

Welcome to

CS 3516:
Computer Networks

Prof. Yanhua Li

Time: 9:00am –9:50am M, T, R, and F

Location: AK 219

Fall 2018 A-term

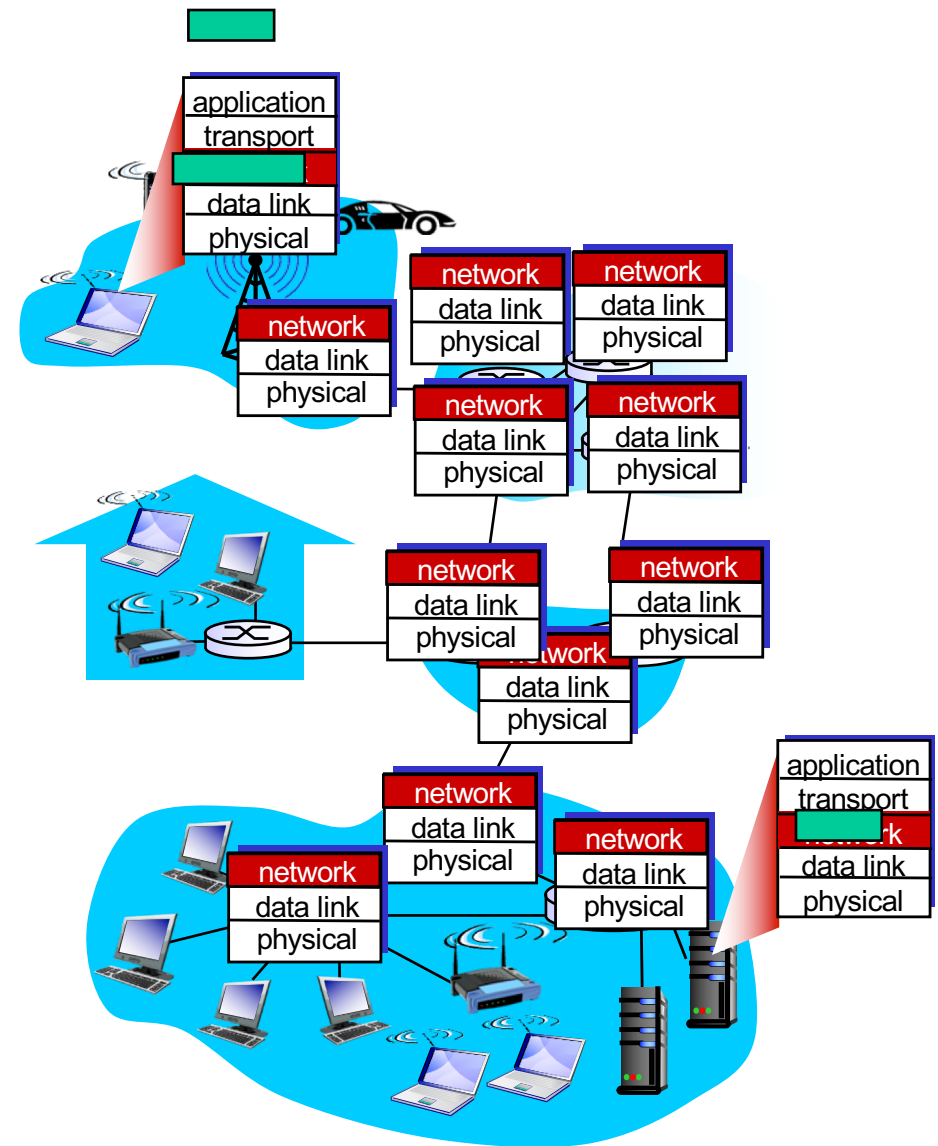
Quiz 7 on Thursday
(TCP, Network layer intro,
and datagram format)

