Beginning System Administration DeCal

Week 4

March 1, 2010

I just the other day got, an internet was sent by my staff at 10 o'clock in the morning on Friday and I just got it yesterday. Why?

Because it got tangled up with all these things going on the internet commercially...

They want to deliver vast amounts of information over the internet. And again, the internet is not something you just dump something on. It's not a truck.

It's a series of tubes.

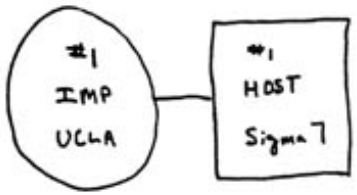
And if you don't understand those tubes can be filled and if they are filled, when you put your message in, it gets in line and its going to be delayed by anyone that puts into that tube enormous amounts of material, enormous amounts of material.

Former senator, Ted Stevens

(Brief) History of the Internet

- 1958 - Advanced Research Projects Agency (ARPA)
- ARPANET
  - Private military communications network
- 1988 - Commercial networks gain access to ARPANET
- 1990s - World wide web created by CERN.

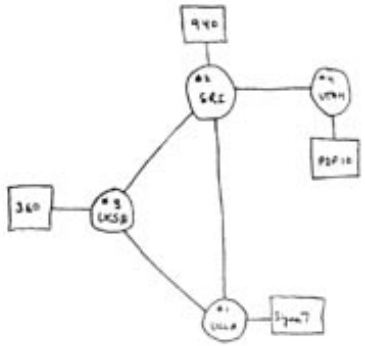
http://blog.icann.org/?p=115



THE ARPA NETWORK

SEPT 1969

1 NODE



THE ARPA NETWORK

DEC 1969

4 NODES

The OSI Model

- Open Systems Interconnection
- The basic reference model
- 7 layers but we focus primarily on 3 of the layers.
- Physical Layer
  - Wires, hardware, equipment
- Transport Layer
  - Protocols for communication
  - "Hello? Are you there?"
  - TCP, UDP
- Application Layer
  - How do I read the data?
  - HTTP (web), SMTP (email), BitTorrent

