

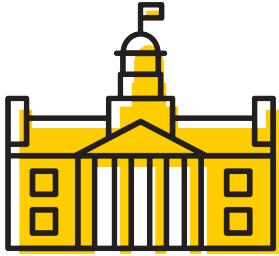
IOWA

CS3640

Introduction to Networks

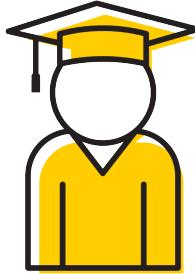
Prof. Supreeth Shastri
Computer Science
The University of Iowa

Am I in the right room?



First course in computer networks

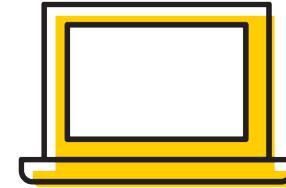
Technical introduction to networks, their designs, and their applications



Advanced undergraduates in CS major

Prerequisites: CS 2210, 2230, 2630 (minimum grade of C-)

Comfortable in programming (Python)



Website: <https://shastri.info/teaching/cs3640>

Sessions: TuTh 3:30 - 4:45pm
110 MLH

Discussions: <https://ui-cs3640-spring22.slack.com>

Meet your teaching staff



More: <https://shastri.info>

Supreeth Shastri (instructor)

- *Joined UI computer science in fall 2020*
- *Focus areas: systems, databases, networking*
- *Research: legalizing personal-data systems*

An out and out networking enthusiast!



Meet your teaching staff

Daniyal Dar (TA)

- *3rd year doctoral student*
- *Research area: internet measurement*
- *Advisor: Rishab Nithyanand*
- <https://homepage.divms.uiowa.edu/~mdar/>



Best way to reach your teaching staff is via Slack

Grading

Grade allocations

Type	Number	Weight
Spot quizzes (in class)	20	20%
Writing assignments	4	20%
Programming projects	2	20%
Written exam (midterm)	1	20%
Technical interview (finals)	1	20%

Cumulative grades

Final Grade	% students
A	22%
B	38%
C	36%
D	3%
F	1%

- We will curve the grades
- We will use +/- grading

Ground rules and policies⁺

Attendance and absence

*Attend the sessions regularly;
participate in spot quiz; engage
in Slack discussion*

*Follow CLAS policy for excused
absences*



Academic integrity

*Read the policy, and read it again. We are
really serious about it.*

*First offense gets a score of zero.
Repeated violation gets F for the course
and will be reported to the Dean's office.*

Late submissions

*All submissions are due midnight on
the specified date.*

*We will not accept late submissions.
However, we will evaluate incomplete
submissions for partial grades.*



*If you have a COVID-19 related
situation, please reach out*

Textbook

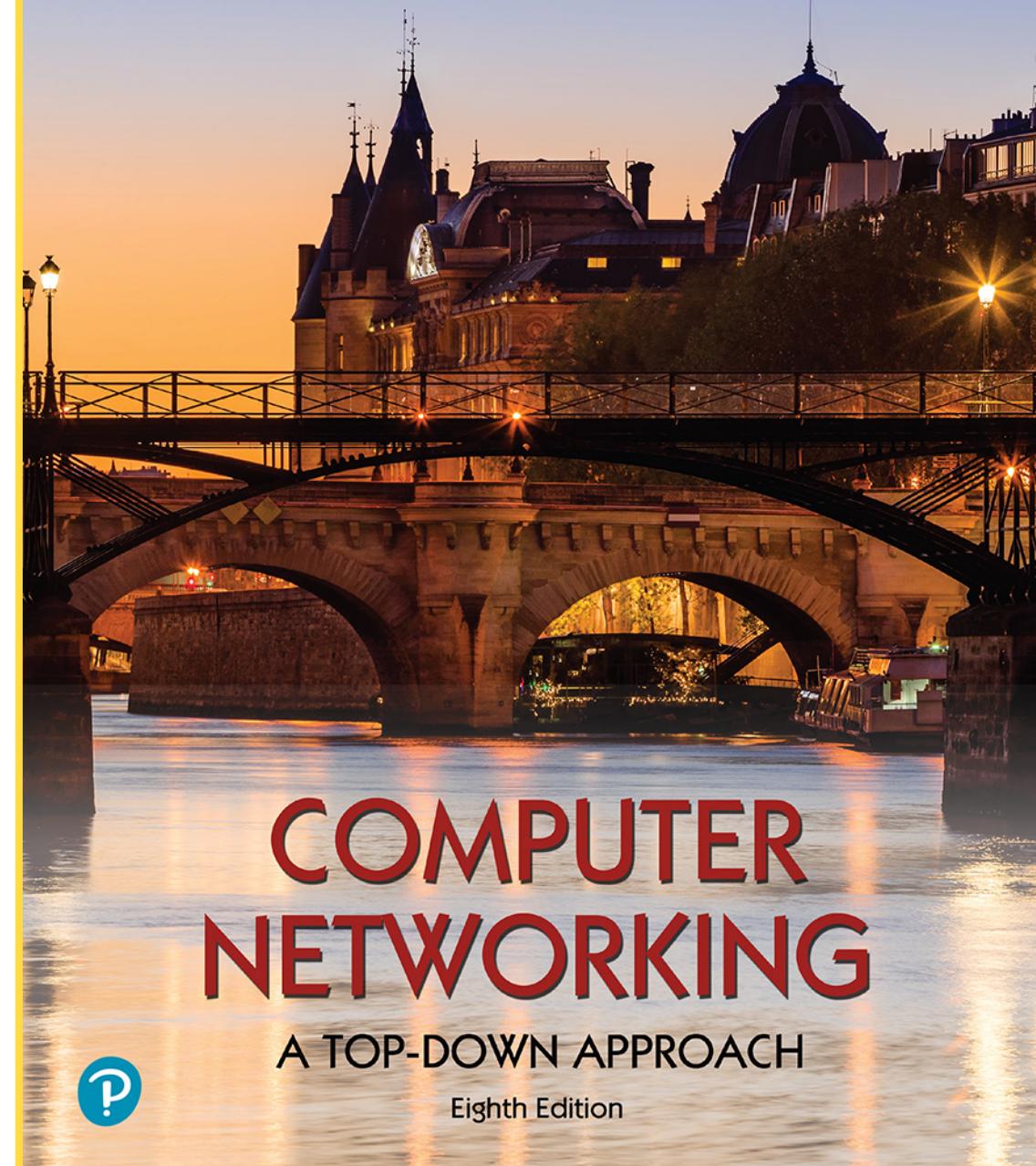
Why Kurose-Ross?

