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Performance Evaluation of Transmission Control Protocol in Mobile Ad-Hoc Networks

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Abstract: **Mobile Ad-Hoc networks are highly dynamic networks and there is no need of physical infrastructure. Nodes inthis worksas a router which automatically find and maintains the routes to other nodes in the network.In these networks, nodes are havingcapability to move and synchronize with their neighbor nodes. Due tothis mobility, connections in the network can change dynamically and nodes can be added and removed at any time. In this research, we are going to analyze protocols in Mobile Ad-Hoc network like DSDV, AODV using network simulator NS2. We are going to analyze the performance ofthe protocols in TCP in different scenarios. The performance metrics areThroughput, packet loss ratio.**

Keywords: **MANETS, DSDV, AODV, Throughput, Packet Loss Ratio, TCP.**

1. INTRODUCTION

A Mobile Adhoc Network is the collection of independent mobile nodes that can communicate to each other through radio waves. The mobile nodes which are in the same range they can communicate with each other directly, whereas the other nodes which are in the out of range them need an intermediate node. In this network every node has a wireless interface to communicate with another node. Thesenetworks can work at any place at any timewithoutany need of any fixed infrastructure that is access points or base stations.The below Figure 1shows a simple ad-hoc network with 3 nodes. Node 1 and node 3 are not within thesame range; however the node 2 can beused to forward packets between node 1and node 2. The node 2 will play as a router and these three nodes together form an ad-hoc network.

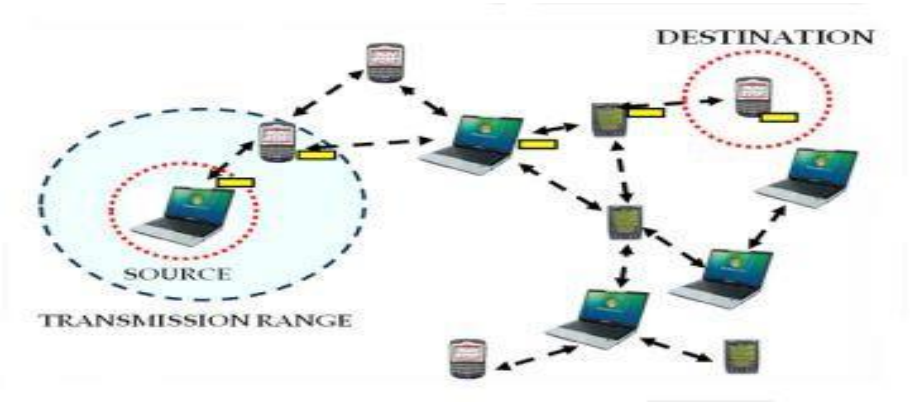

Figure 1. Sample Example for Manets

2. MANETS CHARACTERISTICS

2.1 Distributed operation:

This network does not contain any background for the network operations.The control of the network exists among the nodes. Nodes in the MANETS are having their neighbor nodes, and play an important role like routing and security in the network.

2.2Multi hop routing:

When two nodes are try to send packets and those are not in the same range then they are communicate with each other through intermediate nodes.

2.3 Autonomous terminal:

In MANET, every mobile node acts as anindependent node, and acts as both a host and a router.

2.4Dynamic topology:

In MANET, nodes have mobility and move with different speeds; Due to mobility network topology changes randomly. Due to mobility the nodes in the mantes form their own routing among them, and form their own networks.

2.5 Light-weight terminals:

In this nodes have less memory size, lessCPU capability.

3. MANET ADVANTAGES

• We have to access the mobile nodes from any place in the world.

• Mantes are less expensive than wired networks. Nodes form their own network. Each node acts as host as well as router.

• Scalable—ability to access additional nodes.

• Increases flexibility.

•Robust because of decentralizeadministration.

• The network can be established at any place and time

4. MANET APPLICATION

4.1 Military battlefield:

In army Manets are used for communication between the soldiers, vehicles. And information passed from head quarter to battlefield.

4.2 Collaborative work:

In the business environments, also information should be passed from inside office to outside for project .So due to mobility of nodes in Manets they play important role.

4.3 Personal area network and Bluetooth:

A personal area network needs a small range. Small-range MANET like Bluetooth can make easy for intercommunication between various mobile devices such asnotebooks,laptops, and a mobile phone.

4.4 Commercial Sector:

Ad hoc can be used in emergency/rescue operations when a disaster occurs, e.g. in fire, flood, or earthquake. Emergency rescueoperations are done at which all the area is damaged.

5. TCP

TCP stands for Transmission Control Protocol. TCP is a connection-oriented protocol. TCP provides high reliability for the applications and time criteria is also less. TCP provides a connection between two hosts and allow exchange data in bytes. The delivery of data is guaranteed and in the correct order. TCP can identifies errors or lost of data and can provide retransmission until the data is received, complete and without any errors.HTTP uses the Transmission Control Protocol (TCP) to deliver data between the HTTP client and the HTTP server. When the HTTP client at Argon wants to send an HTTP request, it must first establish a TCP connection to the HTTP server at Neon.

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In TCP when packets sending from source to destination it maintain acknowledgement. TCP provides error checking. But the speed of the TCP (connection oriented) is less than UDP (connection less). TCP also does checksum for error correction.

6. ROUTING IN MANETS

The routing means moving of data (packets) in a network from a source to a destination. The routing is established dynamically in MANETS due to the mobility of the nodes. The MANET routing protocols can be classified into three categories. Those protocols must deal with the limitations of the networks, which includes the high power consumption, less bandwidth, and high error rates.

• Proactive protocols (table driven protocols)

• Reactive protocols (on-demand protocols)

• Hybrid routing protocol

6.1 Proactive protocols:

The table-driven routing protocolsmaintain consistent, and at each node it maintain up- to-date routing information to every other node in the network. In this protocols each node maintain one or more tables to store routing information, and responds when there is a changes in network topology by propagating updates throughout the network in order to maintain a consistent network view.

Destination-sequenced Distance-vector Routing Protocol (DSDV):

In mobile Adhoc networks Distance-Sequenced Distance-Vector (DSDV) is one of the tables driven routing protocol. Each and every node in the network will maintains a routing table.In the table it maintains a list of every destination and the number of hops required to reach the destination. And also each entry in the routing table will includes a sequence number and the sequence number will be given by the destination node. When a node is trying tosend information it will choose on-first-basis the route to destination with the most recent sequence number. It is more similarly to that the most recently discovered route is still active compared to older ones. If there are more than one route to the same destination with the same sequence number, then the path with the lowest hop count is chosen.

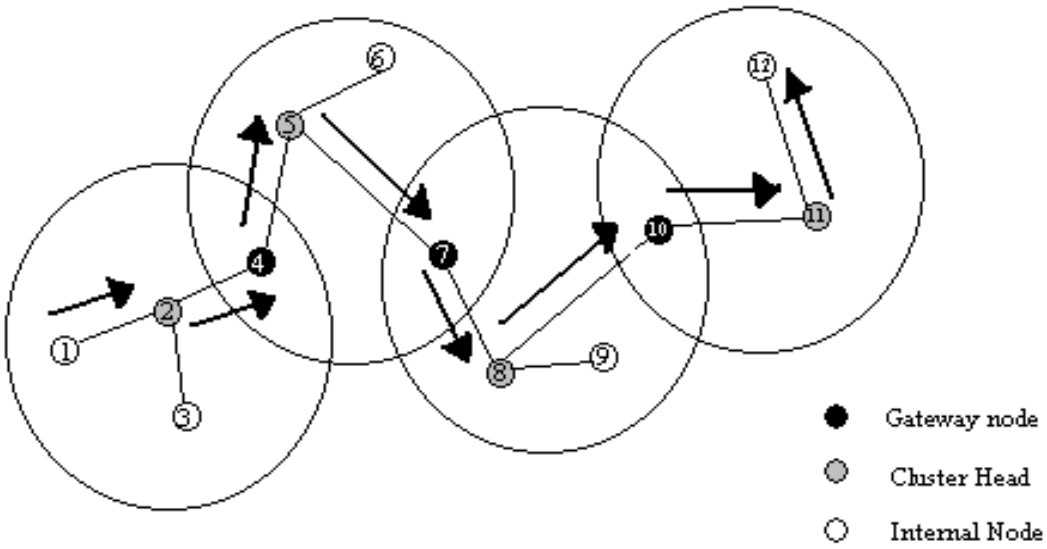

Figure: 2 DSDV routing path

6.2 Reactive protocols:

In reactive protocols every node maintains information about active paths to the destination nodes. A route search is needed for every new destination therefore the communication overhead is reduced at the expense of delay to search the route. Rapidly changing wireless network topology may break active route and cause subsequent route.

