



Wireless@KTH

## Network cooperation between Mobile Operators - Why and how competitors cooperate

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## Research questions and scope of paper

### General research questions

- Why do mobile operators cooperate?
- How do mobile operators cooperate?

### To look into

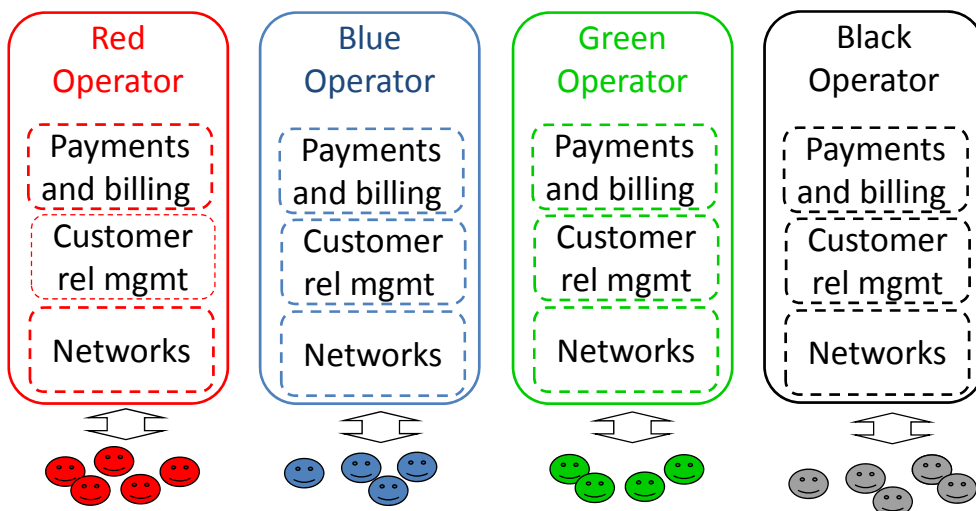
- Does cooperation change over time?
- Can cooperation and drivers be different?

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## Mobile Network Operators (MNOs) resources, customers and relations



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## GSM coverage in Sweden – Own networks

