ESTIMATION OF MAXIMUM POWER EFFICIENCY USING REACTIVE ROUTING IN WIRELESS AD HOC NETWORKS

V. Brindha[1] and P. Manimegalai[2]

[1]Karpagam University, Coimbatore, India. E.mail: brindha1429@gmail.com; [2]Department of ECE, Karpagam Academy of Higher Education, Coimbatore, India.

ABSTRACT:

Background/Objectives: In recent years, several energy-efficient routing protocols are projected. However, little efforts are taken in finding out the energy consumption of individual node, overhead and route maintaining problems. Whereas not considering the look of energy economical routing protocol, it's going to perform terribly worst than the conventional routing protocol. **Methodology:** Here, we've projected On Demand primarily based Energy economical Routing Protocol (ODBEERP). The most aim of projected protocol is to find the minimum power-limitation route. The facility limitation of a route is set by the node that has the minimum energy therein route. Therefore, compared with the minimum node energy in the other route, the minimum node energy within the minimum power-limitation route has a lot of energy. we've conjointly projected a a lot of correct analysis to trace the energy consumptions as a result of varied factors, and improve the performance throughout path discovery and in quality situations. **Result:** The projected protocol is evaluated with object bound distinct event machine setting. Simulation results shows that the ODBEERP achieves smart outturn, less delay, high packet delivery magnitude relation and smart energy potency than the present protocol Peer.

Key words: Power Efficiency, tolerant routing, Throughput, Delay, On demand routing and energy consumption.

1.I ntroduction

Mobile Ad hoc networks (MANETs) are combination of mobile nodes without existence of any centralised cont-rol or pre-existing infrastructure. Such kind of networks generally use multi-hop paths and wireless radio commu-nication channel. Thus, communication between nodes is established by multi-hop routing. Also, new nodes join or leave the network at any time. Network deteriorates rapidly.

So, the development of a secure routing protocol [1, 2] is a critical concern.

Both network coding and opportunistic routing were deployed to enhance data delivery rate and prolonged the network lifetime in existing works. These schemes suffer from network unbalancing and frequent route failures that lead to heavy overhead.

2. Overview of Power Aware Routing

The ODBEERP could be a source-initiated, on-demand routing theme. The most aim of projected theme to find the minimum power-limitation route. The facility limita-tion of a route is set by the node that has the minimum energy therein route. Therefore, compared with the mini-mum node energy in the other route, the minimum node energy within the minimum power-limitation route has a lot of energy. In different words, the worth of that node's energy is that the most of all minimum node energy all told selectable routes.

In routing method of On Demand primarily based Energy Economical Routing Protocol (ODBEERP), the subsequ-ent assumptions are made:

1. A node will realize the worth of its current energy.
2. Links are two-way.

A. Route Discovery

In ODBEERP, nodes that aren't on a particular path don't maintain routing data or participate in routing table exchanges. The route discovery of the EECS is as follows.

Step1:

When the supply node desires to send a message to the destination node and doesn't have already a legitimate route there to destination, it initiates a path discovery method to find the opposite node. The supply node disseminates a route request (RREQ) to its neighbours. The RREQ includes such data as destination net ID, power boundary (the minimum energy of all nodes within the current found route), destination sequence variety, hop count, lifetime, Message Authentication Code (MAC) is for providing certificate authority to the nodes and Cyclic Redundancy Code (CRC) for error detection and correction. The destination sequence variety field within the RREQ message is that the last-known destination sequence variety for this destination and is derived from the destination sequence variety field within the routing table. If no sequence variety is thought, the unknown sequence variety flag should be set. the facility boundary is adequate the source's energy. The hop count field is about to zero. once the neighbour node receives the packet, it'll forward the packet if it matches.

Step 2:

When a node receives the RREQ from its neighbours, it initial will increase the hop count worth within the RREQ by one, to account for the new hop through the intermediate node. The creator sequence variety contained within the RREQ should be compared to the corresponding destination sequence variety within the route table entry. If the creator sequence variety of the RREQ isn't but the present worth, the node compares the facility boundary contained within the RREQ to its current energy to induce the minimum. If the creator sequence variety contained within the RREQ is larger than the present worth in its route table, the relay node creates a brand-new entry with the sequence variety of the RREQ If the creator sequence variety contained within the RREQ is adequate the present worth in its route table, the facility boundary of the RREQ should be compared to the corresponding power boundary within the route table entry. If the facility boundary contained within the RREQ is larger than the facility boundary within the route table entry, the node updates the entry with the data contained within the RREQ.

During the method of forwarding the RREQ, intermediate nodes record in their route tables the addresses of neighbours from that the primary copy of the printed packet was received, therefore establishing a reserve path. If identical RREQs are later received, these packets are taciturnly discarded.

Step 3:

Once the RREQ has received the destination node or associate degree intermediate node with a vigorous route to the destination, the destination or intermediate node generates a route reply (RREP) packet. If the generating node is associate degree intermediate node, it's a vigorous route to the destination; the destination sequence variety within the node's existing route table entry for the destination isn't but the destination sequence variety of the RREQ. If the generating node is that the destination itself, it should update its own sequence variety to the utmost of its current sequence variety and therefore the destination sequence variety within the RREQ packet in real time. once generating associate degree RREP message, a node smears the destination science address, creator sequence variety, and power boundary from the RREQ message into the corresponding fields within the RREP message.

