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Review paper on AODV Protocol and diff routing Techniques

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Abstract- *Packet loss causes obstacles in MANETs, which can be effectively minimized by combining congestion management tactics (which include routing approaches) with control inflow at the network layer. Congestion is the primary problem for routing in the mobile system, and it reduces overall network performance due to insufficient accessibility of wireless network resources, node mobility, and the wireless network's dynamic topology. Due to connection failure and mobile node failure, congestion causes packet loss as well as time and energy waste. Mobility, connection bandwidth capacity, and geographical distance are all indicators of congestion. Finally, we propose Improved AODV, a modified Ad Hoc On-demand Distance Vector (IAODV). Many trust features were considered when developing the route construction algorithm, including geographic distance to the destination node, node velocity, and bandwidth availability. We generate the integrated trust score for each mobile node while selecting the forwarding relay using the dynamic weight-management technique. To decrease the influence of connection circumstances, the IAODV protocol has a simple design. The simulation results show that the proposed model is more efficient than the existing approaches. In terms of average throughput, packet delivery ratio (PDR), average end-to-end delay, jitter, and average energy consumption, we compared the proposed protocol to the existing protocol.*

Keywords- *MANETs, Congestion, Improved AODV, packet drops, average & end delay, Ji-tter, & average energy consumption.*

1. LITERATURE REVIEW

The route creation algorithm took into account a number of trust factors, including geographic distance to the destination node, node velocity, and bandwidth availability. Using the dynamic weight-management technique, we generate an integrated trust score for each mobile node when picking the forwarding relay. The IAODV protocol features a simple design to reduce the impact of connection conditions. The simulation results suggest that the proposed model outperforms previous methods. We compared the proposed protocol to the existing protocol in terms of average throughput, packet delivery ratio (PDR), average end-to-end delay, jitter, and average energy consumption.

1.1Ad Hoc Routing

A wide range of routing protocols for MANETs has been proposed, presented, and developed. Topology-based routing protocols and position-based routing protocols are the two types of routing protocols. The author focuses mostly on topology-based routing. The study and comparison of topology-based routing protocols, which can be table-driven

or on-demand. The following are some examples of this type of routing protocol: Wireless Routing Protocol (WRP) [14], Ad Hoc On-Demand Distance Vector Routing protocol (AODV) [15], Dynamic Source Routing protocol (DSR) [16], Temporally Ordered Routing Algorithm (TORA) [17], Associativity -Based Routing protocol (ABR) [18]. AODV

[15] and DSR [16] are two of the most used ad hoc routing protocols. They've been thoroughly investigated and submitted for standardization. Both are considered on-demand routing technologies. To find routes from a source node to a destination node, DSR [16] uses source routing. AODV [15], on the other hand, saves routes for as long as the source requires them and resumes route discovery if the destination becomes unavailable. The following section delves deeper on AODV and DSR [15].

1.2 AODV Protocol

In a mobile ad hoc scenario, the ad hoc on-demand distance vector routing protocol is one of the most extensively used routing protocols. The low CPU and memory consumption, adaptable topology changes, and unicast routing are the major features of AODV. It solves common distance vector routing problems like "counting to infinity" by using destination sequence numbers to create a loop-free topology. It is a self-starting protocol that allows multi-hop routing between mobile nodes in an ad hoc network. The pathways to different destinations are finished quickly, resulting in a quick convergence time. Routes that are no longer necessary are decommissioned. Because link failures are selectively sent to the affected group of nodes rather than the entire topology, control overhead is reduced. The four basic types of communications described by AODV are Route Requests (RREQs), Route Replies (RREPs), Route Errors (RERRs), and Route Reply Acknowledgement (RREP-ACK). UDP port 654, as well as an IP header, are used in these communications.

Message Formats.

