



Research in the area of wireless communication networks has recently experienced an unprecedented embrace by both industry and academia. Interest has been fueled by advances that promise exponential gains in the error performance of networks with reduced structure, little central oversight, and limited computational capabilities. The research area's utility and challenging nature is demonstrated both by the contributions from a variety of disciplines, such as information theory, discrete mathematics, game theory and finance, as well as from the effort to unify the above and to bring forth the inherent complexities of multi-terminal communication and interaction.

In pace with the above challenges, the proposed Thesis will seek to explore the theoretical limitations of network communications, propose novel network coding schemes, present relaying methods and cooperation protocols, and investigate fundamental performance tradeoffs. The research will seek to provide an in-depth and unifying exposition to the complex nature of analyzing, coding, cooperating, controlling and competing in wireless networks, utilizing the intricacies of multi-terminal network theory and the advanced mathematical structures that support network communication and interactions.

Furthermore the proposed research will study advanced telecommunications techniques for opportunistic and cooperative multi-user communications for complex and dynamically changing wireless networks. This is a fascinating area that uses advanced mathematical tools towards analysis and optimization of large-scale networks which can change arbitrarily fast, and in which actions have a strict delay constraint and strict practicality limitations.

The proposed Ph.D. Thesis is highly conducive to interdisciplinary collaboration, it builds on a diverse set of theoretical breakthroughs (• random matrix theory • division algebras • combinatorics • algebraic geometry) and has been strongly embraced by technology (• sensor networks • decentralized/opportunistic networks • network control-communication-cooperation).

At the end of the day, the proposed work will aim to provide for theoretical breakthroughs as well as practical solutions to problems in complex wireless networks. The work is a natural continuation of our current research which has recently provided near optimal solutions for a variety of wireless network settings.

PhD Student Position Available

**in area of Wireless Communication Networks
PhD Fully Funded by Comprehensive Scholarship**

**EURECOM
Sophia Antipolis, France**

What:

- PhD research assistant position available
- Studies fully funded by comprehensive scholarship

PhD general topic:

- Research in wireless communication networks

Where and When:

- EURECOM – Sophia Antipolis, French Riviera (<http://www.eurecom.fr/cm.en.htm>)
- Starting in Fall 2008

Contact:

- Email CV to Prof. Petros Elia (elia@eurecom.fr) (<http://www.eurecom.fr/people/elia.en.htm>)

Description of Research: Interdisciplinary research in the general area of wireless communication networks, with emphasis in cooperative networks of the future, with subtopics potentially including:

- Cooperative networks – cooperative diversity
- Network and MIMO coding techniques
- Information theoretic bounds
- Stochastic network optimization
- Queuing theoretic aspects
- Complexity of information extraction in wireless communications networks
- Application of sensor networks

Salient features of PhD Position and Research Topic:

- Studies, salary and benefits fully funded by scholarship
- Very competitive salary and benefits package
- Participation in European networks-of-excellence and research projects
- Collaborations with leading research groups
- Proposed research combines engineering and mathematics, theory and practice
- Topic strongly embraced by both academia and industry
- Advanced courses Electrical Engineering and Mathematics
- Fully funded attendance to international conferences

Expected Qualifications of PhD Candidates:

Best to have a strong mathematical background, preferably in topics such as analysis, random processes, linear algebra.