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MULTIPATH ROUTING AND QOS OF UNIPATH AND MULTIPATH REACTIVE ROUTING PROTOCOL IN MANET

[1] Dr.S.Koteswari ,[2] Dr. Kopparthi Suresh

[1]Professor & HOD ,[2] Professor & Principal

[1]Department of ECE, [2]Department of CSE

[1]D.N.R College of Engineering & Technology, Bhimavaram,A.P,India

[2]Bhimavaram Institute of Engineering & Technology ,Pennada, Bhimavaram.,A.P India

Abstract: Mobile Ad hoc Networks are self- configuring, self-organizing and self-maintaining networks comprising of mobile nodes which are free to pass in and out of the network. A MANET is an interconnection of mobile gadgets through wireless links forming a dynamic topology without lots bodily network infrastructure such as routers, servers, access points/cables or centralized administration. Routing is a mechanism of replacing statistics between the supply node and the vacation spot node. Several protocols are used to function routing the data from the source node to the destination node. The essential goal of this paper is to discover the working concepts of each Uni- course routing protocol. The Uni-path routing protocols are divided into Table-Driven (Proactive), On-demand (Reactive), Hybrid routing protocols.

Index Terms **– Adhoc, Networks,MANET, Node,Uni-Path**

I. INTRODUCTION

II. Mobile Ad hoc network additionally known as self- equipped network, is a multi-hop wi-fi community where nodes can pass arbitrary in the topology. It consists of a set of wireless nodes which dynamically alternate data among themselves barring reliance on some fixed base stations or a wired spine network. It has magnificent distinction between the wired network, inclusive of the unpredictability of environment, the unreliability of wi-fi medium, the resource- restrained nodes, the dynamic topology, constrained bandwidth and constrained security. Because of the aspects of MANET, the lookup of the routing protocol has been one of the most involved subjects in the MANET. The conventional routing algorithms for wired networks are now not efficient for the dynamic changes. For the recent years, human beings have developed a lot of routing protocol which can be used in MANET, and right here some usual protocols are summarized. One of the most important factors of the communications method is the plan of the routing protocols used to establish and maintain multi-hop routes to enable the communication of facts between nodes. As the MANETs are dynamic in nature, designing protocols for these networks is a challenging process. A considerable amount of research has been carried out in this area, and many multi-hop routing protocols have been developed. Most of these routing protocols construct and be counted on a uni-path route for every information transmission. The protocols are labeled into two categories: table-driven, on-demand. While these protocols might be enough for a certain type of MANET applications, however are no longer enough for the guide of greater stressful applications such as multimedia audio and video. Such purposes require the community to furnish ensures on the QoS. This is finished by the usage of some mechanism such as QoS routing to find the high-quality route which satisfies these necessities in the first-rate way. QoS routing appears to be a solution to handle these problems. QoS routing requires now not solely discovering a route from a supply to a destination, but a route that satisfies the end-to-end QoS requirement, often given in phrases of bandwidth, prolong or loss probability. Quality of carrier is extra hard to acquire in ad hoc networks than in wired networks. According to [6], QoS is a set of service requirements to be met by using the community whilst transporting a flow. A go with the flow is a packet circulation from a source to a destination with an related QoS. A indispensable requirement of any QoS mechanism is a measurable performance metric. Typical QoS metrics consist of handy bandwidth, packet loss rate, estimated delay, packet jitter, hop rely and route reliability. The key issue in offering QoS guarantees is how to decide paths that satisfy QoS constraints and solving this problem is referred as QoS conscious routing.

