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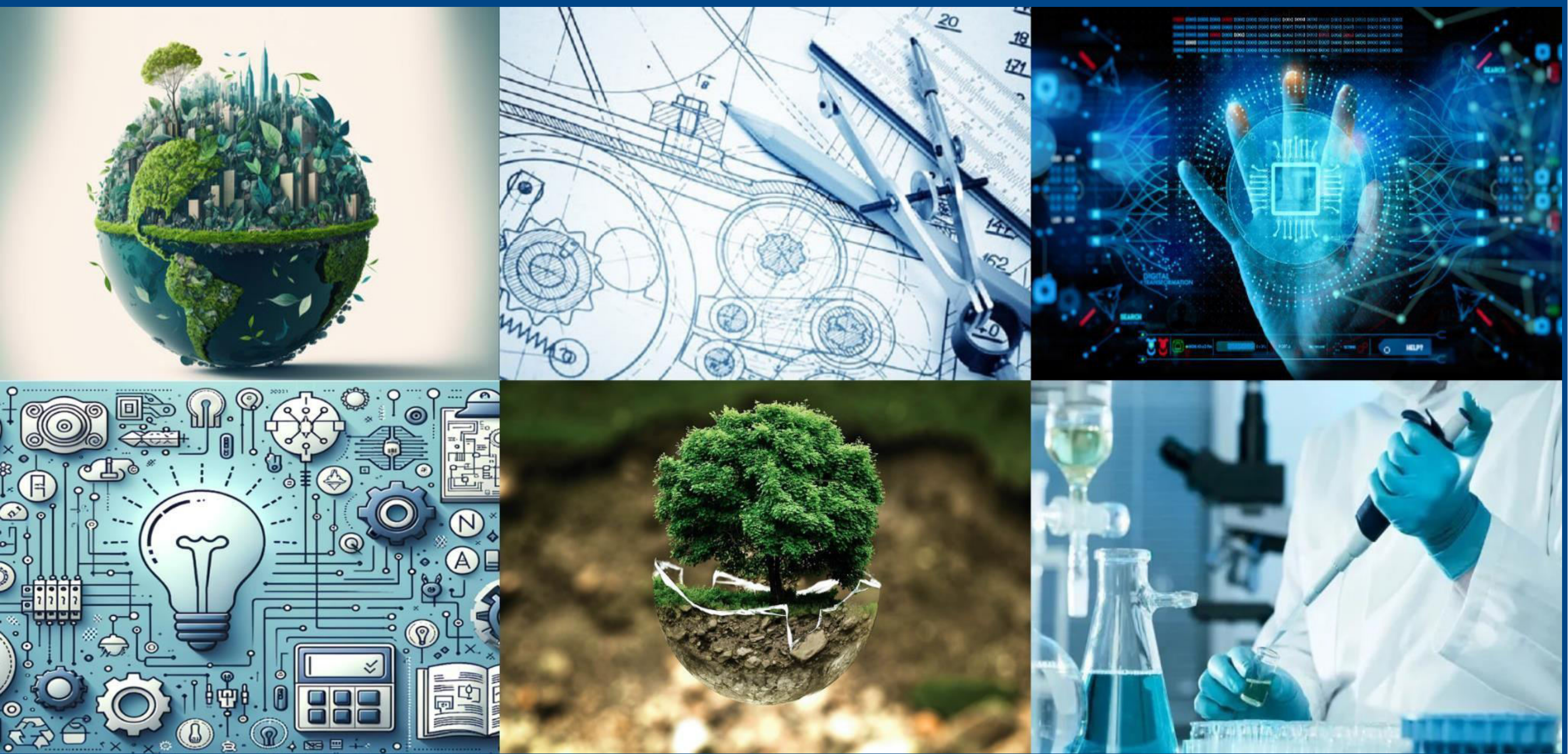

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AODV Based Bandwidth Estimation using MANET

A.Barveen[1], S. Shreya[2], M. Bhuvaneshwari[3], T. Ragunath[4]

Assistant Professor, M.I.E.T Engineering College, Trichy, Tamil Nadu, India[1]

II Year, M.E (CSE), M.I.E.T Engineering College, Trichy, Tamil Nadu, India[2]

II Year, M.E (CSE), M.I.E.T Engineering College, Trichy, Tamil Nadu, India[3]

II Year, M.E (CSE), M.I.E.T Engineering College, Trichy, Tamil Nadu, India[4]

