"Study of Basic TCP/IP Protocols"

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ABSTRACT

Internet the main application which run on TCP/IP model. This TCP/IP model is also known as the model of DoD. The basic protocols come under TCP/IP are ICMP (Internet Control Message Protocol), UDP (User Datagram Protocol), FTP (File Transfer Protocol) and HTTP (Hypertext Transfer Protocol). So, in this paper we are going to study about the basic protocols of TCP/IP model.

Keywords:
TCP/IP, DoD, ICMP, UDP, FTP, HTTP

INTRODUCTION

The Internet Protocol suite is the computer networking model and set of communications protocol which used on the Internet and on the Computer networks. It is commonly known as TCP/IP because it's most important protocols, the Transmission Control Protocol (TCP) and Internet protocol were the first networking protocols defined in the standard. TCP/IP provides end-to-end connectivity specifying how data should be packetized, addressed, transmitted, routed and received at the destination. The TCP/IP model is organized into four abstraction layers. So, from lowest to highest, the layers are link layer, internet layer, transport layer and the application layer. The figure given below shows the structure of TCP/IP. Now, the basic protocols of the TCP/IP are ICMP, UDP, FTP and HTTP. Let us discuss this in detail.
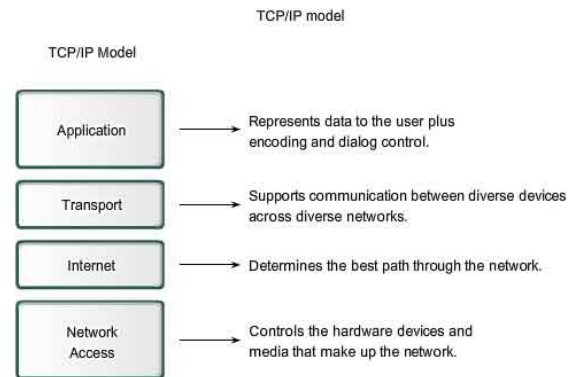

Fig 1. TCP/IP Model

ICMP (Internet Control Message Protocol)

The Internet Control Message Protocol is one of the main protocols of the TCP/IP. This protocol is used by the network devices, like routers to send error messages indicating, for example, that a requested service is not available or that a host or router could not be reached. ICMP can also be used to relay query messages. It is assigned protocol number 1. ICMP differs from transport protocols such as TCP and UDP in that it is not typically used to exchange data between systems, nor is it regularly employed by end-user network applications. The ICMP messages are typically used for diagnostic or control purposes or generated in response to errors in IP operations. ICMP errors are directed to the source IP address of the originating packet. The structure of ICMP segment is shown below in fig 2.
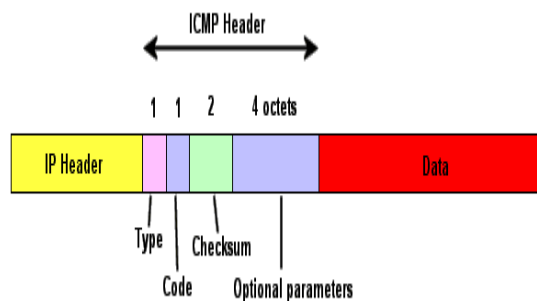
Fig 2. ICMP segment structure

UDP (User Datagram Protocol)

UDP (User Datagram Protocol) is a communications protocol that offers a limited amount of service when messages are exchanged between computers in a network that uses the Internet Protocol (IP). UDP is an alternative to the TCP and together with IP, is sometimes referred to as UDP/IP. Like the Transmission Control Protocol, UDP uses the Internet Protocol to actually get a data unit called datagram, from one computer to another. Unlike TCP, however, UDP does not provide the service of dividing message into packets (datagrams) and reassembling it at the other end. Specifically, UDP doesn't provide sequencing of the packets that the data arrives in. this means that the application program that uses UDP must be able to make sure that the entire message has arrived and is in the right order. Network applications that want to save processing time because they have very small data units to exchange may prefer UDP to TCP. THE Trivial File Transfer Protocol (TFTP) uses UDP instead of TCP. The fig 2. shows the structure of UDP.
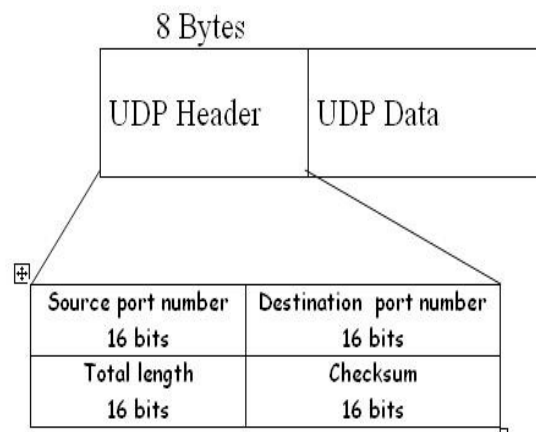

