



A Study of Differing Techniques for Reduction of Power Dissipation over the MANET

Mr.K.Naveen Durai

Assistant Professor

Department of Computer Science,
Sri Eshwar College of Engineering, India

A.Anitha

M.E., Student

Department of Computer Science,
Sri Eshwar College of Engineering, India

Abstract- Mobile adhoc network (MANET) is differing from conventional network. MANET is a self organising and adaptive network rather than fixed infrastructure. Advancement and dynamic improvement technologies in MANET are opening for evolution of mobile communication from regnant stages to enhance state. Even though power dissipation in MANET is one of the challenge tasks for every researcher and practitioner. In this course we will focus on our attention on techniques used for suppress the power dissipation over the MANET in which cross layer feedback mechanism, Hello messaging schemes, Efficient flooding techniques in MANET, Supporting protocols for energy efficient

Keywords— MANET, Feedback mechanism, periodic hello message, adaptive hello message, flooding, power aware source routing protocol

I. INTRODUCTION

Mobile Ad hoc Network (MANET) is one that comes together as essential thing, not compulsory with any support from the existing Internet infrastructure or any other kind of stable stations. We can modify this statement by indicating an ad hoc network as an autonomous system of mobile hosts (also serving as routers) connected by air medium also called a wireless links, the together of this network which forms a communication network modelled in the form of an arbitrary graph. This is in contrast to the well-known single hop cellular network model that supports the needs of wireless communication by installing base stations as communicating point also called as access points. In these cellular networks, connecting in air medium between two mobile nodes completely rely on the wired backbone and the fixed base stations. In a MANET (fig.1) no such infrastructure exists and the network topology may dynamically change in an unpredictable manner since nodes are free to move. Wireless Sensor Networks is an emerging application area for ad hoc networks which has been receiving a large attention.

The idea is that a collection of cheap to produce tiny sensors and it would be able to sense, coordinate activities and transmit some physical characteristics about the surrounding environment to an associated to the base station. Once placed in a given environment. It is expected that power will be a major driving issue behind protocols tailored to these networks, since the lifetime of the battery is responsible for defines the sensor's lifetime.

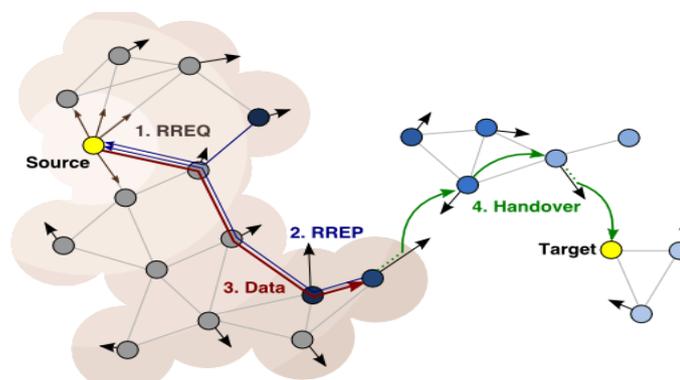


Figure: 1 A Mobile Adhoc Network

REAL TIME APPLICATION OF MOBILE ADHOC NETWORKS

1. MANET is very much useful for some mobile adhoc networks. when the business meeting outside, the MANET environment is very helpful to brief about given assignments to clients
2. The game theory provide basis to analysis the mobile adhoc networks

3. Setting of mobile adhoc network is very easy at the time of disaster recovery rather than conventional network
4. Another application example of mobile ad-hoc networks. Bluetooth, which is designed to support a personal area network by dispose of wires between various devices, such as printers and personal digital assistants.
5. Mobile ad hoc networks also allow devices to transmit at a lower output power to the neighbors which benefits the overall network by lowering the probability of detection and by increasing the battery

II. PROBLEM STATEMENT

In this paper we focus on the energy constrain of MANET network, the wide range of application leads to restrict the power. This will put forward the concept this paper. The power constrains is major role in all application MANET is not exception for this problem, Hence concentrated area for finding the solution is cross layer feedback mechanism, Hello messaging scheme, supported protocols for the energy efficient ,flooding scheme involved in the MANET for increase the life time of network

A. CROSS LAYER FEEDBACK MECHANISM

BACKGROUND

Cross-layer design approaches in wireless networks propose strong interactions between layers in the protocol stack. Mobile Ad-hoc networks (MANETs) have significant characteristics that make them suitable not only for cross-layer designs, but also for even coupled interactions of functions in different layers. The wireless networking community has acknowledged the importance of cross-layer designs for optimizing the performance of wireless networks. In a traditional layering approach, layers present in a protocol stack provide services and interact only with contiguous layers through well defined interfaces. Thus, there is a clear separation of functions and strict boundaries are imposed between layers.

