Applied!

Computer Networks

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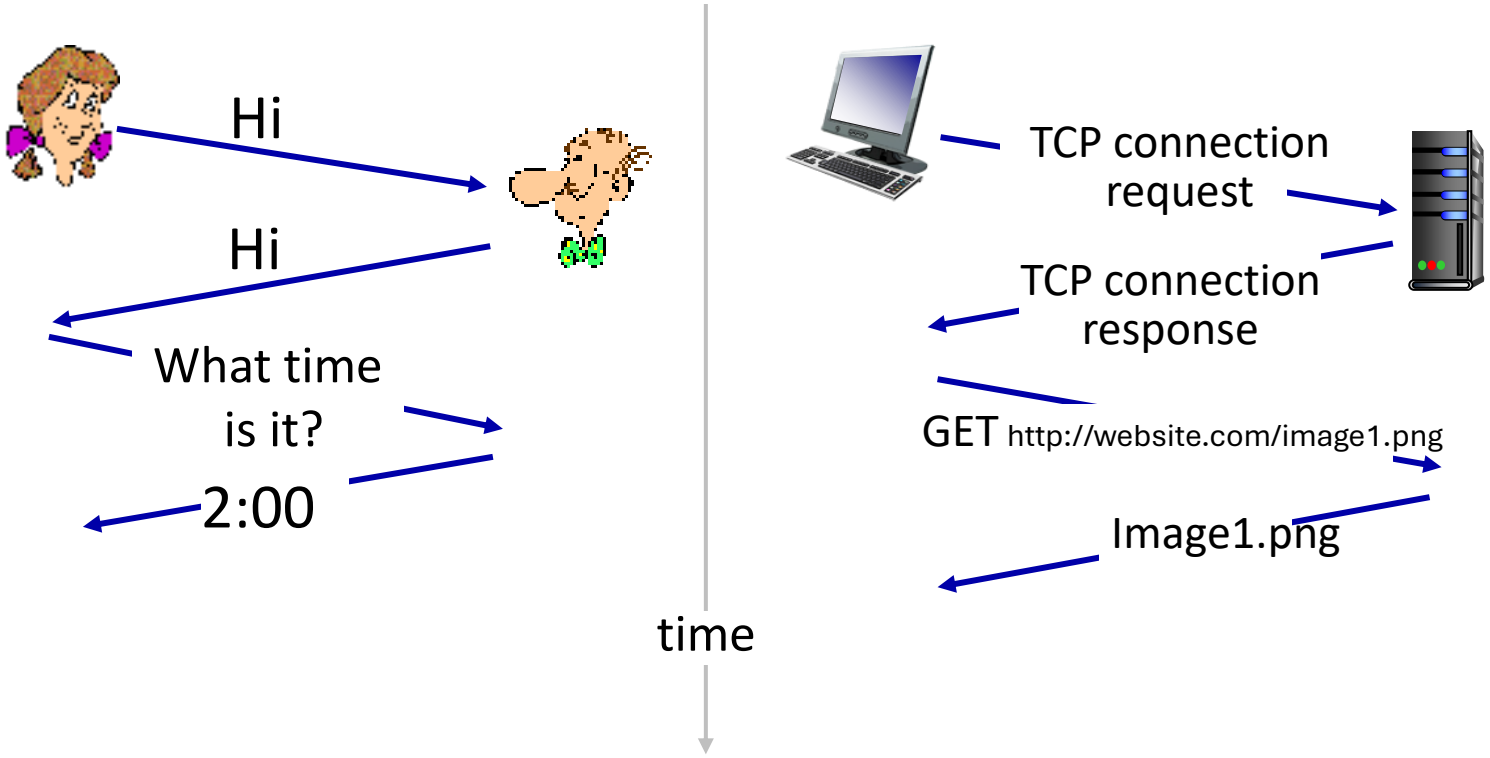
Fast Recap

