Network Veiw

17CS52 - CN: L2

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https://www.youtube.com/watch?v=3A4AkV6GrKA
https://www.youtube.com/watch?v=-Bv9RzQxyd8

Network and Internet

- What *is* the Internet?
  - Internet architecture
    - Network edge
      - End systems, access networks, links
    - Network core
      - Packet and circuit switching,
- Protocol layers, service models
- Network delays and packet loss

Internet

- Internet: an engineering structure
  - Man made
    - Possibly largest entity
    - Contribution from across the world
- To get an insight into it, answer
  - How do we understand it?
  - What are its guiding principles?
  - What is its foundation structure?

Internet Sites

- https://www.netcraft.com
  - https://news.netcraft.com/archives/category/web-server-survey/
- Web server market share (May 2019)
  - Apache: 29%
  - Microsoft IIS: 19%
  - Nginx: 29%
  - Google: 2%
- https://httparchive.org/reports/state-of-the-web
  - Information about a typical web page.

Case Study 1:

- Identify the number of active hosts and domain names, i.e. fill following information
  - Number of domainname:
  - Number of websites:
- Analyze the market share of following web server for the last 2 years
  - Apache
  - Nginx
  - Microsoft IIS

End User Devices

- PCs /desktops, laptops
- Tablets, phones, phablets
- Home appliances e.g.
  – Fridge, air-conditioner, toaster
- Entertainment
  – TV, Xbox, Game consoles
- Wearables
  – Watches, fitbits, …
- Eletrical gadgets e.g.
  – Lightbulbs, fans, geysers etc.
- IoT devices, sensors

Internet Evolution

- At start
  - Person oriented - Human is a consumer
- Prior to 2000:
  - Static pages (0.0)
  - Dynamic contents by companies (1.0)
- Decade of 2010 (2.0)
  - Dynamic contents by individuals
  - Social computing, crowd sourcing
- Internet - Today
  - Internet of things - Machines are consumer
  - Mobile phones (Apps), user engagement
- Practically centralized
  - Google, facebook, twitter, youtube, instagram, amazon

Internet Today

- An equalizer and enabler for all
  - Anyone can produce contents
- Provides immediate reachability
  - Everyone can become celebrity, need
    - A good youtube viewing
    - High twitter following
- Bringing new social norms
  - Silence on phone is considered bad
  - No immediate response on Whatsapp is ok
- Cons
  - Internet Bullying, Trolling
  - Security, Data privacy, phising, MITM issues.

Working of Internet

- The largest engineered system created by mankind
- How it works ?
- What are its guiding principles?
- How it is governed? who owns it?
- Ways of describing Internet
  - Nuts and Bolts view
  - Services view
  - Protocols (Engineering) view
- Applications need interface (socket)
- Need protocol for communication

What's a protocol?

- How humans communicate
  - Hello, what's the time now?
  - Hello, It is 10:00am.
  - Isn't it too hot already?
    - Conversation begins…
- Protocol at a high level
  - Specific msgs sent
  - Specific actions taken when msgs received,
  - Different action taken on other events

What's a protocol?

- Similarity between a human protocol and a computer network protocol:
  - Both involves sending and receiving of messages
  - An action is taken when a message is received or some other event occurs.
- What happens when no common understanding?

