

# Computer Networks and Applications

COMP 3331/COMP 9331

LIC: A/Prof. Salil Kanhere  
Networked Systems and Security Group  
CysPri Lab

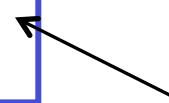
## Course Outline & Logistics

# Today's Agenda

- Course (non-technical) details
- Logistics: How we will roll
- What is this course about?
- Introduction to Computer Networks

# Website

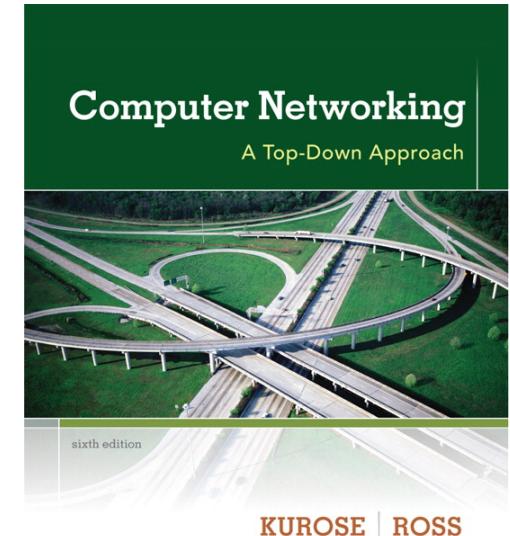
- <http://www.cse.unsw.edu.au/~cs3331>
- Everything is posted on the site
  - **Course Outline (PLEASE READ THIS THOROUGHLY)**
  - Lecture Notes
  - Echo 360 Recordings
  - Lab Schedules, Allocations and Locations
  - Assignments and Lab Exercises
  - Sample Problems
  - Information about Exams
  - Consultation Hours
  - Forum – For discussion
  - **Notices Section:** Your responsibility to check this from time to time (1-2 times per week) for important updates/changes to schedule
  - Nothing will be handed out in class



Very important

# Course Material

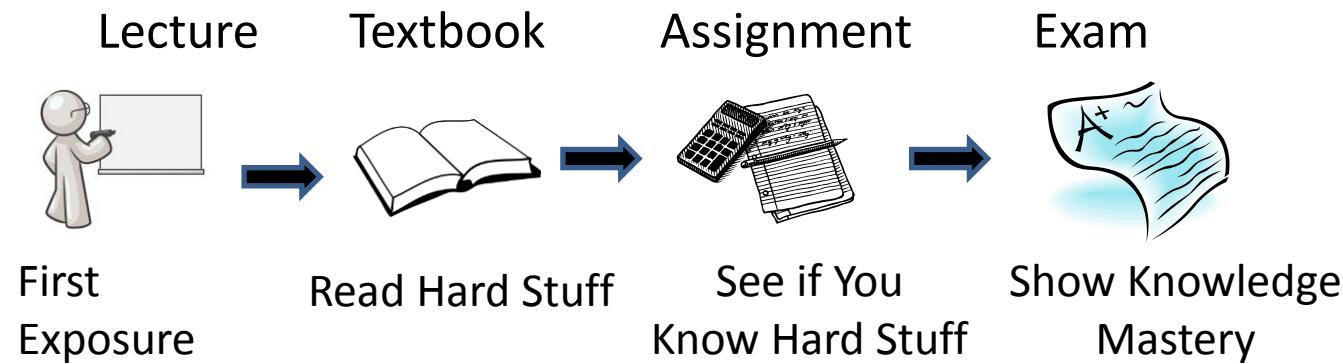
- *Computer Networking: A Top Down Approach*, Jim Kurose, Keith Ross, Addison-Wesley(Pearson), 6<sup>th</sup> Edition, 2012.
- Lecture Notes (on website)
- Links/articles on additional material
- Reference Books:
  - *Computer Networks: A Systems Approach*, Larry Peterson and Bruce Davie, Morgan Kaufmann, Fourth Edition, 2007.
  - *Unix Network Programming Volume 1 - Networking APIs: Sockets and XTI*, W. Richard Stevens, Prentice Hall, Second Edition, 1998 (Third Edition is out this year)
  - *Java Network Programming*, E. R. Harold, O'Reilly, Third Edition, 2004.
- Links to programming help



