



Communicating over the Network



Network Fundamentals – Chapter 2

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Objectives

- Describe the structure of a network, including the devices and media that are necessary for successful communications.
- Explain the function of protocols in network communications.
- Explain the advantages of using a layered model to describe network functionality.
- Describe the role of each layer in two recognized network models: The TCP/IP model and the OSI model.
- Describe the importance of addressing and naming schemes in network communications.

Network Structure

■ Define the elements of communication

–3 common elements of communication

- message source
- the channel
- message destination



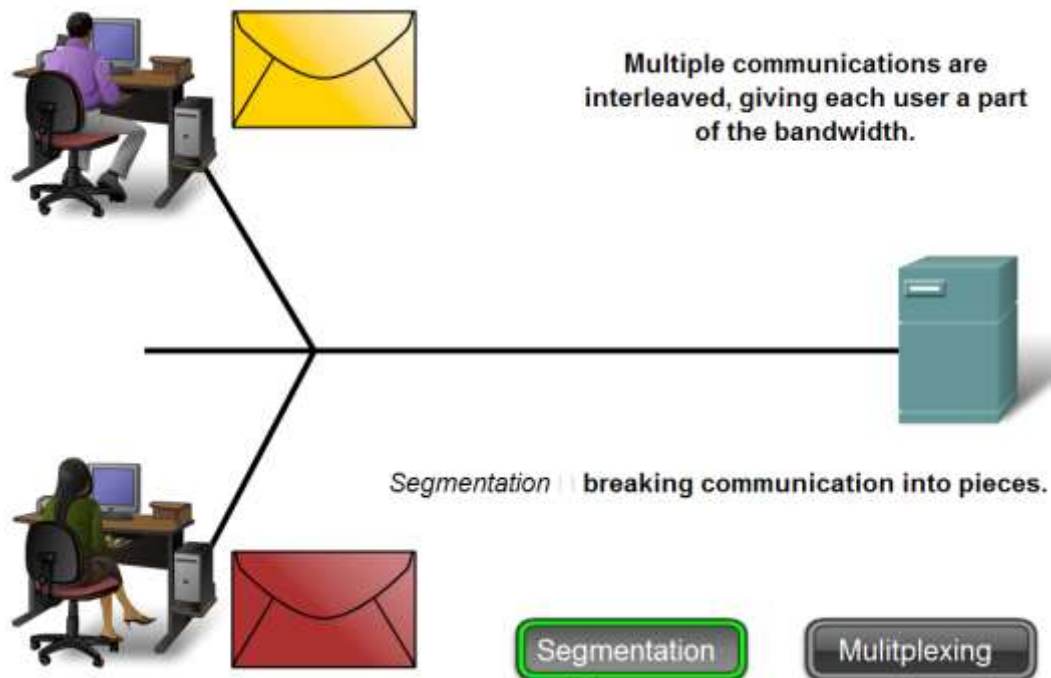
■ Define a network

data or information networks capable of carrying many different types of communications

Network Structure

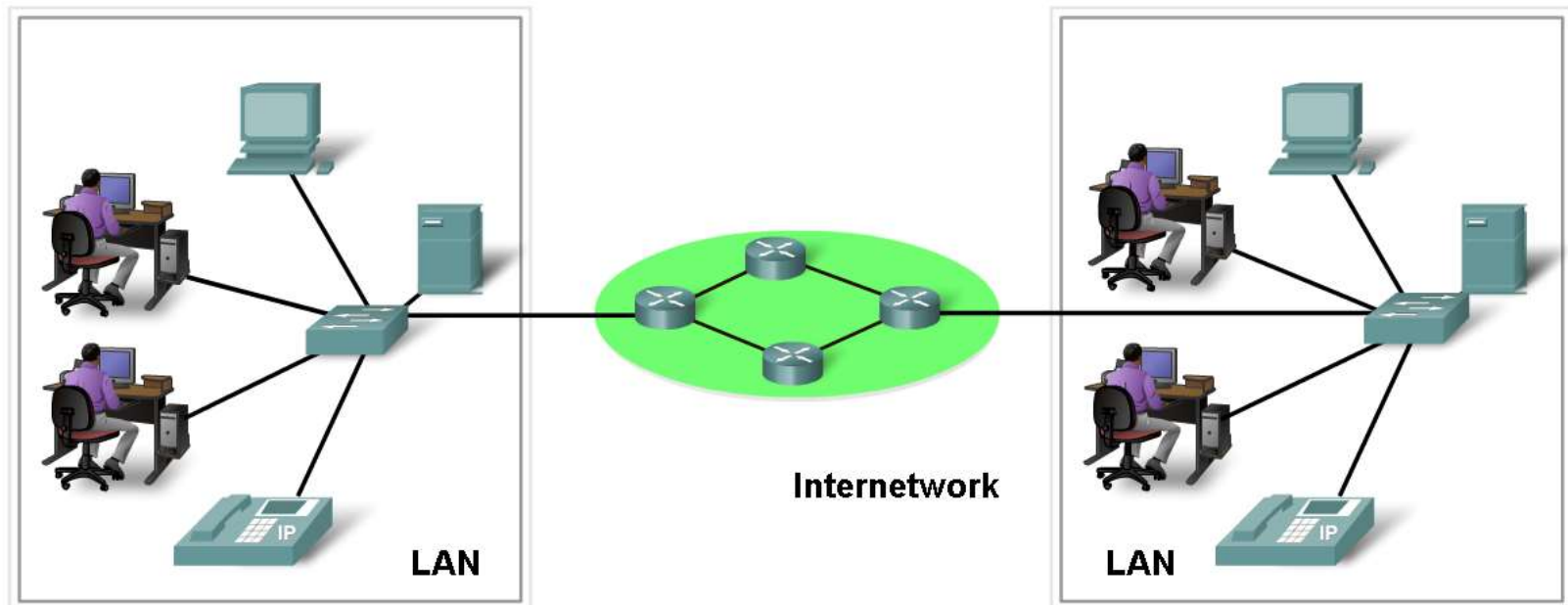
- Describe how messages are communicated

Data is sent across a network in small “chunks” called segments



Network Structure

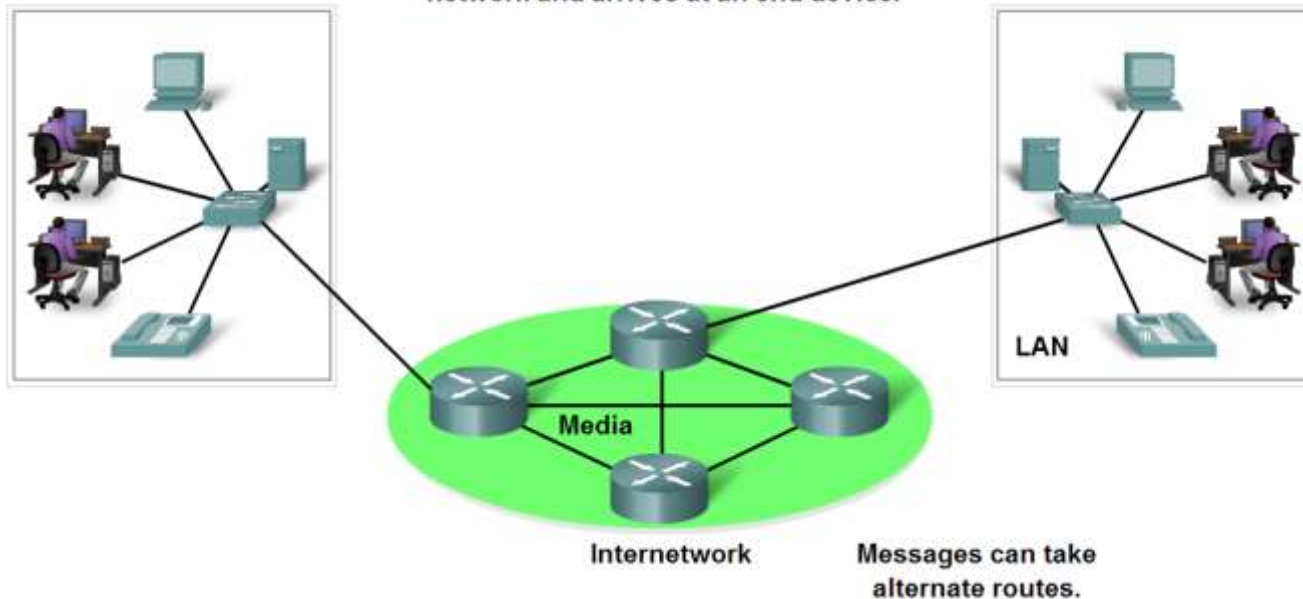
- Define the components of a network
 - Network components
 - hardware
 - software



