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CS3640

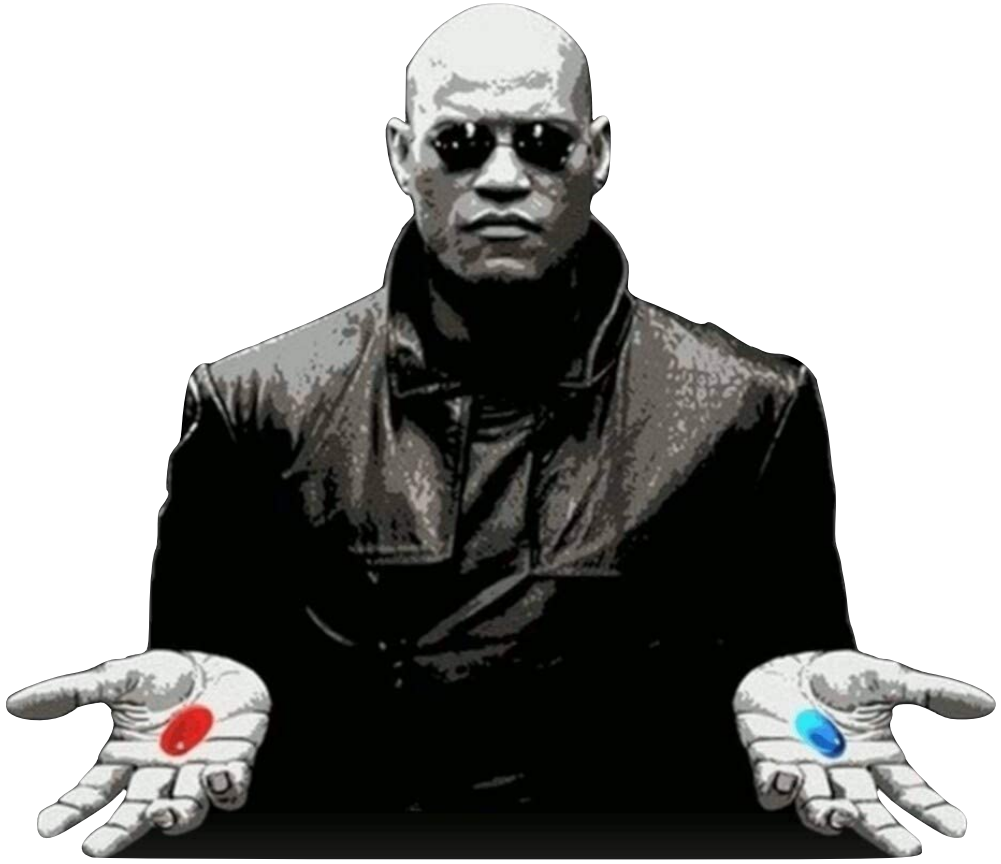
The finals: format and choice

Prof. Supreeth Shastri
Computer Science
The University of Iowa

Based on your feedback, **I'm letting you choose your own path**

❝ Our Professor is a cool guy [...] and having a conversation with him for the interview would be beneficial. I have been looking forward for that interview the entire semester. ❞

❝ While I respect my peers, I believe the only ones truly benefitting from changing the format of the final are those who received the highest grades on the midterm. ❞



Structure of the Tech Interview

1-on-1

conducted by your instructor

20%

your interview determines a fifth of your final grade

May 2 - 6

pick a slot between 9am - noon that works best for you

15 mins

in which you will be asked 4 questions, all carrying equal weights

Q banks

Each question comes from a distinct category (or bank); more in the next slide

Structure of the Written Exam

1 hour

you will answer 4 questions, all carrying equal weights

20%

your interview determines a fifth of your final grade

May 10

10am - noon (official slot); we may have an alternate slot

Question Choice

A mix of easy and challenging questions; a well prepared student should expect to score the same irrespective of the format choice

Question Categories

Category	Example questions and topics	Weight
Networking **Principles**	*Internet's hour-glass model; Middleboxes*	25%
Networking **Protocols**	*A day in the life of a packet*	25%
Networking **Problems**	*Construct Dijkstra's LS table*	25%
Networking **Practice**	*SDN; Cloud computing; Solar superstorms*	25%

Each category has a bank of 3-4 question; for each interviewee, I will generate a sequence of four random numbers that will determine the specific questions picked from each bank.

