Interference Management for Tomorrow's Wireless Networks

Newcom# Summer School
Sophia Antipolis – May 28-31, 2013

Keynote Speakers

Bruno Clerckx (Imperial College):
"Interference Management in Wireless Networks: From Theory to Practice"

Michael Gastpar (EPFL/UC Berkeley):
"Interference Management: The Compute-and-Forward Perspective"

David Gesbert (EURECOM):
"Feedback and Cooperation in interference-limited networks"

Jakob Hoydis (Alcatel-Lucent Bell Labs):
"Massive MIMO and HetNets: Benefits and Challenges"

Syed A. Jafar (UC Irvine):
"Topological interference management for wireless interference networks"

Slawomir Stanczak (TU Berlin):
"Distributed Interference Management and Identification for Wireless Networks "

Lab Sessions

Javier Arribas (CTTC)
"Interference mitigation in GNSS signal acquisition through antenna arrays"

Oriol Font (CTTC)
"Interference mitigation in HetNet systems: From theory to practice"

Florian Kaltenberger (EURECOM)
"Introduction to OpenAir4G and ExpressMIMO2 radios"

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Final schedule

	Tuesday May 28	Wednesday May 29	Thursday May 30	Friday May 31	
8:00 – 9:00	*Registration*				
9:00 – 10:30	**David Gesbert**	**Sławomir Stańczak**	**Bruno Clerckx**	**Lab session OpenAir4G part 1**	**Lab session GNSS**
10:30 – 10:45	*Coffee break*	*Coffee break*	*Coffee break*	*Coffee break*	
10:45 – 12:15	**David Gesbert**	**Sławomir Stańczak**	**Bruno Clerckx**	**Lab session OpenAir4G part 2**	**Lab session HetNet**
12:15 – 13:45	*Lunch*	*Lunch*	*Lunch*	*Lunch*	
13:45 – 15:15	**Syed A. Jafar**	**Jakob Hoydis**	**Michael Gastpar**	**Lab session GNSS**	**Lab session OpenAir4G part 1**
15:15 – 15:30	*Coffee break*	*Coffee break*	*Coffee break*	*Coffee break*	
15:30 – 17:00	**Syed A. Jafar**	**Jakob Hoydis**	**Michael Gastpar**	**Lab session HetNet**	**Lab session OpenAir4G part 2**
17:00 – 18:30	*Welcome cocktail*	**Poster session**			
19:00 – \infty			*Dinner Le Provencal*		

Entry Hall	Amphitheatre	Cafeteria/Terasse	room 151	room 152	room 153

Lunches, coffee breaks and the welcome cocktail will be served on site.
The dinner will take place at "Le Provencal" Restaurant near the Sophia Antipolis golf course (5-10 min walk from Eurecom). During the registration every participant must indicate his choice for the starter, main course and desert. The menu is attached to this program.

Interference Management for Tomorrow's Wireless Networks: Lab Sessions

General information:

The lab sessions are limited to 30 participants max (due to the limited number of workstations). Therefore each lab will be repeated twice and people will be split in two groups. One group will have the OpenAir4G lab in the morning and the the GNSS and HetNet labs in the afternoon while for the other group it will be the other way round.

Lab1: Interference mitigation in HetNet systems: From theory to practice
Speaker: Oriol Font, CTTC
Duration: 1.5h

This tutorials addresses the challenges of implementing and demonstrating interference management in a real-time HetNet scenario with high performance prerequisites. Precisely, it aims to raise awareness on the myriad of issues encountered when embarking in the challenging task of implementing the PHY-layer of a high performance real-time system that demonstrates an interference management scheme applied to a HetNet application scenario. Details of the low-level real-time FPGA implementation will be given together with a full description of the hardware setup which was hosted in the GEDOMIS testbed of CTTC (http://engineering.cttc.es/gedomis). Finally, the tutorial will present the versatile system prototyping possibilities that GEDOMIS testbed is able to offer for implementing the PHY-layer of either real-time or offline wireless communication systems.