II.RELATED WORKS

In MANETs verbal exchange between nodes is executed via the wi-fi medium. Because nodes are cellular and may be part of or leave the network, MANETs have a dynamic topology. Nodes that are in transmission vary of every different are referred to as neighbors. Neighbors can send information directly to every other. However, when a node wishes to ship information to every other non- neighboring node, the information is routed thru a sequence of a couple of hops, with intermediate nodes acting as routers. Routing protocols are used to discover and hold routes between supply and vacation spot nodes. Two main training of advert hoc routing protocols are Table-based (Proactive) and On-demand (Reactive) protocols [1]. In Table-based protocols every node keeps a routing table containing routes to all nodes in the network. Nodes need to periodically alternate messages with routing data to maintain routing tables up-to-date. Therefore, routes between nodes are computed and stored, even when they are not needed. Examples of Proactive Protocols are DSDV (Destination Sequenced Distance Vector) algorithm, WRP (Wireless Routing Protocol), CGSR (Cluster Gateway Switch Routing). In on-demand protocols, nodes only compute routes when they are needed. Therefore, on-demand protocols are greater scalable to dynamic, giant networks. When a node wants a route to every other node, it initiates a route discovery manner to locate a route. On-demand protocols consist of the following two predominant phases.

1.Route discovery is the procedure of finding a route between two nodes

2.Route protection is the system of repairing a damaged route or discovering a new route in the presence of a route failure.

Examples of Reactive protocols are the Dynamic Source Routing (DSR), Ad hoc On-demand Distance Vector (AODV) protocols and Temporally Ordered Routing Algorithm (TORA). In addition to proactive and reactive protocols are Hybrid Protocols [2] protocols that use each the procedures to locate a route from the source to the destination. Example of hybrid protocol is Zone-Based hierarchical Link State RoutingProtocol (ZRP).

III. MANET - Routing protocol

Routing protocols for MANETs can be labeled in a number ways. They can be classified as proactive and reactive routing relying on numerous factors. Such factors can be for example the time taken for routes discovery or routing information replace mechanism. Figure 1 provides some routing protocols for MANETs.

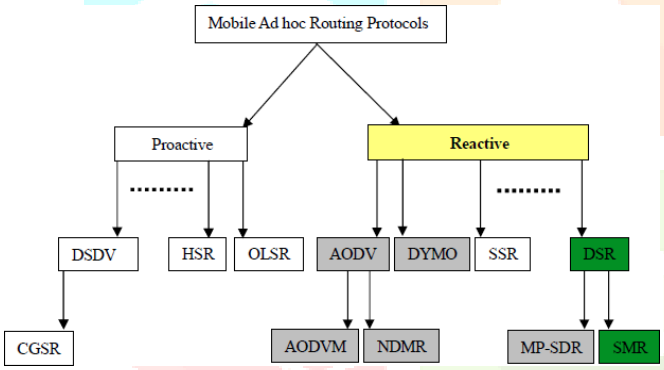

Fig 1. MANET Routing Protocol.

In proactive routing, each and every host continues at least one routing table to characterize the entire topology of the network. The tables (of each host) are up to date continuously. Therefore, routes are already accessible at any time some hosts choose to communicate with every other. In order to keep updated routing information at all hosts, topology facts has to be exchanged between all hosts on a everyday basis. This will increase the overhead in the network. On one hand, vast bandwidth is used for the large manipulate traffic; on the different hand, routes are always reachable in shortly for any conversation request. This reduces the delays of records transmissions. One of the most important proactive protocols is the Optimized Link State Routing protocol (OLSR) [18]. Unlike proactive routing protocols, reactive routing protocols provoke a route discovery technique when needed. This reduces the overhead as in contrast to proactive routing protocols, however it will increase the transmission delay. Another classification can be made according to wide variety of paths a routing protocols gives you per supply destination pair. There exist uni-path and multipath routing protocols. Uni-path routing protocol: one route is used to supply facts from source node to destination node. Multipath routing protocol: more than one route is used to supply the data.

