

Graduate Seminar



Network coding - a personal account of combining theory and practice

Muriel Medard

**Cecil H. Green Professor
Electrical Engineering and
Computer Science Department
Massachusetts Institute of Technology**

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4:30 pm Scaife Hall 125

ECE Seminar Committee

Aswin Sankaranarayanan
saswin@ece.cmu.edu

Maysam Chamanzar
mchamanz@andrew.cmu.edu

Swarun Kumar
swarun@cmu.edu

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 or storage in a network to enhance resource usage. It shows how practical considerations, such as rerouting in backbone networks, can lead to envisaging fundamental network information theory problems and how those, in turn, provide algorithmic solutions, that can be incorporated in common protocols used for data transmission. We particularly consider Random Linear Network Coding (RLNC), show its optimality for a broad set of fundamental problems and present its practical incorporation in the Transmission Control Protocol (TCP) generally used with the Internet Protocol (IP). We consider how recent developments in information theory, such as equivalence theory, that shows a separation between physical layer coding and network coding, may impact the design of sensor nodes. We conclude with open challenges and research directions driven by the coming convergence of data storage and networking. No background knowledge will be assumed.

Bio:

Muriel Médard is the Cecil H. Green Professor of Electrical Engineering and Computer Science at the Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology (MIT), Cambridge, MA, USA. Her research interests are in the areas of network coding and reliable communications.

She is a Fellow of IEEE and has served as an Editor of many IEEE publications, currently as the Editor-in-Chief of the IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS. She served on the Board of Governors of the IEEE Information Theory Society, for which she was President in 2012. She has served as a TPC Chair or general Chair for several IEEE conferences.

She was the recipient of the 2013 MIT Graduate Student Council EECS Mentor Award, the 2009 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 also a co-recipient 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 IEEE Vehicular Technology Evans Avant Garde Award in 2016.

SEMINAR NOTES: (REFRESHMENTS SERVED AT 4:00 PM)