



## A Review on Recent Researches in DSR Protocol for Manet

Deepta Modi

CSE Department, Kurukshetra University  
Haryana, India

---

**Abstract**—Manet is a collection of mobile nodes with a wireless network interface which forms a temporary network. There is no need of any centralised administration and communication is done over relatively bandwidth-constrained wireless links. It is observed that during source to destination route establishment the power consumption is minimized to enhance network lifetime. Various protocols and methods are implemented to find optimized path which helps to increase throughput and decrease routing overhead.

**Keywords**— Mobile ad hoc network (MANET), Ant colony optimization (ACO), Dynamic source routing (DSR), ad hoc on-demand distance vector routing (AODV).

---

### I. INTRODUCTION

A mobile ad hoc network (MANET) [1] is an autonomous system of mobile nodes connected by wireless links. Each node forwards the packets to other nodes. The nodes are free to move about and organize themselves into a network. Various routing protocols have been proposed, Pro-active protocols such as DSDV, TBRPF, the host's exchange routing information and constructs the routing table in advance. In on-demand protocols such as DSR the routing information is required only when there is a need. Also these protocols have some kind of limitations in the case of the throughput and performance. A given protocol will execute efficiently in those networks whose characteristics are in accord with the mechanisms used by the protocol. The set of applications for MANETs is diverse, ranging from small, static networks to large-scale, highly dynamic networks. It is unlikely that a single routing protocol will be optimal for all cases.

#### Characteristics of MANET's:

- 1. Multi hop routing:** When a node tries to communicate to other nodes which is out of its communication range, the packet should be forwarded via different intermediate nodes so that the source node reaches the destination node.
- 2. Distributed operation:** MANET requires that any routing protocol execute in a distributed fashion. In this the control of the network is distributed among the nodes. Each node implements specific functions such as routing and security. The nodes involved in a MANET should cooperate with each other and communicate among themselves.
- 3. Wireless Links:** The wireless communication medium is accessible to any entity with the appropriate equipment and adequate resources.
- 4. Terminals:** In most of the cases, the nodes at MANET are mobile with low power storage, less CPU capability, and small memory size.

#### Advantages of MANET's

There are several advantages of MANET:

1. Robust nature due to decentralization.
2. Improved scalability due to the addition of more nodes.
3. Self Configuring network.
4. No geographic restriction—network can be set up at any time and place.

#### There are two types of routing protocols in MANETs:

- 1. Topological routing :** In this routing, mobile nodes utilize the topological information to construct routing tables or search routes directly.
- 2. Geographic routing :** In this routing, each node knows its own position and makes routing decisions based on the position of the destination and the positions of its local neighbors [2].

#### Wireless networks can be divided into two categories:

- 1. Infrastructured Network:** An infrastructured network consists of a network with fixed and wired gateways. In this approach the base stations are fixed. A mobile host communicates with a base station called a base station within its communication radius. Handoff process takes place. Handoff process occurs when a mobile node moves geographically out of range of one base station, it connects and starts communicating with another base station.

**2. Ad hoc Networks:** These are Infrastructure less networks, in this all nodes are mobile and connected in an arbitrary fashion. All nodes of these networks behave as routers and take part in discovery and maintenance of routes to other nodes in the network.

The ad-hoc routing protocols can be divided into two categories, namely Table-driven routing protocols and On-Demand routing protocols. In former approach, consistent and up-to-date routing information to all nodes is maintained at each node. There are various types of Table Driven Protocols: Wireless routing protocol (WRP), Destination Sequenced Distance Vector routing (DSDV), Cluster Gateway Switch Routing protocol (CGSR), Topology Dissemination Based on Reverse Path Forwarding (TBRPF), Fish eye State Routing protocol (FSR), Optimized Link State Routing protocol (OLSR). In later approach, the routes are created only when there is need. Source invokes the route discovery mechanisms for this purpose that is if source wants to send to destination, it invokes route discovery process. Various types of On-demand protocols are: ad hoc on-demand distance vector routing (AODV), the dynamic source Routing (DSR). Main issues of ad hoc networks are energy consumption, routing, security, service location, etc.

