ECE 671 – Lecture 1

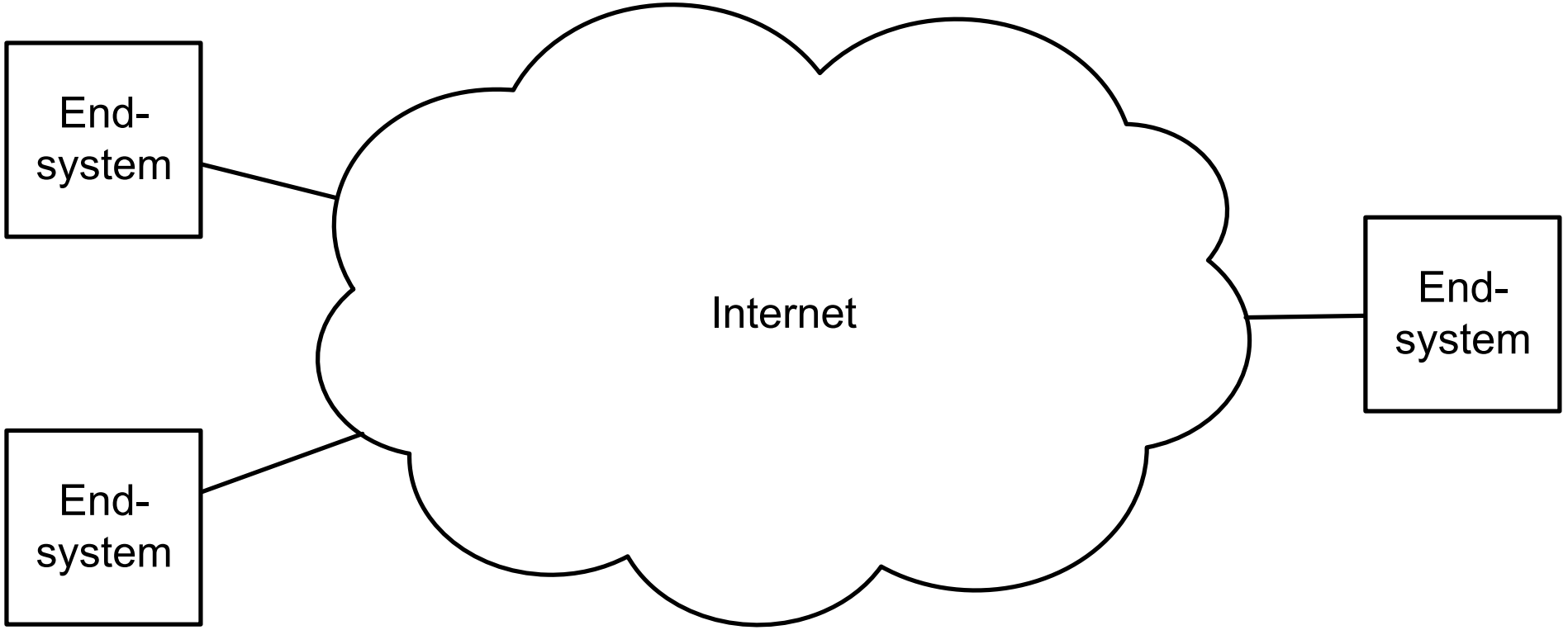
Introduction

What is a computer network?

Why study computer networks?

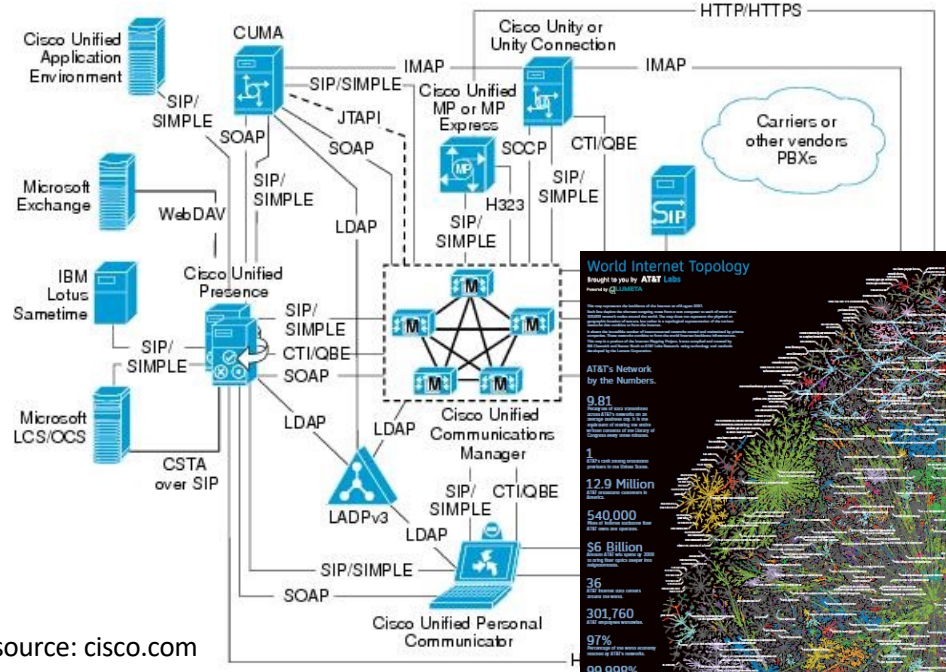
The “pretty” picture

- Conceptual view of Internet:

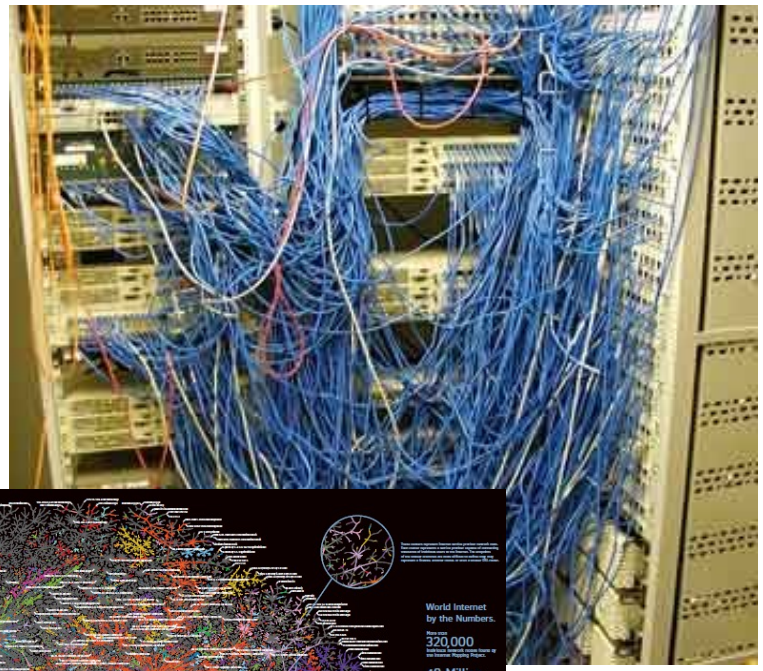


The “ugly” picture

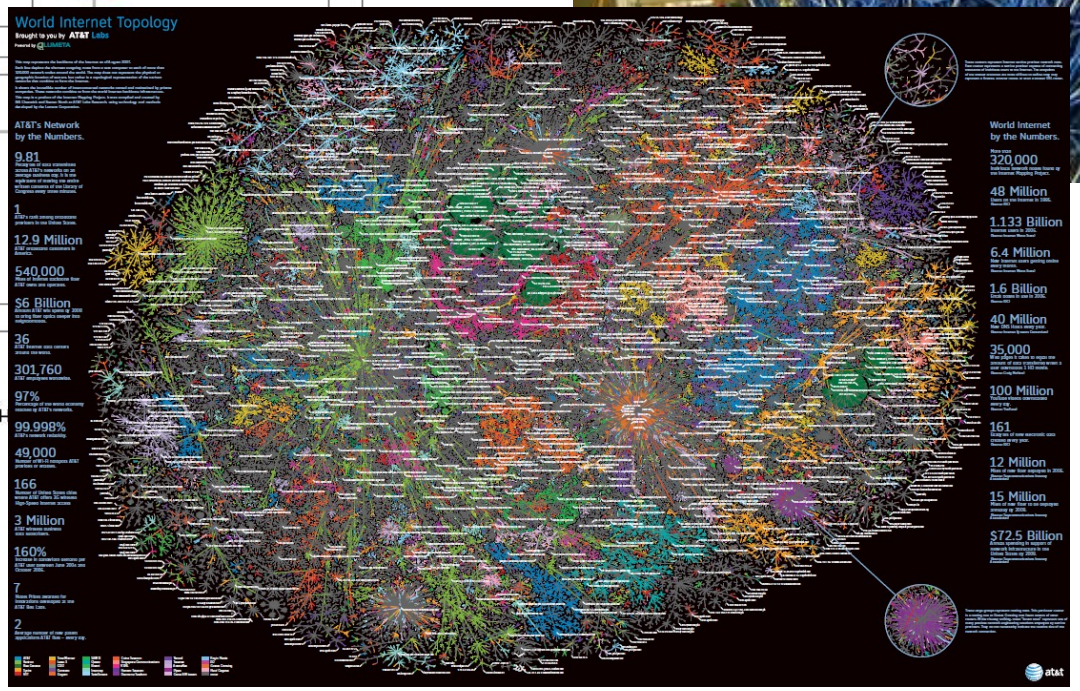
- There are lots of details…



source: cisco.com

