

IOWA

CS3640

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# Introduction to Networks

**Prof. Supreeth Shastri**  
*Computer Science*  
*The University of Iowa*

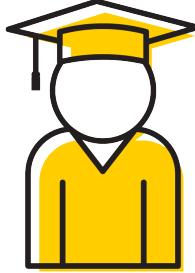
# Am I in the right room/zoom?

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*First course in computer networks*

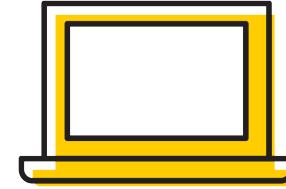
*Technical introduction to networks, their designs, and their applications*



*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  
(Zoom link in ICON)

**Discussions:** <https://ui-cs3640-spring21.slack.com>

# Meet your teaching staff

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More: <https://shastri.info>

## ***Supreeth Shastri (instructor)***

- *Joined UI computer science in fall 2020*
- *Focus areas: systems and networking*
- *Research: CS + law and CS + economics*

*An out and out networking enthusiast!*



# Meet your teaching staff

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## *Adnan Ahmed (TA)*

- *6th year doctoral student*
- *Research area: content delivery networks, web perf*
- *Advisor(s): Zubair Shafiq and Rishab Nithyanand*
- <https://internet.lab.uiowa.edu/people/adnan-ahmed>



*Best way to reach your teaching staff is via Slack*

# Grading

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**Grade allocations**

Type	Number	Weight
Spot quizzes (in class)	20	20%
Writing assignments	5	25%
Programming projects	2	30%
Technical interview	1	30%

**Cumulative grades**

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

# Ground rules and policies<sup>+</sup>

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## *Attendance and absence*

*Attend live sessions regularly;  
participate in spot quiz; watch  
lectures in a timely manner*

*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.*

*You are allowed to turn in partial  
solutions. You will forfeit 10% of the  
earned score for every late day.*



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

# Textbook

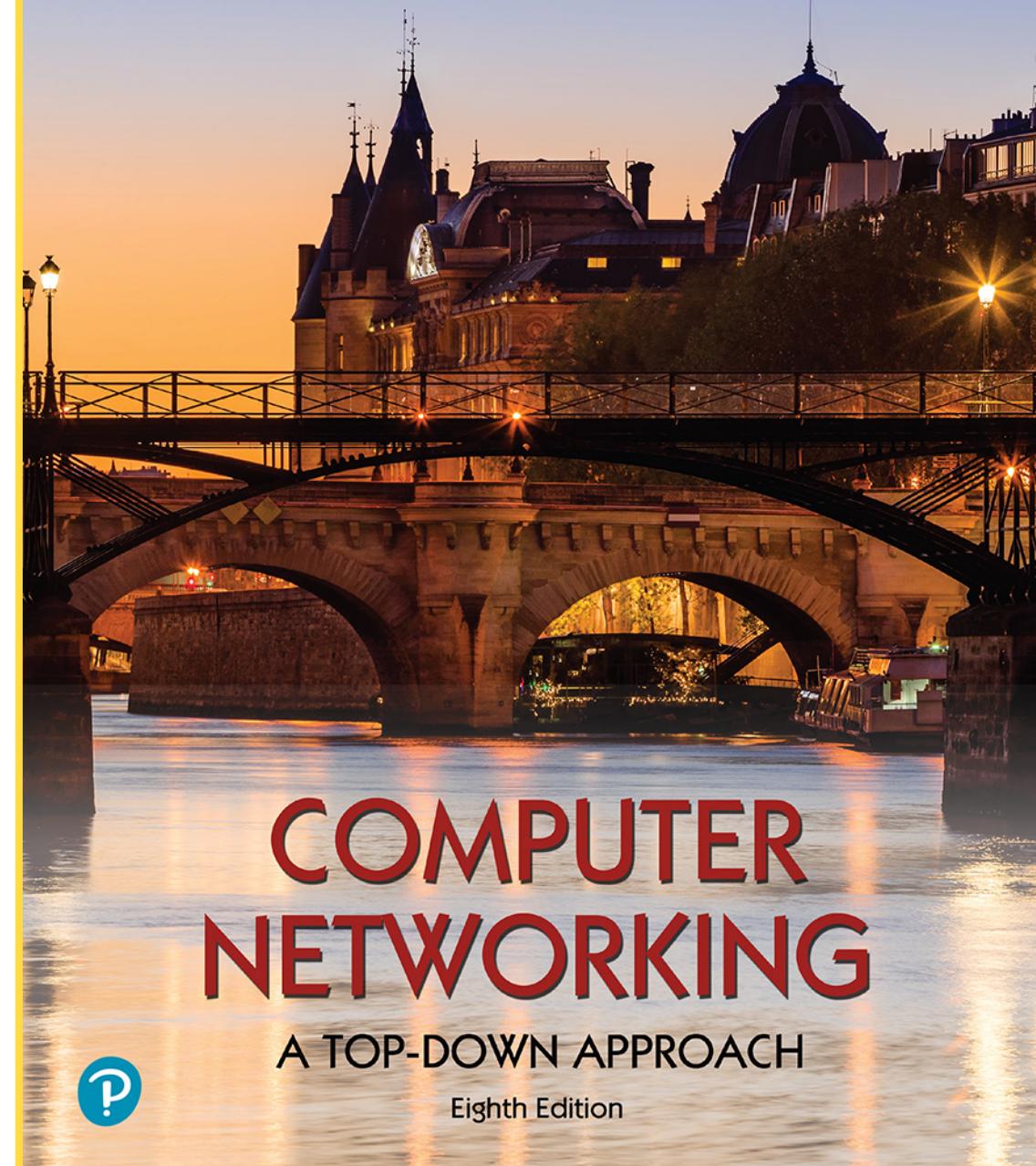
## Why Kurose-Ross?

