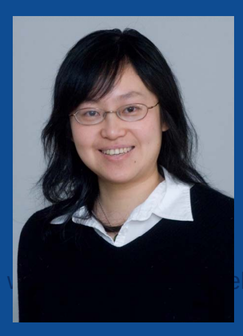
CAREER: Building Trust in Distributed Networks: Theories, Architecture and Applications

Yan Sun, University of Rhode Island **http://www.ele.uri.edu/faculty/yansun/**



Problem Description

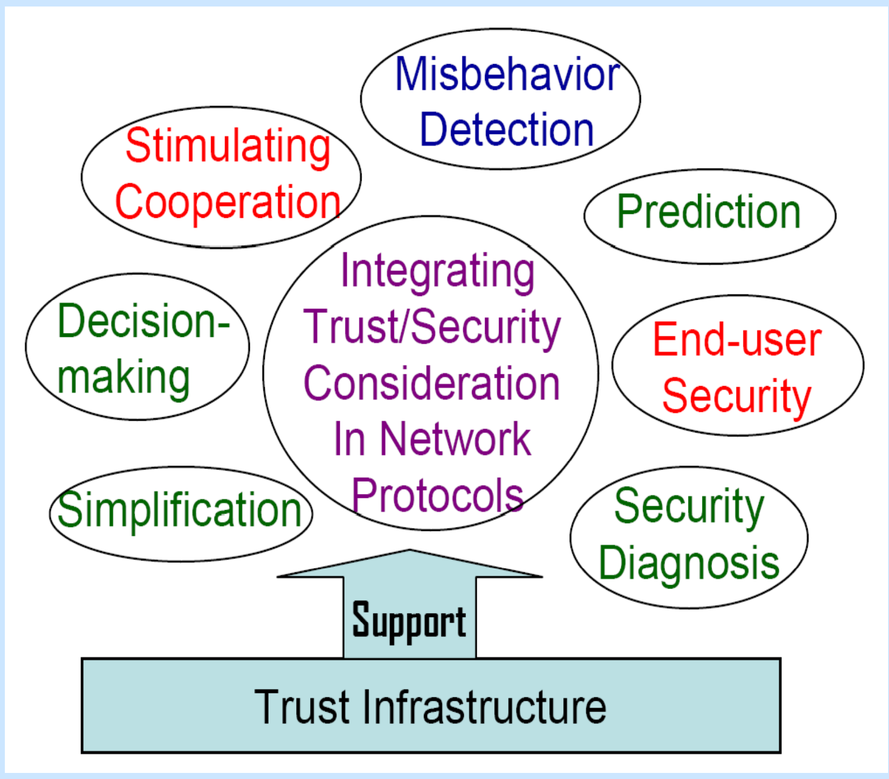
When network participants do not know how to trust each other, participants that naïvely trust will be victimized and mistrustful participants will waste their resources through inefficiencies. The goal of this research is to improve network performance without sacrificing network security through the right trust infrastructure.

Research Components

Theories — meaning of trust; measurement; mathematical properties;

Framework — cross layer trust management; threat models; defense; implementation efficiency; human factors;

Applications — secure ad hoc routing; secure physical layer cooperative communications; trustworthy rating system for e-commerce; P2P reputation systems.



Approach and Impact

New Approaches

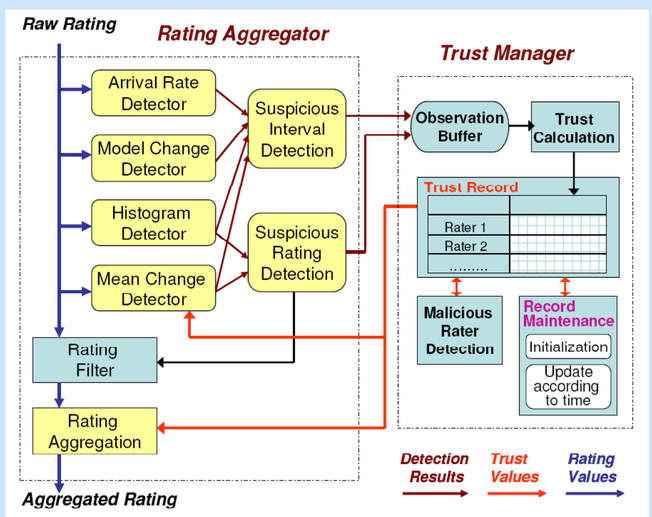
- Build theoretical foundation using information theory and estimation theory
- Build threat models and defense with human user involvement
- Enforce cooperation in various applications through trust infrastructure.

Research Impact

- Understanding the benefit and cost of trust-enhanced system design
- Analysis and evaluation tools for reputation/trust systems
- Improvement in network performance and security in distributed networks

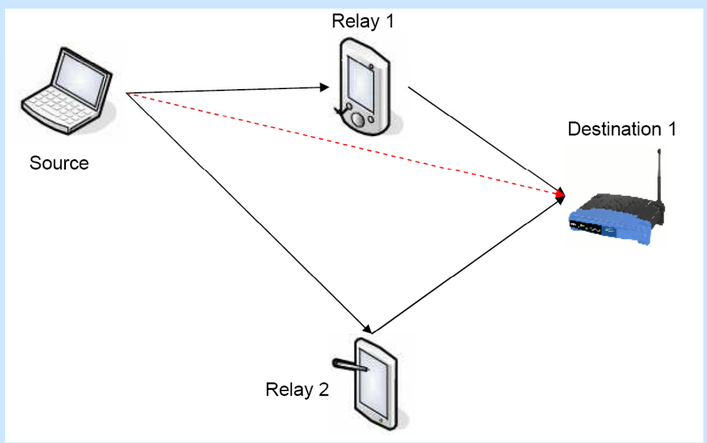
Results

Safeguard Online Rating against Collaborative Attacks



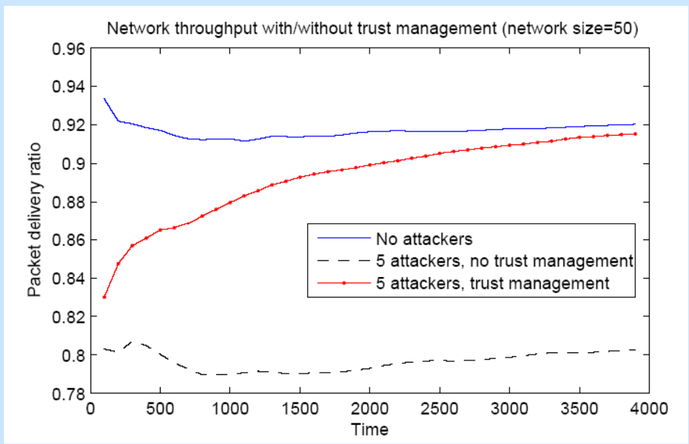
Reduce attack power by 2/3 in real user experiments

Trust-assisted Cooperative Transmission in Wireless Networks



Turn a security weak link into a security enhancement

Secure Ad hoc routing protocol against gray-hole attacks



Quick Recovery from Attacks

National Science Foundation
WHERE DISCOVERIES BEGIN

NSF Cyber Trust Principal Investigators Meeting
March 16-18, 2008
New Haven, CT

UNIVERSITY OF Rhode Island