A Review Paper on Performance Analysis of AODV, OLSR, DSR and GRP Routing Protocols of Ad hoc Networks

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Abstract: ***A mobile ad hoc network (MANET) consists of mobile wireless nodes. The communication between these mobile nodes is carried out without any centralized control. The ease of deployment and the infrastructure less nature of mobile ad hoc networks (MANET) make them highly desirable for the preset day multimedia communications. Traditional routing protocols may not suffice for real time communications it depends upon the condition and our requirements. Though there has been considerable research in this area. In this paper we are analyzing the performance of routing protocol via increasing number of nodes. Here we are observing performance of routing protocol by making a comparison between dcf (Distributed Coordination Function) and edcf (Enhanced Distributed Coordination Function) on the basis of following parameters :-delay, throughput, traffic sent and traffic received .Network simulation tool used in simulation is opnet modeler(ver.14)***

Keywords: MANET, AODV, OLSR, DSR, GRP

1. Introduction

Manet represents a system of wireless mobile nodes that can freely and dynamically self organize in to arbitrary and temporary network topologies, allowing people and devices to communicate without any preexisting communication architecture. Each node in the network also acts as a router, forwarding data packets for other nodes. The absence of fixed infrastructure in a manet poses several types of challenges. The biggest challenges among them are routing. Routing is the process of selecting paths in a network along which to send data packets. An adhoc routing protocol is a convention or standard that controls how nodes decide which way to route packets between computing devices in a mobile adhoc network. In adhoc networks, nodes do not start out familiar with the topology of their network instead, they have to discover it. The basic idea is that a new node may announce its presence and should listen for announcements broadcast by its neighbors. Each node learns about nearby nodes and how to reach them and may announce that it can reach them too. Different protocols are then evaluated based on the packet drop rate, average routing load, average end-to-end delay and other measures. The proposed solution for routing protocols could be grouped in three categories-proactive (or table driven), reactive (or on demand) and hybrid protocol.

1.2Manet routing protocols.

Mobile ado network characterized by the mobility of its nodes each nodes can join and leave the network at any time, this means that the topology of the network also may changes at any time. These make the design of the mobile ad hoc network not an easy task and it become one of the most important Manet challenges. There are different criteria for designing and classifying routing protocols for wireless adhoc networks. For example, what routing information is exchanged, when and how the routing information is exchanged, when and how routes are computed etc. Classification of routing protocols in manet`s can be done in many ways, but most of these are done depending on routing strategy and network structure. According to the routing strategy the routing protocols can be categorized as table-driven and on demand (source initiated), while depending on the network structure these are classified as flat routing, hierarchical routing and geographic position assisted routing. Both the table-driven and on demand protocols come under flat routing. One of the most popular methods to distinguish mobile adhoc network routing protocols is based on how routing information is acquired and maintained by mobile nodes. Using this method, mobile adhoc network routing protocol can be divided into proactive routing, also called or table-driven routing protocol, reactive routing also called on demand routing protocols and hybrid routing. Hybrid routing protocols are proposed to combine the merits of both proactive and reactive routing protocols and overcome their short comings.

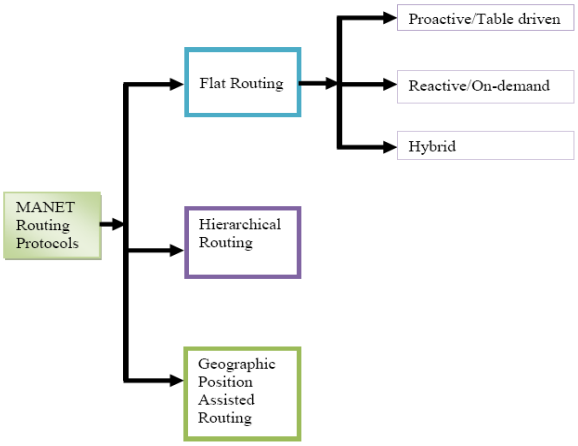

Figure1: shows the classification of manet routing protocols.

