SYSC 4907 – Initial Proposal for ZigBee Mesh Network

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Introduction:

Remote controlled vehicles are used in many industries. Their range is limited by the power and sensitivity of the transceivers used by the vehicle and the controller, as well as the presence of barriers between the vehicle and controller. Increasing the power of the transmitter is one way to increase the range of the vehicle, but has undesirable consequences for activities and functions requiring secure, reliable transmission of data between the vehicle and the controller. This document proposes a solution to the power and security issues related to boosting the power of the transmitter to increase range by means of using a low-cost, long lifetime mesh network to route data between the vehicle and controller and around barriers which would normally block the signal.

Statement of Problem:

One way to increase the range of a remote controlled vehicle is to increase the power of the transceivers. Increasing the power of a transceiver has multiple undesirable consequences, including the following:

- greater power consumption by the transceiver (reduced battery life of the vehicle)
- increasing the area where the communications can be intercepted by third parties
- increased radio frequency noise to any equipment in the range of the transmission

In addition to the above, a single transmitter is vulnerable to being blocked by a barrier, such as a thick wall.

Objectives:

Our objective is ultimately to drive a remote controlled car by sending commands through a ZigBee mesh network from a computer or other command interface. We will achieve the following three goals:

1. To design and manufacture a node capable of mesh networking using the IEEE 802.15.4 (also known as ZigBee) standard.
2. Design custom hardware and software to drive a commercially available remote controlled car using commands received over a ZigBee mesh network.
3. Design software to run on a computer to send commands across a ZigBee mesh network.
4. Demonstrate the greater range of the remote controlled car by using a ZigBee mesh network.

The proposed project will provide a solution to the problems inherent with boosting the power of a transceiver to increase a remote controlled vehicle's range.

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