Comparison of Routing Protocols in MANET- A Review

1 Indu Sharma, 2 Shaina Pundir

1 Student- Department of Computer Science
Baddi University of Emerging Science & Technology

2 Assistant Professor - Department of Computer Science
Baddi University Of Emerging Science & Technology

Abstract - Wireless networking is a technology in which no wire is required to attach with devices. MANET is a type of wireless networks. Routing protocols are used to send data from source to destination. In this paper various routing protocol is discussed and comparison is done. The main focus of the paper is on AODV routing protocol.

Keywords: -MANET, networks, AODV, AMODV, DSDR

1. Introduction

Wireless Networks there is no need of any cables to connect with other devices during communication. The transmission takes place with the help of radio waves at physical level. It is also known as Wi-Fi or WLAN. With the help of this network, devices can be linked easily with the help of radio frequency without wires to share information. The IEEE standard for wireless network is 802.11.

There are three types of Wireless Operating modes:

1. MANET
2. Infrastructure Mode
3. Adhoc Mode or Infrastructure less Mode

MANET is a group of mobiles that are connected organized to form a network which is free of any infrastructure. It means there is no base station compulsory in MANET. So the nodes can communicate with other nodes which are in the range of network only. MANET is a kind of wireless ad hoc network that has a routable networking location on the top of a link layer.

Infrastructure-based wireless network: A number of wireless networks collectively create a logical wireless network, so that organized t access point along with the inter-between fixed network can connect with many other wireless networks.

It means there is no base station compulsory in MANET. So the nodes are presents in the range of network can communicate directly. MANET is a routable networking position on the highest of a link layer. Currently each node in a network can act as a router at the same time, and these nodes are independent to move freely. “Flooding” is used to forward the data from one node to other one. So because of this the topology changes frequently and quickly.

MANET, the data should be routed via intermediate nodes, and these intermediate nodes will act as a router. Each node can be moved ON/OFF without detect other nodes. For communication single hoping and multi-hopping is used. MANET is a self-configuring setup. In MANET nodes are move freely in any direction. The nodes can communicate which are present in the range. Nodes act as router and host. The sources and destination nodes act as host nodes and intermediate nodes act as router because data is transfer through these intermediate nodes.[5]
1.1 Challenges or Design Issues in MANET

The main challenges of MANET are:

1. Security Issues- To provide the protection over data, security become primary concern. There are number of challenges to security design in MANET, like Peer-to-peer network architecture, shared wireless medium and dynamical network topology.

2. Scalability: In MANET is a challenging issue. So to improve the scalability clustering techniques proposed.

3. Battery Consumption- In MANET, all nodes takes batteries devoted toward it, which is inspired during the process of transmission i.e. during transmission, reception and overhearing and many other reasons. It is very problematic to swap batteries or to re-charge them. So to rise the long lifetime of the network; the existing battery power necessity be sensibly used.

4. Link Failure- The main reason behind the link failure is to change in network topology. Due to node mobility the nodes change their place and link between the nodes get fail.

5. Load Balancing- In MANET data travels through the intermediate nodes so that load balancing is most important.

1.2 Routing Protocols in MANET

The most significant and a problematic method to preserve in MANET is the routing mechanism. An ad hoc routing protocol is nothing but a concurrence between nodes as to how they control routing packets in the middle of themselves. The nodes in an ad hoc network discover routes as they do not have any previous knowledge about the topology. Routing protocols in MANETs are categorized into three different classes.[7]

1. Proactive Protocol
2. Reactive Protocol
3. Hybrid Protocol

1. Proactive Protocol

It uses an already existing route. These protocols maintain routes to all possible destinations even while a few of the routes may not be required. Every node in the network maintains tables of routes and when the network topology changes, updates are sending across the network. For maintain the routes node send the control message. Examples are DSDV, WRP, and OLSR.

2. Reactive Protocol

It is On Demand routing protocol. Route only create when it required. When a node wants to communicate a packet to additional node first check route through on demand and after that create the connection between the nodes. The source node initiates the route discovery segment. Example DSR, AODV, TORA.

3. Hybrid Protocol

It is association of proactive and reactive routing ZRP sand TORA.

A. AODV- It is on-demand routing protocol. AODV has less memory overhead and creates the unicast routes from sources to destination. When the link is fail, message is send to effected nodes. AODV use three messages: Route Request, Route Error and Route reply. Data are used to control and keep the ways after source to end point in using UDP packets

B. AOMDV- AOMDV extends the AODV protocol. It is based on well-studied on-demand single path protocol identify as ad hoc on-demand distance vector (AODV). AOMDV has three new aspects that compare to other on-demand multipath protocols. First is AOMDV having not high intermodal bringing together outlay like some other protocols e.g. TORA. Secondly it ensures disjointness of every other route throughout distributed division. It computes alternating paths among least extra overhead above AODV.[8]

