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RESEARCH ARTICLE

A SURVEY ON PERFORMANCE OF AODV AND DSDV PROTOCOLS IN MOBILE ADHOC NETWORKS

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ABSTRACT

Now adays, MANETS are widely used due to its mobility and self-configuring network features, in which any centralized or switching center is not required. In MANETS all the nodes are mobile which are dependent on battery. In MANETS each node have to make connection to receiver node in order to send /forward the data packets in network. As in network there are many mobile nodes and nodes are moving, to send these data packets we required routing protocols .There are many routing Protocols which are classified into 3 types. Proactive, Reactive and Hybrid routing protocols. In this paper we make comparison between proactive and reactive routing protocol based on some performance metrics such as propagation delay, node throughput, and average end to end delay, packet jitter. For comparing proactive and reactive routing protocol we use these two routing protocol a proactive routing protocol DSDV (Destination Sequenced Distance Vector routing) and reactive improvement of DSDV routing AODV (Ad-hoc on demand vector routing).

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INTRODUCTION

Evolution of wireless network is started in 1970 and interest is being increased day by day. To establish the communication between two nodes in MANET we use multi hop paths. In MANET the node communicates using wireless devices and due to mobility of node the topology changes dynamically. Due to high mobility of nodes network link are broken very frequently. The network density and number of nodes in a network is depends on application used in MANET. The use wireless network has become more popular technology due to its features for using internet. It provides easy implementation and its cost is too low as compared to traditional networks. It provides facility to add additional device easily and device equipped with wireless features is called as node. Each node has certain range within which it establishes connection with other node. This technology is also being used in civilian as well as military application. It provide limited bandwidth and mode of communication is wireless.

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To communicate with different or all nodes in mobile ad-hoc network different routing protocol were proposed. Basically three routing protocols are there in MANETS. They are pro-active, reactive and hybrid. These protocols are discussed below:

PROACTIVE ROUTING PROTOCOLS

This is a table driven routing protocol in which every node maintains one or more than one table containing routing information of every other node in network. All the node up to date the table so that updated information of network is maintained in table. Whenever topology of network is changed the table is updated and sends to all nodes so that every node in the network must have the updated information. The main disadvantage of this protocol is every time table is updated whenever any change in network, send to all the nodes. E.g. DSDV.

REACTIVE ROUTING PROTOCOL

This is on-demand routing protocol, in this routing protocol routing table is not maintained at every node as in proactive.

Route discovery process is performed when a source node wants to communicate with other destination node. Route is find through route finding process in which route from source to destination is determined and route is valid until the route is find or the communication between node is completed and route is longer needed. E.g. AODV.

HYBRID ROUTING PROTOCOL

This protocol contains features of both proactive and on reactive routing protocol. E.g. ZRP

ROUTING PROTOCOLS

DSDV ROUTING PROTOCOL

DSDV routing protocol is proactive routing protocol for MANETS which used DBF algorithm. In this algorithm every path is assigned by a sequenced number (SN) assign by destination, which defines the route life time validity. Every node manage their (SN) by assigning it two greater than old sequence number (i.e. sequence number are even)every time the route passes. When route update with higher sequence is received, the old route is replaced by new route. Sometime when different route with same sequence number is encountered then the better route is chosen. Updates are sent every so often or instantly when any significant topology change is encountered. There are basically two types of updated available. "Whennode conveys the complete routing table is Full Dump and Incremental Update in which node directs only those entries which are altered after last update. To avoid fluctuations in route updates, DSDV employs a "settling time" data, which is used to know the time when route becomes stable". In DSDV, broken link may be detected by the layer-2 protocol [2], or it may instead be inferred if no broadcasts have been received for a while from a former neighbor node.

AODV ROUTING PROTOCOL

Ad-hoc On Demand Distance vector (AODV) is one of the reactive routing protocol. When a source node wishes to communicate to a destination node, a route is generated. However, this route would not be developed until the source wishes to communicate to the destination. AODV protocol works in three phases Path establishment, Route Identification, and Maintenance.

