



THE CHINESE UNIVERSITY OF HONG KONG
 Institute of Network Coding
 and
 Department of Information Engineering
Seminar



Combination Network Coding
 By
Prof. Zongpeng Li
 Department of Computer Science
 University of Calgary
 Canada

Date : 14 May, 2010 (Friday)
Time : 1:30 pm - 2:30 pm
Venue : Room 833, Ho Sin Hang Engineering Building
The Chinese University of Hong Kong

Abstract

Network coding allows information flows to be 'mixed' at intermediate nodes in a network during the course of routing. Applications of network coding are found in a number of data networking scenarios, including increasing network capacity and reducing routing cost. We refer to network coding schemes in which information flows propagate along a combination network topology as combination network coding (CNC). CNC and its variations are among the first network coding schemes studied in the literature, and so far still represent arguably the most important class of known structures where network coding is nontrivial. Targeting a thorough understanding of the power of CNC in undirected networks, we prove a tight bound on its potential both in improving multicast throughput (the coding advantage) and in reducing multicast cost under a linear link flow cost model (the cost advantage). We prepare three necessary results towards this goal. First, we show that the cost advantage of CNC is upper-bounded by $9/8$ under the uniform link cost setting. Second, we show that achieving a larger cost advantage is impossible by considering an arbitrary instead of uniform link cost configuration. Third, we show that in a given network topology, for any form of network coding, the coding advantage under arbitrary link capacity configurations is always upper-bounded by the cost advantage under arbitrary link cost configurations. Combining the three results together, we conclude that the potential for CNC to improve throughput and to reduce routing cost are both upper-bounded by $9/8$. The bound is tight since it is achieved in specific networks. This result can be viewed as a natural step towards improving the bound of 2 proved for the coding advantage of general multicast network coding.

Biography

Zongpeng Li received his B.E. degree in Computer Science and Technology from Tsinghua University (Beijing) in 1999, his M.S. degree in Computer Science from University of Toronto in 2001, and his Ph.D. degree in Electrical and Computer Engineering from University of Toronto in 2005. He has been working as an Assistant Professor at the Department of Computer Science in the University of Calgary since August 2005. His research interests are in computer networks, particularly in network optimization, multicast algorithm design, network game theory and network coding. Zongpeng was named an Edward S. Rogers Sr. Scholar in 2004, won the Alberta Ingenuity New Faculty Award in 2007, was nominated for the Alfred P. Sloan Research Fellow in 2007, and received the Best Paper Award at the Ninth Passive and Active Measurement Conference (PAM) in 2008.

*** ALL ARE WELCOME ****