Energy Efficient Routing Protocol for Mobile Adhoc Networks

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Abstract

Energy Efficient Power Reduce Routing (EEPRR) protocol reduces the energy consumption by turning off the nodes which are idle or Sleep mode. As a node consumes significant amount of energy when it is idle, that node is made to go to sleep mode and the difference of energies consumed in idle and sleep mode has been saved. Simulation results show a significant reduction in energy consumption, increase in network lifetime without affecting the throughput. Energy efficient AODV increases the network survivability and leads to a longer battery life of the nodes. They achieve balanced energy consumption with minimum overhead.

Keywords : Routing Protocols, AODV Protocol, Energy Efficient Routing RandomWaypoint Mobility Model

1. INTRODUCTION

The limited energy resources of MANET force the researchers to adapt a multi-hop route communication strategy in order to preserve the node's energy and prolong the MANETs lifetime [1]. Unfortunately, route failures frequently occur in MANETs because of the mobile node's mobility and limited energy resources. For this reason, therefore, an efficient routing protocol is needed to reconnect the source-destination route whenever routes are broken, and the routing protocol algorithms must react rapidly to environmental changes. In this chapter, developed an Energy efficient power reduced an AODV routing protocol to elimination of delay and reduce routing overhead among MANET devices.

2. ROUTINGPROTOCOLS

In adhoc networks all nodes are mobile and can be connected dynamically in an arbitrary manner. All nodes of these networks act as routers and take part in the discovery and maintenance of routes to other nodes in the network. Several routing protocols have been proposed for routing in MANET with the goal of achieving efficient routing. The proposed algorithms differ in the approach used for discovering a new route and maintaining an identified route when a node moves. The mobile adhoc routing protocols may be categorized as proactive (table driven), reactive (On-demand) and hybrid routing protocols.

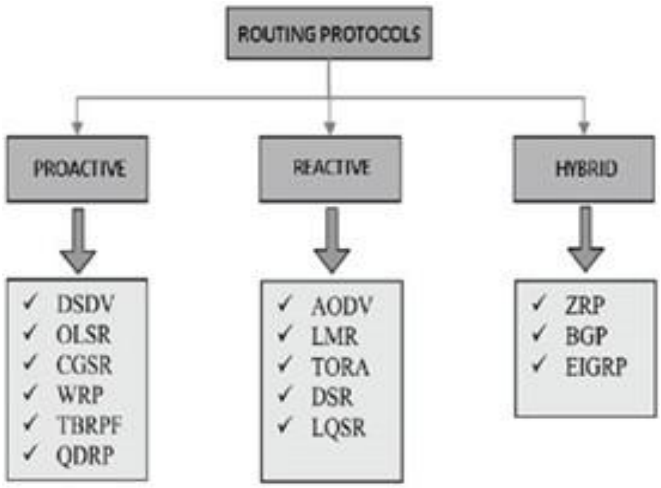

Figure 2 Different types of Routing protocols in MANET

Proactive Protocols

The proactive protocols maintain the routing information even before it is needed. Each and every node in the network maintains routing information to every other node in the network. Route information is generally kept in the routing tables and is periodically updated as the network topology changes. Many of these routing protocols come from the link- state routing. There exist some differences between the protocols that come under this category depending onthe routing information being updated in each routing table.DSDV,WRP and OLSR comes under table driven routingprotocols [2].

Reactive Protocols

The reactive protocols do not maintain routing information or routingactivity at the network nodes if there isno communication. If a node wants to send a packet to another node then thisprotocol searches for route in an on- demand manner and establishes the connection in order to transmit and receive the packet.These protocols were designed to reduce the overhead encountered in proactive protocols by maintaining information for active routes only. This means that the routes are determined and maintained for the nodes that are required to send data to aparticular destination [77]. The routediscovery usually occurs by flooding the route request packets throughout the network. DSR, AODV and ABR comesunder reactive protocols.

Hybrid Routing Protocols

Both of the proactive and reactive routing methods have some pros and cons. In hybrid routing a well combination ofproactive and reactive routing methods are used which are better than the both used in isolation. It includes the advantages of both

protocols. As an example facilitate the reactive routing protocol such as AODV with some proactive features by refreshing routes of active destinations which would definitely reduce the delay and overhead so refresh interval can improve the performance using the network and node. So these types of protocols can incorporatethe facility of other protocols without compromising with its own advantages. Example of hybrid protocol is Zone RoutingProtocol (ZRP).

3 PROPOSED METHOD

Many research works have produced so much innovation and novelideas in this field. But in this research work discussed on different reactive routingprotocols based on AODV. Most of thework today is based on energy

efficient routing because power is main concern in adhoc wireless networks. Each and every protocol has some advantages and shortcomings. None of them can perform better in all conditions. It depends upon the network parameters which decide the protocol to be used.