- *Takes a top-down approach*
- *Uses the Internet as the reference network*
- *It is fun to read!*

How to get hold of the 8th edition?

- *ICON Direct or Pearson (e-books)*
- *Engineering library (print copy)*
- *Older editions w/ assumed responsibility*

James F. Kurose | Keith W. Ross



Computer networks are complex

Today's Internet is arguably the largest engineered systems ever created by humans!

- *Billions of devices, routers, links, and organizations*
- *Constantly evolving and rapidly growing*



But it is possible to learn about it, master it, and even have fun!

Architectural **principles**

Operational **practices**

Networking **protocols**

Course Structure

Overview	2 weeks	The Internet; Network edge/core & packet switching; Network protocols
Applications layer	2.5 weeks	Principles; Web and HTTP; Email; P2P applications; Socket programming
Transport layer	2 weeks	Data transfer service; UDP; TCP; Congestion control
Network layer	2 weeks	Routing and forwarding; IP; Routing algorithms; OSPF and BGP
Link layer	2 weeks	MAC protocols; LANs and ethernet; Datacenter networking
Research topics	1.5 weeks	Software Defined Networking; Cloud computing
Tech interviews	2 weeks	1-on-1 with instructor; more details coming up soon

CS3640

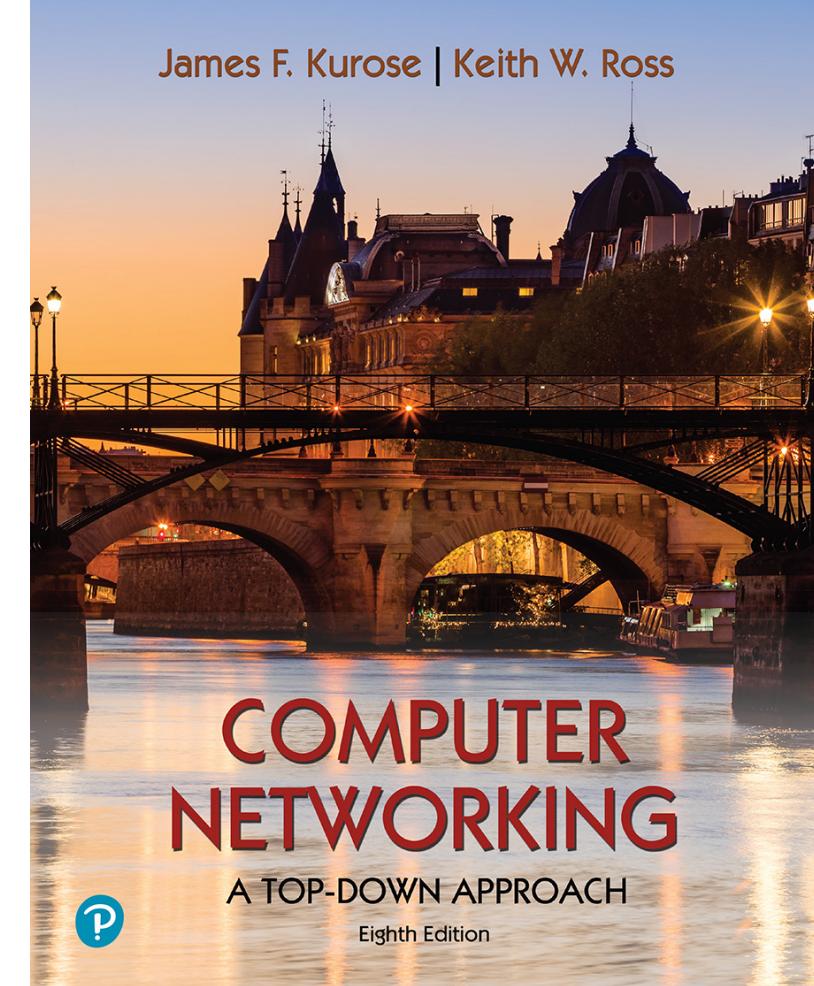
Overview (1): The Internet

Prof. Supreeth Shastri
Computer Science
The University of Iowa

Lecture Goals

Get a big picture overview, and understand key terminologies of computer networks

- *What is the Internet?*
- *What is a protocol?*



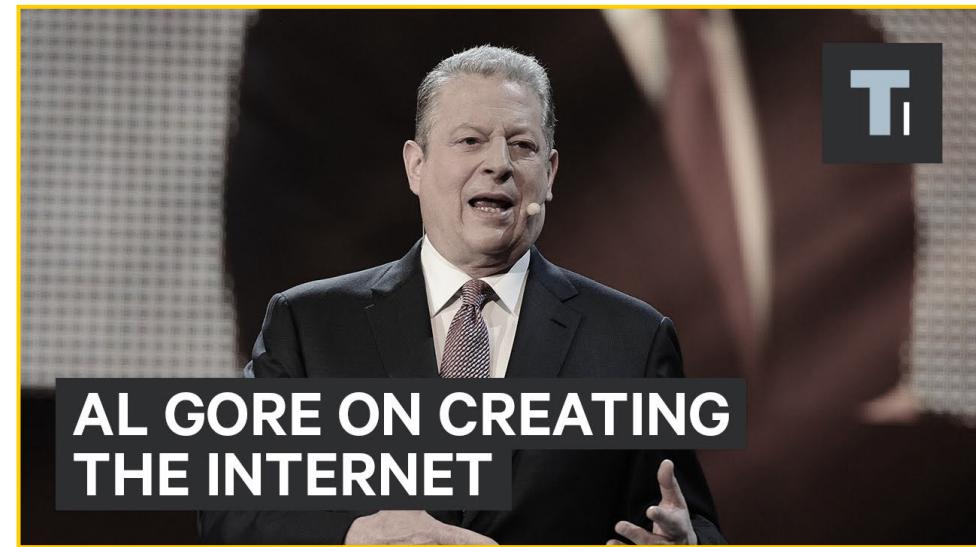
Chapter 1.1

What is the Internet?



What is the Internet?

<https://www.youtube.com/watch?v=ourb9j-dq8Q>



AL GORE ON CREATING
THE INTERNET

https://www.youtube.com/watch?v=pTG_6ypYSS4

We take an engineering view in answering this question

The Internet: a “nuts and bolts” view



Billions of connected computing *devices*:

- *hosts* = end systems
- running *network apps* at edge

Packet switches: forward packets (chunks of data)

