Survey on reactive routing protocols and proactive routing protocols of MANET

1Suhani Rajput, 2Balwinder Kaur
1Student- M.Tech(CSE), 2Assistant Professor
1Lovely Professional University, Phagwara, India

***Abstract*—As we all are familiar with MANET (Mobile Ad Hoc network) is infrastructure-less, self organized. We have taken two types of protocol i.e. proactive routing protocol and reactive routing protocol. As we have firstly compared all the routing protocols on the basis of same parameters, by this we have concluded some parameters like packet delivery ration, throughput, and end to end delay. So to overcome these problems we have taken one each protocol from both the routing protocols i.e. DSR and DSDV. In the case of DSR we have seen how delay and energy can be improved and they used transmission control approach. By doing some change in this approach we can improve our DSR for future scope. For DSDV we have seen improved DSDV and this also can be more improved further. They have used from both these protocols we have enhance our performance of routing protocols.**

***Index Terms*—MANET, DSR, DSDV**

I. INTRODUCTION

MANET(Mobile Ad Hoc Network) is infrastructure less because in this all the nodes are moving freely. They work on within radio range by wireless network and the nodes which are very far from network they work as routers. It also creates a very frequent change in topology. This is more use in military while battles for rescue[1]. It works on physical layer of our OSI model. It is a arrangement of wireless nodes where all the nodes exchange the data. MANET increases the performance of nodes on the basis of network. The main goal of mobile ad-hoc networks are like it uses connection less ip services, ip routing. The MANET has some properties like it is distributed in nature like all the nodes are free to move and also it doesn't create any loop. It doesn 't have a uniform movement like when where we demand the network that is usable. Also in the case of security, as it is wireless security is easy in this but as we talk about wired, security is hard. As we can see MANET have some properties, so it necessary that it also have weakness like it don't have centralized management all the network are distributed on one server it is not there. Resources are not much available in MANET. Due to MANET of nodes in wireless, scalability is changing all time. It also not too cooperative with networks, as the malicious attacked can attack easily. In MANET nodes are dynamically changing as the connection between the nodes get disturbed. Also the power supply is very much limited in the case of MANET, when ever nodes move from one place to another they get less power supply. In the case of bandwidth, it has external noise and interference. The main problem with this is this is it doesn't have a predefined boundary, nodes are free to move. No defined area is specified for network. In the case of device discovery, it is different to know the new nodes and inform to existing ones.

II. ROUTING PROTOCOL

There are mainly 3 types of routing protocol are there i.e. Reactive routing protocol(TORA), Proactive routing protocol (DSDV) and hybrid routing protocol.

Reactive routing protocol

This is also called on demand routing protocol. In this the route is provided whenever we demand for it, when the sender wants to send the message to receiver then this protocol creates a path. It creates a multi hop routing between the nodes wherever we need[1]. They are not maintained all the time, only whenever we demand then it discovered the route. Whenever the traffic is less and topology is not changing frequently, then it reduces the overhead of routes. All the information are at data packets, they store all the source routing information within it, and the information which is stored in header of data packets is the information of intermediate nodes i.e. For communication and update is not necessary for each intermediate nodes.

Advantages:
It eliminates the periodic updating of nodes.
It adapt the network dynamically.

Disadvantages:
Traffic is distributed.
Latency in routes.

Proactive routing protocol

This is also called table driven routing protocol. It maintains fresh updating of nodes in the table and when the nodes want to connect with the network it immediately connects with it. It has high latency while we have to find the routes [2].

PARAMETERS FOR PERFORMANCE ANALYSIS:

1.THROUGHPUT
It means how much number of bits received from sender to receiver. Amount of data received by receiver is known as throughput. We can express it as bits/sec or bytes/sec. If we change the network, between sender and receiver communication is not proper, bandwidth is very less and power constraint is more then all this can affect throughput. If network is proper then throughput will also proper [3].

2.TRANSMISSION DELAY
When there is a delay in transmitting data.

3.BANDWIDTH
While sending data from sender to receiver the data transmitting in a particular time.

4.JITTER
Delay while receiving the packets from sender. The variance delay between source and receiver.

5.PACKET DELIVARY RATION
Number of packets received by the number of packets received.

6.TRANSMISSION DELAY
How much data is transmitted from sender to receiver.

7. MEDIA ACCESS DELAY
On the source side while starting point the transmission of packets.

8. ROUTE OVERHEAD
When there is too much overhead on the network. On the route there is so much of network accessing.

9. NORMALISED LOAD IN ROUTES
It is the ratio of balancing packets send from sender to receiver.

II. REVIEW OF LITERATURE

We can tell the difference between these two routing protocols i.e. Reactive routing protocol and Proactive routing protocol by this literature review.