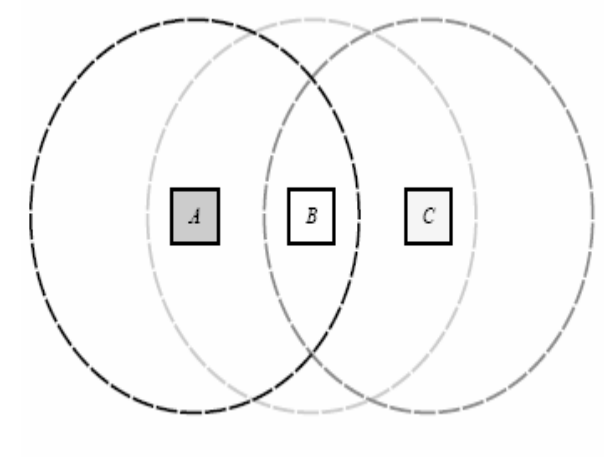


Fig1.Mobile Ad hoc network with 3 mobile nodes

There are three types of control messages used in AODV:

RREQ: "When a source node wishes to communicate to destination node whose route is unknown it broadcasts a Route Request Message (RREQ)". Each RREQ message contains a Request ID (uniquely identifies the RREQ), Source IP, Destination IP, Sequence number (identifies whether the control packet is recent or not), Hop count (number of nodes between source and destination) & flags.

RREP: "If the receiving node is the destination itself or is an intermediate node and has a fresher route to the destination then a RREP (Route Reply) control message is generated and sent back to the source". Each RREP packet contains destination node Sequence number, Source IP, Destination IP, Route lifetime, Hop count & flags.

RERR: "When a link failure is detected at a node which belongs to an active route, a RERR (Route Error) control message is generated to all its neighbors that were using the route".

Performance Evaluation Of routing protocols using metrices

NODE THROUGHPUT

To calculate the performance and speed (byte per second) of a node while transmitting the data is known as Node Throughput. We can also defined as the ratio of the total amount of data received at receiver node send by sender to the time taken by receiver to receive last packet.

Throughput = total received data / simulation time

PACKET DELIVERY RATIO

Packet delivery ratio is calculated by dividing the amount of packet reached to destination through the number packets originated by application layer of source.(i.e. CBR)

AVERAGE END TO END DELAY

"It is average time taken in data packet transmission from source node to the time data packet reached itsdestination and measure in seconds".

PACKET JITTER

It is variation in packet delays. These delays can be due to congestion, improper queuing, or configuration error. The packets is even space intervals at sender sides but due variation in delays they reached at different intervals.

Simulation Environment

"The NS (Network Simulator) is an event driven which simulates different types of IP address". It also used for different network protocol for example Telnet, Web, UDP, FTP, and different routing algorithm. It also supports multicasting and some of the MAC layer protocol for local area network simulation. It is written in programming languages such as C++ and object oriented tool commanding language.

A study is carried on to evaluate the performance of Reactive and proactive routing protocols using performance matrices such as throughput, average end to end delay ,packet jitter, packet delivery ratio of AODV and DSDV. To compare the performance of these routing protocols an environment is created which is mentioned in below table:

