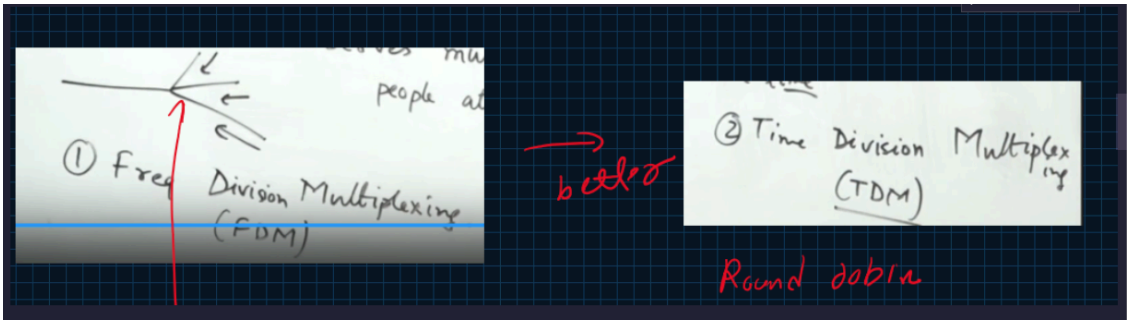
3LayersTermTerminology

September 9, 2025

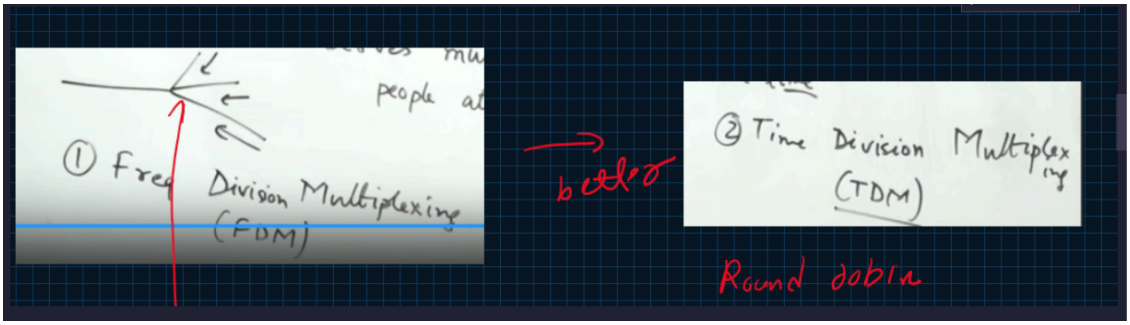


1. Error Control Error control refers to techniques and mechanisms used to detect and correct errors in data

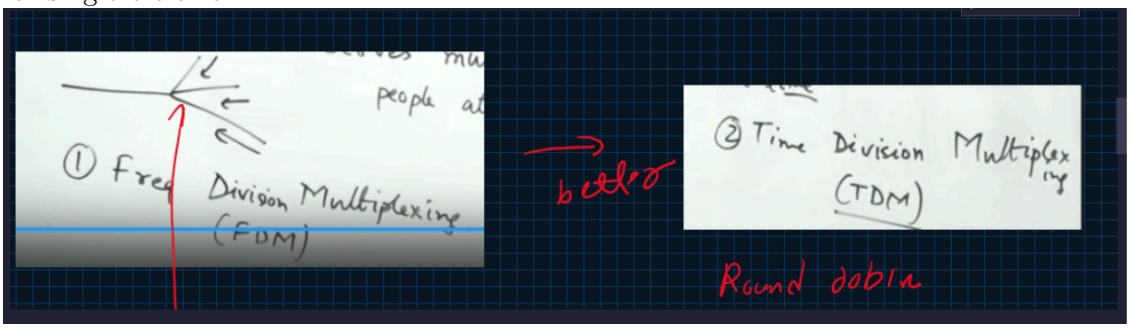
Error Detection:

parity checks,
checksums,
cyclic redundancy checks (CRC). (%)

