COMPUTER NETWORKS AND APPLICATIONS

COMP SCI 3001

Faculty of Engineering, Computer and Mathematical Sciences

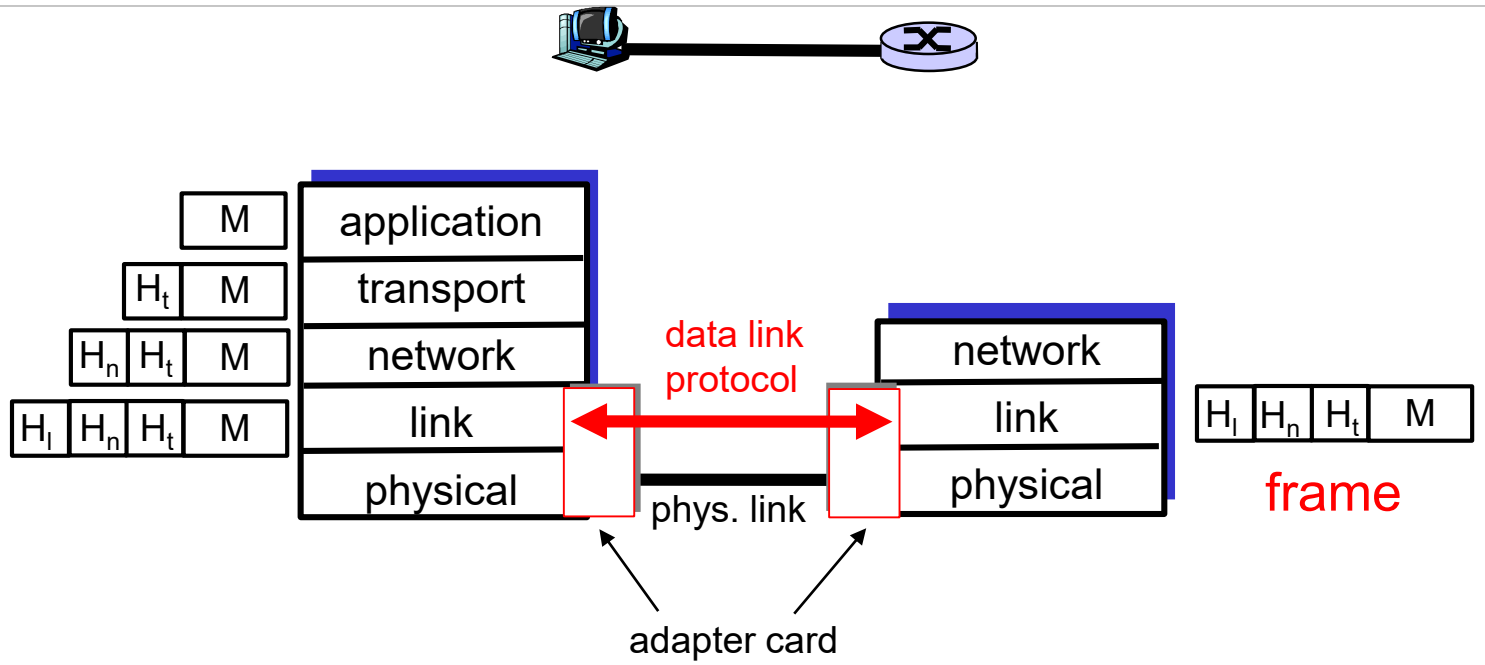
Data Link Layer Introduction

data-link layer has responsibility of transferring datagram from one node to *physically adjacent* node over a link

Data Link Layer introduction

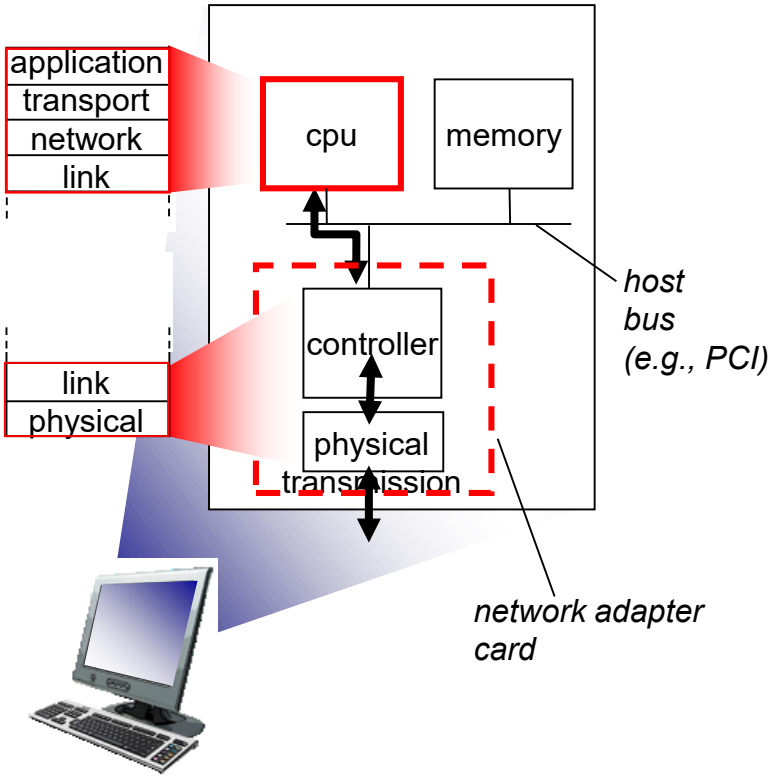
One link

- Examples:
  - host-router, router-router, host-host
- Unit of data or PDU: **frame** (vs. IP packets)



