

## **Introduction to the TCP/IP Model**

The TCP/IP model is a part of the Internet Protocol Suite. This model acts as a communication protocol for computer networks and connects hosts on the Internet. It is a concise version of the OSI Model and comprises four layers in its structure.

This concept of TCP/IP is not just important for people in the computer or IT fields but also is an essential part of the Computer Knowledge syllabus, included in major competitive exams.

Before, diving deep into the different aspects of the structure, refer to the table below and know about some basic and introductory features of the model:

### Basics of TCP/IP Model

Full-Form    Transmission Control Protocol/ Internet Protocol

Developed By    Department of Defence (DoD), United States

Developed in    During the 1970s

Year for acknowledgement as a standard protocol by ARPANET    1983

Function of TCP    Collecting and Reassembling Data Packets

Function of IP    Sending the Data Packets to the correct destination

Number of Layers in TCP/IP Model    4 layers

In this article, we shall discuss in detail the different layers of the TCP/IP model along with their functions. Also, a few sample questions based on this topic have been given further below for the reference of Government exam aspirants.

### History and Development of TCP/IP Model

This protocol is a result of the research and development by the Defense Advanced Research Projects Agency (DARPA) during the 1960s. Given below are a few points which had played an important role in the advancement of the TCP/IP model:

A two-network TCP/IP communications test was conducted between Stanford and University College London in 1975

An important thing which resulted in promoting this model was when the US Department of Defense declared TCP/IP as the standard for all military computer networking. This was In March 1982

In 1983, this structured protocol was adopted by ARPANET as a standard protocol

Later on other Computer and IT companies including IBM, DEC, etc. had also adapted the TCP/IP model as their standard communication protocol

In 1989, the University of California has accepted the TCP/IP code for public domain

Gradually, this Internet protocol suite or the TCP/IP model was accepted across the globe as a comprehensive framework for computer networking and Internet communication.

The TCP/IP model is considered to be similar to the Open Systems Interconnection Model. However, the framework and the structuring of the two was completely different and Transmission Control Protocol/ Internet Protocol was released prior to the OSI Model. For a detailed difference between the two, candidates can visit the [Difference Between TCP/IP and OSI Model](#) page.

### Layers of the TCP/IP Model

Unlike the OSI model which comprises seven layers, the TCP/IP model is structured with four different layers. These four layers are:

Network Access Layer

Internet Layer

Host to Host Layer

Application Layer

Now, let us discuss each of these four layers in detail along with their functions as a part of the protocol architecture.

## 1. Network Access Layer

This is the bottom-most layer of the TCP/IP model architecture

It is a combination of the Data Link and Physical Layer of the OSI model

The physical transmission of data takes place at this layer

Once the frames are transmitted by a network, encapsulating the IP datagram into these frames is done in this layer

Also, the mapping of IP address into physical address is done here

Mainly, the function of this layer is to transmit the data between two devices, connected in a network

## 2. Internet Layer

It is the second layer of the TCP/IP model and this layer is parallel to the Network Layer of the OSI Model, in terms of the structure

Sending the data packets to their destination network is the main function of the Internet layer

The logical transmission of data takes place at this level

There are three different protocols used in this layer. These include:

**IP:** One of the most important protocols as it detects the IP address of a device which is later used for internetwork connections. It is using this protocol that the path with which the data shall be transmitted is decided. There are two common IP versions which are used, To know the difference between IPv4 and IPv6, visit the linked article.

**ARP:** It stands for Address Resolution Protocol. The physical address from the IP address can be determined using ARP.

**ICMP:** It stands for Internet Control Message Protocol and notification regarding datagram problems can be sent back to the user using this. Any issue with the network is immediately notified to the user by ICMP. It can only inform the user about the errors and cannot rectify the problem

### 3. Host-To-Host Layer

This layer is parallel to the transport layer of the OSI Model

The error-free delivery of data is the main function of this layer

There are two main protocols present in this layer:

**TCP:** Another integral part, the Transmission Control Protocol is a reliable communication protocol. It manages the flow of data, i.e. the sequence and segmentation of the data

**UDP:** It is a connection-free protocol which makes it cost-effective but less reliable.

### 4. Application Layer

The top three layers of the OSI Model: Application, Presentation and Sessions, when combined together, they perform similar functions as the Application Layer of the TCP/IP model

node-to-node communication based on the user-interface occurs here

Multiple protocols are present in this layer, a few common ones have been mentioned below in brief:

**HTTP:** Hypertext Transfer Protocol is used to manage the communication between the server and web browsers

**NTP:** Network Time Protocol can set one standard time source in our computer, which enables sync between the server and the user

**TELNET:** Telecommunication Network is used to have access to files present on the Telnet network and manage them on internet

**FTP:** File Transfer Protocol, as the name suggests allows easy transferring of files

Other protocols of Application layer include Network File System (NFS), Secure Shell (SSH), Simple Mail Transfer Protocol (SMTP), Trivial File Transfer Protocol (TFTP), etc.