Network Structure

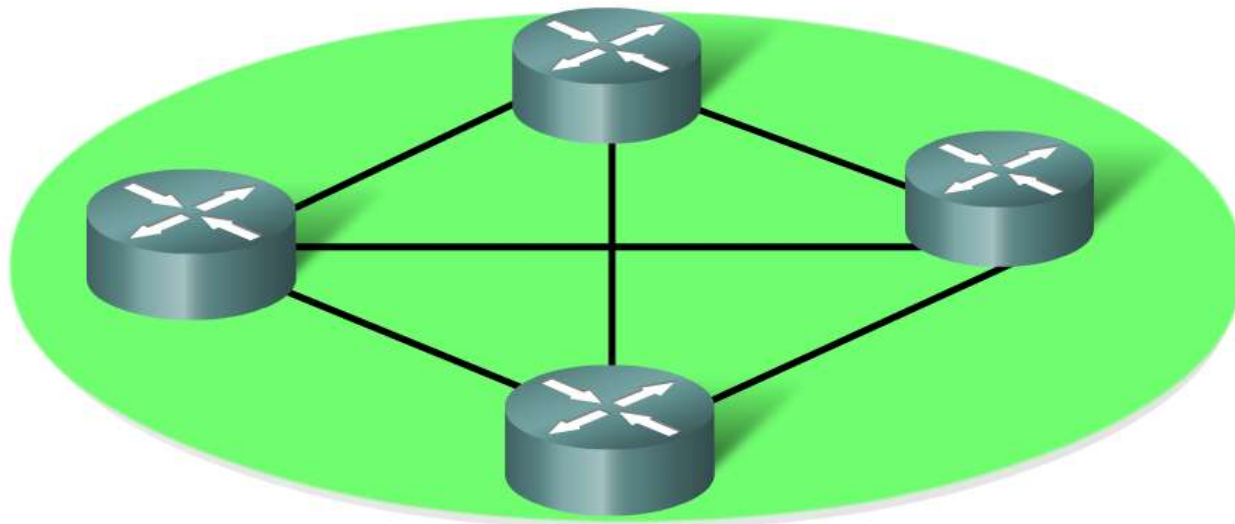
- End Devices and their Role in the Network
 - End devices form interface with human network & communications network
 - Role of end devices:
 - client
 - server
 - both client and server

Data originates with an end device, flows through the network and arrives at an end device.



Network Structure

- Identify the role of an intermediary device in a data network and be able to contrast that role with the role of an end device
 - Role of an intermediary device
 - provides connectivity and ensures data flows across network



Network Structure

- Define network media and criteria for making a network media choice

Network media

this is the channel over which a message travels

Network Media

Copper



Fiber Optics

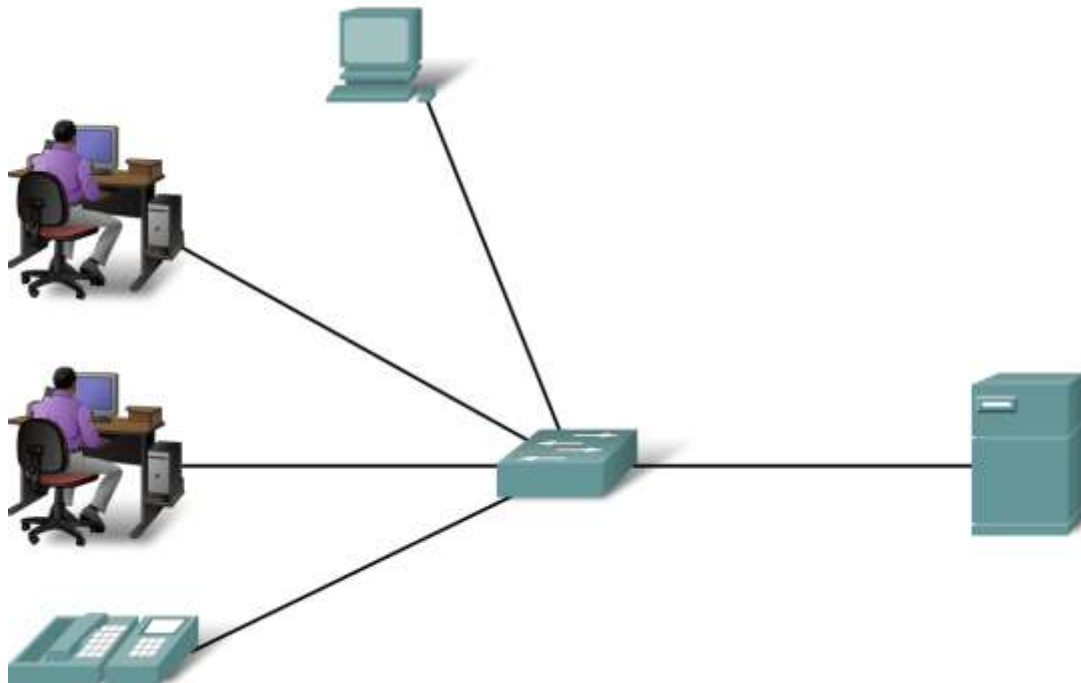


Wireless



Network Types

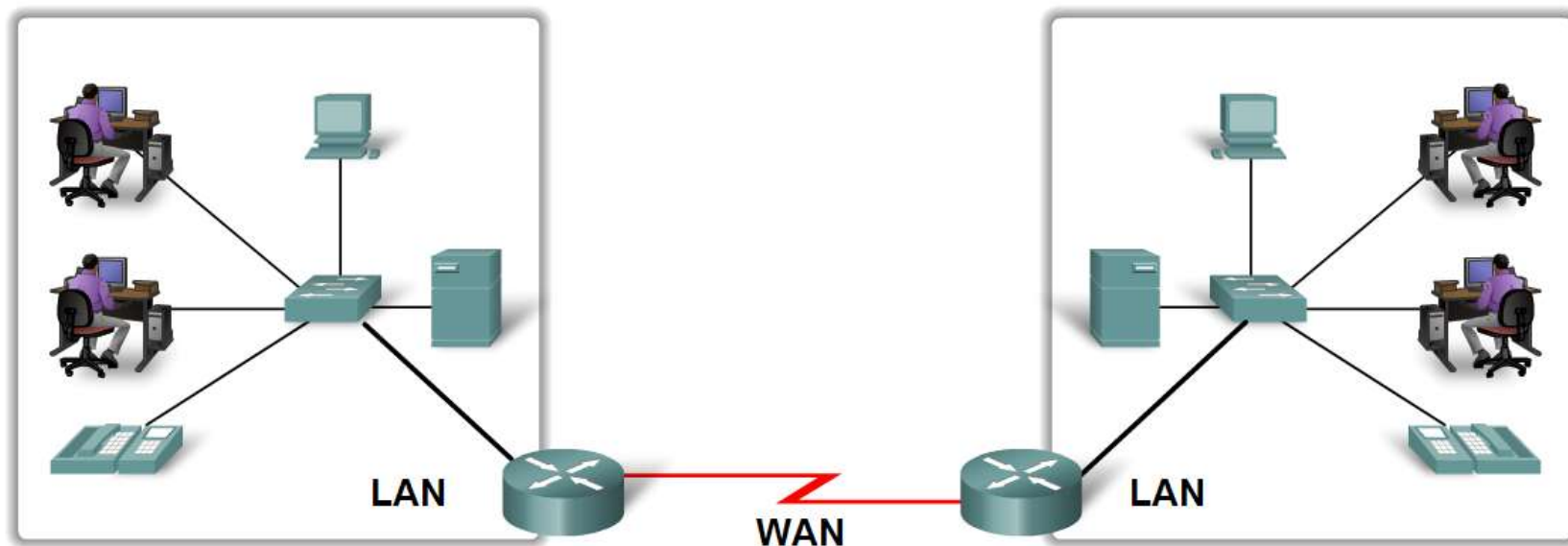
- Define Local Area Networks (LANs)
 - A network serving a home, building or campus is considered a Local Area Network (LAN)



Network Types

- Define Wide Area Networks (WANs)

