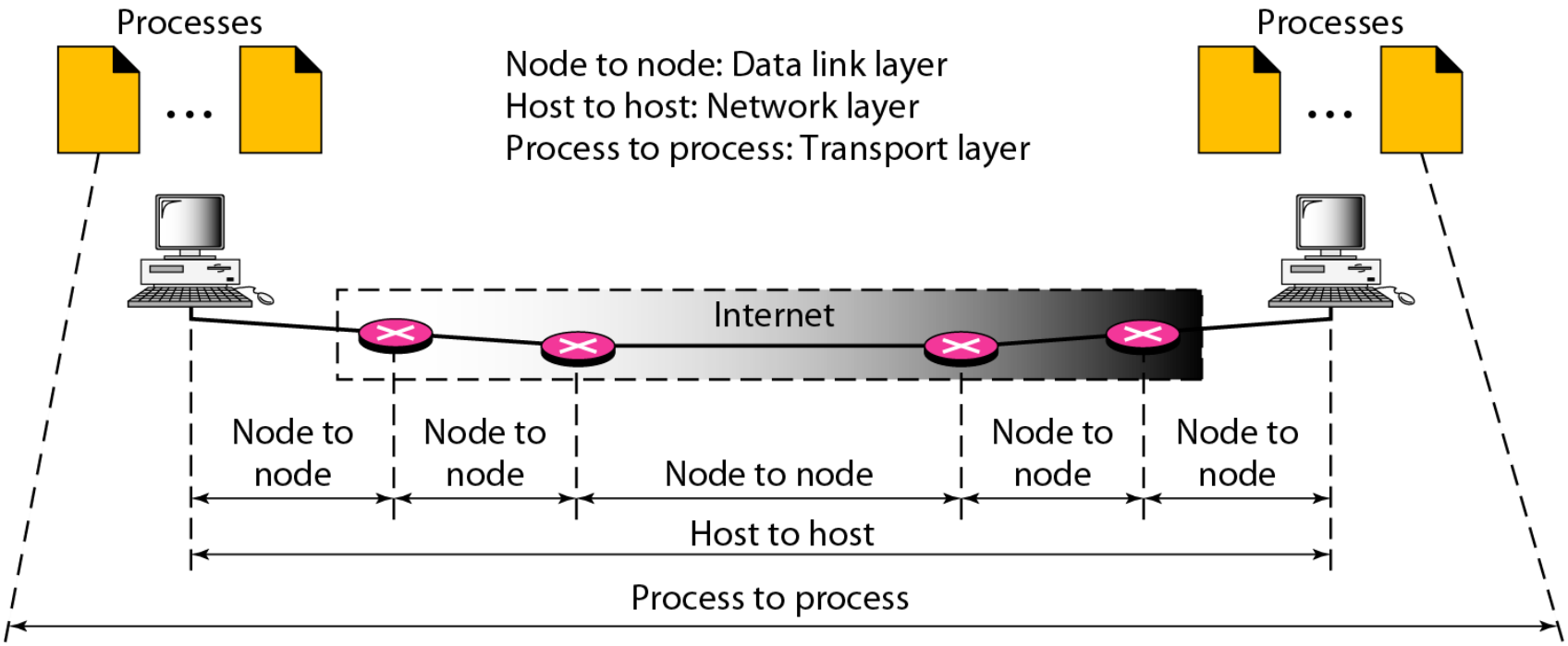
Transport Layer

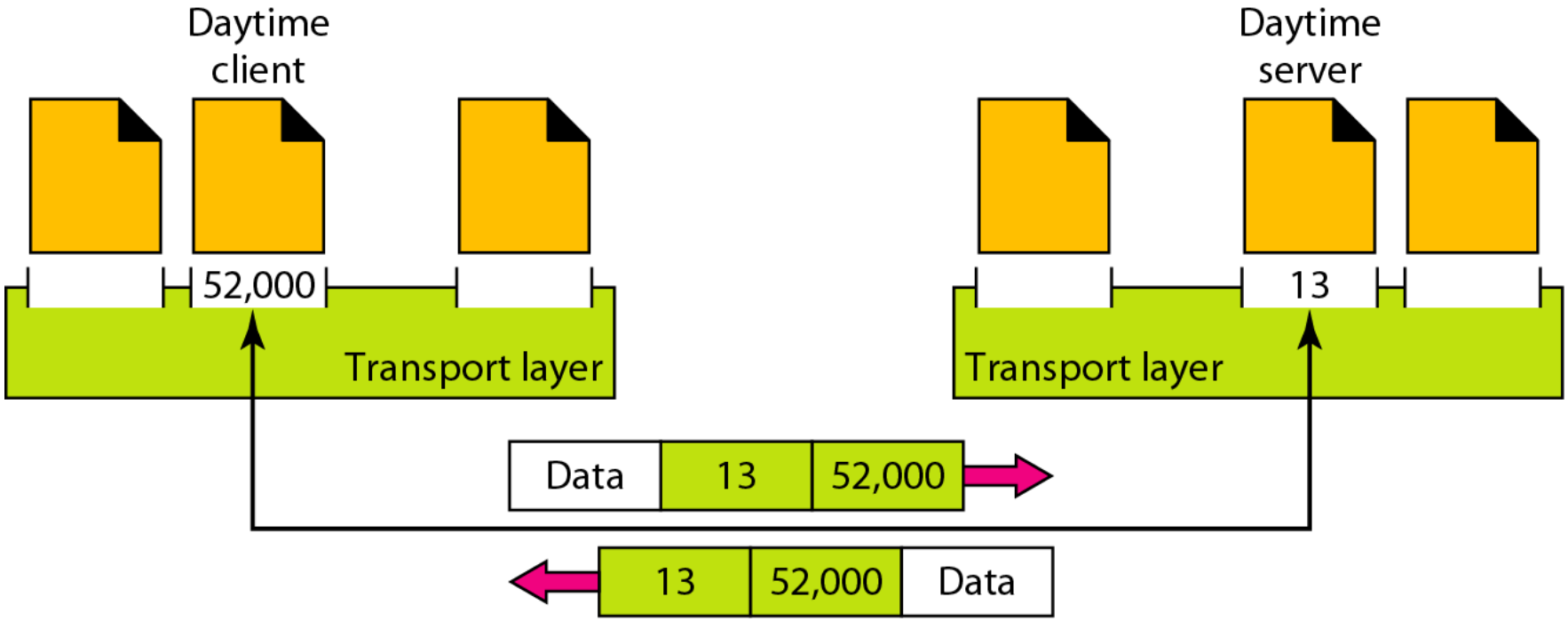
The transport layer is responsible for process-to-process delivery.

Two processes communicate in a client/server relationship.

