Lecture 01-1: Introduction

CS 356 Computer Networks

Mikyung Han

Outline

1. Intro
2. Administrivia
3. Why computer networks?
4. Course goals

Please, interrupt and ask questions AT ANY TIME !

Grading

- **Participation: 12%**
  - Pre-class/in-class activities: total available 120 pts/max possible 100 pts
    - Videos, reading, instapoll, kahoot, this and that
    - 20% buffer accounts for sickness, emergency, etc
  - Breakout Group discussion participation: 20 pts
    - Peer review
    - Self-signup via Canvas group

Grading

- Participation: 12%
- Programming Projects and Labs: 33%
  - 2 Socket programming projects (P1: 100 pts, P2: 180 pts)
  - 1 Mininet lab (50 pts each)
  - Pair programming
  - All in python

Grading

- Participation: 12%
- Programming Projects and Labs: 33%
- Hands-on experiments: 3%
  - Experimenting with DNS Dig
  - Pair or solo

Grading

- Participation: 12%
- Programming Projects and Labs: 37%
- Hands-on experiments: 3%
- Exercises 12%
  - 10 of them, 15 pts each
  - Drop the lowest two
  - Practice exam questions

Grading

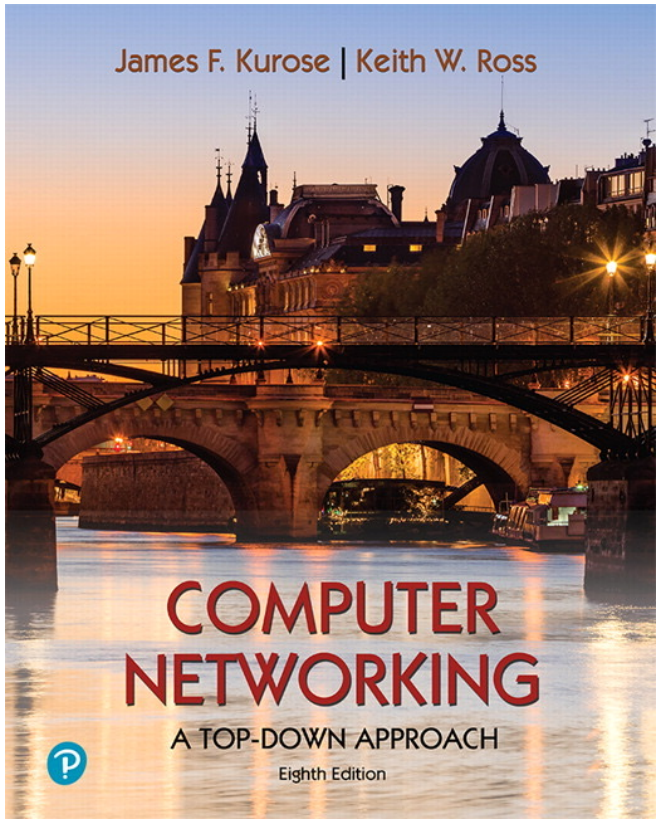
- Participation: 12%
- Programming Projects and Labs: 37%
- Hands-on experiments: 3%
- Exercises 8%
- Exams 40%
  - 2 Midterms (200 pts)
  - Adjustments: (Max {Mid1, Mid2} + Avg {Mid1, Mid2})

Exam Scheduled

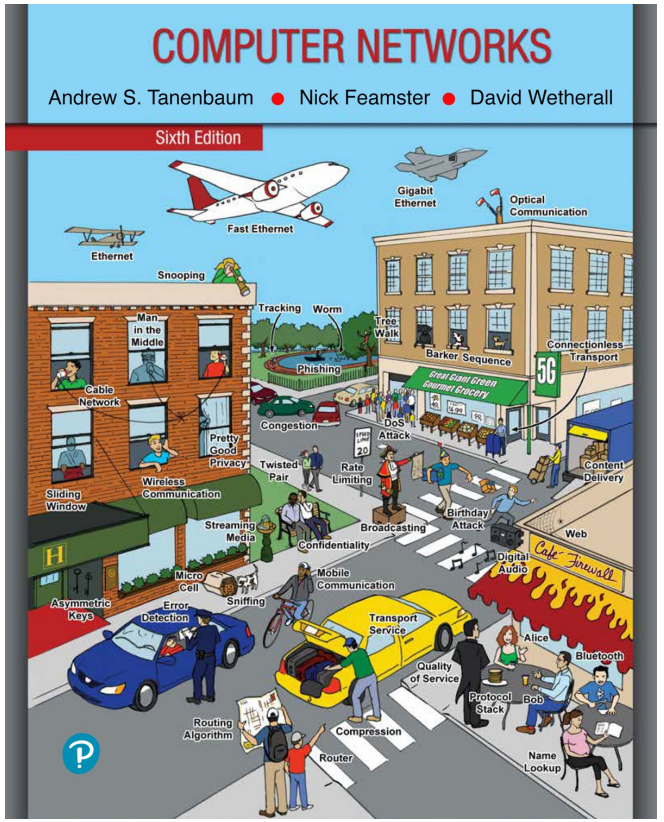
- **Exam 1: 3/9 Thurs 6-9 PM**
  - No lecture on 3/9 Thursday at 9:30 AM/11 AM
- **Exam 2: 4/20 Thursday 6-9 PM**
  - No lecture on 4/20 Thursday at 9:30 AM/11 AM

