



JARINGAN KOMPUTER

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PROGRAM STUDI
SISTEM KOMPUTER

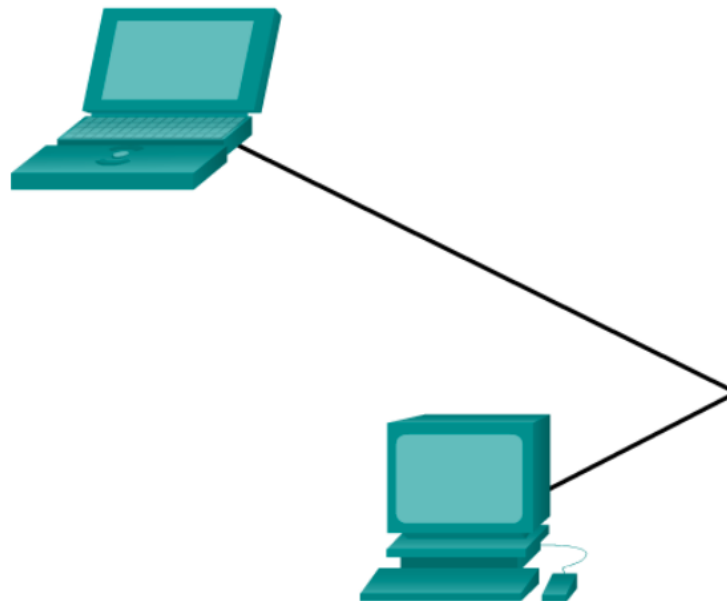
Rules of Communication

- Human Communication



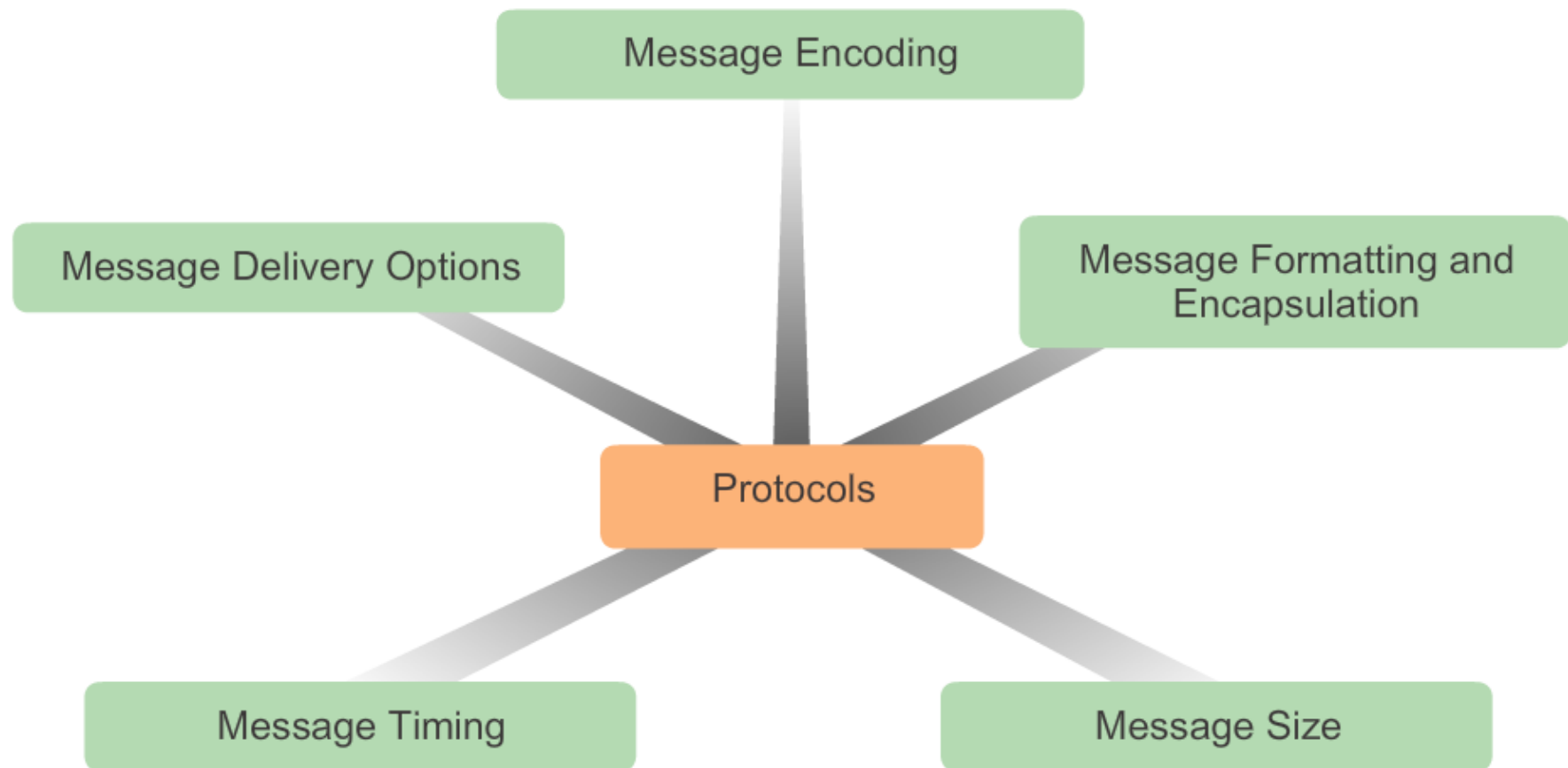
Rules of Communication

- Computer Communication



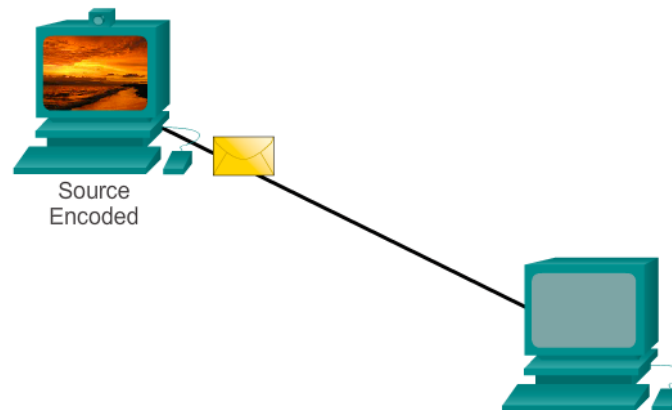
Rules of Communication

- Before communicating with one another, individuals must use established rules or agreements to govern the conversation.
- The protocols used are specific to the characteristics of the communication method, including the characteristics of the source, destination and channel. These rules, or protocols, must be followed in order for the message to be successfully delivered and understood.
- The protocols put in place must account for the following requirements:
 - **An identified sender and receiver**
 - **Common language and grammar**
 - **Speed and timing of delivery**
 - **Confirmation or acknowledgement requirements**



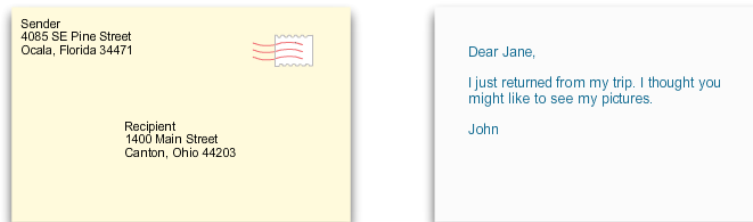
Message Encoding

- One of the first steps to sending a message is encoding it. Encoding is the process of converting information into another, acceptable form, for transmission. Decoding reverses this process in order to interpret the information.