*There will be an optional **bonus question** carrying 10% extra points (only for the written exam)*

Ground rules and policies (tech interviews)

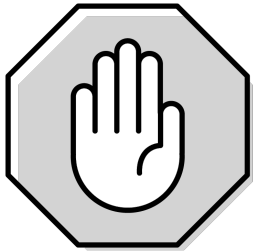
Time management

is completely your responsibility. I will not double guess your strategy (i.e., split time 4-ways, or skip harder ones, etc)

On camera

All interviews will be recorded to ensure academic integrity, and to sort out any grading discrepancies.

Please bring your student ID card.



Accommodations

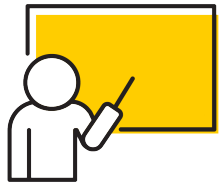
If you need any special accommodations for the interview, please discuss with me at least a week before your slot.

Code of conduct

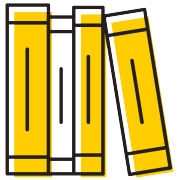
During the interview, you cannot use books, notes, Internet resources, or seek help from others.

After the interview, you should not share interview details with anyone.

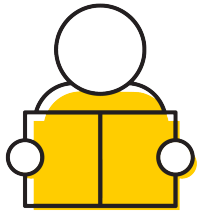
How to Prepare



*Revisit the **lectures and slides**:*
https://shastri.info/teaching/cs3640



*Read the **textbook**:*
Kurose-Ross chapters 4-6;
Research topics



*Practice the **material**:*
assignments, quizzes;
textbook exercises (optional)

Keep a pen and paper handy to work out numerical problems and as aids to visualization

What would I advice?

A well prepared student should expect to score the same irrespective of the format choice

> “In theory, theory and practice are the same.
> In practice, they are not.” — Albert Einstein

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Link Layer (3): A Day in The Life of a Packet

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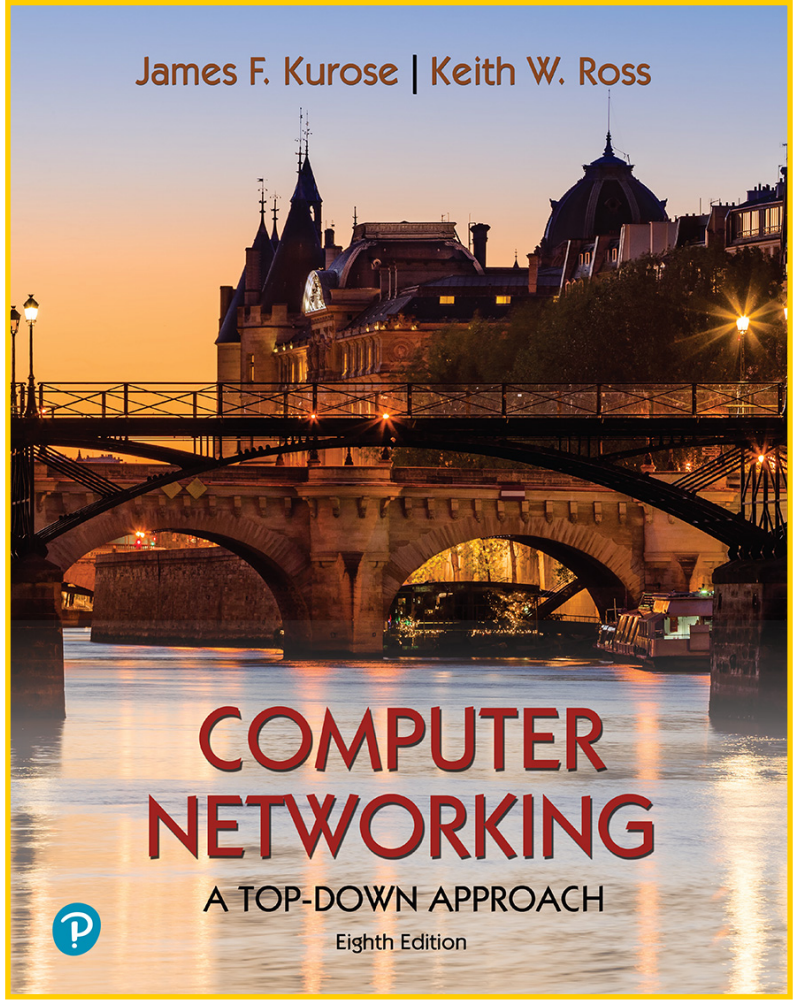
Lecture Goals

***Retrospective**: a day in the life of a web page request*

- *touches all five layers of the stack*
- *utilizes more than a dozen protocols*
- *end-to-end flow of control and data*



