

## Protocols

3.2.1

### Network Protocol Overview



You know that for end devices to be able to communicate over a network, each device must abide by the same set of rules. These rules are called protocols and they have many functions in a network. This topic gives you a overview of network protocols.

Network protocols define a common format and set of rules for exchanging messages between devices. Protocols are implemented by end devices and intermediary devices in software, hardware, or both. Each network protocol has its own function, format, and rules for communications.

The table lists the various types of protocols that are needed to enable communications across one or more networks.

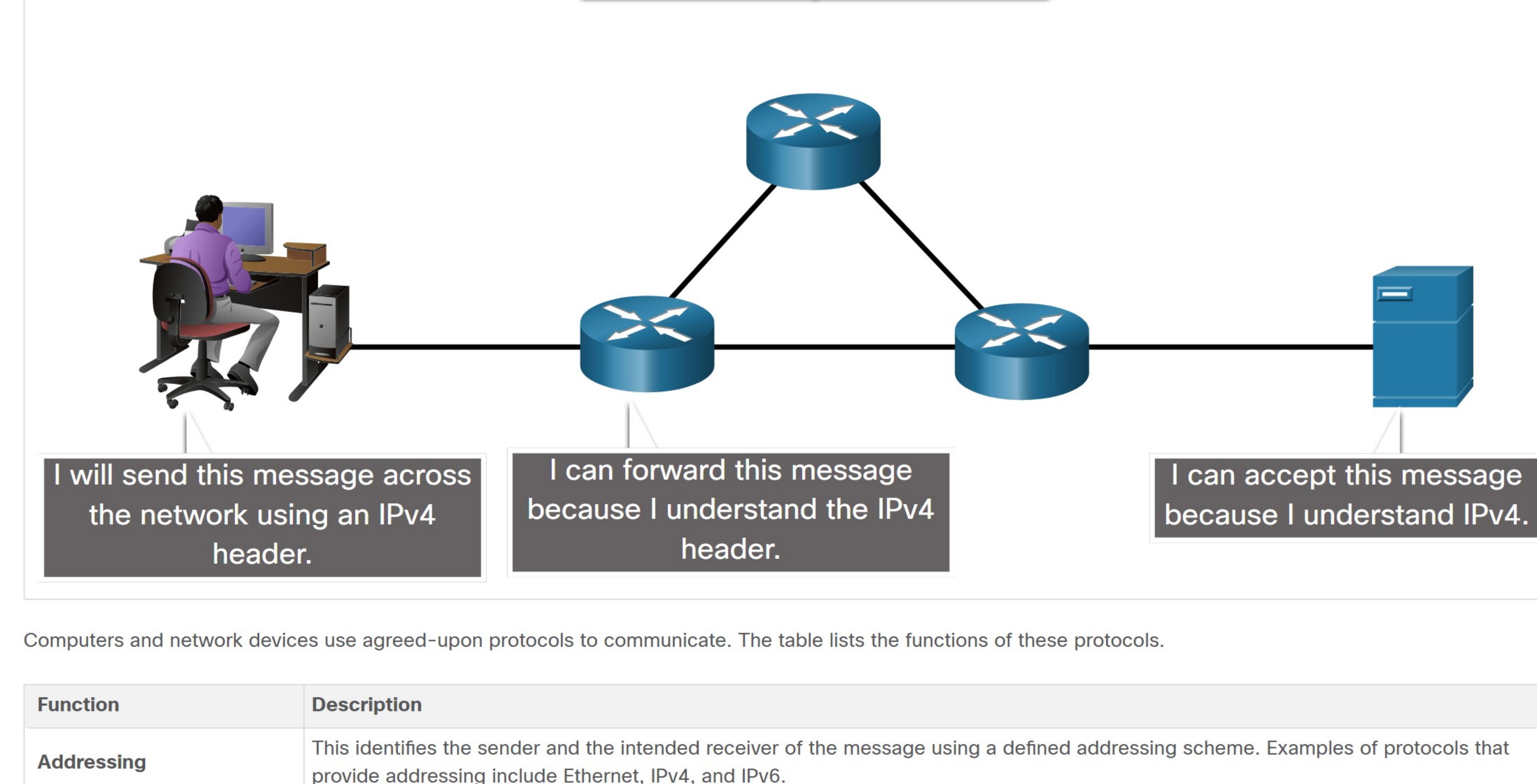
Protocol Type	Description
<b>Network Communications Protocols</b>	Protocols enable two or more devices to communicate over one or more networks. The Ethernet family of technologies involves a variety of protocols such as IP, Transmission Control Protocol (TCP), HyperText Transfer Protocol (HTTP), and many more.
<b>Network Security Protocols</b>	Protocols secure data to provide authentication, data integrity, and data encryption. Examples of secure protocols include Secure Shell (SSH), Secure Sockets Layer (SSL), and Transport Layer Security (TLS).
<b>Routing Protocols</b>	Protocols enable routers to exchange route information, compare path information, and then to select the best path to the destination network. Examples of routing protocols include Open Shortest Path First (OSPF) and Border Gateway Protocol (BGP).
<b>Service Discovery Protocols</b>	Protocols are used for the automatic detection of devices or services. Examples of service discovery protocols include Dynamic Host Configuration Protocol (DHCP) which discovers services for IP address allocation, and Domain Name System (DNS) which is used to perform name-to-IP address translation.