Message Formatting and Encapsulation

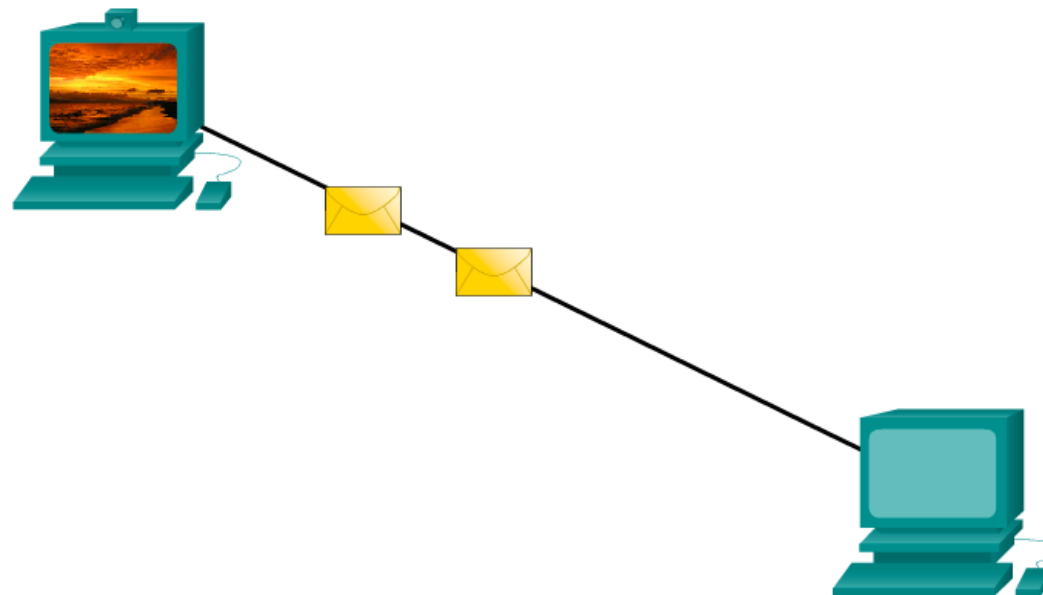
- When a message is sent from source to destination, it must use a specific format or structure. Message formats depend on the type of message and the channel that is used to deliver the message.



Recipient (destination) Location address	Sender (source) Location address	Salutation (start of message indicator)	Recipient (destination) identifier	Content of Letter (encapsulated data)	Sender (source) identifier	End of Frame (End of message indicator)
Envelope Addressing		Encapsulated Letter				
1400 Main Street Canton, Ohio 44203	4085 SE Pine Street Ocala, Florida 34471	Dear	Jane	I just returned from my trip. I thought you might like to see my pictures.	John	

Message Size

- When a long message is sent from one host to another over a network, it is necessary to break the message into smaller pieces, as shown in Figure . The rules that govern the size of the pieces, or frames, communicated across the network are very strict. They can also be different, depending on the channel used. Frames that are too long or too short are not delivered.



Message Timing

- **Message Timing**

Another factor that affects how well a message is received and understood is timing. People use timing to determine when to speak, how fast or slow to talk, and how long to wait for a response. These are the rules of engagement.

- **Access Method**

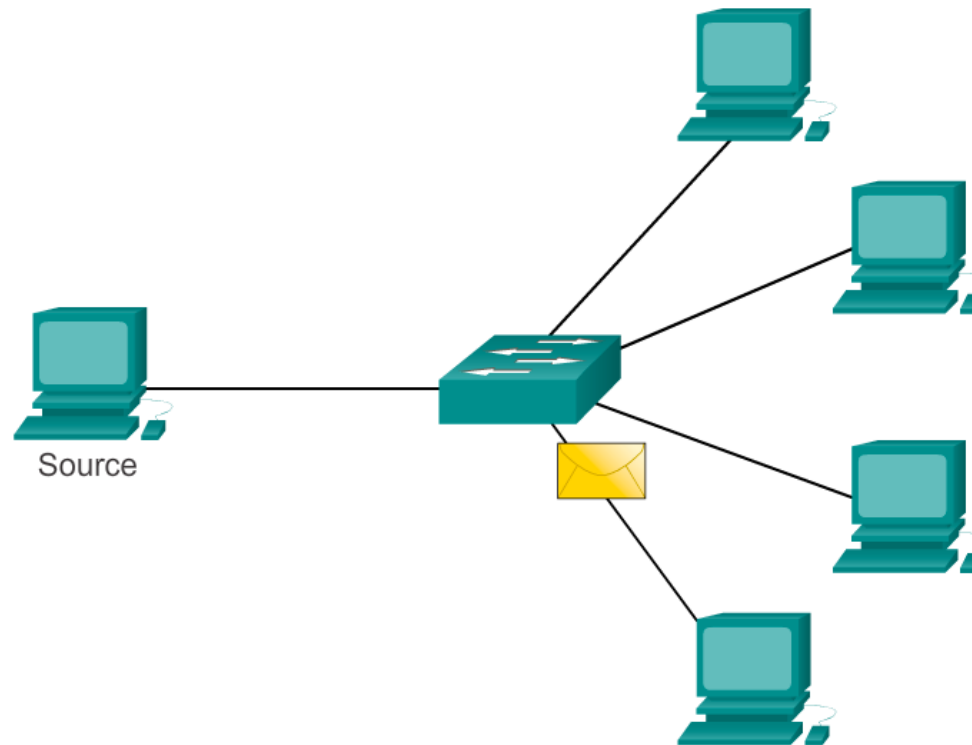
Access method determines when someone is able to send a message.

- **Response Timeout**

If a person asks a question and does not hear a response within an acceptable amount of time, the person assumes that no answer is coming and reacts accordingly. The person may repeat the question, or may go on with the conversation. Hosts on the network also have rules that specify how long to wait for responses and what action to take if a response timeout occurs.

