

Mathematics of Relaying and Cooperation in Communication Networks

April 10–12, 2006 • Berkeley, California

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Information theory bridges mathematics and communication systems analysis. The point-to-point communication problem is fairly well understood today: researchers have developed a refined set of tools for designing and optimizing codes and protocols. In stark contrast, the analysis of communication networks is still a wide open problem because of the complex nature of the interactions permitted by multi-terminal systems. Our lack of understanding is reflected by the fact that most state-of-the-art communication networks are planned using point-to-point principles, and network considerations enter only at a later stage of design.

Designing resource-efficient wireless networks requires a fundamental understanding of the mathematics underlying multi-terminal communication systems. One of the simplest such systems is a “three-body problem,” with a source, a destination, and a relay whose purpose is to assist the communication from the source to the destination. This seemingly simple communication problem has long resisted solution, but new insight has been gained recently.

This workshop aims at bringing together researchers from engineering, computer science, and mathematics to discuss recent advances and promising directions for future research. In particular, the workshop will emphasize:

- physical-layer models
- performance metrics
- sensor networks
- code design
- resource allocation
- converse bounds
- historical perspectives
- multi-terminal information theory
- relaying via network coding

While leading researchers in each of these areas are being invited to participate in the workshop, submissions of contributed posters of original work in each of these areas are also being solicited. Posters will be reviewed on the basis of an extended abstract (not exceeding 3 pages), submitted in PDF format to gastpar@eecs.berkeley.edu. The deadline for submission is February 1, 2006, with notification of decisions by March 1, 2006.

Registration: is free and remains open until one week before the workshop. On the MSRI home web page, select the link to Workshops, select this particular workshop, then link to Register Online. Limited funding is available; students, recent Ph.D.s, women and minorities are particularly encouraged to apply. To do so, complete the second part of the registration form.

Further information and links to the workshop web page are available at:

<http://www.msri.org>