International Journal of Research and Reviews in Applied Sciences And Engineering (IJRRASE)
Vol 8. No.1 –2016 Pp.136-141
©gopalax Journals, Singapore
available at : www.ijcns.com
ISSN: 2231-0061

SURVEY OF ROUTING ALGORITHMS ON QOS BASED OPTIMIZATION MODEL IN MANET

V.Geevidha, PG Student ,R.Gowri, Associate Professor
Dept. of Information Technology
Sri Manakula Vinayagar Engineering College
Puducherry, India.

ABSTRACT --- A Mobile Ad-Hoc network (MANET) are an account of Wireless Ad-Hoc network that mostly has a routable networking performance over on top of a Link Layer Ad-Hoc network. MANETs is a group of mobile nodes which broadcast over radio frequencies. MANETs is subsisting of a peer-to-peer, self-forming, self-healing networks. Each device in a MANET is free to act independently in any guidance, and will accordingly change its links to other devices frequently. These kinds of networks are very flexible, which do not require any actual infrastructure or central administration. The essential challenge in building a MANET is endowing each device to constantly maintain the information enforced to properly route traffic. This paper presents a study on routing algorithms for finding path between nodes in mobile Ad-Hoc network and reduces the time delay and increases the PDR (Packet Delivery Ratio). In recent years, several routing algorithms have been proposed for MANET and prominent among them are DSDV, DSR, AODV and TORA. The functions and features involved in the implementation of different routing algorithms for MANET are examined in detail giving comparative study of various routing algorithms.

INDEX TERMS --- MANET, QoS, DSDV, DSR, AODV, TORA.

1. INTRODUCTION

In recent years, Wireless communication is based on the principle of broadcast and reception of electromagnetic waves. A wireless Ad-Hoc network is a collection of autonomous nodes or terminals that communicate with each other by forming a multihop radio network and sustaining connectivity in a decentralized manner. Since the nodes communicate over wireless links, they have to contend with the holding of radio communication, such as noise, fading, and interference. In extension, the links typically have less bandwidth than in a wired network.

The wireless network has many challenging distinctive, such as path loss, interference and blockage. Therefore designing of wireless routing is very complex than wired routing due to these constraints.Hence, the wireless routing needs some more tasks in extension to wire network that are combined to meet the wireless environment. In the graph theory, the routing can be explained as follows: Let the routing is the problem of discovery closed shortest tour between given source to destination which aims for minimal cost that visits each city once.

Each node in a wireless Ad-Hoc network functions as both a host and a router, and the control of the network is distributed between the nodes. The traditional routing algorithm is known as Link State and Distance Vector and these algorithms are resolved in the well-known protocols.Mobile Ad-Hoc Networks (MANETs) are grown in a situation where there is no infrastructure or limited infrastructure continue, such as military battlefields, forestry, disaster recovery systems etc. A MANET is a type of Ad-Hoc network that can adjustment locations and configure itself on the fly. The main issues relating to these applications are rapid and uncertain change in topology due to limited bandwidth and limited power.

Mobile Ad-Hoc Networks (MANETs) differ from the classic wired Internet infrastructures. The differences introduce difficulties for achieving Quality of Service in such networks. QoS illustrate the degree of performance of the user of the service and by having valuable QoS, information can be improved delivered and the resources can be better utilized. In order to get better QoS metrics being packet delivery ratio (PDR), delay, jitter etc. it is appropriate to fine tune the QoS routing. Excessive node mobility can lead to topology adjustment before network updates can propagate.

I. RELATED WORK

In the literature, the research contribution exists in routing mechanisms of MANETS by considering the QoS parameters.

Multi constrained and multipath QoS aware routing protocol for MANETs [1] proposed by Mamatha Balachandra, K. V. Prema and Krishnamoorthy Makkithaya. This paper proposes Multi constrained and Multipath QoS Aware Routing Protocol (MMQARP) is innovative, which takes care of QoS parameters dynamically and simultaneously along with path finding, so that only link reliable, energy efficient paths are possible for data transmission. The extensive simulation study shows that the planned protocol performs better in terms of PDR, delay and jitter compared to AOMDV protocols.