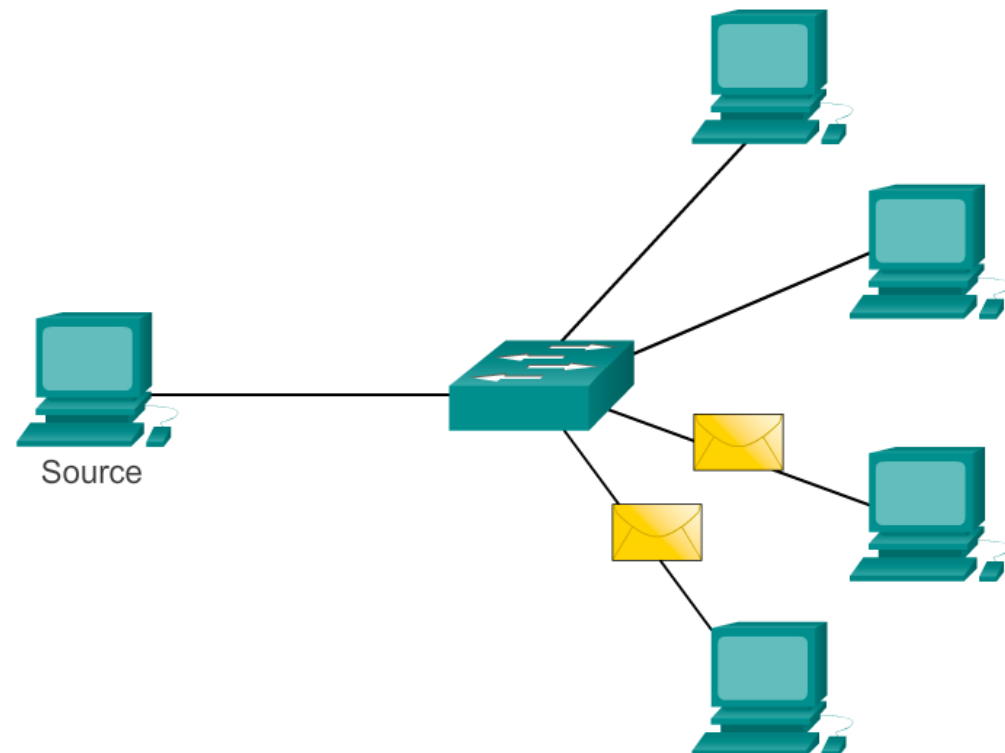
Message Delivery Option (1)

- A one-to-one delivery option is referred to as a **unicast**, meaning that there is only a single destination for the message.



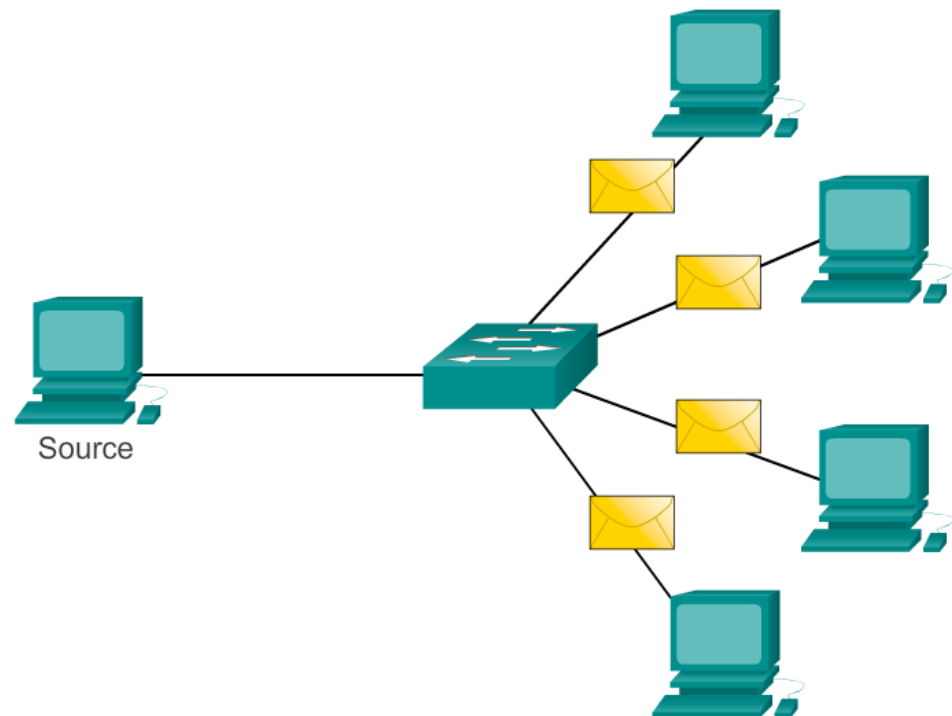
Message Delivery Option (2)

- When a host needs to send messages using a one-to-many delivery option, it is referred to as a **multicast**.
- Multicasting is the delivery of the message to multiple destinations simultaneously.



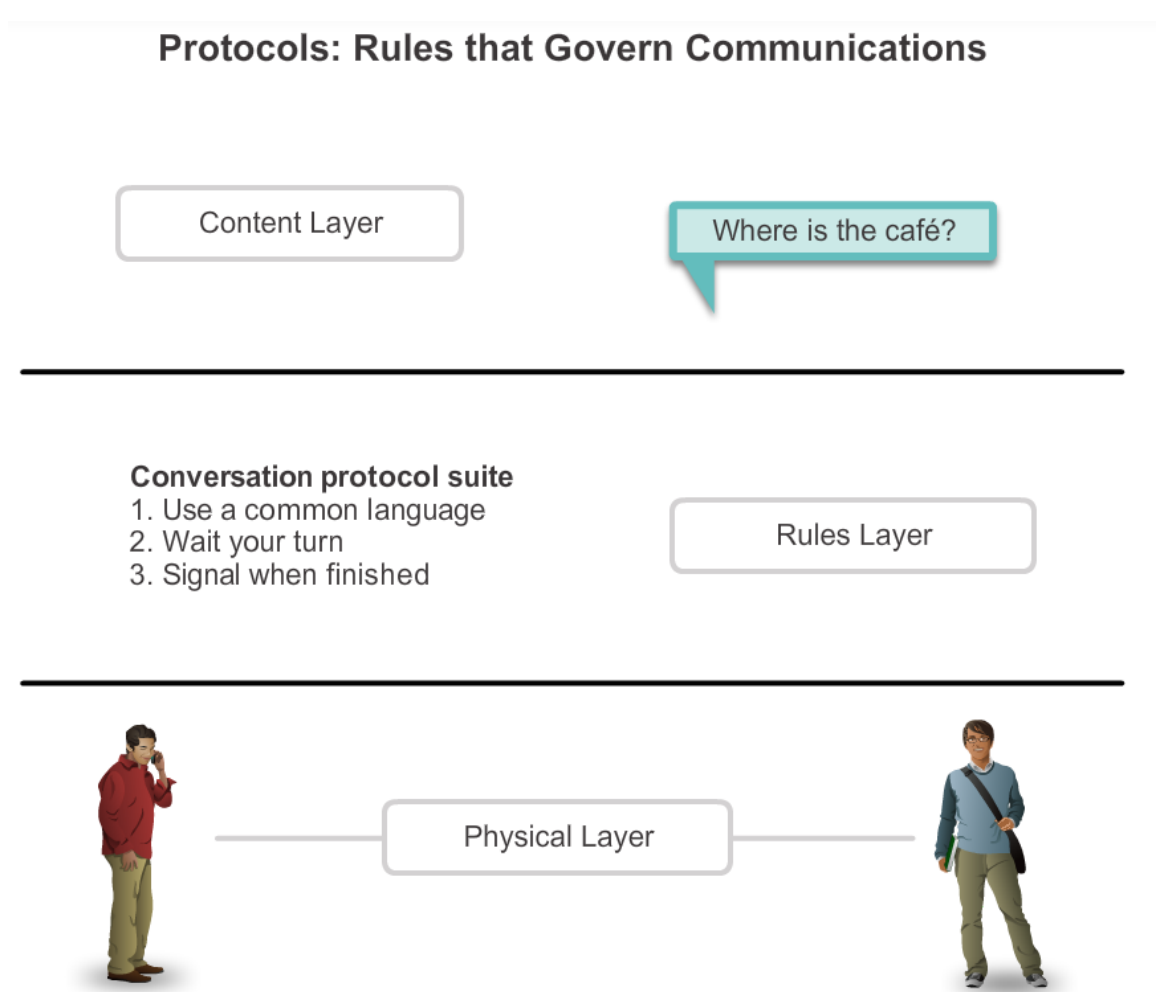
Message Delivery Option (3)