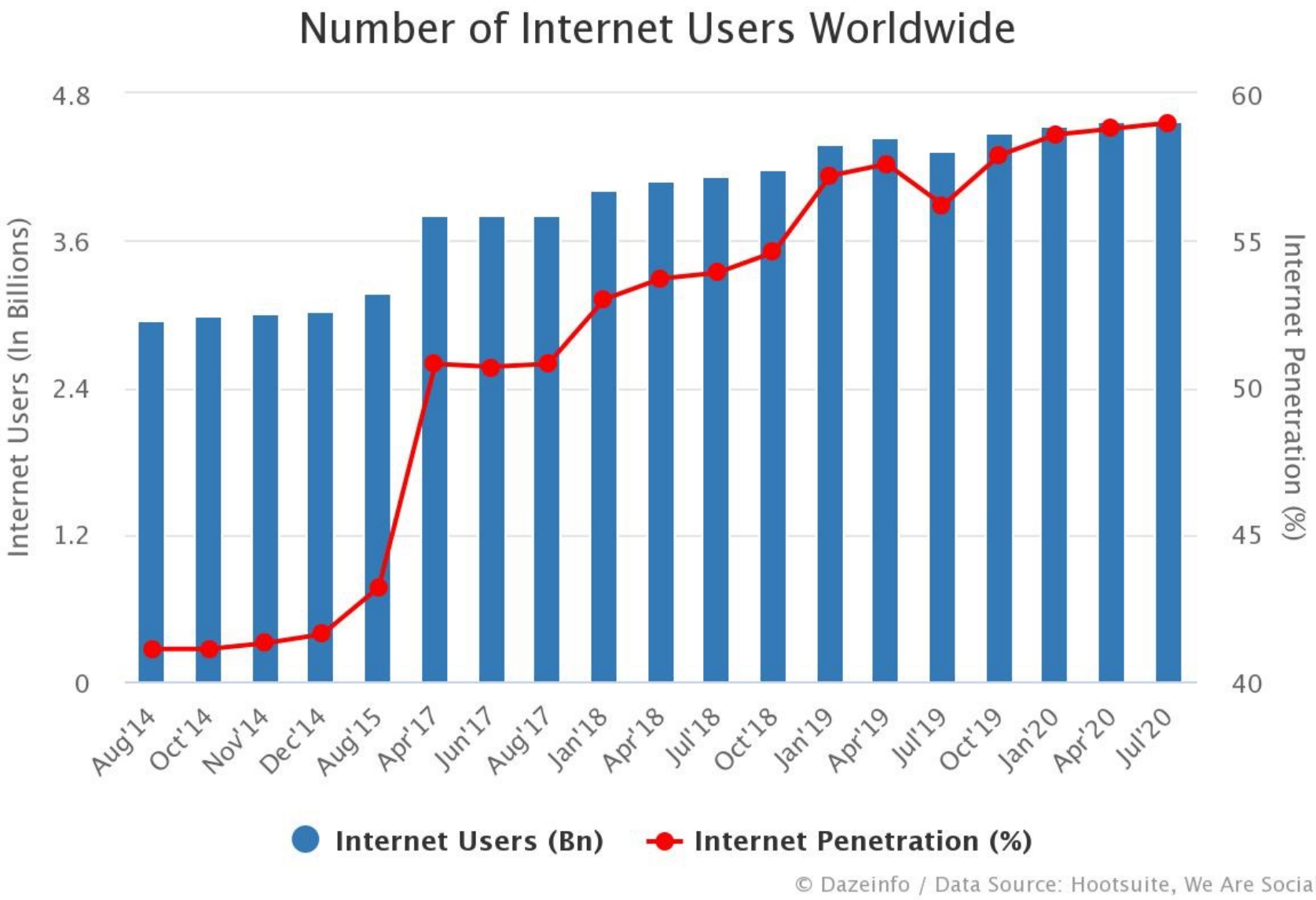


source: aatechnet.com



source: att.com

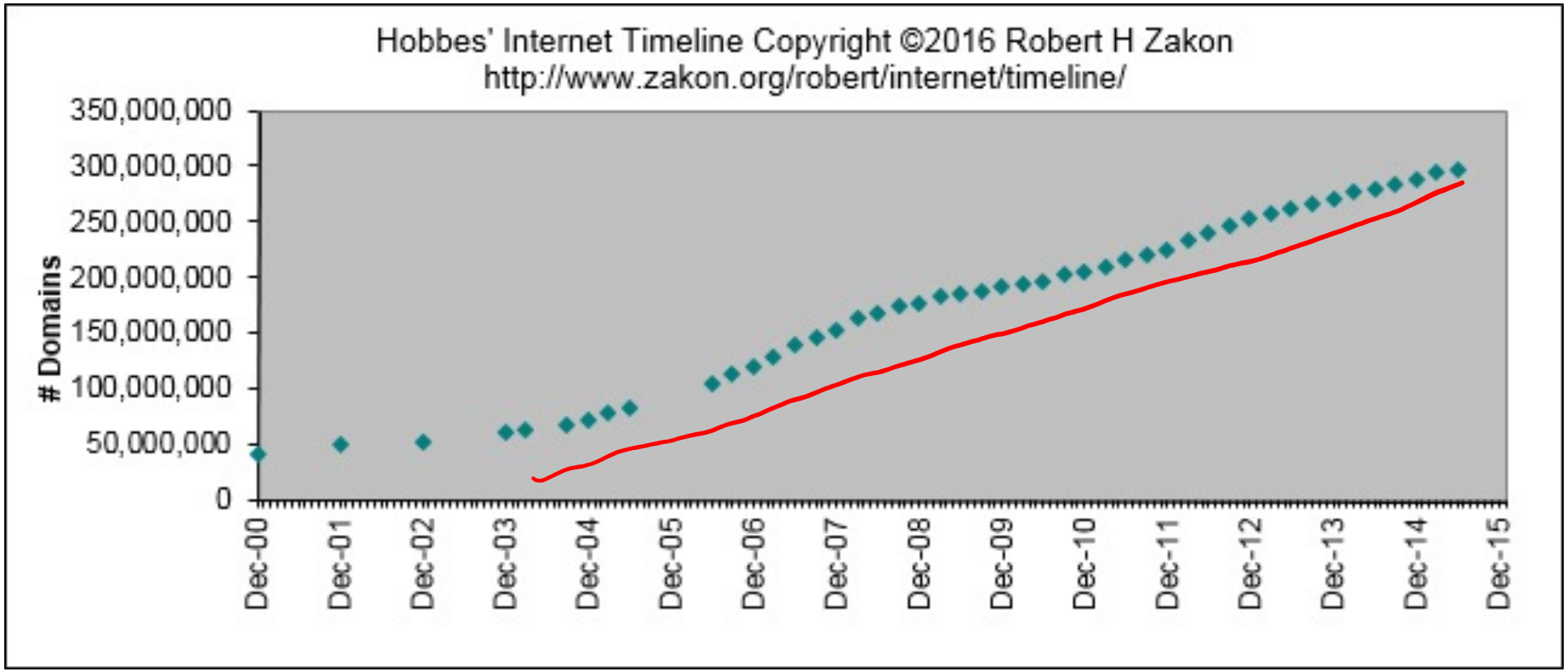
Scale of Internet



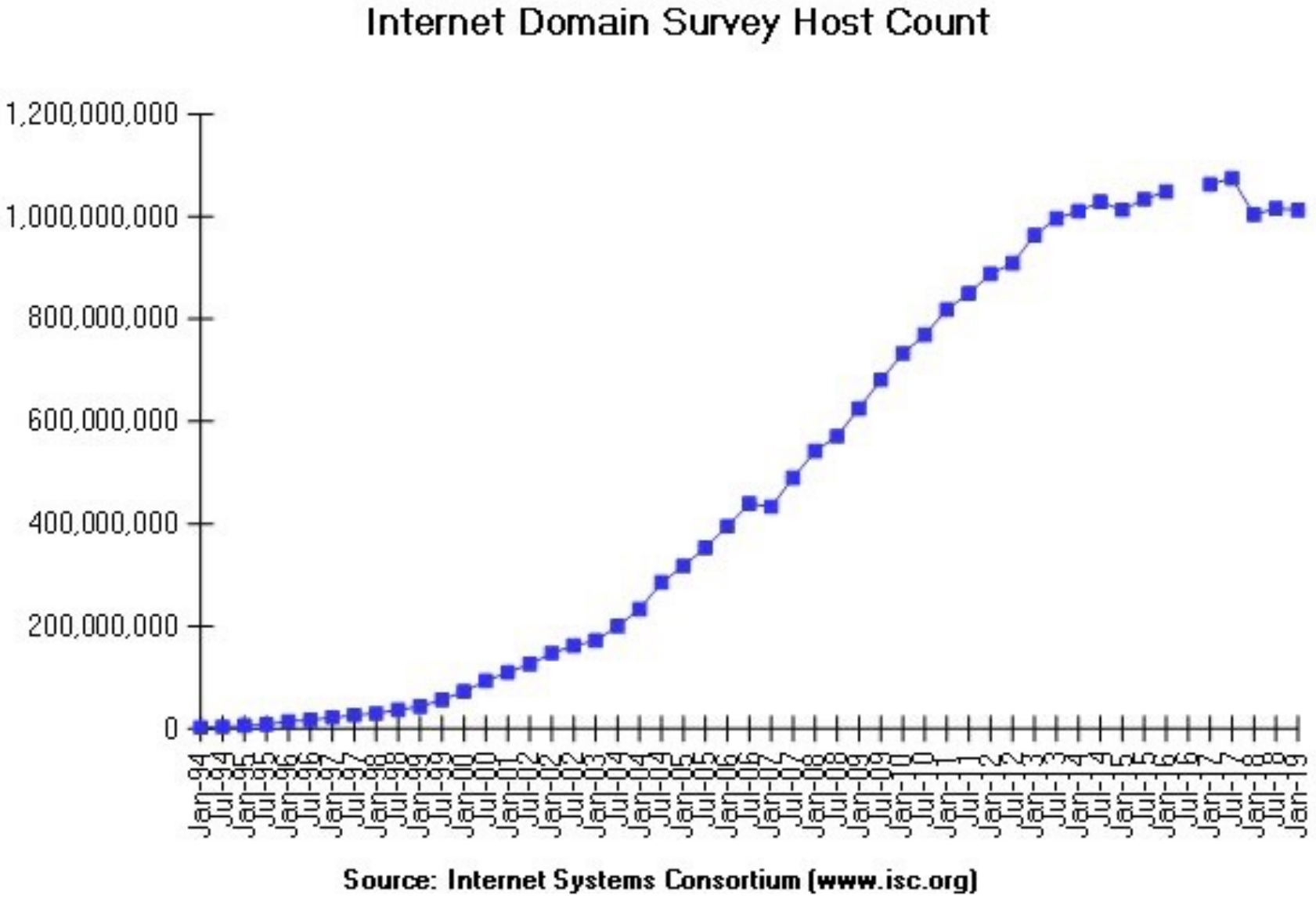
