RESEARCH CENTER

FIELD
Networks, Systems and Services, Distributed Computing

Activity Report 2012

Section Contracts and Grants with Industry

Edition: 2013-04-24

ACES Project-Team

5. Bilateral Contracts and Grants with Industry

5.1. Bilateral Contracts with Industry

5.1.1. Energy saving mechanisms in smart homes using ambient computing principles

- Partner : EDF - R&D
- Starting: 01/06/2010, ending : 01/10/2013

This project is funded by EDF group, leading energy producer in Europe. It started in June 2010. Its ends in June 2013. Its goal is to study the use of ambient computing principles for the management of electricity consumption in residential habitat. It focusses on two main objectives: (1) to define scenarios based on home people activities, and (2) to propose an implementation of these scenarios using ambient computing mechanisms studied in the Aces project. The main results are presented in section 4.3 .

ADAM Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

Thales This contract is associated to the CIFRE PhD thesis of Jonathan Labéjof between ADAM and the Thales company. The goal of the project is to study the evolution of heterogeneous service-oriented architectures. We address two problems. First, we study some various forms of support for heterogeneity in service architectures in terms of communication protocols and software component personalities. Second, we propose solutions for systems which are agile and respond smoothly to changes in their execution contexts. Overall, the goal of this project is to propose to design a model for adaptability, a runtime infrastructure and to provide some means by which these two levels can be causally connected and kept consistent.
Participants: Jonathan Labéjof, Philippe Merle, Lionel Seinturier.

France Telecom DigiHome is a contract with France Telecom to study the adaptation of software systems in distributed digital home environments. These environments and their extensions (vehicles, holiday homes, work at home) are now invaded by a multitude of communicating objects dedicated to content management, viewing multiple video streams, or information sharing within a community network. These objects offer services with capacities of configuration and remote administration, and advanced interactions with the end-user or between devices or services. Given the lack of universality of proposals from IT and device companies and the lack of interoperability of these devices and services, it becomes necessary to offer a virtual environment named Extended Digital Home to encompass and unify these proposals and make life easier for the inhabitants. First, we will propose a unified model for integrating devices and services inside and outside the home with a continuum between private and public lives. Second, we will study an energy model to save energy in this extended environment. Overall, the goal of this project will be to propose to design a model for a cloud inside home and to provide some means to reduce the energy using on media devices. First results have been published in [115] and [99]. This contract is complemented by a second one, which is the CIFRE contract associated to Rémi Druilhe PhD thesis.
Participants: Rémi Druilhe, Laurence Duchien, Romain Rouvoy, Lionel Seinturier.

Kaliterre *Web Energy Archive* (WEA) is a project funded by the French Environment and Energy Management Agency (ADEME) to archive the energy consumption of Web sites that are accessible on the Internet. The objective of this project is to constitute an international referential on the evolution of the Web energy consumption. The adopted methodology focuses on the quality of experience and measures the energy consumed by users when they browse a specific website. The benefit of this approach is that it is representative of Internet usages and takes into account the variety of Web browsers and computer architectures. The software solution developed by this project will build on the HTTP Archive project, initiated by Google, and will extend it with consumption measures that will be collected by our PowerAPI library. The objective of this collaboration is to port our solution to the Windows operating system.
Participants: Aurélien Bourdon, Romain Rouvoy.

ARLES Project-Team (section vide)

ASAP Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Technicolor

Participants: Anne-Marie Kermarrec, Alexandre Van Kempen.

Since 2010, we have had a contract with Technicolor for collaboration on peer-assisted approaches for reliable storage. In this context, Anne-Marie Kermarrec has been the PhD advisor of Alexandre van Kempen since 2010.

7.2. Orange Labs

Participants: Ali Gouta, Anne-Marie Kermarrec.

We have had a contract with Orange Labs for collaboration on peer-assisted approaches for caching and recommendation in streaming applications. In this context, Anne-Marie Kermarrec has been the PhD advisor of Ali Gouta since 2012.

ASCOLA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Cooperation with SIGMA group

Participants: Thomas Ledoux, Simon Dupont.

In 2012, we have started a two-fold cooperation with Sigma Group (http://www.sigma.fr), a software editor and consulting enterprise. The cooperation consists in a joint (a so-called Cifre) PhD on eco-elasticity of software for the Cloud and the sponsorship of several engineering students at the MSc-level.

As a direct consequence of the increasing popularity of cloud computing solutions, data centers are amazingly growing and hence have to urgently face with the energy consumption issue. The aim of Simon Dupont's PhD, started in November 2012, is to explore the *software elasticity* capability in Software-as-a-Service (SaaS) development to promote the management of SaaS applications that are more flexible, more reactive to environment changes and therefore self-adaptive for a wider range of contexts. As a result, SaaS applications become more elastic and by transitivity more susceptible to energy constraints and optimization issues.

ATLANMOD Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

Three technology transfer contracts with software companies were signed this year.

7.1.1. Steria

A first collaboration with Steria Ouest (located in Nantes) is resulting from the presentation of our activities during one of their regular Board of Architects meeting. The identified objective of this initial joint action was to guide and advice them to migrate an internal legacy application to model driven approach and related technologies, relying on our expertise about modeling and the Eclipse ecosystem. This has notably allowed us to get useful feedback on the benefits and drawbacks currently encountered when applying MDE and associated techniques in the context of real applications.

7.1.2. MIA-Software

Since several years, AtlandMod and Mia-Software are actively collaborating around the topic of Model Driven Reverse Engineering (MDRE), i.e.; the combined use of different model-based techniques to solve real reverse engineering problems. This has resulted in the successful creation and development of two open source Eclipse projects, namely Eclipse-MDT MoDisco (providing a generic and extensible MDRE framework) and Eclipse-EMFT EMF Facet (providing a dynamic model extension framework), both reaching today an industrial maturity level.

However, for these technologies to be definitely adopted and deployed in the context of very large systems handling huge data volumes, some remaining scalability issues still have to be addressed. Thus, scalability of model-driven techniques is one of the main challenges MDE is facing right now. In this context, AtlanMod has joined forces with MIA-Software as part of an Inria technology transfer action. This initiative is devoted to the development of new generation MDE techniques, for model creation and general handling, that effectively scale up. Among the different research challenges behind the MDE scalability and performance improvement, the following ones have been explored in the context of this collaborative action:

- **Model random access.** Advanced use of on-demand lazy loading techniques;
- **Model clustering and slicing.** Advanced use of semantic grouping and partial loading techniques;
- **Model virtualization.** Transparent and on-demand access to different views on a same model;
- **Lazy evaluation of model transformation.** On-demand lazy execution of transformations;
- **Incremental model transformation.** Partial model access and transformation execution;
- **Multi-threaded model transformation.** Parallelization of both model accesses and rule executions.