In paper [6] , it is discussed that using the parameters average transmission delay, end-to-end delay, throughput. AODV have more delay than OLSR in case of Average Transmission delay(Delay increases with large variation of source nodes), OLSR have more end to end delay than AODV and AODV perform much better than OLSR when we take the case of throughput. The performance of AODV is best than OLSR means concluded reactive routing protocol is better than proactive and in future they plan for implementation attacks in same network and performance analysis of same network.

In paper [7], it is discussed that using these parameters bandwidth, throughput and packet loss. AODV routing protocol is best acceptable for general mobile Ad Hoc networks as it consuming bandwidth very less and overhead is also low when compared with DSDV routing protocol. So here also reactive routing protocol is better than proactive.

In paper [8], it is discussed that using these parameters end-to-end delay, PDR(packet delivery ratio), routing overhead,optimal path performance metrics. AODV keeps on improving in packet delivery ratio with dense networks. TORA performs much better in packet delivery owing to selection of better routes using acyclic graph. The AODV is better for moderately dense networks where as the OLSR performs well in sparse networks. Here also reactive routing protocol is much better than proactive routing protocol. As for future that we can effort to enhance Ad Hoc network routing protocol by tackling core issues.

In paper [9], it is discussed that using these parameters PDF(Packet Delivery Fraction), throughput, end to end delay. Compared to DSDV & OLSR routing protocols the throughput of AODV is much greater, the average end to end delay of AODV is less than both DSDV & OLSR routing protocols, the performance of AODV is better than OLSR & DSDV protocol. It concluded the results show that AODV protocol performance is better than other two protocols. So the conclusion comes that reactive routing protocol is much better than proactive routing protocol.

In paper [10], The objective of this paper is to analysis about techniques types which is used in load balancing for Ad Hoc networks. From transmitting the data it has a problem of failure link in manet by this there is a decrease in performance of network and reliability. The most forwarded and energy efficient technique is multi path routing. By novel technique we can remove the failure of link problem in future.

The throughput of generation of packets and receiving of packets, sends and receive the jitter and end to end delay are the parameters for the comparison in [11] paper. Analysis of jitter though number of generation of packets in AODV is somewhat more but the rate of dropping packets is much less in case of DSDV as the number of drop packets and packets which are lost is more in case of AODV. If we consider jitter, it is high at the case of DSDV and values which is high in case of AODV. End to end delay is less in AODV case as compared to DSDV. End to End delay impacts the performance of network as fast the nodes are communicating in a scenario of wireless so AODV is better.

DSR, AODV AND TORA that are based on protocol parameters in [12] such as route discovery, route maintenance, network node overhead. AODV performance is considering its ability to manage the connection by exchange of information periodically, which is TCP requirement. When we have large number of network AODV is best. If we talk about real time traffic then also AODV is considered on DSR. AODV is based on discovery of route and maintenance of route mechanism. AODV packet size is uniform and non uniform for DSR. DSR is capable for networks which have a mobility rate moderate. Whereas for huge network which is having dense population of nodes TORA is suitable. For multiple routes and multicasting it is best supportive.

In this [13] paper, we consider the performance of these proactive routing protocols i.e. OLSR, Improvement Destination-Sequenced Distance Vector (I-DSDV), ZRP evaluated for Ipv6 environment on the basis of these parameters end to end delay, PDF(packet delivery fraction), overhead in route. The aim of this paper is to survey how these routing protocols behave when we have IPv6 environment. On analysis of observation, it has been seen that OLSR performs better in terms of end to end delay and PDF, whereas ZRP is good in parameters of overhead in route. Thus we have concluded that OLSR and ZRP performance is better as compared to DSDV and I-DSDV. In this proactive routing protocol is much better than reactive routing protocol.

In this study [14], performance is calculated in terms of Packet Delivery Ratio, Average End to End Delay, Normalized Routing Load and Average Throughput. In terms of Packet Delivery Ratio, AODV, DSR have higher value than other protocols (DSDV, OLSR). As table-driven protocols, DSDV and OLSR show the lowest Average End to End Delay (good performance) compared to on-demand protocols (AODV, DSR). DSR demonstrates the lowest Normalized Routing Load than other protocols. In almost all scenarios, AODV and DSR outperform other protocols (DSDV, OLSR) in terms of average throughput. In the future work is to extend the set of the experiments by taking into consideration other simulations parameters (propagation models, MAC protocols, etc.).