Lab 2: Interference mitigation in GNSS signal acquisition through antenna arrays
Speaker: Javier Arribas , CTTC
Duration: 1.5h

This tutorial addresses the signal acquisition problem using antenna arrays in the general framework of GNSS receivers. GNSSs provide the infrastructures for a myriad of applications that demand a robust and accurate positioning service.Despite that the GNSS CDMA modulation offers limited protection against RFIs, an interference that exceeds the processing gain can easily degrade receivers' performance or even deny completely the service. A single-antenna receiver can make use of time and frequency diversity to mitigate RFIs, even though the performance is compromised in the presence of wideband interferences. Antenna arrays receivers can benefit from spatial-domain processing, and thus mitigate the effects of interfering signals. In this tutorial, we present a state-of-the-art array-based acquisition algorithm using a well-established statistical detection theory framework and we demonstrate its real-time implementation feasibility using both FPGAs and SDR techniques. Performance measurements in realistic scenarios will be also given.

Lab3: Introduction to OpenAir4G and ExpressMIMO2 radios
Speaker: Florian Kaltenberger, EURECOM
Duration: 3h

This lab will give a quick introduction to OpenAirInterface, the experimental software defined radio platform of Eurecom. Students will get on-hand experience with our new radio cards called ExpressMIMO2. They will learn the basic functionality of the cards and how to operate them in both real-time and non real-time.

The goal of the lab session is to perform basic LTE cell synchronization using signals acquired with the ExpressMIMO2 card using the Octave API. The lab will also teach the basics of LTE in order to be able to perform this operation.

Le Provençal
GOLF & CAFÉ

Menu

S1

Bruschetta de Chèvre frais aux herbes
Poivrons grillés et vinaigrette de balsamique
Fresch goat cheese bruscheta with herbes
Grilled peppers in balsamic dressing

Or

S2

Carpaccio de Saumon mariné façon « Gravalax »
Rémoulade de cèleri et pommes Granny
Marinaded Salmon « Gravalax » way
Rémoulade of celery and Granny apples

M1

Epaule d'Agneau confite au Tym
Légumes du moment
Lamb candied in Tym
Season Vegetables

Or

M2

Pavé de Merlu à la grenobloise
Ecrasé de pomme de terre à l'huile de nos moulins
Hake Grenobloise sauce
Mashed potatoes with oil of our mills

