

# Computer Networks

COSC 6377

Lecture 1

Spring 2014

January 13, 2014

# Course Goals

- Overview of the basics
- Principles and Philosophies
- Read research papers
- Hands-on experience with networked systems

# Prerequisites

- Undergraduate level networking/OS course
- Some systems programming
- Familiar with Linux environment
- Access to a Linux environment
  - Use department server
  - Use your own machine

# Structure

- Lectures
- Paper discussions
- Homeworks
- Projects
- Exams
- Class participation

# Homeworks

- 3-4 homeworks
- Concepts
- Calculations
- Some hands-on work
- Allowed to discuss with other students, but you should turn in your own writeup
- Submit through Moodle

# Projects

- Two projects
- Build a networked system
- Possible to propose your own project
  - Talk to the instructor before P2 is out

# Exams

- No final exam!
- The second exam will cover topics not covered by the first exam
- Open notes
- In-class scheduling
  - Conflicts should be reported by this week

# Grades

|                     |     |
|---------------------|-----|
| Exams               | 40% |
| Homeworks           | 15% |
| Projects            | 40% |
| Class Participation | 5%  |

- It is possible to get a C or lower grades
- No incompletes



# Readings

- No required textbook
- Recommended texts
  - Computer Networks: A Systems Approach
  - UNIX Network Programming
- Research papers
- Standards
- Wikipedia

# Academic Honesty

- The work you turn in should be yours
- Acknowledge
  - Group discussions
  - Internet sources
- Plagiarism results in an F

# Course Staff

- Instructor: Omprakash Gnawali
- Office Hours: M 230-330
  
- TA: Hessam Mohammadmoradi
- Contact: [hmoradi@cs.uh.edu](mailto:hmoradi@cs.uh.edu)
- Office Hours: MW 1030-1200 at PGH313

# Communication

- Send questions and answers to Piazza
- Contact TA before contacting the instructor
- Emails **MUST** have COSC6377 in the subject
- Check course website and Piazza regularly

<http://www2.cs.uh.edu/~gnawali/courses/cosc6377-s14/>

# Some Questions

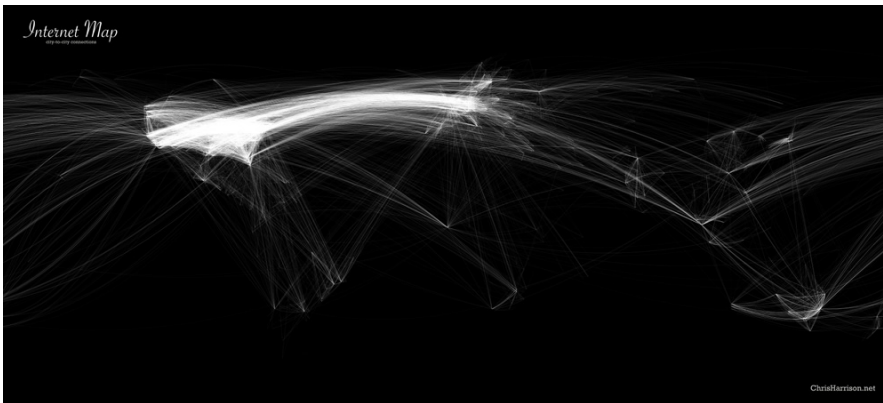
- How difficult is this course?
- What is the workload?
- Will I learn anything useful?
- Any other questions?

# Internet

- What is Internet?
- How did it start?
- How do we use it?
- Where is it going?

# Inter-net

- Network of Networks
  - Deficiencies in this classical definition?



