

Performance Evaluation of HTTP and DB Traffic Application Using Proactive and Reactive Routing Protocols

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Abstract: A group of fixed or mobile communication devices that does not have a stable infrastructure to communicate with each other is known as mobile ad-hoc network. In MANET their is very important role of nodes. All nodes can communicate with each other by directly or indirectly method. Routing is a most important part in MANET. There are three types of protocols we use for routing i.e. Proactive, Reactive and Hybrid. In this Paper, we study the AODV (Ad-hoc On-Demand Distance Vector), DSR (Dynamic Source Routing), OLSR (Optimized Link State Routing Protocol) routing protocols for DB (database) and HTTP (hyper text transfer protocol) traffic types. 20 and 45 nodes are used to computed various parameters like throughput, number of hops and response time and compare using OPNET (Optimized Network Engineering Tool) simulator.

Keywords: Mobile Ad-hoc Network (MANET), AODV, DSR, OLSR, HTTP (Hyper Text Transfer Protocol) Database (DB), Optimized Network Engineering Tool (OPNET)

I. Introduction

Mobile ad hoc networks (MANET) are wireless networks without fixed infrastructure. Nodes can communicate by directly or indirectly method [1]. Nodes can act as a host or a router in each time. In MANET the topology can be dynamic due to the mobility of mobile nodes. [2]. Routing protocols are mainly divided into two classes: table-driven routing protocols and on-demand routing protocols [3]. The network topology include the time and collect routes from each node to every extra node by before they are required, thus they are also called table-driven protocols [4]. In reactive protocols, routes are created when they are required by the source using a route detection method [5]. MANET is suitable for emerging situations like natural disasters, military conflicts and emergency medical situations because they involve negligible configuration and rapid deployment [6]. The main key parameter used for communication in MANET is quality of services (QoS). The most excellent paths from source to destination in calculated by QoS. [7]. QoS is in terms of bandwidth, delay or loss probability etc [8]. In this paper MANET with reactive, proactive ad-hoc routing protocols are studied and evaluated using OPNET Modeler. The performance parameters of Ad hoc routing Protocol (AODV, DSR AND OLSR) like throughput, number of hops and response time in MANET using database and http traffic application has been compared. In Section 2, we discuss MANETs routing protocols. Section 3 briefly describes the Simulation Set up. Results and Discussions have been explained in section 4. The last section presents the conclusion.

II. Routing Protocols

Table-driven routing protocols and on-demand driven routing protocols are the two main protocols. The routing protocols that are considered in the analysis are Ad-Hoc On-demand Distance Vector (AODV), DSR (Dynamic Source Routing) and Optimized Link State Routing (OLSR) etc.

2.1 AODV (Ad-hoc on-demand and distance vector): AODV protocol is a mixture of on-demand and distance vector. A node required to recognize a route for particular destination it creates a ROUTE REQUEST. After the request reaches a node with route to destination it creates again a REPLY. This route produced from every node as of source to destination is a hop-by-hop state [9].

2.2 DSR (Dynamic Source Routing): In Dynamic Source Routing, first node generates Route Request (RREQ), which is sent over data packet. RREQ packet is expected by every node and it is not familiar about the route to the destination. Route Error (RERR) data packet is produced and retransmitted to the route while all node cannot transmit the data packet to other nodes in the MANET [10].

2.3 OLSR (Optimized Link State Routing): Optimized Link State Routing (OLSR) is a topology based, neighbor selection protocol, where every node only maintains a subset of network topology in sequence. OLSR is a proactive protocol, for the reason that it exchanges the topology information through other nodes repeatedly to maintain information required for routing [11]. Two ways are used for optimization, firstly by reducing the

volume of the control packets and secondly by reducing the number of links link. Each node maintains the topology information regarding the network by exchanging link-state messages between the other nodes [12]

III. Simulation Setup

The performance evaluation was carried out using OPNET simulator in area of 5km x 5km using a random way point mobility model. Mobility models were created for the simulations using 20 and 45 nodes with vector mobility. The heavy browsing HTTP and medium load Database network traffic is used during simulation interval of 1200s. Mobility model used is random waypoint model with mobility of 500 m. The implementation of the MANET network is evaluated by routing protocol such as ADOV, DSR and OLSR in different scenarios. The buffer size of data is set to 4194304 bits. Data rate is 11 Mbps for each mobile workstation with extended rate physical 802.11g. Randomly flow of traffic is given by different HTTP and DB applications workstations that are placed at different distances as shown in Fig. 1.