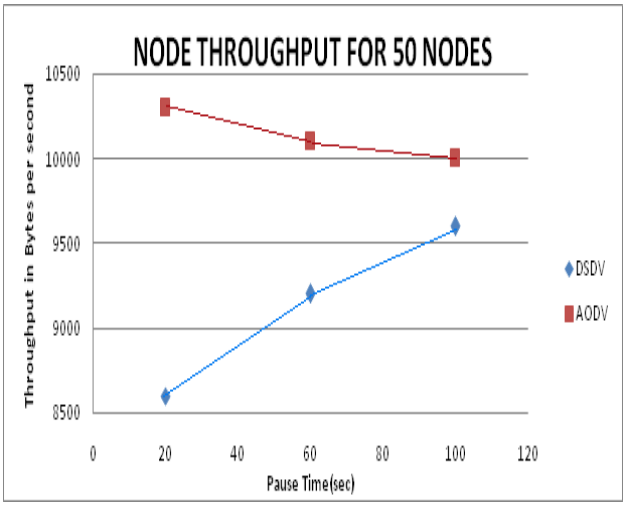
Table 1. Simualtion Environment

Parameters	Values
Radio Propagation Model	Two rays ground
Protocol used	AODV,DSDV
Traffic source	Constant bit rate
Packet size	512 bytes
Max speed	10m/s
Area	500m X 500m
Node transmissionrate	250m
No of nodes	50,100
Application	FTP
MAC	802.11
Total simulation time	100 sec
Pause time	20,60,100
Network simulator	NS 2.3

SIMULATION AND ITS RESULT

NODE THROUGHPUT

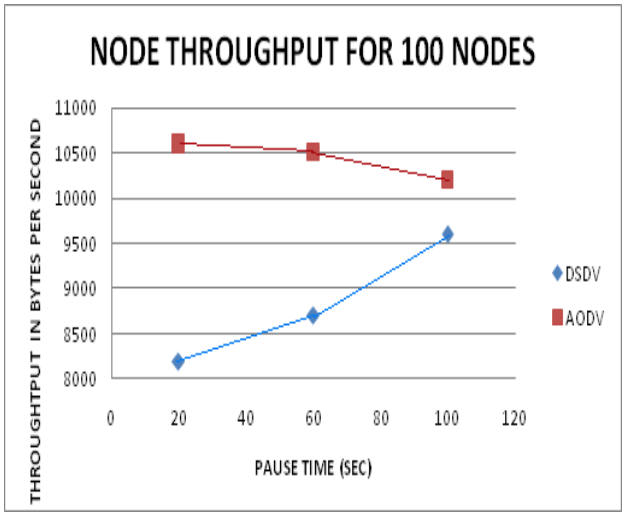
According to condition provided the throughput can be defined "as the ratio of total amount of data received (in bytes) to the total simulation time". We examine that throughput of AODV protocol is much higher than the DSDV. To determine the throughput we used 50,100 nodes with different pause time 20, 60,100 sec which are plotted in below graph. We can clearly see that the throughput of AODV is higher than DSDV routing protocol.



Graph 1. Node throughput for 50 nodes

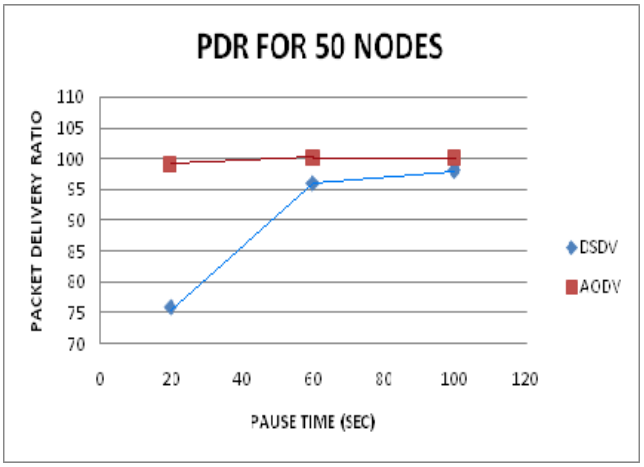
PACKET DELIVERY RATIO

PDR is defined as ratio of received data packet to the sent data packet. As every routing protocol required higher delivery ratio. It defines the efficiency and correctness of routing protocol. In order to define the performance of routing protocol we used 50,100 nodes with varying pause time. While examining the delivery ratio of AODV and DSDV we came to result that delivery ratio of DSDV is higher than AODV in low pause time while we increase the pause time the performance of DSDV is decrease and Packet delivery ratio of AODV increases.