Mark your calendar! Report any conflicts ASAP

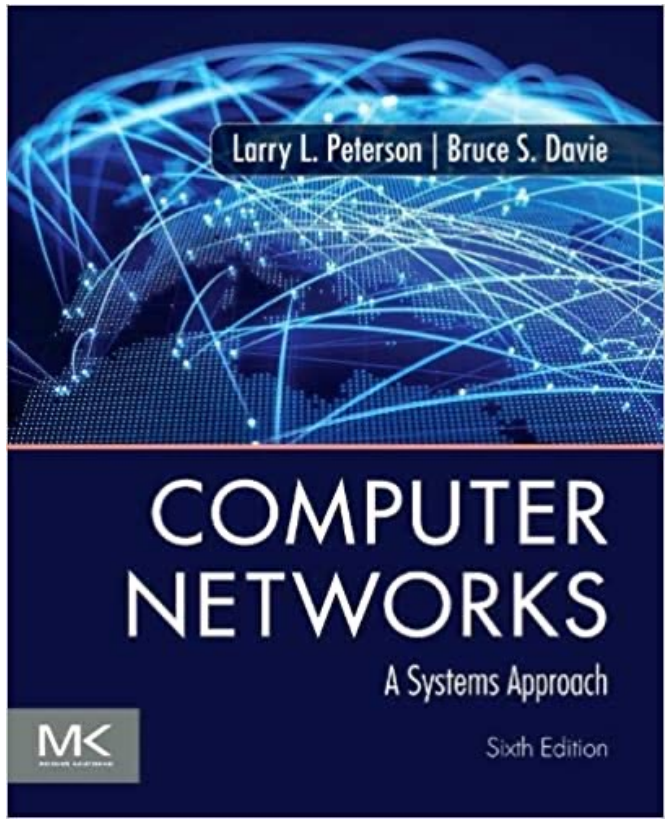
Textbooks



Required, 8th Edition



Recommended, 6th Edition



Optional, Open source

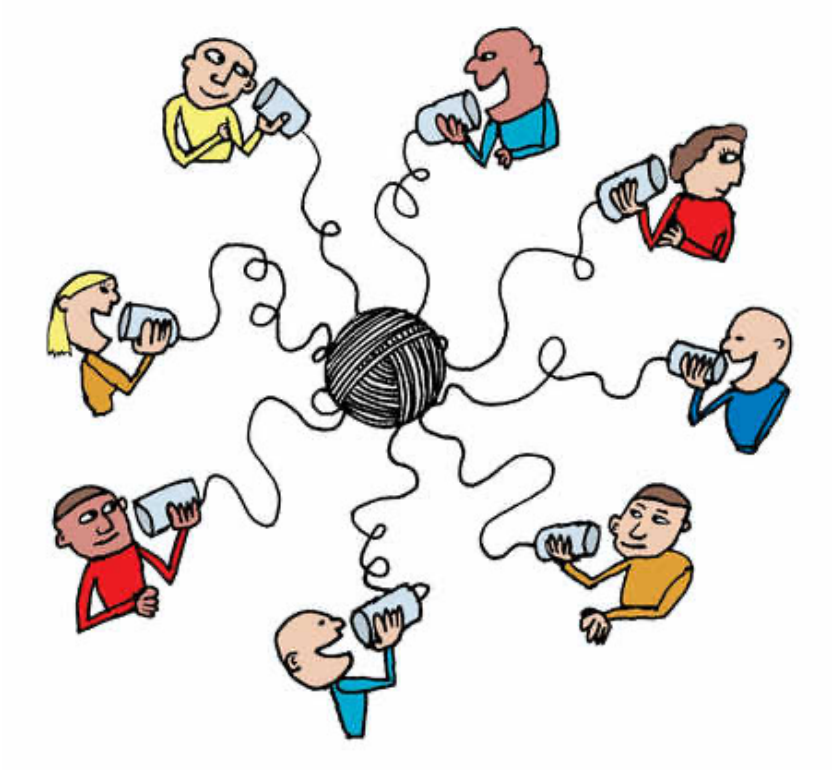
Outline

1. Intro
2. Administrivia
3. Why computer networks?

Why did you pick CS356?