Diverging from this traditional layering approach, the cross-layer approach is more suitable and allows a more intensive feedback between layers [1, 2, and 3]. For instance, using a cross-layer design, adaptive modulation and coding at the physical layer can be designed considering the radio link level error control technique (e.g., ARQ) to maximize network capacity under constrained QoS needed. Cross-layer techniques can also be developed at the application layer for wireless multimedia services which exploit physical and radio link layer information, thus performing act of adapting according to varying conditions in the lower layers. These coupled interactions between different layers are very beneficial in wireless networks, but the benefits are exacerbated in mobile ad-hoc networks (MANETs) and in wireless sensor networks; indeed, in these types of wireless networks resources are more scarce (power, bandwidth, etc.) and should be managed very efficiently.

Service discovery is a function that is normally performed at the application layer, where services are found. However, we argue that wireless sensor networks and MANETs could benefit from carrying out this function jointly with routing, at the network layer. Before presenting experiments and results that support this claim, On one side, in order for a node in a wireless (sensor or ad-hoc) network to establish communication with another, a route has to be available; if a proactive routing protocol is used, the route was measured and calculated in advance, whereas a reactive routing protocol acts on-demand protocols requesting the route only they are needed. On the other side, once the route is established, in order to gain a service provided by the recently discovered node, first it has to use a service discovery mechanism to find out what services that node is offering. Both the routing and the service discovery protocols issue their own messages, many of which travels in the network

CROSS LAYER FEEBACK MECHANISM IN WSN AND MANET

Wireless sensor networks and MANETs could benefit from performing service discovery jointly with routing, at the network layer. We emphasize that, although traditionally handled separately, routing and service discovery are not independent activities. Indeed, once a service request is received by a service provider, it is necessary to discover a route to the client so it can notify its presence, for the case of active service discovery also one of the consideration, for the case of passive service discovery, a client needs a route to the service provider being advertised [4]. The idea of extending routing to perform service discovery has been analyzed previously. Varshavsky et al. [5] have compared the performance of the Dynamic Source Routing (DSR) protocol with extensions for service discovery versus application-level protocols, such as the Service Location protocol (SLP). Nevertheless, SLP is not a protocol designed for mobile ad hoc networks; thus,

We consider that it would be more useful to evaluate the two approaches for service discovery (at the network and application layers) comparing only protocols specifically designed for mobile ad hoc networks. the performance of a routing protocol for MANETs that includes extensions for service discovery, versus an application-level protocol, specifically designed for service discovery in MANETs. The application-level service discovery approach is exemplified by the NOM [6] protocol and the network-level approach for service discovery is exemplified by our proposed AODV-SD extension to the AODV routing protocol. The Ad-hoc On-demand Distance Vector (AODV) protocol [7] is a routing protocol for mobile ad-hoc networks.

Whenever a node requires a service, it performs a lookup in its table. The information about the services offered by the current node is set when the node is initialized (or when a new service is implemented within the node), The information about the services offered by other nodes is acquired when the current node participates in a service discovery process. Each row in a services table contains the service identifier (a string that uniquely identifies the

service), its IP address, a lifetime, and a list of attributes that varies according to the type of service. A lifetime is used to have a soft-state and keep information about the each node is mandatory in ad-hoc networks where the structure of network topology is change frequent.

B.HELLO MESSAGING SCHEME IN MANET

BACKGROUND

The basis of using hello messages to determine connectivity stems from the assumption that reception of a hello message indicates a viable communication channel with the source of the hello. This mechanism works well on wired networks, which experience few packet losses and connectivity changes. However, when used in wireless ad hoc networks the effectiveness decreases due to many factors. Some of the factors that have significant effect are: hello loss settings, hello packet size and 802.11b packet handling

WORKING OF HELLO MESSAGES

Network connectivity may be determined through the reception of broadcast control messages. In the MANET the broadcast control message also serves as a hello message, indicating the presence of a neighbor. When a node receives a hello message for the route discovery from its neighbor, it creates or refreshes the routing table entry to the neighbor.

