International Journal of Advanced Science and Technology
Vol. 29, No. 8, (2020), pp. 5830 - 5837

`

An Optimized Energy Efficient Aware Routing via Hybrid Congestion Control Scheme in Mobile Adhoc Networks

[1]M. M. Karthikeyan, [2]Dr. G. Dalin

[1]Ph.D Research Scholar, [2]Associate Professor,
[1,2]PG & Research Department of Computer Science,
[1,2]Hindusthan College of Arts & Science,
Coimbatore, Tamilnadu, India.

Abstract

A mobile ad hoc network (MANET) is a group of mobile, wireless nodes which helpfully and unexpectedly structure an IP-based network. Nodes that are a piece of the MANET, yet past one another's wireless range impart utilizing a multi-hop course through different nodes in the network. In this paper first, proposed Filter Based Addressing Protocol (FAP) keep away from the impact of the location in parcel combine occasion. It handles the join and leaves of the nodes appropriately. The proposed system lessens the control load. FAP gives the littler delays in the parcel merging occasions and node joining occasion. Second, Optimized Queue Scheduling proposed in the part is fit for handling large traffic and ensuring QoS to end users. It is seen that totally lowering the delays isn't for all intents and purposes conceivable; nonetheless, delays can be controlled to go past certain threshold range. Third, Random Early Congestion Control is employed to minimize congestion in MANETs through optimal data handling. The proposed model in our work is an innovative method to manage congestion alongside reduction in time taken for transmission. Fourth, Congestion-Aware Adaptive Routing can effectively improve the performance of Networks due to its ability to accurately predict network congestion and make optimal routing decisions.

Keywords: *Mobile ad hoc network, Filter Based Addressing Protocol, Congestion Control, Congestion-Aware Adaptive Routing.*

I. INTRODUCTION

MANET is mobile ad-hoc network where various wireless nodes intercommunicate to each other. As this network is temporary network. It is the network where source node communicates to the destination node. This network has limited resources. These resources are in the terms of bandwidth. So there is high chance of congestion. To avoid the network congestion various techniques are used in mobile ad hoc network. Congestion is a situation in communication networks in which too many packets are present in a part of the subnet. Congestion may occur when the load on the network (number of packets send to the network) is greater than the capacity of the network (number of packets a network can handle). Accurate and efficient congestion detection plays an important role in congestion control of sensor networks. There is a need for new congestion detection techniques that incur low cost in terms of energy and computation complexity.

ISSN: 2005-4238 IJAST

`

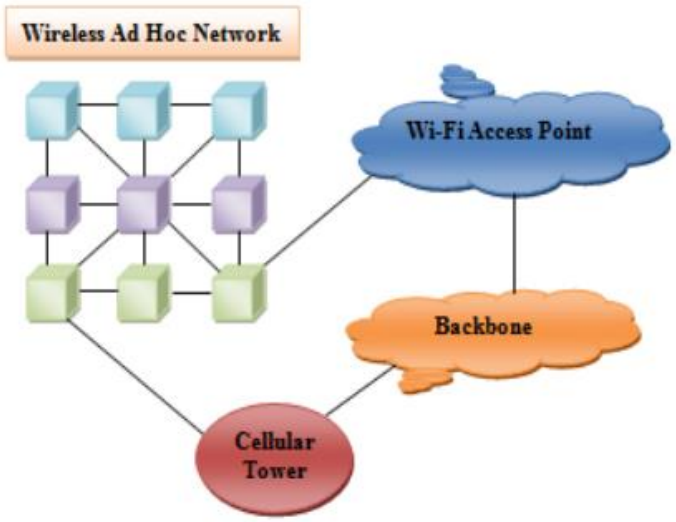

Figure 1.1: Mobile Ad hoc network (MANET)

Several techniques are possible. For typical applications in sensor networks, the sinks expect a certain sampling rate or reporting rate coming from the sources. This rate is highly application-specific, and can be seen as an indication of event fidelity; that is, the reporting rate from the source with respect to certain phenomenon should be high enough to satisfy the applications' desired accuracy.It is difficult to quantify a level of congestion or infer congestion solely based on buffer occupancy. This bimodal effect is not responsive enough and too coarse to provide smooth and efficient congestion control.Channel loading gives accurate information about how busy the surrounding network is but it is inherently a local mitigation mechanism. It has limited effect, for example, in detecting large-scale congestion caused by data impulses from sparsely located sources that generate high-rate traffic. Listening to the channel consumes a significant portion of energy in a node.

