Performance Analysis of AODV and DSDV MANETS Routing Protocols Using Fuzzy Logic and NS-2

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Abstract

Mobile ad hoc network is a type of ad hoc wireless networks which has become highly important in wireless communication. This network has composed of a set of wireless nodes and mobile phones and computer can play role of these nodes. Routing in these networks is complex and difficult because there is no fixed topology and nodes are freely displaced. In these networks, each node plays role of a router. Military networks, crime management networks etc. can be among the examples of mobile ad hoc network. One of the most important issues in ad hoc networks is routing. There are different types of routing protocols such as AODV and DSDV routing protocols. This report analyses and evaluates these two protocols with fuzzy framework system and NS-2 simulator. In this article, performance analysis of AODV and DSDV MANETS Routing protocols using fuzzy system and the result is compared with and NS-2 simulator.

Keywords: *AODV, DSDV, Fuzzy system, NS-2, MATLAB software*

I. Introduction

Ad hoc networks are classified into two groups including mobile ad hoc network and intelligent sensor network. Mobile ad hoc network has composed of wireless nodes. Nodes are freely displaced. In other words, this network has dynamic topology. Figure 1 shows an mobile ad hoc network.

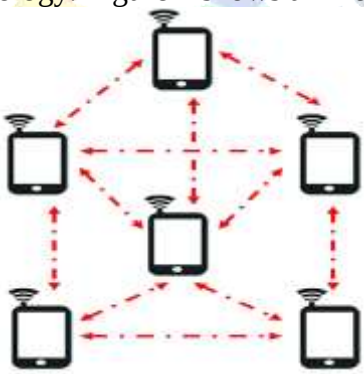

Figure 1 mobile ad hoc network.

Routing is difficult in this network. In order to send data soundly and with low delay to destination, routing protocols should be used. DSDV and AODV protocols are of the popular protocols which are evaluated and compared with different nodes size. DSDV routing protocol performs routing with Bellman–Ford algorithm. Each node has a routing table which is updated continually and periodically. The inputs which are located in routing table include the number of nodes for reaching destination, sequence numbers for reaching destination which is generated by the destination node and is the destination address [2, 5]. Data packets are transferred to nodes with routing table. Preventing creation of loop is one of the features of this protocol. AODV routing protocol This protocol discovers route with request approach. In other words, this protocol finds routes with RREQ, RREP and RERR messages. When the source node wants to send data to destination, source node first broadcasts messages called RREQ to its neighbour nodes. When the RREQ message reaches destination node, the destination node will send its response to the source node from the same previous path with RREP message and it means that the route has been found from source to destination and the source node can send its data. One of the features of this protocol is that it performs routing action only if necessary. ADOV protocol uses a routing method and acts similarly to DSR [6, 7, 8]. As mentioned above, the

source node first broadcasts its route request among neighbours and the node forwards its response message into the source node. Figure 2 shows message broadcasting procedure. This figure has 8 nodes in which node A has role of source and H has role of destination. Node a broadcasts route request among the neighbouring nodes and also neighbouring nodes route request source node to another node.

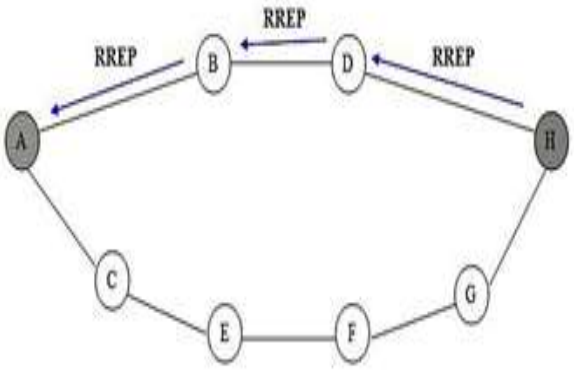

Figure 2 Mobile ad hoc network message broadcasting procedure

When request message reaches node H or destination node is found, the destination node forwards the response message to node A and the source can send its data. Figure 3 shows response of destination node to the source node.Sending route request from node a (source) Sending node H response (destination) to sphere a (source).

