



1.3.3 Internet Structure

1. The internet can be considered an example of a WAN.

a) Describe what is meant by the term 'WAN'.

[2 marks]

- Wide Area Network
- A collection of devices over a large geographical area
- Often using 3rd party communication channels

The internet uses a set of protocols referred to as the TCP/IP stack. The TCP/IP stack consists of four different layers, each with its own set of protocols.

b) Explain why protocols are important on a network.

[2 marks]

- Allow devices to communicate
- By ensuring that all devices follow the same rules/standards
- So they interpret data/signals in the same way

c) Explain what is meant by the term 'TCP/IP stack'.

[3 marks]

- Stands for 'Transmission Control Protocol / Internet Protocol
- Protocols/set of rules for communicating across a network/the internet
- Each protocol belongs to a different layer
- The layers are: Application, Transport, Internet, Link
- Data is further encapsulated as it is passed to each layer

d) Explain **one** advantage of using layers in the protocol TCP/IP.

[2 marks]

- Allows different layer to be worked on independently
- Allows layers to be replaced/upgraded without affecting other
- Allows for layers from different providers to be used interchangeably





2. Saba uses an encrypted messaging program to communicate with her friends. The computer uses the TCP/IP stack.

a) Explain what happens at the application layer of the TCP/IP stack when using this program. **[5 marks]**

- **Appropriate protocol chosen based on the application**
- **E.g. HTTPS for browser, SMTP/POP3 for email services**
- **Encryption added**
- **Passes on to the transport layer to send**
- **Gets data from transport layer when receiving**
- **Unpacks message ready for display**
- **Decrypts message**

b) Explain what happens at the link layer of the TCP/IP stack when using this program. **[2 marks]**

- **Receives data from the internet layer to send**
- **MAC address added to packet**
- **Passes and receives data across wired/wireless network**
- **Passes data back up to the internet layer when receiving**

3. Sneaky Sneaks is a company that makes trainers and has decided to sell its products online. Its website is put on its servers which are given a public IP address. It also purchases the domain name sneakysneaks.co.uk.

a) Explain the automated process that takes place that allows customers to access the site when they enter the domain name into their browser. **[4 marks]**

- **The domain name is sent to DNS servers**
- **DNS servers map this domain name to an IP address**
- **In the DNS server cannot resolve, it passes the request recursively to another DNS server**
- **The DNS server sends the IP address to the browser**
- **So it can retrieve the website from the server it is hosted on**





4. Zuhair wants to create a Local Area Network (LAN) for himself and his family, in his home.

a) Describe what is meant by a LAN.

[2 marks]

- A group of computers/devices connected over a small geographical area
- The infrastructure is usually owned by the network owner

b) TCP/IP use packet switching.

Explain what is meant by packet switching.

[4 marks]

- Data is split into chunks called packets
- Which have header including the address to send to / order
- Each packet is sent on the most convenient route
- The packets arrive in a different order to which they were sent
- Once packets arrive at the receiver they are reordered

5. After several failed login attempts a user's IP address is logged in a database.

a) Describe what is meant by an IP Address.

[2 marks]

- A numerical address made of 4 numbers between 0 and 255
- That uniquely identifies a device on a network
- It is a logical identifier (i.e. can change on a physical device)

b) TCP/IP use packet switching.

Explain why the programmers have chosen to store the user's IP address.

[2 marks]

- IP address can help identify a user
- ... so the company can potentially track users attempting to gain unauthorised access

