



Introduction to operator challenges and wireless infrastructure economics

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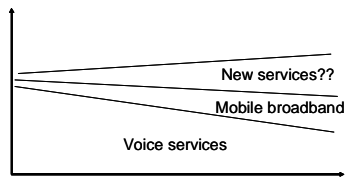
TODAY

- 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

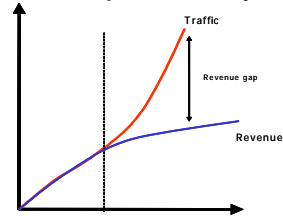
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Operator challenges – business related

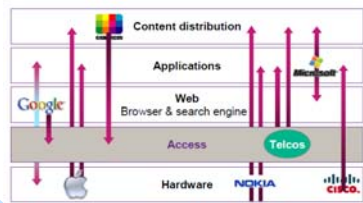
Revenue mix



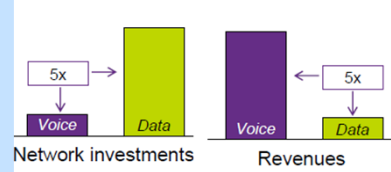
MBB profitability



The business landscape



Investments



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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

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Two main parts

- HW2** • First part is about overall picture, problems/ challenges related to operator business
- HW3** • Second part is about network challenges, relationships cost, capacity, performance, spectrum



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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



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Cost structure



- Operator??
- Networks
- Radio access networks

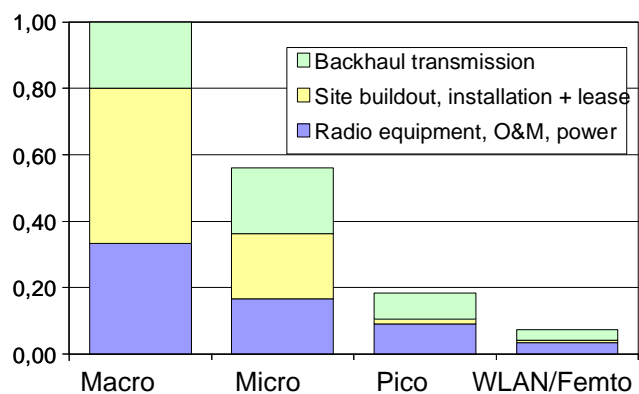
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Cost structure of radio access networks



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

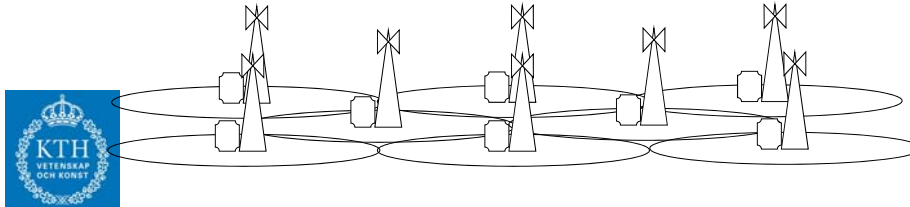
From
Klas Johansson
PhD thesis 2007



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Cellular networks in rural areas

- large coverage areas per base station
- few base stations per area unit



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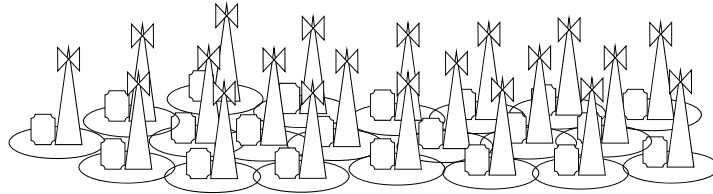
Range limitations

- 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

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

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



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The infrastructure cost for capacity limited systems

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

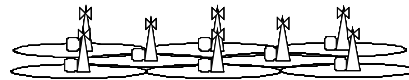


$$Cost \propto N_{BS} \propto \frac{N_{user} B_{user} K}{B_{tot}} A_{tot}$$

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Spectrum, capacity and cost

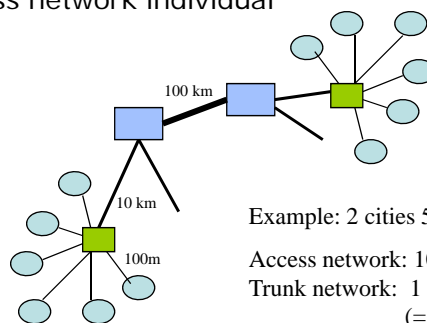
- High bandwidth means high capacity per site, i.e less number of base station sites