Step 4:

When a node receives the RREP from its neighbours, it initial will increase the hop count worth within the RREP by one like,

Hop count = Hop count +1

When the RREP reaches the supply, the hop count represents the space, in hops, of the destination node from the supply node. The creator sequence variety fenced in within the RREP should be compared to the correspond-ding destination sequence variety within the route table entry. If the mastermind sequence variety of the RREP isn't but the present worth, the node compares the facility boundary contained within the RREP to its current energy to induce the minimum, and then updates the facility boundary of the RREP with the minimum. The facility boundary field within the route table entry is about to the facility boundary contained within the RREP.

2.1. Route Maintenance

A node uses a howdy message, that could be a periodic native broadcast by a node to tell every mobile node in its neighbourhood to take care of the native property. A node ought to use howdy messages if it's a part of a vigorous route. If, among the past delete amount, it's received a howdy message from a neighbour then will not receive any packets from that neighbour for over allowed-Hello-loss Hello-interval milliseconds, the node ought to assume that the link to the current neighbour is presently lost. The node ought to send a route error (RERR) message to all or any precursors indicating that link is failing. Then the supply initiates another route search method to search out a brand-new path to the destina-tion or begin the native repair.

2.2. Analysis of the projected Protocol

The ODBEERP could be a pure on-demand routing protocol, as nodes that are not on a particular path don't maintain routing data or participate in routing table exchanges. It permits mobile nodes to get routes quickly for brand new destinations and answer link breakages and changes in constellation during a timely manner. The operation of ODBEERP is loop free and, by avoiding the "counting to infinity" drawback, offers fast convergence once the accidental constellation cha-nges (typically, once a node moves within the net-work). Once links break, ODBEERP causes the affect-ted set of nodes to be notified so they're ready to invalidate the routes victimization the lost link. As within the AODV, the shortest routing is found once the supply initiates a route discovery with a brand-new destination sequence variety. However, one identifying feature of ODBEERP is its use of an influence boun-dary as a range criterion. The facility boundary is that the minimum of all nodes' energy within the route. Employing a power boundary ensures the updated route has the bigger power boundary. Given the selection between 2 routes to a destination, a requesting node is needed to pick out the one with the best power boun-dary. The ODBEERP selects the shortest path initially, that decreases the common relaying load for every node and thus will increase the period of time of most nodes. At identical time, the ODBEERP updates the route victimization the facility boundary as metrics, which might forestall nodes from being foolishly overused by extending the time till the primary node powers down and increasing the operation time before the network is partitioned off. This avoids further management over-head and power consumption to perform a brand new route discovery method to search out a path to the destination. Once the energy is sort of exhausted, the OS (OS) and Basic Input–Output System (BIOS) can take actions in preparation for power down that desires a lot of power. That the most power boundary route will scale back the extra data operations and conserve energy. In a word, the ODBEERP will optimize power utilization.

We have conjointly projected a new theme that is employed to cut back the energy consumption of the Edouard Manet.

3. PERFORMANCE EVALUATION

3.1 Simulation Model and Parameters

The projected protocol is enforced with the article bound distinct event machine. In our simulation, fifty mobile nodes move during a 1200 meter x 1200 meter sq. region for fifty seconds simulation time. We have a tendency to assume every node moves severally with identical average speed. All nodes have identical transmission vary of 250 meters. The simulated traffic is Constant Bit Rate (CBR).

Our simulation settings and parameters are summarized in table 1

Table 1. Simulation settings and parameters

No. of Nodes	200
Area Size	1250 X 1250 m^2
Mac	802.15
Radio Range	300m
Simulation Time	100 sec
Traffic Source	Constant Bit Rate (CBR)
Packet Size	80 bytes
Mobility Model	Random Walk
Max.& Min.Speed	10 & 0.2 ms
Protocol	AODV
Antenna	Omni directional

3.2 Performance Metrics

We evaluate mainly the performance according to the following metrics.

Throughput and delay: Throughput is generally measured as the percentage of successfully transmitted radio-link level frames per unit time.

Transmission delay is outlined because the interval between the frame point in time at the mackintosh layer of a transmitter and therefore the time at that the transmitter realizes that the transmitted frame has been with success received by the receiver.

Data packet delivery ratio: The info packet delivery magnitude relation is that the ratio of the amount of packets generated at the sources to the amount of packets received by the destinations.

End-to-end delay: This metric includes not solely the delays of knowledge propagation and transfer, however conjointly all attainable delays caused by buffering, queuing, and retransmitting information packets.

Energy Consumption per Packet: It is outlined by the full energy consumption divided by the full variety of packets received. This metric reflects the energy potency for every protocol.

Energy efficiency: Energy efficiency will be outlined as wherever the full bits transmitted is calculated victimization application-layer information packets solely, and total energy consumption is that the total of every node's energy consumption throughout the simulation time. The unit of energy potency is bit/Joule, and therefore the bigger the amount of bits per Joule, the higher the energy potency achieved.

