

# STC Research Project Description

**Project Title:** TRANSPORTATION NETWORK VULNERABILITY ASSESSMENT:  
*A QUANTITATIVE FRAMEWORK*

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**Project Start Date:** Feb. 15, 2002

**End Date:** Mar. 15, 2002

**Other Milestones, Dates:** N.A

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**Project Objective:** To prepare a white paper on transportation network vulnerability assessment. The white paper examines and addresses key data, modeling, and substantive challenges in developing quantitative metrics for network wide security assessments.

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## **Project Abstract:**

This white paper examines the need, scope, potential, and relevance of quantitative framework for the vulnerability assessment of transportation networks. The feasibility of a quantitative and network-wide framework for vulnerability assessment of transportation systems is explored in this paper. Second, the suitability of developing models of component vulnerabilities, based on combining expert knowledge on security with quantitative data is examined. Finally, the potential for using network analysis and optimization principles including shortest path and cost minimization techniques to estimate system level vulnerabilities is analyzed in order to quantify critical interdependencies at the system wide level.

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**Task Description: Preparation of White Paper**

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**Total Budget:** \$ 5000.00

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**Student Involvement (Thesis, Assistantships, Paid Employment):** N.A

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**Relationship to Other Projects:**

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**Technology Transfer Activities:** The white paper will be presented at a conference, if appropriate

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**Potential Benefits of Project:** The white paper emphasizes the need for quantitative and comprehensive network vulnerability metrics, and proposes methods to develop these in real-world networks. These metrics would enable, the inclusion of security considerations as integral criteria during the transportation network planning and design practices. Second, they may be implemented relatively rapidly to support operation decisions and implementation of countermeasures. For instance, such vulnerability metrics can be used by transportation agencies to identify security critical system components, and to prioritize resource allocation decisions to reduce risk. Third, these vulnerability indices will play a valuable role in establishing an empirical body of knowledge, currently lacking, on the security implications of interactions between infrastructure components, transportation flows, and external disruptions.

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**TRB Keywords:** Network Security, System Vulnerability, Quantitative Assessment

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