Survey of Energy Efficient Routing Protocols and Gossiping

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Abstract

Many ad hoc routing protocols are based on some variant of flooding. Despite various optimizations of flooding, many routing messages are propagated unnecessarily. We propose a gossiping-based approach, where each node forwards a message with some probability, to reduce the overhead of the routing.

A probability-based approach can be applied to determine whether or not a node should transmit the received packet during broadcasting. Some protocols apply the probability-based approach to resolve the broadcast storm problem, hence saving the power consumption for redundant transmission. A probability-based approach to balance the power consumption on each node, thus improving the network lifetime.

In this paper, we present a routing protocol which achieves considerable energy saving thus increasing the throughput and network lifetime. Working of proposed routing protocol is similar in nature with Ad-Hoc on Demand Distance Vector Routing Protocol (AODV). In proposed protocol, energy critical nodes do not take part in routing.

One more issue that needs to be discussed while performing routing operations is energy consumption. As each node is mobile node which stores its energy in the battery provided with them. If any critical node (intermediate node having lower power) participate in the route discovery or data transmission it may lose its energy and can lead to termination of data transmission from source node to destination node. This paper suggests an approach to avoid such incidents in the network.

The proposed approach can be implemented and simulated on QUALNET, a network simulator.

Keywords: Ad-Hoc on Demand Distance Vector Routing Protocol, Energy Consumption, MANET

I. INTRODUCTION

Today, when ad hoc networking professionals or would-be professional talk about ad hoc networks, they almost always implicitly assume that these networks are based on one of the local area network technologies. The majority of research papers published on simulation-based performance evaluation. The idea of both WLANs and ad hoc networks date back to approximately the same time, the early 1970s. Although the main driving force behind ad hoc networks was the need for survivable, infrastructure less and hard-to-detect military applications, WLANs received a lot of attention from academia and companies interested in commercial deployment.

Routing in ad hoc networks has become a popular research topic. Dating back to the early 1980s, there have been a large number of routing protocols designed for multi hop ad hoc networks. These protocols cover a wide range of design choices and approaches, from simple modifications of Internet protocols, to more complex multilevel hierarchical schemes. Before describing the types of approaches and example protocols, it is important to explain the developmental goals for an ad hoc routing protocol so that the design choices of the protocols can be better understood.

Wireless ad hoc networks have received significant attention in recent years due to their potential applications on the battlefield, in disaster relief operations, festival field grounds, and historic sites. A wireless ad hoc network consists of mobile hosts dynamically forming a temporary network without the use of an existing network infrastructure. In such a network, each mobile host serves as a router.

One important issue in ad hoc network routing is energy consumption. In MANETs, mobile hosts are powered by batteries and unable to recharge or replace batteries during a mission. Therefore, the limited battery lifetime imposes a constraint on network performance. To maximize the network lifetime, the traffic should be routed in such a way that energy consumption is minimized.

Many times we use shortest path routing but it causes power depletion by oversusing nodes in this path. It creates network partition. To solve this problem energy efficient routing protocols [1]-[14] have been studied.

II. RELATED WORK

In this session we give brief information about AODV[15], gossip[16], gossip for MANET[17].

AODV is reactive (on demand) protocol. AODV uses symmetric links between neighboring nodes. One distinguishing feature of AODV is its use of a destination sequence number for each route entry. The destination sequence number is created by the destination to be included along with any route information it sends to.
requesting nodes. Route Requests (RREQs), Route Replies (RREPs), and Route Errors (RERRs) are the message types defined by AODV. AODV is a routing protocol, and it deals with route table management. Route table information must be kept even for short-lived routes, such as are created to temporarily store reverse paths towards nodes originating RREQs.[18]

It does not maintain topology information about all other nodes in the network. In AODV, each time the node initiates the route discovery for some destination using simple flooding for broadcasting the Route Request (RREQ) across the network.[19]

Probabilistic broadcast approaches, broadly called gossip, offer a simpler alternative to deterministic approaches a gossiping mechanism to improve multicast reliability in ad hoc networks; they do not use gossiping to reduce the number of messages sent. Indeed, they start with an arbitrary, possibly unreliable, multicast protocol to multicast a message. They then use gossiping.[20]

The phase-transition phenomenon in a small 802.11 ad hoc network setting. They claim that they do not observe the bimodal effect in their setting. However, their setting is quite different from ours. In their setting, a transmission can cause more than 80% of the nodes not to receive a message. As a result, a larger probability of broadcasting can result in a smaller probability of propagating the messages in the network. Not surprisingly, the probability that leads to most nodes receiving the message is as low as 0.1. This observation emphasizes the fact that their result applies only to small networks. With a large network, a gossip probability of 0.1 is very likely to be below the phase-transition threshold, so would result in few nodes receiving the message in most executions.[21]

Gossiping has a number of advantages over other approaches. Gossiping can reduce control traffic up to 35% when compared to flooding.[16] While there are fundamental limits to the amount of nonlocal traffic that can be sent in large networks, due to problems of scaling [22], [23], gossiping should still be useful in large networks when nonlocal messages need to be sent.

A probability-based approach to balance the power consumption on each node, thus improving the network lifetime. But gossip in this pure form is not energy efficient. In many cases, in random network a node may have very few neighbors; means present neighbors will not propagate message with high gossip. If we propagate message with low probability, message may ‘die out’. So, use some algorithms to overcome this problem.

The gossip-based ad hoc routing is an efficient optimization scheme for flooding, where each node forwards a packet with a probability. This scheme can significantly reduce the number of redundant packets while keeping network connectivity. When we combine these three things then new approach is that, gossip is used to achieve energy saving with AODV.

III. ALGORITHM

In this proposed routing algorithm, we try to focus on threshold value and energy cost of network by using gossiping technique.

Here, we assume that gossiping value for grid configuration is 0.6 for all nodes.[2] If the node having gossip value less than 0.6 then node will not forward RREQ. Threshold value is taken as 80% of average energy of network[24]. By using these two metric, network life time increased. In predefined protocols energy consumption is not achieve hundred percent.

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IV. CONCLUSION

In this paper we discuss the idea of energy efficiency by using gossiping in wireless network. Also, on what is merits & demerits of gossiping. The existing protocols like AODV+GE suffers from power saving and routing load.

Our work is going on to preserve energy of critical nodes because of this during transmission time it avoids energy critical nodes and save network lifetime.
REFERENCES:


