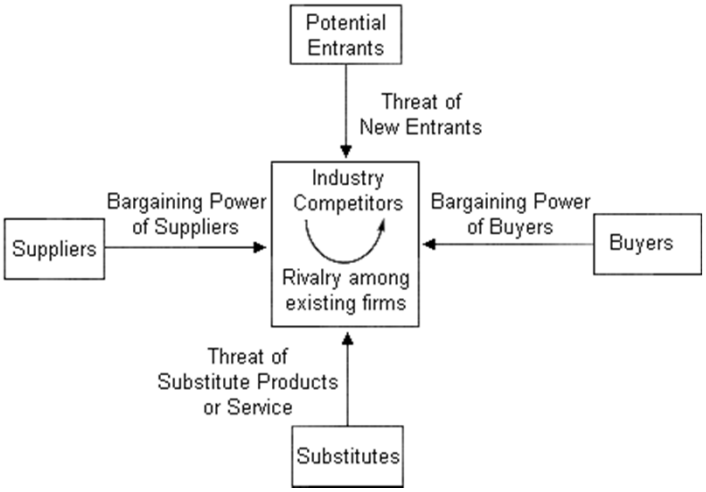
38

Cooperation: Market Actors and Relations



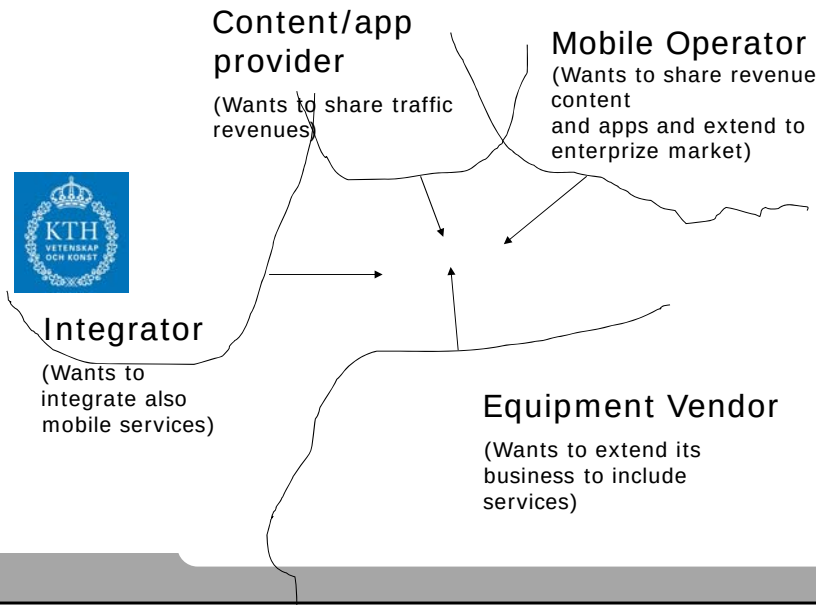
39

Porters five market forces



40

The mobile business battle



41

Porters generic strategies

Target Scope	Advantage	
	Low Cost	Product Uniqueness
Broad (Industry Wide)	Cost Leadership Strategy	Differentiation Strategy
Narrow (Market Segment)	Focus Strategy (low cost)	Focus Strategy (differentiation)

42

Porter and the MOB game

According to Porter, there are three fundamental ways through which a company can achieve sustainable competitive advantage.

Porter's three generic strategies are as follows:

- A *cost leadership strategy*
- A *differentiation strategy*
- A *focus strategy*

Choose ONE strategy for the MOB game

Prepare activities in order to implement the strategy