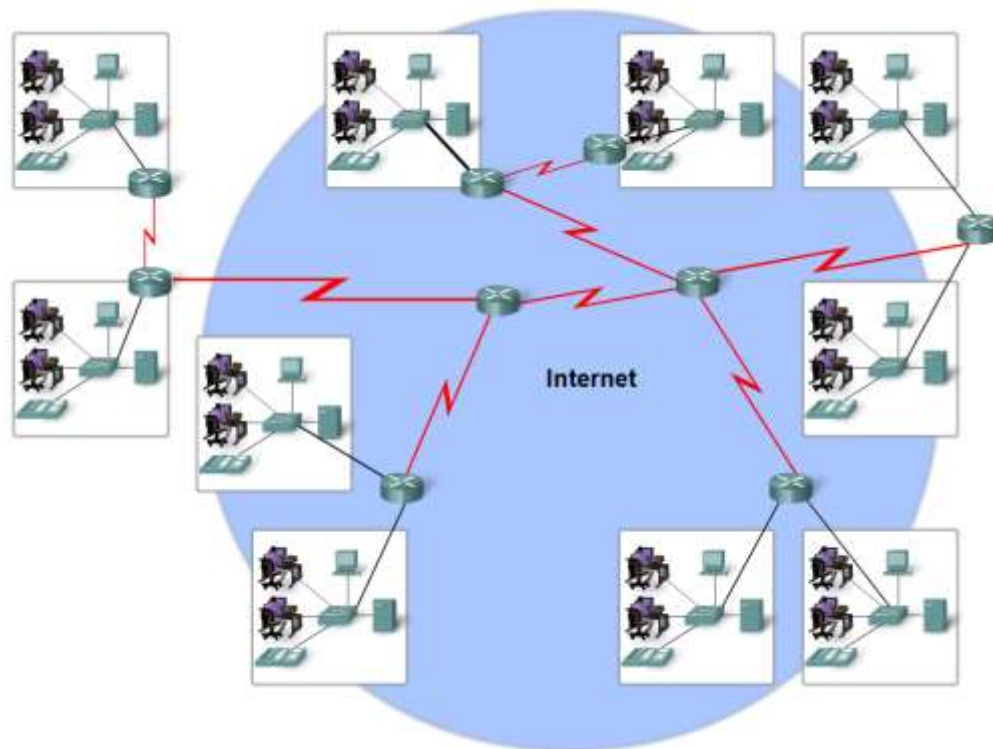
- LANs separated by geographic distance are connected by a network known as a Wide Area Network (WAN)



Network Types

- Define the Internet

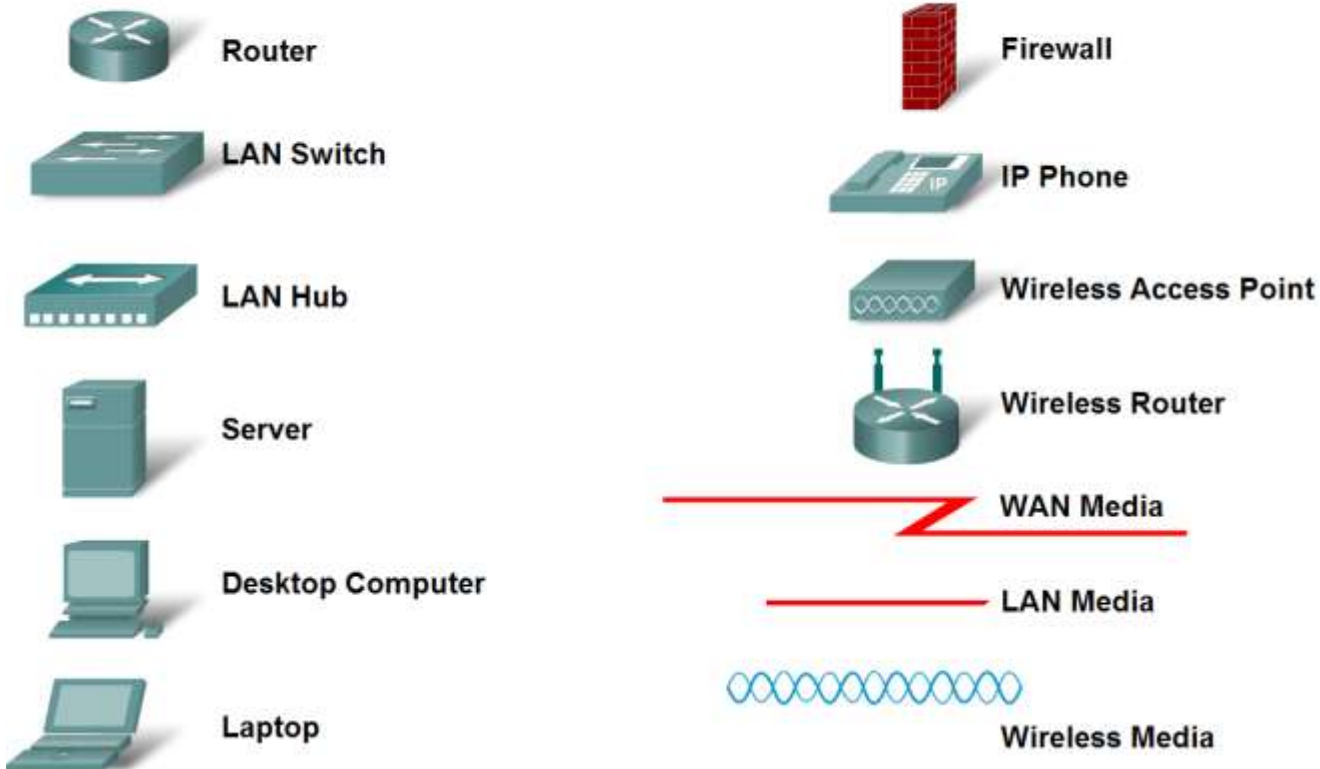
The internet is defined as a global mesh of interconnected networks



Network Types

- Describe network representations

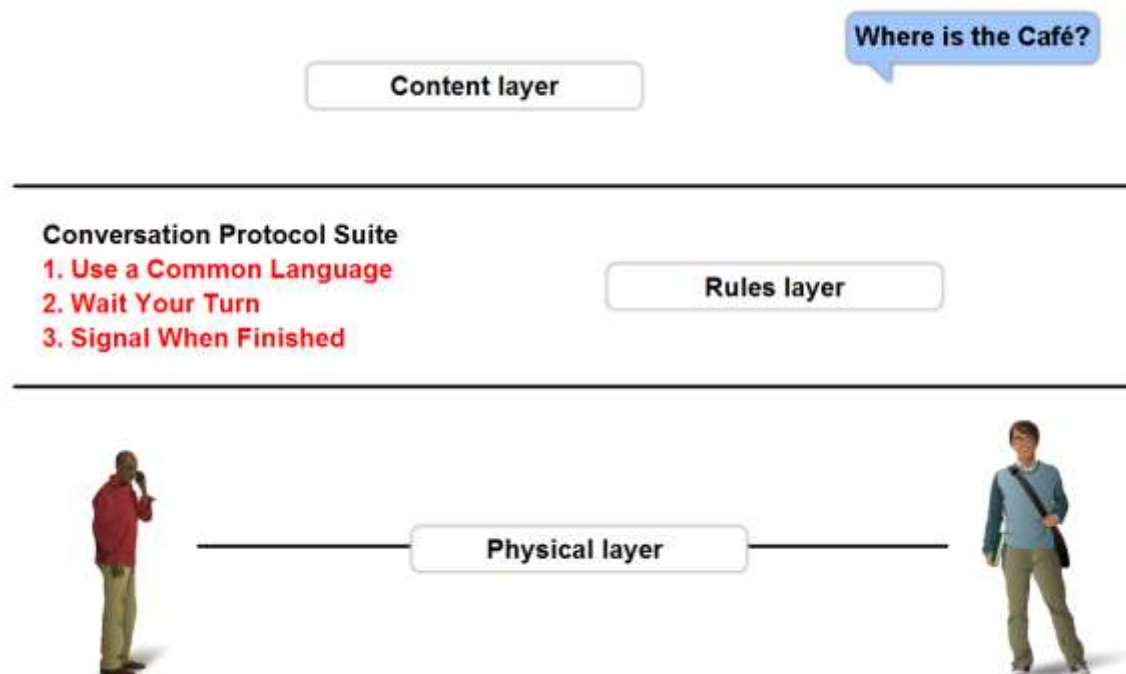
Common Data Network Symbols



Function of Protocol in Network Communication

- The importance of protocols and how they are used to facilitate communication over data networks

