The Literature Survey on Manet, Routing Protocols and Metrics

By Parvinder Kaur, Dr. Dalveer Kaur & Dr. Rajiv Mahajan

CKD Institute of Management & Technology, India

Abstract- Mobile Adhoc Network (MANET) is a collection of nodes or devices with wireless communications and nodes communicate with each other without any centralized support. Each node acts as a router in Mobile Adhoc Network. No wired infrastructure is required to form a network. Nodes form a wireless environment where nodes can communicate with each other without the restriction of the network topology. Examples of Mobile Adhoc Networks are laptops, mobile phones, PDA, Digital Cameras etc. It is also known as wearable and tearable networks, which are created when the requirement is generated.

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THELITERATURESURVEYONMANETROUTINGPROTOCOLSANDMETRICS

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The Literature Survey on Manet, Routing Protocols and Metrics

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Abstract- Mobile Adhoc Network (MANET) is a collection of nodes or devices with wireless communications and nodes communicate with each other without any centralized support. Each node acts as a router in Mobile Adhoc Network. No wired infrastructure is required to form a network. Nodes form a wireless environment where nodes can communicate with each other without the restriction of the network topology. Examples of Mobile Adhoc Networks are laptops, mobile phones, PDA, Digital Cameras etc. It is also known as wearable and tearable networks, which are created when the requirement is generated.

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I. Introduction

Mobile Adhoc Networks are created for temporary time where nodes can join and leave the created network without any restriction [1]-[3]. Nodes can communicate and route the data in any direction. Nodes which configured themself with MANET environment may be part of small network or may be part of large network. In MANET type of communication is peer to peer.

Peer to Peer networks are "peers" of computers which are connected with each other with the help of Internet and P2P software. Systems in P2P environment act as a client and server by itself.

Main Challenging part of Mobile Adhoc Network is maintaining the routing information without losing it. Because nodes are arbitrary moving in Manet so required routing protocols which manage the route information in there table if particular node switch off from the Mobile Adhoc Network. Generation of error message should be there if communication link is broken between the nodes when they leave and join the selected network.

II. The Classification Of Routing Protocols

To transfer data from one node to another node we need some routing protocols that will transfer data without any loss. Protocols are set of rules and regulations which are used in network communication.

For this purpose routing protocols can be classified as described below:

a) Proactive Routing / Table Driven

These types of routing protocols maintains the list all the routes from source to destination in advance [2]. These types of protocols maintain fresh lists of routes by periodically distributing routing information throughout the network.

b) Reactive (On –Demand) Routing

These types of protocols find a route on demand by flooding the network with "Route Request" packets [2].

c) Hybrid (both pro-active and reactive) Routing Reactive

These types of routing protocols combine the advantages of proactive and reactive routing [3]. The routing is initially established with some proactively prospected routes and then serves the demand of additionally activated nodes through reactive flooding. The choice for one or the other methods requires predetermination for typical cases.
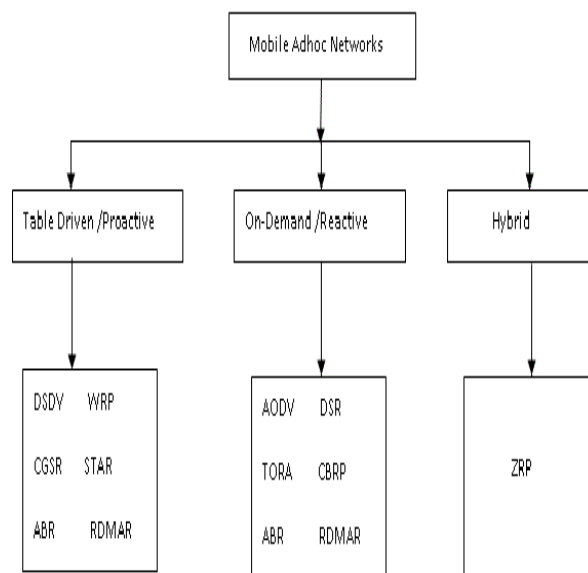