- *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



# **Zoom Poll**

# Computer networks are complex

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

- *Billions of devices, routers, links, and people*
- *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

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

CS3640

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# Overview (1): The Internet

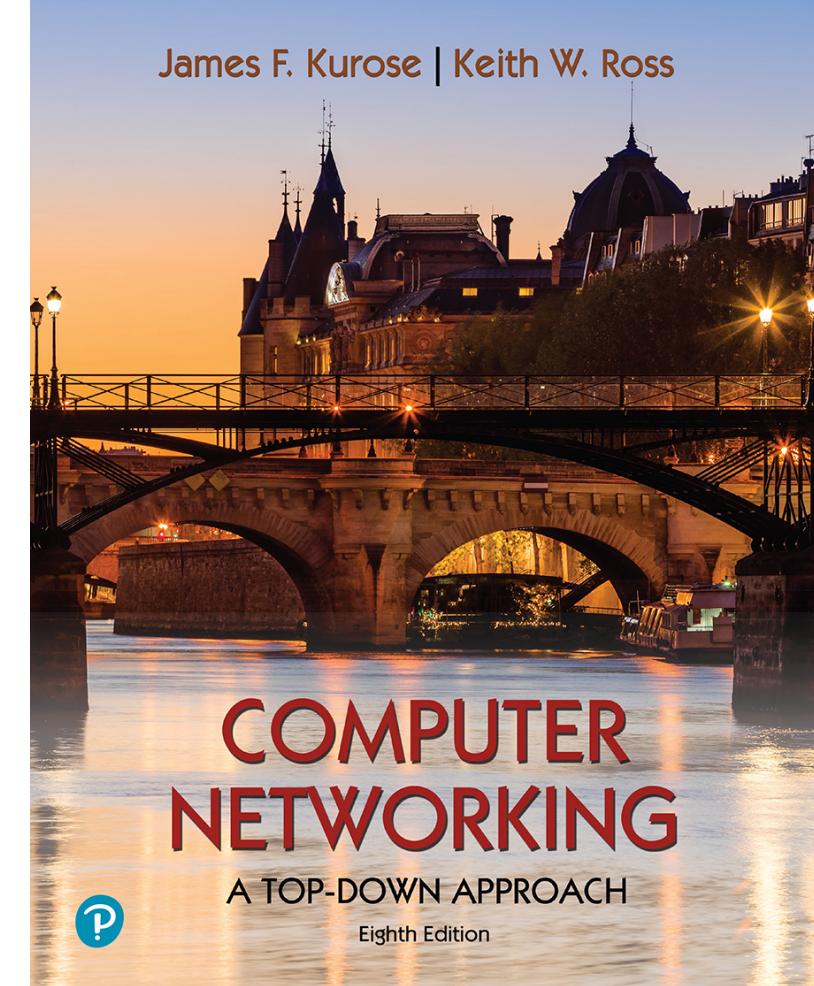
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# Lecture Goals

