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# A comparatives survey on Particle Swarm Optimization based Routing in MANET Network

[1]Sumit Kumar, Assistant Professr, Poornima Group of Institutions, Jaipur

[2]Dr. Ajay Maurya, Associate Professor, Poornima Institute of Engineering & Technology, Jaipur

**Abstract**

In Manet Network Table-driven routing protocol table maintain its store information about the complete network. When a path is found to be referenced from one node to another table to find the route. Based on Swam particle propagation algorithm, routing protocol also maintains a similar table-driven routing protocol table. Its main advantage is that it found many routes data sent from the source to the destination. Thus, multiple routing attribute is "yes" based on Swam particle propagation algorithm routing protocols. It makes the system more reliable, if any problem by the best path to send data in, you can use the alternative routes offered by the GA-based routing protocol. Another advantage of Swam particle propagation algorithm routing protocol is not looking at the route and the number of network nodes dramatically increases the complexity. Since the discovery of Swam particle propagation algorithm coding solution by the evolution of technology, the cross so that it is suitable for large networks.

**Keywords:** Table driven, Routing , Protocol, Propagation.

## Introduction

In the past few years, wireless communication has grown very quickly. The best feature provided by such networks is no wires. Users can take away handheld devices anywhere with them. They get benefited from small devices, long lasting batteries. High bandwidths are available from new communication standards. In order to communicate via such a network, fixed infrastructure is not necessary. These self-organizing networks (Ad hoc networks) have gained interest on a large scale in recent times. The most common applications of wireless networks are Group Standard for Mobile communications (GSM) and Wireless Local Area Network (WLAN). Nodes are not arranged in any particular fashion in such networks. So to ensure better communication in between nodes, some routing protocols have been developed for such networks. Wireless networks are playing a major role in the area of communication. Wireless Networks enable the users to communicate and transfer data with each other without any wired medium. Now we are using wireless networks in military applications, industrial applications and also in personal area networks. The main difference between wireless and wired networks was only in communication channel. In wired network physical medium exists and does not exist in wireless network. In general, wireless networking[1] devices use of infrared or radio frequency signals to transfer information and resources between devices each other. Today many types of wireless devices are available such as, mobile terminals, hand-held PCs, laptops, cellular phone, PDA, wireless sensors and satellite. Wireless networks are two types first is called infrastructure based wireless networks and second is called Infrastructure less network. Infrastructure less network is also called Ad-hoc Network. Ad-hoc networks can be classified in three categories based on applications; Mobile Ad-hoc Networks (MANETs), Wireless Mesh Networks (WMNs), Wireless Sensor Networks (WSN). Wireless networks[2] became very popular due to lots of factors such as ease of installation, reliability, cost, bandwidth, and total required Power, security and network performance.

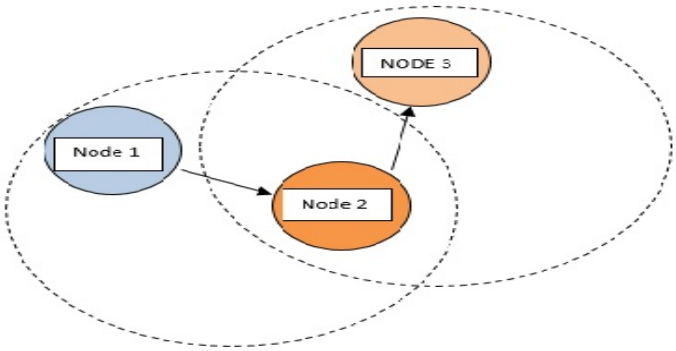


Figure 1: A sample mobile ad-hoc network of three nodes.

**Characteristics of MANETS**

Wireless: Nodes are connected wirelessly and the communication medium used is generally radio or infrared signals.

Mobility: Every node in an ad hoc network is free to move. The reason of existence of ad hoc networks is that the nodes can move and/or can be rapidly repositioned. Generally rapid deployment with no fixed infrastructure implies that users have to be self-coordinated. For an example in any security task, the users need to explore some area and form teams to complete the mission. There can be different mobility models like group mobility, random mobility which can have major impact on selection of routing technique[3].

