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Performance Enhancement of ZRP For MANET

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ABSTRACT

A mobile ad hoc network (MANET) which is also known as wireless ad hoc network or a mobile mesh network is comprises of mobile nodes that can deal with one another by exploiting wireless links. For a better exploitation of network capabilities, we will implement a Binary Error Rate (BER) based approach of ZRP. All phases of link state recording and routing tables calculation are under Quality of Service (QOS) control so that better paths in terms of BER are preferred. This approach improves ZRP Packet Delivery Ratio, Throughput and Normalized Oversize Load. Proposed approach adds quality control to all the phases of route selection decisions. We will find routes where packets have better chances to reach their destination without demanding several retransmissions. Nodes with bad links are excluded from the route request process. The main objective is to have better performance in terms of throughput, reduction of power consumption, routing overhead, latency and so on.

Keywords- Binary Error Rate (BER), Mobile ad-hoc Network (MANET), Quality of Service (QOS), Zone Routing Protocol (ZRP).

I. INTRODUCTION

1) MANET

A mobile ad hoc network (MANET) also known as **wireless ad hoc network** or a **mobile mesh network** is comprises of mobile nodes which can deal with one another by exploiting wireless links. Mobile nodes that comes under radio ranges of each other, communicate directly through wireless links, while those far apart depends on other nodes to relay messages as routers. The important problem in a mobile ad hoc network is discovering and preserve routes as host mobility can make topology changes. MANETs have been exploited in scenarios when an infrastructure is not available, the cost to exploit a wired networking is not worth it, or there is no time to set up a locked infrastructure. Such networks are characterized by: existence of bandwidth constrained dynamic topologies, variable capacity links, energy constrained operations and terribly prone to security threats. Direct communication is only possible between neighboring nodes. That is why, communication between remote nodes is based on multiple-hop.

2) ROUTING ALGORITHM IN MANET

Routing Algorithms for a MANET must be self-configure to fit up to situation and traffic where they run, and goal alteration must be posed by the user and application. On the criteria of routing update

mechanism, Ad hoc wireless network routing protocols, divided into various categories:

2.1)Proactive routing-This algorithms concentrate to keep consistent and up to date routing message in between every pair of nodes in the network by applied propagating path updates at definite time periods.

2.2) Reactive Routing- It is also requested on demand routing algorithms sets a path to a given destination only when a node exploit it by initiating a route finding course. Once a route has been established, the node keeps it till the destination is accessible, or the route becomes unaccessible.

2.3)Hybrid Routing- Hybrid such as ZRP . ZRP is the available simple self-organizing and self-configuring protocol without a much weight on the network .Hybrid ones exploits the merits of both proactive and reactive techniques. The proactive scheme used for all the nodes within the radius of the zone which is measured by hop count (HC) and the reactive scheme is exploited for all the other nodes in the network excepting the nodes within zone radius.

3) ZONE ROUTING PROTOCOL (ZRP)

ZRP is a hybrid routing protocol suitable for a vast range of MANET [6]. ZRP employ both proactive and reactive approach, the key parameter by which it can build a balance between both approaches is zone radius. It was proposed to fasten up the delivery and to minimize the control overhead of Proactive routing protocol and to diminish the latency of Reactive routing protocol by choosing the most efficient type of protocol to utilize throughout the route.The Zone Routing Protocol (ZRP) can be utilized in various network environments by setting appropriate zone radius. On the criteria of zone radius there are two routing protocols are defined:

3.1)) Intra zone routing protocol

The nodes that comes within the zone use proactive routing. In this, each and every node in the zone, records the routing information data to the destination node(DN) in the routing table.

3.2))Inter zone routing protocol

In ZRP, when the information packet is sending outside the zone radius of the source, it is a reactive type of routing called Inter Routing Protocol (IERP).

3.3) QOS Routing Protocol

Mobile ad hoc networks (MANET) are heterogeneous, where physically dissimilar nodes are present.For understanding, we assume here that there are only two types of nodes, present in the network. One type of node has wide transmission range (power), better processing capability and data rate and is more reliable and robust than the other type. We allot it to the more powerful nodes known as Backbone capable nodes (BC node). In QOS routing, Backbone nodes can be elected as the backbone nodes (B-nodes). The nodes having less power are referred to as general nodes (G-nodes). Usually, the transmission range of a B-node is much higher than that of a general node. The main aim of QOS routing is to let most routing traffic go through B-nodes.

3.4) BER-ZRP

Earlier IARP as well as IERP do not take into account quality of link in route establishment process. That is not accepted in QOS context and when we know that bad links (with high BER) cause long delays and low PDR. To improve ZRP performance, we integrate BER metric into different routing path selection stages.

3.4.1) BER-based IARP

The basic criteria of taking into account BER in IARP, consists of selecting better paths in terms of BER during routing tables calculation. We enclose BER in link state packets. Global route BER is computed and integrated as a field of link state tuples. When a node receives a link state packet, the indicated destinations are combined into routing tables if they do not already exist, otherwise records relating to such destinations are replaced (next hop and global BER values) if new paths toward these given destinations with lower global BER are observed.

3.4.2) BER-based IERP

BER metric is introduced two stages of IERP. First, we want to discard that bad routes are transmitted to the source and used for data transmissions. Then, when a link taken by a route request packet has a BER value greater than a given threshold, the route request packet is directly rejected by the receiving node and not transmitted to the next neighbor toward the destination. Thus, by this way we give more chances to better routes known by the source. Second, a route global BER is stored into a route reply packet. Each node receiving this packet, adds the BER value of the incoming link before giving it to the next node towards the source node. The source node as well as the intermediate nodes store BER values of the route to the destination node. Processes of operating these packets have been adapted for the use of BER metric. This allows IARP to exploit QOS information. Indeed, routes toward the destination are stored with their BER metric into their link state set by nodes traversed by the route reply packets. Considering BER-based approach of our IARP algorithm, this enhanced IERP raise substantially ZRP global routing process.

4) NEED FOR ENERGY MANAGEMENT

The nodes in an ad hoc wireless network are uneasy but have limited battery power for their execution. Hence, energy management is an issue of concern in ad hoc networks. Energy management deals with the methods of managing energy resources by means of regulation the battery recharge, managing the transmission power properly, and arranging of power sources so as to increase the life span of the nodes of an ad hoc infrastructure less network. The energy efficiency of a node is defined as the ratio of the amount of data reached at destination to the total energy expended.

II. LITERATURE REVIEW

Shveta&Er. Navdeep Kumar(april2014),Authorproposed that Zone Routing Protocol is based on the conception of the zone radius. A routing zone is described for each and every node and also determined for the zones of neighboring node overlap. Energy management in network deals with the process to manage energy resources such as controlling the battery, scheduling of power sources and adjusting the transmission power so as to increase the lifetime of the node. As the mobile nodes in the network are with low power battery so it is very difficult for a device to sustain for a long time.The main objective is to study methods to reduce the power consumed using ZRP protocols.

RavillaDilli(May2012), In this paper, Author presented the power management problems in mobile nodes by exploiting modified Zone Routing Protocol (ZRP), which was derived using NS2 simulator as mobilead hoc networks (MANET) are wireless networks with no fixed infrastructure, and are mostly

settled on a temporary basis for a particular application like battle field communication or emergency rescue. Energy management in wireless networks deals with the mechanism of managing energy resources by means of regulating the battery discharge, adjusting the transmission power, and arrangement of power sources so as to increase the lifetime of the nodes of an ad hoc wireless network because it could be ambitious for a mobile device to sustain for a long period if it send and receive data more frequently.

SankuSinha&BiswarajSen(2012), In this paper, Author proposed a hybrid routing protocol ZRP for MANET which merges the qualities of both proactive and reactive approaches by sustaining an up-to-date topological map of a zone centered on each and every node. Routes within a routing zone are generally maintained by a table driven proactive routing approach while for destinations outside the routing zone, ZRP follows a Reactive Routing mechanism. Thus paper presenting a study based on simulation to analyze the nature of Zone Routing Protocol (ZRP) under a situation where the nodes' density in the network and more significantly the routing zone radius changing considerably. This will enlighten the execution of the protocol and understand its vulnerability on varying and fast altering network topology which is usually common in any form of wireless networks.

TiguianeYelemou(2012),Authorpresented a Binary Error Rate (BER) based approach of ZRP (BER-ZRP). With BER-ZRP, all stages of link-state recording and routing tables evaluation provides lower Quality of Service control so that better routes in terms of BER are preferred. The overhead generated by route maintenance and route discovery processes is better coached. This approach empowered to improve ZRP Packet Delivery Ratio and Normalized Oversize Load.

SandeepKaur&SupreetKaur(2013), Inthis paper, Author proposed that Routing Protocols helps to contact a mobile node with one another nodes in the network by sending or receiving the packets. This paper presented the study overview of ZRP by presenting its operation. The performance of ZRP is analyzed on the criteria of parameters like Data Dropped, Throughput, Load, and Delay.

Tapaswini Dash&Bharati Mishra(2012), In this paper, Author presented Zone Routing Protocol (ZRP) a hybrid protocol that fuses the merits of both the proactive and reactive protocols. It is classified as: Intra Zone Routing, which utilize the concept of hop count of the N neighbors by exploiting proactive techniques and Inter Zone Routing, which contains the rest of the network excepting the N-neighbors using reactive techniques. In any cast routing, the packets are directed to the most nearest any cast group member. Zone Routing Protocol with Any cast addressing along with the conception that where to utilize Any cast addressing in Zone Routing Protocol (ZRP) assuming that the destination as a member of any cast address.

III.PROBLEM FORMULATION

1) Problem Analysis

1.1)Issues in ZRP

Here we address two major issues that required to be considered and they are outlined below **Power Management**

In ZRP, the packets are progressed with full power without considering the node's location inside the zone. According to Inverse Square Law, the power received by the recipient node is inversely proportional to square of the distance between the nodes i.e

$\gamma = Pt / 4\pi r2$

The node could waste power if the distance in between the sender and the receiver node is less.

1.2) Bandwidth Utilization

As the distance between the transmitter and border nodes increases, the zone area will also increase, which means the radio range of the sender node will not be able to reach the border nodes in the zone. Because of this reason, the sender node will incremented the number of broadcasts to find the border nodes in the zone, which will definitely increase the bandwidth usage.

Now by taking into account quality of links in the choice of route may significantly improve the performance of standard ZRP.

1V. PROPOSED WORK

Problem Statement

For a better exploitation of network capabilities, we will implement a Binary Error Rate (BER) based approach of ZRP. The focus is on QoS routing.This is a complicated and troublesome issue because of the dynamic nature of the network topology and generally imprecise network state information. All phases of link state recording and routing tables calculation are under Quality of Service control so that better routes in terms of BER are preferred. This approach improves ZRP Packet Delivery Ratio, Throughput and Normalized Oversize Load. Proposed approach adds quality control to all the phases of route selection decisions. We will find routes where packets have better chances to reach their destination without needing several retransmissions. Nodes with bad links are excluded from the route request process.

V. RESULTS

1) Packet Delivery Ratio – The ratio of packets that are successfully delivered to a destination compared to number of packets that have been sent out by the sender.

Table 1 Values of Normal and Quality Links PDR

No. of Nodes	Normal PDR	Quality links PDR
10	94.35%	100.00%
20	96.82%	100.00%
30	91.92%	99.76%
40	93.57%	100.00%
50	91.06%	99.93%

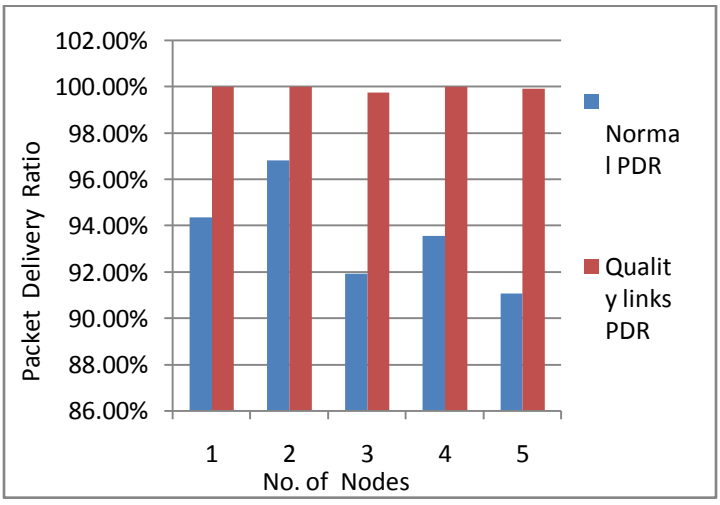

Fig 1 Comparison between Normal and Quality links PDR

2)Average End to End Delay- The average time it takes a data packet to grasp the destination. This includes all feasible delays caused by buffering during path discovery latency, queuing at the interface queue.