3.2.2

### Network Protocol Functions



Network communication protocols are responsible for a variety of functions necessary for network communications between end devices. For example, in the figure how does the computer send a message, across several network devices, to the server?



Computers and network devices use agreed-upon protocols to communicate. The table lists the functions of these protocols.

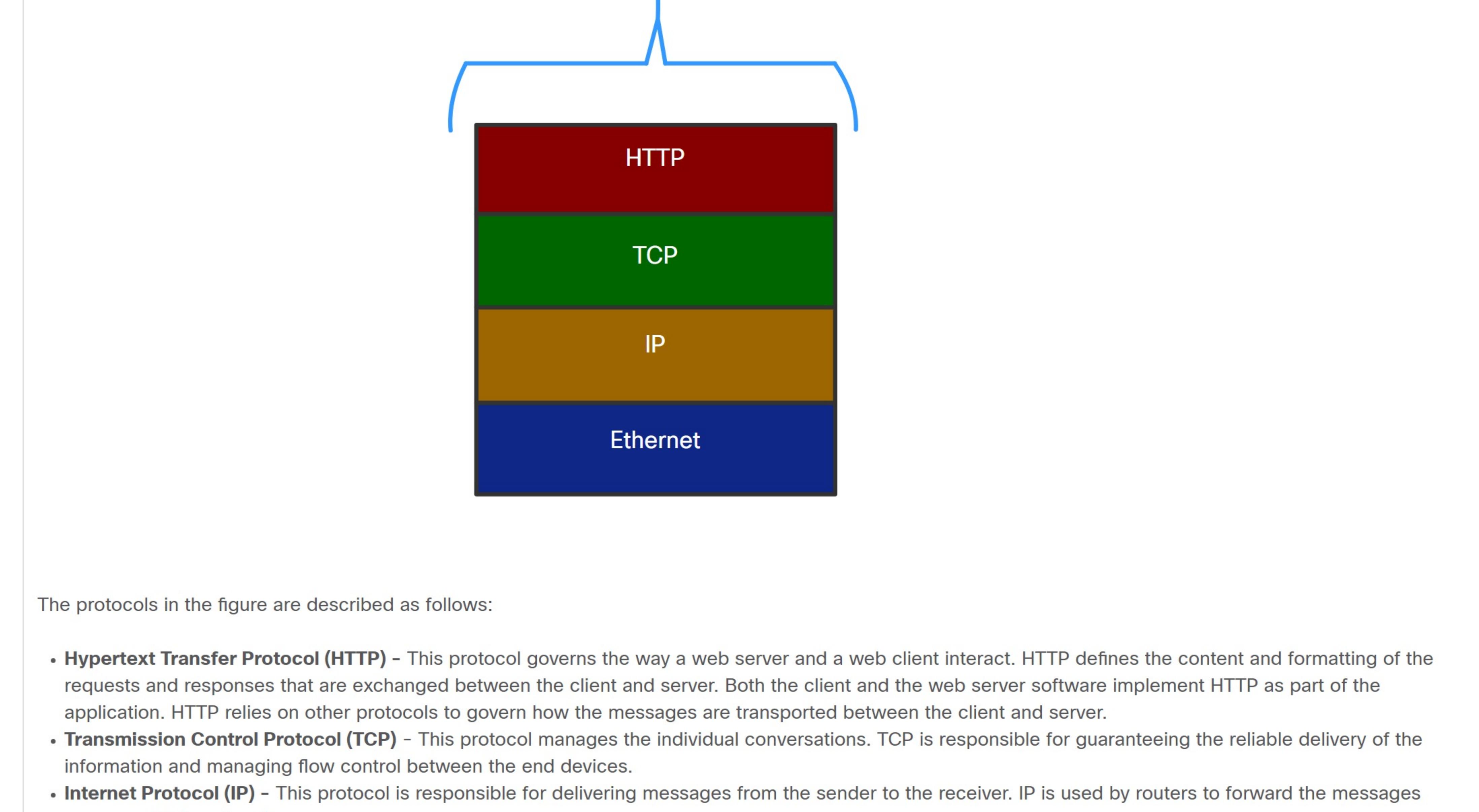
Function	Description
<b>Addressing</b>	This identifies the sender and the intended receiver of the message using a defined addressing scheme. Examples of protocols that provide addressing include Ethernet, IPv4, and IPv6.
<b>Reliability</b>	This function provides guaranteed delivery mechanisms in case messages are lost or corrupted in transit. TCP provides guaranteed delivery.
<b>Flow control</b>	This function ensures that data flows at an efficient rate between two communicating devices. TCP provides flow control services.
<b>Sequencing</b>	This function uniquely labels each transmitted segment of data. The receiving device uses the sequencing information to reassemble the information correctly. This is useful if the data segments are lost, delayed or received out-of-order. TCP provides sequencing services.
<b>Error Detection</b>	This function is used to determine if data became corrupted during transmission. Various protocols that provide error detection include Ethernet, IPv4, IPv6, and TCP.
<b>Application Interface</b>	This function contains information used for process-to-process communications between network applications. For example, when accessing a web page, HTTP or HTTPS protocols are used to communicate between the client and server web processes.

