International Journal of Electronics Communication and Computer Engineering
Volume 4, Issue 2, ISSN (Online): 2249–071X, ISSN (Print): 2278–4209

Analysis of AODV and DSDV Routing Protocol in MANET

Abhishek Purohit
Department of Information Technology,
RGPV University, Bhopal, M.P
purohit_2007@yahoo.com

Gajendra Singh Chandel
Department of Information Technology,
RGPV University, Bhopal, M.P
gajendrasingh86@rediffmail.com

***Abstract* – In Mobile Ad Hoc Networks (MANET) every node functions as transmitter, router and data sink. MANET is network without infrastructure. It discover its local neighbors and through them it will communicate to nodes that are out of its transmission range. The advantages of this mechanism are to overcome the interaction of three fundamental difficulties such as node connectivity, contention and congestion. The paper described the formal evaluation of performances of three types of MANET routing protocols when the node density or the number of nodes varies. Every ad hoc routing protocol on their performances in the network has their own advantages. The protocols included the Dynamic Source Routing (DSR), Ad Hoc On-demand Distance Vector (AODV), Optimized Link State Routing (OLSR) protocol and Destination-Sequenced Distance Vector (DSDV) protocol. The analysis had been done the theoretically and through simulation using an Optimized Network Engineering Tools NS-2.With the help of NS-2 software we can analysis the performances of the following metrics: packet delivery ratio, end-to-end delay, packet dropped, routing load and end-to-end throughput.**

***Keywords* - MANET, DSR, AODV, DSDV, NS-2.**

I. INTRODUCTION

In general, mobile ad hoc network (MANET) is formed dynamically by autonomous systems of mobile nodes that are connected wirelessly without support of any existing network infrastructure or centralized administration. Without any wired infrastructure, it is envisaged that MANET could be deployed in applications such as search and rescue, automated battlefields, disaster recovery, intelligent transportation and sensor networks. The nodes that make up a network at any time communicate with and through each other. In this way every node can establish a connection to every other node that is included within MANET. Typically nodes could be personal devices like mobile phones, laptops and personal data assistant (PDA's). Smaller and simpler devices also utilized this concept, such as wireless headsets and hands free phone. In this regard, MANET has to support multimedia applications, which make quality of service (QoS) a critical issue. The dynamic routing protocol has expanded its path selection criteria to include QoS parameters such as available bandwidth, link and end-to-end path utilization, node resources consumption, delay and latency, and induced jitter. The dynamic nature of MANET, along with limited resources that vary with time such as bandwidth, battery power and storage space, makes QoS provisioning, a challenging problem. The routing mechanisms in MANET are made complicated due to the interaction of three fundamental issues with regard to network such as contention, congestion and node connectivity. Every ad hoc routing protocol has their own advantages based on their individual performances in the network. By give the constant values of parameters such as: number of nodes, data rate, packet size and used constant bit rate (CBR) as a traffic type, this project is done to evaluate the performances of MANET protocols using appropriate metrics. The objective of this paper is to evaluate the routing performances of four MANET protocols: dynamic source routing (DSR), ad hoc on-demand distance vector (AODV) Optimized Link State Routing (OLSR) protocol and Destination-Sequenced Distance Vector (DSDV) protocol.It would be fundamental requirement to study the existing routing protocols before embarking on developing a proper QoS routing algorithm. The analysis had been through simulation using an Optimized Network Engineering Tools Network Simulator. The performances had been analyzed using the following metrics: packet delivery ratio, end-to-end delay, packet dropped, routing load and end-to-end throughput.

II. LITERATURE REVIEW

Josh Broch *et al.* [1] presents the results of a detailed packet-level simulation comparing four multi-hop wireless ad hoc network routing protocols that cover a range of design choices: DSDV, OLSR, DSR, and AODV. They have extended the NS-2 simulator to accurately model the MAC and physical layer behavior of the IEEE 802.11 wireless LAN standard including a realistic wireless transmission channel model, and present the results of simulations of networks of 50 mobile nodes. Each of the protocols studied performs well in some cases yet has certain drawbacks in others. DSDV performs quite predictably, delivering virtually all data packets when node mobility rate and movement speed are low, and failing to converge as node mobility increases. OLSR, although the worst performer in our experiments in terms of routing packet overhead. The performance of DSR was very good at all mobility rates and movement speeds, although its use of source routing increases the number of routing overhead bytes required by the protocol. Finally, AODV performs almost as well as DSR at all mobility rates and movement speeds and accomplishes its goal of eliminating source routing overhead, but it still requires the transmission of many routing overhead packets and at high rates of node mobility is actually more expensive than DSR. The actual work consisted of representing and comparing some researches on ad hoc routing performance

had been presented by Sampo Naski [2]. Three studies were reviewed and their results were compared. The comparison was done with respect to four major protocols: DSDV, DSR, AODV and OLSR. The studies compared were based on simulations. The simulation results of the different studies were generally quite similar. Additionally, for special scenarios and simulation runs with larger networks pointed out that the performance of ad hoc routing protocols may decrease rapidly especially if there are some bottlenecks in the network. It was also concluded that any protocol does not scale up without problems. M.H. Mamoun[3] studied and produced a performance comparison of DSR and AODV on the bases of packet delivery ratio, normalized routing load, normalized MAC load by varying the number of sources, speed and pause time. The simulation showed some important characteristic of differences between the protocols. The presence of high mobility implies frequent link failures and each routing protocol reacts differently during link failures. The different basic working mechanism of these protocols leads to the differences in their performances.

