EFFECTIVE SESSION ESTABLISHMENT AND DATA TRANSMISSION IN MANET

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ABSTRACT

Mobile Ad hoc Network (MANET) is an infrastructure less and decentralized network. Many routing protocol for MANET have been proposed. From all of them the protocols like DSR, DSDV and AODV are quiet popular one. Here in this paper, we are emphasizing the concept of distance sequence number in AODV protocol. Distance sequence number in AODV protocol are use to find the most recent path to destination. In this paper we have presented the modified algorithm use for distance sequence number as to increase parameters like Routing Packet Overhead, Path optimality, Packet loss etc.

Keywords: *Ad hoc networks, Routing protocols, Distance sequence number, AODV protocol.*

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1. INTRODUCTION

Mobile networks are classified into infrastructure networks and mobile Ad hoc networks according to their dependence on fixed infrastructures. In an network that has infrastructure mobile node has a base station within their transmission range whereas when we talk about mobile ad hoc network they are self organizing, infrastructure less i.e. having no centralized administration with changing topology as nodes changes their positions, having limited transmission range. Nowadays wireless mobile ad hoc network area are becoming more and more capable and improved a lot over those available in past. With the advance of the wireless communication technologies, small size and high performance communication devices increasingly used in daily life. There are a lot of fields in which we can see a large scale acceptance of MANET [10] as including emergency relief scenarios, public meetings, virtual classrooms etc. They are also expected to play an important role in civilian forums such as conventional centers, conferences, and electronic classrooms. MANET [10] uses many routing protocols. Designing of routing protocols is a challenging task as in network performances decreases as nodes in network increases and it become difficult to manage the large ad hoc network. The routing protocols in wireless networks are classified as proactive (Table driven) and reactive (On demand). First, proactive type is operating routing path before sending data. If it changes topology of nodes, this information sends neighbour nodes. And neighbour nodes updated it. The well known proactive routing protocol is DSDV [4]. Second, reactive type is setting routing table on demand, and it maintains active routes only. The well-known reactive routing protocols are DSR [4] and AODV [4]. Wireless Network makes frequent movement. So it needs supporting movement of reactive routing protocol. Reviews and performance comparisons of ad hoc routing protocols have been presented in many earlier works [1], [3], [4], and [6].

This paper has been organized in sections as follows. In the below given section 2 we give short description of the recent work done on routing protocols. Section 3 gives overview on AODV protocol. Then in section 4 we explain our proposed methodology. Finally we conclude this paper in section 5.

2. RECENT WORK

S.S Tyagi and R.K Chouhan [1] propose a performance analysis of both type proactive and reactive routing protocol for ad hoc networks. Their work carries a deep analysis on three important routing protocols AODV, DSR and DSDV. AODV protocol [1] shows that it can perform well in dense environment but causes sometimes packet losses. AODV and DSR are found to be better than DSDV in some scenarios but still there are many challenges.

Xiaoyan hong, kaixin XU, Mario Gerla [2] presented a concept that discusses the scalability issue in ad hoc network. In this paper survey on scalability issue is mainly done on three types of protocols namely flat routing protocols, hierarchical routing approach and GPS augmented geographical routing schemes.

All the protocols address challenges of scalability [2]. In this paper a description about protocols is provided and has discussed the differences among them highlighting particular important features imparting scalability.

Suman Kumari, Sunil Maakar, Suresh Kumar, R.K Rathy [3] compared performances of three protocols AODV, DSDV and OLSR by using free mobility model. It also makes use of CBR and TCP traffic.

Kapang Lego [4] with Pranav Kumar Singh and Dipankar Sutradhar presented a paper that presents a comparative study of three AODV, DSR and DSDV protocols based on parameters like packet delivery ratio average end to end delay and routing overhead.

Sachin Kumar Gupta and R.K Saket [5] "performance matric comparison of AODV and DSDV routing protocols in MANET using ns-2". In this paper [5] the performance of AODV and DSDV routing protocol using different parameter of QoS metric have been simulated and analyzed. AODV indicating a high performance and efficiency under high mobility than DSDV.

In the paper [6] "Scenario based performance Analysis of Routing Protocols for Mobile Adhoc Networks" the comparison of three routing protocols are done are DSDV, AODV and DSR. The simulations of work in this shows that DSR performs better than AODV for low traffic loads, since it discovers routes more efficiently. At higher traffic loads, however, AODV performs better than DSR due to less additional load being imposed by source routes in data packets.

In the paper [9] M. Ramakrishnan and DR. S. Shanmugavel discusses, “FPGA implementation of AODV Routing Protocol in MANET” which implemented the AODV protocol using hardware and it also presented simulation and synthesis report. Through this implementation there is a reduction in power consumption and delay time which increases the mobile device’s battery lifetime.

In the paper [11], Elizabeth Royer, C. K. Toh, “A Review of Current Routing protocols for Ad hoc mobile Wireless Networks” presented a review over some of current routing protocols that are used for routing purposes in Ad hoc mobile Wireless Networks.