A protocol is a set of predetermined rules



Function of Protocol in Network Communication

- Explain network protocols

Network protocols are used to allow devices to communicate successfully

Protocols provide:

The format or structure of the message

The process by which networking devices share information about pathways to other networks

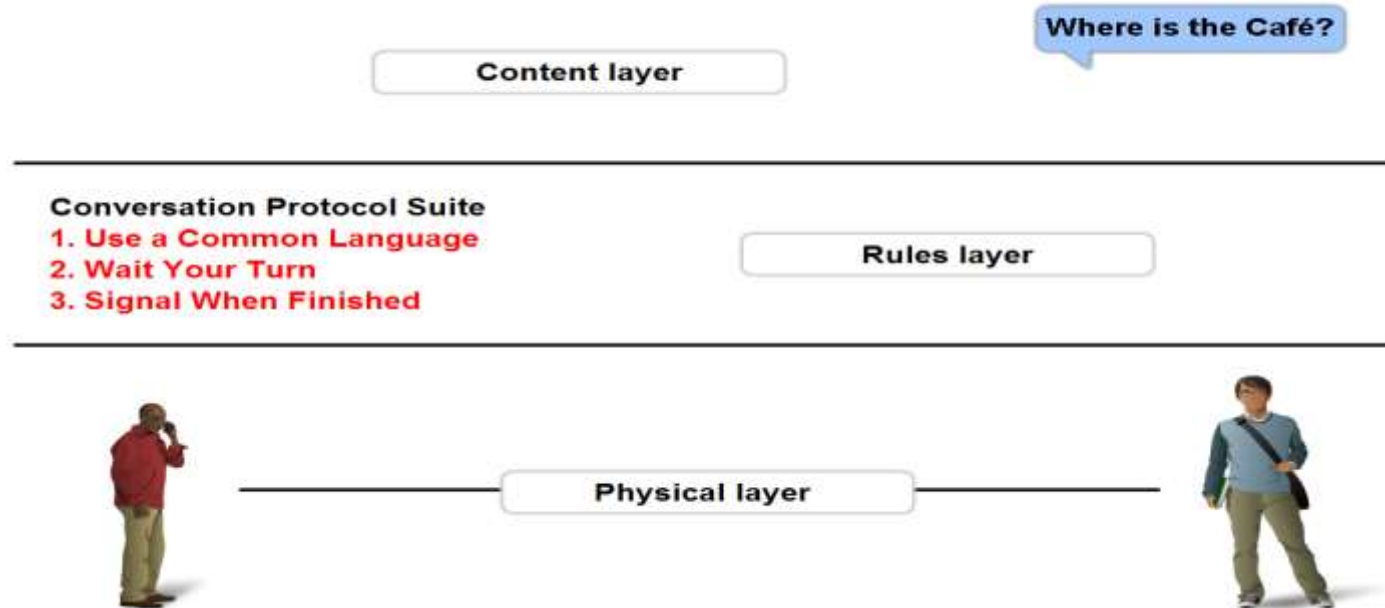
How and when error and system messages are passed between devices

The setting up and termination of data transfer sessions

Function of Protocol in Network Communication

- Describe Protocol suites and industry standards

Protocol Suites are sets of rules that work together to help solve a problem.

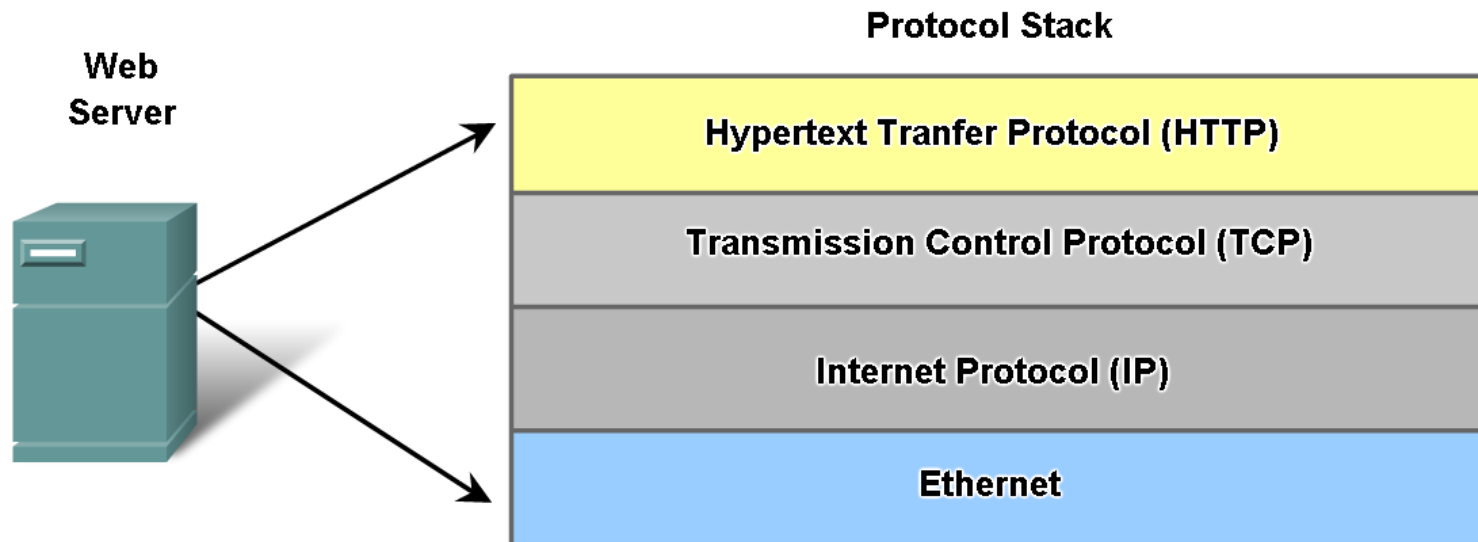


A standard is

a process or protocol that has been endorsed by the networking industry and ratified by a standards organization

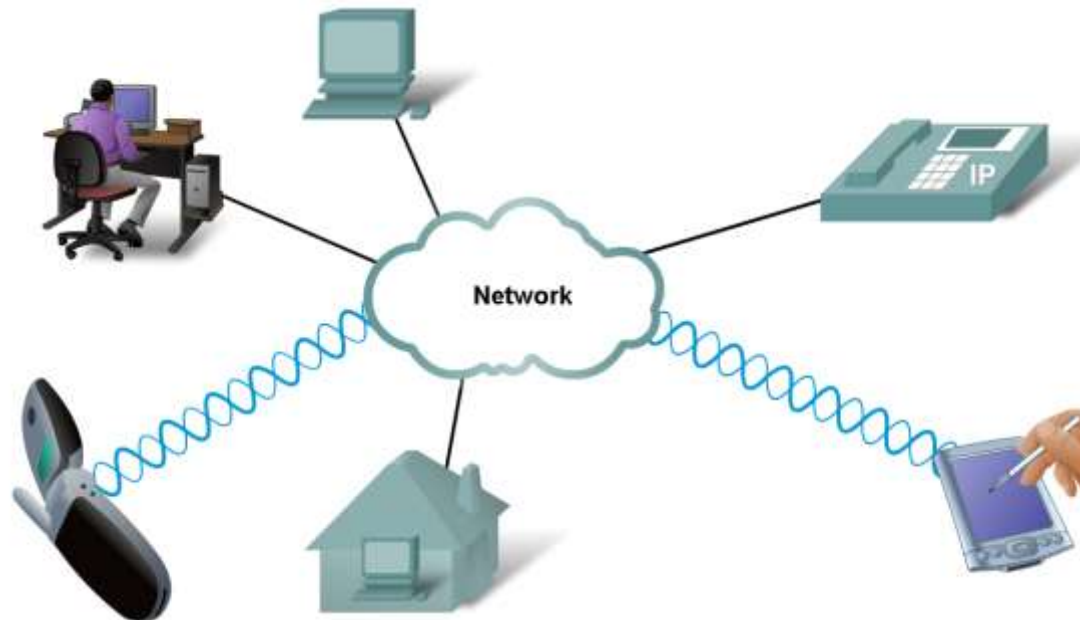
Function of Protocol in Network Communication