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

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



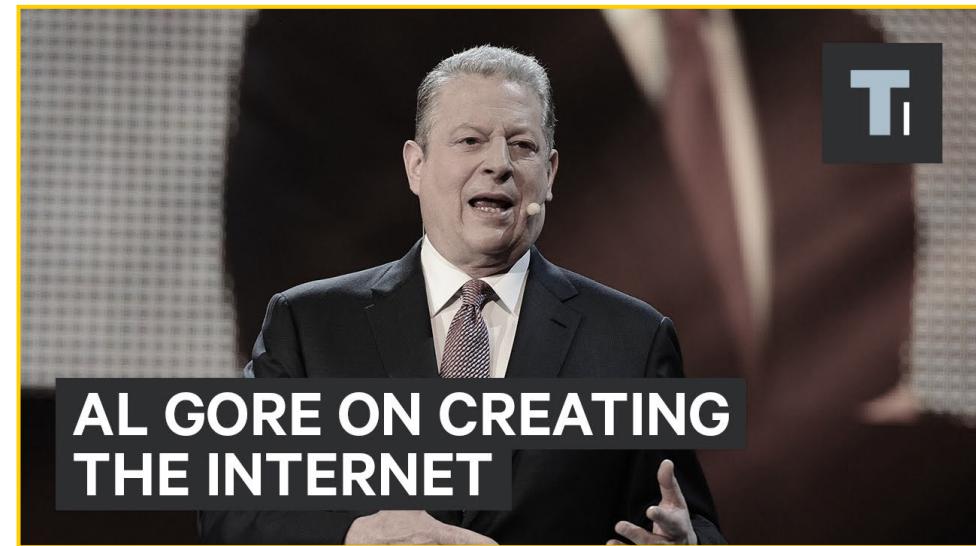
Chapter 1.1

# 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](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)

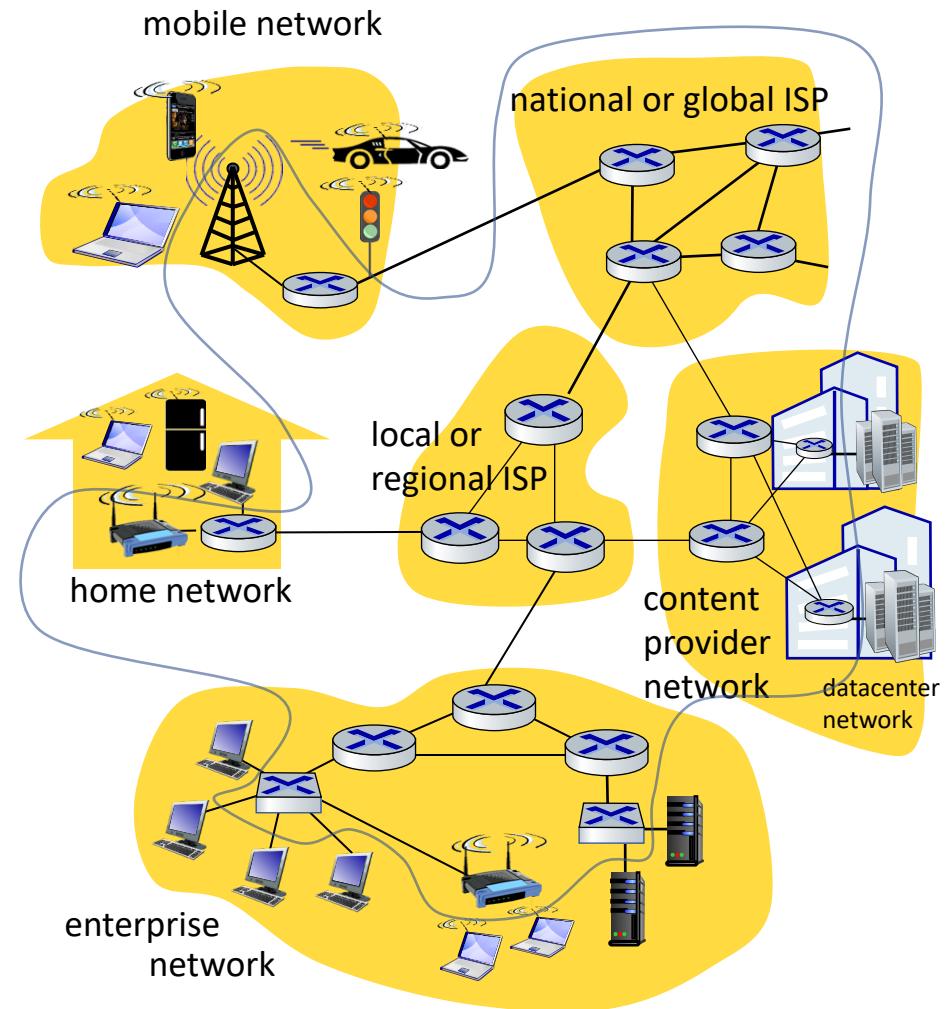
- routers, switches

*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”