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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)

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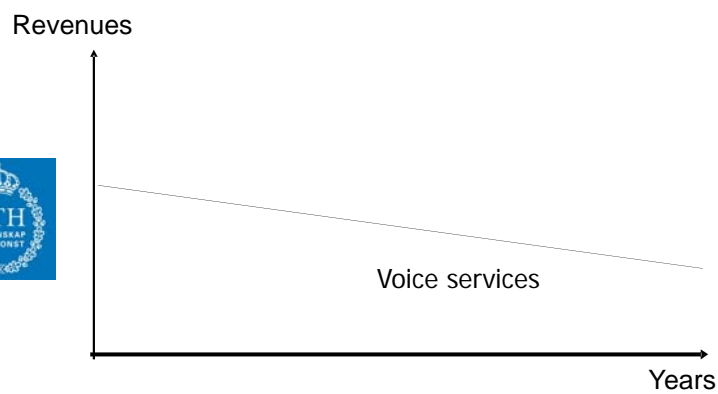
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- Music
- Other services

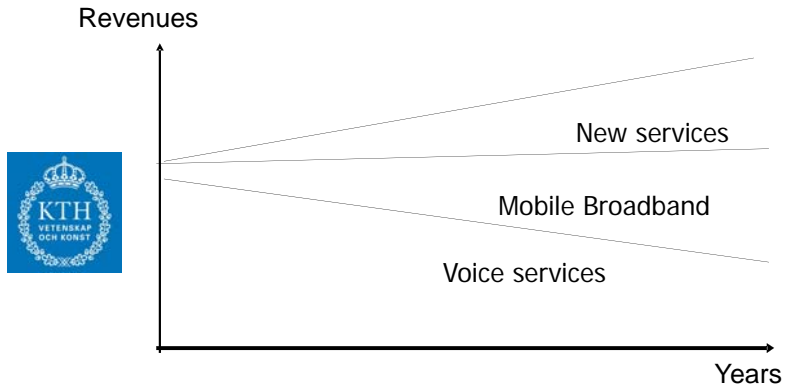
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One motivation for our research Declining voice revenues for mobile operators



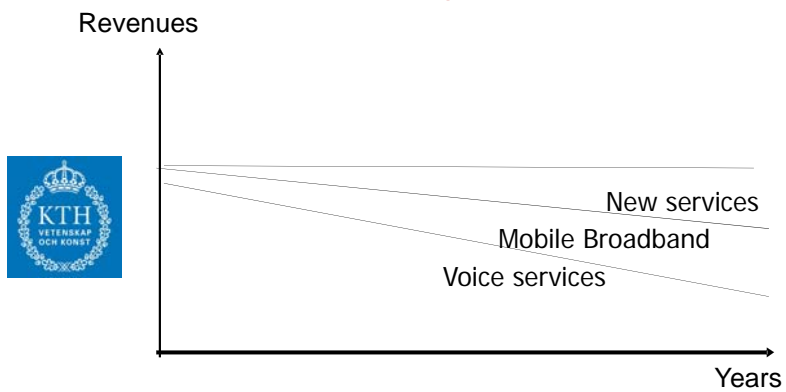
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One motivation for our research
New services require new solutions



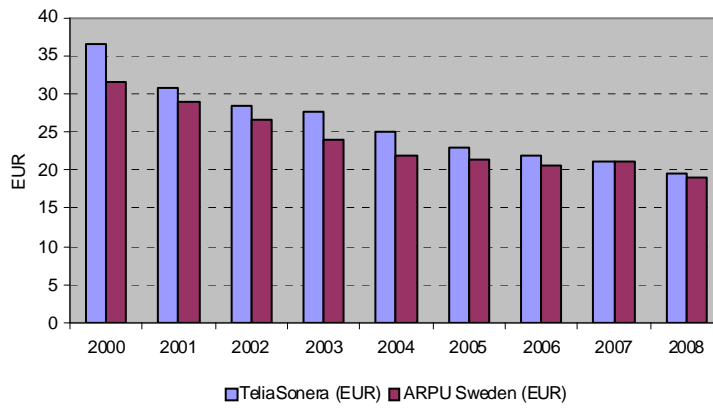
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One motivation for our research
New services require new solutions



