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Performance Analysis of Table Driven and On- Demand Routing Protocol in MANETs

Jyoti Pandey and Ravi Verma

Department of Computer Science, RITS, Bhopal India.
Associate Professor, Department of IT, RITS, Bhopal India.

Abstract

A Mobile Ad hoc Network is a type of wireless ad-hoc network, and it is a self configuring network of mobile routers connected by wireless links. In Mobile Ad hoc Network, nodes are mobile so that the results in frequent changes of network topology making routing in MANETs a challenging task. Many routing protocols are used in MANETs but the efficient routing protocols can provide significant benefits to mobile ad hoc networks, in terms of both performance and reliability. An Efficient routing protocol will make MANETs reliable and efficient. Many research communities are working in field of MANET and trying to adopt the protocols and technology in other applications as well.

This paper presents the performance of three well know routing protocols AODV, DSR and DSDV for CBR traffic in terms of packet delivery ratio, routing overhead, average end to end delay.

Keywords*:* MANET, CBR, AODV, DSR, DSDV

1. INTRODUCTION-

Mobile Ad hoc Networks (MANETs) refer to mostly wireless - networks where all network components are mobile. In a MANET there is no distinction between a host and a router since all network hosts can be endpoints as well as forwarders of traffic. In contrast to fixed infrastructure networks, MANETs require fundamental changes to network routing Destination, along with the source node's address and a unique identification number. Each node receiving the packet checks whether it knows of a route to the destination. If it does not, it adds its own address to the route record of the packet and then forwards the packet along its outgoing links. To limit the number of route requests propagated on the outgoing links of a node, a mobile only forwards the route request if the mobile has not yet seen the request and if the mobile's address

does not already appear in the route record. A route reply is generated when the route request reaches either the destination itself, or an intermediate node, which contains in its route cache an unexpired route to the destination. By the time the packet reaches either the destination or such an intermediate node, it contains a route record yielding the sequence of hops taken.

2. ROUTING PROTOCOLS

There are a large number of routing protocols for MANETs proposed so far. Three most commonly used routing protocols are discussed here.

Dynamic Source Routing (DSR) Protocol-

DSR Routing protocol is mainly use for wireless Mesh Network. The Dynamic Source Routing (DSR) protocol is an on-demand routing protocol that is based on the concept of source routing. It is similar to AODV in that it forms a route on- demand when a transmitting node request one [19].DSR has only two major phase which are Route Discovery and Route Maintenance.DSR is an on demand protocol designed to restrict the bandwidth consumed by control packets in ad hoc wireless networks by eliminating the periodic table update messages required in table driven approach [20].

This protocol used a special approach for construction phase is to establish a route by Flooding Route Request Packet in the network. In it destination node after receiving the route request responds by sending a route reply packet to source. In on demand (reactive) approach a route is established only when it is required and hence the need to find route to all other node in the networks required. But In DSR route maintenance mechanism does not repair the broken links. So the connection set up delay is higher than the Table Driven protocol.

Destination-Sequenced Distance Vector (DSDV)-

Destination-Sequenced Distance Vector Routing (DSDV) is a table-driven routing protocol for mobile ad-hoc networks based on the Bellman- Ford algorithm. It was developed by C. Perkins and P. Bhagwat in 1994.[20].This algorithms are used for solve the Routing loop problems.

It increases convergence speed, and reduces control message overhead, and is stored in the next-hop table entry of these nodes. Each routing table contains a sequence number and it uses the latest sequence number if a route receives new information. If the sequence no is same which is already in the table, the route with better metrics is used. In this protocol all destination in network always show that less delay is required in the path set approaches. But DSDV requires a regular updates of its routing table which uses up battery power and small amount of bandwidth even when the network is idle. So the DSDV does not appear to be much today.

Ad-hoc On-demand Distance Vector (AODV) Routing Protocol-

AODV(On-demand Distance Vector)routing protocol is a reactive routing protocol that uses some characteristics of proactive routing protocols. The AODV Routing Protocol uses an on-demand approach for finding routes, that is, a route is established only when it is required by a source node for transmitting data packets. In an on-demand routing protocol, the source node floods the Route Request packet in the network when a route is not available for the desired destination. It may obtain multiple routes to different destinations from a single Route Request. Route Request carries the source identifier, destination identifier and source sequence number for the communication with other networks. Each node has a sequence number so that it can not repeat route request that they had passed. Ad Hoc On-Demand Distance Vector (AODV) [4] is a routing protocol that shares on-demand behavior with DSR and uses sequence numbers for sharing the data. In AODV Routes are obtained by a discovery process similar to DSR. However, AODV stores routing information as one entry per destination in contrast to DSR, which caches multiple entries per destination.

