Google.com	142.250.176.206
Youtube.com	142.251.41.14
Facebook.com	157.240.241.35
BBC.co.uk	151.101.0.81
Amazon.co.uk	54.239.33.58
Google.co.uk	142.251.40.99
Twitter.com	104.244.42.193
eBay.co.uk	216.113.179.53
Wikipedia.org	208.80.154.224
Live.com	204.79.197.212
Instagram.com	157.240.224.174
GOV.uk	151.101.0.144

Find the IP addresses using an 'online DNS lookup too

How many numbers make up an IP address ?

The numbers must be between 255 and 0

1.3.2 Wired and wireless networks, protocols and layers

☐ Modes of connection:
  - ○ Wired
    - • Ethernet
  - ○ Wireless
    - • Wi-Fi
    - • Bluetooth

☐ Encryption
☐ IP addressing and MAC addressing
☐ Standards
☐ Common protocols including:
  - ○ TCP/IP (Transmission Control Protocol/Internet Protocol)
  - ○ HTTP (Hyper Text Transfer Protocol)
  - ○ HTTPS (Hyper Text Transfer Protocol Secure)
  - ○ FTP (File Transfer Protocol)
  - ○ POP (Post Office Protocol)
  - ○ IMAP (Internet Message Access Protocol)
  - ○ SMTP (Simple Mail Transfer Protocol)

☐ The concept of layers

Required
- ✓ Compare benefits and drawbacks of wired versus wireless connection
- ✓ Recommend one or more connections for a given scenario
- ✓ The principle of encryption to secure data across network connections
- ✓ IP addressing and the format of an IP address (IPv4 and IPv6)
- ✓ A MAC address is assigned to devices; its use within a network
- ✓ The principle of a standard to provide rules for areas of computing
- ✓ Standards allows hardware/software to interact across different manufacturers/producers
- ✓ The principle of a (communication) protocol as a set of rules for transferring data
- ✓ That different types of protocols are used for different purposes
- ✓ The basic principles of each protocol i.e. its purpose and key features
- ✓ How layers are used in protocols, and the benefits of using layers; for a teaching example, please refer to the 4-layer TCP/IP model

Not required
- ✗ Understand how Ethernet, Wi-Fi and Bluetooth protocols work
- ✗ Understand differences between static and dynamic, or public and private IP addresses
- ✗ Knowledge of individual standards
- ✗ Knowledge of the names and function of each TCP/IP layer

What is IPv4

IPv4 stands for Internet Protocol version 4. It is the underlying technology that makes it possible for us to connect our devices to the web. Whenever a device accesses the Internet, it is assigned a unique, numerical IP address such as 99.48.227.227. To send data from one computer to another through the web, a data packet must be transferred across the network containing the IP addresses of both devices.

What is IPv6

IPv6 (Internet Protocol version 6) is the sixth revision to the Internet Protocol and the successor to IPv4. It functions similarly to IPv4 in that it provides the unique IP addresses necessary for Internet-enabled devices to communicate. However, it does have one significant difference: it utilizes a 128-bit IP address.

Why is IPv6 needed and better

- No more NAT (Network Address Translation)
- Auto-configuration
- No more private address collisions
- Better multicast routing
- Simpler header format
- Simplified, more efficient routing
- True quality of service (QoS), also called "flow labeling"
- Built-in authentication and privacy support
- Flexible options and extensions
- Easier administration (no more DHCP)

|						
Hypertext transfer protocol	Together, IP sends packets to their destinations, and TCP arranges the packets in the correct order, as IP sometimes sends packets out of order to ensure the packets travel the fastest ways.	SMTP	This provides more security to users and can prevent common cybersecurity threats, such as man-in-the-middle attacks.	HTTP	Allows a client e-mail program to access remote message stores as if they were local.	Hypertext transfer protocol secure
HTTPS	TCP/IP	Internet message access protocol	provides the access. HTTP connects to the domain's server and requests the site's HTML	Simple mail transfer protocol	FTP	used to transfer e-mail messages and attachments between e-mail servers and from e-mail clients to e-mail servers
IMAP	Clients request files through the command channel and receive access to download, edit and copy the file, among other actions, through the data channel.	File transfer protocol	POP	Transmission control protocol, internet protocol	is the most commonly used message request protocol in the Internet world for transferring messages from an e-mail server to an e-mail client.	Post Office Protocol