# Teaching Strategies

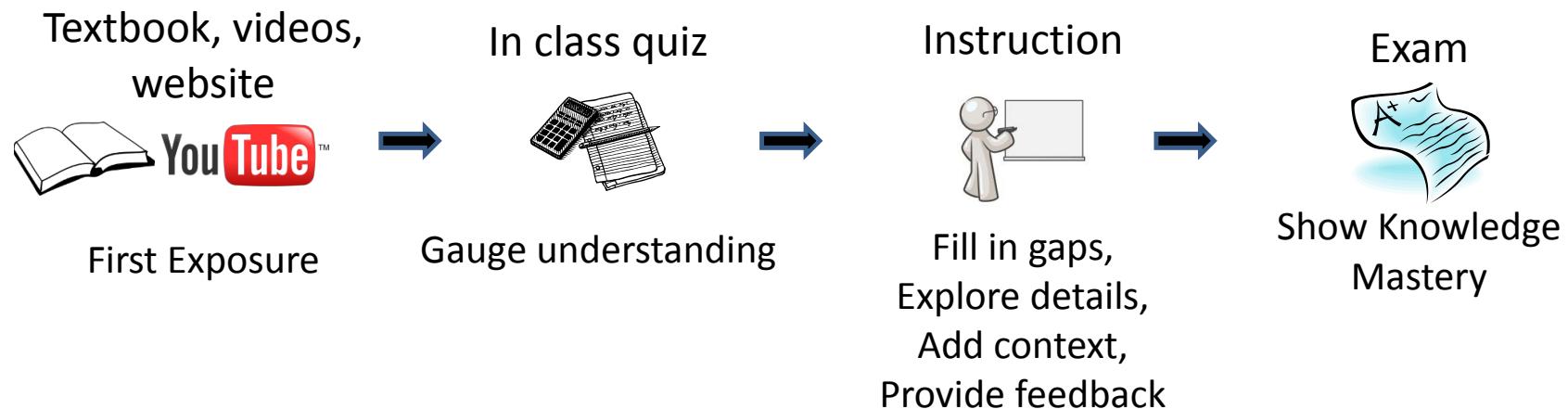
- Lectures
- Labs **REVISED**
  - Hands-on learning
- Assignments
  - U learn basic network programming and protocol design
  - C or Java or Python
- Sample Problems
  - U will gain problem solving skills

# Traditional Lectures



- Little opportunity for expert feedback and deeper insights

# Interactive Classes with Peer Instruction



- Parts of the lecture will be reserved for interactive, customized experiences
- Research on how people learn:
  - Everyone constructs their own understanding
  - To learn, you must actively work with a problem and construct your own understanding of it

# Peer Instruction



- I will pose carefully designed questions at various points of the lecture
- **Individually** – Think for yourself and select answer
- **Group discussions among students in teams of 3-4**
  - Analyse the problem
  - Discuss relevant solutions/challenges
  - Reach consensus – Entire group should select a common answer
  - Room should be LOUD
- **Class-wide discussion**
  - Led by you
  - Share answers with everyone
  - Your explanations are CRITICAL for fellow students' learning
- Continue discussions on the online forum

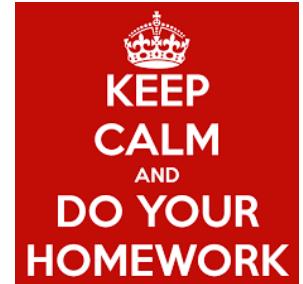


# Why Peer Instruction?

- You get a chance to think
- I get feedback as to what you understand
- It's less boring!
- Research shows it promotes more learning than traditional lectures



# Implications



- You will have to come prepared to the lecture by reading prescribed parts of the textbook/lecture notes (or watching videos)
- You will have to actively participate during lecture
- Certain (simpler) parts of the content will be left for self-study
- We will focus on challenging concepts, cutting-edge research, problem solving, etc. during the lectures
- You will get candy !!