- Route Request (RREQ)

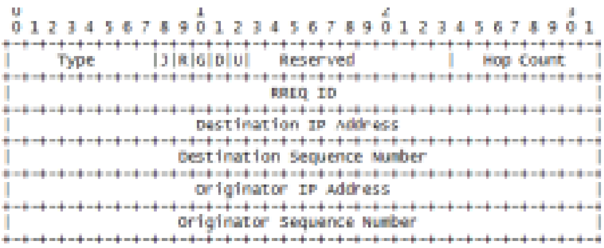

Figure 2.1. RREQ packet format

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• Route Reply (RREP)

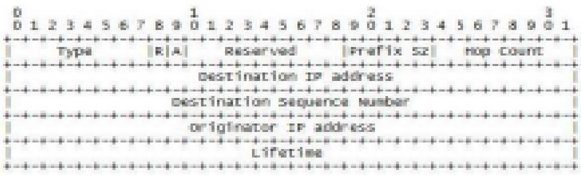

Figure 2.2. RREP packet format

• Route Error (RERR)

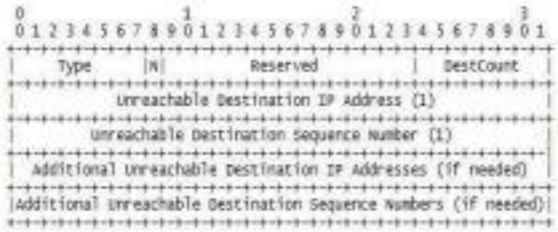

Figure 2.3. RERR packet format

• Route Reply Acknowledgment (RREP-ACK)

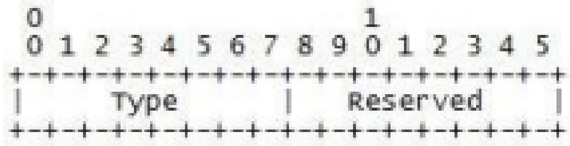

Figure 2.4. RREP-ACK Packet Format

wakeup Messages

In addition to the categories of messages indicated higher than, AODV defines a brand new message . referred to as wakeup. to keep up a neighborhood association, every node should keep track of its neighbors or forthcoming hops. this will be performed by the Link layer warnings, like those supported by IEEE 802.11, or by sending wakeup messages. A wakeup message could be a one-time route reply (RREP) message. These messages , sent each wakeup INTERVAL msec by default, and might be accustomed observe near nodes. additionally to establishing association, they will be accustomed share standing data, which might facilitate with higher routing choices. The node is formed when receiving a wakeup message.

The RREP message fields for the wakeup messages are:

• Destination IP Address: The node's IP address

•Destination Sequence Number: The node's latest sequence no..

• Hop Count: zero

Bits 11-19 of the RREP message square measure reserved. These bits square measure set to zero in an exceedingly traditional AODV operation and square measure neglected once a node gets a route reply. These nine bits are utilized by the author store the energy data of the node that generates these messages.

Operation of AODV:

Because AODV a reactive routing system, it's 2 basic phases: route setup and maintenance. throughout the route setup method, if a route to associate unknown destination is important, it's created and cached within the route info. On the opposite facet, the route maintenance part is answerable for maintaining the routes within the route table up so far. If a link fails, all wedged nodes receive a Mirror message, and also the route discovery method is continual. The functioning of the AODV protocol is additional represented here. whenever a node needs a route to a destination, the RREQ message is delivered into the network. This RREQ message contains the foremost recent legendary sequence no. for that route. till the TTL arrives.

Before checking its own route table to verify if it's a route to the destination, the node that receives the route request modifies the data within the supply node's route table. The request packets square measure flooded across the network in an exceedingly controlled manner till they reach a node that's either the target or features a path to that. each node that sends the RREQ maintains a relevancy a reverse route that leads back to the supply node.

In one amongst 2 cases, a node creates associate RREP: it's a path to the destination or it's the destination. The RREP is then uncast to the node that initiated the request within the 1st place. once the originating node receives associate RREP, an entry is created within the routing table, and information deliverd. If the originating node receives either associate RREP with the next sequence no or associate RREP with identical sequence variety however a lower hop count, the present route record is updated with a brand new route. The network employs sequence numbers to produce loop-free routing. As long because the route working, it remains active within the routing info. once a link fails, the upstream node informs the supply node that the route is not any longer obtainable. delivering associate RERR message to the supply node and every one wedged nodes on the trail accomplishes this. If a node receives associate RERR and needs help.

