

# Lecture 2a - Data Link Layer

Type Lecture

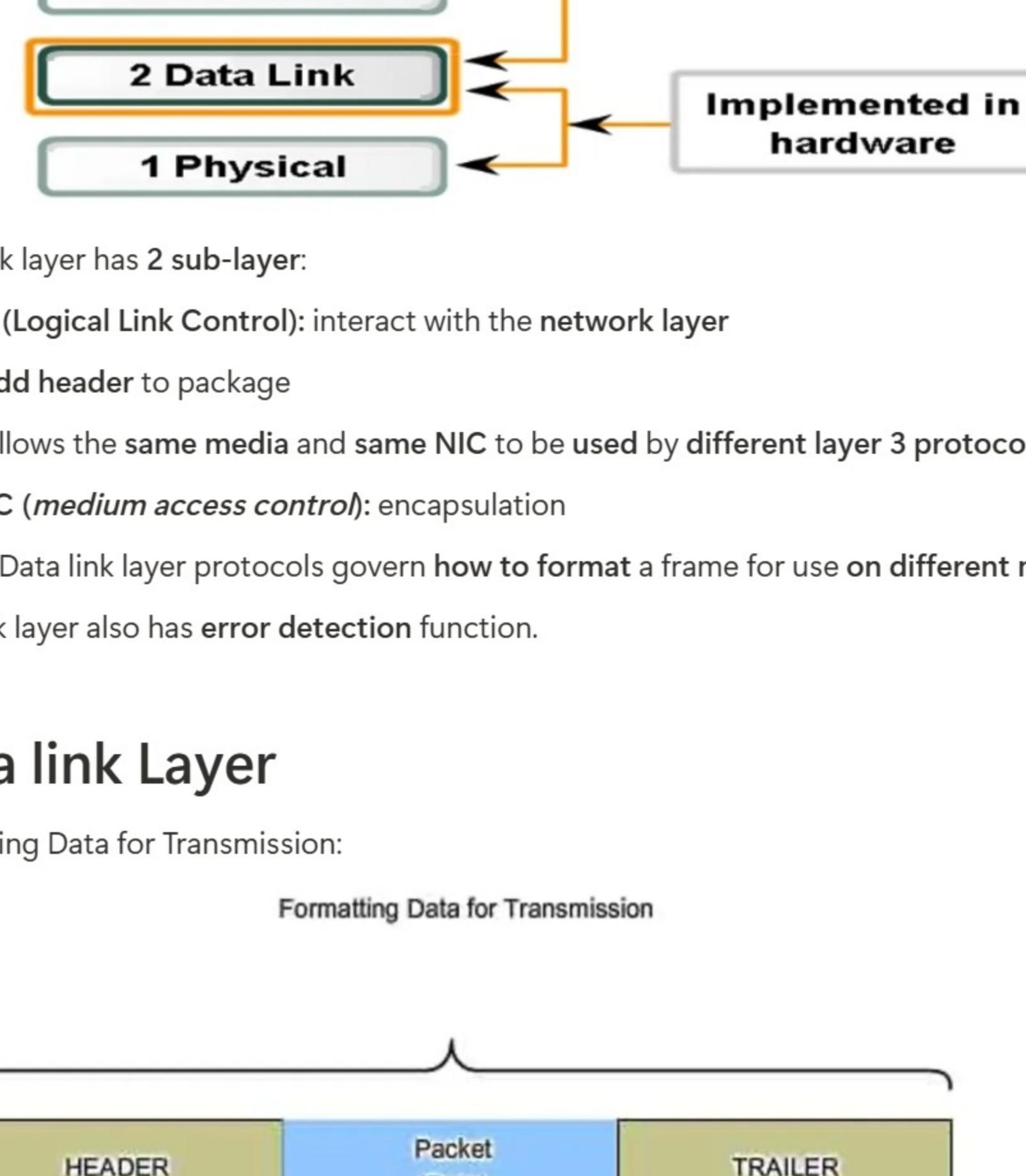
Materials Empty

Reviewed ✓

- I. Purpose of the Data Link Layer
- 2. Data link Layer
- 3. Topologies
- 4. WAN topologies
- 5. Lan Topologies

