LABORATORY I

BAE 5030 – In-Vehicle Networks
SPRING 2008

TITLE: CSMA/CD multiplex network simulation.

OBJECTIVE: To develop first hand experience with the issues and functionality of protocol in a CSMA/CD multiplex network.

PROCEDURE: A simulation of a CSMA/CD network will be done by "speaking" messages within a classroom. Each member of the group will be seated facing away from the rest of the group. Each member will be assigned an address (source address) and will be given a dataset, a brief sentence along with a destination address for the dataset. It is the responsibility of each member of the group to communicate their sentence to the particular member associated with the destination address.

The procedure for communication will be to listen for a start command generated by the instructor and to transmit each word of the dataset (sentence) as a message in the sequence the words occur in the sentence. The format of a message should be as follows:

Source address : destination address : word : checksum

The source address should be the address of the speaker. The destination address should be the destination address of the message. The "word" should be a word in the sentence. The checksum should be the number of letters in the word. Sending of the complete dataset will require multiple messages. Checksums should be pre-computed before initial sending messages.

It is impolite and unacceptable for more than one speaker to speak at the same time. To minimize this problem, the following protocol will be used:

The instructor will issue the ticks of a time clock at which a speaker may listen for at least two ticks to assure no other speaker is speaking. If no other speaker is speaking, then the speaker may begin speaking a message. The speaker must listen while speaking to assure no more than his or her message is being spoken. If more than one message is being spoken, then the speakers must refrain from speaking and wait a random number of one to ten time ticks. The speaker may then attempt to transmit the message again.

Each member must also listen for messages destined for their address. If a message is being spoken for their address, the member must copy down the data (word) and the checksum to assure the word was heard correctly.

Members should turn their seat around to face the group when their message is completely sent.

ANALYSIS AND REPORTING: The instructor will ask that the received messages be read by members at the destination addresses in address order and note any inaccuracies. The overall quality of communication should be assessed. Obtain the details of the Ethernet protocol and compare and contrast communications across Ethernet with communications done in this exercise. Prepare a report with the analysis of this exercise and your comparison with Ethernet.