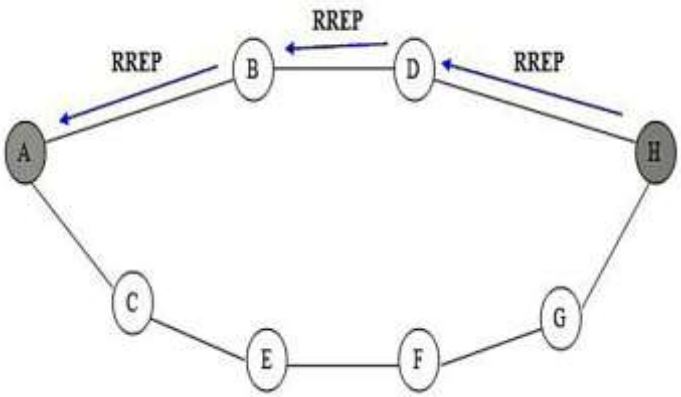

Figure 3 Response of destination node

II. Fuzzy system

Fuzzy models based on Zadeh's compositional rule of inference. The fuzzy system use the raw data to make calculation on whatever the input is given and it begins with an introduction of fundamental ideas of fuzzy conditional (if-then) rules. A collection of fuzzy if-then rules formulates the so-called knowledge base, which formally represents the knowledge to be processed during approximate reasoning.

III. Related Work

Studies have been conducted so far to evaluate and analyse routing protocols in ad hoc networks some of which we describe here. Morshed et al. in their paper compared AODV and DSDV protocols with different parameters. In their test, they showed that AODV protocol was better than DSDV routing protocol for real time applications. Mohapatra et al. in their paper analysed function of several routing protocols on ad hoc network and studied delay, throughput and packet delivery. Odeh et al. analysed and compared function of two protocols i.e. DSR and AODV. Criterion for their comparison was data packet size. They found that DSR protocol had better function for packet of below 7 bytes. Boukerche et al. studied and compared AODV, PAODV, CBRP, DSR, DSDV protocols and found that DSR and CBRP routers had higher power compared with other protocols .in this project here we have analysed things by using fuzzy logic by taking of the outputs of both AODV and DSDV like throughput, packet dropping etc.

IV. Proposed Methodology

Fuzzy system

Fuzzy network can settle on choice and control a framework The expression "framework" is generally comprehended as a lot of connecting segments with all around characterized structure and composed as a multifaceted entire that can be recognized from the "outside" condition. A framework speaks with nature through alleged sources of info and yields. Fuzzy network frameworks are structures dependent on Fuzzy network frameworks arranged towards data preparing, where the utilization of traditional sets hypothesis and paired rationale is unthinkable or troublesome. In the writing, terms, for example, Fuzzy framework, Fuzzy model, framework dependent on Fuzzy principles, Fuzzy controller, or Fuzzy acquainted memory are utilized reciprocally relying upon the application type. Their fundamental trademark includes emblematic information portrayal in a type of Fuzzy restrictive (assuming at that point) rules.

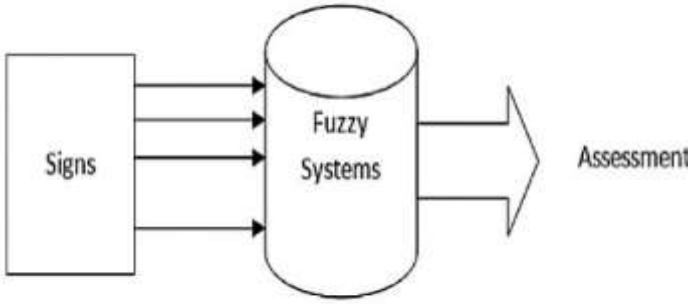

Figure 4 Function of Fuzzy system

$$if x_1 is A_1^1, \ldots, x_m is A_m^1 then y = B^1 \qquad (1)$$

Utilized membership functions are triangular, yet they have different number of variables. This difference roots in natural quiddity of parameters such as degree of anemia.

Input–output parameters of the fuzzy systems

It is not possible to determine efficiency of two AODV and DSDV routing protocols under different conditions but attempt has been made to calculate efficiency of two AODV and DSDV routing protocols with a fuzzy system using this single factor for taking suitable measures. Therefore, the above fuzzy system has four outputs which show efficiency of two AODV and DSDV routing protocols based on different input states.