Table 2 Values of Normal and Quality Links Average Delay

No. of Nodes	Normal Average Delay	Quality Links Average Delay
10	0.14897	0.00152
20	0.00706	0.00273
30	0.01275	0.00696
40	0.02189	0.02358
50	0.01532	0.12263

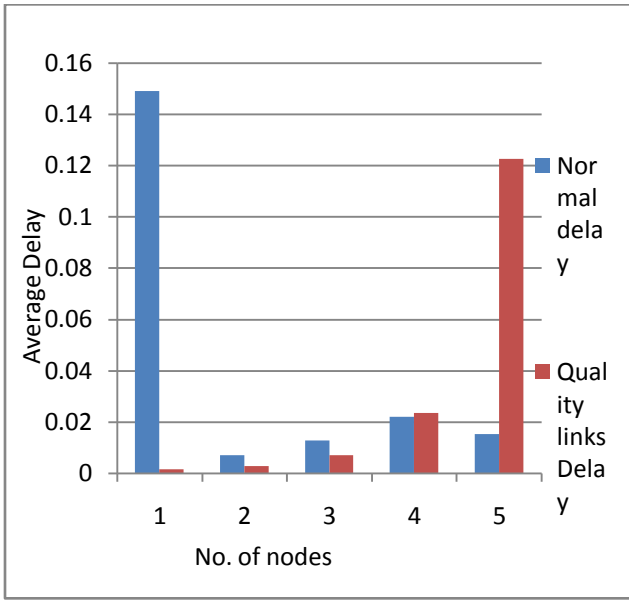

Fig 2 Comparison between Normal and Quality links Average Delay

3)Throughput – It is defined as total number of Packets received over the total simulation time or it can be say that it is a measure of how many packets a system can process in a given amount of time.**Table 3 Values of Normal and Quality Links Throughput**

No. of Nodes	Normal Throughput	Quality Links Throughput
10	1.678	1.7785
20	1.052	1.0865
30	0.751	0.815
40	0.764	0.8165
50	0.6365	0.6985

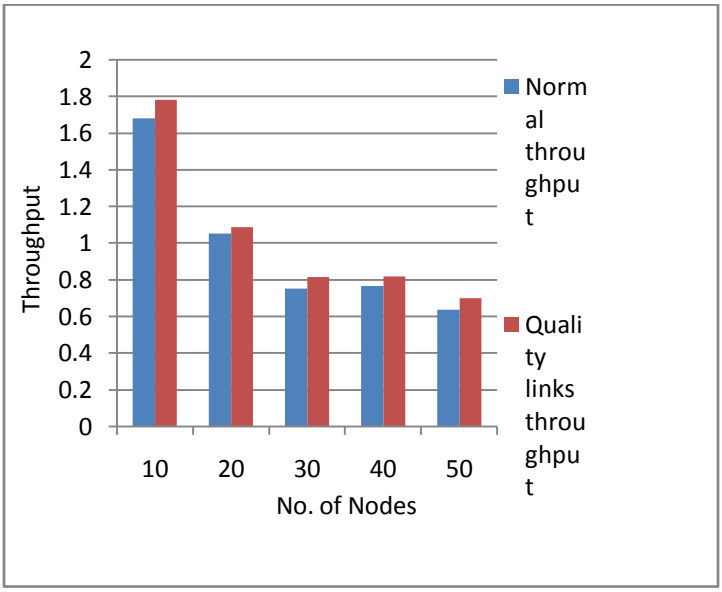

Fig 3 Comparison between Normal and Quality links Throughput

VI. CONCLUSION

Quality links will find routes where packets have better chances to reach their destination without

needing several retransmissions and Nodes with bad links are excluded from the route request process whereas Normal links will not find any better path it just keeps on passing the packet. We introduce BER to quantify link quality and we modify ZRP protocol for more efficient use of network capabilities. At all phases of route selection decisions from link state recording to routing tables calculation, better paths in terms of BER are preferred. Our enhanced ZRP improves PDR and throughput metrics even in complex situations like mobility and dense urban environment. Considering delay, in fixed nodes scenario, BER-based approaches are better than standard ZRP but in mobility context the results are mixed for BER-IARP-IERP and standard ZRP. BER-IARP is always better than standard ZRP for all the three performance metrics. As results are showing that with BER-ZRP protocol over Quality links improves PDR and throughput than in BER-ZRP over Normal links. Although Normal links have lesser average end to end delay than Quality links but still Quality links has given better overall performance.

VII. REFRENCES

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