

Objective:

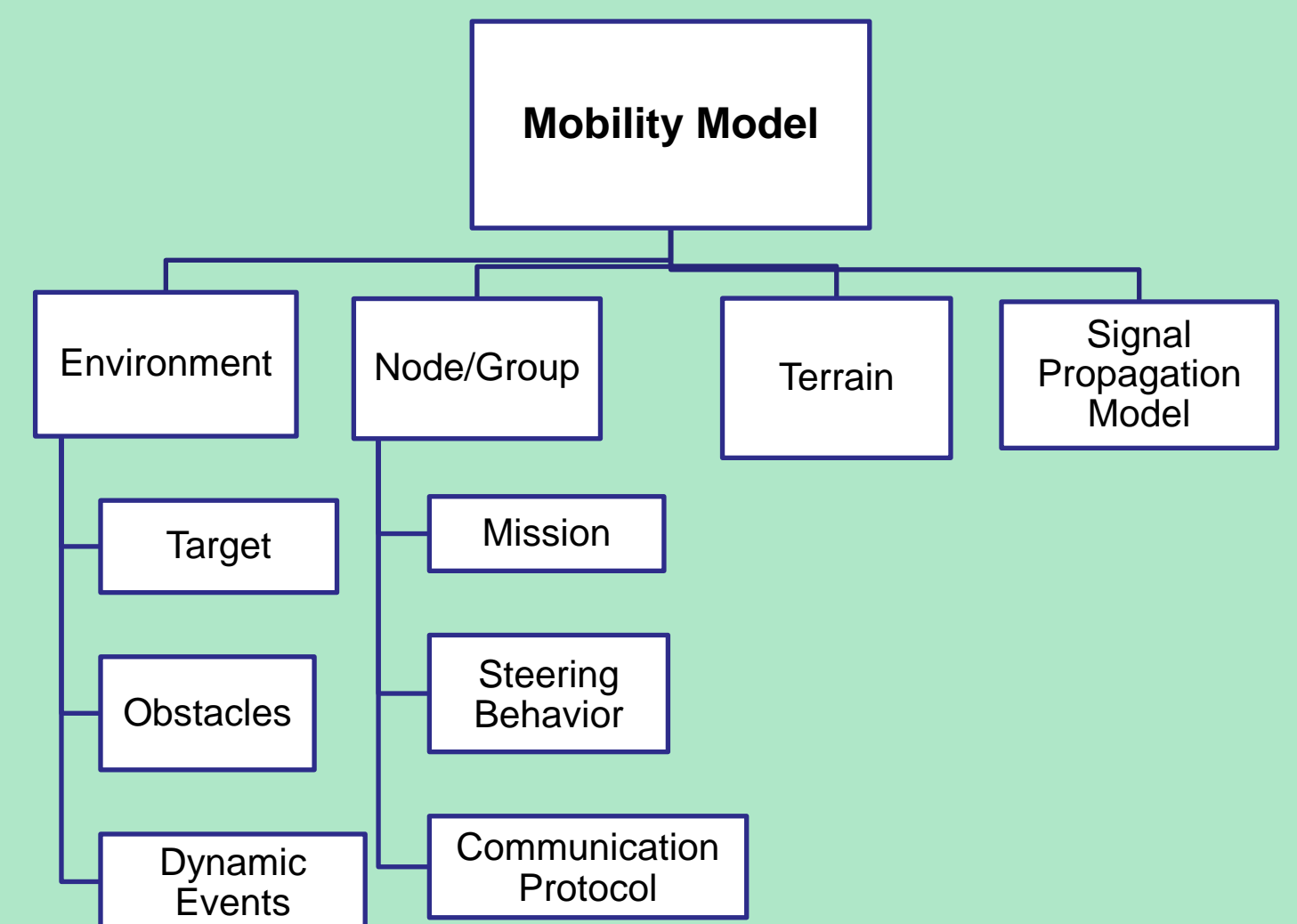
To develop parameterized mobility models for tactical military networks

- Characterize mobility building blocks
- Define mobility parameters of interest
- Compute statistics for mobility parameters and relate them to network parameters
- Generate an extensive trace library for military specific mobility

Background & Motivation:

- In networks characterized by high mobility of nodes (such as MANETs), network topology is highly dynamic.
- The design and performance analysis of protocols for such networks requires mobility models that accurately capture the dynamics of the fast changing network topology and parameters.

