



A Review of Different Routing Protocols in MANET

Neeraj Verma

M.Tech (CS)

Department of Computer Science
Babasaheb Bhimrao Ambedkar University
Lucknow, U.P., India

Sarita Soni

Assistant Professor

Department of Computer Science
Babasaheb Bhimrao Ambedkar University
Lucknow, U.P., India

Abstract: The expansion in accessibility and popularity of versatile wireless mobile devices have lead scientists to build up a wide range of Mobile Ad-hoc Network (MANET) Protocols. Mobile ad-hoc networks (MANETs) are a subclass of wireless ad-hoc network having extraordinary qualities of dynamic network topology and moving nodes. Mobile ad-hoc networks (MANETs) are foundation less self arranging systems intended to support portability. Mobile Ad Hoc Network (MANET) is accumulation of multi-bounce wireless portable nodes that speak with each other without incorporated control or set up framework. The wireless connections in this system are highly sensitive and can go down much of the time because of portability of nodes, obstruction and less foundation. Consequently, routing in MANET is a basic assignment because of dynamic environment. Due to moving element nature Mobile Ad-hoc wireless network used in Military scenarios, Sensor Networks, Rescue operations. This Survey paper gives an outline of these conventions by displaying their attributes, usefulness, advantages and restrictions and after that makes their similar investigation so to analyze their execution.

Keywords: MANET, DSDV, AODV, DSR, ZRP

I. INTRODUCTION

There is [1] two sorts of system wired and wireless system. The wired systems are for the most part associated with the assistance of wires and links. In this the association is build up with the assistance of physical gadgets like routers and center points. If there should be an occurrence of wireless system the radio frequencies are utilized to transmit and get the packets. The wired systems are more effective, less costly and considerably speedier than the remote system. Wireless technologies, for example, Bluetooth or the 802.11 guidelines [5] empower cell phones to set up a Mobile Ad-hoc Network (MANET) by interfacing progressively through the remote medium with no streamline or fixed structure. MANETs offer a few focal points over customary systems including diminished framework costs, simplicity of foundation and adaptation to internal failure, as routing is performed exclusively by nodes utilizing other transitional system nodes to forward packets. In MANET, for sending and getting packets from other node the nodes itself goes about as router or exchanging bundle of packets. Every node changes its connections to different nodes much of the time bringing about a highly dynamic and self-ruling topology [1]. Every node assumes the part of member and in addition router of the system. Mobile ad-hoc networks [1] are the only choice for portability support where there is no foundation or it is excessively costly. Some application regions of such utilization of MANET are given below:

- Instant Infrastructure
- Disaster relief
- Military activities
- Remote areas

A. Advantages of MANET- There are a few attributes that recognize MANETs from foundation systems are below:

- Reliability

- Scalability
- Availability
- Dynamic nature
- Power & Bandwidth constraint

B. Routing Protocols in MANET- Routing is the way towards transmitting data or packets from source node to goal node. As Ad-Hoc network changes their topology every now and again and in this manner making packet routing troublesome at that moment. Routing protocol controls the stream of information in systems and furthermore chooses the efficient way to achieve the goal. Routing protocols can be categorized on various bases such as on the topology of network for routing i.e. proactive and reactive routing protocols, on the basis of communication strategy used for transmitting of information from source to destination i.e. unicast, broadcast and multicast routing [1]. Routing protocols define a set of rules which governs the strategy of message packets transfer from source to destination in a network [2].