3. SIMULATION ENVIRONMENT

The performances of the routing protocols with different CBR traffic model are used for different simulation parameters.

TABLE 1. SIMULATION PARAMETERS

Parameter	**Value**
Simulation Time	30 min
Terrain Area	500×500 m2
Node Placement Strategy	Random
Propagation Model	Two-Ray Model
Traffic Types	CBR
Transmission Range	250
Mobility Model	Random-Waypoint
Radio Type	Accumulated Noise Model
Network Protocol	IP
MAC Protocol	IEEE 802.11
Routing Protocols	AODV,DSR,DSDV
CBR Packet size	512 Bytes

The simulations have been carried out for 1800 seconds. The data packets are

generated by CBR, TELNET and FTP sources only during last 800 seconds of simulation time. To avoid initial transient problem and the problem with random waypoint mobility model as reported in, in our simulations we discard the initial 1000 seconds of simulation period. Five runs with different seeds have been conducted for each scenario and collected data is averaged over these runs.

4. PERFORMANCE METRICS-

The following four performance metrics have been chosen to compare the three routing protocols:

Packet Delivery Ratio*:* The ratio of data packets delivered to the destinations to those generated by the sources.

Average End-to-End Delay*:* The average delay a data packet takes to travel from source to destination.

Routing Overhead: It is the number of packet generated by routing protocol during the simulation

5. SIMULATION RESULTS

In this section we present the results of evaluation, through simulation, of three routing protocols (AODV, DSR, DSDV) based on various performance metrics under different traffic conditions.

Effect of Pause Time

The pause time is the time for which a node waits on a destination before moving to other destination. We used this as a parameter as it indicates mobility of nodes. Low pause time means node will wait for less time thus giving rise to high mobility scenario.

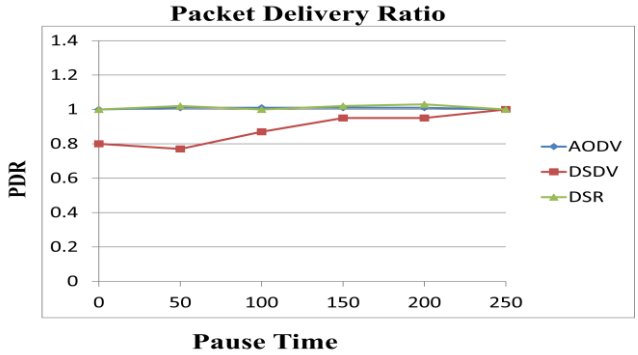

Figure 1. Packet delivery ratio versus pause time for AODV, DSR and DSDV (Number of node = 50, Area space = 500m x 500m)

For the CBR traffic AODV shows maximum packet delivery ratio of 99% in a static network which are approximately same as DSR when the mobility is high DSR shows less pause time approximately 30% less packet delivery ratio. DSDV has lowest packet delivery ratio amongst the three. The reason for this low delivery ratio of DSDV for CBR traffic due to proactive nature which require updating and maintaining all the routes in the routing table.

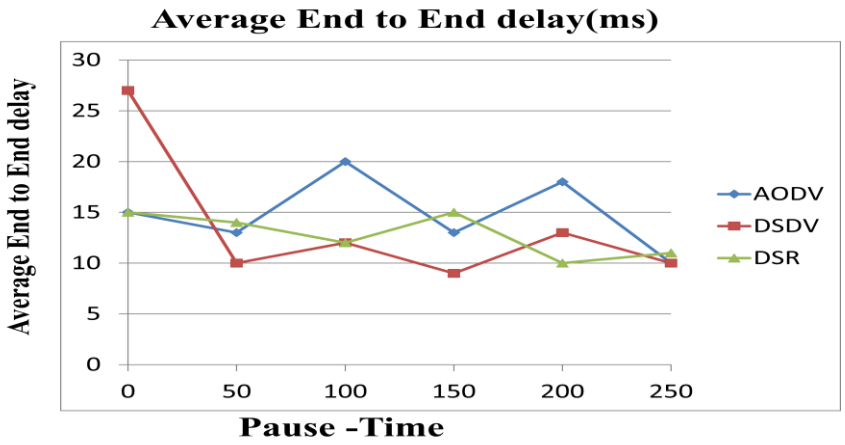

Figure 2. Avg. end to end delay versus pause time for AODV, DSR and DSDV (Number of node = 50, Area space = 500m x 500m)

