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PSR: A Lightweight Proactive Source Routing Protocol for Mobile Ad Hoc Networks

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ABSTRACT:

Opportunistic data forwarding has drawn much attention in the research community of multi hop wireless net- working, with most research conducted for stationary wireless networks. One of the reasons why opportunistic data forwarding has not been widely utilized in mobile ad hoc networks (MANETs) is the lack of an efficient lightweight proactive routing scheme with strong source routing capability. A mobile ad hoc network (MANET) is a wireless communication network, where nodes that are not within the direct transmission range of each other require other nodes to forward data It can operate without existing infrastructure and support mobile users, and it falls under the general scope of multi hop wireless networking. This networking paradigm originated from the needs in battlefield communications, emergency operations, search and rescue, and disaster relief operations. It has more recently been used for civilian applications such as community networks. A great deal of research results have been published since its early days in the 1980s. The most salient research challenges in this area include end-to-end data transfer, link access control, security, and providing support for real-time multimedia streaming. The network layer has received a great deal of attention in the research on MANETs. In fact, the two most important operations at the network layer, i.e., data forwarding and routing, are distinct concepts. Data forwarding regulates how packets are taken from one link and put on another. Routing determines what path a data packet should follow from the source node to the destination.

KEYWORDS:

Ad hoc network, lightweight.

1. INTRODUCTION:

A mobile ad hoc network (MANET) is a wireless communication network, where nodes that are not within the direct transmission range of each other require other nodes to forward data. It can operate without existing infrastructure and support mobile users, and it falls under the general scope of multihop wireless networking. This networking paradigm originated from the needs in battlefield communications, emergency operations, search and rescue, and disaster relief operations. It has more recently been used for civilian applications such as community networks. A great deal of research results have been published since its early days in the 1980s . The most salient research challenges in this area include end-to-end data transfer, link access control, security, and providing support for real-time multimedia streaming. The network layer has received a great deal of attention in the research on MANETs. Data forwarding regulates how packets are taken from one link and put on another.

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Routing determines what path a data packet should follow from the source node to the destination. The latter essentially provides the former with control input. Despite the amount of effort in routing in ad hoc networks, data forwarding, in contrast, follows the same paradigm as in Internet Protocol (IP) forwarding in the Internet. IP forwarding was originally designed for multihop wired networks, where one packet transmission can be only received by nodes attached to the same cable. However, in wireless networks, when a packet is transmitted over a physical channel, it can be that channel. Traditionally, overhearing a packet not intended for the receiving node had been considered completely negative, i.e., interference. Thus, in a sense, the goal of the research in wireless networking was to make wireless links as good as wired links. Opportunistic data forwarding represents a promising solution to utilize the broadcast nature of wireless. Unlike traditional IP forwarding, where an intermediate node looks up a forwarding table for a dedicated next hop, opportunistic data forwarding allows potentially multiple downstream nodes to act on the broadcast data packet.

One of the initial works on opportunistic data forwarding is selective diversity forwarding by Larsson. In this paper, a transmitter picks the best forwarder from multiple receivers, which successfully received its data, and explicitly requests the selected node to forward the data. However, its overhead needs to be significantly reduced before it can be implemented in practical networks. This issue was successfully addressed in the seminal work on ExOR, outlining a solution at the link and network layers. In ExOR, nodes are enabled to overhear all packets on the air; therefore, a multitude of nodes can potentially forward a packet as long as they are included in the forwarder list carried by the packet. By utilizing the contention feature of the medium-access-control (MAC) sublayer, the forwarder closer to the destination will access the medium more aggressively. Therefore, theMAC sublayer can determine the actual next-hop forwarder to better utilize the long-haul transmissions.

To support opportunistic data forwarding in a mobile wireless network as in ExOR, an IP packet needs to be enhanced such that it lists the addresses of the nodes that lead to the packet's destination. This entails a routing protocol where nodes see beyond merely the next hop leading to the destination. Therefore, link state (LS) routing or source routing would seem to be good candidates. On one hand,LS routing protocols include interconnectivity information between remote nodes, which is hardly useful for a particular source node, but this incurs prohibitively large overhead. This is even true with optimization techniques such as multipoint relaying, as in OLSR. Thus, it is not only of interest in opportunistic data forwarding but also in a wider scope such as avoiding congestion, bypassing malicious nodes, and allocating network resources. In this paper, we propose a lightweight proactive source routing (PSR) protocol to facilitate opportunistic data forwarding in MANETs. In PSR, each node maintains a breadth-first search spanning tree of the network rooted at itself. This information is periodically exchanged among neighboring nodes for updated network topology information. Thus, PSR allows a node to have full-path information to all other nodes in the network, although the communication cost is only linear to the number of the nodes. This allows it to support both source routing and conventional IP forwarding. When doing this, we try to reduce the routing overhead of PSR as much as we can. Our simulation results indicate that PSR has only a fraction of overhead of OLSR, DSDV, and DSR but still offers a similar or better data transportation capability compared with these protocols.

