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Sathankulam – 628704**

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What is Internet?

Internet or internetworking refers to a wide network interconnected globally with one another and capable of sharing resources. It is called internet.

Internet refers to millions of computers connected which communicated via TCP/IP Protocols. It is the biggest network in the world and is freely accessible by public.

HISTORY OF THE INTERNET

- In 1957 when Sputnik Satellite was launched by Soviet, United States considered as a threat to its security
- So it started a military and academic proposal to promote research in mathematics, pure sciences and engineering
- This proposal was began under the Department of Defense and named as Advanced Research Projects Agency (DARPA)
- Marshall McLuhan proposed the idea of global village which function as the nerve system of planet
- In 1961 Leonard Kleinrock proposed packet switching
- Packet switching sends data in packets. If a packet is lost or corrupted only missing packet is resent.
- It became fundamental in the development of Ethernet standard for LANs
- In 1967 Wesley Clark coined the term Interface Message Processor (IMP).
- ARPANET initially consisted of four computers. Now more than 100 million by 2001
- In 1972 Bob Kahn proposed open architecture for the Internet
- In 1973 Bob Kahn and Vinton Cerf produced TCP/IP Protocol.
 - TCP handles transmission of data
 - IP handles bundling of packets, addressing them and interface between LAN and Internet.
 - Each computer has a unique IP address.
- Paul Mockapetris developed Domain Name System (DNS)

INTERNET SERVICES

- Electronic mail
- Electronic mailing lists
- USENET newsgroup
- Real-time communication
- File Transfer Protocol

- Telnet
- Gopher
- World Wide Web

INTERNET ACCESSIBILITY

- Access through Internet Service Providers (ISPs)
- Home PC connected to Internet through landline telephone using modem(modulator – demodulator) to transmit data
- Internet Connections
 - Dial-up Connections
 - Popular method and less expensive
 - To use this computer should have a modem to connect and a software to use this modem.
 - ISP supply 56 k connection which refers to the speed
 - High Speed Connections
 - Digital Subscriber Lines (DSL)
 - Cable
 - Satellite
 - Integrated Services Digital Network (ISDN)

USES OF INTERNET

- Telecommuting
- Business, Advertising, online shopping
- News job, software
- Online courses, virtual classrooms, coachings
- Government services, politics and national defense
- Electronic publishing
- Entertainment
- Teaching and learning
- Scholarly research
- General information about a subject
- Correspondence (email, chatting)

PROTOCOLS

It is a set of rules that specifies a common language that computers use for communication with other computers.

- Ethernet – transfer information on LAN. It specifies number of wiring and signaling standards

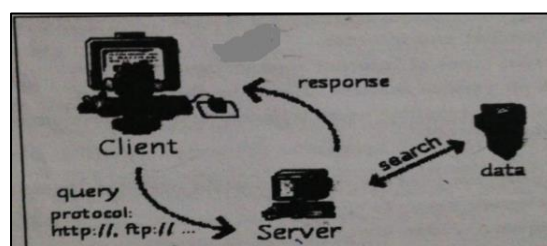
- Internet Protocol (IP) – provides communicable global addresses to the computers.
- Transmission Control Protocol (TCP) – reliable and proper delivery of data from sender to receiver by breaking large messages, transports and reassembles them
- File Transfer Protocol (FTP) – transfer files and perform file commands on the other computer.
- Hypertext Transfer Protocol (HTTP) – used to retrieve web pages from a web server
- Simple Mail Transfer Protocol (SMTP) – used for email transmissions

WEB CONCEPTS

- World Wide Web – is an international hypertext system that links millions of documents together.
- Hypertext Link – is a word or picture requests different file from the Internet
- Hypertext Markup Language (HTML) – is a collection of tags used to create hypertext documents
- Web Page – is a document created using HTML
- Website – collection of related pages
- Web Server – a hard drive in which web pages and websites are stored
- Web Browser – a program to display web pages. Ex. Microsoft Internet Explorer, Mozilla, Chrome

