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Performance Study of Mobile Ad-hoc Networks Reactive & Proactive Routing Protocol

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Abstract – *The persistence of nodes in Mobile Ad Hoc networks (MANETs) results in frequent changes in network topology making routing in MANETs a challenging task. In the literature some studies have been reported to evaluate the quality of the proposed routing algorithms. This paper discusses the performance review of Ad hoc On-Demand Distance Vector (AODV) Routing protocol, Dynamic Source Routing protocol (DSR), Destination Sequence Distance Vector (DSDV) and Optimized Link State Routing Protocol (*OLSR*) routing protocols in MANETs with different network conditions under CBR traffic. Analysis of these protocols shows different protocols behave differently in different situations.*

Keywords- *NS-2, Wireless, MANET, AODV, DSDV, DSR, OLSR*

1. INTRODUCTION

The mobile ad hoc network (MANET) provides a more robust model of communication than existing telephony networks, as the user is not limited to a specific physical location [1]. It is a special new network with no fixed wired communication infrastructure or other network equipment. With no pre-existing fixed infrastructure, MANETs are gaining popularity at anytime and anywhere due to their ease of deployment and usability anytime and anywhere. These are thus seen as suitable systems that can support specific applications such as virtual schools, military communications, emergency search and rescue operations, Acquisition of data in hostile environments, contact in exhibits, conferences and seminars, in the battlefield between soldiers to organize defense or attack, in airport terminals for file sharing, etc.

Portable Ad hoc Networks (MANETs) are future remote systems comprising totally of portable hubs that impart without any brought together help. Hubs in these systems will both produce client and application traffic and do arrange control and steering obligations. Due to the fact that existing Internet routing protocols were designed to support fixed infrastructure and their assets are unsuitable for mobile ad hoc networks, routing protocols in ad hoc networks have attracted broad interest in the past few years. The standardized protocols that are up to date are categorized into reactive and constructive protocols. Reactive protocols, such as AODV [9] and DSR [8], find the path only when there are data to be transmitted and thereby produce low traffic control and overhead routing. On the other hand, adaptive protocols such as OLSR [3] and DSDV [3] identify paths for all source and destination pairs in advance, and regularly share topology information to preserve them.

2. Mobile Ad hoc Network

Mobile ad hoc networks are open, self-configuring networks where nodes are free to move in. Wireless networks lack the complexity of infrastructure setup and management; an ad hoc network is a network consisting of individual devices that communicate directly with each other. The term implies spontaneous or impromptu development, because these networks often bypass the gate holding hardware or central point of access such as a router. Mobile ad hoc networks are types of wireless networks in which no hardware of any kind is used, i.e. there are no infrastructures like routers or switches or anything else on the network that can be used to help the network structure and the nodes have mobility. The routing in MANETs is particularly a challenging task to select paths in a network along which network traffic can be sent.

3. Routing protocols

A directing convention determines how switches speak with one another, appropriating data that empowers them to choose courses between any two hubs on a PC arrange. [6] Switches play out the "traffic coordinating" works on the Internet; information parcels are sent through the systems of the web from switch to switch until they arrive at their goal PC. Directing calculations decide the particular decision of course. Every switch has an earlier information just of systems connected to it legitimately. A directing convention shares this data first among prompt neighbors, and afterward all through the system.

3.1 Ad hoc On Demand Distance Vector Pouting Protocol

The routing algorithm Ad hoc On Demand Distance Vector (AODV) [1] is a routing protocol designed for mobile ad-hoc networks. AODV will rout both unicast and multicast. It is an on-demand algorithm, meaning it builds routes between nodes as desired by source nodes only. It retains such routes as long as the sources use them. When a source node needs a path to a destination for which it does not already have a connection, a route request (RREQ) packet is transmitted over the network. Nodes receiving this packet update their source node information and set up reverse pointers in the route tables for the source node. In addition to the source node's IP address, current sequence number,

and broadcast ID, the RREQ also includes the new sequence number for the destination to which the source node is informed.

3.2 Dynamic Source Routing Protocol

DSR [2] adopts an on-demand approach similar to AODV with respect to route discovery and maintenance processes. A key difference in DSR from AODV and other on-demand protocols is the use of source routing, where the source node defines the full sequence of intermediate nodes for each data packet to reach its destination. The information regarding source route is carried by the data packet header. The advantage of source routing is that there is no need for any additional mechanism to detect loops. The obvious disadvantage is that data packets have to carry routes to the source. The DSR data structure uses routing information to be stored as route cache, with each cache entry holding one particular route from the source to a destination. DSR makes very robust use of the information on source routing.

3.3 Destination Sequence Distance Vector

DSDV [3] is a distance vector routing enhancement for ad-hoc networks. Each route is tagged with a sequence number. A route with greater number of sequences is more desirable than a route with lower number of sequences. Unless two routes therefore have the same number of sequences, the path with fewer hops is more desirable. In the case of a route failure its hop number is set to infinity and its sequence number is increased to an unusual number where even numbers are reserved for linked routes only.

3.4 Optimized Link State Routing Protocol

It is a source-initiated on-demand routing protocol that uses a link-reversal algorithm and provides multi-path routes to a destination node that are loop free. That node in OLSR retains its local topology information in one-hop, and also has the capability to detect partitions. OLSR is proposed to operate in an environment of high dynamic mobile networking. OLSR's key design principle is locating control messages to a very small set of nodes near a topological shift occurring. OLSR's key design principle is locating control messages to a very small set of nodes close to a topological shift occurring. The protocol performs the erasure of three basic functions (a) route formation (b) route maintenance (c) route erasure.

