CAIE Computer Science IGCSE
2.2 Methods of error detection

Flashcards

How does serial transmission work?

How does serial transmission work?

Bits are sent one after another along a single channel or wire.

Give two advantages of serial transmission.

Give two advantages of serial transmission.

As the data is only sent over a single wire, it is less susceptible to skew.

Only one wire is needed, making this method less expensive.

Give one disadvantage of serial transmission.

Give one disadvantage of serial transmission.

It can be slow to send bits over just one channel/wire.

How does parallel transmission work?

How does parallel transmission work?

Multiple bits are sent at once using multiple channels or wires.

Give one advantage of parallel transmission.

Give two advantage of parallel transmission.

Faster data transmission, as several channels/wires are used.

Give two disadvantages of parallel transmission.

Give two disadvantages of parallel transmission.

More expensive, as several wires are needed.

Susceptible to skew, especially over long distances.

How does simplex transmission work?

How does simplex transmission work?

Data flows in one direction only (e.g. from a keyboard to a computer).

Give two advantages of simplex transmission.

Give two advantages of simplex transmission.

No chance of data collision.

Simple to implement.

Give two disadvantages of simplex transmission.

Give two disadvantages of serial transmission.

More expensive, as several wires are needed.

Susceptible to skew, especially over long distances.

What is the difference between half-duplex and full-duplex transmission?

What is the difference between half-duplex and full-duplex transmission?

In half-duplex transmission, data flows in both directions, but only one direction at a time, whereas in full-duplex transmission it flows in both directions simultaneously.

Give two advantages of half-duplex transmission.

Give two advantages of half-duplex transmission.

Allows two-way communication using fewer resources than full-duplex.

Simpler to design than full-duplex systems.

Give two disadvantages of half-duplex transmission.

Give two disadvantages of half-duplex transmission.

Slower than full-duplex due to switching time.

Cannot send and receive data simultaneously.

Give two advantages of full-duplex transmission.

Give two advantages of full-duplex transmission.

Facilitates fast, efficient communication.

No need to wait for the line to be free.

Give two disadvantages of full-duplex transmission.

Give two disadvantages of full-duplex transmission.

More complex and expensive to implement.

Requires more bandwidth.

What is Universal Serial Bus (USB)?

What is Universal Serial Bus (USB)?

A standard interface used to connect peripheral devices (e.g. keyboards, mice, flash drives) to a computer.

Which type of data transmission does USB use?

Which type of data transmission does USB use: serial or parallel?

Serial (one bit at a time).

Describe the steps for USB to transmit data.

Describe the steps for USB to transmit data.

- The data to be transmitted is broken down into packets.
- Each packet is sent serially along the USB cable to the connected device.
- The connected device receives the packets and checks for errors using the error-checking information in the packets' trailer. If an error is found, the packet is re-sent.
- The connected device reassembles the packets.

Give three benefits of USB.

Give three benefits of USB.

Widely supported.

Plug-and-play functionality.

Transmits data and power simultaneously.

Give two drawbacks of USB.

Give two drawbacks of USB.

Susceptible to physical damage.

Cables limited to ~5 metres in length.

Why is error detection needed during data transmission?

Why is error detection needed during data transmission?

To detect data loss, data gain, or data corruption due to transmission issues.

What is a parity bit?

What is a parity bit?

A bit added to make the total number of 1s either even (even parity) or odd (odd parity).

What is a key disadvantage of parity checks?

What is a key disadvantage of parity checks?

Cannot detect errors if an even number of bits are changed (for either even or odd parity).

What is a key advantage of parity checks?

What is a key advantage of parity checks?

Can detect single-bit errors with minimal additional data transfer needed.

How is a checksum used to detect errors?

How is a checksum used to detect errors?

A value is calculated from data (e.g. using MOD) and appended. The receiver recalculates the value from the received data and compares it.

Give one advantage and one disadvantage of using a checksum.

Give one advantage and one disadvantage of using a checksum.

Advantage: Detects more errors than parity checks

Disadvantage: Adds processing time and some errors may go undetected

How is an echo check used to detect errors?

How is an echo check used to detect errors?

The receiver sends the received data back to the sender, who compares it to the original.

What is a disadvantage of echo checks?

What is a disadvantage of echo checks?

The data traffic is doubled, which is inefficient.

What is a check digit?

What is a check digit?

A type of checksum in which only a single digit is added to the transmitted data.

Name two examples of where check digits are used.

Name two examples of where check digits are used.

International Standard Book Numbers (ISBN) and barcodes.

What is Automatic Repeat Query (ARQ) and how does it work?

What is Automatic Repeat Query (ARQ) and how does it work?

ARQ is a method that ensures data is received correctly. If the receiver receives the data without errors, then a positive acknowledgement is sent. If no positive acknowledgement is received by the sender within a set timeout period, the data is resent.