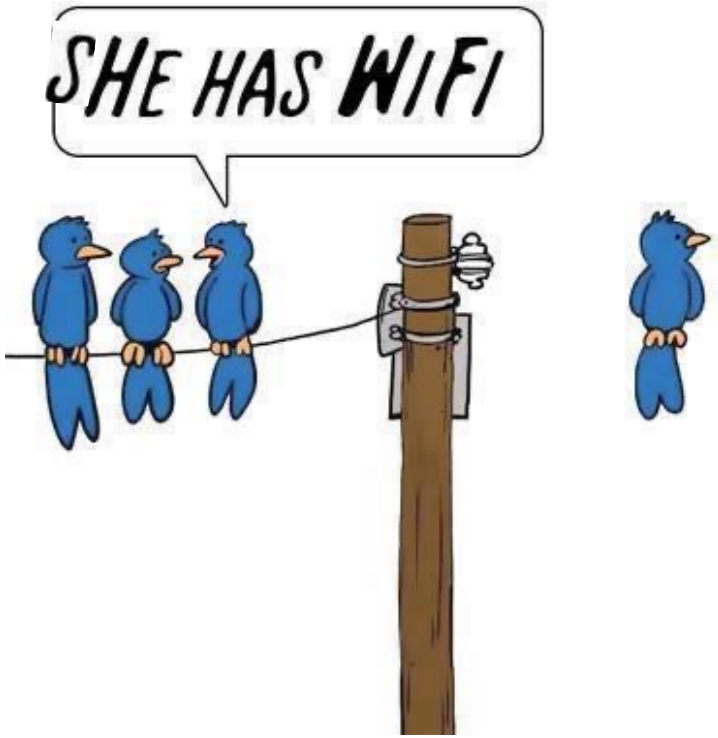
Why did I pick Computer Networks?

At the end of the day…



it's a field that connects people!

Why did I pick Wireless Networks?



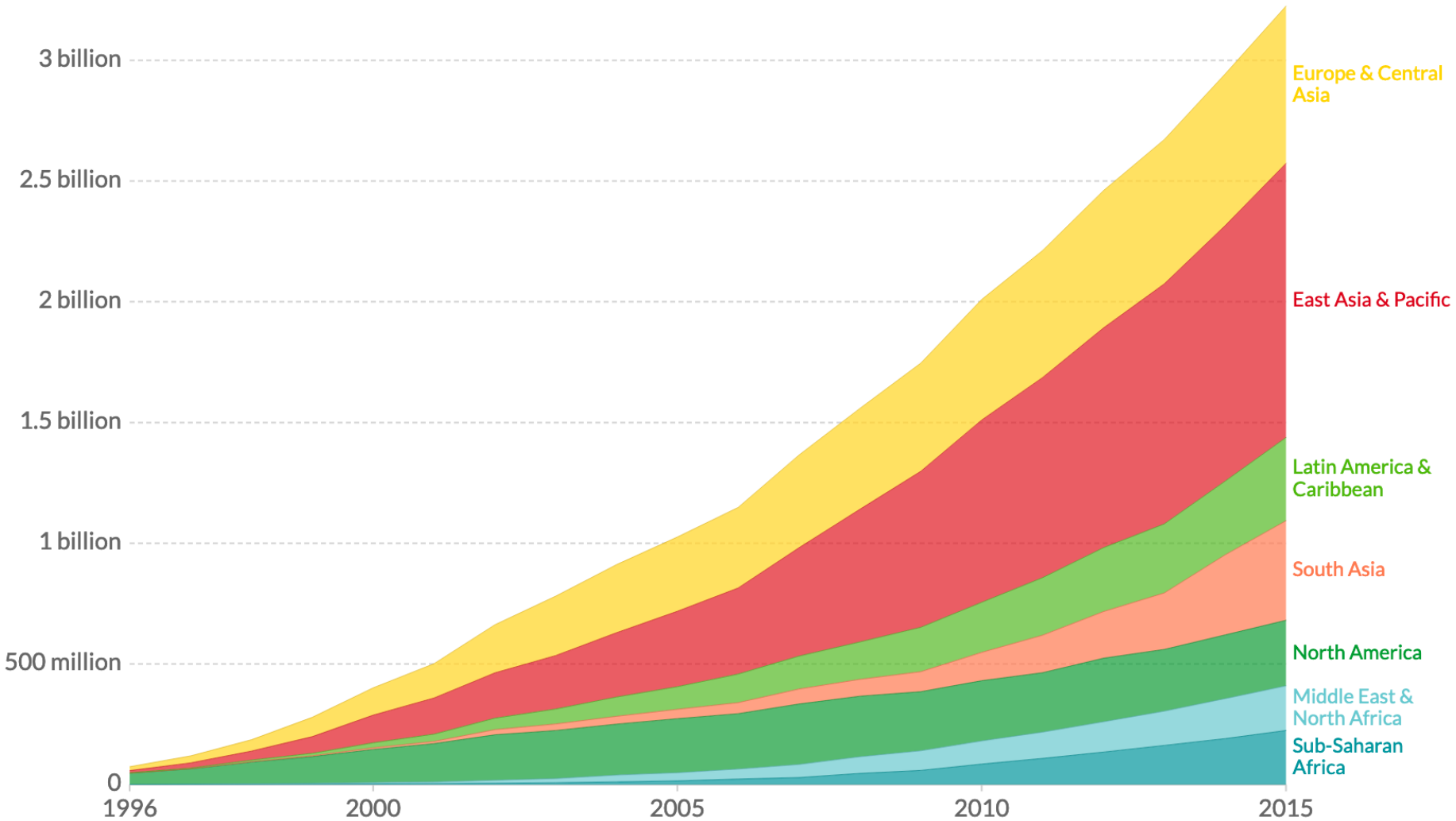
…will be sharing more in CS356R!

