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Active Low Energy Outlay Routing Algorithm for Wireless Ad Hoc Network

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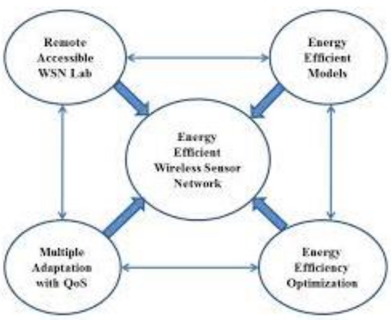
Abstract

A wireless ad hoc network (WANET) is a not centralized type of wireless network. Energy-aware reliable routing algorithms for wireless ad hoc networks, called Dynamic Reliable Low Energy Cost Routing (DRLECR) protocol implemented by an AODV. DRLECR can increases the operational lifetime of the network by using efficient energy and reliable routes. Finding reliable routes can increase the level of excellence of the service. AODV is an on-demand routing protocol in which it discover network destination dynamically. Routers will communicate with the adjacent routers which inform network to which each router is connected. When traffic changes these routers adjust automatically. So it is simple to configure on larger networks, and if a link goes down it choose a different route dynamically.

Key words: DRLECR, AODV, battery-aware routing, end-to end and hop-by-hop retransmission, reliability, wireless ad hoc networks

I. INTRODUCTION

A wireless ad hoc network (WANET) is a decentralized type of wireless network. The network is ad hoc because it does not have any fixed infrastructure, such as routers in wired networks or access points in managed wireless networks. A routing protocol plays important role for communication and also to find efficient path. Each node in network participates in routing by forwarding data to other nodes, so based on the network connectivity the determination of which nodes forward data is made dynamically. The proactive protocols expose short delay in the packets transmission and it consumes more bandwidth to maintain entire network information.



Design of wireless ad hoc network protocols is achieved by three requirements: energy efficiency, reliability, and increasing network lifetime. By considering the energy consumed for end-to-end (E2E) packet traversal, it finds routes. Nevertheless, this should not result in overusing a specific set of nodes in the network or finding less reliable routes. Without considering the reliability of links and residual energy of nodes energy-efficient routing in ad hoc networks is neither complete nor efficient. The quality of the service is achieved by finding reliable routes.

II. LITERATURE SURVEY

We can broadly group them into three categories. The first category is to find more reliable routes by includes algorithms that consider the reliability of links. ETX (Expected Transmission Count) is used to find reliable routes that consist of links requiring less number of retransmissions for lost packet recovery. Although such routes may consume less energy since they require less number of retransmissions, they do not necessarily minimize the energy consumption for E2E packet traversal.

Considering a higher priority for reliability of routes may result in overusing some nodes. If some links are more reliable than other links, then that links will frequently be used to forward packets. Nodes in that links will then fail quickly, because they have to forward many packets on behalf of other nodes.

The second category includes algorithms that used to find energy-efficient routes. These algorithms do not consider the remaining battery energy of nodes to avoid overuse of nodes, even though some of them address energy-efficiency and reliability together. Apart from this, many routing algorithms – including energy-efficient algorithms proposed in has a major drawback.

It does not consider the actual energy consumption of nodes to discover energy efficient routes. It considers the transmission power of nodes. The energy cost of a path is calculated as a fraction of the actual energy cost of nodes for transmission along a path. This affects the reliability, energy efficiency and network lifetime

The third category includes algorithms that try to increase the network lifetime by finding routes consisting of nodes with a higher level of battery energy.

EXISTING METHODOLOGY

A.Network Topology:

Topology of a wireless ad hoc networks is created by a graph G (V1,V2), where V1 is a set of nodes (vertices) and V2 is a set of nodes links (edges), respectively. Each and every node have a unique integer identifier between 1 and N=|V1|. Nodes are assumed to be battery powered. Energy of node u € V1 is represented by Cu is remaining battery power. If battery energy of a node falls below a threshold Cth, node is consider to be not live no loss of generality, assume Cth=0. The topology is created by using a link state proactive routing protocol such as optimized link state routing (OLSR).In this network topology each node shared its view to other nodes. This is achieved by using topology control message. To detect their neighbour node it uses beacons.

B. Energy-Aware Reliable Routing Algorithms for the HBH System:

The RMER and RMECR algorithms are designed for networks supporting HBH retransmissions. In the HBH system, to ensure the link reliability a lost packet in each hop is retransmitted by the sender. If the receiver receives the packet correctly an acknowledgement (ACK) is transmitted by the receiver to the sender. If suppose the sender does not receive the acknowledgement because of the packet or its acknowledgement is lost or corrupted, then the sender retransmits the packet. This continues until the sender receives an acknowledgement or the maximum allowed number of transmission attempts is reached. If each link is reliable, then the E2E path between nodes will also be reliable.

