

COMP9007 Internet Technologies

Semester 1, 2018

Due date: March 23rd March, 5:00 pm, 2018

Assignment 1 – Suggested Solutions

This assignment is worth 5% of the total marks for the subject. This assignment has 5 questions. The weighting of each question is shown beside the Question. **Answers must be submitted as a PDF file via the COMP90007 Assignment 1 submission form in the LMS by 5:00pm, 23/03/2018. Late submissions will attract a penalty of 10% per day (or part thereof). Please ensure your name and user name are clearly presented. Submission should only contain the question number and the answer (do not repeat the text of questions in your submission).** Please present all steps for questions involving calculations and/or derivations otherwise relevant penalties will be imposed.

Each question can be answered in a few sentences. Excessively long answers will be penalized.

All questions can be answered by studying the material from the textbook. You can discuss the assignment topics with your friends, however, all work presented should be your original work. There will be a discussion forum thread for the assignment and any instructions provided in the forum are also part of the specification.

Question 1 [1 mark]

In a system with 5-layer protocol hierarchy, applications generate messages of length M bytes. Assuming each layer has a different header size: 20-byte, 20-byte, 20-byte, 100-bytes and 150-bytes for Layers 1, 2, 3, 4 and 5 respectively. What fraction of the network bandwidth is filled with headers?

Question 2 [1 mark]

An image is 1920×1080 pixels with 3 bytes/pixel. Assume the image is uncompressed. How long does it take to transmit it over 56-kbps model channel? Over a 1-Mbps cable modem? Over a 100 Mbps Ethernet? Over gigabit Ethernet?

Question 3[1 mark]

When a large file is transferred across the network between two computers, two different possible acknowledgement schemes can be used. In the first, the file is divided into smaller packets, which are then individually acknowledged by the receiver as they are received, but the file transfer as a whole is not acknowledged. In the second scheme, the packets are not acknowledged individually, but the entire file is when it arrives at its destination. Discuss the practical implications of these two approaches in terms of bandwidth utilization.

Question 4 [1 mark]

Consider any TCP stream in your Wireshark trace and provide its Flow graph diagram (Choose relevant packet -> Statistics -> Flow Graph). Provide a print screen of your trace (Packets List) as well as Flow Graph and explain what information can you gather from the two, comparing it with each of the Service primitives given below (source: 1.3.4 Service Primitives – Tanenbaum Fifth Edition)?

Primitive	Meaning
LISTEN	Block waiting for an incoming connection
CONNECT	Establish a connection with a waiting peer
ACCEPT	Accept an incoming connection from a peer
RECEIVE	Block waiting for an incoming message
SEND	Send a message to the peer
DISCONNECT	Terminate a connection

Question 5 [1 mark]

The performance of a network application is influenced by two major network characteristics: the bandwidth of the network (number of bits per second that the network can transport) and the latency (the delay experienced by each bit transported).

Identify the requirements of the following applications in terms of bandwidth and latency, and then give an example of a network that is suitable for each of these applications:

- i) File transfers between Melbourne and USA
- ii) Bandwidth intensive interactive gaming
- iii) Connecting a large number of real-time environment monitoring sensors (frequent low data transmissions from sensors but application requires critical event notification)
- iv) Broadband connections in regional Australia
- v) Video streaming during commutes