College of Information Studies

University of Maryland Hornbake Library Building College Park, MD 20742-4345

Networks

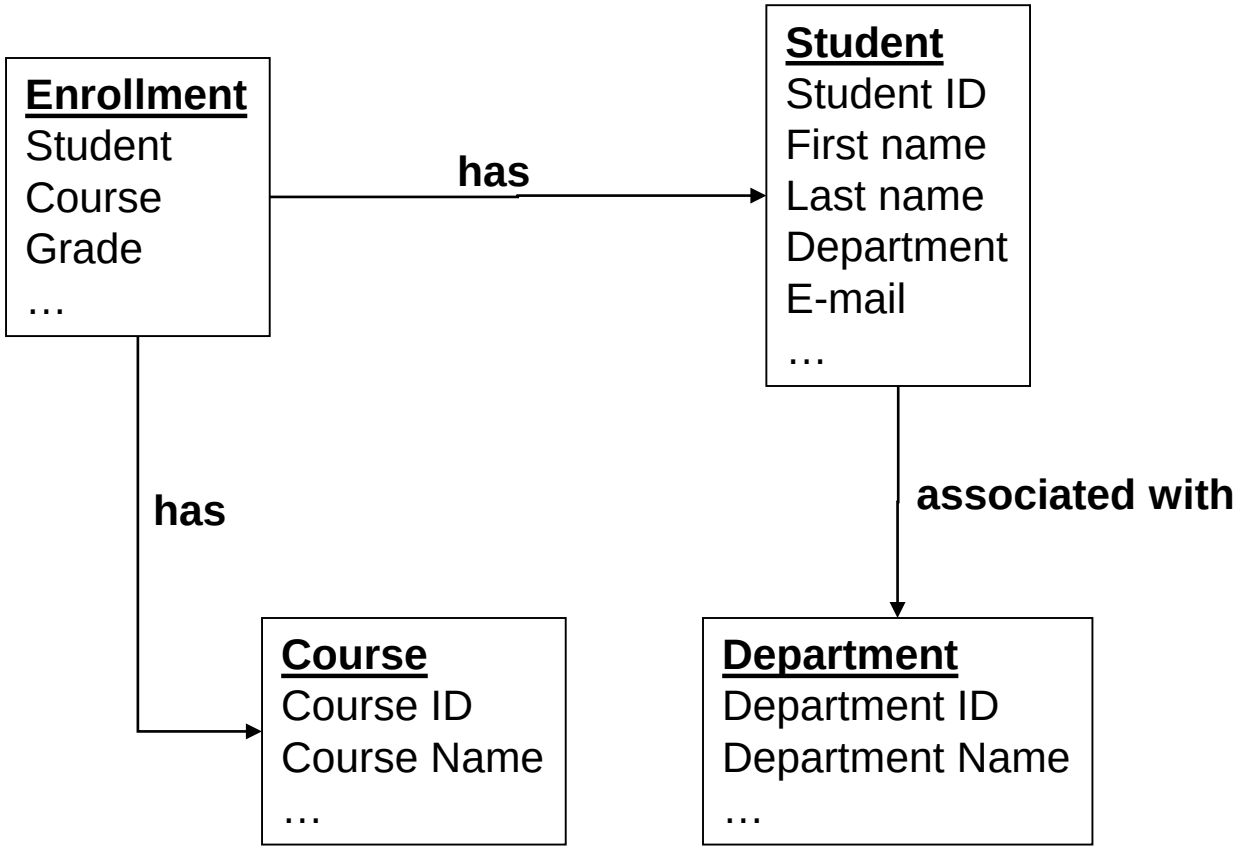
Session 1

INST 346

Technologies, Infrastructure and Architecture

Goals for Today

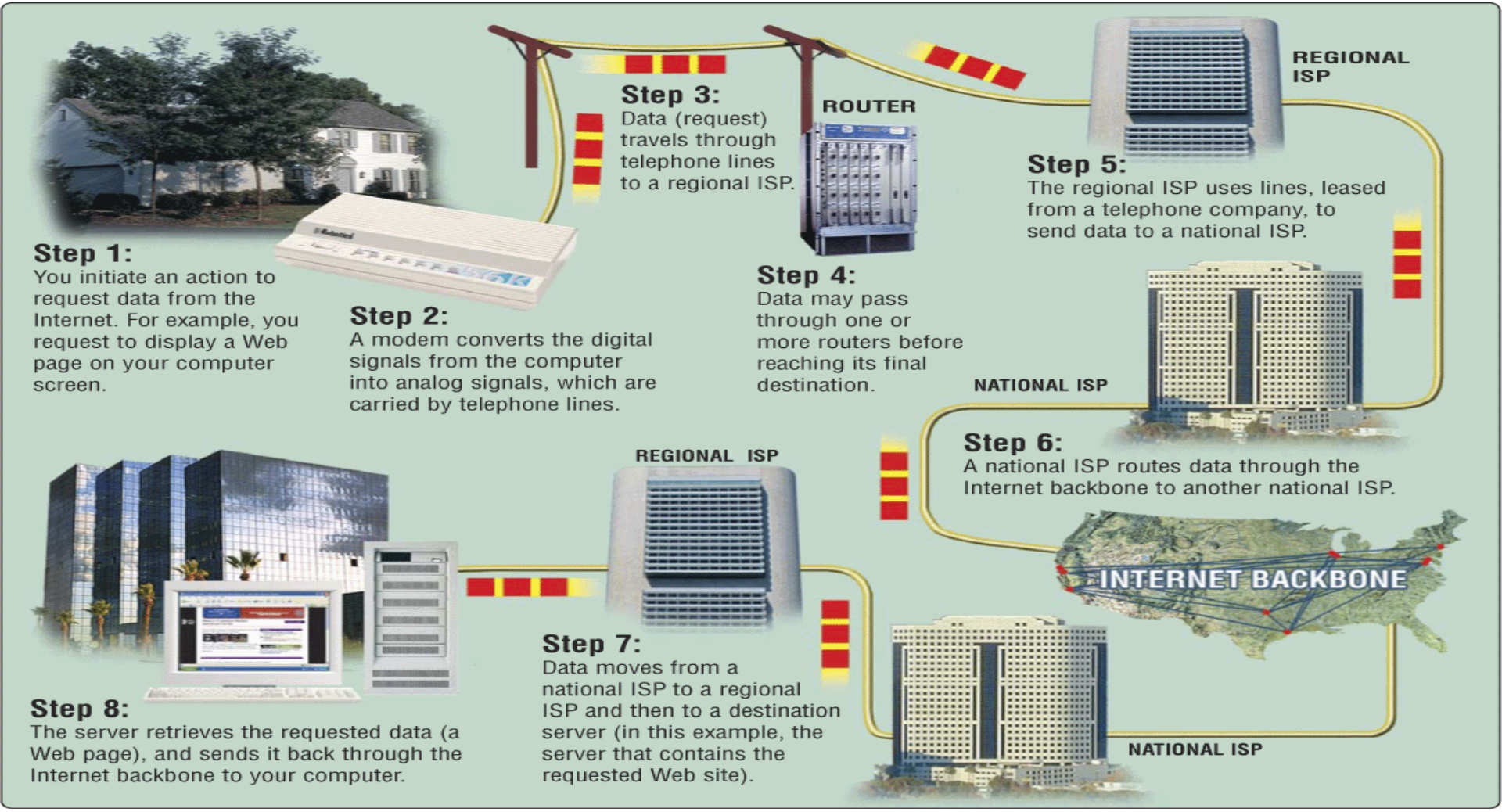
- Understand what a network is
- Learn about the design of the Internet
- Get an overview of the course


Enrollment
Student
Course
Grade
…
has
Student
Student ID
First name
Last name
Department
E-mail
…
has
associated with
Course
Course ID
Course Name
…
Department
Department ID
Department Name
…

