# Understanding Networking Protocols

## SUBMITTED BY

| Name | ID | Section |
|---|---|---|
| Kabid Yeiad | 202-15-14440 | 57_A |

## SUBMITTED TO

**Rahmatul Kabir Rasel Sarker,**

**Lecturer**

**Dept. of CSE**

**Daffodil International University**

Submitted on August 3, 2023

202-15-14440

# Protocol and Ports

### What is Protocol?

A protocol is a set of rules and conventions that govern how data is transmitted, received, and processed between devices on a network. It acts as a common language or framework that enables different devices and systems to communicate effectively and efficiently with one another.

## HTTP (Hypertext Transfer Protocol)

**Description**:
HTTP is the foundation of data communication on the World Wide Web, facilitating the transfer of various resources between clients and web servers. It uses a request-response model, where clients send requests for resources, and servers respond with the requested data or status codes. HTTP operates on TCP port 80 by default.

**Key Features**:

- Stateless protocol: Each request-response cycle is independent and does not retain information from previous interactions.
- Versatile: Supports various media types, making it suitable for transferring text, images, videos, and more.
- Platform-independent: HTTP is designed to work across different operating systems and devices.

## HTTPS (Hypertext Transfer Protocol Secure)

**Description**:
HTTPS is an extension of HTTP that adds an extra layer of security through SSL/TLS encryption. This ensures that data exchanged between clients and servers remains confidential and protected from unauthorized access or tampering. HTTPS operates on TCP port 443.

**Key Features**:

- Encryption: Uses SSL/TLS to encrypt data, ensuring secure communication.
- Authentication: Verifies the identity of servers using digital certificates.
- Trust indicators: Browsers display a padlock icon or "https" in the URL to indicate a secure connection.

## FTP (File Transfer Protocol)

**Description:**
FTP is a standard network protocol used for transferring files between a client and a server. It offers functionalities for uploading, downloading, deleting, renaming, and managing files on a remote server. FTP operates on port 21 for control commands, and it uses dynamic ports for actual data transfers.

**Key Features**:

- Two modes: FTP supports active and passive modes for data transfers.
- Anonymous access: Allows users to connect to FTP servers without authentication for public downloads.
- User authentication: FTP supports various authentication mechanisms for secure access.

## FTPS (FTP Secure)

**Description**:
FTPS is an extension of FTP that enhances security through SSL/TLS encryption. It offers secure file transfers, ensuring data confidentiality and integrity. FTPS can use either explicit or implicit SSL connections and operates on TCP port 990.

**Key Features**:

- SSL protection: Encrypts control and data channels, providing secure data transfer.
- Firewall-friendly: Works well with firewalls and network security policies.

202-15-14440

# SSH (Secure Shell)

**Description**:
SSH is a cryptographic network protocol that provides secure access to remote devices or servers. It allows users to execute commands, manage files, and perform administrative tasks securely. SSH uses TCP port 22 and offers encrypted communication.

**Key Features**:
- Strong encryption: Uses cryptographic algorithms to protect data during transmission.
- Key-based authentication: Supports public-private key pairs for secure logins.

# Telnet

**Description**:
Telnet is a network protocol used to establish text-based communication sessions with remote devices. It allows users to access the command-line interface of a remote device or computer. However, Telnet is not secure and transmits data in plain text, making it vulnerable to eavesdropping and attacks.

**Key Features**:
- Remote access: Provides command-line access to remote systems for configuration and troubleshooting.
- Lack of encryption: Telnet sends data in clear text, making it less secure than SSH.

# SMTP (Simple Mail Transfer Protocol)

**Description**:
SMTP is an email transfer protocol used for sending outgoing mail from clients to mail servers and between mail servers for message relaying. It plays a crucial role in email delivery across the Internet and operates on TCP port 25.

**Key Features**:
- Message relay: Allows mail servers to exchange emails on behalf of their users.
- Delivery status notifications: Provides feedback on email delivery success or failure.

## POP3 (Post Office Protocol version 3)

**Description**:
POP3 is an email retrieval protocol used to download email messages from a mail server to a client device, such as an email client. It operates on TCP port 110 and typically downloads messages to the client, removing them from the server by default.

**Key Features**:
- Offline access: Allows users to access emails offline once they are downloaded.
- Single-device access: By default, POP3 removes emails from the server, making them accessible only on the client device.

## IMAP (Internet Message Access Protocol)

**Description**:
IMAP is another email retrieval protocol, similar to POP3, but with more advanced features. IMAP allows users to view, manage, and organize email messages directly on the mail server, rather than downloading them to the client device. It operates on TCP port 143.

**Key Features**:
- Synchronization: Changes made to emails are reflected across multiple devices accessing the same account.
- Message organization: IMAP supports server-side mail folder management.

## DNS (Domain Name System)

**Description**:
DNS is a hierarchical and distributed naming system used to translate human-readable domain names into IP addresses. It enables users to access websites and resources on the Internet using domain names instead of IP addresses. DNS uses both UDP and TCP, with UDP operating on port 53 for regular queries and TCP for zone transfer requests.

**Key Features**:
- Name resolution: Translates domain names into IP addresses, allowing users to locate resources on the Internet easily.