## Quiz: The most useful super power for a college student would be:



A

Invisibility

B

Lots of \$\$\$

C

Telepathy

D

Weather

E: Some other power (be prepared to discuss)

# Labs

- 2 hour lab sessions starting **Week 2**
- Hands-on experiments
- Variety of networking tools to understand protocol behaviour and evaluate network performance
- NEW: Ns-2 network simulator for some exercises
- 9 lab sessions:
  - 7 Lab Exercises:
    - Marked
    - Lab Report to be submitted one week after your lab
  - 2 Tutorials (Week 5 & 12)
    - Help with problem solving
    - Prep for exams
- Schedule/exercises on the course web page
- Finalise your slot by end of Week 1



# Accounts

- Use your zid/zpass to log into CSE computers
- New to UNSW - <https://it.unsw.edu.au/students/zpass/index.html>
- You will be automatically added as a student to the course website. Log on using zid/zpass

# Getting help



- LiC's consultations
  - Monday 14 – 15
  - Wed 15 -16
  - Location: 612, Level 6, K17 (CSE)
- Lab tutors
- Your fellow students
- **Forum on course website – BEST OPTION**
  - Fellow students benefit from your questions
  - Fellow students can answer your questions
  - Develop a community
  - I will check the forum frequently



# Assessment

Component	Weight
Labs	20%
Programming Assignments	25%
Mid-semester Exam	20%
Final Exam	35%

**NOTE:** To pass the course, a student MUST receive at least 40% marks on the final exam

```

lab = marks for lab exercises (scaled to 20)
assign = marks for the two programming assignments (scaled to 25)
midExam = mark for the mid-semester exam (out of 20 marks)
finalExam = mark for the final exam (out of 35 marks)
mark = lab + assign + midExam + finalExam
grade = HD|DN|CR|PS if mark >= 50 && finalExam >= 14
          = FL           if mark < 50 || finalExam < 14
  
```

**DON'T BE A DOUCHEBAG!**

WRITE YOUR OWN GOD DAMNED CONTENT!

# Be original !!

- Collaboration
  - You may discuss approaches, not solutions
  - You must submit your own work
  - We strongly support discussions
- Plagiarism
  - Zero tolerance, don't do it



<https://my.unsw.edu.au/student/academiclife/Plagiarism.pdf>  
<https://student.unsw.edu.au/plagiarism>



# More about exams ....

- Mid-semester Exam (**20 marks**)
  - In-class during normal lecture hours (Week 6)
  - Includes material from Week 1 – Week 5
- Final Exam (**35 marks**)
  - Final Exam Period
  - Comprehensive coverage
- Both exams – **Closed book**
  - Critical thinking and problem solving questions
  - Not a memory test
  - Sample problem set released very 2 weeks
    - Please attempt these on your own, discuss with friends, forum
    - Solutions will be made available
  - Practice problems during lectures