In Section 2, we will discuss about the previous research work in this area followed by Section 3 highlights proposed

system. In depth discussion of research performance analysis is done in section-4 followed by conclusion in section-5.

2. Related Work

There are many routing protocols in Mobile Ad Hoc Networks, the popular ones being DSDV, AODV, PUMA and Babel. Although a lot of research work is done on individual protocols but not enough research is done on comparing these protocols under environment of NS-2. This is essential considering the fact that these protocols behave differently or perform differently in different environments. By analyzing how a protocol performs under a certain environment, the shortcomings of the protocol can be found out and more research could be done on removing those shortcomings.

Ashish Bagwari ,Raman Jee ,Pankaj Joshi and Sourabh Bisht has analysed the performance of reactive routing protocol via increasing number of nodes and observing its effect on Quality of Service (QoS) of Mobile Adhoc Network. As we know, routing protocols make an important role for improving QoS in Mobile Adhoc Network. The QoS depends upon several parameters like end-end delay, throughput, date drop and network load. The reactive routing protocol which was considered was AODV. Finally, simulation results confirm that AODV gives better performance under such types of circumstances, providing better QoS based on good throughput and acceptable End-End Delay, less data drops.

Ramandeep Kaur Nagra, Jasmeet Singh Gurm and Gurpreet Singh Grewal has done a comparative analysis between threel protocols AODV, PUMA and Babel carried out in the simulated environment created in the NS-2.34 simulator comprising of 25 mobile nodes based on the different parameters and examining their values based on the time scenarios. Researchers investigated that the performance of AODV, BABEL and PUMA over throughput and the delivery ratio of packets .The BABEL has a better packet delivery ratio (PDR) than PUMA and AODV for all the metrics employed above. But in the mesh based multicasting more data packet transmissions fail to reach the destination and hence need re-transmissions. Researchers have analyzed the performance of AODV, BABEL and PUMA routing protocols by simulation using NS-2, with nodes moving at speeds ranging from 0 to 10 m/s. The BABEL routing protocol has exhibited superior performance in terms of data packet delivery ratio and throughput as compared to AODV and puma approach, PUMA. Whereas AODV routing protocols having good delivery ratio and average throughput .The results show an average performance of AODV, yet a notably stable and low throughput was observed. Puma has low performance but throughput of Puma is average .So Babel is best protocol from these three protocols. Avni Khatkar and Yudhvir Singh have done simulation to analyze the performance of Hybrid Routing Protocols ZRP, CBRP on the basis of Packet Delivery Ratio, End to End delay and Average Throughput. These results were compared with AODV, DSR and FSR routing protocols by varying number of nodes. The comparison showed that Hybrid routing Protocol for adhoc networks performs better as compared to AODV and DSR routing protocols. The simulation results showed that average throughput of ZRP was better than other routing protocols with varying number of nodes. Packet delivery ratio for CBRP was better than that of other routing protocols with the changing number of nodes. Average End to End delay for ZRP was less than other routing protocols with the varying number of nodes. Finally, it was concluded that hybrid routing protocols for adhoc networks perform well as compared to AODV, DSR and FSR in terms of PDR, throughput and end to end delay. Rashmi Rohankar, Rinkoo Bhatia, Vineet Shrivastava and Deepak Kumar Sharma have analyzsed the effect of random based mobility models on the performance of Proactive Routing Protocol (DSDVDestination Sequence Distance Vector) and Reactive Routing Protocol (AODV- on Demand Distance Vector, DSR- Dynamic Source Routing). Performance analysis was done with respect to end-to-end delay, throughput and Packet delivery ratio for varying node densities. For proactive routing protocol Random walk outperforms, Random Waypoint. For reactive routing protocol having slight variation in the performance between Random Waypoint and random Walk. Random direction performance was poor in case of both proactive and reactive routing protocols because of its behavior to travel to the border of simulation area in chosen random direction. Sherif M. Badr has introduced a framework for new mobile Ad hoc routing protocol, Ad hoc Destination Sequenced Dynamic Source Routing (ADSDSR), which based on DSR mobile Ad hoc routing protocol and integrate some effective techniques from DSDV and AODV to improve the performance of the DSR. Thus the research produced a new ad hoc routing protocol ADSDSR that can be suitable in low and high load scenario.