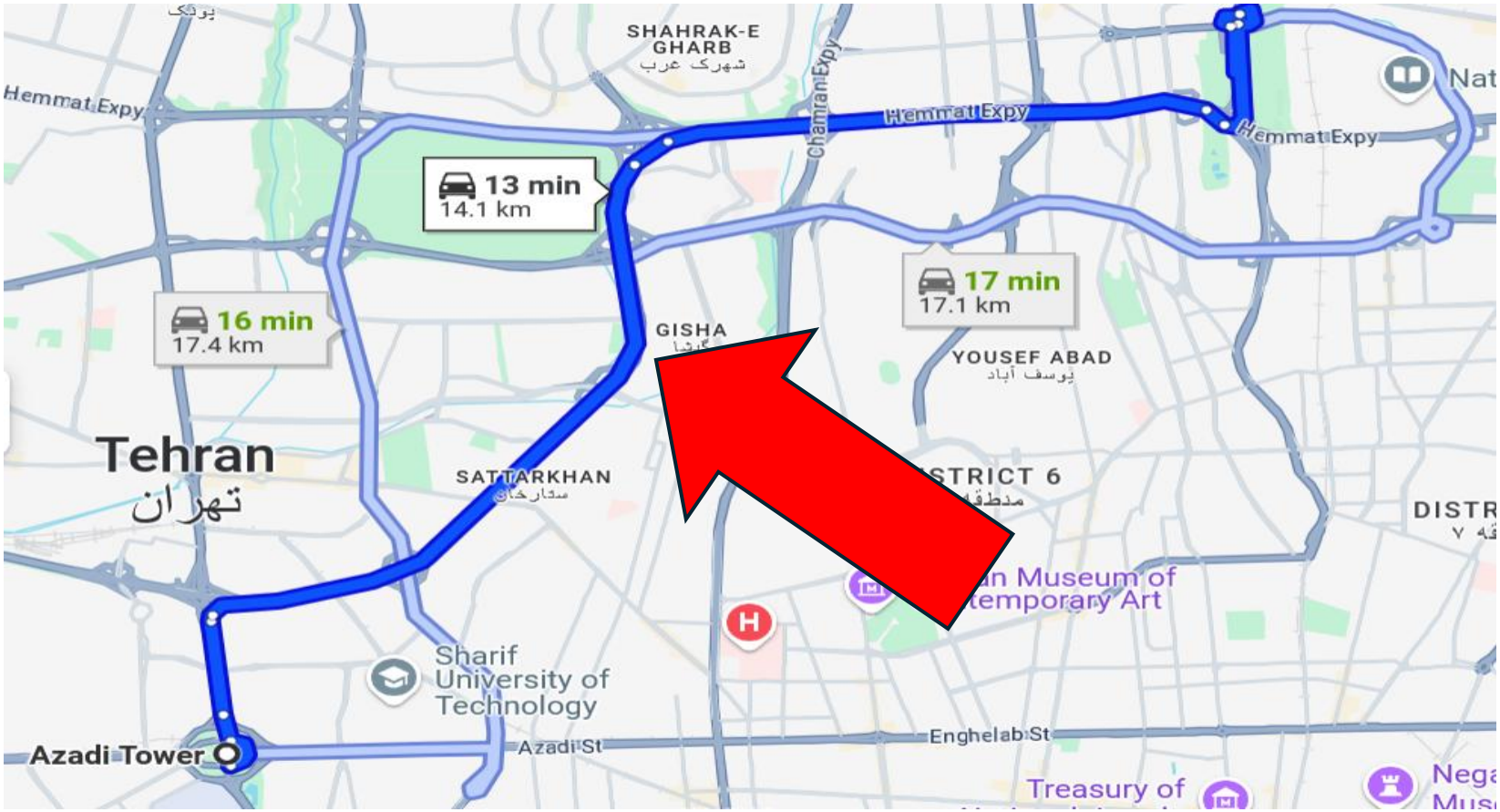
What is a Protocol?

A protocol is a set of rules or guidelines
Manage how data is transmitted and received in communication systems



Routing

Finding way in network
Routing is not unique
We search for fast path
Send & Receive path are not same always