Chapter 6.7

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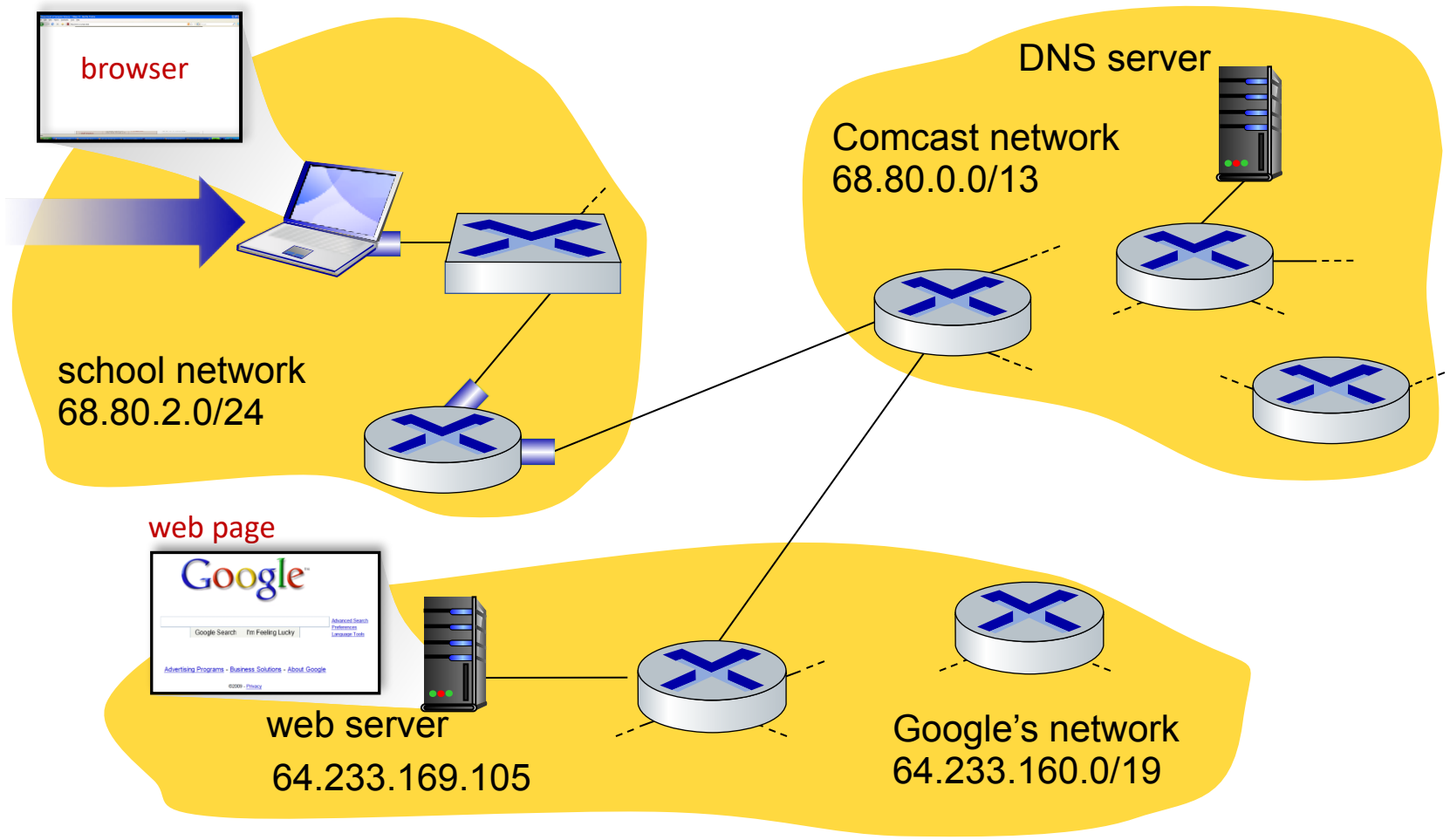
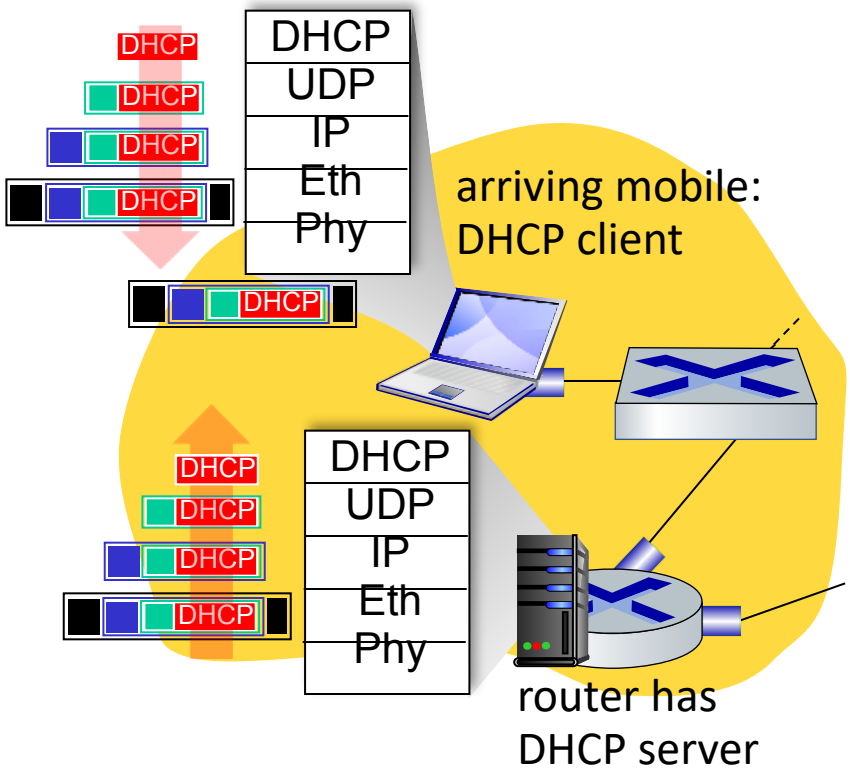
A day in the life: scenario