2. Literature Review

Security in Mobile Adhoc Networks: Challenges and Solutions” IEEE Hao Yang et.al proposed, In this paper they have focused on the fundamental security problem in MANET. They identified the security issues related to MANET and discussed the challenges to security design. The complete security solution should span both layers, and encompass all three security components of prevention, detection, and reaction.[4]

“Black Hole Attack in Mobile Ad Hoc Networks” ACMSE ,Mohammad Al-Shurman and Seong-Moo Yoo Seungjin Park In this paper, they have discussed two possible solutions to prevent the black hole attack. The first solution they proposed is to find more than one route to the destination. The second solution is to exploit the packet sequence number included in any packet header. They compared the results to the original ad hoc on-demand distance vector (AODV) routing scheme, the second solution can verify 75% to 98% of the route to the
destination depending on the pause times at a minimum cost of the delay in the networks.[9]

“L2DB-TCP: An adaptive congestion control technique for MANET based on link layer measurements”, IEEE, Sreenivas B.C G.C. Bhanu Prakash K.V. Ramakrishnan, In this paper, they introduced about congestion control is a key problem in mobile ad-hoc networks. Congestion has a severe impact on the throughput, routing and performance. Identifying the occurrence of congestion in a Mobile Ad-hoc Network (MANET) is a challenging task. The congestion control techniques provided by Transmission Control Protocol (TCP) is specially designed for wired networks. This paper considers design of Link-Layer congestion control for ad hoc wireless networks, where the bandwidth and delay measured at each node along the path.[12]

“Evaluating the Energy Consumption Reduction in a MANET by Dynamically Switching-off Network Interface” Author is Carlos J. They create based on the RTS/CTS which switch off NIC will dynamically when i.e. neither sending idle nor receiving any data. DSR, DSDV, AODV, TORA algorithms used in research paper. These Algorithm provide security, reduce the network overhead, rate of topology change is less or medium.[2]

“A new energy efficient queue based multipath load balancing in ad hoc network” Gagandeep Kaur and T. Hamsapriya. Author focused on the AOMDV (Ad hoc on demand multipath routing protocol) with load balancing. Through AOMDV new E-AOMDV is proposed which include the energy, factor threshold value. Life time of E-AOMDV is limited but improved routing as compare to AOMDV. At the end compare the performance of AOMDV and E-AOMDV.[3]

“On demand multipath distance vector routing in ad hoc networks”, Mahesh K. Marian and Samir R. Das. In this paper author introduced AOMDV which provides the multipath routing as compared the AODV. AODV based on single path routing protocol where the AOMDV based on multipath routing. Multipath loop-free and link-disjoint paths compute in AOMDV protocol. Performance comparison of AOMDV with AODV using ns-2 simulations shows that AOMDV able to get an improvement in end-to-end delay.[8]

“QoS routing for mobile ad hoc networks”, Chenxi Zhu and M. Scott Corson, in mobile ad hoc network a Quality-of-service routing protocol developed. It sets up QoS routes through reserved bandwidth using TDMA. The algorithm calculates the end-to-end bandwidth used to gather with the route discovery mechanism of AODV to associate with QoS routes.[1]

“Designing energy routing protocols with power consumption optimization in MANET”, written by Shivashankar, H.N. Suresh, Golla Varapradas. This paper describe the three ad hoc routing networks protocols; EARP, MTPR and DSR. EARP is Efficient Aware Routing Protocol that increases the network lifetime in MANET. The proposed scheme reduce more than 20 % energy consumption and also decrease the mean delay for high load networks.[11]

“OAODV routing algorithm for improving energy efficient in MANET”, research paper witten by P. Bhatsangave Suvana and Chirchi V.R. the main purpose of this paper is to describe the problem with AODV routing algorithm related to improving energy in MANET and also provide the solution of the problem that is occurring in AODV.[10]

Table 1: Comparison between Routing Protocol

<table>
<thead>
<tr>
<th>Protocols</th>
<th>Advantages</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proactive</td>
<td>- Small Delay.</td>
<td>- More recourses need.</td>
</tr>
<tr>
<td></td>
<td>- Fast route establishment.</td>
<td>- Creating loops.</td>
</tr>
<tr>
<td></td>
<td>- Route always available from one node to another node.</td>
<td>- Information not fully used.</td>
</tr>
<tr>
<td>Reactive</td>
<td>- Routing load minimal.</td>
<td>- More delay.</td>
</tr>
<tr>
<td></td>
<td>- Loop free</td>
<td>- Routes information not updated.</td>
</tr>
<tr>
<td>Hybrid</td>
<td>- Scalability</td>
<td>- More resources used for large zone.</td>
</tr>
<tr>
<td></td>
<td>- Less search cost</td>
<td></td>
</tr>
</tbody>
</table>

4. Conclusion

In this paper, it is concluded that there are various challenges in MANET. It is very difficult to choose optimal path from source to destination for path establishment. So routing protocols are used for this purpose. In this paper we discussed challenges and routing protocols of MANET and Compare them with advantages and disadvantages. In future an enhancement
can be done in AMODV routing protocol to overcome link failure problem.

References


IEEE