OSI Transport Layer

Network Fundamentals – Chapter 4

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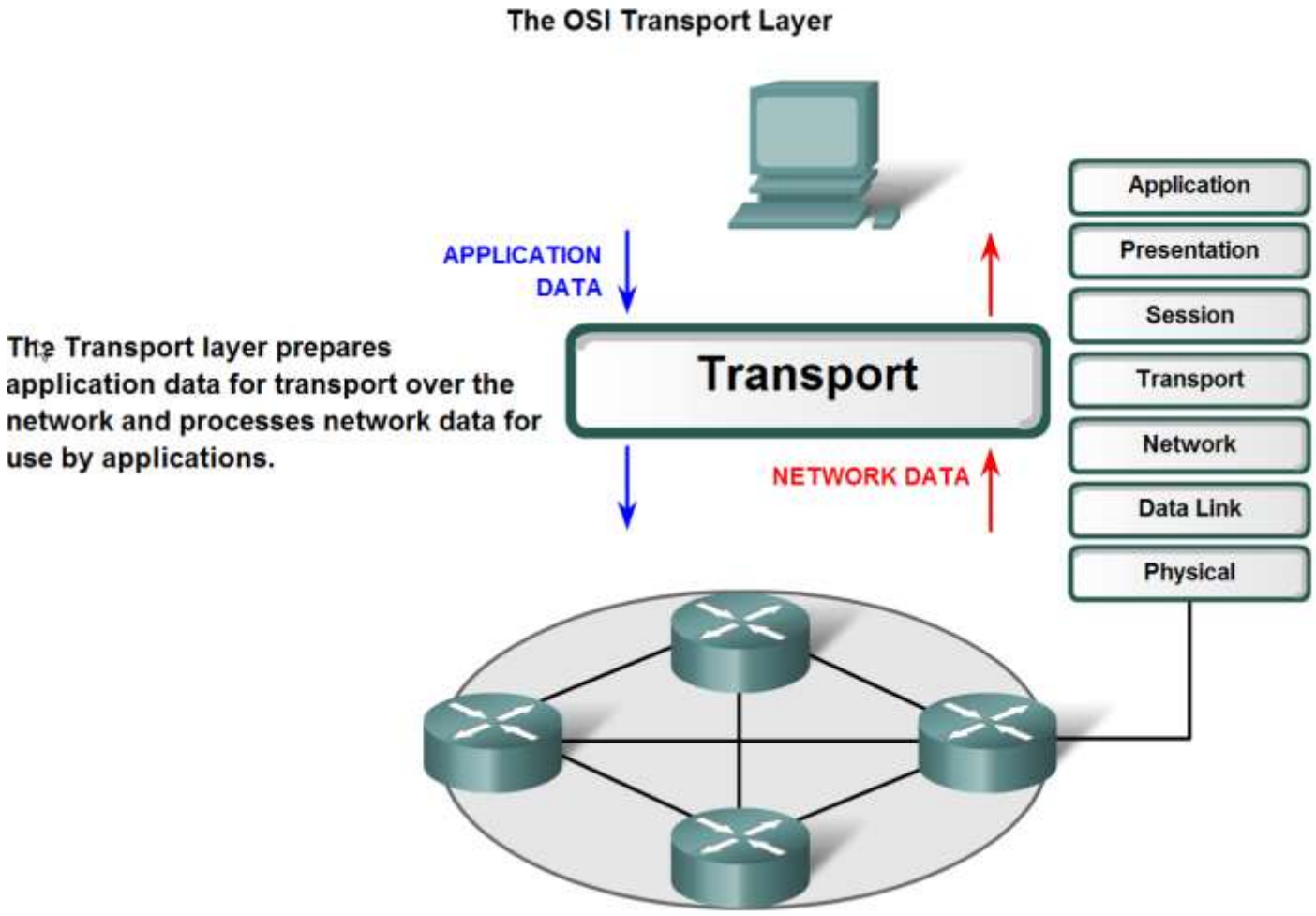
Objectives

- Explain the role of Transport Layer protocols and services in supporting communications across data networks
- Analyze the application and operation of TCP mechanisms that support reliability
- Analyze the application and operation of TCP mechanisms that support reassembly and manage data loss.
- Analyze the operation of UDP to support communicate between two processes on end devices