Figure 1 MANET Network Scenario for 20 Nodes

Table 1 Various Simulation Parameters

Routing Protocols	AODV, DSR, OLSR
MAC Layer	802.11g
Mobile Nodes	20, 45
Buffer Size	4194304 Bits
MANET Size	5Km×5Km
Mobility Model	Random Waypoint Mobility
Simulation Time	20 Min
Data Rate	11mbps
Traffic Type	HTTP (Heavy Browsing) and DB (Database)

IV. Result And Discussion

In this paper, we consider following four performance matrices to evaluate the AODV, DSR, OLSR routing protocols.

4.1 Throughput: The quantity of data transferred from one place to another or processed in a particular amount of time is known as throughput. Data transfer rates and networks are calculated in terms of throughput. Throughputs are considered in kbps, mbps and gbps. For 20 nodes at 10min the throughput of OLSR protocol is 165,024.50 and at 20min throughput is 157,962.91 for HTTP Traffic. At 10min the throughput is 114,376.55 and at 20min throughput is 106,885.36 for DB Traffic as shown in Fig 2. For 45 nodes at 10min the throughput of OLSR protocol is 1,132,222.70 and at 20min throughput is 1,329,062.94 for HTTP Traffic. At 10min the throughput is 1, 114,855.38 and at 20min throughput is 1, 249,668 for DB Traffic as shown in Fig 3.