Quality of Service Enhancement in MANETs with an Efficient Routing Algorithm [2] proposed by Meena Rao and Neeta Singh. This paper introduces AODV routing protocol with nth backup route (AODV nthBR) that provides source node with more than one back up routes in case of a link failure. Improve the results in better throughput, lesser end to end delay and improved lifetime of devices.

An agent-assisted QoS-based routing algorithm for wireless sensor networks [3] proposed by Min Liu, Shijun Xu and Siyi Sun. This paper introduces a novel agent-assisted QoS-based routing algorithm for wireless sensor networks. In the recommended algorithm, the synthetic QoS of WSNs is chosen as the adaptive value of a Particle Swarm Optimization algorithm to improve the long-term performance of network. Intelligent software agents are used to monitor changes in network topology, network communication flow, and each node’s routing state.

Metrics in Mobile Ad-Hoc Networks [4] proposed by R. Asokan. It performs well in route discovery phase with dynamic topology and produces better throughput and low delay variance. Again flooding of route request may potentially reach all nodes in the network, so bandwidth diffusion increases and efficiency degrades. Besides this, it is a collision and contention prone routing protocol. So, packet delivery ratio decreases, congestion increases and throughput also become very low in case of multimedia. The routing overhead is also increased.

Multipath Routing in Wireless Sensor Networks: A Survey and Analysis [5] proposed by Priya Gopi. This paper also highlights the objective behind the development of each protocol category. A detailed study has been made on the design and operation of the different protocols, with emphasis on their advantages and disadvantages.A stable QoS aware reliable on-demand distance vector routing protocols for mobile Ad-Hoc networks [6] Shahram Jamali, Bita Safarzadeh and Hamed. This paper proposes the mobility of mobile nodes in MANETs, when the shortest path is not necessarily in the best path. If we do not consider the stability of routing paths, then wireless links may be easily cracked. There have been many efforts made to design a reliable routing protocol to enhance a network's stability. In order to select a reliable route proposed protocol uses 3 parameters: route life time, mobility and number of hops.

Enhancing the Quality of Service in MANETs by Improving the Routing Techniques [7] Mamatha Balachandra, K. V. Prema and Krishnamoorthy Makkithaya. This paper proposes Multipath QoS

Aware Routing Protocol (MQARP) based on AOMDV is proposed to support delay, jitter and throughput constraints. Simulation using various traffic sources and movement patterns is made and existing version of the protocol is modified. The QoS metrics are measured by varying the pause time, speed and number of nodes. The performance of AOMDV and MQARP are compared using the network simulator.

II. ROUTING PROTOCOL

Routing Protocols:

The routing protocols can be classified into proactive routing, reactive routing and hybrid routing protocols. Some of the relevant protocols in these categories have been discussed below.

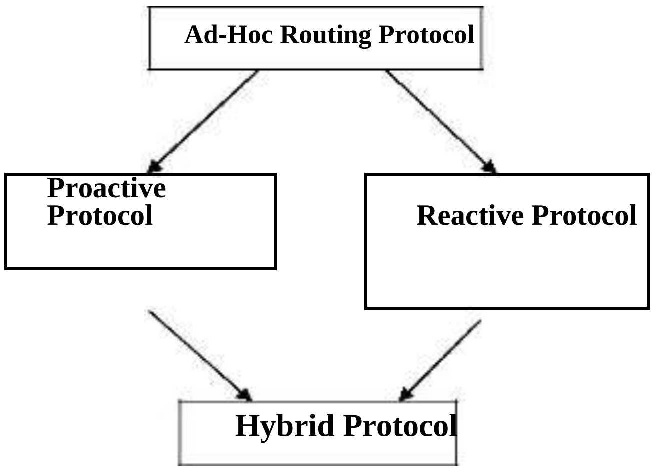

Fig. 1. Classification of Routing Protocol

A. Proactive Routing Protocols:

Proactive routing broadcasts repeated HELLO messages, like traditional routing in the internet, in order to determine the overall view of the network topology, which is useful when route establishments are needed. However, established routes, which are cached in every node, might never be used. This leads to wastage of network bandwidth, especially in high node density. In extension, in proactive routing protocols, there is a trade-off between the freshness of cached routes and the repeated of message broadcasts.