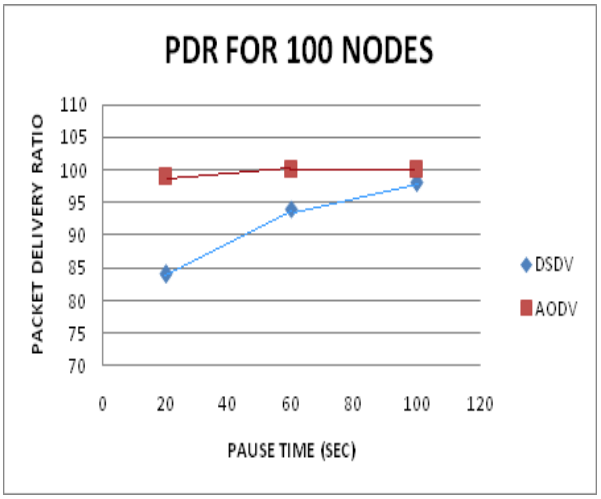


Graph 2. Node throughput for 100 nodes

So come to conclusion that AODV is much reliable than DSDV. Their performance can be seen in below grafh at various pause time for 50 and 100 nodes.



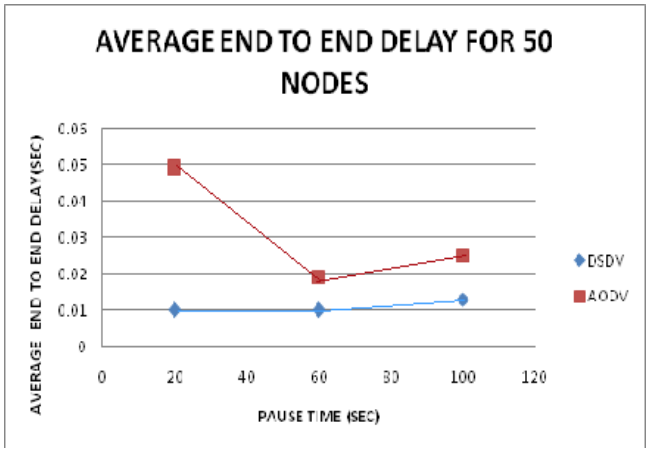
Graph 3. PDR for 50 nodes



Graph 4. PDR for 100 nodes

AVERAGE END TO END DELIVERY

It is the total time taken by data packet from source to reach the destination in a network.



Graph 5. PDR for 50 nodes

It is an average time to traverse in a network. It includes delay such as queues buffer, transmission time and delay due to routing activity and Mac control exchanges. For a routing protocol the average must be less.It means that for data transmission the protocol which takes less time is considered as reliable routing protocol. While examining the AODV and DSDV routing protocol the DSDV show good performance as compared to AODV. As DSDV is table driven protocol in which routes are predefined in routing table and there is less time delay whereas in AODV the route is defined on demand so the time delay is more than DSDV. So we conclude that DSDV is more reliable in average end to end delay than AODV.

Conclusion

In this paper we compare two routing protocol of MANETS Ad-hoc on demand distance vector and Destination-Sequenced Distance Vector routing protocol using NS-2.3 simulator. We generate the simulation result using performance matrices such as node throughput, packet delivery ratio, and average end to end delay with different number of nodes and varying hiatus time. From this simulation result we conclude that DSDV is reliable for low mobility in network as it produce reliable result in regular end to end delay .DSDV is a table driven protocol which is appropriate for small network with limited number of nodes and for lower mobility. Whereas if we compare AODV hasto find route while communicating to other node, the end to end delay of AODV is worse than DSDV. The AODV perform well in the case of higher mobility in network, In all other cases we seen the performance of AODV is quite better than DSDV.

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