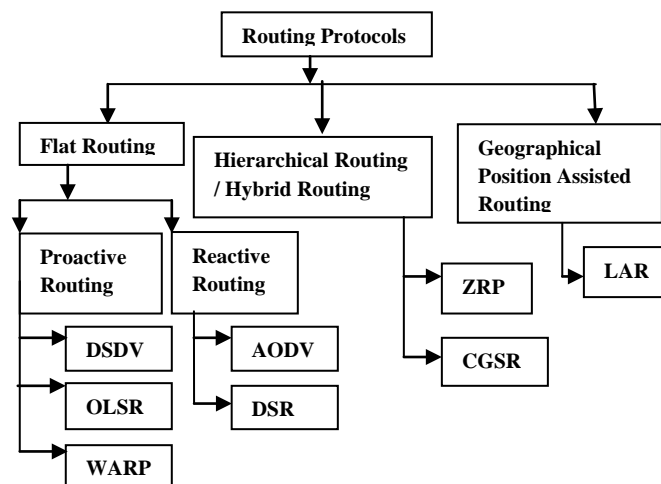


Fig1: Classification of MANET Routing

- **Flat Routing**-In the flat routing protocol [1], Routing table represented each network Identity individually. The network Identity has no network or subnet structure and cannot be summarized in any way. No effort is possible to organize the network or its traffic [1], only to discover the best route hop by hop to a destination by any path. According to flat routing protocol all routers sitting on a flat geometric plane. Flat routing protocols are two types based on table and on demand routing .First is Proactive Routing (Table Driven) Protocol [1] and second is Reactive Routing (On demand) Protocols [1]. In both protocol types all nodes performing in routing and play an equal role. Proactive Routing further divided in DSDV, WAR and OLSR [6]. Reactive Routing also divided in AODV and DSR.

- **Hierarchical/ Hybrid Routing**-As the size of the wireless network increases [2], flat routing protocols will produce much more overhead for the MANET. In this situation Hierarchical Routing may be preferred or suitable. Hierarchical routing provides different solutions to the organization for the routing nodes in MANET. Hierarchical routing Protocols are ZRP and CGSR.

- **Geographic Position Assisted Routing**- The geographical position [2] of a moving node can be used to improve the performance of routing algorithms. The global positioning system (GPS) can be used for acquiring position information. Location-aided routing (LAR) is similar to DSR but have limitation for route discovery to certain geographical regions. Geographical Position Assisted Routing Protocols are LAR and GPSR [2].

II. FLAT ROUTING

A. Proactive Routing Protocols- In proactive routing protocol every node continuously maintains complete routing information of the network through the table. By this reason proactive routing protocol also known as Table-Driven routing protocol. In this every node keep up the network topology data as tables. These tables are periodically exchange data for the current view of data or updating of data. Link State Routing protocol and Distance Vector Routing Protocols are not suitable for Mobile Network environment. DSDV, WAR, OLSR are the Proactive routing protocols in which DSDV eliminate count to infinity and looping problems of Distance Vector Routing Protocol [3].

- DSDV (Destination Sequenced Distance Vector) Routing Protocol**- Destination Sequence Distance Vector Routing (DSDV) is a hop-by-hop distance vector routing protocol. It is a proactive protocol in which each network node keeps up a directing table that contains the separation of next-node and the quantity of jumps to every reachable destination. A periodical broadcast of routing updates keeps the routing table completely updated at all times. To keep up the consistency of directing tables in an evolving topology, each station intermittently transmits refreshes, quickly when critical new data is accessible. DSDV uses a concept of sequence numbers to indicate the freshness of a route [2]. DSDV is inherited from the conventional Routing Information Protocol (RIP) to ad hoc network routing [4]. It adds a new attribute, sequence number, to each route table entry of the conventional RIP [1]. Using the newly added sequence number, the mobile nodes can distinguish old route information from the new one and thus prevent the formation of routing loops [1].

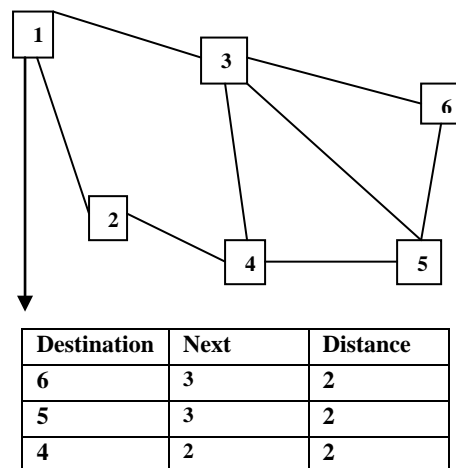


Fig2: Routing Table in DSDV

Advantages-1.Route is available for all the hops 2.Update view of network 3. DSDV protocol guarantees loop free route 4. Adaptable with the ad-hoc.