3. Proposed Work

The proposed work present a comparison between dcf (grp),dcf(olsr),dcf(dsr),dcf(aodv)&edcf(grp),edcf(olsr),edcf(dsr),edcf(aodv) routing protocols .Mainly we have compared these protocols on basis of throughput, delay, traffic sent and traffic foreceived by taking 20 and 60 MANET nodes.

4. Performance Analysis

The simulation is performed for 20 nodes and 60 nodes using triangular mobility. The proposed model is evaluated for its efficiency considering comparative analysis with the prior research work conducted in comparison of routing protocols in mobile adhoc network.

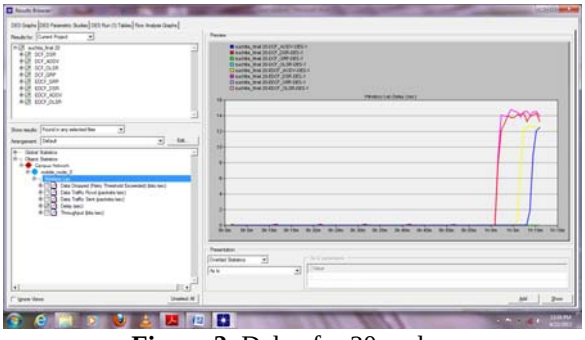

Figure 2: Delay for 20 nodes.

The fig.2 shows the performance analysis when conducted for delay by using 20 nodes. The proposed system shows that edcf routing protocol performs better than dcf routing protocol.

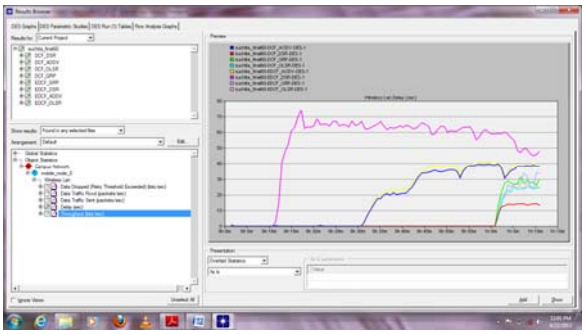

Figure 3: Delay for 60 nodes.

Figure 3 shows the performance of 60 nodes for delay and it also shows that edcf performance well with respect to dcf.

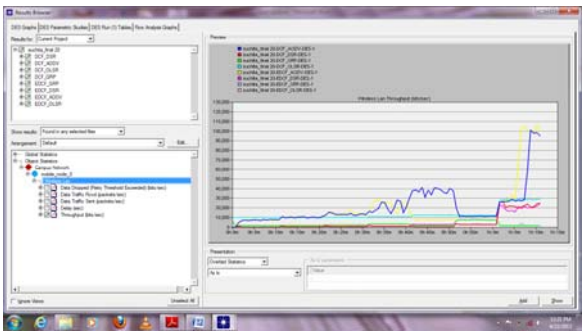

Figure 4: Throughput for 20 nodes.

Fig.4 shows the throughput for 20 nodes, here edcf has performed better than dcf.

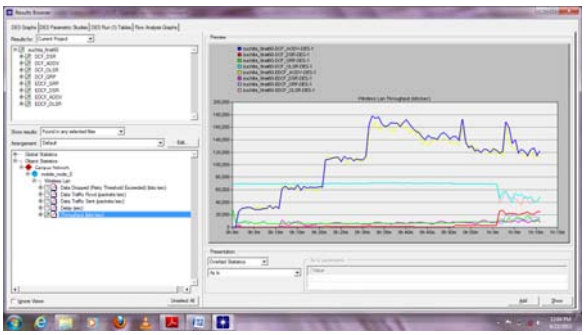

Figure 5: Throughput for 60 nodes.