- If all hosts on the network need to receive the message at the same time, a **broadcast** is used.
- Broadcasting represents a one-to-all mes



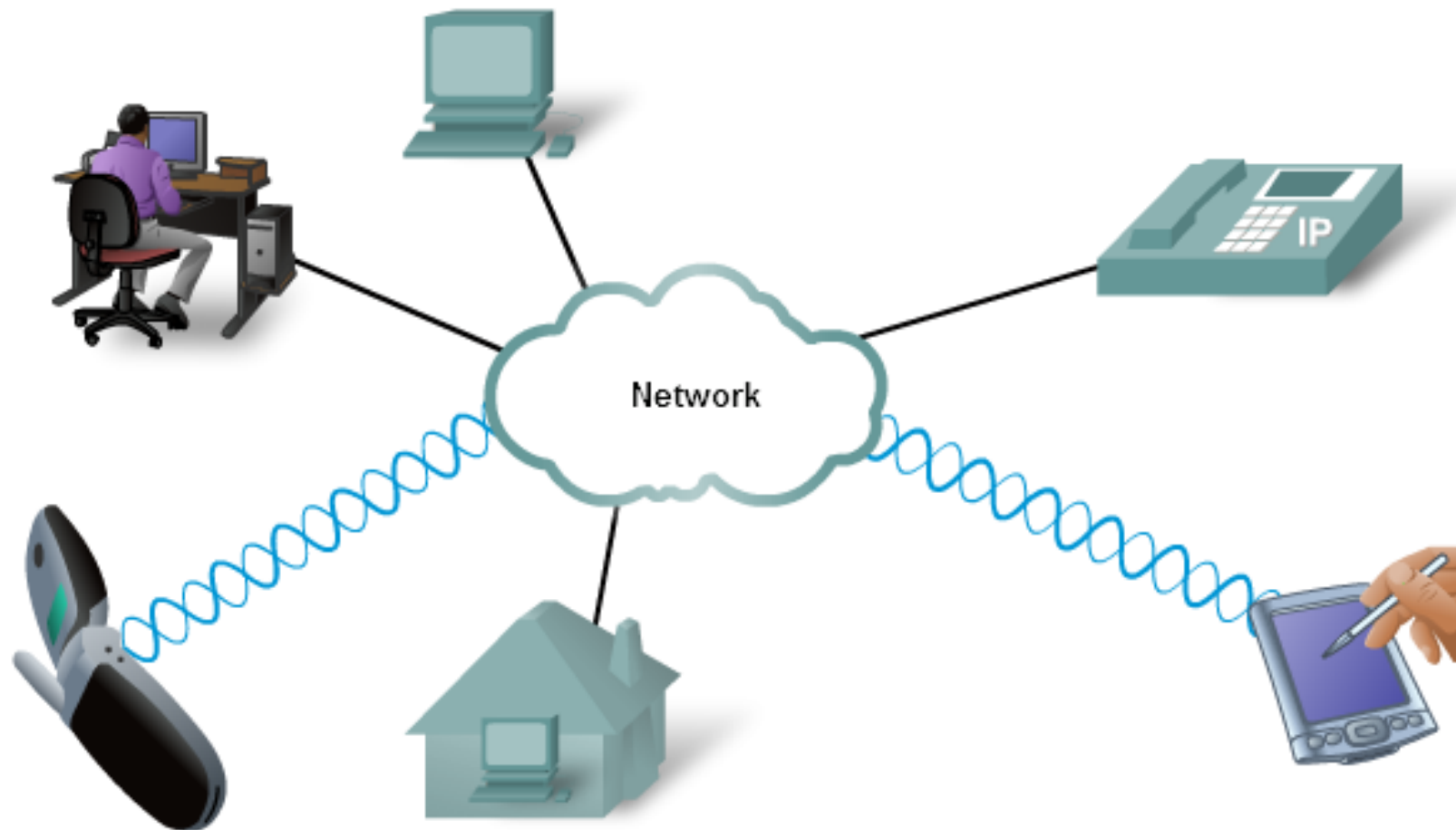
Network Protocols and Standards

- Just like in human communication, the various network and computer protocols must be able to interact and work together for network communication to be successful. A group of inter-related protocols necessary to perform a communication function is called a protocol suite.
- Protocol suites are implemented by hosts and networking devices in software, hardware or both.



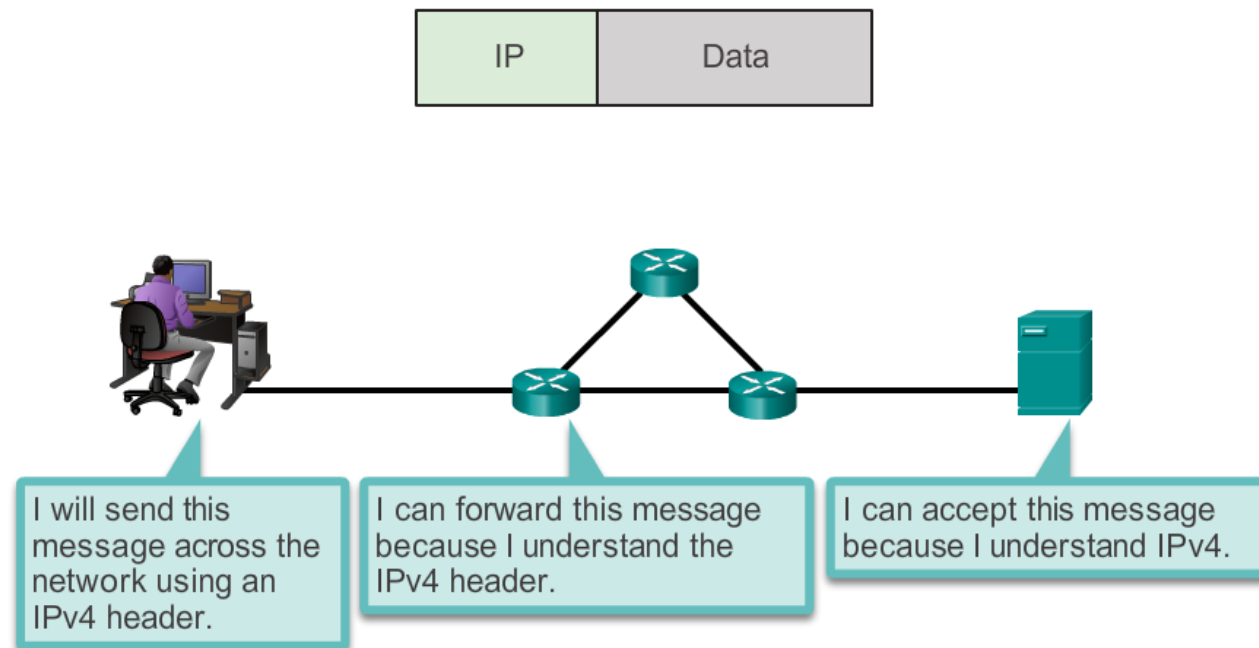
Protocol suites are sets of rules that work together to help solve a problem.