1.1 EXISTING SYSTEM:

AODV, DSDV, and other DV-based routing algorithms were not designed for source routing; hence, they are not suitable for opportunistic data forwarding. The reason is that every node in these protocols only knows the next hop to reach a given destination node but not the complete path. OLSR and other LS-based routing protocols could support source routing, but their overhead is still fairly high for the load-sensitive MANETs.

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DSR and its derivations have a long bootstrap delay and are therefore not efficacious for frequent data exchange, particularly when there are a large number of data sources. In fact, many lightweight routing protocols had been pro-posed for the Internet to address its scalability issue, i.e., all naturally "table driven." The path-finding algorithm (PFA) is based on DVs and improves them by incorporating the predecessor of a destination in a routing update.

1.2 DISADVANTAGES OF EXISTING SYSTEM:

- Over head is very high
- While data forwarding some loss is occur in this protocols

1.3 PROPOSED SYSTEM:

PSR's capability in transporting source-routed packets for opportunistic data forwarding, where we also found that PSR's small overhead met our initial goal. While alleviating forwarding nodes from table lookup, DSR's source routing is particularly vulnerable in rapidly changing networks. The reason for this is that, as a source-routed packet progresses further from its source, the path carried by the packet can become obsolete, forcing an intermediate node that cannot find the next hop of the path to drop the packet. This is fundamentally different from traditional IP forwarding in proactive routing with more built-in adaptively, where the routing information maintained at nodes closer to the destination is often more updated than the source node. Al- though out of the scope of this paper, it would be an interesting exploration to allow intermediate nodes running DSR to modify the path carried by a source-routed packet for it to use its more updated knowledge to route data to the destination. This is in fact exactly what PSR does when we used it to carry source- routed data in CORMAN. Granted, this opens up an array of se- curity issues, which themselves are part of a vast research area.

1.4 ADVANTAGES OF PROPOSED SYSTEM:

- Over head is very less.
- While data forwarding no loss is occur in this psr protocal.

2. IMPLEMENTATION

MODULES:

- Data Service Provider
- Router
- IDS Manager
- End User
- Attacker

MODULES DESCSRIPTION:

- **Data Service provider:**

In this module, the data service provider will browse the data file and initialize the nodes, then select a node & send to the particular end user. Data Service provider will send their data file to router and in a router less cost or less sleep node will select and send to the particular end user. After receiving successful the data provider will get response from the router.

- **Router**

In this module, the router consist of n-number of nodes (A, B, C, D, E and F) to provide a data service. The router will receive the data file from the service provider and select a less cost or less sleep node and send to the particular end user. If any attacker will found in a router, then the router will select another less cost node and send to particular end user. In a router we can assign node cost, view Node details and view attackers. If we want to assign node cost, then select node name and enter new cost and submit, then it will be stored in a router.

- **IDS Manager**

In this module, we can do some operation such as view node trajectory and view attack destination. If we click on view node trajectory, then we will get all information about node with their tags such as node name, metadata, time & date. In IDS Manger the user can view an attacker details with their tags such as attacker name, node name, Mac address, time and date.

- **End User**

In this module, there are n-number of end users are present (A, B, C and D).

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The end user can receive the data file from the service provider via VAN router. The end user will receive the file by without changing the File Contents. Users may receive particular data files within the router only.

- **Attacker**

Attacker is one who is rerouting the trajectory node. The attacker will select the node and inject fake key to the particular node. After attacking successful the attacker details will store in IDS Manger and router with their tags such as attacker name, Node name, IP address, time & date.

3. SCREEN SHORTS:

Fig: Service Provider

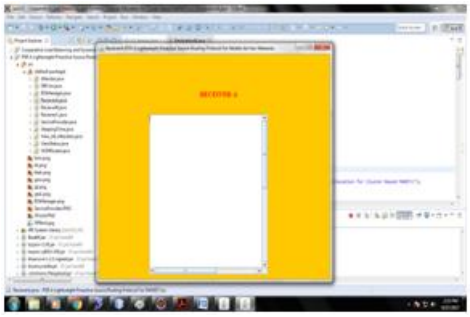

Fig : Recever A

Fig : Recever B

Fig: Recever C

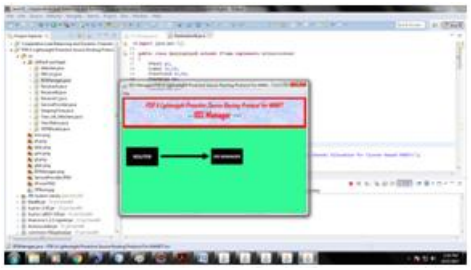

Fig: IDSManager

Fig: Attacker

4. CONCLUSION:

We pro-pose a lightweight proactive source routing (PSR) protocol. PSRcan maintain more network topology information than distance vector (DV) routing to facilitate source routing, although it has much smaller overhead than traditional DV-based protocols [e.g] destination-sequenced DV (DSDV)], link state (LS)-based routing [e.g] optimized link state routing (OLSR)], and reactive source routing [e.g., dynamic source routing (DSR)]. Our tests using com-puter simulation in Network Simulator 2 (ns-2) indicate that the overhead in PSR is only a fraction of the overhead of these baseline protocols, and PSR yields similar or better data transportation performance than these baseline protocols.

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