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

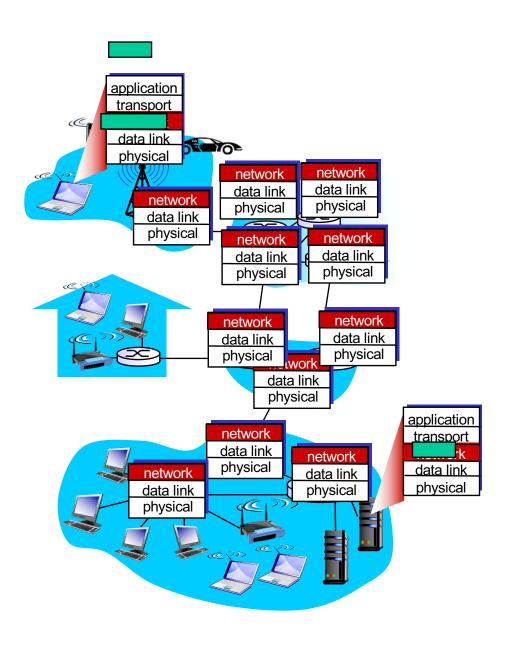
Quiz 7 on Thursday (TCP, Network layer intro, and datagram format)

Quiz 6 has been graded

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

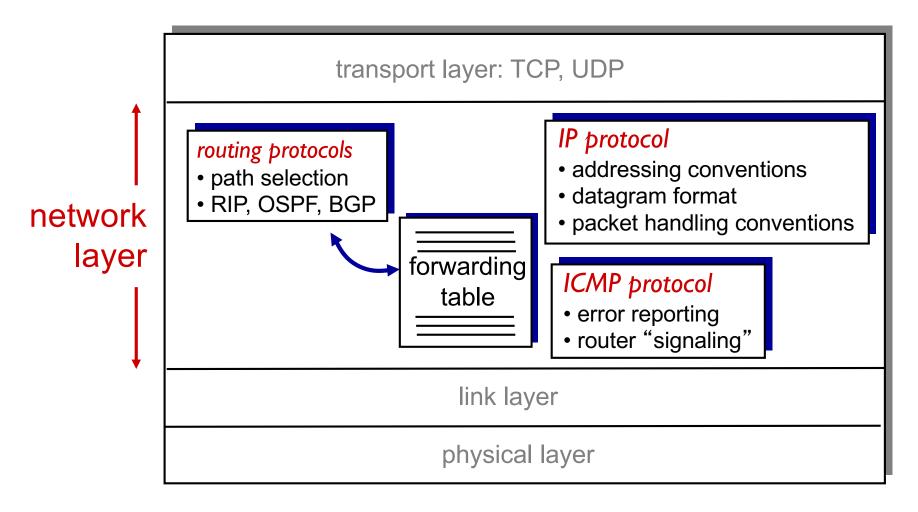
Network layer

- 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:



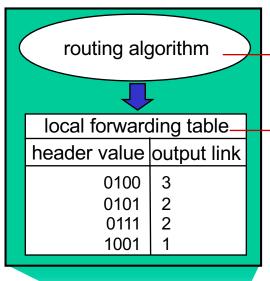
Two key network-layer functions

- forwarding: move packets from router's input to appropriate router output
- routing: determine route taken by packets from source to dest.
 - routing algorithms

analogy:

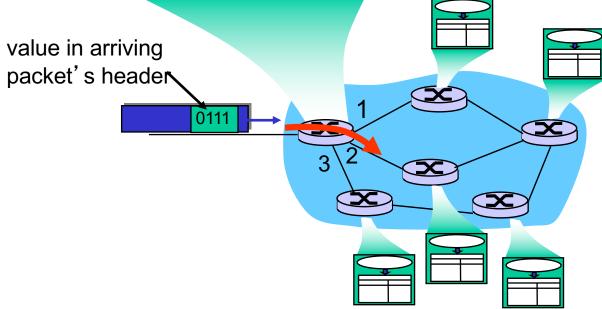
- routing: process of planning trip from source to dest
- forwarding: process of getting through single interchange

Interplay between routing and forwarding



<u>rou</u>ting algorithm determines end-end-path through network

forwarding table determines local forwarding at this router



best effort Network Layer 4-6

Chapter 4-5: outline

- 4.1 introduction
- 4.3 IP: Internet Protocol
 - datagram format
 - IPv4 addressing

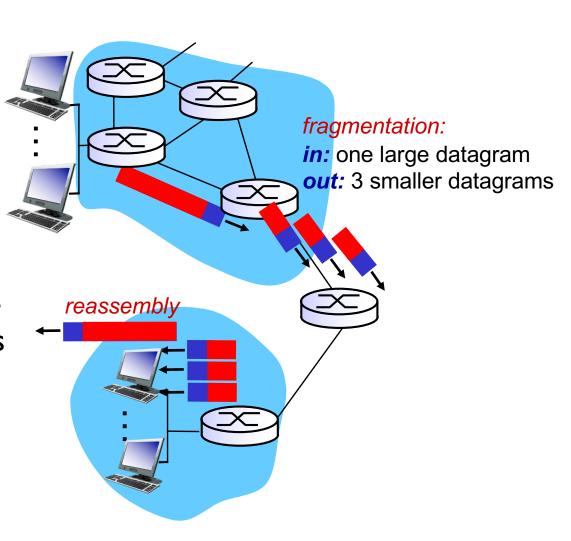
IP datagram format

layer overhead

IP protocol version 32 bits total datagram number length (bytes) header length head. type of ver length (bytes) len service for "type" of data fragment fragmentation/ 16-bit identifier | flgs offset reassembly max number time to upper header remaining hops layer live checksum (decremented at 32 bit source IP address each router) 32 bit destination IP address upper layer protocol to deliver payload to e.g. timestamp, options (if any) record route data taken, specify how much overhead? (variable length, list of routers 20 bytes of TCP typically a TCP to visit. 20 bytes of IP or UDP segment) = 40 bytes + app

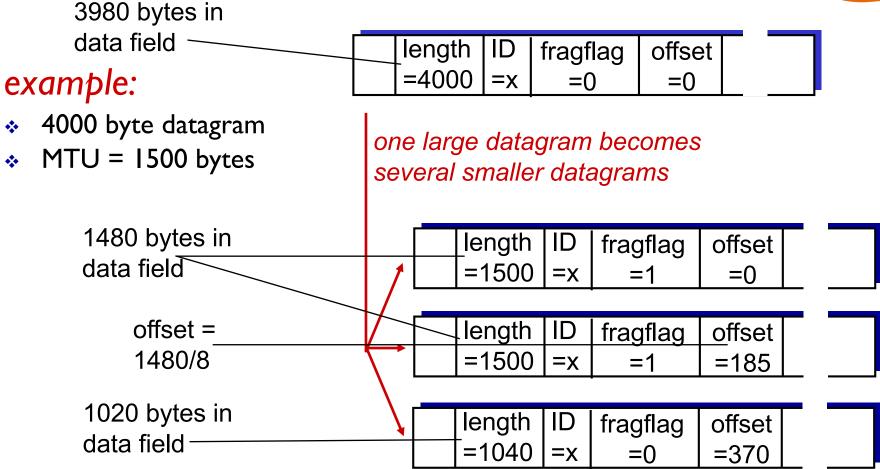
IP fragmentation, reassembly

- 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





Questions