Secure Routing in Ad Hoc Networks

Final Project specifications for Class 646 Project

Submitted by
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Introduction to Ad Hoc Networks:

An ad hoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing network infrastructure. Each node participating in the network acts both as a host and a router. A number of routing protocols like Dynamic Source Routing (DSR), Ad Hoc On-Demand Distance Vector Routing (AODV), and Destination-Sequenced Distance-Vector (DSDV) have been implemented. Though, these protocols work well in routing the wireless traffic but they are vulnerable to many attacks. Therefore, there is a need of protocol, which not only provides the routing but also the security to the network and user data. In this paper, I explore the working and performance of secure extensions to these protocols.

Project Specification:

1. I am planning to understand, analyze and compare protocols that provide security in Mobile Ad-Hoc networks. Ariadne, SEAD, ARAN.

2. I would like to evaluate to each protocol on the following grounds
   - Basic Underlying Assumptions
     - Conditions assumed for successful operation of protocol.
     - Key Setup assumptions.
   - Efficiency
     - Computational resources required
     - Energy Consumption
     - Average execution time for generation and authentication of keys
   - Security against following attacks
     - Attacks Using Modification
     - Attacks Using Impersonation
     - Attacks Using Fabrication
     - Advanced Attacks
       1. Wormholes
       2. Black holes
       3. Rushing
       4. Gray Hole
       5. Partition of Network
       6. Gratuitous Detour
   - Viability from Implementation point of view
3. I will try to identify the most secure and efficient protocol and try to propose guidelines to implement the same.

4. Format of tentative Final Report

- Introduction to Ad-hoc Networks
- Existing Ad-Hoc Protocols
- Security Objectives
- Threats and Attacks
- Secure Routing Protocols
- Security against Advanced Attacks
- Analysis of Protocols
- Conclusion
- References

5. Time Schedule

- Oct 7th - Study of all basic Protocols
- Oct 15th - Review of other protocols that could be considered.
- Oct 29th - Compare Protocols for security
- Nov 12th - Comparison of protocols for Performance
- Dec 3rd - Final Progress Report

6. Possible Changes

I am not sure about the possible changes, but if I am able to implement ARAN I would like to conduct experiments on each protocol evaluate them for different parameters.

7. List of Literature

- http://signl.cs.umass.edu/arand/