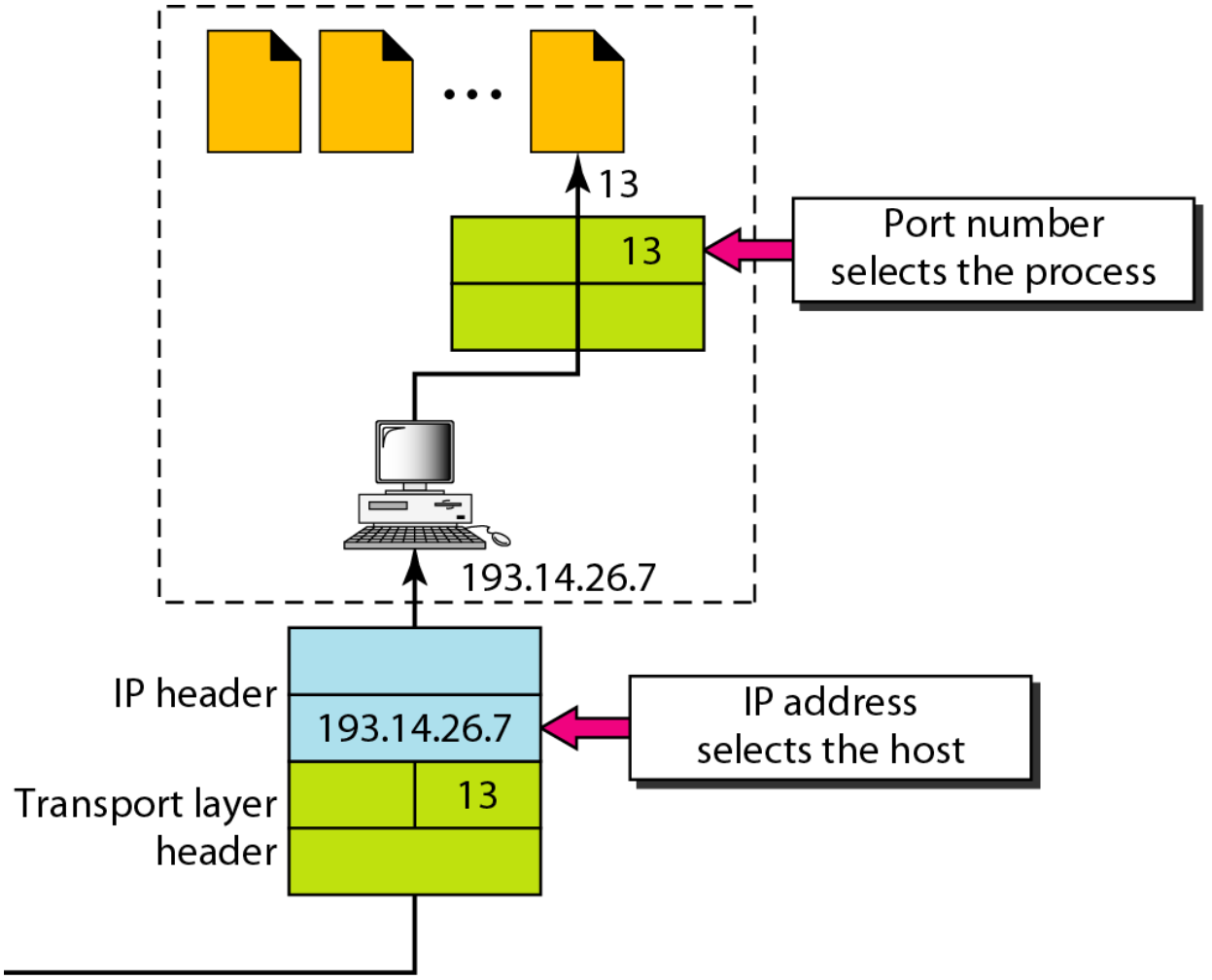
Types of data deliveries



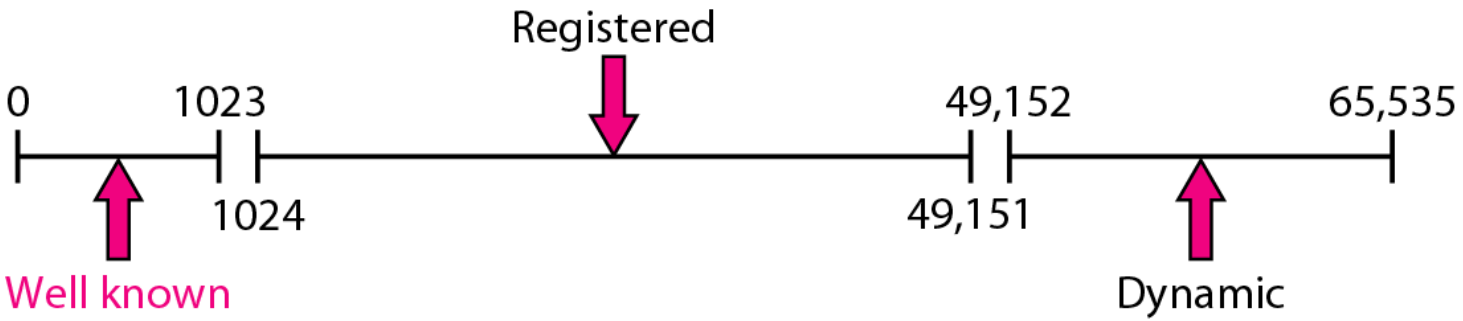
Port numbers



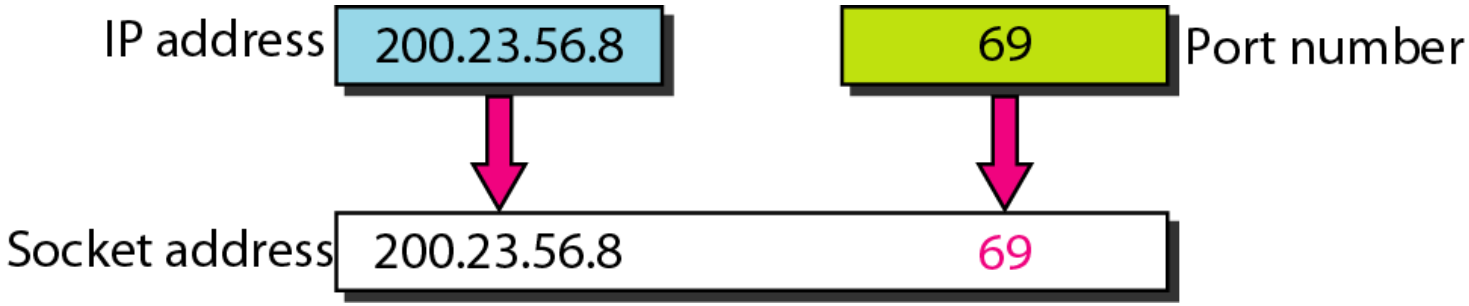