II. LITERATURE SURVEY

Mueen Uddin, Aqeel Taha, RaedAlsaqour, Tanzila Saba (2016) Proposed an energy-efficient multipath routing protocol for mobile ad-hoc organize using the fitness function includes this very certain issue of energy consumption in MANET by applying the Fitness Function system to streamline the energy consumption in Ad Hoc On-Demand MultipathDistance Vector (AOMDV) routing protocol. The proposed protocol is called Ad Hoc On-Demand Multipath Distance Vector with the Fitness Function (FF-AOMDV). The fitness function is utilized to locate the ideal way from the source to the destination to lessen the energy consumption in multipath routing [1]. **Zijie Zhang, Guoqiang Mao and Brian D. O. Anderson (2015)** proposed energy-efficient broadcast in mobile networks subject to channel haphazardness novel energy and bandwidth-effective broadcast conspire named the energy-efficient broadcast plot, which can adapt to brisk changing system topology and channel inconsistency. The structure of the broadcast scheme depends on a top to bottom investigation of the advantages and inadequacies of the generally utilized scourge broadcast schemes [2]. **Jae Seang Lee, Yoon-SikYoo, Hyung Seok Choi, Taejoon Kim and Jun Kyun Choi (**2019) proposed a brought together TDMA space and power planning schemes which expand energy efficiency (EE) considering Quality-of-Service (QoS) utility, and this scheme upgrades the unwavering quality and survivability of UVS strategic MANET. The proposed algorithm has three stages Dinkelbach technique, refreshing the Lagrangian multiplier and CCCP strategy. So as to upgrade the EE, the length of a TDMA outline is progressively adjusted. The disadvantage of this protocol is that as the complete postpone expands as indicated by the edge round, it can't ensure the continuous transmission [3]. **Arvind Kushwaha and Nitika Vats Doohan (2016)** proposed a novel solution to move server load starting with one server then onto the next server. Energy

ISSN: 2005-4238 IJAST

`

efficiencyis a basic factor for the operation of ad-hoc networks. The proposed calculation will occupy the load from a low energy hub to a high energy hubThe issue of structuring routing protocol and overpowering nature of ad-hoc innovation may decrease the life of the hub just as the life of the network [4]. **Gururaj H L, and Ramesh, B. (2015)** proposed a Congestion Control for Optimizing Data Transfer rate in Mobile Ad-hoc Networks using HSTCP the retransmission time and to evade congestion in totally unique conditions where hub versatility is totally arbitrary is the fundamental concern. HSTCP outperforms when contrasted with TCP Reno for various network parameters. HSTCP outperforms when contrasted with TCP Reno for various network parameters [5].

III. PROBLEM STATEMENT

- Relay nodes are affected due to the varying speed of node in MANET.
- To path overloading and residual energy are major problems identified in routing.
- Stable and effective using multi-objective optimized routing algorithm is a major problem and bit rate traffic increases the packet loss.

IV. OBJECTIVES

- The main objectives of congestion control are to avoid network overload, ensure that bottlenecks are fully utilized, share resources between flows in a fair manner, and react to changes in network load as well as in the network topology.
- To design and analyze stability and QoS based anycast routing scheme in Mobile Ad-Hoc Networks to improve the performance and enhance the service availability through the method of evenly distributed traffic load.

V. PROPOSED METHODOLOGY

In this proposed methodology, we used Hybrid Congestion Control Mechanism (HCCM) – Optimized Queue Scheduling, Hybrid Congestion Control Algorithm and Dynamic Congestion Routing. Here we used algorithms and methodologies are following:

- **First phase –** Network initialization**,**is done with setting up the MANET parameters.
- **Second Phase –**Discusses the Virtual rate-based scheduling we used**, Optimized Queue Scheduling Algorithm,**
- **ThirdPhase -**Discuss the InHop by hop congestion control we used, Hybrid Congestion Control Algorithm for Energy Efficiency,
- **FinalPhase -** implementsthe Optimized Congestion Detection and Control Routing we used, Dynamic Congestion Routing for Energy Harvesting.

