

# Network View

17CS52 - CN: L2

Dr. Ram P Rustagi

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Dept of CSE, KSIT

[rprustagi@ksit.edu.in](mailto:rprustagi@ksit.edu.in)

<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, phishing, MITM issues.



# Working of Internet

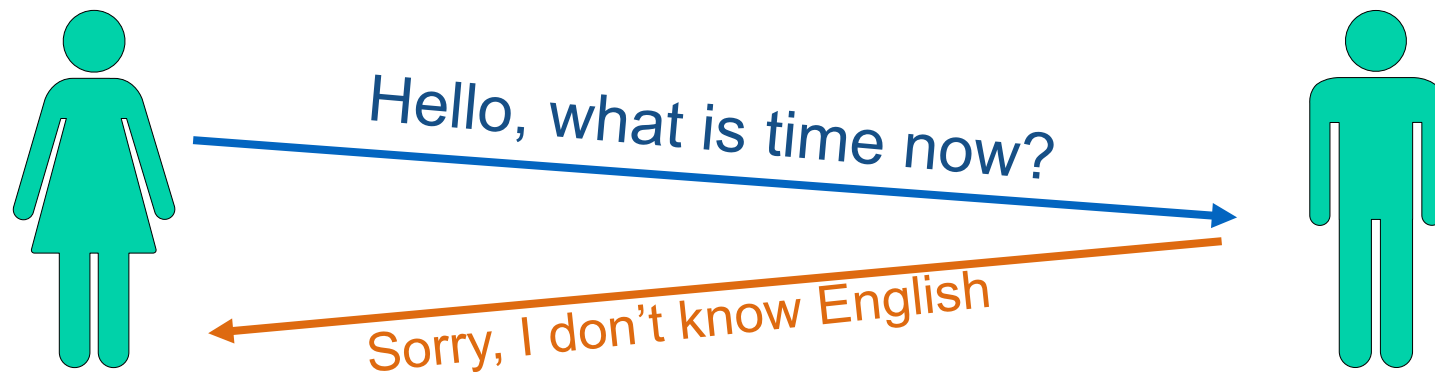
- The largest engineered system created by mankind
- How it works ?
- What are its guiding principles?
- How it is governed? who owns it?
- Ways of describing Internet
  - Nuts and Bolts view
  - Services view
  - Protocols (Engineering) view
- Applications need interface (socket)
- Need protocol for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

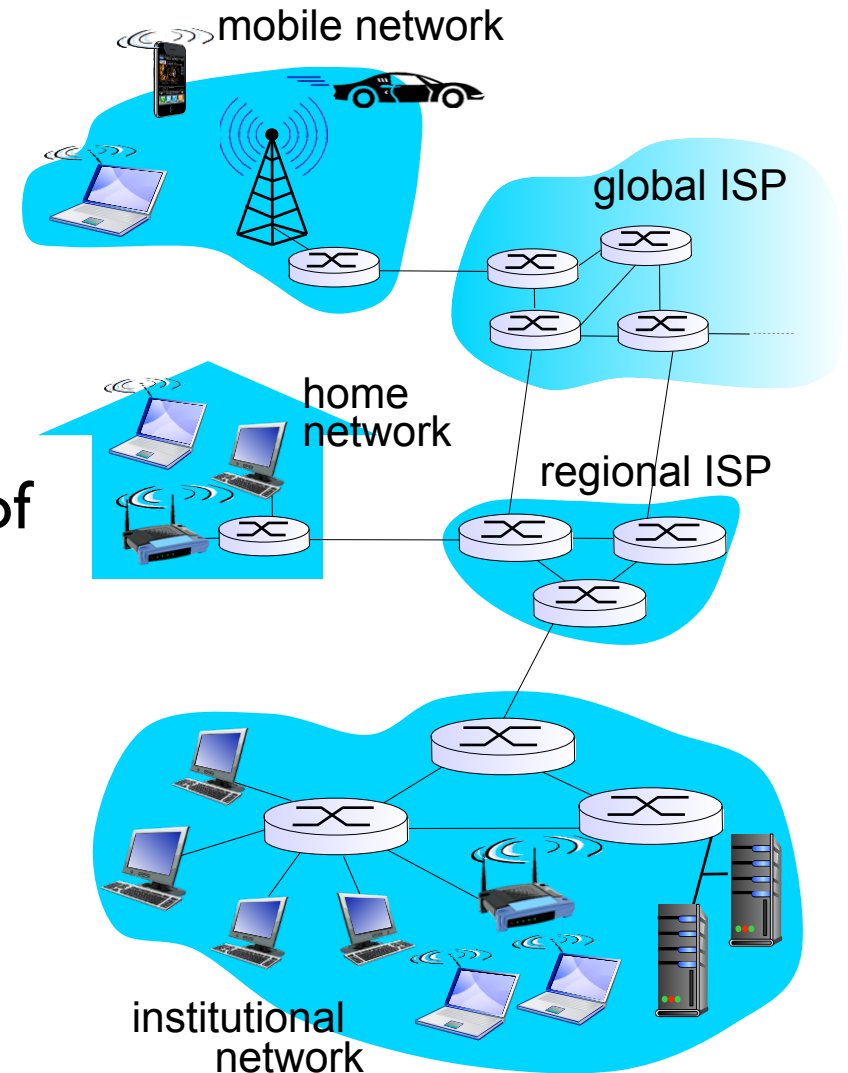
- Example : Classroom interaction
  - Teacher enters the class room
  - Students show respect (by standing up)
- Teacher droning about the protocols and class is confused. Stops to ask?
  - “Are you confused?”
  - Msg is transmitted & received by all
- Some one raises a hand (msg to teacher)
- Teacher 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, which 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