In this paper [15], we have discussed various routing protocols for Mobile Ad Hoc Networks. We have analyzed the parameters of protocols i.e. Loop Free, Distributed, Multicast Routes, QoS Support, Periodic Broadcast, Demand based Operation. The AODV and DSR are Reactive Routing Protocols i.e. it establish the Route on demand. But in DSDV, each node maintains routing information for all destinations. And it regularly updates their routing tables, so consumes more bandwidth as compared to AODV. In future, practical implementation of these protocols for Ad-hoc network is to be analyzed for accurate and absolute result.

From this above literature review we have taken two protocols i.e.DSDV (Destination sequence distance vector) DSR (Dynamic source routing protocol) By studying these protocols we can modify or enhance these performances.

In paper [16] firstly we have shown that how DSR routing protocol work and then we have seen the improvement for DSR routing protocol. It shows how we can conserve less energy as well as the total delay.

DSR-(Dynamic source routing protocol)

DSR is basically implemented for mobile nodes as multi hop Ad Hoc network. It allows the implementation to be self organized and arrange in a way. It doesn't allow any existing system organization. This protocol is divided into two essential parts:-1. Discovery of route 2. Maintenance of route

Route discovery:
When we have to send any message from source to destination but if route is already exist in the buffer then automatically it send the message. As if it is not in the buffer the mechanism start i.e. Route Discovery. Then source send the route request packet i.e. RREQ to intermediate node it then perform repetition of messages. If repetition of packet is going then it is neglected. Then if neglected it send the head part of the packet with it in route record. And then packets are sending to all adjacent nodes. When packets are finally send to destination it then send back route reply i.e. RREP to source and then it is stored in buffer.

Route maintenance
After route discovery we have to maintain our path also. So to maintain path we check how didn't find its path it will immediately send the route error packet i.e. RERR to the source node. When the source gets the RERR packet it deletes the entire link that made by that node from the buffer and from the route table also. Then if necessary again it starts the route discovery [16].

Advantages of DSR-
Whenever we need route, we discover the route.
Node links are stored in route buffer.
Simple process for route.
Overhead is less.
Reduces cost- as it is stored in buffer, again and again not need for route discovery.

Disadvantages of DSR-
Not much efficiency.
Consume more time.
Again and again we have to discover path.
If link broken again we have to again discover the path.
Collision can occur.
Energy consumption is more.

We have seen in this paper that it aimed at how total delay will be less and how energy will be conserved. In paper [17] we have seen working of DSDV. And in paper [18] the how improved DSDV is better than DSDV.

DSDV-(Destination sequence distance vector)

It is proactive routing protocol, each node will maintains routing information for all known destinations. If no node want the data then also it process the information like it send the data, it broadcast the data. It is well known table driven protocol. To solve the problem of distance vector problems, we have to add the sequence number to every node in routing table. Every node is having a counter so whenever they send table the counter is increased. Counter value will be used as a time stamp i.e. sequence number. If a node receiving a table from another node, node will update in only one case if the receiving table has a updated information. So how table would know this table is having a updated information or not it will check sequence number. If that sequence number is higher means that information is a updated information. DSDV routing entry include- <destination, nest hop, distance, sequence number>. Sequence number is originated from the destination. It ensures loop freely.

Advantages of DSDV

Routing information is updated periodically.
No latency caused by route discovery.

Disadvantages of DSDV

Overhead in traffic, even if there is not change in topology.
Maintain that route also which are not used also.
No sleeping nodes.

In this paper[18], we have seen that it depend on node speed the throughput, packet received, packet dropped, packet delay, packet in loop. As the speed increased of nodes the throughput that we get is less. The packets that we are receiving are also less when we increase the speed of node. The packet delay is more when we increase speed. This table is made from papers [6] – [15]. It tell us after comparing all the reactive routing protocol with proactive routing protocol, how there is proactive routing protocols much less than reactive routing protocol.

PARAMETERS	**REACTIVE ROUTING PROTOCOL**	**PROACTIVE ROUTING PROTOCOL**
End to end delay	**LESS**	**MORE**
Throughput	**MORE**	**LESS**
Bandwidth	**LESS**	**MORE**
Packet delivery ration	**MORE**	**LESS**
Jitter	**LESS**	**MORE**
Transmission delay	**MORE**	**LESS**
Media access delay	**LESS**	**MORE**

Route overhead	**LESS**	**MORE**
Normalized routing load	**LESS**	**MORE**

IV. SCOPE OF THE STUDY

We have studied in above literature review that how we can compare the routing protocols on the basis of some performance metrics like end to end delay, throughput, bandwidth, packet delivery ration, jitter, transmission delay, media access delay, route overhead, normalized load. We have seen that in performance metrics of throughput, transmission delay, packet delivery ration the performance is less of proactive routing protocols. So we have also studied two routing protocol of each reactive as well as proactive: DSR and DSDV. We have studied in this protocols how it work and how it can be more improve by enhancing the performance by change in its algorithms. So our scope of the study is that we can make proactive routing protocol also better as reactive routing protocol.

