Assignment

Unit - 2

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How does full-duplex Ethernet reduce collision and increase throughput?

→ Traditional Half-Duplex

Devices share a single communication channel

Uses CSMA/CD

Only on device can transmit at a time

If two device simultaneously, a collision occurs. data is corrupted, and both must retransmit after a random backoff delay.

Throughput Sufferes: Significant overhead from collision detection, waiting, and retries. Effective bandwidth is much less than the nominal speed

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→ full-Duplex

Requires a dedicated point to point link.

Simultanous Two-way Communication: The device can transmit(tx) and recive(rx) data at the same time on sperate wire pass within the cable.

Reduced Latency & No waiting for the medium to be free or dealing with collision backoff delays.

2. What cable types are best suited for this setup?

→ Twisted Pair Copper:

→ Cat 5e (Category 5e): Minium for Gigabit Ethernet (1000 BASE-T) full duplex. Supports 1 Gbps up to 100 meters. Widely available and cost-effective.

→ Cat 6 (Category 6e): Recommended for Gigabit and essential for 10 Gigabit Ethernet (10 G·BASE-T) up to 55 meters. Better crosstalk and noise performance than Cat 5e. Supports 1 Gbps up to 100m

→ Curicial requirement All 4 pairs (8 wires) must be properly terminated and functional.

→ Fiber Optic:

→ Multimode fiber MMF (OM3/OM4/OM5): Ideal for high-speed (1G, 10G, 25G, 40, 100G) links within buildings or campuses. Uses LEDs/VCSELs.

→ Single-mode fiber: Essential for very long distance and highest speed. uses laser light sources. Highest performance and cost.