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Comparison between Ant Colony Routing Protocol and Genetic Algorithm

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Abstract— In this article we present a survey on ant colony routing protocol. Routing, the act of moving information across an Internet work from a source to a destination is one of the major issues in computer network literature. Recently nature inspired algorithms have been explored as means of finding an efficient solution to this routing problem. Ant colony optimization(ACO) is a technique used for solving complex computational problems, such as finding optimal routes in networks.In the natural world ants (initially) wander randomly and upon finding food return to their colony while laying down pheromone trails.If other ants find such a path, they are likely not to keep travelling at random, but to instead follow the trail,returning and reinforcing it if they eventually find food.These pheromones are attractive, nearby ants will be inclined to follow, more or less directly the track.Returning to the colony,these ants will strengthen the route.If there are two routes to reach the same food source then in a given amount of time, the shorter one will be traveled by more ants than the long route.The short route will be increasingly enhanced and therefore become more attractive. Finding the shortest route in the network has always been a challenge. In this paper we have used Ant colony optimization and Genetic algorithm for that purpose. The comparison is done and the results are proposed.

Keywords: Ant colony optimization, Routing, Mobile Ad Hoc Networks, Wireless Sensor Networks.

I. INTRODUCTION

MANET is a collection of mobile, decentralized, and self organized nodes. The distributive nature, infrastructure-less and dynamic structure make it an easy prey to security related threats. A **mobile ad hoc network** (**MANET**), sometimes called a mobile mesh network, is a self-configuring network of mobile devices connected by wireless links.

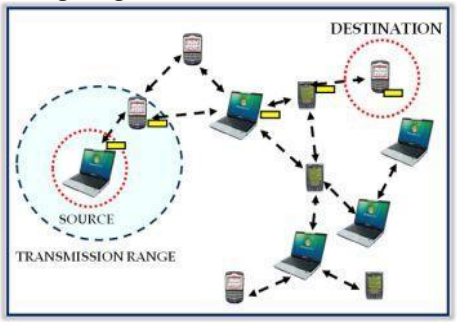

Figure 1.1 shows how data is send from transmitter to receiver

Each device in a MANET is free to move randomly in any direction, and will therefore change its links to other devices again and again. Each must forward traffic unrelated to its own use, and therefore can acts as router. The major challenge in building a MANET is making each device to monitor and maintain the information required to traffic routing.

Such networks may operate on their own or may be connect to the huge Internet MANETs are a kind of WAHN that usually has a networking environment on top of a Link Layer ad hoc network. They can also be called as a type of mesh network, but many mesh networks are immobile or not wireless.

The growth of wireless technologies such as 802.11/Wi-Fi wireless networking have made MANETs a popular research and analysis topic since the late of 19th century .Research papers evaluate protocols and abilities assuming varying degrees of mobility within limited area, usually with all nodes within a few hops of each other and usually with nodes sending data at Transmitter site . Different protocols are then evaluated based on the packet drop rate, Bit rate, overhead for synchronization and other measures.

The security threats may vary from active impersonation attacks to passive eavesdropping. Implementing Security & mitigating threats in MANET has significant challenges because its dynamic properties make it harder to be secured than the other types of static networks. The objective of this paper is to propose a cooperative bait detection scheme to combat sleep deprivation and denial of service attack over MANET. This scheme merges the proactive and reactive defense

architecture in MANET by using the first hop neighbor address as destination address to bait the malicious nodes which were causing the attack.

A **M**obile **A**d-hoc **NET**work (MANET) consists of mobile platforms, which are free to move about arbitrarily. Each of these platforms, herein simply referred to as "nodes", logically consists of a router with possibly multiple IP-addressable hosts and multiple wireless communications devices A node may consist of physically separate networked devices, or may be integrated into a single device such as a Laptop or Personal Computer. The nodes are equipped with wireless transmitters and receivers using antennas which may be Omni-directional (broadcast), highly directional (point-to-point), steerable (arrays) or some combination of them. At a given point in time, depending on the nodes' positions and their transmitter and receiver coverage patterns, transmission power levels, and co-channel levels, a wireless connectivity in the form of a dynamic, multi hop graph or "ad hoc" network exists between the two nodes.

There are two main approaches for enabling wireless communication between hosts. First is enabling existing cellular infrastructure to carry data as well as voice which includes the major problem of handoffs. Another main problem is that they are only limited to places where exits such a cellular data network.

