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Enhancement in Quality of Services using EAM-AODV Protocol in Mobile Ad-hoc Network

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Abstract: *Ad hoc network is a distributed, temporary network system. It is formed by the dynamic link of nodes and does not rely on the existing network infrastructures, such as router, gateway, regular power supply, etc. Ad hoc network is a kind of peer to peer networks and each node has functions of data collecting, storage, processing and forwarding. In the ad-hoc on demand distance vector (AODV) routing process every node carry a routing table having ultimate destination and next hop information. In this work we study and evaluate the performance of AODV and EAM-AODV protocol and increase the performance of quality of services parameters in mobile ad-hoc network.*

Keywords: *Mobile Ad-hoc network, Wireless sensor network, Network simulator, AODV, Quality of services*.

1. INTRODUCTION

Ad hoc network is a distributed, temporary network system. It is formed by the dynamic link of nodes and does not rely on the existing network infrastructures, such as router, gateway, regular power supply, etc. Ad hoc network is a kind of peer to peer networks and each node has functions of data collecting, storage, processing and forwarding. It is the cost-effective solution for the short-range communication in some particular scenarios, such as battlefield, disaster rescue, environment sensing etc [13]. Ad hoc and wireless sensor networks (WSNs) have enabled a large variety of applications. Environmental and wildlife monitoring, clinical medical and home-care monitoring, monitoring and control of industrial processes including agriculture, and smart houses or cities are just some of the examples of ad hoc and WSN applications, where low-cost and easily deployed multi-functional sensor nodes are the ideal solution. As a result, during the past few years we have experienced the emergence of a new paradigm called the Internet of Things (IoT) in which smart and connected objects cooperatively construct a (wireless) network of things. However, the unique features of ad hoc and WSN technologies can pose significant challenges. Hence, envisioned solutions must be verified before being deployed in a real-world WSN deployment, either by utilizing simulators or emulators or through experimentations by employing test beds.

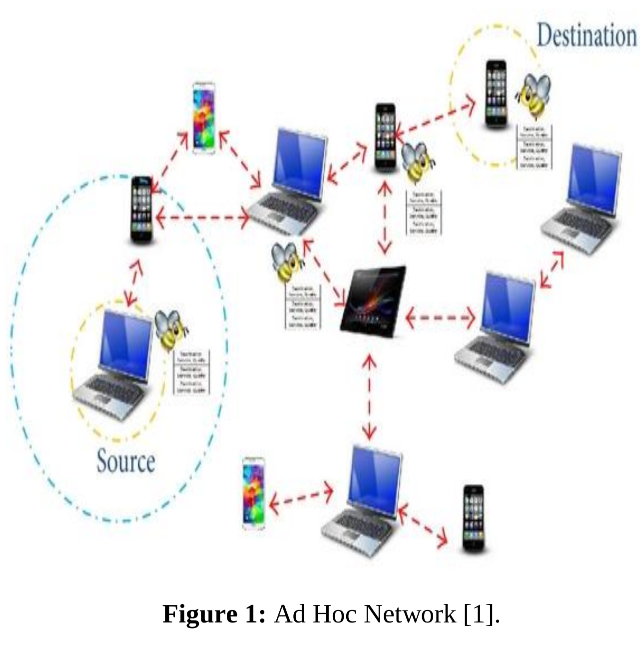

Figure 1: Ad Hoc Network [1].

Recent scientific and technological developments are so rapidly paced that what was not even predicted before has become a reality and part of our life today. One of the notable inventions of the recent time is the small sized electronic device called sensor which has the capability to observe various parameters like object movement, light intensity, temperature, magnetism, seismic activities, and so on. These sensors, often with own capability of communicating within themselves or with other devices, are developed to gather data and store the recorded data to process further if needed. Such communications could take place via wired as well as wireless mode giving scope to their (i.e. the sensors) increase in number for a particular system or network. In general, a WSN requires no infrastructure or very little infrastructure which consists of sensor nodes that can range from few tens to thousands and those sensors in the network could work collectively for monitoring purpose. The WSNs could be categorized as either unstructured or structured. In unstructured WSN, the sensors are deployed randomly over the area of interest (AoI) while in structured WSN; the sensors are deployed at fixed locations. There is a wide range of application scenarios for both structured and unstructured WSNs. As the sensors used in these networks are pretty small in size, they are often equipped with lightweight energy source. In practice, sensor networks are planned to perform tasks like measurement, tracking, detection, and data classification. Various applications of WSNs include the fields of transportation, smart grid, healthcare, smart bridges, precision agriculture, industrial applications, security, environment monitoring, and urban terrain tracking [9].