Tele2



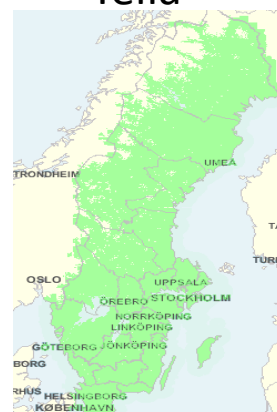
~70% covered area

Telenor



~65% covered area

Telia

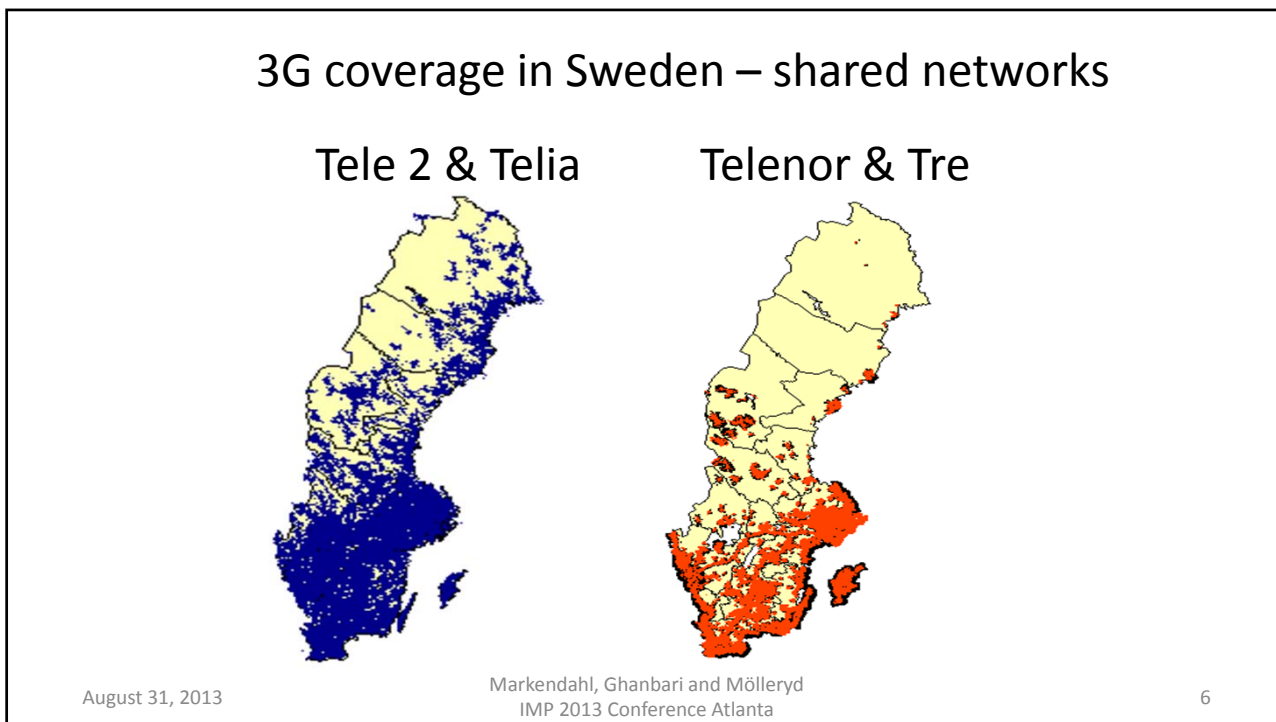
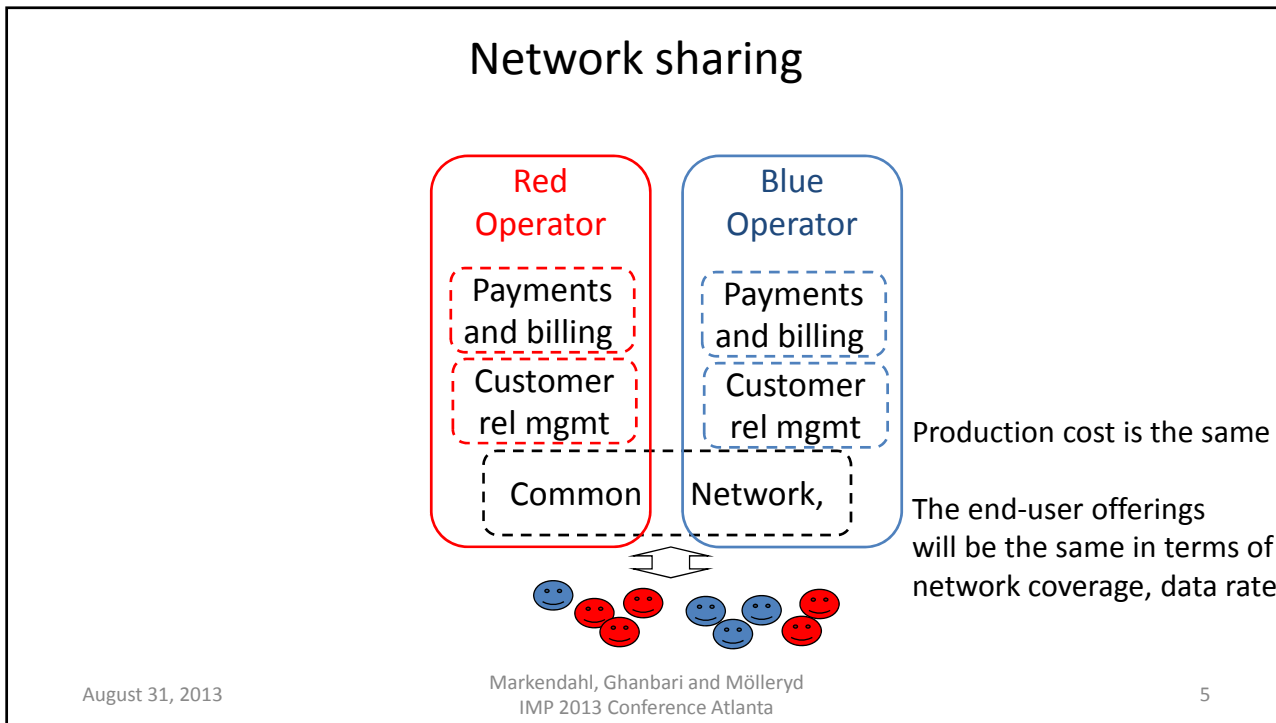


~90% covered area

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## What about 4G in Sweden?