Fig 3. Structure of UDP
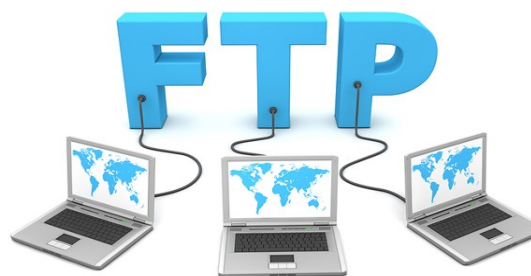
FTP (File Transfer Protocol)

Fig 4. FTP

The File Transfer Protocol (FTP) is a standard network protocol used to transfer computer files from one host to another host over a TCP based network, such as the internet. FTP is built on a client-server architecture and uses separate control and data connections between the client and the server. FTP users may authenticate themselves using a clear-text sign-in protocol, normally in the form of a username and password, but can connect anonymously if the server is configured to allow it. For secure transmission that protects the username and password, and encrypts the content, FTP is often secured with SSL/TLS (FTPS). SSH File Transfer Protocol (SFTP) is sometimes also

used instead, but is technologically different. The fig 5. shows the communication between FTP server and clients.
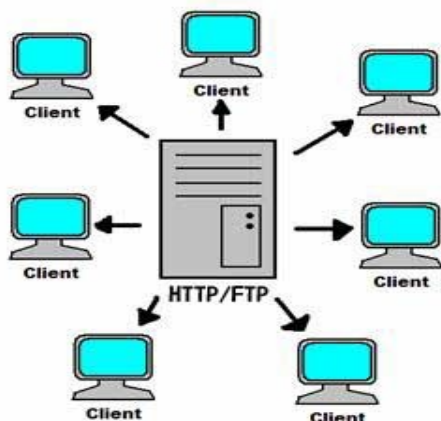

Fig 5. Communication between FTP server and clients

HTTP (Hypertext Transfer Protocol)

It is an application protocol for distributed, collaborative, hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web (WWW). Hypertext is structured text that uses logical links (hyperlinks) between nodes containing text. HTTP is the protocol to exchange or transfer hypertext. The HTTP functions as a request-response protocol in the client-server computing model. A web browser, for example, may be the client and an application running on a computer hosting a website may be the server. The client submits an HTTP request message to the server. The client submits an HTTP request message to the server. The server, which provides resources such as HML files and other content, or performs other functions on behalf of the client, returns a response message to the client. The response contains completion status information about the request and may also contain

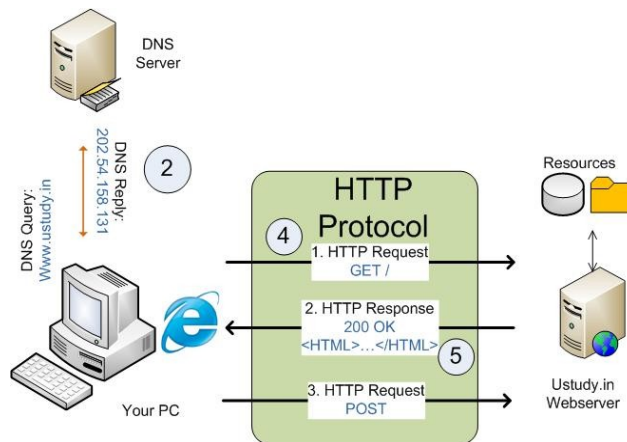requested content in its message body. The fig 6 shows the working of HTTP protocol.

Fig 6. Working of HTTP

CONCLUSION

So, we have discussed and studied about the basic protocols of TCP/IP model: ICMP, UDP, FTP and HTTP. So, all these protocols are the basic protocols of TCP/IP model. The internet is the biggest network which is working on the TCP/IP model. Right now the version of Internet Protocol in IPv4 but in future this version of protocol is replaced by the IPv6, which does have the different protocols as compare to the IPv4.

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