Multi hopping: A Multi hop networks are one in which to deliver information from sender to receiver. It has to be passed through several other intermediate nodes. As adhoc networks are energy and bandwidth constrained, use of multiple hops is useful. In military battle field covert operation for obstacle negotiation and reduce detection, short hopes are used.

Self-organization: An ad-hoc network determines its own configuration parameters. Few main parameters can be routing, addressing, clustering, power control, position identification etc.

Open Medium: Generally ad-hoc networks are used in military operations or disaster recovery, so the medium is often open[4,5,6].

Autonomous and infrastructure less: There is no fixed infrastructure as well as central administration. Each node acts as a router. Nodes work independently and generate their own data.

**Challenges in MANETS**

1. Dynamic topology - in MANET network topology is not fixed. A node can be reached directly from one node time, and may not be directly after the arrival of a period of time node. Therefore, each node has to refresh information on its nationals[7].
2. The limited bandwidth constrained wireless link have to send information compared to the less wired link capability. Therefore, to provide less bandwidth compared to Mount communications, based on the sub-network.
3. Routes Overhead- each packet to find the route to date before sending node. As the location of the node can change over time, as compared to a fixed substructure based network to route it is not easy in a wireless ad hoc network.
4. The hidden terminal Problem- it refers to the data packet collision problem is known as receiver end. The hidden terminal problem[8].

5. The packet loss due to transmission errors - since the radio link for wireless ad hoc network communications so there may be some erroneous data transmission between the sending nodes.
6. Because of the liquidity-induced line changes- routing communication node can always change liquidity. It is built on a wireless ad hoc network challenges[9].
7. Battery Constraints- usually in Mount these devices are battery ran. These less battery life, after a period of time required for charging. The power consumption for battery powered devices is also a challenge in wireless ad hoc networks.
8. Security Threat- because some new security challenges in a mobile wireless communication has been ad hoc network that does not exist is introduced.

**Routing Protocols in MANETS**

As the name suggests, MANET is an ad-hoc network which is mobile in nature. It is mobile as it uses wireless connections. Hence, MANET can change locations and configure itself on the go. It can connect to various networks through a standard Wi-Fi connection or may use another medium like cellular or satellite transmission. MANETS can be connected to either a limited number of wireless devices(example laptop, computer) in a LAN or through the internet[10,11].

For example- a VANET (Vehicular Ad Hoc Network) is also a type of MANET. It helps vehicles for communicating to the roadside equipment. Vehicles may or may not be connected to internet through a connection, but the roadside equipment is wirelessly connected to the internet. It sends data from vehicles over the internet. This vehicle data can be used for measuring traffic conditions or for keeping a track of over speeding trucks. This dynamic nature of MANETs make them a little less secure, thus data sent over a MANET network must be cautiously chosen. Fig 2.1 shows the MANET architecture[12,13].

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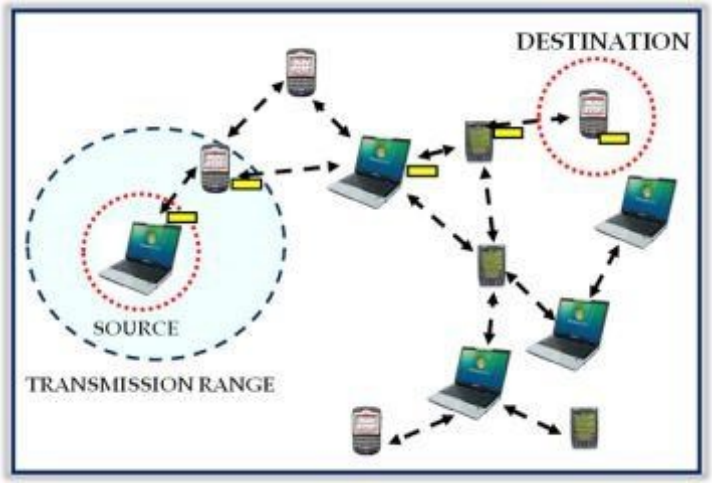


