**Communication protocols**

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## Transmission Control Protocol

**TCP** is an internet communication protocol that allows two devices to form a connection and stream data. **TCP** uses a three-way handshake process. First the device sends a synchronize (**SYN**) request to a server.

Then the server responds with a **SYN/ACK** packet to acknowledge receipt of the device’s request. Once the server receives the final ACK packet from the device, a **TCP** connection is established. In the **TCP/IP** model, **TCP** occurs at the transport layer.

## User Datagram Protocol

**UDP** is a connectionless protocol that does not establish a connection between devices before transmission. This makes it less reliable than **TCP**. But it also means that it works well for transmissions that need to get to their destination quickly. For example, one use of **UDP** is for sending **DNS** requests to local **DNS** servers. In the **TCP/IP** model, **UDP** occurs at the transport layer.

## Hypertext Transfer Protocol

**HTTP** is an application layer protocol that provides a method of communication between clients and website servers. **HTTP** uses port **80**. **HTTP** is considered insecure, so it is being replaced on most websites by a secure version (**HTTPS**) that uses encryption from **SSL/TLS** for communication. However, there are still many websites that use the insecure **HTTP** protocol. In the **TCP/IP** model, **HTTP** occurs at the application layer.

## Domain Name System

**DNS** is a protocol that translates internet domain names into IP addresses. When a client computer wishes to access a website domain using their internet browser, a query is sent to a dedicated **DNS server**. The **DNS** server then looks up the IP address that corresponds to the website domain. **DNS** normally uses **UDP** on port **53**. However, if the **DNS** **reply** to a request is large, it will switch to using the **TCP** protocol. In the **TCP/IP** model, **DNS** occurs at the application layer.

## Simple Network Management Protocol

**SNMP** is a network protocol used for monitoring and managing devices on a network. **SNMP** can reset a password on a network device or change its baseline configuration. It can also send requests to network devices for a report on how much of the network’s bandwidth is being used up. In the **TCP/IP** model, **SNMP** occurs at the application layer.

## Internet Control Message Protocol

**ICMP** is an internet protocol used by devices to tell each other about data transmission errors across the network. **ICMP** is used by a receiving device to send a report to the sending device about the data transmission. **ICMP** is commonly used as a quick way to troubleshoot network connectivity and latency by issuing the “**ping**” command on a Linux operating system. In the **TCP/IP** model, **ICMP** occurs at the internet layer.

## Hypertext Transfer Protocol Secure

**HTTPS** is a network protocol that provides a secure method of communication between clients and website servers. **HTTPS** is a secure version of **HTTP** that uses **secure sockets** layer/transport layer security (**SSL/TLS**) encryption on all transmissions so that malicious actors cannot read the information contained. HTTPS uses port **443**. In the **TCP/IP** model, **HTTPS** occurs at the application layer.

## Secure File Transfer Protocol

**SFTP** is a secure protocol used to transfer files from one device to another over a network. **SFTP** uses secure shell (**SSH**), typically through **TCP** port **22**. SSH uses Advanced Encryption Standard (**AES**) and other types of encryptions to ensure that unintended recipients cannot intercept the transmissions. In the **TCP/IP** model, **SFTP** occurs at the application layer. **SFTP** is used often with cloud storage. Every time a user uploads or downloads a file from cloud storage, the file is transferred using the **SFTP** protocol.