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Dynamic Neighbour Discovery on Manet Through Efficient Hello Messaging Scheme Using OSPF Protocol

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Abstract

In Mobile Ad hoc Networks (MANETs), nodes are capable of frequently changing their location. For effective routing, each and every node is expected to keep track of its moving neighborhood. So whenever the neighbor node changes, all the other nodes should update its routing table to invalidate the paths passing though old neighbors. This prevents the node from sending future packets to a node which is now not its neighbor, and thus preventing loss of packets. When network is highly dynamic neighborhood management becomes more important. Every node broadcasts a beacon, often known as HELLO packet, so that its neighbors may record its presence. Broadcasting HELLO packets consumes node energy. In this project work an alternative method for HELLO messaging is proposed to save energy and increase the throughput. Instead of constantly sending the hello packets to all the nodes for a specific time period. Otherwise to send the hello packets to the nodes which are in active state, this method conserves the energy, eliminating the hello packets to the broken links.

Keywords: MANET, OSPF (Open Shortest Path First), Node, Broadcast, Packet.

Introduction

A Mobile Adhoc NETwork (MANET) is a self-configuring infrastructure less network of mobile devices connected by wireless. Each device in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. Each must forward traffic unrelated to its own use, and therefore be a router. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. Such networks may operate by themselves or may be connected to the larger Internet. MANETs are a kind of Wireless ad hoc network that usually has a routable networking environment on top of a Link Layer ad hoc network.

Mobile Adhoc Networks has become one of the most prevalent areas of research in the recent years because of the challenges it pose to the related protocols. MANET is the new emerging technology which enables users to communicate without any physical infrastructure regardless of their geographical location, that’s why it is sometimes referred to as an infrastructure less network. The proliferation of cheaper, small and more powerful devices make MANET a fastest growing network. An ad-hoc network is self-organizing and adaptive. Device in mobile ad hoc network should be able to detect the presence of other devices and perform necessary set up to facilitate communication and sharing of data and service. Ad hoc networking allows the devices to maintain connections to the network as well as easily adding and removing devices to and from the network. Due to nodal mobility, the network topology may change rapidly and unpredictably over time. The network is decentralized, where network organization and message delivery must be executed by the nodes themselves.

Literature Survey

The AODV reactive routing protocol, when a node requires a route, it initiates a route discovery procedure broadcasting Route Request (RREQ) messages [1]. When a node receives a RREQ, if it has a valid route entry to the demanded destination or it is the destination itself, it creates and sends a Route Reply (RREP) message back to the originator node. When a link breaks along an active path (i.e., a path where data are being transmitted), the upstream node that detects this break creates a Route Error (RERR) message which reports the set of destinations that are now unreachable and sends it to precursor nodes [2].

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Ad hoc On-Demand Distance Vector Routing (AODV) and Optimized Link State Routing (OLSR), propose the use of periodic messages (Hello messages) to detect neighbor nodes. After receiving the first Hello message from one of its neighbors, a node starts the link sensing task by setting up a sensing timer. Each time a new Hello message is received from the same neighbor, the sensing timer is restarted and the link duration is prolonged [3]. We introduce Quorum-Based Energy Conserving (QEC) and Adaptive Quorum-Based Energy Conserving (AQEC) MAC Protocols [4]. Both protocols achieve power conservation and guarantee that any two hosts will wake up concurrently, during the same beacon intervals, through use of a quorum [5] In mobile networks the probability of the link remains active is always less than one and this study gives a quantitative value for the probability of the link remain active given the period of transmission of the Hello message. Energy conservation is a critical issue in wireless networks [6]. A tradeoff between quickly reestablishing the route and preventing the source node from continuing to send data packets exists when allowing intermediate nodes to rebuild routes Allowing intermediate node route re building could provide for quicker route reconstruction and fewer dropped packets if the route is able to be reconstructed quickly[7].