II. LITERATURE SURVEY

Ismail, Z.(2011):- Networks are being used in different areas and the insist of users nowadays has motivated the emergence of the Mobile Ad Hoc Network (MANET). MANET is a self-motivated network without preset infrastructure due to their wireless nature and can be deployed as multi-hop packet networks. It is a wireless network and has dynamic topology due to its node mobility. There are two types of MANET, homogeneous and heterogeneous MANET. Architecture has been designed in previous work to model these two types of MANET. Three scenarios have been defined from this architecture: scenario I (communication entirely within MANET, homogeneous MANET), scenario II (communication between MANET and wireless LAN, heterogeneous MANET) and scenario III (communication between MANET with wireless LAN and wired LAN, heterogeneous MANET). MANET has its own routing protocols which can compromised with frequent route exchange, dynamic topology, bandwidth constraint and multi-hop routing. Ad hoc On Demand Distance Vector (AODV) is one of the routing protocols in MANET. The aim of this research is to assess the effects of different packet size with the implementation of AODV routing protocols in homogeneous and heterogeneous MANET through the simulation method. The three scenarios above have been developed in the OMNeT++ network simulator. The results achieved from the test have been evaluated using the metrics assigned, throughput and packet delivery ratio (PDR). The tests show that the increase of throughput and PDR performance was parallel with the increase of packet size. From the test also, we can conclude that the performance due to the packet size effect in homogeneous MANET is better than in heterogeneous MANET.

Thorat, S.A (2014):- In MANET nodes help each other in data routing. MANET works well if the participating nodes cooperate with each other. It is impractical to assume that, all nodes participating in an open MANET are cooperative and honest. For individual nodes it may be benefcial to be non-cooperative and selfsh. However non-cooperation, selfshness and malicious behavior of the participating nodes may result into collapse of a MANET. Trust based routing algorithms aim to identify misbehaving and non-cooperating nodes in the MANET. These algorithms optimize the network performance by utilizing trustworthy nodes in effective way and penalizing non-cooperative nodes. This paper compares trust based and cryptographic approaches for implementing security in MANET routing. The paper discusses design issues in trust based routing protocols for MANET in details. The paper presents a survey on trust based routing protocols for MANET. The paper provides directions for future research in trust based routing for MANET.

Gnana Jayanthi, J. (2010):- In the near future, a pervasive computing environment can be expected to be based on the recent progresses and advances in computing and communication technologies. The Next generation (Next-Gen) of mobile communications will include both prestigious infrastructured wireless networks and novel infrastructureless Mobile Adhoc NETworks (MANETs). The special features of MANET bring great opportunities together with severe challenges. With this insight, an empirical study on MANET is being conducted. Some of the technical challenges MANET poses are also presented. The paper points out some of the key research issues to promote the development and accelerate the commercial applications of the MANET technology. A special attention is paid on to highlight the integration of MANET with the significant features of IPv6 such as integrated security, end-to-end communication. This paper also briefs and focuses the research directions towards the IPv6 based MANET which is the most essential for growing mobile population.

Lacharite, Y.(2007):- Simplified multicast forwarding (SMF) provides an optimized flooding mechanism in MANET environments to efficiently propagate multicast packets. The main difference between the SMF and traditional multicast routing is that no multicast tree is built and maintained, and no group membership management is needed. Therefore all the nodes in MANET receive the multicast information. However, a multicast border gateway is required in a MANET to interoperate with other multicast routing protocols in the wired domain as SMF does not make use of traditional multicast method. We propose a MANET SMF gateway implementation solution that addresses the issues encountered within the gateway configuration, such as interaction with the protocol independent multicast protocol (PIM). We will present the results of a tested single-gateway MANET implementation, and will also introduce a proposal for the multiple-gateway scenario. In the IETF MANET working group, the SMF design group also presents proposals for handling multiple gateways; they recommend to apply a <taggerID> to the multicast traffic when multiple gateways are injecting a flow into a MANET area. However this approach implies that equal multicast packets disseminated into the MANET by different gateways have different taggerlD, and hence these packets cannot be detected as duplicates. Our approach differs by preferring the use of hashing by the gateways for marking equal packets injected into the MANET, hence

making these equal packets compliant for duplicate detection. This article demonstrates a successful implementation of the gateway functionality and extends its analysis by proposing a solution for the multiple-gateway configuration.

Durai, K.N. (2013):- Mobile Ad hoc networks (MANET) basically have dynamic topology, as the routing system's list of neighboring nodes and routers changes its location from time to time. MANET's often consumes lot of bandwidth, as the medium is shared with other nodes. MANET nodes consumes more power, even if they don't take part in active communication. The drawback is mainly because of limitations of the technology and routing protocols available. MANET's are vulnerable to attack as they share a wireless medium with infrastructure less backbone. The system proposes a Routing protocol in MANET which enables efficient usage of power and bandwidth in Mobile Ad-hoc networks (MANET). Randomized Overhearing techniques is proposed to reduce power consumption and enhance effective Routing in MANET. Randomized overhearing technique is used with AODV (Ad-Hoc on Demand Distance Vector)and DSR(Dynamic Source Routing) protocols to reduce the power consumed during transmission in a MANET. Minimum hop path is introduced to reduce excess bandwidth consumption. MD (Mediation Device) protocol is proposed to extend the battery life of nodes in the MANET scenario.

III. PROBLEMS IN CURRENT WORK

Mobile Ad-hoc Network, Each device in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. Each must forward traffic unrelated to its own use. An ad hoc network typically refers to any set of networks where all devices have equal status on a network and are free to associate with any other ad hoc network device in link range. One key problem in wireless ad-hoc networks is fore seeing the variety of possible situation that can occur. As a result, modeling and simulation using extensive parameter sweeping and what if analysis becomes an extremely important paradigm for use in ad hoc networks. All these things should be done keeping in mind the factor of reduced power in WSN. These network technologies are currently facing many technical problems and unsolved issues of power and coverage some of the most crucial factors for sustainment of the networks are undertaken. In our review period the facts which prevailed disclose that PDR is best in LAR1 with marginal mobility model, end to end delay is best in ADOV in marginal mobility model and best in DSDV under varying node movement, throughput is best in ADOV in varying nodes movement, power consumption is best in DSR when nodes speed is increases and best in varying mobility pattern.

IV. PROPOSED WORK

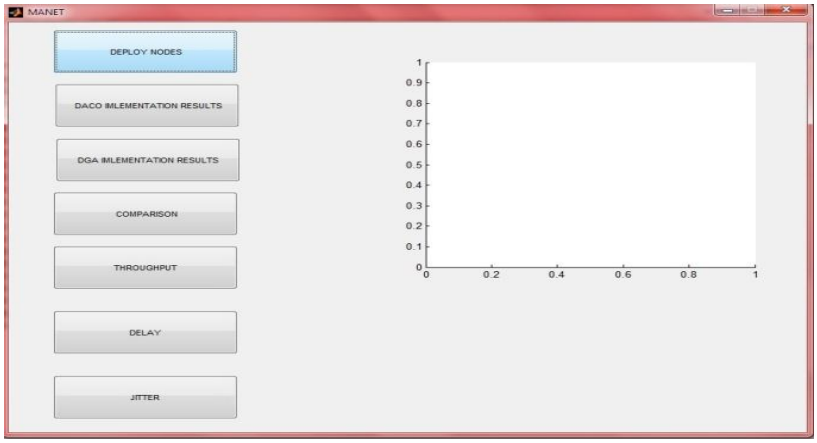

Figure 4.1 Main window of GUI

This is the main window of the GUI of the simulation and it includes the buttons as stated DEPLOY NODES, DACO IMPLEMENTAION RESULTS, DGA IMPLEMENTATION RESULTS, COMPARSION, THROUGHPUT, DELAY and JITTER.

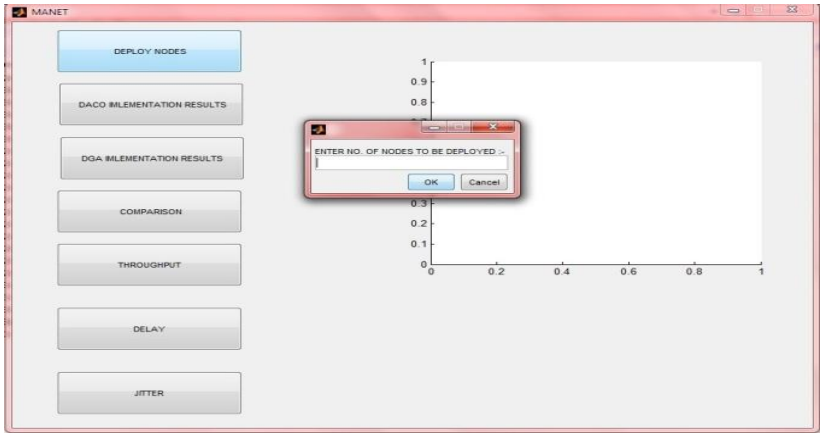

Figure 4.2 Deploy node button

First is the deploy node button where the nodes are deployed .A small dialogue box appear on the screen where we need to enter how many nodes we have to deploy.

