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Performance comparison of DSDV and AODV routing protocols in Manet

Ashutosh Kumar Sharma[1*], Dr. Mukesh Kumar[2]

[1] Research Scholar, Sunrise University, Alwar, Rajasthan

[2] Assistant Professor, Dept. of Computer Science, Sunrise University, Alwar, Rajasthan

Abstract - Ad hoc networks are defined by a poor infrastructure as well as a spontaneous and quickly shifting network topology, necessitating the use of a sturdy dynamic routing protocol that can cope with such conditions.The goal of this research is to evaluate the results of a few routing protocols for Mobile Ad-Hoc networks (MANETs). It is a group of wireless mobile nodes that establish a dynamic topology without the use of a logically centralized point, infrastructures, or management. Because the transmission range of nodes in MANETs is restricted, transmission of data across 2 nodes needs numerous hops. The scenario is made considerably more difficult by the mobility of the various nodes. Several protocols have been proposed have been created specifically for these conditions in recent years to discover the most efficient routes from a sender to the receiver.This study compares and contrasts the performance of 2 routing protocols (AODV & DSDV). The simulations were run using Network Simulator II. The mean end-to-end delay is used to assess the performance of AODV & DSDV.

Keywords - MANETs , Routing Algorithm,DSDV , AODV, Time Interval , NS2 , Delay Packet size

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INTRODUCTION

Any use of mobile networks has exploded in recent years. A considerable series of similar research have focused on MANETs in particular . It is a network that operates without the use of infrastructures and in which MANET nodes can serve as terminals or router. When fixed infrastructure is not financially or logistically feasible, such as in war circumstances or natural disasters, this type of self-organizing system is extremely beneficial.

It has the potential to be used in places where establishing infrastructural networks is impossible, as well as in emergency disaster relief operations following natural disasters such as earthquakes. In large-scale disasters, it is critical to immediately restore communication networks by restoring equipment and applying suitable congestion-control techniques. Network, which take the full advantage of the characteristics of wireless communication , such as fast and short setup and endpoint adaptability and mobility, can also be used to communicate in an emergency. Without relying on the traditional communications networks, ad-hoc networks can permit interaction among momentarily gathered access points.

The goal of this work is to compare the performance of the 2 routing protocols, AODV (Ad hoc On Demand Distance Vector) & DSDV (Direct Stream Distance Vector) (Destination Sequenced Distance Vector). While both routing algorithms use routing information to avoid routing loops and preserve the integrity of route discovery, the fact that they correspond to two separate routing groups distinguishes AODV & DSDV. AODV is a reactive protocol (routes are only produced on demand to minimize routing demands), whereas DSDV is a proactive protocol (routes are prepared in advance)

A routing protocol is a set of rules that describe how prefer to communicate with one another, distributing data that allows them to choose routes between any pair of nodes network. Each router knows just the networks that are immediately connected to it. This information is shared by a routing protocol first among close neighbours, then all through the network. Routers get information of the network's topology in this manner. An ad hoc routing plan is a protocol of rules that governs how nodes on the network determine how to route packets among operating systems. We use AODV & DSDV in this article.

Our objective is to conduct a comprehensive performance analysis of DSDV and AODV . The following is a quick overview of MANET routing. The rest of the study is organised as follows. The routing protocols of MANETs are briefly discussed in section I. The simulation environment is characterized in Section II. In part IV, the simulation and findings are presented, accompanied by their analyses and conclusion.

ROUTING IN MANETs

A. Introductory to Routing Protocols

These protocols are focused on two procedures in particular. Choosing the best routing paths and moving information groups (packets) across a network. The latter concept is known as packet switching, and it is simple to implement, albeit path identification can be difficult. MANET performance is determined on the routing protocol strategy used. Because of the dynamic nature of MANETs, traditional routing techniques do not operate well. As a result, changing network characteristics such as size of the network, traffic density, as well as other network situations make creating an effective and dependable routing protocol extremely difficult. Routing protocols evaluate the optimum path for routing packets to their destination using a number of metrics.