Some Other Networks

- Genealogy
- Post office
- Telephone
- The Web
- Bacon numbers

The Internet



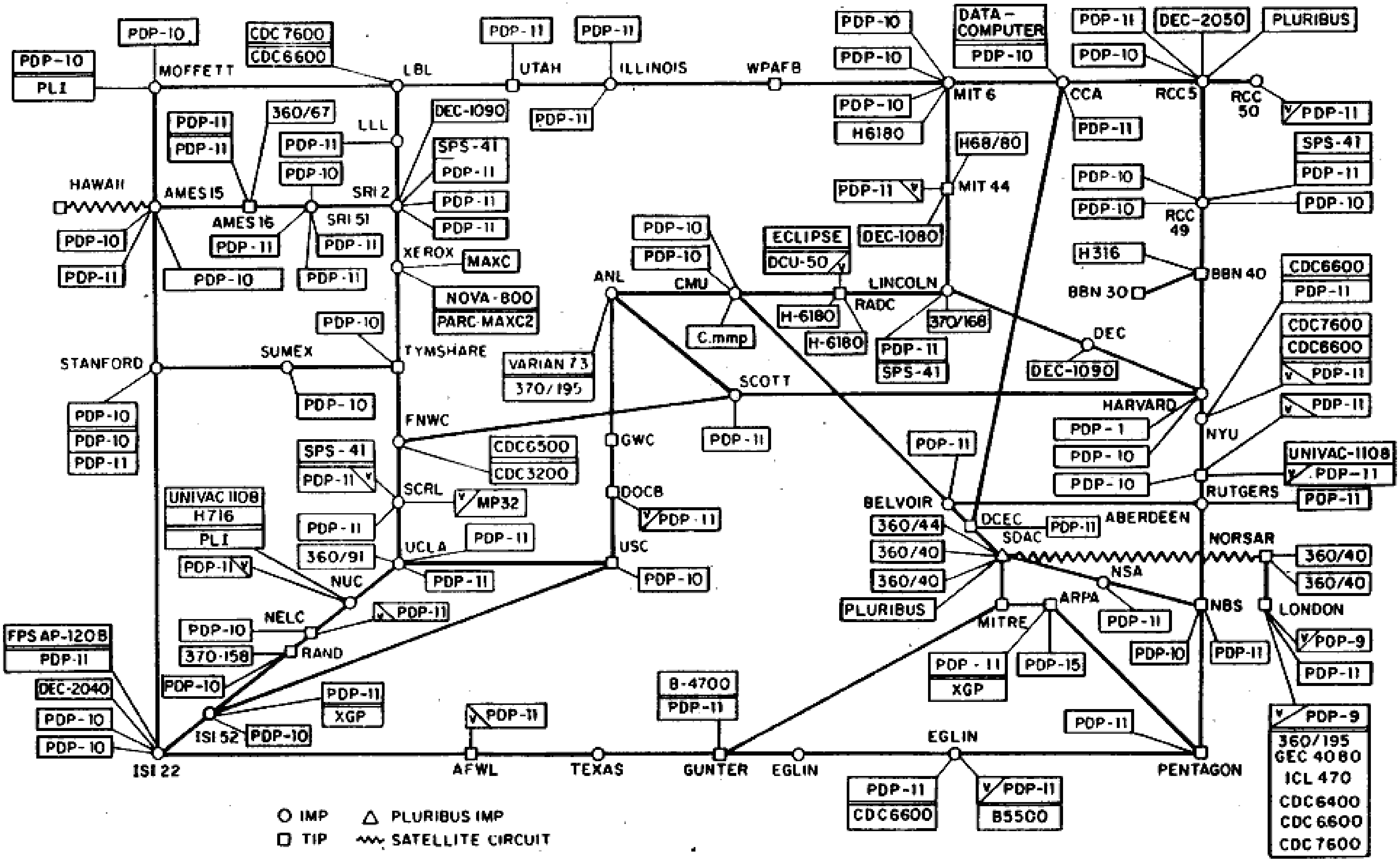
The Internet

- Global collection of public “IP” networks
  - Private IP networks are often called “intranets”
- Independent
  - Each organization maintains its own network
- Cooperating (e.g., ICANN)
  - Internet Protocol (IP) address blocks
  - Domain names

A Short History of the Internet

- 1969: Origins in government research
  - Advanced Research Projects Agency (ARPAnet)
  - Key standards: UDP, TCP, DNS
- 1983: Design adopted by other agencies
  - Created a need for inter-network connections
  - Key standards: IP