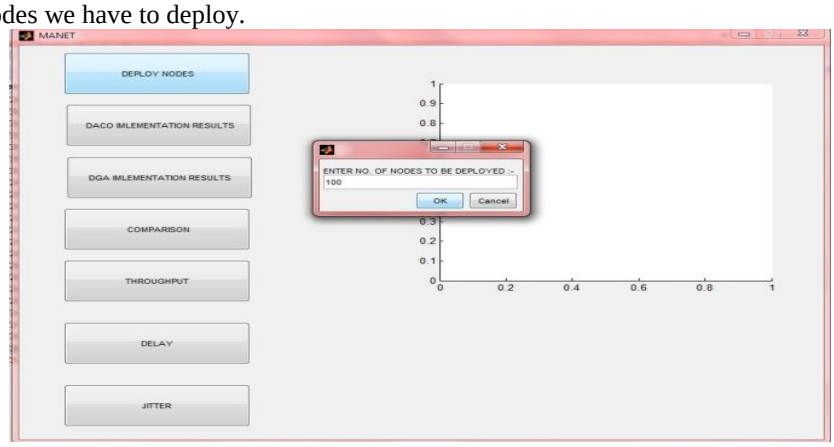

Figure 4.3 Enter number of nodes here

When we enter the number of nodes that we want to deploy like here we entered 100 means 100 nodes will be deployed.

V. RESULTS AND DISCUSSION

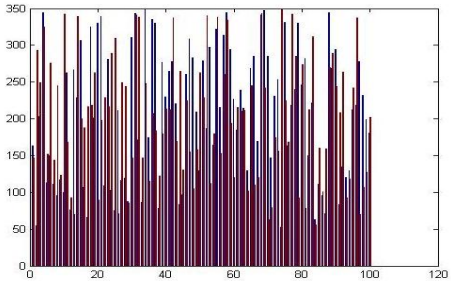

Figure 5.1 Graph Shows deployed number of nodes

This graph shows the deployed number of nodes. Since100 nodes are deployed so the graph shows 100 deployed nodes. This graph also shows the initial energy with the deployed node.

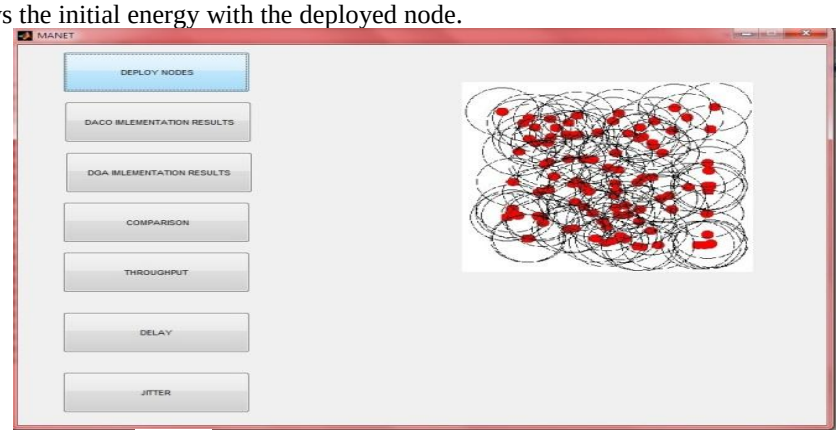

Figure 5.2 Graph shows deployed nodes and its range

This figure shows that the red are the deployed nodes and the black circles are the ranges of the respective node.

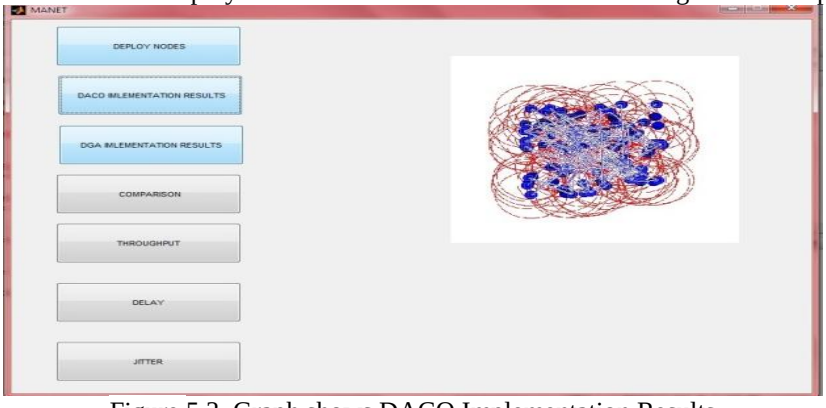

Figure 5.3 Graph shows DACO Implementation Results

Now the second button is the DACO IMPLEMENTATION RESULTS. Where DACO stands for, "density based ant cloning optimization". In this graph the blue are the used nodes and the lines are the shortest route.

