APPLICATION LAYER PROTOCOLS

There are several protocols which works for users in Application Layer. Application layer protocols can be divided into two categories broadly:

- Protocols which are used by users; email for example.
- Protocols which help and support protocols used by users; DNS for example.

Few of Application layer protocols are described below:

Domain Name System

DNS works on Client Server model. It uses UDP protocol for transport layer communication. DNS uses hierarchical domain based naming scheme. The DNS server is configured with FQDN (Fully Qualified Domain Names) and email addresses mapped with their respective Internet Protocol addresses.

A DNS server is requested with FQDN and it responds back with the IP address mapped with it. DNS uses UDP port 53.

Simple Mail Transfer Protocol

SMTP is used to transfer electronic mail from one user to another. This task is done by means of email client software (User Agents) the user is using. User Agents help the user to type and format the email and store it until internet is available. When an email is submitted to send, the sending process is handled by Message Transfer Agent which is normally comes inbuilt in email client software.

Message Transfer Agent uses SMTP to forward the email to another Message Transfer Agent (Server side). While SMTP is used by end user to only send the emails, Servers normally use SMTP to send as well as receive emails. SMTP uses TCP port number 25 and 587.

Client software uses IMAP or POP protocols to receive emails.

File Transfer Protocol

FTP is the most widely used protocol for file transfer over the network. FTP uses TCP/IP for communication and it works on TCP port 21. FTP works on Client/Server Model where a client requests file from Server and server sends requested resource back to the client.

FTP uses out-of-band controlling i.e. FTP uses TCP port 20 for exchanging controlling information and the actual data is sent over TCP port 21.

The client requests the server for a file. When the server receives a request for a file it opens a TCP connection for the client and transfers the file. After the transfer is complete the server closes the connection. For a second file, client requests again and the server open a new TCP connection again.

Post Office Protocol

POP (version 3) is a simple mail retrieval protocol used by User Agents (client email software) to retrieve mails from mail server.

When a client needs to retrieve mails from server it opens a connection with the server on TCP port 110. User can then

access his mails and download them to local computer system. POP3 works in two modes. The most common mode (delete mode) is to delete the emails from remote server after they are downloaded to local machines. The second mode (keep mode) does not delete the email from mail server and gives the user an option to access mails later on mail server.

Hyper Text Transfer Protocol

HTTP is the foundation of World Wide Web. Hypertext is well organized documentation system which uses hyperlinks to link to another pages in the text documents. HTTP works on client server model. When a client (user) wants to access any HTTP page on the internet it initiates TCP connection to server on port 80. When the server accepts client request, the client is then authorized to access web pages.

To access web pages a client normally uses web browsers, who are responsible for initiating, maintaining and closing TCP connections. HTTP is a stateless protocol, which means the Server maintains no information about earlier requests by clients.

HTTP versions:

- HTTP 1.0 uses non persistent HTTP. At most one object can be sent over a single TCP connection.
- HTTP 1.1 uses persistent HTTP. In this version, multiple objects can be sent over a single TCP connection.