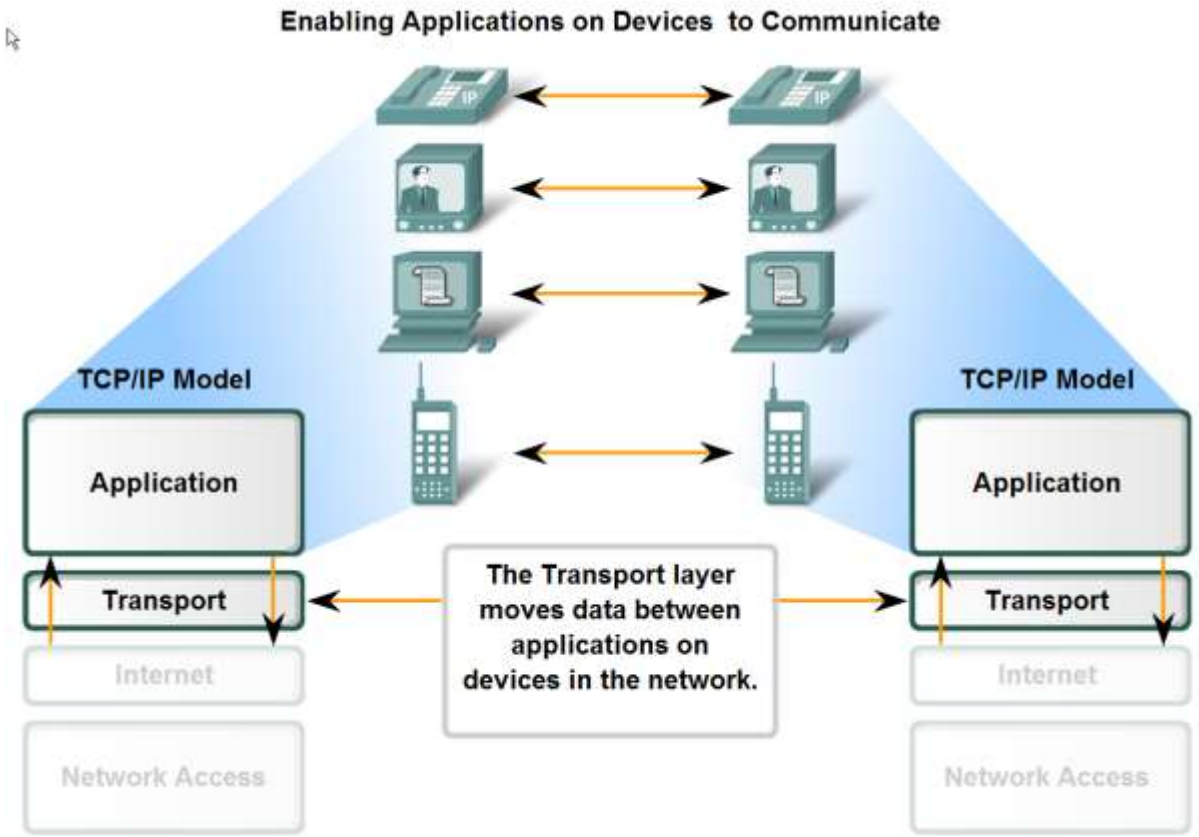
Transport Layer Role and Services

- Explain the purpose of the Transport layer



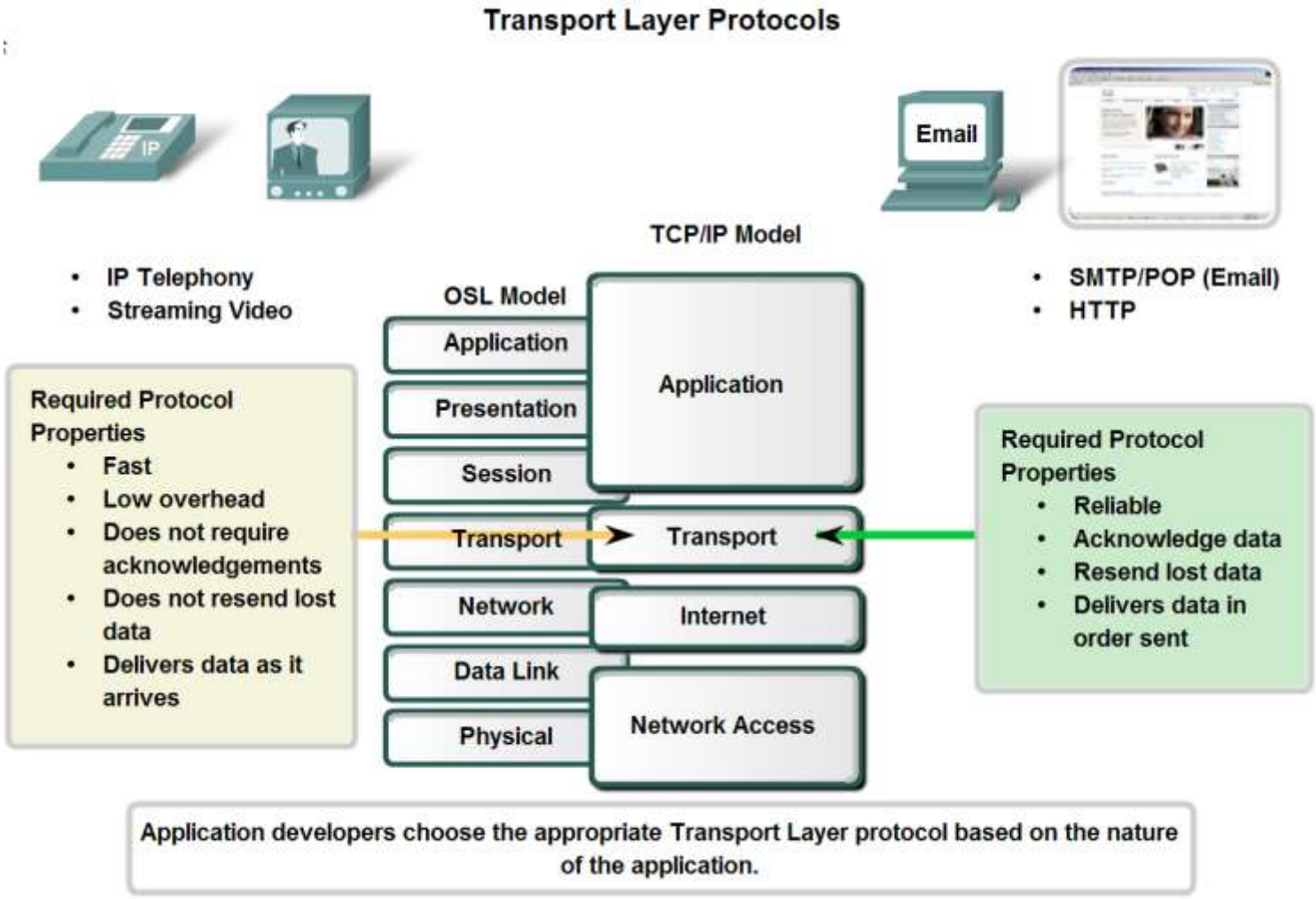
Transport Layer Role and Services

- Major functions of the transport layer and the role it plays in data networks



Transport Layer Role and Services

- Supporting Reliable Communication



Transport Layer Role and Services

- Identify the basic characteristics of the UDP and TCP protocols

TCP and UDP Headers

TCP SEGMENT & HEADER FIELDS

Bit 0	Bit 15 Bit 16	Bit 31
Source Port (16)	Destination Port (16)	
Sequence Number (32)		
Acknowledgement Number (32)		
Header Length (4) Reserved (6) Code Bits (6)	Window (16)	
Checksum (16)	Urgent (16)	
Options (0 or 32 if any)		
APPLICATION LAYER DATA SEGMENT (Size varies)		

20 Bytes

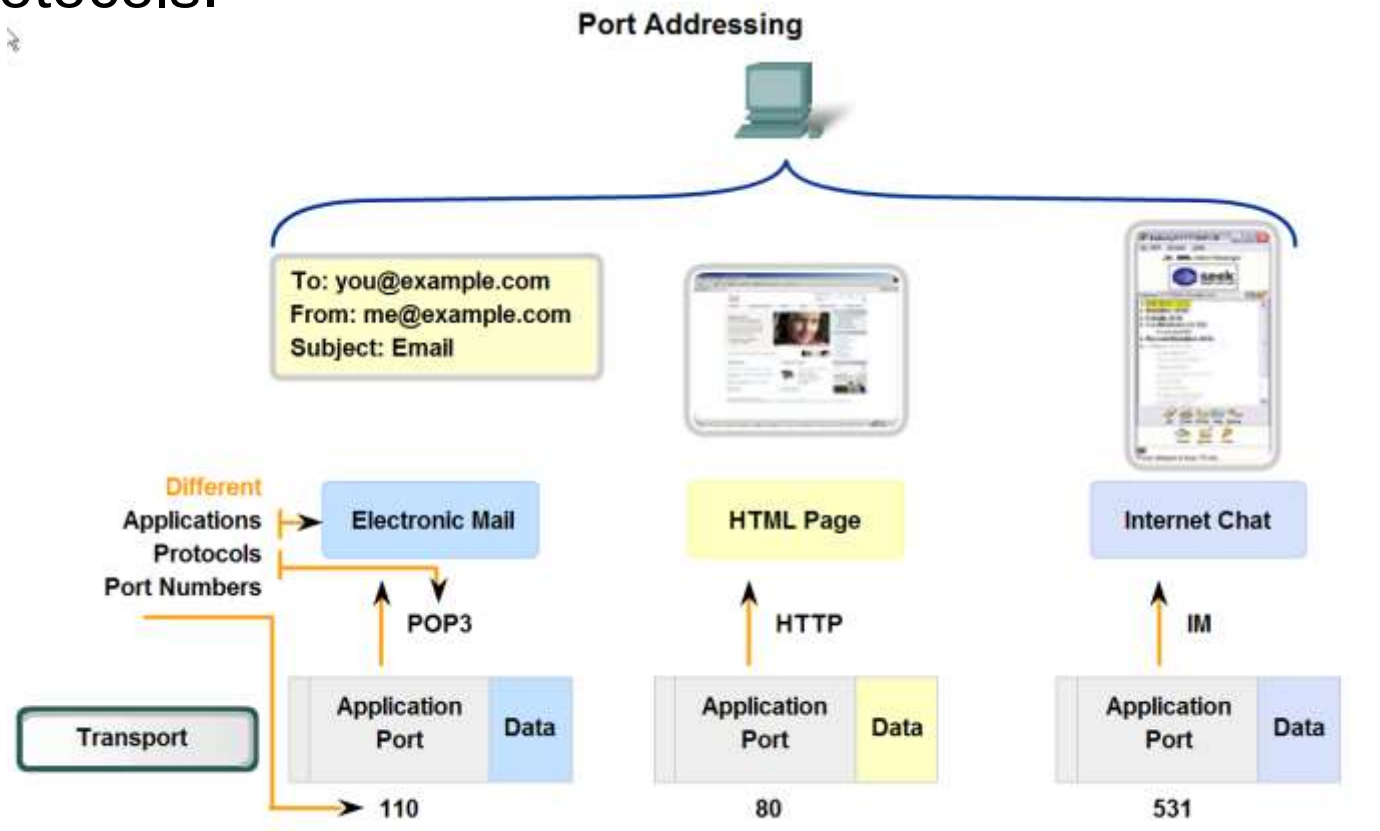
UDP SEGMENT & HEADER FIELDS

Bit (0)	Bit (15) Bit (16)	Bit (31)
Source Port (16)	Destination Port (16)	
Length (16)	Checksum (16)	
APPLICATION LAYER DATA SEGMENT (Size varies)		