ABSTRACT: Bandwidth estimation in high-mobility AODV for MANETs is crucial due to unpredictable factors like transmission range, node mobility, and environmental conditions affecting link lifetimes. Mobile nodes constantly balance reachability with unreliability, updating bandwidth forecasts post each encounter. MANETs, vital for data processing intelligence, demand unique network services due to their wireless nature. In MANETs, nodes autonomously form networks sans infrastructure, posing challenges like shared medium, node mobility, energy constraints, and dynamic node movements. Routes in MANETs have limited lifespans, influenced by considerable mobility, leading to intermittent data connections. Optimization strategies must adapt to dynamic node and link changes, considering factors like available bandwidth, latency, and node lifespan. Relays play a key role in bandwidth estimation in AODV, reducing broadcast senders and network flooding. In AODV, relays manage topology control messages, ensuring efficient message dissemination

I. INTRODUCTION

MANETs have given numerous innovative possibilities in using computer networks in several situations. In fact mobile ad-hoc networks are based on wireless communication; for that reason the requirement of many of services developed for wired networks does not match with resource availability in mobile networks.

In Manet, nodes forming a mobile network are not joined to any infrastructure and form networks during various time spans. When forming a mobile network there are many factors of complexity such as the shared wireless medium, the mobility of the nodes, the energy constraints, and the agitation of nodes that may join or leave the carrier range anytime during the network lifetime.

In context of high mobility, the routes in the network usually have a short life span. A route may or may not exist for the entire duration of a data communication session. Due to the dynamic changes of the factors that affect the performance in a mobile ad-hoc network, it would be convenient that any proposed optimizations should consider this dynamics that acts on nodes and links which interconnect them. In this context, knowledge of network must also have the same character in terms of taking into account factors such as available bandwidth, delays, and the lifetime of nodes in the process of selection of multi point relays.

In available bandwidth estimation mechanism, the use of relays aims to reduce the broadcast messages senders and then the number of flooded messages; here we highlight the importance of relay in Adhoc On-Demand Distance Vector (AODV)is a widely used routing protocol for mobile ad hoc networks (MANETs), since they become the only responsible of broadcasting topology control messages.

While this approach is pleasing to the eye, besides some control functions that are necessary to prevent an eternal duplication of broadcast messages, it is required to select relays in reliable manner; indeed defects in the reception of broadcast packets from Multi Path Relay nodes can greatly affect the rate of delivery of packets across the network. Thus all applications in ad-hoc network depend on reliable and efficient routing of packets. Hence, it is extremely important to design routing protocols that can work within several constraints particularly those of aerospace applications, namely, mobility and lack of energy resources, and provide support for all higher level applications.

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The WLAN based networks have been able to provide a certain level of quality of service (QoS) by the means of service differentiation, due to the IEEE 802.11 amendment. Such an evaluation would, however, be a good asset for bandwidth-constrained applications. In multihop ad-hoc networks, such evaluation becomes even more difficult. Consequently despite the various contributions around this research topic, the estimation of the available bandwidth still represents one of the main issues in this field.

II. LITERATURE REVIEW

S.NO	AUTHOR NAME,TITLE,DATE	CONCEPT	TECHIQUE (ALGORITHM)	DRAWBACK
1	**Authors:** Wang, Q., Zhang, J., & Li, X **Title:** Energy-aware Bandwidth Estimation in AODV-based MANETs using Reinforcement Learning **Published in:** 2021 ADOC NET	Energy-aware bandwidth estimation for AODV MANETs using reinforcement learning, optimizing utilization and conserving energy.	Utilizes reinforcement learning techniques to optimize bandwidth utilization.	High computational overhead during learning and decision-making
2	**Author:** Kumar, A., Pandey, S., & Mishra, S **Title:** Adaptive Bandwidth Estimation with Load Balancing in AODVbased MANETs **Published in:** Wireless Personal Communications, 2022	Adaptive bandwidth estimation scheme with load balancing for AODV MANETs, enhancing network performance and resource utilization through dynamic traffic distribution.	Implements adaptive bandwidth estimation with load balancing capabilities.	Overhead associated with dynamic traffic redistribution.
3	**Authors:** Kevin Wilson, Jennifer Garcia **Title:** Adaptive Bandwidth Estimation Algorithm for AODV Routing in MANETs **Published in:** Proceedings of the International Conference on Mobile Computing and Networking, 2022	AODV MANET bandwidth estimation algorithm improving accuracy and reducing overhead through dynamic parameter adjustments.	Dynamically adjusts bandwidth estimation parameters based on network dynamics and traffic patterns	Requires sophisticated mechanisms for parameter adaptation and decision-making.
4	**Author:** Michael Chen, Sarah Liu **Title:** Energy-efficient Bandwidth Estimation in AODV MANETs **Published in:** IEEE Transactions on Vehicular Technology, 2021	Energy-efficient bandwidth estimation for AODV MANETs, balancing accuracy with minimal energy consumption, validated through analysis and simulations.	Focuses on minimizing energy consumption during bandwidth estimation while maintaining accuracy	Energy-efficient algorithms may sacrifice some accuracy

