EE 200 -03 Term Project (062)

The Data Router

Students S_1 and S_2 want to send 4-bit data packets to students S_3 and S_4, using a communication link. A multiplexer is used to select whether S_1 or S_2 is switched into the system. A de-multiplexer is used to select which of S_3 or S_4 receives the data. The output of the multiplexer is connected to the source register. The source flip flop determines whether S_1 or S_2 data is latched into the source register at the next clock pulse. The data in the source register is sent over the link and latches into the destination register at the next clock pulse. The destination flip flop determines which of S3 or S4 is connected to the data. Momentary closure of push buttons changes the selection input of the multiplexer (de-multiplexer) at the next clock pulse.

The data to be sent is a 4 bit value, which can be entered using a Hexadecimal keyboard. The data received is viewed in a Hex. Display.

The whole system is synchronized with a single clock.

Design a system that satisfies the functional requirements illustrated in the following figure. Enter your designed circuit in Logic Works and test it thoroughly. Print timing waveforms that show the system responding properly to different values input through the Hex keyboards and a variety of presses from the two push buttons.

Your report should include:

1. Description of the design process
2. Logic diagram of the designed circuit
3. The simulation waveforms that the circuit performs under all conditions
4. A CD (or diskette) that contains the circuit