Lecture 01-1: Introduction

CS 326E

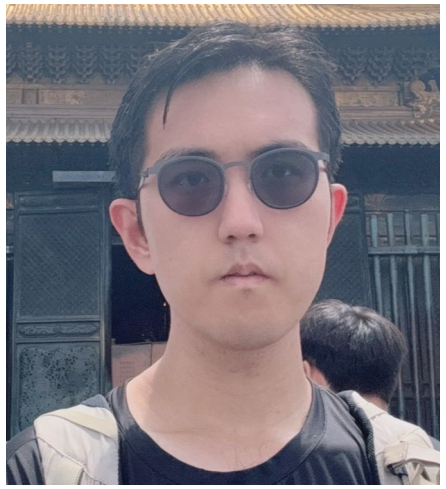
Elements of Networking

Mikyung Han

Please, interrupt and ask questions AT ANY TIME !

Course Staff

TA



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TA

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Instructor

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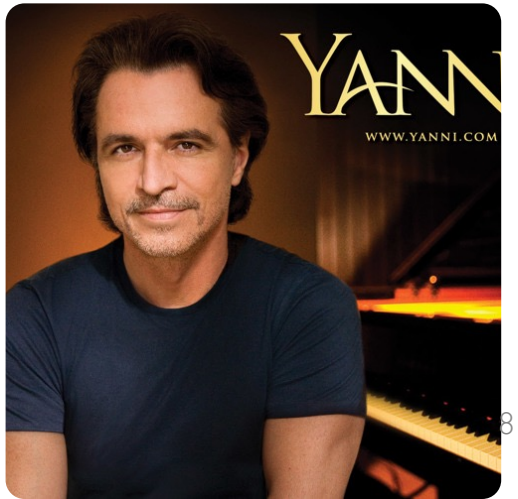
All reachable via cs326e-staff@cs.utexas.edu

Shuozhe Li

- I'm a third year PhD student.
  Just finish undergrad at UT!

- My research interests are wireless networks and Internet. I have done studies in Wireless Sensing.

- I love to listen to Yanni and classic music.
- I hope to make some new friends.



Yunpeng Bai

- I'm Yunpeng Bai, a first-year PhD student
- I specialize in computer vision and computer graphics.
- I like to use computer algorithms to make cool visual content and have published several papers at top conferences

Your turn!

- Turn to your neighbor
- Share your name and major and one interesting fact about yourself
- Tell why you picked CS 326E among other electives

Outline

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

Grading

- **Participation: 10%**
  - Pre-class/in-class activities: total available 105 pts/max possible 84 pts
    - Videos, reading, kahoot, this and that
    - Note there is 20% buffer which will accounts for sickness, emergency, etc

Grading

- Participation: 10%
- Programming Projects and Labs: 35%
  - 2 programming projects in python (250 pts)
  - 3 Hands-on experiments (100 pts)
  - Programming projects will be done in pairs
  - Hands-on experiments are individual work

Grading

- Participation: 10%
- Programming Projects and Labs: 35%
- Exercises: 15%
  - Typically Canvas Quiz
  - One socket programming EX
  - Total 12 of them, 15 pts each
  - Drop the lowest two

Grading

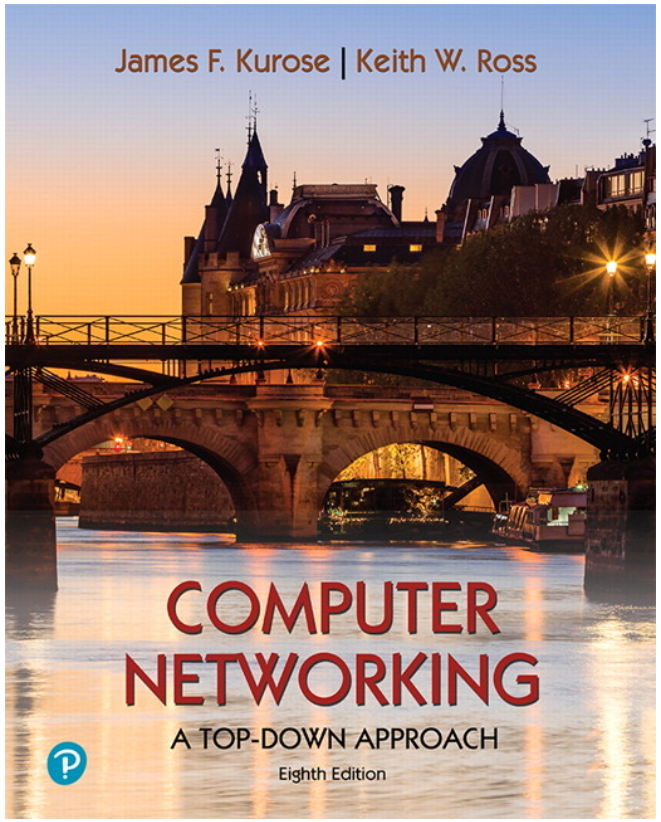
- Participation: 10%
- Programming Projects and Labs: 35%
- Exercises: 15%
- Exam 40%
  - 2 Exams, 200 pts each
  - Adjustments: Max {Exam1, Exam2} + Avg {Exam1, Exam2}

