Chapter-7: Internet

What is the Internet?

- The Internet is a global network of computer networks utilizing a suite of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol) that supports interconnection of a number of different computer networks.
- The Internet covers large, international Wide Area Networks (WAN's) as well as smaller Local Area Networks (LAN's) and individual computers connected to the Internet worldwide.

What is the Internet's history?

- The Internet grew from ARPANET the first computer network designed for the Advanced Research Projects Agency (ARPA) of the U.S Department of Defense.
- ARPA sponsored research on interconnecting geographically remote computers to allow communication and sharing of data and resources.
- The goal was to create a communications network that could exist even if parts of it was incapacitated.

What is the Internet's history?

- One of the early developments that proved significant to the success of ARPANET (which later on becomes the Internet) were "packet switching" and "TCP/IP".
- Packet switching involves digital systems that transmit data in small packets that use the best current path to their destination.
- TCP/IP is the core Internet protocol that allows computers to communicate with each other.

What is the Internet's history?

- Realizing the value of interconnected computers the academic community started with its own research network.
- The NSFNet, created and named for the National Science Foundation, linked academic networks that connected universities and research organizations around North America.
- Networks from Europe and other countries were connected to NSFNet making it the backbone of the Internet.

What is the Internet's history?

- ARPANET was decommissioned and the management of the Internet was passed on to the NSFNET.
- Restriction on commercial use was lifted.
- The emergence of World Wide Web, and Mosaic brought an unprecedented growth to the Internet.
- NSFNET reverts back to a research project, leaving the Internet in commercial hands and its management to independent organizations.

What is the Internet's history?

Summary

- The Internet started as a military network called ARPANET, which was involved in networking research.
- The Internet later expanded to include universities, businesses and individuals
- Today, the Internet is also referred to as the Net, Information Superhighway, and Cyberspace.

Events

Date	Event
1969	ARPAnet
1984	MILNET & ARPANET (Internet)
1980s	National Science Foundation (NSF) controlled Internet Access
1991	NSF eased restrictions on Internet Access
1995	U.S. government relaxed entry into Internet for the public

Evolution of the Internet

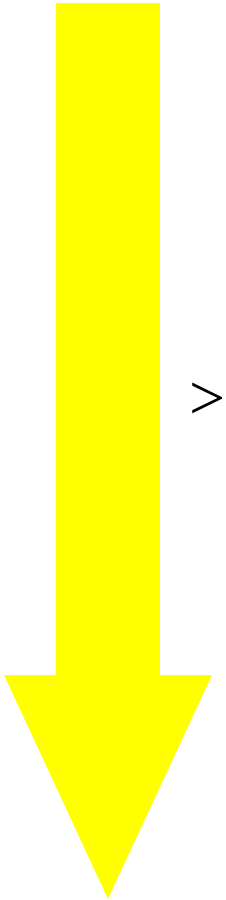
- 1970 ARPANET - 15 nodes
- 1972 first email
- 1982 TCP/IP becomes internet standard
  - Transmission Control Protocol/Internet Protocol
- 1984 ARPANET - 1,000 nodes
- 1986 NSF-Net backbone on ARPANET
- 1987 ARPANET - 10,000 nodes

Evolution of the Internet

- 1988 - businesses begin to connect to system for research purposes
- 1989 ARPANET - 100,000 nodes
- 1989 link email between CompuServe and ARPANET
- 1990 ARPANET becomes the Internet

