# A REVIEW OF AN ADAPTIVE HELLO MESSAGING SCHEME FOR NEIGHBOR DISCOVERY IN ON-DEMAND MANET ROUTING PROTOCOLS USING PSO TECHNIQUE

**Sukhvinder Kaur, Sheenam Malhotra**

***Abstract*— Mobile Ad Hoc Network (MANET) is a gathering of Multi-hop wireless mobile nodes. These nodes are communicated with each other without central control and establish infrastructure. The wireless link can go down regularly due to mobility of nodes and less infrastructure. A mobile ad-hoc network (MANET) is a self- controlled wireless network consisting of mobile nodes. This paper proposes an adaptive hello messaging scheme to suppress unnecessary hello messages without reduced detect ability of broken links. Adaptive hello messaging scheme is proposed to solve the problems related energy saving and network overhead. So the PSO (Particle Swarm Optimization) technique will be implemented using multi objectives optimization for an adaptive hello messaging. PSO is an optimization technique and considers the ability of solving the complex problems by cooperation.**

***Index Terms*— AODV, DYMO, Ad hoc Routing, Hello messaging, Network Overhead, Energy Saving**

## I. INTRODUCTION

A Mobile ad-hoc network may be a network while not infrastructure, therefore in it each node works as a router [12]. The MANET use wireless network to attach with different networks. Some of the MANETs are connected to Local Area Networks (LANs) and some are connected to internet based on the applications of the network. Currently, there is an increasing interest in the wireless communications from both an academic and industrial perspective. MANETs (Mobile Ad-hoc Networks) are one of the fastest emerging networks. MANET is an unstructured network in which nodes are mobile and autonomous.

Each device in a MANET is free to move independently in any direction, and will therefore change its links to the other devices frequently. Each must forward traffic unrelated to its own use, and therefore be a router. Typical MANET nodes are PDAs, Laptops, cellular phones, Pocket PCs, palmtops and Internet Mobile Phones. These devices are lightweight and battery operated [3]. A Mobile Ad Hoc Network (MANET) is a collection of wireless mobile nodes forming a temporary/short-lived network with none fixed infrastructure wherever all nodes are free to move regarding randomly and wherever all the nodes configure themselves. In MANET, every node acts each as a router and as a host & even the topology of network might also change quickly [9]. Some of the challenges in MANET include [9]:

1. Unicast routing
2. Multicast routing
3. Dynamic network topology
4. Speed
5. Frequency of updates or Network overhead
6. Scalability
7. Mobile agent based routing
8. Quality of Service
9. Energy efficient/Power aware routing
10. Secure routing

### Routing Protocols

Routing protocols in ad hoc networks are categorized in two groups: Proactive (Table Driven) and Reactive (On-Demand) routing.

### Proactive (Table-Driven) Routing Protocols

These routing protocols are same as and are available as a natural extension of these for the wired networks. In proactive routing, every node has one or more tables that contain the latest information of the routes to any node within the network [8]. Table-driven routing protocols attempt to maintain consistent, up-to-date routing information from every node to each different node within the network [10]. Proactive Routing Protocol, such as DSDV (Destination Sequenced Distance Vector Routing), ZRP (Zone Routing Protocol).

### Reactive (On-Demand) Protocols

The reactive Hello protocol enables Hello messaging only when it is demanded using a Hello request-reply mechanism, but increases delay due to additional packet exchange before communication [1]. Reactive routing is also known as on-demand routing. These protocols take a lazy approach to routing. They do not maintain or constantly update their route tables with the latest route topology [8]. Examples of reactive routing protocols are the Dynamic Source Routing (DSR), Ad hoc On-demand Distance Vector Routing (AODV). Dynamic MANET On-demand (DYMO) is used.

**Manuscript received April 21, 2015**

**Sukhvinder Kaur** M.Tech. Research Student Department of Computer Science and Engineering , Sri Guru Granth Sahib World University (SGGSWU) Fatehgarh Sahib, Punjab, India

**Sheenam Malhotra** Assistant Professor Department of Computer Science and Engineering, Sri Guru Granth Sahib World University (SGGSWU)Fatehgarh Sahib, Punjab, India

**Dynamic Source Routing (DSR)**

The Dynamic Source Routing (DSR) protocol presented an on-demand routing protocol that is based on the concept of source routing [10]. Mobile nodes are required to maintain route caches that contain the source routes of which the mobile is aware. Entries in the route cache are regularly updated as new routes are learned. The protocol consists of two major phases: route discovery and route maintenance [10].

