EFFICIENT BROADCASTING WITH ENERGY BASED COVERAGE IN MOBILE AD HOC NETWORKS

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***Abstract* - A Mobile Ad Hoc Network (MANETs) consists of a gaggle of mobile and wireless nodes that doesn't use a centralized structure or base station system. There are many problems required to be self-addressed for swish and effective functioning of Manet. One such issue for pretty much all types of mobile nodes supported by battery powers is Energy Saving. Energy could be a restricted resource; thus, a way to extend the life of batteries is a crucial issue, particularly for Manet that is completely supported by batteries. during this paper, varied ways in which for obtaining energy economical AODV (Ad-hoc On-demand Distance Vector) routing protocol, are studied that may well be changed to enhance the networks life in Manet. An answer is planned supported considering the energy every of every} node as a result of each node's energy level contains a vast influence on the complete network life.**

In IEEE 802.11 Power Saving Mechanism (PSM), a packet should be publicized before it is really transmitted. When a node receives an advertised packet that is not destined to it, it switches to a low power sleep state throughout the information transmission amount, and thus, avoids overhearing and onserves energy. However, since some MANET routing protocols like Dynamic supply Routing (DSR) collect route info via overhearing, they would suffer if they are used in combination with 802.11 PSM. This paper proposes a new communication mechanism, known as RandomCast, via which a sender will specify the required level of overhearing, making a prudent balance between energy and routing performance. In addition, it reduces redundant rebroadcasts for a broadcast packet and therefore saves a lot of energy. In depth simulation mistreatment ns-2 shows that RandomCast is extremely energy-efficient compared to conventional 802.11 further as 802.11 PSM-based schemes, in terms of total energy consumption, energy goodput and energy balance.

Mobile ad hoc networks are rapid deployable self organizing networks. Their key characteristics are dynamic topology, high node mobility, low channel bandwidth and limited battery power. Hence, it is necessary to minimize bandwidth and energy consumption. To transmit packets, available bandwidth is known along the route from sender to receiver. Thus, bandwidth estimation is the main metric to support Quality of Service (QoS). This work focuses on improving the accuracy of available bandwidth and incorporating a QoS-aware scheme into the route discovery procedure. It is also important to limit the energy consumed by nodes. Probability based overhearing method is proposed to reduce energy spent on overhearing nodes.

1. INTRODUCTION

Adhoc networks are infrastructure less wireless networks. Here, mobile nodes communicate directly with each other. If two nodes are not within radio range of each other, they can use the forwarding functionality of another node to establish a connection, i.e., the message travels from one node to another until it reaches its destination. All nodes need to implement at least simple medium access mechanisms and need to detect collisions themselves. Therefore, nodes of adhoc networks are much more complex than those of infrastructure based networks. However, ad hoc networks are

One of the most critical issues in mobile adhoc networks (MANETs) is energy conservation. Since mobile nodes usually operate on batteries, a prudent power saving mechanism (PSM) is required to guarantee a certain amount of device lifetime.

The main goal of this paper is to make the IEEE 802.11 PSM applicable in multihop MANETs when the popular (Adhoc On-demand Distance Vector) AODV is used as the network layer protocol. A major concern in integrating the AODV protocol with the IEEE 802.11 PSM is overhearing. Overhearing improves the routing efficiency in AODV by eaves dropping other communications and gathering route information. It incurs no extra cost if all mobile nodes operate in the AM mode because they are always awake and idle listening anyway. However, if mobile nodes operate in the PS mode, it brings on a high energy cost because they should not sleep but receive all the routing and data packets transmitted in their vicinity. A naive solution is to disable overhearing and let a node receive packets only if they are destined to it. However, it is observed that this solution reduces network performance significantly because each node gathers less route information due to the lack of overhearing, which in turn incurs a larger number of broadcasts flooding of route request (RREQ) messages resulting in more energy consumption. In short, overhearing plays an essential role in disseminating route information in AODV but it should be carefully re-designed if energy is a primary concern. This paper proposes a message overhearing mechanism, called Random Cast or Rcast, via which a sender can specify the desired level of overhearing when it advertises a packet. Upon receiving a packet advertisement during an ATIM window, a node makes its decision whether or not to overhear it based on the specified overhearing level. If no overhearing is specified, every node decides not to overhear except the intended receiver and if unconditional overhearing is specified, every node should decide to overhear. Randomized overhearing achieves a balance somewhere in between, where each node makes its decision probabilistically based on network parameters such as node density and network traffic.

Key contributions of this paper are threefold:

1) it presents the Random Cast protocol that is designed to employ the IEEE 802.11 PSM in multihop MANETs.

2) In Random Cast, a transmitter can specify the desired level of overhearing to strike a balance between energy and throughput. More importantly, it helps avoid the semantic discrepancy found in most of MANET routing protocols.