8 Bytes

Transport Layer Role and Services

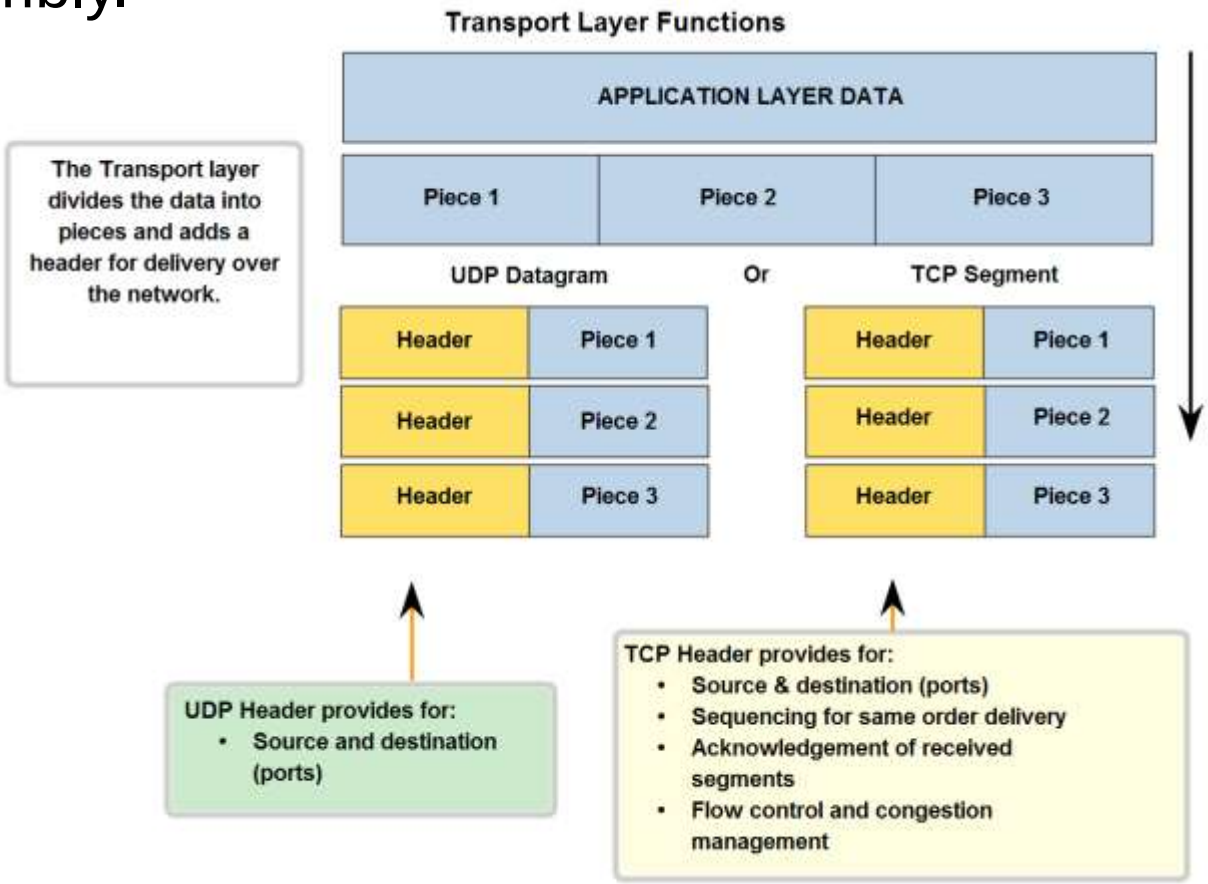
- Identify how a port number is represented and describe the role port numbers play in the TCP and UDP protocols.



Data for different applications is directed to the correct application because each application has a unique port number.

Transport Layer Role and Services

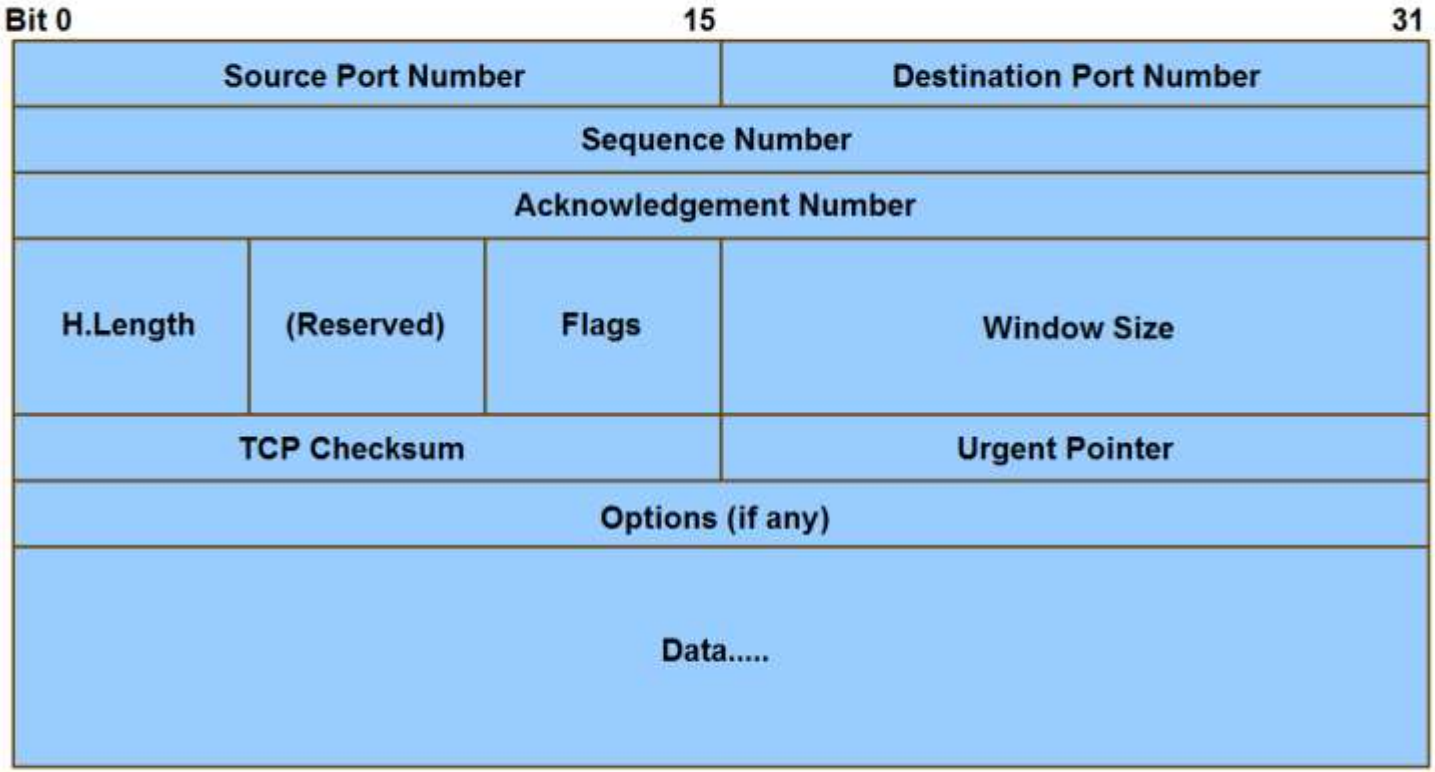
- Describe the role of segments in the transport layer and the two principle ways segments can be marked for reassembly.



Application and Operation of TCP Mechanisms

- Trace the steps that show how the TCP reliability mechanism works as part of a session

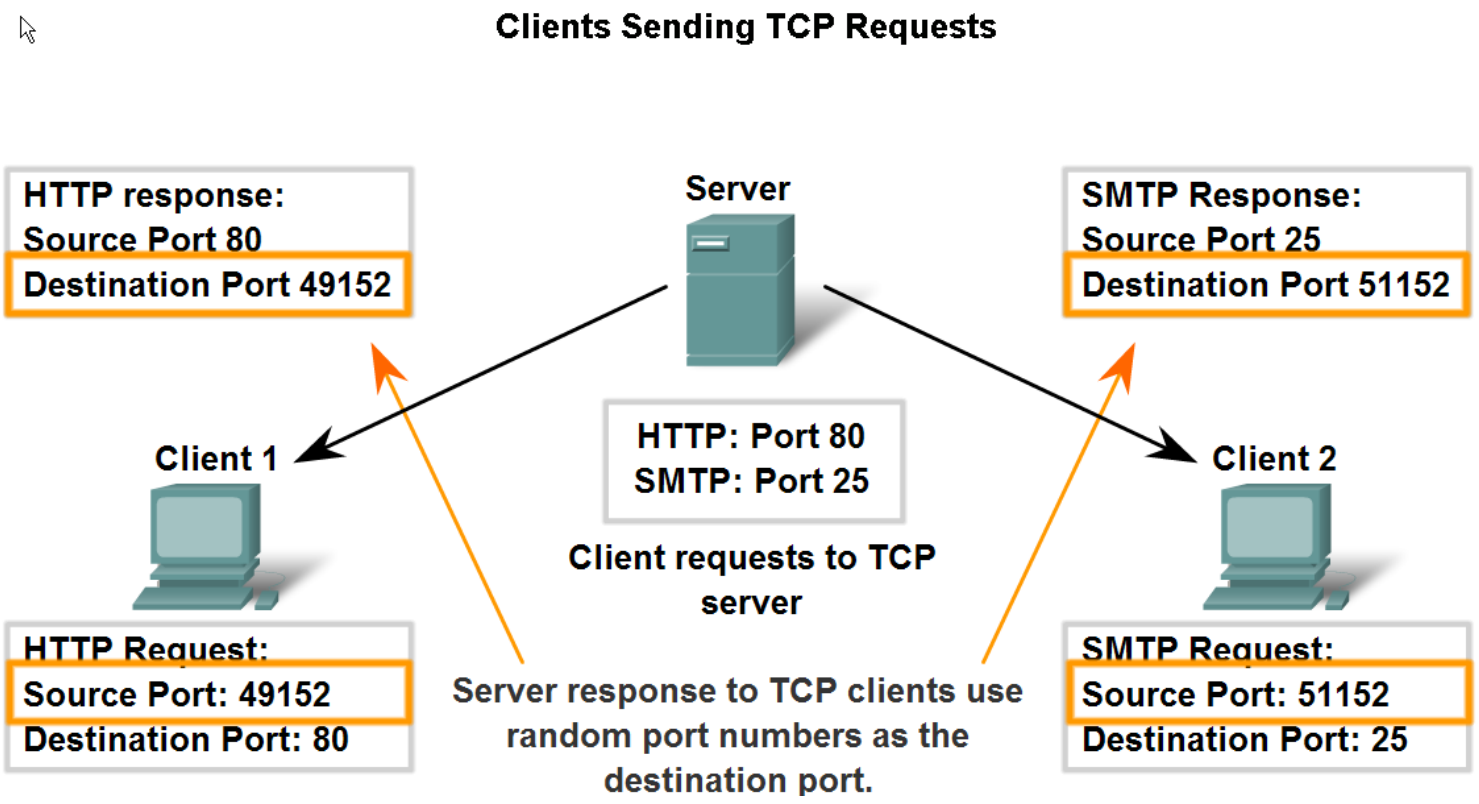
TCP Segment Header Fields



The fields of the TCP header enable TCP to provide connection-oriented, reliable data communications.

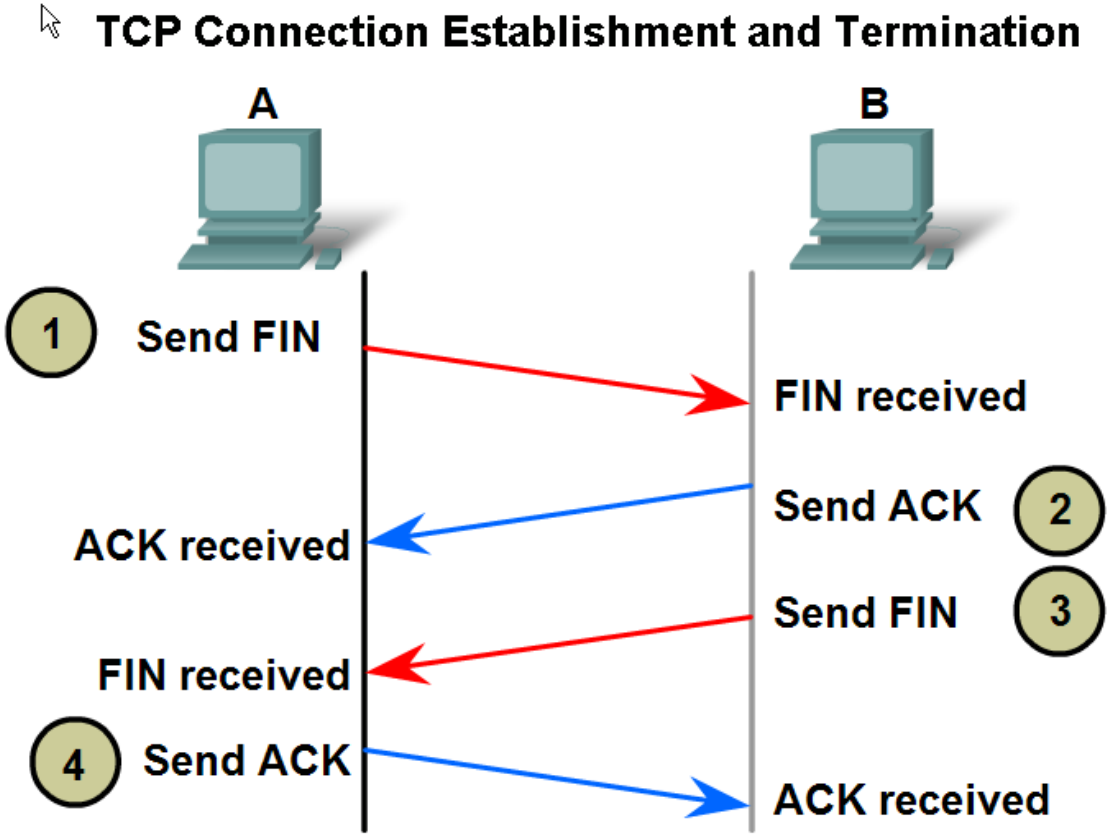
Application and Operation of TCP Mechanisms

- Describe the role of port numbers in establishing TCP sessions and directing segments to server process