# Pull back the curtain on the Internet



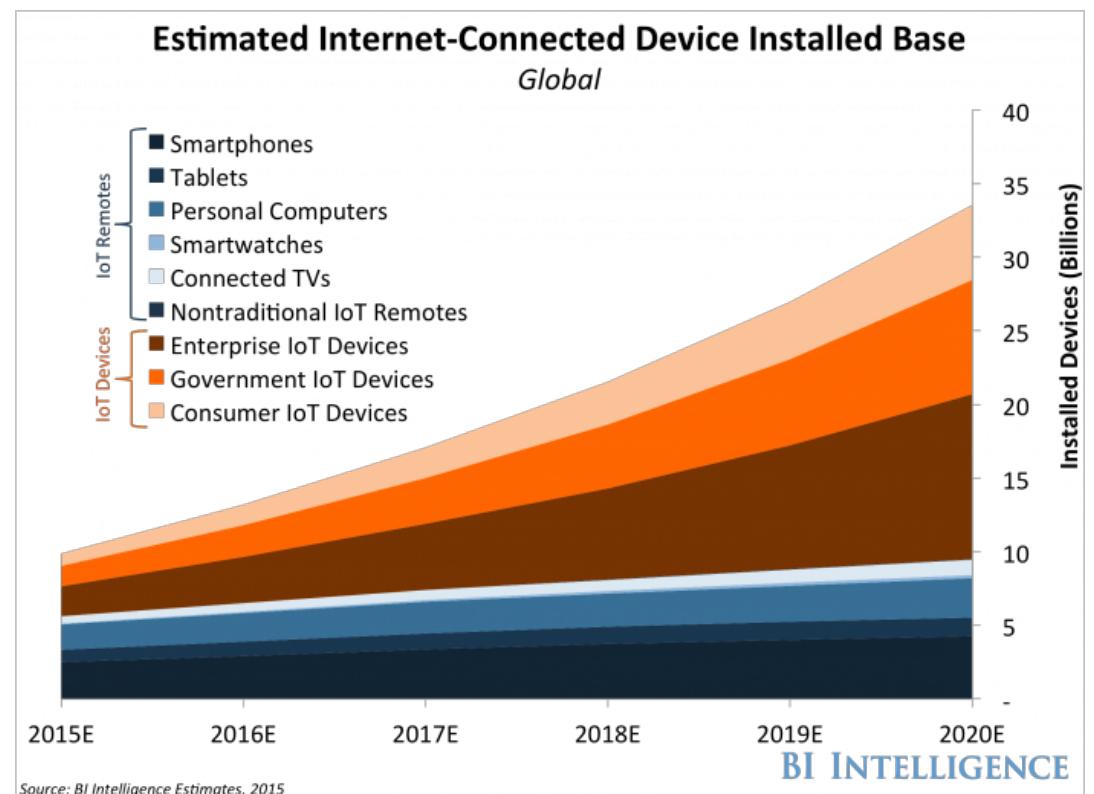


# Why should you care?

- To know how the Internet works
  - What may be wrong with your networks
  - When was the last time you went 24 hours without going online?
- Network architects get respect
  - In high demand, get paid well

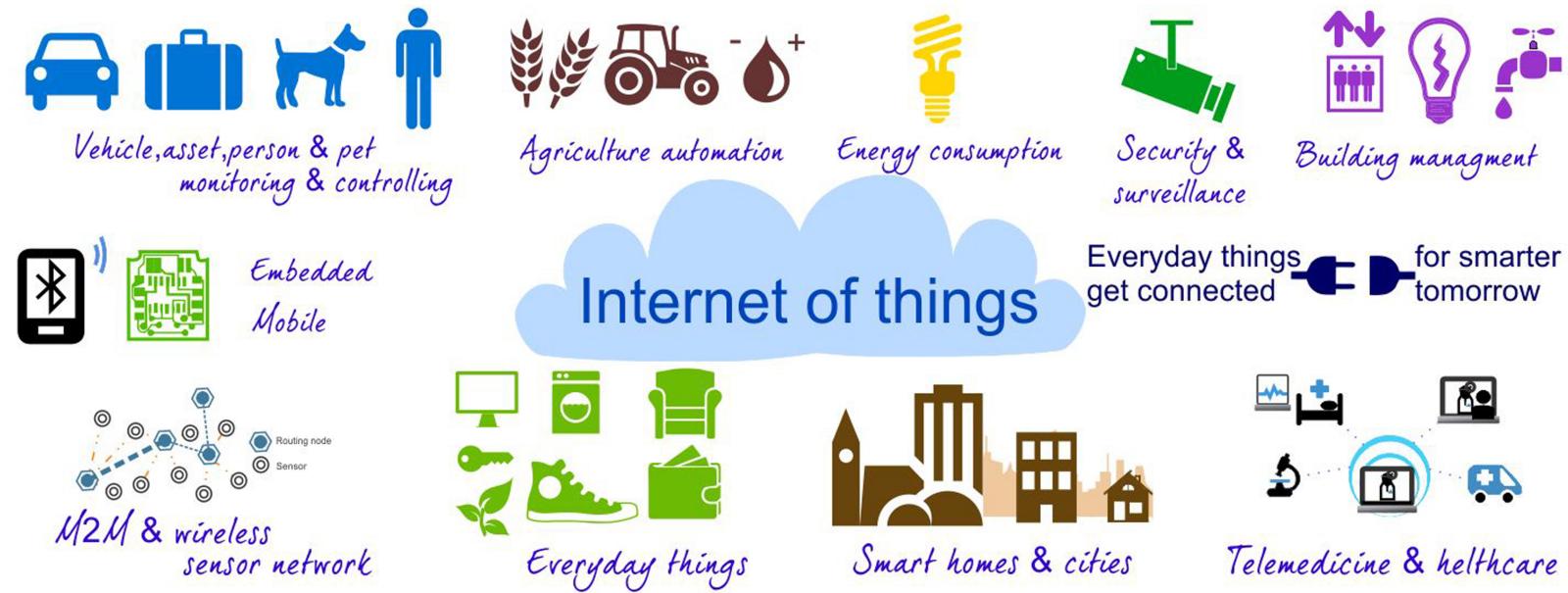
# The Internet is Exciting !