7.1.3. WebRatio

AtlanMod has helped WebRatio and the University of Trento in the definition (to be provided as an answer to the corresponding OMG RFP) of IFML, a modeling language for designing user interaction flows (not limited to the Web). Such a language should be: Extremely compact (no useless overhead), Effective (allows to model exactly what users want), Efficient (grants high reusability of model fragments), Easy to learn (very low learning curve), Comprehensive (covers most of the user interaction needs), Open and extensible (for covering any ad-hoc logic) and Platform independent (addressing any type of user interface device).

For more information about IFML - Interaction Flow Modeling Language see [5].

[5] http://www.ifml.org/

CIDRE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- **DGA PEA (Exploratory Study Program) contract (2011-2012): « PREVA - Security of the ad hoc routing protocols in the context of future tactical military networks »**

  During the DGA-funded PREVA project ending in January 2013, we analyzed secure ad hoc routing in the context of military tactical networks. We first analyzed which routing protocols were the most suited for each type of tactical networks (Joint and Sub-Joint Tactical Groups, vehicular ad hoc networks, Futur Integrated Soldier Technologies (FIST) troopers and sensor networks assisting the troopers). We also considered the various security technologies (both crypto-based proactive mechanisms and intrusion detection-based reactive mechanims) that could be used to protect each selected ad hoc routing protocols. Finally, we built a demonstrator implementing the various selected protocols and security mechanisms.

  This study is led in cooperation with OPEN, an IT service provider located in Rennes.

- **DGA contract (2012-2013): « CAPALID »**

  The CAPALID project aims at building a state of the art of off-the-shelf solutions for supervision systems in distributed environments. Our work was at first to make a state of the art of the research activities for Intrusion detection systems, correlation systems and visualization systems. On a second phase, the goal was to define an assessment methodology of these types of tools. Finally, this methodology will be applied by Amossys, our partner in the project, to evaluate the best off-the-shelf tools that have been retained in the context of the project. This study is led in cooperation with Amossys, a SME located in Rennes.

- **Technicolor contract (2011-2014): « Data Aggregation in Large Scale Systems »**

  The theme of this contract focuses on the management of massively distributed data sets. Briefly, our goal is to provide a lightweight yet continuous flow of aggregate and relevant data from a very large number of distributed sources to a management system. Collaborative data aggregation are relevant mechanisms that could help in securely providing digests of information. However, an important aspect that we want to preserve is the privacy of the aggregated information. This is of particular interest for Telco operators or software/hardware providers in order to smoothly manage the current state of their deployed platforms, allowing accordingly to develop new applications based on quick reactions/optimizations to identify and handle services inconsistencies.

  This study is conducted in cooperation with the Inria project Dionysos.

7.2. Bilateral Grants with Industry

- **Amossys: « Evaluation of intrusion detection mechanisms »**

  The PhD of Georges Bossert is done in the context of a Cifre contract with the SME Amossys (http://www.amossys.fr/).

- **Orange Labs: « Data persistence and consistency in ISP infrastructures »**

  Pierre Obame is doing his PhD thesis in the context of this cooperation with Orange Labs at Rennes. The theme of this project is to propose a distributed storage system dedicated to users who access Internet via a Digital Subscriber Line (DSL) technology. This system aims at guaranteeing data availability, persistency, and low access latency by fully exploiting millions of home gateways and the hundreds of Points of Presence (POP) of an Internet Service Provider (ISP) infrastructure.

- **DGA-MI: « Security events visualization »**

  The PhD of Christopher Humphries is done in the context of a cooperation with DGA-MI. Due to the generalization of logging systems, security analysts are now overwhelmed by data when they want to obtain more informations. Manual inspection is clearly not possible anymore, and automated systems such as correlators are showing their limits. Visualization is a promising field. Visualization allows to build concise and often aesthetic representations of systems and events. In this project, we aim at proposing ways to evaluate current visualization solutions and to propose new ones dedicated to security events analysis, for instance for forensic purposes.

- **DGA-MI: « Alerts Correlation Taking the Context Into Account»**

  The PhD of Erwan Godefroy is done in the context of a cooperation with DGA-MI. This PhD just started in November 2012.

FOCUS Project-Team (section vide)

INDES Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Contracts and Grants with Industry

7.1.1. Collaboration with Xiring

In 2011, Tamara Rezk collaborated with a french company based in Paris, Xiring. She visited the company several times in 2011 to carry out this collaboration.

7.1.2. Microsoft Research and Inria Joint Lab

Since 2007, Tamara Rezk is part of the Secure Distributed Computations and their Proofs project of the MSR-Inria lab in Saclay. She travelled several times in 2011 to visit the lab and continue with several collaborations concerning the project.

LOGNET Team

6. Bilateral Contracts and Grants with Industry

6.1. Quantaflow

Participants: Petar Maksimovic [contact], Luigi Liquori, Sebastien Thuriez [Quantaflow SRL].

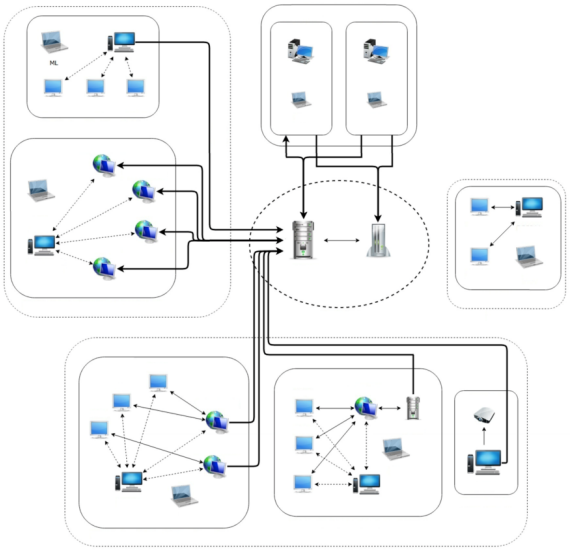

Figure 14. The Quantaflow Network

Quantaflow designs, manufactures and markets hardware, services, and software for professional and autonomous counting and tracking of the flow of people, in the setting of centralized data-gathering, and all for the purposes of security or marketing.

Given the complementarity of their competences, the Parties have decided to form a collaboration in order to formalize a communication protocol that Quantaflow wishes to use with its new equipment.

The main objective of this undertaking was the development of a secure protocol for message exchange between all of the actors in the Quantaflow network see Fig reffig:quantaflow, and has incorporated the following topics:

- Protocol design, in particular:
  - Analysis of use-case scenarios
  - Design of mechanisms for determining device presence in a network
  - Design of protocol messages
  - The flow of protocol messages
- Protocol security, in particular:
  - Message encryption
  - Message authentication
- Cryptography, in particular:
  - Symmetric and public-key cryptography
  - Key storage and management

while the specifics of the work involved are protected by a non-disclosure agreement. This study has been conducted under an NDA and it is released in [24], [25].