Quiz 6 has been graded

Extra office hour for project 2
Thursday 10:00-11:30AM

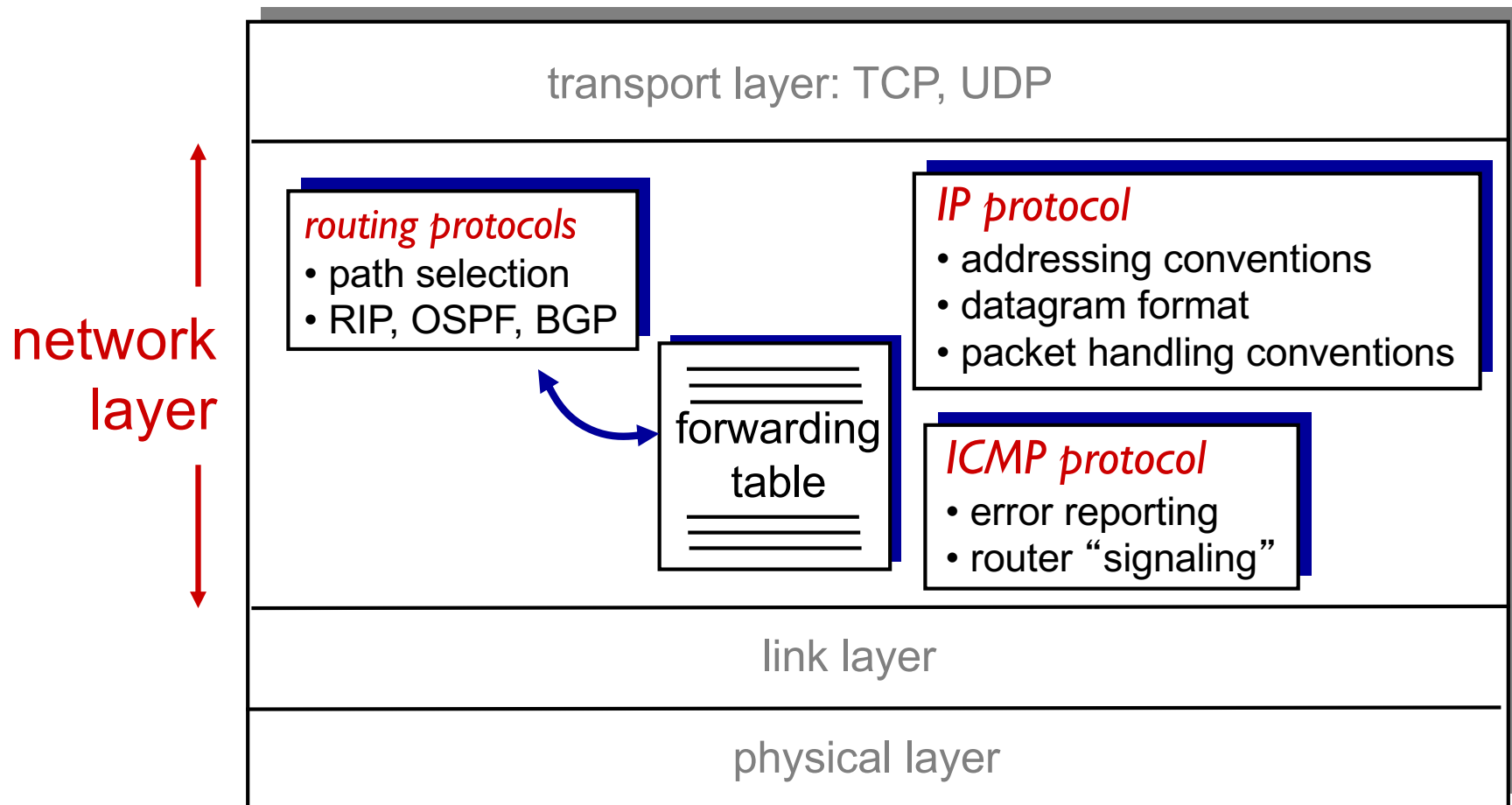
Network layer

- ❖ **transport segment** from sending to receiving host
- ❖ **on sending side** encapsulates segments into datagrams
- ❖ **on receiving side**, delivers segments to transport layer
- ❖ network layer protocols in **every** host, router
- ❖ **router examines header fields** in all IP datagrams passing through it



The Internet network layer

host, router network layer functions:



Two key network-layer functions

- ❖ *forwarding*: move packets from router's input to appropriate router output

- ❖ *routing*: determine route taken by packets from source to dest.