ISSN: 2005-4238 IJAST

`

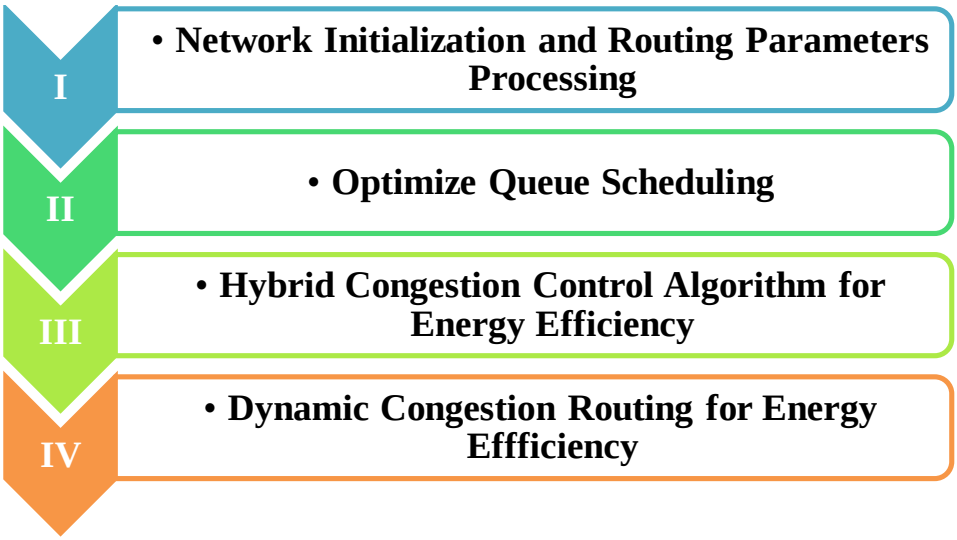

Figure 1: Design Process of Proposed Work

Network Initialization and Routing Parameters Processing

A node in an IP-based network is designed with an IP address, a net mask and a default. In this way, the nodes ought to be fit for being dynamically arranged by the network upon their entrance into it. It might be contended that MANET nodes likewise have a place with some home network, and could keep on utilizing their home network IP address in the MANET. At the point when the absolute first node (requester) wishes to join the network, as a component of its initialization procedure, it broadcasts its Neighbor Query message and starts the neighbor answer clock. The requester hopes to hear a reaction from at any rate one MANET node ready to go about as the initiator for doling out an IP address to the requester. On the off chance that the requester is the absolute first node in the MANET it won't get any reaction to the Neighbor Query message. At the point when the neighbor answer clock terminates, the requester rehashes the procedure a limit number of times hanging tight for in any event one reaction from an initiator. On the off chance that all the endeavors come up short (clock termination), the requester infers that it is the main node in the network and arranges itself with an IP address. Hence, the MANET is instated.

Virtual Rate-Based Scheduling Using Optimized Queue Scheduling Algorithm

In this phase, an Optimized Queue Scheduling is designed and implemented. It schedules the data packets dependent on its virtual rate. The virtual rate is connected to the header of the data packets. Its worth depends on the queue length of the node, data rate of the source (which is standardized as for channel capacity), and expiry time of the packet. This scheduler favors data packets when contrasted with control packets. a few scheduling schemes were concentrated in writing. So as to think about the effect of setting priorities to data packets, these schedulers give high priority to control packets. Their disparities are in doling out priorities among data queues.

Hop By Hop Congestion Control Using Random Early Congestion Control Algorithm for Energy Efficiency

In this phase proposed model packet loss due to congestion and excessive load at intermediate nodes is tried to be reduced. Close to sink node to find every one of those closer nodes where buffer occupancy is high. Close to sink node and nodes closer to it contains the routing table including

ISSN: 2005-4238 IJAST

`

information about its own I.P. address, I.P. address of closer neighbor nodes, distance between the nodes, and queue length of every node.