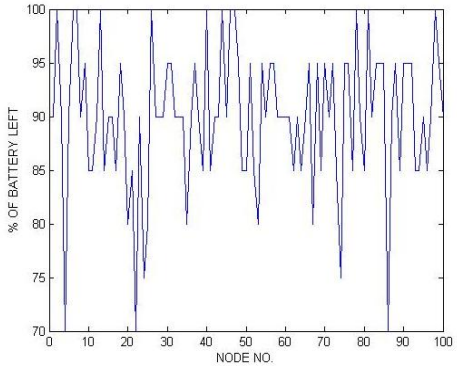

Figure 5.4 Graph shows Battery Left in DACO

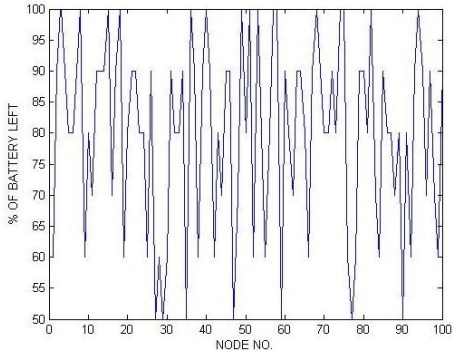

Figure 5.5 Graph shows Battery Left in DGA

This graph shows the battery left percentage of DGA, where DGA stands for "density based genetic algorithm".

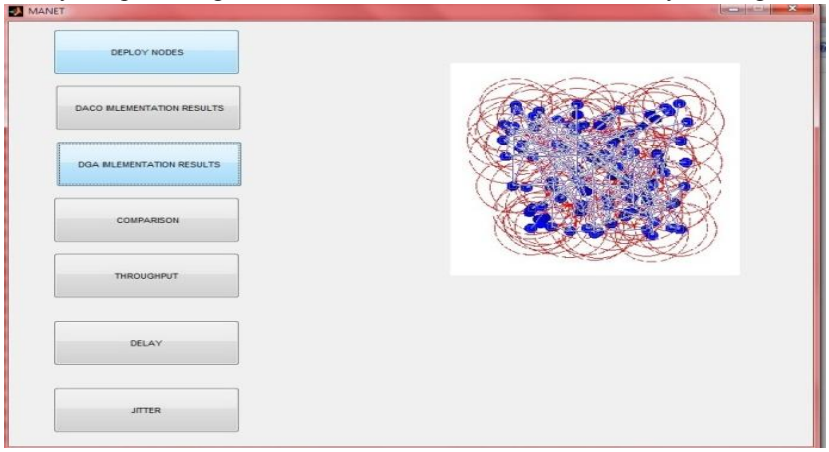

Figure 5.6 Graph shows Implementation Results of DGA

This graph shows the implementation result of DGA. Where blue are the used nodes and lines are the shortest route.

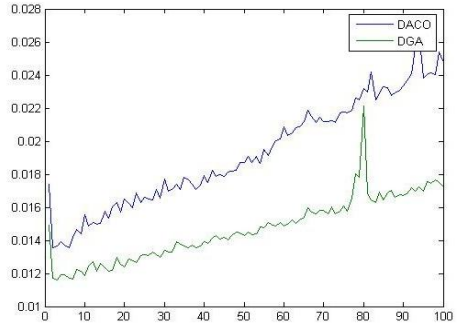

Figure 5.7 Graph shows Comparison of Energy

This graph shows the comparison of energy. The results show that DGA had consumed less energy than DACO.

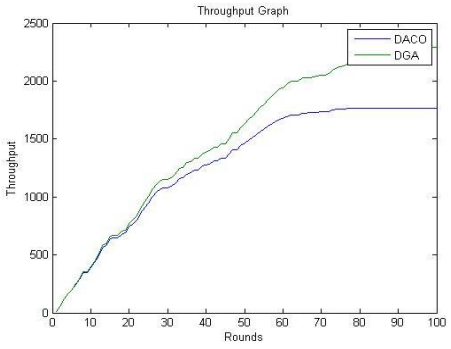

Figure 5.8 Throughput Graph\

This is the throughput graph and where throughput of DGA is less than that of DACO.

