

Enhancement of Proactive Source Routing (PSR) Protocol for MANET

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Abstract—Mobile Ad hoc Networks (MANETs) are self developed and infrastructure- less network. It is a collection of mobile nodes which are connected by multi hop wireless paths. Routing in ad hoc network is a crucial issue, to solve that so many routing protocols are designed. Opportunistic data forwarding has a great attention in researchers. Opportunistic routing is mainly used when network has failures like dynamic network topology changes and has an intermittent network connectivity. The main key aim of opportunistic routing is to find intermediate node to forward data packets, to provide coordination among them and to avoid duplicate transmission of data. Opportunistic data forwarding (ODF) in MANET depends upon protocol which provides powerful source routing capabilities. PSR supports opportunistic data forwarding. It has a very small communication overhead and it also provides more network structure information.

Key Terms— BFS, MANET, Opportunistic Data Forwarding(ODF), Opportunistic Routing, PSR, Source Routing.

I. INTRODUCTION

Mobile Ad hoc Networks are collection of wireless mobile hosts creating a temporary network without any infrastructure. The nodes are allowed to move free and they organize randomly. Thus, the topology of wireless networks may change very rapidly, quickly and unpredictably. Such a network may operate in a standalone fashion, or may be connected to the large Internet. Because of less configuration and quick deployment ad hoc networks are suitable for emergency situations like military conflicts, natural disasters, human disasters, emergency medical situations, battle fields, etc. Ad-hoc networks are decentralized and it does not depend on pre existing network infrastructure as well as it is easy to deploy. It becomes useful when there is an urgent need for network communication between collections of nodes but fixed infrastructure and centralized administrator control are unavailable or difficult to deploy.

1.1 Routing in MANET

Routing protocols define a set of rules which is responsible for journey of message transformation from source to destination in a network. There are different types of routing protocols in MANET each of them is used according to the network circumstance [2]

1.2 Classification of Routing Protocol^[2]

Routing protocols in MANET are classified in several ways depending upon their network structure, routing strategy, state information, communication model and so on but most of these are done depending on routing strategy and network structure.

Based on the routing strategy, routing protocols are classified as:

1. Proactive Routing (Table driven)
2. Reactive Routing (Source initiated or on demand)

Based on the *network structure*, routing protocols are classified as:

1. Hierarchical routing protocol
2. Geographic position assisted routing protocol
3. Flat routing protocol

1.3 Routing Algorithm

Routing protocols are derived from following algorithms

1) Link State(LS) Based algorithm

Every node floods the information of the links between itself and its neighbors in the entire network, so that all other node can reconstruct the complete the topology of the network locally.

2) Distance Vector(DV) Based algorithm

A host provides its neighbors with the cost to reach destination. With estimates coming from neighbors each node is able to determine which neighbor offers the best route to a given destination.

Another important type of routing protocol is Source Routing Protocol, which is neither LS nor DV.

1.4 Source Routing

Source routing is also called as path addressing. It allows a sender of a packet to partially or completely specify the route of the packet, takes through the network.

Each data packets carry the complete path from source to destination. Therefore, each intermediate node forwards these packets according to the information in the header of each packet. Source routing protocols can not only provide routing information but also control data forwarding when it is handled by intermediate nodes.

The value of the source routing protocol includes:^[6]

1. Better control of path selection by the source nodes for congestion avoidance, load and energy consumption balancing, and bypassing un-trusted areas.
2. Alleviation of IP forwarding at intermediate nodes, and
3. Support for opportunistic data forwarding.

1.5 Advantages of Source routing:^[6]

1. More control by source node:- because of the entire route is selected by the source node, source node has complete control of how the packet should be transmitted. This process allows it to avoid congested areas and balance the load and energy consumption among nodes, and bypass untrusted segments of the network.
2. Less requirement on intermediate nodes:- Without depend upon traditional IP forwarding, source routing does not require intermediate nodes have switching/routing capabilities. The intermediate nodes only need to examine the path embedded in the data packets to forward the data to the next hop neighbor without looking up in its forwarding routing table.
3. Support of opportunistic data forwarding :- The broadcast nature of wireless links differentiates multi-hop wireless networks from the Internet. Opportunistic data forwarding explicitly utilizes such a feature in mesh networks. To achieve this, a redundant set of nodes along the path are allowed to help forwarding data, which are included as an ordered list in the data packets

II. PROACTIVE SOURCE ROUTING (PSR) PROTOCOL

Proactive Source Routing Protocol is an inverse of Dynamic Source routing protocol as a proactive counterpart to provide responsive data transportation service in heavily loaded network with less end to end delay. Because DSR is a reactive routing protocol, it is used for delay-insensitive applications and in the situations where the data requests are infrequent.

PSR is proposed to facilitate Opportunistic Data Forwarding in MANET. Opportunistic data forwarding refers to a way in which data packets are handled in a multi-hop wireless network.

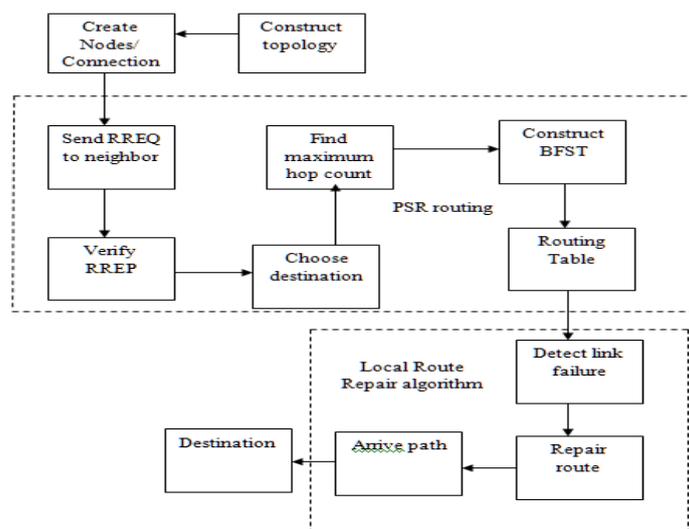
PSR uses BFS(Breadth First Search) to find shortest path between source nodes to destination. At each router psr constructs a BFS tree and using this tree it will create its routing table. BFST provides optimum path for data transmission

2.1 Proposed PSR

Due to high mobility of nodes in mobile ad hoc networks (MANETs), there exist frequent link breakages which lead to frequent path failures and route discoveries.

PSR is a Proactive Source Routing Protocol, which has a small communication overhead. But because of frequent movement of nodes in a network and due to frequent topology changes data packets are dropped due to breakage of links in a network.

The relative mobility of neighbor nodes results in the link breaks between them. Relay Node would set the route leading to its neighbor node as invalid and relay node instead of sending RERR back to source node it carries out local repair. For the local repair, If next relay node receives RREQ and has a route to destination node, it will return RREP and establishes a route entry in its routing table with destination node. In this way Local Route Repair process is completed. The REPLY is sent back to the source node, which contains number of hop information. The source node sends the data using the shortest route



III. CONCLUSION

To support opportunistic data forwarding in MANET, Proactive Source Routing Protocol (PSR) is proposed. PSR provides a responsive data transfer capability. Even if PSR is a Proactive routing protocol it provide nodes with the cost of network structure information for source routing at a

communication overhead similar to or even less than a proactive distance vector routing protocol. Overhead in a PSR is only a fraction of baseline protocols (DSDV, DSR).

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