Figure 2 :Mobile Ad-hoc Network

**The Protocol Stack**

This stack of protocols for mobile ad hoc networks section is described. This gives a comprehensive overview and helps to better understand the mobile ad hoc networks. The protocol stack consisting of five layers: physical layer, data link layer, network layer, transport layer and application layer. It has similarities with the TCP / IP protocols[14,15,16]. As can be seen in the OSI layers to the session, presentation and application are merged into one section, the application layer. On the left of Figure, the OSI model is shown. It is a layered framework for the design of network systems that allows for communication across all types of computer systems. In the middle of the figure, the TCP/IP suite is illustrated. Because it was designed before the OSI model, the layers in the TCP/IP suite do not correspond exactly to the OSI layers. The lower four layers are the same but the fifth layer in the TCP/IP suite (the application layer) is equivalent to the combined session, presentation and application layers of the OSI model. On the right, the MANET protocol stack -which is similar to the TCP/IP suite -is shown. The main difference between these two protocols stacks lies in the network layer. Mobile nodes (which are both hosts and routers) use an ad hoc routing protocol to route packets. In the physical and data link layer, mobile nodes run protocols that have been designed for wireless channels. Some options are the IEEE standard for wireless LANs, IEEE 802.11, the European ETSI standard for a high-speed wireless LAN, HIPERLAN 2, and finally an industry approach toward wireless personal area networks, i.e. wireless LANs at an even smaller range, Bluetooth. In the simulation tool used in this project, the standard IEEE 802.11 is used in these layers. Three models this thesis focuses on ad-hoc routing which is handled by the network layer. The network layer is divided into two parts: Network and Ad Hoc Routing. The protocol used in the network part is Internet Protocol (IP) and the protocols which can be used in the ad hoc network,[18,19].

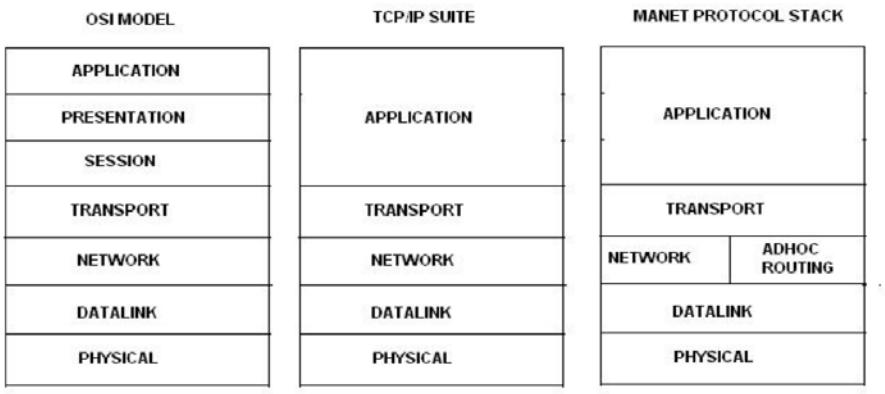


Figure 3 : Three Models of Routing

**Proactive Routing**

The proactive approach algorithms is followed basic routing types 1-link state, 2-distance vector. Different type of routing algorithms worked on distance vector and link state routing. Both of routing is works according character which send information to each node in network either it useful or not on other side it periodically send link add and remove information with the help of routing. Link addition and removal can trigger an event triggered updating of routing table. In proactive approach the main advantage is that the rout to each node is instantly found because the table contains all the

nodal address. Source only need to check the routing table and transfer a packet. The major disadvantage of proactive approach is that each node is prone to rapid movement. So the overhead of maintaining a rout table is very high, and amount of routing state maintained at each node scales as order of on where n is the number of nodes in the network. It becomes inefficient for a large network.GSR introduced below is a proactive routing protocol

Global State Routing (GSR) is based on the Link State (LS) routing method. link state routing method work through the nodes which is pass the link information in to all over network when it confirm that the link state change between itself and its neighbors. Each neighbors are delay that included by link state information. A node will know the whole topology when it obtains all link information. LS routing works well in networks with static topologies. When links change quickly, however, global flooding will frequently highly lead to huge control overhead[20,21,22].