- *arriving mobile client attaches to network*
- *requests web page: www.google.com*

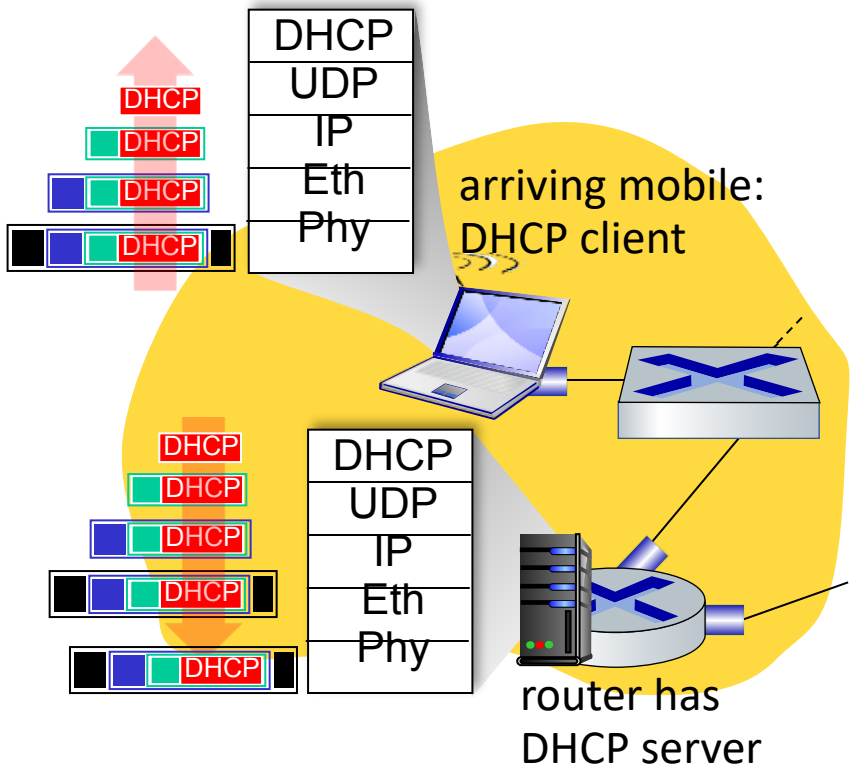
Sounds simple !

