Communication & Internet technologies

Agreed by sender and Receiver

- **Direction of data transfer**
  - → Simplex : One direction
  - → Half Duplex: Both directions but not at the same time.
  - → Full Duplex : Both directions simultaneously.

- **Method of transmission**
  - → Serial : One bit at a time over a single channel/wire.
    - ↳ Long distances, slower than parallel.
    - Example: Computer to modem for transmission over telephone line.
  - → Parallel : several bits of data sent down several wires or channels at the same time.
    - ↳ Short distances. On longer distances it can become skewed - not synchronised).
    - Faster than serial transmission.
    - Example : sending data to a printer from a computer using ribbon connector.
    - Used in internal electronics of a computer.

- **Method of synchronisation**
  - → Asynchronous data transmission.
    - ↳ Agreed bit pattern. Data bits are grouped together and sent with a control bit.
    - ↳ Receiver knows when data starts and ends.
    - ↓ prevents data being mixed up.
  - → Synchronous data transmission
    - ↳ Continous stream of data sent along with timing signals generated by an internal clock.
    - ↳ Ensures sender and receiver are synchronised with each other.
    - Receiver counts the no. of bits and reassembles them into bytes. Though timing must be very accurate.
    - Faster than asynchronous transmission.

Universal Serial Bus (USB)
  - ↳ Asynchronous serial data transmission.

Contains :
- o four-wire shielded cable
  - — two for power and earth
  - — two for data transmission

when device plugged in with USB ports.
  - — Computer automatically detects that a device is present (due to small change in voltage on data signal wires in the cable)
  - — The device is automatically recognised and the appropriate device driver is loaded so that computer and device can communicate effectively.
  - — If new device is detected, the computer will look for driver which matches the device, if not, the user is prompted to download the appropriate software.

Pros:
- Devices automatically detected
- Device driver automatically uploaded.
- Connector fits only one way, prevents incorrect connections.
- Industry standard - considerable support available to users.
- Different data transmission rates are supported.
- Backward compatible

Cons:
- Maximum cable length is 5 metres
- Transmission rate is less than 500 mB per seconds.
- Older standards may not be supported in future.

Error Checking Methods:
- Parity check
- Automatic repeat request
- Checksum
- Echo Checking

Parity Check
Used to check whether data has been corrupted following the transmission.
- A byte of data is allocated a parity bit. This is allocated before the transmission takes place.

  Even parity : even number of 1-bits
  Odd parity : Odd number of 1-bits
- Before data being transferred, an agreement between sender and receiver is made regarding which type of parity being used. Example of Protocol.

  Impossible to which bit has the flaw and hence parity blocks are used.
- Another byte, parity byte is sent and the number of 1's are totalled vertically and horizontally.

Automatic Repeat Request (ARQ)
- Uses ACKNOWLEDGEMENT (message sent by receiver that data has been received correctly) and TIMEOUT (time allowed to elapse before acknowledgement is received).
- If acknowledgement isn't sent back before timeout occurs, the message is automatically resent.

Checksum
- Data is sent in blocks + an additional value the checksum is sent at the end of the blocks.

  Method to calculate checksum.

  If the sum of bytes in data is $<= 255$, then checksum is this value.

  If > 255 then
  1) Divide sum X by 256

2) Round the answer down to the nearest whole
number Y.

3) $Z = Y * 256$

3) Calculate difference $X-Z$

4) The value is checksum

At the other end, the checksum is recalculated
from the block of data received.
If the value is different, request is sent for data to be
retransmitted.

Echo Check

Data is sent to another device, then data is sent back again
to the sender. The 2 sets are compared to check for errors.
It isn't possible to figure out whether data was corrupted
while sending or receiving back.
Method only used to confirm whether data was sent
correctly.

Each device is given a unique Internet Protocol (IP) address.
It is a 32 bit number.

    ↳ Gives location of device, while MAC address identifies
the device.

HTML — Hyper text markup language

structure — semantics and structural markup of language
Presentation — style of the document.
At the end it will contain a separate document (with structure
and content) and a separate CSS (cascading style sheet)
which will contain everything to control the presentation.

Hyper text transfer protocol

    Set of rules which must be obeyed when transferring
files over the internet.
The "s" shows that security (certification or encryption)
is used. It is slower than HTTP, but used when private or
sensitive data is being transferred over the internet.

Web Browser

    Software which allows the user to display a web page on
their computer screen.
    Interpret or translate HTML code from websites and show
the result of the translation.
    A web browser
- Has a Home Page
- Ability to store user's favourite website/pages.
- Keep a history of websites visited
- Give the ability to go backward and forward to
websites opened.

URL — uniform resource locator
webbrowser translates web server's name into an IP address

part of the URL.
    HTML is returned and shown as correctly formatted.