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AN EXTENSIVE COMPARATIVE REVIEW OF MANET ROUTING PROTOCOLS (AODV, DSR, DSDV) BY USING NS-2

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ABSTRACT- MANET is made up of several mobile wireless nodes that communicate with one another without the need for centralized management. A mobile area network, or MANET, is a self-configuring, self-organizing network without any infrastructure in which mobile nodes roam around freely. As a router, the mobile nodes are able to receive and forward packets. A reliable MANET is made possible by an effective routing protocol, which is a crucial issue. Numerous routing protocols have been examined over the nearly past ten years, and numerous researchers have compared their performances.. The majority of earlier studies on MANET Performance differences were examined using parameters such as throughput, delay, maximum packets in queue, delivery ratio, and packet loss of various routing protocols. Nodes' mobility was also varied independently, as was the number of nodes connecting at a given time. The NS-2 network simulator, which is used to run ad hoc simulations, will be used to conduct these simulations.

Keywords: MANET, DSDV, DSR, AODV, PDF.

I. INTRODUCTION

In Ad-hoc networks can help wireless mobile users communicate in places where there is either no communication infrastructure at all or very little, or where the infrastructure that does exist is expensive or difficult to use. Every mobile node in the network functions as a router in addition to a host packets for additional mobile nodes that may not be within a direct wireless transmission range to one another. Every node takes part in an ad hoc routing protocol, which enables it to find "multi-hop" routes to any other node on the network. Since the mobile nodes in the network dynamically establish routing among themselves to form their own network "on the fly," the concept of ad hoc networking is also sometimes referred to as infrastructure less networking. Ad hoc networking can be used in a variety of contexts, such as interactive lectures where students use laptop computers, meetings where business associates share information, soldiers exchanging information for emergency disaster relief and battlefield situational awareness workers organizing activities following 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 two 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].

Reactive protocol i.e... Dynamic source routing protocol is, only when a packet needs to be forwarded does it determine the correct route [8]. This allows every node in the network to dynamically find a source route over a number of hops to any destination. In order to find & maintain source routes to any destination in the network, two mechanisms are DSR route maintenance and route discovery generally cooperate.

The DSDV algorithm is a modified version of the Bellman-Ford algorithm that offers loop-free routes. Typically, it is a proactive hop-by-hop distance vector routing protocol that necessitates the periodic broadcast of routing updates from every node. Here, each node in the network keeps track of all potential destinations and the number of hops needed to get there in a routing table [7].

II. METHODOLOGY

The three primary methods are measurement, simulation, and analytical modelling. We have chosen to evaluate performance using simulation in this paper. Compared to analytical modelling, simulation is a more suitable technique for obtaining more details that can be incorporated with less assumption needed. Another reason simulation is preferred is because of its accuracy, evaluation times, and thesis costs. It should be possible for researchers to study a system through simulation in repeatability under known circumstances, if required to comprehend occurrences. [2]

A. Computer network simulator tools:

There are many simulators available, such as OMNeT++, GloMoSim, OPNET Modeler, and Network Simulator 2 (NS-2).

For this review, we have chosen to use the Network Simulation Tool (NS-2). NS (version 2) is a C++ and OTcl object-oriented discrete event driven network simulator developed at UC Berkeley. Network simulation, both local and wide area, is the primary application of NS-2. Although NS is relatively easy to use once you get to know the simulator, a new user may find it challenging because there aren't many user-friendly manuals available. The documentation provided by the developers is extensive and explains the simulator in great detail, but it is not as detailed as what an experienced NS user would provide.

The purpose of this project is to give a new user a basic understanding of the functionality of the simulator. This includes how to set up simulation networks, where to find more information about network components in simulator codes, how to create new network components, and basic examples and concise explanations based on our experiences. This project may not cover every scenario for a network simulation setup or every use case for a simulator, but it should still help a new user get up and running quickly.

.NS-2 interprets the simulation scripts written in OTcl. The user must configure the different components in the simulation environment, including setup module libraries, network component libraries, and event scheduler objects. After writing the simulation as an OTcl script, the user connects the network's component parts together to finish the simulation [3]

B. 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 length	50
Pause time	00 sec
mobility	20m/s

III. PERFORMANCE METRICS

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

Throughput: It is simply the ratio of the amount of packets sent. [5]

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

Packet delivery ratio: This is the proportion of all packets sent by the source divided by all packets successfully delivered towards destination is known as the packet delivery ratio.

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

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

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

Packet loss: It is related to mobility may occur at both the network layer & the MAC layer. The thesis packet disappearing pay attention to the network layer. upon a packet's arrival at the network layer. The routing protocol forwards the packet if there is a known valid route to the destination. In the event that a route becomes available, the packet is held in buffer. When a packet needs to be buffered and the buffer is full, it is dropped if it takes longer than the allocated amount of time to buffer. [3]

Packet loss = data agent sent − data agent receive (4)

IV. CONCLUSION

This paper presents a practical comparison of 3 routing protocols: -

- DSDV
- AODV
- DSR.

The key discovery is that the simulation's output agree with the conclusions drawn from theoretical analysis using graphs.

V. FUTURE SCOPE

We can improve the routing protocols' efficiency and quality of service, we can alter the simulation's parameters. We might be able to concentrate more on security-related issues in the future. [3]. Adjusting the parameter values can improve the comparison.

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