These metrics are a common statistic, such as the hop count, that the routing algorithm uses to identify the best path for a packet to take to reach its destination. Routing algorithms initialise and manage routing tables, which store the packet's route information, as part of the path decision process. This route data varies depending on the algorithm. Routing tables are loaded with a range of data produced by routing algorithms. The development of improved routing protocols for MANETs has been a major research focus in recent years, with a variety of proactive and reactive routing techniques developed. The goal of this research is to use simulation to compare several of the routing protocols.

B. Ad Hoc on Demand Distance Vector (AODV)

The AODV routing algorithm is a source-driven, on-demand routing system. A route is only tracked when an intermediate node wants to set up contact with a certain destination, because routing is "on demand." The route will be maintained for as long as it is required for future communication. Another characteristic of AODV is that each route entry is assigned a "destination sequence number." Any node that wishes to transfer data must provide this number in its RREQ (Route Request). These codes are used to guarantee that routing information is "up to date."For example, while communicating with its target node, a requesting node always takes the route with the highest sequence number. A RREP (Route Reply) is sent back to the node whenever a new path has been found. AODV also has the essential mechanisms in place to notify network nodes of any potential overall network breaks .

C. Destination Sequenced Distance Vector (DSDV)

DSDV is part of the proactive or table-driven family of protocols, which ensures that a valid route to every network node is always preserved & maintained . Although it was founded on the well-known distributed Bellman-Ford distance vector, it underwent significant changes to make it acceptable for wireless systems and, in particular, to address the count-to-infinity problem . Due to the obvious distributed nature of the media, traditional solutions for overcoming this problem are not useful for wireless topologies. Instead, DSDV assigns a sequence number to each routing table entry to differentiate between old and new routing data

Every node in DSDV maintains a routing table that identifies all accessible destinations as well as the number of hops required to reach each one. The destination node generates an identifier for each entry .. Any modifications to the routing table are broadcast to all other nodes, imposing a significant burden on the entire network. Routing updates are divided into two groups in order to limit possible load. The first is referred to as a "full dump," and it contains all available routing data. This form of modification should be utilised as infrequently as possible, and only when the topology has changed completely. Smaller "incremental" reports are delivered in the case of infrequent moves, containing simply information on changes since last full dump.

COMPARISONS OF ROUTING PERFORMANCE

We offer our simulation attempts in this section in order to measure and compare its performance of the procedures mentioned in Section II.

Scenario 1: Simulation

The NS2 was used to execute our programmes (Network Simulator 2). In current wireless communication studies, NS2 has emerged as the most popular simulator. Each testing was performed out on a 500m * 500m square simulated field of 3 distinct scales of mobile nodes in order to measure the effectiveness of the protocols as the network size scaled up. To illustrate an ad hoc network, 120 nodes were established. Randomly created nodes were placed in random positions. As if only a few nodes were accessing the topology, nodes were formed at random times. Nodes moved at a random rate. Two-Ray Ground was the radio propagation model employed. The Omni Antenna was the antenna model that was used. For the sake of the simulation, motion was linear and node speed stayed constant.

B. Metrics of Performance

The performance evaluation indicators are considered:

1) **Packet delivery ratio:** The proportion of data packet delivery to endpoints compared to those created by CBR origins. The ratio of packets generated by "application layer" CBR sources to received packets by the CBR sink at the final objective.

$$\text{Packet delivery ratio} = \frac{\text{Packets received by the destination node}}{(\text{Packets received} + \text{Packets dropped})}$$

2) **Average end-to-end delay:** This covers all possible delays generated by buffering throughout path discovery delay, interface queuing, MAC re-transmission delays, and propagating and transmission durations.

