



ECE Distinguished Lecture Series



Muriel Medard

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Electrical Engineering and
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Network Coding - a Personal Account of Combining Theory and Practice

Time: Thursday, February 23, 2017, 11:00 am - 12:00 pm

Location: SEH B1220

Abstract

This talk seeks to illustrate the interplay between theoretical development and engineering implementation, with a personal slant. It centers on Network Coding (NC), a modern information theoretic development that leverages algebraic data manipulation during transport through a network to enhance resource use, reliability and security. NC opens many research questions on the theory of networks, but also opens beguiling possibilities of how to improve existing systems. We show how algebraic modeling of NC leads to the development of random linear network coding (RLNC), and how the latter can change transport protocols. In particular, we show how RLNC can be used to improve some of the most common protocols in use currently. The introduction of coding opens fundamental questions about whether cross-layer approaches are desirable in networks, since coding has generally been relegated to the lower layers. We show that, surprisingly, there is a separation between coding at the transport layers and coding at lower layers, so that combining the two under quite general conditions leads to no throughput improvement, although energy improvements may still be possible in practice. We conclude the talk with open challenges and research directions driven by the coming convergence of data storage and networking. No background knowledge will be assumed.

Biography

Muriel Médard is the Cecil H. Green Professor in the Electrical Engineering and Computer Science Department at MIT and leads the Network Coding and Reliably Communications Group at the Research Laboratory for Electronics at MIT. She has co-founded three companies to commercialize network coding, CodeOn, Steinwurf and Chocolate Cloud. She has served as editor for many publications of the Institute of Electrical and Electronics Engineers (IEEE), of which she was elected Fellow, and she is currently Editor in Chief of the IEEE Journal on Selected Areas in Communications. She was President of the IEEE Information Theory Society in 2012, and served on its board of governors for eleven years. She has served as technical program committee co-chair of many of the major conferences in information theory, communications and networking. She received the 2009 IEEE Communication Society and Information Theory Society Joint Paper Award, the 2009 William R. Bennett Prize in the Field of Communications Networking, the 2002 IEEE Leon K. Kirchmayer Prize Paper Award and several conference paper awards. She was co-winner of the MIT 2004 Harold E. Edgerton Faculty Achievement Award. In 2007 she was named a Gilbreth Lecturer by the U.S. National Academy of Engineering. She received the James Evans Avant Garde Award from the IEEE Vehicular Technology Society in 2016.