**Advantages and Disadvantages**

One of the main advantage of DSR protocol is that there is no need to keep routing table so as to route a given data packet as the entire route is contained in the packet header. The disadvantage of DSR protocol is that this is not scalable to large networks and even requires significantly more processing resources than most other protocols.

**Ad hoc On-demand Distance Vector (AODV)**

AODV is a reactive routing protocol which is capable of unicast, multicast and broadcast routing. It is an on demand routing algorithm, meaning that it builds routes between nodes only when source nodes demands. It maintains these routes as long as they are required by the sources [3]. AODV uses the route discovery and route reply process to create and maintain a route on demand. In the route discovery phase for a source node to send information to a destination node. A node that receives the RREQ message which is usually the nearest node to the source node replies immediately with a routing reply (RREP) if it's a contemporary route. The requests are sent using RREQ message and the information in connection with creation of a route is sent back in RREP message. The source node broadcasts the RREQ packet to its neighbors and then sets a timer to wait for a reply [9].

**Advantages and Disadvantages**

The advantages of AODV protocol are that it favors the least congested route instead of the shortest route and it also supports both unicast and multicast packet transmissions even for nodes in constant movement. It also responds very quickly to the topological changes that affects the active routes. The disadvantage of AODV protocol is that it expects/requires that the nodes in the broadcast medium can detect each others' broadcasts.

**Temporary Ordered Routing Protocol (TORA)**

TORA is a distributed highly adaptive routing protocol designed to operate in a dynamic multihop network. TORA uses an arbitrary height parameter to determine the direction of link between any two nodes for a given destination. Consequently, multiple routes often exist for a given destination but none of them are necessarily the shortest route. To initiate a route, the node broadcasts a QUERY packet to its neighbors. This QUERY is rebroadcasted through the network until it reaches the destination or an intermediate node that has a route to the destination. The recipient of the QUERY packet then broadcasts the UPDATE packet which lists its height with respect to the destination. When this packet propagates in the network, each node that receives the UPDATE packet sets its height to a value greater than the height of the neighbour from which the UPDATE was received. This has the effect of creating a series of directed links from the original sender of the QUERY packet to the node that initially generated the UPDATE packet.

**Advantages and Disadvantages**

One of the advantage of TORA is that the multiple routes between any source destination pair are supported by this protocol. Therefore, failure or removal of any of the nodes is quickly resolved without source intervention by switching to an alternate route. TORA is also not free from limitations. One of them is that it depends on synchronized clocks among nodes in the ad hoc network. The dependence of this protocol on intermediate lower layers for certain functionality presumes that the link status sensing, neighbor discovery, in order packet delivery and address resolution are all readily available.

**Optimization**

On demand routing protocols provide scalable and cost-effective solutions for packet routing in mobile wireless ad hoc networks. Routing optimality affects network performance and energy consumption, especially when the load is high. All the neighboring nodes monitor the route and try to optimize it if and when a better local sub-path is available.

**C categories of Swarm Intelligence Based Algorithm :-**

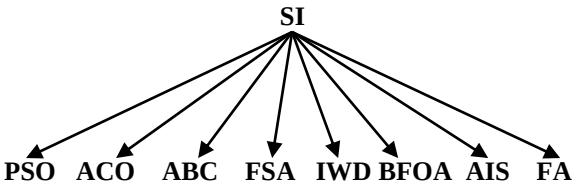


Fig.1 Categories of SI

1. Particle Swarm Optimization (PSO)
2. Ant Colony Optimization (ACO)
3. Artificial Bee Colony Algorithm (ABC)
4. Fish Swarm Algorithm (FSA)
5. Intelligent Water Drops Algorithm (IWD)
6. Bacterial Foraging Optimization Algorithm (BFOA)
7. Artificial Immune System Algorithm (AIS)
8. Firefly Algorithm (FA)

**Particle Swarm Optimization Algorithm (PSOA)**

PSOA is a bio-inspired algorithm and considers the ability of solving complex problems by cooperation. This algorithm simulates the behavior of the bacteria that can be effectively applied in various fields. The interesting point is that the bacteria do not need any direct communication for the solution of problem, instead the communication between these is not direct, but the communication between individuals through modifying or altering their environment [5]. The process, in which a bacterium moves by taking small steps while searching for nutrients, is called chemo taxis and key idea of PSOA is mimicking chemo tactic movement of virtual bacteria in the problem search space, individual bacterium communicate to other by sending signals [12]. It is a global optimization algorithm for various optimization problems. This technique is also inspired by the social foraging behavior like ant colony and particle swarm optimization. It attracts the researchers due to its efficiency in solving real world optimization problems and gives better results than traditional methods of problems solving.