IP addresses versus port numbers



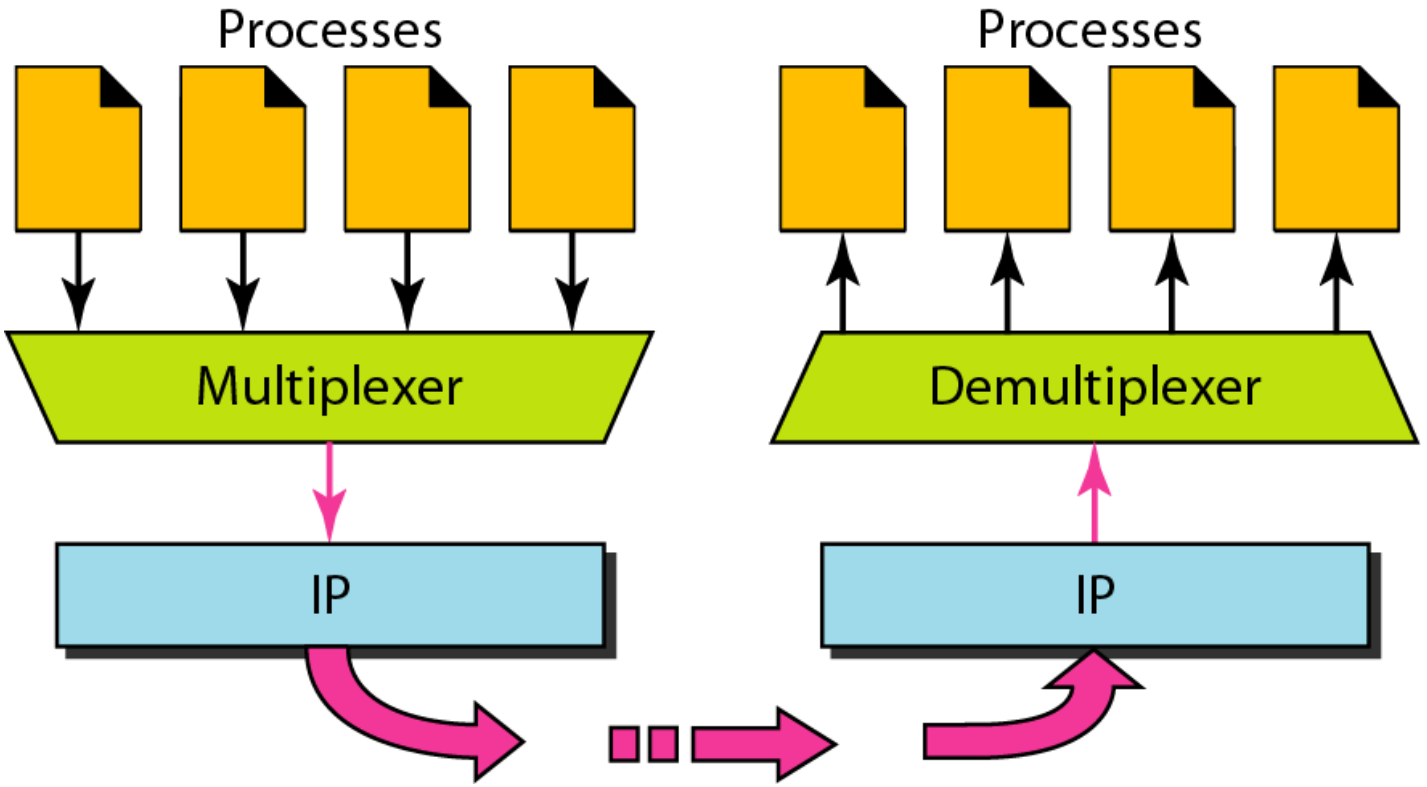
IANA ranges


Registered
0
1023
49,152
65,535
1024
49,151
Well known
Dynamic

