MAC Protocol Implementation on Atmel AVR
for Underwater Communication

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Project Description

Underwater acoustic communication is widely used in many areas to collect the data from different kinds of sensors deployed underwater or send control information to remote nodes. However, there are many challenges for underwater communication systems because of the characteristics of acoustic propagation in the underwater environment, such as doppler spread, ambient noise, fading, high propagation delay, limited bandwidth, wave effect and multipath. MAC protocol, as a developed protocol for Ethernet networks, has been introduced into underwater communication by many researchers and lots of work has been done on the improvement of MAC protocol for throughput and energy efficiency purposes. In this project, I will implement an available MAC protocol to a mini transceiver based on Atmega168. This mini transceiver is 1.5 x 2.5 inches, which is developed by Mr. Gregory Parsons, as shown below. It is battery-powered and could transmit and receive up to four different frequencies. It has switches, a small display and LEDs. These transceivers communicate underwater using ultra-sound. Atmega168 employed in this implementation is a high-performance, low power AVR 8-bit microcontroller, with 1K RAM and 8K ROM. It has 24 MIPS throughput at 24 MHz. I will port the MAC protocol to such a AVR microprocessor and use these transceivers to test the implemented protocol.
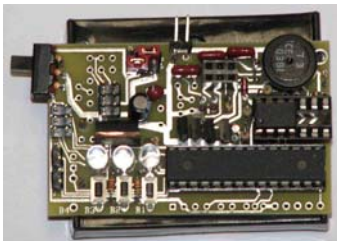
Goal

The purpose for this implementation is to find a reliable protocol that can work better for the transceiver in underwater communication.

Project Plan

1) Survey the existing MAC protocols for underwater acoustic communication to find a suitable one for this transceiver in shallow water communication.

2) Implement the protocol and possible modification.

3) System design and port the protocol to the transceiver.

4) Experimental test in open water.

References

MAC Protocol
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