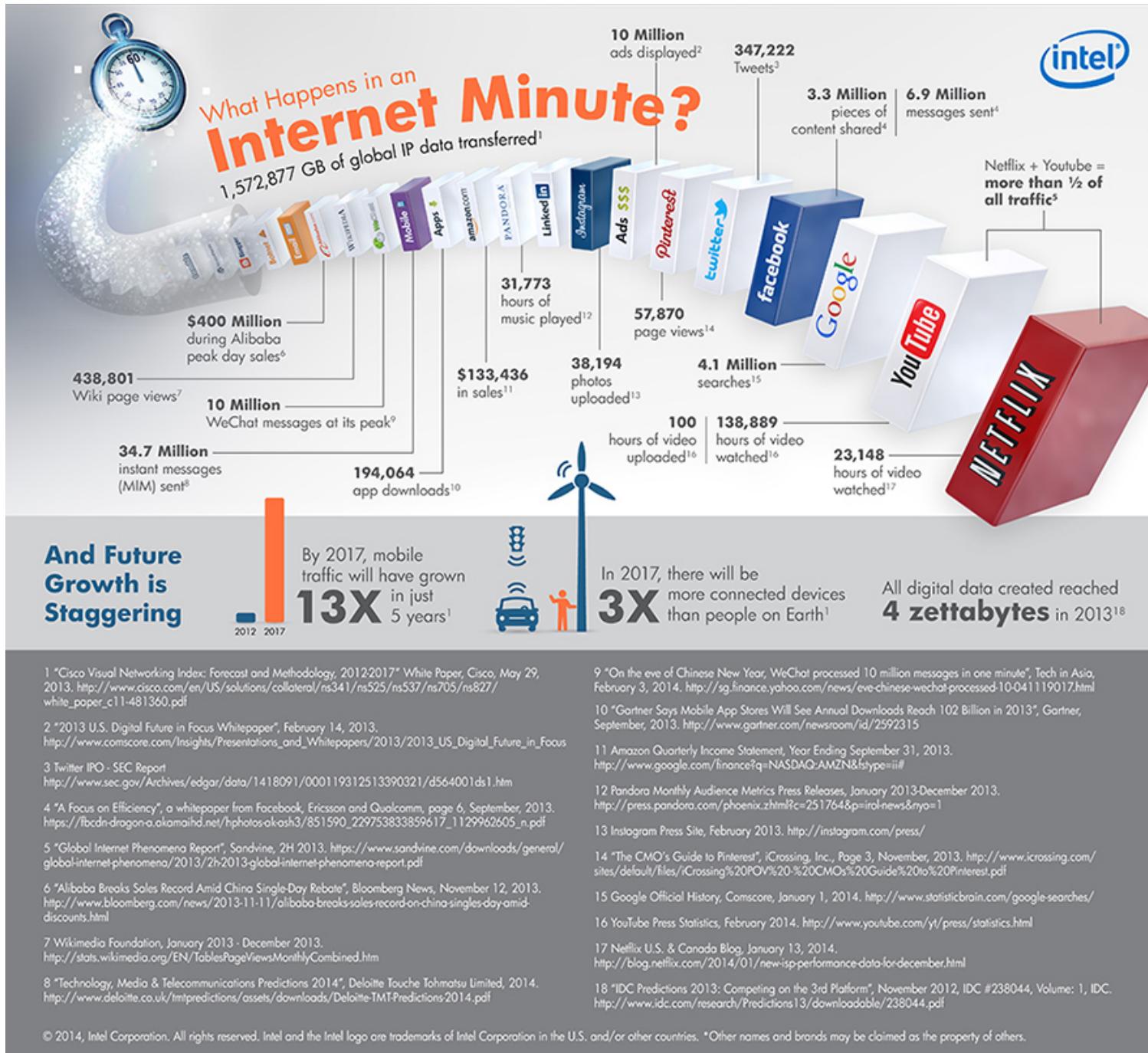
- Rapid growth and success
  - 1977: 111 machines on Internet
  - 1981: 213
  - 1983: 562
  - 1986: 5000
  - 1989: 10,000
  - 1992: 1,000,000
  - 2001: 150-175 million
  - 2002 > 200 million
  - 2011 > 2 billion
  - 2015 > 4 billion
  - 2020 – 20 billion devices (projection)



