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Analyzing performance of proactive and reactive routing protocols for Manets

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Abstract—**Mobile ad hoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing network infrastructure or centralized administration number of routing protocols like Proactive and Reactive protocols have been implemented. Various research communities are working in field of MANET and trying to adopt the protocols and technology in other applications as well. In this paper, we study and compare the performance of the proactive and reactive routing protocols DSDV and DSR. For experimental purposes, we have considered network size 50 nodes and illustrate the performance of the routing protocol across Packet Delivery Ratio parameter. The comparison has been done by using simulation tool NS2 which is the main simulator, NAM (Network Animator) and xgraph which is used for preparing the graphs from the trace files.**

Keywords-DSDV,DSR,PACKET DELIVERY RATIO

I. INTRODUCTION

Nowadays wireless mobile nodes are becoming more and more capable and have improved a lot over those available in past.But mobile nodes and their applications will become indispensable at the places where necessary infrastructure is not available.Manets are the future of existing networks,where all the wireless mobile devices will be capable to communicate with each other in the absence of infrastructure Manets allows all wireless devices within range of each other without involving any central access point and administration. By contrast, a MANET has no permanent infrastructure at all. All mobile nodes act as mobile routers. A MANET is highly dynamic. Links and participants are often changing and the quality of the links as well. Hence, a routing protocol for ad hoc networks runs on every host and is therefore subject to the limit of the resources at each mobile host. A good routing protocol Should minimize the computing load on the host as well as the traffic overhead on the network. Traditional routing protocols based on the link-state or distance-vector algorithms are aimed at finding optimal routes to every host in the network, and topological changes of network can only be reflected through the propagation of periodic updates. These protocols are not suitable for ad hoc networks .

II. ADHOC ROUTING PROTOCOLS

Ad hoc routing protocols are categorized in to Table driven routing protocols and Reactive routing protocol. DSDV is a Table driven (proactrive) protocol while DSR is typical reactive protocols. Tables are maintained to store information for routing and updated through control packets in proactive algorithms.
Updates also respond to the changes in topology of the network.While On demand (reactive) protocol DSR routes all computed to a specific destination only on demand or when needed.So it is not needed to maintain routing table containing all the nodes as entries does not have to be maintained in each node. Route discovery mechanism is initiated when a source want to send a packet to the destination. Route remains valid till the destination is reachable or until the route is no longer required. Challenges and issues for Adhoc routing protocols are as under

A. Destination Sequence Distance Vector (DSDV)

DSDV is considered to be successor of distance vector in wired routing protocol and guarantees a loop free path to each destination. In this protocol every node maintains a routing table that contains next hop entry and no of hops needed for all reachable destinations. Each route table entry is tagged with a sequence number that is originated by the destination node. Each node transmits updates periodically to maintain the consistency in dynamic environment. Because with the time, entries in the list may change so the advertisement must be made often or periodically to each of its current neighbor nodes. When a mobile

node receives new routing information, Either 'Full Dump' or 'incremental' that information is compared to the information already available from previous routing information packets. Any route with the recent sequence no is used and routes with older sequence number is discarded. When such updating takes place, each update is broadcasted in the network, which leads to a heavy network load situation and affects the bandwidth. With more number of nodes network load increases and deteriorates the situation. In response to the topology changes, mobile nodes may cause broken links and these broken links may be detected by layer-2 protocol..

B. Dynamic Source Routing (DSR)

DSR is designed specifically for use in multihop wireless ad hoc network. This protocol is composed of two mechanisms of route discovery and Route maintenance, which work together to allow nodes to discover and maintain source routes to arbitrary destinations in the ad hoc network. Route discovery takes place when source already does not know route to destination. Route cache is also maintained where all Learned routes to any given node in the network exist. When a source sends a packet to destination, it obtains a route from route cache of previously learned routes. If no route is found then route REQUEST message is broadcasted to initiate route discovery protocol. When a node receives a route REQUEST message it returns route REPLY message to the initiator, if it is the target of the request. Simply when a node receives a route request it searches the route cache where all routes are stored. If not found then route REQUEST is broadcasted and flooded over the network until the destination node is found. In fact there is a aggressive use of source routing and caching in DSR. No special mechanism is needed to detect the routing loops. Although several optimization techniques have been proposed and have been evaluated very effective by the authors of the protocol like Salvaging, Gratuitous route repair and promiscuous listening. Each route REQUEST message contains a hop limit that may be used to limit the number of intermediate nodes allowed to forward that copy of the route REQUEST. As the REQUEST is forwarded limit is decremented and packet is discarded if limit reaches to zero. Another mechanism of expanding ring search for the target where a node can initiate another route REQUEST with hop limit of one. For each route REQUEST no route REPLY is received. Node can double the hop limit as previously attempted.

