CS422 Final Review

Grading Policy

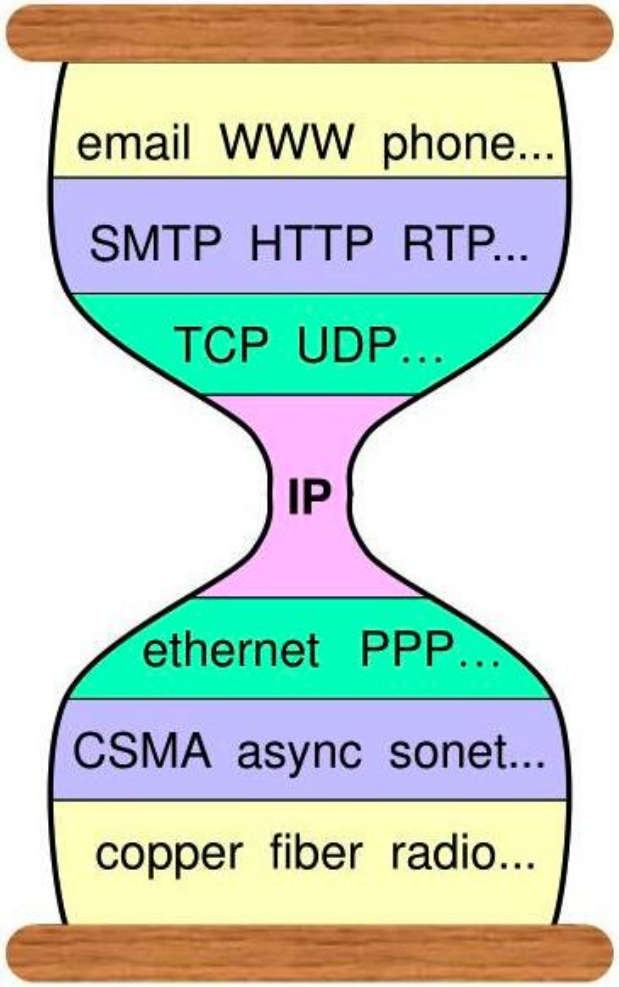
- Grade breakdown
  - Homework: 20%
  - Labs: 32%
  - Exam: 48%
    - Midterm 1: 12%
    - Midterm 2: 12%
    - Final: 24%
- Check your grades at Brightspace
- Final grades will be curved …

Final: 19:00PM – 21:00PM, May 7 (Wed)

- **@WTHR 172**
- **Bring your PUID**
- Closed-book, closed-note …
- No make-up exam
  - Exception only for emergency (with written document), according to University policy;
- Contact me ASAP if any question
- Extra Office Hours: 12:00PM – 13:00PM, May 6 Tue
  - DSAI 2142E or over Teams (link at cs422 homepage)

Internet protocol stack

application
transport
network
link
physical



Applications

… built on ...

Reliable (or unreliable) transport

… built on ...

Best-effort global packet delivery

… built on ...

Best-effort local packet delivery

… built on ...

Physical transfer of bits

Source: Scott Shenker (UC Berkeley): slide 7 at The Future of Networking, and the Past of Protocols
https://www.youtube.com/watch?v=YHeyuD89n1Y&t=111s

One-page highlights

- Knowing **how** and **why** for each technique component
  - E.g., why four algorithms in TCP congestion control (slow start, congestion avoidance, fast retx/recovery, reset)?
  - E.g., why are there so many multiple access protocols? Which multiple access protocol fits in the targeted scenario?
  - E.g., Why is MAC address flat while IP address not?
- Knowing **how** different layers/protocols **work together**
  - The relationship between higher and lower layers
  - The order of different protocols
  - Example: synthesis

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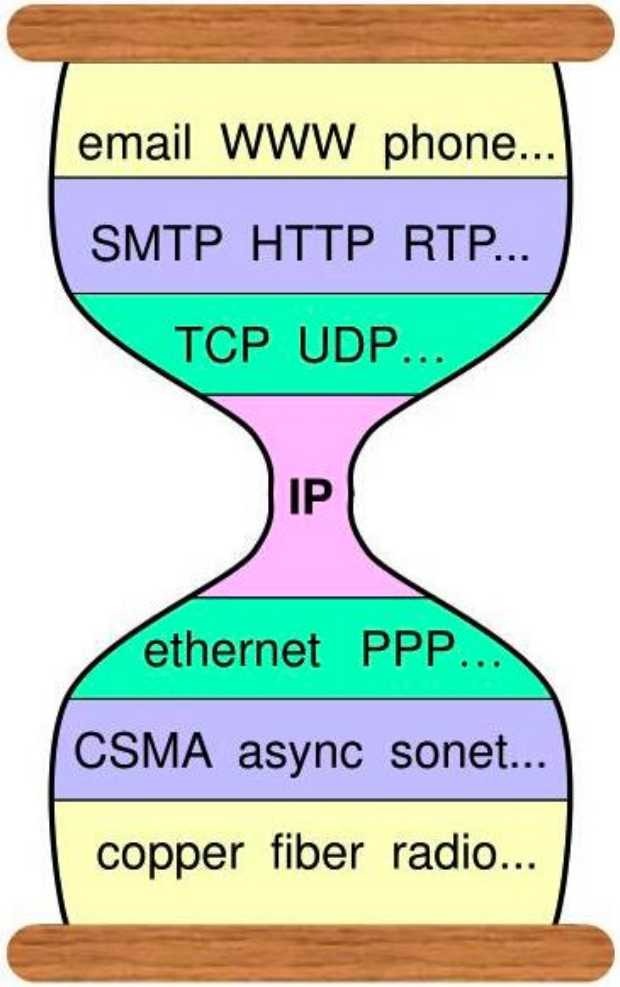
A Vertical View & Beyond