6.2. myMed

Participants: Luigi Liquori, myMed Team.

Because of the rich founding of the interreg myMed contract we have started few collaborations under the form of "Contrat de prestations". Without going too much into détails

- Ludotic: "IHM for myMed".
- VuLog: info-mobility solutions for myMed (stopped because bad results of the collaboration).
- David Da Silva, "autoentrepreneur", "conception et implémentation de 3 social application myMed".
- Sony Marcarelli " "autoentrepreneur", "porting of the social applications the Apple Store".
- GIR MARALPIN: "mounting a critical mass for myMed in the euroregion AlpMed".

MYRIADS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

7.1.1. EDF R&D (2010-2013)

Participants: Stefania Costache, Christine Morin, Nikos Parlavantzas.

In our collaboration with EDF R&D we investigate resource management in virtualized computing platforms in order to efficiently execute distributed applications with stringent time constraints. Our goal is to design a resource management system for private clouds that provides support for different application SLAs while maximizing the resource utilization of the infrastructure. Stefania Costache's PhD work is funded through a CIFRE grant with EDF R&D.

In 2012, we have completed the implementation of Themis prototype and evaluated it with realistic applications provided by EDF R&D and task farming and batch scheduling environments such as Condor and Torque [20], [19].

OASIS Project-Team (section vide)

PHOENIX Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

7.1.1. Integrating non-functional properties in a Design Language and its execution environment – Industrial Fellowship (CIFRE / Thales)

Participants: Charles Consel, Emilie Balland, Stéphanie Gatti, Quentin Enard.

The goal of this project is to add non-functional properties in the DIASPEC language and in the DIAGEN generator. More especially, these non-functional properties are considered on three different levels:

- *The component level.* The non-functional properties define temporal, physical and software constraints restrictive for a component.
- *The component coupling level.* The non-functional properties define the dependency between the components as well as the Quality of Service provided and required by each component of the environment.
- *The software architecture level.* The non-functional properties describe the resources that must be allocated to a component (memory, processing capacity). They also define the necessary resources for a component to interact with other components (network QoS).

This work will be illustrated and validated with a concrete application in the avionics domain.

REGAL Project-Team (section vide)

RMOD Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Resilience FUI

Participants: Nicolas Petton [Correspondant], Stéphane Ducasse, Damien Cassou.

Contracting parties: Nexedi, Morphom Alcatel-Lucent Bell Labs, Astrium Geo Information, Wallix, XWiki, Alixen, Alterway, Institut Télécom, Université Paris 13, CEA LIST.

Resilience's goal is to protect private data on the cloud, to reduce spying and data loss in case of natural problems. Resilience propose to develop a decentralized cloud architecture: SafeOS. Safe OS is based on replication of servers. In addition a safe solution for documents should be developed. Sandboxing for Javascript applications should be explored.

There is a plethora of research articles describing the deep semantics of JavaScript. Nevertheless, such articles are often difficult to grasp for readers not familiar with formal semantics. In our first report, we propose a digest of the semantics of JavaScript centered around security concerns. This report proposes an overview of the JavaScript language and the misleading semantic points in its design. The first part of the report describes the main characteristics of the language itself. The second part presents how those characteristics can lead to problems. The document finishes by showing some coding patterns to avoid certain traps and presents some ECMAScript 5 new features.

6.2. Generali Belgium

Participants: Nicolas Anquetil [Correspondant], Stéphane Ducasse, Guillaume Larcheveque, Muhammad Bhatti, Camille Teruel.

Contracting parties:

Synectique our startup company project;

Generali Assurances http://www.generali.be.

RMoD is looking into providing a software solution to Generali Belgium for its software maintenance and reengineering problems. The goal is to support decision making in a software migration project. The partner needs tools for parsing their legacy code (in a specific, not well-known language) and help in identifying dead code or code duplication. This should serve as an essential element of decision support in the partner's software migration project.

The contract is worth 30.000€.

6.3. Pharo Consortium

We launched the Pharo Consortium. Over 25 companies are interested in participating. Inria supports the consortium with one full time engineer starting in 2011.

SARDES Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Grants with Industry

- PhD grant Quentin Sabah, funded by STMicroelectronics.
- PhD grant Xavier Etchevers, funded by Orange Labs.

SCORE Team (section vide)

TRISKELL Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. VaryMDE

Participants: Benoit Combemale, Olivier Barais, Mathieu Acher, Jean-Marc Jézéquel, Joao Ferreira filho, Suresh Pillay.

MDE, Variability Management, Software Language Engineering.

This bilateral collaboration is between the Triskell team and the MDE lab at Thales Research & Technology. This partnership explores variability management both in modeling and metamodeling (i.e., design and implementation of software languages), and enrolls 4 faculty members and 2 PhD students from the Triskell team. This year, we keep working on the CVL usage in the Thales context.

Project duration: 2011-2014

Triskell budget share: 284 keuros

7.2. EDF

Participants: Nicolas Sannier, Benoit Baudry.

model-driven analysis, requirements modelling, evolution

Since October 2010, we have a collaboration with EDF R& D, Chatou. This project aims at investigating the application of metamodeling and model-driven engineering for modeling and analyzing requirement documents of control-command systems. The purpose of this modeling activity is to improve the global understanding of dependencies between requirements and their context and to use this knowledge for impact analysis in case of evolution. In this context, Benoit Baudry acts as Ph.D advisor for Nicolas Sannier.

Project duration: 2010-2013

Triskell budget share: 30 keuros

7.3. Kereval

Participants: Aymeric Hervieu, Benoit Baudry.

test generation, software product lines, test reuse

Since October 2010, we have a collaboration with Kereval, an SME specialized in software testing. In this project we investigate the selection and reuse of test cases for software product lines in the automotive domain. In this context, Benoit Baudry acts as Ph.D advisor for Aymeric Hervieu. Arnaud Gotlieb from the Celtique EPI acts as a co-advisor for the PhD, as well as Olivier Philippot from Kereval.

Project duration: 2010-2013

Triskell budget share: 15 keuros

7.4. Sodifrance

Participants: Emmanuelle Rouillé, Benoit Combemale, Olivier Barais, Jean-Marc Jézéquel.

Software Process, Intentional-Driven Development, Process Execution

Since October 2010, we have a collaboration with Sodifrance, Rennes. In this project we investigate the support (capitalization, definition, execution, and adaptation) of software processes in the context of model driven development (MDD). The purpose of this work is twofold:

- automate the tool configuration and the dynamic adaptation of MDD CASE tools.
- support an automated verification of models, according to the requirements for each activity of the process.

In this context, Jean-Marc Jézéquel acts as Ph.D advisor for Emmanuelle Rouillé, also supervised by Benoit Combemale and Olivier Barais.

