

Comparative Analysis and Enhancement In AODV Protocol For Path Establishment Using Swarm Intelligence In Manets

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Abstract— MANET is a versatile specially appointed system that has the capacity of changing its area and arranging itself according to the necessities and prerequisites of the client in a hurry. MANETs are very hard to control regarding its directing convention as there is no fixed phrasing that can be executed onto it for the ideal exchange of the information from the source to the goal. Research fundamental examination between different directing conventions has been finished. A bio-motivated system is proposed to investigate organize execution. AODV, DSR and DSDV are thought about regarding throughput, bundle misfortune and deferral. A half and half calculation is intended to locate an ideal best way for directing. The exploratory outcomes show that the proposed crossover directing convention has better execution when contrasted with different conventions.

Keywords— AODV, DSR, DSDV, ACO, BCO and Cuckoo search

I. INTRODUCTION

MANET is spoken to as a remote system that could be a gathering of heterogeneous cell phones and is self-arranging, self-designing. During this sort of system, the gadgets convey through a remote medium with each other. The information bundles are transmitted through middle of

the road gadgets when there is no immediate way from source to target. Versatile impromptu system is decentralized and doesn't rely upon built up foundation, for example, switches in wired networks [1]. The steering convention is liable for making the right way from supply to goal for starting just as keeping up a correspondence between the hubs. Because of portability of hubs, arrange topology is dynamic in nature, which brings about high connection breakage and break in correspondence over the system[2].

Exceptionally powerful nature of remote system, steering conventions need to confront such a large number of difficulties. Specially appointed system can be portrayed as a remote system which works without the nearness of a focal and perpetual foundation as showed in Figure 1.1. Because of conveyed nature, there exist different issues and difficulties in the working of these remote specially appointed systems. Along these lines a remote system comprising of portable hubs which is impromptu in nature can be called as MANET [3]. The versatile hubs in the system are proficient to recognize and pass the traffic by means of the middle of the road hubs towards the goal, portable hubs present in the system can go about as a switch

just as a host. The incessant blurring of versatile hubs bring about association end and re-relationship of hubs which incorporates another variable to the attributes of portable hubs for example vitality [4].

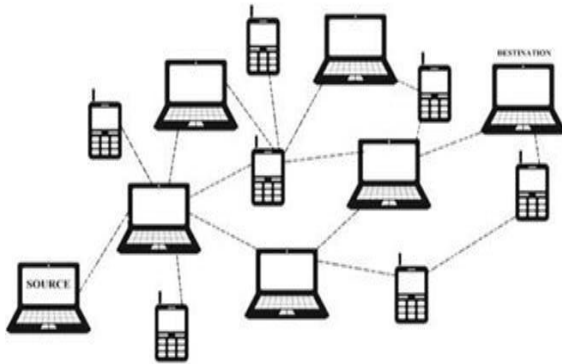


Figure 1.1 MANET Architecture

A. Challenges in MANET

The various mobile nodes can form network at any place when required. In MANETs, no central controller is present; it is decentralized type of network. In such type of network following are the various key challenges:

1. Mobile nodes can move without restrictions in the network. When the mobile node changes its position, network topology certainly changes with it. For such type of networks there are several challenges for choosing routing protocol. The Multi cast routing is the key challenge in MANET [5].

2. The security and reliability are the other major challenges of MANET. In this, certain types of internal and external attacks are possible. The attacker node can join the network at any time and trigger the attack. It has been a tedious task to design the key management and self-authentication mechanism for MANET [6].

3. The Mobile Ad hoc networks have been formed when nodes from various handheld devices or sensor nodes communicate. Power consumption is another major shortcoming of MANETs. The wireless sensor networks are deployed for sensing the environment conditions and generally deployed at far places. In such places, it is difficult to recharge or replace the battery of the sensor

nodes. There have been certain requirements of efficient mechanism for power management.

4. The mobile nodes can move freely in the network. In MANETs, it is very difficult to design a protocol which supports Location-aided Routing.

5. There has been the existence of hidden terminal and exposed terminal problems in case of MANETs. There is an obvious need of a helpful mechanism to solve these problems [7].

6. The mobile nodes can change its position at any time. This approach has led to the problem of link failure which degrades the network performance.