Ad-hoc On demand Distance Vector Routing (AODV) Protocol

Ad-hoc On demand Distance VectorRouting (AODV) is a reactive (on-demand) routing protocol algorithm, enhancement over DSDV routing protocol algorithm. It minimizes the number of broadcasts by creating routes on-demand as opposed to all possible routes as in DSDV. It uses the minimum hop-count criteria to select the route for data transmission without taking into account a path's link stability factors or node quality when constructing the route. A node in a MANET running the AODV protocol must flood routing control packets over the network each time it needs to discover a route to a destination. Such nodes are likely to exhaust their energy resources and deplete their battery power rapidly. Hence, node cooperation is needed to preserve MANET network resources and support the wireless network performance effectively [78]. The behavior of a MANET node changes continuously over time, depending on the wireless network environment. However, a variety of concepts, schemes, and models have been proposed to achieve intelligent services andnetworks.

Using the concept of node trust whenbuilding stable routes decreases the probability of route breaks during the data relay period. This, consequently, minimizes the amount of unnecessary overhead control packets transmitted over the network in the route discovery stage. In addition, it preserves network resources and improves network performance. Finally, it is shown that the proposed intelligent fuzzy-based AODV-modified scheme performs better than the simple classical MANET routingprotocols.

This protocol checks the route table when source needs to transmitdata. AOD Visaloop-free, single path, distance vector protocol based on hop- by-hoprouting approach. There are twomain procedures in AODV:

1. Route discovery
2. Route maintenance

Route discovery

The route discovery procedure begins when a source node wants a routeto send data to a destination.It checks itsrouting table to decide if it has a currentroute to the destination. If it has route, forwards the packet to next hop node or else it starts a route discovery process. Route discovery begins with the making of a Route Request (RREQ)packet. Packet contains the following:

- Source node's IP address
- Source node's current sequencenumber
- Destination IP address
- Destination sequence number
- Broadcast ID number

IP address of node from which RREQ was received. When the destination node receives a RREQ, it also generates a RREP.The RREP is routed back to the source via the reversepath. RREP reaches to source, a forward route to establish the route to destination.

Route maintenance

Route maintenance is finished using route error (RERR) packets. A route is "expired" if not used recently. A set ofpredecessor nodes is maintained for each routing table entry, indicating a set of neighboring nodes that use that entry to route data packets.These nodes are notifiedwith route error(RERR) packets when the next hoplink breaks.Each ancestor node, inturn, forwards the RERR to its own

set of predecessors, therefore, successfully erasing all routes using the broken link.Then this RERR is propagated to each source routing traffic through the unsuccessful link, causing the route discovery process to be reinitiated if routesare still needed.

3.1.2. a) Random Waypoint Mobility Model (RWP)

In RWP, each node randomly selects a new target location and then moves to that location with a constant speed chosen uniformly and randomly from (0,Vmax], where Vmax represents the maximum allowable speed for the mobile node. Once the mobile node reaches that location, it becomes stationary for a predefined pause time, Tpause. After that it selects another random location within the simulation region and moves into it. The whole process is continuously repeated until the end of the simulation time. Two key parameters, Vmax and Tpause, define the mobility behavior of the mobile nodes. If Vmax is small and Tpause is large, the network topology is expected to be stable. On the other hand,large Vmax and small Tpause will produce a highly dynamic network topology.

4. ENERGY EFFICIENT ROUTING

The energy efficient routing algorithms are not just related to minimize the total energy consumption of the route but also to maximize thelifetime of each node in the network to increase the lifetime of the network. The main purpose ofenergy efficient algorithm is to maintain the network functioning as long as possible. In MANETs energy consumption is done in three states of the nodes which are transmitting, receiving an sleeping state. Nodes consume more energy while transmitting than in sleep state. Sleep state means nodes are idle, in which they neither transmit nor receive any signals. More energy can be saved by keeping more nodes in sleep state. The energy consumption of nodes should be minimized not only during the transmission but also during sleep state to accomplish the network functioning goal.

Minimizing Total Transmission Power

5. ENERGY EFFICIENT POWER REDUCED AODV ROUTING

The proposed approach uses a technique to determine a node's trust value by combining the residual energy and speedof each node in the MANET.The nodes withthe highest trust values are selected to establish the best route available to the destination node. Each intermediate node calculates its trust value whenever it receivesthe RREQ packet. The intermediate node initiates a timer if the RREQ packet has not been previously received. During the timer duration, the intermediate node receives more RREQ packets from its neighbors. Theintermediate node selects the node with the best trust value to update its reverse route table, which will be used to construct the reverse unicast route as a part of a reliable route establishment between source and destination. After the timer expires, the intermediate node forwards the RREQ, carrying the intermediate node's trust value to other neighbors. The timer is used to examine the same RREQ packets that arrive at different times to the intermediate node, and then, the one with the highest trust value is forwarded.

6. CONCLUSION

It is an energy utilization efficiency protocol that aims to improve the networklifetime and improve the performance obtainedby the basic AODV routing algorithm. It routesthe packets throughout nodes that is expected to have better outstanding lifetime among all possibilities. An innovative framework to calculate a novel metric called energy utilization rate, which reflects how fast a

nodeis consuming its residual energy.

The proposed an adaptive low battery alert mechanism to overcome the overuse of the firstly established route. The result shows that this algorithm can improve network lifetime in both static and mobile networks.

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