CSC4200/5200 – COMPUTER NETWORKING

INTRODUCTION

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Tennessee TECH

Welcome

- Class website: https://csc4200.github.io/
  - Syllabus
  - Grading policies
  - Homework and assignments
  - **First homework and programming assignment already posted**

- Instructor: Susmit Shannigrahi
  - Office hours: Monday 11 AM – 1 PM, Wednesday 2:30-3:30PM
  - Email : sshannigrahi@tntech.edu

- GTA: David Reddick
  - Office hours: TBA
  - Email: dereddick42@students.tntech.edu

Grading

- Homework – 10%
- Project 1 – 5%
- Project 2 – 15%
- Project 3 + Demo – 20%
- Midterm – 25%
- Final (Comprehensive)– 25%

5200 – Extra reading and presentation requirements.

- Pick a topic, read research papers, prepare a 10 minute presentation
- **Discuss with the instructor by end of the first week - (08/30)**

Policies

- **One late submission allowed, no questions asked**
  - Use it wisely
  - Max 7 days late
- Other late submissions
  - 7 days max
  - Flat 50% deducted
  - No exceptions!
- No make-up exams.
  - Your responsibility to find conflicts and work with the instructor to resolve them

Exams

- One midterm, one final.
- Final is comprehensive.
- **One double sided cheat sheet is allowed for both the midterm and the final**
  - Is not going to help if you don't understand the fundamentals

Programming Assignments

- Must run on Google Cloud Vms – Ubuntu-18.04
- First assignment is individual. Second and third are group projects.
- Third assignment would require a Raspberry PI
  - You will need to buy one. We will provide the exact specification.
- C++/Python
  - C is allowed
  - **If you want to use other languages, talk to the GTA/Instructor**

Cheating Policy

- **If you cheat, you will fail the class!**
  - Regardless of what you cheated in
  - Don’t do it.

- **You will also be reported for academic misconduct**
  - http://catalog.tntech.edu/content.php?catoid=18&navoid=3312

To the more exciting stuff....

Questions so far?

Chapter 1: Fundamentals

- Networking is ubiquitous
  - What did you use it for today?

- First things first:
  - Terminology
  - Basic tools
  - What does it take to build an Internet?

Links, Nodes, Network, Internet

- You can view the network as a graph
- Each device (a phone, a computer) is a node
- Each connection is a link
  - Wires = real links
  - Bluetooth, Radio, Infrared = virtual links
- Nodes + links = a network
  - Many connected networks = Internet

