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Survey of Various Load Balancing Techniques in MANETs

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Abstract: Mobile ad hoc networks are a category of wireless networks but in these networks, the nodes are mobile in nature. The constantly moving nodes bring a lot of topological changes in the network. Issues like link breakage, energy consumption, and load balancing are considered while designing routing protocols or techniques for these networks. This paper describes various load balancing studies done by the authors in the past.

Keywords: Manets, Link Breakage, Load Balancing.

I. INTRODUCTION

A Mobile Ad-hoc network is composed of a number of wireless mobile nodes which are capable of communicating with each other without the use of a network infrastructure or any centralized administration. It is a self-directed network with a collection of mobile users that communicate over relatively bandwidth constrained wireless links. Since the nodes are mobile, the network topology may change dynamically and it is unable to retract over time. The network is distributed, where all activities of a network like adapting topology and delivery of messages must be executed by the nodes themselves, i.e., routing functionality will be incorporated into mobile nodes. The nodes which are in radio range of each other can communicate directly, and others communicate through intermediate nodes to route their packets. Each node communicates through its wireless interface. As the network is fully distributed, so it can work without a fixed infrastructure as access points and base stations.

As there is no background network for central control of the network operation, the control of the network is distributed among the nodes. The nodes in a mobile ad hoc network should cooperate with each other and communicate with each other, and each node performs the function of routing and security as and when needed. Each node in the network depends on batteries or some other exhaustible means for their energy, which is limits the capabilities i.e. services and applications provided by a node. This is one of the major issues in the MANETs, as one node act as receiver and router at the same time, so additional energy is required in forwarding messages. In this paper, various studies considering the multipath routing protocol have been discussed in section 2.

Ad-hoc On-demand Multipath Routing Distance Vector (AOMDV) Routing Protocol

Ad-hoc On-demand Multipath Distance Vector Routing (AOMDV) protocol [7,8] is a denotation to the AODV protocol for computing multiple loop-free and link disjoint paths. There can be multiple next hops for the same destination with the same sequence number. This helps in keeping track of a route. An advertised hop count is maintained for each destination by the node. Advertised hop count is the maximum hop count for a particular destination. Each duplicate route advertisement received by a node defines an alternate path to the destination. Loop-freedom is assured for a node by advertised hop counts. Alternative paths are only considered if they have less hop count than advertised hop count. Because the maximum hop count is used, the advertised hop count, therefore, does not change for the same sequence number. When a route advertisement is received for a destination with a greater sequence number, the next-hop list and the advertised hop count are reinitialized. AOMDV can be used to find node-disjoint or link-disjoint routes. To find node-disjoint routes, each node does not immediately reject duplicate RREQs. Each RREQs arriving via a different neighbor of the source defines a node-disjoint path. This is because nodes cannot be broadcast duplicate RREQs, so any two RREQs arriving at an intermediate node via a different neighbor of the source could not have traversed the same node. In an attempt to get multiple link-disjoint routes, the destination replies to duplicate RREQs, the destination only replies to RREQs which arrives via unique neighbors. After the first hop, the RREPs follow the reverse paths, which are node disjoint and thus link-disjoint. The trajectories of each RREP may intersect at an intermediate node, but each takes a different reverse path to the source to ensure link disjointness. The advantage of using AOMDV is that it allows intermediate nodes to reply to RREQs, while still selecting disjoint paths. But, AOMDV has more message overheads during route discovery due to increased flooding and since it is a multipath routing protocol, the destination replies to the multiple RREQs those results are in longer overhead.

II. LITERATURE REVIEW

Arvind Kushwaha et.al in [9], provided a novel solution to transfer server load from one server to another server. Proposed algorithm will divert the load from low energy node to high energy node. The complete proposed solution will work to discover multipath routing for and congestion control and load balancing for MANET.

Bhavna Sharma et. al in [3] proposed a new protocol E-AOMDV. The proposed E-AOMDV i.e. Energy Efficient AOMDV have taken both parameters energy and load balancing into consideration. The selection of next hop is depended upon its energy level and load balancing among its neighbors. The load from each node i.e. data sent through selected node is calculated. The performance of proposed E-AOMDV is compared with AOMDV on the basis of different performance metrics like Packet delivery ratio, Average end-to-end latency, Routing packet overhead, and Throughput, using NS-2.31 as a simulation environment. The proposed scheme has shown better performance over existing protocol. EAOMDV helped in distributing the load properly and in reducing energy consumption.

Priyanka Bansal et. al in [6] proposed a new multipath protocol called Improved AOMDV (IAOMDV), an extension over AOMDV. IAOMDV has provided enhancement in the security by avoiding black hole attacks and DDOS attacks using P.G.P model. For the simulation results, the NS2 simulator has been used. In the simulation results, it has been shown that the packet delivery fraction and throughput for the IAOMDV are effective as compared to AOMDV. The routing overhead on the case of IAOMDV has been found lesser as compared to AOMDV. It has been found that reason for the better performance of IAOMDV over AOMDV is the implementation of security and load balancing.

Archana Shukla et. al in [2] proposed AOMDV with queue length estimation technique. The proposed technique has helped in reducing congestion by choosing non-congested routes to send RREQ and data packets and if the route has to turn out congested then it helped in choosing the alternate path with the higher hop count. AOMDV routing protocol for the identification of possibly multiple node-disjoint paths between the given source and the destination has been presented. It has found that the performance of the proposed AOMDV is better than AOMDV in terms of different performance metrics like throughput, packet delivery ratio, end-to-end delay etc.