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.

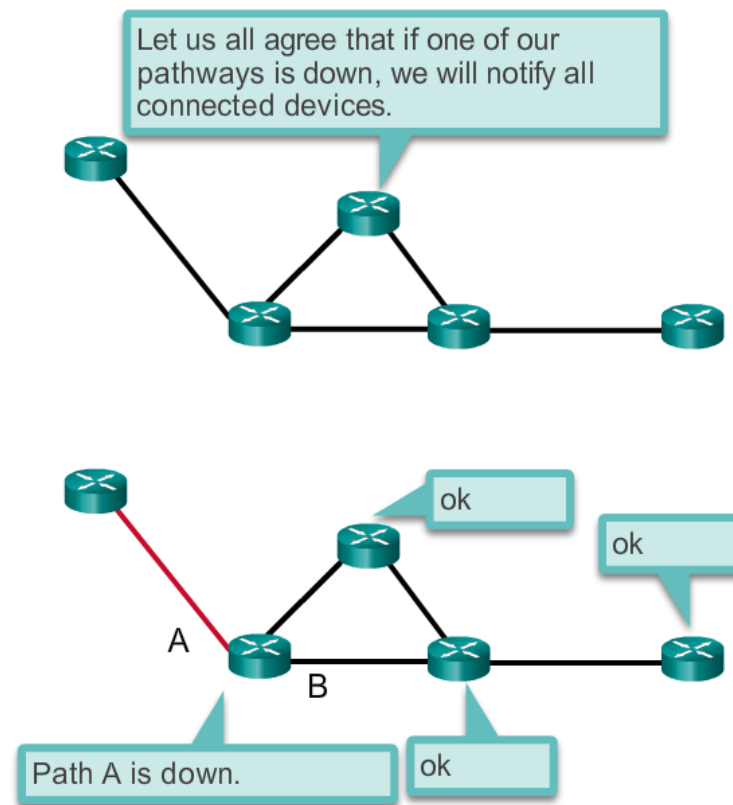


Protocols

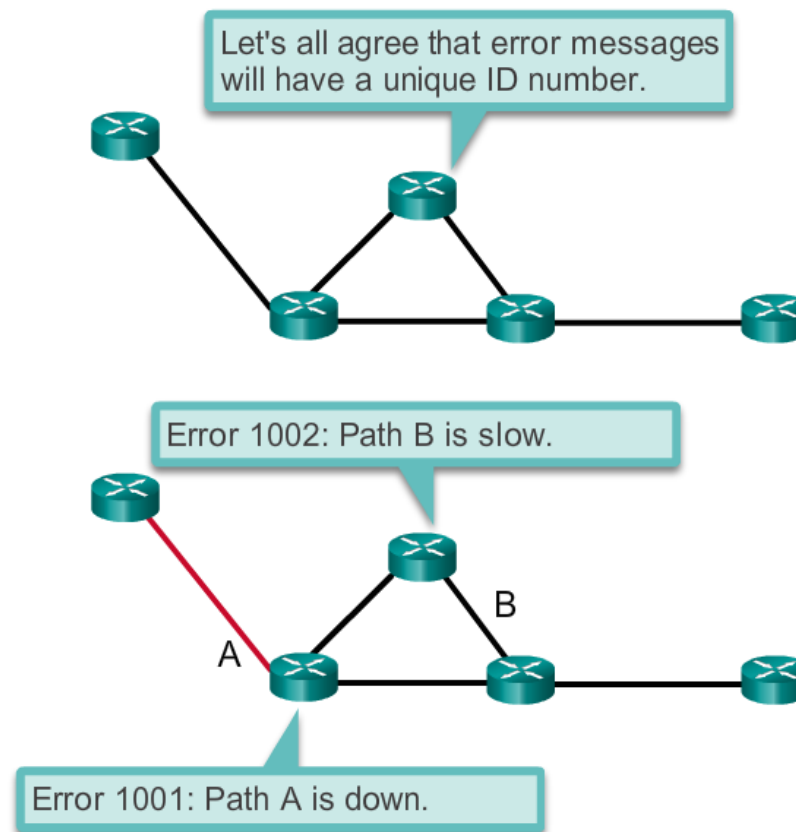
- For devices to successfully communicate, a network protocol suite must describe precise requirements and interactions. Networking protocols define a common format and set of rules for exchanging messages between devices.
- The figures illustrate networking protocols that describe the following processes:
 - How the message is formatted or structured, as shown in Figure



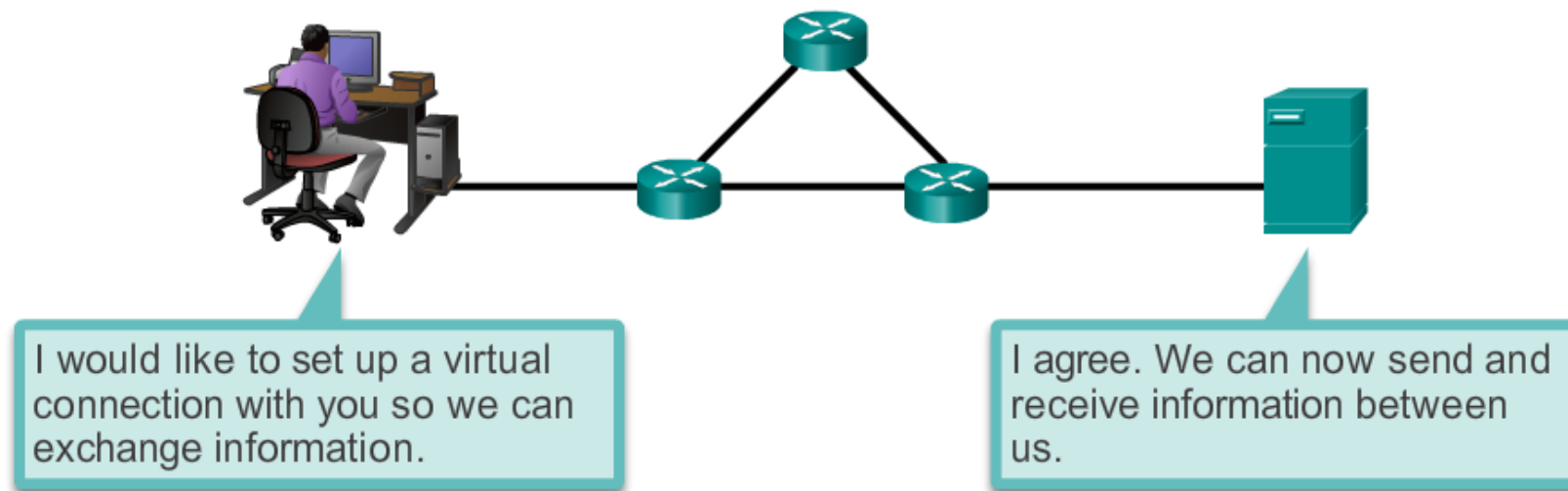
- The process by which networking devices share information about pathways with other networks



- How and when error and system messages are passed between devices



- The setup and termination of data transfer sessions



- There are two basic types of networking models:
 - Protocol models
 - Reference models.