A day in the life: connecting to the Internet



- *connecting laptop needs to get its own IP address, address of first-hop router, address of DNS server: use DHCP*
- *DHCP request encapsulated in UDP, encapsulated in IP, encapsulated in 802.3 Ethernet*
- *Ethernet frame broadcast (dest: FF:FF:FF:FF:FF:FF) on LAN, received at the router running DHCP server*
- *Ethernet demuxed to IP demuxed to UDP demuxed to DHCP*

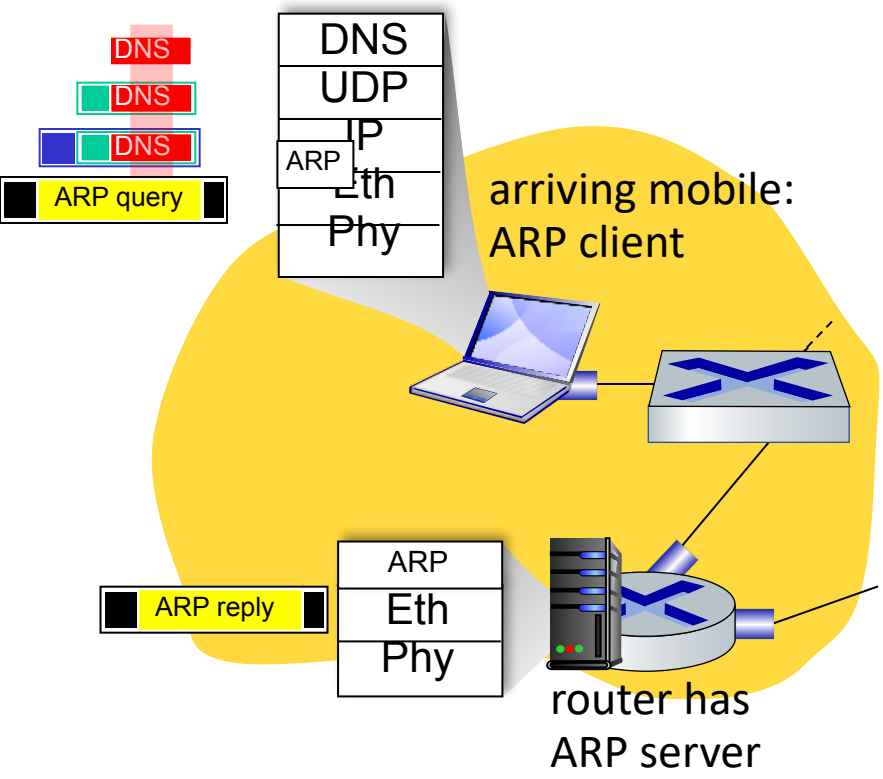
A day in the life: connecting to the Internet



- *DHCP server formulates DHCP ACK containing client's IP address, IP address of first-hop router, name and IP address of DNS server*
- *encapsulation at DHCP server, frame forwarded through LAN, demultiplexing at client*
- *DHCP client receives DHCP ACK reply*

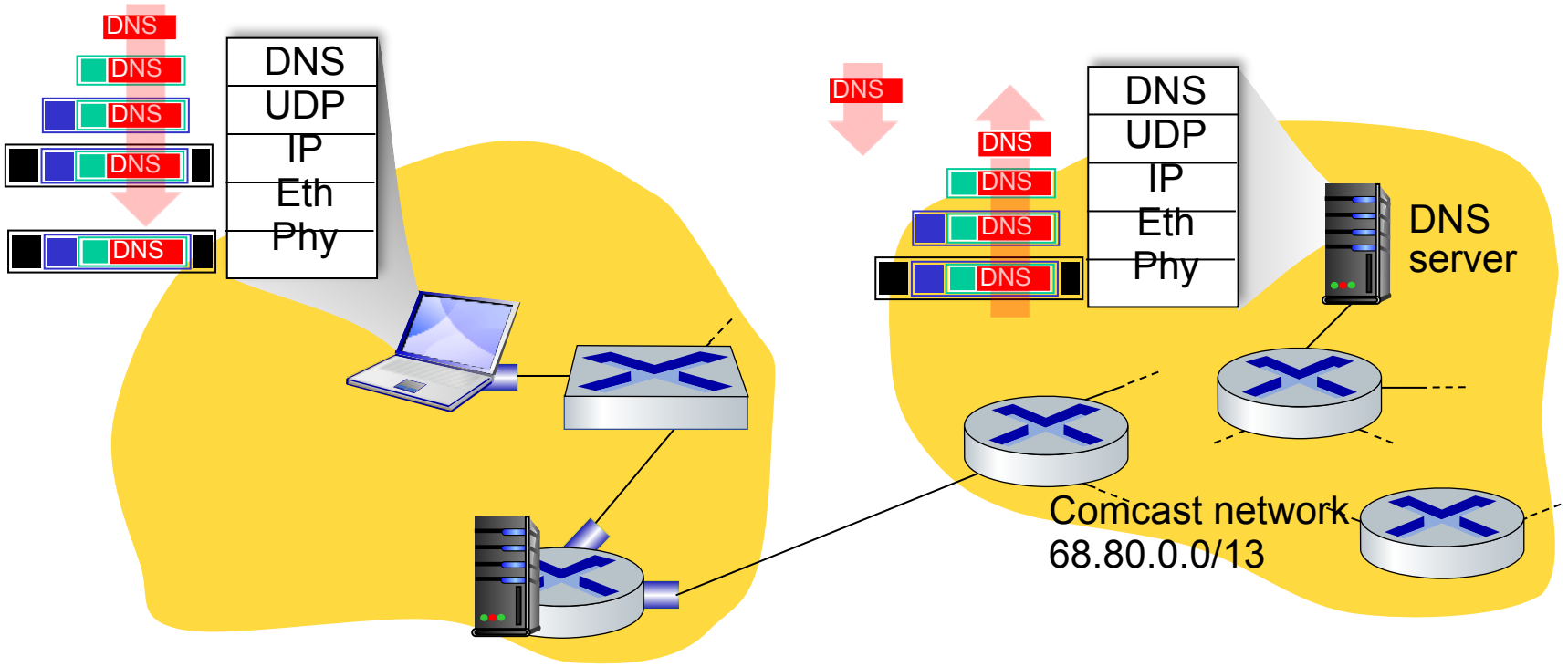
Client now has IP address, knows name and address of ***DNS server*** *and IP address of its* ***first-hop router***