ARPANET LOGICAL MAP, MARCH 1977

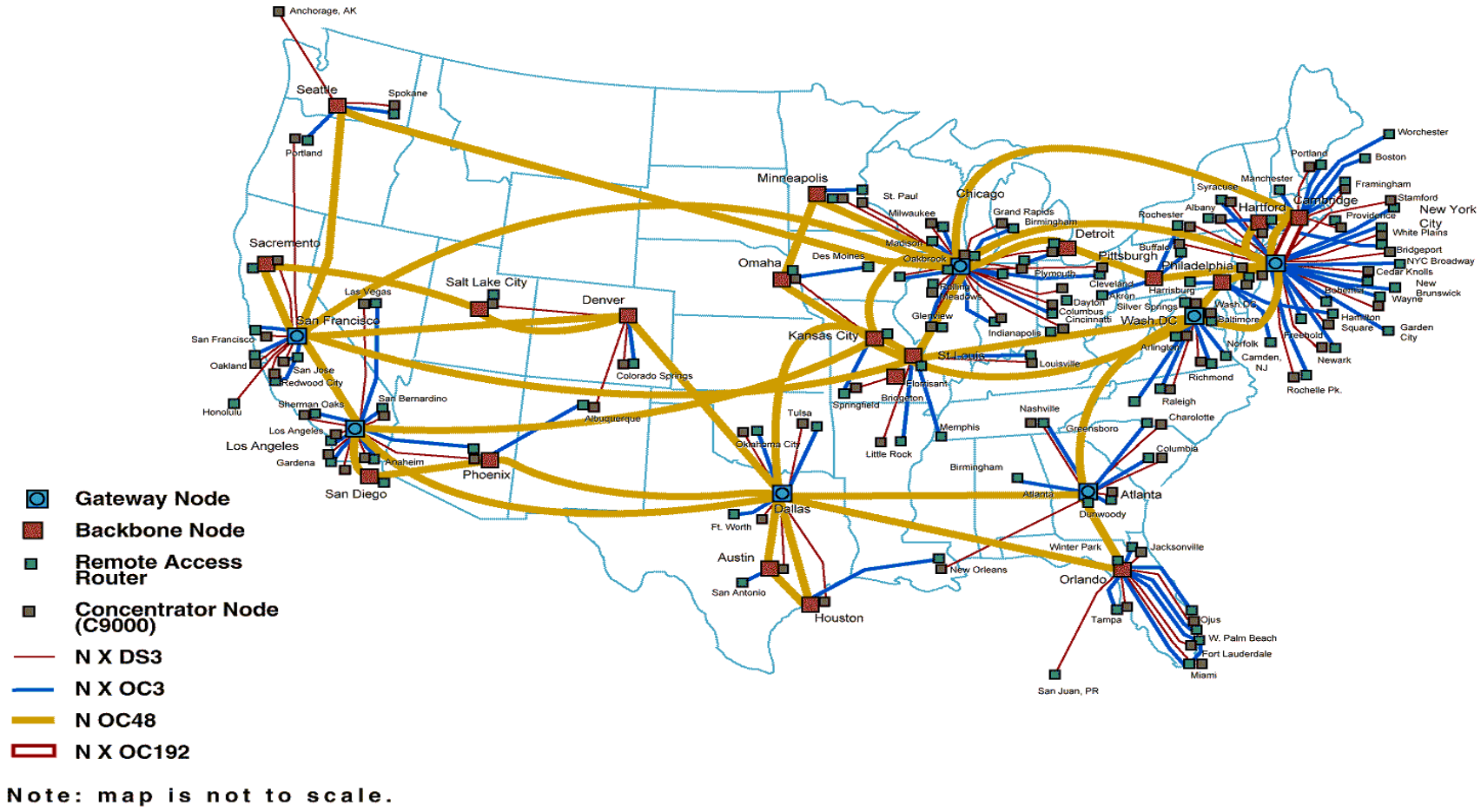


(PLEASE NOTE THAT WHILE THIS MAP SHOWS THE HOST POPULATION OF THE NETWORK ACCORDING TO THE BEST INFORMATION OBTAINABLE, NO CLAIM CAN BE MADE FOR ITS ACCURACY)

NAMES SHOWN ARE IMP NAMES, NOT (NECESSARILY) HOST NAMES

AT&T IP BACKBONE NETWORK

2Q2000



Note: map is not to scale.