https://dazeinfo.com/2020/06/11/number-of-internet-users-penetration-worldwide-graphfarm/

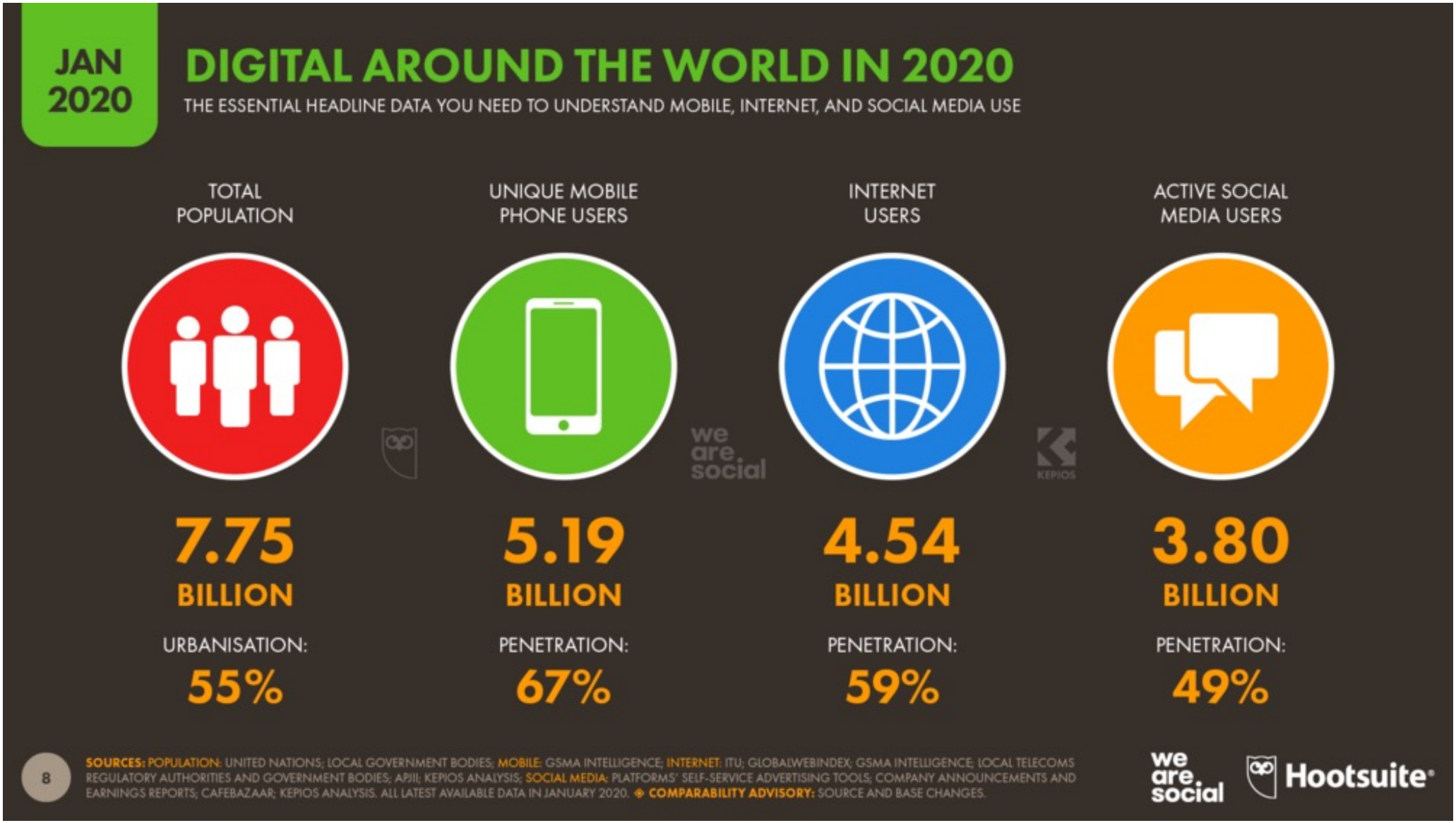
Scale of Internet

- Number of domains:

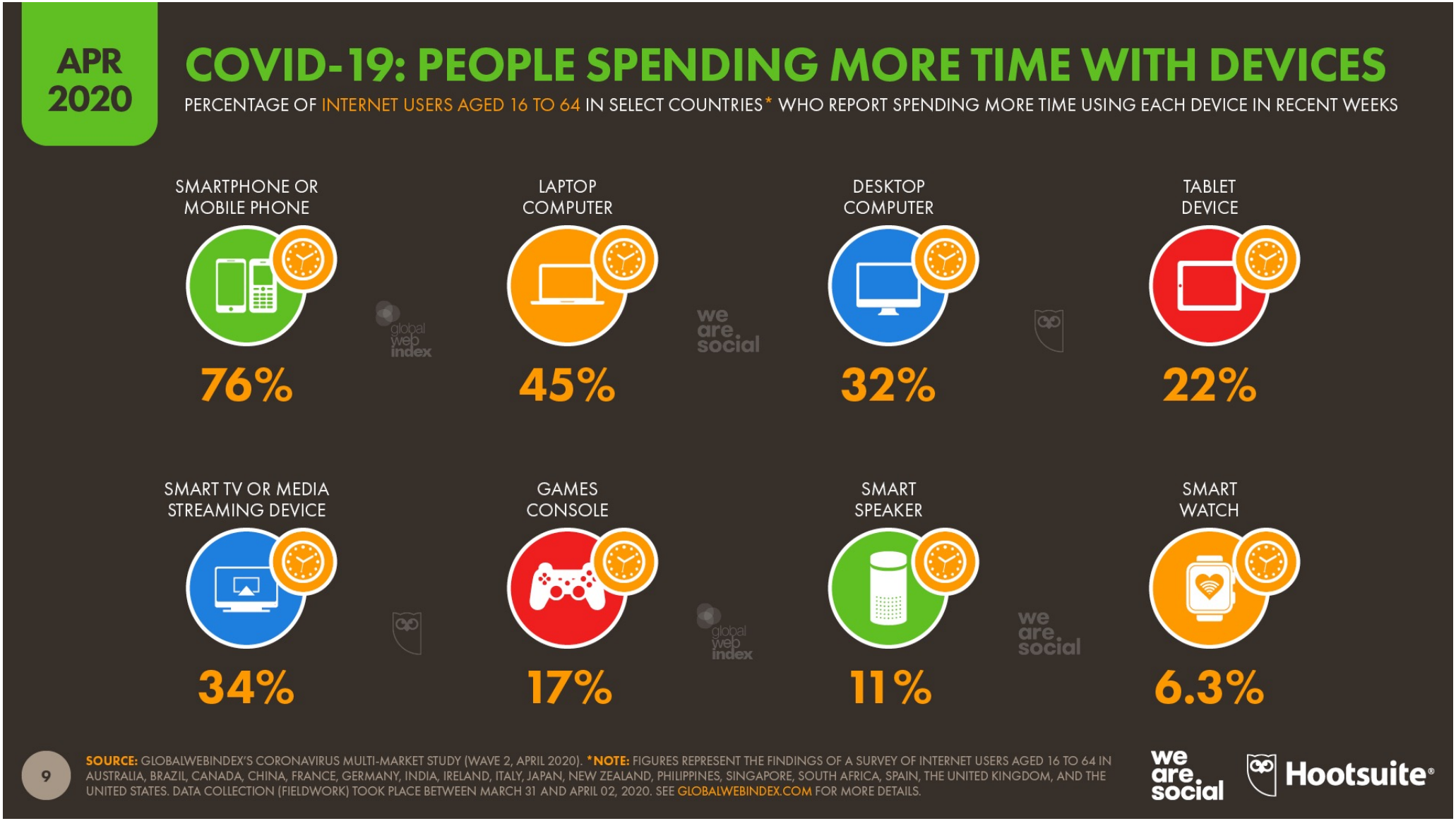


Scale of Internet





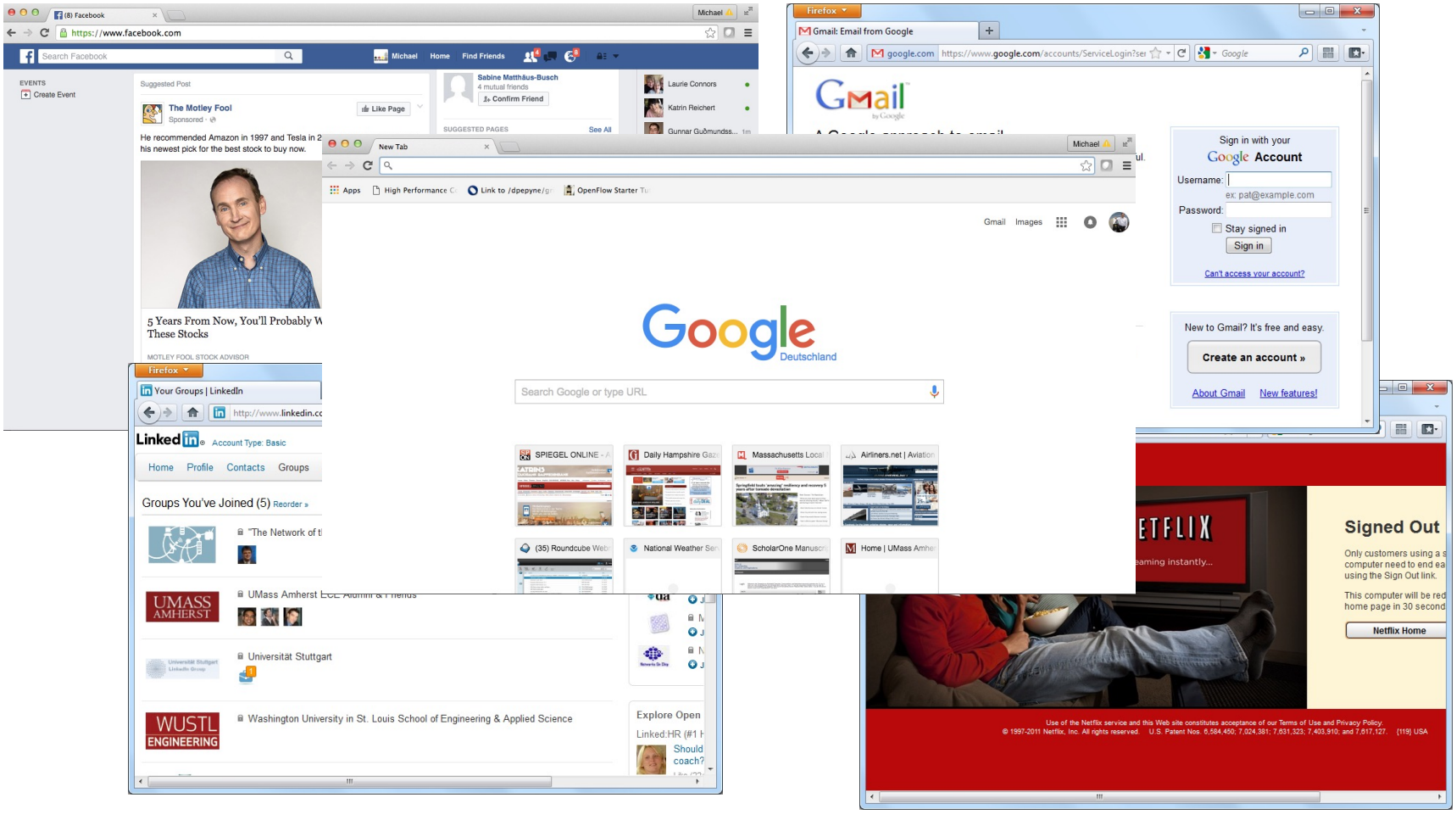
https://dazeinfo.com/2018/07/27/facebook-internet-users-worldwide-online/



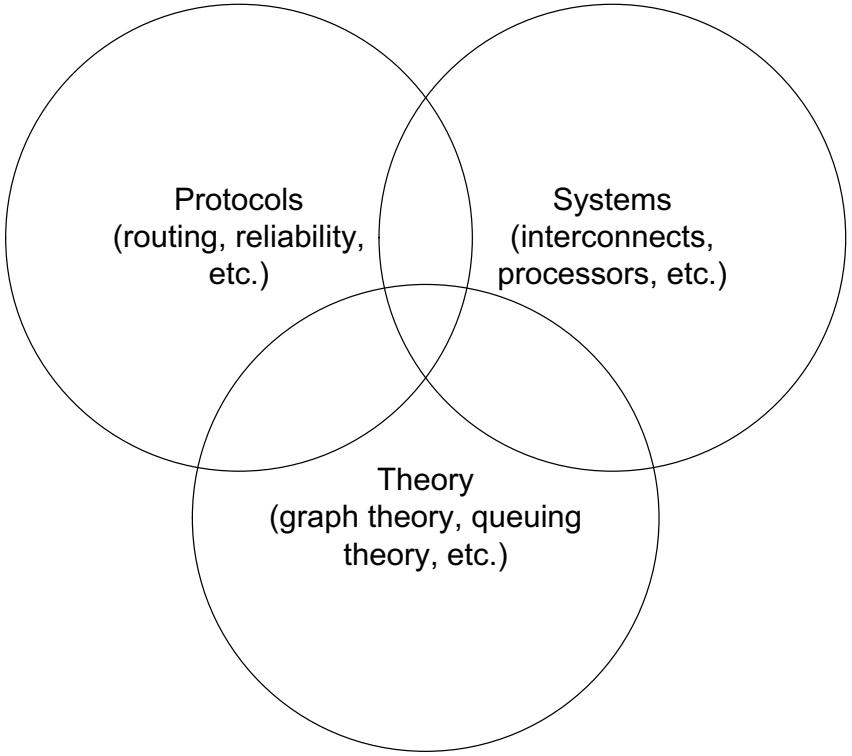
https://wearesocial-net.s3.amazonaws.com/uk/wp-content/uploads/sites/2/2020/04/03-Device-Time-Increase-Overall-DataReportal-20200422-Digital-2020-April-Global-Statshot-Report-Slide-9.png

Uses of Internet

- Web site access, mash-ups, social networking, Zoom, Zoom, Zoom, etc.