### **DSR PROTOCOL**

Each node in the network maintains a route cache. To send data to another node, if a route is found in its route cache, the sender puts this route (a list of all intermediate nodes) in the packet header and transmits it to the next hop in the path. Each intermediate node examines the header and retransmits it to the node indicated after its id in the packet route. If no route is found, the sender buffers the packet and obtains a route using the process mentioned below [10]:

#### **Route Discovery and Maintenance**

Route Discovery is the mechanism by which a node X (Source) wishing to send a packet to a destination node Y obtains a source route to Z. When a source node has some packets to send to a destination, it will search its route cache to find a route to that destination. If it cannot find a route, it initiates a route discovery by sending a route request packet as a local broadcast packet. Each route request contains the source and the destination addresses and unique route identification (ID). When a neighbouring node receives that route request message, it checks its ID to determine whether it has already processed that request. It drops if it has already processed that packet. Otherwise, it checks whether it is the intended destination. If the node is not the destination, it adds its own ID in the request packet and forwards that request packet to its neighbours. If a node is the destination, it sends a route reply to the source after copying the accumulated route from the route request packet into a route reply packet. Secondly Route maintenance is the mechanism by which a node detects any changes in the network. In the DSR protocol, each node is responsible for confirming that the packet flows over the link from itself to the next hop by using an acknowledgment. If the node does not receive an acknowledgment, it treats the link as "broken". It will send a route error message to all other nodes and to source itself. After receiving the route error packet, a source node marks that route as "invalid" and then it tries to find another alternative route in the cache. [8]

#### **Advantages and disadvantages of DSR**

##### **Advantage**

1. This protocol uses reactive approach which helps to eliminate the need to periodically flood the network.
2. The intermediate nodes also utilize the route cache information to reduce control overhead.
3. Route is established only when it is required.

##### **Disadvantage**

1. The route maintenance mechanism does not locally repair broken link.
2. Inconsistencies due to stale cache information during route construction face.
3. Connection set up delay is higher than table driven protocols.
4. Routing overhead due to source routing mechanism

## **II. LITERATURE SURVEY**

### **A. Power aware protocol**

The author Mano Yadav, Vinay Rishiwal, S. Verma, S. K. Bajapai in year 2009 [1] proposed an efficient algorithm for enhancing network lifetime. For today's ad hoc network there is a need of efficient power aware protocols. Algorithm states that by minimizing the power consumption, network lifetime is maximized during the source to destination route establishment. Power is one of the most important design criteria for ad hoc networks as batteries provide limited working capacity to the mobile nodes.

### **B. Biological systems**

The author Vaibhav Godbole in year 2012 [7] proposed various ACO (Ant colony optimization) methods. ACO is Biology-inspired technique which are applied to the MANET routing problem and now adaptable in various problem domains. Some of the ACO based protocols are hybrid ACO (AntHocNet, Improved ant colony optimisation routing algorithm for mobile ad hoc NETWORKS (PACONET), AntNet, ACO based dynamic source routing (Ant-DSR), ACO based on demand distance vector (Ant-AODV) and performance is determined in terms of QoS parameters eg. packet delivery ratio and end-to-end delay.

**C. Balancing Residual energy**

The author Richa Sharma, Neha Sharma, Rajesh Kumar, in year 2014 [8] implements the combination of ACO and DSR (ACO-DSR). Combination of DSR-ACO gives better result than DSR. The main objective is to find the optimized path to send the packets from source to destination which is obtained by this combination (ACO-DSR). In this the residual energy of all nodes in network is balanced which results in the increase in lifetime of the network.

