Year 10

Wired and Wireless Networking Homework booklet
Level 3

1. The internet
2. Local area networks (LAN)
3. Wireless networking
4. Client-server and peer-to-peer networks
5. Protocols and layers

Learning objectives

- Be familiar with **local** and **wide area network** types
- Understand the factors that affect **network performance**
- Explain the different roles of computers within **client-server** and **peer-to-peer** networks
- Identify and describe the **hardware** needed to connect stand-alone computers into a **LAN.**
    - **Wireless access points**
    - **Routers and switches**
    - **NIC** (network interface controller/card)
    - **Transmission media**
- Understand that the **internet** is a worldwide collection of **computer networks**
- Describe what is meant by
    - **DNS** (domain name server)
    - **Hosting**
    - **The cloud**
- Explain the concept of **virtual networks**
- Describe **mesh** and **star** network topologies
- Explain **Wi-Fi, frequency** and **channels** and **encryption**
- Understand the use of **IP addressing** and **MAC addressing**
- Describe different protocols including **TCP/IP, HTTP, HTTPS, FTP, POP, IMAP, SMTP**
- Describe the concept of layers
- Describe packet switching

Homework

Week 1 - The internet **Due 16/3/20**

What is the difference between the internet and the World Wide Web?

What website can be found with the IP address 83.138.174.47

Why doesn't the internet use a MAC address instead of an IP address to locate a networked device on the internet?

Week 2 - Local Area Networks **Due 23/3/20**

Give one advantage and one disadvantage of networking computers

Draw a diagram of a **star network.** Label a desktop computer, a server, a switch and a printer

Week 2 - Wireless Networking

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E

Using the key above translate the following message

KNWJHWFHPJW   BNQQ   QTXJ

Week 3 - Client-server and peer-to-peer networks **Due 30/3/20**

What are the advantages and disadvantages of storing data in the cloud rather than on a local hard drive.

Week 3 - Protocols and layers

List the 4 layers in the standard **TCP/IP** model

If the device receiving a communication via the internet is part of a mesh network, which destination IP address will be added to the packet in the internet layer? (Tip: Look back at the diagram of a mesh network)

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Level 2

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Week 2 - Wireless Networking

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What are the advantages and disadvantages of storing data in the cloud rather than on a local hard drive.

Week 3 - Protocols and layers
List the 4 layers in the standard **TCP/IP** model

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Level 1

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Week 2 - Wireless Networking **Due 23/3/20**

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Week 3 - Protocols and layers **Due 30/3/20**

List the 4 layers in the standard **TCP/IP** model

The Internet

A worldwide collection of **inter-connected networks**

World Wide Web websites stored and accessible on the internet

IP addressing unique address for each device connected to the internet (i.e. 212.58. 226.75)

Domain names text equivalent of an IP address (i.e. news.bbc.co.uk)

Domain Name Server (DNS) database for matching domain names to IP addresses (i.e. 212.58. 226.75 = news.bbc.co.uk)

Network interface controller/card (NIC) hardware to connect a computer to a network

MAC address unique number of a device which can connect to a network, assigned by the manufacturer

Wide Area Network network spread over a wide geographical area (i.e. the internet)

Circuit switching single connection between two people (i.e. a phone call)

Packet switching data sent by various routes and reassembled at the destination

Wireless Networking

Wi-Fi rules for wireless networking

Wireless Access Points (WAP) Converts data from a wired network into wireless data

Wireless Risks security, bandwidth theft, hacking

Wireless Security disable SSID (Service Set Identifier) which hides the network, restrict MAC addresses, WPA encryption.

Wi-Fi frequencies most networks operate on 2.4GHz or 5GHz

	Advantages	Disadvantages
2.4GHz	Greater range	More interference
5GHz	Faster	Less able to get through walls

Encryption prevents hacked data from being read

Local Area Networks (LAN's)

LAN network over small geographical area (i.e. a school)

Advantages share files, printers, internet connection. Central control for users, security, updates, back-ups

Disadvantages managing large networks can be complicated. Viruses can be spread across networked computers.

Topology layout (of a network)

Star network
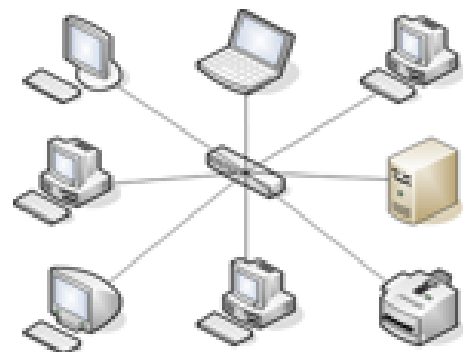
Mesh network

Mesh Topology
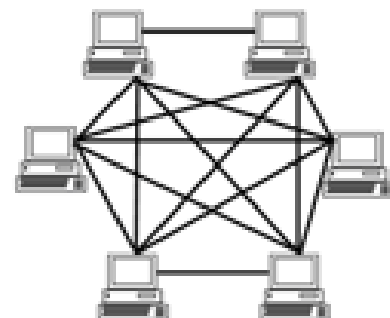
ComputerHope.com

Router directs data packets over a WAN

Switch directs packets over a LAN

Ethernet rules and protocols for LAN

Transmission media network cables

Virtual network small network, part of a larger network but with different rules

Virtual Private Network (VPN) secure private network

Client-server and peer-to-peer networks

Server powerful computer providing services or resources to client computers

Client computer which requests services and resources from the server (i.e. computers in the computer suite)

