

**CS 378 Lab: Midsem [Max Marks = 20; Weightage = 15%]
OSL, Mon Sept 03, 2012 (2:00pm to 5:00 pm)**

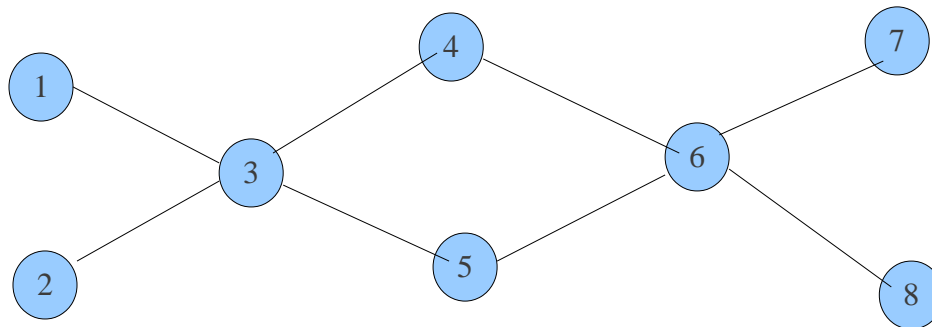
General instructions:

1. This lab midsem is to be done in **individually**. No form of collaboration or communication with others. Penalty for violation: **-20** marks.
2. You have 15 minutes to download whatever items you think you need. Network access will be cutoff at 2:15 pm.
3. Create a directory called <rollnumber>_lab-midsem. As you proceed with the lab activities below, note down observations or relevant output from whatever you do in a file named "lab-midsem.txt" using a text editor.
4. **Write Your Name and Roll Number in "lab-midsem.txt"**.

Lab Activities:

1. Determine the MTU size of your loopback interface. Also write down the command that you used for this purpose. [1 Mark]
2. Determine the MAC address of the machine with IP address 10.105.11.XX, where XX is the last two digit of your roll number %20 + 1. Also write down the steps that you followed to find the MAC address. [2 Marks]
3. What does the following command do? Explain precisely. [1 Marks]
tcpdump -s 1500 dst 192.168.0.2 and src net 172.16.0.0/16 and not icmp
4. Run tcpdump and capture some packets in a file exec4.out.
 1. Put the header information of the frames into a file exec4-headers. What command did you use? [1 Mark]
 2. How many ARP packets arrived at the interface? How did you find out? [1 Mark]
 3. How many TCP packets arrived at the interface? [1 Mark]
5. Open exec4.out with wireshark. Select one of the packets listed. Click on the IP header. The IP header is 20 bytes (40 hexadecimal characters, 4-bits per character).
 1. What is the S.No of the packet you selected? [1 Mark]
 2. What is the position of the checksum field (specify in bytes, where 1st byte corresponds to start of IP header)? [1 Mark]
 3. What is the value of the checksum field? [1 Mark]

6. Create a file called ns-lab-midsem.tcl. Write the script to create the topology shown below in ns2.



Specify bandwidth for each link as follow:

Link 1-3, 2-3, 4-6, 5-6, 6-7, 6-8: 10Mbps

Link 3-4, 3-5 : Bandwidth of 1Mbps in the 1st run, 2Mbps in the 2nd run and so on upto 10Mbps. Both links should have the same bandwidth at any given point of time.

Create flows as follow:

TCP_flow1 : Source – 1, Sink – 7

TCP_flow2 : Source – 2, Sink – 8

UDP_flow3 : Source – 1, Sink – 7

UDP_flow4 : Source – 2, Sink – 8

Data Generation Rate:

All the flows should generate data at 6Mbps. Use CBR to generate data and packet size should be 1500 Bytes. [2 Marks]

Simulation:

Run your tcl script for 10 times with the same seed. In each iteration, increase the bandwidth of both 3-4 and 3-5 links by 1Mbps (as mentioned above) and generate 10 trace files. You need not generate namtrace file.

Answer the following:

1. In given topology each flow has two possible paths. For example TCP_Flow1 can send data in 1-3-4-6-7 or 1-3-5-6-7 paths. Does Node3 spread data traffic evenly between both the paths? Compute the Load Ratio between links 3-4 and 3-5. Write your answers in lab-midsem.txt file.
(Hint: Calculate packets sent from 3 to 4 and from 3 to 5).
LoadRatio = (Packets Sent from 3 to 4)/ (Packets sent from 3 to 5)) [2Marks]
2. Calculate Packet Loss and Throughput for each flow (both tcp and udp). Write your answers in lab-midsem.txt file. [2 Marks]

3. Plot the following graphs:
 - (a) Variable Bandwidth(X-Axis) Vs Packet Loss(Y-Axis). Mention four flows details only in a single plot. [2 Marks]
 - (b) Variable Bandwidth(X-Axis) Vs Per-flow throughput(Y-Axis). [2 Marks]

Submission instructions

The directory named <rollnumber>_lab-midsem that you will submit should contain the following files:

1. lab-midsem.txt
2. exec4.out
3. ns-lab-midsem.tcl
4. relevant trace files
5. bash scripts (if used)
6. relevant plots (in eps format, properly named)

Now tar the directory and submit the file <rollnumber>_lab-midsem.tgz via moodle.

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