Ch2

Communication and Networking Technologies

CHAPTER ASSIGNMENT · 58 MARKS

Name _____ Class _____ No. _____ Date _____

Answer every question in the space given. Show your working. You may use the chapter page to help you.

Questions from *Computer Science for Cambridge International AS & A Level Coursebook*, 2nd edition, Sylvia Langfield and Dave Duddell (Cambridge University Press), for classroom use.

Tasks and questions from the chapter

DP **Discussion Point:** If a print server was attached to a network, what functionality could it provide?

DP **Discussion Point:** Which network topologies have you used? You might wish to defer this discussion until you have read about network devices later in this chapter.

Q2.01 Twisted pair cable can be shielded or unshielded. What are the options for this? How does shielding affect the use of the cable?

2.01 Calculate the approximate time taken for a transmission from the surface of the Earth to a medium-Earth-orbit satellite. (Take the speed of light to be 300 000 km per second.)

DP **Discussion Point:** Carry out some research about the different versions of Ethernet. Which version is implemented for the systems you use? For how long will it give sufficient performance?

DP **Discussion Point:** How many ISPs or major Internet content providers are you familiar with?

Q2.02 How near are you to an under-the-sea Internet fibre-optic cable?

2.02 Consider a bit-streaming scenario for a video where the following values apply:

- the buffer size is 1 MiB
- the low-water mark is set at 100 KiB
- the high-water mark is set at 900 KiB
- the incoming data rate is 1 Mbps
- the video display rate is 300 Kbps.

Assume that the video is playing and that the buffer content has dropped to the low-water mark. The media player sets the controls for data input to begin again.

Calculate the amount of data that will be input to the buffer in two seconds and the amount of data that will be removed from the buffer in the same time period.

Repeat the calculation for 4, 6, 8, 10 and 12 seconds.

From this data, estimate when the buffer will have filled up to the high-water mark.

Assuming that the incoming transmission is halted at this time, calculate how long it will be before the buffer content has again fallen to the low-water mark level.

DP **Discussion Point:** There were options available when the dotted decimal notation was chosen. Can you identify these?

2.03 Create an example of the binary code for a Class C address expressed in CIDR format. Give the corresponding dotted decimal representation.

DP **Discussion Point:** Can you find out which IP addressing scheme is being used when you are connected to the Internet?

EQ2.01 **Extension Question 2.01:** If IPv6 addressing is used, how many addresses would be available per square metre of the Earth's surface? Do you think there will be enough to go round?

RP **Reflection Point:** In several places you have been asked to carry out some research. Are you using the most efficient search methods? Specifically, how could they be improved?

Exam-style questions

1 A new company has been established. It has bought some new premises which consist of a number of buildings on a single site. It has decided that all of the computer workstations in the different buildings need to be networked. They are considering ways in which the network might be set up.

(a) One option they are considering is to use cabling for the network and to install it themselves.

(i) Identify the **three** types of cabling that they might consider. [2]

(ii) Explain **two** factors, other than cost, that they need to consider when choosing suitable cabling. [4]

(b) Another option they are considering is to use wireless technology for at least part of the network.

(i) Explain **one** option that might be suitable for wireless networking. [2]

(ii) Identify **one** advantage, other than cost, of using wireless rather than cable networking. [1]

(iii) Identify **one** disadvantage (other than cost) of using wireless rather than cable networking. [1]

(c) The final option they are considering is to use the services of a PSTN.

(i) Define what a PSTN is or does. [1]

(ii) Explain how a PSTN could provide a network for the company. [3]

2

(a) The Domain Name System is vitally important for Internet users.

(i) Identify the type of software used by the system and the type of hardware on which the software is installed. [2]

(ii) Identify **two** types of application that use the Domain Name System and for each give a brief description of how it is used. [4]

(b) In the classful IPv4 addressing scheme, the 32-bit binary code for the address has the top (most significant) bit set to 0 if it is of class A, the top two bits set to 10 if class B or the top three bits set to 110 if class C. In a document an IPv4 address has been written as 205.124.16.152.

(i) Give the name for this notation for an IP address and explain how it relates to the 32-bit binary code. [2]

(ii) Identify the class of the address and explain your reason. [2]

(iii) Explain why an IPv4 address defines a netID and a hostID. [3]

(c) If the CIDR scheme for an IPv4 address is used the IP address 205.124.16.152 would be written as: [2]

205.124.16.152/24

State the binary code for the hostID in this address, with a reason.

3 A user watches a video provided by a website that uses on-demand bit streaming. Describe the measures needed to ensure that the video does not periodically pause when it is being watched. [6]

4

(a) Describe where private IP addresses can be used. [2]

(b) Explain how it can be ensured that private and public IP addresses are not used in the wrong context. [4]

5

(a) An IP address has the following value:

11.64.255.90

(i) Write the above IP address in hexadecimal. [4]

(ii) Explain the format of an IP address. [2]

(b) Study the following sentence: [4]

"When a user enters a URL into their web browser, the DNS service locates the required resource."

Explain how a URL and DNS are used to locate a resource.

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6 Access to World Wide Web content uses IP addressing.

(a) State what IP stands for. [1]

(b) The following table shows four possible IP addresses. Indicate for each IP address whether it is valid or invalid and give a reason. [4]

Address	Denary/Hexadecimal	Valid or Invalid	Reason
3.2A.6AA.BBBB	Hexadecimal		
2.0.255.1	Denary		
6.0.257.6	Denary		
A.78.F4.J8	Hexadecimal		

(c) Describe **two** differences between public and private IP addresses. [2]

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End of assignment · Check your answers against the chapter at gurujazzy.com/subjects/computer-science/as-a-level/communication-networking/