B. Routing Protocols in MANET

The convention ought to have the option to perform in a successful and productive way all through the systems administration condition comprising of heterogeneous specially appointed systems i.e., from little to enormous multi-bounce systems. Figure 1.2 showcases the different classifications of specially appointed directing conventions [8].

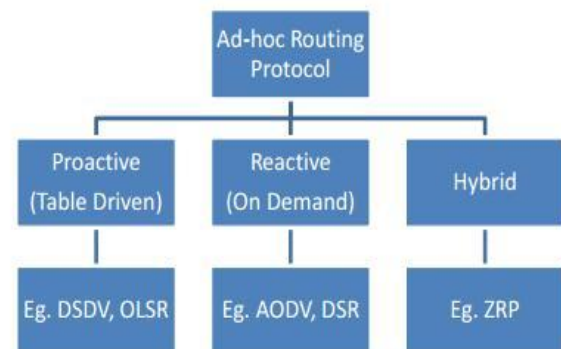


Figure 1.2 Classification of Routing Protocol

Proactive Routing Protocol:

These directing conventions continually holds the refreshed condition of the system topology by making a steering table and this predefined data is utilized to build up way from source to goal. Every one of the hubs present in the system makes and keeps up directing data to each hub, keep data of their neighboring hub which is utilized at the hour of way establishment[8]. These are the conventions which keep up

steering tables and because of irregular topology, have high directing overhead in the system.

Reactive Routing Protocol:

These conventions are otherwise called source-started on-request steering conventions, these are request driven responsive conventions [9]. In this manner, they don't pursue the system making and refreshing steering tables with directing data at ordinary interims. As they are on request steering conventions, so they start course disclosure just when they are inquired. So as to send a bundle to another hub in the system utilizing this convention, at that point this convention starts a course disclosure procedure to discover dependable way to goal and setting up the association with transmit information from source to goal [8]. This procedure the RREQ parcel is communicated all through the system which includes a lot of control traffic to the system because of inquiry flooding.

Hybrid Routing Protocol:

These kinds of conventions utilize the qualities of both the recently examined conventions by joining them together to get better outcomes [10]. In the underlying stage directing is finished with some predefined data which is kept on the hub and after that source flood course demand parcels to accumulate organize data. The fundamental thought is that every hub has a predefined data of its zone head and hubs which are in the zone, the convention used to keep up directing data in the system is proactive.

Constraints	Table-driven (Proactive)	On-Demand (Reactive)	Hybrid
Memory Used	Higher	Dependent on no. of Routes needed	Depends on size of Each zone or cluster
Path Availability	Always Available	Calculated per requirement	Depends upon position of end point
Periodic Updates	Mandatory always	No need	For intra-zone communication
Delay	Low	High	Low for local destinations and high for inter zone
Expandable	100 nodes	More than 100	More than 1000
Traffic Overhead	High	Low	Low as compare to other two types
Routing Details	Stored in the table	Does not stores	Depends upon requirements
Routing Topology	Mostly plane	Plane	Tree

Table 1: Comparison of Routing Tables

II. LITERATURE REVIEW

Dr. Umadevi Chezhiyan [2] explained the importance of the ad hoc networks which communicate and establish path between two end nodes. Routing is the path for path establishment between source and destination to transfer data. Reactive routing is a performed well in MANET than proactive routing. Research discusses various routing protocols with their advantages and disadvantages. At the end measurement performance analysis is also done in MANET.

Sweetey Goyal [3] clarified that ZRP is a blend of dynamic and aloof for huge system during the time spent a convention, inside the steering territory, individuals keep up auspicious IARP Routing table. Outside the locale, the course disclosure system is done by the receptive segment IERP utilizing a directing solicitation and steering answer. Outskirt throwing process for steering Borders found that the utilization of throwing Resolution Protocol (BRP). So as to lessen the measure of question Traffic, get to control components and early end inquiry identifier can be utilized. ZRP is a one of a kind convention that can be utilized as directing engineering.

Prof. B.N. Jagdale et.al [4] depicted that steering convention assumes a significant job in MANET for correspondence and set up way from source to goal. It additionally finds ideal way for information transmission. AODV, DSDV and DSR, ZRP are the different directing convention to set up effective way from source to goal. In explore two directing conventions has been talked about. It is reasoned that AODV is superior to DSDV. DSDV expends more data transfer capacity when contrasted with AODV due intermittently communicate bundles. Then again, AODV has no requirement for table upkeep contains less data transfer capacity and less overhead.