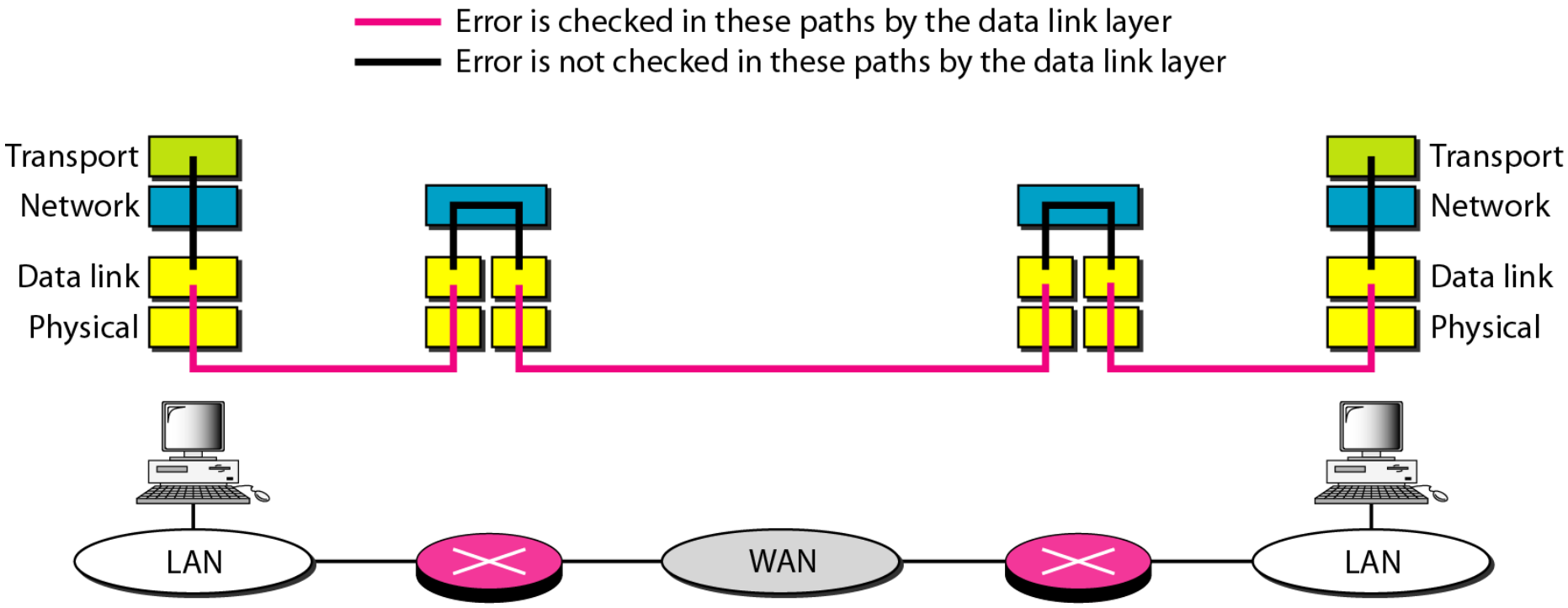
Socket address



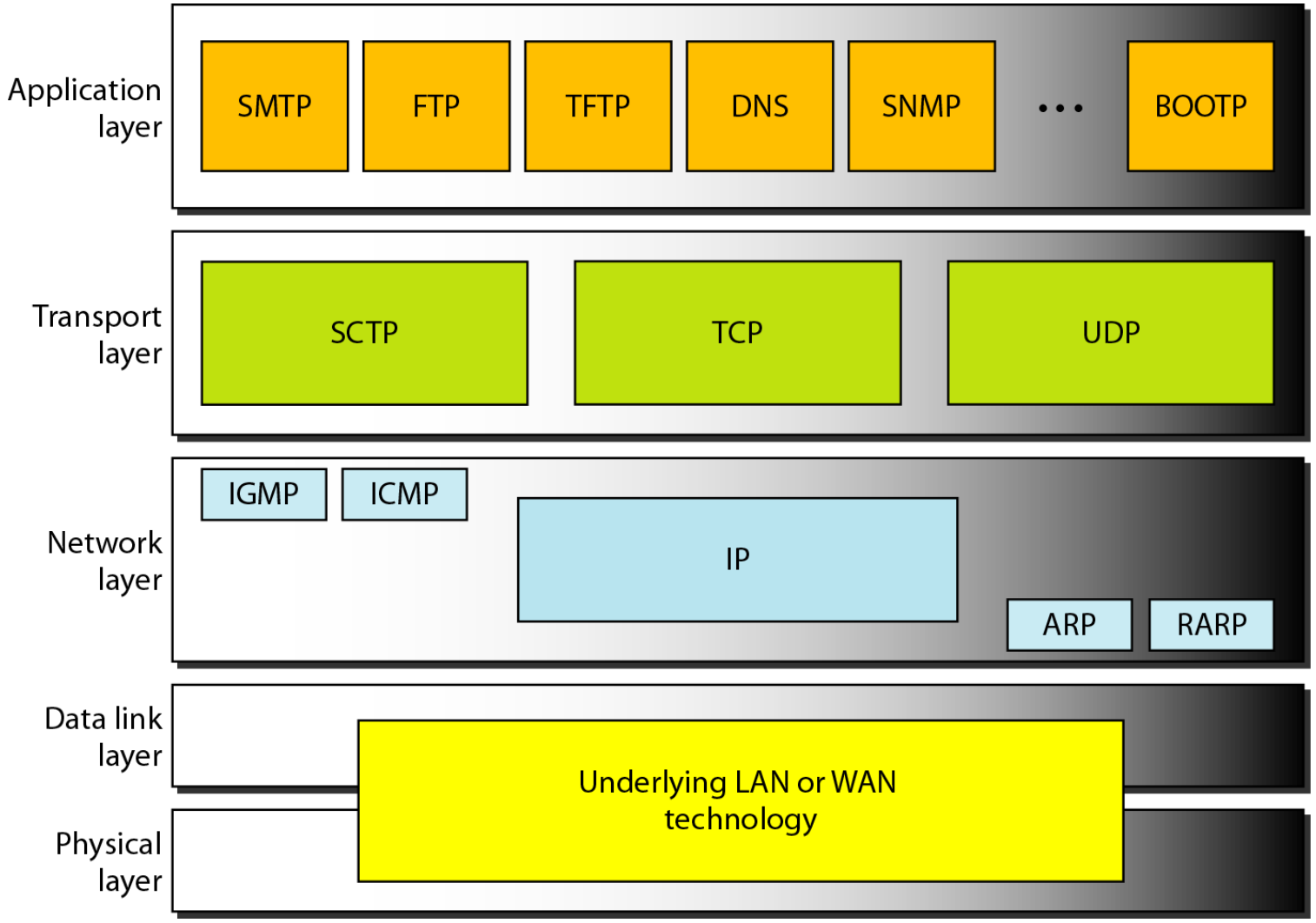
Multiplexing and demultiplexing



Error control



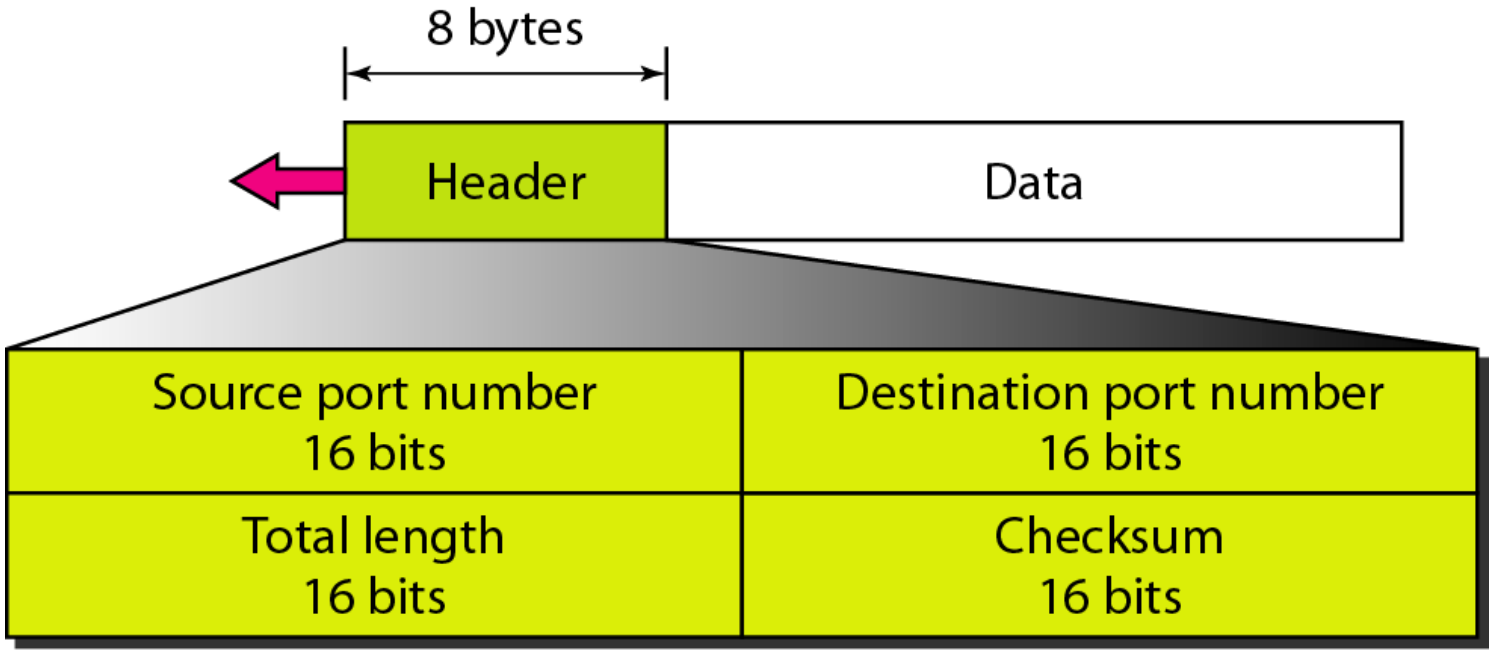
Position of UDP, TCP, and SCTP in TCP/IP suite



USER DATAGRAM PROTOCOL (UDP)

The User Datagram Protocol (UDP) is called a connectionless, unreliable transport protocol. It does not add anything to the services of IP except to provide process-to-process communication instead of host-to-host communication.

