



**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH  
TECHNOLOGY**

**ENERGY MANAGEMENT IN ADHOC WIRELESS NETWORK**

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**ABSTRACT**

Wireless Adhoc Network (WAN) is infrastructure-less, self-organising, decentralised type of wireless network. Nodes acts as router. Battery management is an important issue in Wireless Adhoc Network, which gets depleted in each router whenever transmission occurs within the network. Since adhoc network has limited battery power, energy consumption for transmission should be minimized. Due to limited battery power, energy management is inevitable. Delay to be minimized, nodes has insufficient communication bandwidth in the network. In this paper we focus on the energy management issue such that battery usage considerably should be efficient.

**KEYWORDS:** Wireless AdhocNetwork(WAN), Energy consumption, Power management

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**INTRODUCTION**

Adhoc network is an autonomous system of mobile nodes connected by wireless links; each node operates as an end system and a router for all other nodes in the network. Nodes in mobile ad-hoc network are free to move and organize themselves in an arbitrary fashion. The network is ad hoc because it does not rely on a preexisting infrastructure, such as routers in wired networks or access points in managed (infrastructure) wireless networks. Instead, each node participates in routing by forwarding data for other nodes, and so the determination of which nodes forward data is made dynamically based on the network connectivity. Mobile ad-hoc networks can turn the dream of getting connected "*anywhere and at any time*" into reality. As an example, we can imagine a group of peoples with laptops, in a business meeting at a place where no network services is present. They can easily network their machines by forming an ad-hoc network.

The nodes in adhoc network can communicate with each other through direct wireless links or multi-hop routing. It has been used in a wide range of applications ranging from a battlefield to the user's living room. However, due to the limit battery energy of mobile nodes, how to prolong the lifetime of nodes as well as network becomes the key challenge in wireless adhoc network, and it has received more and more attentions.

An ad hoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing network infrastructure or centralized administration. Due to the limited transmission range of wireless network interfaces, multiple network "hops" may be needed for one node to exchange data with another across the network. Batteries provide limited working capacity to the mobile nodes. Power consumption control in ad-hoc networks is a more difficult problem due to non-availability of access point and low battery power in network. Battery power of a node is a precious resource that must be used efficiently in order to avoid early termination of a node or a network. Thus, energy management is an important issue in such networks. Efficient battery management, transmission power management are the major means of increasing the life of a node. Power consumption depends on the medium access layer and protocol from physical to transport layers, which selects the minimum amount of transmission energy required to exchange messages between any pair of neighboring nodes. Power failure of a mobile node not only affects the node itself but also its ability to forward packets on behalf of others and hence affects the overall network lifetime.

Existing methods for energy conservation are focus on transmission power control and dynamic turning off active nodes in network. Controlling the transmission power allows to significantly reduce the energy consumption for data sending and increase lifetime of the network. A node consumes its battery power of each transmission and reception of data packet, as more as it will transmit or receive data packet, power consumption will also be increased. Nodes forward packets for their peers in addition to their own, in other words, nodes are forced to expend their battery charge for receiving and transmitting packets that are not intended for them.

This paper focuses on energy management techniques that is how to lower the power consumption at each node is being specified.

**RELATED WORK**

Cartigny proposes a local protocol based on energy management where each node requires only the knowledge of its distances to all neighbour nodes and distances between its neighbour nodes [1]. Nodes adjust their transmission power so as to achieve the minimum energy consumption according the local information. Ramanathan and ElBatt implement adjusting transmission power levels to achieve a desired degree of connectivity in the network, while using the minimum transmit power for delivering packets [2][3]. In [6], NeerajTantubay and his colleagues referred the approach to minimize power consumption in idle mode of mobile nodes.

K. Arulanandam and B. Parthasarathy[4] given an idea to change mode of the mobile nodes from Idle to Sleep, because when nodes neither transmitting nor receiving data packets but in Idle mode consume power as consume in receiving mode. They taken two ad hoc on-demands routing protocol and performed this approach and given that power consumed by these protocols, with this mechanism is less than power consumed without this. It saved power up to 60% of than earlier.

Seung Hwan Lee and his colleagues, in [5], proposed an energy efficient power Control mechanism for base station in mobile communication systems and a efficient sector power control based on distance between base station and mobile node. They also proposed a sleep mode energy control mechanism. In sleep mode energy saving protocol, each sector monitors the number of user in sector cell. They proposed, if number of mobile node falls down a given threshold in sector cell, base station shuts down power. They also proposed an algorithms and demonstrated the tradeoff between energy saving and cell coverage in order to enhance efficient use of base station Transmission power.

