Volume 2, Issue 5, May 2012 ISSN: 2277 128X

International Journal of Advanced Research in Computer Science and Software Engineering

Research Paper

Available online at: www.ijarcsse.com

Reliability of MANET through the Performance Evaluation of AODV, DSDV, DSR

Ankur Lal*, Dr.Sipi Dubey, Mr.Bharat Pesswani

CSE,CSVTU

ankur.at.cit@gmail.com

Abstract—**A** mobile ad-hoc network (MANET) **is a self-configuring infrastructure less network of mobile devices connected by wireless, it also represent complex distributed systems that comprise wireless mobile nodes that can freely and dynamically self organize into arbitrary and temporary ad hoc network topologies. Manets are infrastructure less and can be set up anytime, anywhere. for the reliability of manet we have analysed the performance of different routing protocols.The performance measurements are based on the various parameters such as throughput ,goodput and routing load.**

Keywords— Mobile Ad hoc Network, Simulation, AODV, DSR, DSDV, throughput, goodput, routing loads.

I. INTRODUCTION

Mobile Ad Hoc Network (MANET) is a collection of communication devices or nodes that wish to communicate without any fixed infrastructure and pre-determined organization of available links. It is a self-configuring network of mobile nodes connected by wireless links the union of which forms an arbitrary topology. The nodes in MANET themselves are responsible for dynamically discovering other nodes to communicate .The nodes are free to move randomly and organize themselves arbitrarily thus, the networks wireless topology may change rapidly and unpredictably. Routing is a core problem in networks for sending data from one node to another. Such networks are aimed to provide communication capabilities to area where limited or no communication infrastructures exist. MANETs can also be deployed to allow the communication devices to form a dynamic and temporary network among them.

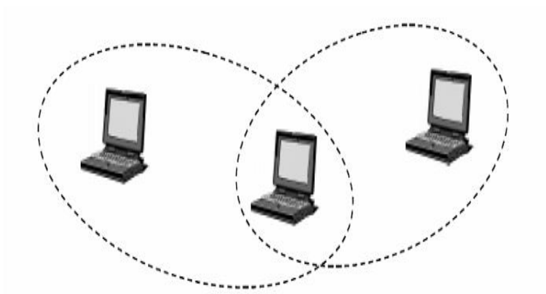


Figure 2.1: Example of a simple ad-hoc network with three participating nodes.

II. MANET ROUTING PROTOCOL

There are different criteria for designing and classifying routing protocols for wireless ad hoc networks. They are classified are as follows:

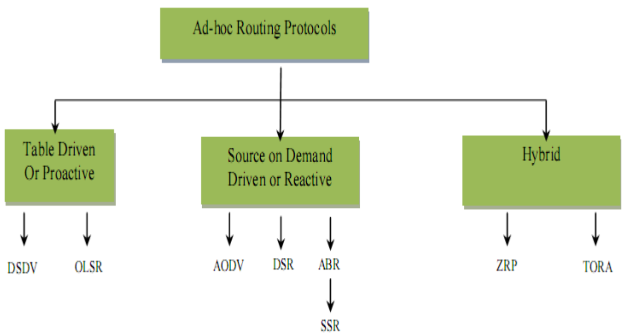


Figure 1: Classification of MANETs Routing Protocols.

2.1 Proactive (Table-Driven) Routing Protocols

In proactive routing, each node has one or more tables that contain the latest information of the routes to any node in the network. Each row has the next hop for reaching a node/subnet and the cost of this route. Various table-driven protocols differ in the way the information about a change in topology is propagated through all nodes in the network. There exist some differences between the protocols that come under this category depending on the routing information being updated in each routing table. Furthermore, these routing protocols maintain different number of tables. This causes more overhead in the routing table leading to consumption of more bandwidth. Examples of such schemes are the conventional routing schemes, Destination Sequenced Distance Vector (DSDV).

2.2 Reactive (On-Demand) Protocols

Also known as on-demand routing protocol. They do not maintain or constantly update their route tables with the latest route topology. These protocols take a lazy approach to routing If a node wants to send a packet to another node then this protocol searches for the route in an on-demand manner and establishes the connection in order to transmit and receive the packet. Examples of reactive routing protocols are the dynamic source Routing (DSR) ,ad hoc on-demand distance vector routing (AODV).

III. DESTINATION-SEQUENCED DISTANCE-VECTORS ROUTING (DSDV)

DSDV is a table-driven routing scheme for ad hoc mobile networks based on the Bellman-Ford algorithm. The main contribution of the algorithm was to solve the Routing Loop problem which is present in Bellman-Ford algorithm. Every mobile station maintains a routing table with all available destinations along with information like next hop, the number of hops to reach to the destination, sequence number of the destination originated by the destination node, etc. DSDV uses both periodic and triggered routing updates to maintain table consistency. Routing table updates can be of two types and incremental. Full dump packets carry all available routing information and may require multiple Network Protocol Data Units (NPDU); incremental packets carry only information changed since the last full dump and should fit in one NPDU in order to decrease the amount of traffic generated. Mobile nodes cause broken links when they move from place to place. When a node receives infinity metric, and it has an equal or later sequence number with a finite metric, it triggers a route update broadcast, and the route with infinity metric will be quickly replaced by the new route. When a mobile node receives a new route update packet; it compares it to the information already available in the table and the table is updated based on the following criteria.