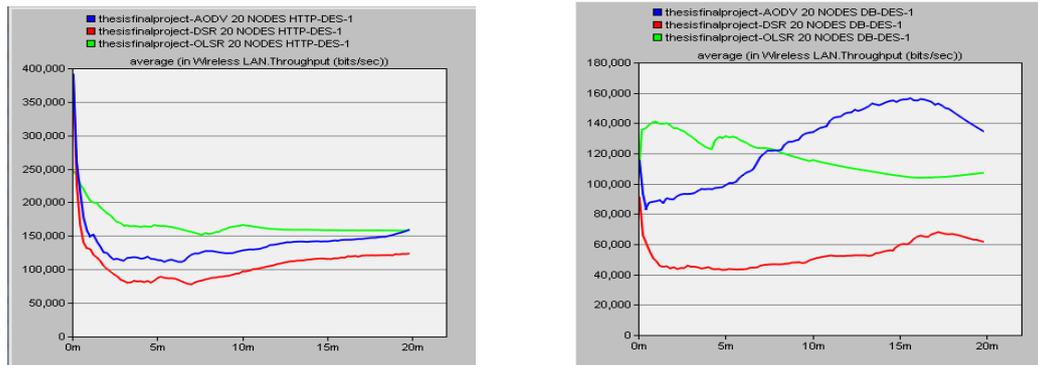


Figure 2. Throughput for 20 Nodes using HTTP Traffic and DB Traffic

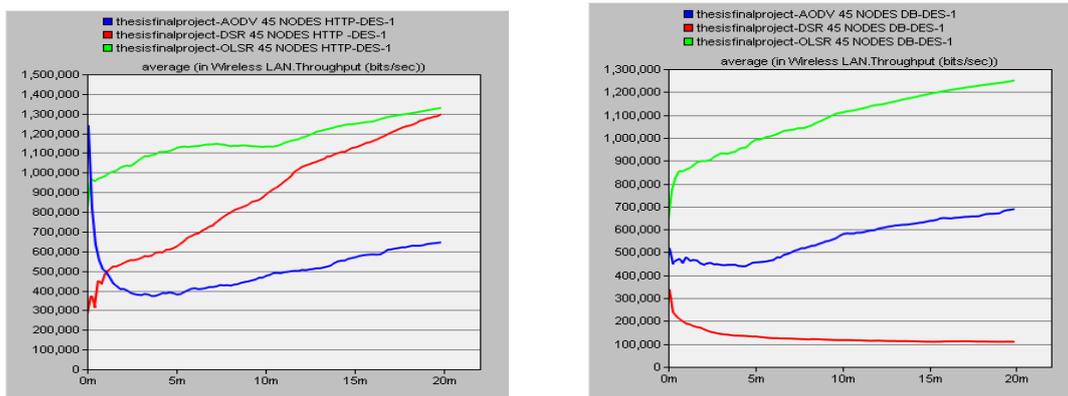


Figure 3. Throughput for 45 Nodes using HTTP Traffic and DB Traffic

4.2 Number of Hops: The statistics gives the average number of IP hops taken by data packets reaching at destination nodes. For 20 nodes at 10min the number of hops of OLSR protocol is 2.41246 and at 20min number of hops is 2.151698 for HTTP Traffic. At 10min the number of hops is 1.988467 and at 20min number of hops is 1.59168 for DB Traffic as shown in Fig 4. For 45 nodes at 10min the number of hops of OLSR protocol is 2.275781 and at 20min number of hops is 2,567225 for HTTP Traffic. At 10min the number of hops is 2.24721 and at 20min number of hops is 1.96581 for DB Traffic as shown in Fig 5.

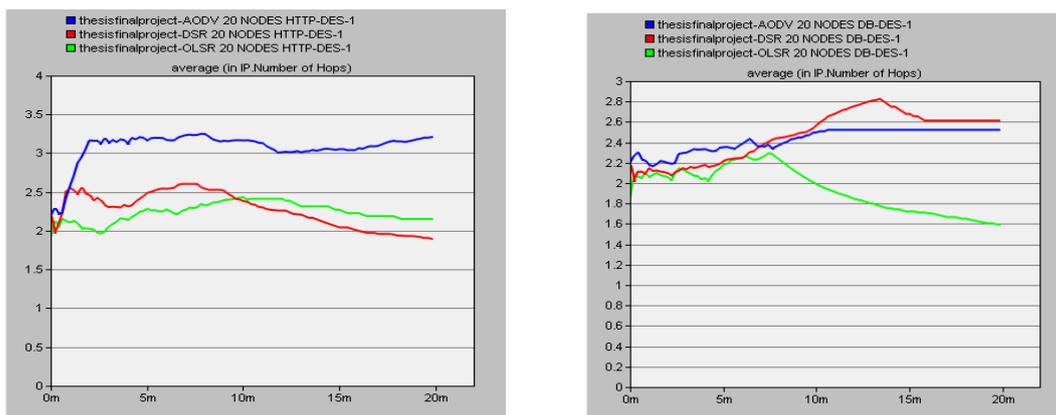


Figure 4. Number of Hops for 20 Nodes using HTTP Traffic and DB Traffic

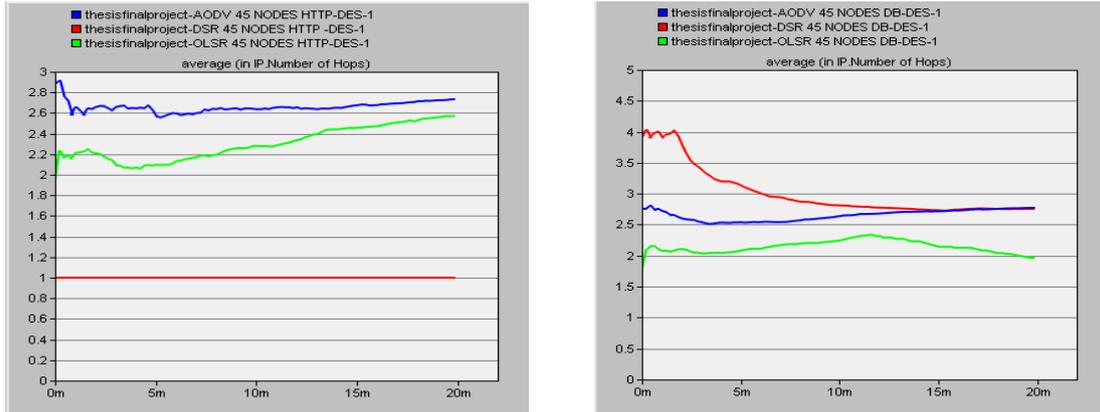


Figure 5. Number of Hops for 45 Nodes using HTTP Traffic and DB Traffic

4.3 Response Time: Time elapsed between sending a request and receiving the response from source to destination. For 20 nodes at 10min the response time of OLSR protocol is 7.562528 and at 20min response time is 6.618174 for HTTP Traffic. At 10min the response time is 11.462434 and at 20min response time is 6.729236 for DB Traffic as shown in Fig 6. For 45 nodes at 10min the response time of OLSR protocol is 3,388134 and at 20min response time is 3.626768 HTTP Traffic. At 10min the response time is 6.754614 and at 20min response time is 4.878302 for DB Traffic as shown in Fig 7.