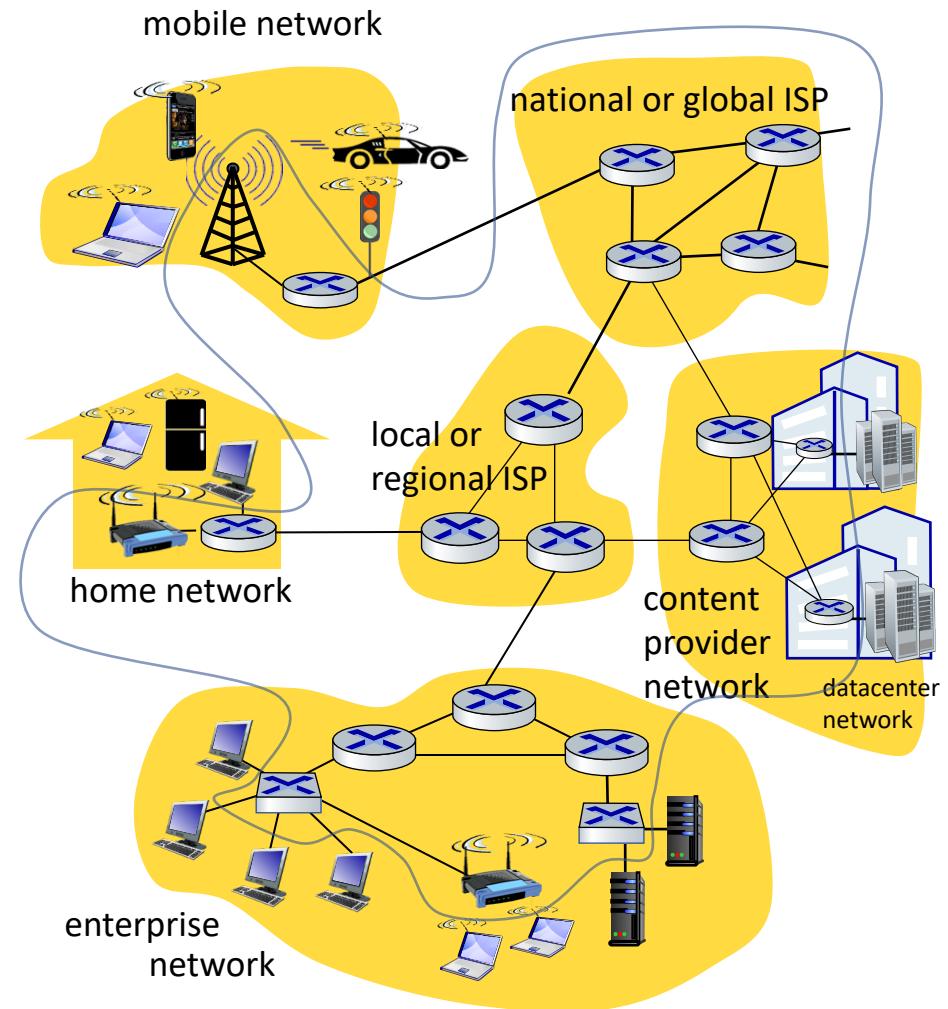
- routers, switches

Communication links

- fiber, copper, radio, satellite
- transmission rate: *bandwidth*

Networks

- collection of devices, routers, links: managed by an organization



The Internet: a “nuts and bolts” view

Internet: “network of networks”