**OBJECTIVE**

The energy can be conserved by reducing the energy consumed for two main operations, namely, communication and computation. The communication related power consumption is mainly due to transmit-receive module present in the nodes. Whenever a node remains active or live, that is, for the duration of transmission or reception of a packet, power gets consumed. Even when the node is not actively participating in communication, but is in the receiving mode waits for the packets, the battery keeps utilized. The processing power refers to the power spent in calculations that take place in the nodes during routing and power adjustments. And communication power refer to utilize energy in transmission, receiving time etc. so our aim to efficient utilize energy of each mobile node and increases the reliability of the network.

**PROPOSED SYSTEM**

In Adhoc wireless environment Power management technique is used to minimize the power consumed of battery-powered based mobile devices. The efficient power management policies are required to measure various performance posed by different application such as throughput, latency and other performance metrics. The main idea of Power management technique is to triggered mobile nodes to the low-power mode (Sleeping Mode) from high-power mode, when they are in inactive mode or idle mode. Since the mobile nodes should be allowed to sleep for power saving. Therefore in power management, the communication mobile nodes require distributed coordination between communicating mobile nodes, as all the mobile nodes have to be in the active mode for a successful communication. Whenever a node is in sleeping mode and the arrival pattern of communication events is not known ,then a control message is required to inform a remote sleeping node to wake up for data packets transmissions.

The power management technique in wireless ad hoc networks is used to achieve the following decisions:

- Which set of nodes should perform power management.
- When a active-mode node switches to the low power state and
- When a inactive-mode node switches from the low-power mode to the active mode.

An efficient power conserving management technique, for wireless ad hoc networks, consists the following properties:

- It should transmit data packets between source and destination with minimum delay than if all mobile nodes were awake.
- For making local decision to each node the algorithm used for awake the nodes should be distributed.

- Even a node is idle in receive mode can consume almost as much energy as an active transmitter.

### *Sleep/Awake Algorithm:*

**Algorithm:** SleepDuration(S)

Require: A valid state S

Ensure: The value of desired sleep duration after reception of last packet

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1: T ← 0
2: while not isInvolved(S) do
3:   S ← nextState(S)
4:   if S.Xpacket == SOURCE then
5:     T ← duration + Tpacket
6:   else
7:     T ← duration + Trelay
8:   end if
9: end while
10: return D

```

This module describes about the sleep/awake state of any node in the course of communication. Before going to detail of the algorithms used to achieve the sleep/awake of any node we have to discuss some of the parameters, assumptions and state maintained in each node in the particular moment. State(S) of Sleep/Awake algorithm consists of two main parts: static state, and dynamic state.

Dynamic state is updated online while routing, whereas the static state is precompiled and does not change afterwards. Sleep/awake algorithm which is responsible for deriving the sleep duration and put the idle nodes in the network to sleep as well as to awake the node to receive the data packet. The algorithm requires the valid state S to compute the desired sleep duration and it will return the sleep duration to node. Initially node which has to undergo to sleep will check whether it is involved in relay because to decide whether the sleep is presleep or postsleep.

Presleep is the condition where the nodes which are not involved in the relay will be put to sleep state before communication starts and Postsleep is state in which the node after forwarding the data packets to next node will be immediately put to sleep after their work is over.

After determining the all those preconditions it checks the current packet is in source or intermediate node to derive the sleep duration as. If the packet location is source the sleep duration will be the combination of duration (sleep duration).T<sub>packet</sub> the node will wait for duration obtained and sends the packet to next node and will go to sleep (Postsleep). If packet location is intermediate node the sleep duration will be the combination of duration (sleep duration) + T<sub>relay</sub> the node will wait that much duration for reception of packet and then forward to next node and will go to sleep. The value of desired sleep duration after reception of last packet, i.e., after forwarding the packets the sensor will go into sleep state, until next seed is passed for state change.

### **CONCLUSION**

In this paper, we have proposed an idea for Energy Management in Wireless Adhoc Networks and power consumption technique. Power saving is carried at different levels. Energy is managed at the nodes in their idle mode before the transmission. It will also gives each node's energy value, required transmission power and receiving power and also increases life time of the network.

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