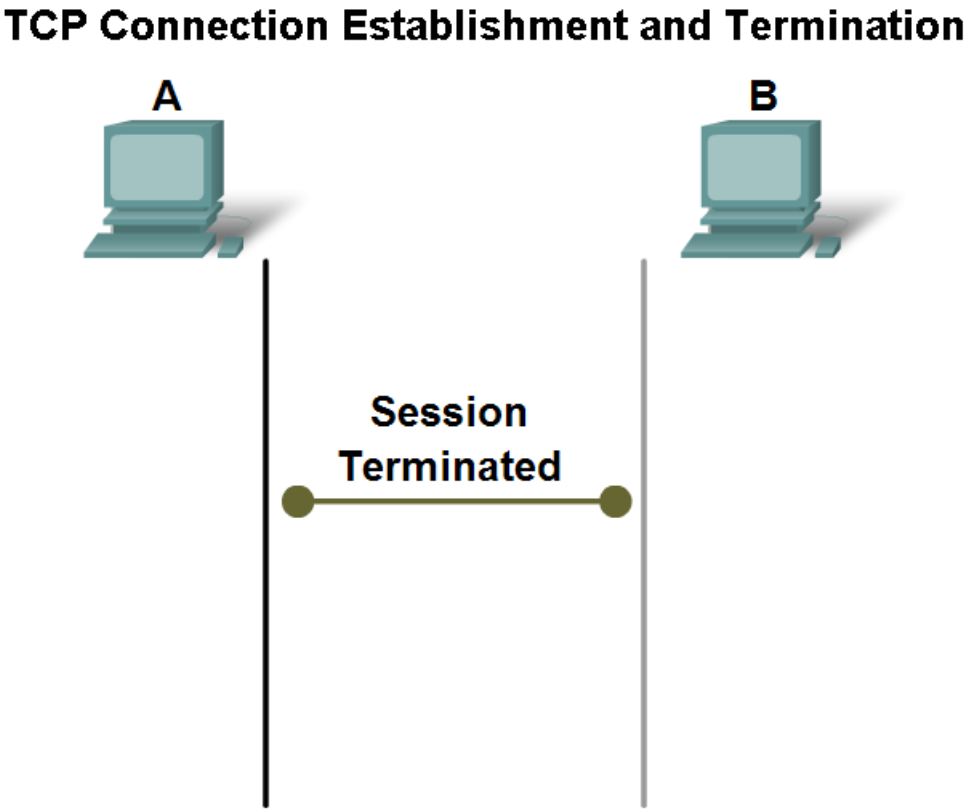
Application and Operation of TCP Mechanisms

- Trace the steps in the handshake in the establishment of TCP sessions



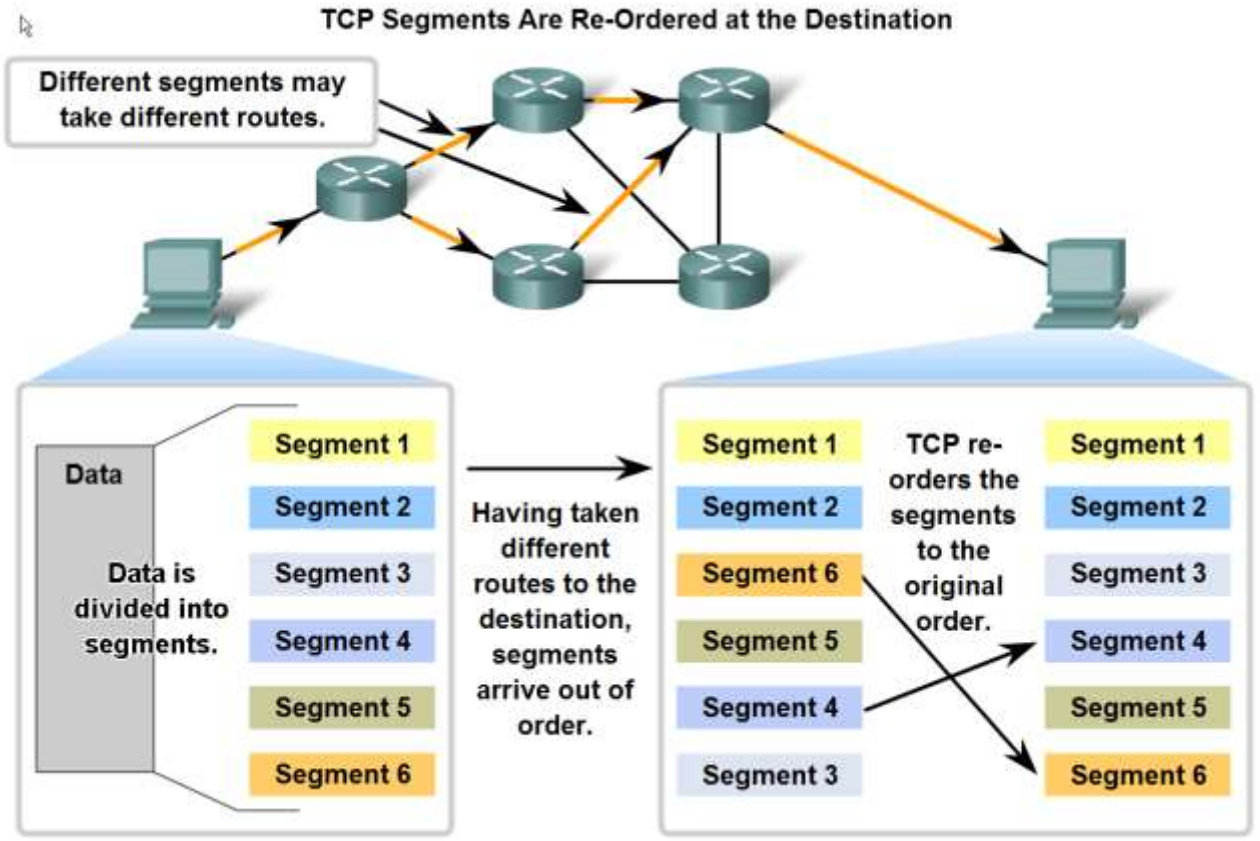
Application and Operation of TCP Mechanisms

