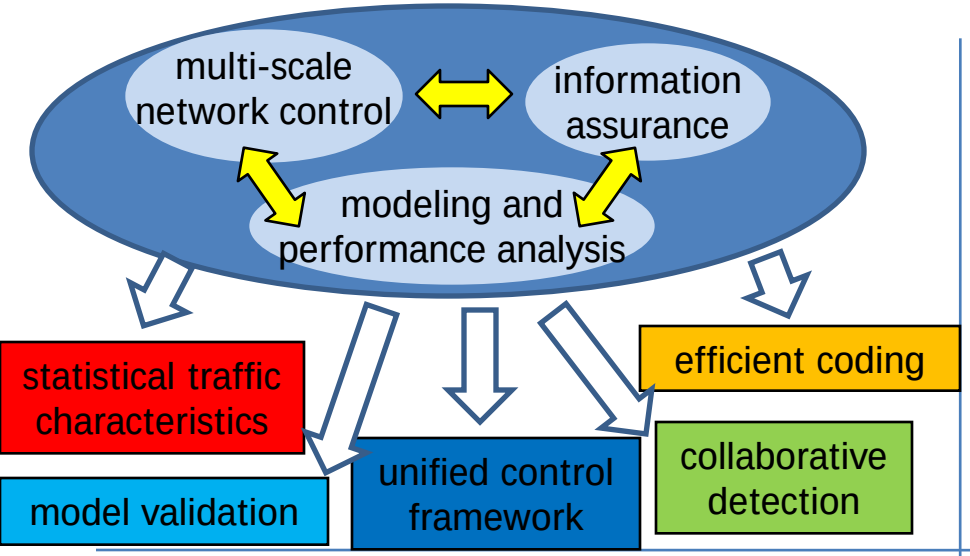
FY08 MURI

MAASCOM: Modeling, Analysis, and Algorithms for Stochastic Control of Multi-Scale Military Networks (PI: N. B. Shroff, OSU)



Objectives:

1)Develop a theoretical foundation for modeling, analysis, and control of tactical wireless networks.
2)Investigate the role of time-scales, network dynamics, and correlations in the performance and security of military networks.
3)Develop efficient and practical control mechanisms to achieve high performance, robustness, and security.
4)Develop distributed intruder detection schemes of information flows and flow changes

Army Relevance:

1)Will enable effective control of complex military and tactical networks
2)Will increase network security and robustness.
3)Will address key attributes of military networks: e.g., multi-scale traffic & multi-scale dynamics; mobility; heterogeneity; limited feedback.
4)Will meet performance requirements for low delay reliability, robustness, energy efficiency, security, low loss communications
5)Will significantly enhance DoD's ability to build future combat systems for low-latency network-centric operations.

Approach: modeling and performance analysis, multi-scale network control, and information assurance

Accomplishments:

1)Developed unified approach for optimizing throughput with heterogeneous traffic
2)Obtained delay bounds for wireless networks
3)Characterized the impact of mobility and spatial correlation on network traffic
4)Developed a new theory of QoS for wireless
5)Used timing analysis to detect information flows
6)Developed covert TCP-IP timing channels from theory to implementation