III. PERFORMANCE EVALUATION

A. Experiment Setup

In this paper the simulation tool used for analysis is NS-2 which is highly preferred by research communities. NS is a discrete event simulator targeted at networking research. Ns provides substantial support for simulation of TCP, routing, and multicast protocols over wired and wireless (local and satellite) networks . NS2 is an object oriented simulator, written in C++, with an OTcl interpreter as a front-end. This means that most of the simulation scripts are created in Tcl (Tool Command Language). If the components have to be developed for ns2, then both tcl and C++ have to be used. These simulations are using DSDV, DSR that will be tested on Random Waypoint Mobility Model scheme. The simulation periods for each scenario are conduct in 50 seconds and the simulated mobility network area is 800 m x 800 m rectangle with 250m transmission range.

.B. Metrics

1 Routing Overhead The number of routing packets transmitted for every data packet sent. Each hop of the routing packet is treated as a packet. *Normalized routing load* are used as the ratio of routing packets to the data packets.

As for the calculation,

Routing Overhead = control packets sent / delivery packet sent

2 Throughput

The rate of successfully transmitted data per second in the network during the simulation

3 Packet Delivery Ratio

The number of data packets sent from the source to the number of received at the destination.

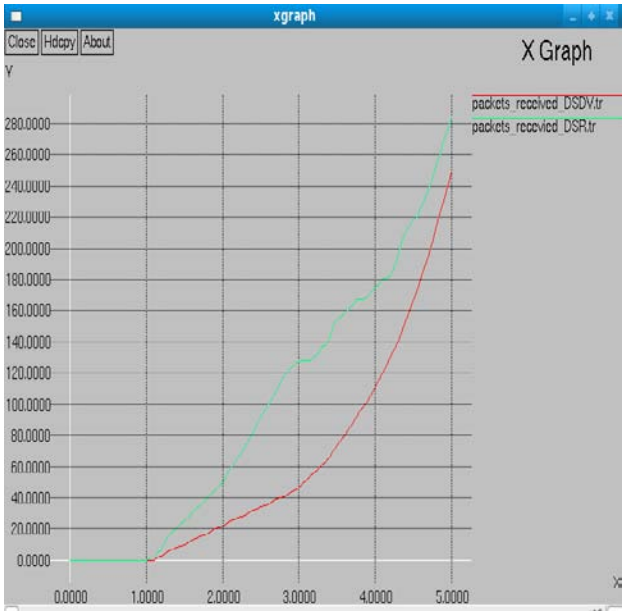
As for the calculation, *PDR = (control packets sent-delivery packet sent) / control packets sent*

Parameter value	Parameter value
Protocols	DSDV,DSR
Simulation Time	5,10,20,30,40,50s
Number of Nodes	50
Network Load	4 packets/sec
Pause Time	10s

Environment Size	800m x 800 m
Traffic Type	Constant Bit Rate
Maximum Speed	10 m / s
Mobility Model	Random Waypoint
Network Simulator	NS 2.34
Platform	Fedora7 Linux

C. Simulation Graph

After simulation we get graphs which contains information about the packet delivery ratio performance of both dsdv and dsr.



Packet Delivery Ratio

IV. CONCLUSION

As a special type of network, Mobile Ad hoc Networks (MANETs) have received increasing research attention in recent years. There are many active research projects concerned with MANETs. Mobile ad hoc networks are wireless networks that use multi-hop routing instead of static networks infrastructure to provide network connectivity. MANETs have applications in rapidly deployed and dynamic military and civilian systems. The network topology in MANETs usually changes with time. Therefore, there are new challenges for routing protocols in MANETs since traditional routing protocols may not be suitable for MANETs. Researchers are designing new MANETs routing protocols, comparing and improving existing MANETs routing protocols before any routing protocols are standardized using simulations. DSDV is selected as representative of proactive routing protocol while DSR as reactive routing protocol .In this DSR is performs better on packet delivery ratio as compare to DSDV. While it is not clear that any one protocol is having its own advantages and disadvantages and may be suited for certain scenarios. Although the field of manet is rapidly growing and new developments are coming day by day,still there are many challenges to be met.

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