

# Wireless Infrastructure Deployment and Economics (Course IK2514)

Course Introduction, October 2012  
Jan Markendahl, Cos/ICT/KTH

## Agenda today

- Why this course? Your expectations?
- Course overview, course objectives
- KTH Social and the schedule
- About part 1 of the course and homework 1
- About part 2 and 3 of the course
- Lecture: Actors & roles at the telecom market
  - A small exercise

## Course overview

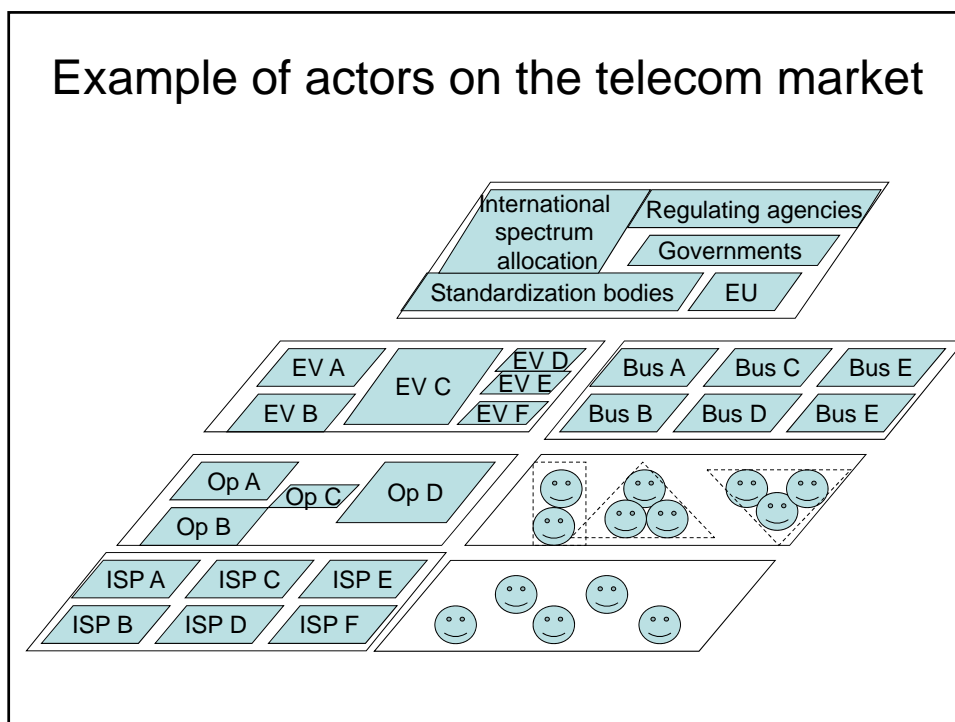
- Course content
- Course objectives
- Learning approach
- Agenda, lectures and lecturers
- Home work assignments
- The mobile operator game
- Examination and credits

## Course Content

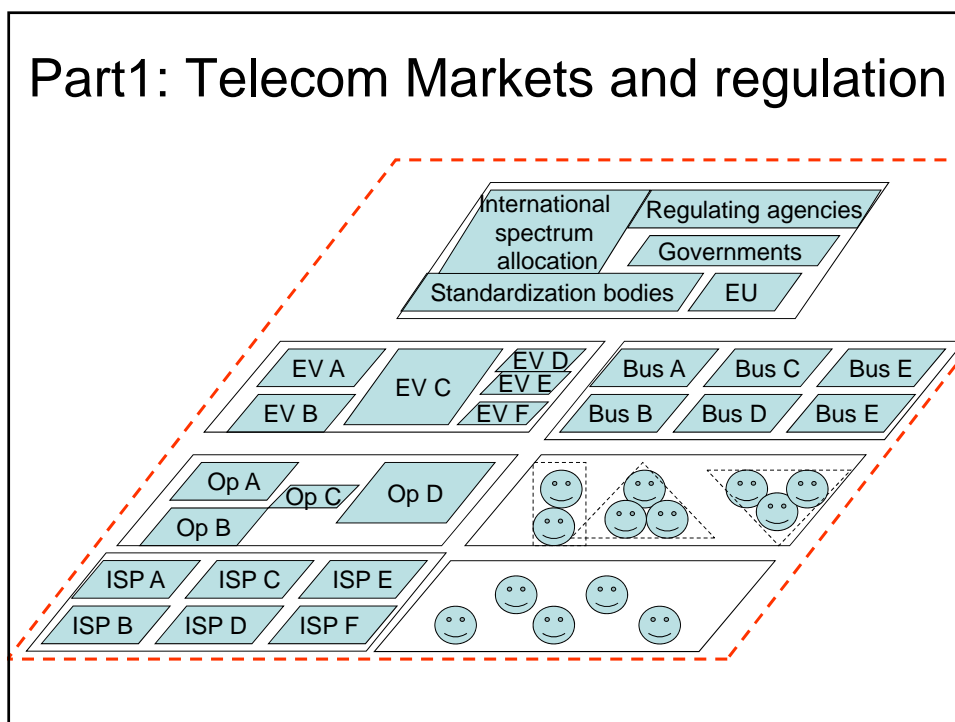
The course consists of three parts

- Telecom Markets and Regulation
- Mobile Operator Business
- Wireless Broadband Network  
Deployment and Economics