The simulation results are presented in the next part. We compare our ODBEERP scheme with the existing techni-que PEER [12] and MTRTP [11].

3.3 Results

Nodes actual behaviours comply with the Bernoulli trial, which means that the probability that a node acts good is predetermined.

Figure 1 show the results of No. of Nodes Vs Energy Consumption per packet (mJ) under Different Node density (Static) scenarios for the 10,20,30,40,50 nodes. Clearly our ODBEERP Protocol consumes less energy per packet than the PEER and MTRTP protocol.

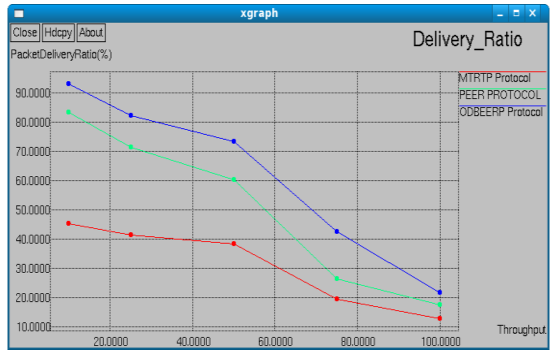

Figure 1: Different node density(Static)

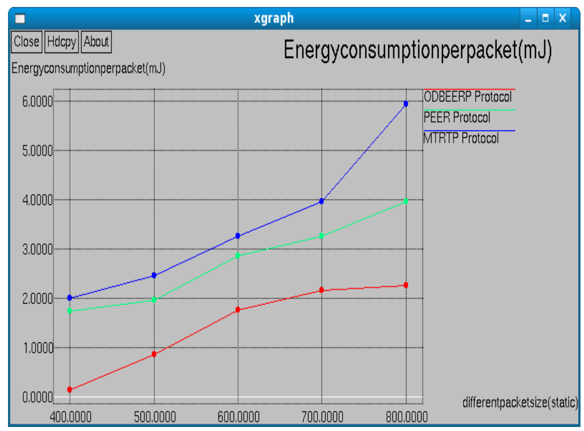

Figure 2. Throughput Vs Packet Delivery Ratio

Figure 3. Energy Consumption per Packet

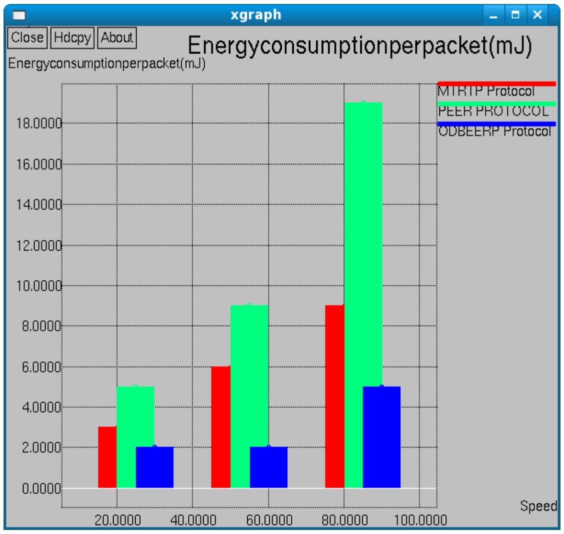

Figure 4. Speed Vs Energy Consumption

Figure 2 shows the results of packet delivery ratio for the throughput. Clearly our ODBEERP achieves more packet delivery ratio than the PEER and MTRTP. Figure 3 shows the results of Different packet size of Nodes Vs Energy Consumption per packet (mJ) under Different Node density (Static) scenarios varied from 400 to 800 packet size. Clearly our ODBEERP Protocol consumes less energy per packet than the PEER and MTRTP protocol.

Figure 4 shows the results of Speed Vs Energy Consumption per packet (mJ) under Different Node density (Static) scenarios for the 10,20,30,40,50 ….. 100 speed. Clearly our ODBEERP Protocol consumes less energy per packet than the PEER and MTRTP protocol.

4. CONCLUSION

In MANET, it's important to style energy-efficient routing protocols. In case if we've not thought of a careful style, associate degree energy-efficient routing protocol may have abundant poor performance than a traditional routing protocol. During this paper, we have a tendency to initial derived associate degree analytical model to a lot of track the energy consumption. We have conjointly mentioned the energy consumption technique victimiztion Topology management Appro-ach supported these observations and our analysis, we have a tendency to propose a ODBEERP protocol with a fast associate degree low overhead path discovery theme and an economical path maintenance theme for reducing energy consumption. Our performance studies show that ODB-EERP protocol reduces routing over-head and path setup delay as compared to look and MTRTP, and is very adaptation to the setting modi-fication. ODBEERP per-forms far better than tradition-nal energy-efficient proto-col in each static and mobile and below all circumstances in terms of node quality, network density, and load. In mobile situations, ODB-EERP will scale back transmission energy consumption up to fifty % all told simulation cases compared to the traditional energy economical routing protocol MTRTP and PEER.

5. References

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