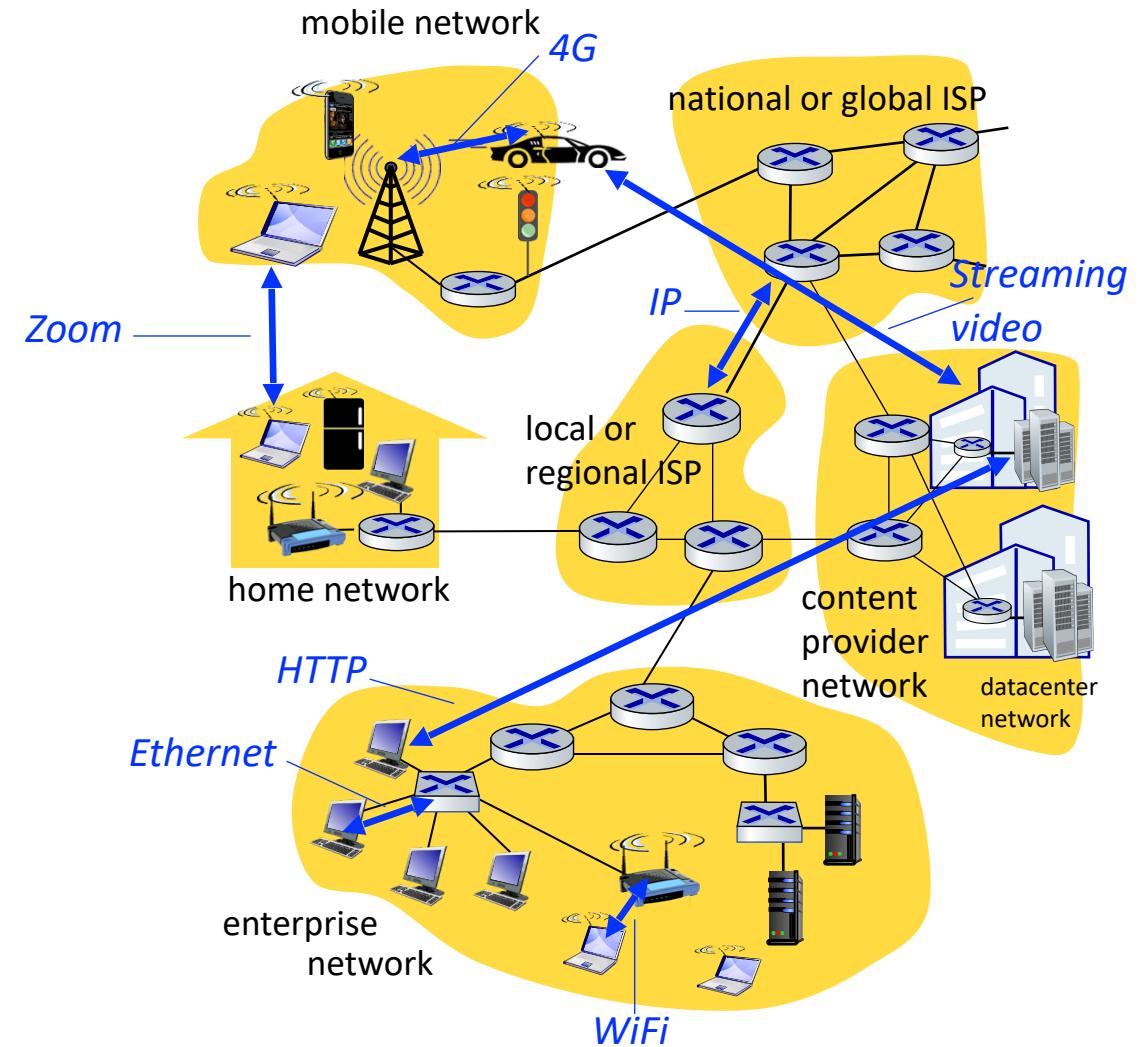
- *Interconnected ISPs*

Protocols governs the behavior

- *control sending, receiving of messages*
- *HTTP, streaming video, Zoom, WiFi, 4G, IP, Ethernet and so on*

