Multi-Parameterized Optimized AODV Routing Protocol in MANET

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ABSTRACT

Mobile ad-hoc networks are a promising research district with sensible application. Dynamic and reliable protocols are necessary in MANET, as they have no infrastructure and their Network topology change recurrently. There are dissimilar protocols for behavior the routing problem in MANET. In this paper we focused on the two popular algorithms Ad-hoc on Demand Distance Vector (AODV) and Dynamic Source Routing (DSR), both being reactive routing protocols and proposed new protocol. We prefecture Quality of Service (QoS) in aspect of packet delivery rate , average time delay and routing load overhead by varying network size and transmission range of the particular nodes .The all-purpose inspection from the replication is that for request oriented metrics such as average delay and packet delivery rate, DSR outperforms AODV in less intense circumstances. AODV, though, outperforms DSR in additional opaque situation. Though, our proposed protocol time after time generate less routing load than AODV. Multi Path Multicast Routing Protocol for Provisioning Of QOS in MANET. To also make a comparison between our proposed protocol DSR and AODV routing protocols in different network scenarios.

Hence it becomes important to study the impact of high mobility on the performance of these routing protocols. Simulation results verify that MAODV gives better performance as compared to AODV, DSR and DSDV. The performance comparison is conducted by varying mobility speed, number of nodes and data rate. The comparison results show that AODV performs optimally well not the best among all the studied protocols.

Keywords
AODV, DSR, DSDV, NS-2, MANET, QoS, Routing, Routing Protocols, Pdf

1. INTRODUCTION
Mobile Ad hoc networks (MANETs) square measure a heterogeneous mixture of totally different wireless and mobile devices, starting from very little hand-held devices to laptops that square measure dynamically and haphazardly situated in such a fashion that the interconnections between nodes square measure capable of fixing on a continuous basis [1] an advertisement hoc network could be a cluster of wireless mobile computers (or nodes) during which nodes get together by forwarding packets for every different to permit a node to speak on the far side its direct wireless transmission vary. Unplanned networks need no centralized administration or fastened network infrastructure like base stations or access points and might be quickly and inexpensively found out as required. In unplanned Networks the individual mobile hosts (nodes) act as an equivalent time as each the router and therefore the host.

MANET is an infrastructure less and decentralized network which need a robust dynamic routing protocol. Many routing protocols for such networks have been proposed so far to find optimized routes from source to the destination and prominent among them are DSR, AODV, and DSDV routing protocols.

It is thought of as a replacement paradigm of infrastructure-less mobile wireless communication systems. MANET area unit being wide studied and it's the technology that's attracting an oversized sort of applications. Routing in MANET essentially means that the obligatory flow of information to destination from supply with maximizing the network performance.
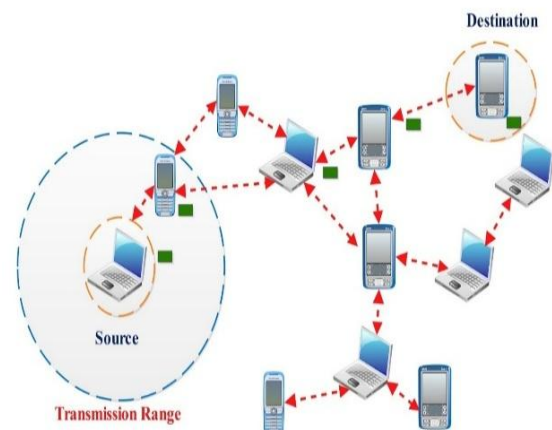

Figure 1: Mobile Ad hoc Network

The characteristics of those networks area unit summarized below:

- Communication via wireless Network.
- Neither centralized neither controller nor infrastructure.
- Dynamic Network topology.
- Frequent routing updates.
- Nodes play the role of hosts and routers as well.
- Intrinsic mutual trust.
- Some applications of MANETs:
- Disaster relief operations.
- Defense Development.
- Urgent Business meetings.
- Mine site operations.

Network Simulator (NS-2) is an object oriented, event driven, network simulating tool. It's considerably utilized by the researchers, professors and students. Basically, Simulation is that the method of making a model with its relative behavior. There variety of network simulating tools area unit out there like GloMoSim, OPNET, QualNet, and NS-2 etc. however NS-2 is that the most fitted among all the opposite. Such a big amount of Routing protocols of Edouard MANET like AODV, DSDV, and DSR area unit enforced exploitation NS-2 and it's out there as free open supply software package programs. During this paper, AODV protocol is taken into account and its network performance is increased by MAODV.