3) Node Features :

Method	Value
Channel Type	Wireless
Radio Propagation Model	Propagation/two ray Ground
MAC Type	Mac/802.11
Antenna	Antenna/Omni Antenna
Total Nodes	120
Atmost Packet	50
Area (m)	500*500
Sound Simulation Time	500 sec
Routing Protocol	AODV & DSDV
Speed	(5, 10,40)m/s

RESULTS OF SIMULATIONS

(A) Packet Delivery Ratio

In Fig. (1, 2), the packet Delivery Ratio Ratio of the DSDV and AODV protocols in information and network is presented, with the y-axis representing the packet delivered. When we compared the throughput of several protocols, we discovered that the On-demand protocol AODV functioned very well, transmitting over 80% of packets received independent of mobility rate. When moving more often, DSDV could not obtain a decent packet delivery ratio. This finding holds true for all of the scenarios with varying simulation times and node counts. AODV is an advancement over DSDV is a table-driven routing technique.

When compared to the efficiency of AODV, which is continuously uniform, DSDV performs better with a larger network nodes. DSDV has the worst results in terms of dropped packets. The performance of the system declines as the number of sensor nodes grows. With an increasing number of nodes, AODV constantly operates well.

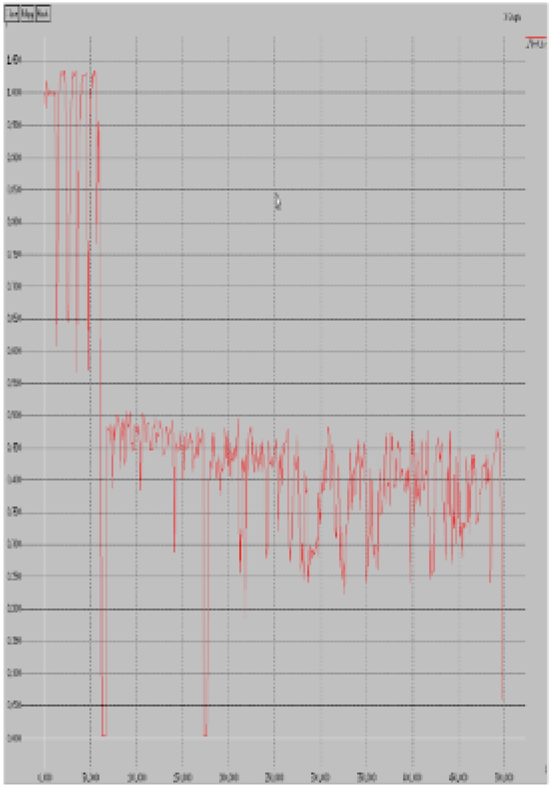

Fig. 1: (DSDV 120 Nodes, 5 m/sec)

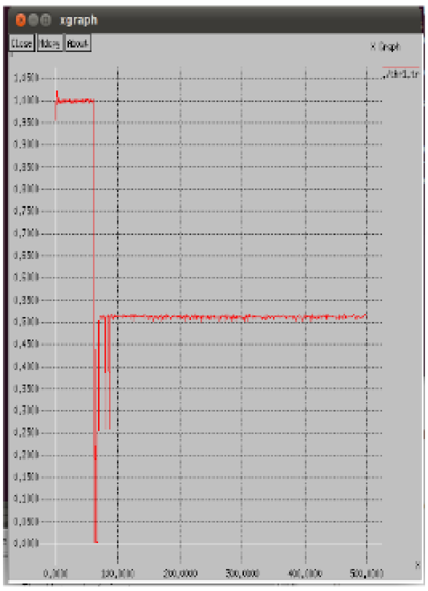

Fig. 2: **(AODV 120 Nodes, 5 m/sec)**

(B) Comparison of delays

The performance of DSDV (fig.3) is deteriorating for mean end-to-end delay because the load of exchanging routing data rises as the network size increases, and the frequency of interchange also tends to increase owing to node mobility. The increase in the number of nodes was used to make this comparison. DSDV does not need to launch the route request procedure as frequently as AODV because it stores all routes to all endpoints in its table (fig. 1.4). As a result, DSDV has a lower average delay. The performance of DSDV was fairly consistent. Because it's a table-driven system, a node doesn't have to look for a route before sending packets. As a result, the delay is rather consistent.