Exam Scheduled

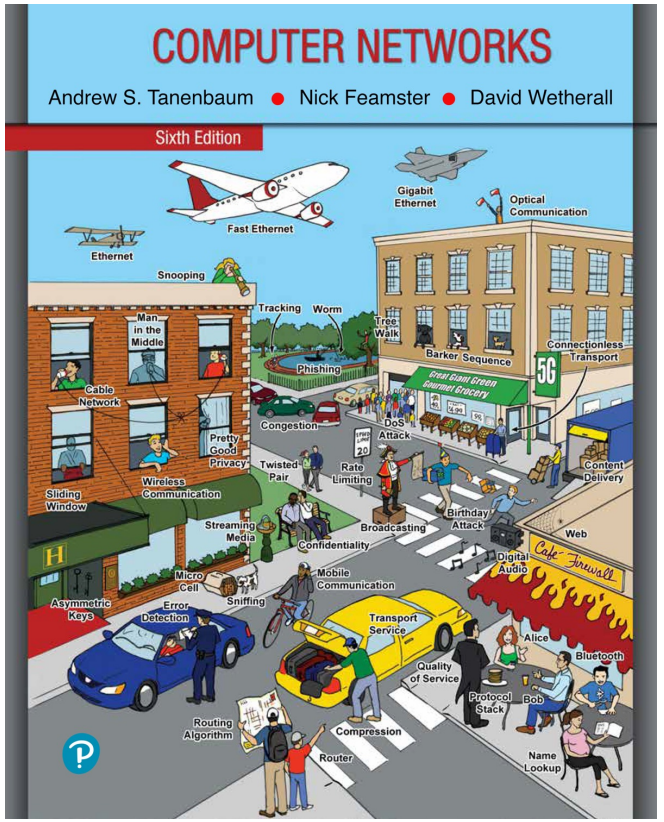
- **Exam 1: 10/10 Thurs 6-9 PM**
  - No lecture at 11 AM or 12:30 PM
- **Exam 2: 12/5 Thurs 6-9 PM**
  - No lecture at 11 AM or 12:30 PM

Mark your calendar! Report any conflicts ASAP

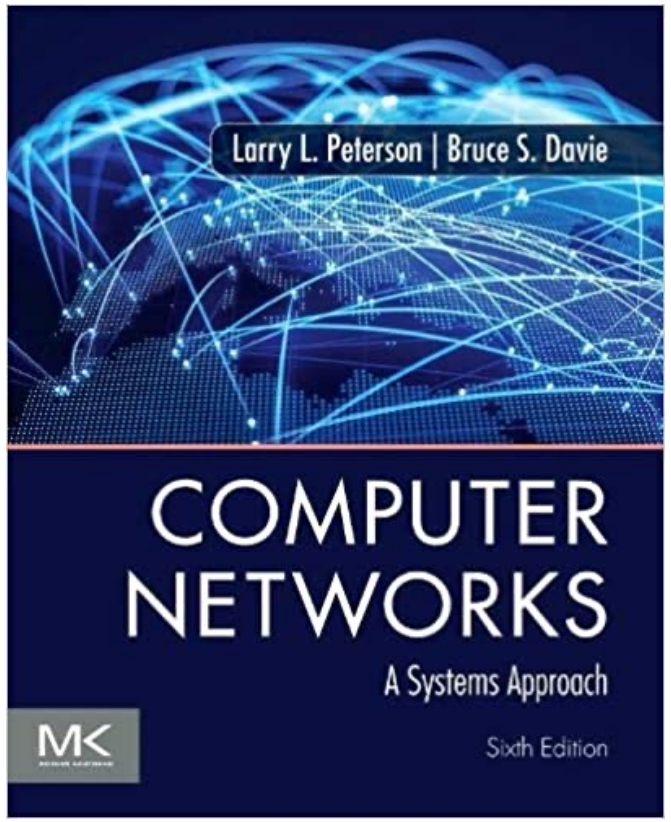
Textbooks



Required, 8th Edition



Optional, 6th Edition



Optional, Open source

Tentative Plan

- Week 1: Computer Networks Overview
- Week 2-3: Application Layer
- Week 4-6: Transport Layer
- Week 7-9: Network Layer
- Week 10-12: Link Layer and Wireless Networks
- Week 13-14: Network Security
- Week 15: Network Management