DSDV protocol shows the maximum delay for all the three protocols .This is due to source routing used by DSDV. The delay also increases with increase in the load. AODV and DSR have approximately same end to end delay.

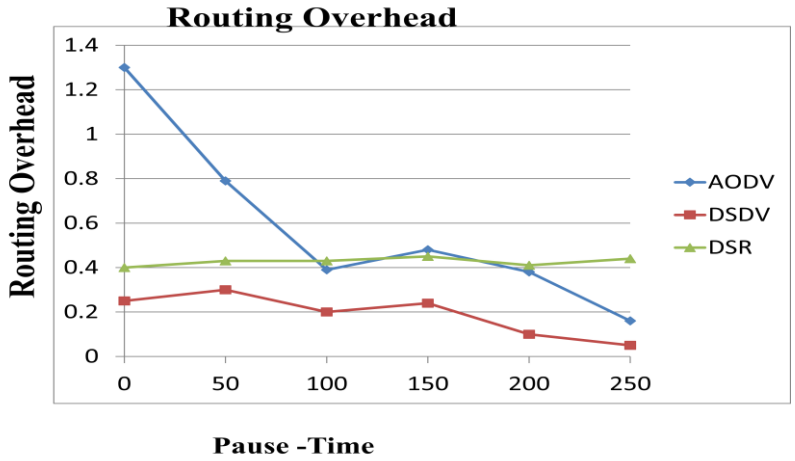

Figure3. Routing overhead versus pause time for AODV, DSR and DSDV (Number of node = 50, Area space = 500m x 500m)

The AODV shows the maximum overhead load in the all three type of protocol but the DSDV and DSR shows approximately same overhead. When the routing message overload (the number of control message send) is consider the results show that for all routing protocol.

6. CONCLUSION & FUTURE SCOPE

From the simulation based results, it is found that AODV shows the best performance in terms of delivery ratio, routing message overhead, and end-to-end delay. Results show the superiority of reactive protocols over proactive protocols. For CBR traffic in terms of packet delivery ratio performance of AODV is best in all network scenarios. The proactive protocol DSDV shows the minimum average end-to-end delay and DSR requires the minimum number of routing messages amongst the three.

The proactive protocol DSDV shows better results than reactive protocol DSR but AODV outperforms the two. DSR tends to performs poorly in more stressful scenarios.

DSR is based on source routing, which means that the byte overhead in each packet can affect the total byte overhead in the network quite drastically when the offered load to the network and the size of the network increases. In those situations, a hop-by-hop routing protocol like AODV is more desirable. Furthermore, in highly mobile networks, the nodes movements result in frequent changes of network topology making the routes in routing tables and caches more and more obsolete. Due to use of caching in DSR and its inability to expire stale routes, its Performance becomes mediocre in highly mobile networks.

In future we plan to investigate the performance of routing protocols with multimedia traffic, HTTP traffic. The results here show that AODV performs best for all the traffic scenarios so we can try to update the protocol in order to accept and perform good for videos on demand.

REFERENCES

[1] Z.J. Haas, J. Deng, B. Liang, P. Papadimitratos and S. Sajama, "Wireless Ad-Hoc Networks," Encyclopedia of Telecommunications,Wiley Interscience, December, 2002.

[2] E. M. Royer, C. K. Toh, " Review of Current Routing Protocols for Ad Hoc Mobile Wireless Networks," *IEEE Personal* Environment." Technical Report 990027, University of California, 13, 1999.

[3] S. Murthy and J. J. Garcia-Luna-Aceves, "An Efficient Routing Protocol for Wireless Networks," ACM Mobile Networks and App.J., Special Issue on Routing in Mobile Communication Networks. pp.183–97, October 1999.