Uni-path Routing Protocols

There exist two main classes of on-demand routing algorithms, namely distance vector and source routing. A distance vector algorithm uses some similar aspects as the Bellman-Ford algorithm to calculate the routing paths. It requires that a node informs its neighbors periodically. The packets encompass the next-hop in their header and each intermediate node adapts this facts consequently along the path. A source routing algorithm requires that a node knows the whole paths to the destination. AODV - Ad hoc On-Demand Distance Vector [6, 7]AODV protocol is described by using the RFC 3561, written by way of Charles Perkins and Elizabeth [6].AODV has some comparable facets as the Bellman-Ford distant vector algorithm, but it has been accelerated to work in a cellular surroundings [7]. AODV makes use of hop-by-hop routing (AODV Route Discovery Process - Figure 2.3). Every node forwards statistics packets toward a vacation spot node in accordance to its routing table (Figure 2.2). The routes in the AODV routing desk are saved up to date as long as they are wanted by the source. AODV keeps a single route per a destination. The

routing is divided into two fundamental mechanisms. The first one is the route discovery. It is responsible for discovering a route to the destination if none is presently accessible in the routing table of the node. The 2d one is the route upkeep which continues the routes up-to-date, e.g. gets rid of broken paths. AODV protocol solely works in a community where the conversation links are bidirectional because if an (intermediate) node receives both a Route REQuest (RREQ) packet or a Route REPLY(RREP) packet, it caches the preceding node

AODV Route Discovery

If a supply has no entry for a destination in its routing cache, it starts a route discovery process. It floods a RREQ packet in the network. The RREQ includes header fields with the following parameters: request ID, supply node ID, destination node ID, hop count, sequence wide variety of the source node, sequence number of the vacation spot node and TTL (time-to-live). If an intermediate node receives a RREQ packet, it assessments if it is the vacation spot node. If not, it assessments if it has viewed this RREQ earlier than via checking the request ID and supply node ID. If this is the case the node simply drops the packet and does no longer ahead the RREQ any further.This avoids loops in the route. If the RREQ packet is not dropped, the intermediate node searches in its route cache table. If there is an active route to the destination, it sends returned a RREP with its route entity. Otherwise it simply rebroadcasts the obtained RREQ. If the vacation spot node has acquired the RREQ, it generates a RREP packet and sends it lower back in reverse way to the source. If an intermediate node receives either a RREQ or a RREP packet, it shops records about the previous node from which the packet used to be obtained in its routing. With this mechanism, hop-by-hop routing, a node can therefore determine which subsequent hop it can use to reach a vacation spot node. [13]

AODV Route Maintenance

If a node tries to forward a message, however detects that there is a hyperlink break, i.e., the next node is no longer more reachable, the forwarding node sends lower back a RERR message towards the supply node. Whenever a node receives a RERR message, it deletes all routes containing this broken hyperlink in its routing table. When the supply receives the RERR packet, it also updates its routing table, but it does not ship the RERR packet anywhere. If the records session has now not yet been executed and the supply does not have any other route to the destination, the node starts the route discovery process.

Multipath Routing Components

Multipath routing consists of three components: Route discovery, Route maintenance, and Traffic allocation. Route Discovery and Maintenance. Route discovery and route preservation consists of finding a couple of routes between a source and destination node. Multipath routing protocols can attempt to discover node disjoint, hyperlink disjoint, or non-disjoint routes [4]. Node disjoint routes, also recognised as totally disjoint routes, have no nodes or links in common. Link disjoint routes have no links in common, however might also have nodes in common. Non- disjoint routes can have nodes and hyperlinks in common. Disjoint routes additionally furnish greater fault-tolerance. Traffic Allocation. Once the source node has selected a set of paths to the destination, it can begin sending statistics to the vacation spot along the paths. The site visitors allocation approach used deals with how the facts is allotted amongst the paths. The preference of allocation granularity is essential in traffic allocation. The allocation granularity specifies the smallest unit of information allocated to each path.