3) Compared to earlier work, this paper shows that the problem of unconditional or unnecessary forwarding of broadcast packets can also be taken care of in the RandomCast framework.

Mobile ad hoc network is formed by a collection of dynamic wireless mobile nodes.

The primary objectives of MANET routing protocols include: maximizing network throughput, maximizing network lifetime and minimizing delay. Network efficiency is usually measured by life time, packet delivery ratio and energy consumption. Energy consumption is measured in joules. Energy consumption varies with number of packets transmitted. It measures the amount of energy consumed for the transmission of all the packets which includes both control and information exchange packets. A major challenge that a routing protocol designed for ad hoc wireless network faces is resource constraints. In wireless networks, energy consumption occurs due to three main events other than the usual operation of transmission and reception.

The first event results due to overhear (due to flooding technique) in which a node receives traffic not meant for it. The second event occurs due to collision. Collisions are due to Retransmissions and hence result in an increase in energy consumption. The third event - the key idea of this paper - is idle listening. It does not involve any active participation like transmission or reception. Idle listening means that a node continues to be a part of the network, but it is inactive at that time.

This paper proposes a modified protocol that reduces energy consumption due to idle listening by implementing an Adaptive Awake-Sleep scheduling algorithm. In a network, nodes must be synchronized, so that they can turn their interface off during the sleep section of the synchronized schedule. They communicate during the awaken section of the schedule. By introducing sleep mode into the network, the total energy consumption of the network can be reduced and the network lifetime can be prolonged. But the problem is that packets may go through longer paths if the nodes are sleeping on the shortest paths between source and destination nodes, resulting in more energy consumption in the network. Also, paths will be broken more often due to mode change of the nodes. Therefore, more overhead is generated to overcome the path failures and this will consume some extra energy.

In our previous work [3], the implemented protocol has the provision that the nodes can be in active mode with the reference probability 1-p and they can be in sleep mode with probability p. The probability is fixed at the initial stage. Every node (which wants to communicate) maintains a control buffer called B which represents the current number of active neighbors. The rest of the nodes in the network will be in either sleep (p) or awaken (1-p) state. The higher value of B represents more number of active neighbors. This leads to consumption of more power. So, to reduce the amount of energy consumption, we start with all initializing nodes in the network B to one.

Mobile Adhoc network is a self-configuring network of wireless links connecting mobile nodes. Each node is free to move on its own and all nodes organize themselves in an arbitrary fashion. There is no static infrastructure needed such as base station. Each node must work as a router and forward messages to the appropriate device. When the Source and Destination nodes are not within their range, then the message or packet communication between them must be done only by relying on the intermediate nodes. MANETs support some specific applications like virtual lecture rooms, military communications, emergency search and rescue operations, information acquisitions in hostile environments, communication setup in exhibitions, conferences, in battlefields among troopers to coordinate defense or attack, at field terminals for staff to share files etc [1].

In this work, Minimum energy routing protocol is considered to improve the performance during path discovery and in mobility conditions. This is combined with new on demand power aware route search scheme to provide the efficient route within given route search delay bound. By using minimally required level of transmission power for each hop, proposed route search scheme can increase battery life of the nodes, and also increase network capacity by reducing interference range.

Dynamic Source Routing (DSR) Protocol

DSR [1] is a source routing protocol. In DSR the source node starts and takes charge of computing the routes. When a node S wants to send messages to node D, it firstly broadcasts a route request (RREQ) which contains the destination and source node's identities. Each intermediate node that receives RREQ will add its identity and rebroadcast it until RREQ reaches a node who knows a route to D or the node D. Then a reply (RREP) will be generated and sent back along the reverse path until S receives RREP.

One of the key research problems in MANETs is routing. The routing protocols establish an efficient route between two nodes so that messages can be delivered in an effective way. Numerous protocols have been developed for MANETs [2]. Such protocols must deal with the typical limitations of these networks, such as low bandwidth, high power consumption, and high Error rates. AODV (Adhoc On demand Distance Vector) is a reactive routing protocol for ad hoc and mobile networks [3][4] that maintains routes only between nodes which need to communicate. The routing messages do not contain information about the whole route paths, but Only about the source and the destination. Hence, the size of the routing messages is reduced. It Uses destination sequence numbers to specify how fresh a route is, which is used to grant loop freedom.