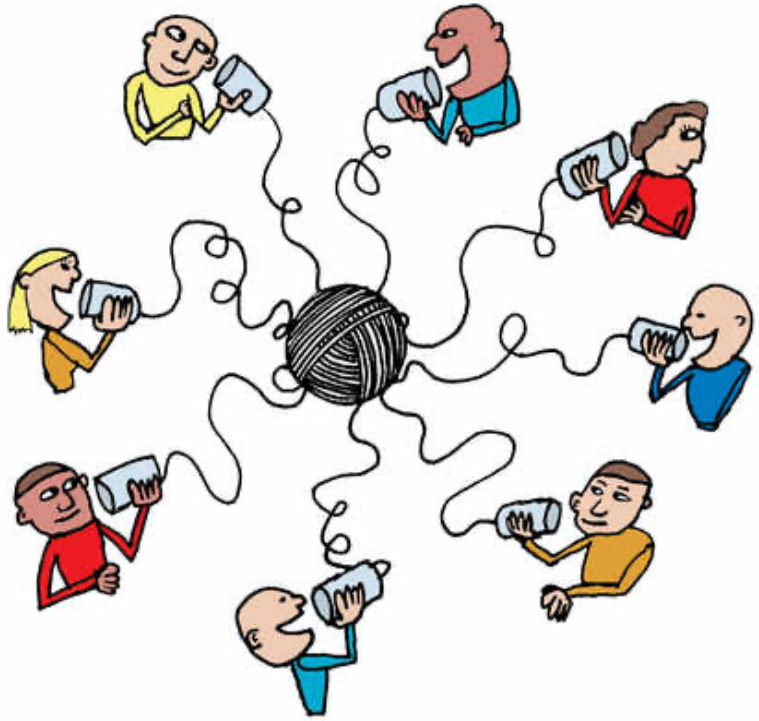
Outline

1. Intro
2. Administrivia
3. Why networking?

Why did you pick CS 326E?

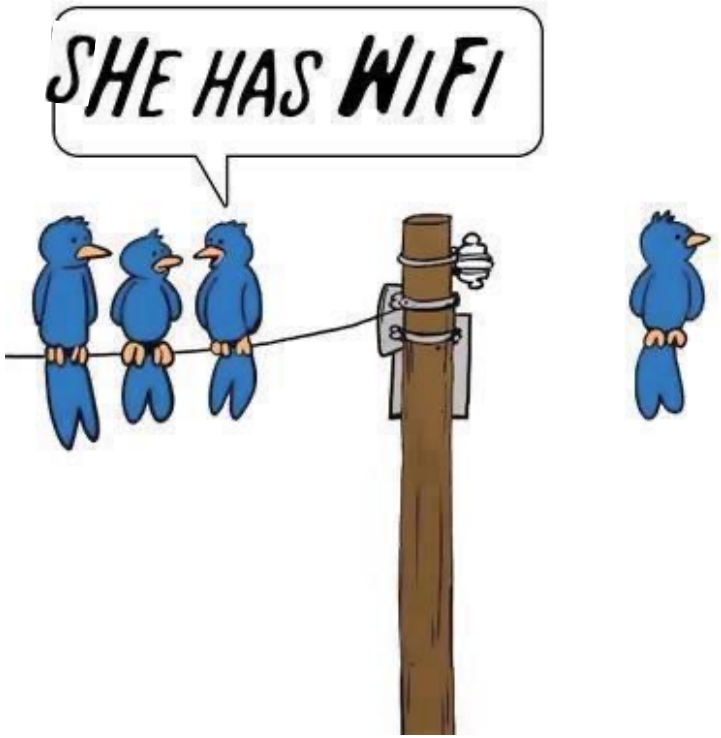
Why did I pick Computer Networks?

At the end of the day…



it's a field that connects people!

Why did I pick Wireless Networks?