## I. Purpose of the Data Link Layer

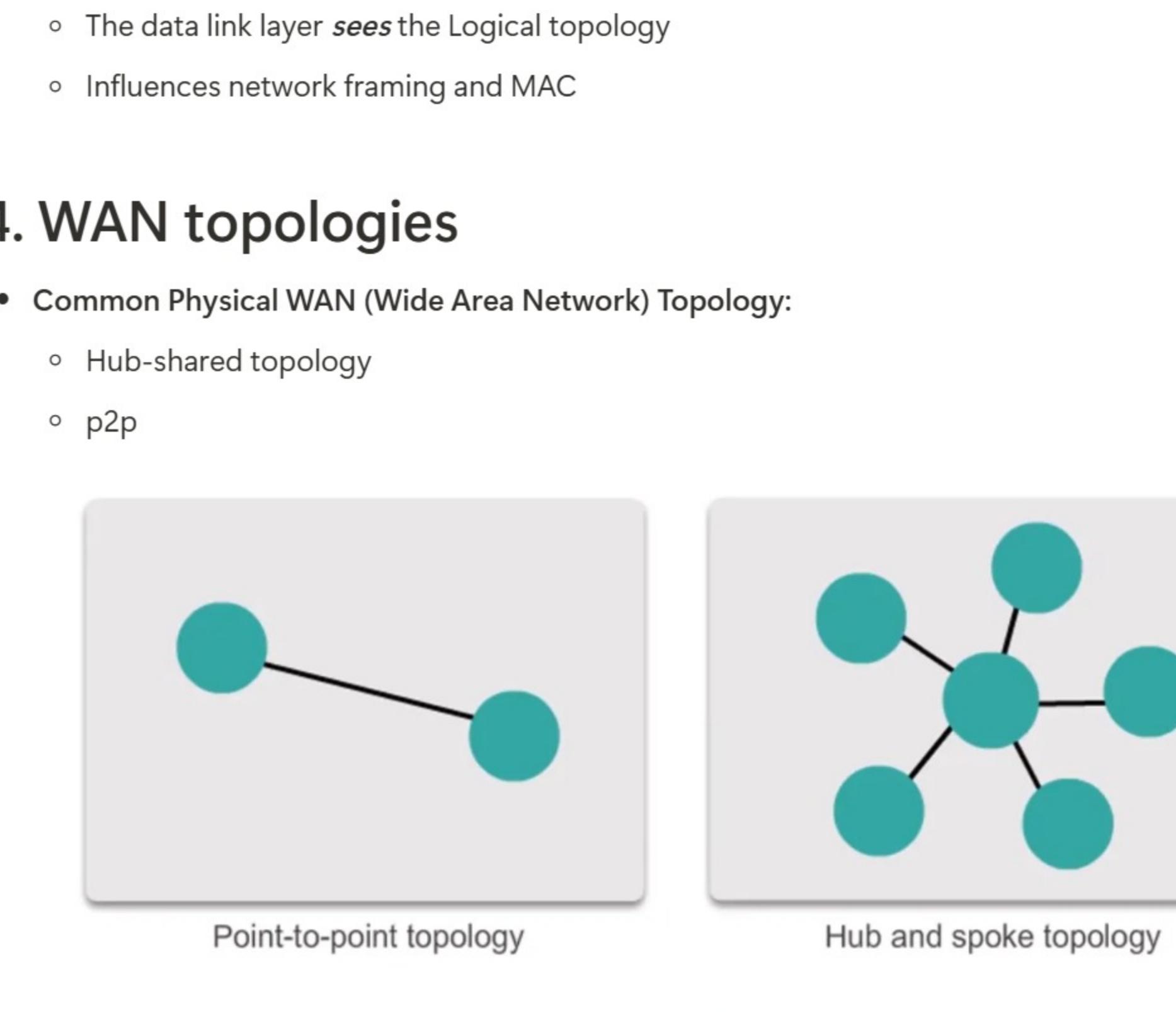
- The Data Link layer links the software and hardware layers



- Data Link layer has 2 sub-layer:
  - LLC (Logical Link Control): interact with the network layer
    - ⇒ add header to package
    - ⇒ Allows the same media and same NIC to be used by different layer 3 protocols.
  - MAC (*medium access control*): encapsulation
    - Data link layer protocols govern how to format a frame for use on different media.
- Data link layer also has error detection function.