The rest of this paper is organized as follows in the first section we describe an introduction of mobile ad-hoc network. In section II we discuss the ad-hoc on demand distance vector routing protocol. In section III we discuss the proposed method and experimental result in mobile ad-hoc network using the enhanced optimized adaptive multipath routing protocol, finally in section IV we conclude the about our paper.

2. AD HOC ON-DEMAND DISTANCE VECTOR ROUTING

AODV is a distance vector routing protocol for MANE proposed in 2003. AODV is designed to cope with high-density network topologies and under various velocities. It has been designed to operate in trust networks that could not include malicious nodes in a loop-free manner, avoiding counting to infinity problem associated with classical distance vector protocols [8]. There are two operating modes in the AODV routing protocol, route discovery and route maintenance. AODV control messages can be defined as Route Requests (RREQs), Route Replies (RREPs), Route Errors (RERRs), and Route Reply Acknowledgment (RREP-ACK). Routes are initiated only on request. With AODV, the source node establishes a route to an unknown destination when there are data packets that need to be sent. Path construction is achieved by broadcasting a Route Requests (RREQs) message to its neighbors maintaining an incremental (fresh) sequence number to preserve updated information. AODV is based on UDP as an unordered transport protocol to deliver packets within the ad-hoc network. Moreover, it requires that every node can be addressed by a network wide unique IP address and sends packets correctly by placing its IP address into the sender field of the IP packets. This means also that AODV is expected to run in a friendly network, where security is a minor concern. It should be mentioned that there are some attempts to extend AODV to prevent malicious nodes from attacking the integrity of the network by using digital signatures to secure routing control packets. AODV requires each node to maintain a routing table containing one route entry for each destination that the node is communicating with. Each route entry keeps track of certain fields. Some of these fields are:

- **Destination IP Address**: The IP address of the destination for which a route is supplied.
- **Destination Sequence Number**: The destination sequence number associated to the route.
- **Next Hop**: Either the destination itself or an intermediate node designated to forward packets to the destination.
- **Hop Count**: The number of hops from the Originator IP Address to the Destination IP Address.
- **Lifetime**: The time in milliseconds for which nodes receiving the RREP consider the route to be valid.
- **Routing Flags**: The state of the route; up (valid), down (not valid) or in repair.

3. EXPERIMENTAL WORK

In the ad-hoc on demand distance vector (AODV) routing process every node carry a routing table having ultimate destination and next hop information. This information is used to discover route from source to destination. Here, every node check routing table to know whether the route is available or not. In case of indirect communication it forward packets to next hop node to forward packet to destination. The objective of this dissertation work is to explore the most suitable solution to mitigate various numbers of attacks and improve the performance of ad-hoc on demand distance vector routing as well as mobile ad-hoc network during insecure situation.

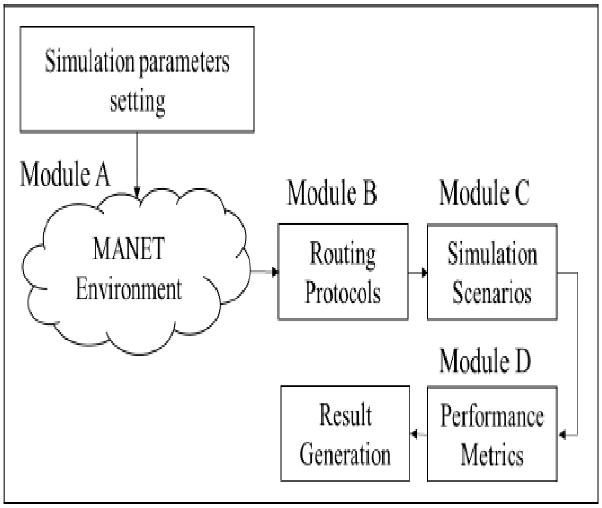

Figure 2: Simulation model design.