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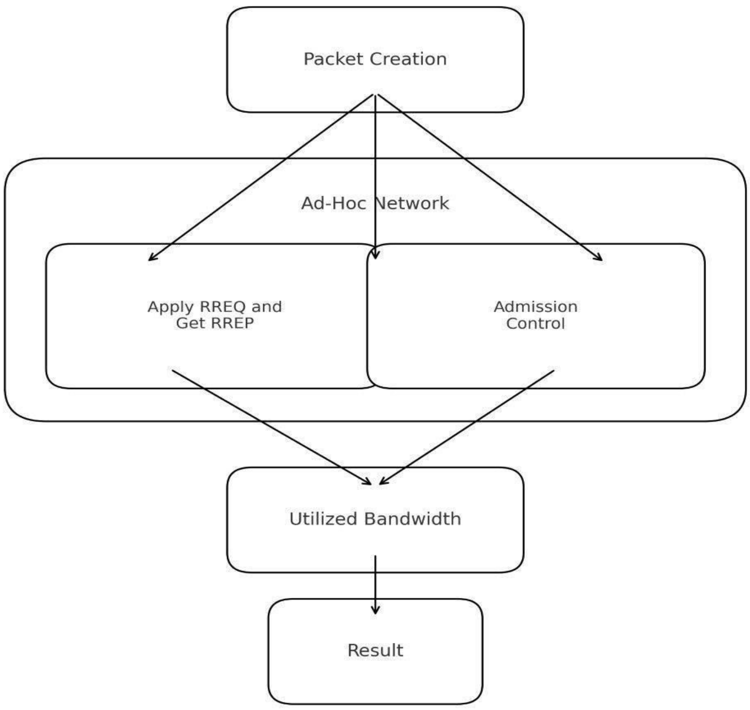
III. METHODOLOGY

The new method aims to improve the AODV routing protocol by adding bandwidth estimation for Mobile Ad hoc Networks (MANETs). This will help choose better routes and manage connections based on available bandwidth instead of just the number of hops. Each node regularly checks its local bandwidth using two methods: passive and active measurement.In passive measurement, the node observes how busy the channel is using the Carrier Sense mechanism of the IEEE 802.11 standard, which measures the busy and idle times on the channel. In active measurement, the node sends packets and measures the time it takes for them to arrive to estimate the link speed. To keep the bandwidth estimates stable and accurate, an Exponentially Weighted Moving Average (EWMA) filter is used.

During the route discovery, the AODV protocol's Route Request (RREQ) and Route Reply (RREP) messages are changed to include information about the needed bandwidth and the lowest available bandwidth on the route. When a source node starts the route discovery, it includes its required bandwidth in the RREQ packet. Each node that receives this request checks its available bandwidth and updates the minimum bandwidth information. This process continues until the destination node gets the RREQ and replies with a RREP message that shows the lowest bandwidth of the found route. The source node then picks the route that meets its bandwidth needs and has the most available capacity.Once the route is set up, regular bandwidth checks ensure that the link information stays current. If a node finds that the available bandwidth drops below a certain level, it sends a Route Error (RERR) message to the source node to start a new route discovery. This system helps make sure that the routes keep meeting the bandwidth needs of active connections. Overall, this method combines bandwidth estimation with AODV routing to enhance service quality, reduce congestion, and better use resources in MANETs.

FLOW DIAGRAM



3.1 Packet Creation

In this module we split the Data in to N number of Fixed size packet with Maximum length of 48 Characters. In this project we split four packets based upon the same design and it differs in their functions.

Four packets called as node1, node2, node3, node4 respectively. Each packet has the details like source address, destination address and the available nodes to communicate.

3.2 Apply the RREQ and get RREP

The aim of the RREQ is to find a route between the sender and the receiver that meets the constraints specified by the application level in terms of Bandwidth. Therefore, two flows with the same source and destination can follow different routes depending on the network state. When a source node has data to send, it broadcasts a route request (RREQ) to its neighbors. The RREQ packet contains the address of the sender, and the requirements at the application level, the destination address, and a sequence number.The Intermediate Node or Destination Node sends RREP if it is free, otherwise, it silently discards the message.

3.2.1 AD HOC ON-DEMAND DISTANCE VECTOR ALGORITHM

The Ad hoc On-Demand Distance Vector (AODV) is a routing method for mobile networks. It was created by researchers at Nokia and two universities. AODV helps devices communicate by finding a path only when needed. Unlike many other methods that always look for paths, AODV waits until a request comes in.

