



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJIRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 5, May 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423

 9940 572 462

 6381 907 438

 [ijirset@gmail.com](mailto:ijirset@gmail.com)

 [www.ijirset.com](http://www.ijirset.com)

# A Study and Implementation of Scalable Routing Protocols for Wireless Mesh Networks

Brunda R V<sup>1</sup>, Megha B<sup>2</sup>, Kavya S G<sup>3</sup>, Nikhitha S A<sup>4</sup>, Prema K N<sup>5</sup>

U.G. Student, Department of Electronics and Communication Engineering, JNN College of Engineering, Shimoga, Karnataka, India<sup>1,2,3,4</sup>

Assistant Professor, Department of Electronics and Communication Engineering, JNN College of Engineering, Shimoga, Karnataka, India<sup>5</sup>

**ABSTRACT:** A Wireless Mesh Network is a communication network consisting of radio nodes arranged in a network topology. Wireless Mesh Network (WMNS) is a new wireless broadband connection network. WMNs combine the advantages of WLAN and mobile ad hoc networks (MANET). Routing is the process of choosing a path for traffic within a network or between or between multiple networks. Routing protocols are mainly divided into three subcategories, proactive, reactive and hybrid protocols. In packet networks, routing creates a path for packets to be transmitted and supports the transport of processed packets from source to destination through intermediate nodes using hardware such as routers, bridges, gateways, firewalls or switches. Scalability is the ability of a routing protocol to perform efficiently when the value of one or more inherent network parameters increases. Appropriate MATLAB simulators are used for implementation. Destination Sequenced Distance Vector (DSDV) and Ad hoc On-Demand Vector (AODV) are implemented routing protocols that are evaluated based on their performance. The performance parameters of both routing protocols such as packet delivery ratio, throughput, end-to-end delay, routing overhead, etc. In this paper, we present a detailed simulation study of different routing algorithms such as ad-hoc ad hoc distance vector. Calling (AODV), Destination Sequenced Distance Vector routing in ad hoc and wireless mesh networks in a MATLAB environment.

**KEYWORDS:** Wireless Mesh Networks, MANET, Routing Protocol, AODV, DSDV.

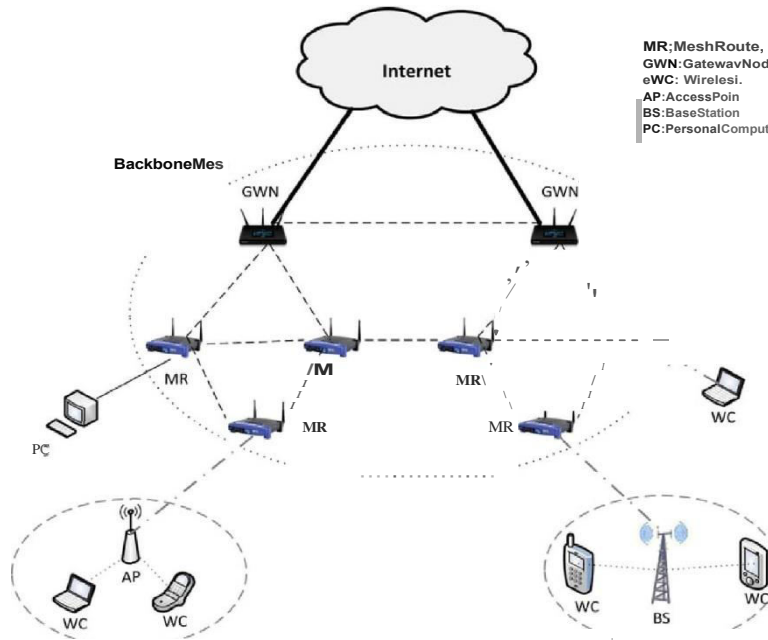
## I. INTRODUCTION

A wireless network network (WMN) is a communication network consisting of radio nodes organized in a network topology. It is also a type of wireless adhoc network. A WMN often consists of network clients, network routers, and gateways. Mesh clients are laptops, cell phones, and other wireless devices, while mesh routers direct traffic to gateways that can connect to the Internet but cannot. The coverage area of radio nodes acting as a single network is sometimes called a network cloud. Access to this network cloud depends on radio nodes synchronized with each other to create a radio network. The purpose of a wireless network is to create a correct and efficient route between nodes and ensure the correct delivery of packets. Call protocols are used whenever a packet needs to be sent through multiple nodes to its destination. These protocols find the route and deliver the packet to the correct destination. Routing is used to select the most appropriate route to forward packets from one location to another.

