Polynomials

A polynomial code is a linear code having a set of valid code words that comprises of polynomials divisible by a shorter fixed polynomial is known as generator polynomial.

They are used for error detection and correction during the transmission of data as well as storage of data.

Types of Polynomial Codes

The types of polynomial codes are:
- Cyclic Redundancy Code
- Bose–Chaudhuri–Hocquenghem (BCH) Codes
- Reed–Solomon Codes

Delta Modulation

The type of modulation, where the sampling rate is much higher and in which the stepsize after quantization is of smaller value **Δ**, such a modulation is termed as **delta modulation**.

Features of Delta Modulation
- An over-sampled input is taken to make full use of a signal correlation.
- The quantization design is simple.
- The input sequence is much higher than Nyquist rate.
- The quality is moderate.
- The design of the modulator and the demodulator is simple.
- The stair-case approximation of output waveform.
- The step-size is very small, i.e., **Δ** (delta).
- The bit rate can be decided by the user.
- It requires simpler implementation.

Pulse Code Modulation

Pulse Code Modulation techniques are used to produce a series of numbers or digits in binary form. Hence this process is called digital modulation. The amplitude at that particular time of the signal sample is indicated by the binary codes.

In the PCM process, a sequence of coded pulses indicates the message signal. This message signal represents amplitude and time.

Pulse code modulations are of two types:
- Differential pulse code modulation (DPCM)
- Adaptive differential pulse code modulation (ADPCM)

Differential pulse-code modulation is a signal encoding process which adds functionalities based on the prediction of the samples of the signal.

Basis for Comparison	Half Duplex	Full Duplex
Direction of Communication	Two-directional, one at a time	Two-directional, simultaneously
Send / Receive	The sender can send and receive data, but one a time	The sender can send and receive data simultaneously
Performance	Better than Simplex	Best performing mode of transmission
Example	Walkie-talkie	Telephone

Digital-to-Digital Conversion
As we have already told you that data can either be in analog form or in digital form. So let us learn how can we represent digital data in the form of digital signals.
Three techniques used for this conversion are as follows:
- Line Coding
- Block Coding
- Scrambling

Line Coding
It is the process used to convert digital data to digital signals. Let us assume that data is in the form of text, numbers, audio, or video and it is stored in the form of a sequence of bits in the computer.

Block Coding
The main problem with line coding is Redundancy. The Block Codes mainly operates on a block of bits. They make use of the preset algorithm, takes the group of bits, and then add a coded part to them in order to make them a large block.

Scrambling
We can modify the line and block coding by including scrambling. It is important to note that scrambling as opposed to block coding is mainly done at the time of encoding.

Advantages of bridge networking:
- It reduces network traffic with minor segmentation
- It reduces collisions
- Bridge connects similar network types with different cabling
- Bridge increase the number of attached workstation and network segments
- It extends the physical network
- Bridges also can reduce network traffic on a segment by subdividing network communications
- It connects different architecture
- Bridges network can extend a network by acting as a repeater
- It helps in an extension of physical network

Topology
Topology defines the structure of the network of how all the components are interconnected to each other. There are two types of topology: physical and logical topology.

Types of Network Topology
Physical topology is the geometric representation of all the nodes in a network. There are six types of network topology which are Bus Topology, Ring Topology, Tree Topology, Star Topology, Mesh Topology, and Hybrid Topology.
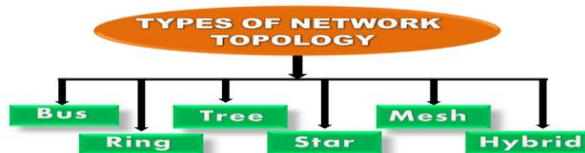
Bus Topology

- The bus topology is designed in such a way that all the stations are connected through a single cable known as a backbone cable.

- Each node is either connected to the backbone cable by drop cable or directly connected to the backbone cable.

Ring Topology

- Ring topology is like a bus topology, but with connected ends.
- The node that receives the message from the previous computer will retransmit to the next node.
- The data flows in one direction, i.e., it is unidirectional.

Star Topology

- Star topology is an arrangement of the network in which every node is connected to the central hub, switch or a central computer.
- The central computer is known as a **server**, and the peripheral devices attached to the server are known as **clients**.

Tree topology

- Tree topology combines the characteristics of bus topology and star topology.
- A tree topology is a type of structure in which all the computers are connected with each other in hierarchical fashion.
- The top-most node in tree topology is known as a root node, and all other nodes are the descendants of the root node.

Mesh topology
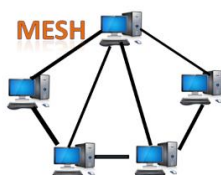
- Mesh technology is an arrangement of the network in which computers are interconnected with each other through various redundant connections.
- There are multiple paths from one computer to another computer.

Hybrid Topology
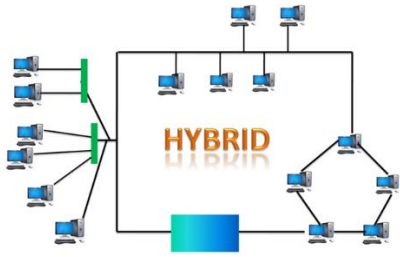
- The combination of various different topologies is known as **Hybrid topology**.
- A Hybrid topology is a connection between different links and nodes to transfer the data.