[4] C.E.Perkins, E.M. Royer, S.R.Das, " Ad hoc On Demand Vector(AODV) Routing," IETF RFC3561, July 2003. Internet Draft draft-ietf-manet- aodv-

08.txt, March 2001.

[5] D. B. Johnson, D. A. Maltz, J. Broch, "DSR: The Dynamic Source Routing Protocol for Multi-Hop Wireless Ad Hoc Networks,"chapter 5, pp 139-172, Addison Wesley, 2001. http://www.monarch.cs.cmu.edu/

[6] J. Broch, D. A. Maltz, D.B. Johnson, Y. Hu, J. Jetcheva, "A Performance Comparison of Multi Hop Wireless Ad Hoc Routing Protocols," *Proceedings of the Fourth Annual ACM/IEEE International conference on Mobile Computing and Networking (MobiCom '98)*, October1998, http://www.monarch.cs.cmu.edu/

[7] C. Mbarusimana,A.Shahrabi, "Comparative Study of Reactive and Proactive Routing Protocols Performance in Mobile Ad Hoc Networks,*"IEEE 21st International Conference on Advanced Information Networking and Applications Workshops (AINAW'07)*, 2007.

[8] J.Yoon, M. Liu, B.Noble "Random Waypoint Considered Harmful" IEEE INFOCOM, 2003.

[9] GloMoSim: Global Mobile Information Syatems Simulation Library. http://pcl.cs.ucla.edu/projects/glomosim/.

[10] L. Bajaj, M. Takai, R. Ahuja, R. Bagrodia

[11] David B. Johnson and David A. Maltz. Dynamic source routing in ad hoc wireless networks. Technical report, Carnegie Mellon University, 1996.

[12] Mehran Abolhasan, Tadeusz Wysocki, and Eryk Dutkiewicz. A review of routing protocols for mobile ad-hoc networks. Technical report, Telecommunication and Information Research Institute, University of Wollongong, Wollongong, NSW 2522; Motorola Australia Research Centre, 12 Lord St., Botany, NSW 2525, Australia,2003. Evaluation of AODV, DSDV & DSR Routing Protocol in Grid Environment" Nor Surayati Mohamad, Usop Azizol Abdullah, Ahmad Faisal Amri Abidin.

[13] Xiaoyan Hong, Kaixin Xu, and Mario Gerla. Scalable routing protocols for mobile ad hoc networks. 2002.

[14] Integration of mobile ad-hoc networks, EU project DAIDALOS, Susana Sargento, Institute of Telecommunications.

[15] Mobile Ad Hoc Networking: An Essential Technology for Pervasive Computing Jun-Zhao Sun MediaTeam, Machine Vision and Media Processing Unit.

[16] C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks, Architectures and Protocols", Second Edition, Low price Edition, Pearson Education, 2007.

[17] Performance Evaluation of Routing Protocols for MANETs under Different Traffic Conditions978-1-4244-6349-7/10/$26.00 c 2010 IEEE V6-79.

[18] Indian Journal of Computer Science and Engineering(IJCSE)Vol. 1 No. 4 364-371 Comparative Study of Adhoc Routing Protocol AODV,DSR and DSDV in Mobile Adhoc Network.

[19] David B. Johnson. Routing in Ad Hoc Networks of Mobile Hosts. Proceedings of the Workshop on Mobile Computing Systems and Applications, pp. 158–163, IEEE Computer Society, Santa Cruz, CA, December 1994.

[20] Perkins, Charles E. and Bhagwat, Pravin (1994). "Highly Dynamic Destination-Sequenced Distance-Vector Routing (DSDV) for Mobile Computers" (PDF). Retrieved 2006-10-20.

[21] Mobile Ad-hoc Networking --https://en.wikipedia.org/wiki/Dynamic _Source_Routing

[22] Prakash, J., R. Kumar and J.P. Saini, 2015. A multi-metric QoS based gateway discovery for multi-hop wireless network. Int. J. Applied Eng. Res., 10: 35508-35516.

[23] Prakash, J., R. Kumar, J.P. Saini and M.K. Maurya, 2016. Periodicity based gateway discovery algorithm in hybrid multihop network. Int. Rev. Comput. Software, 11: 489-501.