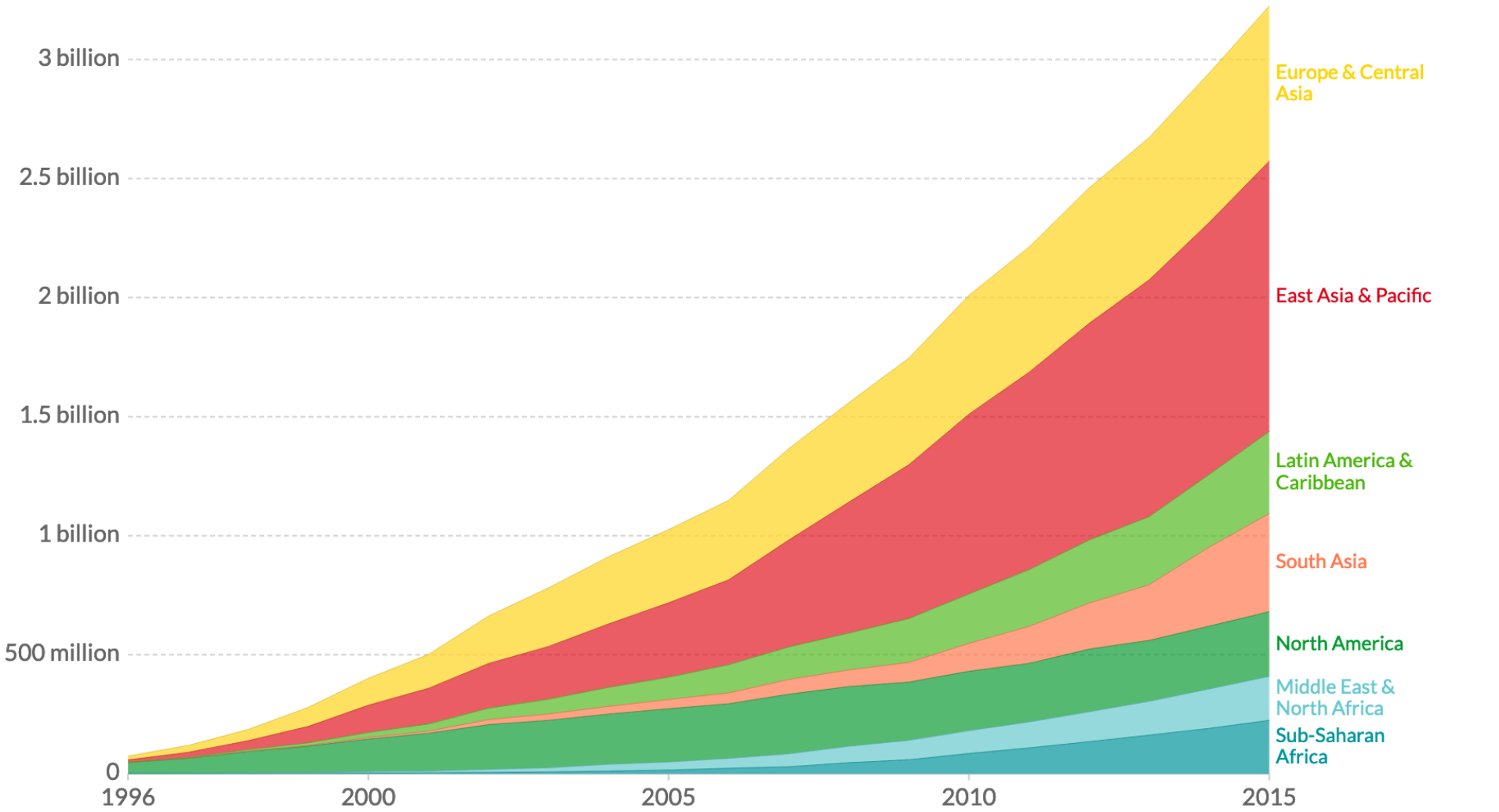


Also, its ever-growing/ever-evolving nature fascinated me

Internet users by world region

Our World in Data

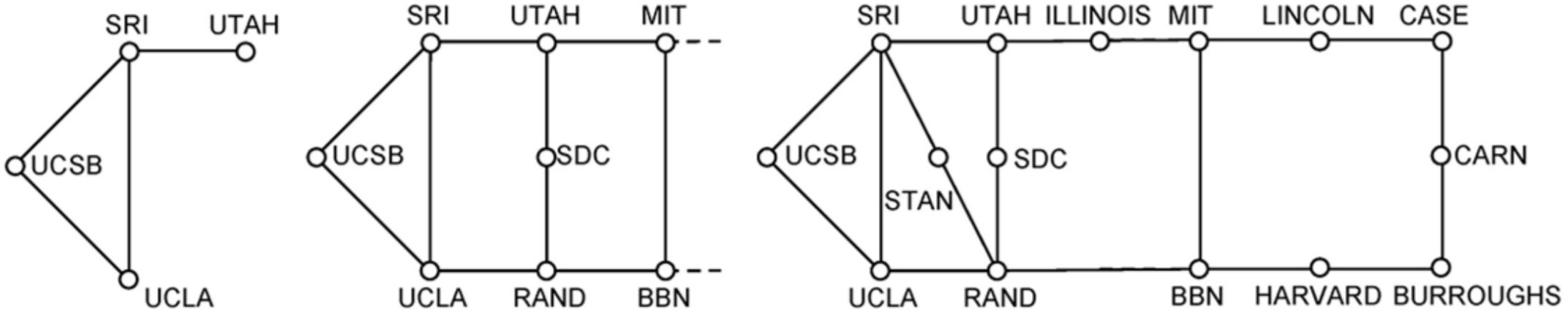
Relative



Source: Science and Technology - World Bank (2016)