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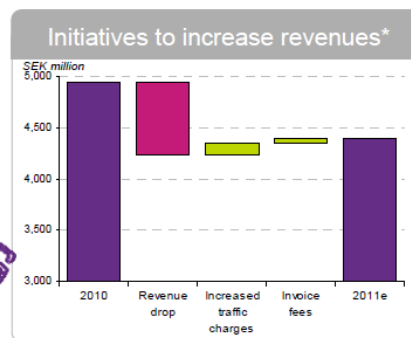
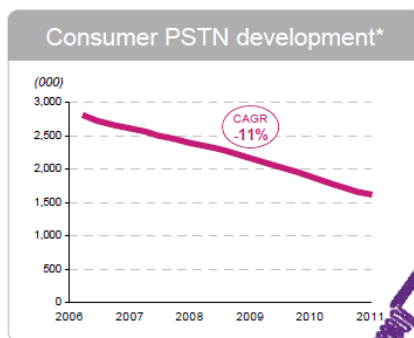
Revenues for mobile voice services in Sweden 2000-2008



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

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Controlled decline in consumer PSTN

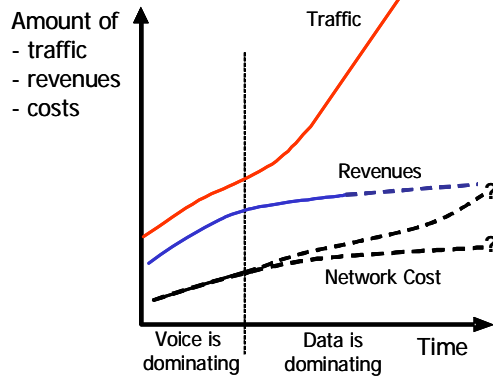


* Example from Consumer segment Sweden

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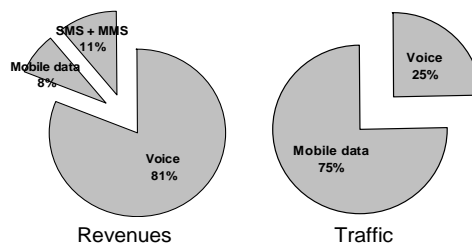
The revenue gap "de-coupling" of traffic and revenues"

- 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



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Traffic, prices and revenues



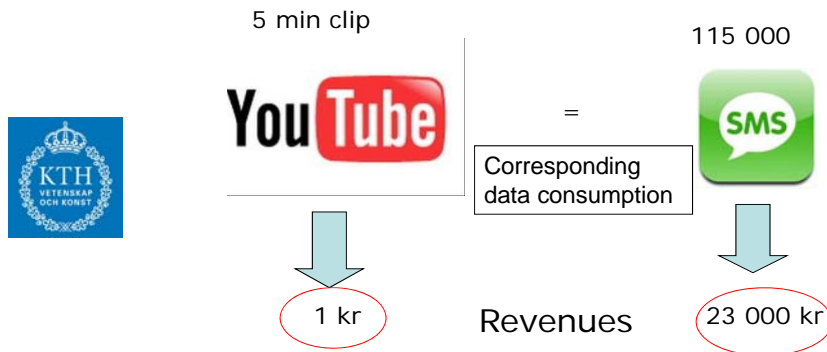
Traffic and revenue for different services at the Swedish market Q4 2008

| 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

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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%