Frequent broadcast messages are useful in order for the packet carrier node to calculate efficient routes to the stated destination. On the other hand, this type of routing is suitable for real time applications (delay sensitive services) because the route between a pair of sources and destinations is build beforehand. In other words, the source does not need to flood route discovery requests on demand as the route is established in the background. In spite of the low end-to-end latency of packet forwarding, the recovery of unused cached routes wastes enormous bandwidth, especially in high mobile environments. Few key examples of proactive routing protocols are Destination-Sequenced Distance Vector Routing (DSDV), Fisheye State Routing (FSR), Optimized Link State Routing (OLSR), Source Tree Adaptive Routing (STAR) protocol, HEAT Protocol, Wireless Routing Protocol (WRP), Mobile Mesh Routing Protocol (MMRP), Linked Cluster Architecture (LCA), Hierarchical State Routing protocol (HSR), Topology Dissemination based on Reverse-Path Forwarding routing protocol (TBRPF), Direction Forward Routing (DFR) and
Distributed Bellman-Ford Routing Protocol (DBF). In this paper only a few important proactive protocols are discussed.

B. Reactive Routing Protocol:

The basic operation of reactive routing protocols is route discovery from source node to destination node and works in reversal to the on demand topology-based routing. This routing solution establishes a route when a node makes a request to broadcast packets to another node in the network. At this time, the node re-broadcasts the requested route establishment to find the expected destination. When the destination receives the query (or the en-route nodes know the path to it), it responds to the source for route establishment between source and destination. Whenever the source node wants to broadcast data packets towards the destination, it floods the network with route request packets. The destinations send, a route reply message, after which the source sends the data packet to the destination. The advantage of this approach is that it does not protect unused routes and reduces bandwidth overhead in the network. Some of the important example of reactive protocol are Ad-Hoc on

Demand Distance Vector (AODV) protocol, Dynamic Source Routing (DSR) protocol, ABR (Associativity Based Routing) protocol, Link Quality Source Routing Algorithm (LQSR) protocol, Dynamic MANET on Demand (DYMO), Lightweight Mobile Routing protocol (LMR), Load-Balancing Curveball Routing (LBCR), Scalable Location Update-Based Routing Protocol (ScrRR) and Interference-Aware Load-Balancing Routing (IALBR).

C. Hybrid Routing Protocol:

Hybrid routing protocols is cohort with the advantages of both reactive and proactive routing protocols for performance and scalability. It provides a mechanism such that it implements proactive routing for the nearby and frequently used routes. The reactive routing technique is used for distant nodes and seldom used for data relay. They minimize proactive routing protocol control overhead and reduce the delay in reactive routing protocol during the route discovery process. Example of hybrid routing protocols are Hazy-Sighted Link State Routing (HSLS) protocol, Temporarily Ordered Routing Algorithm (TORA) protocol, Zone Routing Protocol (ZRP), Hybrid Ad-Hoc Routing Protocol (HARP), Hybrid Routing Protocol for Large Scale Ad-Hoc Networks with Mobile Backbones (HRPLS) and Zone-based Hierarchical Link State routing (ZHLS). In this section only a few important hybrid protocols are discussed.

TABLE. 1. COMPARISON OF ROUTING PROTOCOLS

Protocols	**DSDV**	**DSR**	**TORA**
Category	Proactive	Reactive	Hybrid
Metrics	Shortest Path	Shortest Path, Next Available	Shortest Path, Next Available
Route Recovery	Periodic Broadcast	New Route, Notify Source	Reverse Link
Route Repository	Route Table	Route cache	Route Table
Broad Casting	Simple	Simple	Simple
Loop Free	Yes	No provision for it	Yes
Features	Distributed Algorithm	Completely on Demand	Control packets localized

III. EVALUATION METHODOLOGY

Destination Sequenced Distance Vector Routing Protocol (DSDV):

