

Understanding the TCP/IP Model: Layer-by-Layer Functionality

Assignment 1.2 for Celebal Technologies Internship

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References

- Original Reference: “*TCP/IP vs OSI Model*” (Provided by Company)
- Study CCNA: [Link](#)

Introduction

The **TCP/IP Model** (Transmission Control Protocol/Internet Protocol) is a conceptual framework used to implement network communications. Developed by the U.S. Department of Defense in the 1970s through DARPA, the model standardizes networking functions into **four distinct layers**. It is widely used as the foundation of the modern Internet.

1. Application Layer

The **Application Layer** is the topmost layer and combines the functionalities of the OSI model's Application, Presentation, and Session layers. It facilitates communication between applications and provides services like email, file transfer, and remote login.

Protocols: HTTP, FTP, SMTP, DNS, SNMP, Telnet

Key Role: Enables user-interface and application-level network services.

2. Transport Layer

The **Transport Layer** is responsible for reliable communication between devices. It provides mechanisms for error recovery, data flow control, and ensures complete data transfer.

Protocols: TCP (reliable), UDP (unreliable)

Key Role: Ensures complete and error-free data transmission.

3. Internet Layer

The **Internet Layer** handles logical addressing and routing. It determines how packets are addressed and routed between hosts across networks.

Protocols: IP (IPv4/IPv6), ICMP, ARP, IGMP

Key Role: Manages source and destination addressing and routing across interconnected networks.

4. Network Access Layer

The **Network Access Layer** (also known as the Link Layer) is responsible for the physical transmission of data and the framing required to transport data across the network media.

Protocols: Ethernet, Wi-Fi (IEEE 802.11), ARP, Frame Relay

Key Role: Controls hardware addressing and data transmission over physical mediums.

Advantages of the TCP/IP Model

- **Simplicity:** Only four layers, making it easier to implement and troubleshoot.
- **Scalability:** Designed to grow with networks, including the modern Internet.
- **Interoperability:** Protocols are open and platform-independent.
- **Robustness:** Developed for military-grade communication, it is resilient to network failure.
- **Global Adoption:** Forms the core architecture of the Internet.