Mobility Building Blocks

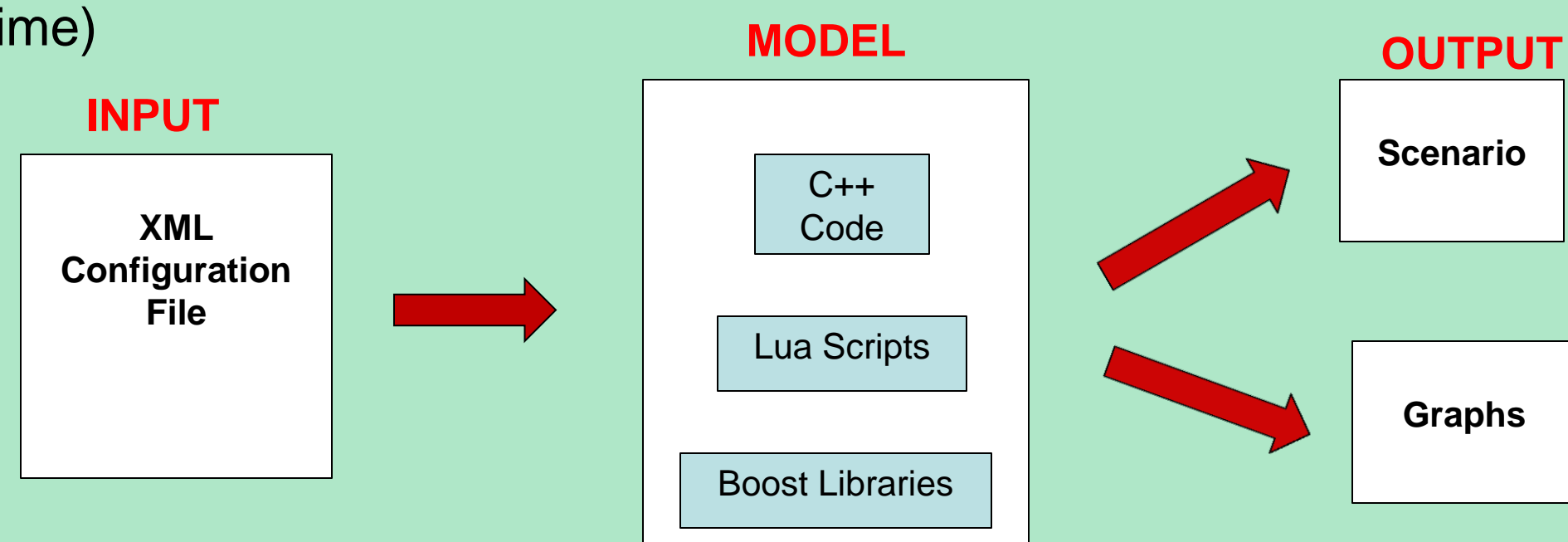


Technical Approach

1. Trace Based Analysis:

Leverage Universal Mobility Modeling Framework, a tool developed with Raytheon BBN, to:

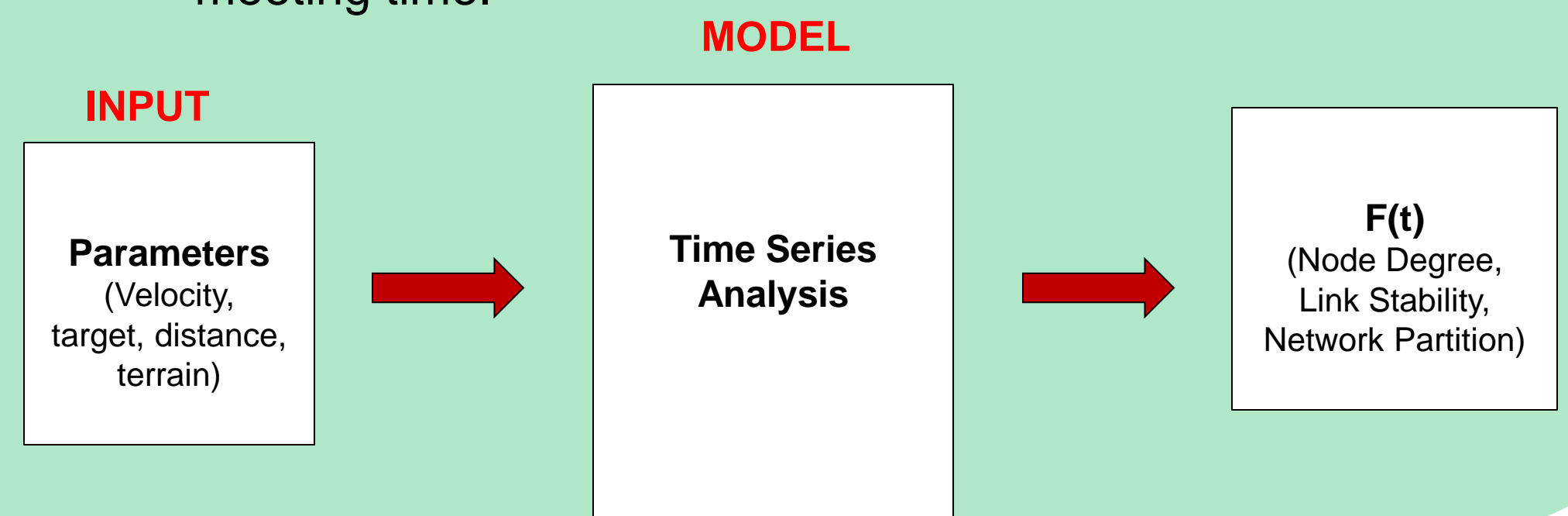
- Simulate military scenarios
- Generate mobility traces (compute mobility statistics as a function of time)