Links, Nodes, Cloud, Routers, Switches

Client and Server

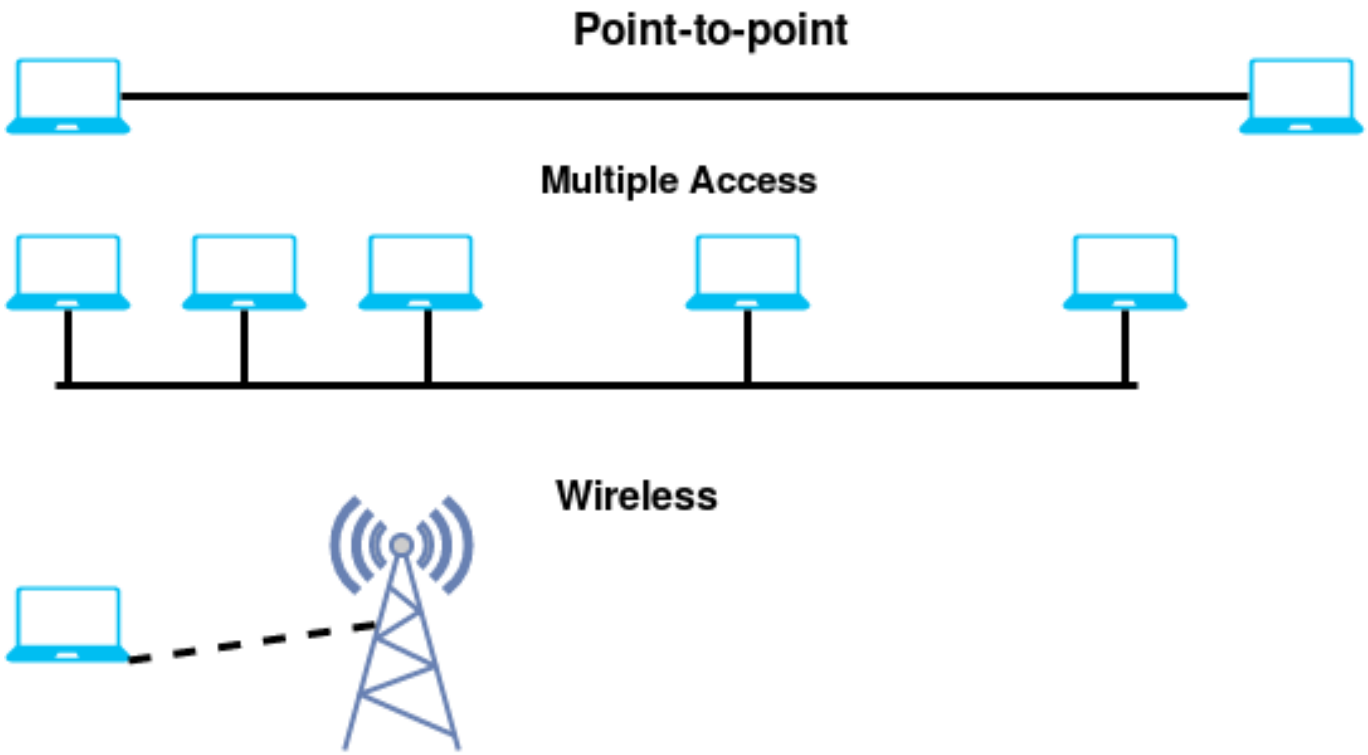
- My laptop with a browser = client
  - It requests a service
  - Email, chat, video, youtube

- A node running a program that serves the requests = server
  - Runs a service
  - Chat, video, messaging

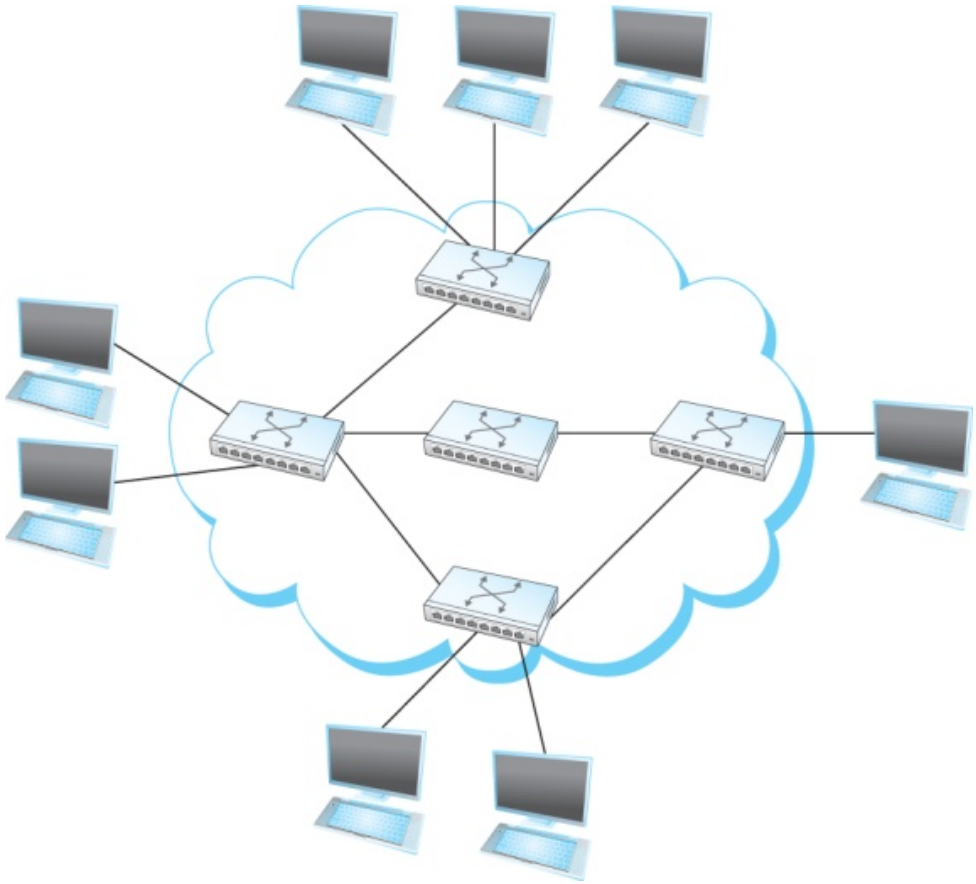
- A node can both be a client and a server