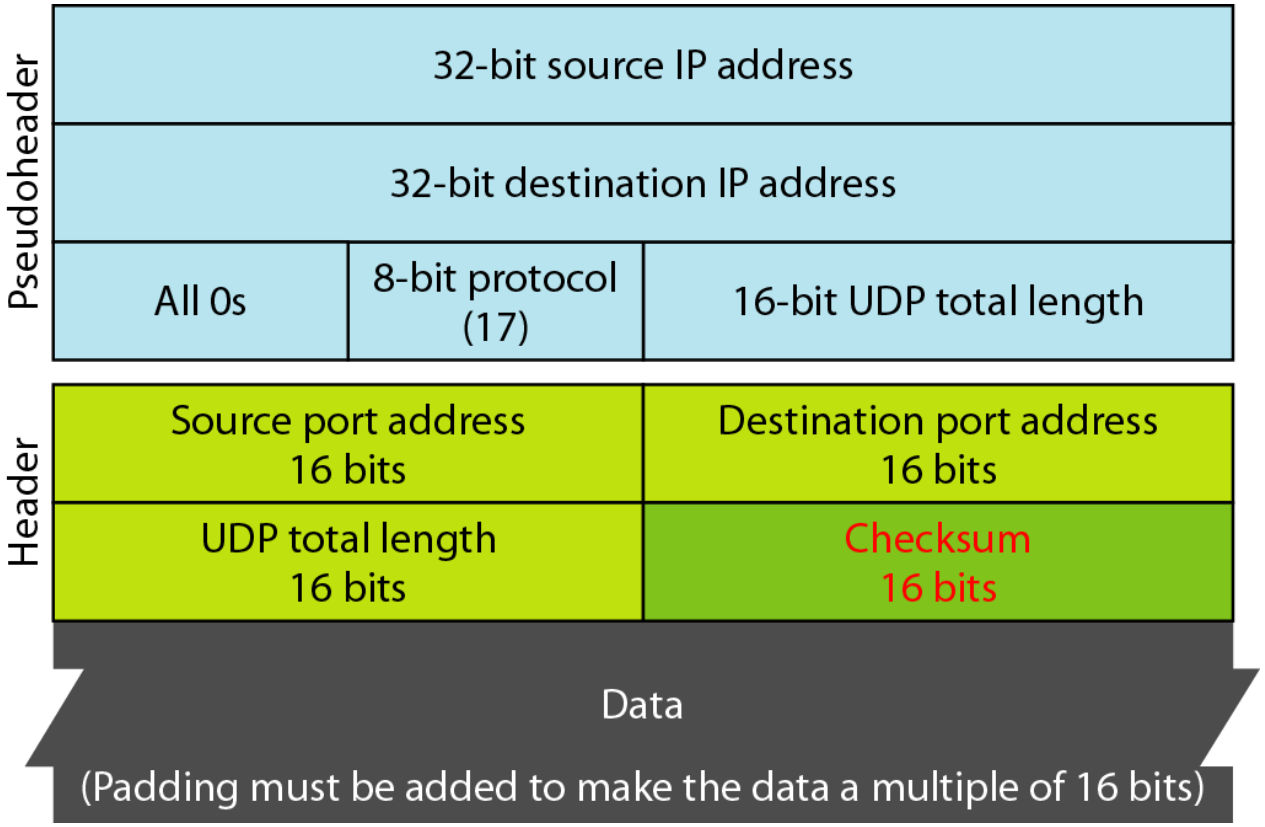
User datagram format



Note

UDP length
= IP length – IP header's length

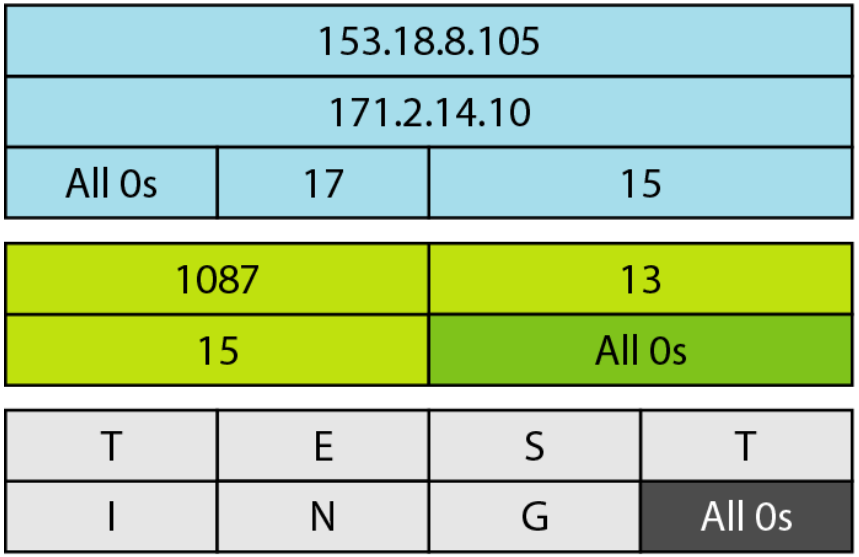
Pseudoheader for checksum calculation



Example

Figure shows the checksum calculation for a very small user datagram with only 7 bytes of data. Because the number of bytes of data is odd, padding is added for checksum calculation. The pseudoheader as well as the padding will be dropped when the user datagram is delivered to IP.

Checksum calculation of a simple UDP user datagram



10011001 00010010 → 153.18
00001000 01101001 → 8.105
10101011 00000010 → 171.2
00001110 00001010 → 14.10
00000000 00010001 → 0 and 17
00000000 00001111 → 15
00000100 00111111 → 1087
00000000 00001101 → 13
00000000 00001111 → 15
00000000 00000000 → 0 (checksum)
01010100 01000101 → T and E
01010011 01010100 → S and T
01001001 01001110 → I and N
01000111 00000000 → G and 0 (padding)

10010110 11101011 → Sum
01101001 00010100 → Checksum

Queues in UDP