There are three types of routing in wireless networks, proactive, reactive and hybrid. Pre-emptive routing protocols are also called table-based routing protocols. Routing tables are updated regularly as the network topology changes. It does not work well on large networks. Destination Sequenced Distance Vector (DSDV), Optimized Link State Routing (OLSR), Open Shortest Path First - MANET (OSPF-MANET), Fisheye State Route (FSR) are some predictive routing protocols. 2. Reactive routing protocols are known as on-demand routing protocols, a route is found when it is needed. Route search is performed by route flooding requests packets over the cellular network. It consists of two steps such as route discovery and route maintenance. Dynamic Source Routing (DSR), Ad hoc on-Demand Vector (AODV), and some other extensions derived from AODV are reactive routing protocols. 3. Hybrid routing protocols combine the advantages of both reactive and proactive routing protocols. They are adaptive in nature and adapt according to source



and destination mobile nodes. Zone Routing Protocol (ZRP) and Temporarily Ordered Routing Protocol (TORA) are hybrid routing protocols.



## II. LITERATURE SURVEY

### Paper[1]PerformanceComparisonofdifferentrouting protocolsforWirelessMesh Networks by Md. Palash Tai.

Wireless networks are the next step in the evolution of wireless architecture, providing wireless services for a variety of applications in non-personal, local, campus and metropolitan areas. NS-2 is short for Network Simulator-2. The NS2 source code is a copyrighted, but freely distributable, stand-alone event simulator that works in a batch model for network projects on both wired and wireless networks. In order to solve the realistic problems of teaching and testing online computer courses, an NS2-based sample and testing system for online computer courses was built. NS2 is a standalone event simulator designed for networking. It supports simulation of TCP, routing and multicast protocols in any wireless network. NS2 can be used in most UNIX systems and windows.

### Paper [2]. Routing Protocol for wireless mesh networks by Bhanu Sharma and Amar Singh.

This paper proposed to classify routing protocols into three parts, which are proactive, reactive and hybrid. Reactive Routing Protocols These protocols use the distance vector to obtain more accurate metrics to obtain the best optimal routes in the network. AODV (Ad hoc on Demand distance vector) is the most popular routing protocol where routes are created on demand and only active routes are stored In Re-active Pro protocol, a node starts searching for a route only in the entire network. if it requires a packet to be sent to the destination node. When a source starts sending packets to a destination, it chooses a route discovery procedure to find the path. The route response is processed by the destination if a certain node knows about the route to the destination. Call protocols find routes to send packets and deliver the packets to the destination suggested by the source. They use routing algorithms to find the optimal path for data transmission between network nodes. For many years, research has been actively offering work related to various aspects.

### Paper [3]: An Overview of AODV Routing Protocol by Prashant Kumar Maurya, Gaurav Sharma, VaishaliSahu, Ashish Roberts, and Mahendra Srivastava.

This paper proposed to classify routing protocols into three parts, which are proactive, reactive and hybrid.