Dr. Arvinder Kaur et.al [5] has displayed BCO calculation for greatest flaw inclusion. The proposed BCO calculation has been clarified with models. C++ compiler has been created to discover the deficiencies which are most extreme

in number and in least execution of time. With the assistance of 5 distinct sorts of model honey bee settlement idea is clarified with indicating that most extreme deficiencies are secured with their briefest way.

III. OPTIMIZATION TECHNIQUES

Streamlining strategies are those which give the best fit arrangement. It is utilized to get the knowledge of complex computational solutions [5]. It also discovers good outcome from the given possible assumptions. There are few systems which really depend on the common marvels. These methods are as following:

- A. Artificial Bee Colony Optimization
- B. Artificial Ant Colony Optimization
- C. Artificial Cuckoo Search

A. Artificial Bee Colony Optimization

Honey bee artificial Colony Optimization, a nature wise motivated strategy. That depends on the swarm insight method. It is meta heuristic approach which is worry with memory intensive looking. Honey bee state advancement system is utilized to locate the best way from the quantity of the arrangements. There are two kinds of honey bees which are available in the apiary for example Scout honey bees and Forageer honey bees. These are in hundred and thousand in numbers which cooperate. It is a worldwide streamlining agent which has successful looking through procedure [14].

B. Ant Colony Optimization

Ant Colony Optimization is a probabilistic and meta-heuristic method which is additionally normal enlivened system and is meta heuristic method in nature based that is used to tackle complex issues. It utilizes the past outcomes to discover such present ideal ways, and is dynamic in nature. It gives the thought for group coordination, and their conduct and usefulness. It is additionally founded on swarm insight. Subterranean insect begins from home to reach to goal and pursue various ways. The way which has the most noteworthy pheromone trails are the ideal ways contrasted with others. So the way is relying on the pheromone trails. It is additionally upgradeable system as indicated by the discharge pheromone trails. At the point when the

subterranean insect's profits back to the home they pursue a similar way as that of forward way not the most brief way [14].

C. Cuckoo Search

Cuckoo search is also optimization algorithms that would be utilized in many fields like image classification, procesing, networks and artificial-intelligence. These searches carry the concept from different cuckoo species. Previously, such algorithm was used for big complex problems. Later on, these researches was applied with some PSO and Genetic optimization algorithms and also finds out that the way it achieves achievable outcomes than PSO and Genetic algorithms.

III. PROPOSED METHODOLOGY

In this research we are trying to do comparative analysis between the proactive and reactive routing protocols. Thus improvement is proposed on AODV routing protocol using biologically inspired optimization algorithms. These bio-inspired algorithms used are Cuckoo search and bee colony.

Firstly, the relative examination has been done between different directing conventions like AODV, DSR and DSDV to get the best convention. The correlation is done based on different parameters like start to finish deferral, throughput and bundle misfortune. One best convention is accomplished through investigation for example AODV.

At that point, cuckoo search and honey bee settlement are joined together and utilized with AODV directing convention to build up a best way to goal

In the proposed procedure, let us guess one way will be built up from source to goal utilizing AODV convention and the set up way jumps are 0,1,6,9, 10.

The half breed insect and honey bee settlement calculation are applied for way foundation and way which is set up are

having bounces 0,2,7,22,10.

The source hub chooses hubs which are basic in the ways based on its figuring of most limited good ways from the source hub. The hub which has least separation will be chosen as the bounce hub from source to goal.

Hence, best path is chosen this way through this designed hybrid algorithm. Then, packets are routed along this path. The experiments results of comparison of all the previous

protocols is done along with this enhanced AODV.

