

Lecture 1: Introduction to Computer Networks and to Course

What this Course Covers

Network Protocols and Architectures:

- Internet: a network of networks
- Application layer, naming
- Network layer: addressing and routing
- Link layer and wireless
- Transport layer and queue management
- Multimedia networking and content distribution
- Security in networks
- Cloud computing

What this Course is NOT About

We do NOT cover:

- Homepage design, CSS, PGP, MySQL
- Photoshop, Flash, Silverlight
- Web site administration
- Web hosting and data center setup and maintenance
- DSL or cable modem setup
- LAN setup and administration
- How to connect to the Internet
- How to become an ISP
- How to run an ISP

What this Course Covers

Focus on the fundamental concepts, not just the technology

- there will always be new protocols, how to go about designing one?
- what are the architectural principles?

Provide high-level overview of computer networks

- wired, wireless, cellular
- how they are interconnected

What is a Communication Network?

Communication networks offer one basic service:

move information

- bird, fire, messenger, truck, telegraph, telephone, Internet ...

Another example of networks: transportation network

- horse, train, truck, airplane ...

What service does a transportation network provide?

What distinguish different types of networks?

What characteristics distinguish the services?

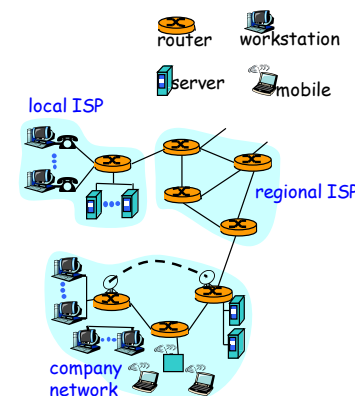
What is the Internet?

Internet: "network of networks"

- loosely hierarchical
- public Internet versus private intranet

Network components:

- **hosts** – communication endpoints: desktops, laptops, tablets, smart phones, glasses, millions of them, running network applications
 - applications: browser, email clients, facebook app, tweet apps, etc.
- **links** – carry bits from one place to another: fiber, copper, satellite, wireless ...
- **routers/switches** – interconnect links: store and forward packets



Communication over the Internet

A packet-switched network:

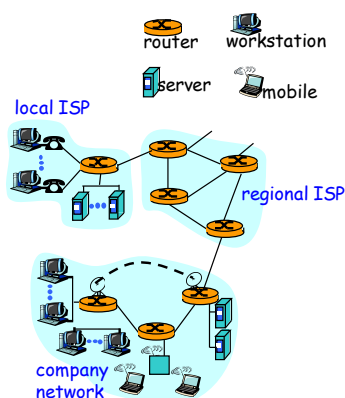
- data parceled into packets
- each carries a destination address
- each is routed independently
- packets can arrive out of order
- packets may not arrive at all

Strengths:

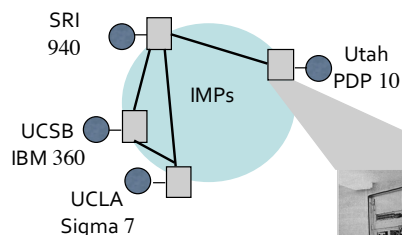
- intelligence at end points
- decentralized control
- heterogeneous access technologies

Weaknesses:

- variable performance, no quality of service
- no trusted infrastructure



In the Beginning: The ARPANET



BBN team that implemented the Interface Message Processor



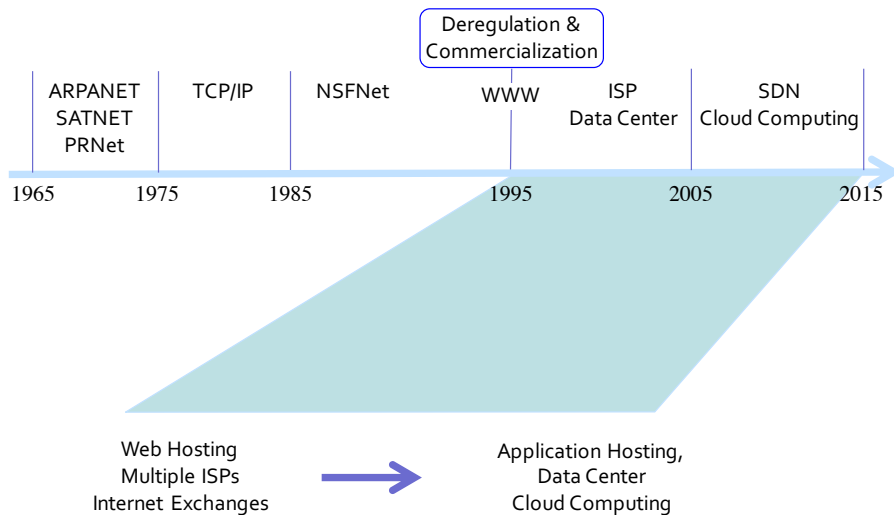
Paul Baran

- RAND Corp, early 1960s
- Communications networks that would survive a major enemy attack