1 Error



for single bit error



Hence no of 1 bits always become even

2 CRC

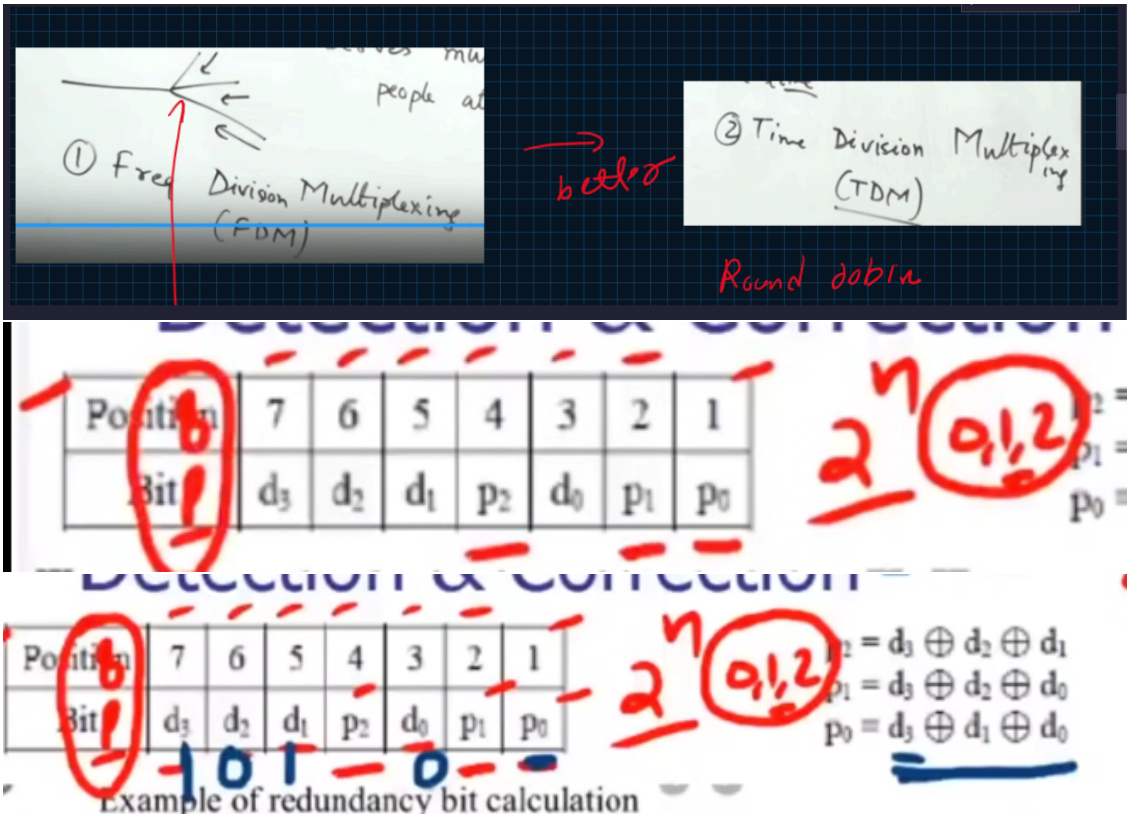
no. of bits detected according to polynomical degree , append no. of bits equal to polynomial degree

Error correction:

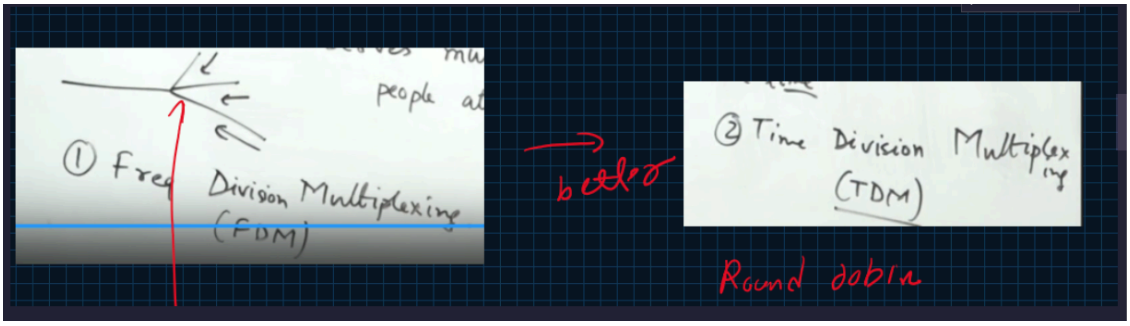
Hamming Code

Forward error correction:

3 Hamming



Example of redundancy bit calculation



transmission:

In protocols like TCP, error control ensures damaged packets are retransmitted using mechanisms like Automatic Repeat Request (ARQ).