LTE in 800 MHz, 900 MHz and 2.6 GHz frequency bands

**Telia & Tele 2**

↓

Telia is deploying an own LTE network

**Telenor & Tre**

↓

Tele2 and Telenor are deploying a shared LTE and GSM network

**Tre**

↓

Tre has plans to deploy an own LTE network

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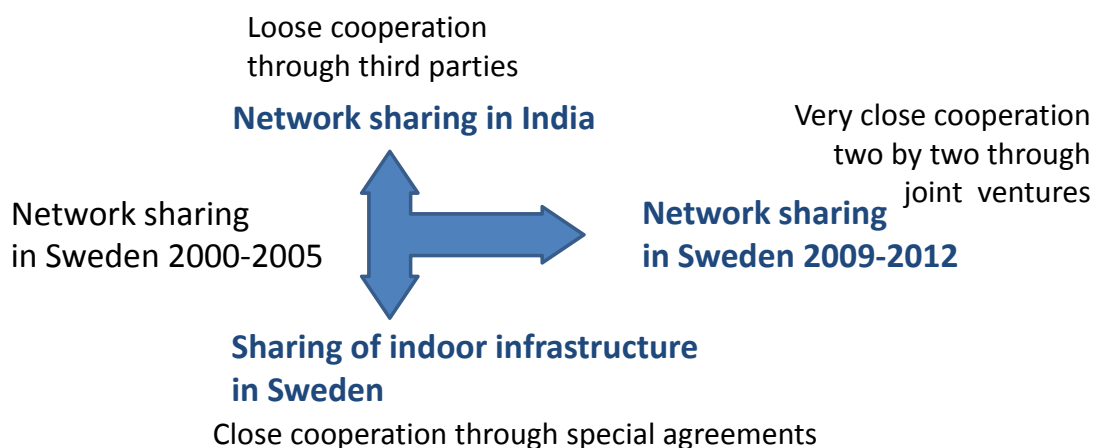
**Network sharing in India**

Network sharing in Sweden 2000-2005 → Network sharing in Sweden 2009-2012

**Sharing of indoor infrastructure in Sweden**

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## Research questions and scope of paper



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## A note on Methodology

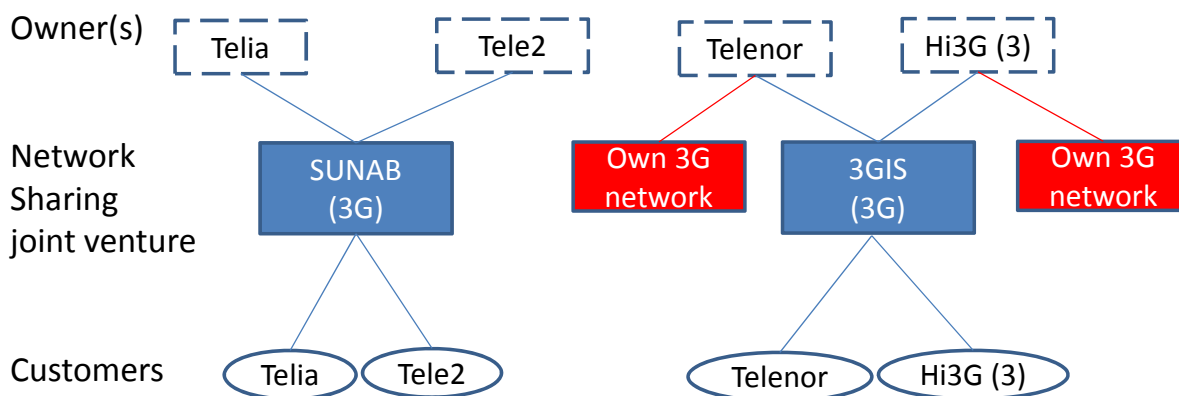
- Data collection
  - Interviews with Swedish mobile operators 2009-2010
  - Interviews with Swedish joint ventures and operators 2012
  - Interviews with Indian operators and regulator 2012
  - Interviews with providers of indoor wireless systems, local area operators, facility owners, enterprises (users) 2010-2013
- Analysis
  - Use co-opetition concepts (Bengtsson and Kock, 2000)
  - Apply ARA model, actors, resources, activities (Håkansson et al, 1995)
  - Apply cost structure analysis (Johansson, 2007), Markendahl, 2011)
  - Identification of drivers and obstacles for cooperation and sharing