Internet standards

- *RFC: Request for Comments*
- *IETF: Internet Engineering Task Force*



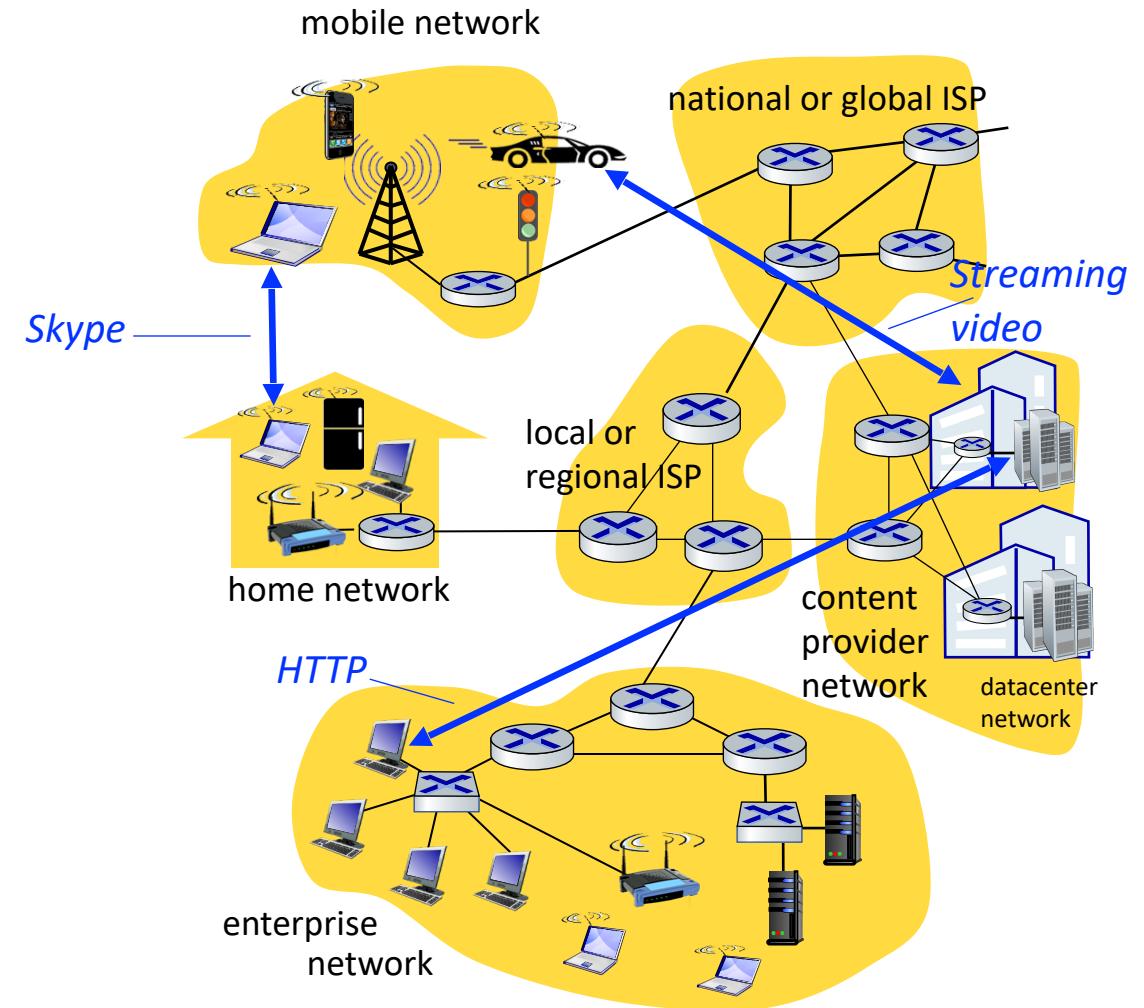
The Internet: a “services” view

Infrastructure that provides services to applications:

- *web pages, streaming video, email, games, teleconferencing, social media, networked appliances, ...*

Programming interface to build distributed applications:

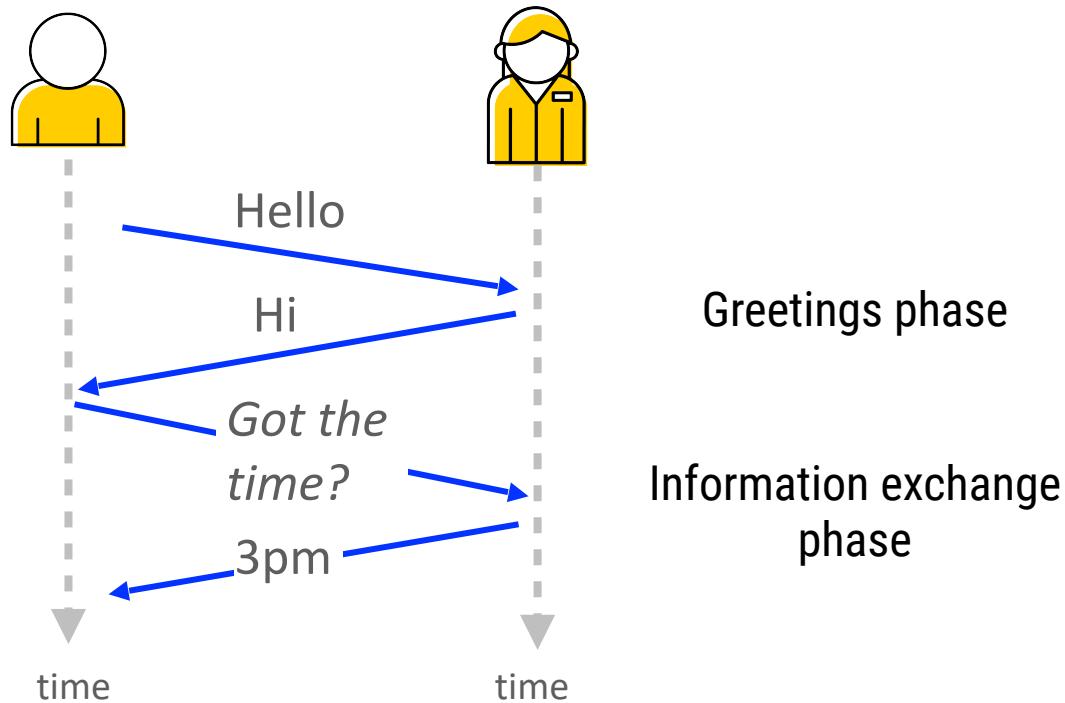
- *“sockets” that allow apps to connect, and use Internet transport service*
- *provides service options, analogous to postal service*



What is a protocol?

