SigNet
from Signal to Network
Cooperation
- Aalto University
- LIG, Grenoble
- MIT
- Telecom Sud Paris Tech
- ISAE

People
- 5 permanents
- 7 PhD

Contracts
- ANR TroupWilma
- CIFREs: Orange, TMG
- Intel

Teaching choirs
- M1 IFI international
- M2 IFI Ubinet
- Dpt Elec. EPU

TCP in high BDP networks

Green networks and SDN

Cognitive Radio
Space-time coding for MIMO systems

HTTP video streaming

Information dissemination
In MANET

Application
Transport
Network
Link Layer
Physical

Network coding
Scheduling

Cooperation

Contracts
People

Permanent:
- Guillaume Urvoy-Keller – Prof. UNS
- Luc Deneire – Prof. UNS
- Jérôme Lebrun – CR CNRS
- Lucile Sassatelli – MdC UNS
- Dino Lopez – MdC UNS
- Ramon Aparicio Pardo – MCF UNS

Recent graduated PhD Students:
- Sonia Behlareth (I3S/Orange Lab) - Cloud computing – 15/12/14
- Miguel Hisojo (I3S) – Space time coding - 05/12/14
- Neetya Shrestha (I3S) – Mobile Social Networks – 29/04/15

Current PhD Students:
- Mohamed Bouzian (I3S/Orange Lab) – Streaming video sur les mobiles
- Nicolas Huin (I3S/SigNet-Coati) - Energy-Efficient Software Defined Networks
- Xiwen Jiang (I3S/Eurecom) - Reciprocity in massive MIMO networks
- Imane Mnie-Filali (I3S/TMG) – Multi-content distribution in the Internet
- Riccardo Ravaiol (I3S/INRIA Diana) – Network neutrality
- Myriana Rifai (I3S) –SDN (Software Defined Network) based Data Centers
- Sergio Livi - Towards NFV-based Green Networks
Research themes

- Data center networking
- Energy and SDN
- User-centric networking
- Mobile Social Networking
- Cognitive Radio
- Continuous phase space-time coded modulation
News

- Ramon Aparicio Pardo
  - PhD 2011, Universidad Politécnica de Cartagena (UPCT)
    - "Optimization and Planning of WDM Transparent Optical Networks,"
  - Post-doc Orange Lab and Télécom Bretagne
  - Keywords: Optical network, content delivery networks (CDN), video streaming.

- Sergio Livi
  - BsC/Msc Bologna and Ubinet for M2
  - Towards NFV-based green networking

- Visitors
  - Out: Luc Deneire, Brazil (3x 1 month per year; 3 years)
  - In: Hasti Pedersen UCSD
    - PhD candidate: «Caching policies in mobile networks for video streaming»
    - Chateaubriand scholarship for 4 months stay at SigNet with Lucile Sassatelli
    - Topic: A Network Coding Enhanced Video Caching and Scheduling Framework
Data Center Networking

- **Virtualization** in DC
  - Network start within physical servers with virtual switch
  - Research questions: Fairness, efficiency at VM level

- **High speed TCP versions**, e.g., Cubic in Linux kernel
  - Research questions: Fairness, efficiency at flow level

- **Selected Publications:**
  - Sonia Belhareth, Dino Lopez Pacheco, Lucile Sassatelli, Denis Collange, Guillaume Urvoy-Keller: *Understanding synchronization in TCP Cubic*. International Teletraffic Congress 2014
Energy and SDN

- Network responsible of 1/3 of total IT consumption
- SDN - Software Defined Network – to ease flow management with centralized control plane
Energy and SDN

- **Research questions:**
  - Design of practical green routing algorithms
  - SDN based DC: greening and VM migration.

- **Selected publication:**
  - M. Rifai, D. Lopez-Pacheco, G. Urvoy-Keller: *Towards Enabling Green Routing Services in Real Networks*. IEEE Greencom Online 2014
  - Cooperation with
Mobile Social Networking

- Information dissemination in MANET
- Focus on Delay-Tolerant MANET
- Research Questions: Use of Network Coding, Capacity
- Selected Publications:
User centric networking

- User satisfaction is the key to success for ISP
- Research questions:
  - Video QoE for mobile operators
  - Network neutrality
- Selected Publication:
  - R. Ravaioli, G. Urvoy-Keller and C. Barakat: Towards a general solution for detecting traffic differentiation at the Internet access. 27th International Teletraffic Congress (ITC), 2015.
Cognitive Radio

- In mobile networks, one frequency per user - allocated even if no traffic
- Idea: cooperation between primary and secondary user
- Various solutions
  - Signaling between primary and secondary user
  - Mutual information on spectrum usage $\Rightarrow$ interference avoidance
- Research questions: signaling overhead, throughput gain trade-off.
- Selected Publications:
  - Boris Kouassi, Irfan Ghauri, Luc Deneire. Reciprocity-based cognitive transmissions using a MU massive MIMO approach. ICC 2013
Continuous phase space-time coded modulation

- Continuous phase modulation combined with Space-Time Codes

- Contributions
  - CPM ST-coding schemes based on L2-orthogonality
  - Application of CPM to MIMO systems
  - Trade-off between decoding complexity (improved with L2 orthogonality approach) and synchronization constraints
  - Extension to multi-user system (future work) - combination of FDM and CPM

- Selected publications: