Power control in mobile ad hoc network using NS2 simulator

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Abstract - In mobile ad hoc networks, communication among mobile nodes happens through wireless medium the planning of ad hoc network protocol, typically supported a standard ''layered approach'', has been found ineffective to deal with receiving signal strength (RSS)-related issues, affecting the physical layer, the network layer and transport layer. This paper proposes a style approach, deviating from the normal network style, toward enhancing the cross layer interaction. Among completely different layers specifically physical, mac and network. The Cross Layer style approach for Power manage (CLPC). Would facilitate to boost the transmission power by averaging the RSS values and to search out a good route between the supply and therefore the destination. This cross-layer style approach was tested by simulation (NS2 simulator) and its performance over AODV was found to be higher.

1. INTRODUCTION

A mobile ad hoc network could be a collection of wireless nodes that can transfer information while not the utilization of network infrastructure or administration. Such networks have several potential applications, as well as in disaster mitigation, defense, health care, domain and business. In such a network , every node acts each as a number and a router. a significant limitation with mobile nodes is that they need high mobility, inflicting links to be frequently broke and reestablished Moreover, the bandwidth of a wireless channel is additionally limited, and nodes operate restricted batter power ,which will eventually be exhausted. Therefore, the planning of a mobile ad hoc network is extremely difficult, however this technology has high prospects to be able to manage communication protocols of the future .A wireless ad hoc network works on the principle of one hop neighbor node broadcasting, during which a transmission signal from the source node propagates to all neighbor nodes within its communication region Transmission power related problems are a unit a common feature touching the functioning of wireless ad hoc networks. the inability to take care of a steady transmission power, thus, degrades the transmission range and signal strength, and therefore the reliability of wireless ad hoc networks is controversial .At the transport layer, the node interference affects the level of transmission power and causes network congestion. In such networks, TCP-supported congestion manage has been unreliable the standard transport protocols like UDP are a unit unreliable, since no mechanism of congestion detection has been provided. Even supported control is unreliable . Transmission power-related issues will have an effect on all the layers of the stack, from physical to move, and include the following: (i) long delay, (ii) packet losses and (iii) low output. Previously, the look of ad hoc network protocol has beenlargely supported the''layeredapproach''.In layered architecture,the designer or implementers of the protocol or algorithmic rule focuses on a selected layer, while not being needed to contem plate the parameters of the remainder of the stack . However, this has usually resulted in suboptimal performance of applications. To overcome this, the ''cross-layer' 'approach has been found to deal with transmission power related problems in wireless ad hoc networks. The cross layer style deviates from the normal network design approach during which every layer of the stack would be created to work severally .A work group of the Internet Engineering Task Force has been learning inter-layer interactions and performances in mobile ad hoc networks. The inter-layer interaction metrics and also the advantages of information exchange among the lower layers, network layer and transport layer were additionally reported. In this paper, a brand new cross layer optimization frame work is proposed that gathers info a few node's receiver signal strength (RSS) by using hello packet. Employing a dynamic transmission power manage mechanism, each node computes minimum RSS, average RSS and most RSS. This info can facilitate every node to understand its neighbor positions and guide it to dynamically manage its power levels. As a result, optimum transmission power and reliable communication range will be achieved.

1. Cross-layer design frame work

The proposed cross-layer optimization framework permit modification of transmission power to be made at physical layer after knowing a node's one-hop neighbor's RSS data. The modified transmission power can facilate that node to dynamically vary its propagation range at the physical layer. This is because the propagation distance **is** usually directionally proportional to transmission power. This information is passed from the physical layer to the network layers that it can take optimum choices in routing protocols .A major advantage of this framework is that it allows access of information between physical layer and high layers(MAC and network layer).

1.1. Dynamic transmission power control

Much of labor on power management protocols for mobile ad hoc networks is however to mirror within the literature. while not an efficient transmission power management mechanism in place, packet transmissions may be littered with link instability, weak of receiving signal strength (RSS) and, network interference. As noted on top of, the standard of RSS forever depends on a broadcasting node's transmission power. it's best-known that the broadcasting signal from one node travels omni directionally to its 1-hop neighbors .This paper assumes that every one nodes have the same propagation vary, which is able to be altered counting on the 1-hop neighbors' coverage. The node's receiving signal strength has taken from mac layer. This info helps to determine whether or not or not a current node is placed either in high or low signal strength space. once computing the RSS, the node broadcasts this information to its 1-hop neighbors by hello packets.

1.2 Primary route discovery

The main objective of routing protocols in ad hoc networks is to search out the shortest path between the sourceand so the destination. A majority of routing protocols are able to choose the shortest path however not a reliable path, as a result of these routing protocols don't take into account neighbor's RSS price. to beat this limitation, similarly on cut back extra RREQ packets and save network resources (link, buffer, battery), during this cross-layer improvement framework, each node applies a dynamic transmission power management mechanism and identifies 3 communication regions (minimum communication region, average communication region and most communication region).All nodes within the network alter their transmission power supported a most communication region. Once a supply node broadcasts a RREQ packet to its most communication region neighbors, the neighbors shall decide whether or not or to not rebroadcast the RREQ packet . just in case the RREQ packet has come from a weaker node (node's RSS price = A min RSS), the receiving neighbors should drop the RREQ and avoid to retransmit it. On the opposite hand, if RREQ packet have come from reliable nodes (node's RSS value > A min_RSS) ,these are retransmitted to the destination node, which in flip generates the RREP packet and sends to the source node. Finally, the source node has known a reliable link to the destination, which currently becomes a primary route.

3.3. Route rediscovery

All nodes within the primary path sequentially calculate their RSS values by employing a dynamic transmission power management rule. If a node's RSS worth is adequate to A Min_ RSS, then there is a risk associate intermediate node move out of a most communication region, because of that a link breakage will occur. In such an occasion, the node preceding that intermediate node initiates a route discovery mechanism to change a route to the destination

Algorithm for route rediscovery begin	
1	Create the nodes and fix there ranges.
2	Select the anyone of the node as an source and start routing process
3	Search for minimum rss node near to the source node
4	If yes then packets are to min rss node
5	If no then send packets to the average strength node
6	Check packets are expired or not if yes then reapet the the procedure
7	If no then send towads destination
Stop	

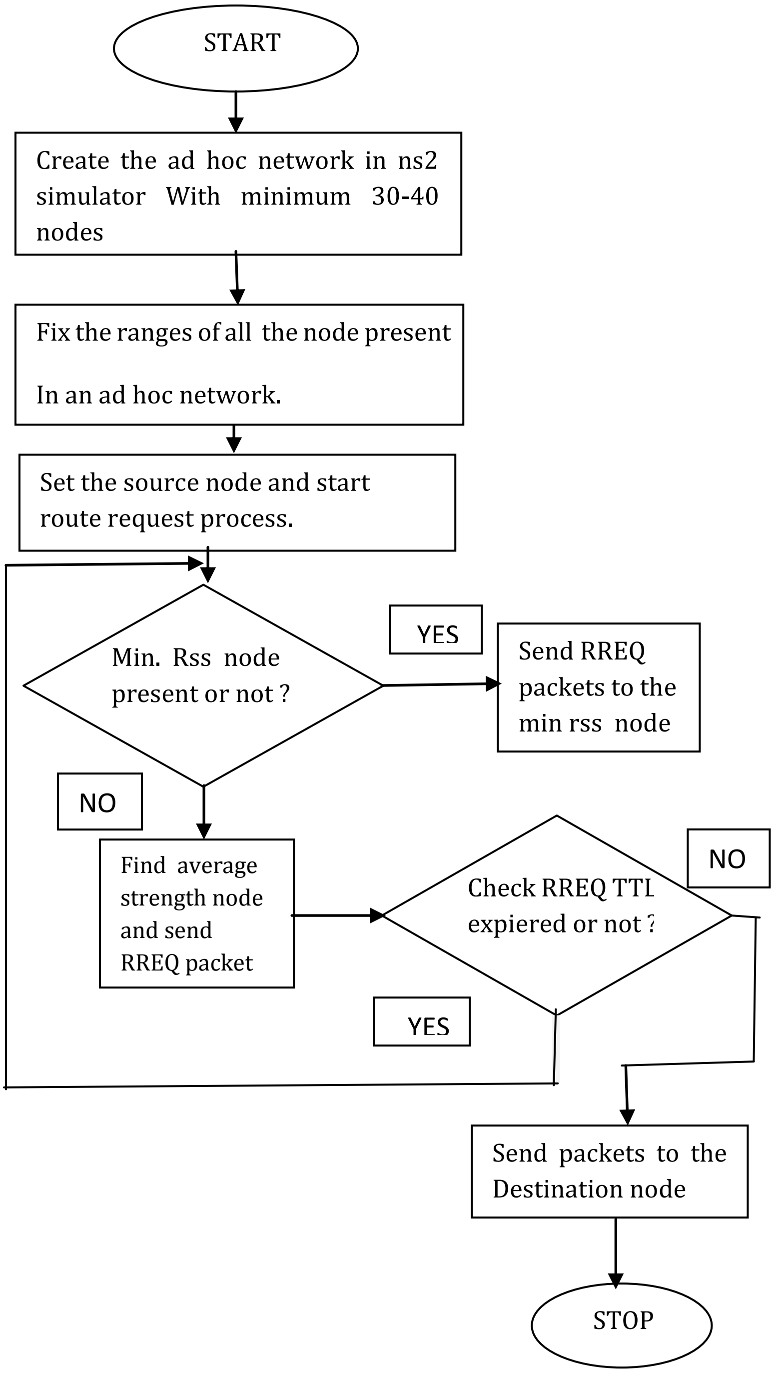

Fig:- routing rediscovery algorithm

2. Performance analysis

We thought about the subsequent necessary metrics for the analysis by simulation:Packet delivery ratio (PDR): The ratio between the amount of packets received by the destination and therefore the range of packets sent by the supply. End-to-end delay: The end-to-end delay is calculated by obtaining time delay o a packet between the transceiver. Routing overhead: the whole number of management packets transmitted throughout simulation. For packets sent over multiple hops, every transmission over one hop is counted joined transmission.

Table -1: network simulator 2 configuration

Network parameter	range
speed	10–35 m/s
packet rate	4 Packets/s
load	20% network size
Max propagation range	250 m
Receiver sensitivity (Min RSS)	-90 dBm (Milli watts in decibel)
Mac protocol	IEEE 802.11
Packet size	512 bytes
Transport layer protocol	UDP
Application	CBR (constant bit rate)

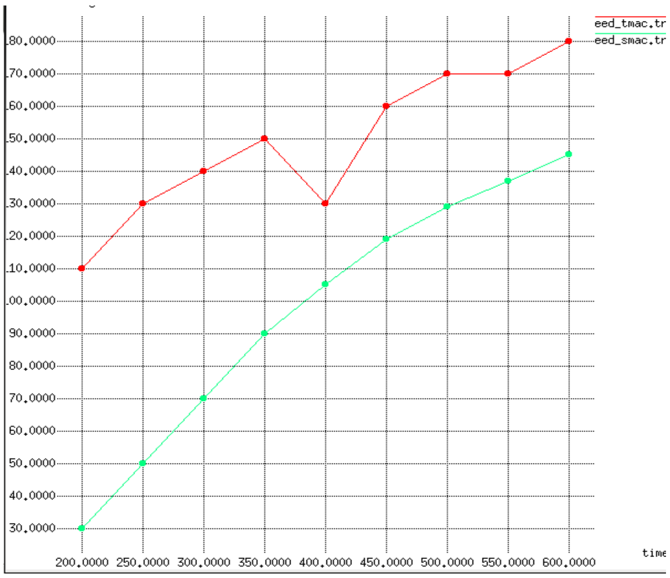

image -1: End to end delay analysis.

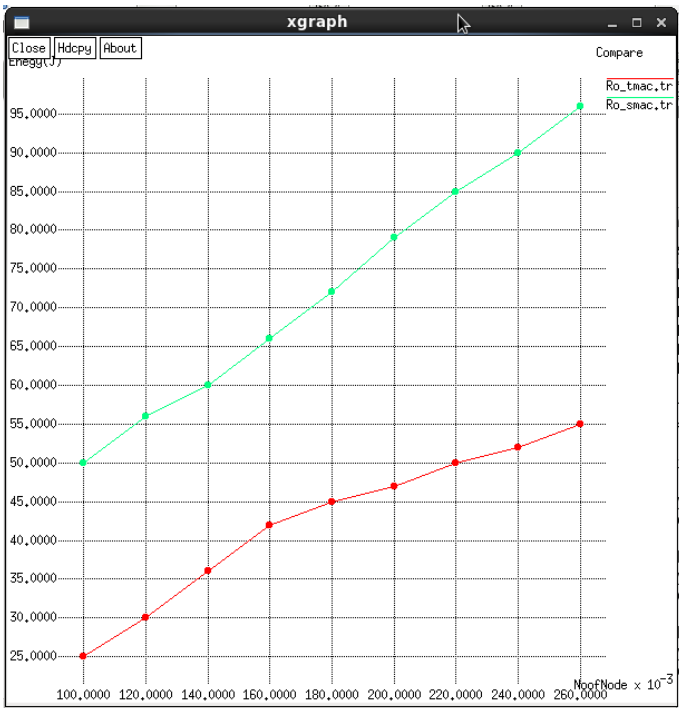

Image -2: Routing overhead analysis

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3. CONCLUSIONS

The Link breakage can cause serious impairment in network performance because the price of recent route finding is extremely high. In traditional route finding ways, the source node (or intermediate node) floods the complete network with RREQ packets to get the new route to destination. Whereas, within the planned model (CLPC), a dynamic transmission power management algorithm predicts a link breakage if probably to happen and discovers a new route to be updated within the routing table. Firstly, each node gathers its neighbors' RSS and constructs 3 transmission (maximum, average, minimum) ranges. Secondly, each node alters its transmission power primarily based on most transmission range. Since the path finding process relies on neighbor's RSS value and transmission vary, the approach

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