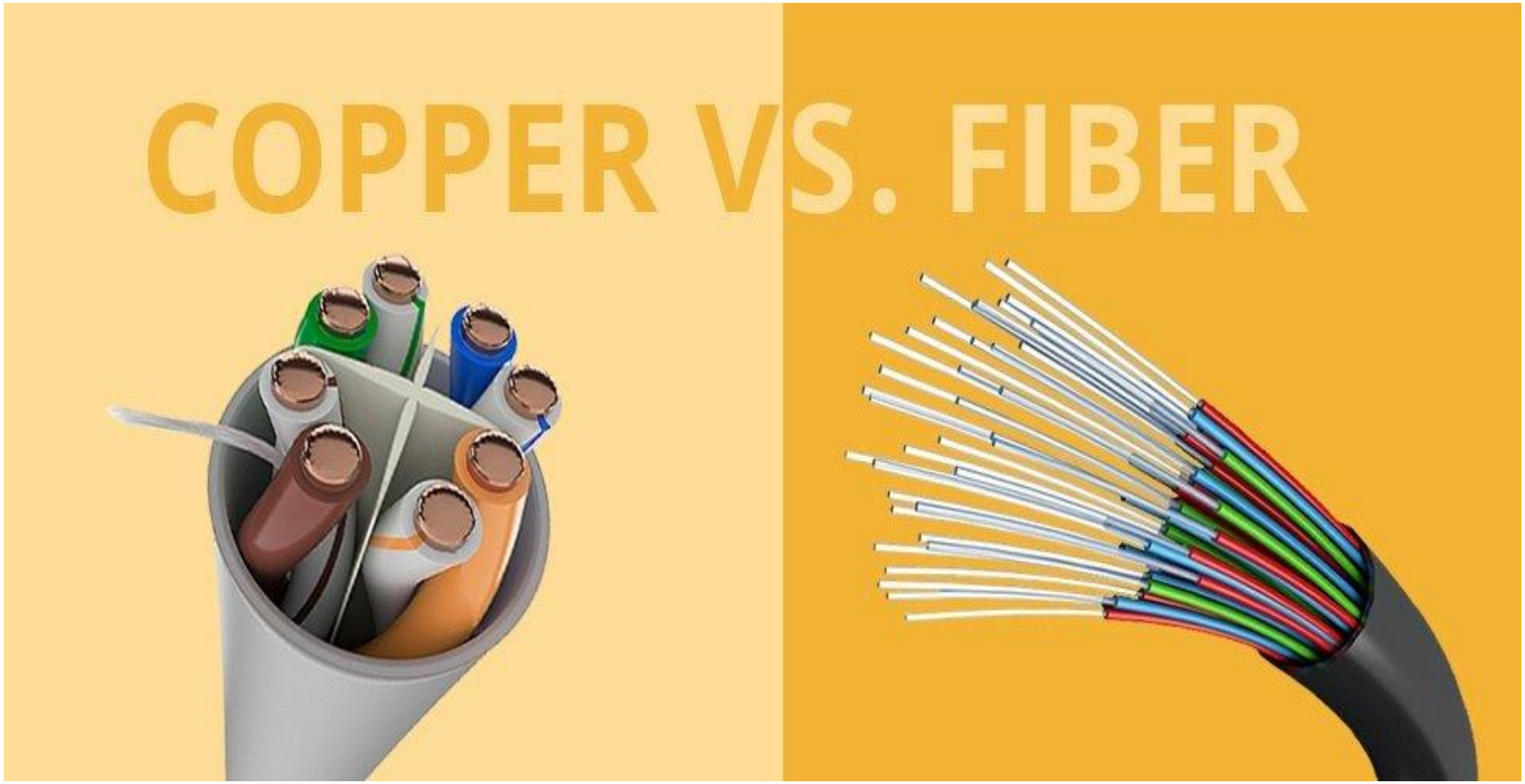
Fragmentation

- Image is too large!
- Fragment it to small parts - packets
- Each has sequence number