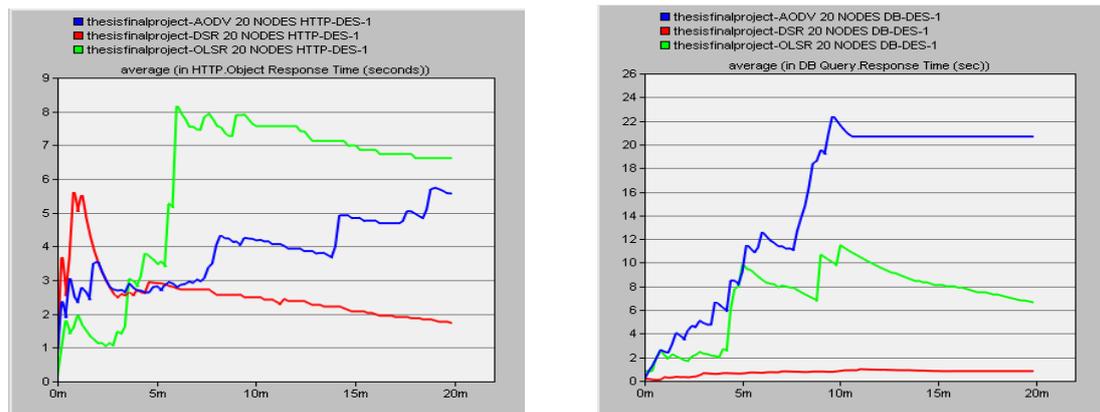


Figure 6. Response Time for 20 Nodes using HTTP Traffic and DB Traffic

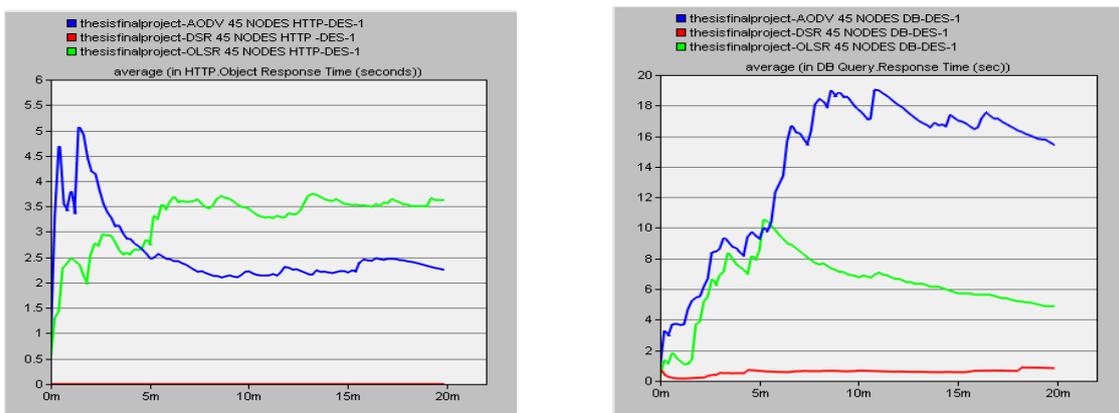


Figure 7. Response Time for 45 Nodes using HTTP Traffic and DB Traffic

V. Conclusion

The simulation representation of Mobile ad-hoc network is presented in this paper using OPNET. We analyzed special reactive and proactive ad-hoc routing protocols through different mobile nodes using HTTP and DB traffic application. We concluded that the general performance of OLSR using HTTP traffic application is improved preference for 20 and 45 nodes networks. The performance of DSR and AODV will changed through 20 and 45 nodes networks. The overall simulation result also shows that OLSR routing protocol is best for

MANET, but AODV and DSR has reduced QoS with HTTP and DB traffic application. In future we can evaluate the proactive, reactive and hybrid protocols with the special traffic application like ftp, voice, text etc. In future work we can increase the data rate to check the performance matrices.

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