Destination Sequenced Distance Vector Routing Protocol is proactive unicast routing protocol. DSDV is based on classic Bellman Ford algorithm. In DSDV, every node maintains a routing table. Each entry in the routing table keeps information of all likely node destinations in the network. It also keeps a record of the number of hops for every destination. To prevent loops, DSDV uses sequence numbers. The routing updates are either event driven or time driven. Each node broadcast routing table update and its routing information to its adjacent neighbour nodes periodically. In DSDV, two types of updates are possible. The first one is full dump and an incremental update. In the full dump, the complete routing information is drifting and may require the number of Network Protocol Data Unit (NPDU). In variation, only entries of available destinations with new changes from the routing table are sent in the additional update. When the nodes are relatively static, incremental update avoids extra traffic compared to the full dump update. Still, the full dump update is more dynamic in the network with high speed mobile nodes. In both restored mechanisms, the route update packet is sent with a particular sequence number with the routing information. During the selection, the path accepting the greatest sequence number is selected as the current path. If two paths have the same sequence number, the shortest path is selected.

Dynamic Source Routing Algorithm (DSR):

Dynamic Source Routing Algorithm (DSR) is the source based routing protocol where the source records the sequence of intermediate nodes in a data packet which is sent to the destination. The basic operation of the protocol consists of two phases, namely the path discovery and path maintenance process. In DSR, a path discovery phase is begun when the source node without a valid path intends to broadcast a data packet to the destination node. DSR applies the source routing strategy to broadcast a route request message. This includes source id, destination id, a route record with an empty list of addresses of all intermediate nodes and a unique request id towards the destination node. On receiving route request, an intermediate node caches the route record. A route reply message may be replied if the destination node is arrived. The destination node cache stores the route record. Then it uses the cached path in the route record for the propagation of route reply back to the source node. Otherwise, if this node is not in the route cache of route request, it appends its address to the route record and broadcasts the route request messages. To avoid the overhead, DSR optionally defines the unique request id for each message in the route discovery mechanism. In addition, these messages are forwarded hop-by- hop. Unlike other on-demand driven algorithms, there are no proactive periodic probes for neighbour detection, or link status detection in DSR. Therefore, DSR operates truly on demand to minimize the routing overhead. The route maintenance mechanism is initiated when a node cannot deliver packet to its next-hop node. This node then generates route error messages towards the source node to find the most viable route. Hence, the broken link is removed from the route cache of the source node.

Ad-Hoc On-Demand Distance Vector Routing Algorithm (AODV):

AODV is a reactive unicast routing protocol. AODV protocol doesn't deploy flooding. AODV does not store routing information of all the nodes, instead it just keeps information about the nodes falling on the active route. In AODV when a source node has data packets and intends to communicate with another node, it initiates the route discovery process in the network. As the source has no suitable route for the destination, it broadcasts the Route request (RREQ) message. RREQ packet contains the address of the source node, address of the destination node and broadcast id. Broadcast id is an identifier that contains the most-current sequence number of the source and the destination node. Each RREQ begins with the least Time to Live (TTL) value. The TTL value increments by 1 if the destination node is not found. HELLO messages are used to notify adjacent neighbor nodes.

Routing tables keep records for a specific period. A cache is maintained by each node. The cache keeps the entries of the received RREQs. The RREQ with the greatest sequence numbers is accepted and others are rejected. The cache also saves the return path. RREP message is generated and is transmitted back to the source node provided the sequence number of the destination node is equal to or larger.

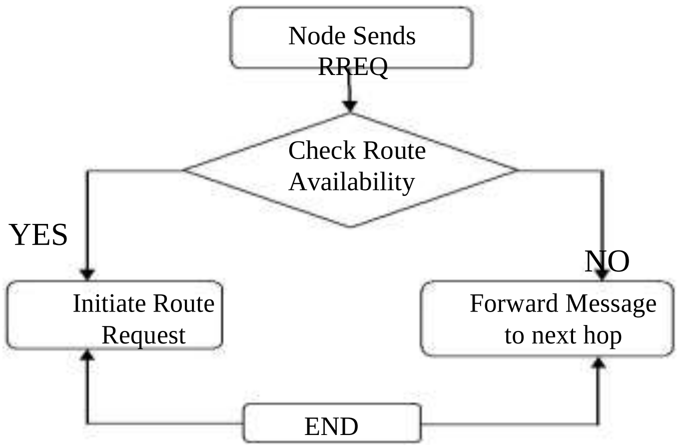

Fig. 2. AODV Routing Mechanism

Temporally-Ordered Routing Algorithm (TORA):

Temporally Ordered Routing Algorithm (TORA) is an on demand routing protocol. It is a distributed routing protocol. It is designed to reduce the communication overhead involved in adjusting to the changes which occur whenever there is a change in network topology. TORA's control messages are generally restricted to a very minor group of nodes. It ensures loop free routes.