application
transport
network
link
physical



Recall our synthesis example:

- **Protocols/layers**
- **Nodes**
  - @Hosts
  - @ routers
  - @ switches
  - @ DNS server,
  - @...

e.g., what happens @source host? In which order? How do they interact with other network equipment (following a protocol or function)?

Another Synthesis Example

- Suppose you walk into LWSN, power on your laptop, connect to PAL3.0 (WiFi), open Youtube to watch a TED talk.
  - What are all the protocol steps that take place in turn? Please introduce each step and protocols used as much as you can.

    CSMA/CA first or DHCP first? (CSMA/CA, why?)

    DNS earlier or TCP earlier? (DNS, why?)
  - Please explicitly indicate in your steps how you obtain the IP and MAC address of a gateway router.

    Which address (IP address or MAC address) does your laptop know first? (IP address, why?)

Synthesis Example (More)

Refer to the lecture (at end of chapter 6)

@ Hosts

- DHCP
  - why? a valid IP first, regardless of applications
- The rest is invoked by the application
  - Dependence → other protocols
    - e.g., WEB (URL) → DNS → UDP → IP → MAC address in Ethernet (or 802.11) → ARP
    - e.g., HTTP → TCP → the first TCP segment (three-way handshaking)
    - e.g., L2 delivery via WiFi → CSMA/CA

@Routers (switches) [a network: a **distributed** system]

