

# 3.9. Communication and Networking

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1. a) Define the following types of communication link:  
i. Serial [1]

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ii. Parallel [1]

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b) A company wishes to connect sites which are a considerable distance apart with their WAN. Which sort of cabling would you advise them to use, serial or parallel, and why? [2]

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2. A printer is connected to a computer via a USB (universal serial bus) link.

a) USB uses asynchronous transmission.  
i. What is asynchronous transmission? [1]

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ii. Asynchronous transmissions often use special bits to control the flow of data. What are these bits called and exactly what is it they do? [2]

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b) The alternative to asynchronous transmission is synchronous transmission.  
Describe how synchronous transmission differs from asynchronous transmission and give an advantage of using synchronous transmission. [3]

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3. Describe what is meant by the following terms:

a) Client-server networking [2]

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b) Peer-to-peer networking [2]

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4. You are assessing an experimental high-speed communications link for use by your company.

a) If the link has a bit rate of 200Gbps and a baud rate of 100Gbps, how many bits must be sent per signal change? [1]

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b) The link uses even parity bits to check for errors. There is one parity bit for every seven data bits.

i. Explain what an even parity bit is and how it is used to check for errors. [2]

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ii. Does the byte 10110111 contain an error? [1]

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iii. What is the limitation of using only parity bits for error checking? [1]

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c) The link has been described to you as low latency. What does this mean? [1]

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5. The Internet is very useful, however, connecting a computer to it exposes it to a number of threats.

a) What is a firewall and how does it protect a computer? [2]

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b) Two capabilities of a firewall system can be packet filtering and a proxy server. Describe what each of these capabilities are and what they try to achieve. [4]

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c) Define the term 'virus' and explain briefly how viruses work. [3]

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d) Define the term 'worm' and describe how it differs from a virus. [2]

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e) Define the term 'Trojan horse' and describe how it differs from a virus. [2]

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6. A home user is trying to set up a local area network which is connected to the Internet. They have drafted you in to help them set it up.

a) What is a gateway and why will they need one to connect to the Internet in this example? [2]

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b) They have bought a router. The router has an internal IP address of 192.168.1.1. The external IP address is provided by their Internet Service Provider.

i. Explain what a router is and why it is necessary. [2]

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ii. The router they have bought has a built-in wireless access point. Explain why it is better for the access point to use the Wi-Fi standard rather than other alternatives and what the security implications of a wireless network are. [2]

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c) They have a printer with a network port. Suggest an appropriate static IP address for the printer, assuming a subnet mask of 255.255.255.0. [1]

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d) Laptop computers connect to the network using Wi-Fi. They use carrier sense multiple access with collision avoidance (CSMA/CA) to determine when to transmit data.

Explain how the CSMA/CA method is used. [6]

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