Generally, TORA offers several routes from source to destination. TORA functions can be broadly classified into three types, which are a) 1) route creation, 2) maintaining route and 3) removal of route. It uses height metric during route creation and maintenance to form a Directed Acrylic Graph. (DAG) fixed at destination. Links are allocated on the basis of relative height of the neighboring nodes. Timing is very crucial in TORA as the height metric relies on link failure logical time. When TORA wishes to delete the routes, it broadcasts a clear (CLR) packet flooding the entire network to delete the invalidated paths.

The messages move in a downward flow that is a from a higher height node to a lower height node. Discovery and updating of routes is through Query (QRY) and Update (UPD) packets. The QRY packet circulates over the network until it finds a node which is either the destination node or has route information. A UPD packet containing the node's height is then broadcasted. On getting the UPD packet each node sets its height larger than the height mentioned in the UPD message. After setting its height higher, this node broadcasts its own UPD packet resulting in many routes.

Table. 2. Summary of routing algorithm

Routing Protocols	**DSDV**	**DSR**	**AODV**	**TORA**
Routing Structure	Flat	Flat	Flat	Flat
Over all Complexity	High	Medium	Medium	High
Frequency update transmission	Periodically	Event driven	Event driven	Event driven
Update transmission to	Neighbours	Source	Source	Neighbours
Loop free	Yes	Yes	Yes	Yes
Utilize hello message	Yes	No	Yes	No
Multiple Route Support	No	Yes	No	Yes
Routing Metric	Shortest Path	Shortest Path	Freshest and Shortest Path	Shortest Path

IV. CONCLUSION

In this paper, routing protocols can be categorized into proactive routing, reactive routing and hybrid routing protocols. Some of the important protocols that have been categorized are discussed here. Destination Sequenced Distance Vector Routing Protocol (DSDV), Dynamic Source Routing Algorithm (DSR), Ad-Hoc On-Demand Distance Vector Routing Algorithm (AODV) and Temporally-Ordered Routing Algorithm - (TORA) are different protocols summarized here for improving the QoS based Optimization Model in MANET. These protocols deals with several QoS metrics like time delay and PDR. Table above shows the comparison of the diffent routing protocols mentioned here on the basis of several parameters and features.

REFERENCES

[1] Mamatha Balachandra, K. V. Prema and Krishnamoorthy Makkithaya. "Multiconstrained and multipath QoS aware routing protocol for MANETs": Springer Science, 2014.

[2] Meena Rao and Neeta Singh. "Quality of Service Enhancement in MANETs with an Efficient Routing Algorithm": Conference: 2014 IEEE International Advance Computing Conference (IACC)

[3] Min Liu, Shijun Xu and Siyi Sun. "An agent-assisted QoS-based routing algorithm for wireless sensor networks": Journal of Network and Computer Applications Elsevier, 2012.

[4] R. Asokan. "Metrics in Mobile Ad-Hoc Networks": Journal of Computer Science, 2007

[5] Priya Gopi. "Multipath Routing in Wireless Sensor Networks: A Survey and Analysis": IOSR Journal of Computer Engineering (IOSR-JCE), 2014

[6] Shahram Jamali, Bita Safarzadeh and Hamed. "A stable QoS aware reliable on-demand distance vector routing protocols for mobile Ad-Hoc networks": Research and Essays, 2011

[7] Mamatha Balachandra, K. V. Prema and Krishnamoorthy Makkithaya. "Enhancing the Quality of Service in MANETs by Improving the Routing Techniques": International Journal of Computer Application, 2012