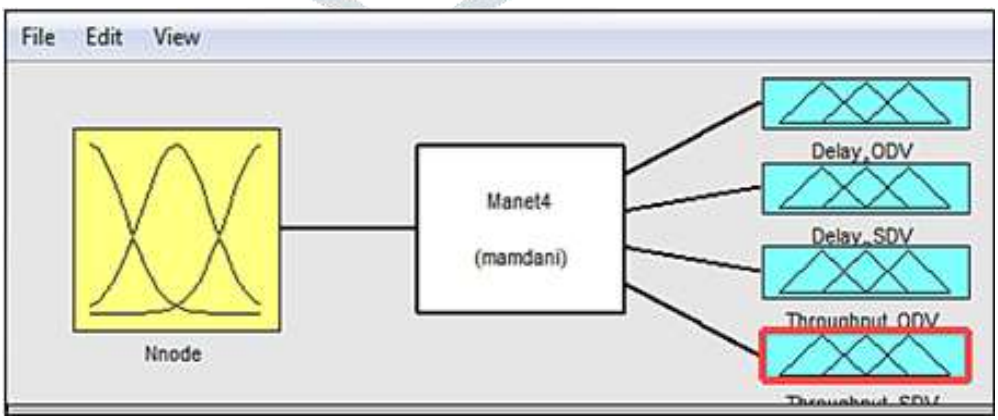

Figure 5 AODV and DSDV routing protocols

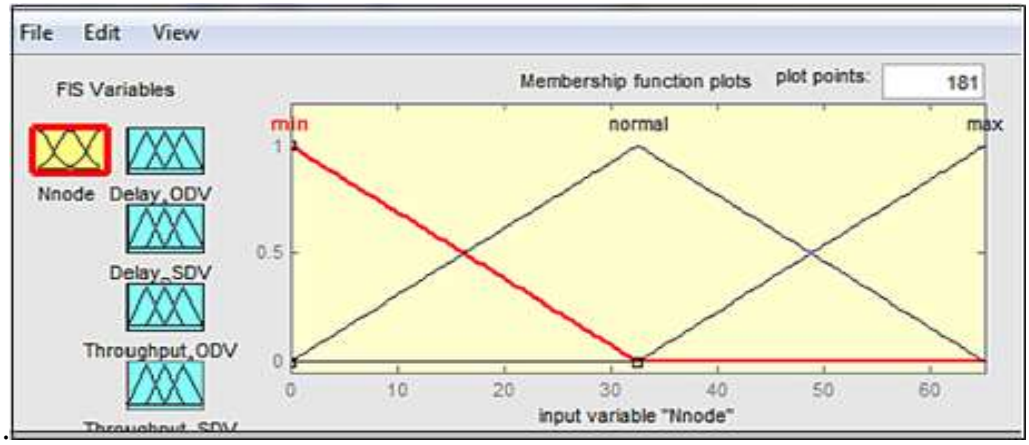

Figure 6 Member function related to input of the no. of node

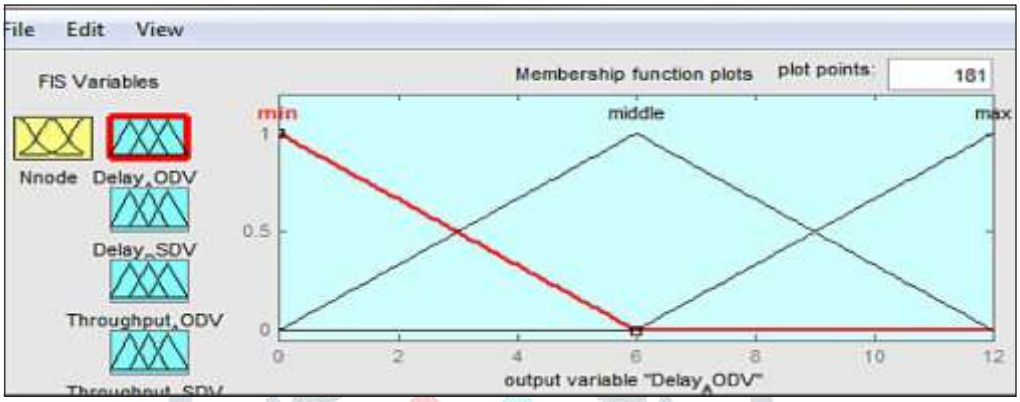

Figure 7 Member function related to delay of AODV

V. Result and discussion

Figures 8A and 8B we then showed results obtained from effect of the number of node on output as 2D which has been obtained in the simulation model.

