

SOFTENG 364: Computer Networks

Assignment 1 (worth 10%)

Due May 1st, 5pm.

This assignment will focus on protocols in the application, transport and network layers of the Internet Protocol stack, but you will also need to dip into the link layer occasionally. You will be using Wireshark to analyse networks via various saved traces. Please submit your assignment as a **pdf file** via the assignment submission option in Canvas. Marks will be awarded for both technical depth and for readability. Screen shots with pertinent information should be included. Please make sure you correctly list all references used in completing your assignment. All assignments will be checked for plagiarism, and will be awarded zero marks if plagiarism is detected.

Task 1.

Open *task1.pcapng* trace file in Wireshark and using the information from the Packet list frame and Packet details frame and build a picture of the network. List both the IP and MAC address for each device. You will not be able to give explicit links to each of the hosts in the network, but there are two hosts that are connected to the same router, so make sure this is clear. Remember the MAC addresses are found in the link layer.

Task 2.

Open *task2.pcapng* in Wirehark, and find the following

1. Create an IO Graph for this trace file and establish what is the highest packets-per-second value seen in this trace file, and at what time did it occur?
2. Create an IO Graph for this trace file and establish what is the highest bits-per-second value seen in this trace file, and at what time did it occur?
3. Create an IO graph for this trace file, and show when all the duplicate ACKs occurred, as well as all the retransmissions, and fast retransmission.
4. What is a duplicate ACK, and how is it used in TCP?
5. Plot a flow graph of the conversations in this trace, and state how many TCP conversations are in this file.
6. Within this trace file there are number of time the info “Previous segment not capture” is displayed (e.g. frame 9), find out what this Wireshark warning means. Next find out where the Expert Infos button is and click it to open the expert Infos window. Using this window establish how many times “*Previous segment now captured*” has been detected in this trace file.
7. How many retransmissions and fast retransmission are seen in this trace file?

Task 3

Open *task3.pcapng* in Wireshark and find the following

1. What are the protocols used in this trace? What percentage of the total number of packets was involved with DHCP messages? Which transport layer protocol was used the most in this trace?
2. Create an IO graph, showing all the traffic, when the DHCP protocol was used, when the domain name system protocol was called, and when the two protocols in the transport layer were called.
3. Establish what is the highest bits-per-second in the trace and when did it occur.
4. Identify IP address of the host that requested a pdf document, and the IP address of the server that responded to the request.
5. Create a flow chart of the TCP conversation of the pdf download.
6. How long did the pdf document take to download?
7. What was the average Round Trip Time for the pdf download?
8. When did the longest Round Trip Time occur during the pdf download?

Task 4

Consider the three Video Streaming services Netflix, YouTube and Lightbox. Discuss how video streaming on the internet is achieved in general, then discuss the approaches taken by the above three services. Be sure your discussion includes the protocols involved, and facts pertaining to New Zealand. Pictures are also very useful. Make sure you reference all your sources, including any images taken from other sources. This report should be between 800-1200 words.