2. Mathematical Modeling

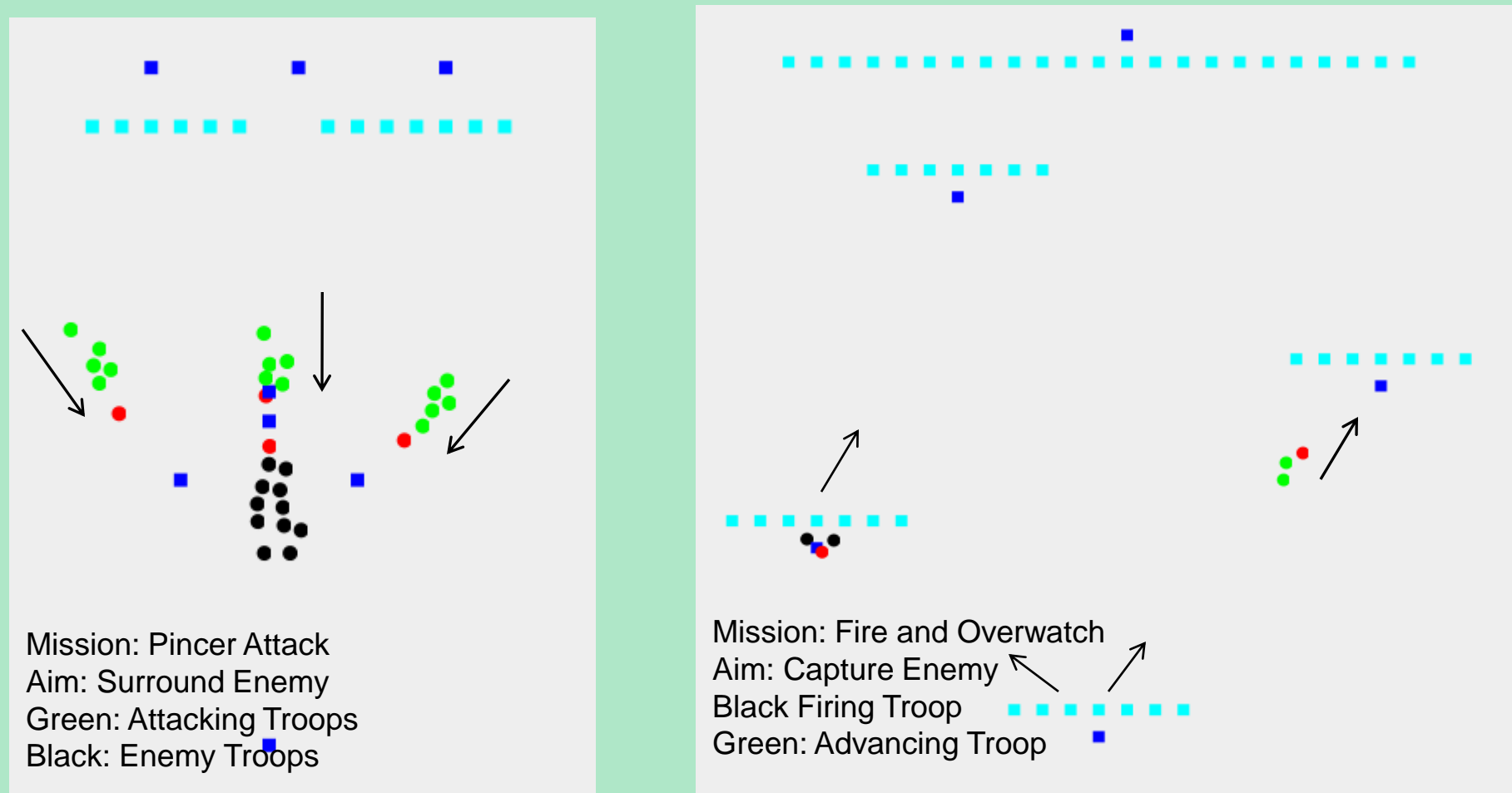
Perform piecewise time series analysis to obtain tractable mathematical equations for the following network parameters:

- Node degree, Link Stability, Network Partitions, Inter-meeting time.