Existing System

The hello message is sent to all the nodes, and those which send the acknowledgement back as response is considered to be the Neighboring nodes. This takes more energy consumption and as well as the time taken to identify the neighboring node is more on demand neighbor discovery, though saves the energy level. The reactive Hello protocol enables Hello messaging only when it is demanded using a Hello request-reply mechanism, but increases delay due to additional packet exchange before communication. The event-based Hello protocol enables only active nodes (i.e., those either sending or receiving data packets) to broadcast Hello packets based on a threshold called an activity timer. However, a threshold that is set too high rarely reduces the Hello messaging overhead, whereas a low threshold results in local connectivity information loss. Thus, there is an outstanding need to effectively suppress unnecessary Hello messaging while minimizing the risk of losing local connectivity information. Before we describe the model, some terms are defined as follows. When a node wants to send out a HELLO message, it takes a snapshot of its neighbor list at this very moment. The neighbor stability (NS) for a node is defined as the number of neighbor changes, including new neighbors found and old neighbors lost, divided by the larger node degree in the two adjacent snapshots. In case a node does not have any neighbors in the two adjacent snapshots, the NS is defined as 2. Therefore, a larger NS implies more rapid neighbor and link connectivity changes. Note that the value of NS is always within the range of [0, 2] according to the definition.

Proposed System

In this project, to reduce the energy consumption and network overhead, the hello message sending for already existing nodes in the Routing table is restricted, since however it’s clear that, the node is already present in neighboring area. Instead the hello message is sent only to the nodes, which are newly joined. This saves the time to identify the neighboring nodes, especially whenever the nodes are high in number. The time interval is measured on one node for sending and receiving the packet. Based on the time interval the neighbor discovery is done by sending the hello message. It reduces the network overhead and traffic upon sending the hello message for neighbor discovery periodically for a particular amount of usage of that particular node.

Due to energy consumption and network overhead, an adaptive Hello interval to reduce battery drain through practical suppression of unnecessary Hello messaging. Based on the event interval of a node, the Hello interval can be enlarged without reduced detectability of a broken link, which decreases network overhead and hidden energy consumption. On demand neighbor discovery, though saves the energy level. This method increases the time interval for maintaining the neighbor or routing table, when the nodes are enormously high in number. At these situations, on demand neighbor discovery is less efficient as it transmits the hello message only after the requirement is confirmed.

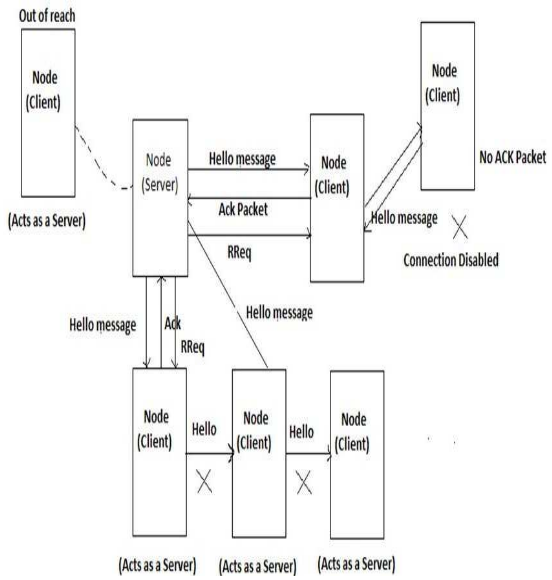

Figure 1: Proposed Architecture

The whole architecture deals with the adaptive efficient hello message delivery to the client. Thus so far previous approaches failed to provide the efficiency in transformation of hello message. It caused the frequent battery drain issues as mobile phones are concerned. The above diagram specifies the new architecture of the efficient hello message forwarding or delivering to the client. The left most node is the server node, which sends the hello message to the client node which is present in the right most side. The intermediate nodes carry the hello packets. Once the hello message is sent to the client, and the response is obtained from the client whom the client access. For the nodes, which doesn't send the acknowledgement is treated as failure node and the link between the nodes are cancelled. The hello messages are filtered to those nodes and hence preserving the time, to do other work.

Modules

(a) Node Generation Phase

In this module, the Number of nodes that is to be created is obtained from the user and the specific node is assigned a separate IP Address. The position of the node is decided randomly and placed in random position.

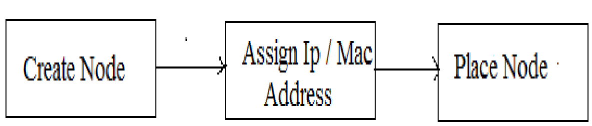

Figure 2: Node Generation

(b) Route Request Phase

In this phase, the client node sends the route request to the nodes, which is currently present in the neighbour table in order to send the packets to the nodes. The neighbour table maintenance is done based on the filtering that is mentioned in the below phases.

