An Extensive Comparative Review of MANET Routing Protocols (AODV,DSR,DSDV) by using NS-2

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Abstact- **A Mobile Ad-hoc NETwork (MANET) consists of a number of mobile wireless nodes, among which the communication is carried out without having any centralized control. MANET is a self organized, self configurable network having no infrastructure, and in which the mobile nodes move arbitrarily. The mobile nodes can receive and relay packets as a router. Routing is a critical issue and an efficient routing protocol makes the MANET reliable. For almost last 10 years, a number of routing protocols have been studied and their performance comparisons are made by many researchers. Most of the previous research on MANET The performance differentials analyzed by varying the network size , mobility of nodes independently , varying the number of connecting nodes at a time and varying pause time and using parameters like Throughput, Delay, maximum Packets in queue Delivery Ratio and Packet Loss of different routing protocols. These simulations will carried out using the NS-2 network simulator, which is used to run ad hoc simulations.**

Index Terms— MANET ,DSDV,DSR, AODV,PDF.

I. INTRODUCTION

In areas in which there is little or no communication infrastructure or the existing infrastructure is expensive or inconvenient to use, wireless mobile users may still be able to communicate through the formation of an Ad-hoc Network. In such a network, each mobile node operates not only as a host but also as a router, forwarding packets for other mobile nodes in the network that may not be within direct wireless transmission range of each other. Each node participates in an ad hoc routing protocol that allows it to discover "multi-hop" paths through thenetwork to any other node. The idea of ad hoc networking is sometimes also called infrastructure less networking, since the mobile nodes in the network dynamically establish routing among themselves to form their own network "on the fly." Some examples of the possible uses of ad hoc networking include, students using laptop computers to participate in an interactive lecture, business associates sharing information during a meeting, soldiers relaying information for situational awareness on the battlefield, and emergency disaster relief personnel coordinating efforts after a hurricane or earthquake.[1]

AODV the adhoc on demand driven vector routing protocol joins mechanism of DSDV and DSR[1]. AODV provides the quick adaption of to dynamic link conditions , low processing and memory overhead , low network utilization, and determines unicast routes to destinations within the ad hoc network. It uses destination sequence numbers to ensure loop freedom at all times, avoiding problems associated with classical distance vector protocols. The destination sequence number is created by the destination to be included along with any route information it sends to requesting nodes. [7]

DSR dynamic source routing protocol is a reactive protocol . it determines the proper route only when a packet needs to be forwarded [8] . In this each node can discover dynamically a source route to any destination in the network over multiple hops. There are two mechanism of DSR route maintenance and route discovery ,generally both are working together to find and maintain the sorce routes to arbitrary destinations in the network.

DSDV bellman ford algorithm's modified algorithm is known as DSDV algorithm , which provides loop free routes. It is generally a proactive hop by hop distance vector routing protocol, requiring each node to broadcast routing updates periodically . Here every node in th network maintains a routing table for all possible destinations within the network and the number of hops to each destination [7].

II. METHODOLOGY

There are mainly three techniques which are analytical modeling, simulation and measurement. In this paper we have chosen simulation for performance evaluation. Simulation had being chosen because it is the most suitable technique to get more details that can be incorporate and less assumption is required compared to analytical modeling . Accuracy , times available for evaluation and cost allocated for the thesis are also another reason why simulation is chose. By using simulation , researchers should be allowed to study a system

in well-known conditions , repeatability if necessary in order to understand events.[2]

A. Computer network simulator tools:

There are many simulators such as Network Simulator 2 (NS-2), OPNET Modeler, GloMoSim, OMNeT++ and etc.
In this review we choices Network Simulation Tool (NS- 2). NS (version 2) is an object-oriented, discrete event driven network simulator developed at UC Berkely written in C++ and OTcl. NS-2 is primarily useful for simulating local and wide area networks. Although NS is fairly easy to use once you get to know the simulator, it is quite difficult for a first time user, because there are few user- friendly manuals. Even though there is a lot of documentation written by the developers which has in depth explanation of the simulator, it is written with the depth of a skilled NS user. The purpose of this project is to give a new user some basic idea of how the simulator works, how to setup simulation networks, where to look for further information about network components in simulator codes, how to create new network components, etc., mainly by giving simple examples and brief explanations based on our experiences. Although all the usage of the simulator or possible network simulation setups may not be covered in this project, the project should help a new user to get started quickly.
NS-2 interprets the simulation scripts written in OTcl. A user has to set the different components (e.g. event scheduler objects, network components libraries and setup module libraries) up in the simulation environment. The user writes his simulation as a OTcl script, plumbs the network components together to the complete simulation[3].

B. Simulation model:

We run the simulation in Network Simulator (NS-2). It accepts input as a scenario file that describes the exact motion of each node and the exact packets originated by each node, together with the exact time at which each change in motion or packet origination is to occur. The detailed trace file created by each run is stored to disk, and analyzed using a variety of scripts, particularly one called file *.tr that counts the number of packets successfully delivered and the length of the paths taken by the packets, as well as additional information about the internal functioning of each scripts executed. This data is further analyzed with AWK file and Microsoft Excel to produce the graphs.[3]
The simulation models are built using the Network Simulator tool (NS-2) version 2.34.

Simulation parameters :

TABLE 1. Parameters of simulation

PARAMETERS	Value
Routing protocols	Aodv,dsdv,dsr
No. of nodes	100,150,200,250
No. of connections	25,50,75,100
Simulation time	900sec
Area	1500x500m
Simulation model	Two way ground
Mac type	802.11
Link layer type	LL
Interface type	queue
Traffic type	TCP
Packet size	512kb
Queue lenth	50
Pause time	00 sec
mobility	20m/s

III. PERFORMANCE METRICS

In this paper we have considered packet delivery fraction (PDF) and throughput[4],average end to end delay [5],data packet loss[3].

Throughput: It is basically defines as ratio of the number of packets sent.[5]

$$\text{Average throughput} = \frac{\text{total received size}}{\text{elapsed time between sent and receive}} \quad (1)$$

Packet delivery ratio: it is the ratio of the total number of packets successfully delivered to the destination to the total number of packets sent by the source .[5]

$$\text{Pkt delivery ratio} = \frac{\text{no.of packet received successfully}}{\text{no.of packets sent}} \quad (2)$$

Average end to end delay: It is the total time taken by all the packets to reach the destination .[5]

$$\text{Average end to end delay} = \frac{\text{sent time} - \text{receive time}}{\text{Receive time}} \quad (3)$$

Packet loss: Mobility-related packet loss may occur at both the network layer and the MAC layer. In the thesis packet loss

concentrate for network layer.When a packet arrives at the network layer. The routing protocol forwards the packet if a valid route to the destination is known. Otherwise, the packet is buffered until a route is available. A packet is dropped in two cases: the buffer is full when the packet needs to be buffered and the time that the packet has been buffered exceeds the limit.[3]

$$Packet\ loss = data\ agent\ sent - data\ agent\ receive \qquad (4)$$

IV. CONCLUSION

In this paper the realistic comparison of three routing protocols DSDV, AODV and DSR has been done . The significant observation is this simulation results agree with expected results based on theoretical analysis by using graphs.

V. FUTURE SCOPE

We can change the simulation parameters to enhance the performance and Qos of the routing protocols. May be for the future we would be able to focus more on security issue.[3]. Comparison can be in better way if we change the parameters values.

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