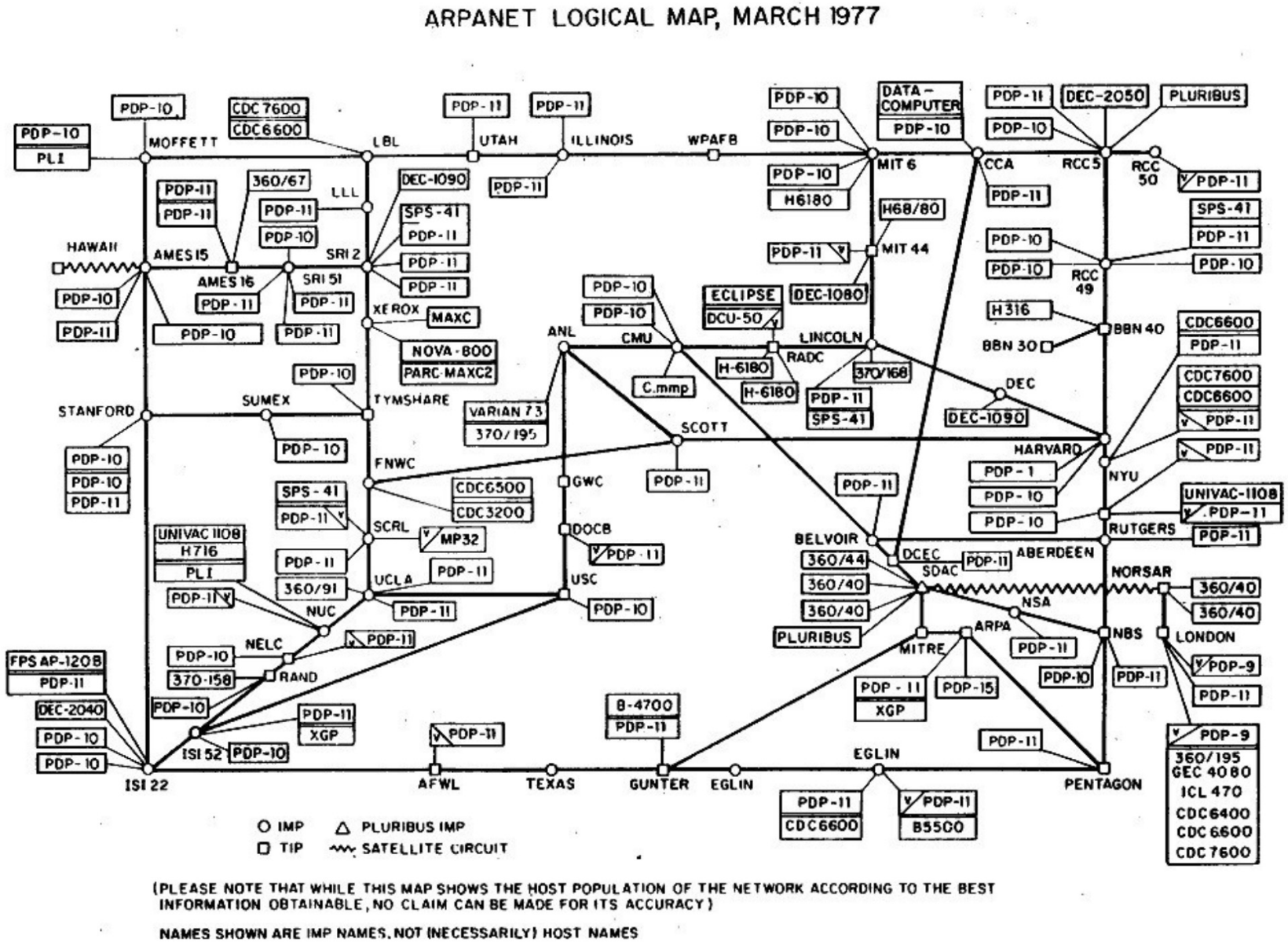
OurWorldInData.org/internet/ • CC BY

From this experimental network (~1970)



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

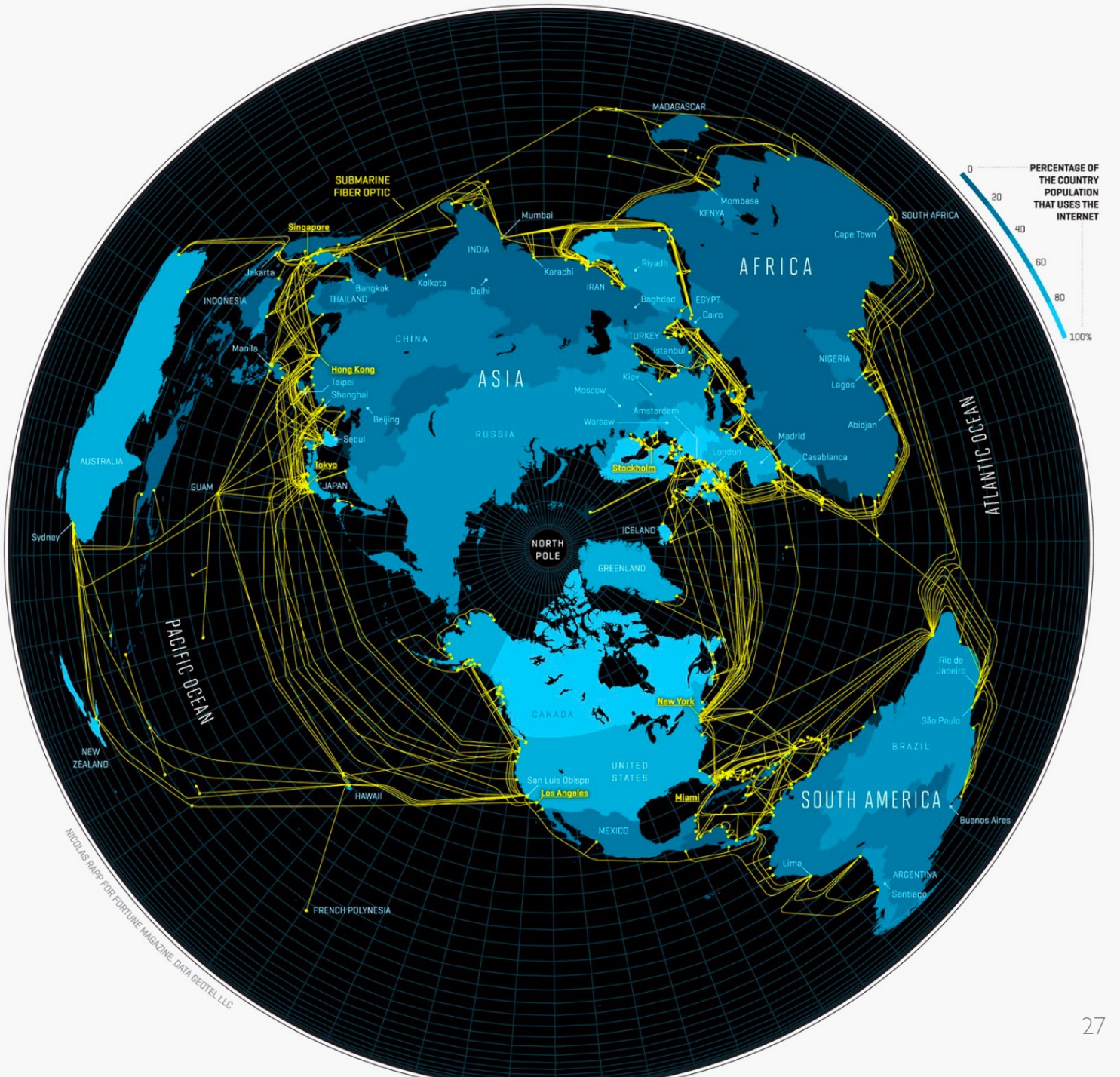
To this



(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)