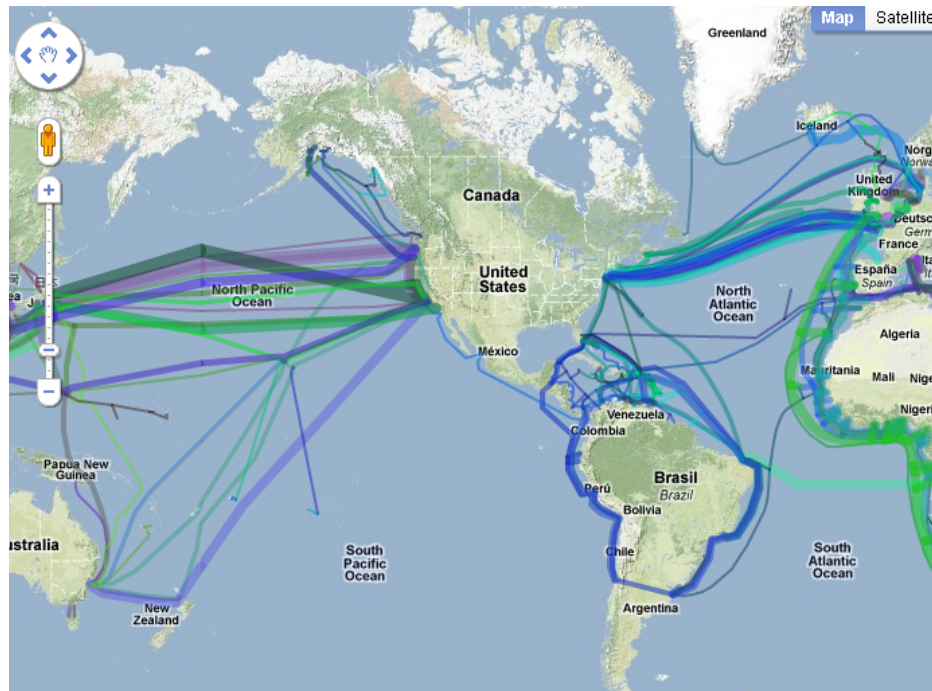
<http://www.chrisharrison.net>



From: [http://www.telepresenceoptions.com/2008/04/att\\_first\\_service\\_provider\\_to/](http://www.telepresenceoptions.com/2008/04/att_first_service_provider_to/)

# Connecting the Networks

- Cables
- Even under the sea



<http://www.cablemap.info/>



# A Brief History

- Packet switching technology
- ARPANET and other research projects
- Commercial Internet by the early 90's
- Core networks still owned by a handful of companies
- Reference
  - <http://www.zakon.org/robert/internet/timeline/>

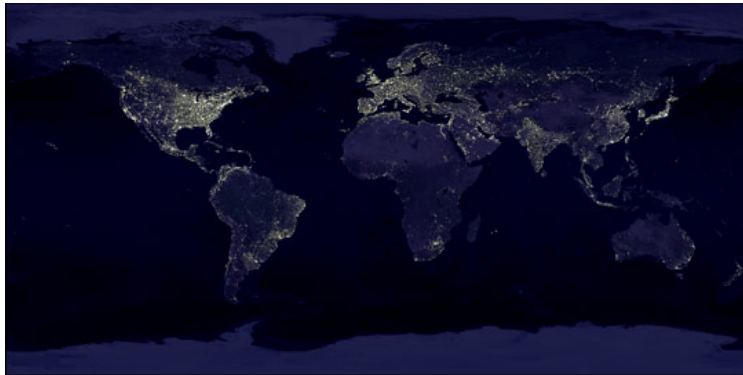
# How do we use it?

- Emails/Facebook
- Phone calls
- Government services
- Connect systems and services

# Where is it going?

- More inter-connection
- Internet of Things / Web of things
- More mobile and wireless
- More networked applications

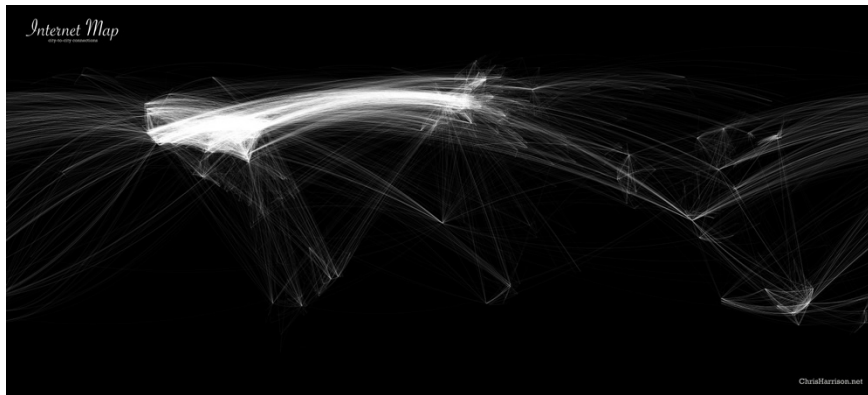
# Internet and Us



<http://earthobservatory.nasa.gov/Features/Lights/>



<http://www.chrisharrison.net>



<http://www.chrisharrison.net>



[http://www.facebook.com/note.php?note\\_id=469716398919](http://www.facebook.com/note.php?note_id=469716398919)

News

Print  Email  Share  Like  +1  1 

## Power struggle: Texas woman uses gun to stop utility worker



by Vicente Arenas / KHOU.com

 Recommend < 56

Posted on July 19, 2012 at 1:54 PM

HOUSTON – Thelma Taormina didn't want a new electric meter, and she went to great lengths to keep her old one.

When a worker showed up at her northwest Harris County home to install a smart meter, she grabbed her gun.