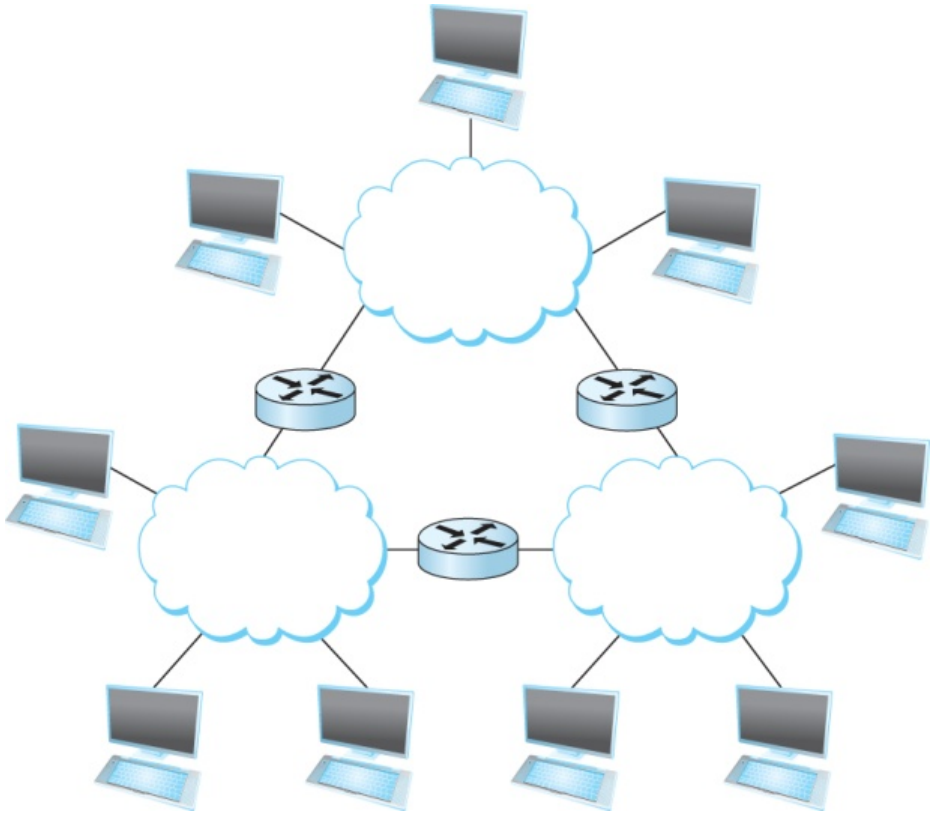
Connectivity

- Point to Point
- Multiple access
- Wireless



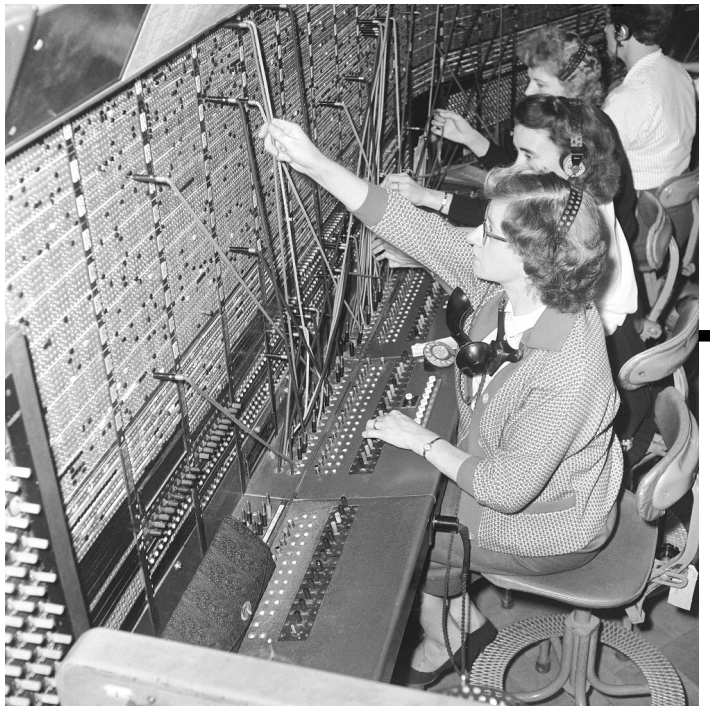
A Network and the Internet