## 2. Data link Layer

- Formatting Data for Transmission:



## 3. Topologies

- Physical:

- Arrangement and physical connection between nodes
- What the network *looks* like

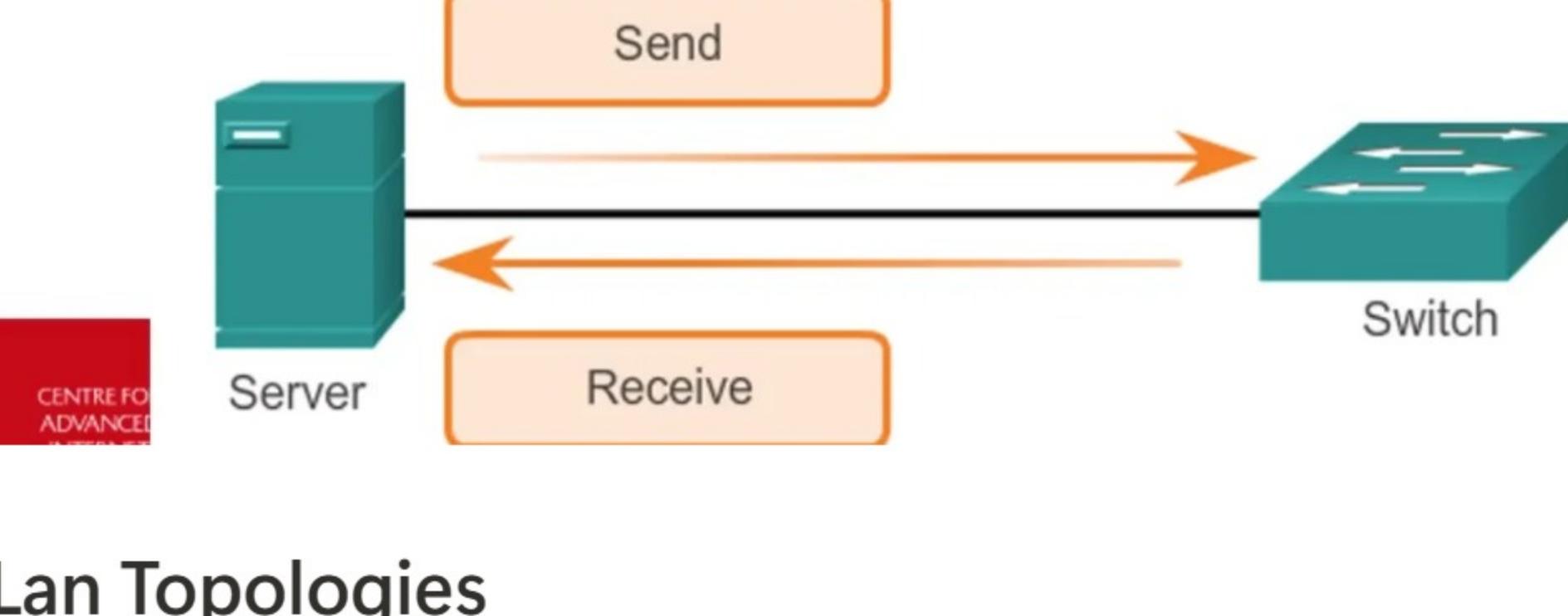
- Logical:

- Virtual arrangement of nodes independent of their physical activity
- The data link layer *sees* the Logical topology
- Influences network framing and MAC

## 4. WAN topologies

- Common Physical WAN (Wide Area Network) Topology:

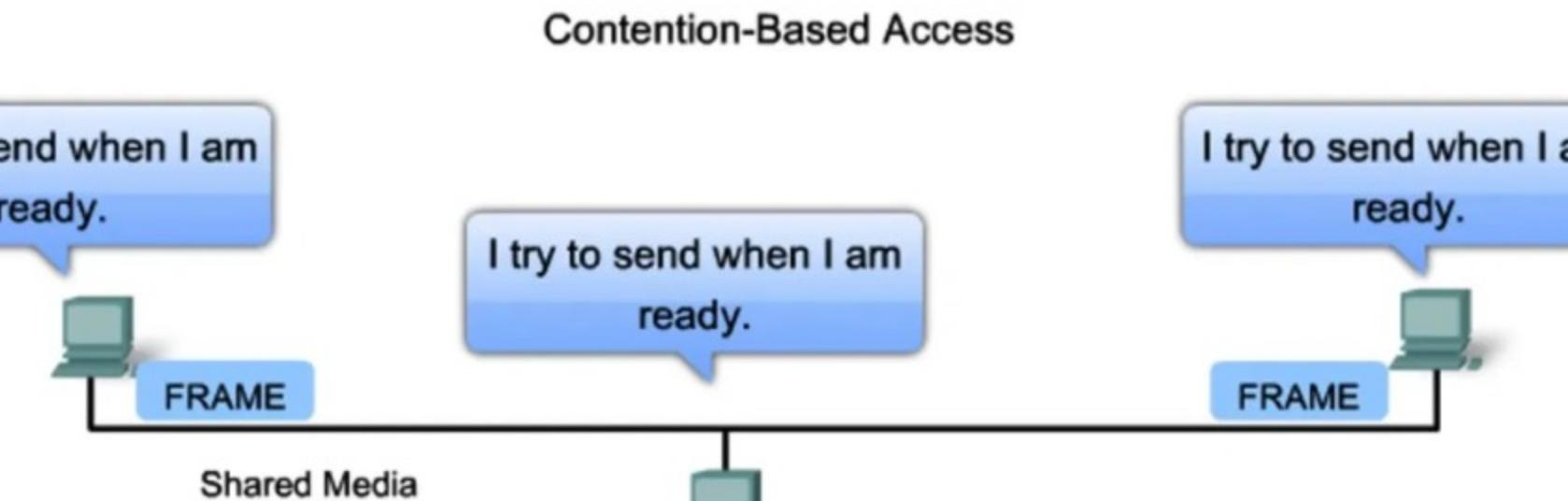
- Hub-shared topology
- p2p



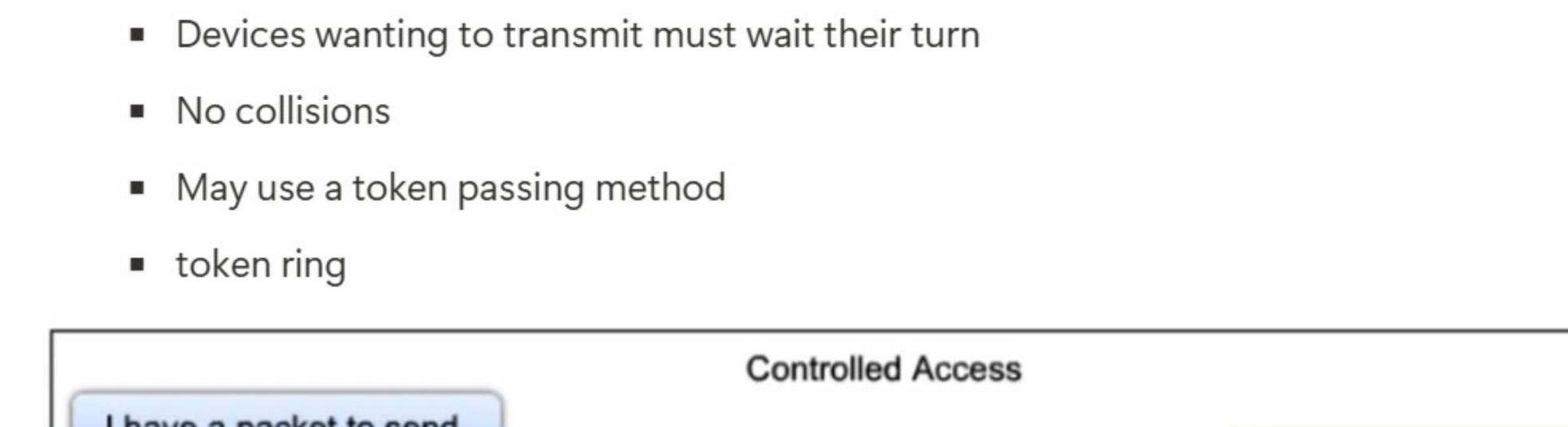
- Physical Point-to-Point Topology:
  - No need MAC address in the frame (Data Link Layer) if only 2 nodes in the Topology

- Half-duplex vs Full duplex Communication:
  - Half-duplex: need to wait complete sending, then receive after that.
  - Full-duplex: sending and receiving at the same time.

### Half-Duplex



### Full-Duplex

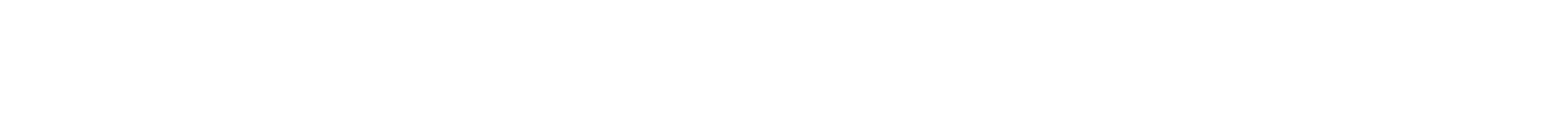


## 5. Lan Topologies

- Contention-based Access:

- Stations can transmit at any time
- Collision exist
- There are mechanisms to resolve contention for the media

- CSMA/CD, CSMA/CA



- Controlled Access:

- Characteristics:
  - Only one station can transmit at a time
  - Devices wanting to transmit must wait their turn
  - No collisions
  - May use a token passing method
  - token ring

