Computer Networks Homework 1

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Question 1

1. (a) A network protocol defines the format and order of messages exchanged between two or more communicating devices on a network, as well as the actions taken on the transmission and/or receipt of a message.
   (b) A network service is an application running at or above the application layer. Can serve many different functions, like data storage, presentation, etc.
   (c) Service interface - theoretical, a definition of the service independent of implementation
   Implementation of a service - practical, follows the service interface definition and implements the service

2. (a) A network architecture - framework for the specs of a network's physical components & functional org/config, operation principles & procedures, & communication protocols
   (b) ISO/OSI - Application, Presentation, Session, Transport, Network, Link, Physical layers
   TCP/IP - Application, Transport, Network, Data Link, Physical layers

3. 1k) Overhead: $100 * 1,000,000/1,000 = 100,000$ bytes

   Bytes lost: 1 packet AKA 1,000 bytes

   Total: 101,000 bytes

   5k) Overhead: $100 * 1,000,000/5,000 = 20,000$ bytes

   Bytes lost: 1 packet AKA 5,000 bytes

   Total: 25,000 bytes

   10k) Overhead: $100 * 1,000,000/10,000 = 10,000$ bytes

   Bytes lost: 1 packet AKA 10,000 bytes

   Total: 20,000 bytes (OPTIMAL)

   20k) Overhead: $100 * 1,000,000/20,000 = 5,000$ bytes

   Bytes lost: 1 packet AKA 20,000 bytes

   Total: 25,000 bytes

Question 2

1. Recording on eno1, my PC is connected via ethernet to the SLU network
2. Protocols
   - TCP - transport layer
   - TLSv1.2/3 - presentation layer
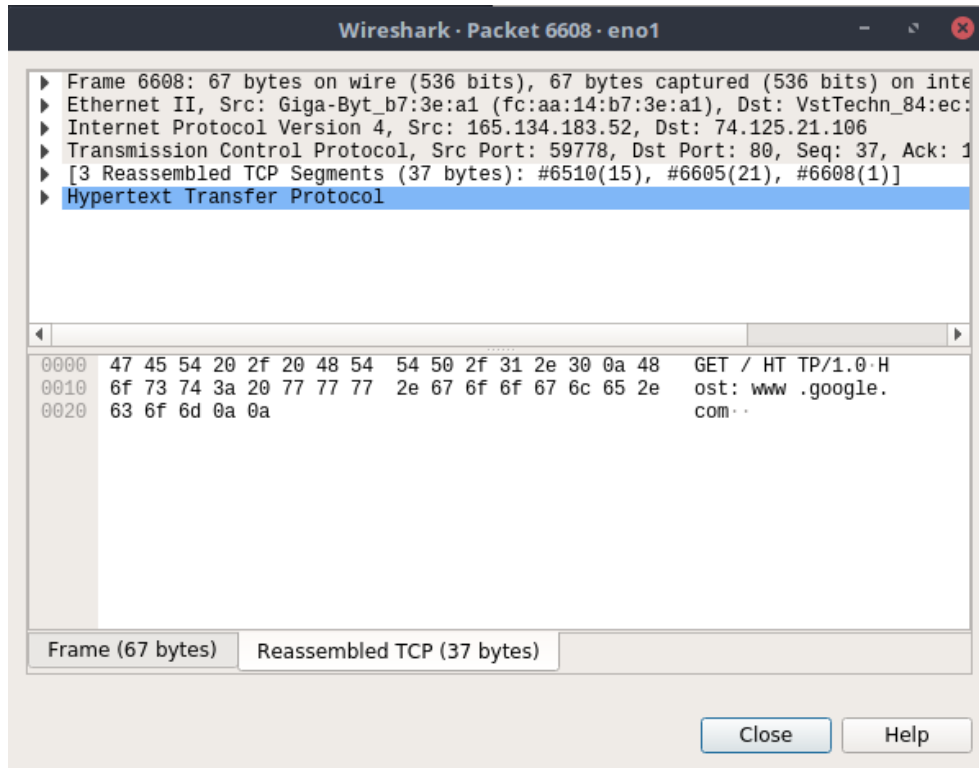
3.

Question 3

1. Traceroute uses the IP TTL field to cause an ICMP TIME_EXCEEDED response from each gateway. Firewalls filter the "unlikely" UDP ports, or the ICMP echoes.

2.

	First Round	Second Round
Trial 1	30.856ms	79.627ms
Trial 2	31.305ms	79.249ms
Trial 3	30.942ms	78.053ms
Trial 4	31.624ms	78.726ms
Trial 5	30.936ms	77.228ms
Average	31.1326ms	78.5766ms
Std Deviation	0.32507ms	0.9579ms

3. 165.134.183.254, 165.134.198.4, 165.134.248.137, 10.248.101.30, 10.248.100.20, 165.134.223.27, 10.248.5.2, 34.230.135.168

   165.134.183.254 - St. Louis University
   165.134.198.4 - St. Louis University
   165.134.248.137 - St. Louis University
   10.248.101.30 - Private IP Address LAN
   10.248.100.20 - Private IP Address LAN
   165.134.223.27 - SLU
   10.248.5.2- No ISP associated
   34.230.135.168 - Amazon.com, Inc.