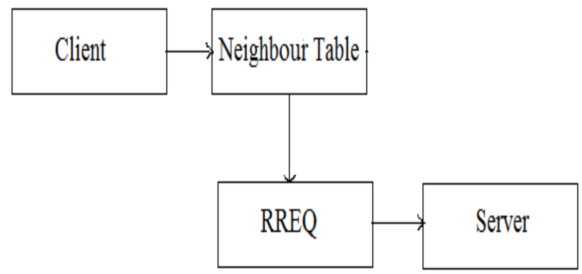

Figure 3: Route Request Phase

(c) Route Reply Phase

In this module, the route request that is being sent on the above phase is carried to the corresponding node. Once the corresponding receives the route request, it sends back the acknowledgement as route reply. Once a particular node (Server) sends the route reply, that particular node is stored in the neighbour table.

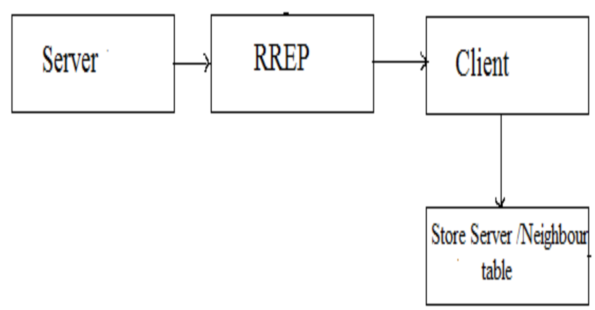

Figure 4: Route Reply Phase

(d) Traceability-Monitoring And Identification Process

This process is part of route request and reply propagation of our proposed design. In this module, target node generates the route reply packet and sends it via reverse of discovered path towards source node. After sending the RREP (), sender node of the RREP () monitors the forwarding nature of its downstream neighbour node through promiscuous mode. The request or the hello message is filtered in order the send the message in an adaptive and efficient way. The efficient way is carried out by filtering the nodes based on its action. That is, only the nodes which are in action(either sending or receiving) is taken in to consideration and the hello message packets are sent to the corresponding nodes. The rest of the nodes are left unsent.

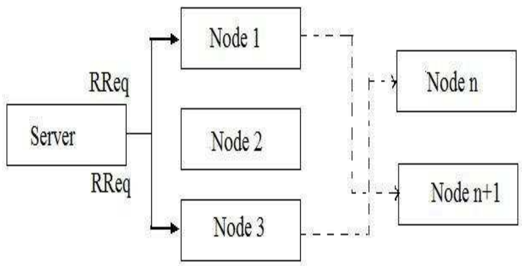

Figure 5: Monitoring & Identification

It identifies the malicious nature of its downstream neighbour node, examining the 2hop ID and Node list field of the forwarded RREP (), Based on the inference, the sender node decides the malicious behavior and broadcasts an alarm message. In order to avoid intentional rumors of maliciousness, we have added here alarm acceptance concept. Using alarm acceptance message, upstream neighbour nodes that already process RREP () endorse the validity of the alarm message. In this way, intentional rumors are avoided.

Conclusion

In this project work, an efficient technique for adaptive Hello message sending is proposed in order to reduce the unwanted battery drain and network delay through eliminating the unwanted hello messages to the neighboring node. The technique is implemented in MANET for efficient network throughput and long battery life of a device. Based on the event interval of a node, the Hello interval can be enlarged without reduced detectability of a broken link, which decreases network overhead and hidden energy consumption. The nodes are scanned frequently in order to check whether the links got broken. Accordingly the Neighbor table is continuously altered. Since the nodes are not stationary in MANET. A node which is at one particular location at this time moves continuously. The hello message is sent to the neighbor nodes, each time the nodes move from one location to another location. The filtration process is handled in such a way that, the Hello messages are not sent to all the nodes, rather it is sent only to the nodes are currently in action. The rest of the nodes are considered to be inactive, and hence the power lasts for long time without draining.

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