

TCP SEGMENT FORMAT

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INTRODUCTION

A TCP (Transmission Control Protocol) segment is a unit of data used in computer networking.

It consists of two main parts:

- **Header:** The header contains control information necessary for reliable communication. It includes fields like source port, destination port, sequence numbers, acknowledgment numbers, flags (such as SYN, ACK, FIN), and more.
- **Application Data:** This is the actual payload or data that needs to be transmitted. It comes from the upper Application Layer.

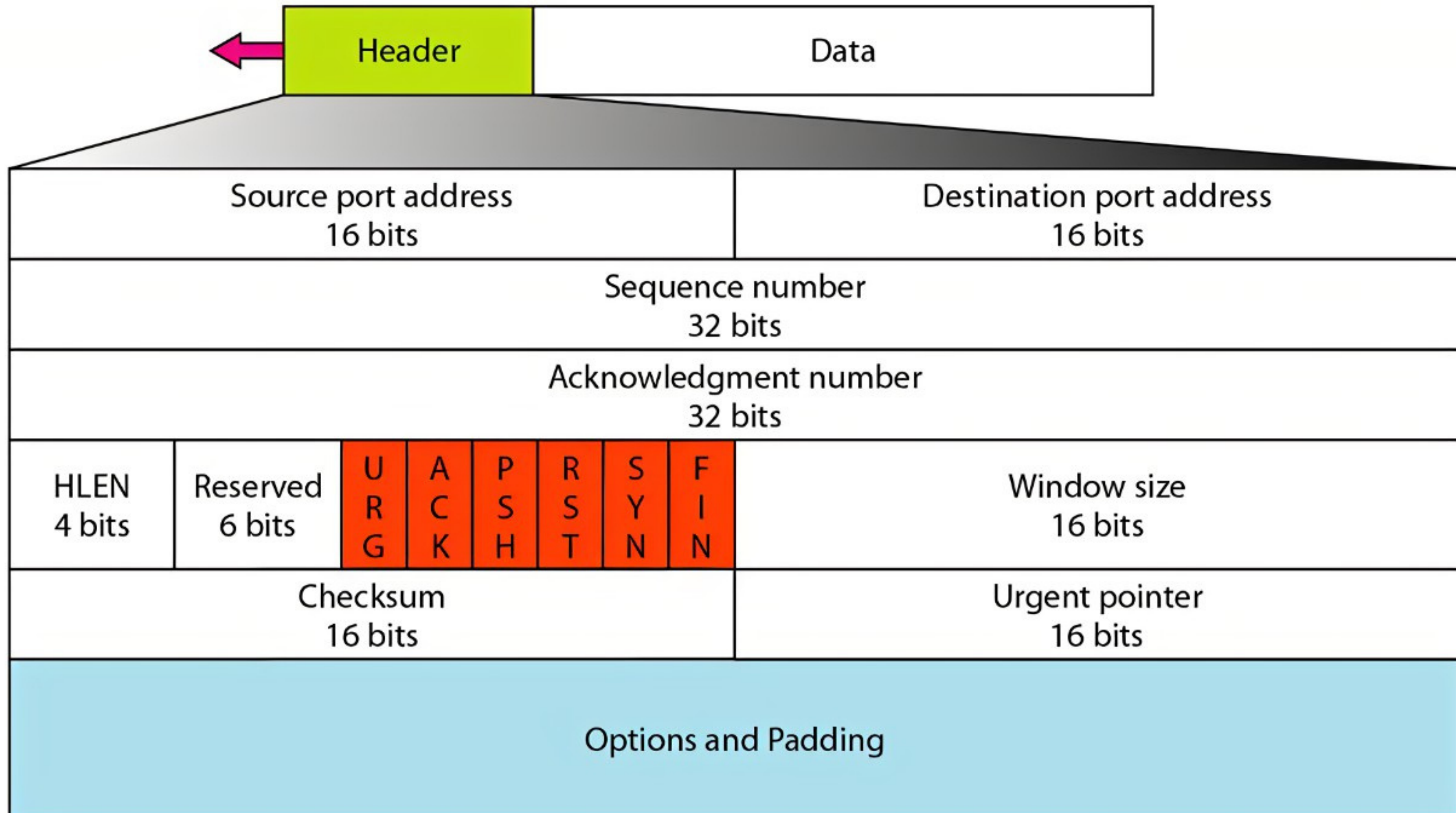


figure. TCP Segment Format



SOURCE PORT ADDRESS –

- It is a 16 bit field that specifies the port number of the sender.

DESTINATION PORT ADDRESS –

- It is a 16 bit field that specifies the port number of the receiver.

SEQUENCE NUMBER –

- The sequence number in TCP represents the byte number of the first byte of data in a TCP packet (also known as a TCP segment).
- Initial sequence numbers are effectively random within a specific range.
- when analyzing network traffic using tools like Wireshark, relative sequence numbers are typically displayed.

ACKNOWLEDGEMENT NUMBER –

when a host receives data successfully, it acknowledges the receipt by sending an acknowledgment number back to the sender. This value will be the sequence number incremented by 1.



HEADER LENGTH (HLEN) –

This is a 4-bit field that indicates the length of the TCP header by a number of 4-byte words in the header.

CONTROL FLAGS

These are 6 1-bit control bits that control connection establishment, connection termination, connection abortion, flow control, mode of transfer etc. Their function is:

- URG: Urgent pointer is valid
- ACK: Acknowledgement number is valid(used in case of cumulative acknowledgement)
- PSH: Request for push
- RST: Reset the connection
- SYN: Synchronize sequence numbers
- FIN: Terminate the connection



RESERVED -

The reserved field is always set to zero.

WINDOW SIZE -

A 16-bit field specifying how many bytes the receiver is willing to accept

CHECKSUM

16 bits are used for a checksum to check if the TCP header is OK or not.

URGENT POINTER -

This field (valid only if the URG control flag is set) is used to point to data that is urgently required that needs to reach the receiving process at the earliest. The value of this field is added to the sequence number to get the byte number of the last urgent byte.

OPTIONS & PADDING

- These are optional fields for setting maximum segment sizes, selective acknowledgments and enabling window scaling for more efficient use of high-bandwidth networks.
- This field is optional and can be anywhere between 0 and 320 bits.

THANK YOU