Disadvantages-1.Doesn't support multipath routing 2. It is difficult to determine a time delay for the advertisement of routes [1].

b. WARP (Wireless Ad-hoc Routing) Protocol- WARP is based on the path-finding algorithm. Wireless Ad-hoc routing protocol is the extension of DSDV routing protocol. It acquires the properties of conveyed Bellman-Ford calculation and also removes count to infinity problem like DSDV. A WARP protocol provides the up-to-date view of network which gives the current scenario of Network. WAR utilizes an arrangement of tables to keep up the shortest distance, predecessor node, successor node and a flag which indicate the status of the path [2]. Link cost table contain the cost about the node. The cost of broken links is infinity. Message retransmission list keep up the data of all messages which are participate in Network [3].

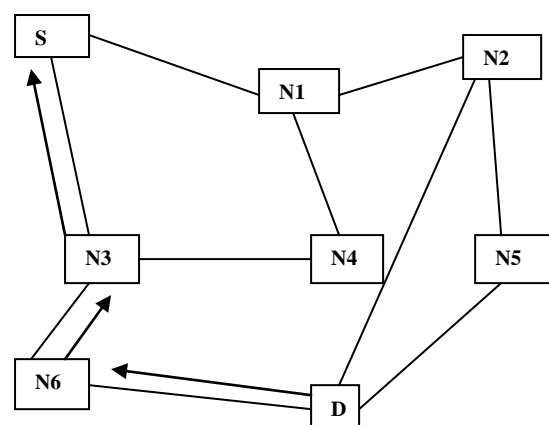


Fig3: Routing in WARP

Advantages-1.Count to infinity problem reduced in WARP 2. Faster convergence.

Disadvantages-1.Bulk of memory space required 2. WARP not suitable for large Network.

c. OLSR (Optimized Link State Routing) Protocol- OLSR is a table

driven protocol and an optimization of classical link state protocol. OLSR routing protocol is isolated into three fundamental modules that are-neighbor detecting, advanced flooding, Link state informing and route count. In neighbor/connect detecting the connections and neighbors are distinguished by hello messages. Every one of the nodes transmits hello messages at a consistent interim. The upgraded flooding and multipoint handing-off is utilized to decrease the quantity of copy retransmission while sending a broadcast packet. In Link state informing all nodes surges the system with Link state data [8].

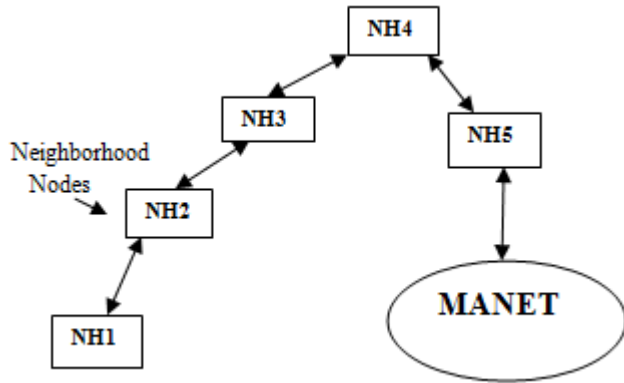


Fig4: OLSR Routing with Neighborhood

Advantages-1.Control message size reduced 2.Flooding minimizes in OLSR.

B. Reactive Routing Protocols-Each node in this routing protocol keeps up data of just active routes to the destination node. A route scan is required for each new destination in this way the correspondence overhead is decreased at the expense of delay to search the route. Quickly changing wireless network topology may break active route and cause consequent route scan. Reactive Routing protocol based on demand so Reactive routing protocol also called the On-demand routing protocol [1]. In this routing protocol route is established based on Demand. AODV and DSR are the Reactive routing protocols [7].

a. AODV (Ad-hoc On-demand Distance Vector) Routing Protocol-

On request or Reactive routing protocols were intended to beat the overhead that was made by proactive routing protocol in the event of expansive and exceptionally dynamic network. AODV depends on Bellman-Ford Distance algorithm [9]. It is on-request routing protocol. In this routing protocol, route is finding from source to destination just on request premise. AODV is guide full routing protocol implies trading of hello message to make the association with the neighbors. AODV have the different stages like route discovery stage, route maintenance stage, route table management and local connectivity management. In route discovery stage the source node speak with the destination node through the intermediate nodes. The route request for (RREQ) sends by the source node [10]. This RREQ contain source address, destination address, source sequence number, destination succession number, communicate id and TTL [11]. The source sequence number is utilized to maintain a strategic distance from the loops. The source sequence number and the destination succession number are utilized to keep up the most recent data of nodes. The (Source address and communicate id)

combine is utilized to recognize the RREQ exceptionally [14]. At the point when a node find link break then it communicates route error packets to its neighbors.