A day in the life: ARP (before DNS, before HTTP)



- *before sending HTTP request, need IP address of www.google.com: use DNS*
- *DNS query created, encapsulated in UDP, encapsulated in IP, encapsulated in Ethernet. However, to send frame to router, need MAC address of router interface: use ARP*
- *ARP query broadcast, received by router, which replies with ARP reply giving MAC address of router interface*
- *client now knows MAC address of first hop router, so can now send frame containing DNS query*

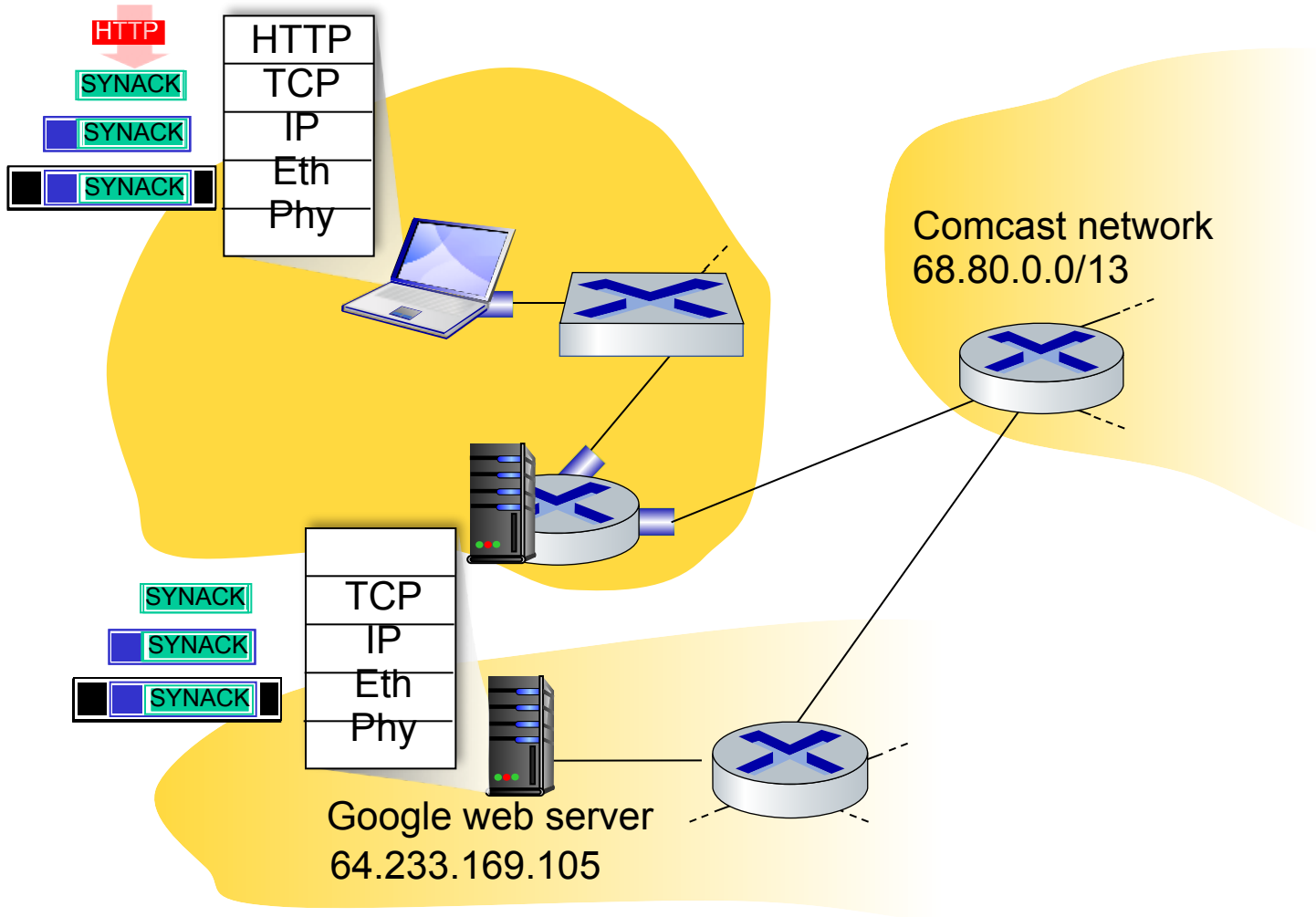
A day in the life: using DNS



- *demuxed to DNS*
- *DNS replies to client with IP address of www.google.com*

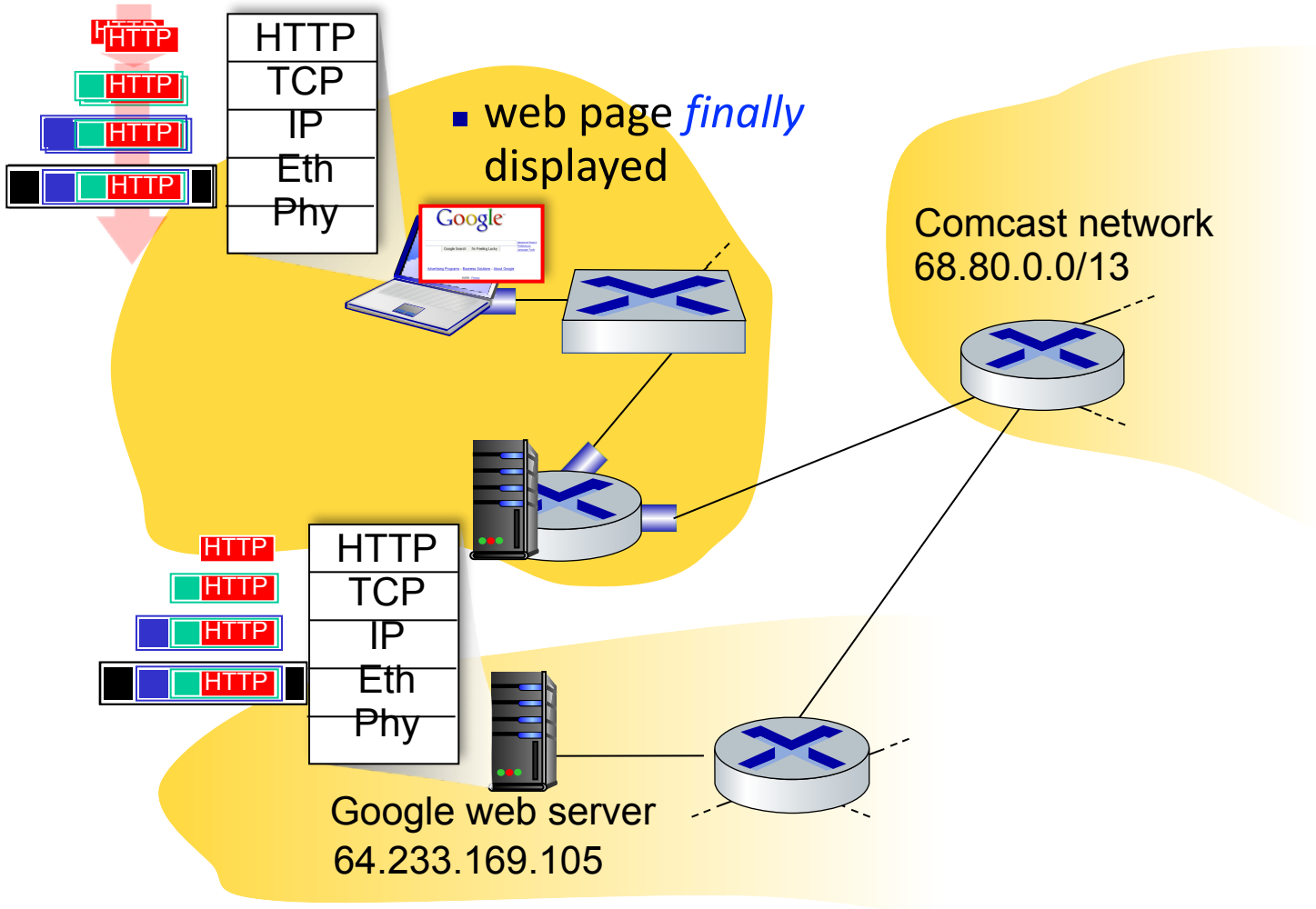
- *IP datagram containing DNS query forwarded via LAN switch from client to first-hop router*
- *IP datagram forwarded from campus network into Comcast network, routed (tables created by RIP, OSPF, and/or BGP routing protocols) to DNS server*