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## Owners / customers of network sharing companies

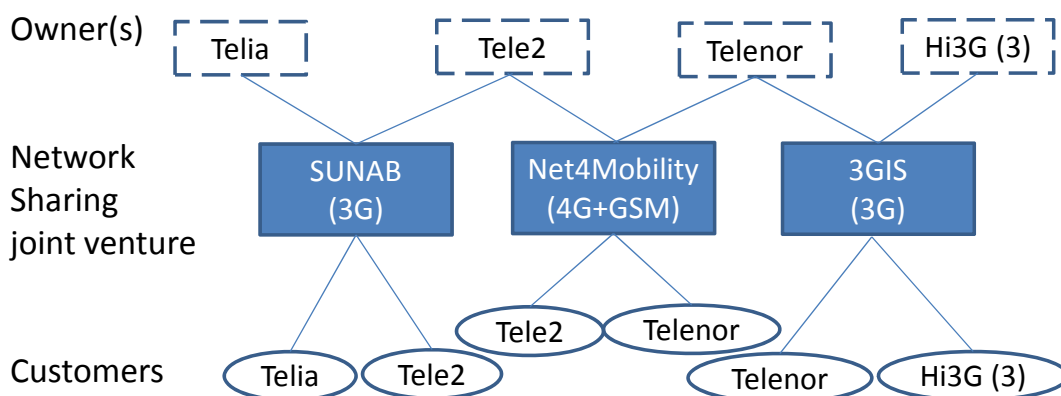


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## Owners / customers of network sharing companies



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## Network sharing - Why cooperation ?

- Drivers for network sharing
  - To reduce network costs
  - To get access to spectrum license
  - To "dare" to enter 3G business
  - To get access to competence and network of an established operator
  - Aggregated spectrum means that operators can offer higher bit rates
- Anti-drivers for network sharing
  - Less independence
  - Decision making takes more time and effort

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## Investments in mobile networks in Sweden 2000-2009 (Million SEK)

| Operator    | Investments |
|-------------|-------------|
| Telia       | 10334       |
| Tele2       | 4006        |
| SUNAB       | 5797        |
| Telenor     | 2945        |
| Hi3G access | 13384       |
| 3GIS        | 8786        |

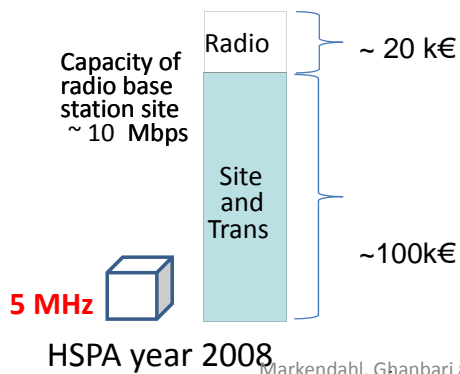
In total: 45 Billion SEK ~ 4 Billion € more than 20 000 sites

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## Capacity, cost and cost structure

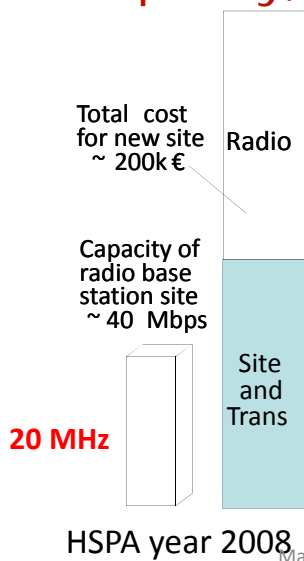


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## Capacity, cost and cost structure