- Define different protocols and how they interact



Function of Protocol in Network Communication

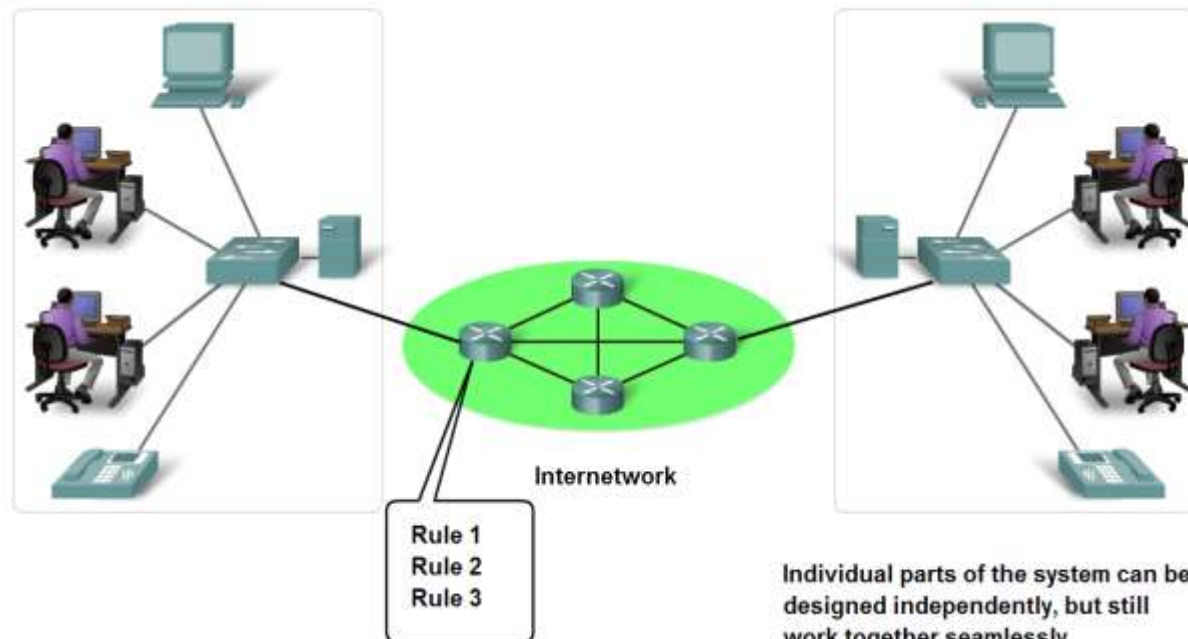
- Technology independent Protocols
 - Many diverse types of devices can communicate using the same sets of protocols. This is because protocols specify network functionality, not the underlying technology to support this functionality.



Layers with TCP/IP and OSI Model

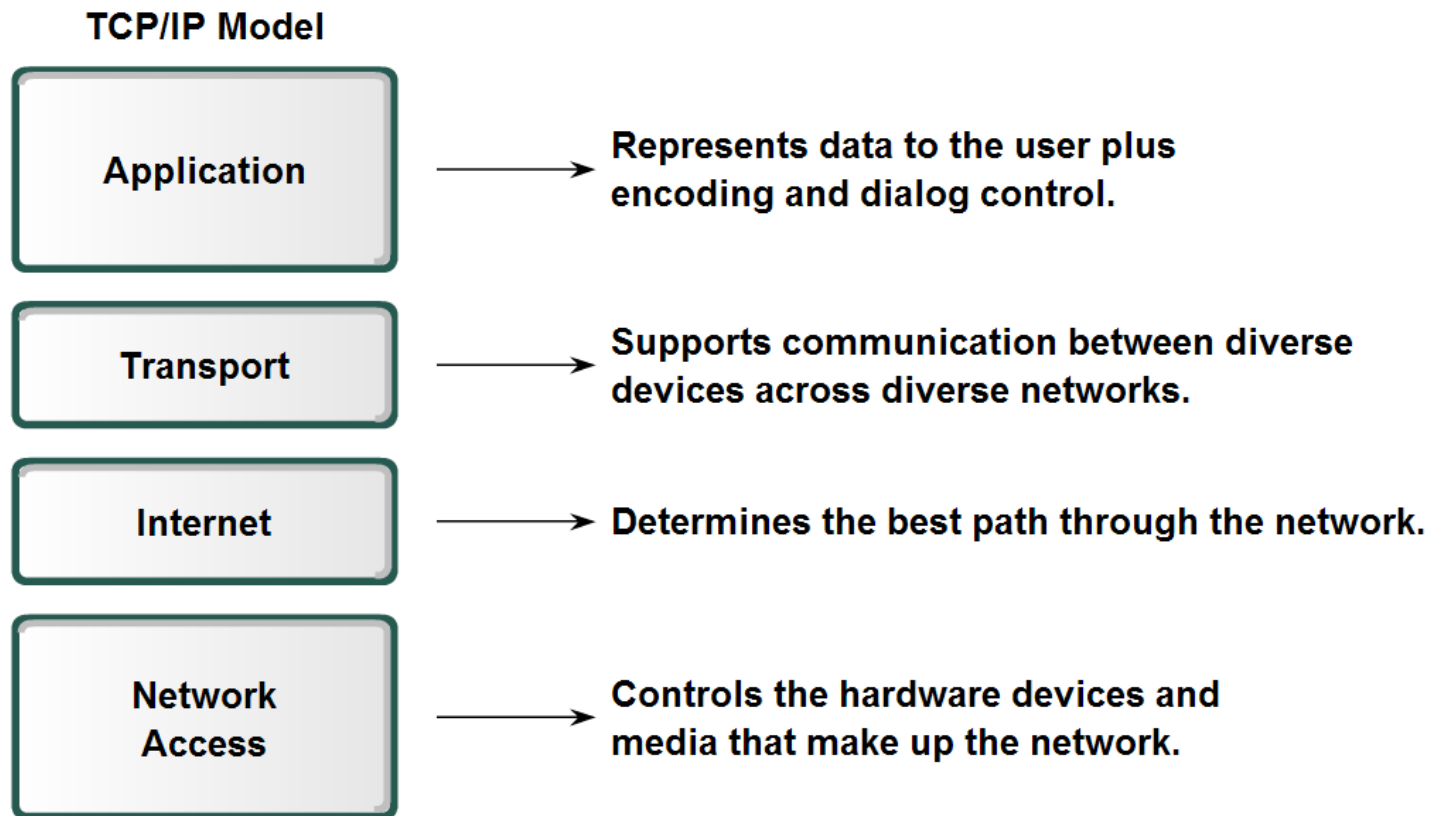
- Explain the benefits of using a layered model
 - Benefits include
 - assists in protocol design
 - fosters competition
 - changes in one layer do not affect other layers
 - provides a common language

Using a layered model helps in the design of complex, multi-use, multi-vendor networks.



