LCT1-09  Multi-Hop Wireless Ad Hoc Networks

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Introduction

In a multi-hop network, nodes can communicate to other nodes that are too far to transmit directly. This network is an alternative to the traditional ad hoc network, which may provide wider coverage, larger capacity and better communication quality.

A multi-hop ad hoc network (MANET), also called wireless ad hoc network, uses the multi-hop model and is the main focus in this project. A MANET can be applied to areas that popular routing protocol can hardly handle, such as the network between vehicles and military networks.

Aim

The aim of this project is to build an IEEE 802.11 standard wireless ad hoc network and study the related architectures, such as routing protocols and the overall network performance.

Objectives

As wireless communication is becoming popular these days, MANET is a hot topic to be studied. Unlike wireline networks, wireless networks provide a higher mobility and flexibility. These advantages are even more obvious in the wireless ad hoc network. However, wireless network signals are unstable and easily affected. On the other hand, the protocols applied in the network are the keys to success. Therefore, the principle, implementation of MANET will be studied in the project.

Methodology

Optimized Link State Routing protocol (OLSR) is an optimization of the link state algorithm of the mobile wireless ad hoc network. The key concept is to reduce the time for constructing the topology of the network, some main features are minority interference matrix.

HELLO Message

HELLO message is used to find the neighbours.

MultiHop Routing

Each node selects a 3-hop neighbour as the Multipoint Relay (MPR) for forwarding messages. The transmission is thus reduced.

Topology Control Message

Topology Control (TC) messages provide each node in the network with sufficient link-state information to calculate the routes to the others. They are broadcasted by the MPRs.

Multiple Interface Declaration

Multiple Interface Declaration (MID) message is announced by the nodes which have more than one network interfaces.

Host and Network Association

Host and Network Association (HNA) message is generated by the nodes which connect to other nodes in the network and the network. These nodes can provide Internet accessibility to the others.

Results and Conclusion

The figure shows the routing table of the node 10.1.1.6. These nodes are detected in the network and their statuses are displayed.

Skype was used to test the network. The nodes in the ad hoc network formed by OLSR can communicate to each other via Skype.

In conclusion, OLSR is easy to use and does not consume many resources. An ad hoc network can be set up conveniently. Also, OLSR is being developed to perform different applications, such as iPhone and vehicular network. This protocol will have the potential to become more popular in the future.