Packet	Data
Packet1	
Packet2	

Cables

- Cat 5,6 cables
- Fiber is more faster

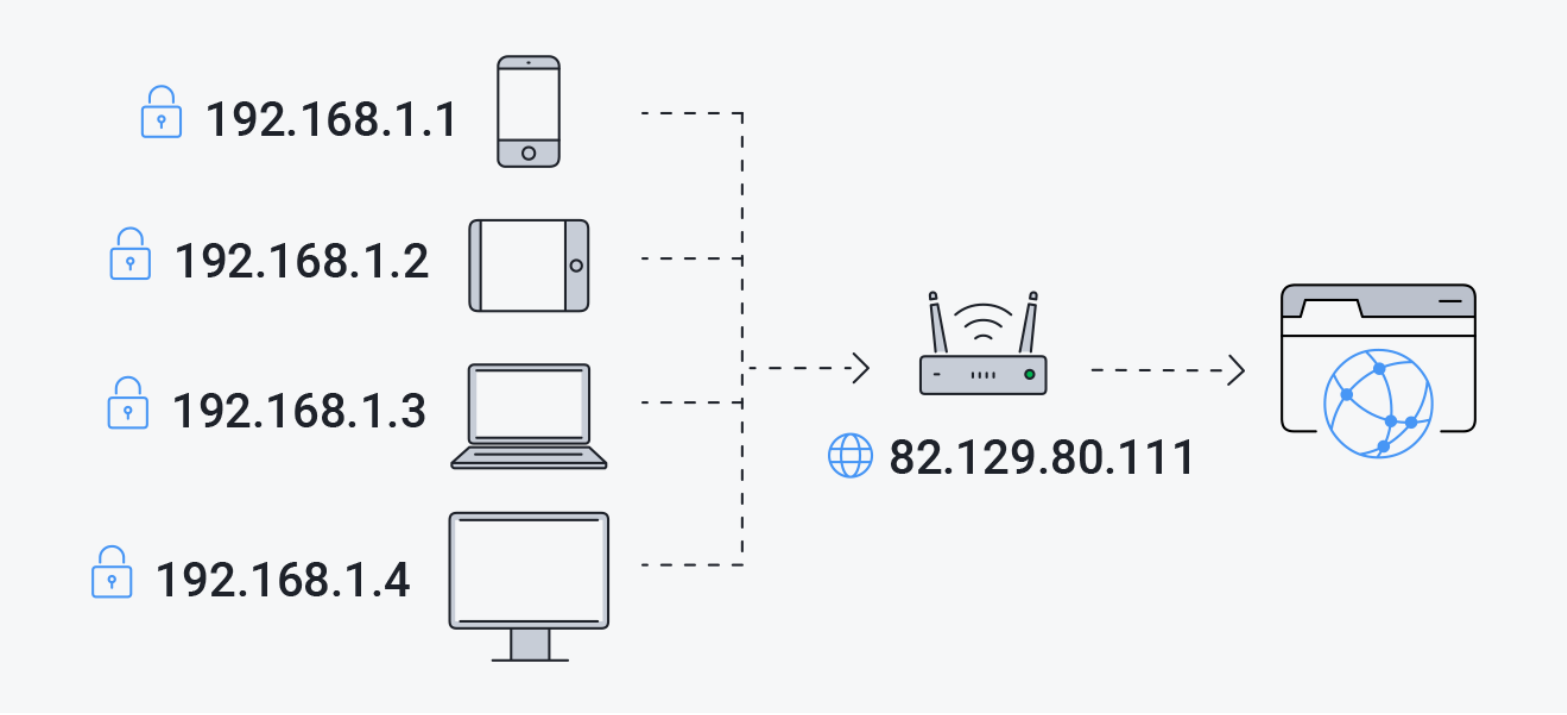


Network Layers

https://gaia.cs.umass.edu/kurose_ross/index.php

IP Address

- Is a unique identifier assigned to each device connected to a network
- Internet is network of networks
