CECS 327 Introduction to Networks and Distributed Computing   **Spring 2022**

Notes:

1- This is individual assignment.
2- The assignment will be due on Sunday 02/27/2022 @ 10:00 PM PST.
3- Late assignment won't be accepted.

Problems:

1- What advantages does a packet-switched network have over a circuit-switched network?
2- What are the five layers in the Internet protocol stack? What are the principal responsibilities of each of these layers?
3- How long does it take a packet of length 1500 bytes to propagate over a link of distance 2500km, propagation speed of (2.5×10^8) m/s, and transmission rate 2Mbps? Does this delay depend on packet length? Does this delay depend on transmission rate?
4- Suppose a 1-Gbps point-to-point link is being set up between the Earth and a new lunar colony. The distance from the moon to the Earth is approximately 385,000 km, and data travels over the link at the speed of light—3×10^8 m/s.
   a) Calculate the minimum RTT for the link.
   b) Using the RTT as the delay, calculate the delay × bandwidth product for the link.
   c) What is the significance of the delay × bandwidth product computed in (b)?
   d) A camera on the lunar base takes pictures of the Earth and saves them in digital format to disk. Suppose Mission Control on Earth wishes to download the most current image, which is 25 MB. What is the minimum amount of time that will elapse between when the request for the data goes out and the transfer is finished?

Hands-on Activities:

Use Networking Tools:

5- Measuring Round Trip Times with Ping: In Windows, open a command prompt. Use the -? Flag on the ping command and find out a list of options available for the ping command. (Support your answers with screenshots)

   a. Try a simple ping www.google.com. Record the minimum, maximum and average round trip times.
   b. Try the option ping –n 2 www.google.com. And then try ping –n 7 www.google.com. What differences do you notice?
   c. Try ping 10.0.0.50 and write down what output you get and explain why you get the result.
   d. Try ping www.imperialequestriancenter.com Did you receive any responses

for the packets you sent? What are some reasons as to why you might have not got a response?

6- Understanding Internet routes using Traceroute: In Windows, open a command prompt. Use the -? Flag on the tracert command and find out a list of options for the tracert command. (Support your answers with screenshots)

   a. Try a simple tracert www.google.com. How many hops there were between your computer and www.google.com?

   b. Compare tracert www.google.com and tracert www.ieee.org. What hops are the same for each destination?

   c. Try tracert www.ubc.ca and then try the option tracert –d www.ubc.ca. What differences do you notice?

   d. Compare round trip times to the number of hops from a local host to the three hosts, www.tsinghua.edu.cn, www.usyd.edu.au and www.harvard.edu at different times of a day (e.g, morning, afternoon and evening). What correlation(s) do you find? Are these your expectations? Explain.

   e. Run traceroute on your local machine for the previous URLs, then paste the output in the following link. What do you conclude? Include a screenshot in your response.

   https://stefansundin.github.io/traceroute-mapper