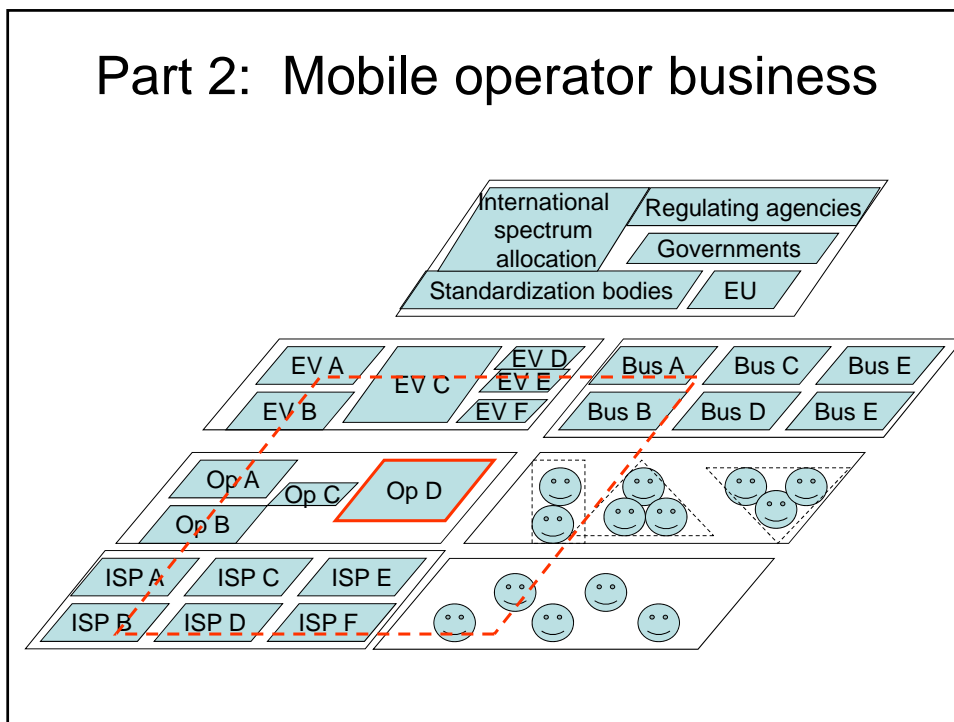
## Example of actors on the telecom market



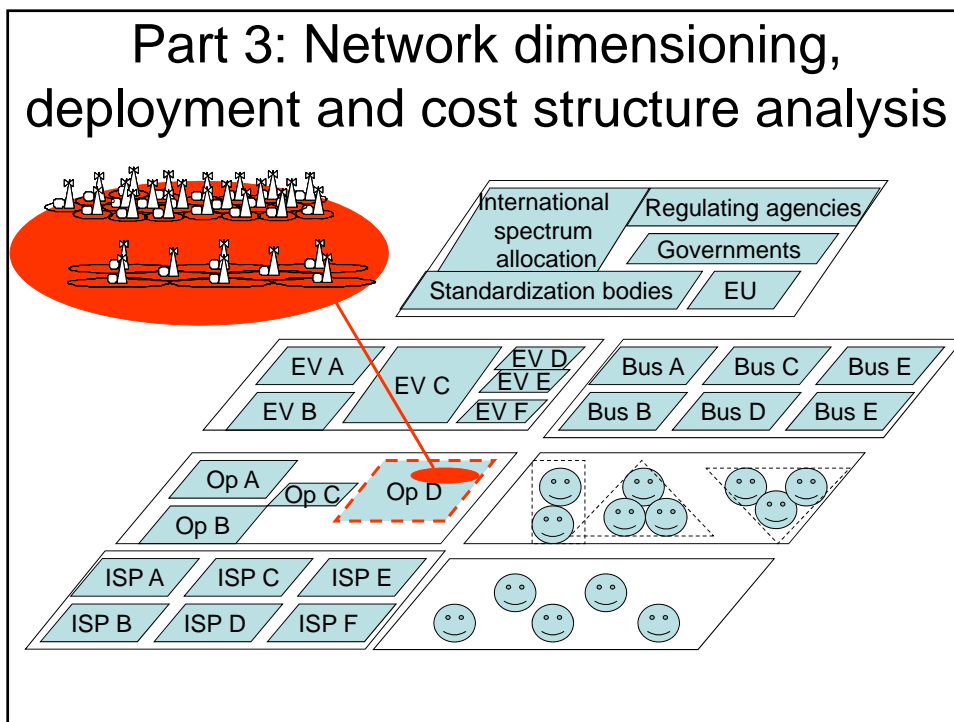
## Part1: Telecom Markets and regulation



## Part 2: Mobile operator business



## Part 3: Network dimensioning, deployment and cost structure analysis



## Course objectives

After the course the students should be able to:

- Analyze telecom markets in terms of actors, market segments, services, regulation + identify differences
- Describe the key characteristics of a Mobile Network Operator and identify strengths and weaknesses
- Dimension and design of a wireless network given demand, spectrum and radio access technologies
- Model and analyze the cost structure of a mobile operator network and compare different solutions

## Learning Approach

- A strong focus is put on “learning by doing” with home works, seminars and a operator game
- Motivation
  - The course covers a multitude of architectures, concepts, methods and tools within both wireless technology as well as areas of economics and business.
  - Each concept, solution etc may not be so complex or difficult to understand, but the combination of all aspects leads to a very high degree of complexity.

