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CSE 3666

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Extra Assignment: Asynchronous Protocol

1. During a malfunction of a read operation for a device with an asynchronous bus protocol, there will be little to no response from the device to the processor, which also will not be identified. This inability to identify this lack of response/malfunction will make processing continue, and could possible end up with incorrect data. To fix this, response signals must be sent back to the processor bus, which is not necessary, but will be able to notify the processor that the device isn't responding, and stop the read operation. The bus would then send out some sort of suitable error exception that no response is coming from the device.

2. When there is a larger distance between the processor and I/O device increases in a timing diagram, there will be a longer delay between the processor and device. This leads to a bigger skew, also increasing the intervals to compensate for propagation delay. To hold the maximum propagation delay, the clock period must be increased.

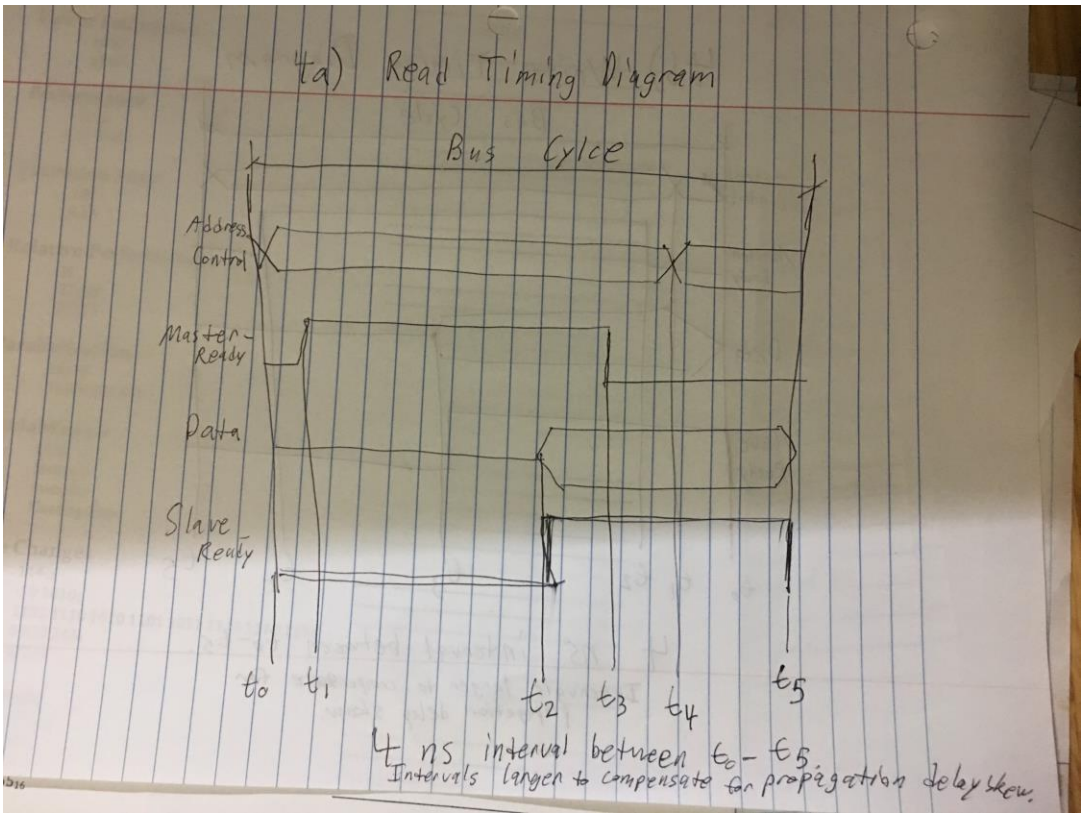
3. a) The maximum clock speed can be found as the following:

   Max clock speed = Bus driver delay + maximum propagation delay + address code delay + maximum time to fetch the request data + setup time

