Definitions and Concepts for CAIE Computer Science IGCSE

Topic 2: Data Transmission

2.1 Types and methods of data transmission

Data Transmission: The process of sending data from one device to another, often by breaking it into smaller packets.

Packet: A small unit of data used in transmission, containing a header, payload, and trailer.

Packet Header: Part of a packet that contains control information such as the destination address, originator's address, and packet number.

Payload: The main content or actual data being sent in a packet.

Trailer: The part of a packet that contains error-checking information to verify data integrity.

Destination address: An IP address that specifies where a packet is going.

Packet number: A sequential identifier assigned to each packet, used to reorder them at the destination.

Destination address: An IP address that specifies where a packet came from.

Packet Switching: A method of data transmission where data is split into packets, sent separately via the most efficient routes, and reordered at the destination.

Serial Transmission: A method of data transmission where bits are sent one after another over a single wire or channel.

Parallel Transmission: A method of data transmission where multiple bits are sent at the same time using multiple wires or channels.

Simplex Transmission: A one-way communication method where data flows in only one direction.

Half-Duplex Transmission: A two-way communication method where data flows in both directions, but only one direction at a time.

Full-Duplex Transmission: A two-way communication method where data flows in both directions at the same time.

Universal Serial Bus (USB): A standard interface that connects peripheral devices to a computer, using serial transmission and allowing data and power transfer.

2.2 Methods of error detection

Parity Check: An error detection method that uses a parity bit to ensure the number of 1s in a data transmission matches the expected even or odd total.

Even Parity: A parity system where the number of 1s in the data, including the parity bit, must be even.

Odd Parity: A parity system where the number of 1s in the data, including the parity bit, must be odd.

Checksum: An error detection method that uses a calculated value based on the data, which is appended and checked at the destination.

Echo Check: An error detection method where the receiver sends the received data back to the sender, who compares it to the original.

Check Digit: A form of checksum where a single digit, calculated from the data, is added to detect errors in data like ISBNs or barcodes.

Automatic Repeat Query (ARQ): An error control method where data is resent automatically if an error is detected or no acknowledgment is received within a set time.

2.3 Encryption

Encryption: The process of converting plaintext into unreadable ciphertext to protect data from unauthorised access during storage or transmission.

Plaintext: The original readable data before encryption.

Ciphertext: The unreadable form of data after encryption, which requires a key to decrypt.

Symmetric Encryption: An encryption method where the same private key is used by both sender and receiver to encrypt and decrypt data.

Asymmetric Encryption: An encryption method that uses a public key for encryption and a private key for decryption, allowing secure communication without sharing secret keys.