COMP 445 – Theoretical Assignment 1 (TA1)
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Instructions

- Please submit your assignment as a pdf file on Moodle. The name of the pdf file must contain your name and student id.
- All questions will receive equal points.
- Each question may have zero, one, or more than one correct choices.
- Wrong answers will be penalized with negative points.
- Partial answers will not receive any point.
- Blank answers (no answer) will not be penalized.

Student ID: .....

First Name / Last Name: .....

Signature: .....

Introduction

Q1: A protocol of the application layer is implemented:

a) □ At the network core.

b) □ At the network edge.

c) □ Both at the network core and at the network edge.

Q2: Consider two hosts A and B connected through a single router X (the network looks like A – X – B). Assume that the link between A and X is of capacity R_{A-X}=8 Gbps and the link between X and B is of capacity R_{X-B}=16 Gbps. What is the time required for N=5 packets of size L=1 MB to be delivered from A to B, assuming that all delays except the transmission delay are negligible? We assume that 1 Gb=1000 Mb.

a) □ 5.5 ms

b) □ 7.5 ms

c) □ 1.5 ms

d) □ None of the above.

Q3: Starting from the same network as in the previous question, we now assume that propagation delays are not negligible:

- A and X are connected by a 5000-km link (l_{A-X}=5000 km) where the propagation speed is s=10^8 m/s.
- B and X are connected by a 20-km link (l_{X-B}=20 km) where the propagation speed is s=10^8 m/s.

What is the new delivery time between A and B for the same N=5 packets?

a) □ 45.7 ms

b) □ 55.5 ms

c) □ 51.5 ms

d) □ 55.7 ms

Q4: In the Internet protocol stack, the transport layer can directly use services from:

a) □ The application layer.

b) □ The network layer.

c) □ The link layer.

d) □ All of the above.

Q5: What is the probability that more than 5 users are active at the same time in a network of 15 users where each user is active 20% of the time?

a) □ 1

b) □ 0.6

c) □ 0.04

d) □ 0.06

Application layer

Q6: The content below was captured using Wireshark:

```
▸ Frame 110: 75 bytes on wire (600 bits), 75 bytes captured (600 bits) on interface 0
▸ Ethernet II, Src: IntelCor_50:80:98 (f0:d5:bf:50:80:98), Dst: mynetwork (f0:82:61:f7:5e:80)
▸ Internet Protocol Version 4, Src: 192.168.2.111 (192.168.2.111), Dst: mynetwork (192.168.2.1)
▸ User Datagram Protocol, Src Port: 60634 (60634), Dst Port: domain (53)
▾ Domain Name System (query)
    Transaction ID: 0x8ed4
  ▾ Flags: 0x0100 Standard query
      0... .... .... .... = Response: Message is a query
      .000 0... .... .... = Opcode: Standard query (0)
      .... ..0. .... .... = Truncated: Message is not truncated
      .... ...1 .... .... = Recursion desired: Do query recursively
      .... .... .0.. .... = Z: reserved (0)
      .... .... ...0 .... = Non-authenticated data: Unacceptable
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
  ▾ Queries
    ▾ www.lapresse.ca: type ANY, class IN
        Name: www.lapresse.ca
        [Name Length: 15]
        [Label Count: 3]
        Type: * (A request for all records the server/cache has available) (255)
        Class: IN (0x0001)
```

This trace contains:

a) □ An HTTP request encapsulated in a DNS query.

b) □ A DNS query encapsulated in a TCP segment.

c) □ An IP datagram encapsulated in a UDP datagram.

d) □ A DNS query encapsulated in a UDP datagram.

Q7: Among the following HTTP methods, which one(s) may be used to upload a file to a Web server?

a) □ GET

b) □ POST

c) □ PUT

d) □ HEAD

Q8: Among the following protocols, which one(s) are **not** involved in the retrieval of the Web page at URL `http://www.concordia.ca/` with a Web browser?

a) □ TCP

b) □ DNS

c) □ HTTP

d) □ SMTP

Q9: DNS may be used to retrieve the name of the email server of a specific domain:

a) □ by querying records of type CNAME.

b) □ by querying records of type NS.

c) □ through any type of iterated query.

d) □ through any type of recursive query.

Q10: SMTP is:

a) □ a push protocol.

b) □ a deprecated protocol.

c) □ a transport protocol (a protocol belonging to the transport layer).

d) □ a text (ASCII) protocol.