



ICWS Seminar Series



GENERALIZED NETWORK SHARING BOUND AND FUNDAMENTAL LIMITS TO INFORMATION FLOW IN NETWORKS

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141 Coordinated Science Lab / 4:00 p.m.

Abstract: The talk will be in three parts.

In the first part, we consider the two-unicast problem in wireline networks, i.e. the problem of communication over a network with two sources and two destinations, each source with a message for its own destination. Our interest is in investigating the network coding capacity region for this problem. We develop a new outer bound that is a simple improvement over an existing bound in the literature called the Network Sharing bound [Yan, Yang, Zhang]. We call our bound the Generalized Network Sharing (GNS) bound. We discover some interesting properties of this bound with regard to two-unicast networks. Joint work with Prof. David Tse and Prof. Venkat Anantharam.

In the second part, we consider two-unicast in linear deterministic networks. The linear deterministic model has been very successful in characterizing approximately capacity regions of Gaussian networks. By developing a GNS bound for layered linear deterministic networks, we find an interesting analogue of a result obtained for two-unicast wireline networks by Chih-Chun Wang and Ness Shroff. Further, by providing achievable schemes and matching outer bounds, we completely characterize the capacity region of a class of two-unicast layered linear deterministic networks. Joint work with I-Hsiang Wang and Prof. David Tse.

In the third part, we consider the k -unicast problem with symmetric demands in wireline networks. Reflecting upon the work of Chekuri, Kannan, Raja, Viswanath, we use the GNS bound to demonstrate the fundamentality of edge-cuts as outer bounds. Further, we develop a GNS bound for a class of Gaussian networks which along with the work of Chekuri et al, shows approximate optimality of Local PHY + Global Routing for k -unicast with symmetric demands in this class of Gaussian networks.

Biography: Sudeep Kamath received the B.Tech degree in Electrical Engineering from Indian Institute of Technology Bombay in 2008. Since August 2008, he has been a graduate student at the EECS department, University of California, Berkeley affiliated with Wireless Foundations. His research interests lie broadly in information theory and coding theory.

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