https://youtu.be/jXUj2dYkDnI
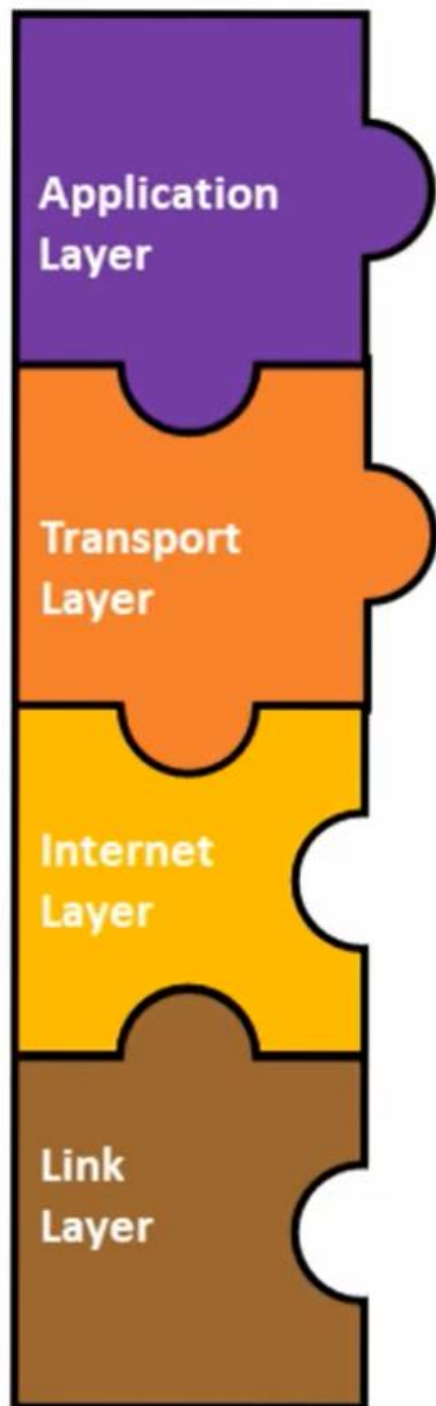
Application Layer — Network applications such as web browsers or email programs operate at this layer.

Transport Layer — Sets up communication between the two hosts and they agree settings such as 'language' and size of packets.

Internet Layer — Addresses and packages data for transmission.
— Routes packets cross the network.

Link Layer — Actual network hardware is located here such as the Network Interface Card (NIC).
— Operating System device drivers also sit here.
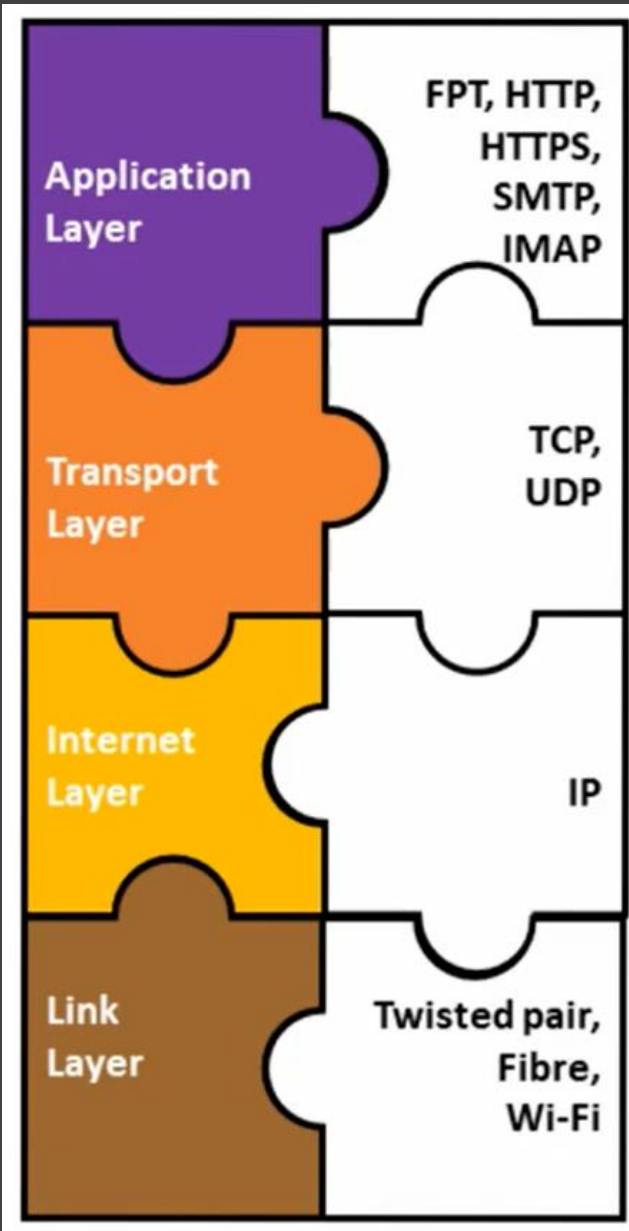
Layering allows standards to be developed, but also to be adapted to new hardware and software over time. For example, different software packages (applications) may use the same transport, network and link layers but have their own application layer. The way the program encodes the message changes - the rest of communication method remains the same.

ADVANTAGES

Each layer can upgrade separately

Easier to diagnose connection problems

LAYER NAME	PROTOCOLS USED	WHAT THE LAYER DOES
Application layer	FPT HTTP HTTPS SMTP IMAP	Web browsers and email programs
Transport Layer	TCP UDP	Language and size of packets
Internet Layer	IP	Adresses and packages data for transmission. Routes packets cross the network.
Link Layer	Twisted Pair, Fibre Wi-Fi	Actual network hardware Operating System device drivers