.

III. Proposed Work & Methodology

We are trying to evaluate the performances of two MANET protocols which reflect how efficiently the data is delivered. In contagion routing, multiple copies may be delivered to the destination. According to the literatures [1], [2], [3] and [4], some of these metrics are suggested by the MANET working group for routing protocol evaluation.

I. *Packet Delivery Ratio:* The ratio between the number of packets originated by the application layer CBR sources and the number of packets received by the CBR sink at the final destination.
II. *Average End-to-end Delay:* This includes all the possible delays caused by buffering during route discovery latency, queuing at the interface queue, retransmission delays at the MAC, and propagation and transfer times.
III. *Packet Dropped:* The routers might fail to deliver or drop some packets or data if they arrive when their buffer are already full. Some, none, or all the packets or data might be dropped, depending on the state of the network, and it is impossible to determine what will happen in advance.
IV. *Routing Load:* The total number of routing packets transmitted during the simulation. For packets sent over multiple hops, each transmission of the packet or each hop counts as one transmission.

IV. Simulation Parameters

The simulation parameters that have been used can be divided to two types that are: general simulation parameters and simulation parameters for every protocol. All of this parameters are common parameters and been used by many researcher. Table 1 shows the simulation parameters. We get Simulator Parameter like Number of nodes, Dimension, Routing protocol, traffic etc.

According to below table we simulate our network.

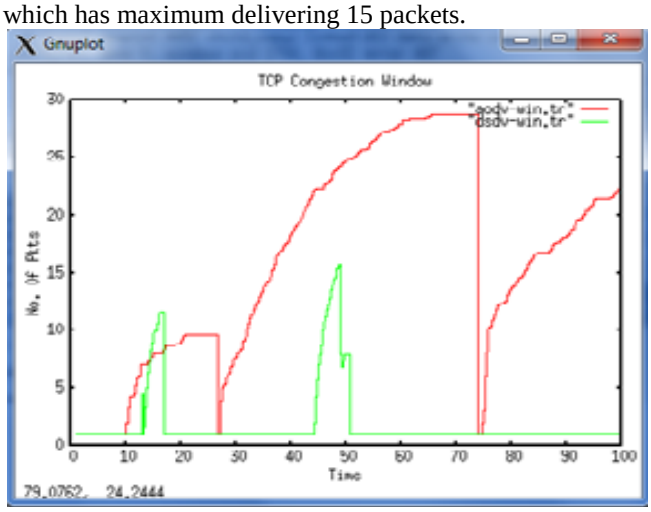
Table 4.1: Simulation parameter

Metrics	Parameter
Number of nodes	30
Dimension of simulated area	800×600
Routing Protocol	AODV,DSDV
Simulation time (seconds)	100
Traffic type	CBR
Packet size (bytes)	1000
Number of traffic connections	20 , 8
Maximum Speed (m/s)	30

V. Performance Measure

A. TCP Congestion Window:-

Shows the fraction of the originated application data packets each protocol was able to deliver, as a function of nodes. For AODV, packet delivery ratio is increase when the number of nodes increased, with both protocols maximum delivering 28 packets. While, DSDV has the lowest packet delivery ratio compared to these protocols which has maximum delivering 15 packets.



B. Average Delay:-

Here result shows average end-to-end delay in case of AODV routing is 770.53 m/s and DSDV time 536.64 m/s at the time of 30 mobile nodes AODV time delay is maximum compare to DSDV (table driven) protocol because AODV time number of packets sends by the user is greater than the DSDV routing protocol so more packet travel in case of AODV.

Protocol	AODV	DSDV
Delay	770.53	536.64

C. Average Data Dropped :-

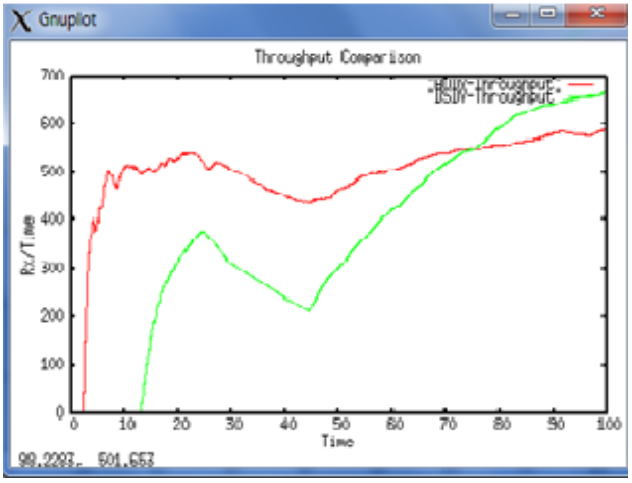
The network size and the average data dropped of the typical protocols which indicate the reliable degree of each protocol. Except DSDV, the rest protocols have lower data