Project duration: 2010-2013

Triskell budget share: 25 keuros

7.5. All4Tec

Participants: Hamza Sahmi, Benoit Baudry.

Model-based testing, Software product lines

In this project with the All4Tec company we investigate the support of variability modelling for model-based test generation with Matelo (a tool developed by All4Tec).

In this context, Benoit Baudry acts as Ph.D advisor for Hamza Samih.

Project duration: 2011-2014

Triskell budget share: 20 keuros

7.6. Zenexity

Participants: Julien Richard-FOY, Olivier Barais, Jean-Marc Jezequel.

Web engineering, Domain Specific Languages

In this project with the Zenexity company we investigate the new architecture model for efficient web development on top of the play framework (a web framework developed by Zenexity).

In this context, Jean-Marc Jézéquel and Olivier Barais act as Ph.D advisor for Julien Richard Foy.

Project duration: 2011-2014

Triskell budget share: 20 keuros

ALGORILLE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- In 2012, SUPÉLEC had 2 contracts with Quartet Financial System about parallel and distributed applications processing flows of financial data (the first one on PC clusters, and the second on NUMA computing nodes). This industrial research collaboration is continuing in 2013.
- In 2012 SUPÉLEC has achieved an industrial contract with Thales Underwater Systems about parallelisation on GPU of sonar signal processing algorithms.
- In 2012 SUPÉLEC has achieved an industrial contract with CGGVeritas about the parallelization on GPU of seismic data decompression.
- In 2012 SUPÉLEC has started 2 contracts with EDF R&D about the development of co-simulators for electrical smart Grids, including control parallelism issues.

AVALON Team (section vide)

CEPAGE Project-Team (section vide)

GRAND-LARGE Project-Team (section vide)

HIEPACS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

ASTRIUM Space Transportation research and development contract:

- Design of a parallel version of the FLUSEPA software (Jean-Marie Couteyen (Intership); Jean Roman).

CEA Cadarache (ITER) research and development contract:

- Peta and exaflop algorithms for turbulence simulations of fusion plasmas (Fabien Rozar (PhD); Guillaume Latu, Jean Roman).

EDF R & D - SINETICS research and development contract:

- Design of a massively parallel version of the SN method for neutronic simulations (Moustapha Salli (PhD); Pierre Ramet, Jean Roman).

TOTAL research and development contracts:

- Parallel hybrid solver for massivelly heterogeneoux manycore platforms (Stojce Nakov (PhD); Emmanuel Agullo, Luc Giraud, Abdou Guermouche, Jean Roman).
- Parallel elastodynamic solver for 3D models with local mesh refinment (Yohann Dudouit (PhD); Luc Giraud and Sébastien Pernet from ALGO-EMA at CERFACS).

KERDATA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

Microsoft: A-Brain (2010–2013). In the framework of the Joint Inria-Microsoft Research Center. See details in Section 4.1 . To support this project, Microsoft provides 2 million computation hours on the Azure platform and 10 TB of storage per year. The project is funding Louis-Claude Canon as a postdoc fellow (18 months since September 2011) and to complete the PhD MESR grant of Radu Tudoran (*Mission complémentaire d'expertise*, 3 years, started in October 2011).

IBM: MapReduce ANR Project (2010–2014). IBM is a partner of the MapReduce ANR Project: see Section 8.1 .

MESCAL Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Contracts with Industry

7.1.1. Real-Time-At-Work

RealTimeAtWork.com is a startup from Inria Lorraine created in December 2007. Bruno Gaujal is a scientific partner and a founding member of the startup. Its main target is to provide software tools for solving real time constraints in embedded systems, particularly for superposition of periodic flows. Such flows are typical in automotive and avionics industries who are the privileged potential users of the technologies developed by http://www.RealTimeAtWork.com.

7.1.2. ADR Selfnets with Alcatel

Selfnets is an ADR (action de recherche) of the common laboratory between Inria and Alcatel Lucent Bell Labs. Bruno Gaujal is co-leading the action with Vincent Rocca. Selfnets is mainly concerned with self-optimizing wireless networks (Wifi, 3G, LTE). Eight Inria teams are participating in Selfnets. As for MESCAL, we mainly work on recent mobile equipment (e.g. using the norm IEEE 802.21) can freely switch between different technologies (vertical handover). This allows for some flexibility in resource assignment and, consequently, increases the potential throughput allocated to each user. We develop and analyze fully distributed algorithms based on evolutionary games that exploit the benefits of vertical handover by finding fair and efficient user-network association schemes.

7.2. Grants with Industry

7.2.1. CIFRE contracts with STMicroelectronics

- Kiril Georgiev has done his PhD with STMicroelectronics on distributed file systems and defended in Dec. 2012.

MOAIS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

- Contract with EDF (2010-2013). High performance scientific visualization. Fund 1 postdoc and 1 PhD. Partners: Inria (MOAIS and EVASION), EDF R&D
- HiPeComp, NANO 2008-2012 contract with ST-MicroElectronics. The project HiPeCoMP (High Performance Components for MPSoC) consists in the development an coupling of: on the one hand, wait-free scheduling techniques (pre-partitioning and mapping, on-line work stealing) of component based multimedia applications on MPSoC architectures; and on the other hand, monitoring, debug and performance software tools for the programming of MPSoC with provable performances.
- CEA: Contract with CEA (2012): Europlexus Parallelization with KAAPI. Partners: Inria Rhônes-Alpes and CEA Saclay.

ROMA Team (section vide)

RUNTIME Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

SAMSUNG We have signed a contract with the Samsung company to work on the *Generation of Parallel Patterns based programs for hybrid CPU-GPU architectures* from october 2012 to september 2013.

7.2. Bilateral Grants with Industry

STMicroelectronics STMicroelectronics is granting the CIFRE PhD Thesis of Paul-Antoine Arras on *The development of a flexible heterogeneous system-on-chip platform using a mix of programmable processing elements and hardware accelerators* from October 2011 to October 2014.

TOTAL TOTAL is granting the CIFRE PhD thesis of Corentin Rossignon on *Sparse GMRES on heterogeneous platforms in oil extraction simulation* from april 2012 to march 2015.

CEA-CESTA CEA-CESTA is granting the CIFRE PhD thesis of Cyril Bordage on *Parallelization of fast multipole methods over hybrid CPU+GPU architectures* from october 2009 to november 2012.

DANTE Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- A bilateral contract has been signed between the DANTE Inria team and ACT750 to formalize their collaboration in the context of churn prediction.
- A bilateral contract has been signed between the DANTE Inria team and KRDS to formalize their collaboration in the context of Facebook marketing / cascade analysis.
- A bilateral contract has been signed between the DANTE Inria team and HiKoB to formalize their collaboration in the context of the Equipex FIT (Futur Internet of Things) FIt is one of 52 winning projects in the Equipex research grant program. It will set up a competitive and innovative experimental facility that brings France to the forefront of Future Internet research. FIT benefits from 5.8 euros million grant from the French government Running from 22.02.11 – 31.12.2019. The main ambition is to create a first-class facility to promote experimentally driven research and to facilitate the emergence of the Internet of the future.