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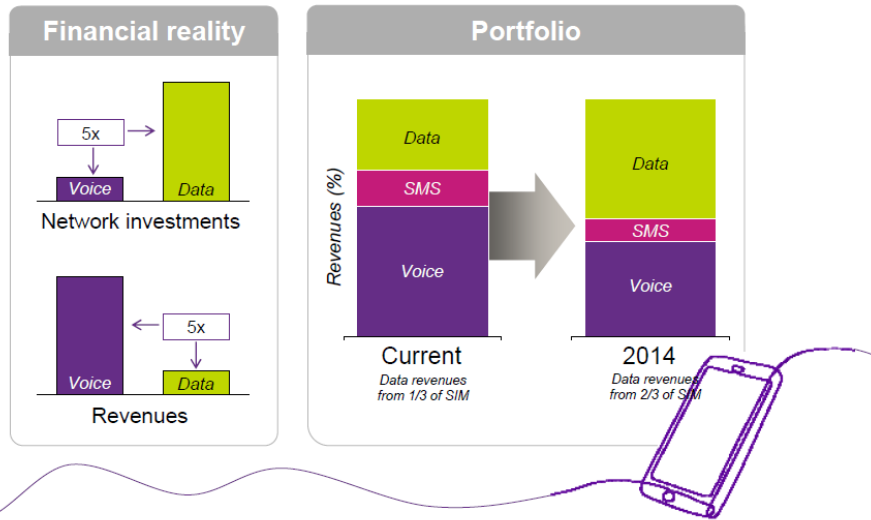
Traffic, prices and revenues

- 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



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Rebalancing of pricing model needed



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"New" services

The screenshot shows the Spotify website's 'Spotify Mobile' page. At the top, there are navigation links: 'Products', 'Download', 'Mobile', 'Help', and 'Blog'. The user is logged in as 'lenaplutt'. The main content area features the Spotify logo and the tagline 'Everyone Loves Music'. A 'BETA' badge is visible. The 'Spotify Mobile' section is titled 'A world of music in your pocket.' and lists the following features:

- Stream over WiFi or 2.5/3G**
- Offline playlists**: Play music even without a connection, for example when riding the underground or on a plane.
- Access your Spotify account**: All your playlists will be made available.
- On-the-fly sync**: Add a track to a playlist and see it appear immediately on your computer and vice versa.

Below the list is a link: 'Learn more about Spotify Mobile'. To the right, there is a video player titled 'Spotify for iPhone preview' showing a hand holding an iPhone displaying the Spotify app interface. The video player has a progress bar at the bottom showing '0:00 / 1:49'.

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TapExpense 2.3
Keep Your Numbers in Place

TapExpense helps you keep a record of daily expenses.

It is designed for both daily personal bookkeeping and business trip expense tracking. Multi-currency support makes it ideal for international travel.

Available on the [App Store for USD 4.99](#). Or try a [free Lite version](#) now!

Available on the iPhone **App Store**

Introduction TapExpense


Click to Play!

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Source: IDATE

Revenue sharing for Apps?

Revenues from applications

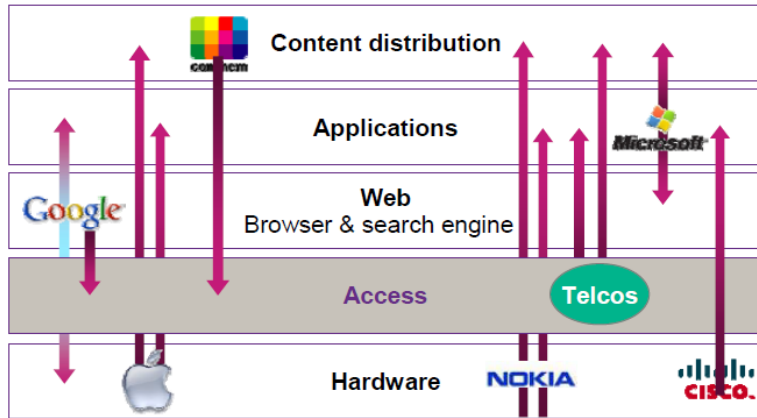
| | Previous | Now |
|---|----------|-----|
|  Developer | 20% | 70% |
| Publisher | 20% | 0% |
| Aggregator | 20% | 0% |
| Operator | 40% | 0% |
| Handset supplier | 0% | 30% |

Type I-Mode *Apple*

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Changing competitive dynamics