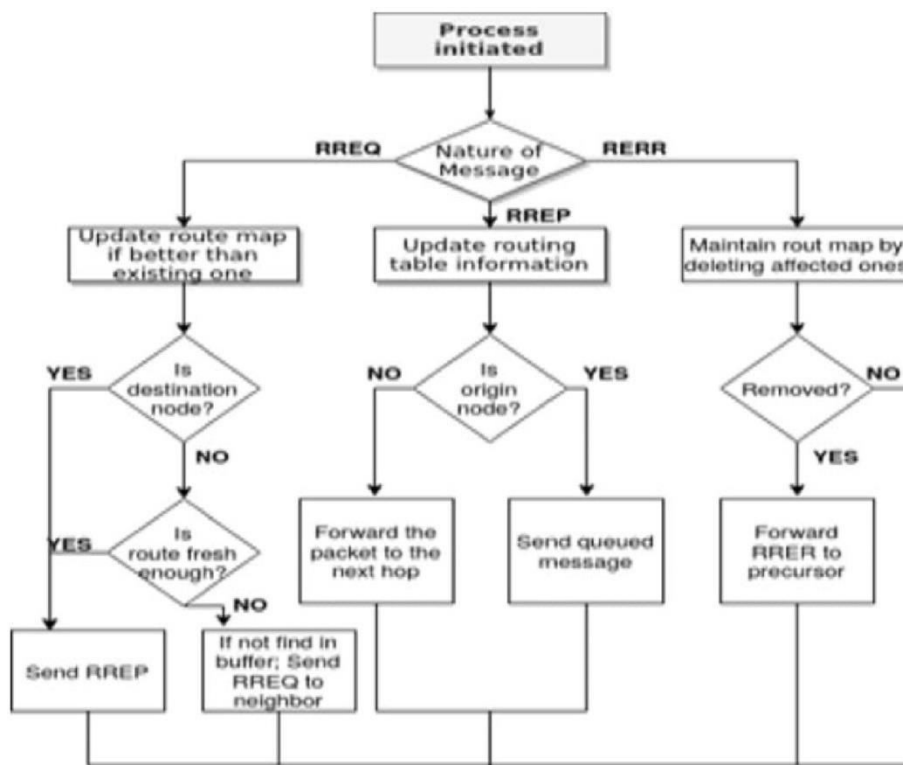
Reactive Routing Protocols These protocols use the distance vector to obtain more accurate metrics to obtain the best optimal routes in the network. AODV (Ad hoc on Demand distance vector) is the most popular routing protocol where routes are created on demand and only active routes are stored In Re-active Pro protocol, a node starts searching for a route only in the entire network. if it requires a packet to be sent to the destination node. When a source starts sending packets to a destination, it chooses a route discovery procedure to find the path. The route response is processed by the destination if a certain node knows about the route to the destination. Call protocols find routes to send packets and deliver the packets to the destination suggested by the source. They use routing algorithms to find the optimal path for data transmission between network nodes. For many years, research has been actively offering work related to various aspects.

**Paper [4]: An Energy Efficient Optimal Path Selection Using AODV Protocol in Wireless Sensor Network by Dr. P. Bagyalakshmi, Dr. A. Muruganandam**

In this paper, SCA (Successive Convex Approximation Algorithm) is used with AODV to improve data reliability and effectively manage grid energy. The algorithm finds the shortest path node in the existing convex network using the algorithm. During node selection, the energy level of all nodes is monitored to extend the lifetime of the network. Wireless sensor network plays an important role in many applications in collecting and transmitting data between nodes and base station. The network lifetime and performance of WSNs are highly dependent on the limited power supply provided to it. To extend the efficiency and lifetime of WSNs. Here, we used sequential convex approximation with AODV protocol to ensure the energy efficiency of the network.

**III. METHODOLOGY**

AODV Implementation:



AODV Flowchart



Suppose that S is the source and D is the destination, and S wants to send data to D. When S wants to send data to a destination, it sends a request to the destination. If the node is a valid target, it sends a response to the source. A Route Reply Node (RREP) is an intermediate node between a source and a destination. It then sends an acknowledgment packet to the destination node. When S receives an RREP (route response), it sends a Check Check packet to D via the path suggested by the RREP node. When D receives a VERIFY packet from an intermediate node, it stores its contents in an array to prepare the final response.