Protocol - Human Analogy

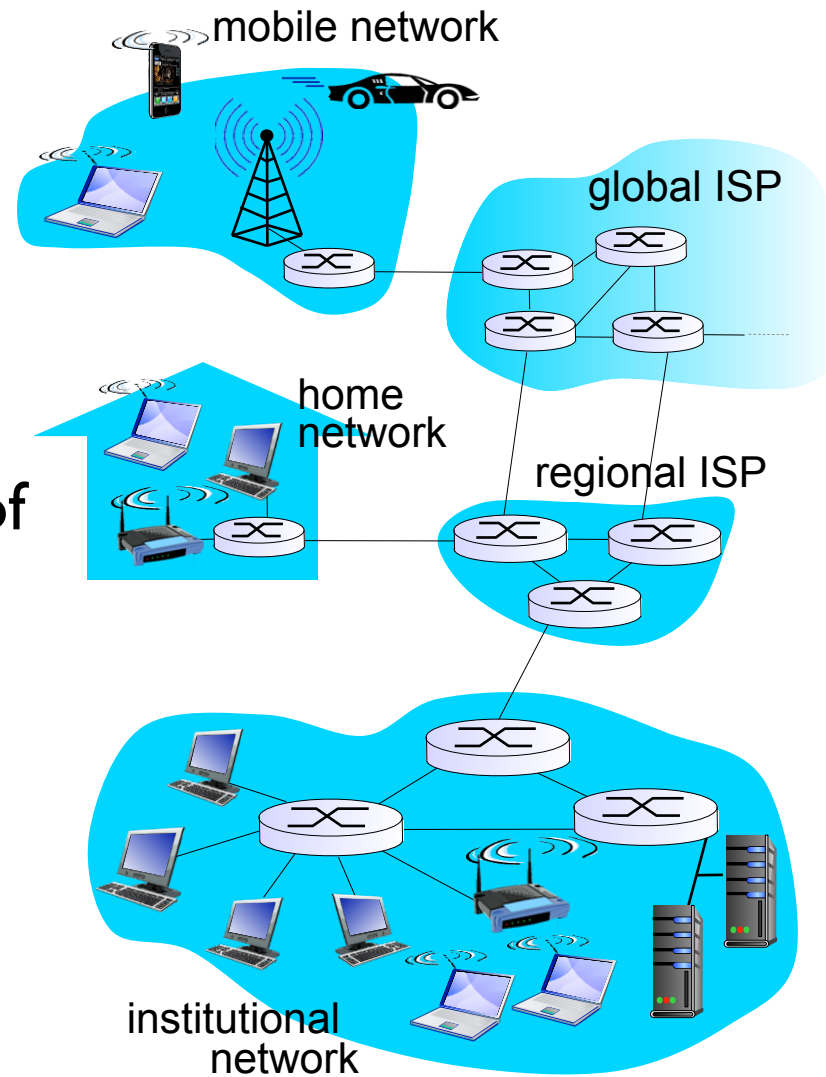
- Example : Classroom interaction
  - Teacher enters the class room
  - Students show respect (by standing up)
- Teacher droning about the protocols and class is confused. Stops to ask?
  - "Are you confused?"
  - Msg is transmitted & received by all
- Some one raises a hand (msg to teacher)
- Teacher allows to ask a question
- Students ask the question,
- …
- What happens when you type a URL in browser

Case Study 01

- Consider that as a class teacher, you need to elect a class representative in your class, whcih consists of 40 students. Ignore the computation or processing time.
  - Design the protocol to elect the class representative?
  - Count how many messages are exchanged to elect the representatives

What's the Internet:

- *Network:*
  - *(old)Interconnect PCs, servers etc*
  - *(new) sensor nodes, fridge, cars*
    - *Tons of other devices*
  - *Devices are end systems, hosts*
- *Internet:*
  - "network of networks"
  - Interconnected ISPs
- *protocols* control sending, receiving of msgs
  - e.g., TCP, IP, HTTP, Skype, 802.11
- *Internet standards (IETF)*
  - RFC: Request for comments
- How do define College?



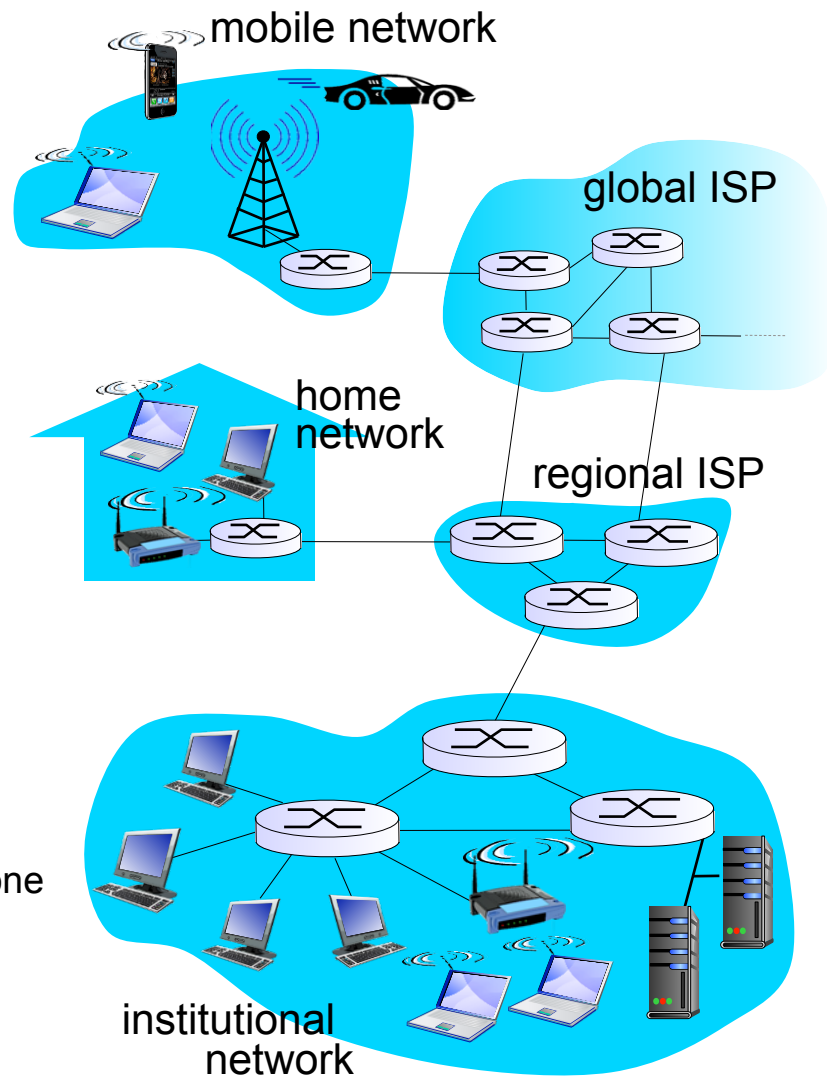
src: Computer Network: A top down approach; Kurose, Ross