Unlike existing methods LS, GSR link-state packets are not flooded. Instead, each node has received from the neighboring nodes latest LS link status table based on the information maintained and periodically only its neighbors (global flooding) to exchange information between the LS. Before sending an LS packet, a node assigns the LS packet a unique sequence number to identify the newest LS information. I replace those with small sequence number to be distributed as LS packet with a large sequence number more, the LS information. 8The convergence time required to detect changes in link GSR is shorter than in (DBF) protocol Distributed Bellman-Ford. The convergence time in the GSR, D is a diameter of the network, the update interval of link state I O is a (D * I). The convergence time, I usually smaller than (N individual * Ⅰ) O DBF, in the update interval and N is the number of nodes in the network. Because the global topology is maintained in every node, preventing routing loops is simple[23,24,25]. The disadvantage of GSR to the large size of the update message, which Information update time interval LS and information depending on the bandwidth of the significant amount of propagation delay time consuming. Fisheye technique to reduce the size of the update message may be used. In this case, all the nodes are remote nodes to gradually close detail, the immediate neighborhood node in the network maintains information about very accurate.

**Reactive Routing**

Reactive routing technique is a technique which is also known as a-on demand routing. It takes the different approaches of routing which overcomes as the disadvantages of proactive routing. In reactive approaches those nodes which are in require of connectivity to the internet reactively find internet gateways by means of broadcast and some kind of solicitation within the entire ado network. This approach has been to maintain a routing table, overhead Dictionary. Nodes automatically checks the route table entries for which the object is found or if no entry is found out if the date that the destination of the route search is performed to find the path. In this method, a signal with low overhead and network traffic load in the middle, is reduced. Disadvantages for the delay in the path argument. When no corresponding entry is found, the packet is route-discovery mechanism for the update of the table wait time occurs in a time-consuming[26,27].

**Routing Protocols in MANET**

Ad hoc routing protocol requirement was felt because ad hoc networks are self organizing, decentralized. Also there are the possibilities of change in topology makes the necessity of ad hoc routing protocol more prominent. For a node it trivial to communicate with a direct neighbor but to communicate with a node at some distance a node must have a proper

knowledge about the network. In a pure flooding mechanism all the nodes are retransmit in which each packet are received which leads to quite poor consumption of source ad there is a bandwidth which is used quite badly and the rate of collision is high[28].

**Issues and Challenges**

Though ad hoc networks are very useful at one end, however on the other end, there are many problems associated with them. Some basic issues which are very critical from security point of view are as follows:

1. Due to the vary mobile nature of ad hoc networks, higher movements are possible which cause frequent disconnection of links. Also due to mobility routing becomes the main issue.
2. Because of the broadcast environment, interference is high. So the network becomes less reliable.
3. As we know that in ad hoc networks bandwidth is low, so transmission rate is generally low.
4. As compared to wired networks, the speed in ad hoc networks is slow. Which is a reason of degraded quality of service?
5. Since bandwidth availability is low, and speed is slow, hence these networks take more time in connection setup.
6. Energy constrained: Generally in ad hoc networks, nodes (e.g. PDAs, sensors, laptops etc.) have limited power supply and they are not facilitated to generate power on their own. So efficient use of energy remains a challenge.
7. Due to mobility there are limitations on weight, size and cost of devices. As a result devices have limited memory, disk size and computing capacity.
8. Due to device type, network condition and distance, ad hoc networks have limited service coverage. So the area covered is very small. In case of need of large area coverage, large number of nodes has to be deployed[30].
9. As the wireless interface is generally accessible to outside world, it is difficult to establish a secure network, because attackers can interference in ad-hoc network.

**Literature Survey**

Presented in the survey mobile ad-hoc network. In mobile ad-hoc network routing existing literature can be classified into three major categories, such as active, Reactive and hybrid protocol. Also following mobile ad-hoc network of the main application areas:

Wireless ad hoc applications

1. In the search and rescue operations.
2. Make battlefield decisions.

In some operations, such as hostile terrain.

3. Data Acquisition System and I found some of the challenges of mobile ad-hoc network are:

1. Multi-hop data transmission
2. Dynamic Network
3. Limited resources, such as processing speed, battery life, available bandwidth.