To maintain connectivity, if a node has not sent any broadcast control message within a specified interval, a hello message is locally broadcast to the every node in the network. The result leads at least one hello message transmission during every time period. If the node is unable to receive any hello message from a neighbor for several time intervals indicates that neighbor is no longer within transmission range, and connectivity has been lost. Two variables is responsible for the control the determination of connectivity using hello messages: HELLO INTERVAL and ALLOWED HELLO LOSS. HELLO INTERVAL specifies the maximum time interval between the transmissions of hello messages. ALLOWED HELLO LOSS specifies the maximum number of periods of HELLO INTERVAL to wait without receiving a hello message before detecting a loss of connectivity to a neighbor. The recommended value for HELLO INTERVAL is one second and for ALLOWED HELLO LOSS is two [11]. In other words, if a hello message is not received from a neighbor within two seconds of the last message, the communication from the neighbor node is determined

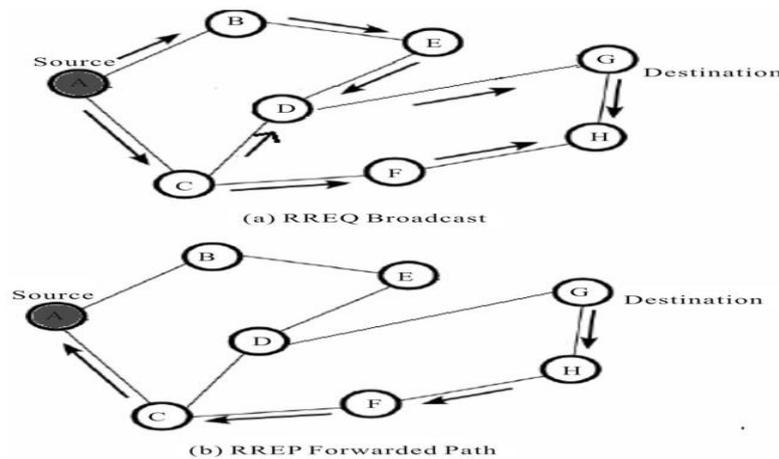


Figure: 2 Hello Messages in MANET

OPERATION INVOLVED IN HELLO MESSAGES

1. Route Discovery
2. Route Maintenance

CONVENTIONAL HELLO MESSAGES VS ADAPTIVE HELLO MESSAGES

Conventional hello messages are also known as periodic hello messages. The working of hello messages is concentrated on the time period of hello messages broadcasting to the network for route establishment and route maintenance rather than new proposal of hello messages. In Adaptive hello messages the time period is not fixed for the hello messages broadcasting. Instead it choose the time period for deducting the broken links in the network and consider as event and take this account for suppressing the unnecessary hello messages to overcome the power dissipation over the MANET.

WORKING OF ADAPTIVE HELLO MESSAGES

Adaptive Hello messaging scheme for neighbor discovery by effectively suppressing unnecessary Hello messages. The proposed scheme dynamically adjusts Hello intervals, and does not increase the risk that a sender will transmit a

packet through a broken link that has not been detected by Hello messaging; we call this the probability of failure of detection of an unavailable link (PFD). To estimate this risk, we exploit an average event interval, that is, an average time gap between two consecutive events (i.e., sending or receiving a data packet) on a node. By monitoring the event intervals, we can estimate how actively a node is involved in sending or forwarding. If a node is not involved in any communication for a given period, it does not need to maintain the status of the link;

Hello packets broadcasted during this period are unnecessary. If a constant Hello interval is used, the risk of attempting to transmit a packet through a broken link decreases as the event interval increases. Instead of using a constant Hello interval, our proposed scheme uses a constant risk level. As the event interval increases, the Hello interval can also increase without increasing risk. If the event interval is extremely large, the Hello messaging interval is also correspondingly large; that is Hello messaging is practically suppressed. When a node receives or sends a packet, the Hello messaging interval is reset to a default value so that up-to-date information is kept in a neighbor table for active communication. Simulation results show that our proposed scheme suppresses unnecessary Hello messaging and reduces the energy consumption up to 54% without any additional delay. The Table.1 is taken parameters

TABLE 1.PARAMETER FOR EXPERIMENT

Parameter	Value	Parameter	Value
Propagation model	Rayleigh Fading	Mobility speed	Max 5m/s 0 sec pause time
Transmission power	16dBm	Mobility model	Random way point
Topology size	670 x 670 m	Flows	ftp, Pareto
Data rate	11 mbps	Number of senders	10
Number of Nodes	20	PHYMAC	802.11 (no RTS)

C. ON-DEMAND ROUTING PROTOCOLS FOR ENERGY EFFICIENT IN MANET

BACKGROUND

Proactive (Table-Driven) Routing Protocols These routing protocols are similar to and come as a natural extension of those for the conventional wired networks rather than wireless network. In proactive routing, each node has more than one or more tables that contain the latest information of the routes to any node in the network. Each row has the near or neighbor hop for reaching a node/subnet and the cost of this route. Discrete table-driven protocols differ in the way the information about a change in topology is propagated through all nodes in the network. Different proactive routing protocols are addressed in [8],[9] and [10]. Reactive routing is also known as on-demand routing. These on-demand routing protocols take a lazy approach to routing. They not to maintain or constantly update their route tables with the latest route topology. Examples of reactive routing protocols are the dynamic source Routing (DSR) [11][10], ad hoc on-demand distance vector routing (AODV) [12] and temporally ordered routing algorithm (TORA)[13].

