

# Assignment 2: Ethernet Lab

“Course 1-02-327 and 1-01-051: Introduction to Networks”

Due May 2, 2010 at 11:59:59pm

## 1 Questions

- (1) (15 points) Explain the graph we received in the simulation that shows the relationship between the received (throughput) and sent (load) packets. Why does the throughput drop when the load is either very low or very high?
- (2) (25 points) Create three duplicates of the simulation scenario implemented in this lab. Name these scenarios **Coax\_Q2a**, **Coax\_Q2b**, and **Coax\_Q2c**. Set the **Interarrival Time** attribute of the *Packet Generation Arguments* for all nodes (make sure to check **Apply Changes to Selected Objects** while editing the attribute) in the new scenarios as follows:
  - **Coax\_Q2a** scenario: exponential(0.1)
  - **Coax\_Q2b** scenario: exponential(0.05)
  - **Coax\_Q2c** scenario: exponential(0.025)

In all the above new scenarios, open the *Configure Simulation* dialog box and from the *Object Attributes* delete the multiple-value attribute (the only attribute shown in the list).

Choose the following statistic for node 0: **Ethcoax** → **Collision Count**. Make sure that the following global statistic is chosen: **Global Statistics** → **Traffic Sink** → **Traffic Received (packet/sec)**. (Refer to the *Choose the Statistics* section in the lab.)

Run the simulation for all three new scenarios. Get two graphs: one to compare node 0's collision counts in these three scenarios and the other graph to compare the received traffic from the three scenarios. Explain the graphs and comment on the results. (*Note*: To compare results you need to select **Compare Results** from the **Results** menu after the simulation run is done.)

- (3) (15 points) To study the effect of the number of stations on Ethernet segment performance, create a duplicate of the **Coax\_Q2c** scenario, which you created in Question 2. Name the new scenario **Coax\_Q3**. In the new scenario, remove the odd-numbered nodes, a total of 15 nodes (node 1, node 3, . . . , and node 29). Run the simulation for the new scenario. Create a graph that compares node 0's collision counts in scenarios **Coax\_Q2c** and **Coax\_Q3**. Explain the graph and comment on the results.
- (4) (15 points) In the simulation a packet size of 1024 bytes is used (*Note*: Each Ethernet packet can contain up to 1500 bytes of data). To study the effect of the packet size on the throughput of the created Ethernet network, create a duplicate of the **Coax\_Q2c** scenario, which you created in Question 2. Name the new scenario **Coax\_Q4**. In the new scenario use a packet size of 512 bytes (for all nodes). For both **Coax\_Q2c** and **Coax\_Q4** scenarios, choose the following global statistic: **Global Statistics** → **Traffic Sink** → **Traffic Received (bits/sec)**. Rerun the simulation of **Coax\_Q2c** and **Coax\_Q4** scenarios. Create a graph that compares the throughput as packets/sec and another graph that compares the throughput as bits/sec in **Coax\_Q2c** and **Coax\_Q4** scenarios. Explain the graphs and comment on the results.

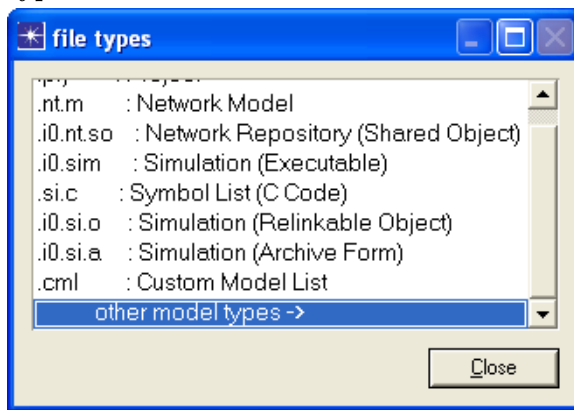
## 2 What to do

In the Targil session we have worked on and designed an Ethernet network scenario using OPNet IT Guru. The scenario allows you to analyze the behavior of a Coaxial Ethernet network's congestion behavior.

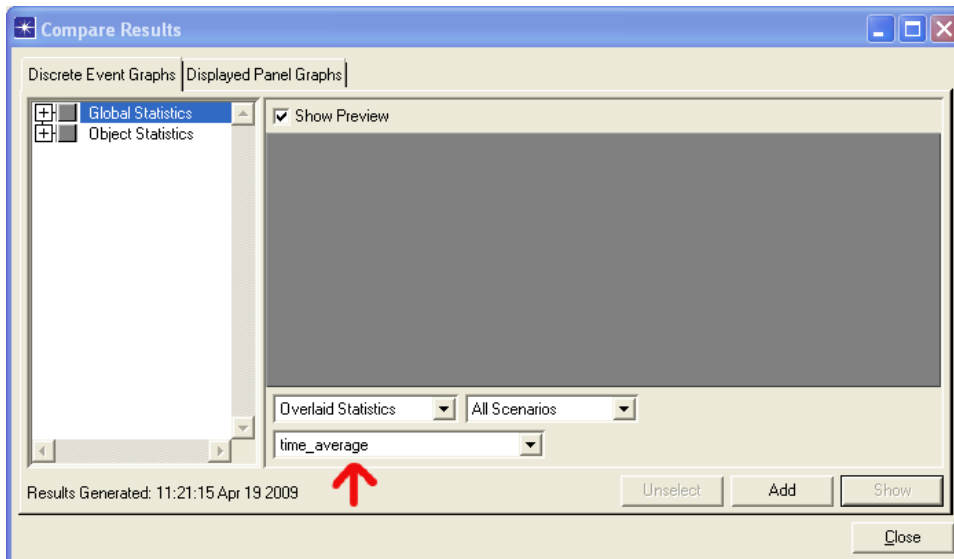
At the end of the laboratory's PDF file is a series of questions which ask you to explain the results for the scenario you created and modify is slightly. Perform and answer questions 1–4 for the laboratory.

### 2.1 Notes on the Compare Results Window

1. You will find the **Compare Results...** option under the **Results** menu.
2. Remember to perform the **Model Files** → **Delete Model Files** operation *before* you perform your simulation runs.
  - You can find the option to delete the **.os** files in the **other model types** -> entry in the **file types** window:



3. In questions 2 and 3, the graph that best shows the results is derived using the **time\_average** graph option:



4. In question 4, the graph that best shows the results is derived using the **As Is** graph option instead of the **time\_average** selection shown above.

### 3 What to Turn In

Each submission should include the following information:

- A cover page with your name or the names of all members of the group, course information, lab number and title, and date of submission.
- For questions 2, 3, and 4, using the Compare Results window to generate graphs. Take screen shots of each of the graphs you generate and include them in your submission.

**Hint:** You can take screen shots using your favorite screen shot tool or Shift-PrtSc to copy and Ctrl-V to paste into Microsoft Paint

- A conclusion that includes what you learned, difficulties you faced, and any suggested extensions or improvements to the lab

Turn in your work via Telem, in person, by email ([ise327@gmail](mailto:ise327@gmail.com)), or by fax (04-665-3661) before the end of May 2, 2010.

As with all assignments in this course, **you are permitted (and encouraged) to work in groups of up to 3 students**. Groups need only submit their work once and should put the names of all group members on the first page of the submission.