http://www.geog.ucl.ac.uk/casa/martin/atlas/isp_maps.html

The Internet

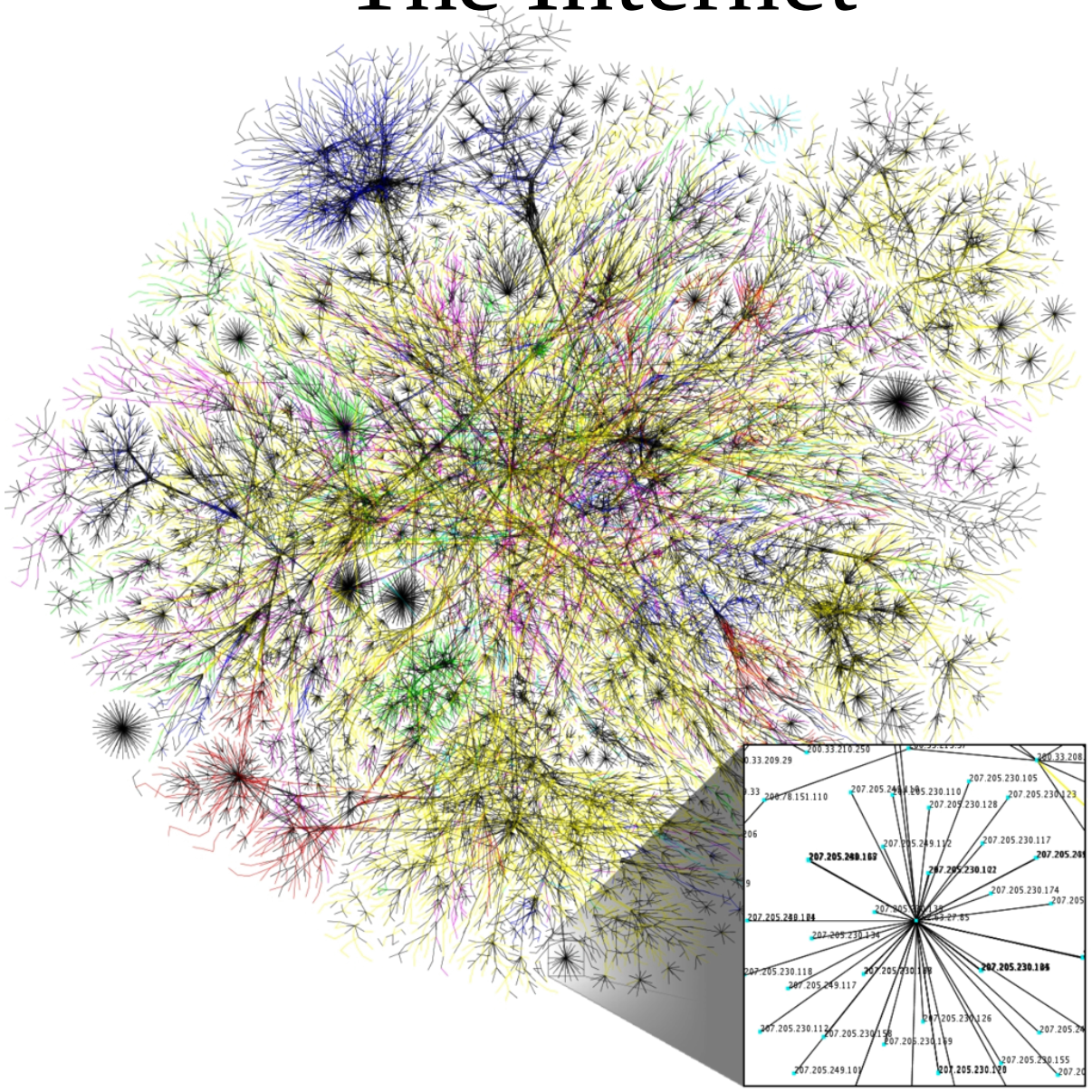


Image from the Opte Project

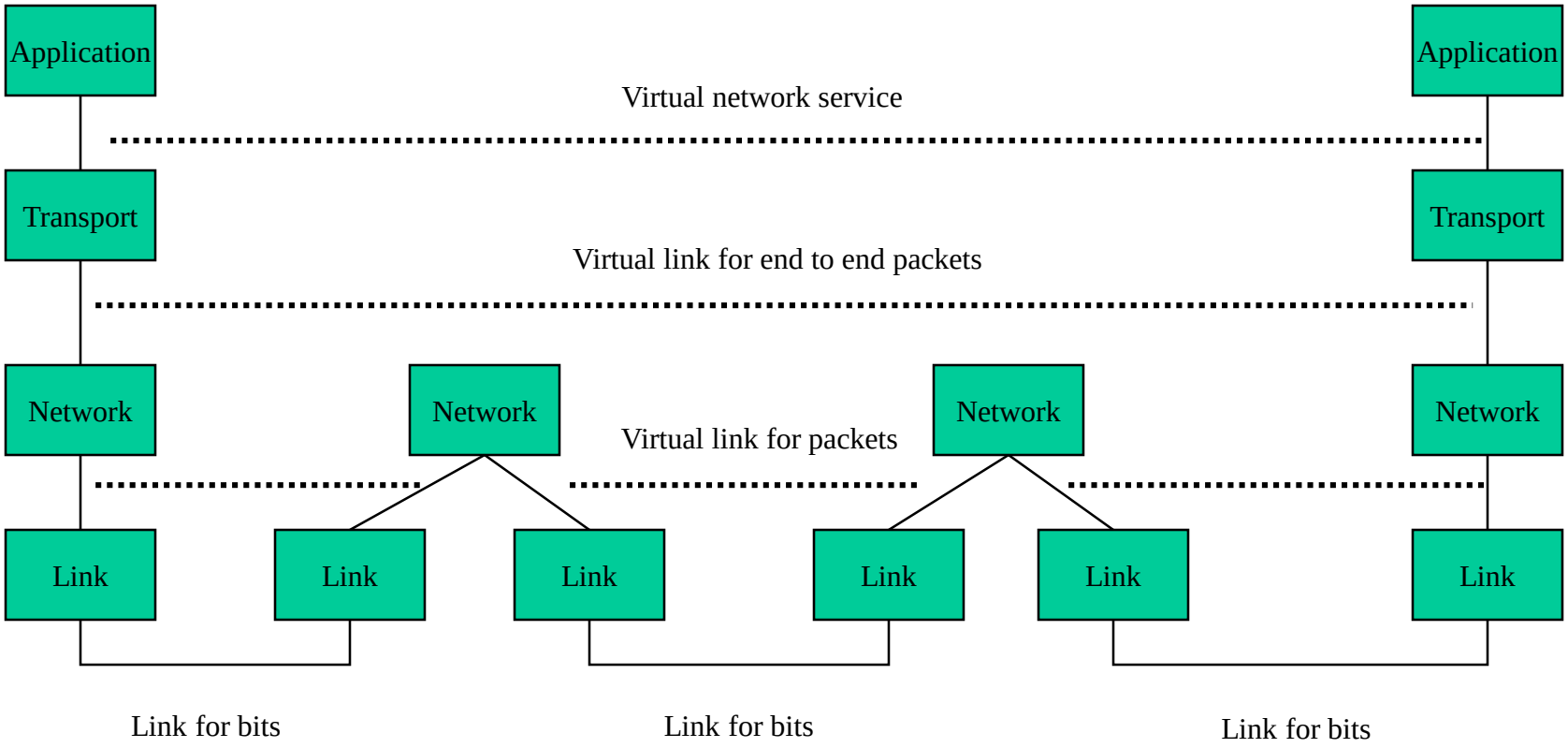
Types of Internet “Nodes”