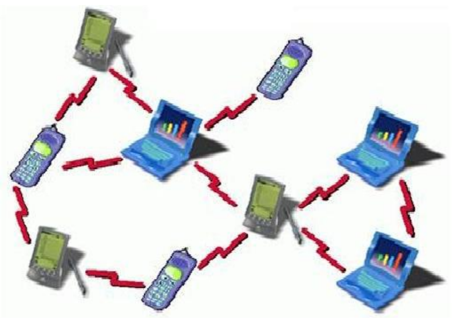


Fig.1 Mobile Ad-hoc Network (MANET)

2. RELATED WORK

The energy computation based on Gossip Sleep Protocol has been discussed as below.Zygmunt J. Haas et al [4] proposed a gossip based approach, where each node forwards a message with some probability, to reduce the overhead of the routing protocols. They stated that gossiping can reduce control traffic up to 35% when compared to flooding. This reduces the energy consumption. But, retries increase latency in large networks. So, the timeout period will have to be large so as to allow the message to propagate throughout the network. Xiaobing Hou et al [5] proposed a novel energy saving scheme, termed the Gossip-based sleep protocol (GSP). The advantages of the GSP approach through both simulations and analysis is discussed in this paper. Mubashir Husain Rehmani [6] et al gives a full report about working of AODV routing protocol in ns-2.Sunho Lim et al [7] proposed a new communication mechanism, called Random

Shibo Wu et al [9] proposed a set of probabilistic multipath routing algorithms, which generate braided multi paths based only on local information to overcome drained nodes on these paths which results in short network life when the communication in the network is unevenly distributed. Amulya Ratna Swain et al [10] have addressed reduced rate of average energy consumption for each node as they are able to put more number of nodes to sleep condition.

Analysis for the power conserving issue in MANET nodes can generally be categorized as follows:

• Importance on Transmission power: In wireless communication, based on transmitted power, some of the parameters like bit error rate, transmission rate, and inter-radio interference are computed. But, these parameters attributes are different from each other. In [2], power control is

Implemented to reduce interference and improve throughput on the MAC layer.

Determination of transmission power on each mobile host, decides to select the best network topology is discussed in [11-13]. Based on power adjustment, network throughput can be increased. The concerned issue for packet radio networks is analyzed in [14].

• Routing based on remaining Power: Routing protocol depends on the remaining power in each node. The solution has been addressed based on Power-aware and other various power cost functions [15-19]. In [15], a mobile host's battery level is computed. It has been compared with the preset threshold value. If it falls below a certain threshold, it will not forward packets for their hosts. A mixed network scenario which consists of battery powered and power plugged hosts is considered in [16].Heuristic clustering approaches for two multi-casting are addressed in [17] for two different distributed methods. This is used to minimize the transmission power. In [18], five different metrics for battery power consumption are discussed. Ref.[19] includes the hosts' lifetime and computed power metric for a distant one for solution.

• Routing based on Low Power mode: All solutions are resulted to formulate wireless devices which can be operate on low-power sleep modes. A radio of IEEE 802.11, which has a power-saving mode [20], only needs to be awake periodically. A mobile host in HIPERLAN allows defining power saving mode to its own active period. An active node may conserve powers by

Turning off its equalizer according to the transmission bit rate. Comparisons addressing the power-saving mechanisms of IEEE 802.11 and HIPERLAN in ad hoc networks are presented in [21]. A hybrid characteristic of multi-hop communication, unpredictable mobility, battery- power, and no clock synchronization mechanism is considering for MANETs.

In the protocol AAC (Adaptive Admission Control), each node estimates its local used bandwidth by adding the size of sent and sensed packets over a fixed time period [7]. It solves intra-flow contention problem by estimating the contention count of nodes along a QoS path. In [8], the authors have considered idle times of both the sender and the receiver to achieve more accuracy.

A NPSM [19] (New Power Saving Mechanism) introduces some parameters indicating amount of data in each station. In (ODPM) (On Demand Power Management) [20], soft state timers are set or refreshed on-demand based on control messages and data transmission.

Rcast [24] implements randomized overhearing but not randomized rebroadcast. Dorsey and Siewiorek [25] discussed a fast wakeup mechanism for route discovery to reduce latency. In

Randomcast algorithm [26], sender can specify the desired level of overhearing in order to save

Energy and reduce redundant rebroadcasts to improve the performance. It is integrated with DSR

(Dynamic Source Routing) routing protocol. In DSR, route caches often contain stale route Information. It broadcasts more control packets which waste channel capacity and energy.

Distance Vector) routing protocol is proposed for energy efficient method.

The paper presents Multicasting through Time Reservation using Adaptive Control for Energy efficiency (MC-TRACE) [5], an energy-efficient real-time data multicasting architecture for mobile ad hoc networks. MC-TRACE is a cross-layer design, where the medium access control layer functionality and the network layer functionality are performed by a single integrated layer. The basic design philosophy behind the multicast routing part of the architecture is to Establish and maintain an active multicast tree surrounded by a passive mesh within a mobile ad hoc network.