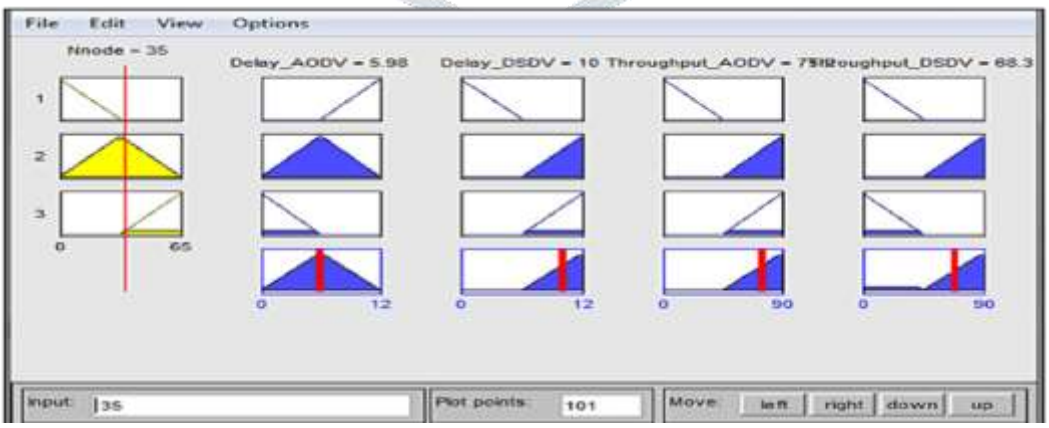

Figure 8 Simulation with 15 nodes

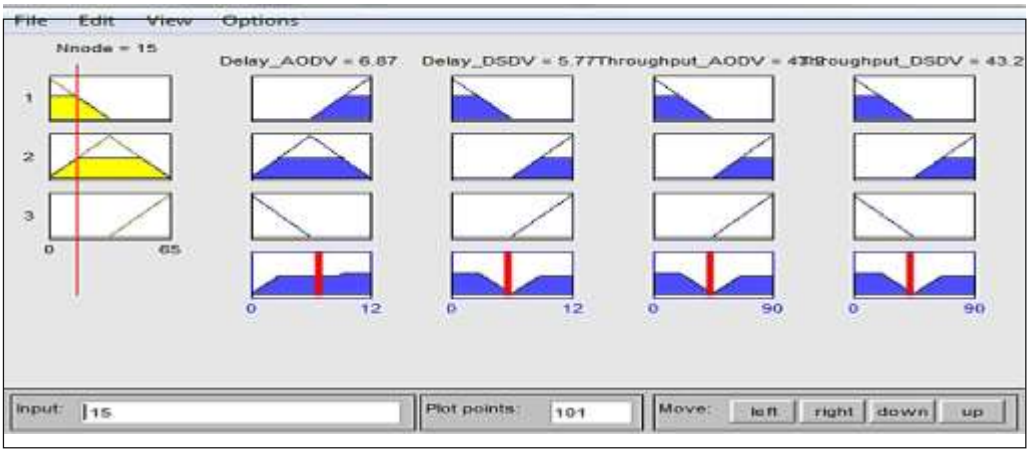

Figure 8B. Simulation with 35 nodes

Results of fuzzy expert system for two outputs of delay and throughput are given in Table 1. The results for two protocols which have been tested with nodes 10, 15, 25, 35, 45, 55 and 65 are shown in Figure 10A and 10B. The obtained results show that AODV protocol has lower delay

NS-2 software has been used to simulate the protocols and NS2 Visual Trace Analyser software has been used to analyse the results. Our evaluation criterion is condition of the sent packets, the maximum delay and maximum forwarded data per second. Each one of them is discussed here. The settings which have been done for analysis of this test are shown in Table 2. Figure 11 shows. Simulation medium and Figure 12 shows layout of nodes in which number zero is source node and node number 1 is destination node.