The following fields square measure enclosed in associate AODV route table:

- Destination IP Address
- Destination Sequence no.
- Valid Destination Sequence no. flag
- alternative state and routing flags (e.g., valid, invalid, repairable, being repaired)
- Network Interface
- Hop Count (number of hops required to achieve destination)
- Next Hop
- List of Precursors (These nodes are going to be notified within the event of a link breakage)
- Lifetime (Time when that a route that's not active are going to be removed)

Regardless of whether or not the destination could be a single node or a subnet, the time period of a route is updated anytime it's accustomed forward a packet. Route choices are created considering the hop count. for every destination, the shortest route are going to be chosen and also the previous route are going to be off from the routing info. Traffic to an explicit destination will forever follow constant path as long as all of the links within the route square measure purposeful. the bulk of latest on-demand routing protocols, as well as AODV, use one route with few alternatives. each time a route fails, this behavior mandates the initiation of a brand new route discovery procedure, leading to traffic delays and raised control.

1.3 DSR Protocol

The Dynamic supply Routing Protocol (DSR) uses dynamic supply routing to route packets in a commercial hoc network. The supply node determines the entire sequence of nodes that a packet should transit on its path from supply to destination. within the packet's header, the supply node includes an inventory of all node addresses, guaranteeing that the packet is routed to the destination via the nodes provided. supply routing, on the opposite hand, may be done statically or dynamically, with Dynamic supply Routing (DSR) taking care of the latter. this can be performed by using a method called route discovery. once a node has to send a packet to a different node, it initiates the route discovery method

Route Discovery

A node initially examines its route cache before sending a packet to another node. The source node broadcasts a route request with a sequence number and destination address if there are no existing routes in the route cache for the requested destination node. A route request's sequence number is used to identify it. The request table is a table on each node that keeps information about all previous route requests it has received. The source node keeps track of the route requests it sends in the request table. When a node receives a route request, it searches its request database for the information. If there is an entry in the request table that is identical to the current route, If the item is not in the request table and the node is the route request's destination, it simply copies the path from the route request packet and sends a route reply packet back to the source node. If the node is an intermediate, it examines its route cache. If the node has a cached route to the destination, it copies the path from its cache and the path from the route request packet to send a route reply to the source node. The route request packet is replayed if the intermediate node's route cache does not contain any accessible routes to the destination. After receiving the first route reply, the source node deletes the matching entry in the request table.

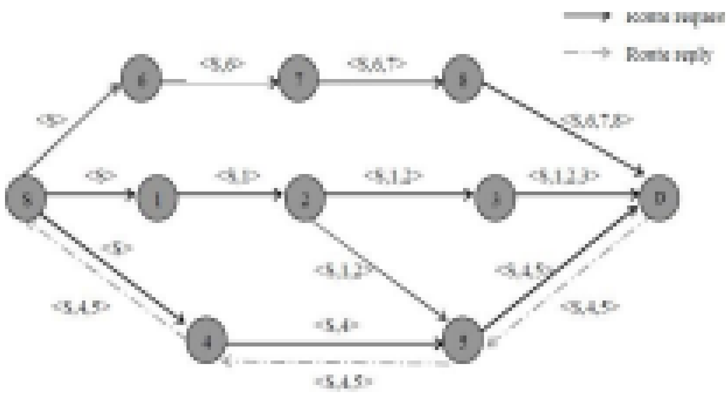

Figure 2.5. Route Discovery mechanism in DSR

Figure 2.5 shows the transmission of the route request message and the corresponding route reply message. 'S' is the source node, and 'D' is the destination node. The route request packet is broadcast by 'S' and received by nodes 1, 4, and 6. When node 2 rebroadcasts it, nodes 3, 5, and 6 receive it. However, node 5 has already received the route request from node 4. As a result, the duplicate request from node 2 is ignored. Finally, the target node receives the route request first through S, 4, 5. As a result, it sends the route answer across that path.

