Centre for Communications Engineering
School of Electrical & Mechanical Engineering

Final Year Project Outline Specification

Microcontroller-based Medium Access Control protocol implementation for short-range wireless channels

Recent technology innovations in circuits, devices and packaging, the availability of license-free frequency bands, and new end-user needs for communication with portable computers have been key factors leading to the introduction of wireless LAN products. Notebook and hand-portable computers use applications and protocols, originally developed for wired desktop hosts, to communicate over wireless channels. Unlike wired networks, packets transmitted on wireless channels are often subject to effects such as burst errors and degrading bit-error-rate, which cause back-to-back packet losses.

The main aim of the project is to implement an adaptive synchronous polling based Medium Access Control (MAC) algorithm using a low power PIC microcontroller and a radio transceiver module. The solution expects to provide the best mix of cost, power efficient, transmission robustness and performance. The project is based in the Centre for Communications Engineering (www.ether.ulst.ac.uk) and supports Nortel Networks sponsored research in the area of portable data networks using short-range radio.

Outline Objectives

- PIC-microcontroller and timer design (to achieve synchronisation for interrupts between sleep and active mode).

- Software implementation of adaptive algorithm (outline to be provided) that optimises channel utilisation according to both traffic and error statistics.

- Interfacing of radio packet controller and ISM band radio transceiver.

- Characterise the performance of the MAC protocol implemented.

- Identify improvements to the adaptive algorithm.

References:
Mao, H. *et al.* "An adaptive radio link protocol for infostations", IEEE 49th IEEE Vehicular Technology Conference, Vol.2, Part 2, 1999 pp.1345-9.

Wu, G. *et al.* "WINMAC: A novel transmission protocol for infostations", IEEE 49th IEEE Vehicular Technology Conference, Vol.2, Part 2, 1999 pp.1340-4.

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