- Each device has 1 or more IP Address

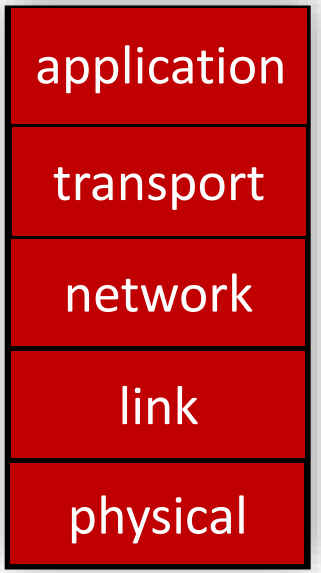


IP Classes

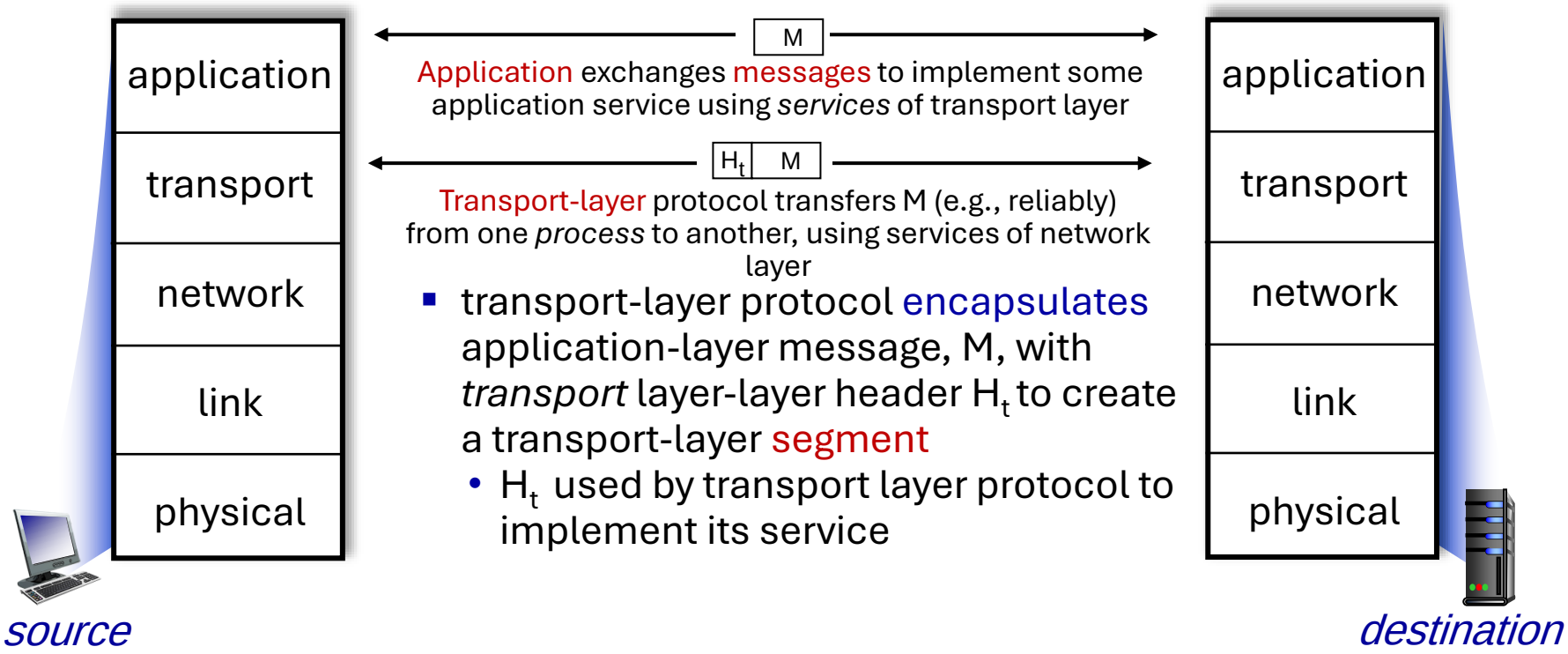
Class	Private Address Ranges
Class A	10.0.0.0 – 10.255.255.255
Class B	172.16.0.0 – 172.31.255.255
Class C	192.168.0.0 – 192.168.255.255
Loopback	127.0.0.0 – 127.255.255.255 (127.0.0.1)