# The Internet is Exciting !

- Rapid growth and success

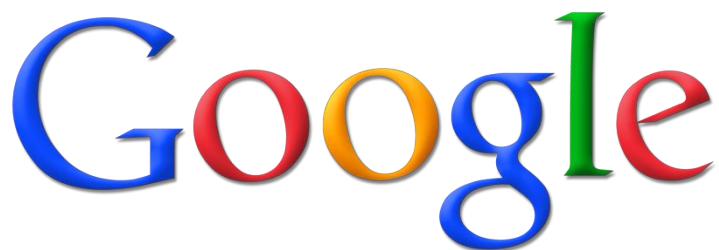




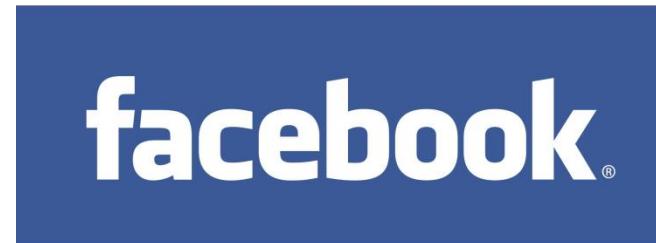
Source: Intel

# The Internet is Exciting !

- Rapid growth and success
- We're here at the beginning
  - Most of the growth happened in our lifetime
  - Engine of economic growth
  - Still TONS of untapped potential



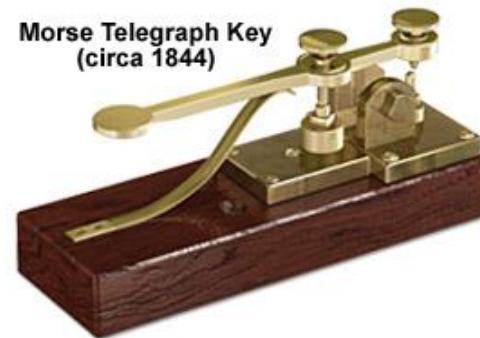
Founded in 1998



Founded in 2004

# The Internet is Exciting !

- Rapid growth and success
- We're here at the beginning
- Communication is empowering



# The Internet is Exciting !

- Rapid growth and success
- We're here at the beginning
- Communication is empowering



(Late 60s)



Course Outline

26

# What is this course about ?



1. To learn how the Internet works
  - What really happens when you “browse the Web”?
  - What are TCP/IP, DNS, HTTP, NAT, VPNs, 802.11, .... anyway?

# What is this course about ?

1. To learn how the Internet works
  - What really happens when you “browse the Web”?
  - What are TCP/IP, DNS, HTTP, NAT, VPNs, 802.11, .... anyway?
2. To learn the fundamentals of computer networks
  - What hard problems must they solve?
  - What design strategies have proven valuable?
  - How do we evaluate network performance?

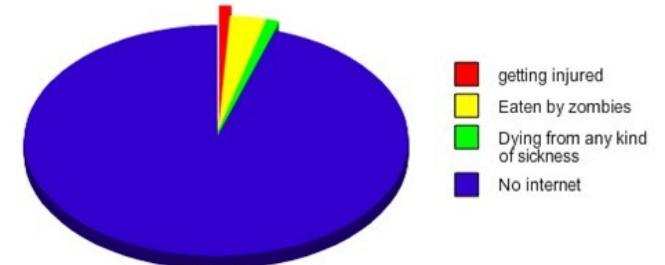
# Why learn the fundamentals?

**Worst things in a Zombie Apocalypse!**

- Applicable to all computer networks

- Intellectual interest

- Change/reinvention



 GraphJam.com

- Today's Internet is different from yesterday's
- And tomorrow's will be different again
- But the fundamentals remain the same

# Pre-requisites



- Good understanding of algorithms, data structures and basic probability
- Proficient in programming: C, Java or Python

**This is a first course in computer networks**

## Where do I go from here?

- COMP 9332: Network Routing and Switching
- COMP 9334: System Capacity and Planning
- COMP 3441/9441: Security Engineering
- COMP 4336/9336: Mobile Data Networking
- COMP 4337/9337: Securing Wireless Networks
- COMP6733: Internet of Things Experimental Design Studio
- Thesis Projects
- Research (Master's, PhD)

