Implementation Considerations for Network Coding in Sensor Networks

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Abstract: The implementation of network coding in energy-challenged sensor networks, such as body area networks, requires consideration of the energy cost of coding and the benefits that coding can provide in reducing the number of transmissions for successful reception. In this talk, we consider three different aspects of implementing network coding in body area networks, from low-level construction of modules in chips, to full circuit integration, to protocol design. The first concerns the choices of implementation of finite field arithmetic for network coding, trading off computational complexity for retransmission. The second issue considers the overall use of energy, when network coding and physical-layer error correction can be used in a complementary fashion. Finally, we consider energy use when coding is incorporated in the transmission protocol. Coding changes the way in which acknowledgements are managed, as well as forwarding in the types of simple relay scenarios that arise in body area networks.

BRIEF BIOGRAPHY

Muriel Médard is the Cecil H. Green Professor of Electrical Engineering and Computer Science at MIT. She was previously an Assistant Professor in the Electrical and Computer Engineering Department and a member of the Coordinated Science Laboratory at the University of Illinois Urbana-Champaign. From 1995 to 1998, she was a Staff Member at MIT Lincoln Laboratory in the Optical Communications and the Advanced Networking Groups. Professor Médard received B.S. degrees in EECS and in Mathematics in 1989, a B.S. degree in Humanities in 1990, a M.S. degree in EE 1991, and a Sc.D. degree in EE in 1995, all from the Massachusetts Institute of Technology (MIT), Cambridge. She has served as an Associate Editor for the Optical Communications and Networking Series of the IEEE Journal on Selected Areas in Communications, the IEEE Transactions on Information Theory, the IEEE/OSA Journal of Lightwave Technology and the OSA Journal of Optical Networking. She has served as a Guest Editor for the IEEE Journal of Lightwave Technology, the Joint special issue of the IEEE Transactions on Information Theory and the IEEE/ACM Transactions on Networking on Networking and Information Theory and the IEEE Transactions on Information Forensic and Security: Special Issue on Statistical Methods for Network Security and Forensics. She serves on the board of Governors of the IEEE Information Theory Society as well as having served as President.