

**Out: November 4<sup>th</sup>, 2016**

**Due: November 25<sup>th</sup>, 2016**

**Goal**

To gain experience in creating interface monitor components that add automated checking and reporting capabilities to a testbench environment.

**Procedure**

1. This lab package includes the “phase 2a” SBIU testbench that we are developing in class (sbiu\_phase\_2a.zip). Extract it to a convenient location for reference. The design of the PDM testbench closely parallels the SBIU testbench, so you can leverage the latter as you work on this lab.
2. Extract the lab 5 PDM testbench shell (pdm\_tb.zip) to your working folder. The usual .do files have been provided for your convenience:
  - a. compile\_all.do – Compiles the DUT and all of your testbench files, excluding the testcase file. Run this script every time you make a change to your testbench code that you want to simulate. NOTE - before you compile for the first time, issue the following command: vlib work
  - b. run\_sanity\_test.do – Compiles the sanity test, invokes the simulator, and brings up a wave trace window in the same format as shown in the PDM specification so you can easily verify that your testbench is working properly. Run this script every time you change sanity\_test.sv or want to run/re-run the sanity test.
3. Complete the input interface monitor. Follow the “TO DO” comments as a guide to the functionality that you need to implement. The key tasks are:
  - a. Capture raw signals for the duration of each packet.
  - b. Fill in the fields of the transaction record.
  - c. Implement post-processing protocol checks on the transaction record:
    - i. Check for valid packet length.
    - ii. Check that the ACK delay did not exceed 4 cycles.
    - iii. Check that the ACK was only asserted for 1 cycle.
4. Complete the output interface monitor. Follow the “TO DO” comments as a guide to the functionality that you need to implement. The key tasks are:
  - a. Capture raw signals for the duration of each packet.
  - b. Fill in the fields of the transaction record.

- c. Implement post-processing protocol checks on the transaction record:
  - i. Check for valid packet length.
  - ii. Check that the PROCEED delay did not exceed 4 cycles.
  - iii. Check that PROCEED was only asserted for 1 cycle.
- 5. All of the components are already instantiated and connected for you. The sanity test is set up to confirm that your monitors are working properly. First run the sanity test as-is, confirm that the monitors/module do not raise any errors, and confirm that the monitors print out the transaction records with the fields filled in correctly. Then, uncomment the error-injection function calls one-at-a-time (such that only one error-injection function is uncommented for a given run) and re-run the sanity test each time to confirm that your protocol checks are all working.

#### **Deliverable**

A compressed archive (.zip or .tar.gz) of your completed lab 5 testbench environment. Include your name, NSID, and student number in the filename, and email to the course lab instructor Chandler Janzen ([chandler.janzen@usask.ca](mailto:chandler.janzen@usask.ca)) by midnight on November 25<sup>th</sup>.