Research indicates that the route is a mobile ad-hoc network of major problems. The authors also used some of the key issues in the routing protocol optimization.

1. In order to maximize the throughput of the network.
2. In order to reduce the delay between packets.
3. In order to maximize the network life cycle.

On the prototype for MANET too counsel energy and suggested that energy states of any of the following four nodes:

1. Transfer Status: The node data transfer some
2. Receiving state: Some data node is received:
3. Idle state: nodes are idle.
4. Sleep: node in sleep state. It does not participate in any communication, nor listen to different messages.

Energy MANETs nodes consume all states are different. The authors suggest that there are four possibilities to save power nodes.

1. The minimum energy consumption per pack.
2. Maximize network connection
3. The minimum variance in the power level of the node.
4. Try to reduce the maximum cost of the node.

Also he explained the active, passive and hybrid two different protocols. Many key issues, advantages and disadvantages of the different protocols have also been advised. The authors conclude that any agreement is not, in all cases, the most appropriate. Some protocols can better mobility is high among the nodes, and other protocols may be better, where mobility is low. There are also some agreement might be better, where high node density, and other protocols may be better where the node density low.

Bijay Gura B Pin proposed mobile Ad hoc network of power-efficient routing protocol. I believe that the following three points while optimizing mobile ad-hoc network routing process.

Node 1 the remaining battery capacity

Node 2 Transmit power

Node 3. Hop routing packets.

The proposed I-AODV system can also constrained optimization mechanism for faster route ERS found that by using TTL survival time. The original TTL is set to 1. If hop number 1 is unable to find the target node is increased to 2 to find TTL hops 2-way to the destination. If you still cannot find the target node in the second node layer is further increased to 3 TTL and RREQ messages are flooded in the network[31]. The proposed I-AODV protocol was simulated in NS-2 simulator and results show that the algorithm is able to reduce energy near 7-24 and end-to-end delay percentage. Adding I-AODV system is suitable for applications in which packets of different sizes will be sent [3]. ahu Caucasus Eugenia and Sukhpreet Kaur proposed an energy efficient approach to the use of genetic algorithms and mobile ad-hoc network routing ant colony optimization. The author tries to apply BP and ACO mobile ad-hoc network multicast routing. It's been cleared form the graph that projected BP algorithm ensures minimum end to end delay. Obviously with low cost energy from LDT compare AODV figures presented in less

than energy spent on Genetic Algorithms LDT process. BP also suggested routing algorithm has higher comparative PDR, LDT and AODV protocols [5]. Priti BPurre commends use multicast routing to achieve genetic process. The author proposed a new route while through strategy; the contract to handle the move temporarily set up dynamic. QoS parameters of the MANET routing number in work[32]. Author provides multicast network which is characterized by the following views:

1. The host can be a member of any multicast group.
2. Host and multicast group members may change.
3. Members of the nodes can send data to the same or some other multicast group.
4. UDP user datagram protocol is used for data communications.
5. Each multicast group defined by the class.

Multicast applications can be any of the following categories:

1. Single-multipoint
2. Multipoint
3. Multi-to-point.

I propose the following algorithm for multicast ad-hoc network routing process:

1. Generate initial population.
2. Calculate the distance between each member of the population.
3. Check whether to terminate the process or not, if yes, then go to step 8, otherwise go to step 4.
4. Perform the genetic operations: selection, crossover and mutation.
5. Generate the next generation.
6. Remove invalid node collection.
7. Go to step 3.
8. Stop.

I used simulation parameters are as follows:

| **Parameters** | **Description** |
|---|---|
| No of nodes | 20,40 |
| Mobility model | Randomewalk2dmobmodel |
| Simulation time | 50 sec |
| Simulation size | 500X500 |
| Routing protocol | ADOV and genetic |
| Loss model | Fixed loss mode |
| Data rate | 500kb/s |

Table 1 : Simulations parameters for genetic algorithm.

[6] Gihan Nagib Ali and Wahied G. proposed the use of genetic algorithms network routing protocol. On the attempt has been compared to the famous Dijkastra systems disclosure genetic coordination. This, to find the best path minimum path between two nodes.