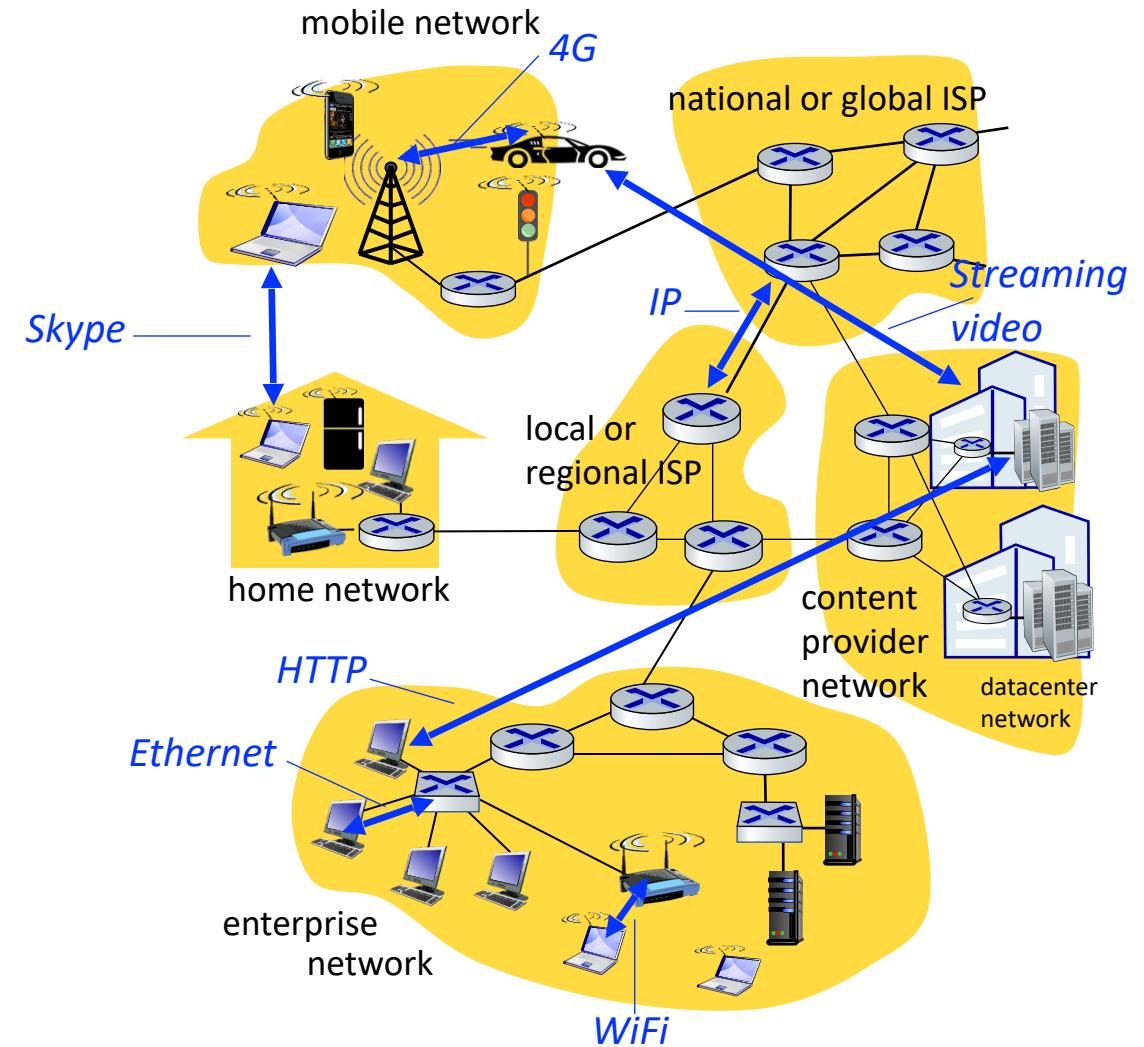
- *Interconnected ISPs*

## Protocols governs the behavior

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

## Internet standards

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