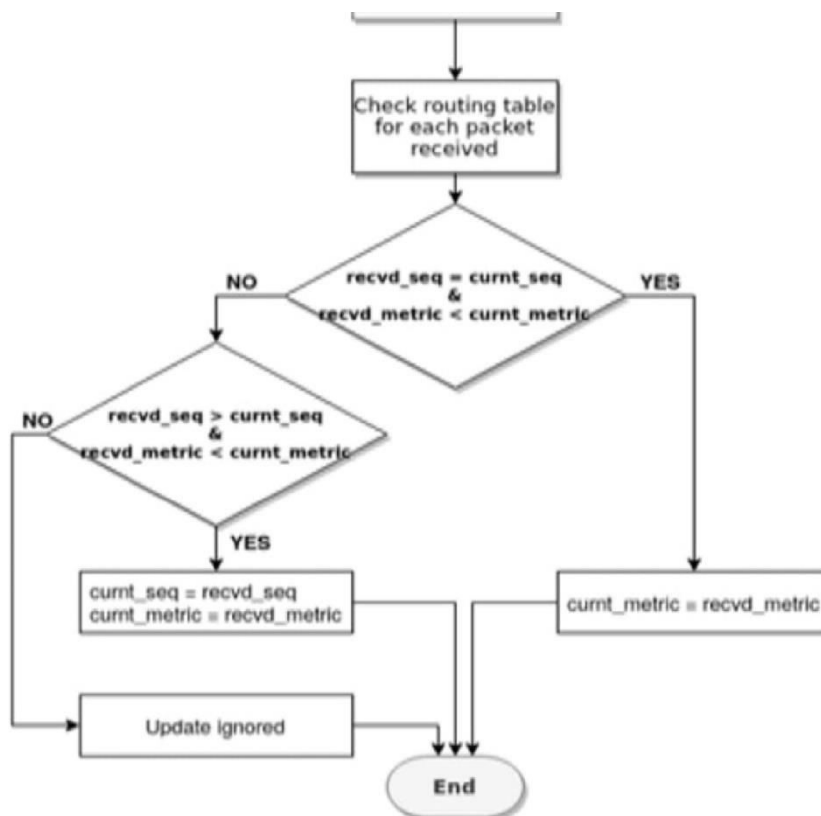
When D receives a Check Verification packet from S, it checks the table to see if it received a VERIFY packet with the appropriate source ID. If it matches, it sends a FINALREPLY packet.

- RREQ (route request) A node sends an RREQ multicast message to initiate a route discovery process. Neighboring nodes trace the origin of the message and forward it to their neighbors before it reaches the destination node.

- RREP (Route Reply) The destination node responds with an RREP that returns to the source along the route used by the RREQ. -> When the RREP returns to the source, forwarding routes are created to the intermediate nodes.

- RERR (route error) If the connection is lost, that is, if the path no longer works or messages cannot be sent, a RERR message is sent by the node that detects the link failure.

DSDV Implementation:



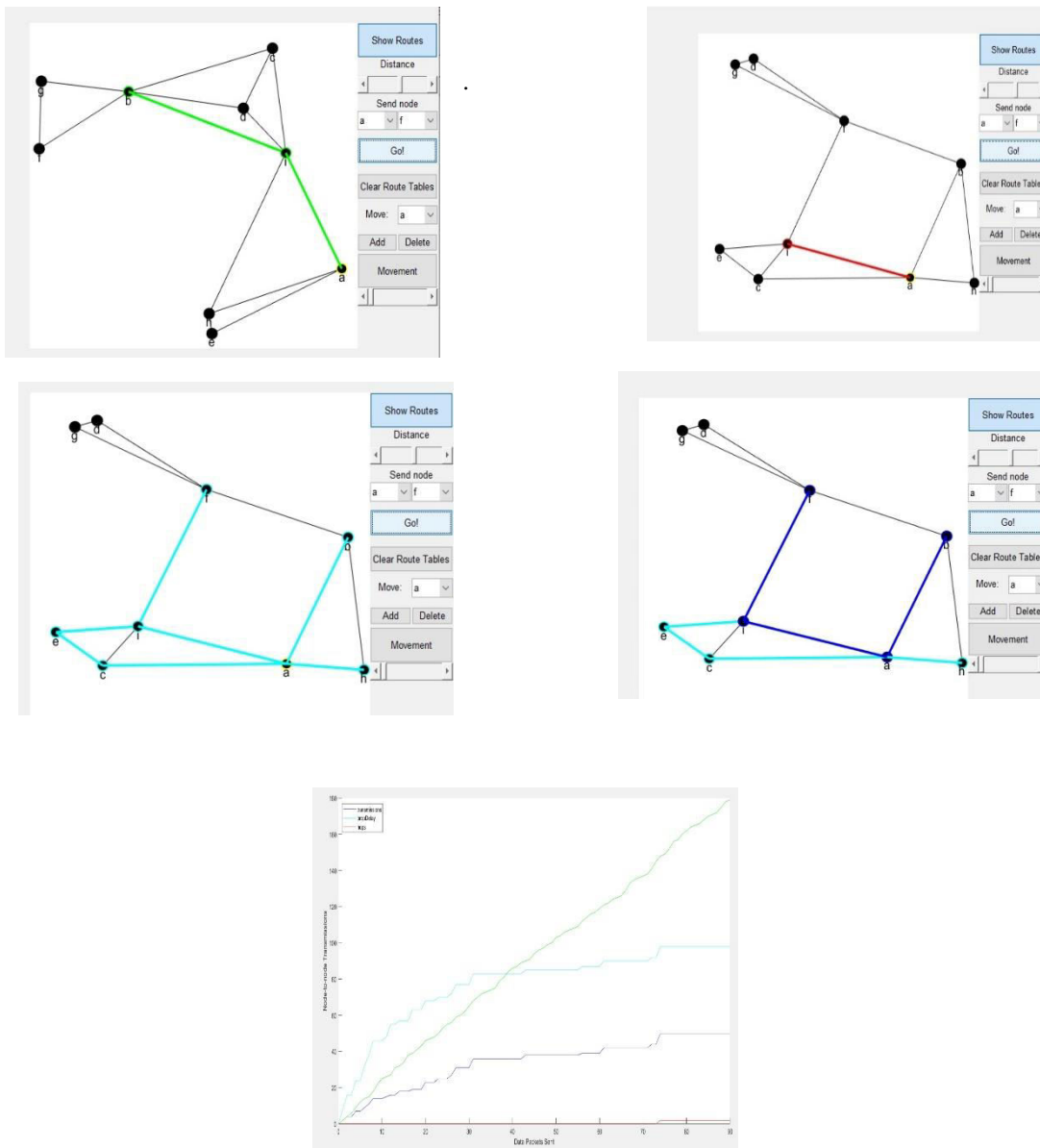
DSDV Flowchart

Destination-Sequenced Distance-Vector Routing (DSDV) is a table-driven routing scheme for adhoc mobile networks based on the Bellman-Ford algorithm. It was developed by C. Perkinson and P. Bhagwat in 1994. The main contribution of the algorithm was to solve the routing loop problem. Each entry in the routing table contains a sequence number, the sequence numbers are generally even if a link is present; else, an odd number is used. The number is generated by the destination, and the emitter needs to send out the next update with this number. Routing

information is distributed between nodes by sending full dumps infrequently and smaller incremental updates more frequently.

#### IV. EXPERIMENTAL RESULTS

These are the pictorial representation of the results obtained when AODV was implemented in Matlab.

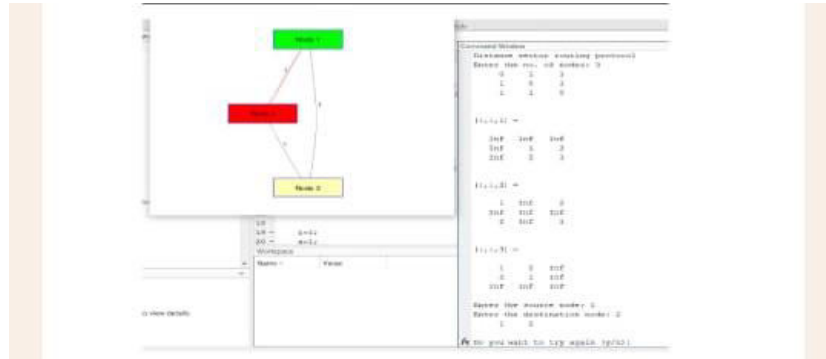


Route request packets are sent to the neighbouring nodes in order to find the destination node. In this figure, route request packets are indicated by cyan color. Here 'a' is the source and 'f' is the destination. Reply packets are indicated by dark blue color, and data transmission packets are indicated by green lines.