**D. Reputation based scheme**

The author Kulbir nain, Roshan Lal Hiranwal and Poonam kumari in the year 2012 [10] has proposed a set of minor extensions to the DSR protocol proposed, by implementing the reputation based scheme on it. Scheme results in increasing the performance of the network as risk of dropping of data packets is reduced. According to network metrics used there is also increase in packet delivery ratio and throughput. This mechanism allows a node to autonomously evaluate the “reputation” of its neighbors based on the completion of the requested services. Results of simulation will show the decrease in data drop and routing overhead.

**E. Target System and Security Issue**

The author Shengxiang Yang, Hui Cheng, and Fang Wang in year 2010 [2] has proposed the advancement in wireless Networks. MANETs are target systems because they represent new-generation wireless networks. As the network topology changes, the immigrants and memory-based GAs can quickly adapt to environmental changes and after each change they produce high-quality solutions. Dr. S.S. Tyagi and Aarti in year 2013 [17] has characterized various security goals and different types security attacks at different layers. Due to its fundamental characteristics, such as wireless medium and dynamic topology MANETs is vulnerable to various kinds of security attacks like black hole, worm hole etc.

**F. Delay, Hop count and Topology Dynamics**

The authors P. Venkata Krishna, V. Saritha, G. Vedha, A. Bhiwal, A.S Chawla in year 2010 [3] has proposed a quality of service enabled ant colony based multipath routing (QAMR) algorithm. Author considered bandwidth, delay and hop count as the QoS parameters along with stability of nodes, no. of hops and path preference probability factors. The performed algorithm is scalable and performs well on high traffic load and is based on foraging behaviour of ant colony for selecting path and transmitting data. Shengxiang Yang, Hui Cheng, and Fang Wang in year 2010 [2] proposed the important characteristic of wireless network that is the network topology changes over time due to energy conservation. This produces high-quality solutions after each change. Due to topology dynamics topology, the SP routing problem in MANETs turns out to be a dynamic optimization problem.

Table I

METHOD	AUTHOR & YEAR	BASED ON	FEATURES	EXPERIMENTAL RESULTS
Power Aware Protocol	Vinay Rishiwal, Mano Yadav, S. Verma, S. K. Bajapai in year 2009	Route discovery procedure	Maximized network lifetime and minimized power consumption	Proposed algorithm's performance is better as compare to AODV and DSR
Biological Systems	Vaibhav Godbole in year 2012	Biology-inspired approach	Self-organisation, self-healing and local decision making	Very adaptable in various problem domains
Balancing Residual Energy	Richa Sharma, Rajesh Kumar, Neha Sharma in year 2014	Combination of DSR-ACO	New version of DSR protocol, balanced residual energy	Optimized path to send packets, increase lifetime of packet, better results as compared to DSR
Reputation based scheme	Kulbir nain, Poonam kumari & Roshan Lal Hiranwal in the year 2012	reputation based scheme	autonomously evaluate the “reputation” of its neighbors based on the completion of the requested services	increase in throughput and packet delivery ratio, decrease in data drop and routing overhead
Target System and Security Issue	Shengxiang Yang, Hui Cheng, Fang Wang in year 2010 and Dr. S. S. Tyagi and Aarti in year 2013	Topology dynamics	New generation wireless network and memory schemes to solve the dynamic SP routing problem in MANETs.	immigrants and memory-based GAs can quickly adapt to environmental changes and produce high-quality solutions

				after each change.
Delay, Hop count and Topology Dynamics	P.Venkata Krishna,V.Saritha,G.Vedha,A. Bhiwal,A.S Chawla in year 2010 and Shengxiang Yang, Hui Cheng,Fang Wang in year 2010	Stability of nodes and path preference probability	Scalable,QAMR for selecting path and transmitting data	Performs better at higher traffic load; Adaptable to environment change and produce better results

### III. CONCLUSIONS

Balancing Residual Energy and Reputation based schemes are used in route discovery process and route maintenance. By balancing residual energy optimized results are achieved in terms of network lifetime and throughput. Reputation schemes helps to increase in throughput and packet delivery ratio and decrease in routing overhead and data drop.