Protocol Model

- A protocol model provides a model that closely matches the structure of a particular protocol suite.
 - The hierarchical set of related protocols in a suite typically represents all the functionality required to interface the human network with the data network.
 - The TCP/IP model is a protocol model because it describes the functions that occur at each layer of protocols within the TCP/IP suite.

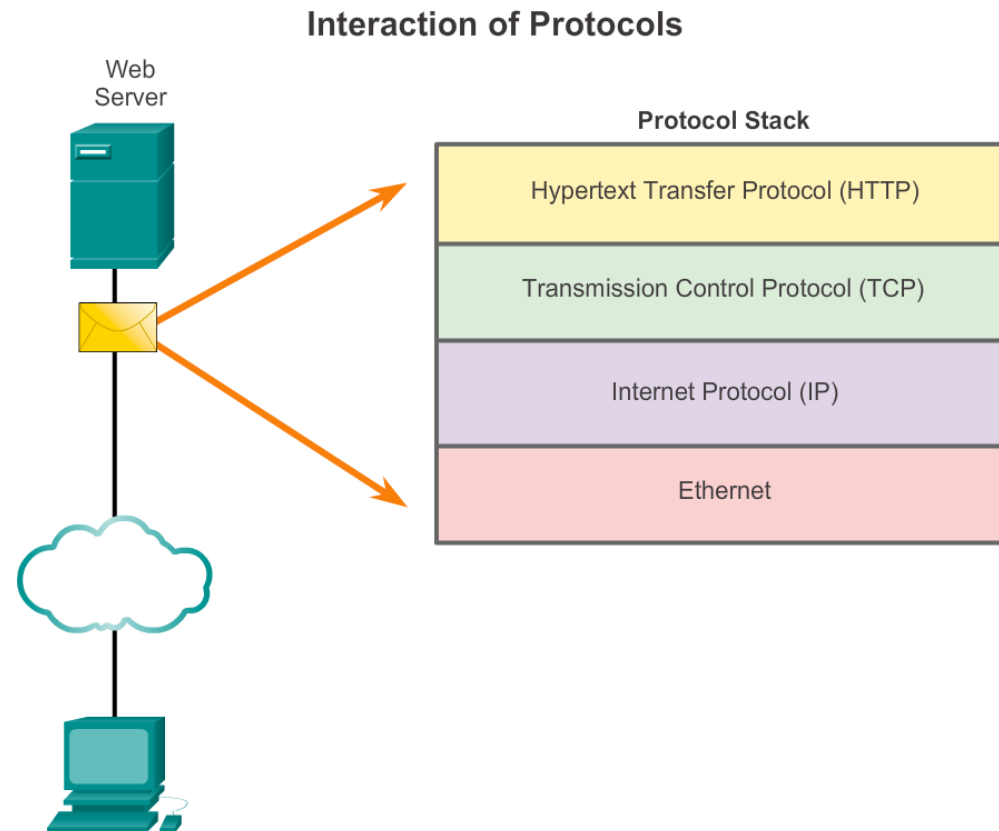
Reference Model

- A reference model provides a common reference for maintaining consistency within all types of network protocols and services.
- A reference model is not intended to be an implementation specification or to provide a sufficient level of detail to define precisely the services of the network architecture.
- The primary purpose of a reference model is to aid in clearer understanding of the functions and process involved.
- The Open Systems Interconnection (OSI) model is the most widely known internetwork reference model. It is used for data network design, operation specifications, and troubleshooting.

- TCP/IP and OSI models are the primary models used when discussing network functionality, designers of network protocols, services, or devices can create their own models to represent their products.
- Ultimately, designers are required to communicate to the industry by relating their product or service to either the OSI model or the TCP/IP model, or to both.

Interaction of Protocols

- An example of using the protocol suite in network communications is the interaction between a web server and a web client. This interaction uses a number of protocols and standards in the process of exchanging information between them. The different protocols work together to ensure that the messages are received and understood by both parties.



