OSI Reference Model, Layer 4

Angelo Gambara

Sunday 30 September, 2023

OSI Reference Model, Layer 4

UDP message format

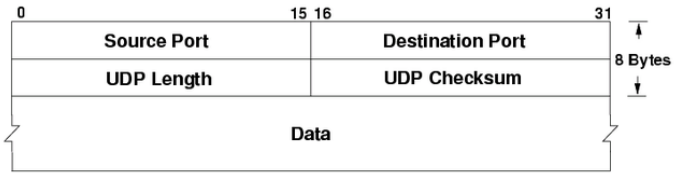

Figure 1: UDP is a wrapper protocol that only provides multiplexing.

Process multiplexing

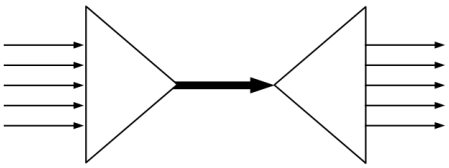

Figure 2: Multiplexing is combining multiple signals and carrying them over a shared medium.

Ports	Range	Description
Well-known	2^{10}	Ports assigned by IANA for standard servers.
Registered	-2^{14}	Same as before, for non-standard servers.
Ephemeral	2^{16}	Ports temporarily assigned by the OS for clients.

TCP message format

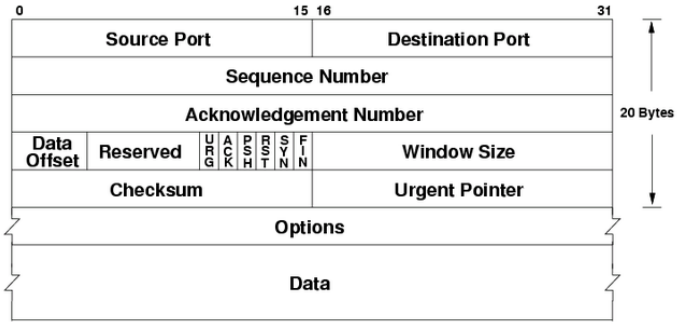

Figure 3: TCP provides reliability of transmission and flow control.

Header section	Size	Description
Option 2	4-byte	MSS is the equivalent of MTU −5 bytes.
Option 5	var	ACK for non-contiguous blocks of data.
Data	var	Stream of data, as opposed to a message.

Three-way handshake

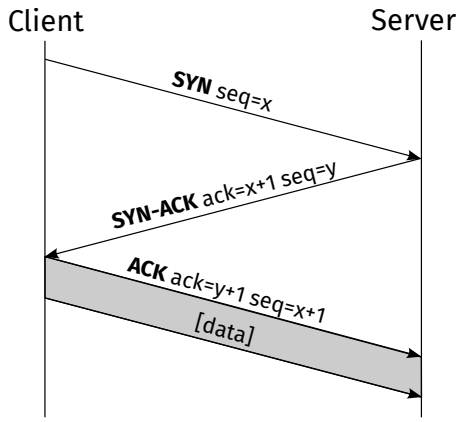

Figure 4: The three-way handshake is being used to connect a client and server.

Sliding window

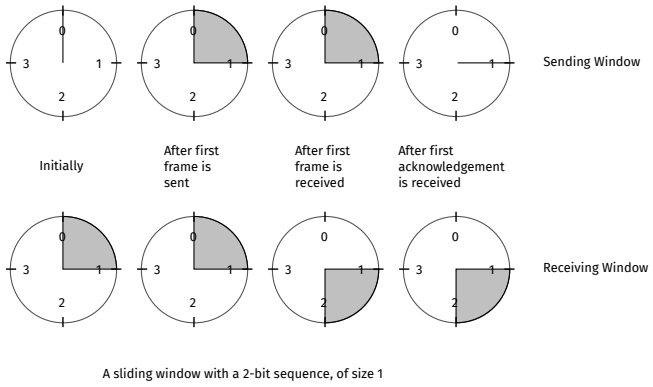

Figure 5: The window slides forward only when the sender knows the receiver has received the bytes.

Problems with windows

Problems with windows	Description
Shrinking the windows	Wait for the sender's usable window to empty.
Silly window syndrome	Keep the window closed until buffer is half empty.

Congestion algorithms

Congestion algorithms	Description
Slow start	Segments incrementally grow in size.
Throttling	Segments temporarily shrink in size.
Fast retransmit	Segments are retransmitted for same ACK.