Case Study 02

- Define your college taking analogy defining internet
  - Define equivalent of following for college
    - Nodes
    - Network
    - Protocols

Internet: The Network Edge

- millions of connected computing devices:
  - *hosts* = *end systems*
  - *Clients & Servers*
  - *Data Centers*
  - running *network apps*
- Billion of users
  - PC, laptops, tablets
  - Smartphones, ipads
  - Sensors, webcams
  - Game consoles
  - Picture frames, TVs
  - …



src: Computer Network: A top down approach; Kurose, Ross

Internet: Access Network

- millions of connected computing devices:
  - *hosts* = *end systems*
  - running *network apps*

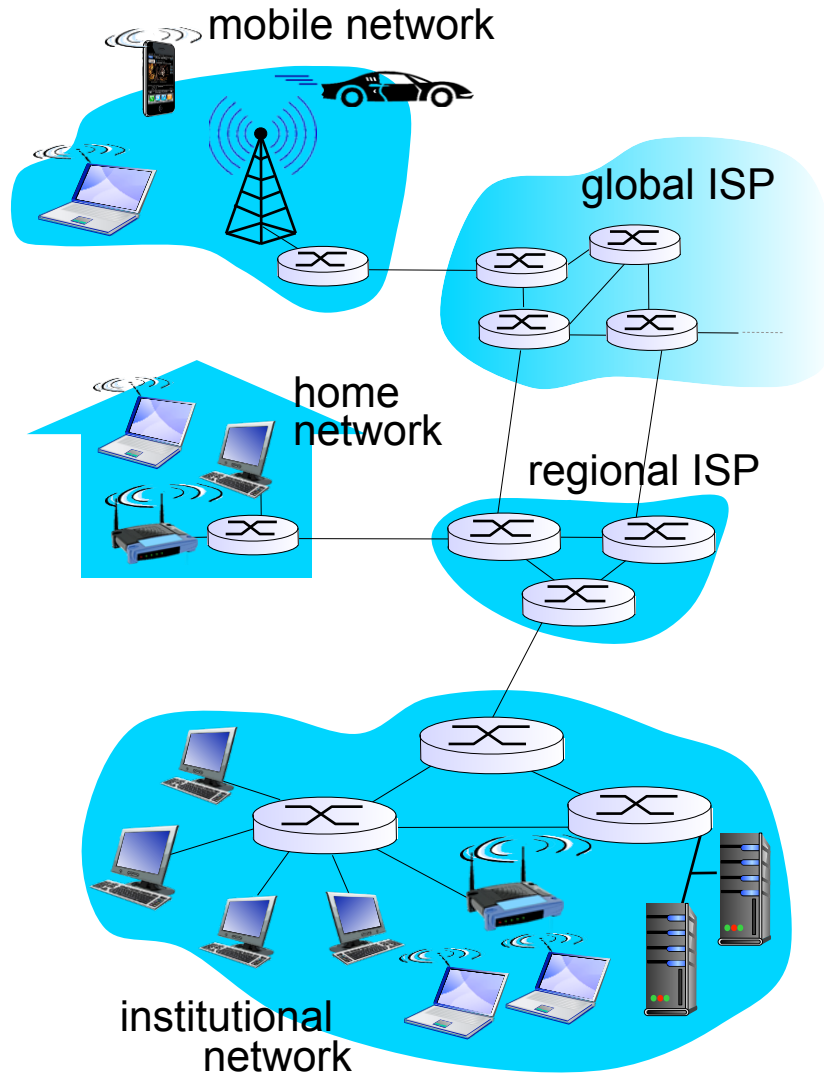
wireless links

wired links

- *communication links*
- Fiber, copper
- Radio, satellite
- Wireless
- Transmission rate: *bandwidth*

router

- *Packet switches:* forward packets (chunks of data)
- *routers* and *switches*



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Nuts and Bolts view

- Analogy: transportation network
  - Highways, roads, intersections
  - Transport vehicles
  - Example: factory wants to send a cargo
    - Segmented and loaded on to multiple trucks
    - Trucks reached destination
    - Unloaded and regrouped
  - Protocols: Traffic rules, transport regulations

Case Study 03

- Consider your college and describe it from the perspective of
    - Nuts and Bolts view

Summary

- General information about internet
- Web server distribution
- Case study -1:
  - Number of internets domains and web server
- What is internet
- View of Internet
- Nuts and Bolts View
- Case study