Investor Day 2009

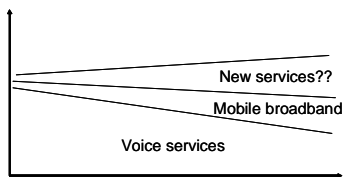


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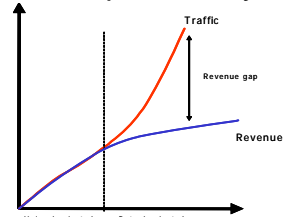
TeliaSonera

Operator challenges – business related

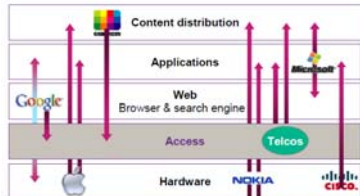
Revenue mix



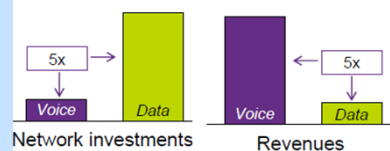
MBB profitability



The business landscape

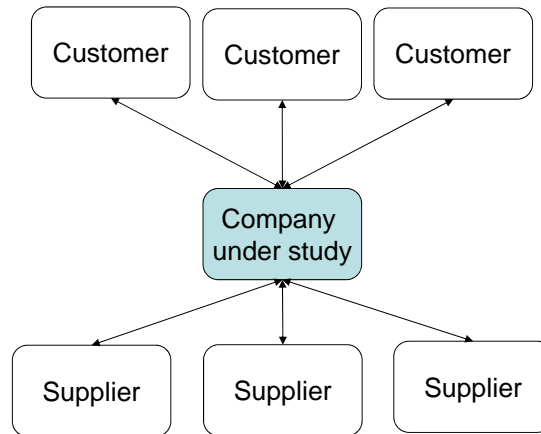


Investments



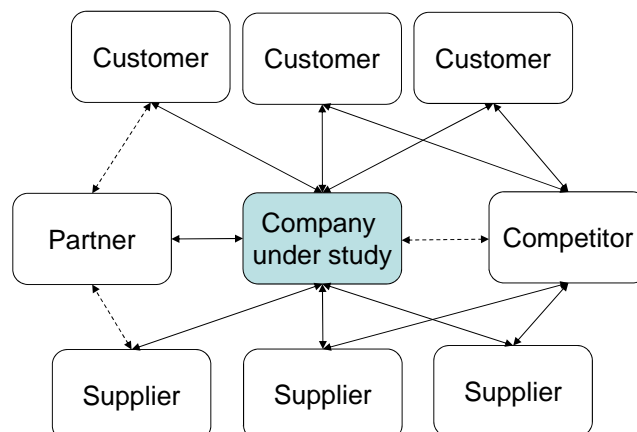
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Cooperation: Market Actors and Relations



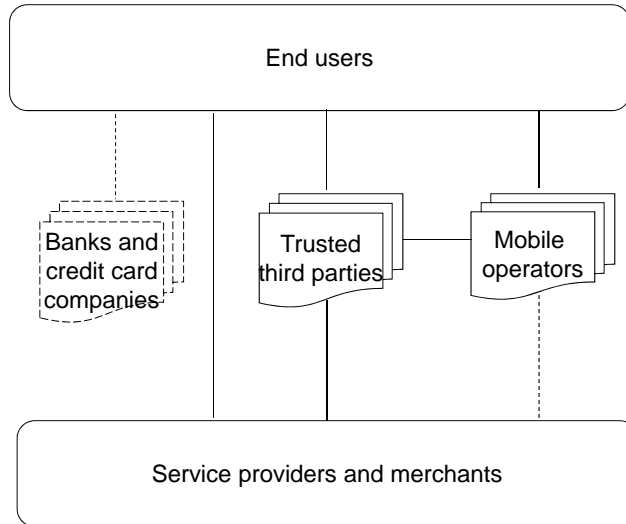
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Cooperation: Market Actors and Relations