A day in the life: TCP connection carrying HTTP



- *To send HTTP request, client first opens TCP socket to web server*
- *TCP SYN segment (step 1 in TCP 3-way handshake) inter-domain routed to web server*
- *web server responds with TCP SYNACK (step 2 in TCP 3-way handshake)*
- *TCP connection established!*

A day in the life: HTTP request/reply

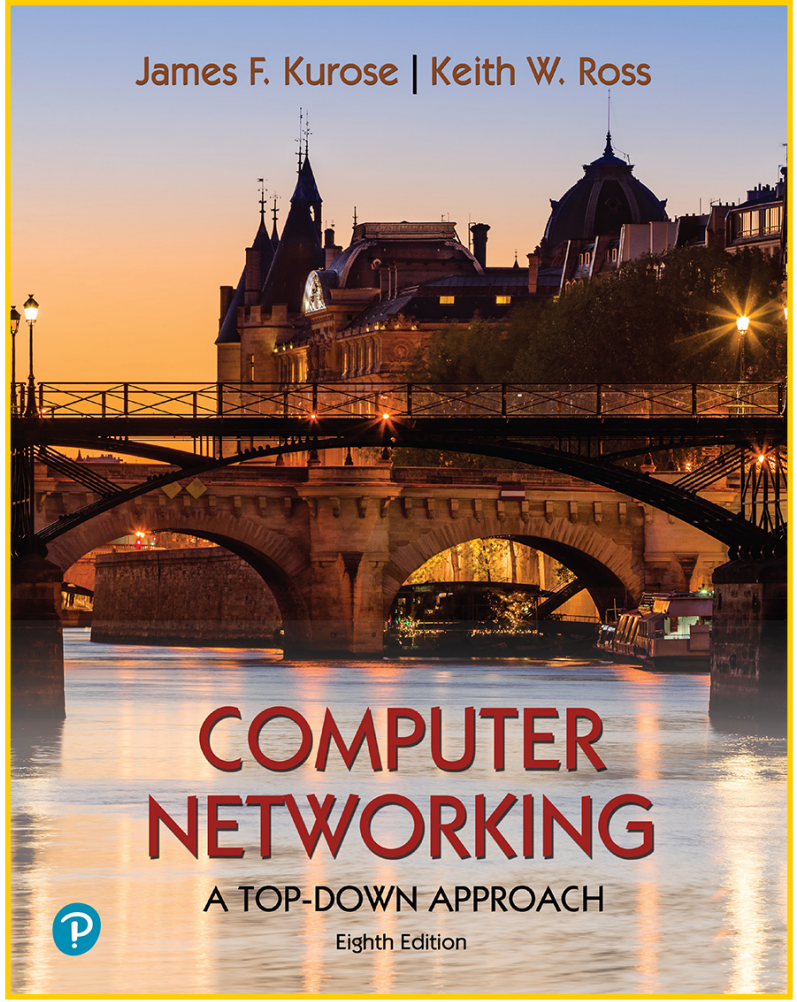


- *HTTP request sent into TCP socket*
- *IP datagram containing HTTP request routed to www.google.com*
- *web server responds with HTTP reply (containing web page)*
- *IP datagram containing HTTP reply routed back to client*

Next two lectures

Research topics to expand our horizon and get a taste of the state-of-the-art in networking

- *Software-Defined Networking*
- *Solar Superstorms and the Internet*



Chapters 4.4, 5.5

These two lectures are asynchronous (**no in-person classes**)

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Spot Quiz (ICON)