7.2. Inria Alcatel-Lucent Bell Labs joint laboratory

Participants: Isabelle Guérin-Lassous, Paulo Gonçalves, Thomas Begin, Éric Fleury, Doreid Ammar, Mohamad Jaber.

Traffic awareness, Flow analysis, Flow scheduling, Sampling, Flow-based routing

Former RESO team participated to the ADR (Action de Recherche/Research Action) “Semantic Networking" (SEM- NET), one of the three ADRs of the Inria ALCATEL-LUCENT BELL LABS joint laboratory. This ADR started on January 1st 2008 and formally ended in October 2012. I. Guérin Lassous and L. Noirie are the respective coordinator for Inria and for ALCATEL-LUCENT of the ADR SEMNET.

In 2013 the research axes of the Joint Lab will be renewed and a new one entitled "Network Science" will involve the participation of the research team DANTE.

DIONYSOS Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. ADR Selfnets

Participant: Bruno Tuffin.

We participate to the common lab ALU-Inria within the "Action de Recherche" SELFNETS, on pricing issues in inter-domain. The goal is to produce economic incentives for intermediate autonomous systems to forward the traffic of concurrent providers and to analyze the handover between mobile providers from an economic point of view.

6.2. Cifre contract on QoE-aware network adaptation

Participants: Adlen Ksentini, Gerardo Rubino.

This is a Cifre contract (2009-2012) (PhD thesis supervision) with Viotech Communication, on network adaptation for multimedia traffic by using QoE metrics. This work is done in the context of the FP7 ALICANTE project.

6.3. Cifre contract on LOCARN: Low Opex and Capex Architecture for Resilient Networks

Participants: Adlen Ksentini, Bruno Sericola, Yassine Hadjadj-Aoul.

This is a Cifre contract (2012-2015) (PhD thesis supervision) with Orange labs., on evaluating and developing a new plug-and-play routing protocol (called Low Opex and Capex Architecture for Resilient Networks – LOCARN), which do not require any network management and configuration.

6.4. Data-aggregation for large-scale distributed networks

Participants: Bruno Sericola, Romaric Ludinard.

We started a 3-year (2011 – 2014) bilateral project with Technicolor R & D, France, on data-aggregation for large-scale distributed networks. Along with the ubiquity of data and computing devices, comes the complexity of extracting and gathering relevant information for management purposes. The very distributed nature of sources of data (be they partially local applications at user's place, or hardware as gateways), as well as their ever increasing number prohibit a systematic and exhaustive gathering on a single (or few) central server for offline analysis. In this context, collaborative data aggregation, where some computing resources collaborate securely to provide digests, appears as an interesting application for both scalability and efficiency. Moreover, collecting information at a large scale pose the problem of privacy and data aggregation may allow preserving the privacy while collecting data.

6.5. IPChronos

Participants: Sofiane Moad, Pantelis Frangoudis, Yassine Hadjadj-Aoul, Adlen Ksentini, Bruno Sericola.

We are working in the 2-years (September 2011 – September 2013) FUI Project IPChronos, where the main focus is in the use of the IEEE 1588 synchronization protocol over IP. Our contribution focuses on developing analytical models to estimate, basing on the IEEE 1588 protocol, the end-to-end delay. IPChronos is leaded by ORALIA SPECTRACOM, and the partners are IPlabel and our team.

6.6. Celtic QuEEN

Participants: Sofiene Jelassi, Gerardo Rubino.

We started a 3-year Celtic project (end 2011-end 2014) called QuEEN: Quality of Experience Estimators in Networks. The project objectives are: to develop automatic QoE measure modules for Web services and applications, and to organize these measure modules as a network of cooperative agents in order to allow each member to take advantage of the measures of the others. Dionysos is involved in most of the activities of the project, and it is expected that QuEEN will benefit from our experience in developing the PSQA technology. QuEEN is a large project (22 European partners); the project leader is Orange Labs, in Sophia Antipolis.

DISTRIBCOM Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. HIMA

High Manageability (HiMa) is a research team hosted by the virtual joint research lab between Alcatel-Lucent Bell Labs France and Inria. This team is in its last year of existence, and most of its activity is now absorbed by the UniverSelf Eu IP (see below). DistribCom is involved in two topics: joint fault diagnosis in IMS networks and services (Carole Hounkonnou's thesis), and the early detection of anomalies in networks by analyzing the timed behavior of protocols (Aurore Junier's thesis). This work resulted in two publications at CNSM'12, and two joint patents on early fault detection and on the graceful maintenance of OSPF networks.

FUN Team

6. Bilateral Contracts and Grants with Industry

6.1. Etineo Partnership

Participants: Roudy Dagher, Xu Li, Fadila Khadar, Nathalie Mitton [correspondant].

EtiPOPS will focus on portability and flexibility of GOLIATH on several hardwares and in different environments (indoor and outdoor) through the deployment of different applications such as geolocalization. In order to favor the portability, designed solutions in EtiPOPS will respect on-going communication standards which will allow a greater interoperability between heterogeneous hardwares.

6.2. France Telecom partnership

Participants: Nathalie Mitton, Enrico Natalizio, Tahiry Razafindralambo [correspondant], Dimitris Zorbas.

This collaboration aims to investigate rural networks and to deploy efficiently and dynamically such networks.

6.3. Noolitic partnership

Participants: Roudy Dagher, Nathalie Mitton [correspondant], Roberto Quilez.

This collaboration aims to set up a localization trial for localization of mobile object in a building based on wireless sensor networks. The idea is to deploy some landmarks (fix sensors) in places to be defined and to equip the mobile objects to other sensors. These sensors must be zigbee compliant for portability purposes.

6.4. Traxens partnership

Participants: Natale Guzzo, Nathalie Mitton [correspondant], Tahiry Razafindralambo.

This collaboration aims to set up a full protocol stack for TRAXENS's guideline.

GANG Project-Team

5. Bilateral Contracts and Grants with Industry

5.1. Bilateral Contracts with Industry

5.1.1. Peer-to-peer for high quality Internet radio

Participant: Fabien Mathieu.

A contract has been signed between Inria, RadioCeros and the ARITT Center. Gang is to provide a feasibility study on the subject of the use of Peer-to-peer mechanisms for high quality Internet radio.

5.1.2. Manipulability of voting systems and applications to networks

Participants: Fabien Mathieu, François Durand.

Alcatel grants ADR LINCS to study applicability of voting systems to loosely connected networks (Peer-to-peer, social networks...).

5.1.3. Extension of PageRank for Social Networks

Participants: Fabien Mathieu, The-Dang Huynh.