dropped of the originated data packets when the network is smaller (with the number of nodes 10, 20, 30, 40, and 50). AODV perform well, which explains their higher reliability. However, with the number of nodes increasing, the protocol have a greater data dropped especially for DSDV. In these scenarios, DSDV fails to converge at network size bigger than 30 nodes. With 5 sources, DSDV's average data dropped comes to 25% nearby, although upon simulation of the data, it has been found that the variability was extremely large, with the data dropped ranging from 3.2% to 30%.

Protocol	AODV	DSDV
No. of Pkt	8225	6114
Data Drop	267	1551

D. Throughput

Throughput means number of packet received by the genuine receivers per unit time. Here we show result retrieve by the gnuplot in case of 30 mobile nodes. Result conclude both routing protocol throughput nearly same. But according to packets receive result AODV gives best result. The protocol has partial node's efficiency of battery energy and decided its scalability especially under an environment of narrower bandwidth and easier congestion. The two routing protocols impose vastly different amounts of overhead.



VI. Conclusions

Two protocol being simulated using the same parameters that had been discussed to ensure the simulation produced accurate results. In MANET we can find the performance of the various matrices and overcome the destroyed packet and drop rate, Transmission rate of these three metrics and compare with the two Protocols DSDV, AODV. The analysis had been done through simulation using commercial and highly reliable tool like Network Simulator (NS2).The performances comparison of the two routing protocols for mobile ad hoc networks. Besides, AODV uses the source-initiated in the route discovery process, but at the route maintenance stage, it uses the way of the table-driven, which also shows the better delay characteristic. In all the scenarios, AODV displays the smallest delay and loss ratio and the adaptive ability is also of relative strength. The performance of destination sequenced distance vector (DSDV) protocol has been analyzed keeping in mind a MANET Scenario where in all the nodes are static and two nodes are moving (one of which is a data harvester from static nodes and other one acting as a sink).

References

[1] Josh Broach, David A. Maltz, David B.Johson, Yih-Chun Hu & Jorjeta Jetcheva (1998). A Performance Comparison of Multi-hop Wireless Ad Hoc Network Routing Protocols. *Proc. ofMobiCom.* Texas. USA.

[2] Sampo Naski (2004). Performance of Ad Hoc Routing Protocols: Characteristics and Comparison. Seminar on Internetworking. Helsinki University of Technology.

[3] Mamoun Hussein Mamon (2007). Important Characteristic of Differences between DSR and AODV Routing Protocol. *MCN 2007 Conference.*

[4] Bu Sung Lee, Mai Ngoc San, Teck Meng Lim, Chai Kiat Yeo & Boon Chong Seet (2006). Processing Delay as a New Metric for On-Demand Mobile Ad Hoc.

[5] Li Layuan, Li Chunlin & Yaun Peiyan (2007). Performance Evaluation and Simulations of Routing Protocols in Ad Hoc Networks. *Computer Communications, 30,* pp. 1890-1898.

[6] Ashish Shrestha & Firat Tekiner (2009). Investigation of MANET Routing Protocols for Mobility and Scalability. UK. University of Central Lancashire.

[7] Hong Jiang (2001). Performance Comparison of Three Routing Protocols for Ad Hoc Networks. USA. University of California.

[8] Chenxi Zhu and M. Scott Corson (2002). QoS routing for mobile ad hoc network. *IEEE INFOCOM 2002.* New Jerssey.

[9] Samir R. Das, Charles E. Perkins, & Elizabeth M. Royer (2008). Performance Comparison of Two On-demand Routing Protocols for Ad Hoc Networks. *IEEE Jurnal.* USA.

[10] Morten Kronstad Vinjie (2006). Quality Of Service (QoS) in Mobile Ad Hoc Networks. *Grimstad.* Agder University College.

[11] OPNET Modeler. Available: http://www.opnet.com.

[12] Centre for Graduate Studies, Universiti Tun Hussein Onn Malaysia (2009). *Thesis Writing Guide.* 3rd ed. Malaysia.

[13] S. Carson & 1. Macker (1999). Mobile ad hoc networking (MANET): Routing protocol performance issues and evaluations considerations. IETF RFC 2501, from*http://www. iet(org/r(c/r(c250. txt46.*

[14] David B. Johson, David A. Maltz &Yih-Chun Hu (July 2004). The Dynamic Source Routing Protocol for Mobile Ad Hoc Networks. *Internet-Draft, draft-ietf-manet-dsr10.txt.*\