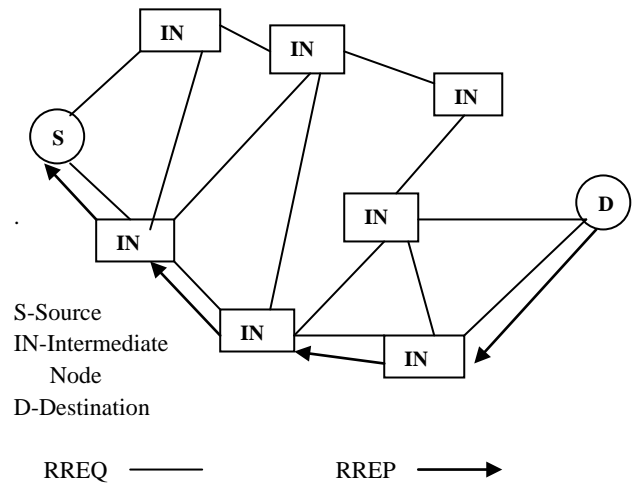


Fig5: AODV Routing

Advantages-1.Loop free routes 2. Used for unicast, broadcast and multicast 3. Route establishment depends on request or demand.

Disadvantages-1.Bandwidth consumption is more 2.Routing information not used again.

b. DSR (Dynamic Source Routing) Protocol-DSR is a Reactive Protocol which is based on request or on demand. In this protocol hello packets are not exchanged. These hello packets are utilized to alert its neighbors of its presence [9]. At first source node does not have the route to send the first packet to the destination. DSR have two stages first is route discovery and second is route maintenance [15]. At the point when a source node needs to send a packet to the destination the first it check in its route cache, in the event that it has legitimate route then it send the packet, however in the event that there is no route accessible then source node start the route discovery process by sending the Route Request RREQ packets to all neighbor nodes [6].

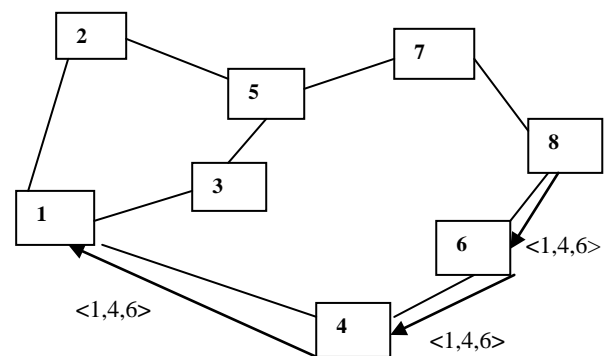


Fig6: DSR Routing

Advantages-1.Source-based routing rather than table-based 2. Route establishment depends on request or demand [16].

Disadvantages-1.Aplicable for small network 2.Header size increased.

III. HIRARCHICAL/ HYBRID ROUTING

As the size of the wireless network increases, flat routing

protocols are not suitable for routing they will produced much more overhead for the MANET. At that time Hierarchical or Hybrid Routing Protocols are preferred instead of flat routing. ZRP and CGSR are the two types of Hybrid routing protocol [13].

a. ZRP (Zone Based Routing) Protocol- Hybrid routing protocols combine the feature of Proactive and Reactive Protocols [10]. It takes advantage of proactive routing to discover nearby contiguous nodes and Reactive Protocols for routing between these neighboring nodes. In ZRP the nodes have routing zone which characterize a range as far as hop that every node is required to keep up network availability [17]. The routing procedures inside the zone are performed by the intrazone routing protocols (IARP) and to speak with various zone is performed by Interzone routing protocols (IERP). To enhance the routing procedure between edge nodes is finished by Bordercast Resolution Protocol (BRP) additionally used to control activity between zones [18].