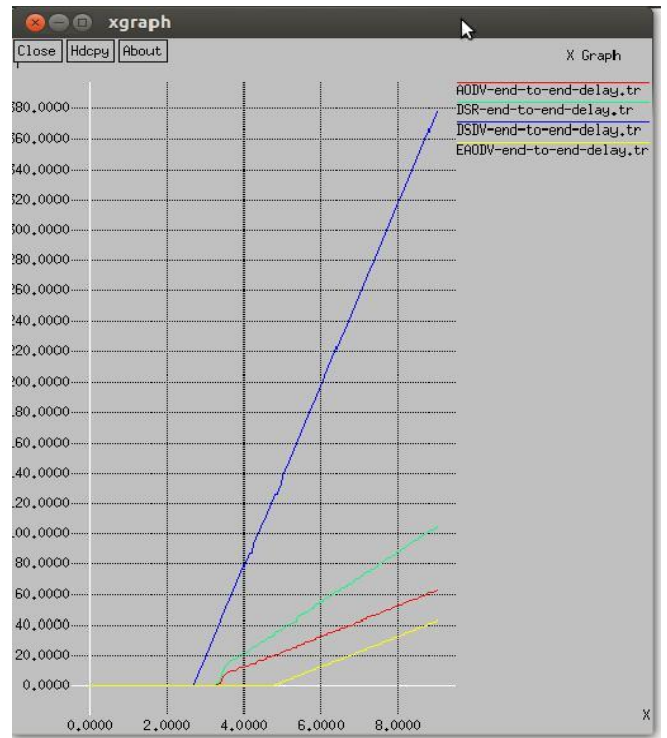
V. EXPERIMENTAL RESULTS

The whole scenario is implemented in NS2. It is an event based simulator.

The X graphs are generated to see the output. The graphs are generated for parameters like end to end delay, throughput and packetloss. The existing protocols like AODV, DSR and DSDV are compared with newly designed enhanced AODV (EAODV). Generally, the EAODV gave better results in comparison to other protocols. The following graphs show the results as:

Figure 5.1 Delay Graph

As shown in figure 5.1, the AODV, DSR, DSDV and half breed directing convention (EAODV) are analyzed as far as deferral. It has been broke down that cross breed directing convention has least deferral when contrasted.



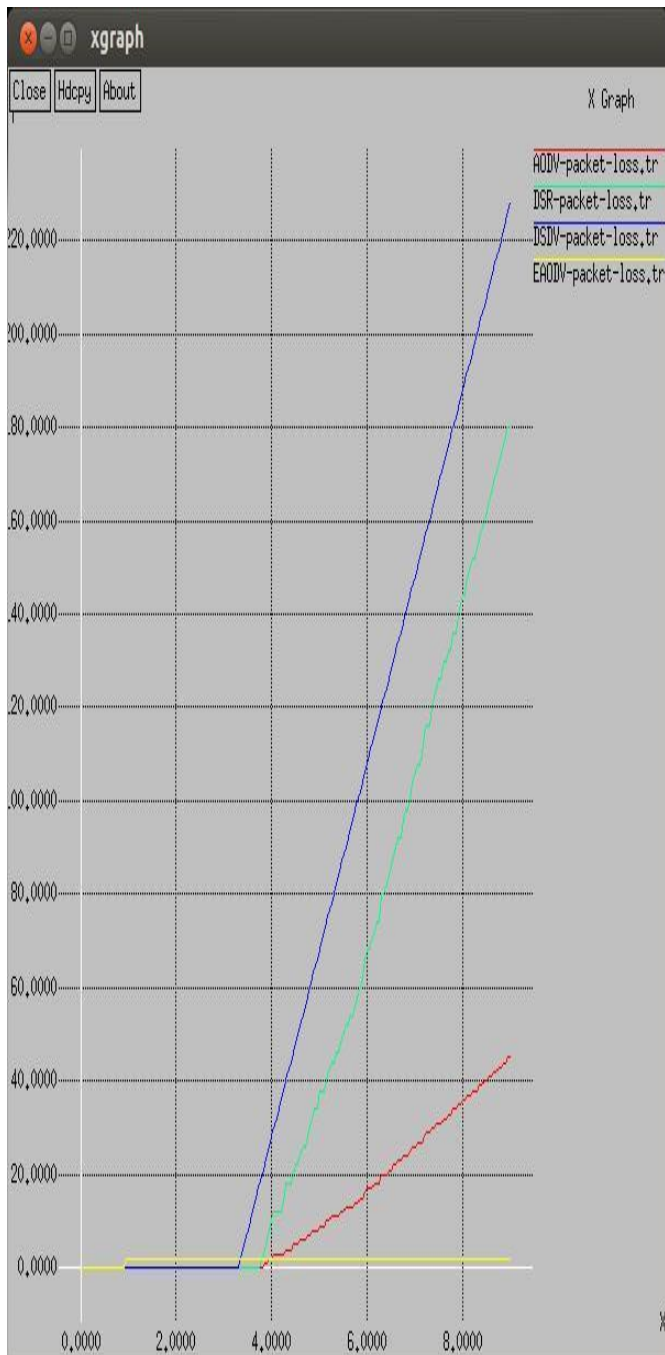


Figure 5.2 Packet Loss

As shown in figure 5.2, the AODV, DSR, DSDV and cross breed directing convention (EAODV) are looked at as far as Packet misfortune. It has been examined that mixture steering convention (EAODV) has least bundle misfortune when contrasted with other directing conventions.