4. Implementation

Ad hoc wireless networks are in fact decentralized and therefore routing is a core problem in this kind of network. Some are proactive, some reactive, others hybrid routing protocols. Many people use many different ways to show the difference between the performance of the routing protocols.

4.1 Performance Based Work

A mobile ad hoc network (MANET) is a network consisting of a collection of mobile wireless nodes that communicate with each other without centralized control or an infrastructure built. The mobility model in the MANET should reflect the practical behavior of every mobile node. The routing protocols are usually tested using simulation for ad hoc networks.

4.2 SIMULATION AND RESULTS

A mobile ad hoc network (MANET) is a network consisting of a collection of mobile wireless nodes that communicate with each other without centralized control or an infrastructure built. The mobility model in the MANET should reflect the practical behavior of every mobile node. The routing protocols are usually tested using simulation for ad hoc networks.

4.2.1 Simulation Environment

We take 30 nodes in our scenario. The simulation is performed using NS-2 to evaluate the network performance by adjusting the mobility of nodes. The parameters used to evaluate the performance of the protocols are given below:

1. Maximum No. of Drop Packages: This is the difference between the packets sent and received.
2. Throughput: Average rate of successful delivery of messages over a communication channel is throughput.
3. End to end Delay: It can be described as the amount of time a packet takes to travel from source to target.

4.3 Simulation Parameter

Table -1: Simulation Parameters Considered

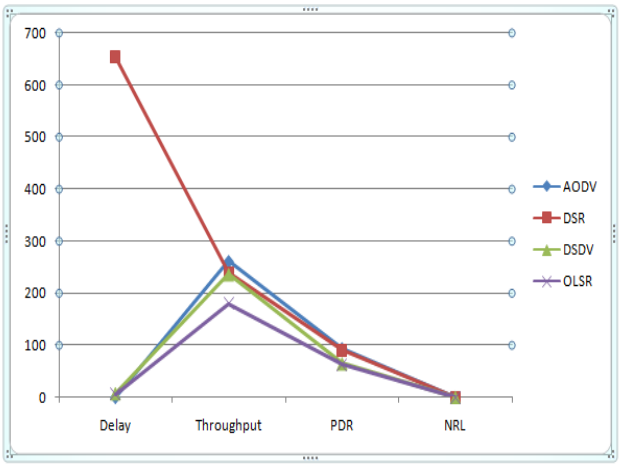
Parameters	Values
Simulator	NS-2.35
Mobility Model	Random Way Point
Antenna Type	Omini Directional
Area of Map	400X400
PHY/MAC	IEEE802.11
Routing Protocol	AODV,DSDV,DSR,OLSR
Network traffic	TCT
Simulation Time	100 Sec
No. Nodes	60

5. Results

Four routing matrices were taken to compare the performance of all four protocols. High mobility and high traffic.

Table-2: Results

Matrices	AODV	DSR	DSDV	OLSR
Delay	37.74.	653.56	7.48	6.28
Throughput	261.56	239.49	236.11	179.20
PDR	94	90.1	64.81	62.53
NRL	0.002	0.004	0.001	0.006



Chat-1: Routing Protocol in MANET

By watching the above table, it is discovered that AODV has most extreme throughput under low traffic and DSDV has most extreme throughput under high traffic. As system becomes thick OLSR, DSR and DSDV perform well in terms of Throughput than AODV. DSR performs well in thick systems regarding parcel conveyance part yet at a similar time Normalized Routing heap of OLSR is most extreme among every one of the conventions in both the systems. DSDV has least Normalized Routing load in both low and high traffic. OLSR and DSDV give the least Jitter and Normal Delay in the two systems Low postponement and low jitter are for the most part required in voice applications (for example Voice over Web Protocol (VOIP)) and ongoing applications (for example ongoing multi-player games in versatile specially appointed condition), so OLSR and DSDV can be utilized there. The least the estimation of Normalized Routing load, least will be the squandered bit of BW that is utilized for trade of directing message among hubs and more will be the BW accessible for moving information between hubs. The applications like voice and video conferencing need more BW, so right now DSDV can be utilized. The applications like video communication, web games, and so on require high throughput, so right now AODV can be utilized under low portability and low traffic and DSDV can be utilized under high portability and high traffic. There is high versatility of clients and system hubs at the time of crisis and military activities. We have seen that as the portability expands there is an improvement in the throughput of OLSR, DSR and DSDV. So these three conventions can be utilized in crisis and military applications.

6. CONCLUSION

The presentation assessment is vital for breaking down the inadequacy of existing methodologies and making the necessity with progressively pertinent structure for MANET. This paper thinks about the directing conventions AODV, DSDV and DSR execution in the bunch base MANET condition with builds the versatile hub in the group for making high traffic situation. Finding shows that from these any single convention isn't reasonable for proficient directing in diverse condition. DSR convention is increasingly appropriate in little size of group yet as size of the bunch expanded AODV convention shows extreme changes in its presentation furthermore, progressively relevant while DSDV assessment results are definitely not alluring in correlation with other two responsive steering conventions.

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