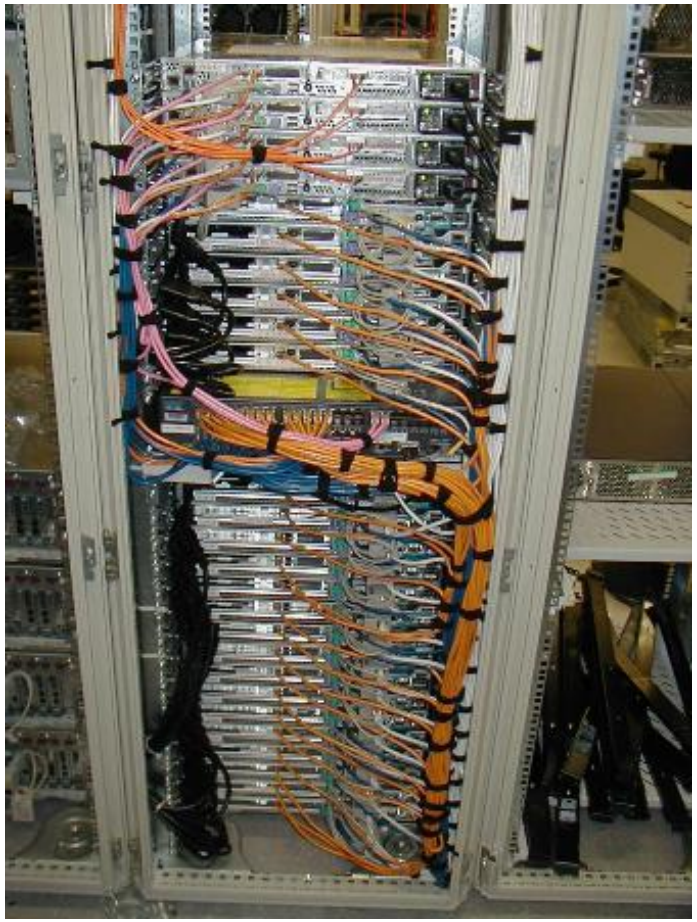
Administrivia

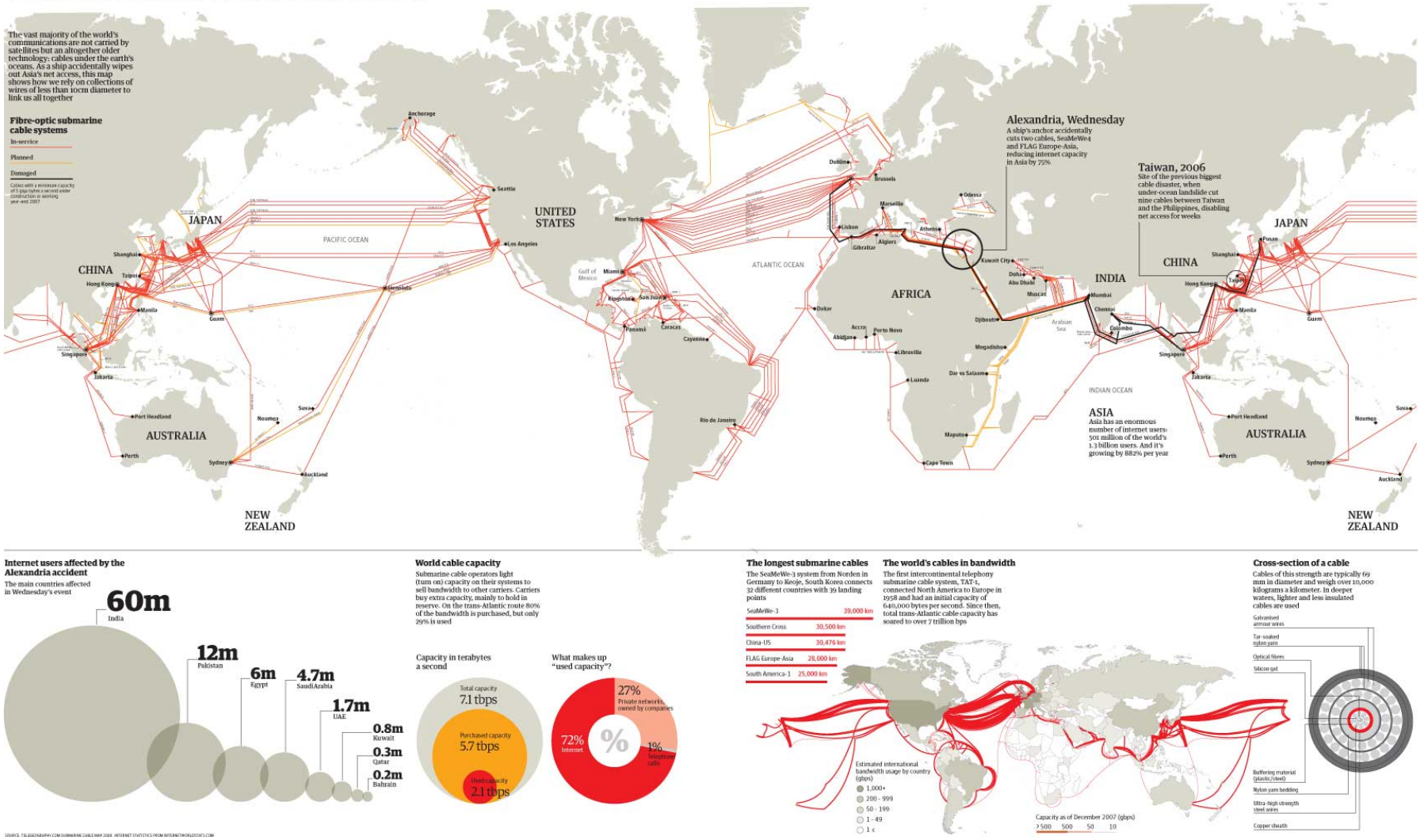
- If you haven't created an OCF account, do so **ASAP** as you will need one to do this week's lab.
- Be sure to turn in labs in addition to HW.
- Must complete majority of labs and homework for a Pass.
- Attendance also impacts grade.
- Read everything!