Circuit Switching – Old telephone networks

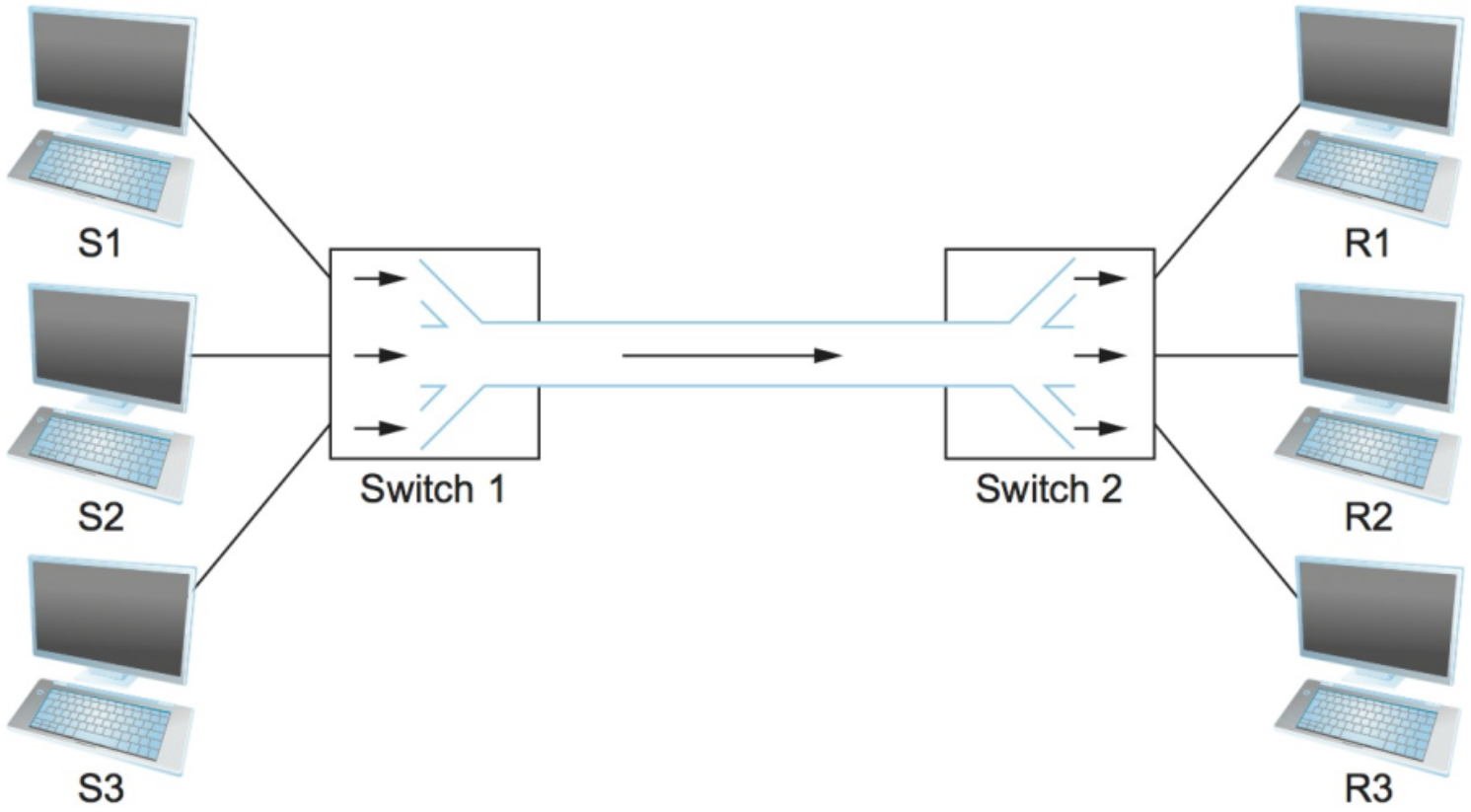
Operator, get me the navy



- Build physical wire:
  - Guaranteed resources