Figure 1 : Classification of Manet Routing Protocols

III. Proactive Routing Protocols

a) Distance Source Initiated Vector (DSDV)

DSDV is table driven and source initiated routing protocols. In DSDV the information about

Author α: Assistant Professor, CKD Institute of Management and Technology, Amritsar, Punjab, India. e-mail: jassi33@gmail.com
Author σ: Assistant Professor, PTU, PIT University Campus, Jalandhar-Kapurthala Highway, Punjab, India. e-mail: dn_dogra@rediffmail.com
Author ρ: Professor, GIMT, Amritsar, India.
e-mail: rajivmahajan08@rediffmail.com

different paths are for each hop stored in routing tables in advance .When ever source want to send data to destination. In will search the path from the routing tables [1]-[3]. In DSDV each routing table contains the Hop count and Sequence Number. Hop count tells the number of hops occurs in the path for source to destination. Sequence Number is used to update path. The path with the old sequence number is replaced with the new sequence number. The New Sequence number defines the new path from source to destination.

i. *Advantages*
1. The Updation in routing tables regarding paths is done time to time by broadcasting of messages between the hops.
2. Paths are predetermined.

ii. *Disadvantages*
1. Not applicable for Large Networks.
2. Wastage of battery resources unnecessarily due to updation of paths.

b) *Wireless Routing Protocols (WRP)*

WRP is table driven or proactive routing protocol [2]. It is advancement of DSDV protocol. Information about different paths stored at the routing tables in advance. In WRP, Each hop contains shortest path from source to destination. This helps in reduction of about power consumption and loop free routing.WRP uses Distance Table, Routing Table, Link Cost Table and Message Transmission Table while creating paths from source to destination.

i. *Advantages*
1. It stores the information about previous node and next node in the Routing Table.
2. Path searching and path updation cost is less.

ii. *Disadvantages*
1. Required more space due to multiple tables.
2. Complexity is increases due to creation of shortest path in advance and storing the previous node and next node information in the Routing Table
3. Multiple Updation in multiple tables requires more power consumption.

c) *Fisheye State Routing Protocols (FSR)*

FSR is proactive and flat routing protocol. It is also known as Link State Routing Protocol because it uses topology information from source to destination for sending the data [15]. Link state defines the activeness of nodes while creations of path from source to destination. Inactive nodes are not part of the path .FSR also maintain the information about the nodes which are near to the focal point. To maintain the topology information WRP uses Link State Table.

i. *Advantages*
1. Applicable Large type of Networks.

2. Nodes are excluded in the routing tables which are not currently working.

ii. *Disadvantages*
1. Maintaining the topological information about nodes is difficulty which is far from the focal point.
2. It is wired routing protocols.

IV. Reactive Routing Protocol

a) *Temporary Ordered Routing Protocols (TORA)*

TORA is reactive protocol and on demand routing protocol [3]. It is also known as Link reversal routing protocol. Path searching is based on the source initiation. In the TORA, the path search is performed from higher level to low level. Each node maintains multiple paths from source to destination. While transferring the data from source to destination ,any path can be used, which is currently available for transfer the data. Shortest path method is not applicable in TORA. It performs Remote Creation, Route Maintenance and Route Erasure types of operations.

i. *Advantages*
1. Multiple paths available from source to destination.
2. Efficient and loop free routing.
3. Overhead reduce because of on demand creations of routes.

ii. *Disadvantages*
1. Non availability of paths when required.
2. Delay in the path searching.
3. Flooding of messages in the network while discovering of routes on demand.