- Trace the steps in the handshake in the termination of TCP sessions



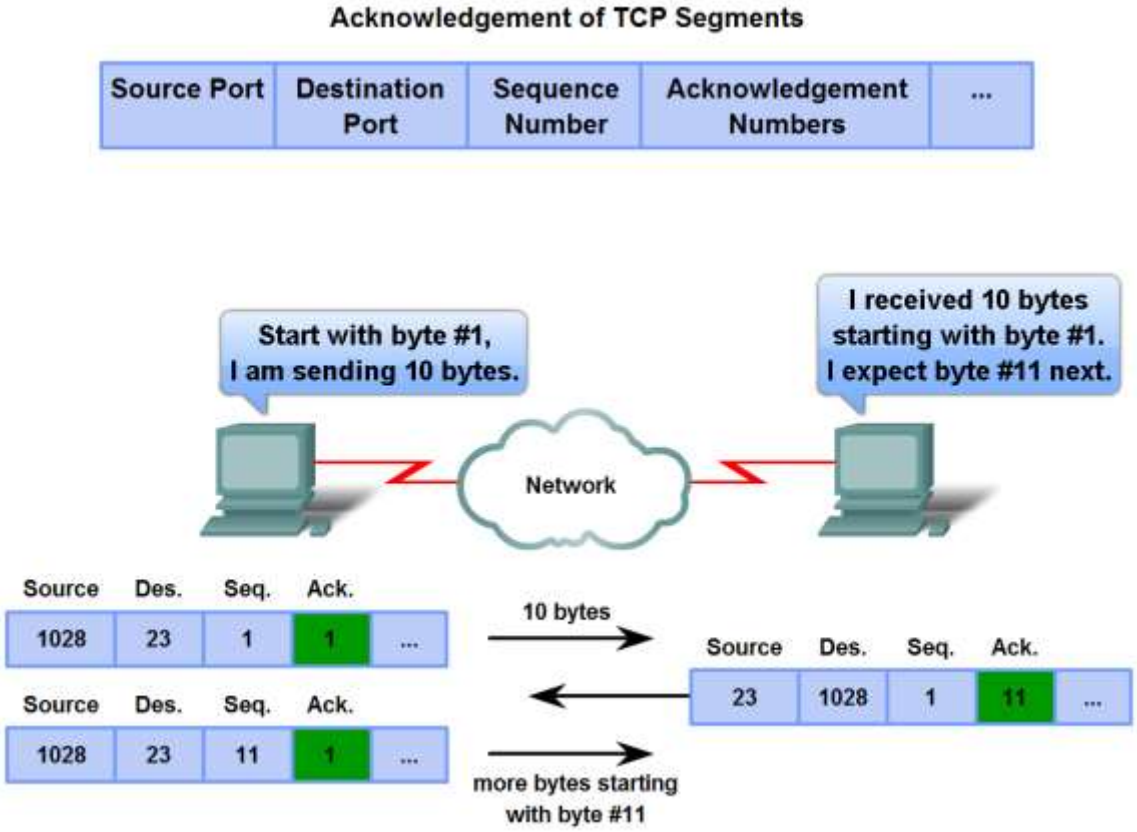
Managing TCP Sessions

- Describe how TCP sequence numbers are used to reconstruct the data stream with segments placed in the correct order



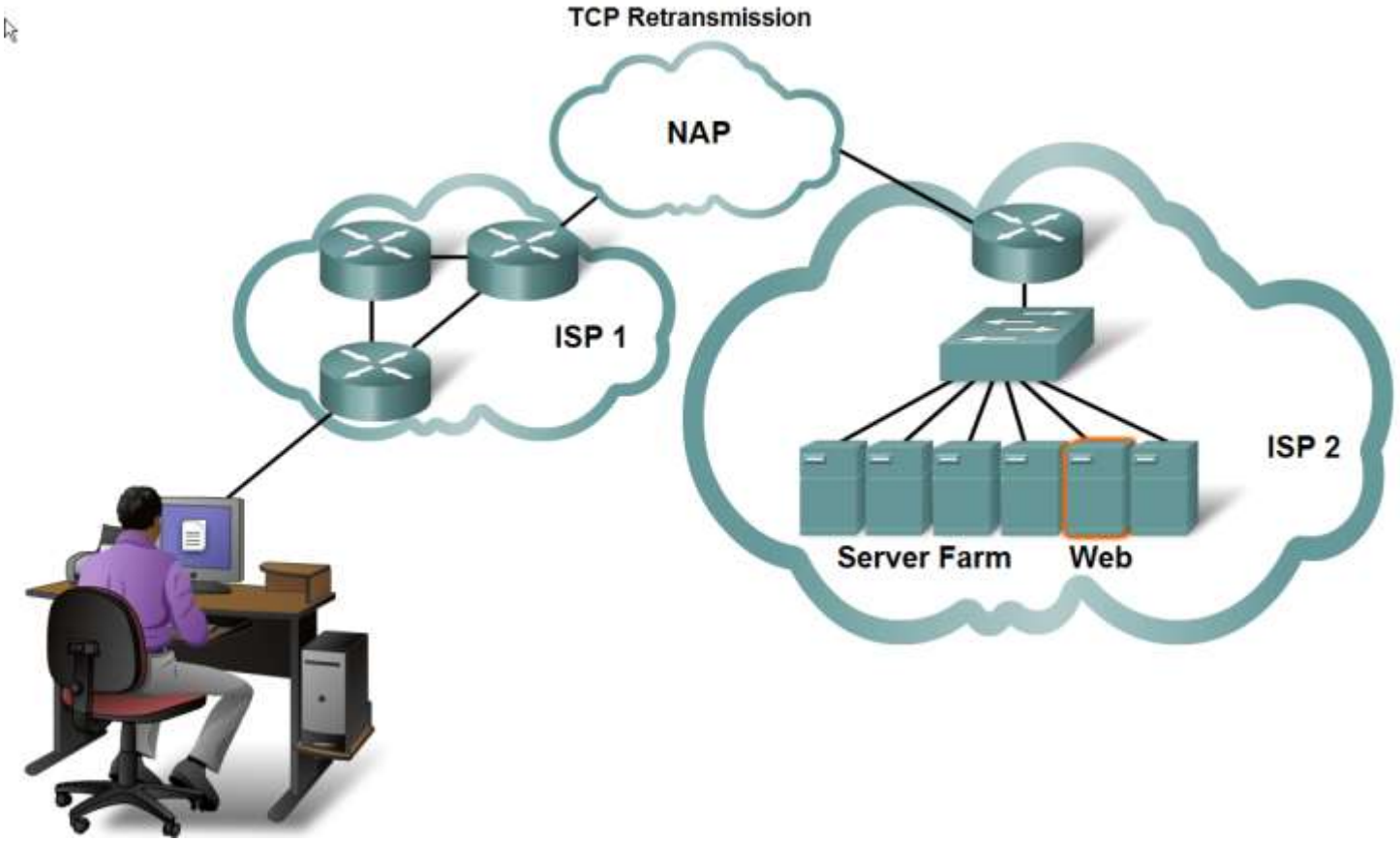
Managing TCP Sessions

- Trace the steps used by the TCP protocol in which sequence numbers and acknowledgement numbers are used to manage exchanges in a conversation