  - Great for voice

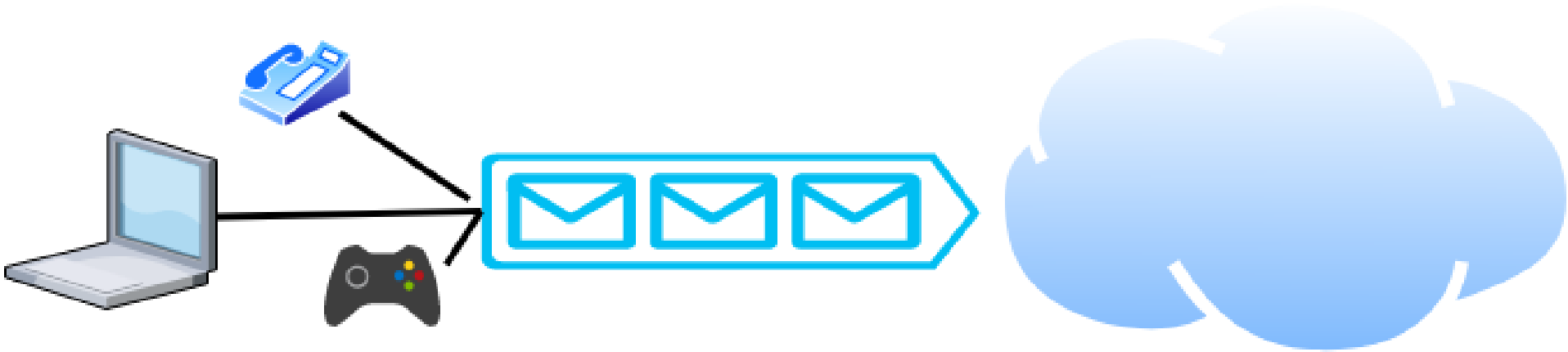
Why change?

Circuit Switching – TDM and FDM



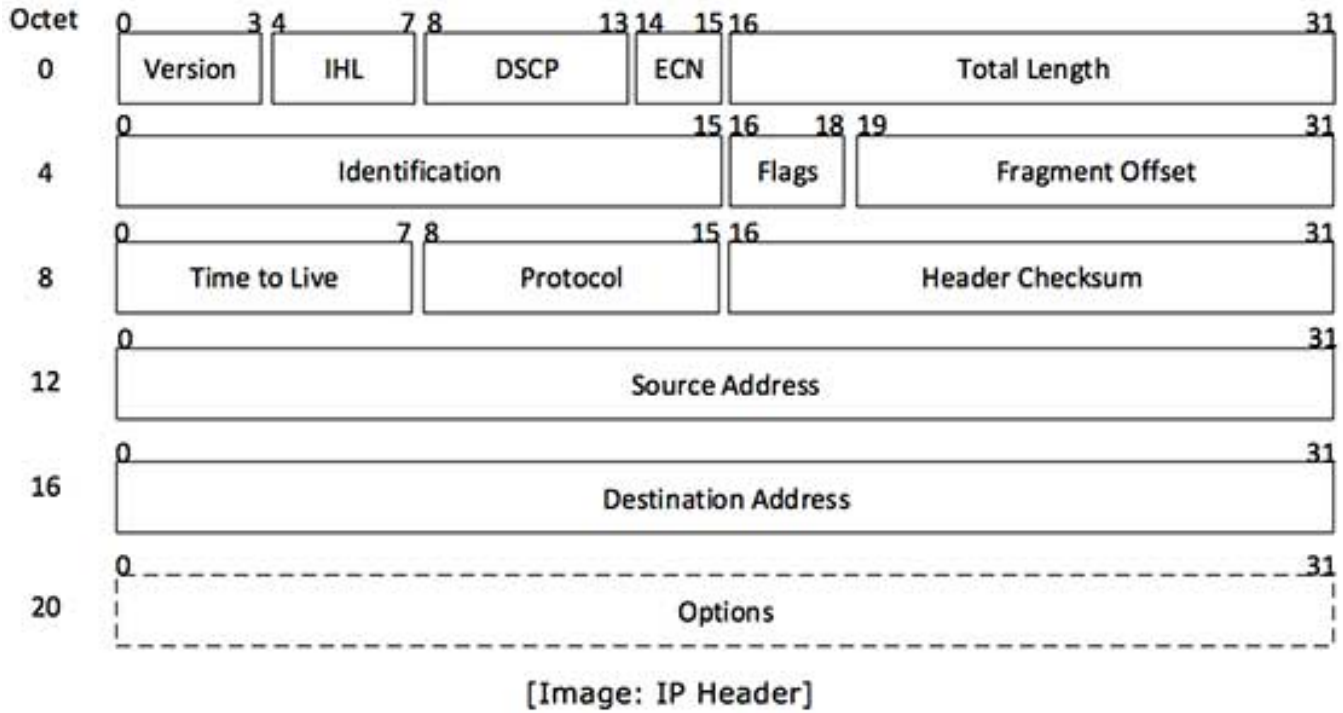
What are the problems?