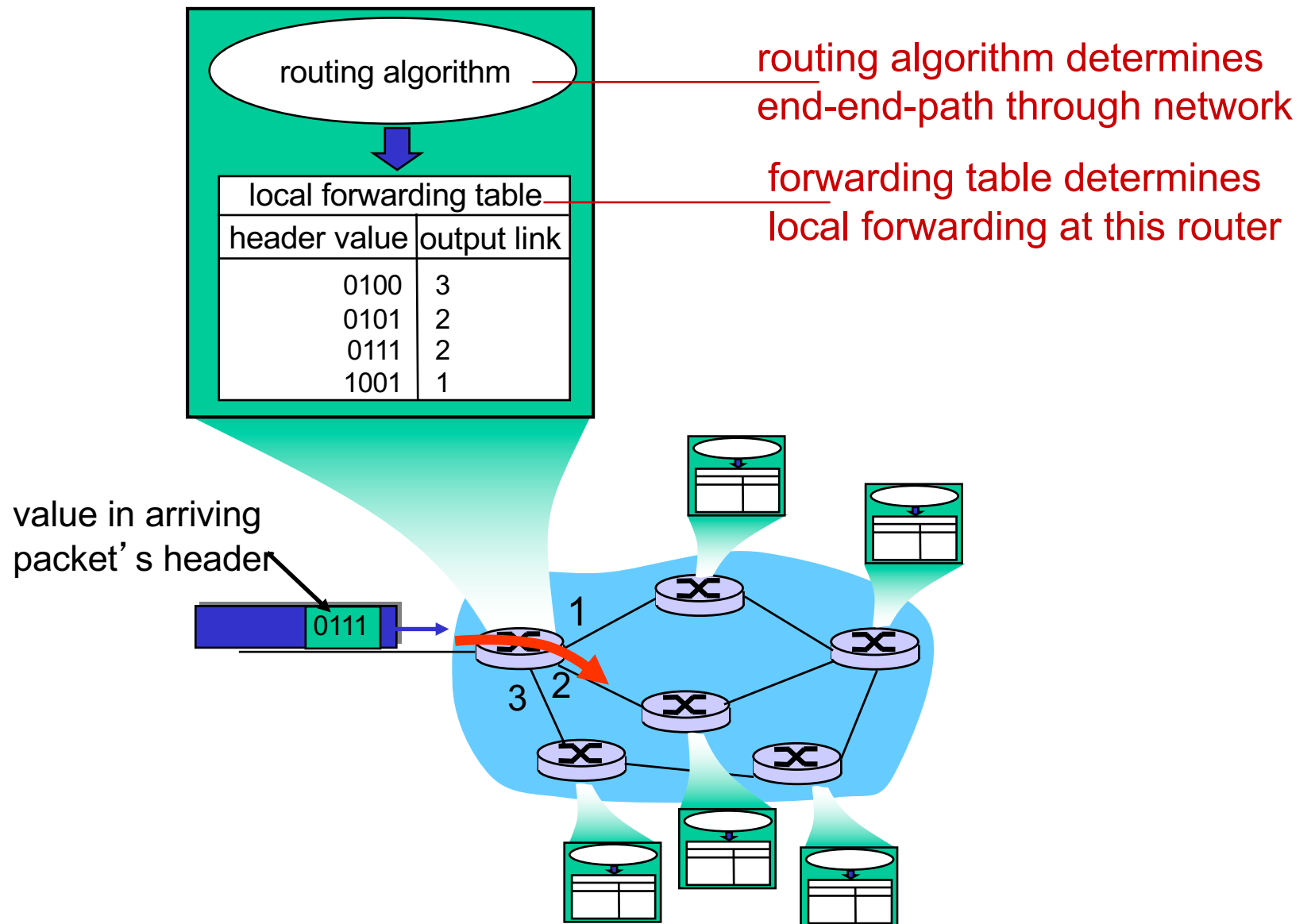
 - *routing algorithms*

analogy:

- ❖ *routing*: process of planning trip from source to dest

- ❖ *forwarding*: process of getting through single interchange

Interplay between routing and forwarding



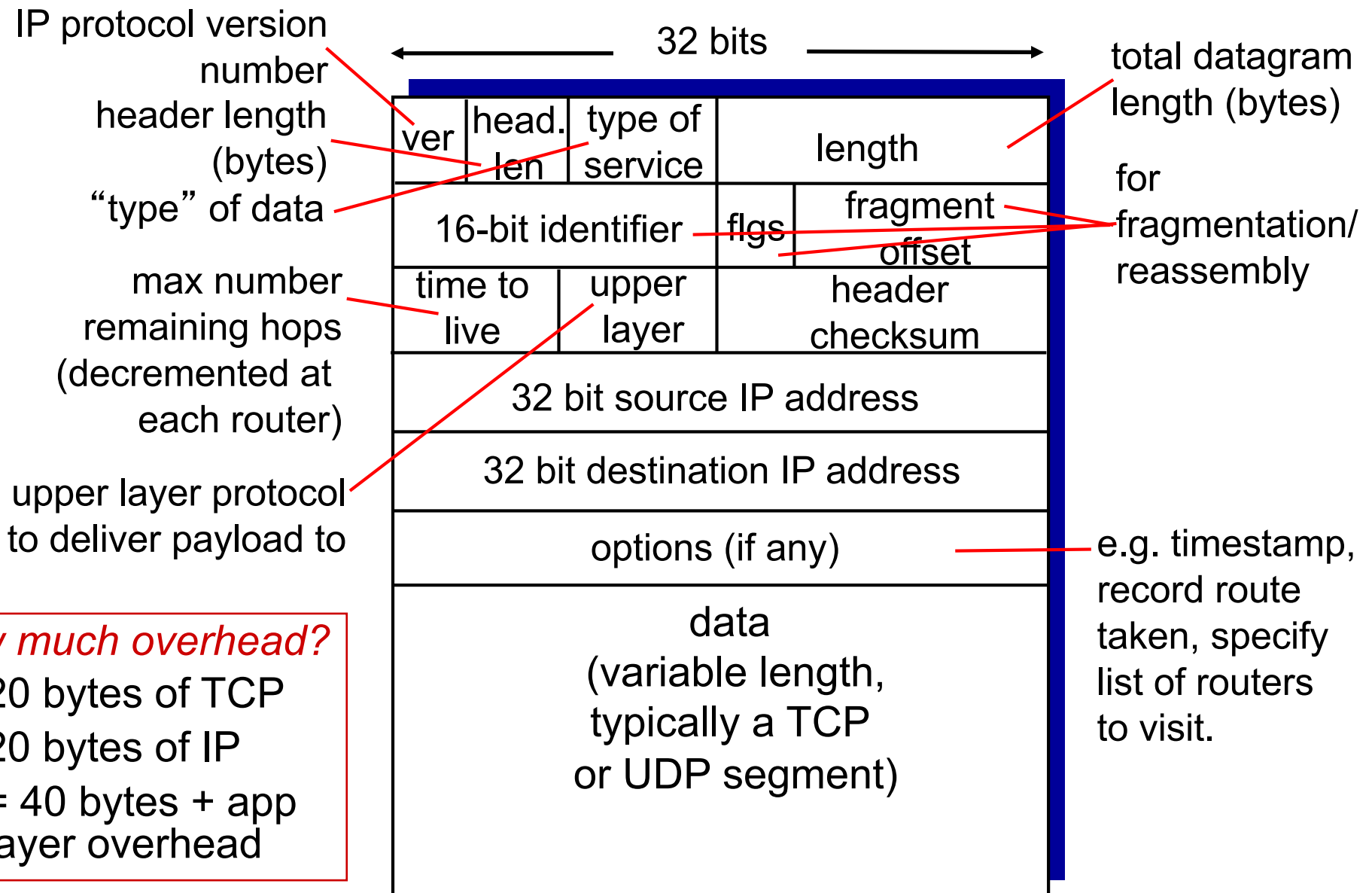
Chapter 4-5: outline

4.1 introduction

4.3 IP: Internet Protocol

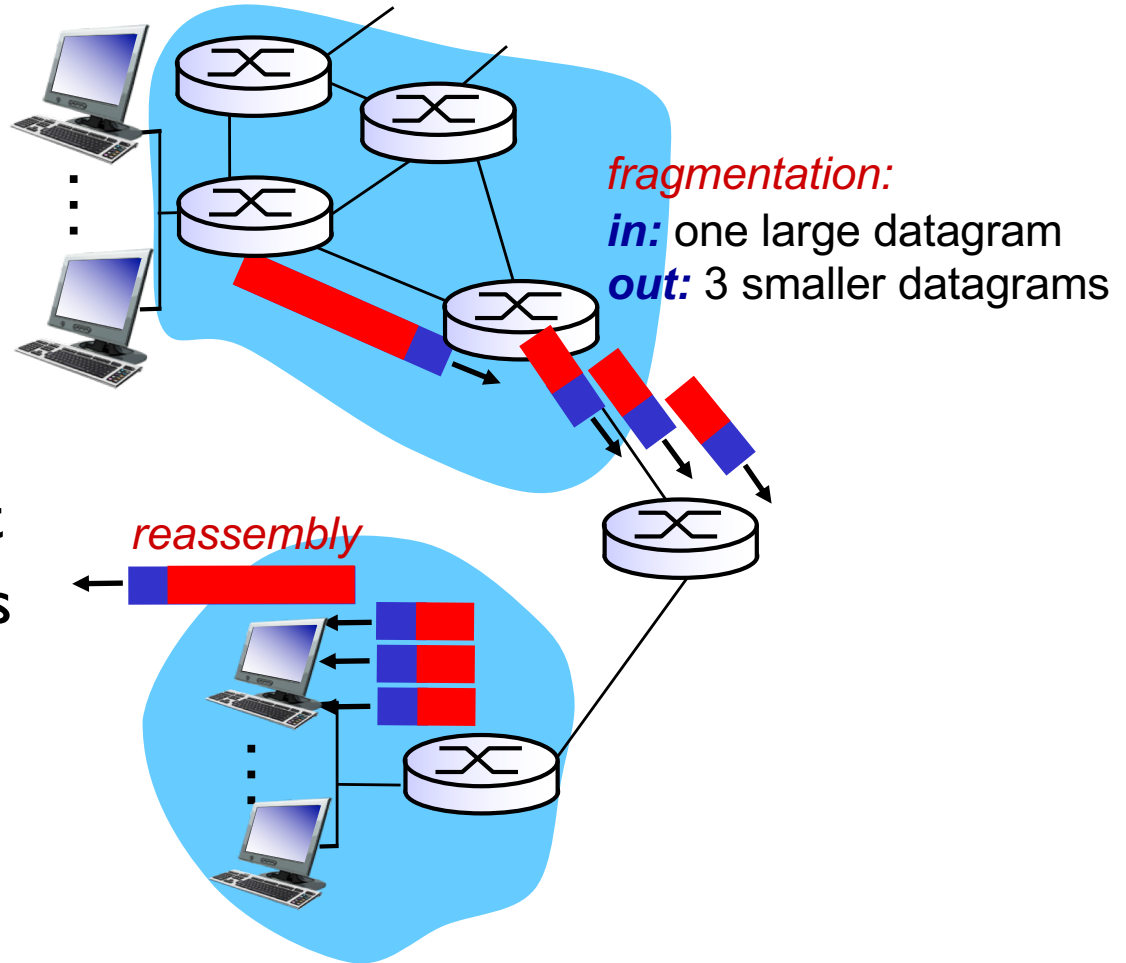
- datagram format
- IPv4 addressing

IP datagram format



IP fragmentation, reassembly

- ❖ network links have MTU (max.transfer size) - largest possible link-level frame
 - different link types, different MTUs
- ❖ large IP datagram divided (“fragmented”) within net
 - one datagram becomes several datagrams
 - “reassembled” only at final destination
 - IP header bits used to identify, order related fragments



IP fragmentation, reassembly



3980 bytes in
data field

example:

- ❖ 4000 byte datagram
- ❖ MTU = 1500 bytes

	length	ID	fragflag	offset	
	=4000	=x	=0	=0	

*one large datagram becomes
several smaller datagrams*

1480 bytes in
data field

offset =
 $1480/8$

1020 bytes in
data field

	length	ID	fragflag	offset	
	=1500	=x	=1	=0	

	length	ID	fragflag	offset	
	=1500	=x	=1	=185	

	length	ID	fragflag	offset	
	=1040	=x	=0	=370	

Offsets are counted by 8 bytes in the data

Questions