IV. UNIPATH ROUTING Vs MULTIPATHROUTING

The essential risks of multipath routing protocols in contrast to unipath protocols are complexity and overhead. In the case of mulipath extensions to AODV, maintaining more than one routes to a destination outcomes in large routing tables at intermediate nodes. In multipath routing, the approach with the aid of which packets are allocated to the more than one routes ought to be taken into account. Multipath routing can end result in packet reordering. In unipath routing, site visitors allocation is no longer an issue, given that solely one route is used. After a source starts offevolved sending records alongside multiple routes, some or all of the routes can also break due to node mobility and/or link and node failures. For unipath routing route discovery can be brought on upon failure of the route. In the case of multipath routing, route discovery can be induced each time one of the routes fails or solely after all the routes fail. Nodes in an advert hoc network communicate thru the wireless medium. When selecting a couple of paths, it is essential to select paths that are as independent as possible to ensure the least interference between the paths. Multiple metrics can be used to calculate the relative degree of independence amongst a set of paths, namely correlation [5] and coupling [6]. The correlation element between two node-disjoint paths is defined as the whole quantity of hyperlinks connecting the paths. The coupling between two paths is calculated as the average number of nodes that are blocked from receiving information alongside one of the paths when a node in the different direction is transmitting. The advantage of using coupling as a metric is that it can be used for both disjoint and non-disjoint routes. Non-disjoint routes are regarded rather coupled. Choosing paths that have low coupling or correlation can enhance the overall performance of multipath routing.

V. *APPLICATIONS OF MULTIPATH ROUTING*

Multipath routing can be used to support a range of applications in MANETs. Such as fault tolerance, energy conservation, minimization of end-to-end delay, and fulfilling bandwidth requirements.

FAULT TOLERENCE

Satisfying Reliability Requirements : MP-DSR [7] is a multipath QoS-aware extension to DSR, the protocol attempts to grant end-to-end reliability as the QoS metric. End-to-end reliability is defined as the chance of sending statistics correctly within a time window. The end-to-end reliability is calculated from the reliabilities of the paths used for routing. The direction reliability is calculated from the link availabilities. Link availability is described as the chance that a hyperlink is reachable from time t0+t, given that it is an active link at time t0. Path reliability is the product of the link availabilities along the path, assuming the hyperlink availabilities are independent. The end-to-end reliability is the chance that at least one path does now not fail inside the given time window. Generally the end- to-end reliability is greater than any of the direction reliabilities. Hybrid Network for

Enhanced Reliability: It may additionally be hard to find a appropriate wide variety of node disjoint paths between two nodes to grant the fundamental fault tolerance and reliability. However, some advert hoc networks may also incorporate heterogeneous nodes, where some nodes are more dependable than other nodes. Reliable nodes [8] are deployed to furnish dependable paths. The objective is to function dependable nodes such that the chance of establishing a reliable course between any two arbitrary nodes is maximized. The reliable nodes acquire topology records from surrounding nodes to determine where to function themselves. Depending on the mobility of the nodes, the dependable nodes might also have to reposition themselves. The reliable nodes be quicker than the other nodes, such that they can adapt to node mobility in a well timed fashion. Packet Salvaging for Fault Tolerance: With packet salvaging intermediate nodes hold more than one routes to the destination, and a RERR message propagates upstream only until an intermediate node can ahead the packet alongside an alternate route. Multipath protocol known as CHAMP (Caching and Multipath Routing) [9] makes use of round- robin visitors allocation to preserve routes fresh. A node solely accepts the shortest routes to the destination, and the routes should be of equal length. When routing a packet to a destination, a node sends the packet along the least used route, thereby spreading information packets over all the handy routes. Routes are of equal size in order to assist reduce out-of-order packets arriving at the destination. CHAMP approves for non-disjoint paths. CHAMP takes gain of temporal locality in routing, where a dropped packet is a currently sent packet. Each node maintains a cache of packets it currently forwarded. Diversity Coding : A multipath traffic allocation scheme for advert hoc networks that uses M-for-N diversity coding is proposed in [10]. In this scheme, a packet is split up into N equal dimension blocks. Then, M blocks of the same dimension are introduced to the packet as overhead. The extra blocks are calculated from the N blocks, and provide redundant information. The N + M complete blocks are then allocated to the more than one handy paths. Based on the M-for-N coding scheme, if no extra than M blocks are lost, the authentic packet can be reconstructed from the received blocks. The major notion in the back of this scheme is to allocate the blocks amongst the routes such that the likelihood of dropping no greater than M blocks is maximized.

