



Performance Parameter of AODV and DSR Protocol by Varying Nodes Mobility

Nayla Sherwani, Shahjahan Ali

Abstract— MANET is a cluster of nodes that are mobile which transfer the packet within a limited transmission range. It is decentralized and infrastructure less wireless network. Due to host mobility requirement for a robust dynamic routing protocol is needed, since a random and dynamic difference in the network topology is there. This paper presents a performance analysis between two routing protocols AODV and DSR. In terms of throughput, PDR and delay both protocols AODV and DSR is compared.

Keywords: AODV, DSR, Mobile Ad-hoc Network, NS-2.

I. INTRODUCTION

MANET is a non-permanent wireless network which is made of a collection of nodes which is mobile connected with other nodes via links that is wireless. MANET don't have any infrastructure and provides wireless links which are multi hop in nature. MANET's real time environment applications are rescue areas, disaster relief and for military purposes which do not requires fixed infrastructure. In MANET, hosts are movable and communicate with each other under the radio range area. It is an inter set of mobile nodes, in which sender communicates through multi hop network to transmit packets to the destination. MANET is ungraded to many types of attacks because of various security problems such as dynamic nature, limited computation and shortage of defense's clear line. Due to mobility in communication with wireless, it invites lot of data security attacks and threats.

MANET's routing protocols make many paths from source to destination with minimum overhead and bandwidth consumption to deliver the packets on time. Routes in MANET are authorized between mobile hosts, holding multi hop range of transmission in restricted wireless radio. In malicious node, it is easy to join networks and begin its malicious behavior by packet dropping & by spreading false routing information. Malicious node quietly drops few or all packets even if there is no congestion.

The condition become more cut off when a huge number of malicious nodes collaborate with one another that is why MANET security is important in network's basic functionalities such as forwarding the packets, routing and management of network conducted by each nodes rather than one which is committed.

Application of MANET:

In military: MANET helps military to build a communication network for military soldiers and military vehicles so that they can exchange information with each other.

In rescue operations: In rescue operations MANET is very important where it can be used for disaster relief, emergencies, fire and earthquakes.

In urgent business work: In business works it is used for business related information exchange within the organization like if any meeting is going to held outside the office.

In education: It is also used in education for virtual classrooms and communications when meetings / lectures are happens.

Challenges in MANET:

Limited battery: Because of limited battery, as per MANET's requirement may not be achieved and it may result in bulky and less portable nodes. In order to maintain portability, devices which are used in this type of networks have limitations on power resources.

Packet loss: In MANET packets are lost because of bit error rate in the wireless transmission channel and increment of collision because hidden terminals.

Time variation within wireless link: A set of different transmission problems like fading, path loss, interference, and blockage because of wireless channel vulnerability.

Asymmetric links: Wired networks always depends on fixed links like symmetric links. In wireless nodes changes their locations constantly.

Routing overhead: Due to rapid change of node location within the network, some improper routes are generate which can be a cause of routing overhead.

II. MOBILE AD HOC NETWORK (MANET) ROUTING PROTOCOLS

Protocol Classifications

Routing protocol classification of MANET is shown in figure 1 which describes packet transmission to the destination. Due to its functionalities, routing protocols are described in three categories of reactive, proactive and hybrid protocol.

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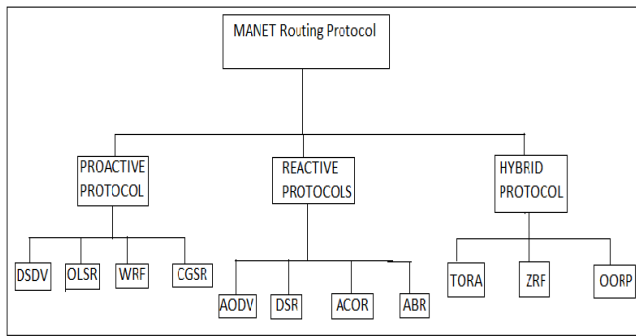


Fig. 1: Classification of MANET Routing Protocols

Proactive Routing Protocol

It is also known as table-driven protocol and is based on traditional distance-vector resulting in no delay in sending packets. The Routing tables are updated daily for updating routing information. In the proactive routing protocol, routes are accessible only on request.

Reactive (On-demand) Routing Protocol

Reactive routing protocol does not maintain routing information because of no communication within itself. In this, reactive protocol clearly begins if a node wish to send packet to another node, the protocol searches for a route and set up the connection in order to send and receive packets. Examples of Reactive Routing Protocols are AODV and DSR.

Hybrid Routing Protocol

It is a combination of both proactive and reactive protocol and take benefits from both of them. From their result, routes are immediately discovered in the routing zone. One of the example is ZRP (Zone Routing Protocol).

AODV Protocol

Only when the path is required to set up from source node to destination node, AODV is used. AODV being a reactive routing protocol involve two main processes of route discovery and maintenance of discovered route. In the process of route discovery, the source node send a RREQ message to all its neighboring nodes for route discovery to the destination, if the neighbor node has any available path to the destination, it replies a RREP message to the source node. After discovering the route, packets are readily transmitted to the destination. Route maintenance works whenever a link breaks and a HELLO message is generated which acknowledges about the link failure and broadcasts a RERR message to the source node.

DSR Routing

DSR is type of On-Demand Routing Protocol and is designed mainly for multi-hop wireless ad hoc networks. It mainly works on two mechanism of route discovery and route request. If source node wants to send packet to the destination and requires a path for it, route discovery process is used. In route request, source node starts searching for another available routes or again sends a route request for sending the packets from source to destination on route breakage.