Hassanali Nasehi, et. al in [5] proposed an algorithm for improving energy efficiency for AODV protocol and then a comparison between AOMDV, AODVM, and IZM-DSR multipath routing algorithms has been made, based on AODV and DSR. The proposed algorithm in this paper tries to discover distinct paths, using Omnidirectional antennas, to send information simultaneously from source to destination. The algorithm proposed is based on AODV routing algorithm, which is presented as ZDAOMDV and then it is compared with AOMDV, AODVM, and IZM-DSR using the GLOMOSIM as a simulator. These routing algorithms are compared on the basis of different parameters such as Packet Delivery Ratio, End-to-End delay, Routing Overhead, Number of Dead Nodes and Energy Consumption in different scenarios. In the results, it has been found that proposed algorithm shows improvement in energy consumption, end-to-end delay and in packet delivery ratio but it has higher routing overheads than AOMDV and AODVM routing algorithms.

Alpesh Chauhan et. al in [1] proposed different techniques for improved energy function in case of AOMDV. This paper has proposed various techniques to help in improving the energy function, such as Minimum Battery Cost Routing (MBCR), Min-Max Battery Cost Routing (MMBCR), Minimum Total Transmission Power Routing (MTPR), Conditional Min-Max Battery Cost Routing (CMMBCR), Min-Max Residual Energy in AOMDV (MMRE-AOMDV).

D. Maheshwari et. al in [4] proposed a new approach to achieving Balanced Reliable Shortest Route (BRSR) for Ad hoc On-demand Multipath Distance Vector (AOMDV) with Three-way Filter (TF) mechanism. The selection of BRSR between the source to destination has been done based on energy, link quality and inference noise to improve the data transmission and load balancing. The proposed work has been compared with AODV and it has shown better performance over AODV in terms of throughput, packet delivery ratio, end-to-end delay, packet loss rate and energy. The proposed algorithm helps in choosing a reliable shortest route based on minimum hop count path and also in choosing the reliable route based on link quality, interference, and energy.

III. CONCLUSION

This paper shows a survey of the various techniques for achieving load balancing in mobile ad hoc networks. Most of these studies use the multipath routing protocols such as AOMDV. The authors in M-EALBM has achieved load balancing by transferring the load from low energy nodes to high energy nodes. In future, we would like to extend this work to make it energy efficient.

Technique	Operation	Focuses on
M-EALBM [9]	Achieves load balancing by transferring load from low energy node to high energy node.	Improving throughput and reducing routing load.
E-AOMDV [3]	Selects the next hop node in the route considering residual energy and load over the nodes.	Improving throughput and PDR of the network.
IAOMDV [6]	Considers security against Blackhole and DDOS attacks.	Improving end to end delay and packet delivery fraction.
Queue Length Based AOMDV [2]	Chooses the non-congested routes to transfer the data.	Improving PDR and throughput.
AOMDV based on TF mechanism [4]	Balanced Reliable Shortest Route between the sources to destination is done based on energy, link quality, and inference noise.	Improving throughput and PDR.

IV. REFERENCES

[1] Alpesh Chauhan, Prof. B.V. Buddhdev, "AOMDV with improved Energy Function", International Journal of Advanced Research in Computer Engineering & Technology, Vol. 2, No. 2, February 2013.
[2] Archana Shukla, Sanjay Sharma, "Queue Length based Load Balancing Technique using with AOMDV Protocol in MANET", International Journal of Scientific & Engineering Research (2229-5518), Vol. 4, No. 10, October 2013.
[3] Bhavna Sharma, Shaila Chugh, Vismay Jain, "Energy Efficient Load Balancing Approach to Improve AOMDV Routing in MANET", 2014 Fourth International Conference on Communication Systems and Network Technologies", IEEE 2014.
[4] D. Maheshwari, R. Nedunchezhian, "Balanced Reliable Shortest for AOMDV (BRSRAOMDV) using TF Mechanism in MANET", International Journal of Computer Technology & Applications (2229-6093), Vol. 4, No. 6, Nov-Dec 2013.
[5] Hassanali Nasehi, et. al, "Improving Energy Efficiency in MANETs by Multipath Routing", International Journal of Wireless & Mobile Networks (IJWMN), Vol. 5, No. 1, February 2013.
[6] Priyanka Bansal, Prof. Anuj K. Gupta, "Performance Evaluation of AOMDV and IAOMDV under Pretty Good Privacy Model", Global Journal of Advanced Engineering Technologies, Vol. 3, Issue 2, 2014.
[7] Chintan Bhavsar, Mayur M. Vegad, Sunil. A Bakhru, "Performance Comparison of Stability Enhanced AODV and AOMDV Protocols for MANETs", International Journal of Emerging Technology and Advanced Engineering (2250-2459), Volume 2, No. 5, May 2012.
[8] Mahesh K. Marina, Samir R. Das, "Ad hoc On-demand multipath distance vector routing", Wireless Communications and Mobile Computing, 2006.
[9] Arvind Kushwaha, Prof Nitika Vats Doohan, "M-EALBM: A Modified Approach Energy Aware Load Balancing Multipath Routing Protocol in MANET", IEEE 2016