IV. AD HOC ON DEMAND DISTANCE VECTOR (AODV)

Each node maintains a routing table which is used to store destination and next hop IP addresses as well as destination sequence numbers. When a node wishes to communicate with another node, it checks with its existing information for a valid route to the destination. If one exists, the node uses that route for communication with the destination node Each entry in the routing table has a destination address, next hop, precursor nodes list, lifetime, and distance to destination. To initiate a route discovery process a node creates a route request (RREQ) packet. The packet contains the source nodes IP address as well as the destinations IP address. The RREQ contains a broadcast ID, which is incremented each time the source node initiates a RREQ. The broadcast ID and the IP address of the source node form a unique identifier for the RREQ. The source node then broadcasts the packet and waits for a reply. When an intermediate node receives a RREQ, it checks to see if it has seen it before using the source and broadcast IDs of the packet. If it has seen the packet previously, it discards it. Otherwise it processes the RREQ packet. To process the packet the node sets up a reverse route entry for the source node in its route table which contains the ID of the neighbors through which it received the RREQ packet. In this way, the node knows how to forward a route reply packet (RREP) to the source if it receives one later. When a node receives the RREQ, it determines if indeed it is the indicated destination and, if not, if it has a route to respond to the RREQ. If either of those conditions is true, then it unicasts a route reply (RREP) message back to the source. If both conditions are false, i.e. if it does not have a route and it is not the indicated destination, it then broadcasts the packet to its neighbors. Ultimately, the destination node will always be able to respond to the RREQ message. The protocol uses different messages to discover and maintain links:
Route Requests (RREQs)
Route Replies(RREPs)
Route Errors(RERRs)

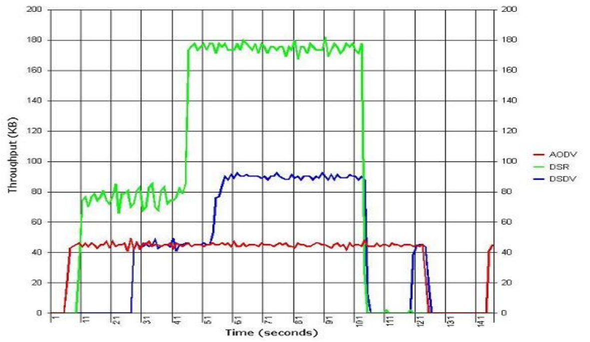
V. DYNAMIC SOURCE ROUTING (DSR)

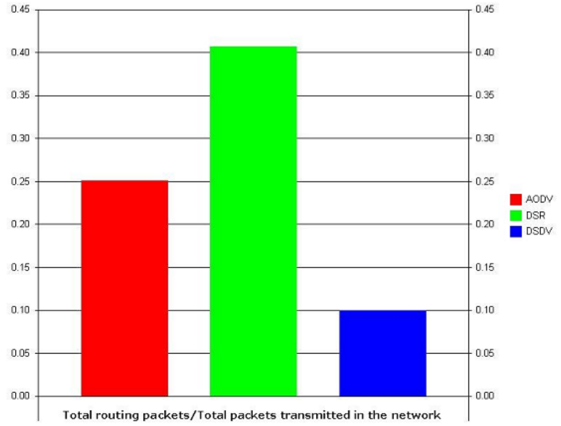
DSR is on demand, which reduces the bandwidth use especially in situations where the mobility is low.It has two important phases, route discovery and route maintenance. The main algorithm works in the following manner. A node that desires communication with another node first searches its route cache to see if it already has a route to the destination. If it does not, it then initiates a route discovery mechanism. This is done by sending a Route Request message. When the node gets this route request message, it searches its own cache to see if it has a route to the destination. If it does not, it then appends its id to the packet and forwards the packet to the next node; this continuous until either a node with a route to the destination is encountered (i.e. has a route in its own cache) or the destination receives the packet. In that case, the node sends a route reply packet which has a list of all of the nodes that forwarded the packet to reach the destination. This constitutes the routing information needed by the source, which can then send its data packets to the destination using this newly discovered route. DSR can support relatively rapid rates of mobility.

VI PERFORMANCE EVALUATIONS AND RESULTS

6.1 Throughput: The total bytes received by the destination node per second (Data packets and Overhead).
Goodput:

6.2 Goodput (In terms of Number of Packets):
The ratio of the total number of data packets that are sent from the source to the total number of packets that are transmitted within the network to reach the destination.