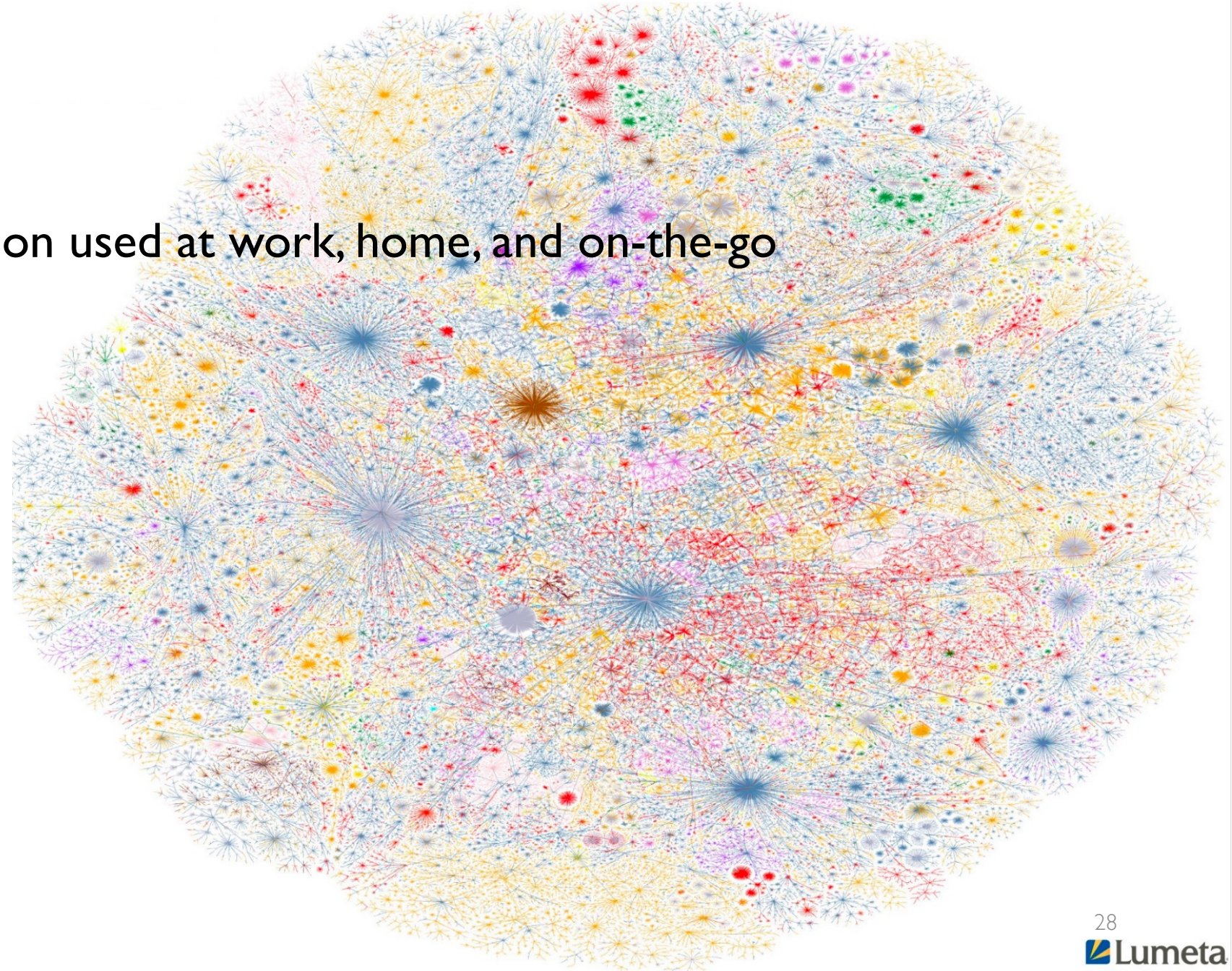
NAMES SHOWN ARE IMP NAMES, NOT (NECESSARILY) HOST NAMES