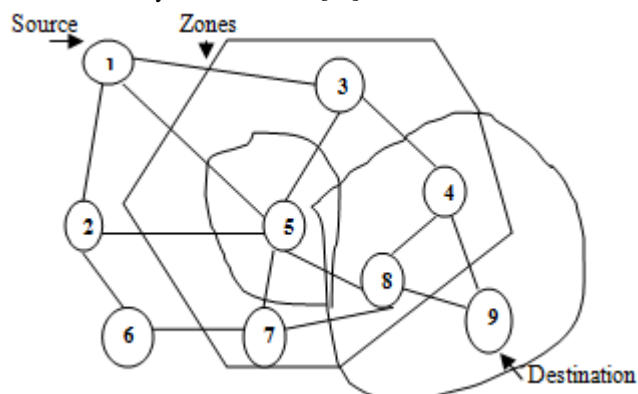


Fig7: ZRP Routing

Advantages-1.Route discovery much faster than Reactive protocols.

b. CGSR (Cluster-head Gateway Switched Routing) Protocol- CGSR also hybrid routing protocol which are based on table driven routing [12]. CGSR sort out the nodes into cluster form. The individuals from cluster pick the group head. The decision of cluster head is done on the premise of least cluster count (LCC) algorithm. As indicated by this calculation three parameters are utilized 1.lower ID 2.Less portability 3.higher network. For the most part the hubs which are one hop away make cluster. In LLC if the tie is happen between nodes then the head is chosen in the premise of lower ID. The node which is common in both clusters is called gateway. The interchanges between to clusters are done through the gateway. In CGSR two tables are keep up first is member table and another is routing table. The member table maintains the list of all nodes of cluster and the routing table maintains the route information [19].

Advantages-1.Utilized better bandwidth comparison to other routing protocol.

Disadvantages-1.Cluster-head gateway Switched Routing increased route length.

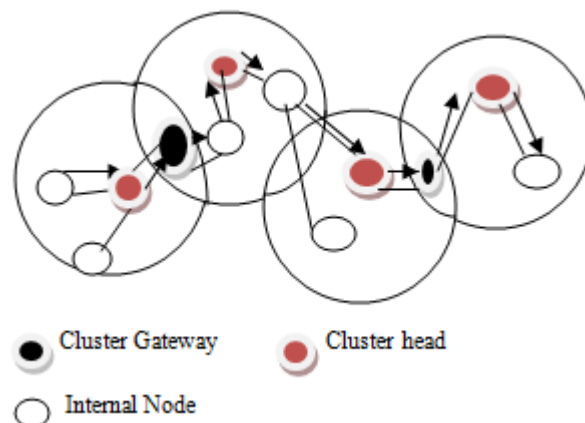


Fig8: CGSR Routing

IV. GEOGRAPHIC POSITION ASSISTED ROUTING

a. LAR (Location-Aided Routing) Protocol- The geographical position of a portable node can be utilized to enhance the performance routing algorithm. The global positioning system (GPS) can be utilized for getting position data. Location aided routing (LAR) is like DSR however restricts route discovery to certain topographical areas. LAR reduce the search space for a desired route. Limiting the search space provide fewer route discovery messages [19].

V. CONCLUSION

In this paper, an outline on Mobile ad-hoc Network (MANETs) is exhibited including need of MANETs, its applications and qualities that recognize it from different wireless network. Because of these attributes, there is need of partitioned routing protocol for MANET has been done on the premise topology of the system i.e. proactive or table-driven and reactive or request driven. The main aim of routing protocol is provide efficient energy aware and secure routing strategy. In this research paper we summarize characteristics, feature, advantage and disadvantages of MANET. From this, we reasoned that MANET routing protocols are outlined on the basis of application area and condition and it is impractical to plan a single protocol, which is appropriate for all MANETs.