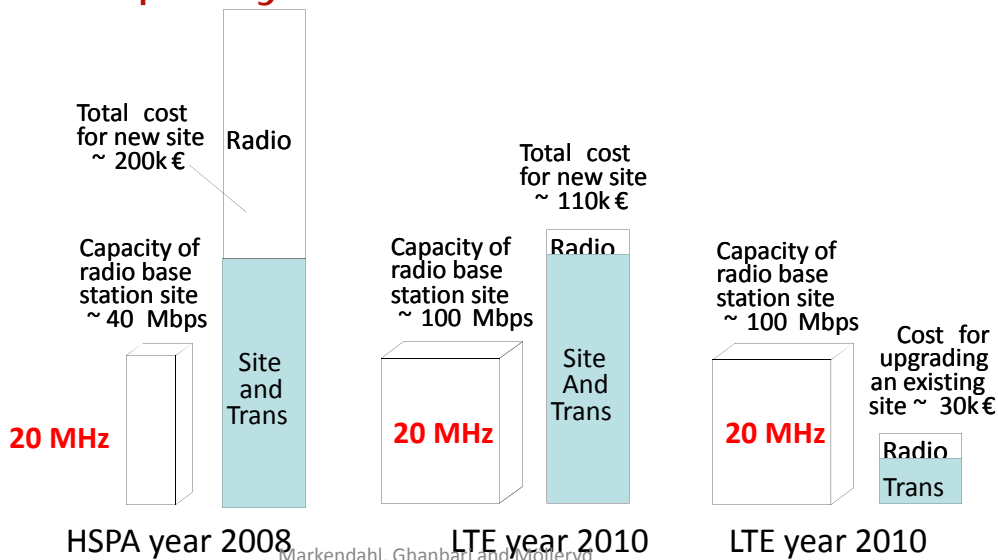
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## Capacity, cost and cost structure



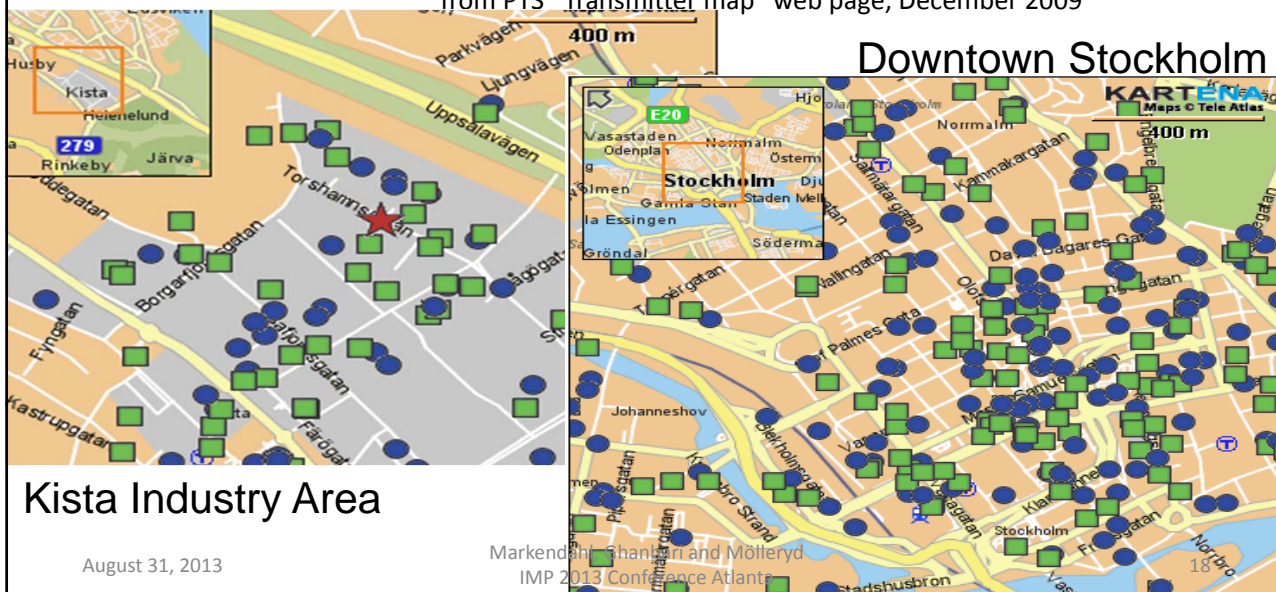
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## Base station site location in urban areas

from PTS "Transmitter map" web page, December 2009



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## Compare situation in Sweden 2000 and 2010