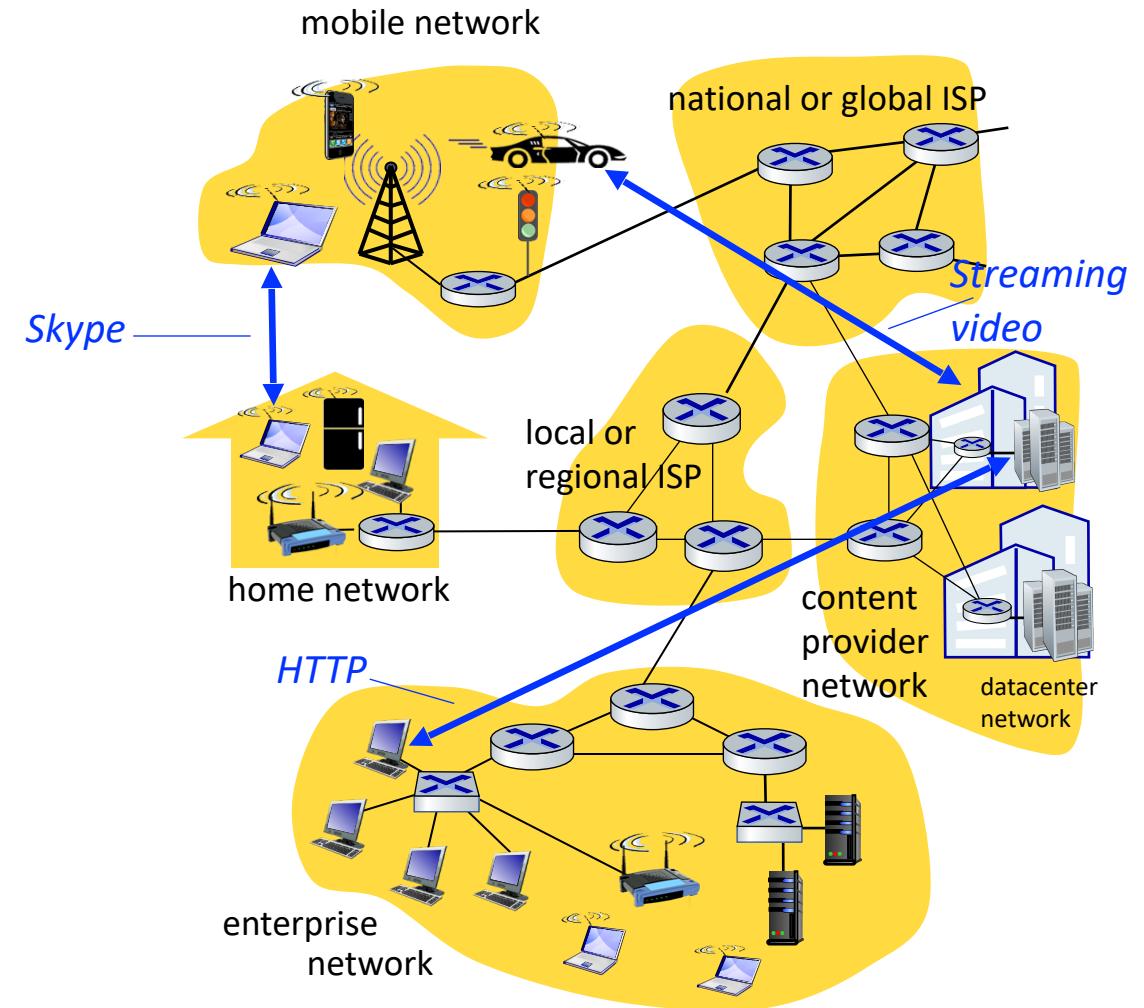
# The Internet: a “services” view

*Infrastructure* that provides services to applications:

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

*Programming interface* to build distributed applications:

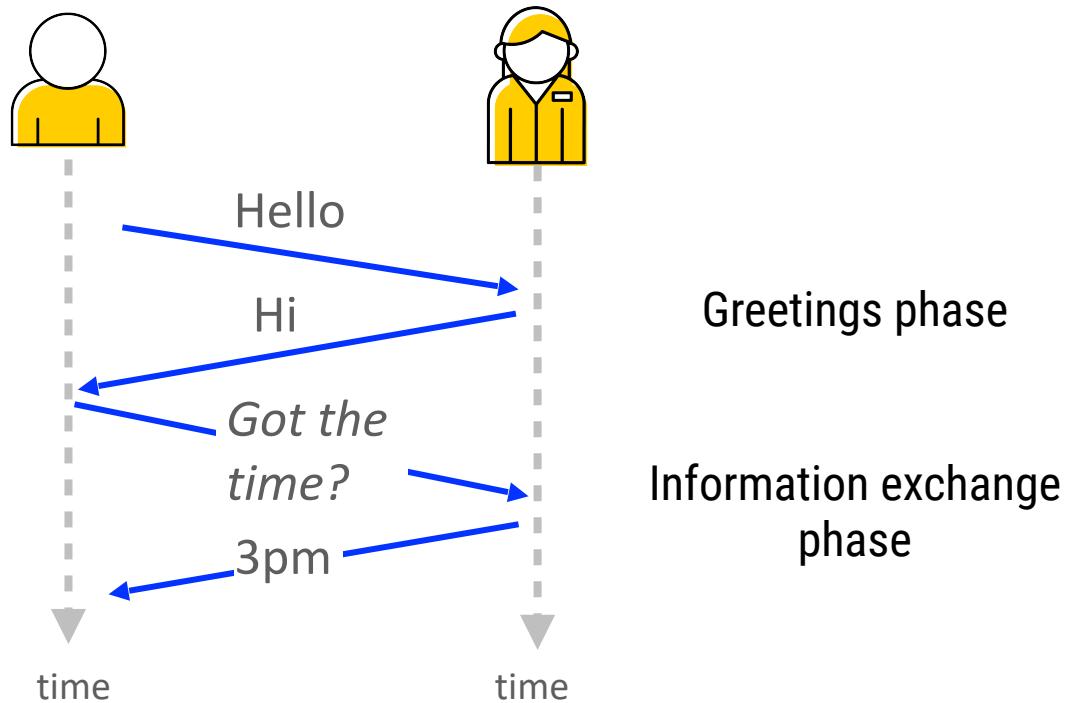
- *“sockets” that allow apps to connect, and use Internet transport service*
- *provides service options, analogous to postal service*



