Lecture 0: Welcome to the class!

Who should take it? How to attend?

CSEE 4119: Computer Networks
2015, Wednesday January 21st
Objectives of this class

★ Learn fundamental concepts of networking
  o And how they apply (or not) to the Internet

★ Learn how to program with network protocols
  o And how to program protocols
  o Go beyond using libraries as black boxes
  o Cisco/Wuawei router manual is not the final word

★ Learn about network performance
1969 was quite a year!

- And, by the way, the Internet was born (Oct. 29th)

Nobody noticed, but in retrospect that is the event that had the largest impact on the world!
This is not just history!


Congressional Democrats are itching for a fight over net neutrality!

By Brian Fung
January 21 at 11:52 AM

This week the center of gravity in the net neutrality debate shifts to Capitol Hill, where hearings in both chambers are pitting Democrats against Republicans over the future of the Internet. Here's how you can expect the next stage of the battle to unfold.

President Obama's top telecom regulator, FCC Chairman Tom Wheeler, says he'll submit new proposed rules for Internet providers in February and that the Federal Communications Commission will vote on the issue later that month.

To get ahead of what they say will be a "heavy-handed" proposal,
Today, almost all computing apps are networked
  - Enterprise, Games, Social Net, P2P, Cloud
This adds a lot of challenge
  - Deal with asynchronicity / unreliability
  - Resources sharing should be fair and scalable
  - How to make different competing systems cooperate
Not easy, still mostly unsolved
  - In clouds, network today remains difficult to price!
It’s a requirement!
- Because this covers background for more advanced classes and projects in computer networks

Including (but not limited to):
- COMS 4180 Network Security
- COMS 6998-10 Cloud Computing & Big Data
- COMS 6998-2 Cloud and Mobile Security
- COMS 6998-4 Privacy & Online Social Networks
- COMS 6998-7 Cellular Network/Mobile Computing
- CSEE W4140 Networking Lab
- ELEN E6773 Network Economics and Engineering
- ELEN E6777 Formal Methods of Communication
- ELEN E6951 Wireless and Mobile Networking II
- ...
- Many related groups in projects
Why NOT take this class!

* You are not ready! Prerequisite
  - Discrete probability: introductory level
    * Independent events, conditioning, expectation
  - Programming: code comfortably in C and/or Java

* You are too much ready!
  - No need to repeat your first networking class!
  - Please come to ask for advices on advanced classes

* You want to focus solely on one related topic:
  - Physical layer, Security, Applications
How to pass this class

* Come prepared to 2 lectures per week
* Office hours: close to class, early to avoid conflicts!
  Chaintreau: Tuesday & Thursday 8:20-9:05am, CEPSR 610,
  TAs: upcoming, announced on wiki
* Grading:
  o 5 written assignments (20%)
  o 2 mid-sized programming projects (30%)
  o 1 midterm (75mn, March 13th, closed books) (15%)
  o 1 final exam (3h, around May 13th, closed books) (35%)
  o Class participation does not count directly but …
More on the course

* Main source: Our wiki slides, assignment, etc. csee4119computernetworks.wikischolars.columbia.edu
* Public, Do not ask to join!
* Piazza:
  o Read before you post!
  o We apply a 24h max delay
* Integrity / Assignment Rules
* The “Apple” Policy
A bit about myself

* Worked first as undergrads in 1999 in Bay area
  o Attended ACM SIGCOMM since 2000, 4x PC member
  o Organized Travel Grant 2013, PC Chair ACM CoNEXT 2014,
* Studied at ENS-INRIA in Paris (Ph.D in 2006)
  o Interns at Sprint, Alcatel, IBM, Intel
  o Worked 5 years for Technicolor (formerly Thomson)
* Works on Mobile and Social Networks
  o Previously on multicast, TCP congestion control, p2p
  o Emphasis on performance of networked algorithm
Part I (1-3): The Internet, seen from 10,000 feet

Part II (4-8): The Applications
  * Web, Email, P2P, HTTP, FTP, DNS, Socket

Part III (9-14): Transport Layer
  * ACK, Retransmission, TCP, UDP, Congestion, Resource

Part IV (15-20): Network Layer
  * Addressing, IP, Routing, OSPF, BGP

Part V (21-25): Link Layer
  * MAC, CSMA, 802.11