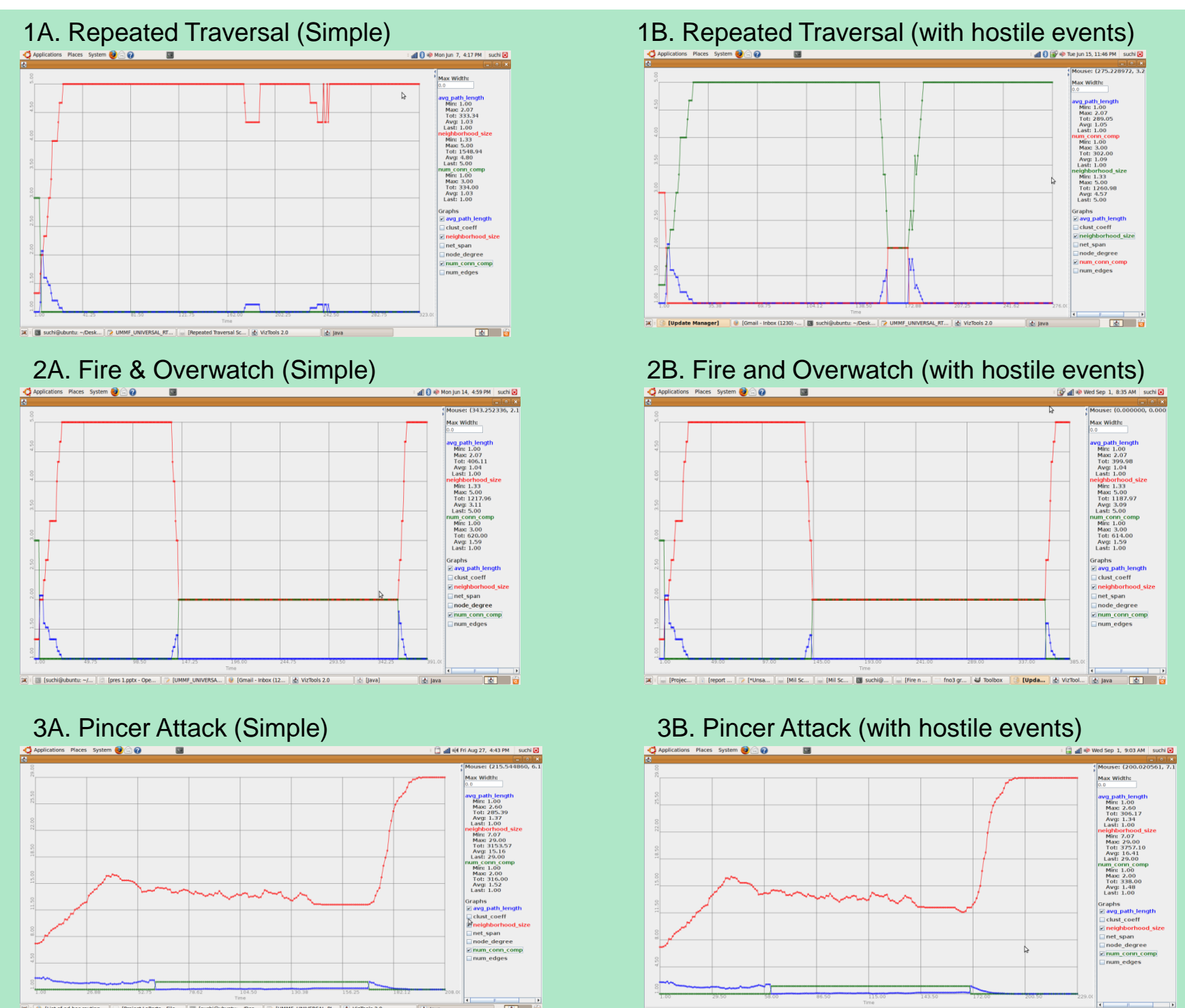


Military Scenarios

1. Identify objective of mission (capture/surround enemy, patrol)
2. Derive mobility features (group mobility, inter-group communication, geometric configurations)
3. Define inputs to UMMF tool (targets, steering behaviors, dynamic events, obstacles, number of nodes/groups)



Simulation Results



Conclusion & Future Work

- Mobility models help analyze and quantify the dynamic behavior of network parameters in a MANET environment.
- Mobility trace libraries generated by the model can be fed into NS2 and used to evaluate routing protocols
- Tractable mathematical equations provided by the model can be used to derive routing overheads, channel allocation schemes, in-network storage decisions.