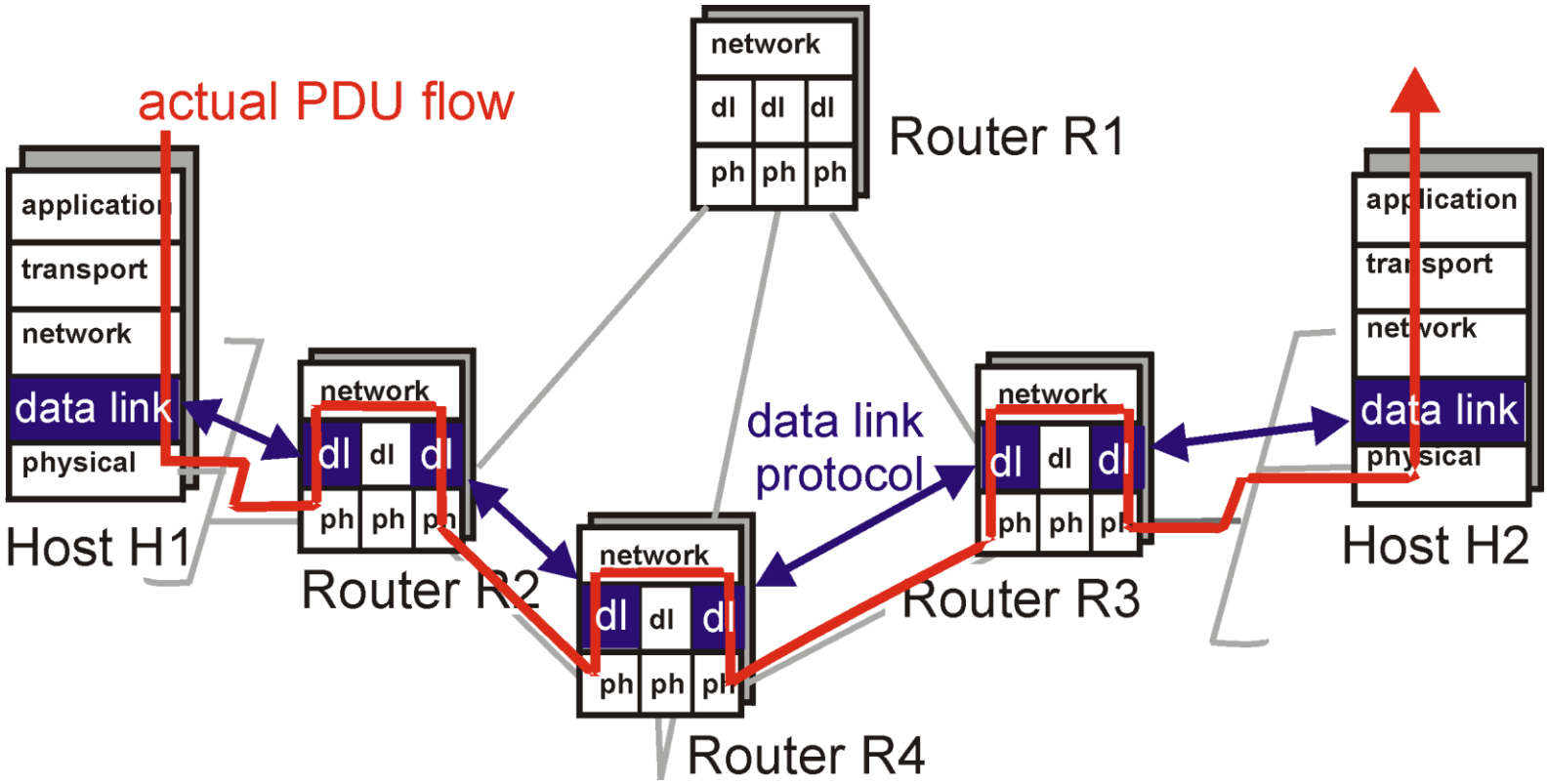
Where is the link layer implemented?

- in each and every host
- link layer implemented in "adaptor" (aka *network interface card* NIC) or on a chip
  - Ethernet card, 802.11 card; Ethernet chipset
  - implements link, physical layer
- attaches into host's system buses
- combination of hardware, software, firmware



Data Link Layer introduction

Context



Data Link Layer introduction

Link layer services

1. Framing
   - Encapsulate datagram into **frame:** add **header and a trailer**
   - 'Physical addresses' used in frame headers to identify source and destination
     - *different from IP address*!
2. Link access
   - Implement channel access if shared medium

Link layer services

Reliable delivery between two physically connected devices

- We learned how to do this already (remember **TCP**?)
- Seldom used on **low bit error** link (glass fiber, some twisted pair)
- Wireless links: high error rates

Q: why both link-level and end-end reliability?

Link layer services (cont.)

4 **Flow control**

- Pacing between sender and receiver(s)

Link layer services (cont.)

4

Flow control

- Pacing between sender and receiver(s)

5

Error detection

- Errors caused by signal attenuation and noise
  - every link **will** have errors
- Receiver detects presence of errors
  - signals sender **for retransmission or drops frame**

Link layer services (cont.)

Flow control

- Pacing between sender and receiver(s)

Error detection

- Errors caused by signal attenuation and noise
  - every link **will** have errors
- Receiver detects presence of errors
  - signals sender for retransmission or drops frame

Error correction

- Receiver identifies **and corrects** bit error(s) without resorting to re-transmission
- Also called **Forward Error Control**
  - **Problem: more bits to transmit!**

Link layer services

- Flow control
- Reliable delivery between two physically connected devices

Already looked at in TCP

- Error detection and Correction
- Link access

So we will consider