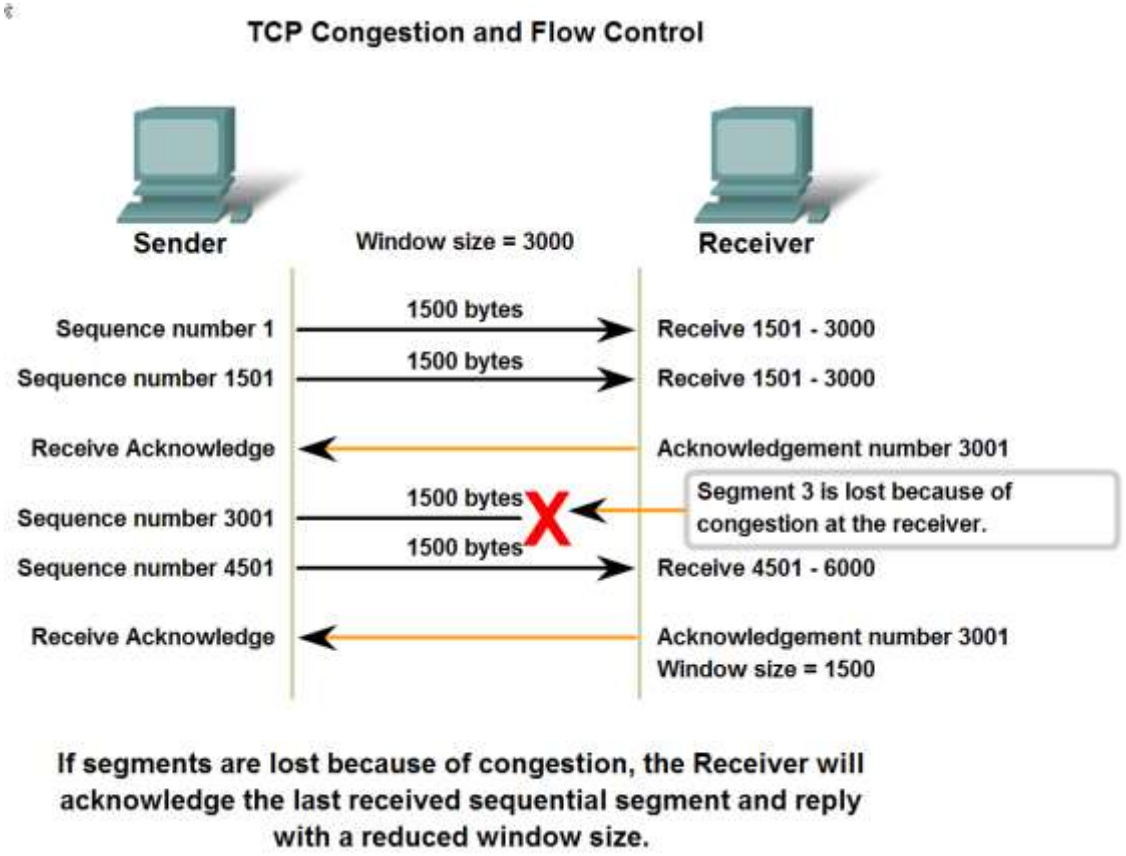
Managing TCP Sessions

- Describe the retransmission.remedy for lost data employed by TCP



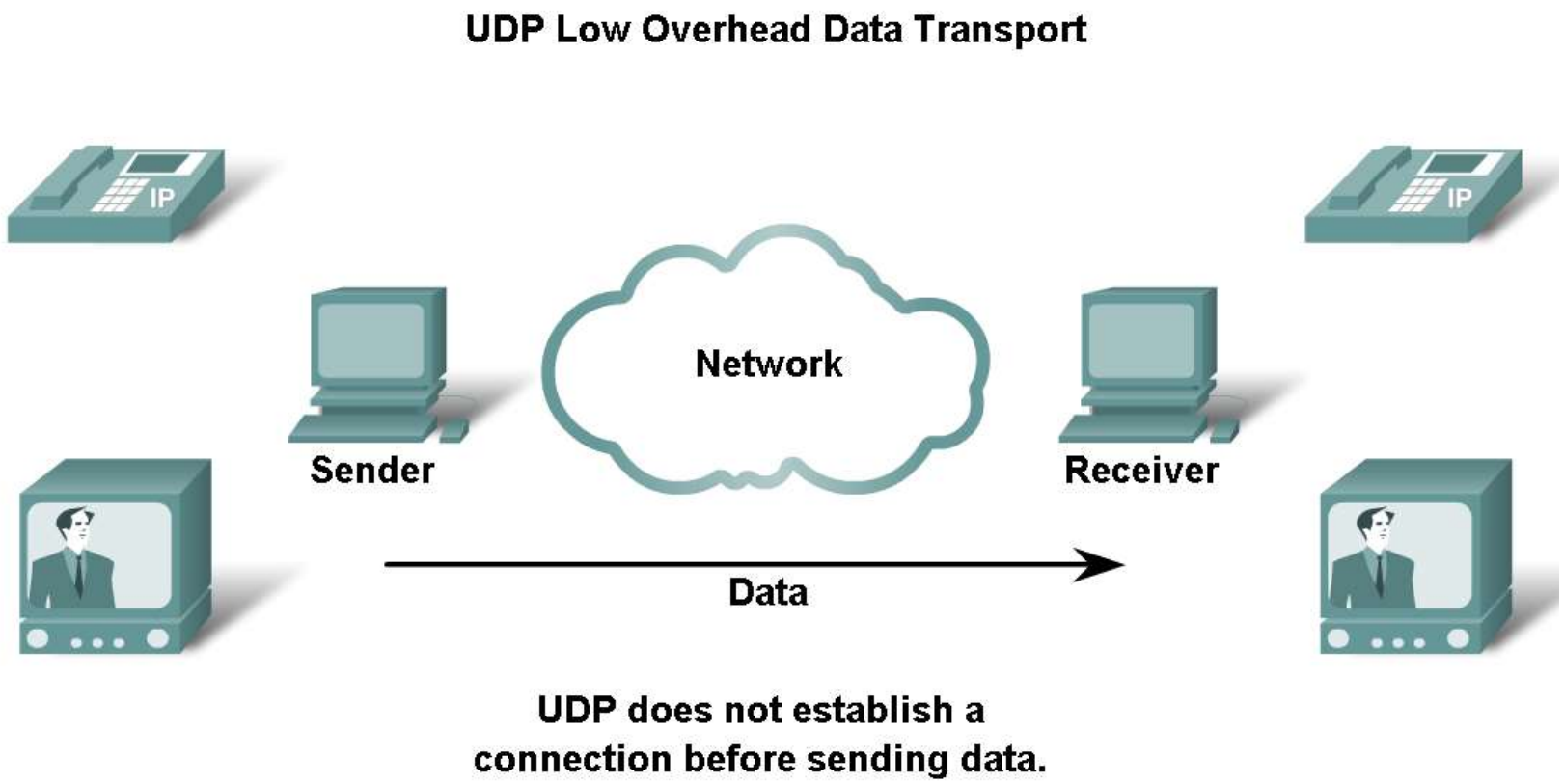
Managing TCP Sessions

- Describe the mechanisms in TCP that manage the interrelationship between window size, data loss and congestion during a session



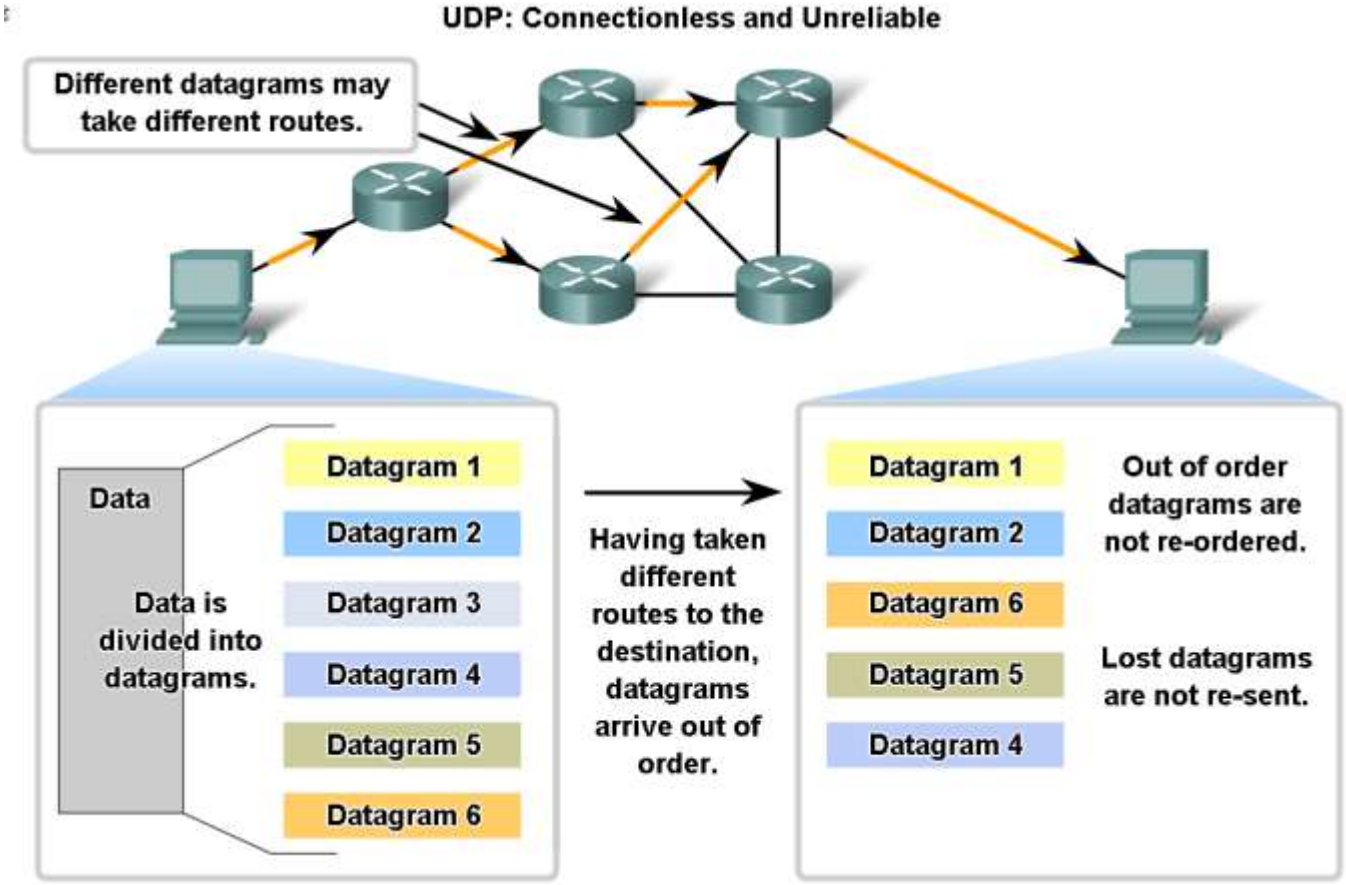
UDP Protocol

- Describe the characteristics of the UDP protocol and the types of communication for which it is best suited