Client-server network multiple computers connected to a server
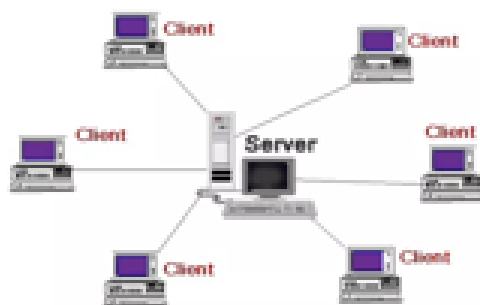
Peer-to-peer networks computers connected directly to share files and resources
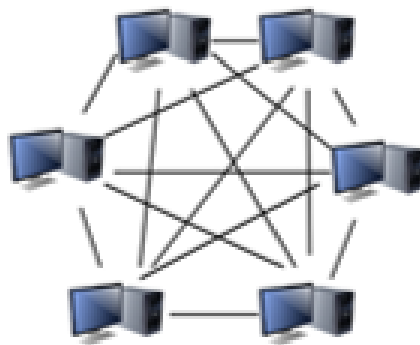
Hosting Storing files and making them available over the internet (websites, images, videos, documents)

File Transfer Protocol (FTP) method and rules for uploading files to the internet

Cloud storage Personal secure web server storage, allowing access from any internet connected device with the correct authorisation

Factors affecting network performance

- **Bandwidth** megabits per second available
- **Latency** The delay between data transmission starting and the data being received at its destination
- **Errors in transmission** missing data needs to be resent

Protocols and layers

Protocol set of rules that define how devices communicate

Packet unit of data. Part of a larger file broken down for ease of transmission

Transmission Control Protocol (TCP) how messages are split into **packets** and reassembled at the destination

Internet Protocol (IP) identifies the device location and directs **packets** from source to destination

HyperText Transfer Protocol (HTTP) asks a web server to transmit a web page

Secure Protocol (HTTPS) encrypts web page data

Post Office Protocol (POP) server storage for emails until you download them to your computer

Internet Messaging Access Protocol (IMAP) store emails on a server where the user can access, read and keep them (i.e. gmail)

Simple Mail Transfer Protocol (SMTP) coding and sending emails between servers

Concept of Layers splits the TCP/IP communication process into 4 modules

- **Application Layer** encodes the data and adds a header
- **Transport Layer** splits the data into packets and adds data required to reassemble the data
- **Internet Layer** attaches the **IP addresses** of the sender, host and destination
- **Link Layer** adds the MAC addresses of sender and recipient
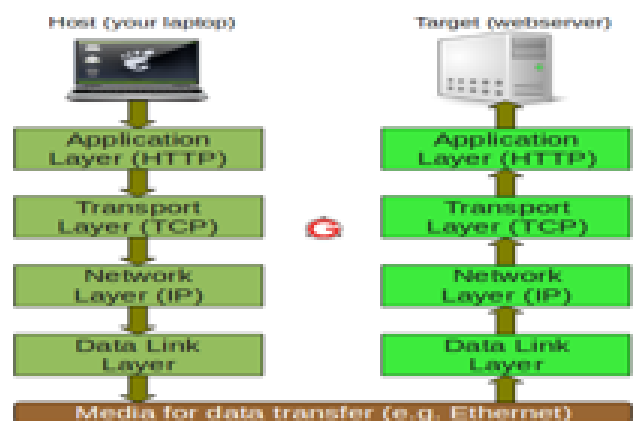
Year 9

w/c 2/3/20
Due date 9/3/20

Complete any 2 tasks from the CMU CS Academy course 1.1 Basics

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w/c 9/3/20
Due date 17/3/20

Complete any 4 tasks from the CMU CS Academy course 1.2 Colours
2 from Fills and Borders section and 2 from Colours and Gradients section

Fills and Borders	Colours and Gradients

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w/c 16/3/20
Due date 23/3/20

Complete any 4 tasks from the CMU CS Academy course 1.3 Shapes
2 from Rectangles, ovals, circles & Lines section and 2 from Labels section

1.3 Shapes

Rectangles, ovals, circles & Lines	Labels

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w/c 23/3/20
Due date 31/3/20

Complete any 4 tasks from the CMU CS Academy course 1.3 Shapes
2 from Regular Polygons and Stars section and 2 from Polygons section

Regular Polygons and Stars	Polygons

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w/c 30/3/20
Due date after Easter

Complete any 4 tasks from the CMU CS Academy course unit 1 exercises