# What is a protocol?

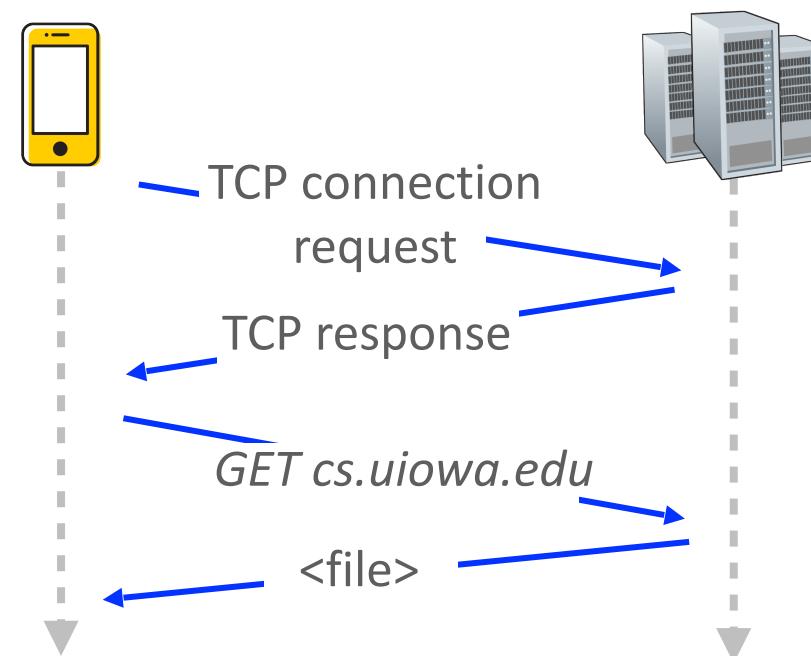
## Human protocols

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

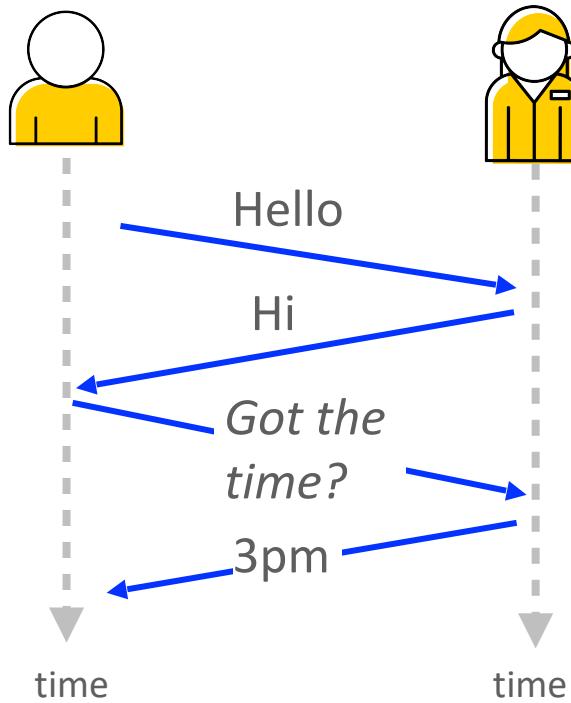


## Network protocols

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



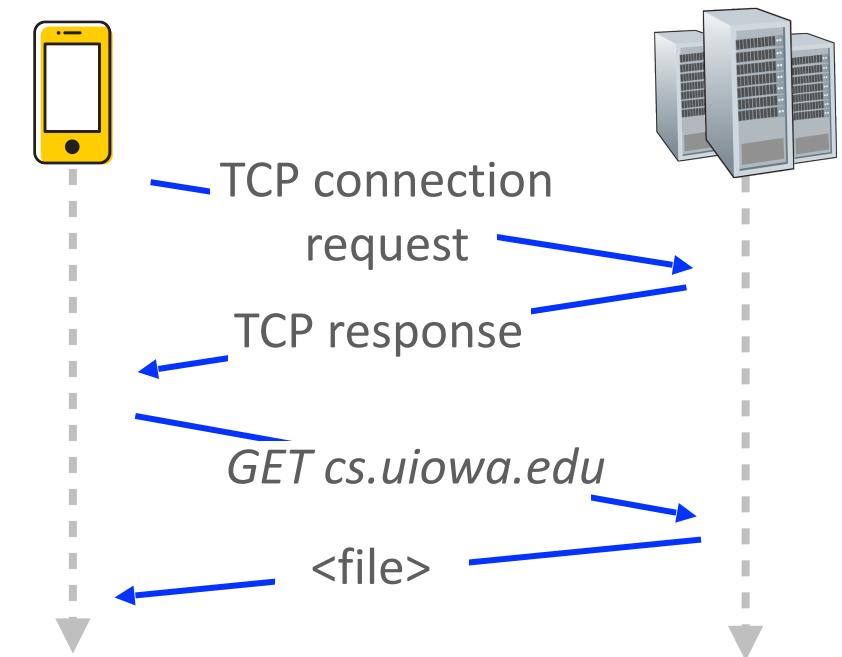
# What is a protocol?



