Simulation Analysis of AODV Routing Protocol of MANET using OPNET

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Abstract
Mobile Ad hoc network is concept of communication that mobiles nodes want to communicate using dynamic topology. The important characteristics of having dynamic topology is node can change position quite frequently. Nodes can consist laptops and personal digital assistants and are often very limited in resources like CPU capacity, storage capacity, battery lifetime and bandwidth. The routing protocol should minimize the control traffic and calculate route only when they receive request. In this paper we present simulation analysis of the AODV Protocol consider two networks one having smaller nodes and other having larger nodes.

Keywords
MANET, AODV, OPNET, RREQ, RREP

I. Introduction

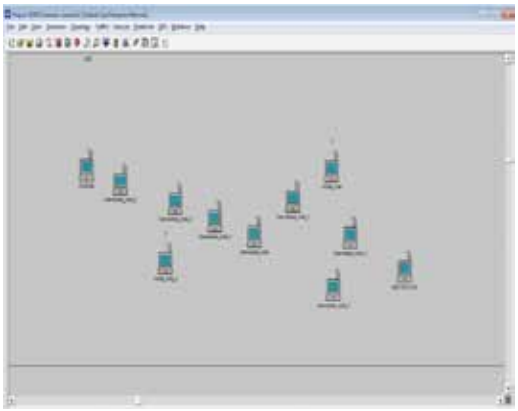
Mobile ad hoc network (MANET) forms dynamic network without the use of any existing infrastructure or centralized administration. Due to the dynamic nature the network topology keep changes randomly. In mobile ad hoc network each node acts as router for sending and receiving the packets to/ from other node [1]. Ad hoc network having advantage due to its wireless nature. On other hand in wired network the physical cabling is done restricting the connection topology of the nodes. This restriction is not present in the wireless domain and provided that two nodes are within transmitter range of each other, an instantaneous link between them may form. Routing is an activity to move the information from source to destination in the network. During this process, at least one intermediate node within the network is encountered. The routing concept basically involves, two activities: firstly, determining optimal routing paths and secondly, transferring the information through a network. Routing basically classified in two types: static routing and dynamic routing. Static routing refers to routing strategy being manually. In static routing maintains a routing table by administrator. Dynamic routing mainly depends upon the state [2]. Mobile ad hoc network provide the dynamic routing. It having two types of routing protocols (1) Proactive Protocols are table driven approach that constantly updates list of destinations and routes. Such as Destination sequence distance Vector (DSDV) and (2) Reactive Protocols are event driven approach that creates the routes whenever it required. Such as Ad hoc on demand distance Vector (AODV) and Dynamic source routing (DSR). Ad hoc on demand distance vector is reactive protocol. It requests a route when needed and does not require nodes to maintain routes to destination that are not actually used in communication. The main feature of AODV is loop free protocol and the link breakage because immediate notification to be sent to the offered set of nodes it use of destination sequence number that guarantees a route is fresh [3]. AODV maintain table on each node and need to keep track of information such as destination IP address, Destination Sequence number, hop count, next hop, life time, active neighbors request buffer. AODV used route discovery method to find new route. When a node wants to communicate, it sends RREQ to nearest neighbors. After broadcasting a RREQ the nodes waits for RREP. If the reply is not received with certain time the nodes may rebroadcast the RREQ or assume that there is no route to destination. When the RREQ reaches a node that either is the destination node or node with a valid route to destination. [4] A RREP is generated and uni casting back to requesting node. While this RREP is forward to route is created to the destination and when RREP reaches the source node. There exists a route from source to destination. In AODV the route maintenance can be done when a node detects that route to a neighbor no longer valid .it will remove entry and send a link failure message, a triggered route reply message to the neighbors that are actively using the route informing them that this route no longer valid.