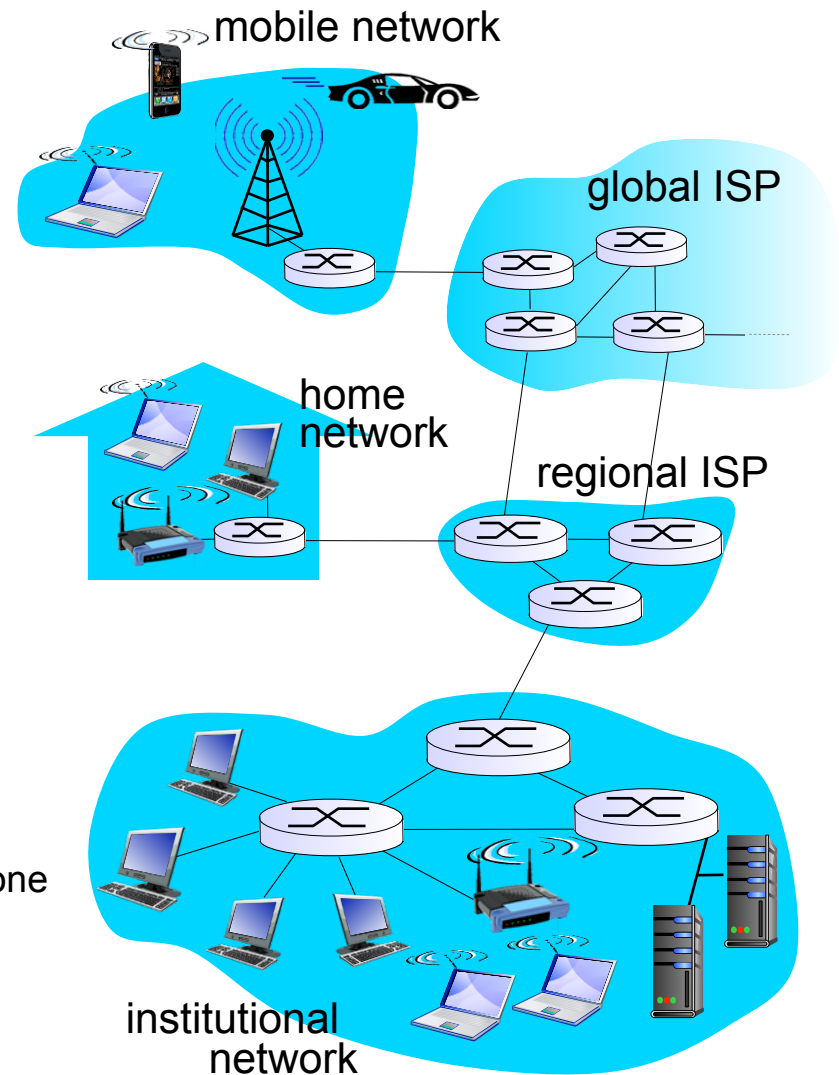
# Internet: The Network Edge

- 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*

- *communication links*

- Fiber, copper

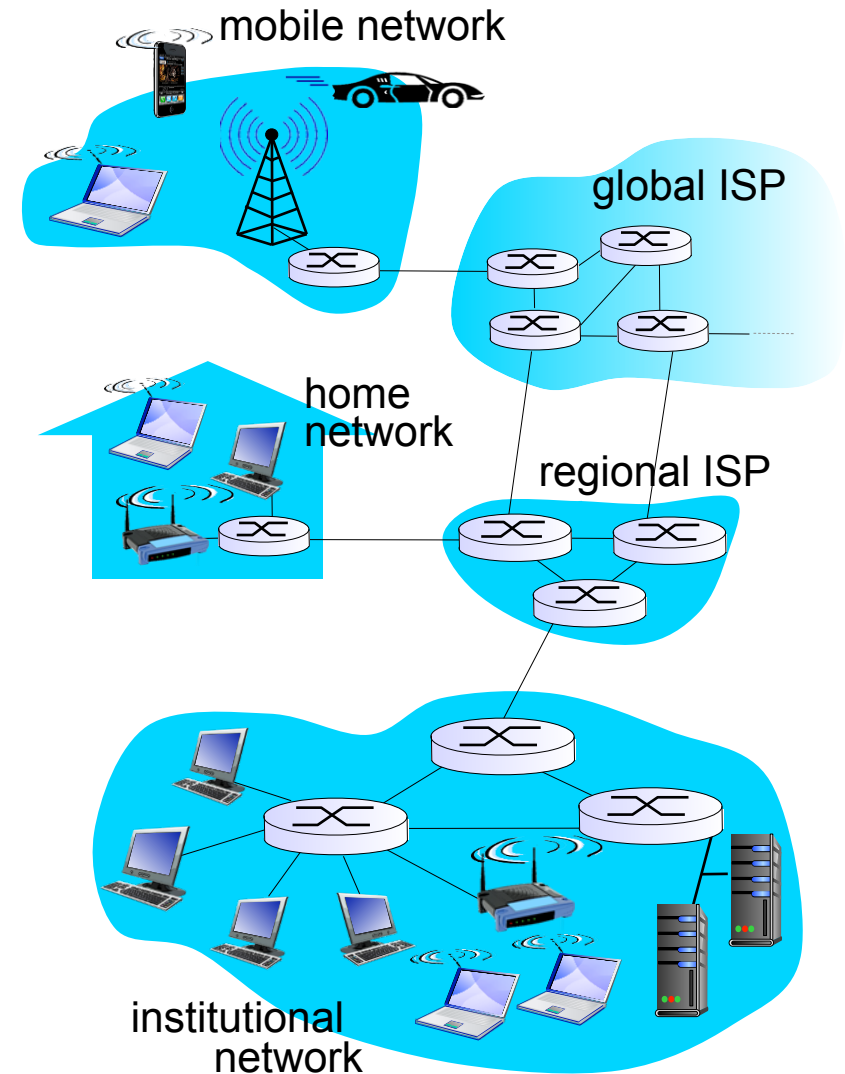
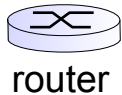
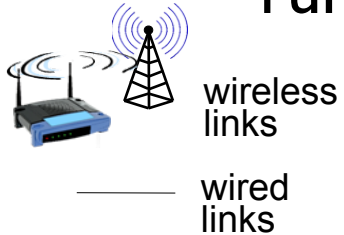
- Radio, satellite

- Wireless

- Transmission rate:  
*bandwidth*

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

- *routers* and *switches*



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

# 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 - I:
  - Number of internet domains and web server
- What is internet
- View of Internet
- Nuts and Bolts View
- Case study-2