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Ad-hoc On-demand Distance Vector (AODV):

AODV's reactive approach indicates that once it needs to transmit information, then solely requests and establish a route to destination AODV protocol starts a broadcast route discovery mechanism to seek out the recent effective route to destination by employing a route request (RREQ) route reply (RREP) question cycle. Associate degree AODV sender broadcasts associate degree RREQ packet to all or any nodes within the network, and once receiving this packet the nodes update their data within the routing table for the sender node and initiate a route back to the sender node through the RREQ path. Then nodes unicast a RREP packet to the sender if the receiver node has a vigorous route to the destination, otherwise, the RREQ packet is forwarded to different nodes. once there's a reply transmitted, all the nodes therein route will record the route to the destination during this packet. as a result of different ways will be found between the sender and also the destination, the sender will receive the RREQ packet multiple times. just in case of route failure, as a result of quality or link disconnection a route error (RERR) packet is shipped to the neighbors to tell concerning the broken ways, and activate the route discovery mechanism. A destination sequence range is additionally used for avoiding routing loops, and guaranteeing the recent routes to be chosen, wherever the larger the quantity is that the freshman the route is. AODV protocol is employed in comparatively static networks, with low computer memory unit overhead and loops free routing exploitation the destination sequence numbers.

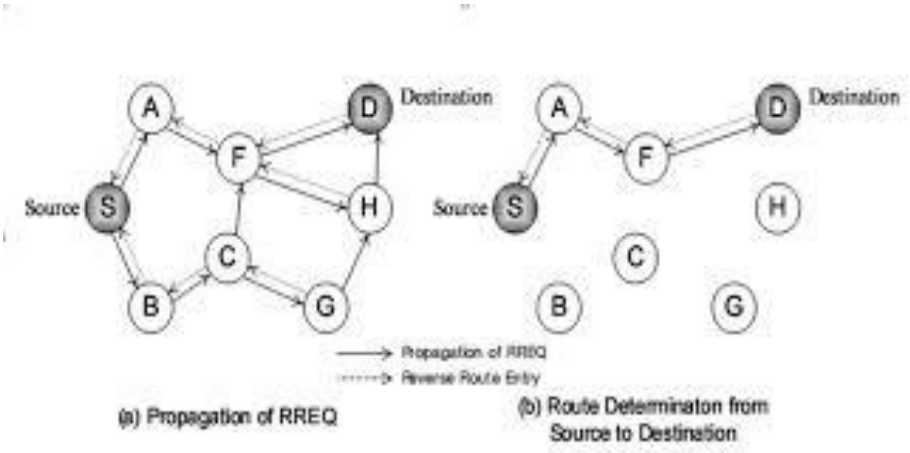

Figure: 3 AODV routing path

7. RELATED WORK

In this project we are going to analyze two on demand routing protocols through their performance metrics .And the final results will be shown in network simulator. Network Simulator which is used to simulate all type of networks and it can be easily understandable by everyone.

8. SIMULATION AND ANALYSIS METHOD

In mobile Adhoc networks the simulation operations are performed by using Network Simulator (Ns-2), which is popularly for adhocnetworking .Based on the performance metrics the routing protocols are analyzed.

Those are:

1) Throughput

2) Packet loss

8.1 Throughput:

Throughput means in a unit of time the rate of successful packets are deliver from source to destination. It is measured in bits per second (bit/s or bps).

8.2 Packet loss:

Packet loss means how many number of packets will loss in a unit of time when deliver from source to destination.

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9. SIMULATION PARAMETER

In this section we are going to analyze the simulation results of DSDV, AODV through the performance metrics.

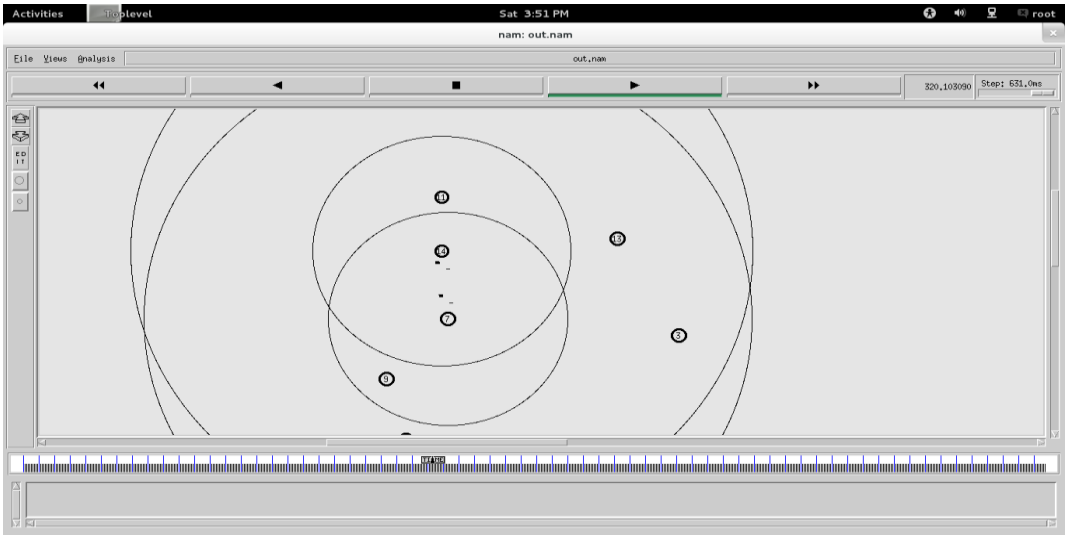

Figure: 4 NAM environments

Table:1 SIMULATION PARAMETERS:

Parameter	Value
Simulator	Ns2
Protocol Suited	DSDV,AODV
Simulation Time	800s
Simulation area	1000 x1000
Transmission range	300m
Node movement model	Random way point
Number of nodes	150

10. SIMULATION PLATFORM

Simulator is the best experiment platform for simulating different routing protocols.NS2 simulator provides good GUI which allowsthe users to design various simulation scenarios and display the simulation.

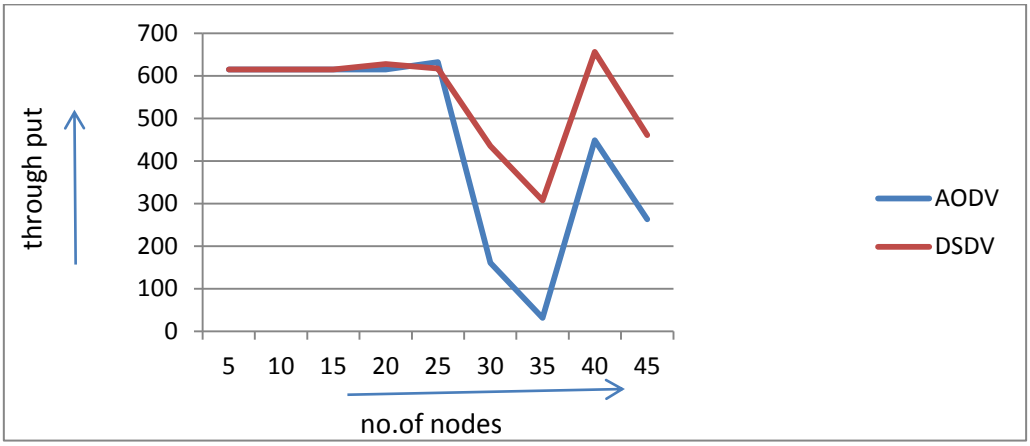

Figure: 5 Throughput in mantes (tcp)

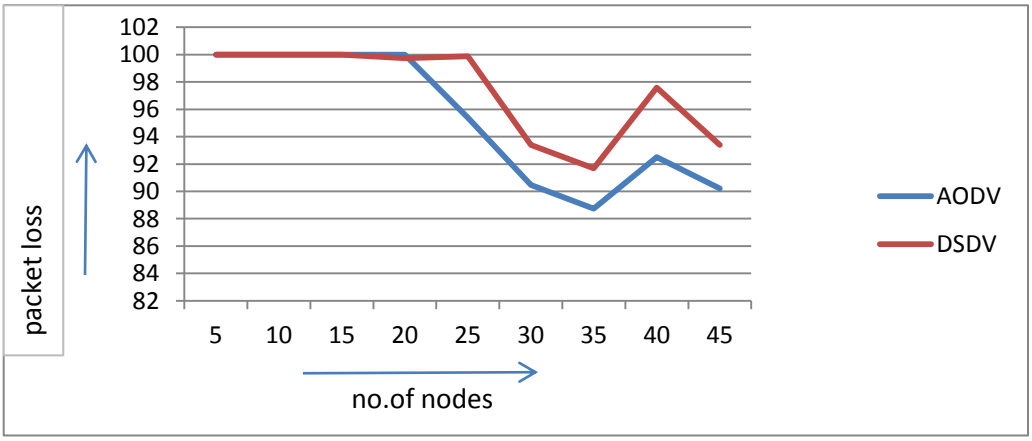

Figure: 6 Packet losses in Manets (tcp)

According to figure5 DSDV gives best throughput than AODV in Manets (tcp).

According to figure6 AODV gives less packet loss than DSDV in Manets (tcp).

11. CONCLUSION AND FURURE WORK

Our simulation work illustrates the performance of 2 routing protocols AODV, DSDV. DSDV gives best throughput than AODV in Manets (tcp). AODV gives less packet loss than DSDV in Manets (tcp).

The paper presents a study of the performance of routing protocols, employed in MANETs (tcp), byvictimization the performance metrics. We tend to vary the amount of nodes from five (low density) to fifty (high density) of simulation area 1000 x 1000 meters. Moreover, since Random Waypoint quality Model has been employed in this study to come up with node quality, we tend to take a mean of ten arbitrarily generated eventualities therefore to create an in depth performance analysis.

In future there is a scope to implement energy consumption of nodes and other performance metrics.

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