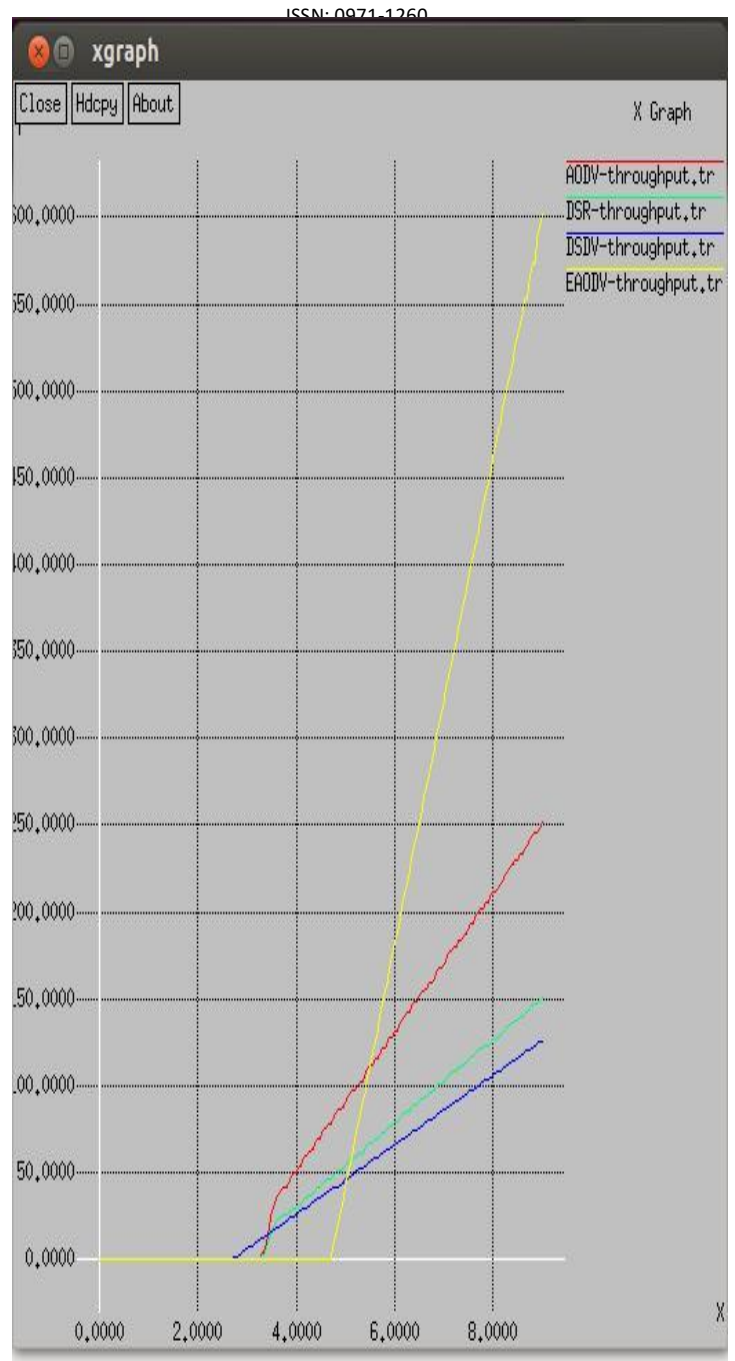


Figure 5.3 Throughput

As shown in figure 5.3, the AODV, DSR, DSDV and half breed directing conventions are looked at as far as throughput. It is been dissected that cross breed steering convention (EAODV) has most extreme throughput when contrasted with other directing conventions.

