1. Protocols

14 Communication and internet technologies	
14.1 Protocols	
Candidates should be able to:	Notes and guidance
Show understanding of why a protocol is essential for communication between computers	
Show understanding of how protocol implementation can be viewed as a stack, where each layer has its own functionality	
Show understanding of the TCP / IP protocol suite	Four Layers (Application, Transport, Internet and Network) Purpose and function of each layer Application when a message is sent from one host to another on the internet
Show understanding of protocols (HTTP, FTP, POP3, IMAP, SMTP, BitTorrent) and their purposes	BitTorrent protocol provides peer-to-peer file sharing
14.2 Circuit switching, packet switching	
Candidates should be able to:	Notes and guidance
Show understanding of circuit switching	Benefits, drawbacks and where it is applicable
Show understanding of packet switching	Benefits, drawbacks and where it is applicable Show understanding of the function of a router in packet switching Explain how packet switching is used to pass messages across a network, including the internet

> A set of rules governing communication across a network - the rules agreed by both the sender and the recipient

Communication protocol **definition**:

- Sets of rules
- for successful transmission and receipt of data

Why communication protocol is necessary:

- All data is sent and received using the same **rules** and **format**
- Allows communication between devices operating on **different platforms**
- The communication is independent of the **software** and **hardware** used
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- Provide a set of standards for transmission of data

- … that gives a known/accepted set of rules for transmitting and receiving of data
- This enables communication/compatibility between devices from different manufacturer/platform

Protocol implementation

Application layer
Transport layer
Internet layer
Network (access) layer

There are lots of different names for each layer, but this is from 2022 specimen paper, making it more authentic.

Protocol stack

> For a protocol suite the protocols can be viewed as layers within a protocol stack. There are a number of aspects relating to this concept.

- Each layer can only accept input from the next higher layer or the next lower layer
- There is a defined interface between adjacent layers which constitutes the only interaction allowed between layers.
- A layer is serviced by the actions of lower layers.
- With the possible exception of the lowest layer the function of a layer is created by installed software
- A layer may comprise sub-layers.
- Any user interaction will take place using protocols associated with the highest level layer in the stack.
- Any direct access to hardware is confined to the lowest layer in the stack.

State how each layer of stack is implemented

- Software/module/program/code