II. Related work

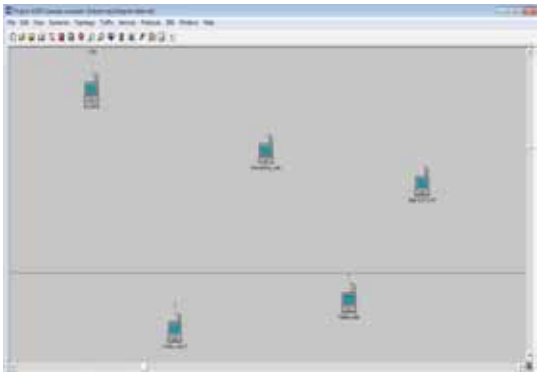
Many researches have been done on the performance analysis of the MAC AODV, most of them concentrating on the improvement of network size and pause [5,6]. Bashar and S.P Shetty [5]anlaysised with less size of the nework the performace of encoraging.in this paper also the explain the DSR gives high throuhput and packet delivery ration in all size networks. Ashish and Danish Singh[6] compare the perforamce of AODV with FSR and ZRP at pause time no of nodes incresase in the network and analyzed AODV delivers more than 60% packets when we consider the pause time function and more than 80% packets considering parameter of network size than FSR and DSR. Paper[6] it analysed on basis of mobility nodes in the network. The mobility nodes increase the efficeny of the network. Sikander, Sukhwinder,andTirlok Chand [7] compares the performance of AODV with OLSR and OFLSR in mesh wireless network consider mobility and traffic load. They analyzed AODV is not Scalabable. OLSR and OFLSR always provide the better performance in terms of packet delivery ratio and throughput considering instances of the mobility node traffic load. Abdallah Rasheed & Khader Mohammad [8] they concluded that AODV gives better performance in high mobility and traffic load. Balakrishna,Rajeswar Rao and Geethanjali [9] analyzed the performance issue AODV and AOMDV for MANETs and concluded that AOMDV is better than AODV in terms of packet delivery ratio and number of packets droped but in terms routing overhead AODV is preferable than AOMDV.Nor, Azizol and Ahmad [10] compare the performace of AODV, DSR and DSDV in grid environment they analysis AODV is not gives best by increasing the mobility as compare to DSR and DSDV.

III. Experimental result and analysis

We have analyzed the performance of a AODV by creating two different scenario in Opnet Modeler 14.5. Traffic of the AODV is evaluated in presence source and destination on the same distance of both scenarios. For the experimental results fewer nodes are configured in first scenario and large nodes are configured in second scenario. Two mobility nodes are configured in both scenarios to represent mobile Adhoc network. In these scenarios we give IP address of source and destination node. Other nodes having auto IP

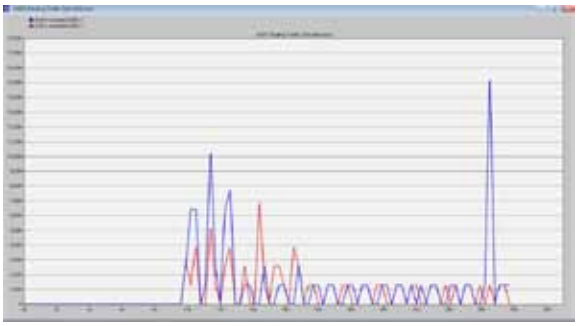


Scenario having large Node



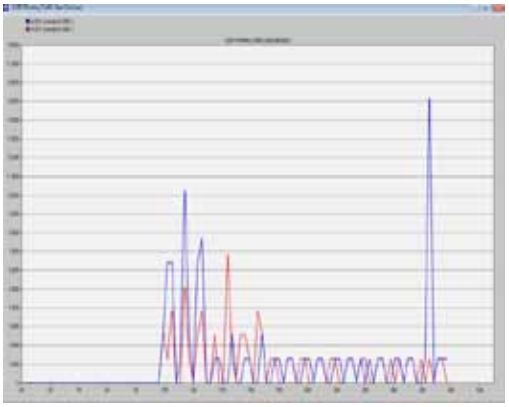
Scenario having Small Node Routing Traffic Sent By AODV

In these scenarios routing traffic sent by AODV in bit/sec is gathered. It is observed that routing traffic is generated at 10sec. It observed that at 28 sec 15000 bits in large node Scenarios and fewer node scenarios at 14sec 6000 bits sent.



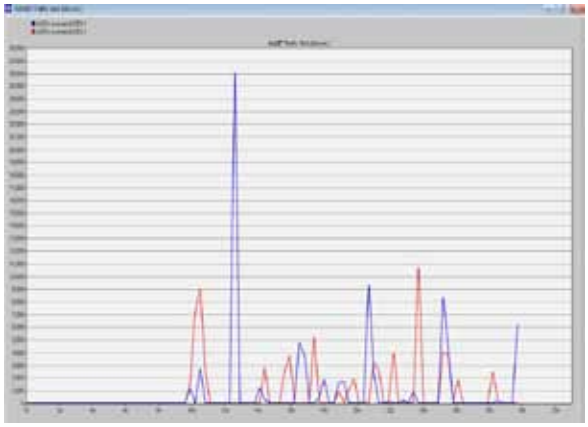
Routing Traffic Receive By AODV

In these scenarios, Traffic (bits/sec) received over network is gathered and studied.