In the graph, red color indicates the hop count, blue color indicates transmission, and sky blue indicates the propagation delay. The waves moving will represent how much traffic is present to transmit the data.



packets to the nodes.



DSDV Result.

Protocol	Parameters	Nodes<=10	Nodes<=20	Nodes<=30
AODV	THR	7	9	97
	PLR	7.89	4.46	5.22
DSDV	TIIR	03.10	90.96	95.4-
	PLR	1-13	0_73	2_08

Comparison of AODV and DSDV

V. CONCLUSION

In the DSDV routing protocol, mobile nodes periodically send their routing information to their neighbours. Each node must maintain its own routing table. The AODV protocol finds routes using a route request packet, and a route is found when needed. These protocols should be compared in terms of packet ratio, throughput, end-to-end delay, implemented AODV and DSDV routing parameters. Then we need to compare each dimension of both AODV and DSDV routing protocols. Because the proposed routing protocol calculates the load at each node and selects the congestion-aware optimal shortest path, the end-to-end communication delay is minimized and the packet ratio is increased. Also, the variable load of other nodes sharing the same network resources is minimized, resulting in increased system performance. In general, the proposed routing protocol preserves the QoS of the network, during the communication and can provide better performance in the wireless network.

REFERENCES

[1] Md.PlashTai "Performance Comparison of different routing protocols for Wireless Mesh Networks" *Journal of Multidisciplinary Engineering Science and Technology*, Volume 9, Issue 1 January 2022, pages 14976-14982

[2] Bhanu and Sharma Amar Singh "Routing protocol for wireless mesh network", volume 18, issue 8 June 2019, pages 605-616

[3] Prashant Kumar Maurya, Gaurav Sharma, Vaishali Sahu, Ashish Roberts, and Mahendra Srivastava "An Overview of AODV Routing Protocol" , *International Journal of Modern Engineering Research (IJMER)* www.ijmer.com, Volume 2, Issue June 2012, page 728-732.



|| Volume 12, Issue 5, May 2023 ||

| DOI:10.15680/IJIRSET.2023.1205217 |

- [4] Dr.P. Bagyalakshmi, Dr. A. Muruganandam "An Energy Efficient Optimal Path Selection Using AODV Protocol in Wireless Sensor Network" *International Journal of Innovative Science and Research Technology*, *International Journal of Innovative Science and Research Technology*, Volume 7, Issue 6 June 2022, pages 203-207.
- [5] Mr. Rahul Suryawanshil, Mr. Ravindra Kale "Improved Aodv Routing Protocol with Efficient Qos for Wireless Mesh Network" Mr. Rahul Suryawanshil *Int. Journal of Engineering Research and Application* [www.ijera.com](http://www.ijera.com), Volume. 8, Issue 4 April 2018, pages 73-78.
- [6] Yin Fengjie, Yang Hui, and Zhang Ying "Research on DSDV Routing protocol based on wireless mesh network" published Chinese control and decision conference, issue 2018, pages 4292-4296.
- [7] D.G. Narayan and Uma Mudenagudi "A cross-layer interference and delay-aware routing metric for multi-radio infrastructure wireless mesh networks", *Int. J. Ad Hoc and Ubiquitous Computing*, Volume. 29, issue 2018, pages 290-304,





**INNO SPACE**  
SJIF Scientific Journal Impact Factor  
**Impact Factor: 8.423**



**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

9940 572 462 6381 907 438 [ijirset@gmail.com](mailto:ijirset@gmail.com)



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details