### REFERENCES

- [1] Vinay Rishiwal, Mano Yadav, S. Verma, S. K. Bajapai " Power Aware Routing in Ad Hoc Wireless Networks", JCS&T Vol. 9 No. 2, October 2009
- [2] Shengxiang Yang, Hui Cheng, and Fang Wang, Member IEEE " Genetic Algorithms With Immigrants and Memory Schemes for Dynamic Shortest Path Routing Problems in Mobile Ad Hoc Networks" vol. 40, no. 1, January 2010
- [3] P. Venkata Krishna V. Saritha G. Vedha A. Bhiwal A.S. Chawla "quality-of-service-enabled ant colony-based multipath routing for mobile ad hoc networks" the institution of engineering and technology 2012.
- [4] Wei Liu, Chi Zhang, Guoliang Yao, and Yuguang Fang" DELAR: A Device-Energy-Load Aware Relaying Framework for Heterogeneous Mobile Ad Hoc Networks" vol. 29, no. 8, September 2011.
- [5] S. Soundararajan, R. S. Bhuvaneshwaran" Ant Based Multi-path Routing for Load Balancing and Congestion Control in MANETs" Journal of Information & Computational Science 9: 12 (2012) 3365–3377.
- [6] Soni Dalal , Mr Sukhvir Singh(HOD)" Comparative Study of Reactive/On Demand Routing Protocols for Mobile Adhoc Network" International Journal of Computer Science & Engineering Technology (IJCSET).
- [7] Vaibhav Godbole" performance analysis of bio-inspired routing protocols based on random waypoint mobility model" Defence S & T Technical Bulletin, Science & Research Technology Institute for Defence (STRIDE), Vol. 5, No. 2, November 2012, pp. 114-134, ISSN: 1985-6571.
- [8] Richa Sharma, Rajesh Kumar, Neha Sharma" Energy Efficient DSR Protocol Using ACO" Volume 4, Issue 5, May 2014.
- [9] Heenu Garg, Pooja Narula" Improvement of Network lifetime by improving Route discovery phase in multi-path DSR" Vol. 2, Issue VI, June, 2014 ISSN 2320-6802.
- [10] Kulbir Nain, Poonam Kumari & Roshan Lal Hiranwal" Improved DSR protocol using Reputation based scheme" Journal of Computer Networking, Wireless and Mobile Communications (JCNWMC) Vol.2, Issue 1 Sep 2012 7-15.
- [11] G.Lavanya, A. Ebenezer Jeyakumar" An Enhanced Secured Dynamic Source Routing Protocol for MANETS" International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume X, Issue-4, September 2011.
- [12] M.Sreerama Murthy and M.Venkat Das" Performance Evaluation of MANET Routing Protocols using Reference Point Group Mobility and Random WayPoint Models" International Journal of Ad hoc, Sensor & Ubiquitous Computing (IJASUC) Vol.2, No.1, March 2011.
- [13] Jyoti Raju, J.J. Garcia-Luna-Aceves" A New Approach to On-demand Loop-Free Multipath Routing".
- [14] C.E. Perkins, E.M. Royer & S. Das, Ad Hoc On Demand Distance Vector (AODV) Routing, IETF Internet draft, draft-ietf-manet-aodv-08.txt, March 2001.
- [15] Vincent D. Park and M. Scott Corson" A Highly Adaptive Distributed Routing Algorithm for Mobile Wireless Networks".
- [16] Madhavi W. Subbarao " Performance of Routing Protocols for Mobile Ad-Hoc Networks " Wireless Communication Technologies Group National Institute of Standards and Technology 100 Bureau Drive Stop 8920 Gaithersburg, MD, USA 20899-8920.
- [17] Aarti & Dr. S. S. Tyagi" Study of MANET: Characteristics, Challenges, Application and Security Attacks" International Journal of Advanced Research in Computer Science and Software Engineering, Volume 3, Issue 5, May 2013.