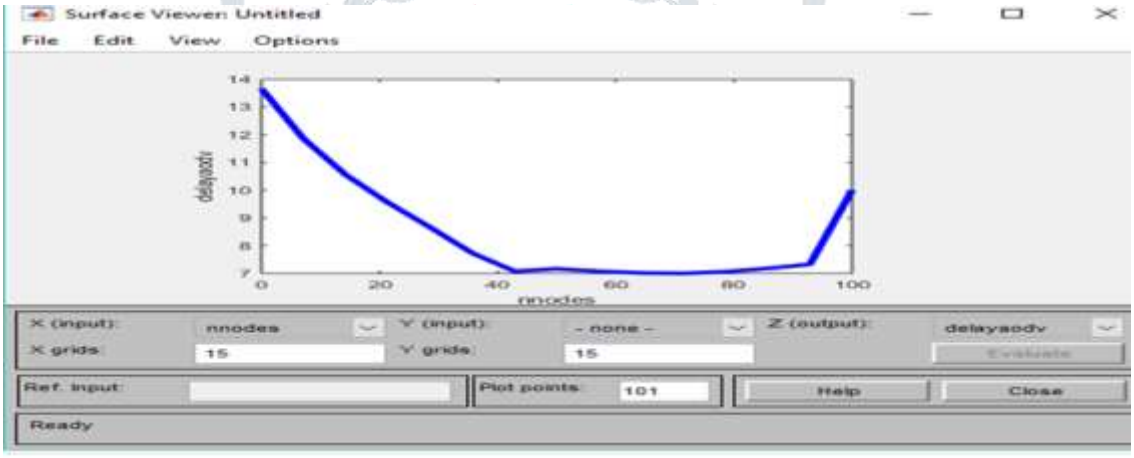

Figure 10 A graph of delay dsdv and n nodes

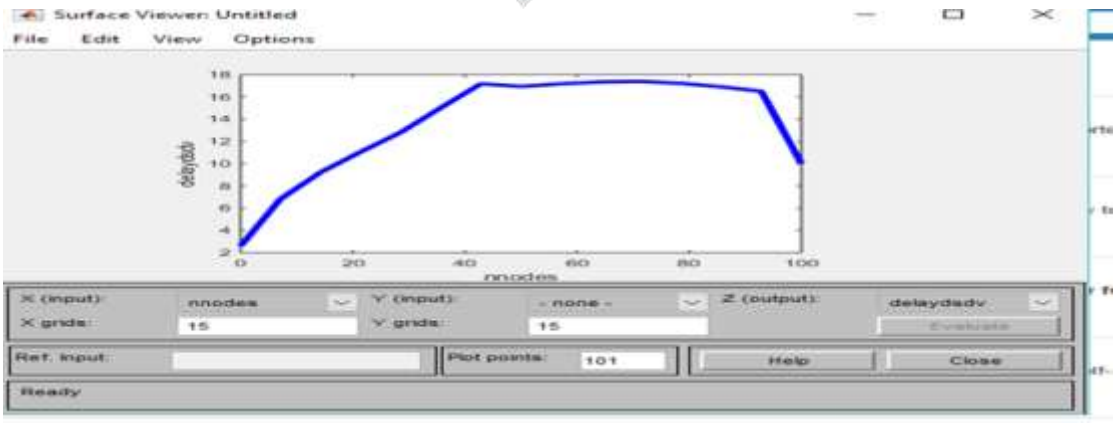

Figure 10 B graph for delay aodv and n nodes

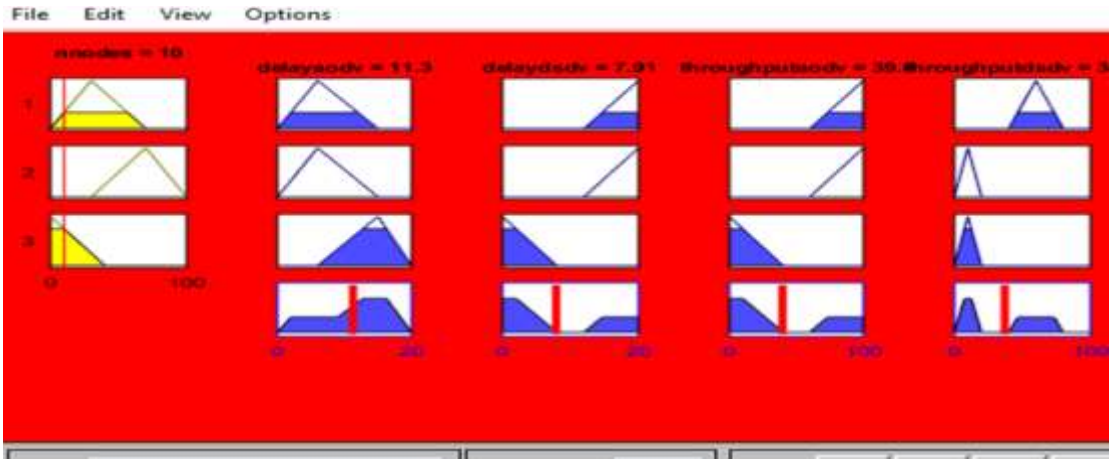

Figure 11 Ruler viewer result for 10 nodes

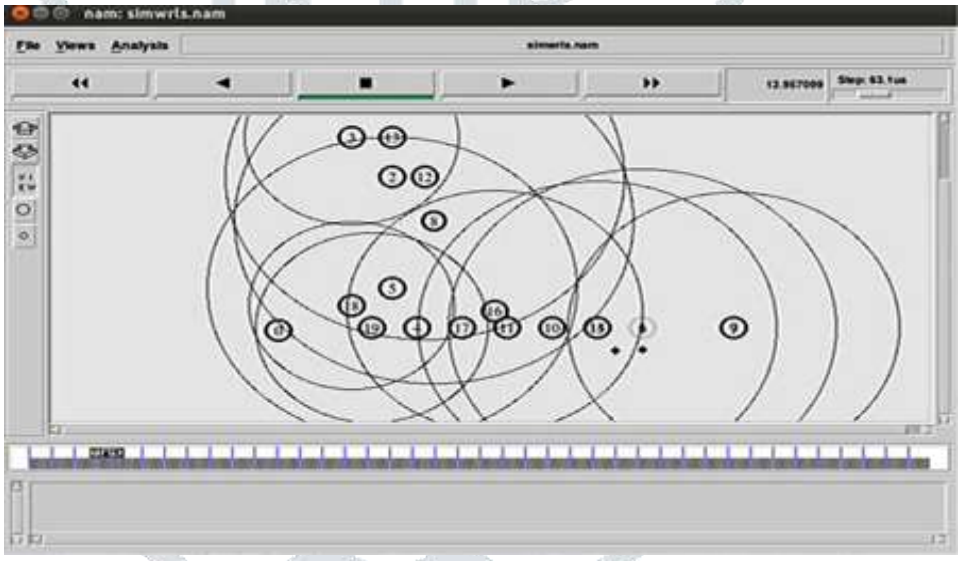

Figure. 12. Layout of nodes with 20 nodes in which node number zero is source and node number 1 is destination

The forwarded packets

In this Section, condition of the packets which have been generated, dropped and transferred are shown with different nodes with both protocols. Figure 13 shows the generated packets, dropped packets and transferred packets for AODV protocol with different nodes. For example, a test has been done on 10 nodes in this Figure. There are 4038 TCP packets and 13 packets have been transferred from source to destination is 4025. Considering this Figure, it can be said that with increasing the number of nodes, the number of packets forwarded from source to destination increases Figure 14 shows the generated packets, the dropped packets and transferred packets for DSDV protocol with different nodes. For example, there are 4726 TCP packets in the test which has been performed on 10 nodes and the number of the dropped packet is 41 and also the number of transferred packet from source to destination is 4685.

VI. Conclusion

In this report, framework has been intended to examinations both DSDV and AODV conventions in MANET and to demonstrate truth of the fluffy framework, we contrast results by looking at two conventions and NS-2 programming and the outcomes show that the structured fluffy framework has reasonable proficiency for proposing and choosing one of these two steering conventions essentially and intelligently under various conditions and dependent on various applications. AODV convention has preferred execution over the DSDV convention as far as the information move rate every second and postpone rate with expanding the quantity of hub in the system. We can say that goal of designing the fuzzy system in this report is to help ordinary user select type of the routing protocol only based on information of ordinary user (even if the user has no accurate information about routing protocols of MANET networks) .

Reference

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