Layered Internet protocol Stack

- *application:* supporting network applications
  - HTTP, IMAP, SMTP, DNS
- *transport:* process-process data transfer
  - TCP, UDP
- *network:* routing of datagrams from source to destination
  - IP, routing protocols
- *link:* data transfer between neighboring network elements
  - Ethernet, 802.11 (WiFi), PPP
- *physical:* bits “on the wire”

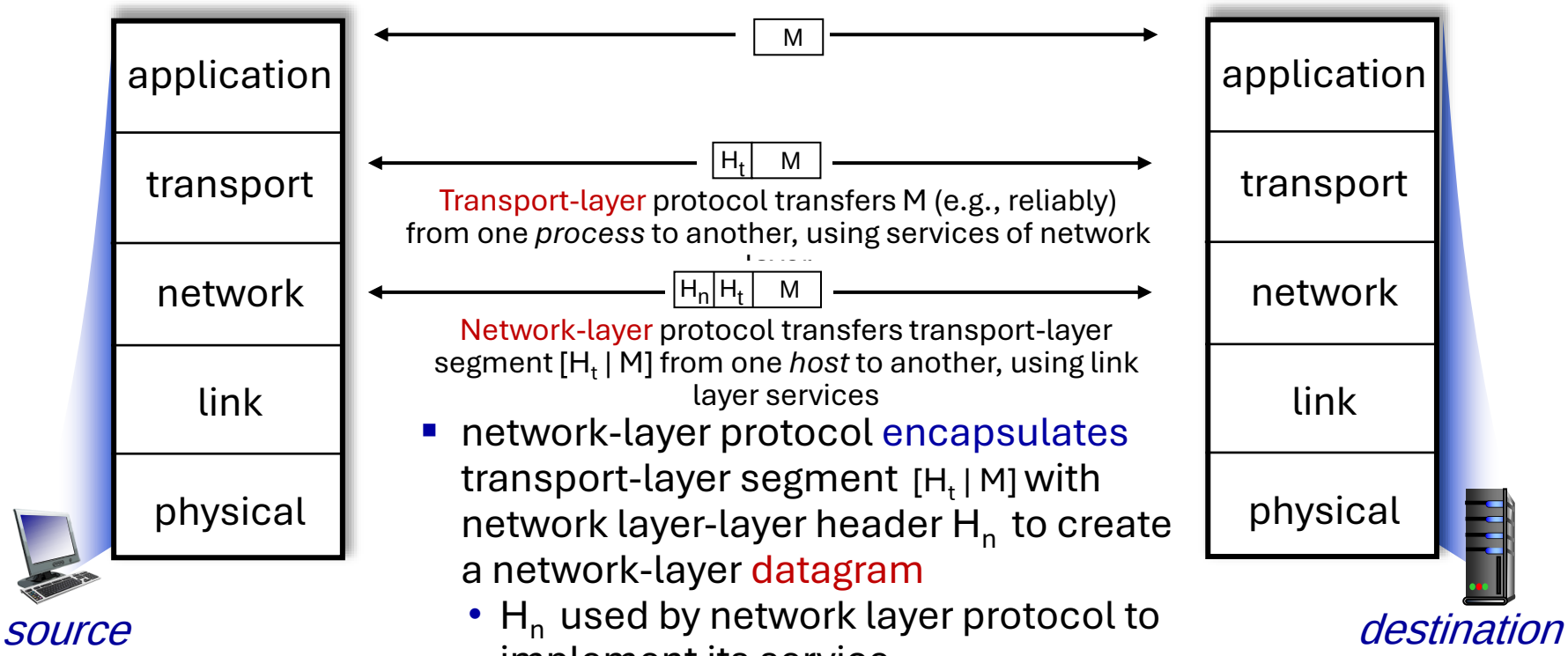


Services, Layering and Encapsulation



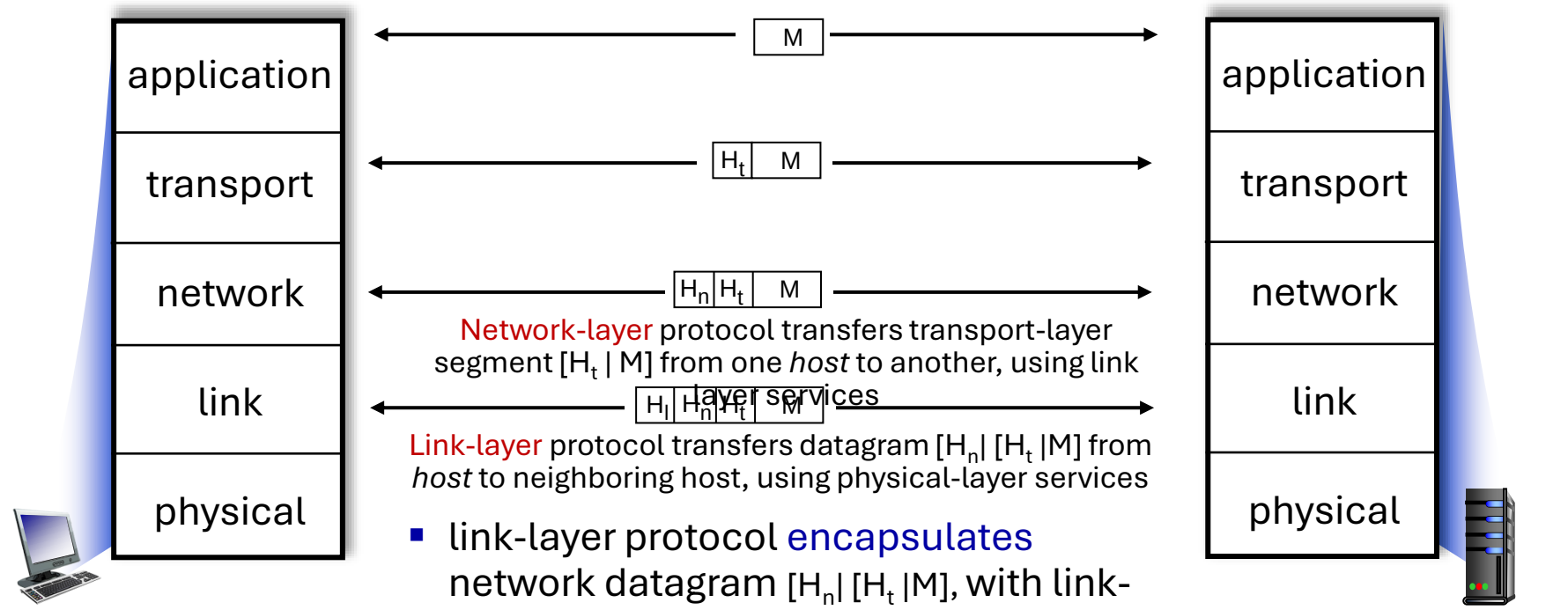
- transport-layer protocol encapsulates application-layer message, M, with *transport* layer-layer header H_t to create a transport-layer segment
  - H_t used by transport layer protocol to implement its service