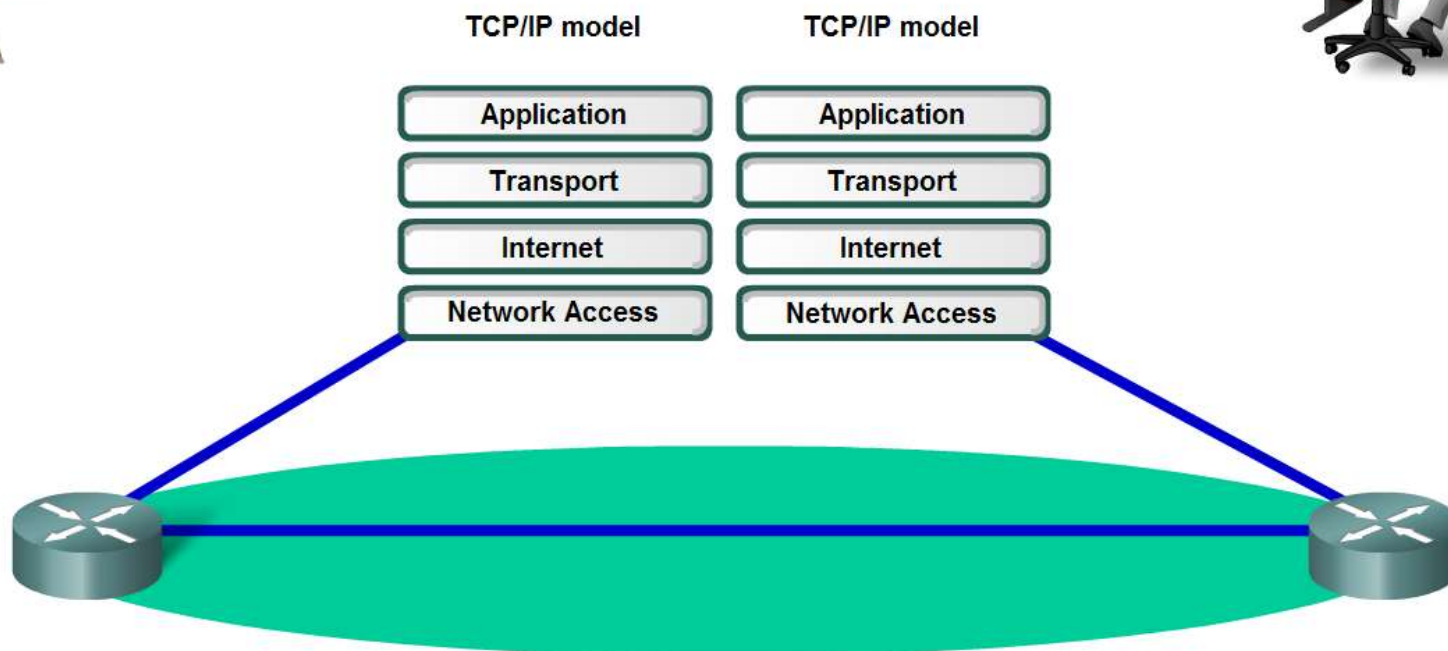
Layers with TCP/IP and OSI Model

- Describe TCP/IP Mode



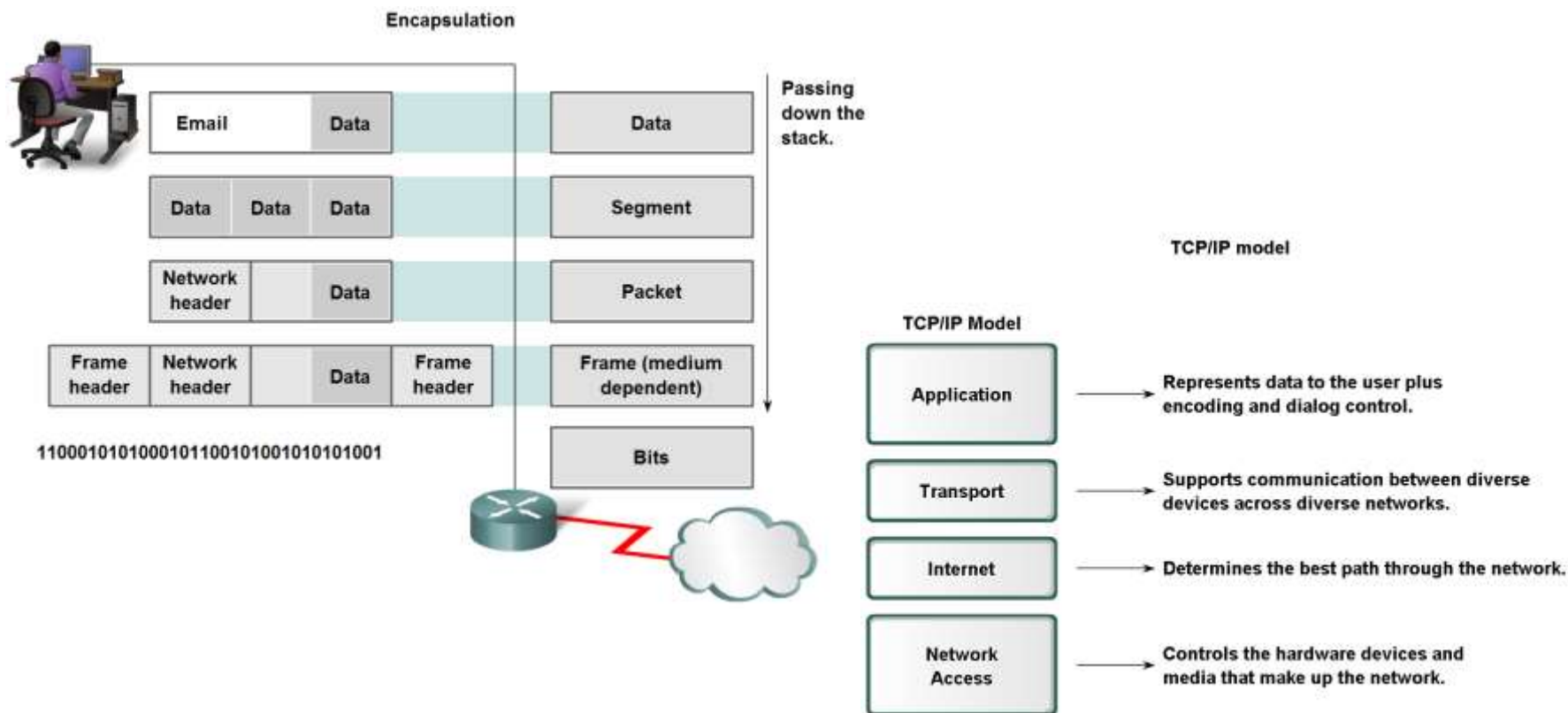
Layers with TCP/IP and OSI Model

- Describe the Communication Process



Layers with TCP/IP and OSI Model

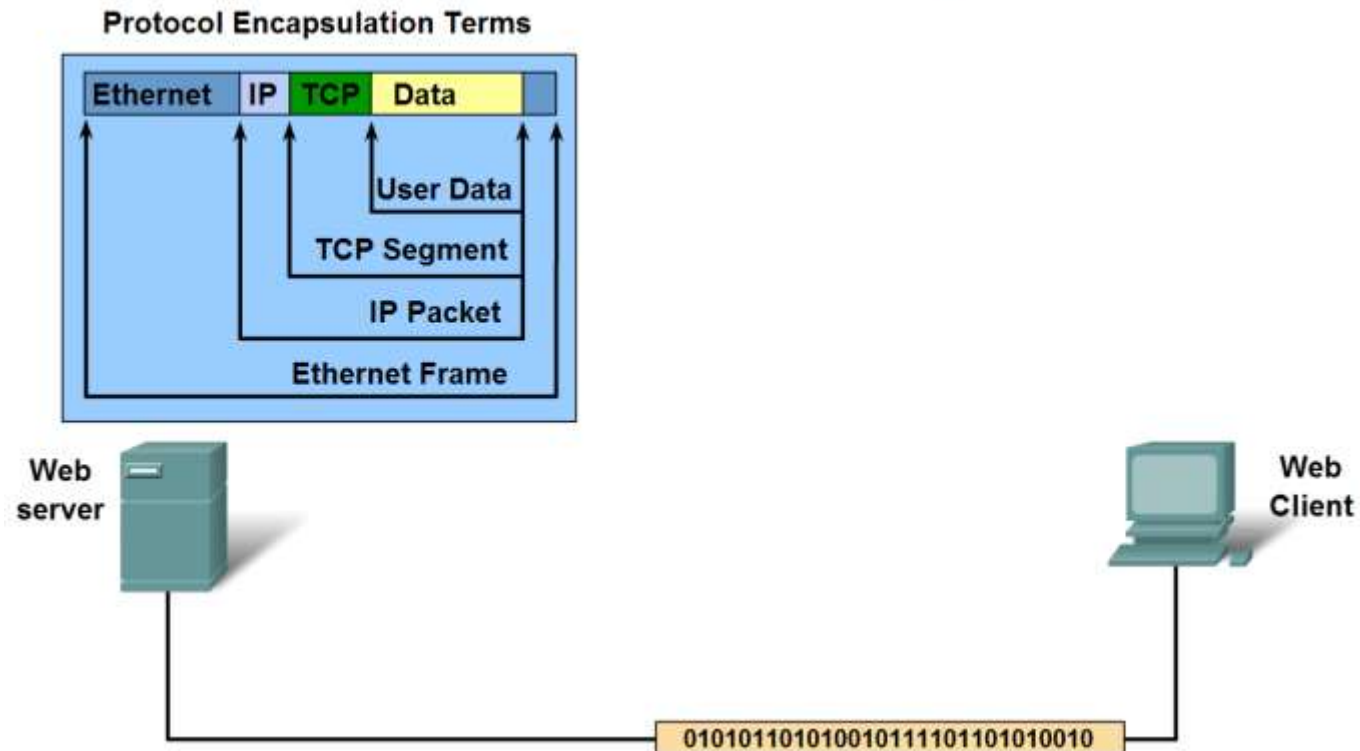
- Explain protocol data units (PDU) and encapsulation