VI. REFERENCES

- [1] Dimpy Grover, Sunil Saini, "A Survey on Unicast Routing Protocols in Mobile Ad-Hoc Networks" Volume 5, pp. 697-702, May- 2015.
- [2] Parul Gupta, "A Literature Survey of MANET ", in International Research Journal of Engineering and Technology, Volume 03, Issue 02, Feb-2016.
- [3] Dr.S.S.Dhenakaran and A.Parvathavarthini, "An Overview of Routing Protocols in Mobile Ad-Hoc Network", in International Journal of Advanced Research in Computer Science and Software Engineering February 2013.
- [4] Sunil Taneja and Ashwani Kush, "A Survey of Routing Protocols in Mobile Ad Hoc Networks, International Journal of Innovation, Management and Technology, Vol. 1, No. 3, August 2010.
- [5] C. E. Perkins and P. Bhagwat, "Highly dynamic destination-sequenced distance-vector routing (DSDV) for mobile computers," in ACM SIGCOMM Computer Communication

- Review, 1994, vol. 24, pp. 234–244.
- [6] D. Johnson, Y. Hu, and D. Maltz, “The dynamic source routing protocol (DSR) for mobile ad hoc networks for IPv4,” 2007.
 - [7] Alex Hinds, Michael Ngulube, Shaoying Zhu, and Hussain Al-Aqrabi, “A Review of Routing Protocols for Mobile Ad-hoc NETworks(MANET)” in International Journal of Information and Education Technology, Vol 3, No. 1, Feb 2013.
 - [8] S. Gowrishankar, T.G. Basavaraju, M. Singh, Subir Kumar Sarkar, “Scenario based Performance Analysis of AODV and OLSR in Mobile Ad hoc Networks”, available at <http://www.ijcim.th.org>
 - [9] Geetha Jayakumar and Gopinath Ganapathy, “Performance Comparison of Mobile Ad-hoc Network Routing Protocol,” IJCSNS International Journal of Computer Science and Network Security, VOL.7 No.11, November 2007.
 - [10] Gurbinder Singh, Asst. Prof. Jaswinder Singh University College Of Engineering, Punjabi University Patiala (PB.), India,” MANET: Issues and Behavior Analysis of Routing Protocols,” International Journal of Advanced Research in Computer Science and Software Engineering, Volume 2, Issue 4, April 2012, ISSN: 2277 128X.
 - [11] V. D. Park and M. S. Corson, “A highly adaptive distributed routing algorithm for mobile wireless networks,” in INFOCOM’97. Sixteenth Annual Joint.
 - [12] J. Broch, D.A. Maltz, D. B. Johnson, Y-C. Hu, J. Jetcheva, “A performance comparison of Multi-hop wireless ad-hoc networking routing protocols”, in the proceedings of the 4th International Conference on Mobile Computing and Networking (ACM MOBICOM ’98), October 1998, pages 85-97.
 - [13] Md. Golam Kaosar, Hafiz M. Asif, Tarek R. Sheltami, Ashraf S. Hasan Mahmoud, “Simulation-Based Comparative Study of On Demand Routing Protocols for MANET”, available at <http://www.lancs.ac.uk>
 - [14] R. Misra, C. R. Manda, “Performance Comparison of AODV/DSR On-Demand Routing Protocols for Ad Hoc Networks in Constrained Situation”, IEEE ICPWC 2005.
 - [15] Iskra Djonova Popova, “A Power Point presentation on Routing in Ad-hoc Networks”, 9th CEENet Workshop on Network Technology, Budapest 2004.
 - [16] Samir R. Das, Charles E. Perkins, Elizabeth M. Royer, “Performance Comparison of Two On-demand Routing Protocols for Ad Hoc Networks”, in the proceedings of NFOCOM 2000, Nineteenth Annual Joint Conference of the IEEE Computer and Communications Societies, IEEE, volume 1, pages 3 – 12 and also available at www.cs.ucsb.edu
 - [17] W. Wang and C. Amza, “Motion-based Routing for Opportunistic Ad-hoc Networks,” in Proc. of 14th ACM international conference on Modeling, analysis and simulation of wireless and mobile systems, October 31–November 4, 2011, pp. 169-178.
 - [18] Z. J. Haas, M. R. Pearlman, and P. Samar, “The zone routing protocol (ZRP) for ad hoc networks,” draft-ietf-manet-zone-zrp-04. txt, 2002.
 - [19] Simardeep Kaur , 2Anuj K. Gupta, RIMT IET, Punjab, India, Dept. of CSE, RIMT IET, Punjab, India,” Position Based Routing in Mobile Ad-Hoc Networks: An Overview,” IJCST Vol. 3, Issue 4, Oct - Dec 2012, ISSN : 0976-8491 (Online) | ISSN : 2229-4333 (Print).