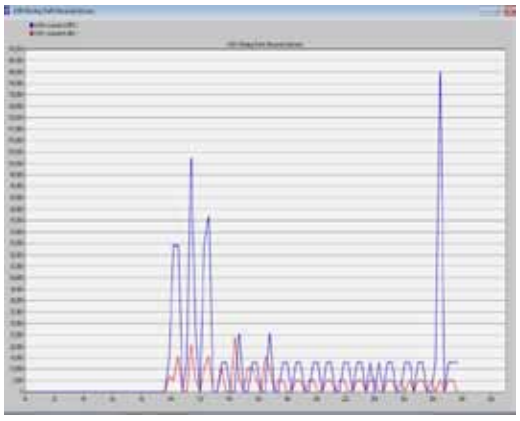
Traffic Sent by MANET

Considered as same time taken in less node and large node scenarios when source and destination both at same destination, In MANET nodes are communicates to each other on establish route by AODV.



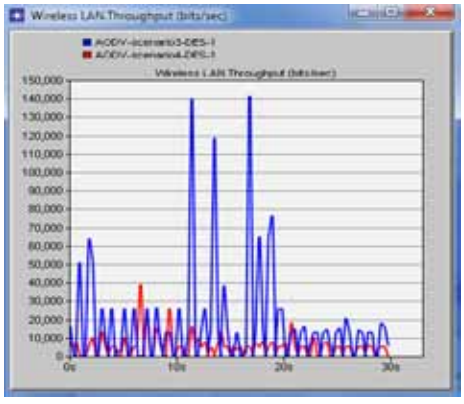
Traffic Receive By MANET

In these scenarios, Traffic (bits/sec) sent over network is gathered and studied.



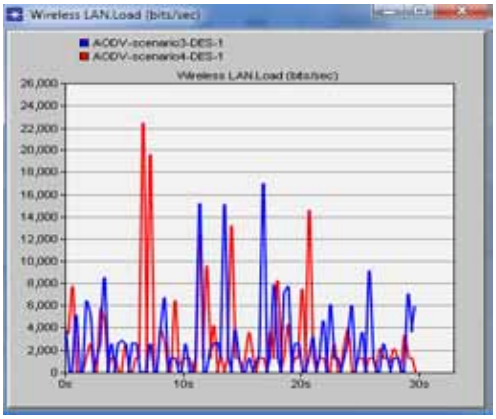
Throughput

In these scenarios we analyzed the when we used large node in network throughput of the network is increase as compare to fewer nodes used in network



Routing Load

In both scenarios we observed that routing load is increase with increase of traffic. In other words we say when we used large nodes in network routing load also increase in that network



IV. Conclusion

In simulation the analysis of AODV of using different network size in Opnet 14.5.The significance of network for performance of network size. From the result we conclude that with lesser size AODV gives encouraging results. But throughput and routing load is preferable in large network size

References

[1] Krishna Gorantala, "Routing Protocols in Mobile Ad-hoc Networks"

[2] Bassam Halabi, "Internet Routing Architectures". Cisco Press, 2000.

[3] Chakeres, I.D.; Belding-Royer, E.M, "AODV routing protocol implementation design," Proceedings of the 24th International Conference on Distributed Computing Systems Workshops (ICDCSW'04), pp. 698- 703, 23-24 March 2004

[4] Humaira Nishat, Vamsi Krishna, Dr. D.Srinivasa Rao, Shakeel Ahmed," Performance Evaluation of On Demand Routing Protocols AODV and Modified AODV (R-AODV)in MANETS", International Journal of Distributed and Parallel Systems (IJDPS) Vol.2, No.1, January 2011

[5] Syed Basha Shaik, Prof. S. P. Setty," Performance Comparison of AODV, DSR and ANODR for Grid Placement Model", International Journal of Computer Applications (0975 – 8887)Volume 11– No.12, December 2010

[6] Ashish K. Maurya, Dinesh Singh," Simulation based Performance Comparison of AODV, FSR and ZRP Routing Protocols in MANET", International Journal of Computer Applications (0975 – 8887) Volume 12– No.2, November 2010

[7] G. Carofiglio, C.-F. Chiasserini , M. Garettoyand E. Leonardi, "Route Stability in MANETs under the Random Direction Mobility Model".

[8] Mr.Sikander Singh, Mr. Sukhwinder Singh Sran, Dr. Tirlok Chand, Performance Comparison of AODV, OLSR and OFLSR in Wireless Mesh Networks", Proceedings of 2nd National Conference on Challenges & Opportunities in Information Technology (COIT-2008) RIMT-IET, Mandi Gobindgarh. March 29, 2008

[9] Abdallah Rasheed Khader Mohammad," Exploration and Comparison of Several AODV Implementations: A Survey"

[10] Nor Surayati Mohamad Usop, Azizol Abdullah, Azizol Abdullah, "Performance Evaluation of AODV, DSDV & DSR Routing Protocol in Grid Environment",IJCSNS International Journal of Computer Science and Network Security, VOL.9 No.7, July 2009 261.

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