



International Journal of Linguistics & Computing Research

Journal Homepage: <http://cphfs.in/research.php>



The TCP/IP Model: An Overview

Sudha Mishra

Centre for Public Health and Food Safety
sudhamishra911@gmail.com

Abstract: Protocol is a set of rules which is established by the network vendors. These set of rules govern the electronic communication process. TCP/IP is protocol suite that controls the movement of data across the Internet. This paper explains the TCP/IP model and reveals the differences between OSI reference model and TCP/IP model. TCP/IP Model poses four layers while OSI Reference Model poses seven layers. Each layer has its own responsibilities.

Keywords: HTTP, FTP, packets, protocol.

I. INTRODUCTION

The TCP/IP reference model is a solid foundation for all of the communication tasks on the Internet. TCP/IP stands for Transmission Control Protocol/Internet Protocol [1]. It is a collection of protocols, or rules, that govern the way data travels from one computer to another across networks. The internet is based on TCP/IP. It can also be used as a communications protocol in a private network (an intranet or an extranet). TCP/IP has two major components: TCP and IP. The TCP (Transmission Control Protocol) component performs following task-

- It breaks data into packets so that the network can handle efficiently.
- It verifies that all packets arrive at their destination.
- It reassembles the data.

The IP (Internet Protocol) component performs following task.

- It envelops and addresses the data.
- It enables the network to read the envelop and forward the data to its destination
- It also defines how much data can fit in a single envelope (a packet).

IPv4 and IPv6 are the versions of internet protocol(IP). The IPv6 comes with built in security mechanism known as IPSec [2].

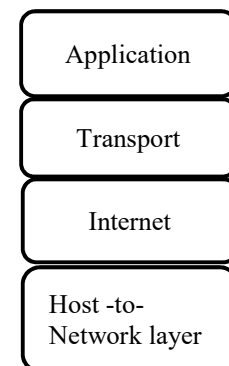
II. TCP/IP MODEL

TCP/IP was developed by the Department of Defense (DoD) to connect various devices to a common network (Internet). The

main aim behind developing the protocol was to build a robust and automatically recovering phone line failure while on the battlefield [3]. TCP/IP protocol suite is the most widely used protocol suite. There are 4 layers in TCP/IP protocol suit and each layer has different protocols in it. Each layer performs various functions.

Layers of TCP/IP Model: The layers of TCP/IP are as follows [4]-

- 1.) Network Interface Layer
- 2.) Internet Layer
- 3.) Transport Layer
- 4.) Application Layer



TCP/IP MODEL

Telnet	HTTP	FTP	SMTP	DNS
TCP		UDP		
IP	ARP	ICMP	IGMP	
Ethernet		Token Ring	Frame Relay	ATM

TCP/IP PROTOCOL SUITE

III. FUNCTION OF THE LAYERS

A. APPLICATION LAYER

In Application layer applications create user data and communicate this data to other applications on another or the same host. The applications, or processes, make use of the services provided by the underlying, lower layers, especially the Transport Layer which provides reliable or unreliable pipes to other processes. The communications partners are characterized by the application architecture, for example the client-server model and peer-to-peer networking. In this layer all higher-level protocols (for example SMTP, FTP, SSH, HTTP) operate. The most common protocols of this layer are HTTP (Hypertext Transfer protocol) core protocol of World Wide Web, FTP (File Transfer Protocol) enables a client to send and receive compete files from a server, Telnet, SMTP (Simple Mail Transfer Protocol) and DNS (Domain Name System). Processes are addressed via ports which essentially represent services.

B. TRANSPORT LAYER

The Transport layer facilitates in establishing the session between source and destination machines. It performs host-to-host communications on either the same or different hosts and on either the local network or remote networks separated by routers. UDP is the basic transport layer protocol which provides an unreliable datagram service. The Transmission Control Protocol provides flow-control, connection establishment, and reliable transmission of data.

C. INTERNET LAYER

The Internet layer is responsible for the exchanging datagrams across network boundaries. It provides a uniform networking interface that hides the actual topology (layout) of the underlying network connections. Hence it is also known as the layer that establishes internetworking. It defines and establishes the Internet. This layer defines the addressing and routing structures used for the TCP/IP protocol suite. The primary protocol in this scope is the Internet Protocol, which defines IP addresses. In other words, this layer specifies a packet format and a protocol called Internet Protocol (IP). Each packet contains the address of both

sender and receiver which is known as IP address. For routing efficiency, the IP address is considered in two parts:

- The prefix which identifies the physical network.
- The suffix which identifies a computer on the network.

A unique prefix is required for each network in an internet. For the global Internet, network numbers are obtained from Internet Service Providers (ISPs). ISPs coordinate with a central organization called the Internet Assigned Number Authority (IANA).

D. NETWORK INTERFACE LAYER

The Network Interface Layer of TCP/IP architecture, also known as the data link layer or host to network layer. It corresponds to OSI physical and data link layer. At this layer many protocols are used by the user (including token ring, Ethernet and LAN's and WAN's protocols). This layer specifies the networking methods within the scope of the local network link on which hosts communicate without intervening routers [5].