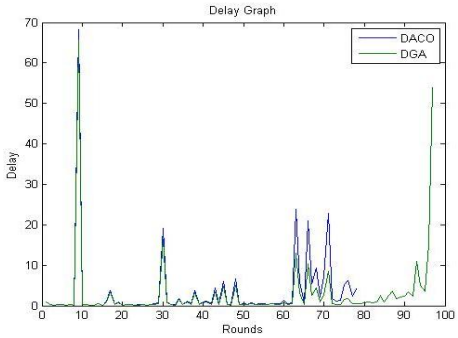

Figure 5.9 Graph Shows Delay Between DGA and DACO

This graph shows the delay between DGA and DACO. In this graph the delay of DGA is less than that of DACO.

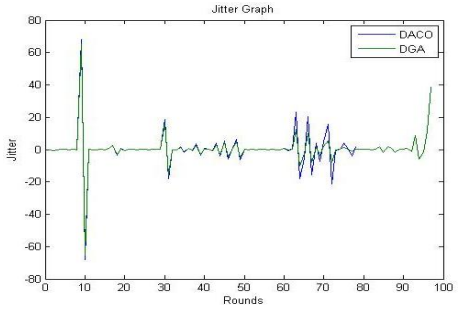

Figure 5.10 Graph Of Jitter Between DGA and DACO

This figure shows the graph of jitter. Over here the DGA jitter is less than that of DACO.

VI. CONCLUSION

The biggest challenge in this kind of networks is to find a path between the communication end points, what is aggravated through the node mobility. MANET consists of mobile nodes, a router with multiple hosts and wireless communication devices. Mobile ad hoc network are used for specific purpose. But ad-hoc network is most popular network because it is more flexible as compare to another network. It is easily data transfer from one network to another network, it increasing flexibility and consuming less time. But to find shortest route in the network has always been a challenge. We have used Ant colony optimization and Genetic algorithm for that purpose in which the genetic algorithm proves to be better.

REFRENCES

[1] Ismail, Z. ; Hassan, R.. "Effects of Packet Size on AODV Routing Protocol Implementation in Homogeneous and Heterogeneous MANET". 2011. Computational Intelligence, Modelling and Simulation (CIMSiM), 2011 Third International Conference.

[2] Thorat, S.A. ; Kulkarni, P.J.. "Design issues in trust based routing for MANET". 2014. Computing, Communication and Networking Technologies (ICCCNT), 2014 International Conference .

[3] Gnana Jayanthi, J. ; Rabara, S.A. ; Macedo Arokiaraj, A.R.. "IPv6 MANET: An Essential Technology for Future Pervasive Computing". 2010. Communication Software and Networks, 2010. ICCSN '10. Second International Conference.

[4] Lacharite, Y. ; Wang, M. ; Lamont, L. ; Landmark, L.. "A Simplified Approach to Multicast Forwarding Gateways in MANET". 2007. Wireless Communication Systems, 2007. ISWCS 2007. 4th International Symposium.

[5] Durai, K.N. ; Baskaran, K.. "Energy efficient random cast DSR protocol with mediation device in MANET". 2013. Advanced Computing and Communication Systems (ICACCS), 2013 International Conference .

[6] Yi Wang ; Hairong Chen ; Xinyu Yang ; Deyun Zhang. "Cluster based location-aware routing protocol for large scale heterogeneous MANET". 2007. Computer and Computational Sciences, 2007. IMSCCS 2007. Second International Multi-Symposiums .

[7] Rahman, F.M. ; Gregory, M.A.. "IP Address Associated 4-N Intelligent MANET routing algorithm utilising LTE cellular technology". 2012. Telecommunication Networks and Applications Conference (ATNAC).

[8] Chze, P.L.R. ; Yan, W.K.W. ; Kan Siew Leong. "A User-Controllable Multi-Layer Secure Algorithm for MANET". 2012. Wireless Communications and Mobile Computing Conference (IWCMC), 2012.

[9] Younchan Jung ; Peradilla, M.. "Host mobility management using combined MIPv6 and DNS for MANETs". 2013. Mobile and Wireless Networking (MoWNeT), 2013 International Conference on Selected Topics.

[10] Shimizu, M. ; Todoroki, H. ; Takami, K.. "MANET routing scheme for establishing a connection from an isolated LAN to the Internet using HTTP communication". 2013. Communications (APCC), 2013 19th Asia-Pacific Conference.