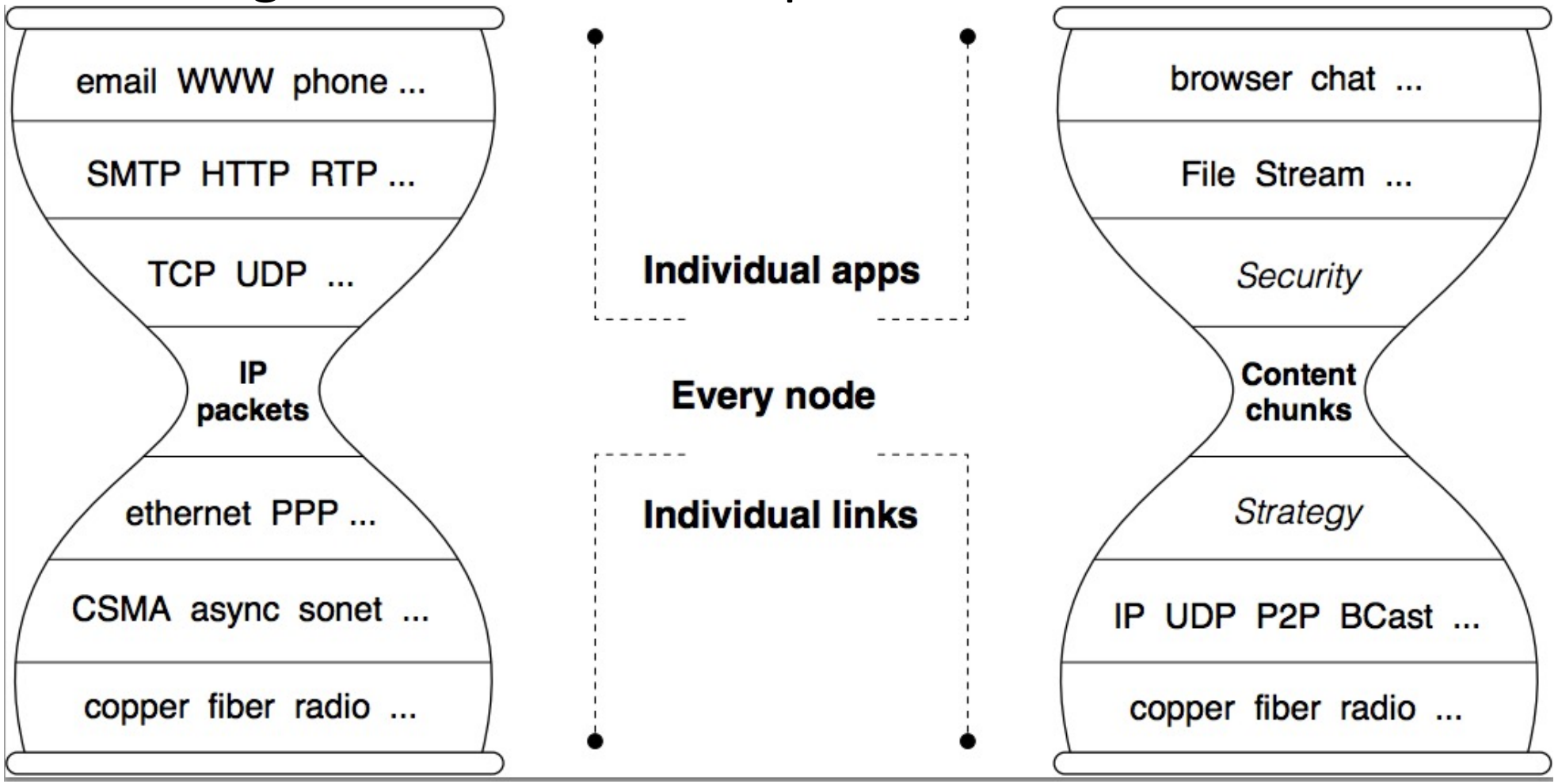
Networking has many facets



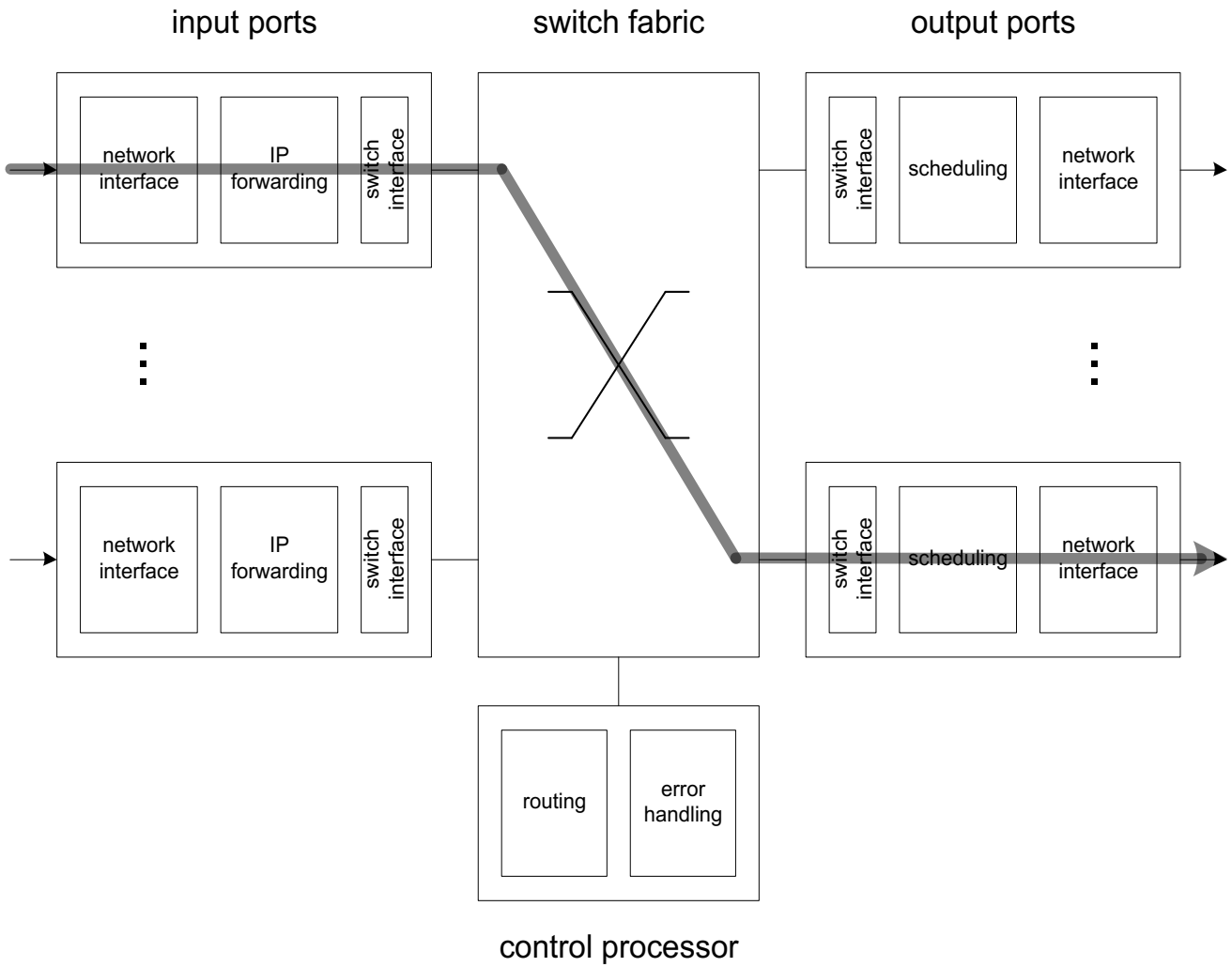
- Goals: functionality, scalability, throughput performance, security, power efficiency, manageability, etc.

