

IT 263 / NET 405

Homework #1

Due Thursday, July 29th, 2021 at 11:59 PM CDT

100 points total

Type your answers to each of the following questions into a separate document and submit to the HW 1 Submission Folder on D2L. Your answer file must include your name in the file and must be in PDF format.

1. (5 points) I am installing a data cable between two office labs that are 80 meters apart. What is one advantage of installing a copper wire twisted-pair cable versus a fiber optic cable? What is one advantage of installing a fiber optic cable versus a copper wire twisted-pair cable?

Advantage of installing a copper wire twisted-pair cable

- Easier to install
- Lower price
- Strong anti-interference ability

Advantage of installing a fiber optic cable

- Not disturbed by external electromagnetic signals
- The transmission speed can be very fast
- Longer distance possible (in some cases)

2. (5 points) What is the data transmission time to send a 2 Gbyte file over a link with a 100 Mbps line rate? You can assume there is no overhead, so the throughput is equal to the line rate. Round your answer to the nearest 0.1 second and show your work.

Data transmission time = (file size, in bits) / (line rate in bits/sec)

Size of data = 2 GB = $2 \times 1024 \times 1024 \times 1024 \times 8 = 16,777,216$ bits

Bandwidth = 100 Mbps = 100×10^6 bits/sec = 100,000,000 bits/sec

Transmission time = $16,777,216 / 100,000,000 = 0.16777216$ sec.

3. (5 points) Explain what it means for a network to be scalable.

It means to grow a network or increase the size of network. It allows you to add other users and networks to an existing network without reducing the performance of users on the network

4. (5 points) Each numbered RFC document defines the rules of a network protocol. What is the title of RFC 8216 and what year was this RFC published?

- RFC 8216 is "HTTP Live Streaming"
- It was published in August, 2017.

5. (5 points) Each Well-Known Port number is associated with a standard network service application that can be offered on an Internet server. What is the name of the network application associated with TCP port 17?

TCP port 17 is associated with the QOTD (Quote of the day) service.

6. (5 points) Describe two reasons that you would prefer to use a switched Ethernet compared to a shared Ethernet.

- Switched Ethernet improve efficiency
- Switched Ethernet reduced the decline in network performance
- Switched Ethernet improve the actual throughput of the network.

7. (5 points) What is the purpose of the ARP protocol?

- The purpose of the ARP protocol is to map an IP address to a physical address, to resolve the IP address of the opposite host into a MAC address.
- It makes full use of the broadcast capability of the Ethernet to dynamically bind the IP address to the physical address.

8. (5 points) The IP address of my PC is 150.8.22.16 (in dotted decimal format). Write this out as a 32-bit binary value. Your answer should consist of 32 values, each of which is 0 or 1.

150 => 10010110

8 => 00001000

22 => 00010110

16 => 00010000

So the 32-bit value is: 10010110 00001000 00010110 00010000

9. (5 points) The MAC address of my PC is 18-6B-2C-99-DD-7A (in hexadecimal format). Write this out as a 48-bit binary value. Your answer should consist of 48 values, each of which is 0 or 1.

18 => 0001 1000

6B => 0110 1011

2C => 0010 1100

99 => 1001 1001

DD => 1101 1101

7A => 0111 1010

So the 48-bit value is : 0001 1000 0110 1011 0010 1100 1001 1001 1101 1101 0111 1010

10. (5 points) On an Ethernet switch, what is the difference between sending data packets in Store-and-Forward Mode compared with Cut-Through Mode?

- One big advantage of store-and-forward switching is that it can determine whether the frame has errors before propagating the frame
- Cut-through switching-this frame forwarding method forwards the frame before it is completely received. At the very least, the destination address of the frame must be read before the frame can be forwarded.