Exponential Growth in Network Bandwidth

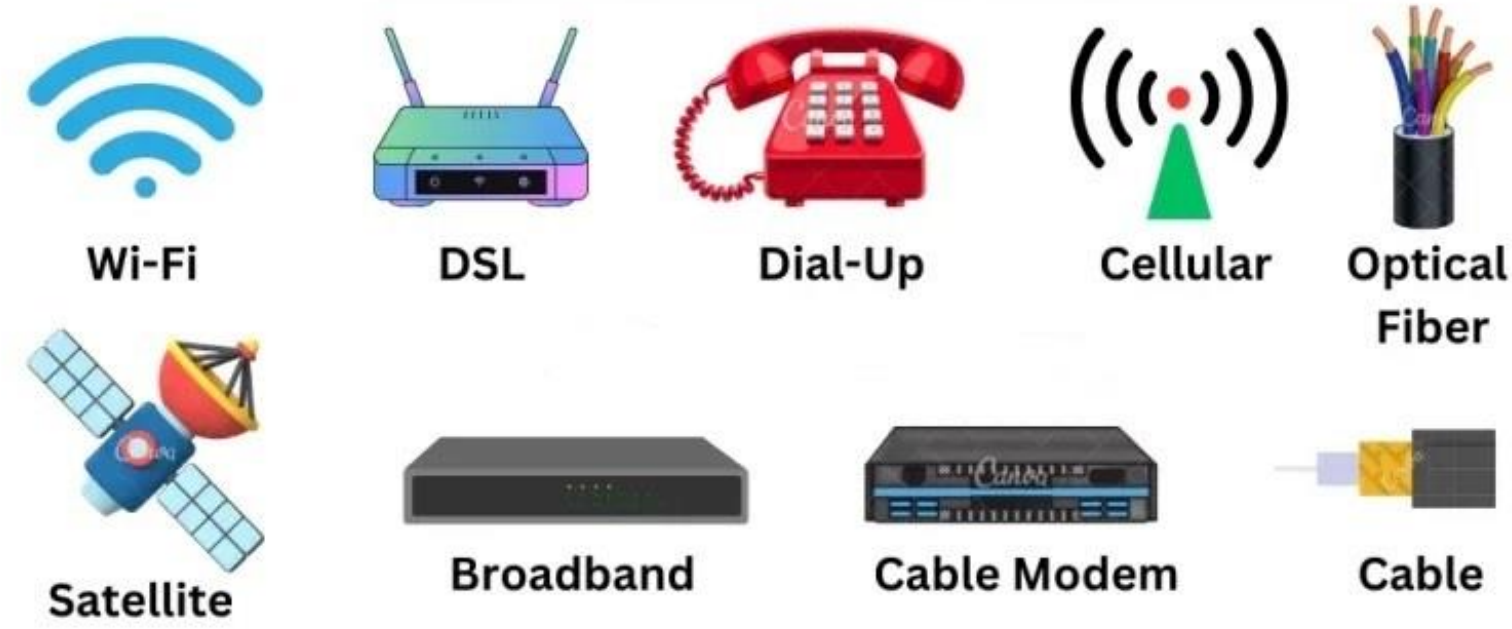
Year	Bandwidth
1969	9.6 Kbps
1985	54 Kbps
1987	1.544 Mbps (T1 speed)
1989	45 Mbps (T3 speed)
1995	155 Mbps
1997	622 Mbps
1998	1,024 Mbps
2000	2,048 Mbps



Growth rate:

> **210, 000** times

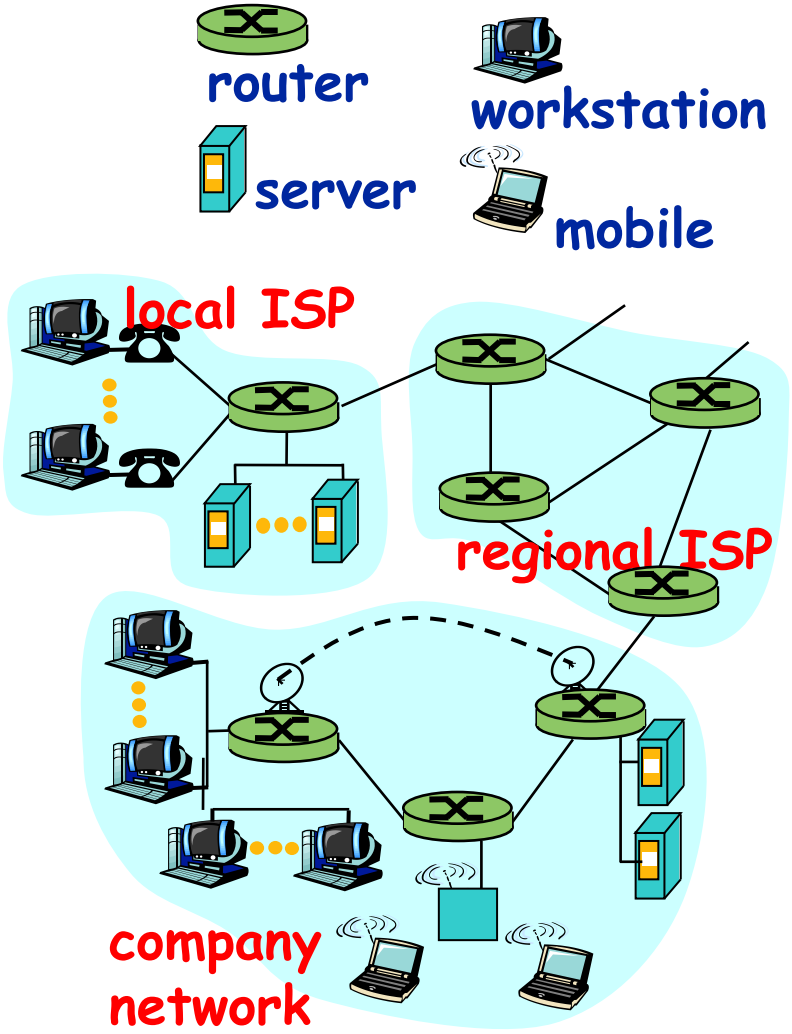
Types of Internet Connection



Internet: Three Components

- End systems (hosts): millions of connected computing devices executing network applications
- Routers: forwarding packets (chunks of data)
- Communication links:

  Connecting hosts and routers
  - fiber, copper, radio, satellite
  - transmission rate = ***bandwidth***



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What are the major Internet tools and services?

- Electronic mail (email)
- Newsgroups
- Internet Relay Chat (IRC)
- Telnet
- File Transfer Protocol (FTP)
- World Wide Web (www)

What are the major Internet tools and services?

E-mail

- The most popular use of the Internet
- Available for free on the Web
  - Yahoo Mail, Gmail, Hotmail, Eudoramail
- Valid e-mail address consists of a username and a domain name separated by the @ sign
  - ex. abc@mail.com

What are the major Internet tools and services?

Newsgroups

- Service dedicated to discussions on a particular topic through posted articles.
- Accessible through newsreaders.
- Names signify to users the topic of discussion.
  - ex. http://www.vetclick.com

What are the major Internet tools and services?

IRC (Internet Relay Chat)

- Allows real-time text based communication through the Internet.
- Organized by topic of interest into “channels”.
- Discussion occurs in “chatrooms”.
- Some Websites have built-in chatrooms.

What are the major Internet tools and services?

Telnet

- Service that allows one computer to access another computer.
- Enables the user to exchange data and issue commands on the other computer, the Telnet host.
- Mainly used by libraries to allow access to information stored in their computers.

What are the major Internet tools and services?

FTP (File Transfer Protocol)

- Allows the transfer or copying of files from one computer to another.
- Ideal for procuring or sending files to a remote computer.
- FTP Programs available freely.
- Modern browsers have built in FTP capabilities.

What are the major Internet tools and services?

World Wide Web (www)

- Invented in 1991 by Tim Berners-Lee, the web is the fastest-growing Internet service.
- Based on HTML (Hyper Text Markup Language) allowing users to access data in multimedia format.
- Simplest unit is the Webpage, primarily a document encoded in HTML format that can be accessed by using a browser.
- HTML links contents of a Webpage to each other as well as to other Web pages through a hyperlink.
- Each page has an address, a Uniform Resource Locator (URL).

How does the Internet work?

- **Protocols** – standardized rules that define how computers communicate and exchange data.
- **IP address** – unique number used to identify computers on the Internet.
- **Domain name** – structured naming system to locate computers on the Internet.
- **URL** – uniform naming scheme that specifies unique addresses of Internet resources.
- **Client and server** – computing architecture used by most Internet services.

How does the Internet work?

TCP/IP (Transmission Control Protocol / Internet Protocol)

- The Internet is a packet-switching network that uses TCP/IP as its core protocol.
- TCP/IP is a suite of protocols that govern network addresses and the organization and packaging of the information to be sent over the Internet.
  - TCP – flow control and recovery of packets.
  - IP – addressing and forwarding of individual packets.

How does the Internet work?