Also, its ever-growing/ever-evolving nature fascinated me

Internet users by world region

Our World in Data

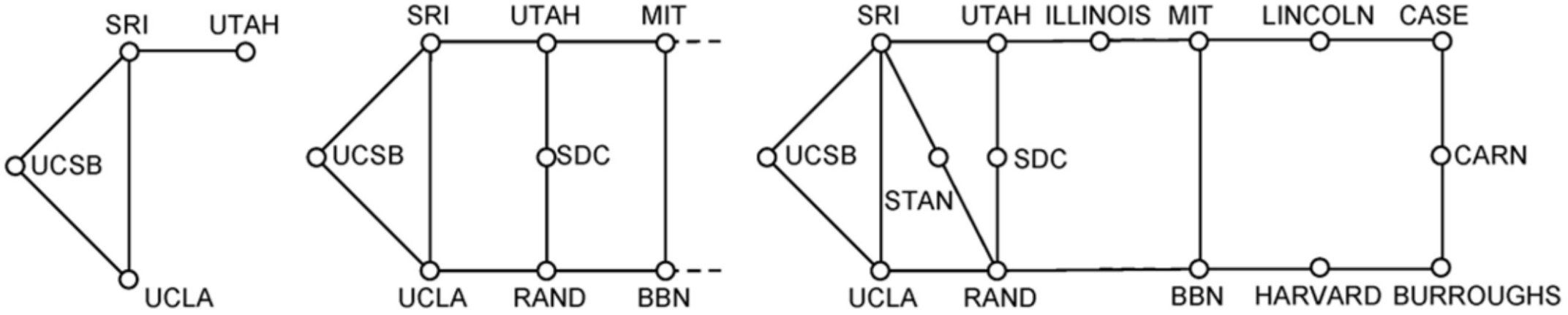
☐ Relative



Source: Science and Technology - World Bank (2016)

OurWorldInData.org/internet/ • CC BY

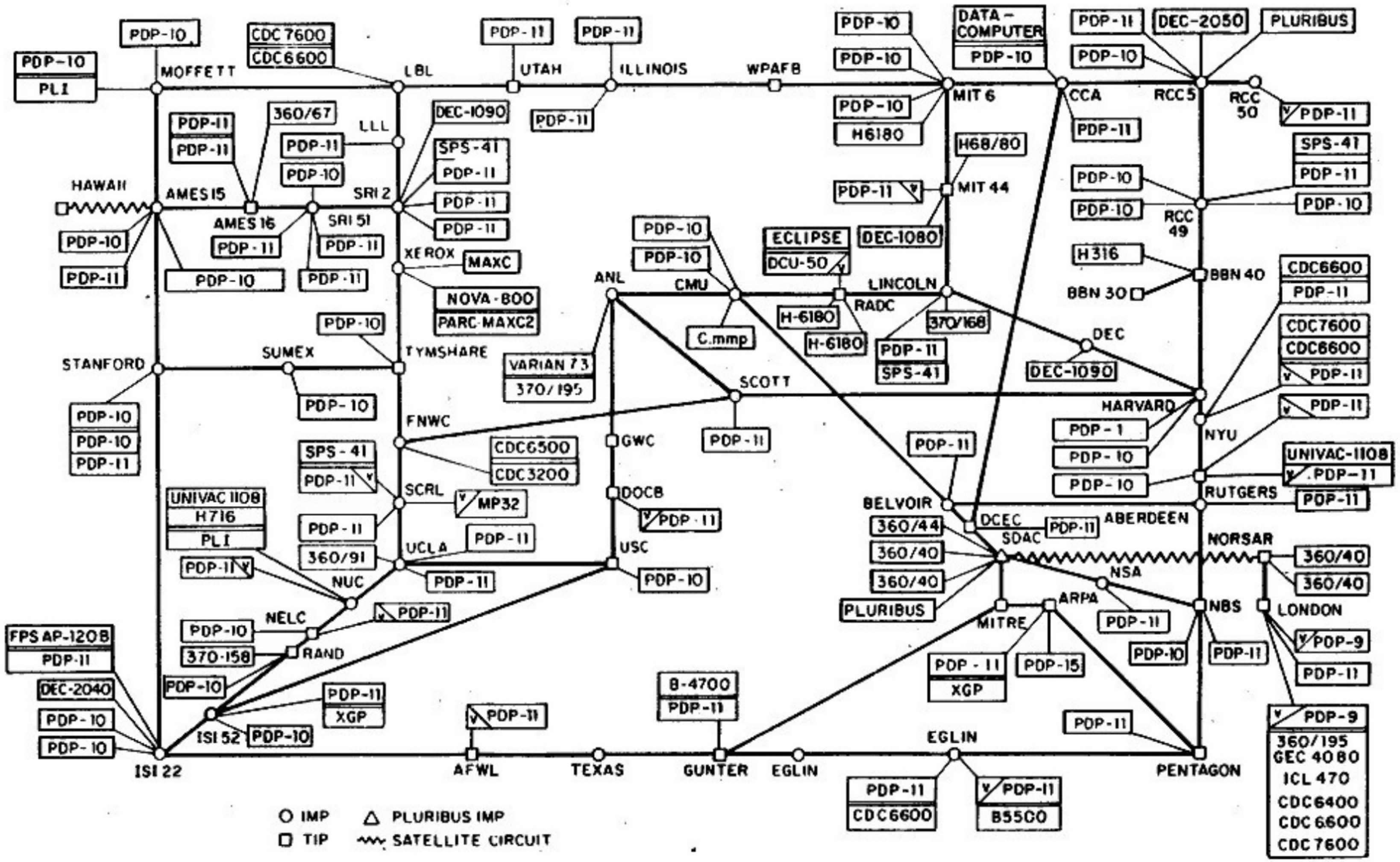
From this experimental network (~1970)