Layers with TCP/IP and OSI Model

- Describe the process of sending and receiving messages

Protocol Operation of Sending and Receiving a Message



Layers with TCP/IP and OSI Model

- Explain protocol and reference models

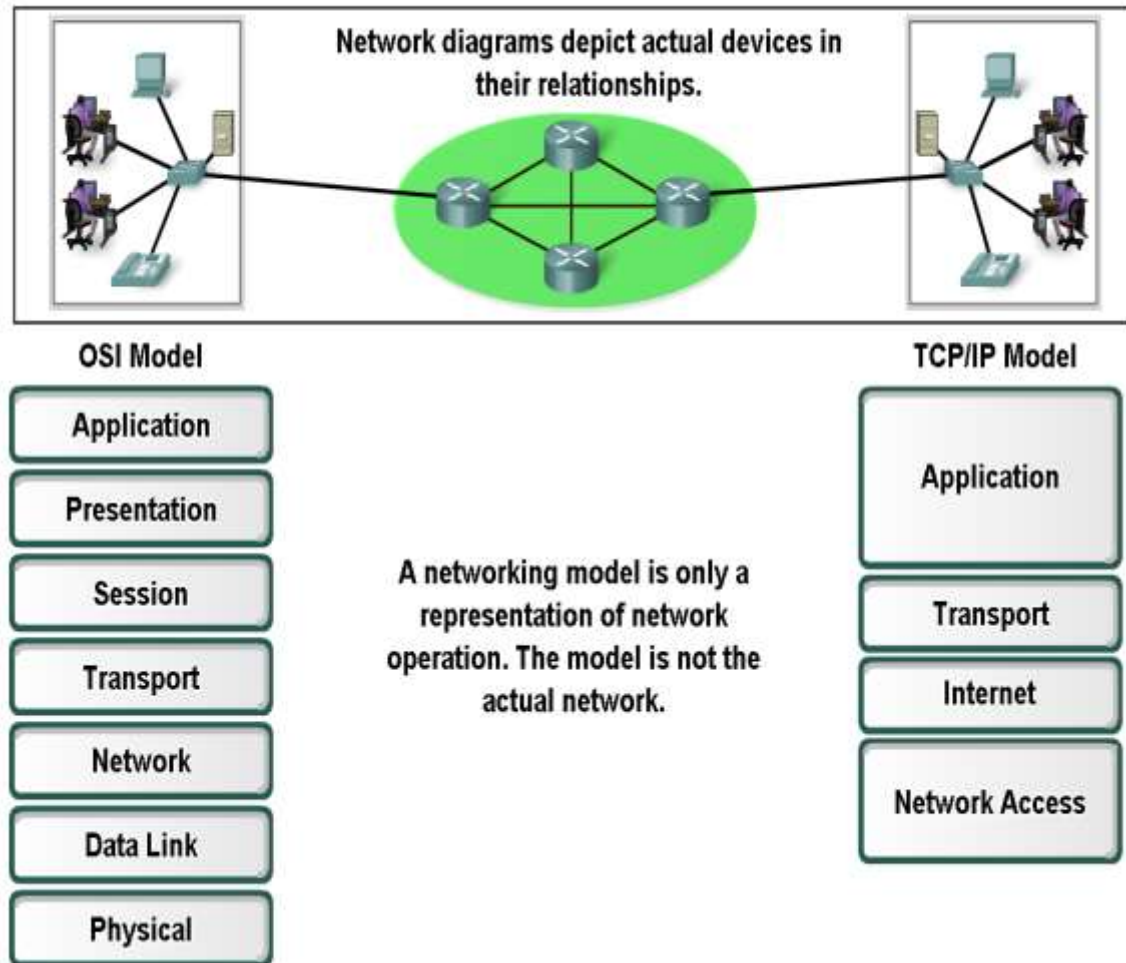
A protocol model

provides a model that closely matches the structure of a particular protocol suite.

A reference model

provides a common reference for maintaining consistency within all types of network protocols and services.

Models Provide Guidance



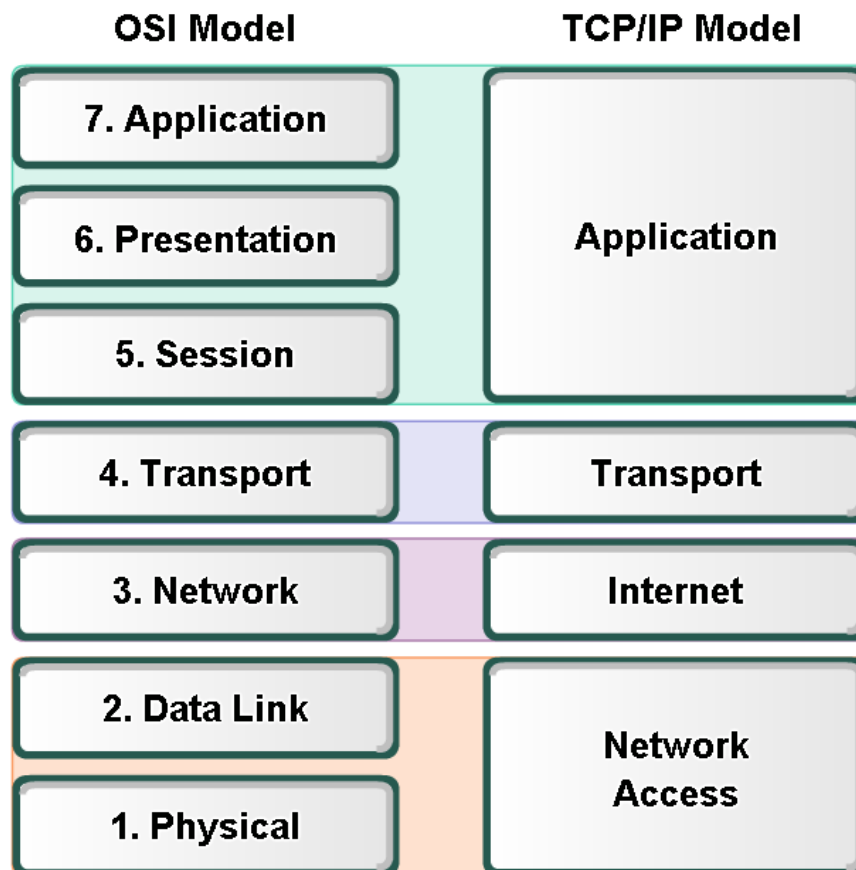
Layers with TCP/IP and OSI Model

- Define OSI



Layers with TCP/IP and OSI Model

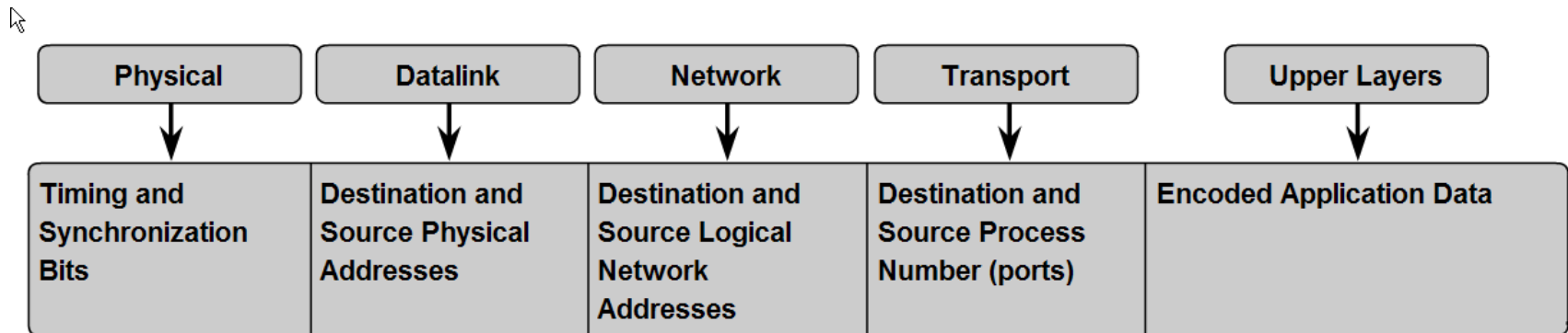
- Compare OSI and TCP/IP model



The key parallels are in the Transport and Network layers.