3. OVERVIEW OF BASIC AODV PROTOCOL

The AODV is a reactive i.e. on demand unicast routing protocol. The motivation behind developing a reactive routing protocol like AODV is reduction of routing load. It only maintains the record for the active paths. For recording active paths the routing tables are maintained. Routing tables are maintained at every node. Routing table has destination, next hop IP address and destination sequence number as entry.

Mechanism of AODV protocol: When a source wants to send the packet to any destination but no route is available then it starts Route Discovery operation source broadcast the RREQ packets. The packets of RREQ includes address of source and destination, broadcast id, last seen sequence no. of destination, source node's sequence number and TTL field. Destination sequence number employ to find most recent path and ensure a loop free operation. When an intermediate node or destination receives RREQ it either forwards it or prepares RREP if valid route to destination is found through sequence number. As for example we have two nodes A and B, B is next hop to A to some destination D. Also let sequence number and hop count of routes to D at A and B are (S_A,HC_A) and (S_B,HC_B) respectively then AODV maintain always

$$(S_A < S_B) \cup (S_A = S_B \cap HC_A > HC_B)$$

That means either B has newer route to D than A or B has shorter route that is equally recent to be get selected. And RREP packet is unicast back to original sender.

4. PROPOSED METHODOLOGY

One distinguishing feature of AODV is its use of a destination sequence number for each route entry. The destination sequence number is created by the destination to be included along with any route information it sends to requesting nodes. Using destination sequence numbers ensures loop freedom and is simple to program. Given the choice between two routes to a destination, a requesting node is required to select the one with the greatest sequence number.

Every route table entry at every node must include the latest information available about the sequence number for the IP address of the destination node for which the route table entry is maintained. This sequence number is called the "destination sequence number". It is updated whenever a node receives new (i.e., not stale) information about the sequence number from RREQ, RREP, or RERR messages that may be received related to that destination. AODV depends on each node in the network to own and maintain its destination sequence number to guarantee the loop-freedom of all routes towards that node. A destination node increments its own sequence number in two circumstances:

- Immediately before a node originates a route discovery, it MUST increment its own sequence number. This prevents conflicts with previously established reverse routes towards the originator of a RREQ.
- Immediately before a destination node originates a RREP in response to a RREQ, it MUST update its own sequence number to the maximum of its current sequence number and the destination sequence number in the RREQ packet.

In order to ascertain that information about a destination is not is not fresh (stale), the node compares its current numerical value for the sequence number with that obtained from the incoming AODV message. This comparison must be done using signed 32-bit arithmetic, this is necessary to accomplish sequence number rollover. If the result of subtracting the currently stored sequence number from the value of the incoming sequence number is less than zero, then the information related to that destination in the AODV message must be discarded, since that information is stale compared to the node's currently stored information.

The only other circumstance in which a node may change the destination sequence number in one of its route table entries is in response to a lost or expired link to the next hop towards that destination. The node determines which destinations use a particular next hop by consulting its routing table. In this case, for each destination that uses the next hop, the node increments the sequence number and marks the route as invalid. Whenever any fresh enough (i.e., containing a sequence number at least equal to the recorded sequence number) routing information for an affected destination is received by a node that has marked that route table entry as invalid, the node should update its route table information according to the information contained in the update.

A node may change the sequence number in the routing table entry of a destination only if:

- it is itself the destination node, and offers a new route to itself, or
- It receives an AODV message with new information about the sequence number for a destination node.
- The path towards the destination node expires or breaks.

To enhance the following given matrices through modifying the algorithm of distance sequence number:

1) The node receives RREQ packet suppose p.
2) It extracts the IP header from the packet p.

3) It extracts the routing information which are included in packet p.
4) If the node is source of packet or, the node already seen the packet it discard the packet.
5) If the node is destination of packet, it upon reception of RREQ sets or trigger FSM.
6) If the request packet sequence number is greater than destination sequence number then it increment the sequence number by 1.
7) Like in normal operation, send the RREP packet.
8) Repeat the whole process.

5. PARAMETERS

1. **Routing Packet Overhead -** This is the ratio between the total number of control packets generated to the total number of data packets received during the simulation time.
2. **Path Optimality -** The ratio between the numbers of hops of the shortest path to the number of hops in the actual path taken by the packets.
3. **Packet Delivery Ratio -** The ratio of the data packets delivered to the destinations to those generated by the CBR sources.
4. **Average end-end delay -** Average amount of time taken by a packet to go from source to destination. This includes all possible delays caused by buffering during route discovery latency, queuing at the interface queue, retransmission delays at the MAC and propagation and transfer times.
5. **Packet Loss -** It is the measure of the number of packets dropped by the routers due to various reasons.
6. **Routing Overhead -** The ratio between the total numbers of routing packets transmitted to data packets.

6. CONCLUSION

Ad hoc mobile networks are very dynamic, self organizing and self healing distributed network without an infrastructure. Many of protocols are use for routing in this network. In this paper we discuss a concept of distance sequence number in AODV protocol. We have improved the algorithm of sequence number in AODV protocol. We are also trying to improve some of matrics given in the paper through the modified algorithm. To implement the proposed model, NS-3 simulator is used in a physical topology area of 500m x 500m using a random way point mobility model.

7. REFERENCES

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