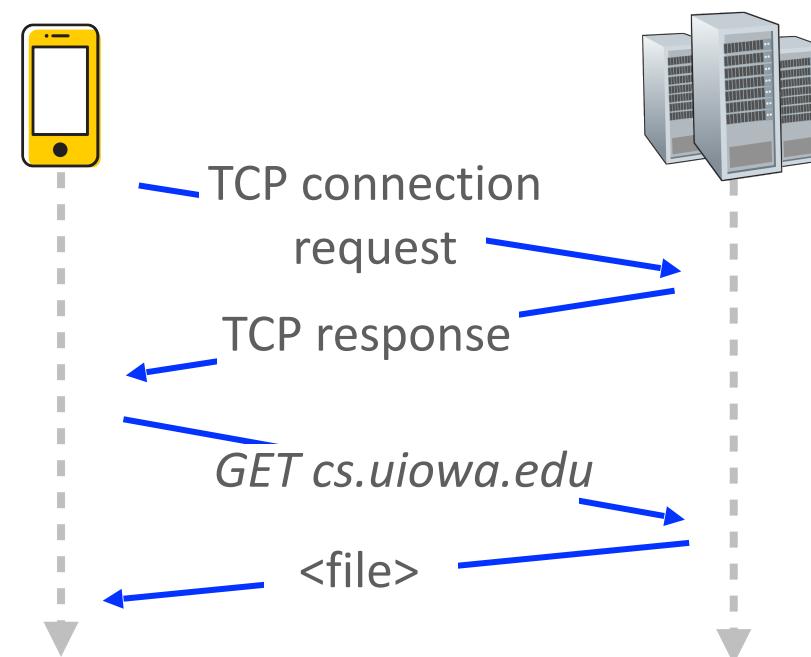
Human protocols

- *introduction to a new person*
- *“what’s the time?”*

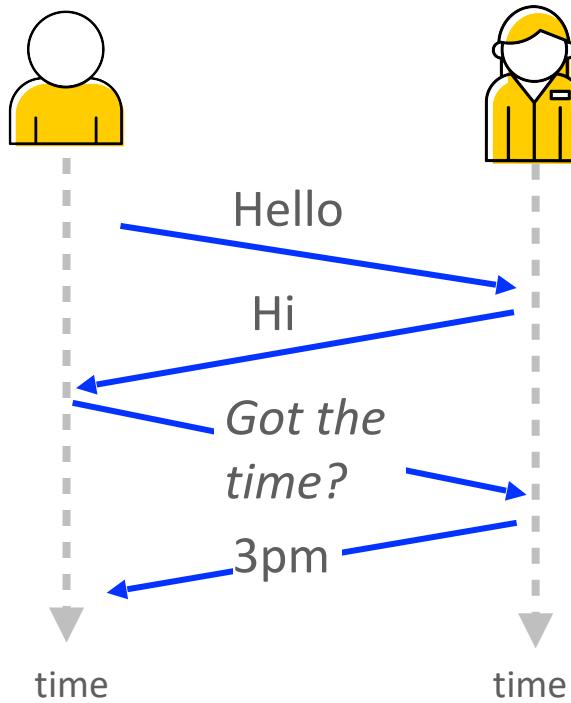


Network protocols

- *computers (devices) rather than humans*
- *govern all communications in network*



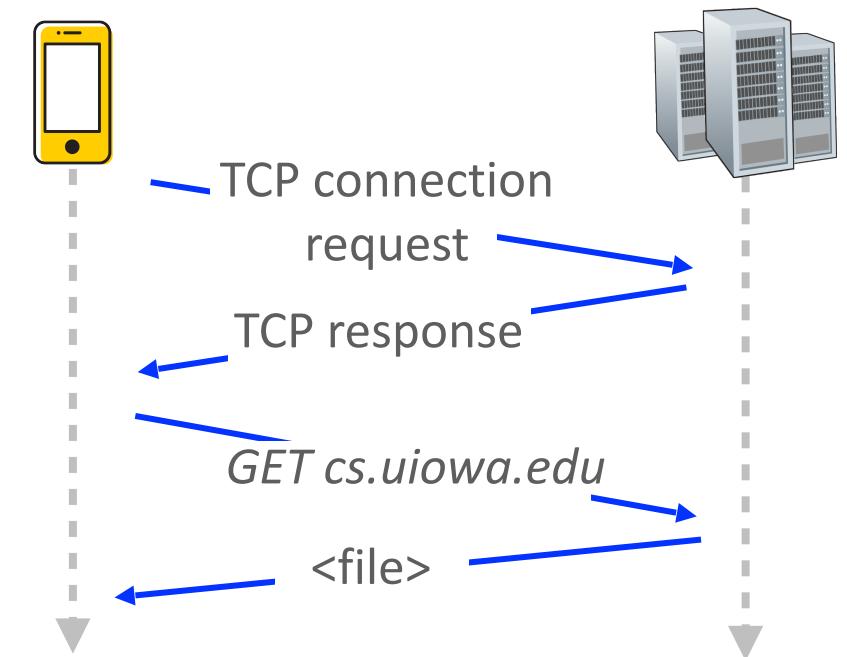
What is a protocol?