ALCATEL is funding a CIFRE PhD for carrying PageRank techniques to Social Networks.

HIPERCOM Project-Team (section vide)

MADYNES Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

As part of our effort in Pervasive Computing research, we worked with Firelies RTLS, a French startup specialized in advanced geolocation services. The contract led to new routing schemes, QoS mand management protocols for Wireless Sensor Networks.

7.2. Bilateral Grants with Industry

We are active in the Alcatel Lucent/Bellabs Inria joint lab. This joint lab brings together research teams from Inria and Alcatel Lucent Bell Labs for addressing the key challenges of autonomous networking in three critical areas: semantic networking, high manageability and self-organized networks. Our activity is part of the joint initiative dedicated to high manageability, and focuses on security management aspects with the Alcatel-Lucent Bell Labs teams on network security. Our work in this joint lab concerns the automation of security management. It includes a first activity related to fuzzing, which includes the improvement of the KiF framework as well as the design of novel fuzzing models for Alcatel-Lucent specific protocols. A second activity of the joint lab aims at investigating to what extent risk management strategies can be applied to VoIP infrastructures. The objective is to design and experiment dynamic risk management methods and techniques for voice oriented critical services.

MAESTRO Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

MAESTRO members are involved in the INRIA ALCATEL-LUCENT BELL LABS joint laboratory and participate in several ADRs (Action de Recherche/Research Action). The joint laboratory consists of three ADRs in its first phase (2008–2012) and six ADRs in its second phase (starting October 2012).

6.1.1. ADR "Semantic Networking" (January 2008 – April 2013)

Participants: Sara Alouf, Eitan Altman, Konstantin Avrachenkov, Oussama Habachi, Philippe Nain, Marina Sokol.

Coordinators are Isabelle Guérin Lassous (INRIA project-team RESO) for INRIA and Ludovic Noirie for ALTCATEL-LUCENT.

The new paradigm of "semantic networking" for the networks of the future brings together "flow-based networking", "traffic-awareness" and "self-management" concepts to get "plug-and-play" networks. The natural traffic granularity is the flow. MAESTRO's task is to elaborate on the scheduling of flows in routers having in mind the fairness among flows with different round-trip times. Three joint INRIA ACATEL-LUCENT patents have been filed already, one in 2009 (inventors for INRIA: S. Alouf, K. Avrachenkov, D. Carra, P. Nain) and two in 2010 (inventors for INRIA: S. Alouf, K. Avrachenkov, A. Blanc).

6.1.2. ADR "Self-Organized Networks in Wireless" (October 2012 –)

Participants: Eitan Altman, Majed Haddad, Manjesh Kumar Hanawal.

Coordinators are Bruno Gaujal (head of INRIA project-team MESCAL) for INRIA and Laurent Roullet for ALTCATEL-LUCENT.

This ADR is a follow-up of the ADR "Self Optimizing Wireless Networks" from the first phase. Two joint INRIA ACATEL-LUCENT patents have been filed during the first phase, one in 2011 (inventors for INRIA: E. Altman, S. Ramanath) and one in 2012 (inventors for INRIA: E. Altman).

Many key features in mobile access networks rely on user velocity information in order to reinforce the perception of performance stability during mobility. Based on the analytical framework elaborated during the first phase that show the need for an efficient method of user speed estimation, the first objective of the research activity (strongly supported by the Wireless Business Unit) is to devise a procedure for user speed estimation or classification.

6.2. Bilateral Grants with Industry

6.2.1. CRE "Content-Centric Networking" (October 2010 – December 2012)

Participants: Sara Alouf, Konstantin Avrachenkov, Nicaise Choungmo Fofack, Philippe Nain, Giovanni Neglia.

Contractor: Orange Labs (http://www.orange.com/en/innovation)

Participants: Bruno Kauffmann, Luca Muscariello, Alain Simonian.

The objective of this grant (CRE) is to develop mathematical models for the analysis of Content-Centric Networks (CCN). This research focuses on routing and caching policies.

P. Nain is responsible for INRIA. This work is done in collaboration with C. Barakat (PLANETE, INRIA).

6.2.2. CRE "Self Optimization in Networks" (October 2009 – September 2012)

Participants: Eitan Altman, Richard Combes.

Contractors are

- Orange Labs (http://www.orange.com/en/innovation). Participant: Zwi Altman,
- Univ. Pierre and Marie Curie (UPMC, http://www.upmc.fr). Participant: Sylvain Sorin.

This grant (CRE) from Orange Labs is related to a Cifre thesis allocated to R. Combes, whose advisors are E. Altman, S. Sorin (UPMC) and Z. Altman (Orange Labs).

MASCOTTE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. Contract APRF (région PACA/FEDER) RAISOM with 3-Roam and Avisto, 05/2009 - 04/2012

Participants: Jean-Claude Bermond, David Coudert, Alvinice Kodjo, Stéphane Pérennes, Issam Tahiri.

On Wireless IP Service Deployment optimization and monitoring.

(http://www-sop.inria.fr/mascotte/projets/raisom/)

7.2. Bilateral Grants with Industry

7.2.1. Contract CIFRE with Orange Labs, 11/2009 - 12/2012

Participants: Jean-Claude Bermond, Mikaila Toko Worou.

"Convention de recherche encadrant une bourse CIFRE" on the topic *Outils algorithmiques pour la détection des communautés*.

7.2.2. Contract CIFRE with Orange Labs, 02/2011 - 01/2014

Participants: Jean-Claude Bermond, Sébastien Félix.

"Convention de recherche encadrant une bourse CIFRE" on the topic *Smart Transports: optimisation du trafic dans les villes*.

7.2.3. Contract CIFRE with KONTRON, 11/2011 - 10/2014

Participants: Michel Syska, Mohamed Amine Bergach.

"Convention de recherche encadrant une bourse CIFRE" on the topic *Graphic Processing Units for Signal Processing* with joint supervision with AOSTE project.

PLANETE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Contracts with Industry

Industrial contract with Alcatel Lucent - Bell Labs (2008-2012):

The goal of this study is the use of AL-FEC techniques in broadcasting systems and in particular on the optimization of FEC strategies for wireless communications. Two persons are working in the context of this contract: Ferdaouss Mattoussi works on the design, analysis and optimization of a Generalized LDPC AL-FEC scheme, and Rodrigue Imad work focuses on Unequal Erasure Protection capabilities (UEP) and file bundle protection systems.