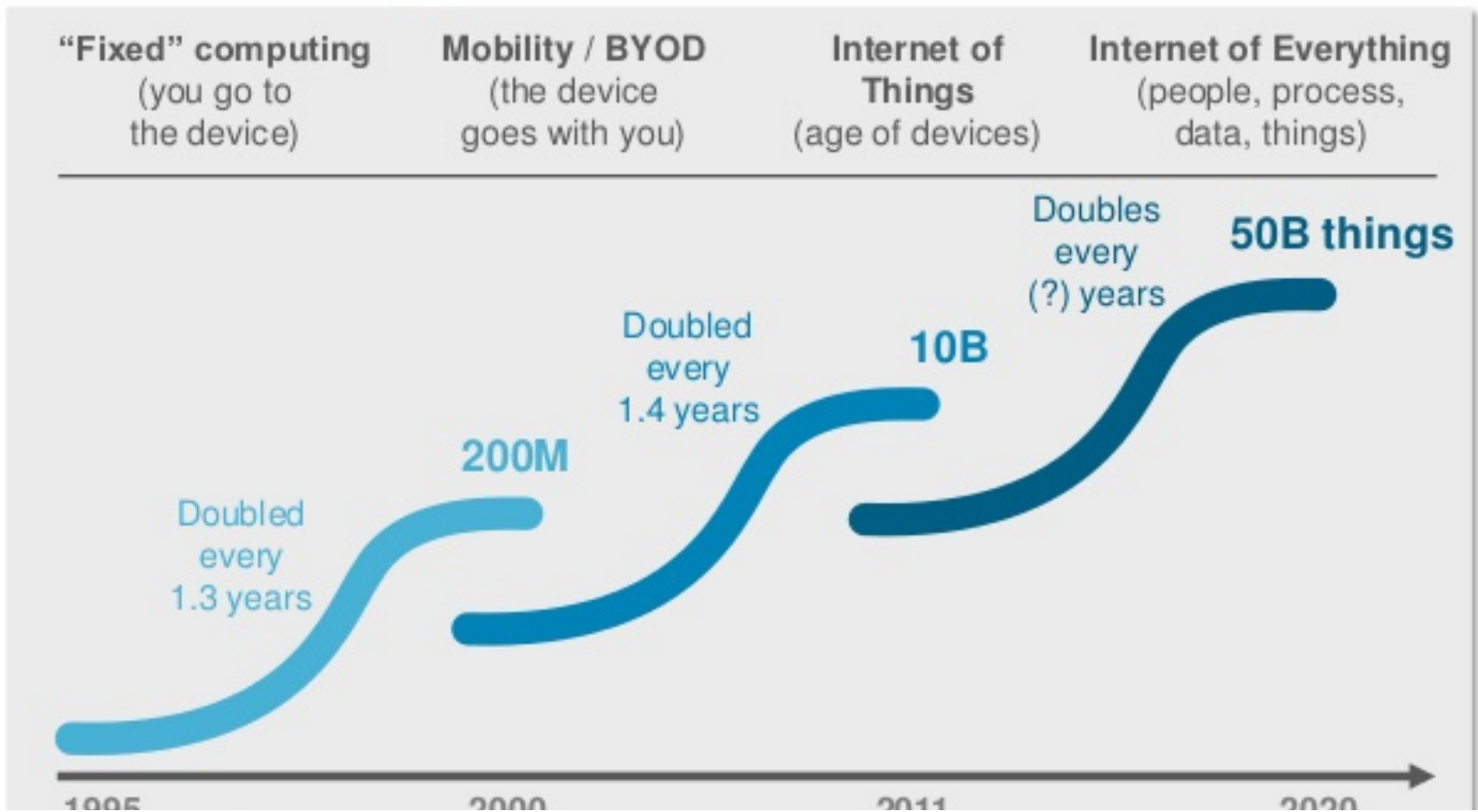
### Gallery



[SEE ALL 2 PHOTOS »](#)

<http://www.kens5.com/news/Power-struggle-Woman-uses-gun-to-stop-utility-worker-163070346.html>

# Accelerating waves



# Connected public lighting: moving from dumb to smart network

## Traditional lighting operations



### Physical failure inspection

Scouting team drives during night to visually spot failures



### Paper-based mapping / archiving

Use paper maps and files to manage maintenance of lighting stock



### Undifferentiated lighting levels

Lights burn uniformly throughout night



### Estimation-based metering

As multiple entities are connected to the grid, energy consumption roughly estimated by the utility

## Intelligent lighting operations



### Remote monitoring

Lighting failures are automatically reported by system, saving time and costs



### Smart asset management

Digital system smartly plans and routes maintenance works to minimize street blockages



### Smart dimming / scene setting

Lights are dimmed during low-traffic hours to save energy or enhanced in problematic neighborhoods to improve safety



### Intelligent metering / billing

Smart meter accurately calculates energy consumption, taking into account varying rates; automatically bills all entities



## Efficient transportation



- 1 billion cars on the road today
- 4 billion projected by mid-century
- China: 100 km traffic jam lasts nine days in August 2012
- Sao Paulo, Brazil: traffic jams typically exceed 100 miles; average commute 2–3 hours
- By 2040, 75% of cars will be autonomous

Connected, intelligent cars could boost highway capacity by 273%



# Plan for next four weeks

- Review of undergraduate material
- Watch lectures/read slides from COSC4377
  - Cover approx. 5 lectures per week
- Discuss the material in the class
- Grab lectures from:  
<http://www2.cs.uh.edu/~gnawali/courses/cosc4377-s12/>