Route Maintenance

This procedure uses a new control message called route error, which will be used to maintain the route's current. The route is tracked via hop-by-hop acknowledgements at the data connection level or end-to-end acknowledgements at the transport or application layer. A node waits for the receiving node to acknowledge a data packet before sending it to the next hop. When a node discovers a broken link to the next hop, it sends a route error message including the two node addresses that lead from the broken link to the data packet's sender. When a route error packet is received, the source node deletes any routes that include the error link as part of the route.

Promiscuous Mode Operation

Nodes in an ad hoc network can operate in promiscuous mode, which allows the wireless interface of the node to listen to packets intended for select nearby nodes as well. If a node overhears a route reply packet, it saves the route if it isn't already in its route cache. If the node receives a route error notice, it deletes all routes in its route cache that contain the problematic link. When a node receives a data packet and has a route in its cache that is shorter than the packet's source route, it sends the packet's source a gratuitous route reply. A gratuitous route reply differs from a route reply message in that it is not sent in response to a route request.

2 Related Works

For MANETs, numerous routing approaches have been proposed to improve performance. This section reviews the procedures that have been proposed in the recent decade.

In [5], authors have planned bandwidth aware multipath reactive (BAMR) routing protocol for mobile ad hoc networks. The projected protocol was an extension of ad hoc on demand multipath distance vector (AOMDV) routing protocol for mobile circumstantial networks. The projected protocol, named as BAMR, tries to find methods with adequate bandwidth and fewer link failures.

Increasing traffic in mobile ad hoc networks (MANETs) demands high bandwidth. quality of human action nodes is another crucial concern for such sort of networks. Providing flourishing finish to finish communication in mobile circumstantial networks could be a difficult task.

In [6], we have a tendency to aim at providing a bandwidth aware multipath reactive routing protocol for mobile ad hoc networks. The projected protocol is an extension of ad hoc on demand multipath distance vector (AOMDV) routing protocol for mobile ad hoc networks. The projected protocol, named as BAMR, tries to find paths with adequate bandwidth and fewer link failures. The performance comparison of BAMR routing protocol is finished with AOMDV and BAOMDV, an another bandwidth aware on demand multipath distance vector routing protocol for MANETs. Simulation results exhibit that proposed protocol BAMR considerably improves the performance of other 2 routing protocols and might be used a lot of effectively for information transmissions in MANETs.

The author of [10] proposed a method for QoS routing approaches that involve a MAC layer as well as QoS metric gathering schemes. Using the QoS constrained ad hoc on demand distance vector (AODV) routing protocol, the researchers assessed the feasibility and efficacy of speech support in multichip IEEE 802.11 MANETs. When using QoS constrained AODV routing into multi-hop IEEE802.11 MANETs, audio communication is only supported in a very limited way, according to this paper. Another conclusion drawn from the authors' OPNET simulations was that IEEE 802.11 performed poorly in multi-hop MANETs due to the problem of concealed links.

In [11], the author presents another method for MANET QoS support based on the 802.11 MAC protocol. In MANET situations, the author created a novel technique for QoS design that could accommodate applications with bandwidth, latency, and jitter requirements. The suggested architecture is modular, allowing different protocols to be plugged in and providing a lot of flexibility. Despite its modularity, they implemented performance-enhancing optimizations based on interactions between the MAC, routing, and admission control layers. The author confirmed their suggested technique under which various network loads, node mobility degrees, and routing algorithms were analyzed and tested in order to quantify the benefits provided by our QoS approach. Figure 2.6 shows the architecture of this QoS approach.