Internet Protocols

- HTTP (Hypertext Transfer Protocol Protocol) - for accessing and transmitting World Wide Web documents.
- FTP (File Transfer Protocol Protocol) - for transferring files from one computer to another.
- Gopher Protocol - for accessing documents via Gopher menus (no longer widely used).
- Telnet Protocol - allows users to logon to a remote computer.
- SMTP (Simple Mail Transfer Protocol) for sending and managing electronic mails (e-mail).

How does the Internet work?

IP address

- IP address is a unique address assigned to each computer connected to the Internet
- It is used by TCP/IP to route packets of information from a sender to a location on the Internet
- IP address consist of four sets of numbers ranging from 0 to 255 Ex. 249.7.13.53

How does the Internet work?

IP address

- 192.168.213.4
- The first two number sets designate the network.
- The third number set identifies the local network.
- The fourth number set identifies the particular machine.

How does the Internet work?

Domain names

- Domain names are the alias or English language equivalent of a computer's IP addresses.
- Domain Name System (DNS) allows the use of easier to remember domain names instead of IP addresses to locate computers on the Internet.
- Domain Name Resolvers scattered across the Internet translate domain names into IP addresses.

How does the Internet work?

Domain names

- Domain names have two parts:
  - First part names the host computer
  - Second part identifies the top level domain
- Top level domains (TLD) – identifies the type of host
  - Generic Top Level Domains
  - Country Code Top Level Domains
- Domain names are used in URLs and e-mail addresses

How does the Internet work?

Top Level Domains

- **.com** – commercial/company site
- **.edu/ac** - educational/academic
- **.gov** – government site
- **.org** – non-profit organization
- **.mil** – military sites
- **.int** – international organizations
- **.net** – network providers

How does the Internet work?

Additional Top Level Domains

- **.aero** - restricted use by the air transportation industry
- **.biz** - general use by businesses
- **.coop** - restricted use by cooperatives
- **.info** - general use by both commercial and non-commercial sites
- **.museum** - restricted use by museums
- **.name** - general use by individuals
- **.pro** - restricted use by certified professionals and professional entities

How does the Internet work?

Country Code Top Level Domains

- **.lk –** Sri Lanka
- **.au** – Australia
- **.cn –** China
- **.fj** – Fiji
- **.id** – Indonesia
- **.jp** – Japan
- **.mn** – Mongolia
- **.ph –** Philippines
- **.sg –** Singapore
- **.uk** – United Kingdom
- **.us –** United States
- **.tw -** Taiwan
- **.vn -** Vietnam
- The complete list can be accessed at http://www.iana.org/cctld/cctld-whois.htm