Comparison of AODV & DSR

AODV is an on-demand routing protocol, in which route is discovered as per requirement. After broadcasting, RREQ message is generated at source node after which route discovery starts. All the discovered nodes are maintained

routing table, routing table consists only correct route and delete others after timeout. DSR is a table driven routing protocol which uses source routing, it means it knows the transmission route within sender and receiver hop –by-hop. Also in this, all the information of routing is maintained by mobile nodes and always updates the route.

Network Simulator (NS2)

Simulation tool used is NS-2 (Network Simulator). NS-2 can be used in any type of network and is user friendly. NS-2 is an object-oriented simulator and uses C++ language and OTcl interpreter. Almost all the simulation script are created in Total Command Languages. In NS-2 starting and ending time of packet sending is specified. Tcl and C++ is used for component development of NS-2.

III. SIMULATED RESULTS

We used NS2.35 for simulation of both routing protocols. NS2 is user friendly and used for the simulation of each network type as shown by the comparison of both routing protocol AODV and DSR with the help of throughput, PDR and delay. We have taken 10, 20, and 30m/s respective speed in the simulation. AODV works better for throughput more than DSR. The throughput gives a fluctuating graph during respective interval of 10 to 30m/s interval as shown in figure 2. DSR works better for PDR than AODV. DSR throughput gives a constant decrement graph from 1 to 0.96 bit/sec during 10 to 30 m/s interval as shown in figure 3. Both routing protocols AODV and DSR, gives same resultant delay.

Throughput vs. Speed

Delivery of a successful message over a communication channel's average rate is called throughput. Generally unit of throughput is in bits per second (bps), but for data packets unit is considered in per second (s^{-1}). In the graph shown (figure 2), fluctuation in the throughput is observed.

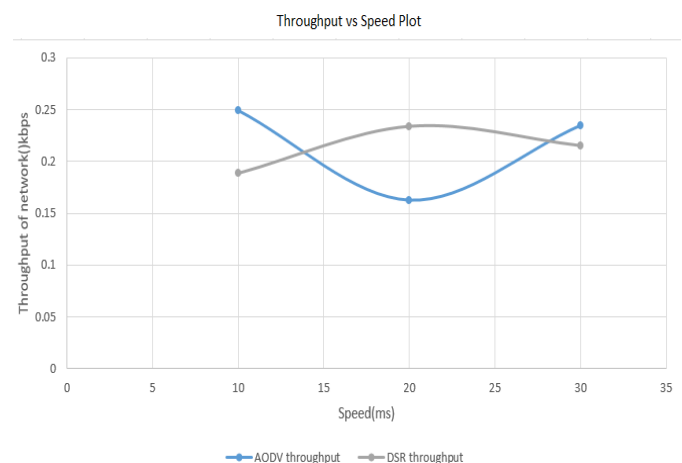


Figure 2: Throughput vs. Speed

A. Packet Dropped Rate vs. Speed

The ratio of amount of transmitted data packet from source to the amount of received data packet via sink is called Packet Dropped ratio. As per the graph shown in figure 3, it is observed that increment in speed results in fluctuation in packet drop rate.

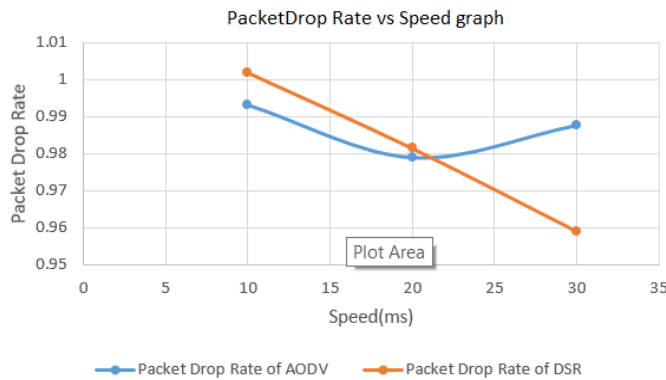


Figure 3: Packet drop rate vs. Speed

C. Delay vs. Speed

Due to all possible delays like buffering during route discovery process, queuing delay at interface, propagation delay, delay due to data packets transmission time and retransmission delay, the average time of data packet transmission is disturbed. This is as shown in figure 4.

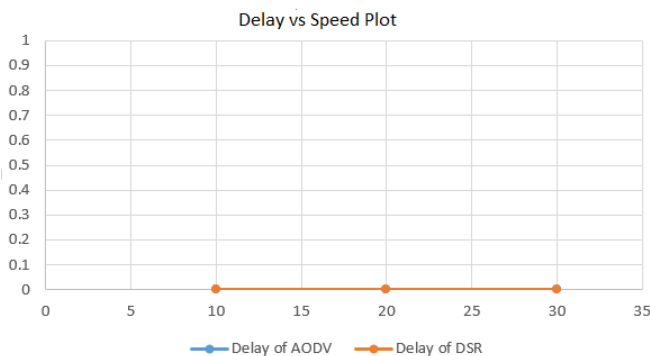


Figure 4: Delay vs. Speed

IV. CONCLUSION

The paper compares two routing protocols AODV and DSR in the term of throughput, PDR and delay using two routing protocols Ad hoc On-Demand Distance Vector routing protocol (AODV) & Dynamic Source Routing protocol (DSR) respectively. On analysis, it is observed that in terms of throughput of AODV's performance is better than DSR. In terms of PDR, fluctuating performance of DSR is better than AODV. Delay of both routing protocols ADV and DSR is similar.

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