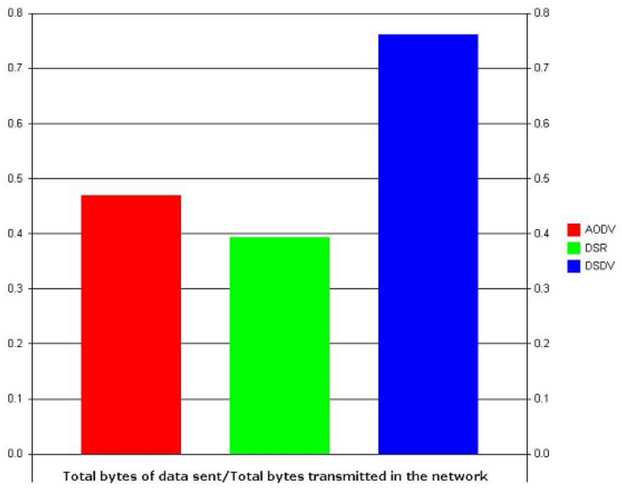




(a)

6.3 Routing Load:

Routing Load (In terms of Number of Packets):
The ratio of the total number of routing packets that are sent Within the network to the total number packets that's are transmitted within the network to reach the destination.



CONCLUSIONS AND FUTURE WORKS

In this paper, we have presented simulation tool/prototype which can ease the task of simulation of MANET routing protocols even in Windows based environments. Many users dealing with ns-2 simulations face troubles in setting up Linux or other systems and environment.Using our simulation tool, we obtained different graphs and analyzed the results for throughput,goodput,load load,which lead us to the following conclusions:

1. For AODV, we can see that it adapts quickly to the change of the network and has a relatively stable throughput with a moderate goodput. So, in an application where there is a fast change in the network topology and a requirement of stable date rate, AODV is more preferable.
2. DSDV turns out to have the best goodput and lesser routing load; however, it takes time to converge. So if there is relatively less number of nodes in the network and the mobility is somewhat steady or slow,
DSDV will work more efficiently.
3. DSR, though has a very high throughput, it actually contains less data packets and we can see that there are lots of fluctuations on the throughput curve which are not preferred in a wireless network.

As our future works, we would like perform the comparision of TCP variants over different routing protocols.also we can perform this in network simulator .

REFERENCES

[1] Performance Comparison of On-Demand and Table Driven Ad Hoc Routing Protocols using NCTUns by Khaleel UrRahman Khan Rafi U Zaman A. Venugopal Reddy, Tenth International Conference on Computer Modeling andSimulation, Pages 336-341.

[2] Md. Monzur Morshed, Md. Habibur Rahman, Md. Rezaur Rahman Mazumder, and K. A. M. Lutfullah, Simulation and Analysis of Ad-hoc on demand Di ICIS 2009, vol. II, pp. 610- 614, November 2009.

[3] Azizol Abdullah, Norlida Ramly, Abdullah Muhammed, Mohd Noor Derahman: Performance Comparison Study of Routing Protocols for Mobile Grid Environment, pp 82-88, IJCSNS International Journal of Computer Science and Network Security, VOL.8 No.2, February 2008.

[4] C. S. R. Murthy and B. S. Manoj, Ad Hoc Wireless Networks: Architecture and Protocols, ch. Routing Protocols for Ad Hoc Wireless Networks, pp. 299{364. Prentice Hall Communications Engineering and Emerging Technologies Series,New Jersey: PrenticeHall Professional Technical Reference, 2004.

[5] Network simulator-ns-2. www.isi.edu/nsnam.

[6] Performance Evaluation of AODV, DSDV & DSR Routing Protocol in Grid Environment, by Nor Surayati

Mohamad Usop, Azizol Abdullah, IJCSNS International Journal of Computer Science and Network Security, 9, No.7, July2009.

[7] S H Manjula, C N Abhilash, Shaila K, K R Venugopal, and L M Patnaik, Performance of AODV Routing Protocol using Group and entity Mobility Models in Wireless Sensor In proceedings of the International Multi Conference of Engineers and Computer Scientists (IMECS 2008), Hong Kong, vol. 2, pp 1212-1217, 19-21 March 2008.

[8] Performance Measurement of Various Routing Protocols in Ad-hoc Network, Md. Anisur Rahman, Md. Shohidul Islam, Alex Talevski,Proceedings of the International Multi Conference of Engineers and Computer Scientists 2009,1, IMECS 2009, March 18 - 20, 2009, Hong Kong.

[9] P. Johansson, T. Larsson, N. Hedman, B. Mielczarek,and M. Degermark. Scenario based Performance Analysis of Routing Protocols for Mobile Ad-hocNetworks, Mobicom99, 1999, Pages 195-206.

[10] C. E. Perkins and P. Bhagwat Highly Dynamic Destination Sequenced Distance-vector Routing (DSDV) for Mobile Computers, Proceedings of the ACM SIGCOMM 94 Conference, August 1994, Pages 234244.

[11] S.R. Das, C.E. Perkins, and E.E. Royer, Performance Comparison of Two on Demand Routing Protocols for Ad Hoc Networks, Proc. INFOCOM, 2000, pp. 3-12.

[12] Sachin Kumar Gupta and Dr. R. K. Saket, protocols in Mobile Ad-hoc Networks, In proceedings of the International Conference on Electronics, Information and Communication Engineering; Jodhpur (Rajasthan) India. pp. 1-5, 28-30 March 2011.