Packet Switching



- Packets are low level components
- Multiple kind of traffic with different requirements
  - Gaming vs Phone
- Dumb network – How do you ensure quality of service?
- End points must be smart

But What is a Packet?



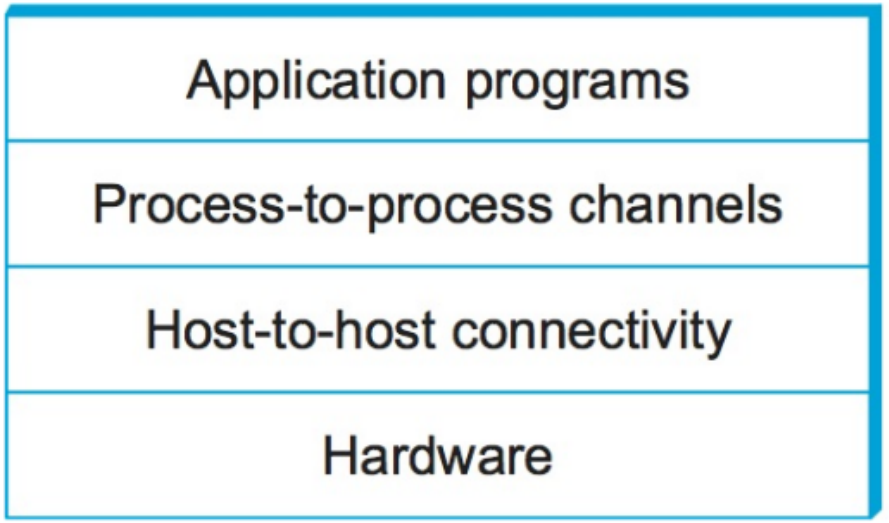
[Image: IP Header]

- Self-contained data unit
- Has two parts (generally)
  - Control information
  - Payload
- How do we transmit a dictionary?