IEEE 802.11 PSM

In the IEEE 802.11 PSM, a node can be in one of two different power modes, i.e., active mode when a node can receive frames at any time and power-save mode (PS) when a node is mainly in low-power state and transits to full powered state subject to the rules described next. The low-power state usually consumes at least an order of magnitude less power than in the active state. In the power-save mode, all nodes in the network are synchronized to wake up periodically to listen to beacon messages. Broadcast/multicast messages or uncast messages to a power-saving node are first buffered at the transmitter and announced during the period when all nodes are awake. The announcement is made via an ad hoc traffic indication message (ATIM) inside a small interval at the beginning of the beacon interval called the ATIM window. If a node receives a directed ATIM frame in the ATIM window (i.e. it is the designated receiver), it sends an acknowledgment and stays awake for the entire beacon interval waiting for data packets to be transmitted. Immediately after the ATIM window, a node can transmit buffered broadcast/multicast frames, data packets and management frames addressed to nodes that are known to be active (by reception of acknowledgment to ATIM frames). Otherwise, the node can switch to the low-power state to conserve energy. In IEEE 802.11, a node's power management mode is indicated in the frame control field of the MAC header for each packet. In the IEEE 802.11 PSM, the length of a beacon interval and the size of an ATIM window are configured by the first node that initiates the network in IBSS. A mobile station can choose to wake up every multiples of the beacon intervals for further energy saving.

Sree Ranga Raju [14] proposed a conservative approach to gather route information. It does not allow overhearing and eliminates existing route information using timeout. This necessitates more RREQ messages which in turn results in more control overheads in routing. Shish Shukla [3] proposed a cache timeout policy to predict route cache lifetime, and to expunge stale route Cache entries, which are timed out.

3. PROBLEM STATEMENT

The PS mode of IEEE 802.11 is designed for a single-hop (or fully connected) ad hoc network. When applied to a multi-hop ad hoc network, three problems may arise. All these will pose a demand of redesigning the PS mode for multihop MANET.

A) Clock Synchronization: Since IEEE 802.11 assumes that Mobile hosts are fully connected; the transmission of a beacon frame can be used to synchronize all hosts' beacon intervals .

B) Neighbor Discovery: In a wireless and mobile environment,

A host can only be aware by other hosts if it transmits a signal that is heard by the others. For a host in the PS mode, not only is its chance to transmit reduced, but also its chance to hear others' signals.

C) Network Partitioning: The above inaccurate neighbor information may lead to long packet delays or even network partitioning problem.

D) POWER-SAVING PROTOCOLS FOR MANET

In this section, we present three asynchronous power-saving protocols that allow mobile hosts to enter PS mode in a multihop MANET. According to the above discussion, we derive several guidelines in our design:

- **More Beacons**: To prevent the inaccurate-neighbor problem, a mobile host in PS mode should insist more on sending beacons.
- **Overlapping Awake Intervals:** Our protocols do not count on clock synchronization, to resolve this problem, the wake-up patterns of two PS hosts must overlap with each other no matter how much time their clocks drift away.

- **Wake-up Prediction:** When a host hears another PS host's beacon, it should be able to derive that PS host's wake-up pattern based on their time difference.

3.METHODOLOGY

Gossip Routing in Ad hoc Networks:

The major objective as proposed in Gossip Sleep Protocol (GSP) is used to achieve energy efficiency by putting some nodes in a sleep mode. The potential disadvantage of this approach is that packets may go through longer paths if the nodes sleeping are on the shortest paths [4] between source and destination nodes, resulting in more energy consumption in the network-wide communication. Also, paths will be broken more often due to mode change of the nodes.

Bandwidth estimation is a main function needed to provide QoS in MANETs. Since each host has inaccurate knowledge of the network status and dynamic links, it is difficult to estimate the available bandwidth between nodes. Hence, an effective bandwidth estimation scheme is needed.

3.1 Available Bandwidth Measurement Algorithm (ABM)

Step1: Evaluate the capacity of a node and estimate the available bandwidth.

Available bandwidth = Channel Capacity - Utilized Bandwidth (1)

Here Utilized Bandwidth = N*S*8/T

Where N- No. of packets, S- Size of packet and T- Time duration

Step 2: Estimate the link's available bandwidth. It depends on channel utilization ratio and idle period synchronization. Let it be E(b(s,r)). It is calculated based on the probability that the medium is free simultaneously at the sender and the receiver side.

Step 3: Estimate collision probability Pm=f(m).P hello (2)

Where f(m) – Lagrange interpolated polynomial function, Phello - Collision probability

Estimated based on hello packets.(Phello = (Expected - Recd no. of Hello pkts)/ Expected no. of Hello packets)

Step 4: Collision leads to retransmission of same frames. When collision occurs, log based Pipelined backoff algorithm is executed. Backoff algorithm is used to reduce collisions when more than one node tries to access the common channel. This is an additional overhead which affects the available bandwidth.

Bandwidth loss due to this additional overhead K is evaluated as,

$$K = \frac{DIFS + \overline{backoff}}{T(m)}$$

Where DIFS- DCF Inter Frame Spacing, T (m) - time between two consecutive frames and - the average number of slots decremented for a frame.