(a) Dec. 1969. (b) July 1970. (c) March 1971.

To this

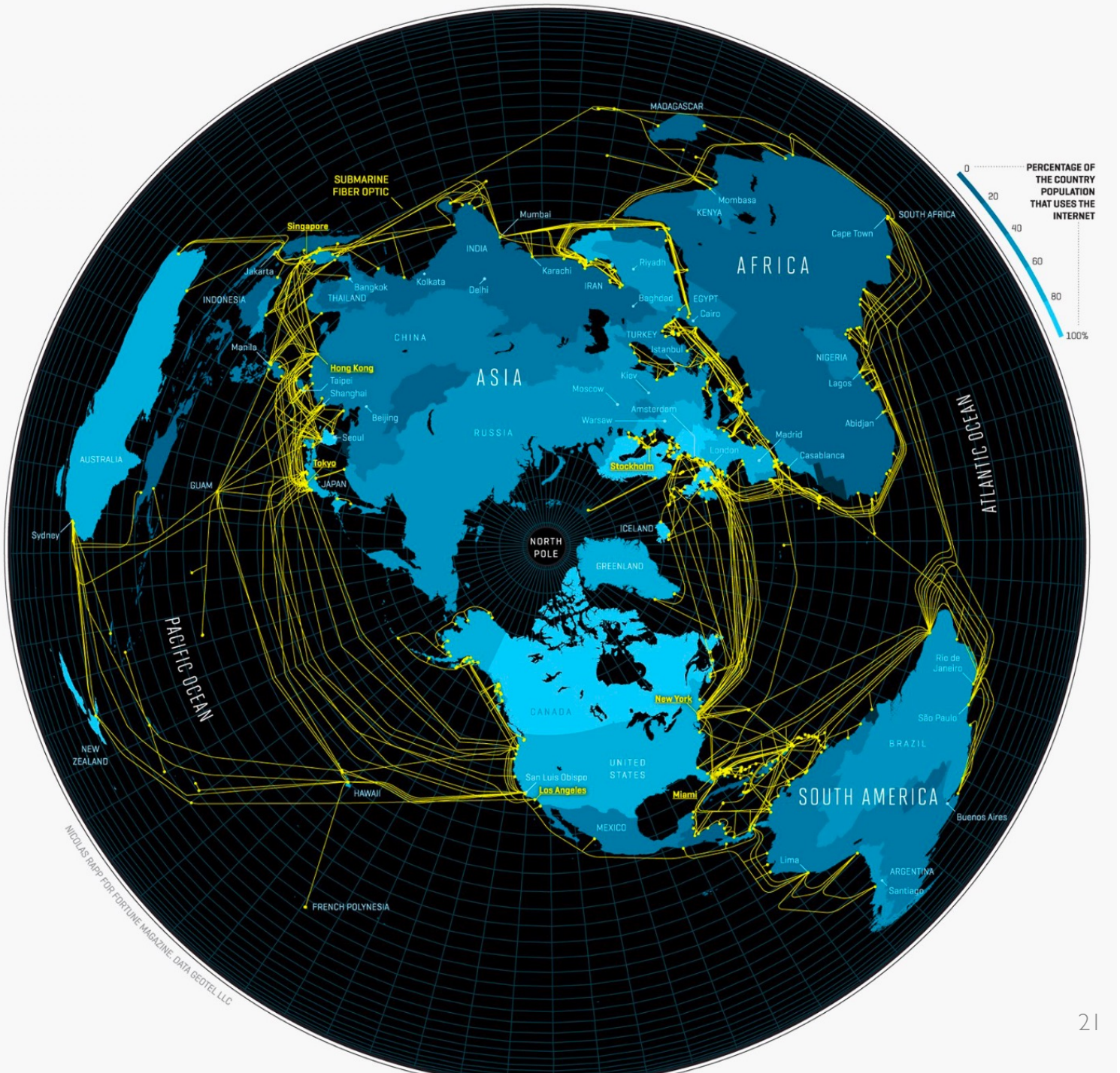
ARPANET LOGICAL MAP, MARCH 1977



(PLEASE NOTE THAT WHILE THIS MAP SHOWS THE HOST POPULATION OF THE NETWORK ACCORDING TO THE BEST INFORMATION OBTAINABLE, NO CLAIM CAN BE MADE FOR ITS ACCURACY)

