TITLE: Network Coding: Recent Trends and Challenges

ABSTRACT: Network coding techniques have been studied extensively for the past one decade and for the past few years physical layer network coding has attracted the attention of researchers. More recently interconnections between network coding problems and other seemingly different problems, (both in wired and wireless networks setting), like interference alignment, source coding with an informed source (source coding with side-information), multiway relay networks and the topological interference management problem in wireless networks have been studied. The interconnections among these difficult problems are studied in the framework of noiseless index coding. The amount and nature of side-Information appearing in these problems play a crucial role in obtaining solutions.

In this talk we survey the recent trends and results in both wireline and wireless network coding with focus on their relation to interference alignment and management problems, multiway relaying problems and more fundamental index coding problems. The recent results in the topics of decoding of network codes and noisy index coding problems will be discussed in detail. A number of open problems will be pointed out at every stage of the talk along with the challenges posed by these problems.

BIO: Dr. B. Sundar Rajan received the B.Sc. degree in mathematics from Madras University, the B.Tech degree in electronics from Madras Institute of Technology, and the M.Tech and Ph.D. degrees in electrical engineering from I.I.T. Kanpur. He was a faculty member with the Department of Electrical Engineering at I.I.T. Delhi, from 1990 to 1997. Since 1998, he has been Professor in the Department of ECE at I.I.Sc. His primary research interests include signal processing and coding for MIMO systems, network coding, distributed space-time coding and cooperative communication and coding for multi-user channels.

Dr. Rajan is a Fellow of IEEE; Fellow of the Indian National Science Academy (INSA), Fellow of the Indian National Academy of Engineering (INAE), Fellow of the Indian Academy of Sciences (IASc) and Fellow of the National Academy of Sciences, India (NASI). Currently he is an Associate Editor for Coding Theory of IEEE Transactions on Information Theory and Editor for IEEE Wireless Communications Letters. He served as Technical Program Co-Chair of the IEEE Information Theory Workshop (ITW'02).

Dr. Rajan is a recipient of IEEE Wireless Communications and Networking Conference (WCNC 2011) Best Academic Paper Award, recipient of Prof. Rustum Choksi award by I.I.Sc. for excellence in research in Engineering in 2009, recipient of Khosla National Award in 2010 from I.I.T. Roorkee and recipient of the IETE Pune Center's S.V.C. Aiya Award for Telecom Education in 2004.