



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



## On Error Correction for Networks and Deadlines

by

**Prof. Tracey Ho**  
**California Institute of Technology, USA**

**Date : 6 August 2012 (Monday)**  
**Time : 11:00 am - 12:00 pm**  
**Venue : Room 1009 , William M. W. Mong Engineering Building**  
**The Chinese University of Hong Kong**

### Abstract

Classical coding theory deals with the problem of robust transmission on individual unreliable channels. Its network generalization, called network error correction coding, considers coding for networks where some links may be erroneous. Many existing works have studied network error correction coding for single-source multicast networks with uniform link capacities. For the case of multiple sources, multiple receivers with different demands, or nonuniform link capacities, we show that new coding schemes and capacity bounding techniques are required. We further introduce applications beyond the original network communication context. One application is streaming communication, where specific information must be decoded by specific deadlines. This can be modeled as a network error/erasure correction problem where each deadline corresponds to a receiver with different demands. We use this perspective to characterize capacity and design good codes. In decentralized networks, our results on secure multi-source network error correction can be used for decentralized distribution of information (such as keys from a pool) when not all participating nodes are trustworthy. We also construct rateless network error correction codes suitable for combining coding-based information theoretic security (which uses path diversity and redundant capacity as resources) with cryptographic security (which relies on computation as a Resource) in networks of computationally limited devices.

### Biography

Tracey Ho is an Assistant Professor in Electrical Engineering and Computer Science at the California Institute of Technology. She received a Ph.D. (2004) and B.S. and M.Eng degrees (1999) in Electrical Engineering and Computer Science (EECS) from the Massachusetts Institute of Technology (MIT). She was a co-recipient of the 2009 Communications & Information Theory Society Joint Paper Award. Her primary research interests are in information theory, Network coding and communication networks.

**\*\*ALL ARE WELCOME \*\***