## II. PROPOSED WORK

The technique PSO (Particle Swarm Optimization) is applied in the proposed work. PSO is a bio-inspired algorithm and considers the ability of solving complex problems by cooperation. This technique is also inspired by the social foraging behavior like ant colony and BFOA. The PSO (Particle Swarm Optimization) technique uses multiobjective optimization for an adaptive hello messaging. This technique gives better results than traditional methods of problems solving.

## CONCLUSION

Adaptive hello messaging scheme is proposed to solve the problems related to battery consumption and network overhead. Hello messaging scheme aims to reduce unnecessary hello messages while a neighbor discovery and also establish a reliable connection between the source nodes to the destination node. An adaptive hello interval reduces battery drain through practical suppression of unnecessary hello messages.

## REFERENCES

[1] Seon Yeong Han and Dongman Lee, "An Adaptive Hello Messaging Scheme for Neighbor Discovery in On-Demand MANET Routing Protocols" IEEE communications letters, Vol. 17, Page No.1040-1043, May 2013.

[2] Kulvir Kaur, Sonia Goyal, "Optimized Routing in Wireless Ad Hoc Networks" international journal of communication engineering and technology (IJCET) , Issue No. 1, Vol. 2, Page No.69-74, March 2011.

[3] Preeti Gulia, Sumita Sihag," Enhance Security in MANET using Bacterial Foraging Optimization Algorithm", International Journal of Computer Applications , Vol. 84, Page No. 32-35, December 2013.

[4] J. Abdullah, "Multiobjectives GA-Based QOS Routing Protocol for Mobile Ad Hoc Networks" International Journal of Grid and Distributed Computing, Vol. 3, Page No.57-68, December 2010.

[5] G.Kokila, Mr.M.Karnan and Mr.R.Sivakumar, "Immigrants and Memory Schemes for Dynamic Shortest Path Routing Problems in Mobile Adhoc Networks Using PSO" International Journal of Computer Science and Management Research , Issue No. 5, Vol. 2, Page No.2490-2494, May 2013.

[6] Margarita Reyes-Sierra and Carlos A. Coello Coello, "Multi-Objective Particle Swarm Optimizer Survey of the State-of-the-Art" International Journal of Computational Intelligence Research, ISSN: 0973-1873, Vol. 2, Page No. 287–308, 2006.

[7] Yu-Chee Tseng, , Sze-Yao Ni, and En-Yu Shih, "Adaptive Approaches to Relieving Broadcast Storms in a Wireless Multihop Mobile Ad Hoc Network" IEEE Transcation on computers, Vol. 52, Page No. 545-557, MAY 2003.

[8] Sankalp Bahadur Singh1, Asha Ambhaikar, **"**Optimization of Routing Protocol in MANET using GA" International Journal of Science and Research(IJSR), India Online ISSN**:**2319-7064, Issue No. 2, Vol. 1 , Page No.23-26 , November 2012.

[9] Sunil Taneja and Ashwani Kush, "A Survey of Routing Protocols in Mobile Ad Hoc Networks" International Journal of Innovation, Management and Technology, ISSN: 2010-0248, Vol. 1, Page No. 279-285, August 2010.

[10] Elizabeth M. Royer, University of California, Santa Barbara Chai-Keong Toh, Georgia Institute of Technology, "A Review of Current Routing Protocols for Ad Hoc Mobile Wireless Networks", IEEE Personal Communications, Page No.46-55, April 1999.

[11] P.V. Rama Krishna, G. Poornachandra Rao, Sukhdeo Sao, "Particle swarm optimization technique to solve unit commitment problem", International Journal of Advanced Computer Research (ISSN (print): 2249-7277 ISSN (online): 2277-7970), Issue No.-7 ,Vol. 2, Page No. 100-105, December-2012.

[12] Harpreet Kaur, Jasmeet Singh, "Optimization of Hello messaging scheme in MANET on demand routing protocols using BFOA", International Journal of Application or Innovation in Engineering and Management (IJAIEM), ISSN 2319-4847, Issue No. 7, Vol. 3, Page No. 333-339, July 2014.