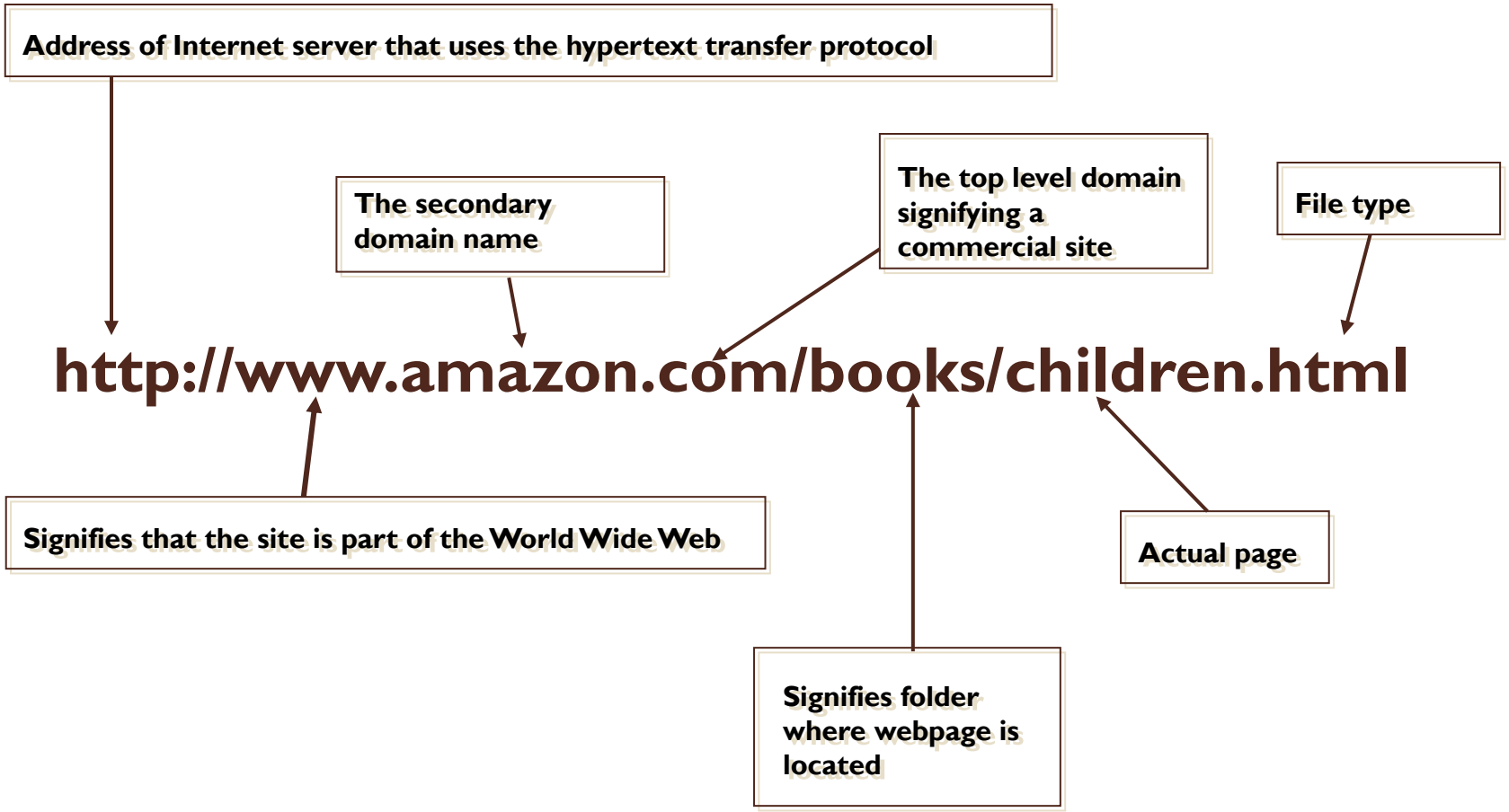
How does the Internet work?

Uniform Resource Locator (URL)

- Each Internet document or file has a unique address called a URL
- The URL comprises of three parts:
  - Protocol – lets the computer know how to process the information it receives
  - Domain name – Internet address of the computer hosting the site and storing the documents
  - Path – lets the computer which directory and file to access

What is URL?

UNIFORM RESOURCE LOCATOR



How does the Internet work?

http://www.amazon.com/books/children.html

- **"http“**
  - transfer protocol
- **"www"**
  - server name
- **“amazon"**
  - second-level domain name
- **“com"**
  - top-level domain name
- **"books"**
  - directory name
- **“children"**
  - file name
- **"html"**
  - file type

How does the Internet work?

Client Server

- The client server model is the distributed computing architecture used by most Internet services, generally classifying hosts on the Internet as clients and servers.
- Client programs are used to access Internet services provided by host computers running server programs that provide the information or service needed.
- For example web browsers are client programs used to access information hosted by web servers.

What are the Internet search tools and services?

- Search engines
- Subject directories
- Invisible Web
- Meta-search engines
- Specialized search engines
- Other search tools

How to use the Internet tools and services?

Browsers

- Programs used to access the World Wide Web
- Allows a user to access resources on a server
- Displays the contents of the web in multimedia format
- Examples of browsers
  - Internet Explorer, Mozilla Firefox, Opera, Google Chrome

How to find information on the Internet?

- Analyze your topic
- Choose the search tool you need
- Learn how to use the search tools
- Formulate your search strategy
- Search with a question in mind

How to find information on the Internet?

Simple search strategy

- pick your site
- learn to use the search tools
- choose your words carefully
- vary your spelling
- know how to widen your search
- know how to use the refining techniques
- use multiple search engines
- use meta-search engines
- use specialized search engines
- reuse your search