4 Flow control

2. Flow Control Flow control ensures that the sender does not overwhelm the receiver by sending data faster than it can be processed. It manages the rate of data transmission to prevent congestion and buffer overflow.

Stop-and-Wait:

The sender transmits one frame and waits for acknowledgment before sending the next.

Sliding Window Protocol:

Allows multiple frames to be sent before requiring acknowledgment, improving efficiency. The sender and receiver maintain a "window" of acceptable frames to manage data flow. Buffering:

Temporarily stores incoming data in a buffer to prevent loss if the receiver is busy.

5 ARQ

Automatic repeat request

stop and wait
sliding window

sequence number

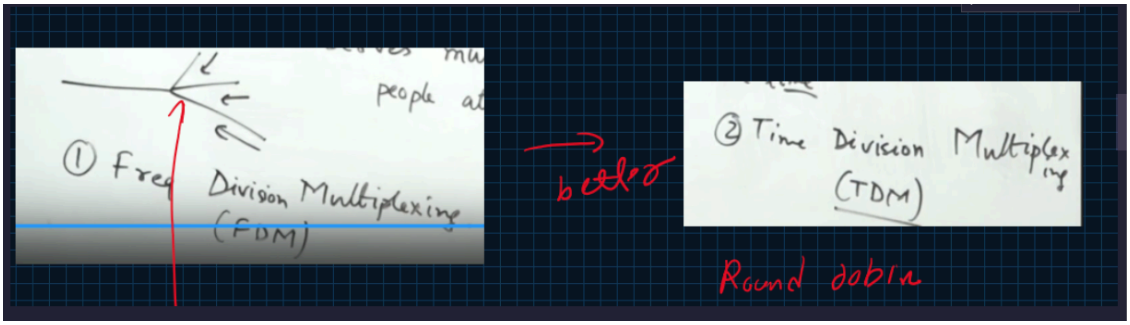
6 Access Control

3. Access Control Access control regulates who or what can access resources (e.g., data, devices, or services) in a system or network. It ensures security and prevents unauthorized access.

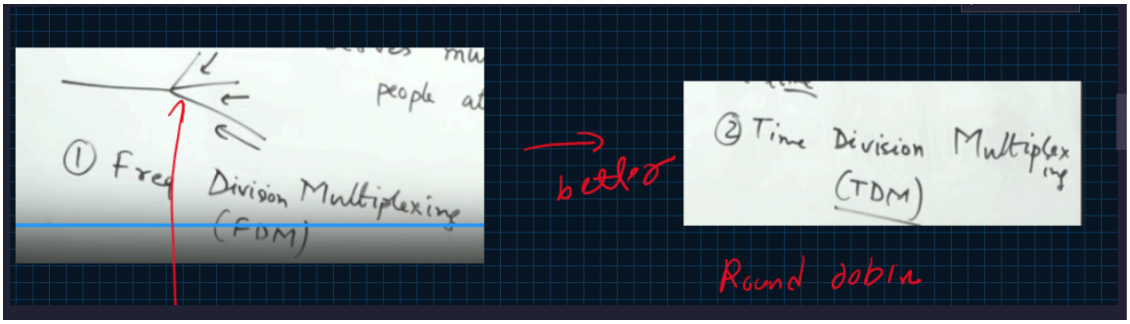
which device has control over the link at any given time

Firewalls

we are sharing thwe same link to transfer the data


people at
① Freq
Division Multiplexing
(FDM)
border
② Time Division Multiplex
ing
(TDM)
Round robin

7 PURE ALOHA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