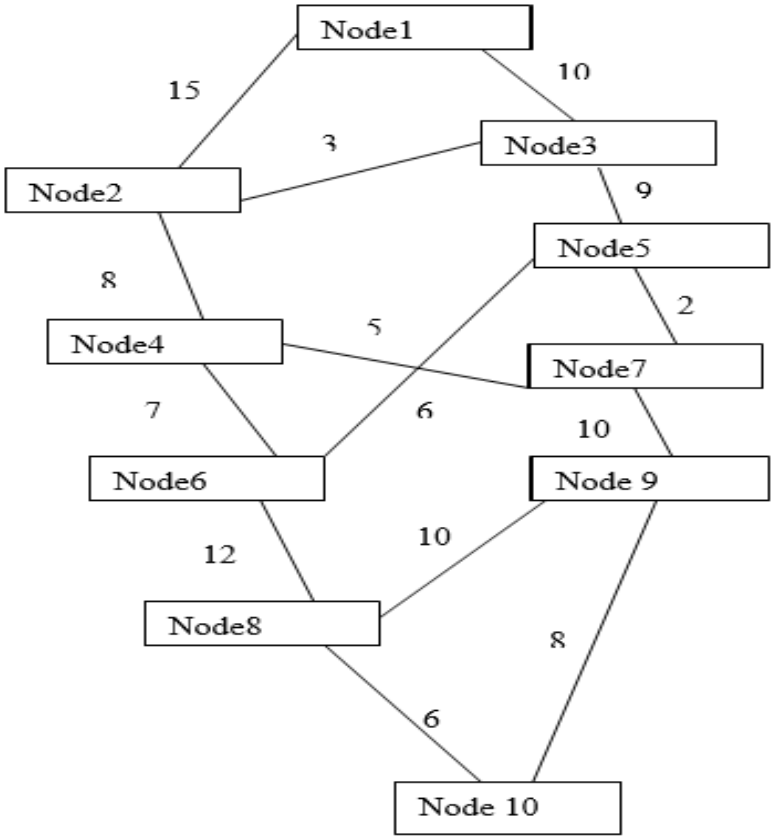


Figure 4: Network topology to perform simulation using BP

In operation the cross is as follows

- Parent 1: 1-3-5-7-9-10
- Parent 2: 1-2-4-7-9-8-10
- New -angle produced as follows:
- Children 1: 1-3-5-7-9-9-10
- Children under 2: 1-2-4-7-9-10

Using the above method of cross more iterations can be performed to find the best path. It has ended, for lighter work, like network Dijkastra algorithm, BP, but can be found in a large network routing scheme based on genetic algorithms optimal or near-optimal results in less time.

[7] Anjum A. Muhammad and the ancient Chinese Nahib proposed the use of ad-hoc network routing genetic algorithm optimization. A new algorithm developed compared with the existing Dynamic Source Routing DSR.

The proposed algorithm is as follows:

- Step1: the constraints set to SP route.
- Step 2: generating any value between the limits.
- Step 3: the creation of routing values are placed in the objective function.
- Step 4: Fitness Evolution made a different route.

The Fmax (N, 1) = Maximum (FX (N, 1))

fmin of (N, 1) = MIN (FX (N, 1))

For i = 1: Z

Feet ( i , 1) = {fmax of (I, 1) -Fmin (N, 1)} - Forex (N, 1);

End

Ft. = Average (feet);

I = 1: Z

End

- Step 5: best fit is calculated based on the above equation.
- Step 6: route selection based on the concept of round is completed. Value proved to be an error in the wheel area of a higher percentage of best fit.
- Step 7: Cross is carried out using the midpoint of the chord.
- Step 8: mutilation do if successive iterations values are the same.
- Step 9: meet the relevant parameters to minimize the goals and plans of the new routes.

Wherein, FX is opinion and FT are unvarying FX.

To assess the appropriateness of: a route is to transfer the cost of health data through this route.

The best fit is rich: the lowest cost routing path has the population of the most suitable chromosomes.