2. ROUTING PROTOCOL FOR MANET

Routing is that the method to send data from one host to a different host. Routing suggests that route packet to its destination mistreatment economical path. Protocols square measure set of rules. Routing protocols square measure needed wherever supply has to communicate to the destination.
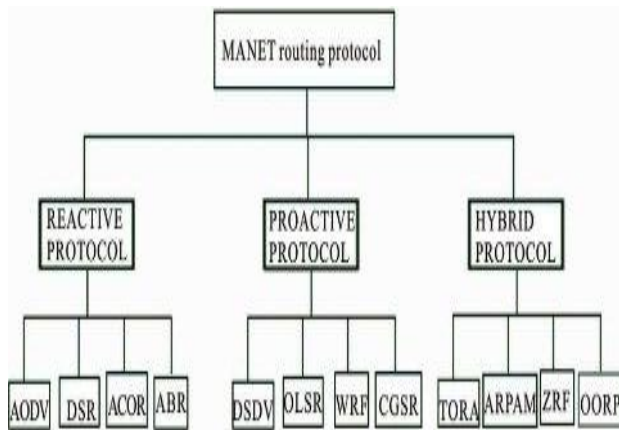

Fig 2: Protocol Stack in MANET

2.1 Reactive Routing Protocol

Reactive protocols are called On-demand driven reactive protocols. These Protocols don t initiate route discovery by themselves, till or unless a supply node request to search out a route. That's why these protocols are known as reactive protocols. These protocols setup routes once demanded [9], [4]. Once a node desires to speak with another node within the network, and therefore the supply node doesn't have a route to the node it desires to speak with, reactive routing protocols can establish a route for the supply to destination node.

2.2 Proactive Routing Protocol

Proactive routing protocols work because the different method around as compared to reactive routing protocols. These protocols perpetually maintain update topology of the network. Each node within the network is aware of regarding the opposite node before, in different words the entire network is thought to all or any the nodes creating that network. All the routing data is typically unbroken in tables. Whenever there is a modification within the configuration, these tables area unit updated in line with the modification. The nodes exchange topology data with one another, they can have route data any time once they required. A number of the present proactive routing protocols area unit DSDV [3], OLSR and Wireless Routing Protocol (WRP).

2.3 Hybrid Routing Protocol

Hybrid protocols exploit the strengths of each reactive and proactive protocols, and mix them along to urge higher results. The network is split into zones, and use completely different protocols in 2 different zones i.e. one protocol is employed among zone, and also the different protocol is employed between them. Zone Routing Protocol (ZRP) is that the example of Hybrid Routing Protocol. ZRP uses proactive mechanism for route institution among the nodes neighborhood, and for communication amongst the neighborhood it takes the advantage of reactive protocols. These native neighborhoods' square measure referred to as zones, and also the protocol is known as for a similar reason as zone routing protocol. Every zone will have totally different size and every node could also be among multiple overlapping zones. The scale of zone is given by radius of length P, wherever P is range of hops to the perimeter of the zone. A number of the present hybrid protocols square measure ZRP, TORA and Hazed sharp-eyed Link State Routing Protocol (HSLS).

3. PROPOSED METHODOLOGY

MANET is a non-centralized infrastructure in which mobile nodes are moving without any centralized control on them. The free movement of nodes has great opportunity for mobile ad-hoc network for various applications but it also creates a lot of challenges. As we know bandwidth capacity and capability of wireless network is increasing day by day, it also increasing number of various services on mobile ad-hoc network such as online games and video-c conferencing. Our proposed protocol selects an adaptive optimized path as required by the MANET services. Our proposed protocol is compared with AODV [11] [12] [13], DSDV [16] [17] [18] and DSR routing protocol in various network scenarios. We will compare our protocol performance on various network performance metrics such as end-to-end Delay, throughput, jitter, packet loss and network load in various changing scenarios and prove that our protocol is producing better performance compare to existing protocol in MANET.