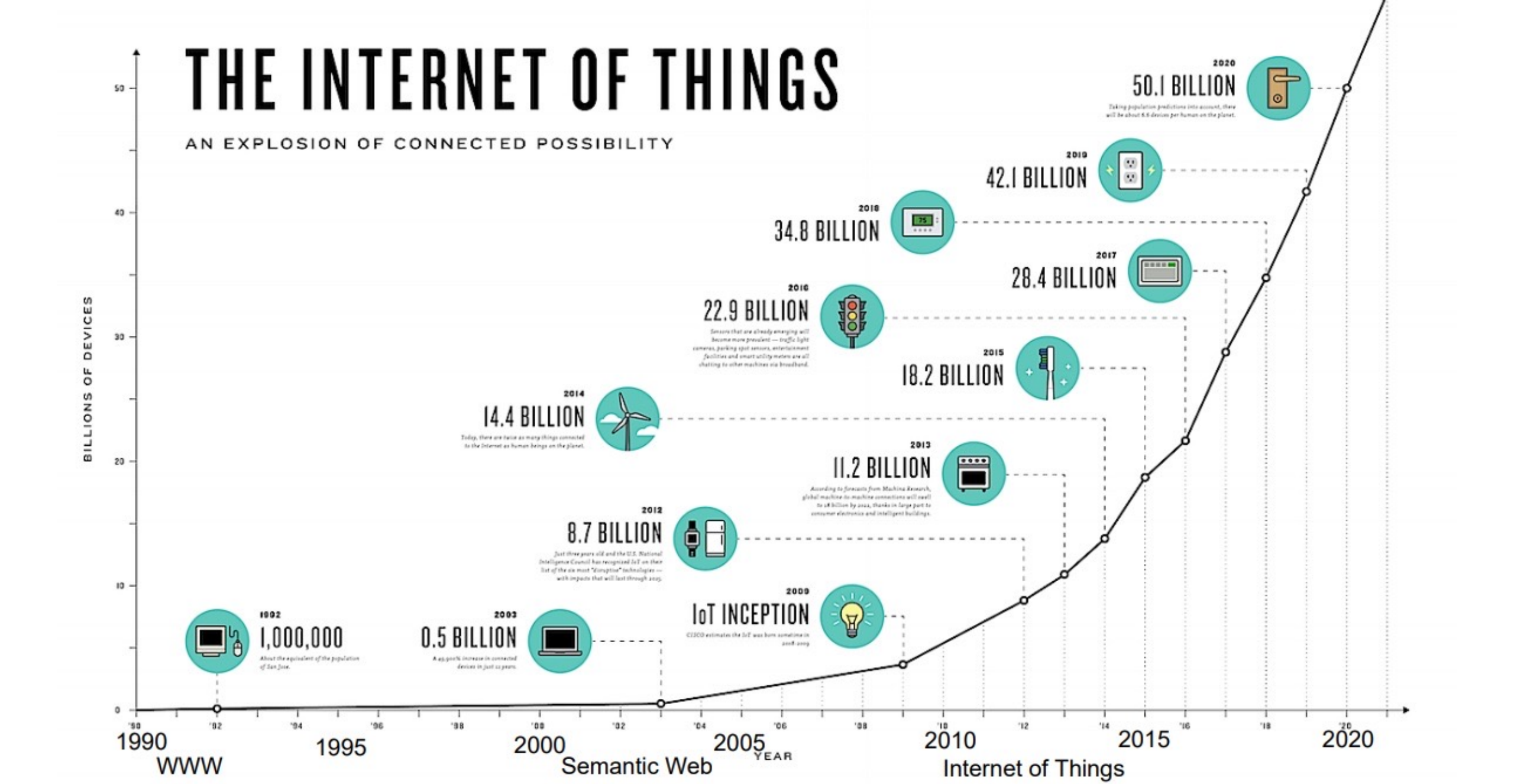
To this! (2011)


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!

