Workshop 1 - Only need to submit at least 48 hours before your workshop session to receive credit (submission deadline set only as a reminder for everyone)

Start Assignment

- Due Mar 8 by 17:00
- Points 3
- Submitting a text entry box or a file upload
- File Types pdf

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 workshops and we do not record the workshops.

If you ***missed*** your scheduled workshop:

- Please feel free to come to another session, you do not need to let us know as we only mark your submitted work
  - Where do you find another session? You can find out when and were by looking at the **University Course Planner, (https://access.adelaide.edu.au/courses/search.asp)** searching for our course (Computer Networks and Applications), clicking on the link for the course and looking for **Workshop** by scrolling down the page. There you will see session times and places.
- In the worst case, you can always come to a consulting session to discuss your work and questions with the lecturer.

Making use of the workshop and time with the tutor is essential to doing well in the course and supporting your learning. Past experience shows that those that students coming to workshops, following up on questions and concepts that were not clear do well in the course and ***avoid disappointments at the end***.

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 workshop will cover other areas requested in submissions (some examples: working on current practical, more problems on a given topic, review of a topic, etc.)

To receive credit you must submit solution attempts to this workshop at least 48 hours before YOUR workshop session (as a *reminder* we have set a submission deadline a week before all the workshops. But you only need to submit 48 hours before your scheduled workshop session).

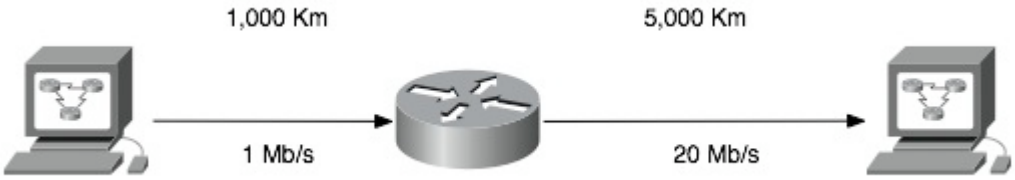
Please note, *credit for partially completed submissions* will depend on the depth and breadth of answers (ie we may give credit if you answer most questions with clear thought and miss one question). If you are unable to answer a question, ***we expect you to write what thoughts you have on how to solve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

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:

(https://myuni.adelaide.edu.au/courses/95212/files/14654158/download?wrap=1)



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 (K&R)

Statistical multiplexing gains (see section 1.3 in the textbook)

Assume that you are sharing a link with a bandwidth of 2 Mbps at home. Assume that each member of your family, when using the link, transmits continuously at 1 Mbps but each member transmits only 20 percent of the time.

1. If you set-up your network to circuit switching, how many family members can be supported simultaneously (remember, in circuit switching, resources are reserved for each user)?
2. Now, let's assume that you've re-designed the network to support packet switching and re-consider how may active (simultaneous users can be supported).

I. Why will there not be a queuing delay at the devices waiting to use the link if two or fewer users transmit at the same time?
II. Why will there be a queuing delay at the devices attempting to use the link, if ***three*** users transmit at the same time?
III. What is the probability that a given user is transmitting at any given time?
IV. Now re-consider the situation of three users transmitting at the same time. First, find the probability that at any given time, all three users are transmitting simultaneously. Now find the fraction of time during which the queue grows.

Question 3 - Peer to Peer (P2P) and Client Server (K&R)

(Topic ***only*** discussed in the workshops) (Section 2.5 in Seventh Edition)

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 7 - Learning to Read a protocol specification

What is the difference in response to a HTTP Head vs HTTP Get request? You will need to consult the RFC for HTTP 1.1 to answer this question.

Question 6

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