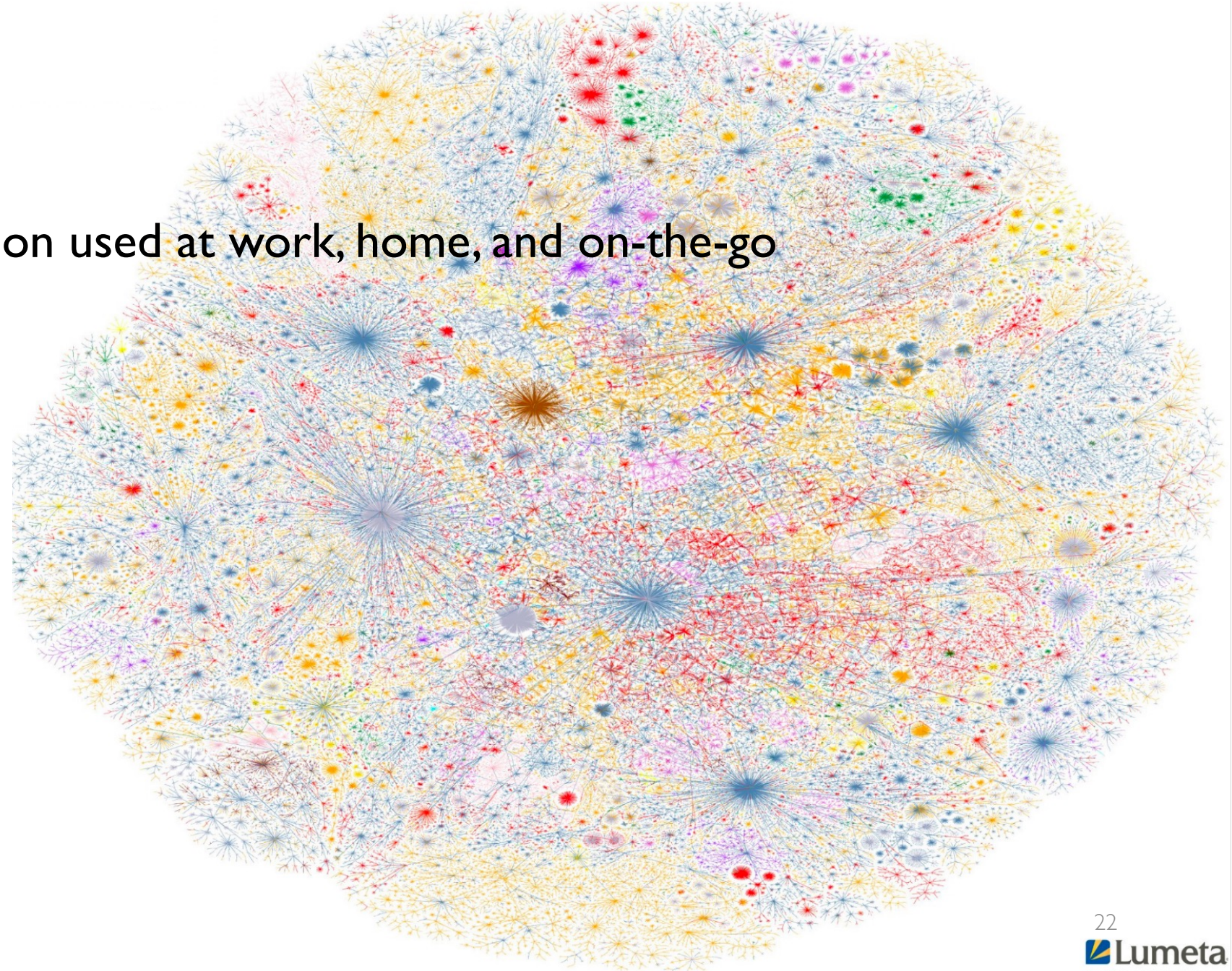
NAMES SHOWN ARE IMP NAMES, NOT (NECESSARILY) HOST NAMES

