

Monthly Progress Report for March 2004

STUDENT NAME: Ritabrata Roy

ADVISOR: Dr. Wade Trappe

PROJECT TITLE: Network Tomography

BACKGROUND / PRIOR WORK: Interested in ad-hoc network problems as well as unlicensed band routing and spectrum management issues.

PROGRESS DURING MARCH 2004:

- Continued working on network tomography, which deals with the study of estimating internal characteristics of a network from its end-point measurements.
 - Prepared literature survey of related work.
 - Reformulated analysis of link success probabilities for three nodes, and extended it to a general case of K nodes.
 - Analyzed the method to determine link characteristics using maximum likelihood estimation (MLE) in R. Caceres, N.G. Duffield, J. Horowitz, and D.F. Towsley. "Multicast-Based Inference of Network Internal Loss Characteristics." *IEEE Trans. Info. Theory*, pages 2462–2480, November 1999.
 - Proposed a way to reduce our particular network tomography problem to a more general class of problems so that existing results could be applied. This includes the application of the maximum likelihood estimate (MLE) to our problem. Compared the MLE results obtained from existing papers to that obtained from our approach.
 - Analyzed a two-to-one network analysis, so that the general case of many-to-many network can be analyzed as a combination of multiple two-to-one and one-to-two networks.
 - The problem was thus generalized to a multiple-source network.
- Submitted paper to the *IEEE Globecom General Conference 2004*. Title: "Optimal Signature Sets for Transmission of Correlated Data over a Multiple Access Channel." Co-authors: Joydeep Acharya, Jasvinder Singh, Christopher Rose.
- Attended talks by other members of the Network/RRM group to learn about different projects.
- Attended the ECE Colloquium (Distinguished Lecture Series).
- Participated in ECE Open House for the MUSE wireless ECG demonstration.
- Updated personal and central WINLAB websites.

WORK PLANNED FOR APRIL 2004:

- To continue working on the Network Tomography problem.
 - Compare MLE approach with our approach in obtaining link success probabilities, with a constraint on the sum of the recording probabilities.
 - Obtain variance of the estimators.
 - Consider the use of the EM (expectation maximization) algorithm for the tomography problem.
 - Further work to be planned out at the meeting after April 17, 2004.
- To prepare poster for *IEEE Sarnoff Student Symposium 2004* on April 27, 2004 (wrong date given in previous report).
- To attend colloquia organized by WINLAB and weekly Network/RRM group meetings.
- To attend the ECE Colloquium (Distinguished Lecture Series).
- To continue maintaining personal and central WINLAB websites.