In this work, the protocol EAM-AODV is proposed as an optimization of the currently functioning efficient AODV protocol. This adaptive protocol utilizes the battery power of the node and links signal strength as the metrics for the route selection. The signal strength of node depends upon the distance that exists between the neighboring linked nodes. The choosing of the path is done on the basis of path with maximum battery power and signal strength. The MINMAX method is used for route selection.

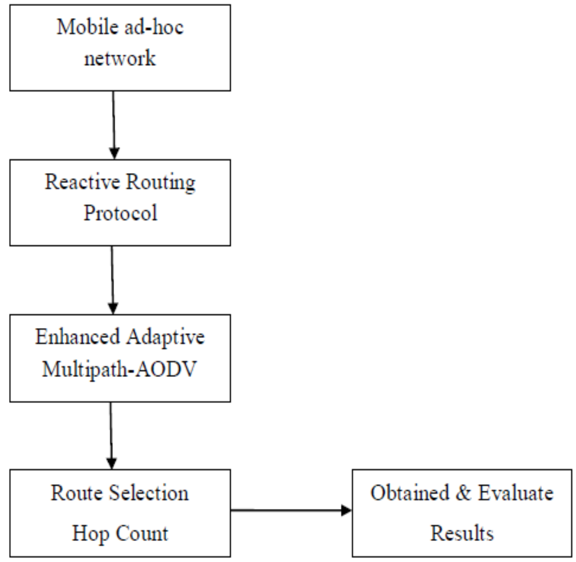

Figure 3: Proposed work block diagram.

There are some steps we have to follow to implement this system are following:-

Step 1- begin the process of virtualization and open the vmware machine and turn on the power of virtual machine.

Step 2- After the successful power on for machine login with the id and password to enter into machine.

Step 3- Run the tool command script file for the network simulator.

Step 4- open the shell scripting window and run the file using shell command.

Step 5- Apply the techniques with network simulator like previous approach and proposed approach.

Step 6- Find the best route according to applied techniques with network simulator and find the best route or path.

Step 7- Getting the optimal routing results.

Step 8- After the getting optimal results if we are not satisfied with the results then goto step 5, until we found the best results.

Step 9- Exit the experimental simulation process and end the vmware machine with power off signal.

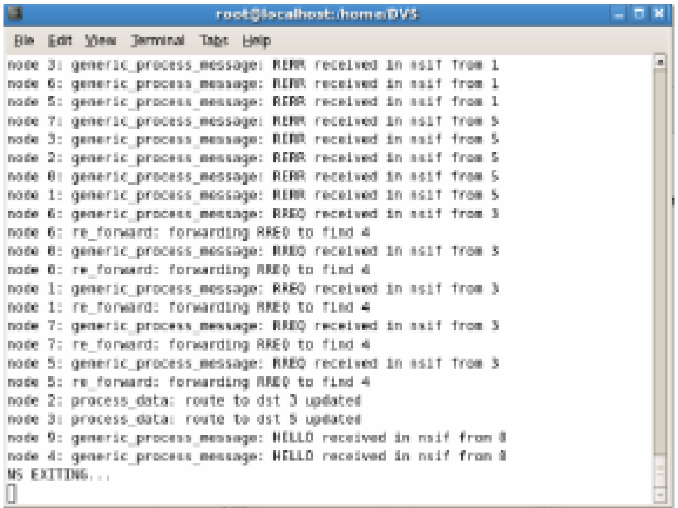

Figure 4: This picture represents the running shell files output and their description used in a network simulator.

4. CONCLUSION

As the importance of using computers to making easy the work, in our daily life increases at the same time also there is sets new requirement to getting higher efficiency at a lower cost and in standard time for connectivity. The wired connect has been used for a long time to achieve the mission, but because of increasing demand on a wireless network which allows users to access information such as send the E-mail message from someone to the other one or connect to the internet and so on [1]. If two hosts wish to exchange data in that environment the intermediate nodes should be able to communicate between them to send and receive the data with ability using at anytime and anywhere. In this work we discussed our proposed algorithm is EAM-AODV very efficient in comparison in AODV routing protocol. For the evaluation of performance our modified algorithm which is distance source routing based on link availability. The results of the proposed works are batter then the previous approaches in order to improve the performance parameter evaluation like end to end delay, throughput and packet delivery ratio.

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