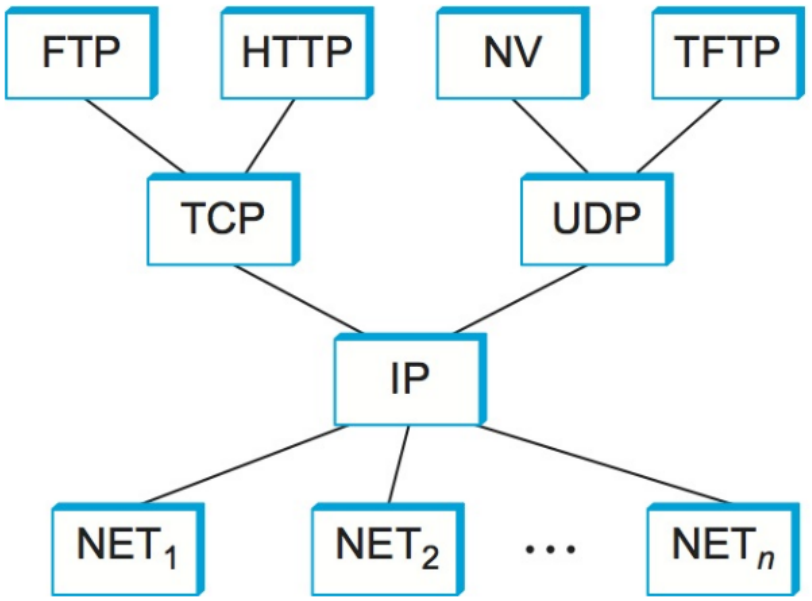
Network Architecture

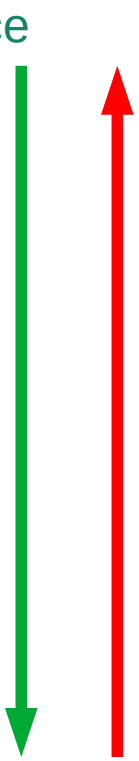
- What are the requirements from a network?

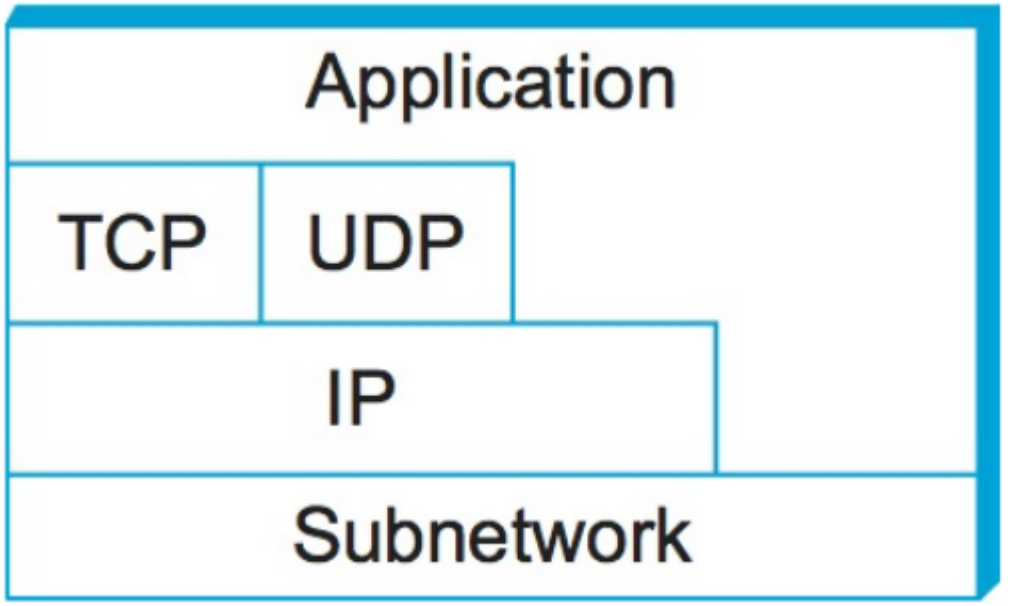
- Architecture = High-level blueprint
  - Protocols = Building blocks of the architecture
  - Layering = Break down the problem in smaller pieces