- Year 2000
  - Many new base station sites were needed
  - Radio capacity relatively expensive
  - Capacity demand was relatively low
  - No shortage of spectrum
- 2010
  - Many base station sites exist
  - Cost of radio capacity has decrease dramatically
  - Capacity demand is increasing
  - Amount of spectrum is important

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## Marketing by mobile operators – all have the "best" network

*'The fastest Mobile broadband in Sweden - according to information retrieved from Bredbandskollen.se, November 25, 2010' (Telenor)<sup>49</sup>*

*'Today the best Mobile broadband in Sweden was nominated and the winner is Tele2. This means that you can do web surfing at higher speeds with Tele2 compared to any other operator.'<sup>50</sup> 'We have the fastest 4G network in Stockholm.' (Tele2)<sup>51</sup>*

*'For the fourth year in a row the magazine 'Mobil' did nominate our mobile broad band to be the best in Sweden'<sup>52</sup> (HI3G)*

*'4G. The fastest mobile broadband in the world for just 15€ per month until the Easter holiday, ordinary price 60€ per month.' (Telia)*

*'We are the operator with the best 3G coverage. Today 9,1 million Swedes can use our mobile broadband where they live'. '3 offers 98,5% coverage'(HI3G)*

*'Tele2 has the best mobile broadband in Sweden - according to the annual coverage test made by the magazine Mobil'*

*'The network, that we share with Telia, covers 99,8% of Sweden' (Tele2)<sup>53</sup>*

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*'Today 8 million of Sweden populations have coverage with Turbo3G+' (Telia)<sup>80</sup>*

## Telecom market in India

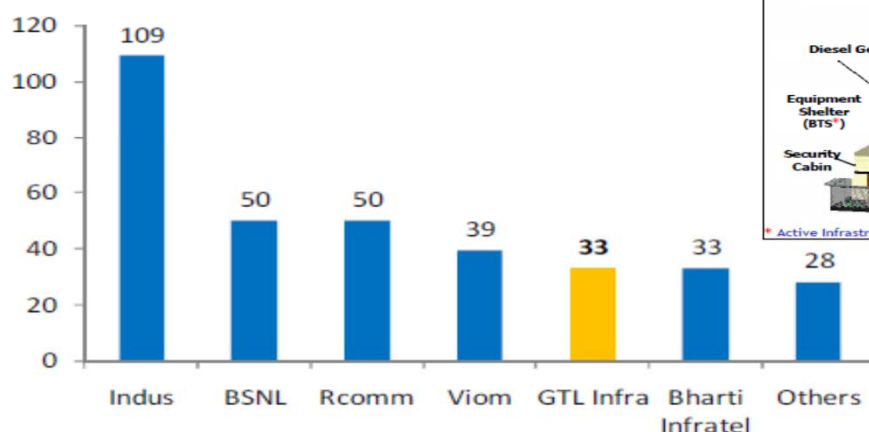
- Big market, around billion users
- Focus on mobile voice and messaging services, mobile broadband 1%
- Almost no fixed broadband, quite low level of fixed phones
- Large number of operators, 10 or more in each circle (region)  
=> high level of competition
- Very low prices, very low ARPU

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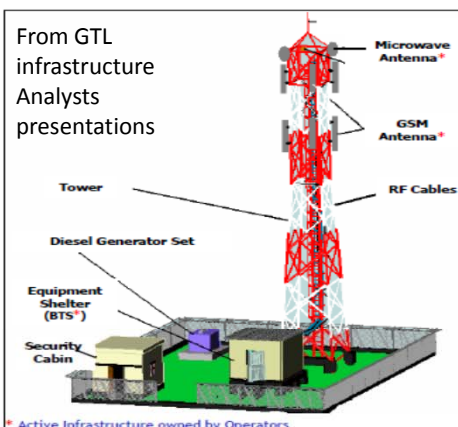
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## Number of base station towers in India (thousands FY2011)