Dynamic Congestion Routing for Energy Harvesting

In this phase, we present the complete design and an in-depth evaluation of the DCR algorithm. When a source host needs to transmit a data packet to a destination, the DCR algorithm first develops a congestion-free set (CFS) to interface both one-jump and two-bounce neighbors. At that point the source starts the route discovery method utilizing the CFS to distinguish a congestion-free way to the destination. In the event that the DCR algorithm can't build a CFS because of the network being as of now clogged, it can't start the route discovery process. Be that as it may, when another route has been built up, the transmission of data packets will proceed. In this manner, the principle target of DCR is to discover a congestion-free route between the source and the destination.

VI. EXPERIMENTAL RESULTS

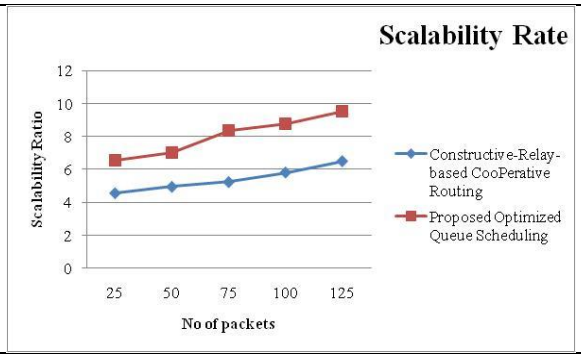

Figure 2: Comparison chart of Scalability Rate

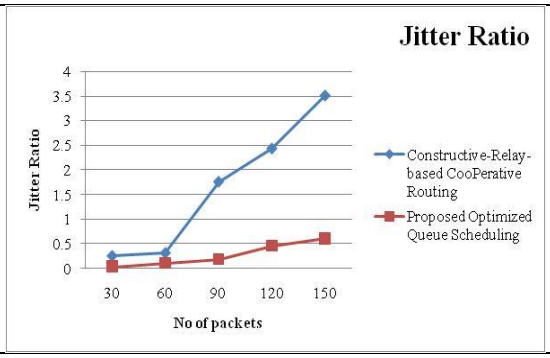

Figure 3: Comparison chart of Jitter Ratio

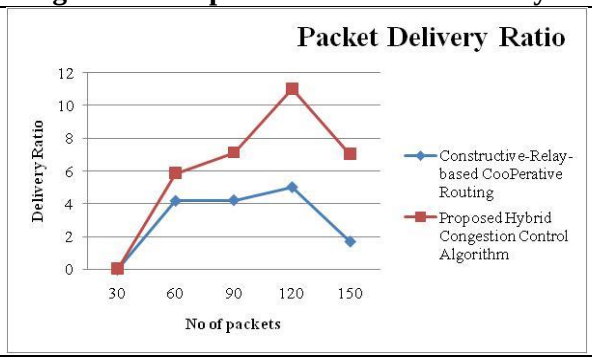

Figure 4: Comparison chart of Packet Delivery Ratio

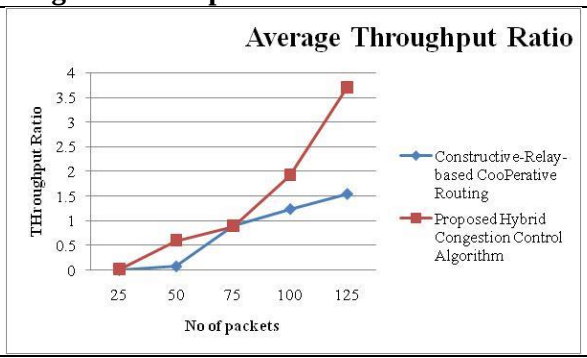

Figure 5: Comparison chart of Average Throughput Ratio

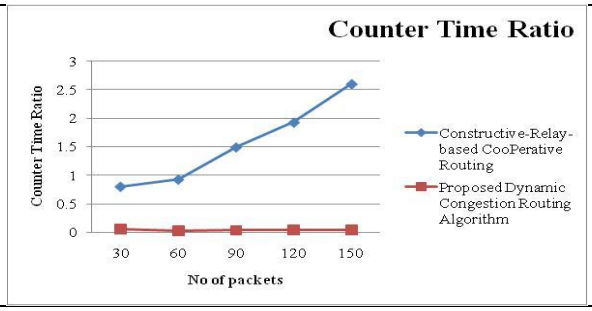

Figure 6: Comparison chart of Counter Time Ratio

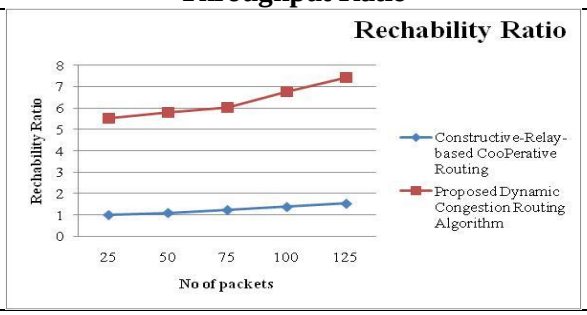

Figure 7: Comparison chart of Reachability Ratio

ISSN: 2005-4238 IJAST

`

VII. CONCLUSION

Proposed a novel framework for congestion detection name as Hybrid Congestion Control Mechanism (HCCM) as dynamic optimized scheduling and congestion control. Hybrid Congestion Control Mechanism and dynamic optimized scheduling and congestion control (HCCM_DOSC). Hybrid Congestion Control Mechanism includes techniques are Optimized Queue Scheduling, Hybrid Congestion Controland Dynamic Congestion Routing. We investigates and measures the optimum performance of a congestion protocol during link and buffer congestion states; then establishes relationships between optimum transmission window and cache size at congestion states in MANET; and provides a basis