Protocols: Internet architecture

- Hourglass architecture of protocol stack

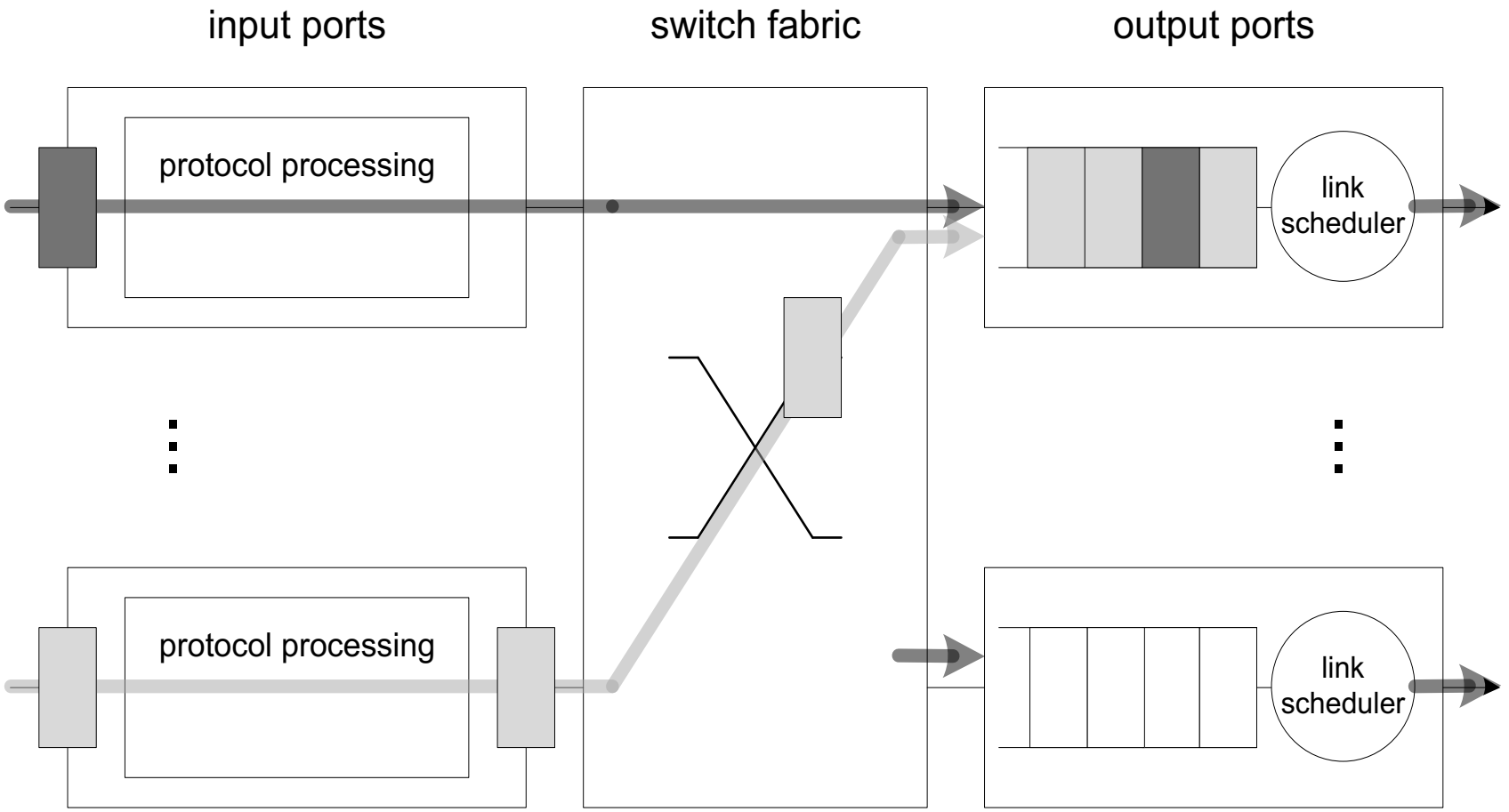


Systems: generic router



Theory: statistical multiplexing

- Operation of network without guarantees



What are interesting new problems?

- Many interesting research problems in networking
  - Billions of users, machine-to-machine communication, applications (e.g., health-care), etc.
- Examples:
  - Protocols
    - Defining exchanges for new communication paradigms (e.g., peer-to-peer, content-centric networking, sensor networks, etc.)
  - Systems
    - Design of high-performance routers that can process packets in software
  - Theory
    - Network science and overlap with other “networks”
  - Many more…

Structure of this course

http://www.ecs.umass.edu/ece671/Schedule.html

Course information

- Read the syllabus
- Up-to-date information on course web site:
  - http://www.ecs.umass.edu/ece671/
  - Schedule, slides, etc.
- Course components:
  - Exam I 15%
  - Exam II 15%
  - Exam III 15%
  - Homework assignments 10%
  - Lab assignments 20%
  - Final project 25%

Labs and assignments

- Labs
  - Four lab assignments
  - Details later in the semester
- Assignments
  - Check web site for reading assignments
    - Multiple lectures may cover single chapter