- Routing protocols (inter-AS, intra-AS) performed
- Self-learning performed

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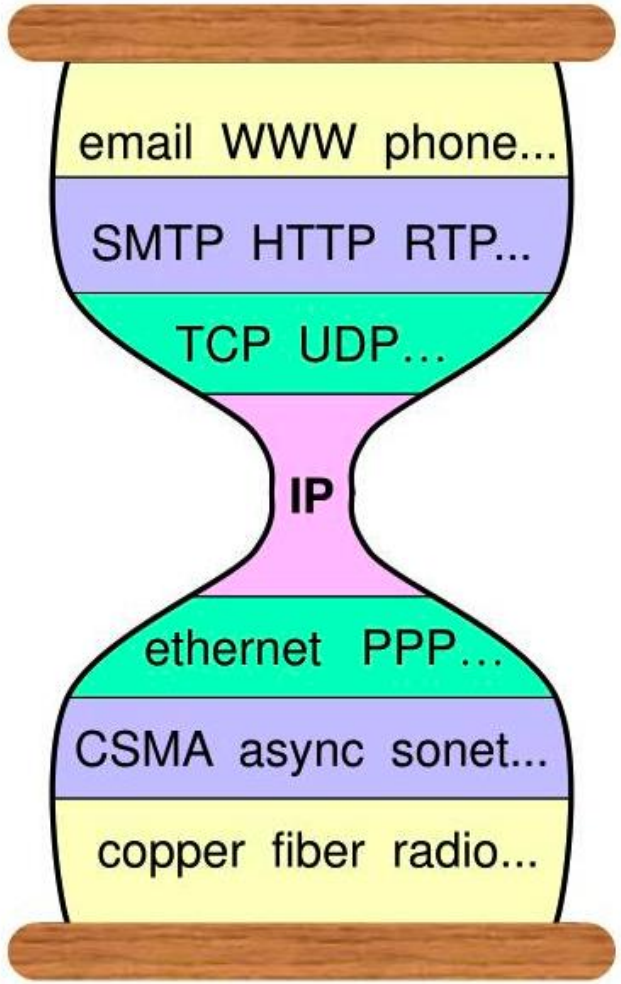
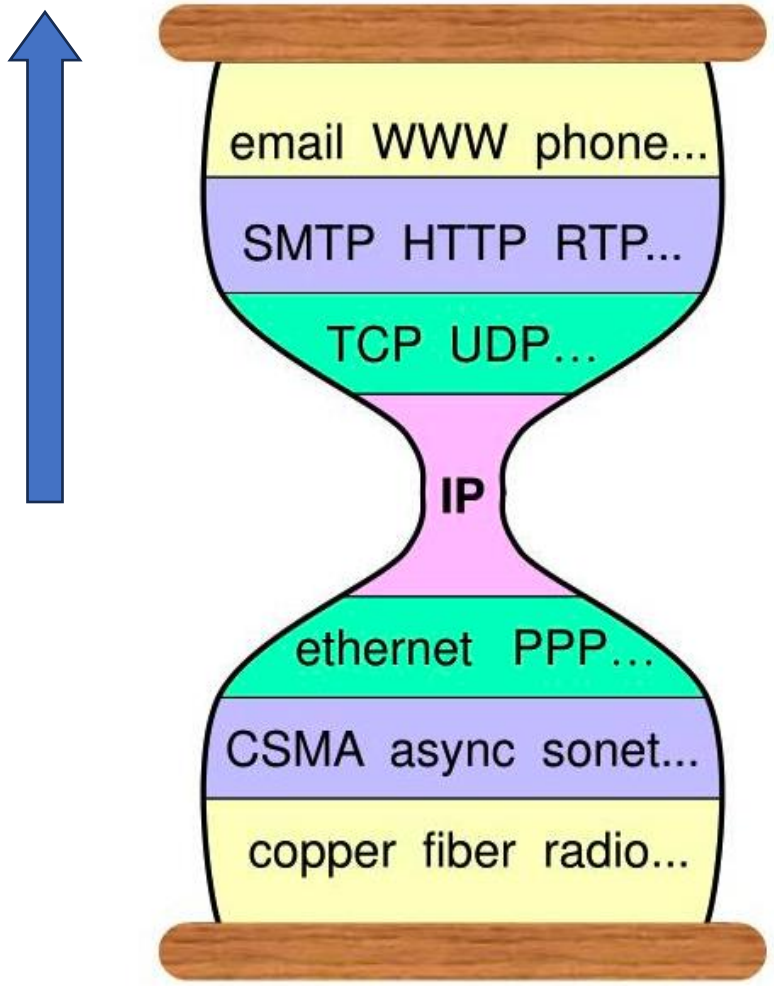
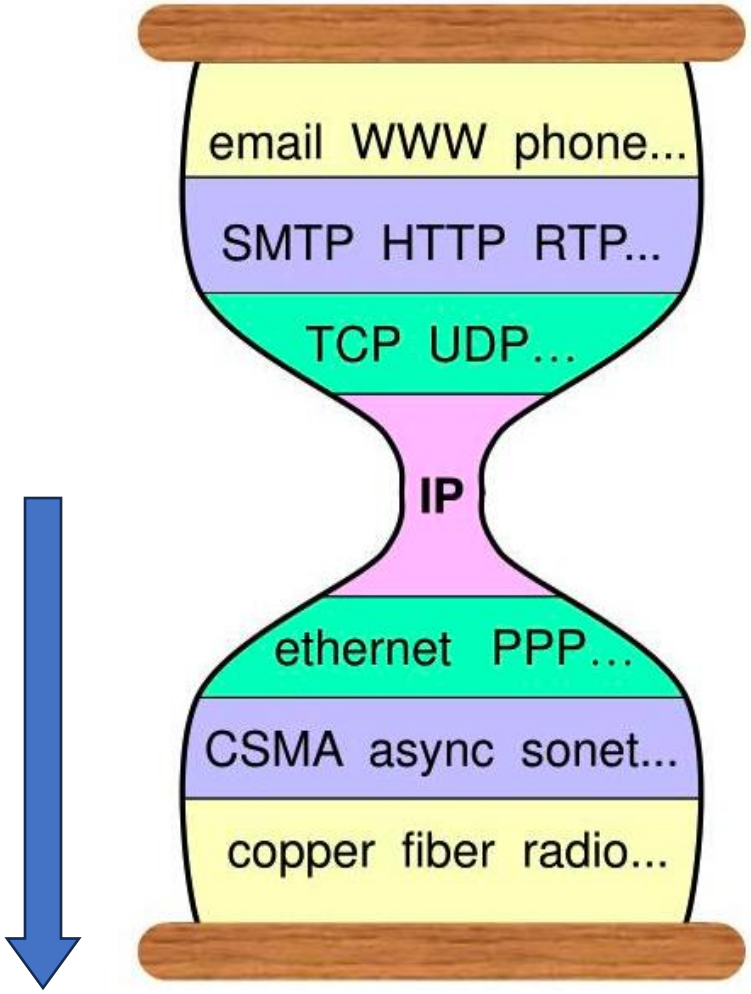
Network Layer: Waist of the Internet



Higher layers: Transport + Application



Lower layers: Link (wired + wireless)



Any Question?

- CS422 COURSE EVALUATION
  - SEVERAL MINUTES BY **MAY 4 (THIS SUNDAY)**
  - Your time and feedback is appreciated!

- Contact me (chunyi@purdue.edu) or TAs (cs422-ta@cs.purdue.edu)
  - Campuswire
  - **Office hours next week:** 12PM – 13PM TUE MAY 6
    - @DSAI 2142 OR @TEAMS

Final: **7:00PM - 9:00PM Wed May 7**, WTHR 172

Good Luck
on Your Exams!