for future congestion control management that guarantees congestion avoidance while meeting the optimum detection and routing performance. In terms of future research, we plan to set a baseline test to compare our proposal with other existing frameworks, once they become available, and to extend the tested to explore current real limits of such communication architecture by increasing the number of IoT devices and by using cutting edge smartphones and tablets equipped with enhanced radio interfaces.

REFERENCES:

[1] Mueen Uddin, Aqeel Taha, RaedAlsaqour, Tanzila Saba "Energy Efficient Multipath Routing Protocol for Mobile ad-hoc Network Using the Fitness Function" 2169-3536 (c) 2016 IEEE.

[2] Zijie Zhang, Guoqiang Mao and Brian D. O. Anderson "Energy Efficient Broadcast in Mobile Networks Subject to Channel Randomness" 1536-1276 (c) 2015 IEEE.

[3] Jae Seang Lee, Yoon-SikYoo, Hyung Seok Choi, Taejoon Kim and Jun Kyun Choi "Energy-Efficient TDMA Scheduling for UVS Tactical MANET" 1089-7798 (c) 2019 IEEE.

[4] Jabbar, W. A., Saad, W. K., and Ismail, M. "MEQSA-OLSRv2: A Multicriteria-based Hybrid Multipath Protocol for Energy-Efficient and QoS-Aware Data Routing in MANET-WSN Convergence Scenarios of IoT" 2169-3536 (c) 2018 IEEE.

[5] Arvind Kushwaha and Nitika Vats Doohan "M-EALBM: A Modified Approach Energy Aware Load Balancing Multipath Routing Protocol in MANET" 978-1-5090-0669-4/16/$31.00 © 2016 IEEE.

[6] Gururaj H L, and Ramesh, B. "Congestion Control for Optimizing Data Transfer rate in Mobile Ad-hoc Networks using HSTCP" 978-1-4673-9563-2/15/$31.00 ©2015 IEEE.

[7] Nousheen Akhtar, Muazzam A. Khan Khattak, Ata Ullah and Muhammad Younus Javed "Efficient Routing Strategy for Congestion Avoidance in MANETs" 0-7695-6347-3/17/$31.00 ©2017 IEEE.

[8] Akhtar, N., Khan, M. A., Ullah, A., &Javed, M. Y. "Congestion Avoidance for Smart Devices by Caching Information in MANETS and IoT" 2169-3536 2019 IEEE.

[9] Mallapur, S. V., Patil, S. R., &Agarkhed, J. V. "Load Balancing Technique for Congestion Control Multipath Routing in Mobile Ad Hoc Networks" 978-1-4799-8641-5/15/$31.00 c 2015 IEEE.