CLIENT / SERVER MODEL

- Internet services rely on client/server model
- User is the client and has client software installed to access internet services
- Client software connect to server programs which provide the information needed.
- Client request through query to server programs which in turn retrieve data and response back to client
- Most browsers function as client programs for World Wide Web and FTP access



RETRIEVING DATA FROM WEB

- Retrieve data using address of the file and is called URL (Uniform Resource Locator)
- Address box of browser shows URL of the displayed document
- Structure of URLs - consists of three parts
 - Protocol : is the set of rules computer follows to communicate with other computers
 - Domain-name : Internet address that is hosting the site and storing the documents. It may be expressed as IP address.
 - Path : it is the directory and file specification which lets the computer which directory and file to access

http://www.lincweb.org/erseources.asp
 http:// - protocol
 www.lincweb.org - domain name
 eresources.asp – path to the specific page

INTERNET PROTOCOLS

- Protocol suites is a set of protocols defining services at a number of layers
- Internet protocols are popular open-system protocol suites.
- They are used to communicate across interconnected networks
- TCP and IP are well-known communication protocols in that suite.
- Internet Protocols not only has TCP and IP but also applications like Email, Telnet and File Transfer

FTP	NFS	5-7	Application Layer
Telnet	XDR		Presentation Layer
SMTP	RPC		Session Layer
SNMP			
TCP/UDP		4	Transport Layer
Routing protocols, IP, ICMP		3	Network Layer
Data Link Layer		2	Data Link Layer
Physical Layer		1	Physical Layer

INTERNET PROTOCOL (IP)

- Network layer of TCP/IP is called IP(Internet Protocol)
- It is responsible for sending data between end-systems on different networks
- IP networks has the following properties:
 - Each end-system has unique address
 - IP layer in each end-system uses a data link layer to transmit and receive IP packets
- the combination of network and host address make up IP address
- Provide connectionless delivery of datagrams and provide fragmentation and reassembly of datagrams

IP Addresses

- Each IP address is a pair of network address and host address
- It is 32 bits long and shown using dotted decimal notation
- Ex. 137.132.88.16

Network Address	Host Address
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- Each byte is shown as decimal number encoded by the 8 bits

Binary	Dotted decimal
00000001 00000010 00000011 00000100	1.2.3.4
10000000 11010101 00000001 00000001	128.213.1.1

- When routing data packets, routers look at the network address.
- Each router has a table called routing table that indicates where to send a packet
- IP address space is administered by IANA (Internet Assigned Numbers Authority)
- Managed by RIRs (Regional Internet Registry)
- IANA allocates IP address space to the RIRs, who in turn allocate IP address space to Internet Service Providers(ISPs).
- ISPs allocate IP address space to downstream providers, customers etc
- RIRs also assign IP address space to organizations who are end entities

Types of Internet Addresses

- Internet Addresses are divided into 5 classes A, B, C, D and E

Class A

0	Netid (7 bits)	Hostid (24 bits)
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Class B

1	0	Netid (14 bits)	Hostid (16 bits)
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Class C

1	1	0	Netid (21 bits)	Hostid (8 bits)
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Class D

1	1	1	0	Multicast group id (28 bits)
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Class E

1	1	1	1	0	Reserved for future use (27 bits)
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Address ranges in each class

Class	Lowest Address	Network Identifier	Highest Address	Network Identifier
A	1.0.0.0		126.0.0.0	
B	128.0.0.0		191.255.0.0	
C	192.0.0.0		223.255.255.0	
D	224.0.0.0		239.255.255.255	
E	240.0.0.0		247.255.255.255	

Some addresses 0, 127 and 255 are reserved for special use. 255 indicates broadcast address which is understood by all machines on the net. Address with 127 is the loopback network which does not exist.