DELAY AWARENESS

Pre-emptive Route Discoveries: A multipath extension to DSR referred to as MSR [11] is used by way of the source node to locate more than one paths to the destination. Disjoint paths are preferred to make certain direction independence. The scheme tries to reduce the end-to- give up delay for sending a volume of statistics from supply to destination by way of the use of multipath routing and wise site visitors allocation. In this scheme, data is routed along multiple paths in sequential blocks. Since routes may also wreck earlier than all the data is transmitted, new paths need to be discovered. Pre-emptive route discoveries are achieved to locate new paths earlier than route errors occur. In order to determine how to distribute facts amongst the paths, the scheme uses a mechanism to predict the lifetime of a path. The lifetime of a course is decided via the link affinity, which is a prediction of the life span of a link. Prioritize Multipath routing: Multiple paths are chosen between a source and a vacation spot relying upon the type of traffic [12]. The protocol assumes that a supply node is aware of the significance of a packet that it sends to a destination. A supply node uses an indicator to classify a packet depending on its importance. Routing choices are made based on this priority indicator. A low priority packet travels a longer course compared to a greater precedence packet. The priorities are assigned from 1to M, where M is the indication of the best possible priority. A packet with the best possible priority is sent using the top-quality direction among all M paths. The top-quality path is defined as the route that has the shortest end- to- stop delay.

Multipath Reactive Routing Algorithm

1: if numOfForwardedMsg[RREQ] > m0 then
2: return ;
3: end i
4: Pacc = Pacc ¥ Aj,i(tw);5: Li(tw) = Plower / Pacc;
6: n = num of the neighbors of the intermediate node;
7: Pend_to_end = {(n1, v1), ..., (nn, vn)};
{where the list is sorted according to vi}8: for k = 1 to n do
9: if Pend_to_end[k].neighbor ŒpathVector then
10: continue;
11: end if
12: if Ai,k(tw) ³ Lk(tw) then
13: numOfForwardedMsg[RREQ] + +;
14: forward(RREQ, Pend•to•end[k].neighbor);
15: return ;
16: end if 17: end

It improves the Multipath reactive routing protocol with fee based route discovery sche me. The fuzzy good judgment techniques are used for the value estimation. Bandwidth and site visitors fact ors are used in the route discovery process. The proposed system improves the end•to•end reliability. Multi course route discovery is designed in the system. Cost element is used for route discovery process. Dynamic so urce routing protocol is used in the system. Alternate route is chosen in node failure st ate. The machine is divided into three fundamental modules. They are Route discovery, Route primary tenance and Cost estimation.a MANET may additionally consist of nodes which cannot be recharged in an predicted time period, electricity conservation is imperative to keeping the life- time of such a node. In networks consisting of these nodes, where it is not possible to top off the nodes' power, techniques for MANET Reactive routing as well as environment friendly information dissemination between nodes is crucial. MANET Reactive Routing : The mobility conscious geographical multipath routing (MRR) protocol proposed in [15]. The authors advised that whilst choosing the subsequent hop, a mobile node think about the last battery capacity, mobility and distance of that next hop to the destination. Based on these parameters, a fuzzy good judgment device is developed and utilized to the next hop resolution mechanism. Braided Multipath : A multipath routing approach which makes use of braided multi-paths is

additionally proposed in Braided multi-paths [16] loosen up the requirement for node disjoint. Multiple paths in a braid are solely partially disjoint from every other and are not completely node-disjoint. These paths are generally shorter than node-disjoint multipaths and for that reason devour less electricity resources; alternate paths ought to eat an quantity of strength related to the important path. It was once found in that multipath routing using the braided multipath approach expends solely 33% of the electricity of disjoint paths for alternate path preservation in some cases, and have a 50% higher resilience to isolated failures.

VI. CONCLUSION

In this paper we reviewed the challenges and simple standards at the back of QoS routing in MANETs and provided a thorough overview of QoS routing metrics and diagram considerations. MANETs are possibly to extend their applications in the future communication environments. It is clear from the benefits of multipath routing that it is a better preference than single course routing as it can expand the network operation lifetime by distributing load amongst nodes and now not overusing some set of nodes as may additionally be in case of unipath routing. It is perfect that instead than fulfilling one QoS at a time, more than one requirements be sufficed. Thus a protocol that may additionally fulfill bandwidth requirements additionally be able to stability load and in flip conserve network's energy. Further, an adaptive QoS strategy depending on the kind of information to be transmitted can additionally be employed for multipath routing.