- Hosts
  - Computers that use the network to do something
- Routers
  - Specialized computers that route packets
- Gateway
  - Routers that connect two networks
- Firewall
  - Gateways that pass packets selectively

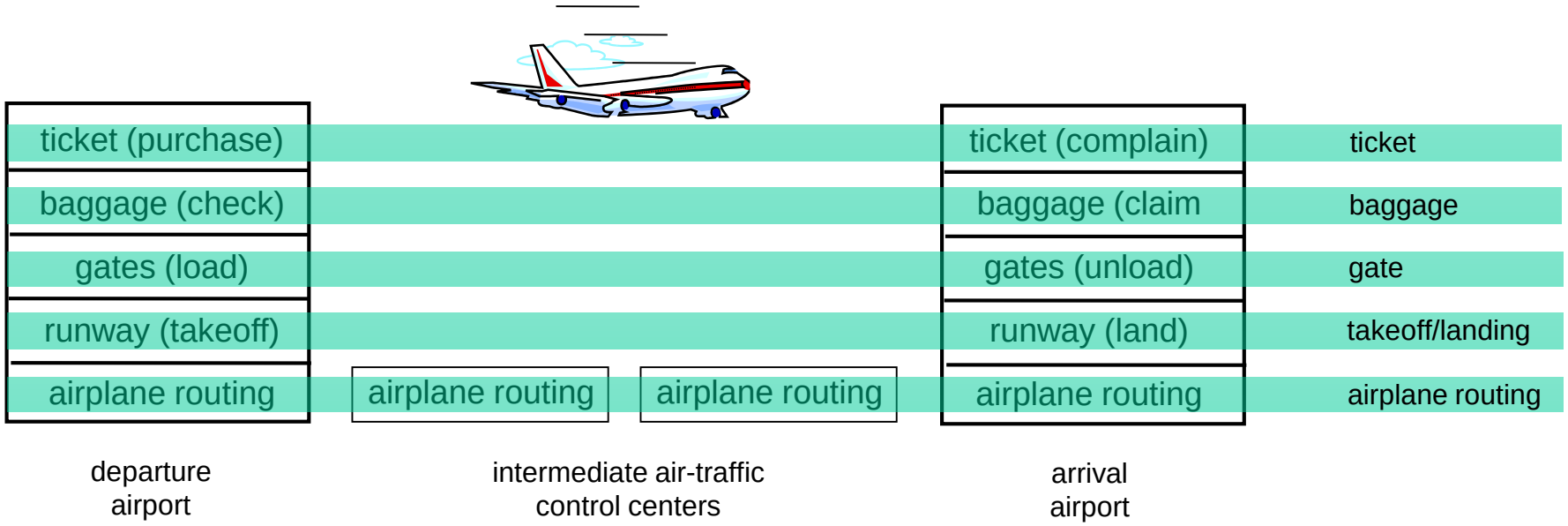
Types of Digital Links

- "Backbone"
  - Microwave
  - Satellite
  - Fiber
- "Last mile" wired
  - Telephone modem
  - Cable modem
  - Fiber
- "Last mile" wireless
  - Wi-Fi (IEEE 802.11)
  - Mobile data (GSM, 4G)