RAP Project-Team

5. Bilateral Contracts and Grants with Industry

5.1. Contracts

- CRE with Orange Labs " Dynamical Optical Networking in the Internet". Contract on bandwidth allocation algorithm in optical networks. Duration 2 years starting from 01/01/12.
- CELTIC-Plus Saser "Safe and Secure European Routing" submitted. RAP participates in the section on optical networks. Participants include Orange labs, Alcaltel-Lucent, Telecom Institute, ENSSAT as well as a number of German laboratories. Duration three years.
- ANR Project "CONNECT: Content-Oriented Networking: a New Experience for Content Transfer". The proposal submitted to the VERSO programme has been accepted. The planned starting date is January 2011 and the project is scheduled to last 2 years. The lead partner is Alcatel-Lucent Bell Labs France and the other partners are RAP, Inria/PLANETE, Orange LAbs, TelecomParisTech, UPMC.
- The ANR Boole contract (Models for random Boolean functions and applications) has been transferred from the Algorithms project, and the funding will last until August 2013.
- PhD grant CJS (Contrat Jeune Scientifique) Frontières du vivant of INRA for Emanuele Leoncini.

5.2. Bilateral Grants

- A bilateral project PHC Tournesol funded by Campus France (formerly Egide) will cover the costs of exchanges between *Nicolas Broutin* and Stefan Langerman (FNRS, UL Brussels). The topic of the collaboration is coloration of random hypergraphs for channel assignment in networks.

SOCRATE Team

7. Bilateral Contracts and Grants with Industry

7.1. Industry

Socrate has strong collaboration with Orange Labs (point to point collaboration) and Alcatel Lucent through the Inria-ALU common lab and the Green Touch initiative. Socrate also works in collaboration with Siradel, a french worldwide company working on wireless system simulations, Sigfox a french young compagny deploying the first cellular network operator dedicated to M2M and IoT, and HIKOB a start-up originated from the Citi laboratory providing sensor networks solutions. A bilateral cooperation supports the PhD of Laurent Maviel, and Siradel is a member of the Ecoscell ANR project in which Socrate is involved.

Socrate started in September 2011 a strong bilateral cooperation with the Euromedia group about Body Area Networks in which Hervé Parvery, Guillaume Villemaud and Jean-Marie Gorce are involved and the project supports the thesis of Matthieu Lauzier.

7.2. National Actions

7.2.1. Equipex FIT- Future Internet of Things (2011-..., 1.064 k€)

The FIT projet is a national equipex (*equipement d'excellence*), headed by the Lip6 laboratory. As a member of Inria, Socrate is in charge of the development of an Experimental Cognitive Radio platform that should be used as test-bed for SDR terminals and cognitive radio experiments. This should be operational in 2013 for a duration of 7 years. To give a quick view, the user will have a way to configure and program through Internet several SDR platforms (MIMO, SISO, and baseband processing nodes).

7.2.2. ANR - ECOSCELLS - Efficient Cooperating Small Cells (2009-2012, 242 keuros)

Ecoscells is a national initiative (ANR) which aims at developing algorithms and solutions to ease Small Cells Network deployment. Theoretical studies will provide models for understanding the impact of radio channels, and permit the definition of new algorithms exploiting a full diversity (user, spatial, interferences, etc.) of such networks. The novelty of the project is not to consider the interference as a drawback anymore, but to exploit it in order to offer an optimal resource utilization. The algorithms will be based on most recent developments in distributed algorithms, game theory, reinforcement learning. Architecture and algorithms for the back-hauling network will also be proposed.

7.2.3. ANR - Cormoran - "Cooperative and Mobile Wireless Body Area Networks for Group Navigation" (2012-2015, 150 keuros)

Cormoran project targets to figure out innovative communication functionalities and radiolocation algorithms that could benefit from inter/intra-BAN cooperation. More precisely, the idea is to enable accurate nodes/body location, as well as Quality of Service management and communications reliability (from the protocol point of view), while coping with inter-BAN coexistence, low power constraints and complying with the IEEE 802.15.6 standard. The proposed solutions will be evaluated in realistic applicative scenarios, hence necessitating the development of adapted simulation tools and real-life experiments based on hardware platforms. For this sake, Cormoran will follow an original approach, mixing theoretical work (e.g. modelling activities, algorithms and cross-layer PHY/MAC/NWK design) with more practical aspects (e.g. channel and antennas measurement campaigns, algorithms interfacing with real platforms, demonstrations).

7.2.4. FUI ECONHOME - "Energy efficient home networking" (2010-2014, 309 keuros)

The project aims at reducing the energy consumption of the home (multimedia) data networks, while maintaining the quality requirements for heterogeneous services and flows, and preserving, or even enhancing the overall system performance. the equipments under concern are residential gateways, set-top-boxes , PLC modules, Wifi extenders, NAS. The user equipment, such as smartphones, tablets or PCs are not concerned. The approach relies on combining both individual equipments IC and system level protocols that have to be eco-designed.

7.2.5. ADR Selfnet - "Self Optimization Networking" (2008-2012, 258 keuros)

This action is a part of the common lab of Inria and Alcatel Lucent Bell Labs. This action groups several team of Inria with Alcatel teams and adresses different aspects of Self Networking: distributed algorithms, energy efficiency, mobility. Virgile Garcia has finished is PhD on distributed power management in cellular networks and

7.3. Actions Funded by the EC

7.3.1. Projet iPLAN - FP7-PEOPLE-IAPP-2008 (2009-2012, 440 keuros)

(Indoor Planning) (2009-2012, 440k€)
iPlan is an FP7 project of the FP7-People-IAPP-2008 call. The iPlan consortium is made of the Ranplan Company, the Citi Laboratory and the University of Bedfordshire and proposes the study of Indoor planning and optimization models and tools. The aim is to develop fast and accurate radio propagation models, investigate various issues arising from the use of femtocells, develop an automatic indoor radio network planning and optimization and facilitate knowledge integration and transfer between project partners, to enable cross-fertilization between radio propagation modeling, wireless communications, operations research, computing, and software engineering.

7.4. Theses, Internships

7.4.1. Theses

7.4.1.1. Theses defended in 2012

Virgile Garcia: "*Resource sharing optimisation for self-organized cellular networks*", PhD thesis from INSA LYON, Inria/Alcatel-Lucent grant,30/04/2012.

7.4.1.2. Theses in preparation

Mickael Dardaillon: "*Virtual machine for the cognitive radio*", Rhône-Alpes grant, since 10/2011.

Cengis Hasan: "*Optimization of resource allocation for small cells networks*", Orange labs grant, since 01/2010.

Paul Ferrand: "*Cooperative communications in BANET*", MENRT, since 10/2009.

Arturo Jimenez Guizar: "*Cooperative communications in Body Area Networks*", ANR Cormoran grant, since 09/2012.

Matthieu Lauzier: "*Design and evaluation of information gathering systems for dense mobile wireless sensor networks*", CIFRE/Euromedia, since 09/2011.

Meiling Luo: "*Fast and accurate radio propagation models for radio network planning*", MENRT grant, since 01/2010.

Laurent Maviel: "*Wireless heterogeneous networks dynamic planning in urban and indoor non-stationary environments*", CIFRE grant with SIRADEL, since 11/2009.