The above facts are considered and combined to estimate the final available bandwidth.

$$E_{final}(b(s,r)) = (1-K).(1-P).E(b(s,r)$$

Where Efinal(b(s,r)) is the available bandwidth on link by monitoring node and link A capacity, P is collision probability and K is bandwidth loss due to backoff scheme.

Step 5: Finally this estimated available bandwidth is stored in neighbor nodes with the help of
hello messages.

Step 6: Malicious nodes consume bandwidth and increases packet loss. These attackers are identified and blocked using a threshold value set for the node.

Step 7: Routing protocol called enhanced link disjoint AOMDV (Adhoc On demand Multipath
Distance Vector) finds the route based on this available bandwidth.

Energy efficient method

Energy saving mechanism is important for the efficient operation of the battery powered networks. All the neighboring nodes overhear when a node is transmitting a packet. Hence it is necessary to limit the number of overhearing nodes based on probability. Probability value depends on the number of neighbors. The proposed algorithm controls the number of overhearing nodes. It saves energy consumption without affecting quality of route information. When a node is ready to transmit a frame, check its overhearing level (OL) for broadcast and unicast transmission. Three possibilities such as probability overhearing, no overhearing, and unconditional overhearing are considered while finding the routes.

a) Probability overhearing is applied for RREP (Route Reply) and DATA packet.

b) RERR (Route Error) messages will be assigned unconditional overhearing. The reason is that the link failure should be informed to all the nodes, so that the nodes will not use it for the next time until the path gets ready.

c) RREQ (Route REQuest) is a broadcast message and based the probability (Po) values, probability overhearing is set. Each node receives ATIM and ATIM-ACK during an ATIM window and depending on its subtype, node is either in awake or sleep state.

Step 1 : Check if Destination Address = Broadcast / Unicast

Step 2 : If it is Broadcast, check for whether it is the destination. If so, receive packet.

Step 3 : If it is Unicast, check for the subtype values and decide the level of overhearing.

Step 4 : If the subtype is for conditional overhearing then compare the probability values with the threshold and decide the level of overhearing.

Step 5: Rebroadcasting probability and overhearing probability can be identified

Step 6: Repeat the process 2 to 5.

Probability based overhearing method controls the level of overhearing and forwarding of
Rebroadcast messages. Node is awakened if unconditional overhearing or probability overhearing is set or if it is a destination node. Each node maintains overhearing probability Po and rebroadcast probability Pr.

$$P_o = 1/n$$

$$P_r = cn/N^2$$

Where c is a constant, n- No. of neighbors and N- Average no of. Neighbor's neighbors.

Then the energy consumed (Ec) by the nodes is calculated as,

$$E_c = \sum(I_e - R_e)/\text{ no. of pkts transmitted}$$

Where Ie is Initial energy and Re is residual energy. If a node's subtype is 1101, it generates a random number between 0 and 1 and compares it with Po

The main contribution of this part of the work is to limit the number of overhearing nodes based on probability. It reduces energy consumption without affecting quality of route information. This probability based overhearing is incorporated into log based pipelined ABM and integrated with routing protocol.

This modified algorithm is also integrated into a routing protocol called enhanced link disjoint multipath AODV (AOMDV) to find the routes from given source to destination based on available bandwidth.

The Modified ATIM frame

The mechanism enables a transmitter to choose no, overhearing for its neighbors, specified in the ATIM frame and is available to its neighboring nodes.

FC	DI	DA	SA	BSSID	SC	Frame Body	FCS	MAC	OC
2	2	6	6	6	2	0	4	2	4

PV	Type	ST	To DS	From DS	More Frag	Retry	Pwr Mgt	More Data	WEP	Order
2	2	4	1	1	1	1	1	1	1	1

Fig 2. Modified Frame Format

The node decides whether or not to receive/overhear the advertised packet in the following data transmission period based on DA and ID. MAC is used for accessing the medium. OC means Overhearing Count, which is used for measuring the overhearing from the source to destination node. It would remain awaken to receive it if one of the following conditions is satisfied:

1. The receiving node is the anticipated destination.
2. If the node is not the destination and unconditional overhearing is opted.
3. If the node is not the destination, the randomized overhearing is opted. For each of the unicast packets, DSR uses the following overhearing mechanism, they are as follows,

a. Randomized overhearing for RREP packets
b. Randomized overhearing for data packets
c. Unconditional overhearing for RERR packets

3.2An Overhearing and Forwarding Mechanism for Broadcasting Packets

This overhearing and forwarding mechanism can be applied to the broadcast packets such as RREQ to allow randomized overhearing; this avoids redundant rebroadcast of the same packet in dense mobile networks. On the other hand, the rebroadcast decision must be made conservatively.

