## Link Layer Overview

Moreover, the link layer is responsible for transferring data between adjacent nodes across a physical link.

The important functionalities are framing, reliable delivery, flow control, error detection, and error correction.

This is done by a Network Interface Card (NIC) or on-chip hardware-software-firmware combination.

## Error Detection and Correction

Parity Checking: Using even or odd parity, it detects single-bit errors.

Internet Checksum: It detects errors in transmitted segments by summing 16-bit-integers.

Cyclic Redundancy Check (CRC): More sophisticated method of error detection registers polynomial division.

## LANs and Addressing

MAC Addresses: Network interface use these 48-bit unique identifiers, only for the purpose of communication in local.

Address Resolution Protocol (ARP): Used in LAN to resolve IP addresses into associated MAC addresses.

Ethernet: The foundation of wired LAN technology, CSMA/CD used in media access.

## Ethernet

Frame Structure: Preamble & MAC addresses; type field; data payload; CRC.

Unreliable and Connectionless. That is, there is no handshaking or acknowledgment and leaves the job up to higher layers.

Physical Topology: It evolved from a bus to a switched Ethernet, minimizing the chances for collisions.

## Switches vs. Routers

Switches. These are link-layer devices that forward frames based on their MAC addresses.

Routers. These are network-layer devices that forward packets based on their IP addresses.