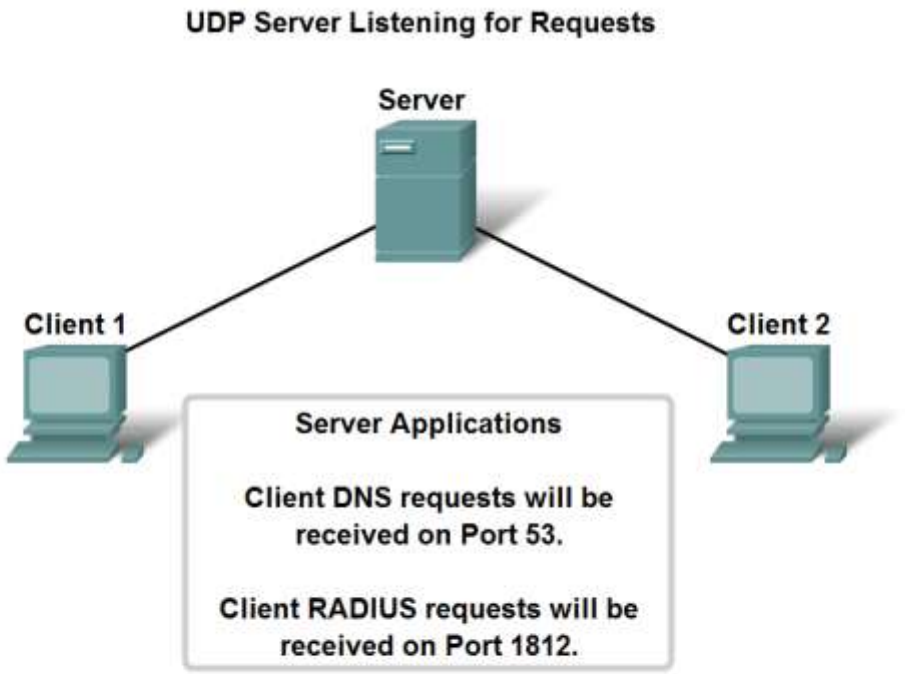
UDP Protocol

- Describe in detail the process specified by the UDP protocol to reassemble PDUs at the destination device



UDP Protocol

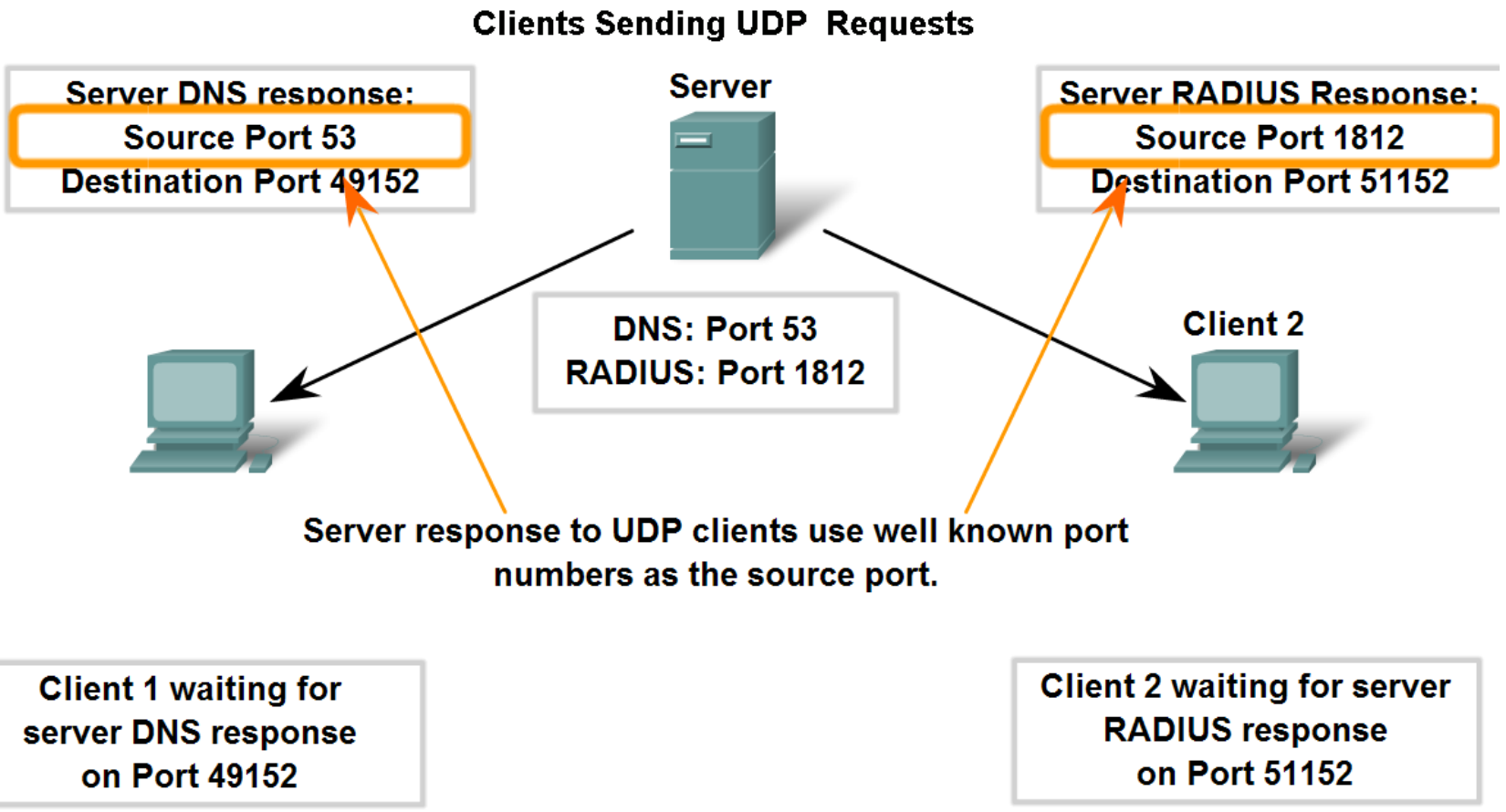
- Describe how servers use port numbers to identify a specified application layer process and direct segments to the proper service or application



Client requests to servers have well known ports numbers as the destination port.

UDP Protocol

- Trace the steps as the UDP protocol and port numbers are utilized in client-server communication.



Summary

In this chapter, you learned to:

- Explain the need for the Transport layer
- Identify the role of the Transport layer as it provides the end-to-end transfer of data between applications
- Describe the role of two TCP/IP Transport layer protocols, TCP and UDP
- Explain the key functions of the Transport layer including reliability, port addressing, and segmentation
- Explain how TCP and UDP each handle these key functions
- Identify when it is appropriate to use TCP or UDP and provide examples of applications that use each protocol