References

[1] Haas ZJ. Panel report on ad-hoc networks. Mobile Computing and Communications Review 1997; 2(1): 15–18.

[2] Corson S, Macker J. Mobile Ad hoc Networking (MANET): Routing Protocol Performance Issues and Evaluation Considerations. Internet-Draft, October 1998.

[3] Perkins CE. Mobile Ad Hoc Networking Terminology. Internet Draft, November 1998.

[4] Alwan A, Bagrodia R, Bambos N, Gerla M, Kleinrock L,Short J, Villasenor J. Adaptive Mobile Multimedia Networks. IEEE Personal Communications Magazine 1996; 3(2): 34–51.

[5] Lettieri P, Srivastav M. Advances in wireless terminals. IEEE Personal Communications 1999; 6(1): 6–19.

[6] Crawley E, Nair R, Rajagopalan B, Sandrick H. A Framework for QoS Based Routing in theInternet. RFC 2386, August 1998.

[7] CH.V.Raghavendran, G. Naga Satish, Dr. P.Suresh Varma, Intelligent Routing Techniques for Mobile Ad hoc Networks using SwarmIntelligence, International Journal of IntelligentSystems and Applications, 2013, 01, 81-89

[8] CH.V.Raghavendran, G. Naga Satish, Dr. P. Suresh Varma, I.R. Krishnam Raju, Enhancing the Performance of Routing in Mobile Ad Hoc Networks using Connected Dominating Sets International Journal of Computer Applications2012, (0975 — 8887)

[9] Bhagyashri. R. Hanji et al. Survey on QoS Routing protocols challenges and recent advances in MANETs, Journal of Computing Technologies 2012, ISSN 2278 – 3814

[10] Xiaoyan Hong, Kaixin Xu, and Mario Gerla. Scalable routing protocols for mobile ad hoc networks. 2002.

[11] Elizabeth M. Royer and Chai-Keong Toh. A review of current routing protocols for ad hoc mobile wireless networks. Technical report, University of California and Georgia Institute of Technology, USA, 1999.

[12] Tseng Y.C., Shen C.C, and Chen W.T. Mobile ip and ad hoc networks: An integration and implementation experience. Technical report, Dept. of Comput. Sci. and Inf. Eng., Nat. Chiao Tung Univ., Hsinchu,, Taiwan, 2003.

[13] C.Siva Ram Nurthy and B.S. Manoj. Ad hoc wireless networks Architectures and Protocol, Prentice Hall, 2004.

[14] Roch A. Guerin and Ariel Orda, ―QoS Routing in Networks with Inaccurate Information: Theory and Algorithms‖, IEEE/ACM Transactions on Networking, Vol. 7, No. 3, June 1999.

[15] QoS relevant lecture slides from HelsinkiUniversity of Technology: http://keskus.hut.fi/opetus/s382121/s05/slides, visited 2006-07-22

[16] Shan Gong, ―Quality of Service Aware Routing Protocols for Mobile Ad Hoc Network‖. 2006.

[17] Hannan XIAO, Winston K.G. SEAH,Anthony LO and Kee Chaing CHUA ―A FlexibleQuality of Service Model for Mobile Ad-Hoc Network‖.

[18] C. R. Lin and J.S. Liu,―QoS Routing in Ad Hoc Wireless Networks, IEEE JSAC, vol. 17, Aug. 1999, pp. 1426–38.

[19] S. Chen and K. Nahrstedt, ―Distributed Quality-of-Service Routing in Ad Hoc Networks, IEEE JSAC, vol. 17, Aug. 1999,pp. 1488–505.

[20] A. R. Bashandy, E. K. P. Chong, and A. Ghafoor, ―Generalized Quality-of-Service Routing with Resource Allocation, IEEE JSAC, vol. 23, Feb. 2005, pp. 450–63.