## Part 1: Telecom Markets and regulation

- Market structure, type of actors and business relations at telecom markets
- Telecom regulation, regulated markets and services, Spectrum allocation and licensing;
- Operator competition and cooperation, Mobile operator strategic planning
- **Home work 1:** Country study -description and analysis of the telecom market in country X

## Part 2: Mobile operator business

- Overview of operator business; marketing, customer management, charging & billing
- Cost structure, financing, investments and risk, revenue streams, pricing and subscriptions
- Operator challenges for mobile broadband, the revenue gap, capacity & coverage, data rate
- **Home work 2:** Analysis of operator strategy
- **Mobile Operator Business game** session (1 day) and preparation and summary report

## Part 3: Network dimensioning, deployment and cost structure analysis

- Economics of wireless infrastructure, cost-capacity trade-offs, scalability, spectrum allocation
- Network dimensioning, deployment and configuration strategies, impact of user demand
- Cost structure modeling & analysis of network, to calculate CAPEX, OPEX, Net present value
- **Home work 3:** Dimensioning and high level design of a wireless network incl. cost structure analysis

## About home work assignments

- **Homework 1 task:**
  - Describe the telecom market i country X in terms of key actors and their characteristics
  - Identify problems and challenges for key actors
- **Homework 2 task:**
  - Compare business strategies of two mobile operators in "your" country
  - Find data on the business performance and operator strategy in order to be able to make a comparison
- **Homework 3 task:**
  - Dimensioning of a radio access network and analysis of the cost structure for different deployment options and types of used Radio Access Technologies (RATs).
  - The analysis will be done for a specific scenario with a set of user and traffic data and different RAT's)

## Course outline and timing

- Part 1: 22/10 – 5/11  
Telecom Markets and Telecom regulation
- Part 2: 6/11 – 30/11  
Mobile operator business
- Part 3: 19/11 – 13/12  
Network dimensioning, deployment and configuration and cost structure analysis
- Written exam: 14/12



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## Examination and grading

- In total the home works and the problems can give 30 points (3\*5points + 5\*3 points).
  - Each home work will be graded with 0 to 5 points and these points are included in the points at the exam.
  - At the exam there will be five problems to solve; each problem can give maximum 3 points.
- To pass the course
  - All home work assignments are satisfactory ( 3-5 points)
  - In total 12 points are required (grade E)
- Credits
  - 7,5hp = 5 weeks of full time work distributed over 9 weeks



## To pass the home work assignments

- To do a draft report and send for review
  - Max 5 pages in total
- Revise report according to the review comments and submit a final version
- Review the reports of student in the group
- Present review comments in group session
- Make a oral presentation of results
  - Max 5 minutes and 2 slides
- Attend the presentation seminar

## Home work 1 deadlines

Activity	Home work 1
Home work is assigned to each student	11-10-27 ; 13:00
Draft report sent to teacher & reviewers	11-10-30; 16:00
Review comments sent to teacher and report authors (students)	11-11-01; 09:00
Review session and discussions in groups	11-11-01; 13:00-15:00
Send final report version and slides for oral presentation to teacher	11-11-05; 07:59
Oral presentation	11-11-05 ; 10:00-10:00 5 min at seminar
Feedback and HW grading send to student	11-11-12; 12:00 latest

## Lectures & seminars – part 1, week 43

- October 22; 13-15 (Jan Markendahl)
  - Course overview
  - Intro to telecom actors and roles
- October 24; 13-15 (Bengt Mölleryd)
  - Development of telecom markets
  - Regulation and liberalization
- October 25; 13-15 (Jan and guest lecturer Bengt Oberger)
  - Telecom markets from the end-user perspective (JM)
  - Telecom in Africa: any specifics to consider? (BO)
- October 26; 08-10 (Jan Markendahl)
  - More on actors and roles, ecosystems,
  - Q&A session for Home work 1

## Lectures & seminars – part 1, week 44/45

- October 29; 13-15 (Bengt Mölleryd)
  - Telecom and spectrum regulation
  - Role of regulator and examples of regulated markets
- October 31; 13-15 (Guest lecturer Kenneth Karlberg)
  - Operator strategies
  - Example of market entry
- November 1; 13-15
  - Review seminar, discussions in student groups
- November 5; 10-12 (Jan Markendahl)
  - Presentation of Homework 1

## For you to do today

- Sign list of presence, contact data
  - One list for students already selected the
  - One list for students not selected the course
- If not done - Select course in Daisy
- Send e-mail to me, [janmar@kth.se](mailto:janmar@kth.se)
  - Your expectations on the course
  - Your personal and educational background
  - Experiences that may be useful for the course