[10] Shanti Rathore and M. R. Khan "Enhance Congestion Control Multipath routing with ANT Optimization in Mobile Ad hoc Network" 978-1-5090-5515-9/16/$31.00 ©2016 IEEE.

ISSN: 2005-4238 IJAST

`

[11] Istikmal, Adit Kurniawan and Hendrawan "Performance Analysis of Routing and Congestion Control Cooperation in Wireless Mobile Ad Hoc Networks" 978-1-4799-8975-1/15/$31.00 ©2015 IEEE.

[12] A. Pratapa Reddy and Dr. N. Satyanarayana "Energy Efficient Stable Multi path Routing in MANET" 978-1-5090-4620-1/16/$31.00 ©2016 IEEE.

[13] SenthilnathanPalaniappan and KalaiarasanChellan " Energy-efficient stable routing using QoS monitoring agents in MANET" DOI 10.1186/s13638-014-0234-9, © 2015; licensee Springer.

[14] Hannan Bin Liaqat, Amjad Ali, Junaid Qadir, Ali Kashif Bashir, Muhammad Bilal and Fiaz Majeed "Socially-aware congestion control in ad-hoc networks: Current status and the way forward" https://doi.org/10.1016/j.future.2019.02.017. 0167-739X/© 2019 Elsevier.

[15] Balasubramanian Paramasivan ; Maria Johan Viju Prakash ; Madasamy Kaliappan, "Development of a secure routing protocol using game theory model in mobile ad hoc networks", Journal of Communications and Networks, Vol.17, No.1, pp.75-83, 2015.

[16] Bhavna Arora and Dr.Nipur "An Adaptive Transmission Power Aware Multipath Routing Protocol For Mobile Ad hoc Networks"© 2015 Published by Elsevier.

[17] Bouchemel A., Abed D., Moussaoui A. Enhancement of Compressed Image Transmission in WMSNs Using Modified μ-Nonlinear Transformation. IEEE Commun. Lett. 2018;22:934–937. doi: 10.1109/LCOMM.2018.2812821.]

[18] Cheng L., Niu J., Di Francesco M., Das S.K., Luo C., Gu Y. Seamless streaming data delivery in cluster-based wireless sensor networks with mobile elements. IEEE Syst. J. 2015;10:805–816. doi: 10.1109/JSYST.2015.2459071.

[19] D. Kanellopoulus, "Congestion control for MANETs: An overview", ICT Express, vol. 22, 2018, pp. 841-858.

[20] Abedalmotaleb Zadin, Thomas Fevens "Neighborhood-based interference minimization for stable position-based routing in mobile ad hoc networks" 0167-739X/© 2016 Elsevier.

LIST OF PUBLICATIONS:

[1] M.M.Karthikeyan, Dr.G.Dalin, **"Mobile AD-HOC NETWORK: A Survey and Analysis Of Issues And Challenges In Security",** International Journal Of Engineering Research In Computer Science And Engineering, Vol 4, Issue 12, December 2017.

[2] M.M.Karthikeyan, Dr.G.Dalin, **"Manet:- Energy Harvesting Architecture And Their Components",** eng journal, ISSN: 2455-1341, 2018.

[3] M.M.Karthikeyan, Dr.G.Dalin, **"Optimized queue scheduling Using Energy Harvesting and Controlling in MANET",** International Journal Research in Science Engineering and Technology, Volume 6, Issue 5, 2019.

[4] M.M.Karthikeyan, Dr.G.Dalin, **"Energy Efficient Process Using Congestion Control Algorithms in MANET",** International Journal of Computer Science Engineering and Technology, Volume 5, Issue 10, 2019.

[5] M.M.Karthikeyan, Dr.G.Dalin, **"Survey on Energy Harvesting Routing Protocols and Methods in MANET",** Journal of Emerging Technologies and Innovative Research (JETIR) 5 (12), 126-132. (UGC Approved)

ISSN: 2005-4238 IJAST

`

[6] M.M.Karthikeyan, Dr.G.Dalin, **"Hybrid Congestion Control Mechanism and Dynamic Optimized Scheduling And Congestion Control",** The International Journal Of Analytical And Experimental Modal Analysis Volume Xi, Issue Xii, December/2019, ISSN No: 0886-9367. (UGC Care List)

ISSN: 2005-4238 IJAST