From GTL infrastructure Analysts presentations



Strategy by one actor is to increase the number of tenants per site

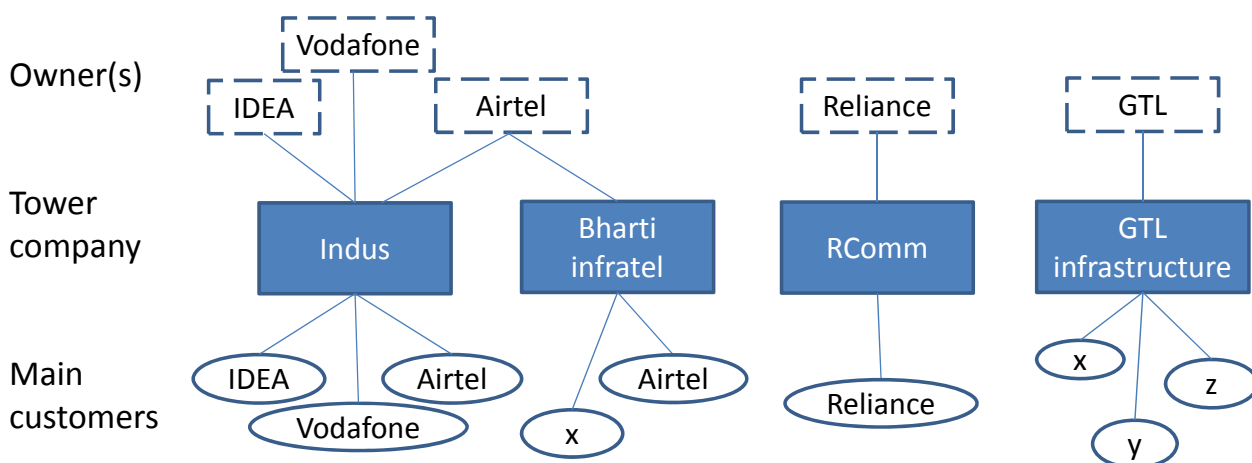
Source: Industry Research, TRAI

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## Owners and customers of tower companies



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## What to share ?

- Sweden
  - Everything is shared: sites, radio and spectrum, transmission
- India
  - Passive elements are shared: sites, power, etc
  - Active sharing is proposed for operators with "few" MHz
    - But spectrum fee proposal implies a "sharing cost"
  - Inefficient use of equipment => costly for operators
    - Can offer new business opportunities for tower companies

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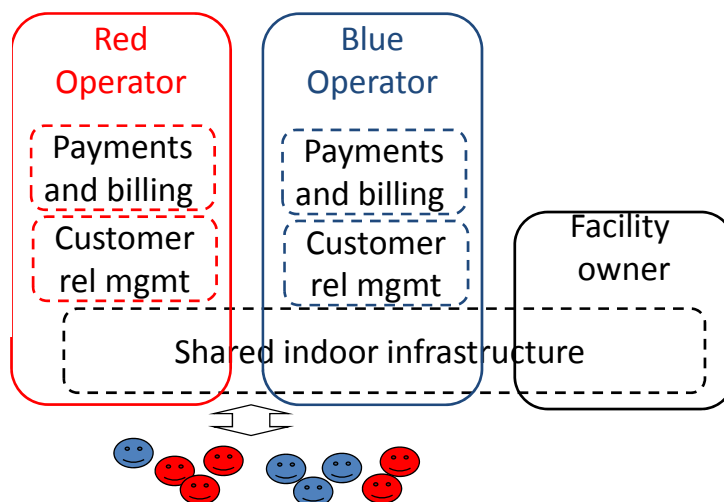
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## Shared indoor infrastructure

Facility owners do not accept  
 - a single operator network  
 - multiple indoor networks

=>  
 public indoor networks  
 need to be shared



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## Wireless indoor solutions