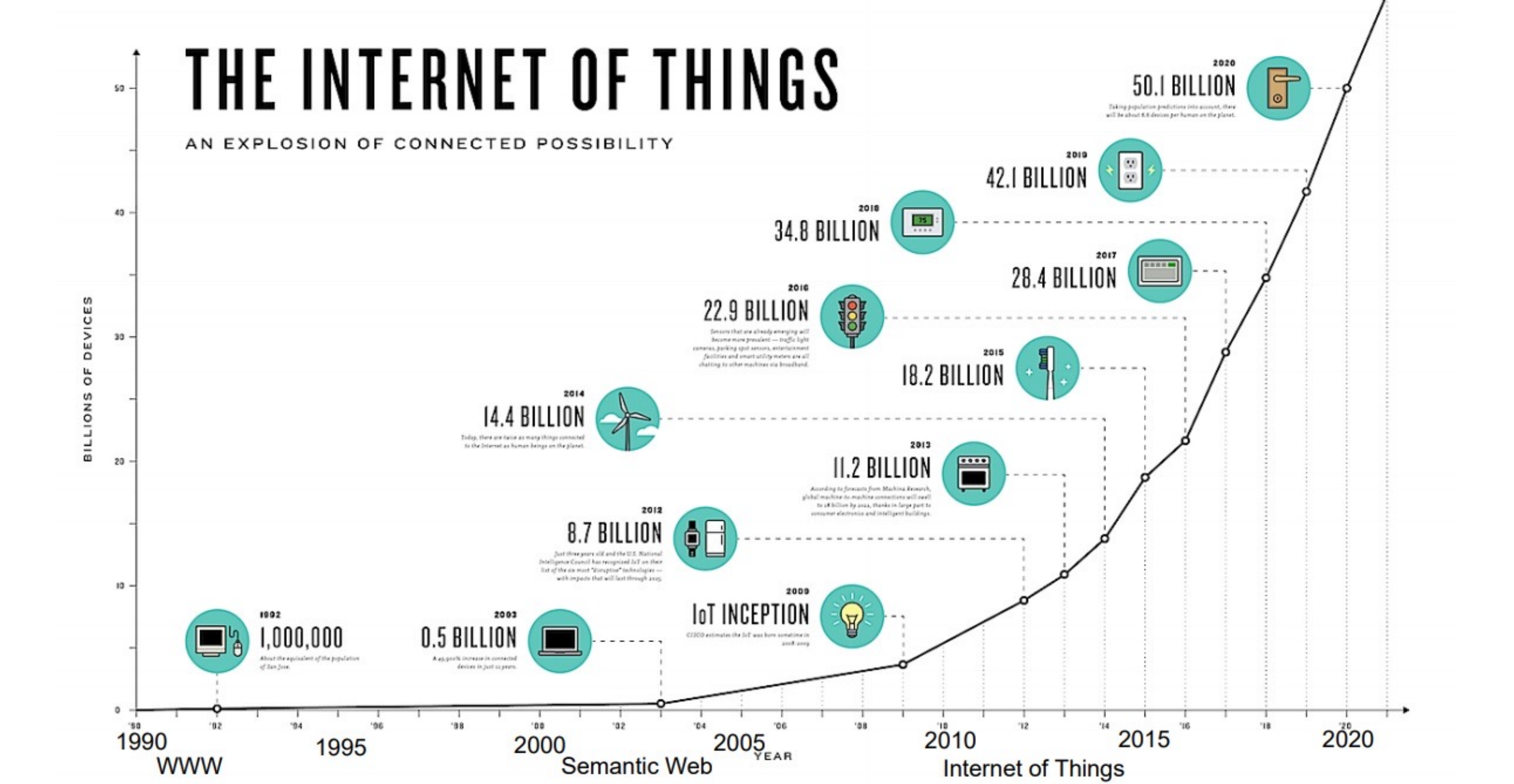
To this! (2011)


SUBMARINE FIBER OPTIC
PERCENTAGE OF THE COUNTRY POPULATION THAT USES THE INTERNET
0
20
40
60
80
100%
MADAGASCAR
Mombasa
KENYA
SOUTH AFRICA
Cape Town
AFRICA
Singapore
Mumbai
INDIA
Karachi
Riyadh
Jakarta
Bangkok
THAILAND
Kolkata
Delhi
IRAN
Baghdad
EGYPT
Cairo
INDONESIA
CHINA
TURKEY
Istanbul
Manila
Hong Kong
Taipei
Shanghai
ASIA
Kiev
Moscow
NIGERIA
Lagos
Amsterdam
Warsaw
Beijing
Abidjan
RUSSIA
Madrid
Seoul
London
Casablanca
AUSTRALIA
Tokyo
Stockholm
JAPAN
GUAM
ATLANTIC OCEAN
ICELAND
Sydney
NORTH POLE
GREENLAND
Rio de Janeiro
New York
CANADA
São Paulo
PACIFIC OCEAN
BRAZIL
NEW ZEALAND
UNITED STATES
San Luis Obispo
Los Angeles
Miami
HAWAII
SOUTH AMERICA
Buenos Aires
MEXICO
Lima
ARGENTINA
Santiago
FRENCH POLYNESIA
NICOLAS RAPP FOR FORTUNE MAGAZINE. DATA GEOTEL LLC

To this! (2015)

- An everyday institution used at work, home, and on-the-go
- millions of servers
  - Red = .com,
  - Yellow= .org
- 3 billion+ people
- 50 billion+ devices