b) *Adhoc on Demand Distance Vector Routing Protocols (AODV)*

The AODV routing protocol is an on demand routing protocol [8]. Therefore, routes are created only when the requirement is generated [2]. "Hello Messages" may be used to detect and monitor neighbors. Periodically nodes broadcast the "Hello Message" to determine the activeness of neighbor nodes [6]-[9]. This technique is used to know the status of active nodes for data transfer. It broadcasts a "Route Request" (RREQ) to each intermediate node. if the receiving node does not receive RREQ and there is no route to the destination rebroadcasts the RREQ. If the receiving node is the destination or has a current route to the destination, it generates a Route Reply (RREP).

i. *Advantages*
1. The searching of paths are done when the requirement is generated.

ii. *Disadvantages*
1. Multiple route replies are generated for the same route request.
2. Time to time "hello" message is generated; which is wastage of resources like battery consumption.

c) Distance Source Routing Protocols (DSR)

DSR is an on demand based routing protocol that is based on source routing [2]. It is designed for use in multi-hop wireless adhoc networks of mobile nodes. DSR is based on the concept of "Route Discovery" and "Route Maintenance". In DSR the Route Discovery process is started by a packet that discovers the path from source to destination and accumulates the whole information about path into its header [2]. Route Reply is generated by the destination if the route is discovered from source to destination and If no path is found from source to destination then the error message is generated [2],[10].

i. *Advantages*
1. When the whole path is searched from source to destination, then reply is sent back to source. One source reply is generated for route request.
2. It is source generated type of routing protocol.
3. No beaconing technique is used.

ii. *Disadvantages*
1. Protocol is unable to find the broken links.
2. Full path searching is time consuming process.

d) Zone Routing Protocols (ZRP)

ZRP is hybrid protocol as it is combination of reactive and proactive [12]. Reactive Protocol is on demand protocol which finds the path from source to destination when requirement is generated. Proactive protocol means that information about each path is already stored in the tables. Based on zones, ZRP can also be divided into Intra Zone Routing Protocol (IARP) and Inter Zone Routing Protocol (IERP).

i. *Advantages*
1. It is combination of reactive and proactive.
2. If the nodes are within the zone table driven technique is used, if nodes are far from zone reactive path searching technique is used.

ii. *Disadvantages*
1. If the zones are overlapping, difficulty is in the path search.

V. Metrics in Manet

Metrics are measurements in the manet used to analysis the performance of routing protocols. Metrics are required to evaluate the performance of network; metrics defines how well the network is doing under different parameters [16]. The metrics can be classified in two parts.

a) Quantitative Metrics: It is numerical measurement of the network performance. It can be defined in numbers like Number of nodes, Number of delays; Number of bytes is transmitted etc.
b) Qualitative Metrics It is quality measurement of your network performance. Quality can be measured on the basis of Throughput, Route Acquisition Time, and Packet out of delivery etc.

Some performance metrics are:

i. Throughput: It defines the number of bits transferred per unit time.
ii. Packet Delivery Ratio: It defines the total number of packet delivered out of total number of packet sent.
iii. End to End Delay: It defines the time taken by the packet to reach the destination. There are four packets which affect the performance. like transmission delay, propagation delay, processing delay, average delay.
iv. Jitter: Jitter is also known as delay .Delay occurred because of network congestion, improper setting of network etc.
v. Packet Loss: It defines the how many bits are lost due toelay.

Table1 : Perfomance Metrics In Manet

Metrics	Formula
Throughput	No. of packet received/No. of per Unit of time
PDR	No. of packet received/No. of packet sent
End to End Delay	Time the pkt sent-Time the pkt received
Jitter	[((PA+1)-(PS+1))-((PA)-(PS)))/N-1
Packet Loss	No. of pkt sent-No..of pkt received
PA=Packet Arrival, PS=Packet Start	

VI. Conclusion

In this paper, we have surveyed the various routing protocols with their advantage and disadvantages. We analyzed the metrics which are used to analysis the performance of the network. As mobile adhoc network growing day by day. there are many area to review like routing protocols, types of attack, application, IDS etc.

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