Workshop 1 - Submit at least 48 hours before your workshop session to receive credit (deadline set as a reminder)

[**Re-submit Assignment**]

Due Mar 12 by 13:00   **Points** 2   **Submitting** a text entry box or a file upload

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Computer Networks & Applications

Workshop 1 - Network Overview & Application Layer

Workshops are aimed at practicing and developing your problem solving skills. As the focus is on the reasoning process and not the specific problems in the workshop, we do not distribute solutions to tutorials.

⤢ [(https://cs.adelaide.edu.au/users/third/cn/Tutorials/Network-Layer/)](https://cs.adelaide.edu.au/users/third/cn/Tutorials/Network-Layer/)

The 3 workshops make up 5% of your mark. Your tutor will review all submissions for your session and the workshop will be tailored around the submissions. The workshop will not just be going through the problems, but instead will focus on the problems/misconceptions that arise from reviewing the submissions. If the submissions answer all the questions correctly, the tutorial will cover other areas requested in submissions (some examples: working on current practical, more problems on a given topic, review of a topic, etc.)

⤢ [(https://cs.adelaide.edu.au/users/third/cn/Tutorials/Network-Layer/)](https://cs.adelaide.edu.au/users/third/cn/Tutorials/Network-Layer/)

To receive credit you must submit solution attempts to this tutorial at least 48 hours before your workshop session (as a *reminder* we have set a deadline of Saturday of the week before the tutorial).

Please note, *credit for partially completed submissions* will depend on the depth and breadth of answers (ie we may give credit if you answer most questions with clear thought and miss one question). If you are unable to answer a question, **we expect you to write what thoughts you have on how to solve the question** (what information is useful, what equations do you think are relevant, etc).

⤢ [(https://cs.adelaide.edu.au/users/third/cn/Tutorials/Network-Layer/)](https://cs.adelaide.edu.au/users/third/cn/Tutorials/Network-Layer/)

If you have any other questions about topics covered so far or other network related topics you are curious about, include them in your submission and we can discuss them in the workshop.

Question 1 - Latency through a Network

Consider a packet flowing through the Internet over 2 hops (source -> router1 -> destination). Assume that it takes the router 1 msec to process a packet and determine the outgoing link. The simplified network is shown below:
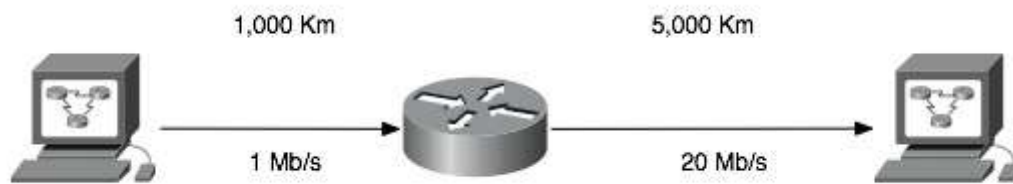
Given a propagation speed of 2.5 x 10^8 m/s (slightly under the speed of light) and a packet data size of 1000 bytes, what is the end-to-end delay for a packet assuming no other traffic at the router?

What effect would other traffic at the router have?

Question 2 - Packet switching and Circuit switching - from K&R

Suppose that all of the network sources send data at a constant bit rate. Would packet-switching or circuit-switching be more desireable in this case? Why?

Question 3 - Peer to peer and Client Server (K&R)

Consider distributing a file of 10 Gbits (10 x 10^9 bits - note we are making life easier by using base 10 here) to N peers. The server has an upload rate of 20 Mbps, and each peer has a download rate of 1Mbps and an upload rate of u. For N=10, 100 and 1,000 and u=200 Kbps, 600 Kbps, and 1Mbps, prepare a chart giving the minimum distribution time for each of the combinations of N and u for both client-server distribution and P2P distribution.

How close would this approximation be to bit torrent's performance?

Question 4 - HTTP

Why does HTTP specify a blank line between the headers and the entity body for requests and responses? Could HTTP have been designed without this blank line? Explain why or why not.

Is the content-length header necessary? Explain.

Question 5 - Caching and DNS

Assume you are using persistent HTTP and request a web page that contains two images. Explain the events that must occur if:

1. The web page and images are cached in the web proxy cache and the domain is not cached in the local DNS
2. The web page is not cached; but the domain is cached in the local DNS
3. Neither the web page nor the domain is cached.

In case 3, how much time is likely to pass between the time the user clicks on the link until the web page is loaded? Assume the user is in Adelaide connected to the Internet through an ADSL modem and they are accessing a website in Sydney (about 1500 Kms away). Be creative in how you could work this out (or at least estimate it).

Question 6

What topic(s) would you most like to review/discuss or have further examples of?

For Discussion (come prepared to discuss this in groups):

One standard for carrying internet traffic by pigeon is defined in **RFC 1149 (IP over Avian Carrier)** ↗ **(https://tools.ietf.org/html/rfc1149?)** . Assuming the care and feeding of pigeons is not an issue and given that we have seen that pigeons can exceed the data rate of the NBN (with capacity to grow that rate by adding larger USB drives), what is the underlying **performance** issue that makes pigeons an unlikely carrier choice? What types of applications are likely to be negatively impacted by IP over Avian Carrier? What applications are likely to have positive impacted performance? How would you calculate the change in performance? Why is the standard described in RFC 1149 'high delay'?

(although pigeons are unlikely to ever play a major role in the Internet and are an amusing look at the issues, there are some services, such as satellite that have similar, if not as extreme, characteristics of high bandwidth, high latency. Under what circumstances would you be better off taking data off-net - ie give your friend a USB vs having them download a file over the Internet)? Define these circumstances as a mathematical equation.