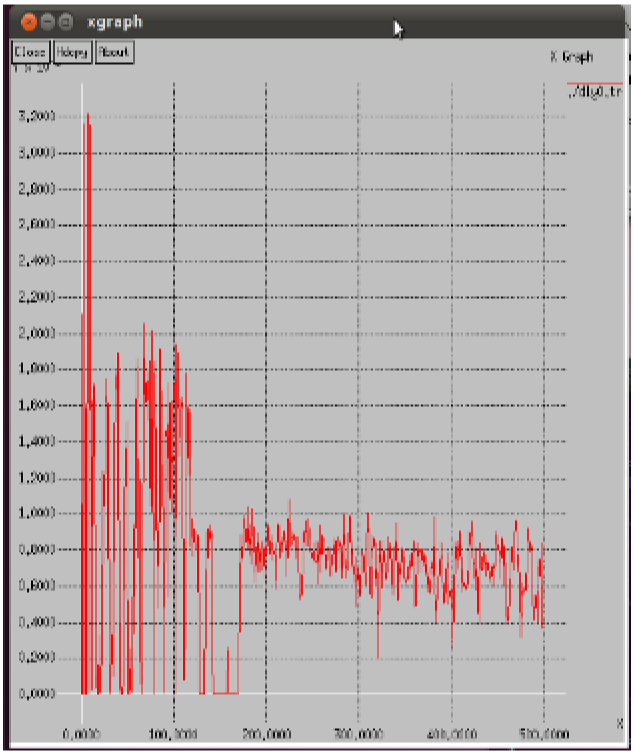

Fig.3: Delay DSDV (120 Nodes, 10 m/sec)

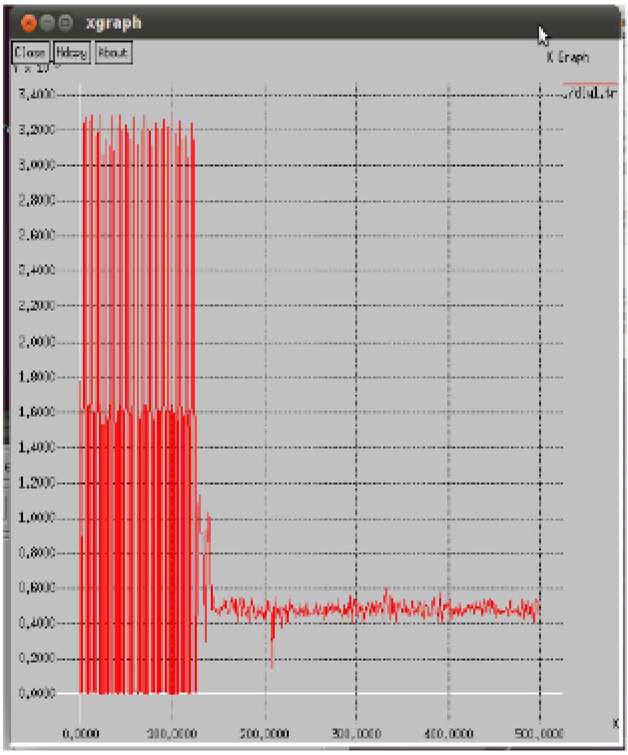

Fig. 4: Delay AODV (120 Nodes, 10 m/sec)

CONCLUSIONS

A performance comparison of significant routing systems for mobile ad hoc wireless networks has been published. Both protocols contain route maintenance methods that preserve route discovery until sources no longer require it or until routes become invalid, meaning certain destination node become inaccessible. We used NS-2 to simulate wireless ad hoc networks with 50 nodes, using the routing protocols AODV as well as DSDV. Although more packets are discarded and more routing packets are created, AODV was capable of handling the additional load. The simulations' results lead to some intriguing conclusions: The packet delivery fraction (PDF) of AODV suffers, although it scales well in respect of end-to-end delay.

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Corresponding Author

Ashutosh Kumar Sharma*

Research Scholar, Sunrise University, Alwar, Rajasthan