V. SUMMARY AND CONCLUSIONS

As we know in reactive routing protocol, it is on demand protocol. It discovers the path whenever it is needed. Basically it is a source-initiated route discovery. So there is reduction in routing overhead. Useful when number of traffic sessions is much lower than the number of nodes. So for this we have taken the protocol DSR (Dynamic Source Routing) in this route is discovered and route is maintained. Whenever we need route, we discover the route. Node links are stored in route buffer. Overhead is less. As it is stored in buffer, again and again not need for route discovery so less cost. Where as in proactive routing protocol it is called table driven protocol. It is not on demand protocol. So broadcast of message is continue in this. We have taken for this is DSDV (Destination Sequence Distance Vector).

So we have concluded for both the routing protocol we have seen the approaches. So in future we can enhance its performance by improving its given algorithm by changing in the parameters like packet delivery ratio, end to end delay and throughput.

REFERENCES

[1]. Lidong Zhou and Zygmunt J. Hass (1999) "Securing Ad Hoc Networks" IEEE networks.

[2]. Anil Lamba and Dr. Sohan Garg (2015) "A Study on the Behavior of MANET: Along with Research Challenges, Application and Security Attacks" International Journal of Emerging Trend s & Technology in Computer Science (IJETTCS).

[3]. Nitesh Yadav and Sunita Chaughary (2015) "An Accessible Energy Efficient Routing Protocols for Mobile Ad Hoc Networks: A Contempory Investigation" International Research Journal of Engineering and Technology (IRJET).

[4]. Neetendra Singh Dhakad and Anjana Goen (2016) "Review on Routing Protocols of Mobile Ad-hoc Network MANET" International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering.

[5]. Subhrananda Goswami, Subhankar Joardan and Chandan Bikash Das (2014) "Reactive and Proactive Routing Protocols Performance Metric Comparison in Mobile Ad Hoc Networks NS 2" International Journal of Advanced Research in Computer and Communication Engineering.

[6]. Parminder kaur, Monika Sachdeva and Gagandeep (2016) "Comparative performance analysis of manet routing protocol" International journal of advances in cloud computing and computer science.

[7]. Krunal S Bhavsar and Dr. Kamaljit I Lakhtaria (2016) "Comparison of DSDV and AODV Routing Protocol in Mobile Adhoc Network" International Journal of Advanced Research in Computer Science and Software Engineering.

[8]. S.Poornima and Mr. V.P. Muthukumar (2016) "Comparison of AODV, OLSR, TORA routing protocols in manet" International journal of modern trends in engineering and research.

[9]. C.Thanka Saranya and M.S Sylvia Blossom (2016) "Comparison of AODV, OLSR and DSDV Routing Protocol for manet" Journal of Recent Research in Engineering and Technology.

[10]. Manveer Kaur and Ambrish Gangal (2015) "Comparative Analysis of Various Routing Protocol in manet" International Journal of Computer Applications.

[11]. Neha Aggarwal, Teglovy Singh Chohan, Karamveer Singh, Rajan Vohra and Dr.Shalini Bahel (2016) "Relative Analysis of AODV & DSDV Routing Protocols for MANET based on NS2 " International Conference on Electrical, Electronics and Optimization Techniques.

[12]. Dr. R. Shanmugavadivu and B. Chitra (2016) "A comparison of reactive routing protocol DSR, AODV AND TORA in manet" International Journal of Advanced Research in Computer Engineering & Technology.

[13]. Aman Kumar and Rahul Hans (2015) "Performance Analysis of DSDV, I-DSDV, OLSR, ZRP Proactive Routing Protocol in Mobile Ad Hoc Networks in IPv6" International Journal of Advanced Science and Technology.

[14]. Mohamed Elboukhari, Mostafa Azizi and Abdelmalek Azizi (2015) "Performance comparison of routing protocols in mobile Adhoc networks" International Journal of UbiComp.

[15]. Charanjeet Singh (2015) "A Review:Comparative Study of Routing Protocols for Adhoc Networks" International Journal of Advanced Research in Computer and Communication Engineering.

[16]. Deepti Badal and Rajendra Singh Kushwah (2015) "A Energy Efficient Approach to DSR based Routing Protocol for Ad Hoc Network" International Journal of Computer Applications.

[17]. Guoyou He "Destination-Sequenced Distance Vector (DSDV) Protocol".

[18]. Gulfishan Firdose Ahmed, Raju Barskar, and Nepal Barskar (2012) "An Improved DSDV Routing Protocol For Wireless Ad Hoc Networks" International Conference on Communication, Computing & Security (ICCCS).