D1

Tiramisu
Tiramisu

ou

D2

Bavaroise framboise – crème brûlée
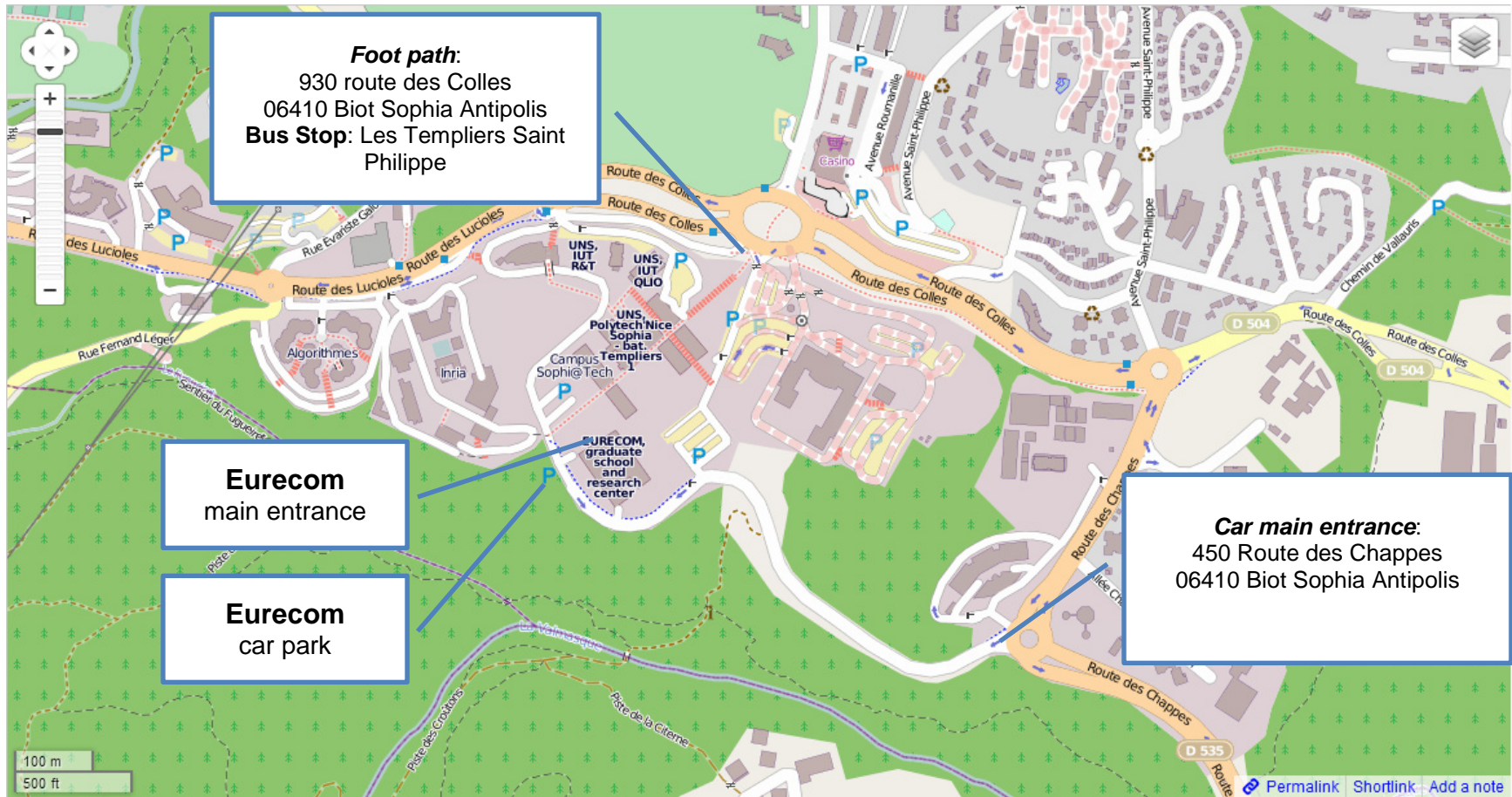*Raspery Cake*

1/2 Eaux plates ou gazeuses par personne
1/3 Vin Côtes de Provence AOC, choix dans les 3 couleurs

Café

Location

Eurecom is located on the new "Campus SophiaTech" in Sophia Antipolis, France. The campus has two different accesses:

Link to this map: http://www.openstreetmap.org/?lat=43.61483&lon=7.07396&zoom=16&layers=M

How to get there

Usually, we recommend that people rent a car at Nice airport as public transportations are not very good in the area, especially at night.

By car:
From the **highway A8** take the exit 44 "Antibes". Then follow the signs to **Sophia Antipolis** and then **Campus SophiaTech.**

By train:
The nearest station is Antibes. Buses run regularly to Sophia during the day (Express Bus 100 stops at the Templiers bus stop in front of the campus). But taxis from the train station have to be booked in advance. See the list of taxis hereunder.

From the airport
➔ **By bus:**
- The **Sophia Express** **(Bus 230)** is a direct bus which runs from the airport to Sophia Antipolis. You must stop at "**Les Templiers St Philippe"** bus station, 5 mn walking from EURECOM.
- Bus schedules are listed at: http://www.cg06.fr/cms/cg06/upload/servir-les-habitants/fr/files/230.pdf

➔ **By taxi:**
- The fare is at least 50 € in each direction (special EURECOM rate). You can contact the following companies and ask for EURECOM special rate. The trip will be charged directly to you and you can pay by credit card directly to the driver.

TransLynes Services	Tel: 0033 4 9314 1820 Or 0033 6 1435 9089	tlscotedazur@wanadoo.fr
Nardin Daniel taxi	Tel: 0033 6 7269 2990.	daniel.nardin@yahoo.fr
Biomotion Company	Tel : 0033 4 9317 5789	http://www.biomotion.fr

- Please contact secretariat@eurecom.fr for more information