No Response | 408 Timeout

Ask someone else | 301 Moved

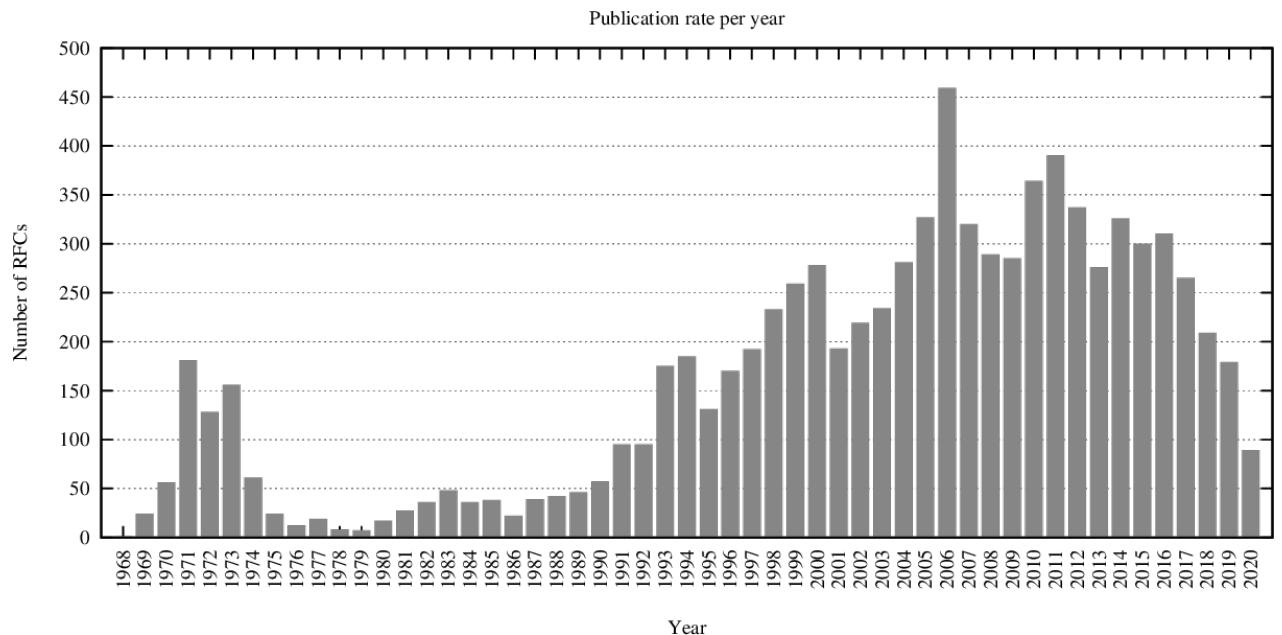
Have no watch | 404 Not found



**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 are  
defined in the Internet?*

**9003**  
*as of Jan 2021*

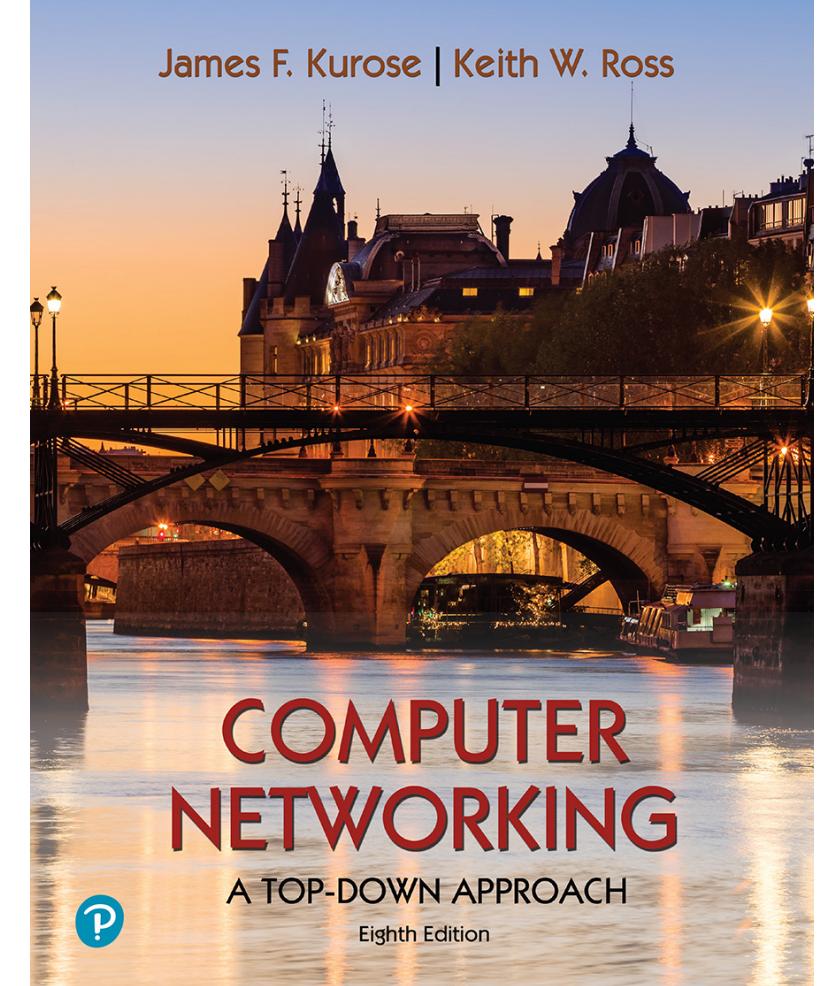


# Next Lecture

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*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)**