Fig.5 shows the performance analysis for throughput by taking 60 nodes resulting in dcf superior than edcf.

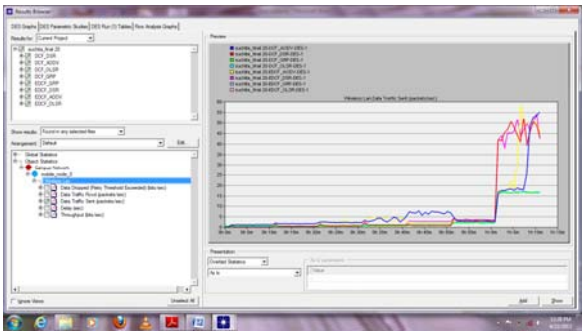

Figure 6: Traffic sent for 20 nodes.

Fig.6 presents the performance for traffic sent by using 20 nodes and it shows that edcf performs better than dcf.

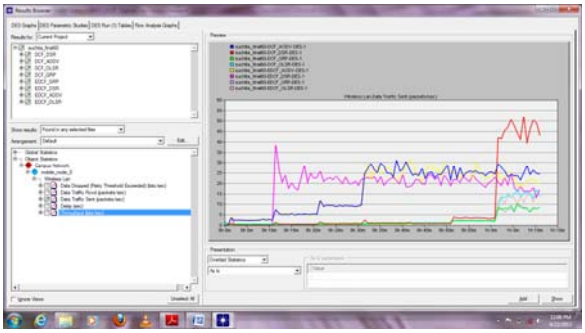

Figure 7: Traffic sent for 60 nodes**.**

Fig.7 gives the result that when nodes are increased dcf performs better than edcf.

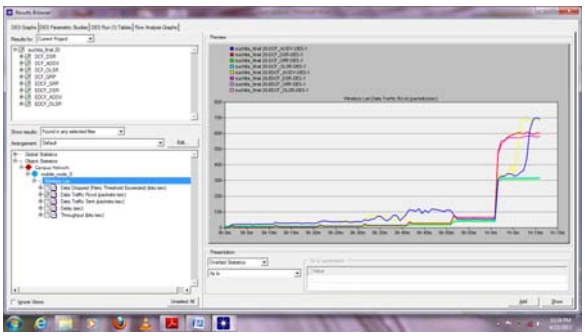

Figure 8: Traffic received for 20 nodes.

Fig.8 shows the performance analysis of traffic received for 20 nodes which shows that dcf is slightly superior to edcf.

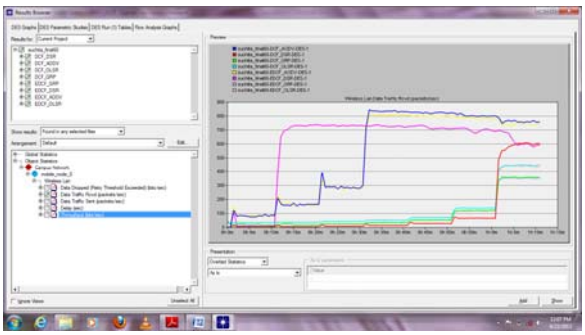

Figure 9: Traffic received for 60 nodes.

Fig.9 Illustrates that traffic received for 60 nodes in which the performance of dcf is greater than edcf.

5. Conclusion

In this work ,performance evaluation of triangular mobility models on four routing protocols olsr, grp, aodv and dsr is done on the basis of four different performance metrics that is throughput, delay, traffic sent, traffic received. The simulation results shows that throughput of edcf in case of 20 nodes is better than dcf, while there is reverse case in terms of 60 nodes. Delay of edcf is better than dcf in both the cases that is 20 nodes and 60 nodes. The performance of edcf is greater than dcf in case of 20 nodes where as dcf perform better in case of 60 ndes for traffic sent. Traffic

received of dcf performs better than edcf in both the cases that is 20 and 60 nodes.

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