Baher Mawlawi: CEA grant, since 09/2012.

Matthieu Vallerian: "*Radio Logicielle pour réseau de capteurs*", CIFRE/Orange, since 09/2012.

Zhaowu Zhan: "*Full-Duplex Multimode MIMO wireless communications*", CSC/China grant with , since 9/2012.

7.4.2. Participation in thesis Committees

Jean-Marie Gorce:

- Examinateur au jury d'Habilitation à diriger les recherches de Olivier Berder: "Systèmes multi-antennes et efficacité énergétique des réseaux de capteurs sans fil" (nov. 2012, Univ. Rennes1)
- Examinateur au jury d'Habilitation à diriger les recherches de Fabien Mieyeville: "Méthodes de conception hiérarchique de systèmes hétérogènes multi-physiques communicants" (Ecole Centrale Lyon, mai. 2012)
- Rapporteur de la thèse de Guillaume Viennot "Utilisation de techniques d'imagerie de synthèse pour le calcul de la propagation des champs électromagnétiques" (Université Limoges, dec. 2012)
- Rapporteur de la thèse de Hussein Kdouh: "Application of Wireless Technologies to Alarm and MonitoringSystem on Board Ships" (INSA Rennes, dec. 2012).
- Rapporteur de la thèse de Vinh Tran: "Energy efficient cooperative relay protocols for wireless sensor networks" (Université Rennes 1, dec. 2012).
- Rapporteur de la thèse de Mustapha Dakkak: "Indoor geo-location : static and dynamic geo-location of mobile terminals in Indoor environments" (Université Paris-Est, nov. 2012).
- Rapporteur de la thèse de Yougourta Benfattoum: "Network coding for quality of service in wireless multi-hop networks" (Université Paris-Sud, nov. 2012).
- Rapporteur de la thèse de Getachew Rediateb: "Cross-layer optimization for next generation WiFi" (INSA Rennes, oct. 2012).
- Rapporteur de la thèse de Dora Ben Cheikh Battikh "Outage probability formulas for cellular networks: contributions for MIMO, CoMP and time reversal features" (Telecoms Paris Tech, juillet 2012).
- Directeur de thèse de Virgile Garcia: "Opportunistic radio resource sharing for next-gen cellular networks" (Insa-Lyon, 29 Mars 212).

Tanguy Risset:

- Président de jury de la thèse d'Antoine Floch, le 8 juin 2012 (U. Rennes 1/ENS Cachan)
- Examinateur pour le jury de thèse de Naeem Abbas, 22 mai 2012 (U. Rennes 1/ENS Cachan - IRISA).
- Directeur d'Habilitation à Diriger les recherches de Marine Minier, le 31 mai 2012 (U Lyon1/Insa-Lyon)

7.4.3. Internships

- Pierre BRUNISHOLZ, "OFDM decoding on a Virtex 6 FPGA"
- Fayçal AIT-AOUDIA "OFDM decoding on a Virtex 6 FPGA"
- Moemen CHERNI "Smart radio pour réseau de capteurs"
- Borja DE RIVA SOLLA "Etude des techniques de sous-échantillonnage pour la radio logicielle"
- Thibaut VUILLEMIN "Performance analysis for /dev/random"
- Egea Pierrick "Mise en place d'une plateforme experimentale d'evolution de charges dans les systemes d'exploitation"
- Jimenez-Guzar Arturo "PHY layer network coding"
- Richelmy Marion "Algorithmes pour les self-optimized networks"
- Vasselin Virginie "Algorithmes pour les self-optimised networks"

7.5. Teaching

- Tanguy Risset and Jean-Marie Gorce and are professor in the Telecommunications department of Insa Lyon.
- Claire Goursaud is associate professor in the Telecommunications department of Insa Lyon.
- Guillaume Salagnac and Kevin Marquet are associate professors in the Computer Science department of Insa Lyon.
- Guillaume Villemaud and Florin Hutu are associate professor in the Electrical Engineering department of Insa Lyon.
- Nikolai Lebedev is associate professor in the engineering school in Chemistry, Physics and Electronics, Lyon.
- Tanguy Risset has been the vice-head of the Telecommunications department of Insa Lyon until september 2012.
- Tanguy Risset is the responsible for the Networking program of the Master Mastria from University of Lyon.
- Jean-Marie Gorce is the responsible for the Telecommunications program of the future Master EEAP from University of Lyon.
- Guillaume Villemaud is responsible for international relations in the Electrical engineering département of Insa Lyon

TREC Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Laboratoire Commun Alcatel-lucent Bell Labs / Inria

Participant: Anne Bouillard.

The joint laboratory was lauched on 2008. The objective of this collaboration is to contribute to the autonomic networking trend. On Inria's side, the research for this ADR (*action de recherche*) is mainly located at DISTRIBCOM team-project. On TREC's side, it involves the co-supervision of the thesis of Aurore Junier and has led to one publication [30] and a patent application [57].

7.2. CIFRE Grant of Technicolor

Participants: Mathieu Leconte, Marc Lelarge, Laurent Massoulié.

The CIFRE grant of Mathieu started in January 2011. The topic bears on information dissemination and recommendation in social networks. The distribution of multimedia content and the use of social networks like Facebook, Orkut, etc. are booming in today's networks. These social networks are also increasingly used for dissemination and recommendation of content. The objective of the thesis will be to develop an understanding of how information disseminates in social networks based on the type of information, user tastes, and the topological structure of these networks. This study will result in developing methods for more effective dissemination of content.

7.3. CIFRE Grant of Orange

Participants: Bartłomiej Błaszczyszyn, Miodrag Jovanović.

The CIFRE grant of Miodrag started in 2012. The topic bears on the evaluation and optimization of the QoS for new services in cellular networks. This year a work on feasible bit-rates in the MIMO LTE (Long Term Evolution) cellular networks has been presented in [39]. We have been also studying real-time streaming (like mobile TV) in wireless cellular networks. This work is reported in [50] submitted for the publication.

URBANET Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- Two bilateral collaborations are running since 2009 with Orange Labs, and another one since 2008. These collaborations include the supervision of Ph.D. students into a common research program (heterogeneity in wireless sensor networks, resiliency and security of routing protocols, quality of service support of WSN). These three collaborations ended in 2012.
- Two short-term bilateral collaborations, also with Orange Labs, were pursued in 2012: a 4 months project in quality of service in WSN (joint supervision of a master student), and a 2 months project on the SensORLab testbed, deployed in Orange Labs (Meylan).
- A new bilateral collaboration with Orange started in November 2012. This CRE includes the supervision of a CIFRE thesis about multi-topology routing protocol and service level agreement for wireless sensor networks.
- One short-term bilateral collaborations with Thalès was done during 4 months, as a preliminary research project for a Ph.D. student. Unfortunately, no candidate with solid/strong background applied for this position yet. This project should start in 2013.