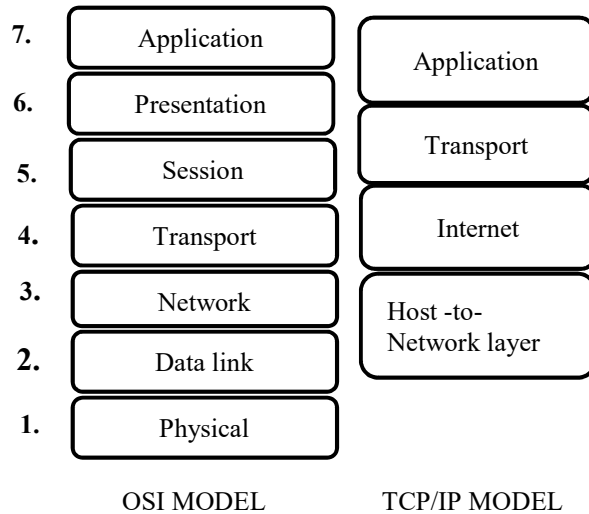
IV. SIMILARITIES BETWEEN OSI REFERENCE MODEL AND TCP/IP MODEL

TCP/IP model works as OSI model but there are certain differences in its working.

- The Application layer of the TCP/IP Model performs the same functions as the Application, Presentation, and Session layers of the OSI Model.
- The Transport layer of the TCP/IP Model works the same as the Transport layer in OSI Model and part of Session layer.
- The Internet of layer of the TCP/IP Model Performs the same functions as the Network layer of OSI model.
- The Network Interface layer of the TCP/IP Model performs much of the job of the MAC portion of the Data Link and Physical layers of the OSI Model.

V. COMPARISON BETWEEN OSI AND TCP/IP MODELS

- The Internet Protocol (IP) was developed by the Department of Defense (DoD) to connect various devices to a common network (Internet) and was a cornerstone for a group of protocols that became known as the TCP/IP protocol suite [6]. Whereas Open Systems Interconnection was developed by the International Organization for Standardization (ISO).
- There are seven layers in OSI model. On the other hand, TCP/IP model has only four layers. Presentation and session layers are not present in it. The TCP/IP Model also squashes the OSI's Physical and Data Link Layers together into the Network Access Layer.



- The TCP/IP model is generally regarded as more practical than the OSI model. Upper layer protocols often provide services that span the top three layers. A converged Data-link and Physical layer is also sensible, as many technologies provide specifications for both layers, such as Ethernet.
- The transport layer in OSI model guarantees the delivery of packets. Whereas the transport layer in TCP/IP model does not guarantee the delivery of packets
- The OSI model follows a horizontal approach but TCP/IP follows vertical approach.
- Protocols are hidden in OSI model and are easily replaced as the technology changes but in TCP/IP replacing protocol is not easy.
- Network layer of OSI model provide both connection oriented and connectionless service. Whereas the Network layer in TCP/IP model provides connectionless service.
- OSI provides layer functioning and also defines functions of all the layers. On the other hand, TCP/IP

model is more based on protocols and protocols are not flexible with other layers [7].

CONCLUSION

In this paper TCP/IP model has been explained. The similarities and dissimilarities of OSI and TCP/IP models has been revealed. Instead of all the factors, these two-network model (OSI and TCP/IP) are most commonly used model in computer networks. OSI defines layer wise functioning whereas TCP/IP more based on protocols. We can't really decline any one of these models as both of these are equally important and widely use all over the world.

REFERENCE

- [1]. Julian Moss, Understanding TCP/IP, PC Network Advisor, Issue 87 (September 1997).
- [2]. Dr. M. Anand Kumar, Dr. S. Karthikeyan, An Enhanced Security for TCP/IP Protocol Suite, International Journal of Computer Science and Mobile Computing, Vol. 2, Issue. 11, November 2013, pg. 331 – 338.
- [3]. P. Ravali, A Comparative Evaluation of OSI and TCP/IP Models, International Journal of Science and Research, Volume 4 Issue 7, July 2015.
- [4]. Sravya Mundra, Professor Tarik El Taeib, TCP/IP PROTOCOL LAYERING, International Journal of Computer Science and Information Technology Research, Vol. 3, Issue 1, January - March 2015, pp. 415-417.
- [5]. Pranab Bandhu Nath, Md.Mofiz Uddin, TCP-IP Model in Data Communication and Networking, American Journal of Engineering Research, Volume-4, Issue-10, 2015, pp-102-107.
- [6]. Aaron Balchunas, OSI Reference Model, at <http://www.routeralley.com>.
- [7]. Nitish Aggarwal, Rachit Gupta, Pallavi Saxena, Comparative Study of OSI & TCP/IP Reference Model, International Journal for Research in Applied Science & Engineering Technology, Volume 2 Issue XI, November 2014.