Layered Internmet Architecture



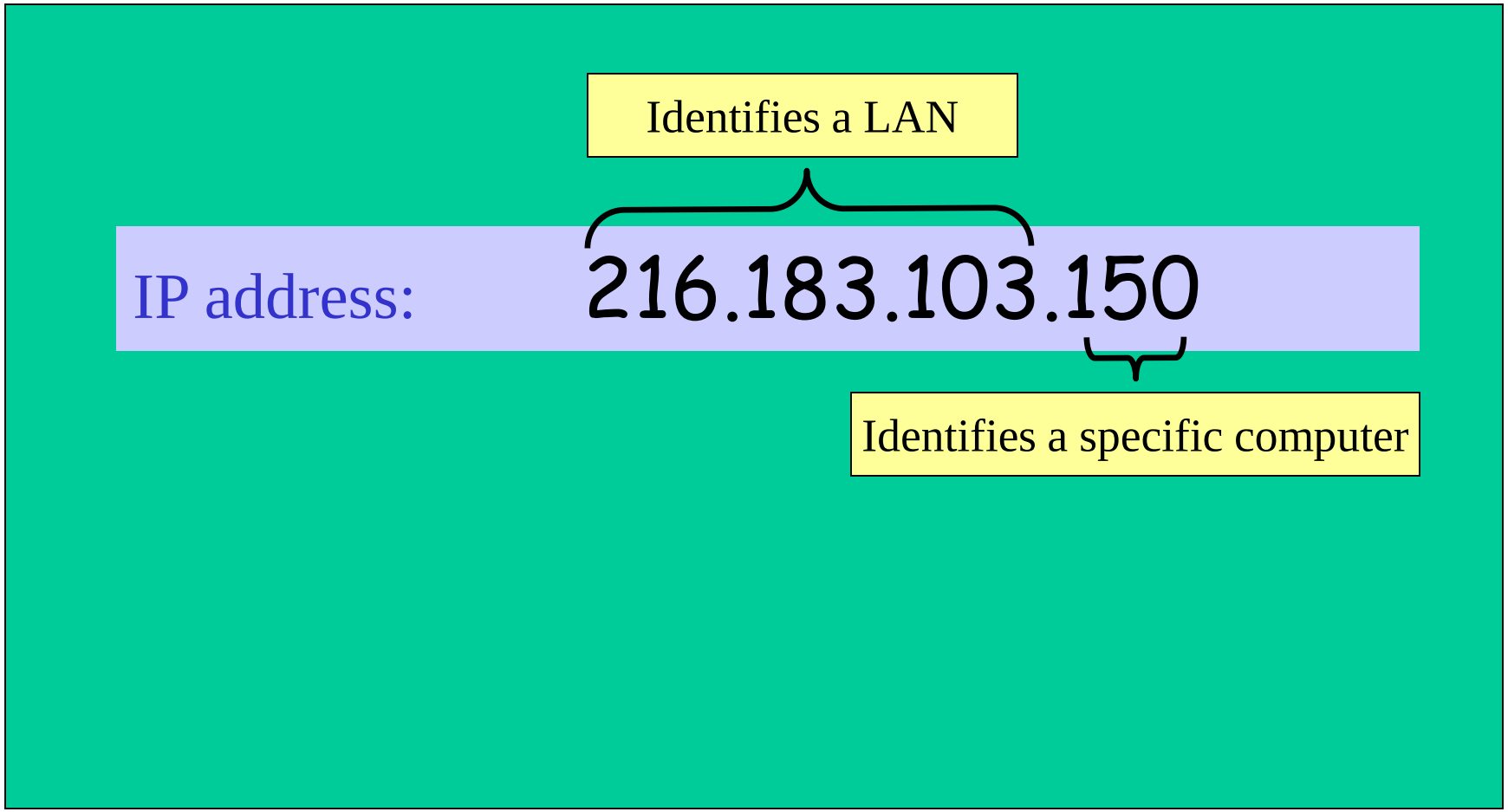
Layering of airline functionality



layers: each layer implements a service

- via its own internal-layer actions
- relying on services provided by layer below