70's: TCP/IP
80's: Internet

By Blake Irving: Based on CISCO Data

Finally, the Internet has many interesting and practical problems to solve! ☺

- Each agent knows its own state only (must infer other's state)
- Heterogenicity on links, hosts, and applications
- High availability and scalability
- Security and privacy
- Possibility of errors at any point adds a significant level of difficulty

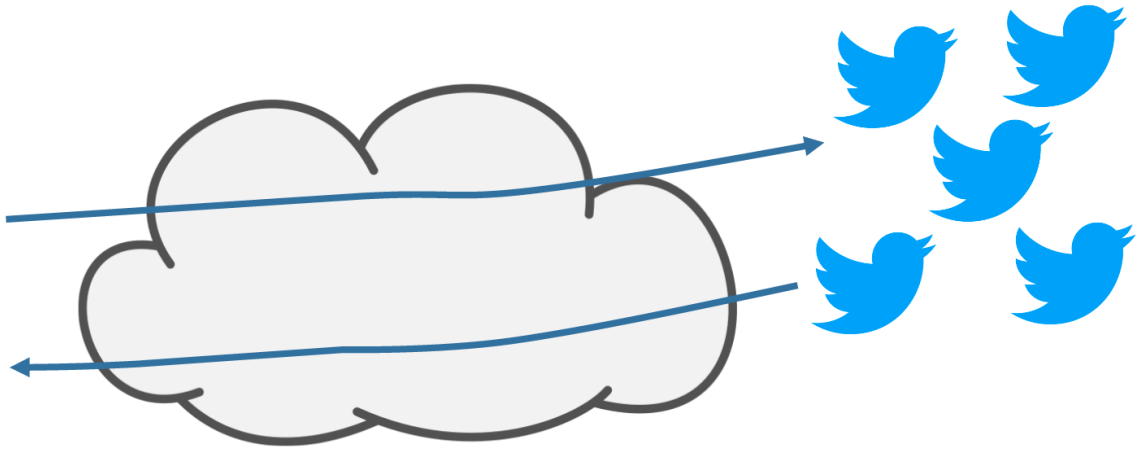
Sounds like a LOT of job/paper/market opportunities!

Outline

1. Intro
2. Administrivia
3. Why computer networks?
4. Course goals
5. Reminders

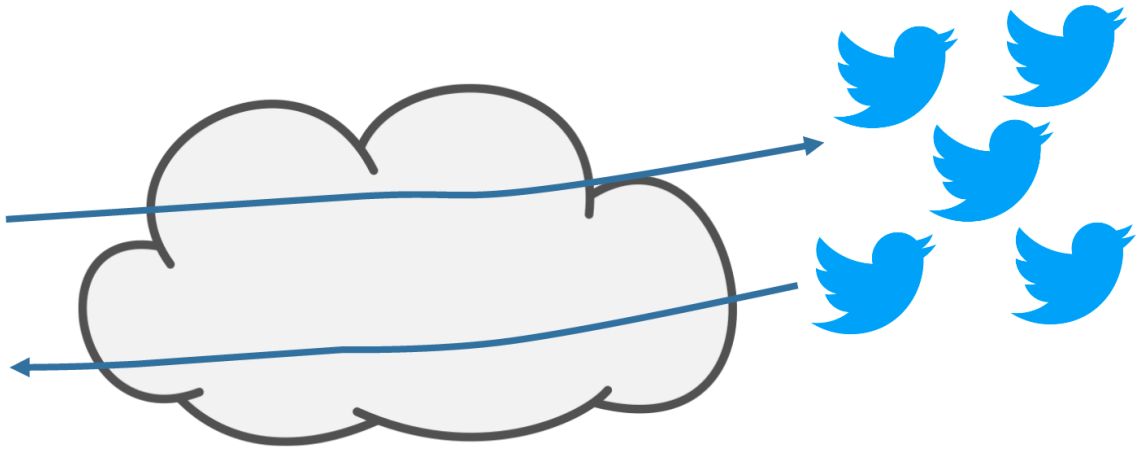
BTS Jungkook's post reached 1M people in just 10 min!

Video of Jeon Jungkook singing Lauv's "Never Not" via Twitter (@BTS_twt)



One: Learn HOW Internet works

Video of Jeon Jungkook singing Lauv's "Never Not" via Twitter (@BTS_twt)



What really happened before/after JK clicked the "tweet" button?

Two: Understand WHY behind the Internet design

Internet Reference Model

Example Protocols		Responsible for
FTP, HTTP, SMTP	Application	application specific needs
TCP, UDP	Transport	process to process data transfer
IP	Network	host to host data transfer across different network
Ethernet, WiFi	Link	data transfer between physically adjacent nodes
802.3 PHY	Physical	bit-by-bit or symbol-by-symbol delivery

Three: Know the fundamentals of computer networks

- Today's Internet is different from yesterday's
- Tomorrow's will be different again

But the fundamentals remain the same!

Any questions regarding the course?