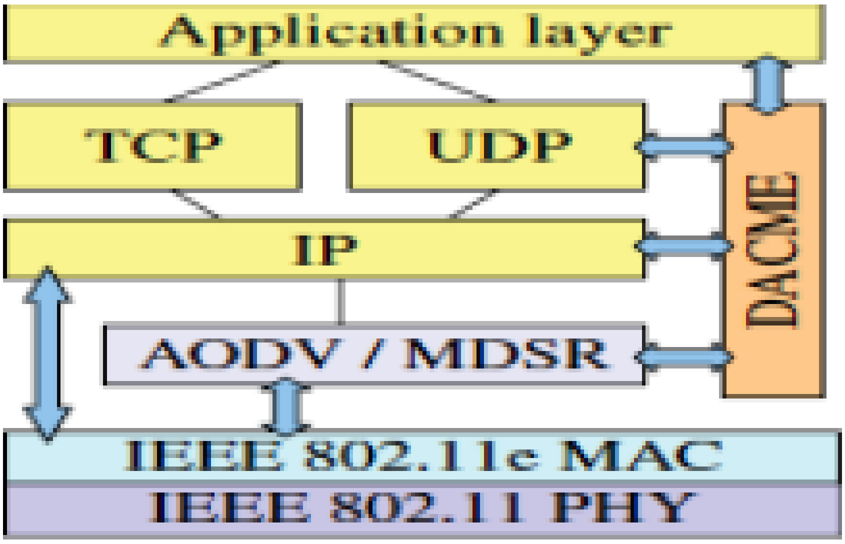

Figure 2.6. Architecture diagram of QoS designed

In MANET [12], the author demonstrated multipath routing with load balancing and QoS. By merging a multipath routing protocol with a load balancing mechanism based on QoS requirements, the author created a unique routing protocol. The planned routing protocol is known as QLB-AOMDV (QoS and Load balancing AODMV). The OLB-AOMDV approach improves load balancing in regard to end-to-end QoS requirements. This was the first routing protocol-based method in MANET that took into account QoS requirements. According to the author's real results, QLB-QoS ADAM's performance improves in terms of load balancing, latency, and capacity.

[13] describes another load balancing and QoS enhancement approach suggested by the author. The author improved the current situation.

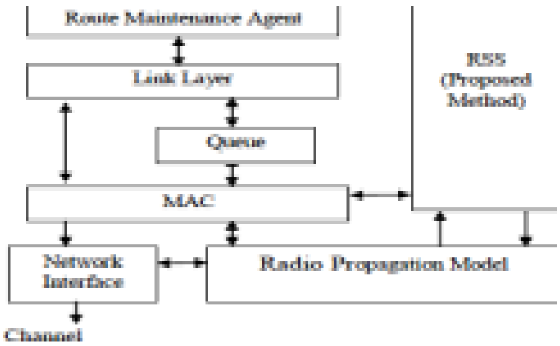

Fig 2.7. Cross Layer

Method Introduced in [15] The author of [16] developed a cross-layer based strategy for improving TCP performance in an ad hoc network while alsominimizing the packet loss rate. However, frequent disconnection of the mobile node may result in packet losses and delays in some circumstances. The throughput, jitter, and

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packet delivery ratio findings of the practical simulation were provided.

In [17], the author described a routing protocol-based QoS enhancement method. The author proposed an upgraded opportunistic MANET routing technique to address the opportunistic data transfer problem during communication. The author first described the CORMAN protocol, which outperformed the old one, before going into its disadvantages. Finally, the ECORMAN algorithm was created to address CORMAN's weaknesses.

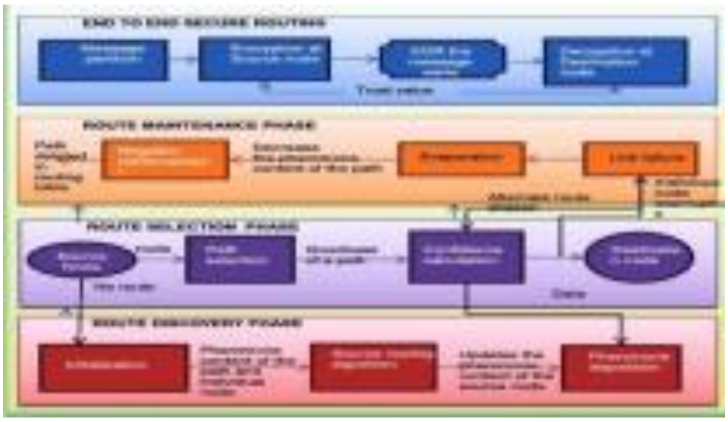

Figure 2.9. Approach for Secure Routing and Fault Tolerant.