When a device wants to connect, it sends out a request. Other devices share this request and keep track of where it came from, creating temporary paths. If a device knows a way to the requested connection, it sends that information back. The requesting device then uses the quickest route. Old or unused routes are removed over time.If a connection fails, an error message is sent back, and the process starts again. AODV tries to reduce unnecessary messages to save network space. It uses sequence numbers to avoid repeating requests and has a limit on how many times requests can be sent.

AODV is simple and doesn't need much memory, but it can take longer to set up a connection compared to other methods. It uses a unique number to keep track of the most recent route and checks if it can use an updated path. If a request is sent out multiple times, duplicates are ignored.

The protocol keeps the network quiet until a connection is needed, which helps manage network traffic effectively. A timer is used to remove paths if a response isn't received in time. When a response does come in, the device notes where it came from to continue forwarding messages correctly. Overall, AODV is efficient for finding paths only when needed.

3.2.2 Admission Control Mechanism

The Admission Control Mechanism is done in the receiver side. The Admission Control Mechanism has the all status of the node so if the nodes want to send RREP or discard the message, the particular node check the status by using the Admission Control Mechanism.

3.3 Bandwidth Utilized

After the source nodes send the total message to the Destination Node finally we calculate the end to end delivery of the Bandwidth and Time delay.

3.4 RESULT

In module given input and expected output

The source node selects the destination node first and then by using the browse button we select some text file and this text file is send to the destination side

IV. RESULTS AND DISCUSSION

In this project, we want to fix the problems in the current system. Our project handles bandwidth limits under 500kbps by using something called delay time (DT). DT helps us measure and control the bandwidth value, keeping it under

500kbps when it's sent between nodes. A high DT means a high bandwidth value, while a low DT means a lower bandwidth value.

We focus on fixing communication problems in single-hop networks. We use a method called buffer resizing to solve this issue. Buffer resizing and delay time calculation help us adjust the bandwidth, manage the available bandwidth, and share it among all nodes. This allows more nodes to communicate at the same time. Our system, made using Java Swing, improves performance and reduces errors. It also saves all communication data in an MS Access database.

We check the available bandwidth in the channel and find out the source and destination addresses, file size, and delay time between the source and destination nodes. A longer file size means a longer delay time, which can make it take longer to send the file to its destination. This is a main goal of our project. Calculating DT helps us figure out how long it will take to send messages between the source and destination nodes.

Another benefit of our project is that you can see the original message after we estimate the bandwidth and delay time. Buffer resizing and delay time calculation are key for adjusting and sharing the bandwidth, making it easier for more nodes to communicate at once.

V. CONCLUSION

The proposed AODV-based bandwidth estimation approach effectively enhances routing efficiency in Mobile Ad Hoc Networks (MANETs) by dynamically estimating and utilizing available bandwidth during route discovery and maintenance. By integrating bandwidth estimation into the AODV protocol, the network achieves improved QoS (Quality of Service), reduced packet loss, and better utilization of network resources.

Simulation results show that this method optimizes route selection, minimizes congestion, and improves throughput compared to conventional AODV.

Overall, the project demonstrates that adaptive bandwidth estimation can significantly improve the performance and reliability of MANETs, making it a promising technique for real-time and high-data-rate applications in mobile wireless environments

REFERENCES

[1] C. Perkins, E. Belding-Royer, and S. Das, “Ad hoc On-Demand Distance Vector (AODV) Routing,” RFC 3561, IETF Network Working Group, 2003.
[2]. T. Senthil Kumaran and V. Sankaranarayanan, “Early congestion detection and control routing in MANET,” Egyptian Informatics Journal, vol. 12, no. 3, pp. 165–175, Nov. 2011
[3] S. R. Das, C. E. Perkins, and E. M. Royer, “Performance comparison of two ondemand routing protocols for ad hoc networks,” in Proceedings of IEEE INFOCOM, 2000, pp. 3–12.
[4] B. Manjula and C. R. Reddy, “Bandwidth estimation in mobile ad hoc networks,” International Journal of Computer Science and Information Security (IJCSIS), vol. 6, no. 2, 2009.
[5]. J. Liu, Q. Zhang, and W. Zhu, “End-to-end available bandwidth estimation based on AODV in ad hoc networks,” in Proceedings of IEEE ICCCAS, 2005, pp. 1085–1089.
[6]. M. K. Marina and S. R. Das, “Ad hoc on-demand multipath distance vector routing,” Wireless Communications and Mobile Computing, vol. 6, no. 7, pp. 969–988, 2006. [7]. K. Lakshmi and S. Radha, “Enhanced AODV protocol with bandwidth estimation for QoS improvement in MANETs,” International Journal of Computer Applications, vol. 80, no. 1, pp. 1–5, Oct. 2013.
[8]. P. Samar and S. B. Wicker, “On the behavior of communication links of a node in a multi-hop mobile environment,” in Proceedings of the 5th ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc), 2004, pp. 145– 156.

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