No Response | 408 Timeout

Ask someone else | 301 Moved

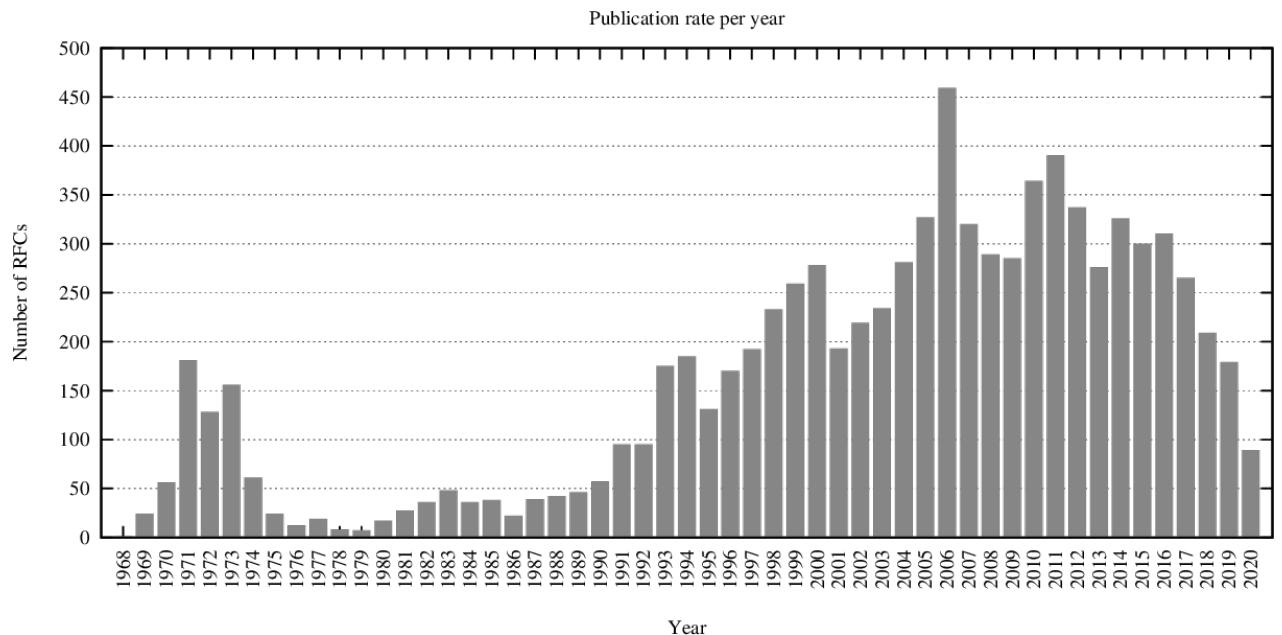
Have no watch | 404 Not found



Network protocols define the **format** and **order** of **messages**
sent and received among network entities, and
the **actions taken** on message transmission and receipt

*How many protocols
govern the Internet?*

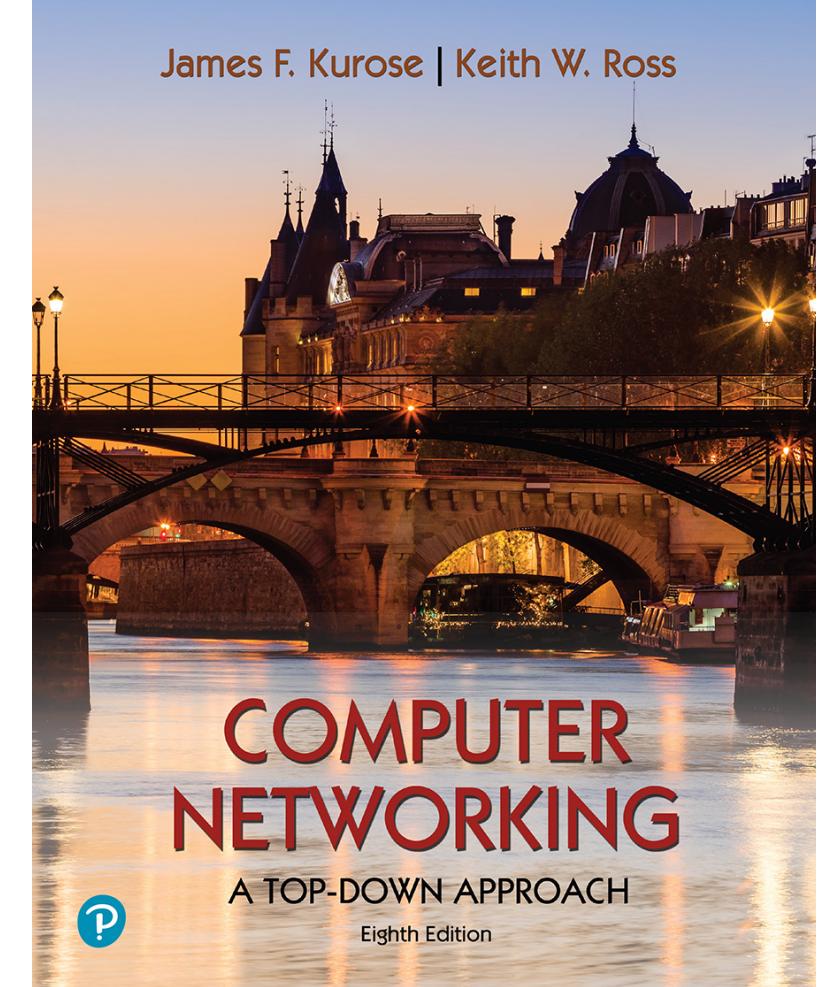
9170
as of Jan 2022



Next Lecture

In-depth look into the structure and functioning of the Internet

- *Network Edge*
- *Network Core*
- *Packet Switching*



Chapter 1.2 - 1.3

Spot Quiz (ICON)