Services, Layering and Encapsulation



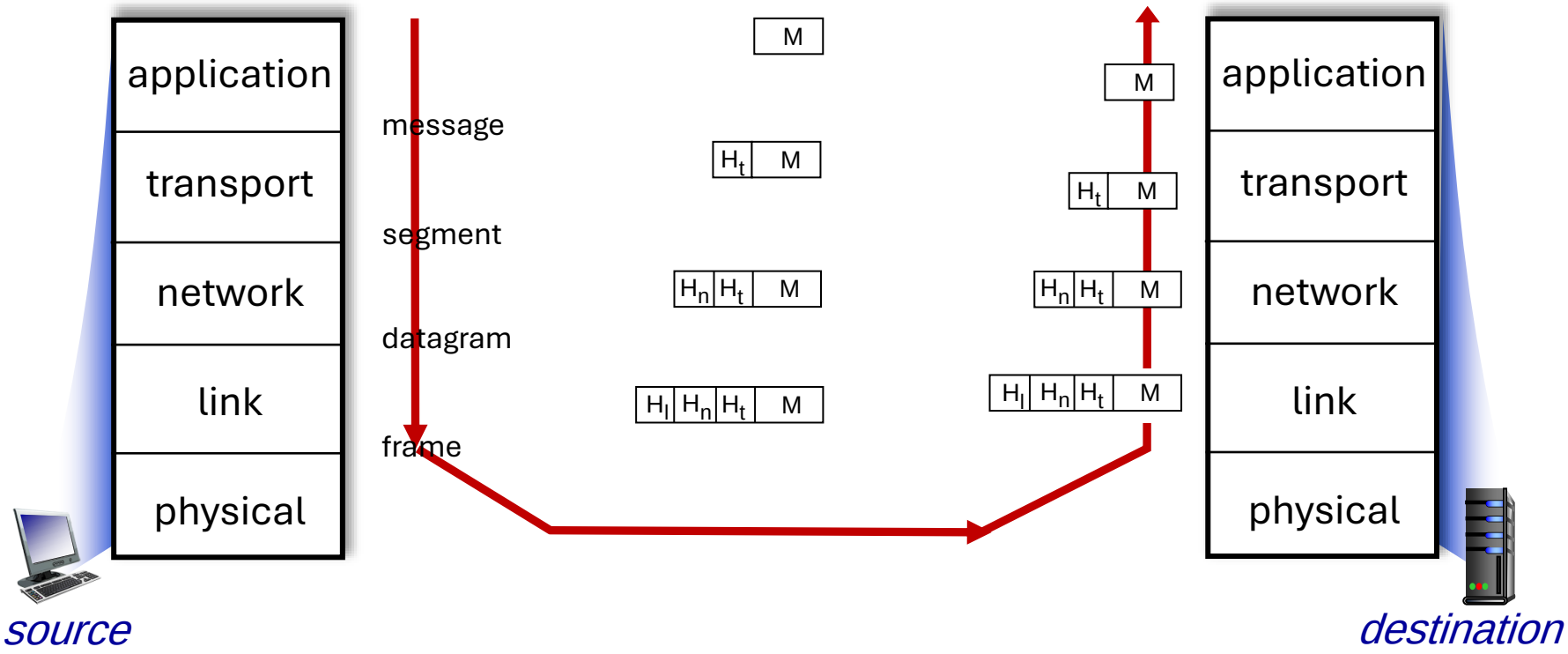
- network-layer protocol encapsulates transport-layer segment [H_t | M] with network layer-layer header H_n to create a network-layer datagram
  - H_n used by network layer protocol to implement its service

