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AOMDV with Load Balanced as an Improvement to AOMDV Protocol

Gurpreet Kaur
Computer Science & Engineering
Beant College of Engineering and Technology
Gurdaspur, India

Arpinder Singh
HOD, CSE Deptt
Beant College of Engineering and Technology
Gurdaspur, India

Mohit Marwaha
Computer Science & Engineering
Beant College of Engineering and Technology
Gurdaspur, India

***Abstract*—** MANETs are one of the most challenging and growing research field because of their demand and challenges in providing services because of its dynamic nature. Load balancing is one of the key problems in MANETs as load balancing in network is essential for better lifetime of network, Qos, congestion control. The proposed approach in the research emphasises on the stability of the paths and distributing the traffic in the network based on the energy of the nodes. The simulations were performed in NS2. The results shows that the proposed algorithm was able to achieve batter packet delivery ratio and throughput without increasing the overhead in the network, The proposed algorithm also managed to consume a balanced energy from all the nodes in the network.

Keywords- *Qos, PDR, MANET etc*

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I. INTRODUCTION

Computers are attached & converse with one another not with discernible means, but through the excretion into the air of electromagnetic energy. Radio broadcasts are usually used for support. Wireless transmissions adapt to the microwave spectrum: the available frequencies of 2.4 gigahertz for industrial as well as scientific and medical are positioned about the band for a bandwidth of approximately Eighty Three Megahertz & the U-NII of Five Gigahertz in case of National unlicensed information infrastructure about a bandwidth of approximately Three Hundred Megahertz dispersed in two parts. Distribution of exact frequency is established by laws in various countries. Well, similar laws also manage the utmost power as well as location of the internal and external communication. On the other side wireless radio network has autonomy of nearly ten to hundred meters till ten kilometers per car along with the production power, the data communication speed, as well as frequency & kind of antenna utilized during the process.There are two types of routing: Static routing and dynamic routing. Static routing is simply the process of manually entering routes into a device's routing table via a configuration file that is loaded when the routing device starts up of router.

Classification of Routing Protocols

Protocols can be classified under various categories:

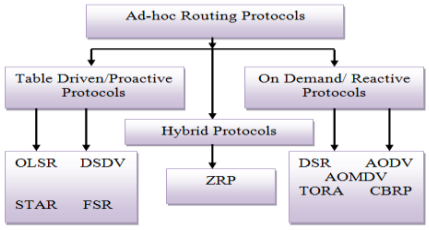

Fig 1: Adhoc Routing protocols

Here we have categorized it under Scheduling i.e. when a source obtains route information; it initiates traffic flow to destination. Under this category, 3 most popular classifications are most popular viz. Proactive, Reactive and Hybrid protocols.

Proactive Routing Protocols:

Proactive routing protocols attempt to maintain consistent and up-to-date routing information from each node to every other node in the network. The routing information is always kept in a number of different tables and they respond to changes in network topology by propagating updates throughout the network in order to maintain a consistent. The Proactive routing approaches designed for ad hoc networks are derived from the traditional routing protocols. These protocols are sometimes referred to as table-driven protocols since the routing information is maintained in tables. There are different types of proactive protocols which are following:

- Destination-Sequenced Distance-Vector Routing (DSDV)
- Optimum Link State Routing (OLSR)

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Advantages of MANETs

a) Grant permission to information & services without any interference of geographic locations.

b) Such kind of networks could be configured at any time & place.

c) Such networks operate exclusive of already built infrastructures.

Disadvantages of MANETs

a) Inadequate resources & physical security.

b) Basic common trust susceptible to attacks.

c) Lack of Authorization services.

d) This Network topology makes it difficult to find destructive nodes.

1.5.2 Reactive Routing Protocols:

Reactive type of routing approaches move away on or after conventional Internet routing approaches un-constantly establishing a route between every network node pairs. Moreover, routes are revealed only in case they are needed. However, a beginning node needs to send data data towards destination, then perform a check on its routing table to look if it has a path or not. If path is not found, then it will carry out a path discovery method to look for a path to the destination. Some of the reactive protocols are:

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

b) Dynamic Source Routing (DSR)

c) Ad hoc On demand Distance Vector Routing Protocol (AODV)

Advantages

Minimize routing overhead as one does not need to look for & maintain paths where there is hardly traffic.

Disadvantages

Delay of the acquirement of the route is given. That is, when a source node needs a route, there is little finite delay whereas the path is exposed.

1.5.3 Hybrid Routing Protocols

Mixture of reactive & proactive protocols is known as hybrid. Zone dependent protocols are most of the time hybrid routing protocols which means that the number of nodes is splitted into several zones so that the detection & maintenance of the paths are more dependable for MANET. One of the protocols is next:-

Zone Routing Protocol

Advantages: The advantage of hybrid protocol is No route setup latency for short distance connections.

Disadvantages: Hybrid routing protocols are not suitable for networks where node behavior is highly dynamic and the network contains a large number of nodes.

II. LITERATURE REVIEW

S.R. Das made a comparison on dsr as well as AODV, both on-demand kind of routing protocols. Bothe these protocols makes efficient use of Path discovery in case a request is made but with different method. Dynamic source routing makes use of source routing & route caches, hence, it does not rely on any intermittent or timer-based event. Dynamic source routing takes benefit of caching & manages various paths per destination. Ad-hoc on demand, makes use of routing tables as well as a path to destination & end point serial numbers, a technique to keep away from loops & decide routes. Moreover it also makes a detailed counterfeiting model to prove the performance description of the 2 such protocols. Apart from it, surveillance of the simulation is that for the application-oriented parameter, like latency & performance, the DSR exceeds the AODV in fewer "stressful" situations that is less knots & less load. Ad-hoc on demand distance vector exceeds the DSR in more stressful situations, with hike in show gaps with amplified stress. One should have studied that ad-hoc on demand works better than high-moving DSRs & a large no. of nodes.

Mandeep Kaur Gulati et. al. (2012) [3] looked for various kind of Quality of service routing. The objectives achieved by the paper are as follows:

The basic concepts and challenges of QET routing in MANET have been revised. Routing protocols can be derived based on approaches relied on multiple paths, cross-layers, constancy, bandwidth hesitation, balancing the load as well as energy efficiency. Therefore the protocols are chosen so as to highlight many various approaches to quality of service routing in MANET, but agreeing most of the vital advances in the field. The functionality & important characteristics are briefly discussed for every single protocol. However, the strengths as well as weaknesses of these protocols are also discussed.

All QoS routing protocols discussed above can be used in areas of bandwidth / delay estimation, route discovery, resource reservation, path maintenance, and layered design to improve performance. Most research areas in this field offer significant challenges and potential to improve the growth of MANET and its applications. These areas include energy consumption, resource availability, location management, integration between levels of QoS services, support for heterogeneous MANETs, as well as stability, robustness and security. Effective and efficient solutions for these problems require the design and development of new QoS routing protocols in MANET. Therefore, based on the detection of multiple paths, approaches are chosen because this protocol provides bandwidth aggregation, minimization of end-to-end delay, increase in fault tolerance, reliability improvement,

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Load balancing. Based on these characteristics, we try to provide QOS in MANET.

Sung-Ju Lee et. al. (2000) [26] gave proposal of routing on how to backup AODV. The mesh configuration gives multiple alternative paths & is built without incurring additional costs. Alternative paths are utilized only in case data packets cannot be reached through the main route. They implemented the algorithm on AODV & calculated its performance. On calculating simulation results, it showed that our proposal provides mobility robustness & improves the performance of the protocol. Moreover, they also present that, when there occurs a heavy traffic networks, some idea does not work in correct way. However, from this method, we learned that if we have a second available path from the starting point to the destination, proposed approach gets better performance than the repair of a single route. Backup routing could also be proposed according to the methodology.

Mohammed Tariqu described a general description of the quite latest multipath type of routing protocols for MANET. Performance of network could be increased only if latency, reliability as well as performance & multipath routing are also improved parallel. But, it is hard task to look for a single protocol or a chain of protocols capable of making better all these performance parameters. Chosing of a multipath routing protocol actually depends on an application and compensation in particular. Major aims are energy reliability, low overhead, efficiency & scalability on which it depends. Taking the help of literature work, researchers can look for what has been done & network architects can find out which protocol to utilize & what are its advantages and disadvantages.

Xuefei Li gave a proposal of NDMR to overcome the demerits of single path routing protocols. NDMR has two works to do, one is to minimize the routing overhead & other to get multiple node disjoint routing routes. However it's clear that NDMR works on both AODV & DSR as the disjoint paths of various nodes give efficient mobility. Such types of protocols are optimally designed for small & no best networks in the huge network.

III. PROBLEM FORMULATION

According to the literature, the problem is that real-time communication or transmission of audio and video in MANET is rather difficult due to mobility or node congestion in the network or limited battery resources. Existing current routing protocols can not achieve proper load balancing without increasing node overload. Our goal is to provide a load-balancing approach with AOMDV as a routing protocol that can provide load balancing to routing protocols to eliminate network distortion and use network resources better. In normal scenarios, nodes that are in the middle of the networks are consumed more than the nodes in the less dense part of the network, which causes a rapid depletion of the energy of the nodes that are found in half of the networks

IV. IMPLEMENTED WORK

Performance Metrics

1. Packet Delivery ratio

The packet delivery ratio in this simulation is defined as the ratio between the number of packets sent from constant bit rate sources (CBR, application layer) and the number of receiving packets by the CBR sink at destination. It specifies the packet loss rate, which limits the maximum throughput of the network.

2. End to end Delay

This metric represents an average end-to-end delay and indicates how long it took for a packet to travel from the source to the application layer of the destination. It includes all possible delay caused by buffering during route discovery latency, transmission delays at the MAC, queuing at interface queue, and propagation and transfer time. It is measured in seconds

3. Throughput:

Throughput is total packets success fully delivered to individual destinations over total time.

4. Normalized Routing Overhead: Normalized routing overhead is the ratio of the number of data packets transmitted in the network and the number of routing packet transmitted in the network.

5. Normalized MAC Overhead: Normalized mac overhead is the ratio of the number of data packets transmitted in the network and the number of control packets on the mac layer transmitted in the network.

6. Average Energy Remaining: It is the average amount of energy remaining in every node after the simulation is over.

Performance comparison of AOMDV and L_AOMDV:

In this section we compare the existing AOMDV protocol with the new proposed approach for stability. In figure 4.1 the comparison of AOMDV and L_AOMDV is done based on packet delivery ratio. The graph shows that in the beginning when the speed of the node was less the AOMDV had a better packet delivery ratio, but as the speed of the node increased the packet delivery ration of L_AOMDV dominates AOMDV. The reason for the dominance is because as the speed of the nodes increases paths becomes less stable and since AOMDV does not consider stability as a metric for routing, it chooses weak paths, they break easily when nodes move. In L_AOMDV since signal strength is considered before choosing a path, the paths withstands the mobility of the nodes to a better extent, resulting in better packet delivery ratio.

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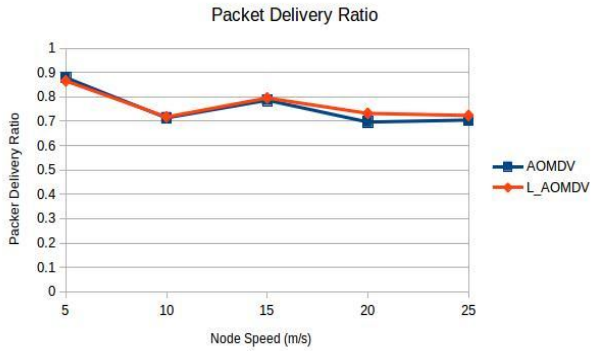

Figure 3 Comparison of AOMDV and L_AOMDV based on Packet Delivery Ratio

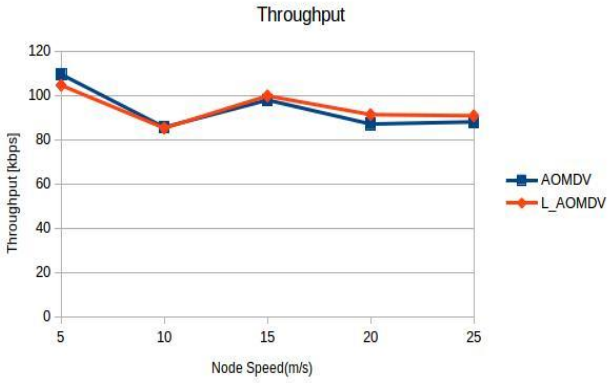

Figure 4 Comparison of AOMDV and L_AOMDV based on throughput

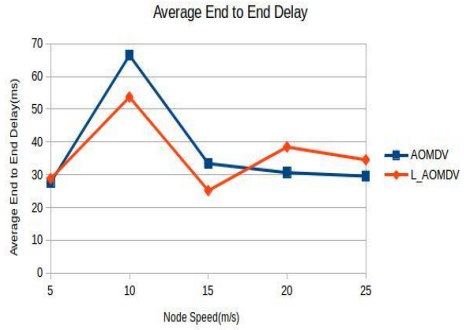

Figure 5 Comparison of AOMDV and L_AOMDV based on Average end to end delay5

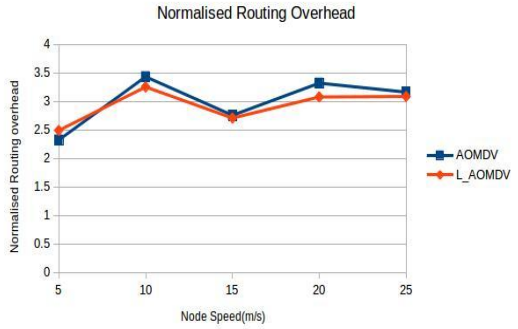

Figure 6 Comparison of AOMDV and L_AOMDV based on Normalized

In figure 4 comparison based on throughput is done between AOMDV and L_AOMDV. Throughput is following same trail as that of packet delivery ratio. The reason for the result is same as that in packet delivery ratio. Since the paths are able to withstand the mobility of the nodes, due to which L_AOMDV dominates AOMDV as the speed of the nodes increases.

V. CONCLUSION

An ad-hoc wireless network is a collection of mobile nodes that communicate with each other, forming a multi-hop radio network and maintaining connectivity management without an existing infrastructure. This type of networks is expected to play a very important role in military and civil applications. Designing a balanced load routing protocol to improve QoS in the network is a challenge. The objective of this research is to provide load balancing in the network to improve the quality of network service. The proposed protocol has the following characteristics:

1. L_AOMDV has the function of providing stability in scenarios of high mobility, which gives us the characteristic of supporting the mobility of nodes in the network.
2. L_AOMDV also offers us a better way to distribute traffic to the less loaded parts of the network for more even power consumption in the network.

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