In [18], they used the NS2 to evaluate three routing approaches, including Anthoinite, DSR, and AODV schemes. In terms of scalability, they demonstrated the results of all three routing options. In a number of network scenarios, Anthoinite outperformed both DSR and AODV routing algorithms, according to their findings. Anthoinite is an ACO-based routing technique.

The author of [19] sought to present a practical method for determining the best path between source and destination nodes in a MANET and detecting the attacker's mobile nodes. Because of misbehaving mobile nodes, routing approaches suffer from the lowest QoS performance, which they addressed with their solution.

In [20], they contributed in two ways to this paper. To begin, they modified the present AODV and DSDV routing methods to solve their restriction using the ACO algorithm's properties. Secondly, they compared and contrasted the three routing strategies in terms of QoS Performance and fairness. Their innovative routing system outperformed the current DSDV and AODV approaches in simulations.

In MANET, the author of [21] looked into and analyzed different ant colony optimization-based routing algorithms. They evaluated ACO-based routing strategies in terms of latency, packet delivery ratio, and other factors, and were prompted to switch from AODV to ACO to improve MANET routing performance. They devised an ACO-based strategy for lowering latency.

In[22] Author proposes a link matrix technique for MANETs that minimizes congestion links depending on the boundary before the distortion level of every hand-picked transmission node to urge higher system ability. The effectiveness of the chosen traffic matrix technique is analyzed by examination of its performance with the capability Optimized Co-operative communication (COCO). Experiments counsel that the traffic matrix technique considerably improves the accuracy to derive traffic patterns in MANETs. The simulation results tried that the planned technique performed well compared to the Capacity Optimized co-operative communication technique in terms of throughput (41%), delay (28%), energy (60%), overhead (48%), and packet delivery ratio (5%).

In[23] Congestion causes packet loss, time, and energy wastage by association failure and by mobile node failure. Congestion may be recognized as a base of readying, link capability node, and routing routes of the network. The congestion is detected on node-link by a supply node in conjunction with the node of the trail, that distributes traffic flow over the choice node ways by considering the routing path convenience of the network. This paper has planned congestion control load balancing adaptive routing protocol (CCLBARP) algorithms in the direction to cut back delay, system routing overhead, and congestion and enhance the life of the network in Manet. The planned congestion management technique is compared with original existing routing protocols like DYMO and DSR of Manet in terms of output, end-to-end delay, packet drops average ji-tter, packet delivery magnitude relation, and normalized routing overhead of the network, and this CCLBARP gets outperformed the DSR and DYMO.

In[24] mobile . networks (MANETs), the packet loss are often caused either by link failure or by node failure. Moreover, the techniques for choosing the bypass route and avoiding congestion within the bypass route ar seldom handled. to beat these, during this paper, the Author propose associate accommodative reliable, and congestion control routing protocol to resolve congestion and route errors mistreatment bypass route choice in MANETs. The multiple methods are made. Among these, the shortest methods . found for output oriented . transmission. The congestion is detected on the idea of the use and capability of links and routs. once a supply node detects congestion on a link on the trail, it distributes traffic over various methods by considering the trail availableness threshold and using a traffic rending function. If a node cannot resolve the congestion, it signals its neighbors mistreatment the congestion indication bit. By using simulation, we tend to show that the projected protocol is reliable and achieves a lot of throughput with reduced packet drops and overhead

Summary

The survey on various features of MANET routing was offered in this chapter. We looked at the AODV and DSR routing methods in depth before moving on to QoS-based MANET routing options.

Conclusion

The relative traffic link matrix technique was used to investigate hidden traffic patterns in MANETs in this paper. In terms of end-to-end delay, throughput, energy consumption, packet delivery ratio, and overhead, simulation results show that the relative traffic, link matrix technique provides successful results for network congestion management in MANETs. By comparing the findings with the Capacity Optimized Cooperative communication technique, the relative traffic, a link matrix approach's usefulness in network congestion control has been proven. Future research will improve the algorithm's capabilities in the context of the Internet of Things (IoTs) and in uncertain environments.

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