Energy Aware and Link Breakage Prediction using DSR in MANET

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Abstract - Mobile Adhoc Network (MANET) consists of collection of wireless mobile nodes that can communicate with each other without any fixed infrastructure. Each node in the network acts as a router which provides flexibility to the network. Due to the mobility of mobile nodes the link breakages and node failures are occurred commonly.This will reduces the performance of entire mobile network. Proposed LBP(Link Breakage Prediction) with EADSR (Energy Aware Dynamic Source Routing) helps to increase the packet delivey ratio and throughput of entire mobile network. Availability of the link between source and Destination to be Evaluated with the consideration of individual node's Energy.If a node's energy falls below a threshold level energy ,Error message will be sent to source node. Handover Mechanism will be taken place with EADSR and selects a best path with least hop count and higher energy nodes for forwarding packets. Addition of LBP(Link Breakage Prediction) and EADSR to the Original DSR the packet Delivery ratio will be increased. This will increases the entire mobile network performance.

Keywords-EADSR, MANET, LBP

I. Introduction

There are two types of mobile wireless networks. The first type of mobile network is known as infrastructure network. The brides of these networks known as base station.A mobile node within these network are to be connected with nearest base station node with in a specified RR(Radio Range)..Mobile Adhoc Networks are very popular in wireless communication.To facilitate communication with in mobile network many routing protocols are to be used. A routing protocol is needed whenever a packet needs to transmitted to destination through the intermediate nodes and many routing protocols have been proposed such kind of ad hoc networks.The various types of routing protocols are DSR , DSDV, AODV, TORA and AOMDV. These protocols offering various performance efficiency for routing technique.It aims to limit power consumption of mobile nodes in the network in order to prolong the entire network life time.

Some of the challenges in MANET include:

1)Quality of service
2)Scalability
3)Dynamic netwok topology
4)Speed
5)Node failure
6)Link failure
7)Secure routing

II.MANET ROUTING PROTOCOLS

Basically routing protocols can be broadly classified into two types.

i)Table driven or Proactive protocols

ii)On Demand or Reactive protocols

i)Proactive Routing Protocols

In this type of protocols, nodes maintain one or more routing tables about nodes in the network. These routing protocols update the routing table information periodically. The main advantage of these protocols is that a source node does not need route discovery procedures to find a destination node.

The drawback of these protocols is that maintaining a consistent and up-to-date routing table requires substantial overhead ,which consumes high power and bandwidth and it also decreases throughput, especially for high node mobility. There are various types of Table Driven Routing Protocols: Destination Sequenced Distance Vector Routing(DSDV),Wireless Routing Protocols (WRP),Fish eye State Routing Protocol(FSR),Optimized Link State Routing Protocol(OLSR),Cluster Gateway Switch Routing Protocol(CGSR),Topology Dissemination based on Reverse Path Forwarding(TBRPF).

ii)Reactive Routing Protocols

In this protocol there is an initialization of a route discovery mechanism by source node to the destination when source send data packets to destination.when the route is found ,the route maintanence is initiated.the main advantage of this protocol is route overhead is reduced.one disadvantage is that delay in discovering a new route.The different types of reactive routing protocols are :Dynamic Source Routing(DSR),Ad-hoc On-demand Distance Vector Routing(AODV),Ad-hoc On-demand Multipath Distance Vector Routing Algorithm and Temporally Ordered Routing Algorithm(TORA).

III.DYNAMIC SOURCE ROUTING

Dynamic Source Routing is an Ad Hoc routing protocol which is based on source-based routing rather than table based.This protocol is source routing.This protocol mainly designed for multi-hop ad-hoc networks of mobile nodes.This protocol does not need any existing network infrastructure.This protocol have two mechanisms include “route Discovery” and “route Maintanence”.

Every node maintain a cache to store recently discovered paths.when node sends a data packet to destination node ,it first checks the entries in the cache.If it is there then it uses that path to transmit the packet and it will attach the source address on the packet.The sender broadcast the RREQ message to all neighbor nodes and to the destination.Receiving nodes will send a RREP message to the source node.If a link failiure ,a Route Error packet(RERR) will be sent to the source node for modification .Then source node removes a failure link from cache.A failure link will be replaced by old one or it will initiate new Route Discovery process.

i)Route Discovery

When sending packet to destination ,Route Maintanance is used to Detect if the network topology has changed such that link broken or packet loss ,when transmitting packet to the next hop,is responsible for detecting the link of next hop.Both retransmission and acknowledgement mechanism detects the link is broken, detecting node sends a Route Error Packet to the Destination. This will add a packet Header and send using new Route from route cache. This mechanism is called “salvaging” a packet.If that route not in cache again have to perform a Route Discovery Process.

ii)Route Maintanance

All nodes in mobile network willing to participate in packet forwarding. Proposed algorithm, selects Route with minimum number of hop count and high signal strength.Source node predicts the channel

characteristics and predicts a link have soon breakage,selects a best path Route for forwarding packet.

Characteristics of Proactive Route Maintanance(PRM):

a)Freshness-All nodes near active route have up-to-date routing information.Broken paths are eliminated,new paths are recognized, and non-optimal paths are rejected and optimal paths are selected.

b)Robustness-If any route path fails ,it selects a alternate path from various fresh paths and sends a packet without any loss.If all fresh paths failed PRM have to perform Route Discovery process.

c)Lightweight Maintanance-The lifetime of active route is lenghthened and maintenance is confined to small area of data transmission.

IV.PROPOSED IDEA

The main goal of proposed idea is to select a path between source and destination in such a way that all intermediate nodes will have a higher enegy with minimum number of hop counts. In this idea the nodes initial enery levels and delay's are assigned while node creation phase.If the energy falls below threshold value ,source will selects a new path in such a way of calculating remaining node's battery energy and forwarding packet through that path.Two main phases in proposed idea are,i)EADSR & LBPDSR route Discovery phase and i)EADSR & LBPDSR route Maintanance phase

A. EADSR & LBPDSR route Discovery phase:

In this route discovery phase a source node discovers 2 primary route and 1 secondary route for forwarding packets to the destination.Proposed idea predicts a link between source and destination.when a source node wants to send a packet to destination, it initiates a route discovery by broadcasting the RREQ packet to its neighbors.The intermediate nodes receives the RREQ packet and rebroadcast it into neighbors by appending its id in the route record and reaches destination.when the destination node receives two or more RREQ from the same source it finds the three best routes based on the no of hopes.

The route which has less number of hop count and having higher energy with minimum jitter that is to be selected as a primary route one.Next route having same energy and hopcount with same jitter,known as primary route two.If any node in primary route one falls below minimum threshold value it automatically selects a primary route two.Third route will be next minimum hop count and maximum energy ,known is backup route.The destination node sends route reply RREP packet using primary route 1,primary route 2 and backup route.

In traditional DSR during route discovery phase,if any node receives a Route Request (RREQ) and that node not is not a receiving node,it holds a packet for certain time and rebroadcast to next node.Usually 0.01 is to be considered as a jitter and this should be constant and this this should be distributed to all node.In proposed EADSR & LBPDSR the jitter varies from 0 to 0.02sec.

The minimum value of the is set to 1 joule and it corresponds to the Delay of 1/(1*100) =0.01 sec.In our simulation we set the initial energy of the nodes as 50 joules.So the delay inytroduced at RREQ packet is 1/(50*100)=0.0002 sec.So the new path in proposed idea contains with high energy with minimum no of hops.The RREQ packet will reach at the destination which has maximum sum of remaining energy because delay is inversely proportional to the remaining residual battery power.

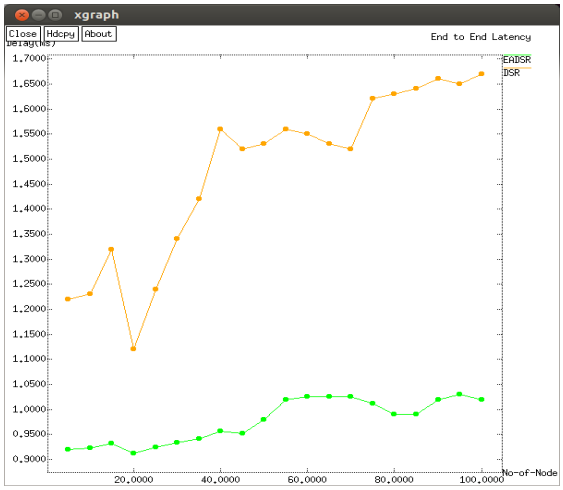

Figure 1:End to End Delay

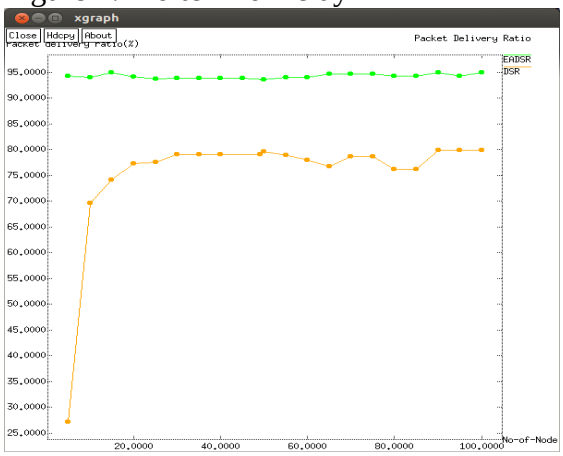

Figure 2:Packet Delivery Ratio

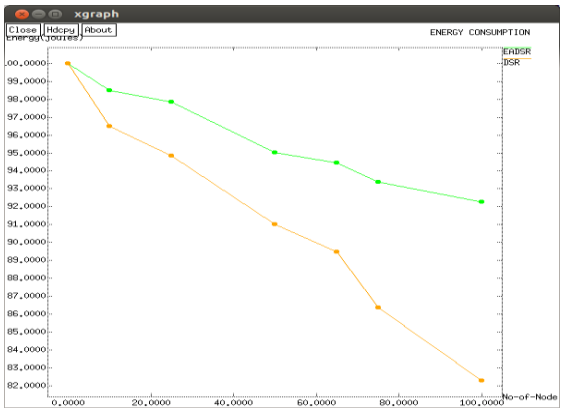

Figure 3:Energy Consumption

B.EADSR & LBPDSR route Maintenance phase:

We set the minimum threshold value as 1 joule, so that every remaining node have energy as 1 joule,it means it will set a "Low Energy" field and this field is to be added with error control message.The receiver node receives this error message with Low Energy field with 1,then that route will be discarded.Once the error message reaches the source node ,it will look into a new route in the route cache otherwise it will perform a route discovery phase. The advantage of this energy Maintenance phase is to save the node from getting maximum data delivery in each session and increases the performance of the network like packet delivery ratio,throughput and minimize the end-to-end delay,it will also gives each node's energy value,required transmission power and receiving power.

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