Network Layers

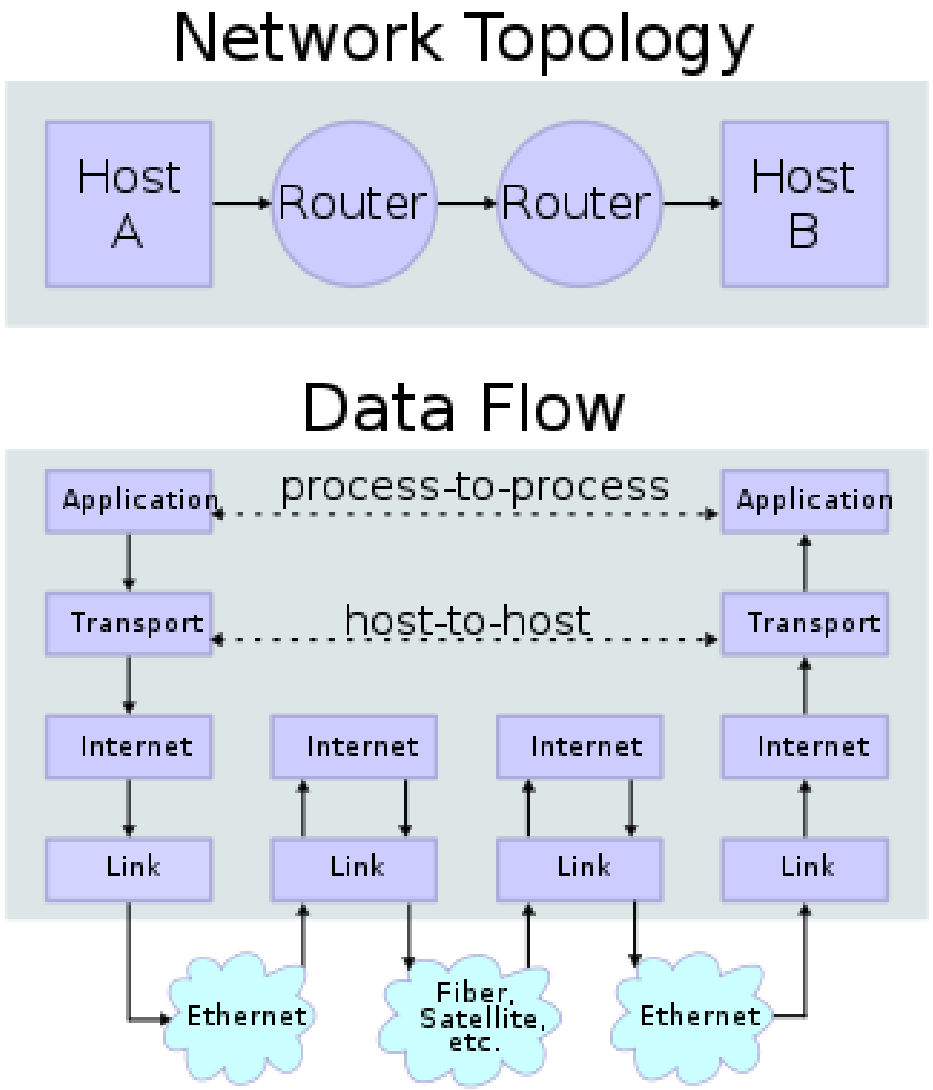


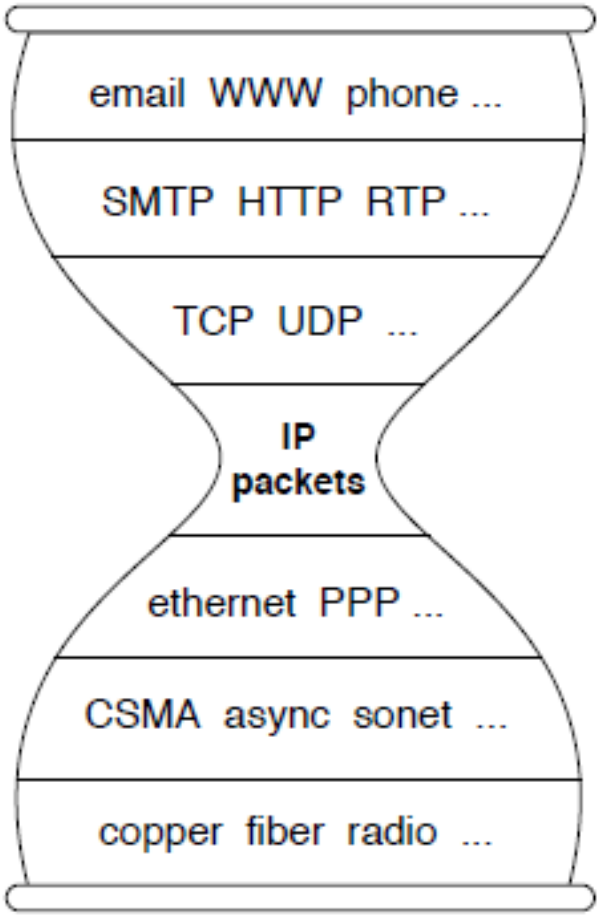




- Makes it easier to divide functionality
- Hides implementation details
- What else?

IP Suite





wikipedia

Next Steps

- Read Chapter 1
- Homework 1 has posted – due on next Monday – 09/02
  - Substantial hands-on component, start ASAP
- Project 1 has posted – due on 09/15
- Next lecture – Network performance basics