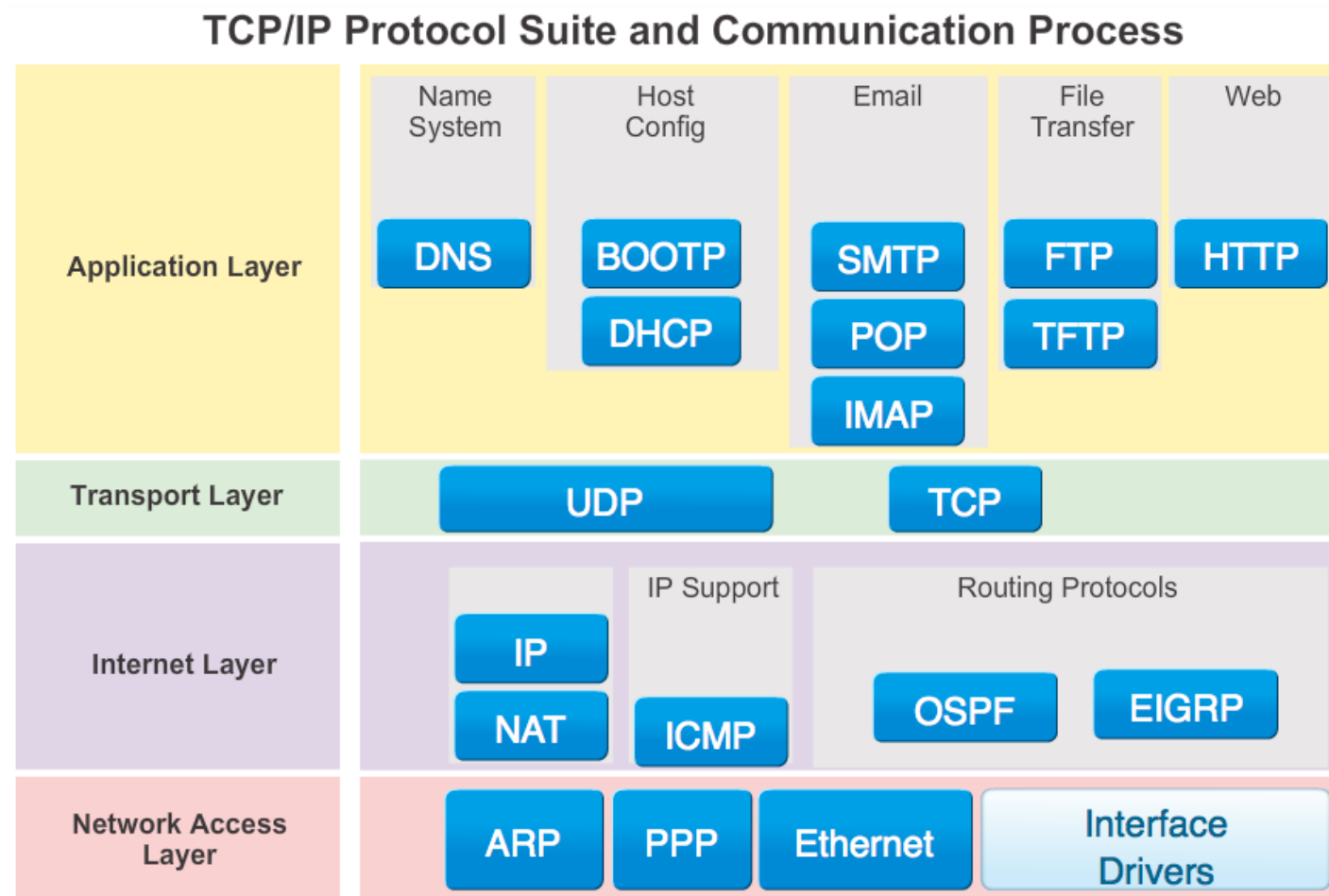
Protocol Suites

- A protocol suite is a set of protocols that work together to provide comprehensive network communication services. A protocol suite may be specified by a standards organization or developed by a vendor.
- The protocols IP, HTTP, and DHCP are all part of the Internet protocol suite known as Transmission Control Protocol/IP (TCP/IP). The TCP/IP protocol suite is an open standard, meaning these protocols are freely available to the public, and any vendor is able to implement these protocols on their hardware or in their software.

Protocol Suites and Industry Standards

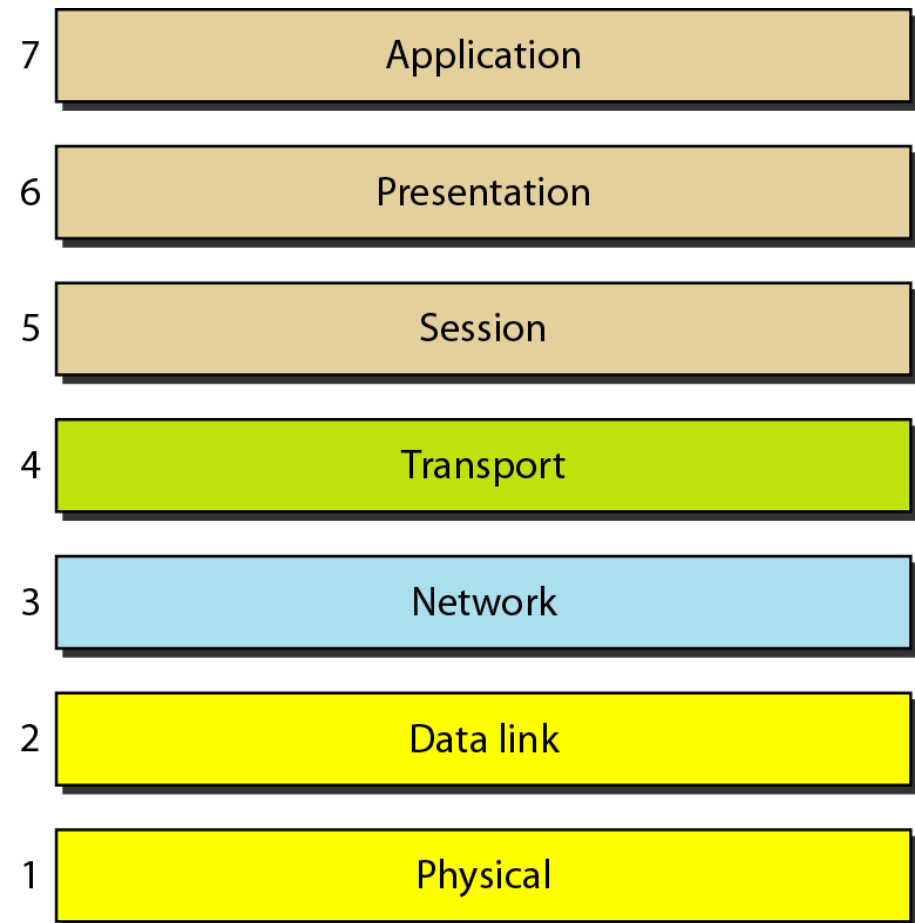
TCP/IP	ISO	AppleTalk	Novell Netware
HTTP DNS DHCP FTP	ACSE ROSE TRSE SESE	AFP	NDS
TCP UDP	TP0 TP1 TP2 TP3 TP4	ATP AEP NBP RTMP	SPX
IPv4 IPv6 ICMPv4 ICMPv6	CONP/CMNS CLNP/CLNS	AARP	IPX
Ethernet PPP Frame Relay ATM WLAN			