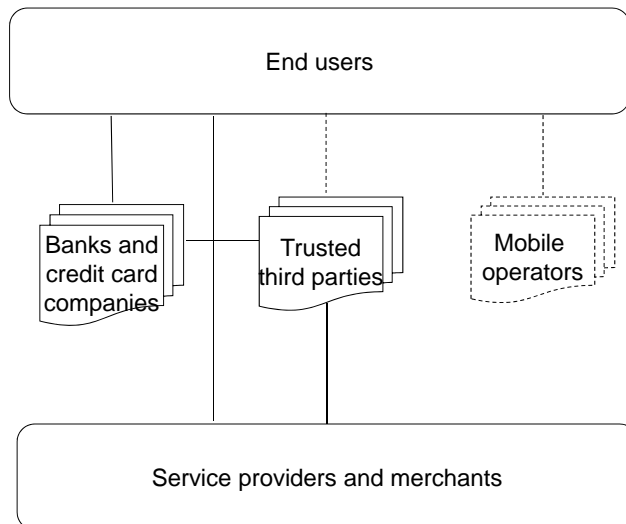
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Premium SMS



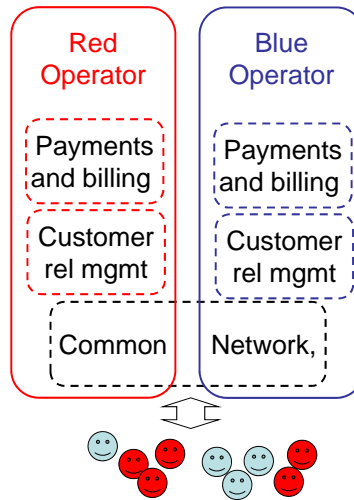
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Bank SMS



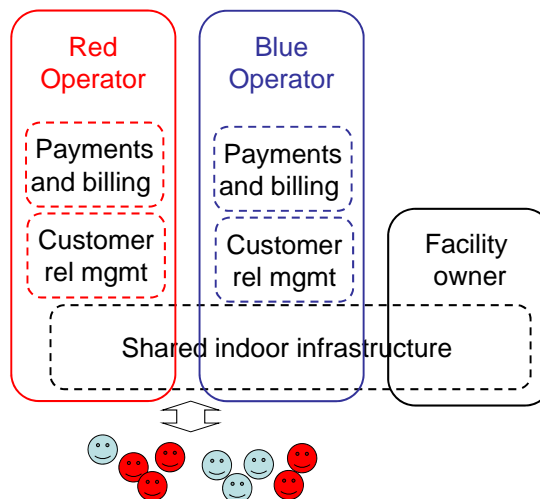
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Network sharing



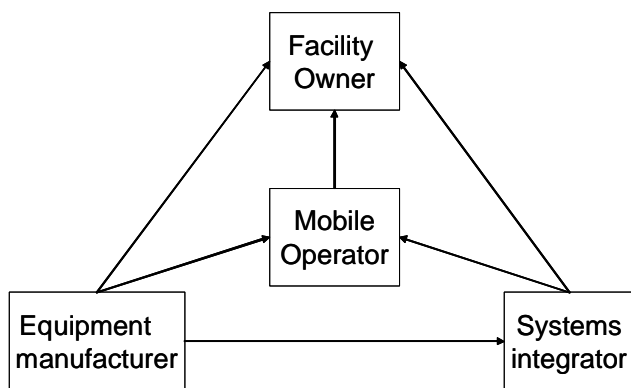
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Shared indoor infrastructure



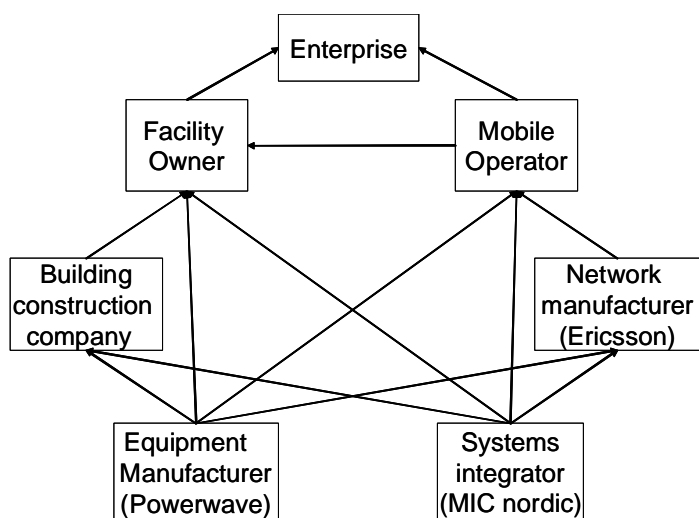
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Actors and relations indoor wireless access systems