Packet Format

Version	IHL	Type_of_service	Total Length	
Identification			Flags	Fragment offset
Time_to_live		Protocol	Header Checksum	
Source address				
Destination address				
Options (padding)				
Data variable				

TRANSMISSION CONTROL PROTOCOL (TCP)

- TCP corresponds to transport layer of OSI model
- It provides reliable transmission through connection-oriented, end-to-end reliable packet delivery.
- It receives data from application layer and hand it over to IP layer.
- Timeout mechanism is used to detect lost packets and requests for retransmission

Packet format

Source Port		Destination Port	
Sequence number			
Acknowledgement number			
HLEN	Reserved	Flags	Window size
Checksum		Urgent pointer	
Option and padding			
Data variable			

USER DATAGRAM PROTOCOL (UDP)

- UDP is a connectionless transport layer protocol.
- It adds no reliability, flow control or error recovery.
- Receiving system remains unaware of the sending of a datagram unless it arrives.
- It also does not know if the received data is one of the series of datagram
- It is used where reliability is not necessary and helpful in multimedia and multicasting applications.

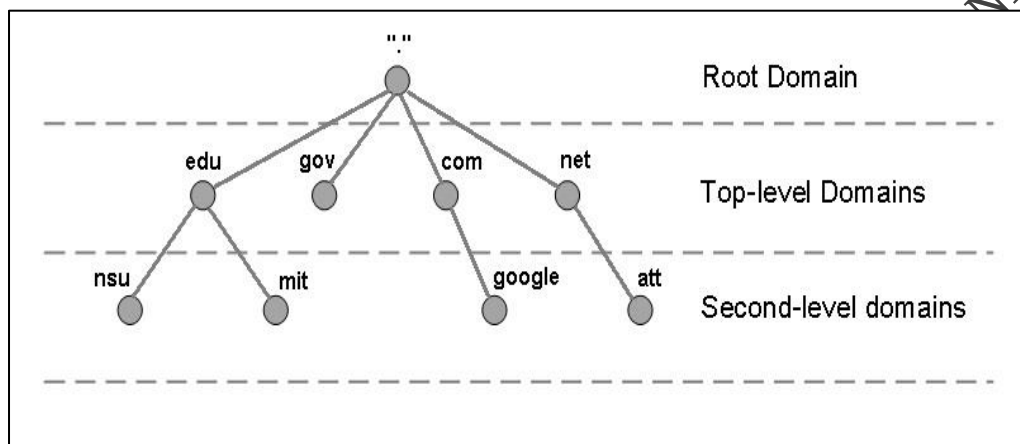
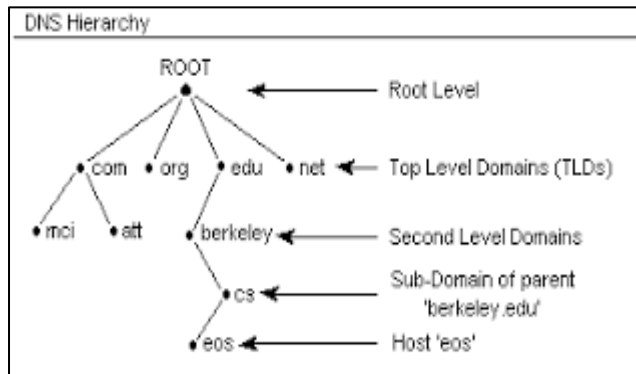
Packet format

Source port	Destination port
Length	Checksum

HOST NAMES

- Users deal with host names rather than IP addresses
- These names are arranged in hierarchical structure.
- The name is based on naming domains

- At the top level there are domains like educational institutions(.edu), commercial entities(.com), public organizations(.gov)



- Each individual end-system(host) has a unique name within its department or sub-organization.
- Ex. stan.cs.tcm.edu a specific computer in the computer science department
- There are thousands of participating DNS servers, each server can provide IP addresses for a specific domain
- When we access a remote computer using a host name, the client process contacts DNS server that controls the client domain.
- It asks for the IP address to establish communication with remote computer.
- The local DNS server knows the IP address of all host on the Internet.
- It might contact another DNS server and ask for help.
- This process continues in the naming tree until it reaches top level DNS server, where the top level server forward the request to the DNS server that handles the top-level domain of the remote host.