Physical Layer

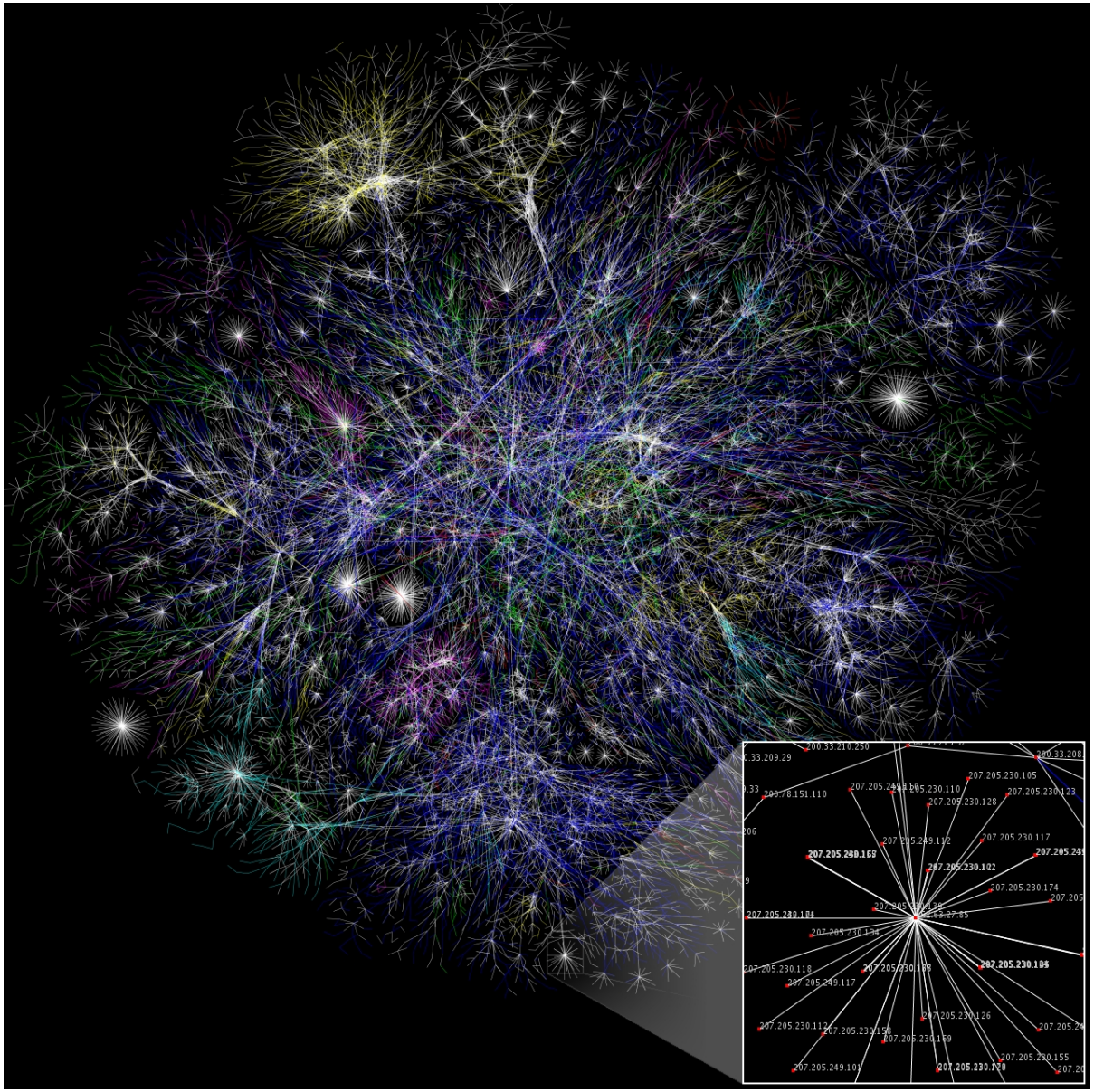
- Standalone Networks
  - AT&T, Verizon, Sprint
- Lots of wires
  - Ethernet, Fiber Optics
- Routers and Peering Points
  - How do I cross the web?

http://flickr.com/photos/digitalslurp





http://image.guardian.co.uk/sys-images/Technology/Pix/pictures/2008/02/01/SeaCableHi.jpg



http://upload.wikimedia.org/wikipedia/commons/d/d2/Internet_map_1024.jpg

Transport Layer

- Transmission Control Protocol (TCP/IP)
  - Reliable, in-order delivery
- User Datagram Protocol (UDP)
  - Short messages, non-guaranteed delivery
- Internet Protocol (IP)
  - Actually a part of the Link Layer, but we'll let that slide for simplicity.
  - IPv4 address: `xxx.xxx.xxx.xxx`
    - Each `xxx` is between 0-255.
    - 4,294,967,296 addresses!
    - `http://technical.cns.berkeley.edu/internet/access/ucb-nets.shtml`
  - IPv6: 3×10^{38} addresses!

Application Layer

- Domains
  - Internet Corporation for Assigned Names and Numbers (ICANN)
  - `www.ocf.berkeley.edu` = 192.58.221.243
- DNS Servers
- Protocols
  - Web Browsers - HTTP
  - Mail - SMTP/IMAP/POP3
  - P2P - BitTorrent, GNUtella, Usenet, Winny, Skype

Extra Topics

- Firewalls
- Network Services
- IP Allocation
- Network Neutrality