CONCLUSION

MANET is a self-controlling system. Hubs can without much of a stretch join and leave the system. Topology changes much of the time in MANET. MANET has different difficulties like security, directing, vitality utilization and so forth. In this paper, different directing conventions' examination has been done based on different parameters. At that point, relative investigation is done between the proactive and responsive kind of directing conventions. Afterward, improvement is proposed in AODV

directing convention utilizing bio-inspired strategies. The bio-motivated strategies are Cuckoo search and honey bee settlement are consolidated with AODV together to acquire the best way for steering of parcels. It is presumed that the structured half and half convention give better outcomes regarding bundle misfortune, throughput and delay and improves arrange execution.

FUTURE WORK

In our present work, the source hub chooses hubs which are regular in the ways of (AODV and structured Hybrid calculation) based on its computation of most brief good ways from the source hub. The hub which has least separation will be chosen as the following jump hub from source to goal. For future work, in case there are no common nodes in the paths of former two protocols then the parameters for both the paths will be checked separately. Parameters are end to end delay, packet loss and throughput. Both the paths will be compared on basis of defined parameters. Hence, a path is selected which is better than the other and in which nodes are selected on basis of prediction method.

REFERENCES

- [1] Jagdeep Kaur, Rupinder Kaur Gurm, "Performance Analysis of AODV and DYMO Routing Protocols in MANETs Using Cuckoo Search Optimization", International Journal of Advance Research in Computer Science and Management Studies Volume 2, Issue 8, August 2014 pg. 236-247
- [2] Dr. Umadevi Chezhiyan, "Measurement Based Analysis of Reactive Protocols in MANET", International Journal of Wired and Wireless Communications Vol.1, Issue 2, April, 2013
- [3] Charu Sharma and Jaspreet Kaur, "Simulative Analysis of AODV Routing Protocol Of MANET Using OPNET Modeler 14.0", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 02 Issue: 03 | June-2015
- [4] Prof. B.N. Jagdale, Prof. Pragati Patil , Prof. P. Lahane , Prof. D. Javale, "Analysis and Comparison of Distance Vector, DSDV and AODV Protocol of MANET", International Journal of Distributed and Parallel Systems (IJDPS) Vol.3, No.2, March 2012
- [5] Dr. Arvinder Kaur, Shivangi Goyal. (2011). A Bee Colony

Optimization Algorithm for Fault Coverage Based Regression Test Suite Prioritization. *International Journal of Advanced Science and Technology* , 29.

- [6] S.A. Adel& P.A. Tijare, "Performance Comparison of AODV, DSDV, OLSR and DSR Routing Protocols in MANET", International Journal of Information Technology and Knowledge Management, Vol. 2, No. 2, , Dec. 2010, pp. 545-548
- [7] S. Mohseni, R. Hassan, A. Patel, and R Razali, "Comparative Review Study of Reactive and Proactive Routing Protocols in MANETs", 4th IEEE International Conference on Digital Ecosystems and Technologies 2010 IEEE, Apr. 2010, pp.- 304-309.
- [8] S.S. Tyagi, R.K. Chauhan, "Performance analysis of ProActive and ReActive routing protocols for ad hoc networks", International journal of computer applications, Vol. 1 No.-14, 2010, pp. 27-30
- [9] T.P. Singh, Dr. R.K. Singh, J. Vats, "Effect of quality parameters on energy efficient Routing protocols in MANETs", Vol. 3 No-7, July 2011,pp. 2620-2626.
- [10] W. Kiess, M. Mauve, "A survey on real-world implementations of mobile ad-hoc networks", Vol. 5, Issue 3, Apr. 2007, pp 324-339.
- [11] X. Hong, K. Xu, M. Gerla, " Scalable routing protocols for mobile ad hic networks", Network IEEE, Vol. 16, Issue 4, july 2002, pp. 11-21.
- [12] Y. Shaima, A. Shaima, J. Sengupta,"Performance evaluation of mobile ad hoc network routing protocols under various security attacks", 2010, pp. 118-124.
- [13] Z. Ghaleb, A. Mekhlafi and R. Hassan,"Evaluation Study on Routing Information on Protocol and Dynamic Source Routing in Ad-Hoc Network",International IT in Asia Conference, 2011.
- [14] Mandeep Kaur Bedi, Sheena Singh, "Comparative study of two natural phenomena based optimization techniques, "International Journal of Scientific & Engineering Research, Issue 4, 2013