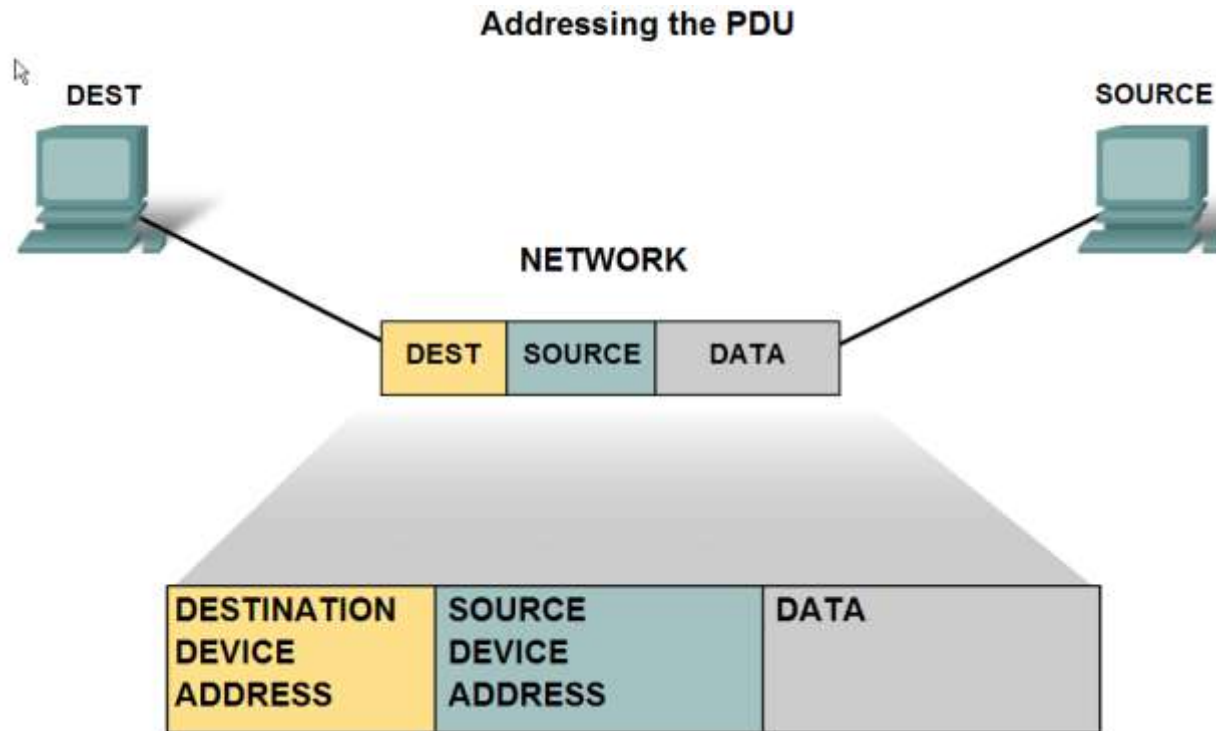
Addressing and Naming Schemes

- Explain how labels in encapsulation headers are used to manage communication in data networks



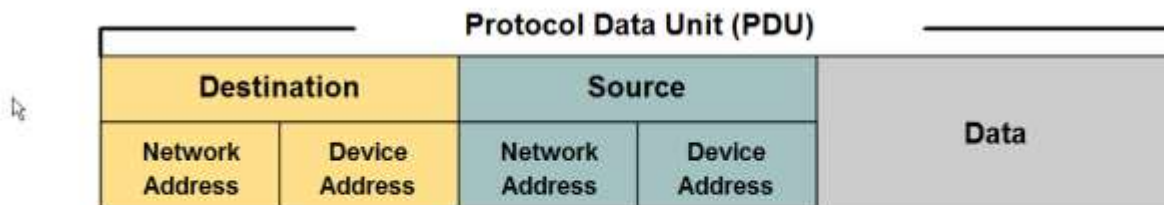
Addressing and Naming Schemes

- Describe examples of Ethernet MAC Addresses, IP Addresses, and TCP/UDP Port numbers

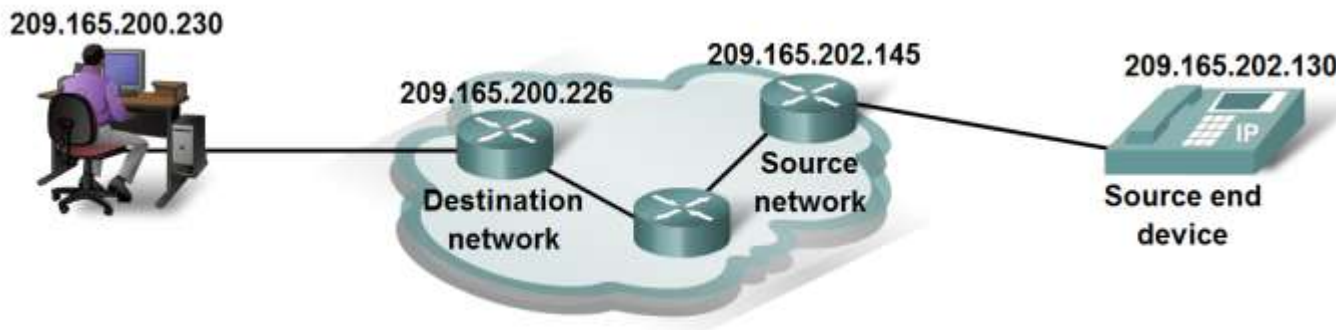


Addressing and Naming Schemes

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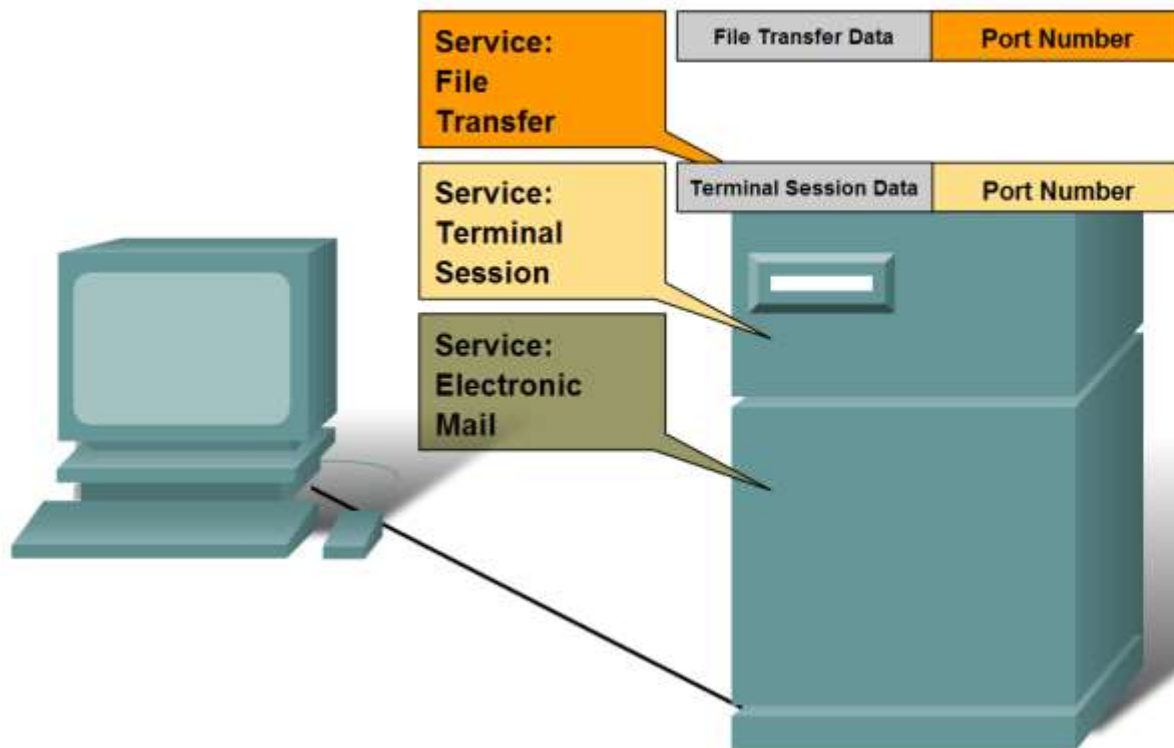
The Protocol Data Unit header also contains the network address.



Addressing and Naming Schemes

- Describe how information in the encapsulation header is used to identify the source and destination processes for data communication

At the end device, the service port number directs the data to the correct conversation.



Summary

In this chapter, you learned to:

- Describe the structure of a network, including the devices and media that are necessary for successful communications.
- Explain the function of protocols in network communications.
- Explain the advantages of using a layered model to describe network functionality.
- Describe the role of each layer in two recognized network models: The TCP/IP model and the OSI model.
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