Services, Layering and Encapsulation

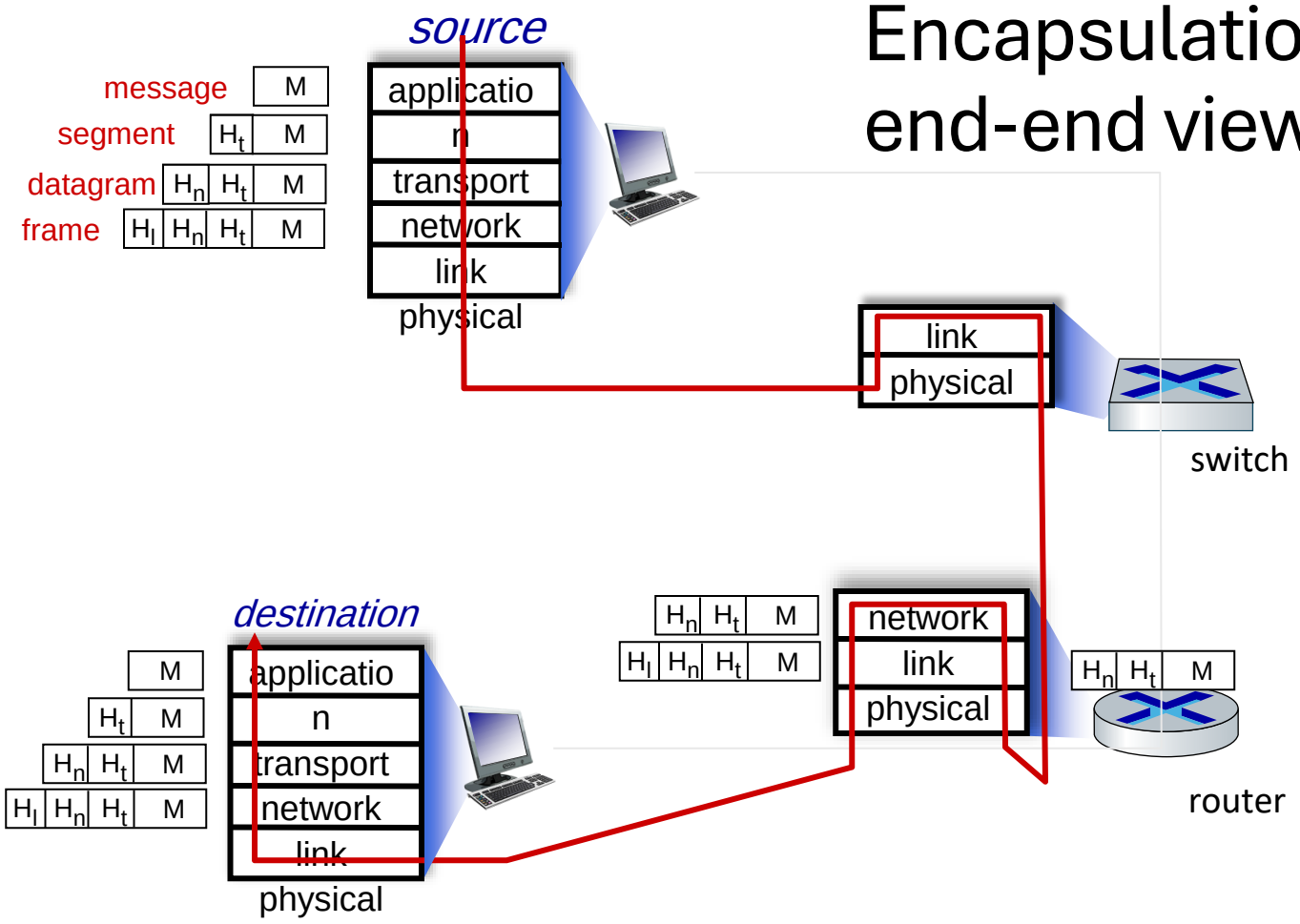


- link-layer protocol encapsulates network datagram [H_n| [H_t |M], with link-layer header H_l to create a link-layer frame

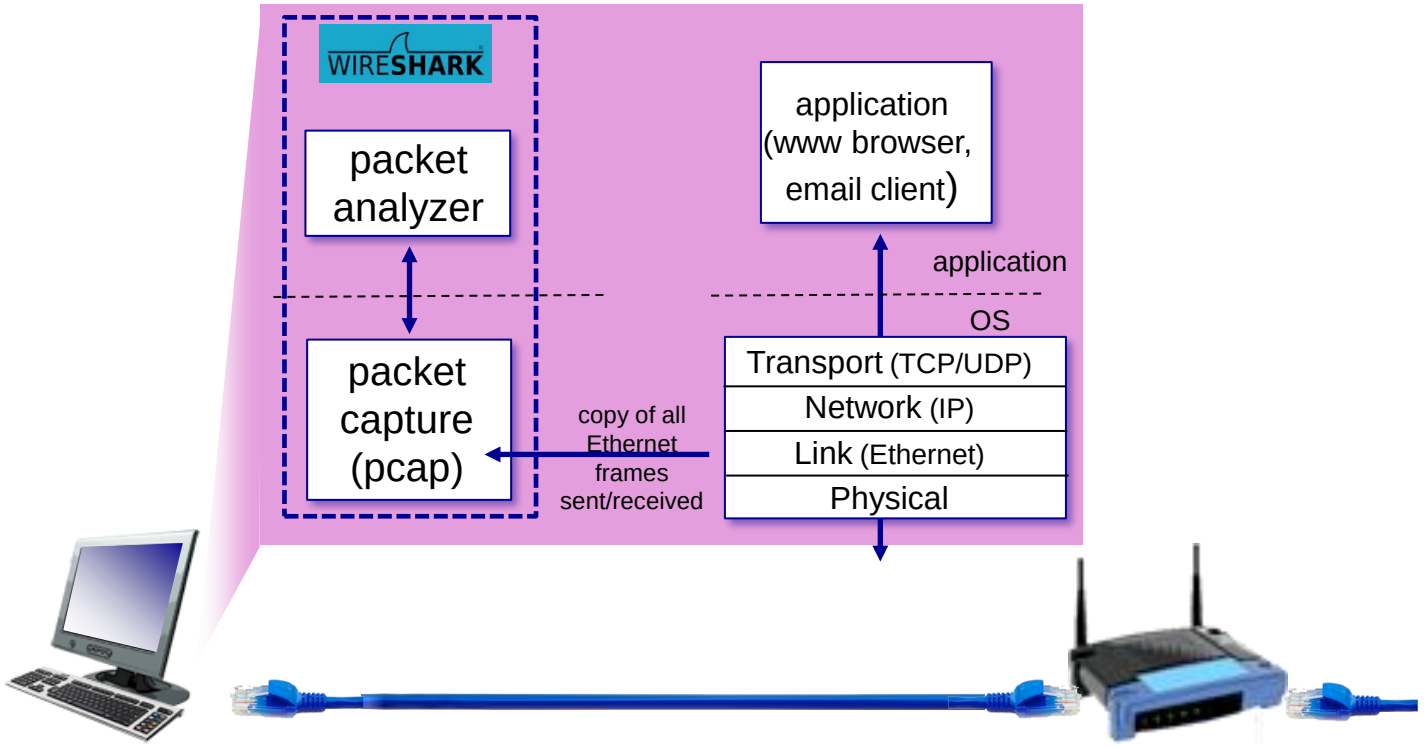
Services, Layering and Encapsulation



Encapsulation: an end-end view



Wireshark


WIRESHARK
packet analyzer
packet capture (pcap)
copy of all Ethernet frames sent/received
application (www browser, email client)
application
OS
Transport (TCP/UDP)
Network (IP)
Link (Ethernet)
Physical