3.2.3

### Protocol Interaction



A message sent over a computer network typically requires the use of several protocols, each one with its own functions and format. The figure shows some common network protocols that are used when a device sends a request to a web server for its web page.



The protocols in the figure are described as follows:

- Hypertext Transfer Protocol (HTTP)** - This protocol governs the way a web server and a web client interact. HTTP defines the content and formatting of the requests and responses that are exchanged between the client and server. Both the client and the web server software implement HTTP as part of the application. HTTP relies on other protocols to govern how the messages are transported between the client and server.
- Transmission Control Protocol (TCP)** - This protocol manages the individual conversations. TCP is responsible for guaranteeing the reliable delivery of the information and managing flow control between the end devices.
- Internet Protocol (IP)** - This protocol is responsible for delivering messages from the sender to the receiver. IP is used by routers to forward the messages across multiple networks.
- Ethernet** - This protocol is responsible for the delivery of messages from one NIC to another NIC on the same Ethernet local area network (LAN).

3.2.4

### Check Your Understanding – Protocols

Check your understanding of the protocols used in network communication by choosing the BEST answer to the following questions.

1. BGP and OSPF are examples of which type of protocol?

- network communication  
 network security  
 routing  
 service discovery

2. Which two protocols are service discovery protocols? (Choose two.)

- DNS  
 TCP  
 SSH  
 DHCP

3. What is the purpose of the sequencing function in network communication?

- to uniquely label transmitted segments of data for proper reassembly by the receiver  
 to determine if data is corrupted during transmission  
 to ensure data flows at an efficient rate between sender and receiver  
 to guarantee delivery of data

4. This protocol is responsible for guaranteeing the reliable delivery of information.

- TCP  
 IP  
 HTTP  
 Ethernet

Check

Show Me

Reset