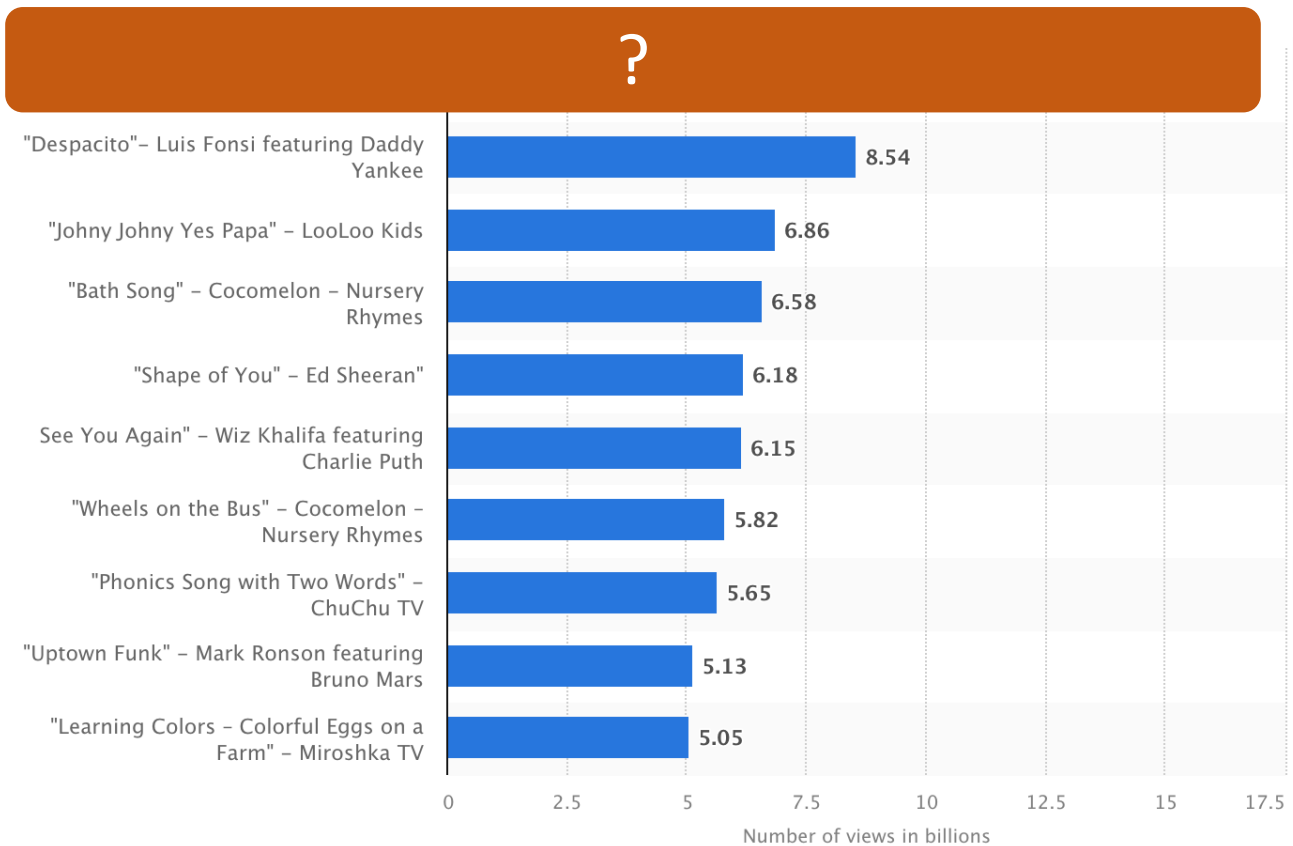
Outline

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

Internet › Online Video & Entertainment

Most popular YouTube videos based on total global views as of January 2024

(in billions)



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Sources

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Release date

January 2024

Region

Worldwide

Survey time period

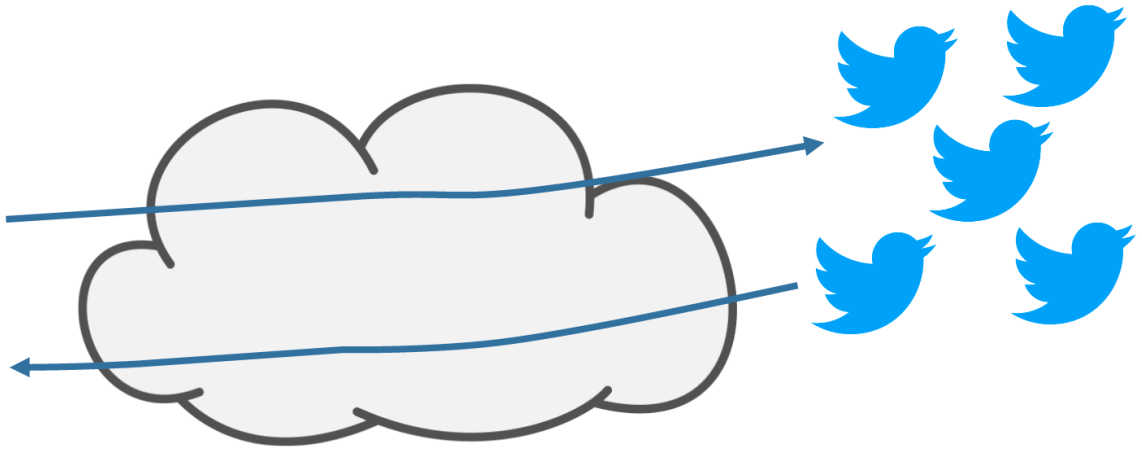
January 2024

Open this statistic in...

French

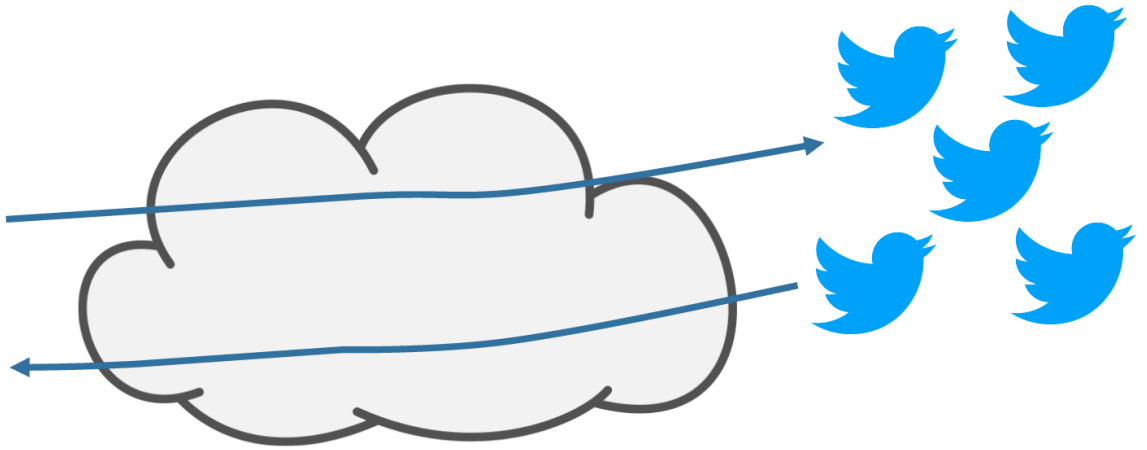
BTS Jungkook's post reached 1M people in just 10 min!

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?