- Indoor solutions are not only used in order to compensate for wall penetration losses
- Other reasons may be:
  - Companies want ensured and dedicated capacity
  - Companies use mobile phones as office phone
  - Mobile operators want to increase customer loyalty
  - Mobile operators want to offload data traffic from outdoor (more expensive?) macro networks

**80-90% of wireless data traffic is from/to indoor locations**

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## Indoor wireless solutions are used in two different business settings

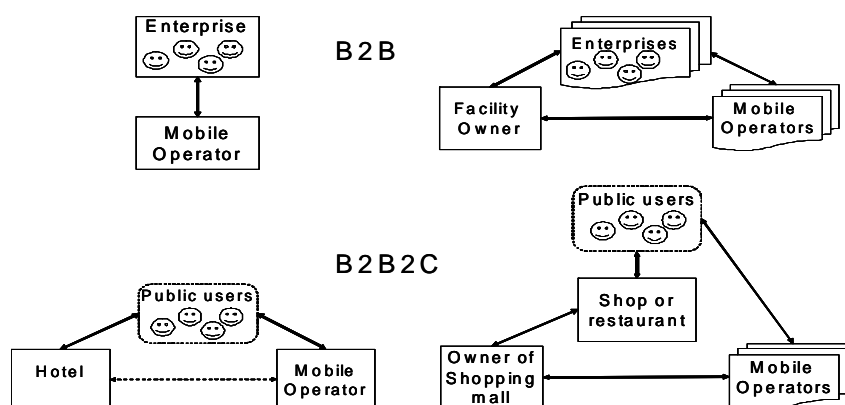
1. To ensure public access in locations like shopping malls, subways, sport arenas, hotels
    - The users are subscribers of the operators that visit the shopping mall, arena, hotel, etc
    - The operator have agreements with the owners of the mall, the sport arena, the hotel etc
    - The service IS the ensured indoor coverage
- B2B2C
2. To provide indoor "private" access at company offices etc as part of a complete offer etc
    - The users are the employees of the "company", etc
    - The indoor coverage is just one part of the offer
    - Other components can be outdoor coverage, handsets, IT support and services, call centers
- B2B

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## How do actors organize the cooperation



- In all these cases the mobile operators are key actors and organize the network of actors

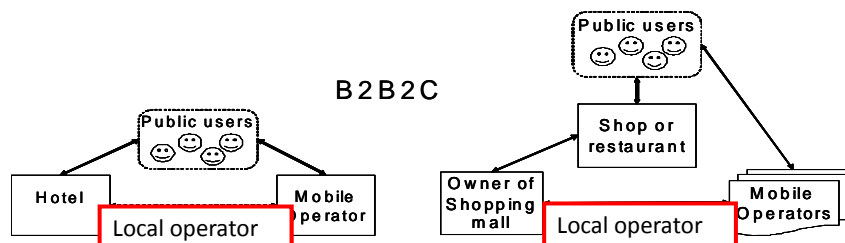
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## How do actors organize the cooperation and what about sharing?

Public indoor networks need to be shared  
New actors providing or operating indoor networks emerge  
**80-90% of wireless data traffic is from/to indoor locations**



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## Conclusions

- In Sweden network sharing was a key enabler for 3G networks to be deployed
- Operators compete for customers but cooperate closely on the network level
- Today cost savings are still important but is not the main issue, network sharing strategy is closely linked to the overall operator strategy  
- Telia case and Telenor and Tele2 case
- In India close network cooperation is not allowed due to regulation, this has implications for cost and efficiency
- In Sweden sharing of indoor networks is very common but is agreed on a case-by-case basis among operators, facility owners and enterprises

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## Observations and about the future

- In India the current regulation on network sharing and spectrum allocation will be an obstacle for large scale adoption of smartphones and mobile broadband services
- Globally many operators enter network sharing agreements
- In countries like Sweden the network sharing focuses on the outdoor big macro base stations and indoor sharing gets little attention.
- Operators need to a larger extent consider indoor sharing since most of the traffic is generated indoor or at public places
- Large scale adoption of indoor sharing will open up for new actors and have a big impact on the mobile operator business models

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# Thank you!

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