Table 1: Simulation parameters of Network Simulator

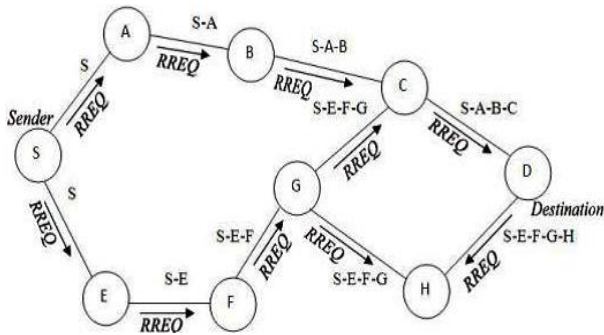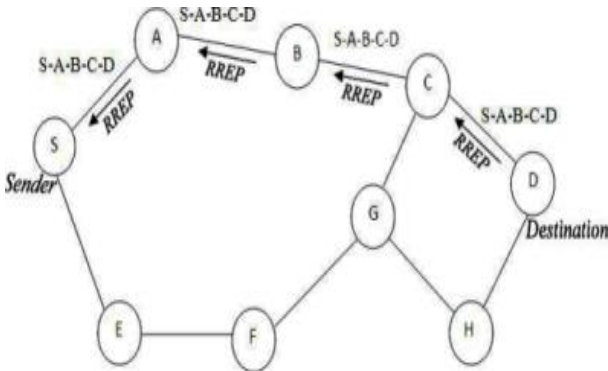| No.	Parameter	Value
1	Number of nodes	25, 50, 75
2	Simulation time	30 sec
3	Simulation Model	Two Ray Ground
4	MAC Type	802.11
5	Link Layer Type	LL
6	Interface Type	Queue
7	Traffic Type	TCP
8	Packet Size	Random
9	Queue Length	50
10	Node Speed	20 m/sec
11	Simulation TOOL	Network Simulator-2.35
12	Channel	Wireless Channel

Fig 3: RREQ Messages in MANET using AODV

Fig 4: RREP Messages in MANET using AODV

4. PERFORMANCE METRICES

The following performance metrics square measure accustomed value the impact of every programing algorithm:

- **Packet Delivery Ratio:** This can be the fraction of the info packets received by the destination to those sent by the supply. This classifies the power of the protocol to find routes.

- **Throughput**: It's taken because the average rate of prosperous messages delivery over a channel for communication. The outturn is largely measured in bits per second (bit/s or bps) unit.

- **End-to-end delay**: It's usually the common time that an information packet takes to trip destination from supply in seconds. It's sometimes calculated by subtracting the time at that initial packet was transmitted by supply from the "time at that initial information packet arrived to the destination".

- **Residual Energy**: It's the entire quantity of remaining energy [16] by the nodes once the completion of Communication or simulation. If a node has 100 percent energy at the start and having seventieth energy once the simulation than the energy consumption by that node is half-hour. The unit of it'll be in Joules.

- **Average Jitter:** Jitter is that the time variation between once packets leave one system and reach another, moving time period communications like VoIP and video conferencing.

5. RESULTS AND DISCUSSION

Fig 5. Analysis of Overall Throughput:-From the above Fig. we analyzed that the MAODV routing protocol has better throughput as compare to the AODV, DSDV and DSR routing protocols for different node density scenario.
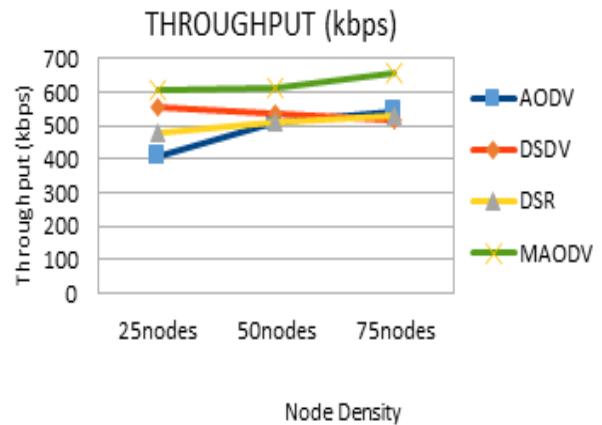

Fig 6. Analysis of Packet Delivery Ratio:-From the above fig. we analyzed that the MAODV routing protocol has better Packet Delivery Ratio as compare to the AODV, DSDV and DSR routing protocols for varying node density scenario.
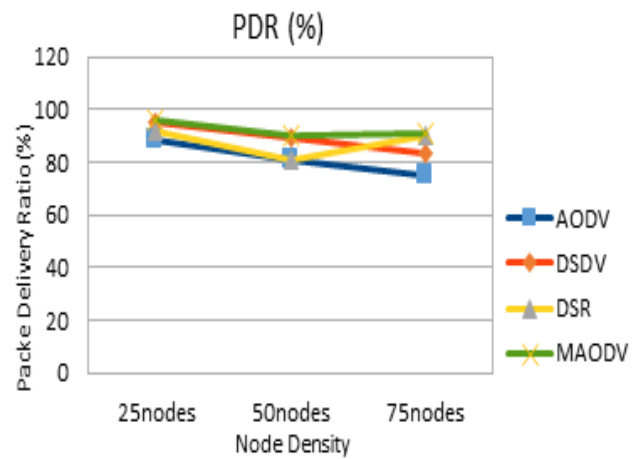