C. Energy-Aware Reliable Routing Algorithms for the E2E System:

The RMER and RMECR algorithms are designed for networks supporting E2E retransmissions. Like HBH system, we first analyse the energy cost of a path for transferring a packet from sender to its destination. Here, we also consider the impact of E2E acknowledgement. In the E2E system, the acknowledgements are generated only at the destination and retransmissions happen only between the end nodes. The destination node sends an E2E acknowledgement to the source node when it receives the packet correctly. It retransmits the packet when the source node does not receive an acknowledgement for the sent packet. This may happen either because the packet or the acknowledgement is lost. For each case, the source node retransmits the packet until it receives an acknowledgement for the packet.

IV. PROPOSED SYSTEM

A. Topology Formation:

Evaluate the performance of DRLECR algorithm considers a network in which nodes are uniformly distributed in a square area. Nodes are assumed to be dynamic. Network topology is achieved by using a reactive routing protocol such as Ad hoc On-demand Distance Vector Routing (AODV).

B. Analysis of Energy Cost:

The energy cost of a path is analysed in three steps:

- Transmission count of data and ACK packets.
- Energy cost of a link by considering the energy cost of retransmissions.
- Analysing the reliability of a path.

Assume that a node u1 is allowed to transmit a packet only Qu1 times (including the first transmission). Thus, due to probabilistic nature of packet loss over wireless links, a packet might be retransmitted a random number of times not greater than Q (u1 – 1). An acknowledgement is

sent to the transmitting node u1, when the receiving node v1 receives the packet correctly.

If the transmitted acknowledgement is lost, another acknowledgement will be transmitted for the same packet after v1 again receives the packet correctly possibly after several attempts. Therefore, an acknowledgement could be transmitted for the same data packet a random number of times not greater than Qu1. It is also possible that no acknowledgement is transmitted for a data packet, if the packet is lost in all Qu1 transmission attempts.

The reliability of a link is not affected by the probability of losing the acknowledgement. If the packet is received correctly but its acknowledgement is lost, then the packet will be retransmitted after expiration of a timer. If the retransmitted packet is received correctly too, there will be a duplicate packet at the receiver. Duplicate packets are usually discarded silently at the MAC layer, but acknowledgements are sent for them. This affects the energy consumption of the transmitting and the receiving nodes, which was considered in computing their energy costs.

C. Residual Battery Energy:

The energy model represents the energy level of nodes in the network. The energy model defined in a node has an initial value that is the level of energy the node has at the beginning of the simulation. This energy is considered as initial Energy. In simulation, the variable "energy" represents the energy level in a node at any specified time. The value of initial Energy is passed as an input argument.

For every packet transmitted and every packet received each node looses a particular amount of energy. By this, the value of initial Energy in a node gets decreased. The residual energy is considered as the current value of energy in a node after transmitting or receiving routing packets.

Data Transmission is established between nodes by using UDP agent and CBR traffic. Residual energy of the node is evaluated by accessing inbuilt variable "energy" in find energy procedure at different times.

D. Finding Minimum Energy Cost Path:

Design a generic routing algorithm for finding MECP between every two nodes in the network. Dijkstra's shortest path routing algorithm could be used to find Minimum Energy Cost Path.

The Dijkstra's algorithm is a centralized algorithm for finding the shortest-path between nodes. It is a greedy based algorithm and it solves the single source shortest path problems. DRLECR algorithm also can design based on the Bellman-Ford algorithm, but it has a higher computational complexity than the Dijkstra's algorithm. We only need to

analyse the route cost and link weight for Bellman-Ford algorithm to find Minimum Energy Cost Path.

V. CONCLUSION

In Proposed work DRLECR protocol implemented in dynamic Routing called Ad hoc On-demand Distance Vector Routing (AODV).DRLECR can increase the operational lifetime of the network using energy efficient and reliable routes. DRLECR also extends the network lifetime by directing the traffic to nodes having more amount of battery energy. Considering the residual energy of nodes in routing can avoid nodes from being overused and can eventually lead to an increase in the operational lifetime of the network. Ad hoc on demand Distance Vector (AODV) is one of the commonly used reactive on demand routing protocols. AODV minimizes the number of packets involved in route discovery by establishing routes on-demand.

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