POWER AWARE SOURCE ROUTING PROTOCOL

The objective of Power-aware Source Routing (PSR) is to extend the useful service lifetime of a MANET. This is highly seductive in the network since death of certain nodes leads to a possibility of network partitions, rendering other live nodes unreachable. On-demand protocols of Power aware source routing protocol solves the problem of finding a route p at route discovery time t such that the following cost function is minimized

ROUTE DISCOVERY

In PSR, all nodes except the destination calculate their link cost, C_{ij} and add it to the path cost in the header of the RREQ packet. When an intermediate node receives a RREQ packet, it starts a timer (Tr) and keeps the cost in the header of that packet of minimum cost as $Min-Cost$. If extra RREQs arrive with same destination and followed with sequence number, the cost of the recently arrived RREQ packet is compared to the $Min-Cost$. If the new packet has a lower cost, $Min-Cost$ is changed to this new value and the new RREQ packet is forwarded. Otherwise, the advanced RREQ packet is dropped. In PSR, the destination waits for a threshold number (Tr) of seconds after the first RREQ packet arrives. During that time, the destination measures the cost of the route of every arrived RREQ packet. When the timer (Tr) expires, the destination node selects the route with the minimum cost and replies. afterward, it will drop any received RREQs. The reply also consist the cost of the selected path appended to it. Each node that hears this route reply adds this route along with its cost to its route cache table in the network. Even though this scheme can somewhat increase the latency of the data transfer, it results in a significant power saving as will be shown later.

ROUTE MAINTENANCE

PSR adopts the local approach because this approach minimizes control traffic of the MANET. Furthermore, it take a granted that all transmit power levels (r_{ij}) are stable. This allow PSR to separate the effect of mobility from that of

energy depletion during route maintenance. More precisely, node i generate a route error at time t when the following condition is met

D.EFFICIENT FLOODING SCHEME

Flooding scheme is classifying them according to the information each node keeps when the flooding occurs: 1) no need of neighbour information; 2) 1-hop neighbour information; 3) 2-hop neighbour information.

1) *No Need of Neighbour Information;*

a. Pure flooding

Pure flooding also called blind flooding, is the simplest flooding technique. The basic idea of this approach is every node in the network retransmits the flooding message when it is the first time to receive it [14] [15].

b. Probabilistic flooding scheme

The probabilistic flooding schemes is that each node forwards a flooding message with probability P upon receiving it for the first time. Clearly, when $P=1$, this scheme is equivalent to pure flooding.

2) *1-Hop Neighbour Information*

The 1-hop neighbor information can be obtained by exchanging the HELLO message in MAC layer protocols [16].

a. Flooding with Self Pruning

FSP is a receiver-based scheme which uses 1-hop information. A sender promote a flooding message by attaching all of its 1-hop neighbors to the message. A receiver examine its contrast of own 1-hop neighbors with the node list in the message it will not forward the message if all its 1-hop neighbors are already included in the list, Another way it ahead the message as a sender

b. Edge forwarding

One notable work of efficient flooding that uses 1-hop neighbor information is Edge Forwarding. It tries to minimize the flooding traffic by leveraging location information so that broadcast retransmission is limited only to the nodes near the perimeter of each broadcast coverage.

3) *2-HOP NEIGHBOUR INFORMATION.*

There are few flooding or broadcast algorithms where the nodes keep more than 2-hop neighbor information. The three-hop horizon pruning (THP) algorithm is the first heuristic to take into account 3-hop information in the selection of relay nodes for broadcast packets. THP is also the first neighbor-designated algorithm for computing TCDS—2-hop connected dominating set, which is a set of nodes such that every node in the network is within 2 hops from some node in the dominating set. In this algorithm, maintaining fresh routes to all nodes within 2 hops is possible for every node that has the 2-hop neighborhood information.

III. CONCLUSION

In this paper we analysis differing techniques used for the reduction of power dissipation over the MANET. We consider the areas Routing protocols, Feedback layer mechanism, Hello messaging scheme, Efficient Flooding Scheme. The most scare resource is power in all communication network. This study provides the overall view of techniques present for the above mentioned problem Further research work is put forward the finding the solution of this problem.

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