In its representation has been made on the implementation of the network topology in the figure:

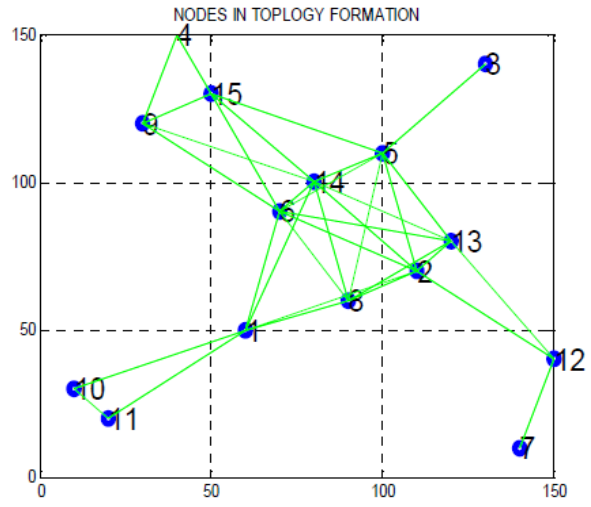


Figure 5: Network topology for the implementation

About 15 nodded model network.

The algorithm has been using ns2 to achieve results. "Comments have been. The graph has been drawn DSR and predictable algorithm representations stay end delivery and transmission range between the end-to.

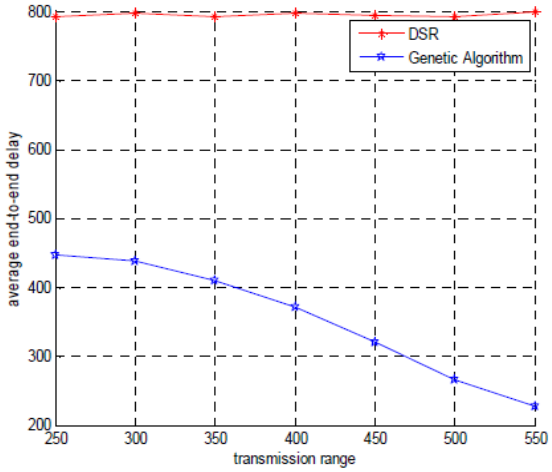


Figure 6: Average end to end delivery delay vs. transmission range

The figure shows that the delay time of the Genetic Algorithm than DSR. [8] Annapurna P Patil proposed AODV-based energy efficient routing protocol MANET. The authors review the cost indicators are as follows:

| **Metrics classification** | **Objectives** | **Drawbacks** |
|---|---|---|
| Total transmission power | minimize energy consumption | May cause node deletion |
| Remanding energy capacity | Evenly distributed energy depletion | Does not certify least energy cost path |
| Estimate nodes life-time | Likewise tiredness | Do not ensure least energy path |
| Combination | Tradeoff between power consumption and fairness | Hard to find perfect tradeoff |

Table 2: Energy related cost metrics

I try to combine the two existing protocols, and then compare the results with the existing agreement, the merger agreement. The authors used the following indicators to improve:

- The packet delivery ratio
- Throughput
- The network life cycle

The average energy consumption

The author attempts to measure two kinds of energy combined transmit power and sustained energy capacity. Alternative energy capacity of the largest remaining node sending and receiving RREP RREQ packet after packet and the minimum transmit power.

**Conclusion**

There are lots of algorithms have been proposed to find best shortest path and energy saving in routing in wireless ad hoc network routing protocols. The algorithm for the initial input network for the transmission path from the source data to the destination. The algorithm provides us with a set of paths, transmit data packets from the source to the destination. It can be concluded that the back propagation algorithm can be effectively work on Manet's best path to transmit data packets to be found in power usage nodes. The algorithm not only provides us with the best path, but also a list of paths consuming power than the best of the best path slightly. As a wireless ad hoc networks are dynamic, so the link between the two nodes may be broken at any time. In this case, an alternative route can be used to transmit data packets. Therefore, the algorithm inherently more reliable.

The future work of this proposed algorithm is that to work on genetic algorithm and fuzzy logic system and it also work on more complex network and improve the more energy efficacy of the Mobile Ad-hoc network.

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