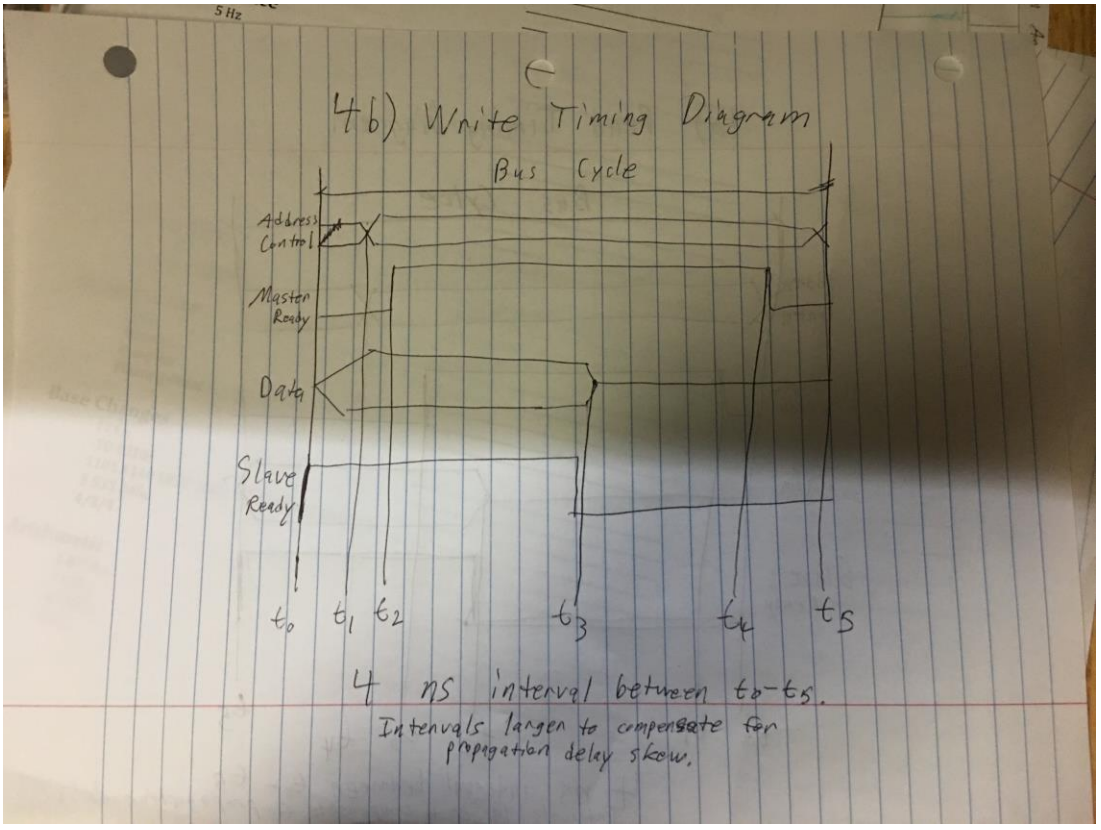
   Max clock speed = 3 ns + 15 ns + 6 ns + 25 ns + 2 ns = 51 ns

   b) 4 cycles are needed to complete an input operation because a new data transfer is done in a 4-clock cycle.

4. a)


4a) Read Timing Diagram
Bus Cylce
Address Control
Master Ready
Data
Slave Ready
t_0 t_1 t_2 t_3 t_4 t_5
4 ns interval between t_0 - t_5
Intervals langen to compensate for propigation delay skew.

b)


4b) Write Timing Diagram
Bus Cycle
Address Control
Master Ready
Data
Slave Ready
t_0 t_1 t_2 t_3 t_4 t_5
4 ns interval between t_0-t_5.
Intervals langen to compensate for propagation delay skew.

c) For the minimum time, consider no delay. Minimum time = 3 ns + 4 ns + 5 ns + 0 ns = 12 ns.

Maximum time = 3 ns + 4 ns + 5 ns + 25 ns = 37 ns. 25 ns can be taken here since it is the largest data fetch time.