An Internet Protocol (IP) Address



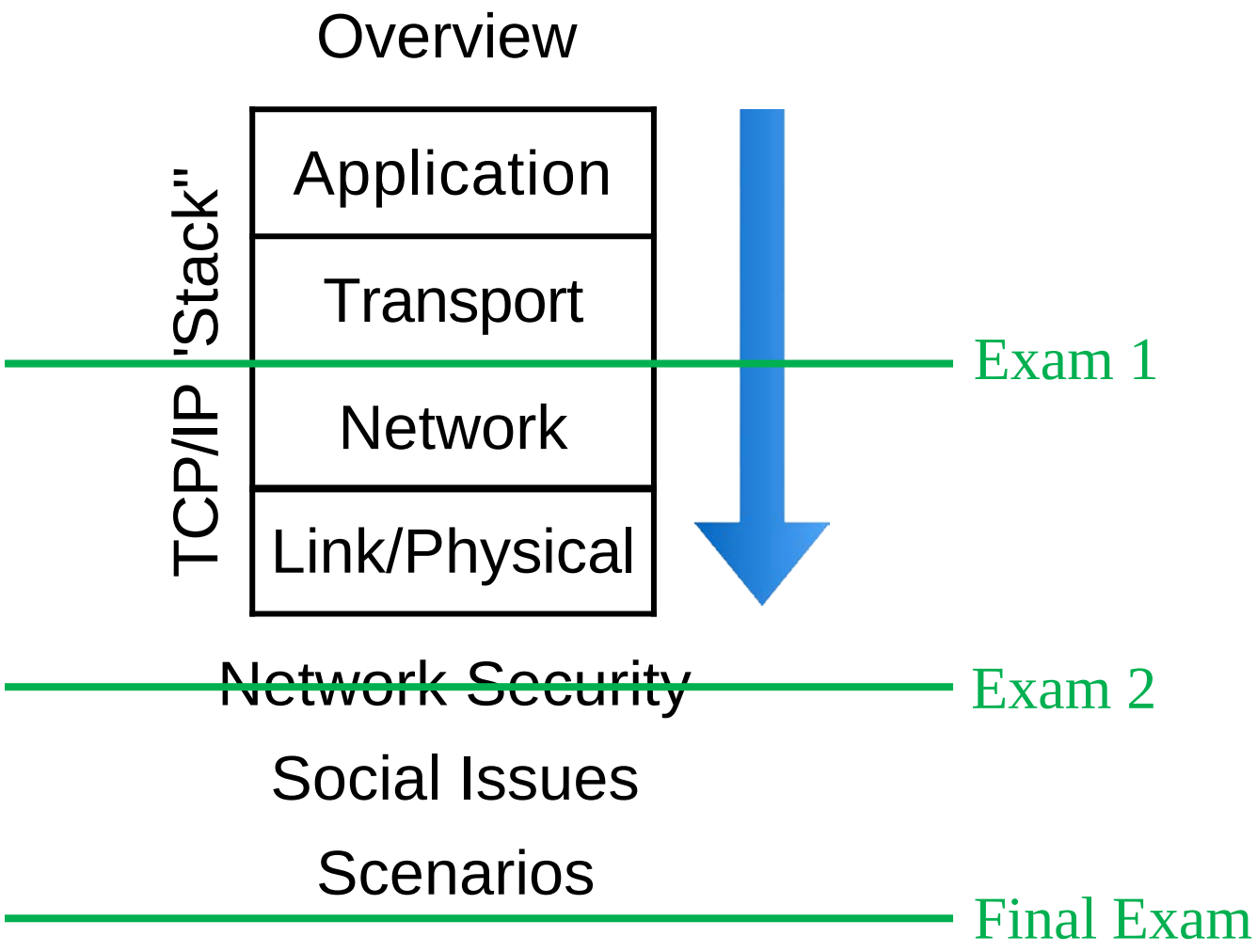
Hands-on:
Learn About Your IP Address

- Find your IP address
  - Windows: “cmd” in the search box, then ipconfig /all
  - Mac: open a Terminal, then ifconfig
- See who “owns” that address
  - Use http://remote.12dt.com/
- See where in the world it (probably) is
  - http://www.geobytes.com/ipLocator.htm

Thinking About Speed

- Two parts of moving data from here to there:
  - Getting the first bit there (latency)
  - Getting everything there (throughput)
- Latency: Amount of time it takes data to travel from source to destination
- Throughput: Amount of data that can be sent in some amount of time (e.g., 1 second)

Modules


Overview
TCP/IP "Stack"
Application
Transport
Network
Link/Physical
Exam 1
Network Security
Exam 2
Social Issues
Scenarios
Final Exam

Required Background

- Algebra
- Statistics
- Programming
- Database design

Keys to Success

- Don’t get behind
  - 20 pages or so of reading for every class
- Use class to deepen your understanding
  - You’re here to discuss it, not to listen to it!
- Use homeworks and labs to gain mastery
  - Work together, share ideas online
  - Final submission must be written by you!
- Proactively use office hours
  - We can’t help if you don’t ask!

Grading

- No curve, no extra credit.
  - 90 for A-, 93 for A, etc.
- No single-point failures
  - 50%: Best 2 of 3 exams (individual work)
  - 10%: Best 8 of 10 quizzes (individual work)
  - 20%: Best 4 of 5 homeworks (work together)
  - 20%: Best 4 of 5 labs (work together)
- Attendance is not separately graded
  - But it is strongly correlated with success

Pair Up

Turn to the person next to you and discuss:

What do you most want to learn in this course?