Anonymous Communications in Mobile Ad Hoc Networks

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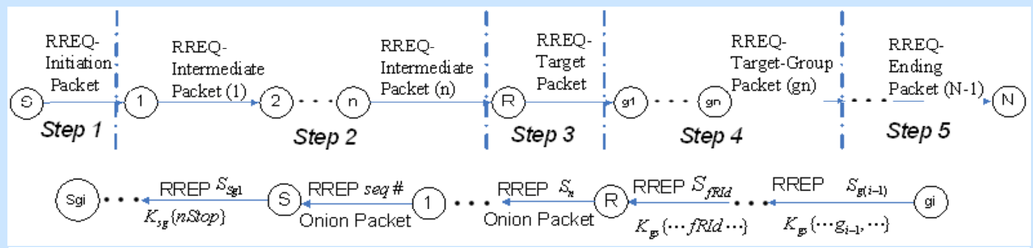
Problem

Most anonymous routing protocols for Mobile Ad Hoc Networks (MANETs) realize anonymity by piggybacking security strategy on the traditional MANET routing protocols. They therefore are subject to certain inherent defects.

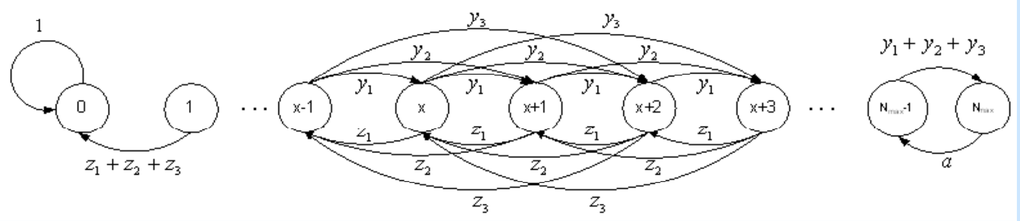
Approach

We propose an anonymous on demand source routing (AODSR) framework. AODSR is a scalable distributed solution to achieve sender, receiver, and sender-receiver relation anonymity in MANETs.

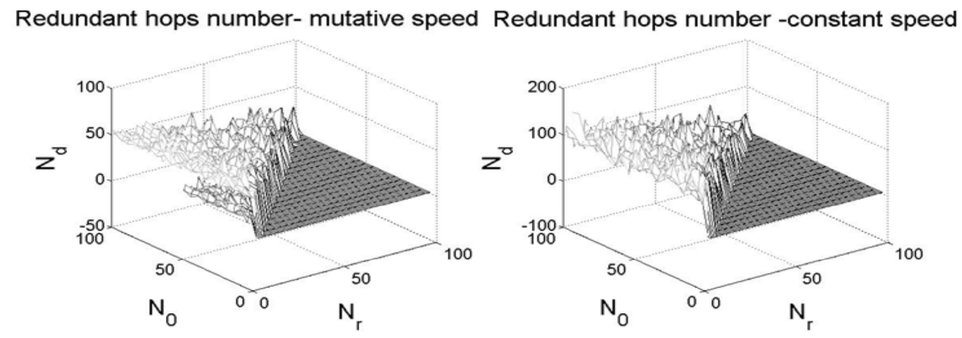
AODSR route discovery is not controlled by the initiator/target node, but by *a series of random residual-hop numbers*. This not only eliminates different protocol behaviors among the initiator/target node and intermediate nodes, but also avoids the flooding of routing packets. With the aid of the "buddy" group strategy, the anonymity is further reinforced.



Route Discovery Process in AODSR Framework



State Trans. Diagram: Residual-hop Number Generation



Comparison of Cost for Anonymous Communications

Approach and Impact

New approach	Research Impact
• Identity Hiding Throughout Communications	• All-time Sender/Receiver Anonymity
• Novel Random Residual-Hop Numbering	• Low-cost, High-reachibility Anonymity
• Group-Sender/-Receiver Strategy	• Enhanced Sender/Receiver Anonymity
• Uniform Packet Updating Pattern	• Ultimate Behavior Camouflage

Technical Description

AODSR possesses the following features:

- It provides sender, receiver and sender-receiver relation anonymity in a complete ad hoc environment;
- The terminal of routing packets is a group of nodes among which the initiator or the target is hidden;
- The design of AODSR considers requirements to countermeasure peculiar *reachability* and *shielding attacks* in MANET;
- The careful packet design in AODSR enables the initiator and the target behaving the same as "ordinary" nodes and therefore further improves the sender and receiver anonymity;
- The computational complexity and communication overhead is well controlled in AODSR.

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