Fig 7. Analysis of End to End Delay:-From the above fig. we analyzed that the DSDV routing protocol has less end to end delay as compare to the AODV, DSR and MAODV routing protocols for varying node densities scenario
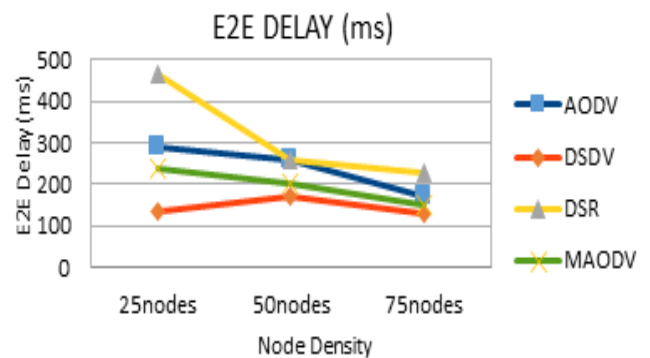

Fig 8. Analysis of Residual Energy: - From the above fig. it is very clear that MAODV routing protocol gives better performance in terms of residual energy.
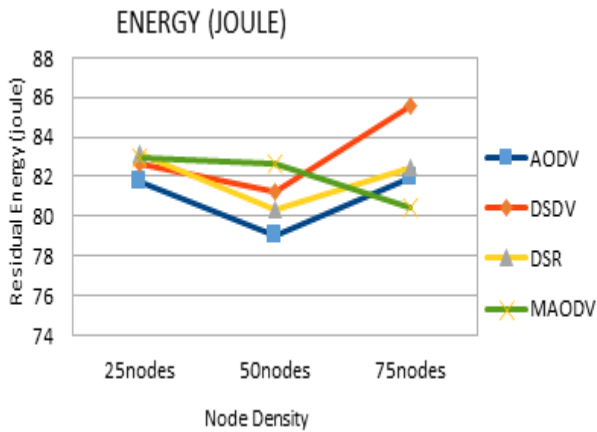
Fig 9. Analysis of Average Jitter: - From the above fig. it is very clear that MAODV routing protocol gives better performance in terms of Average Jitter.
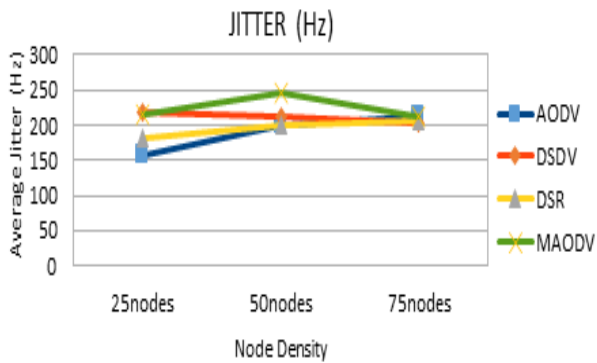

Table 2: Packet Delivery Ratio on different nodes

Nodes	AODV	DSDV	DSR	MAODV
25	88.77	95.04	91.68	96.20
50	80.78	89.35	80.78	90.28
75	74.64	83.65	90.16	91.20

Table 3: Throughput on different nodes

Nodes	AODV	DSDV	DSR	MAODV
25	406.49	554.89	480.72	604.18
50	512.60	538.52	512.60	613.33
75	542.28	520.14	527.66	660.78

Table 4: End to End Delay on different nodes

Nodes	AODV	DSDV	DSR	MAODV
25	291.26	137.48	465.58	237.19
50	260.99	169.31	260.99	204.94
75	170.83	131.77	229.90	151.39

Table 5: Residual Energy on different nodes

Nodes	AODV	DSDV	DSR	MAODV
25	81.78	82.67	83.12	82.91
50	79.03	81.28	80.33	82.69
75	81.94	85.58	82.49	80.43

Table 6: Jitter on different nodes

Nodes	AODV	DSDV	DSR	MAODV
25	158.13	217.15	181.11	214.39
50	199.42	210.74	199.42	245.05
75	210.67	202.89	205.41	210.94

6. CONCLUSION

An AODV routing protocol is modified using NS2.34 as the simulation tool. The modified AODV is evaluated through several experiments and simulations that measured the throughput, packet delivery ratio, and overhead of our network. The results are depicted in Figs. 5, 6 and 8. In this paper, Description is given about the importance of QoS (in terms of average end to end delay and packet delivery ratio) routing in MANETs, challenges came across, and the approach taken. When this traffic is becomes high on the network, not all the taken routes that are found by an AODV routing protocol have enough free data rate to send packets ensuring the low end to end delay of each packets. As result, an M-AODV protocol works very well and shows its effects when the traffic on the network is comparatively high. People work in the area of an ad-hoc networks with the aim of improving the QOS to reduce the average end to end delay and enhanced the packet delivery ratio for an ad hoc networks can get benefits from this MAODV protocol. In the further work other additional network parameter will be considered.

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