This is because a broadcast packet may not be delivered to all nodes in the network when conditional rebroadcast is used. The rebroadcast probability (PF) is set higher than overhearing probability (PR). In overhearing, different broadcast packets are given, they are as follows

i. Randomized rebroadcast for RREQ packets
ii. Unconditional rebroadcast for ARP (address resolution protocol) request Even though RandomCast reduces energy consumption by allowing the sender to specify the desired level of Overhearing, the problem arises due to node mobility since the node mobility results in stale routes in route caches. This stale route problem will again be a cause for energy consumption. To make the RandomCast mechanism more effective stale route avoidance is necessary and this is done by implementing the cross layer framework which depends on cache timeout policy.

Stale Route Avoidance in DSR by Cache Timeout Policy

Nodes movements result stale route cache entries. Cache staleness is a big problem in link cache scheme where individual links are combined to find out best path between source and estimation. A cache timeout policy is required to expire a route cache entry, when it is likely to become stale. DSR makes aggressive use of route cache to avoid route discovery. The performance of DSR heavily depends on efficient implementation of route cache. In this, a new cross-layer approach for predicting the route cache lifetime is presented. This approach assigns timeouts of Individual links in route cache by utilizing Received Signal Strength Indicator (RSSI) values received from wireless network interface card.

Demand based energy efficient algorithm (DBEE), the topology is changed dynamically according to the network traffic requirements. DBEE is integrated with the cross layerb approach [3] to predict the route cache life time and find the stale route information. Initially a small set of nodes is computed which form a connected set, while the other nodes are put off to conserve energy. This connected set is used for routing the packets under low network load. If bulk data is transferred between a pair of nodes, the topology dynamically changes along the path between these nodes to minimize the power consumption. Steps involved in the modified DBEE - Cross layer approach as follows:

Step 1:

The first phase chooses a small set of nodes that constitutes independent set of the network. Here, we have considered 3 factors like energy factor, mobility factor, and utility factor. In energy factor, Let E0denote the initial node's energy and Et be the amount of energy of a node at time t. So the energy factor Ei of the node i is calculated as

$$\frac{E_o - E_t}{E_o}.$$

Mobility factor (Mi) can be derived as the ratio of Received signal strength and Probability of overhearing rate to the energy consumption at the source to be transmitted. Utility factor is derived as nodes that have a large number of neighbor nodes which have less conditional overhearing. It is denoted as Ui By forming these three factors within the limitation of region R, the node moves independently with the reducible amount of overhearing.

Step 2: The second phase is electing more nodes to ensure that the selected nodes form a connected set.

Step 4: In fourth phase, the topology is dynamically changed with the use of power control technique to minimize the total power consumption. In this technique, all nodes consume more power when it receives full transmission power. This can be reduced by choosing low energy cost path. The minimum receiving power is calculated as,

$$P_r = P_t G_t G_r h_t^2 h_r^2 / d^4$$

ht, hr, Gt, Gr - Antenna height and gain of the transmitter and receiver's is the distance between transmitter and receiver. The actual power is given as,

$$\zeta p,q = K \frac{P_t}{P_r} + W$$

K is function of ht, hr & d.

W is the energy consumed by each receiving node.

In DBEE algorithm, the energy consumption is minimized along the routing path using the power control technique during the transmission.

Step 5:

The steps for removing stale route information is as follows

1. RREQ packet will be broadcasted to all the nodes.
2. The overhearing level will be set in the frame type field of ATIM for RREP and RERR packets.
3. Nodes in the network may overhear the RREP and able to stores the route information in route caches.
4. If there is any link break, RERR is propagated to the source node by an upstream node, so that it can be deleted these stale route from route cache.
5. The stale route information will be present in some of the neighboring nodes due to the overhearing of RREPs.
6. Route cache is updated based on RSS by cache timeout policy to remove stale routes from the Neighboring nodes.

In this work, based on the Adaptive Energy Efficient Routing for Gossip based (AEERG) Ad hoc routing [3], we propose a modified Protocol to achieve energy efficiency and reliability in wireless ad hoc networks in an efficient manner. In this protocol, at the initial stage, the nodes can be in active mode with probability 1-p or sleep mode with probability p.Every node in the network, which wants to communicate, maintains a control buffer called B. It represents the current number of active neighbors.

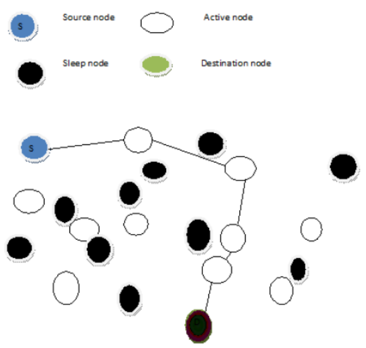


Fig. 3 Illustratration of triggering node from sleep mode

In this work, to improve the reliability, adaptive technique is incorporated. In each node, a Remote Activated Switch (RAS) is placed. The schematic representation of the switch RAS is shown in Fig.3.Whenever a node becomes idle, it enters into a sleep state, If the received sequence matches the device's sequence, it turns on the standard receiver. Notice that the RAS receiver may be either totally passive (e.g., an amplitude demodulator) or supplied by the battery source through connection 1