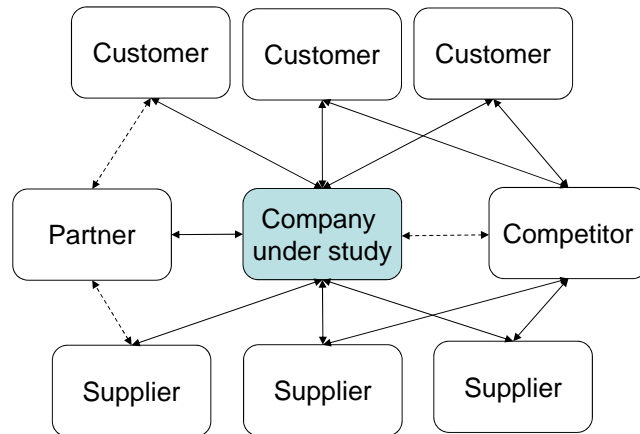
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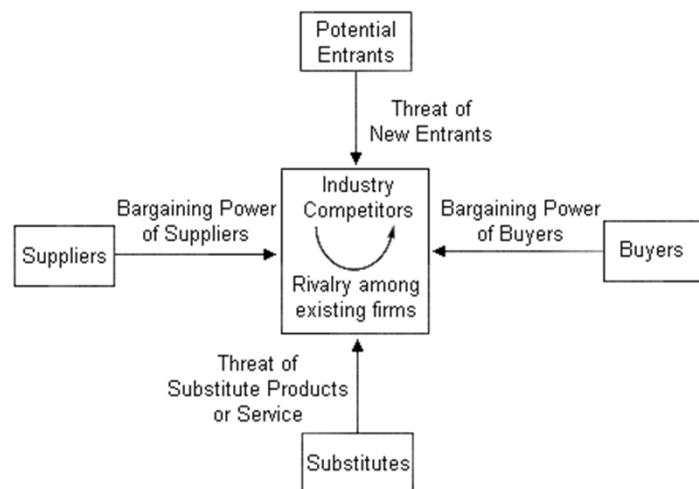
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Cooperation: Market Actors and Relations



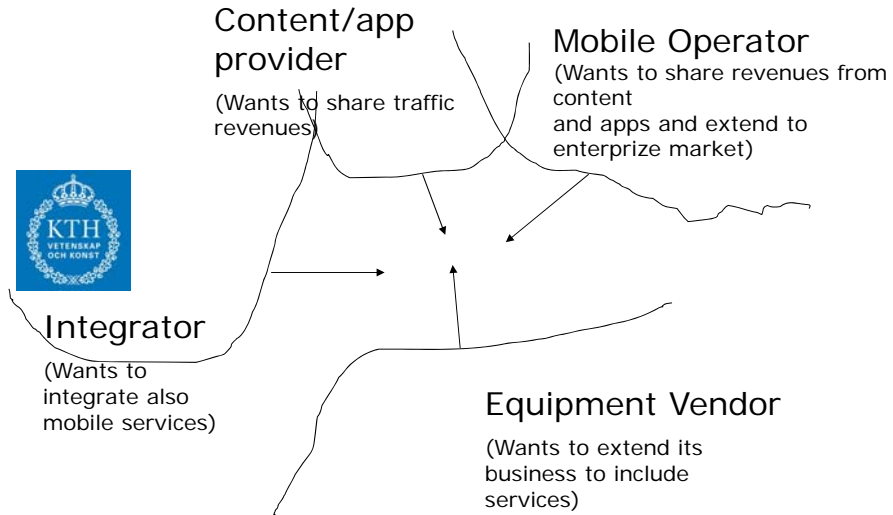
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Porters five market forces



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The mobile business battle



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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) |

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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