



1SC2392 – Mobile network design for crisis management

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Department: DOMINANTE - SYSTÈMES COMMUNICANTS ET OBJETS CONNECTÉS

Language of instruction: FRANCAIS

Campus: CAMPUS DE PARIS - SACLAY

Workload (HEE): 40

On-site hours (HPE): 27,00

Description

The integration teaching projects for the ST2 SCOC will consist in the design of a wireless communication network.

Several scenarios will be presented, among which the deployment of a new wireless communication network in a developing country and the reconstruction of a network for disaster relief on a hurricane-hit island.

Students will design the networks using the technical data provided by our industrial partners, based on their current wireless communication products (power consumption, frequencies, ...), wireless propagation models (ground features, distance, ...), as well as traffic models (number of calls, data throughput, ...).

Each project will emphasize a specific aspect of the design process : cost constraints, lead time (use of drones for fast relief operations), antenna design, communication channel modeling based on measurements, ...

During the week-long integration teaching, each group of students will be coached and advised by CentraleSupélec lecturers and engineers from our industrial partners (Thales, Nokia, Bouygues Télécom, ...)

Quarter number

ST2

Prerequisites (in terms of CS courses)

none

Syllabus

Days 1-2 : "First aid" phase

1. taking control of the problem and analysis of the technological solutions proposed by Thales



2. Identification of the island's context and formulation of a coverage proposal for the priority areas of the airport and the capital.
3. Exchanges with Thales experts will be organised, in order to ask your questions and validate your technical solution.

Day 2 : Consolidation phase

1. identification of the needs of each zone of the island to size the capacities of each node of the network
2. Evaluate radio-frequency signal levels for testing radio coverage based on the propagation model used and the geographical positions of the nodes of the proposed network.
3. Coverage and capacity; a balance to be found.

Days 3-4 : antenna design and visit of the Thales LAS site.

1. design of a microwave link to the island of St. Martin
2. design of a base station antenna for mobile cell coverage.

Day 5 : defense

The project presentations will take place in front of Thales experts.

A visit to the Thales LAS site (Limours) will be organised in the afternoon of the third day. It will allow to discover the activities of Thales around the antennas and radars.

Each group will take part in practical demonstrations on antenna characterization in anechoic chamber and multipath channel emulation in reverberation chamber. It will then be possible to validate the design of base station antennas, using an antenna model.

Class components (lecture, labs, etc.)

This course is a problem-solving pedagogical activity. It is an opportunity to deal with a real-life telecommunication problem. Students must work as a team to carry out a mission that the group must present and defend according to technical and economic criteria.

Teaching is scheduled over a "blocked" week. During the week, the students work in groups of 5 to 6. students, supervised by a team composed of experts from Thales and teacher-researchers from CentraleSupélec.

Progress reports will be made on a daily basis. The communication with the management team is horizontal and solicitations are taken care of during the whole week.

Grading

The evaluation will take into account: individual attendance, involvement in group work, relevance of choices, etc. technical-economic, oral presentations and discussions with industrial experts (questions/answers).



Course support, bibliography

Handouts and documents from the specific course.

Presentation of the partners in challenge week

Resources

- Teaching staff : J. Antoine, A. Cozza, F. Jouvie
- Thales experts team
- Staff size : 30 to 35
- Software tools: Matlab, Excel, CloudRf

Learning outcomes covered on the course

At the end of the course, students will be able to :

1. Understand the issues involved in the implementation of a telecommunication network for exceptional situations
2. Selecting network components from the technical characteristics imposed by a customer
3. Building a technical argument and refining a commercial offer
4. Prioritize the constraints of a modeling problem
5. Establish technical reasoning on the basis of complex and different kinds of parameters
6. Build a solution from a simple model and propose alternatives based on more complex models
7. Take a critical look at a solution and justify its limitations
8. Detail their problem-solving approach

Description of the skills acquired at the end of the course

Four skills will be assessed during the week:

- C1 : Analyze, design and build complex systems with scientific, technological, human and economic components
- C4 : Have a sense of value creation for one's company and customers
- C7 : Know how to convince
- C8 : Lead a project, a team