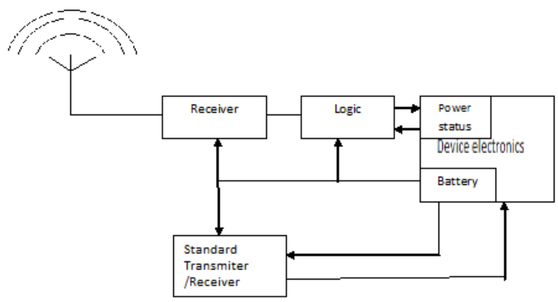


Fig 4. Basic Communication model circuit diagram

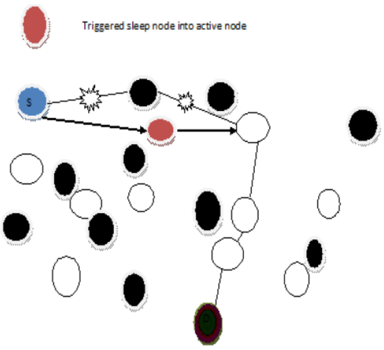


Fig 5 .Illustratration of triggering node from sleep mode

4. PROPOSED METHOD

NO, UNCONDITIONAL, AND RANDOMIZED OVERHEARING

The unicast packet is delivered only to an intended receiver if the IEEE 802.11 PSM is employed. Consider that a node S transmits packets to a node D via a pre-computed routing path with three intermediate nodes as shown in Fig. 3. Only five nodes are involved in the communication and the rest would not overhear it (no overhearing). However, if each neighbor is required to overhear as in AODV, each sender should be able to ―broadcast‖ a unicast message. i.e., it specifies a particular receiver but at the same time asks others to overhear it as shown in Fig. 4 (unconditional overhearing).

A key design issue in the Random Cast implementation is randomization. Basically, each node maintains an overhearing (rebroadcast) probability, PR (PF), determined using the factors listed below.

Sender ID: The main objective of RandomCast is to minimize redundant overhearing. Since a node would typically propagate the same route information in consecutive packets, a neighbor can easily identify the potential redundancy based on the sender ID.

Number of neighbors: When a node has a large number of neighbors, there potentially exists a high redundancy.

Mobility: When node mobility is high, link errors occur frequently and route information stored in route caches becomes stale easily.

Remaining battery energy: This is one of the most obvious criteria that helps extend the network lifetime: less overhearing (a lower PR) and less rebroadcast (a lower PF) if remaining battery energy is low.

Flow of random cast process:

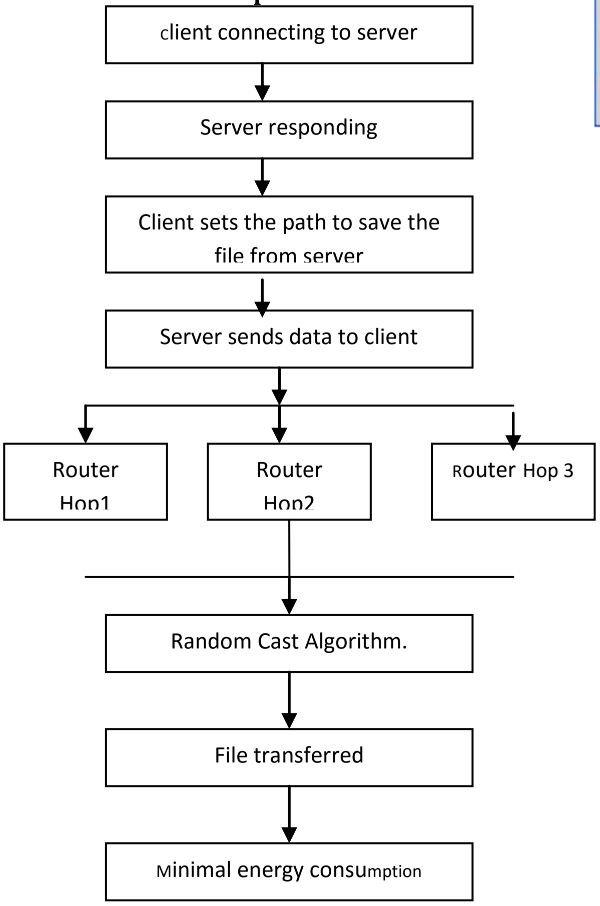


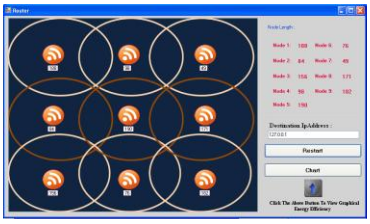
FIG 6 .FLOW OF OUR PROPOSED METHODS

4. PERFORMANCE EVALUATION

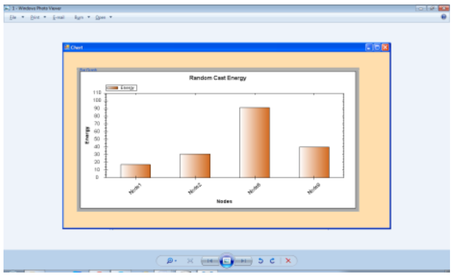
The performance of Random Cast is evaluated using ns-2, which simulates node mobility, a realistic physical layer, radio network interfaces, and the DCF protocol. Since ns-2does not support 802.11 PSM, we modified the simulator based on suggestions in [7]. Our evaluation is based on the simulation of 50 mobile nodes located in an area of 1500 _ 300m2. The radio transmission range is assumed to be 250 m, and the two-ray ground propagation channel is assumed with a data rate of 2 Mbps. The data traffic simulated is constant bit rate (CBR) traffic. Twenty nodes out of 50 generate CBR streams at the data rate of 0.2-2.5 256-byte data packets every second (Rpkt).

The average energy consumption per node, and energy good puts for the five different schemes mentioned above with varying packet injection rate (0.2- 2.5 packets/second). In the high packet injection rate, both 802.11 and ODPM show a higher PDR than 802.11 PSM, RCAST, and RandomCast because all (802.11) or more (ODPM) nodes are in AM and participate in the packet transmission. On the other hand, 802.11 and ODPM consume more energy than RCAST and RandomCast. It is important to note the performance difference between RCAST and RandomCast. RandomCast achieves a higher PDR, particularly when packet rate is high. In the graph it is clear that after certain extent the overhead increases exponentially with increase in number of nodes.

Data sending for each node



Data sending for each node and find nearest node



Energy Level For Ever Node Based

4. CONCLUSION

In this paper, we have developed demand based energy efficient with cross layer approach which attains minimum energy consumption to the mobile nodes. In the first phase of the scheme, minimum energy consumption is achieved using DBEE algorithm. It uses three factors called utility factor, energy factor, mobility factor to favor packet forwarding by maintaining minimum energy consumption for each node. In first phase, all the redundant nodes are removed. We have demonstrated the energy estimation of each node. In second phase, the stele route problems are avoided using the Cross layer approach.

By simulation results, we have shown that the DBEE -CLA achieves good packet delivery ratio while attaining low delay, overhead, minimum energy consumption than the existing schemes Randomcast and 802.11 PSM while varying the number of nodes and mobility. The unique characteristics of MANETs make routing a challenging task. Mobility of nodes cause
Frequent route failure. As a result of these, an effective routing protocol has to adapt to dynamic Topology and designed to be bandwidth and energy efficient. Log and pipelined concepts help to Reduce the channel idle time and collision overhead. In order to reduce energy consumed by overhearing nodes, probability based method is implemented. Results presented in this article
Confirmed that the proposed method outperforms the existing method in terms of QoS parameters.

Hence, this method improves the available bandwidth and reduces energy consumed by overhearing nodes so that as much as possible bandwidth is available for actual data transmission. In power-controlled wireless ad-hoc networks, battery energy at conventional routing objectives was to minimize the total consumed energy in reaching the destination. However, the conventional approach may drain out the batteries of certain paths which may disable further information delivery even though there are many nodes with plenty of energy.

In Random Cast, when a packet is transmitted, nodes in the proximity should decide whether or not to overhear it considering the trade-offs between energy efficiency and routing efficiency. RandomCast also improves energy good put by as much as 56 percent, that is, an integrated measure of energy and PDR. The performance results indicate that the proposed scheme is quite adaptive for energy-efficient communication in MANETs. In particular, applications without stringent timing constraints can benefit from the RandomCast scheme in terms of power conservation

5. FUTURE WORK

The projected mechanism is enforced by considering the parameter as variety of neighbors and remaining battery energy. This work may be extended by considering alternative factors like, sender ID, and node quality. Random Cast opens several fascinating directions of analysis to pursue. First, this paper identifies four factors that have to be considered for the overhearing/rebroadcast call. These are sender ID, variety of neighbors, mobility, and remaining battery energy. we have a tendency to enforced the Random Cast theme exploitation solely the second issue (number of neighbors) however we have a tendency to attempt to investigate the effect of alternative 3 factors (sender ID, mobility, and remaining battery energy) for creating the choice. Since these factors increase the corresponding overheads, we have a tendency to additionally got to assess their tradeoffs. Particularly, sender ID is that the most compelling plan and can be enforced simply with an easy hashing perform. Remaining battery energy can play a vital issue if energy balance is critically necessary. It's have a tendency to attempt to incorporate the thought of Random Cast with alternative routing protocols. Its can reduce the waste energy consumption of the nodes by reducing the number of routing control packets and reducing the energy consumed by nodes in a large network to increase the life time of network.

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