ARPANET: research vehicle for "Resource Sharing Computer Networks"

- 2 September 1969: UCLA first node on the ARPANET
- December 1969: 4 nodes connected by phone lines

ARPANET ⇒ the Internet



Time and Place

Lecture: MWF 9:30-10:30 in 1500 EECS

Discussion/Lab session:

- Wed 12:30-1:30 in 2166 DOW
- Wed 4:30-5:30 in 1014 DOW

Instructor: Sugih Jamin (sjamin@eecs.umich.edu)

Office: 4737 BBB

Office hours: Wed 11:30-12:30, Thu 12:00-1:00, and by appt.

Tel: +1 734 763 1583

IA/GSI: Office hours held in the Learning Center (across from 1620 BBB)

Charlie Barto (bartoc)

Office hours: Tue and Fri 11:00-12:00 noon, and by appt.

Xianghan Pei (xhpei)

Office hours: Mon 5:00-6:00 pm, Tue 12:30-1:30 pm, and by appt.

Course Web Site

<http://www.eecs.umich.edu/~sugih/courses/eecs489/>

- Course grade composition
- Policy on collaboration and cheating
- Regrade and late days

Lecture slides are available on the web site, but some will be **updated after** lecture

- always grab a **fresh copy** if you need to consult a lecture note
- don't bother to keep a printed copy

How to Read the Syllabus Page

Linked to lecture slides

| | |
|---------------|---|
| Wed 01/08 | <p>Introduction to course, history of the Internet, the protocol stack</p> <p>Required reading:</p> <ul style="list-style-type: none"> • Kurose & Ross (K&R) Ch. 1 (exc...) <p>Recommended reading:</p> <ul style="list-style-type: none"> • Stevens et al. (UNP) Chs. 1, 4, S... everything on SCTP) <p>I won't be nagging you; check the syllabus on your own</p> |
| Wed 01/08 LAB | <p>Lab 0: Building Socket Programs</p> |

Assigned HW0 PA0 Due

Linked to MFile

Labs posted 7-5 days prior (announced on CTools)
Available later today: Lab1

Course Announcements

Announcement page on course web site (CTools)

Both course web site and Announcement page are “required readings”

We will post FAQ’s on the Announcements page, check it first before asking your questions

Grading Policy

- 1 Final Exam: 15% Wed 4/27, 4-6 pm
- 1 Midterm Exam: 15% Wed 3/9, 6-8 pm, 1013/4 DOW
- 2 Homeworks and n Pop Quizzes: 20%
Hand in hardcopies
- 8 Labs and 4 PAs: 48% Turn in online
- Class Participation: 2%

Do not email us any
of your assignments!

Labs and PAs

Each PA has 2 supporting labs

Each lab comprises $\leq 30\%$ of a PA

If your PA works 100%, you get the full 100 points, even if you didn’t turn in either of the supporting labs

If you got a lab to work and turned it in **on time**, but couldn’t get it to work as part of the PA, you will get credit for the lab

But if you didn’t turn in a lab **on time** and couldn’t get it to work in the PA, you will NOT get credit for the lab

Labs are not accepted late--today’s Lab 0 is not graded

Grading Policy

Regrade:

- within 5 working days (except PA4 and Final Exam, same day)
- written request
- whole work will be regraded

Late days:

- 4 free late days **in total** for **all** programming assignments and homework **together**
 - including weekends
 - NOT per assignment
- no need to inform us to use any of your free late days
- keep track of your own free late day usage

Help with PAs stops **2 days before due date**

Late Penalty

Applied to PAs and HW **after** free late days are used up
Labs and pop quizzes are not accepted late

Penalty schedule:

- ≤ 24 hours: 4%
- ≤ 48 hours: $8+4=12\%$
- **HW will not be accepted more than 2 days late**
- ≤ 72 hours: $12+12=24\%$
- ≤ 96 hours: $16+24=40\%$
- **PAs will not be accepted more than 4 days late**

Example:

- HW is worth 100 points, work late by 24 hours and 1 min
 - if no free late days left: 12 points late penalty
 - if 1 free late day left: 8 points late penalty
- turning in HW **after lecture has started** is considered **one day late**

Collaboration

All work must be done **individually**

Cheating and plagiarizing are not tolerated

To pass off the implementation of an algorithm as that of another is considered cheating:

- e.g., insertion sort is *not* heap sort
- **must let us know when you turn in your assignment if a required algorithm/data structure cannot be implemented**

Consultation of online and offline sources allowed, but must not be copied verbatim

Cite your sources, including classmates and roommates, but not teaching staff or required readings