TCP/IP Protocol Suite and Communication Process

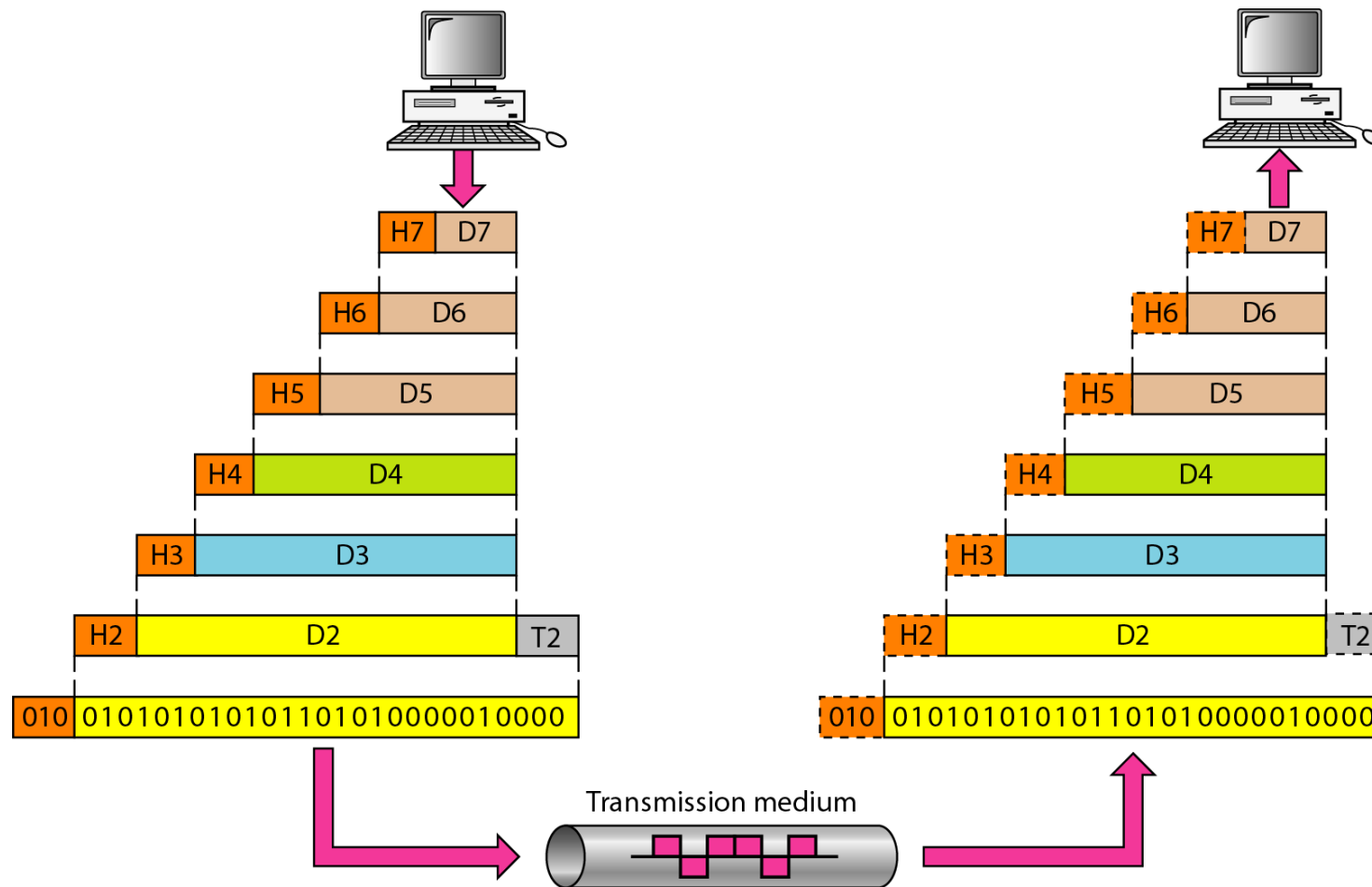


Reference Models

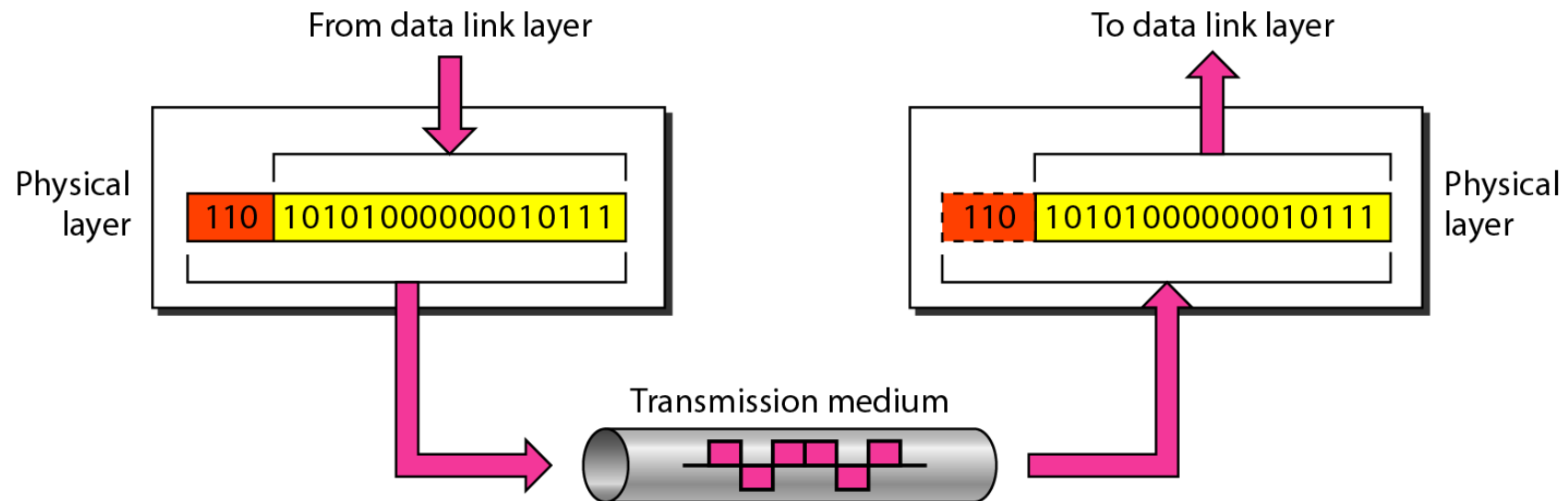
- The OSI model is the most widely known internetwork reference model.
- It is used for data network design, operation specifications, and troubleshooting.



Exchanging the OSI Model

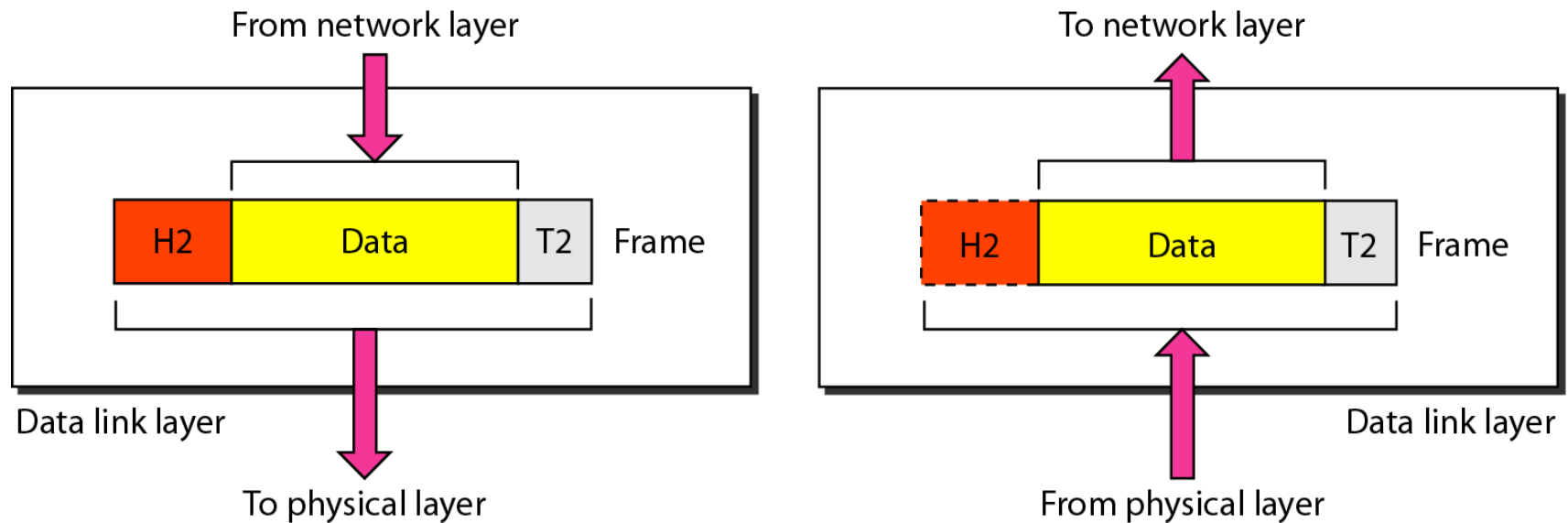


Physical Layer

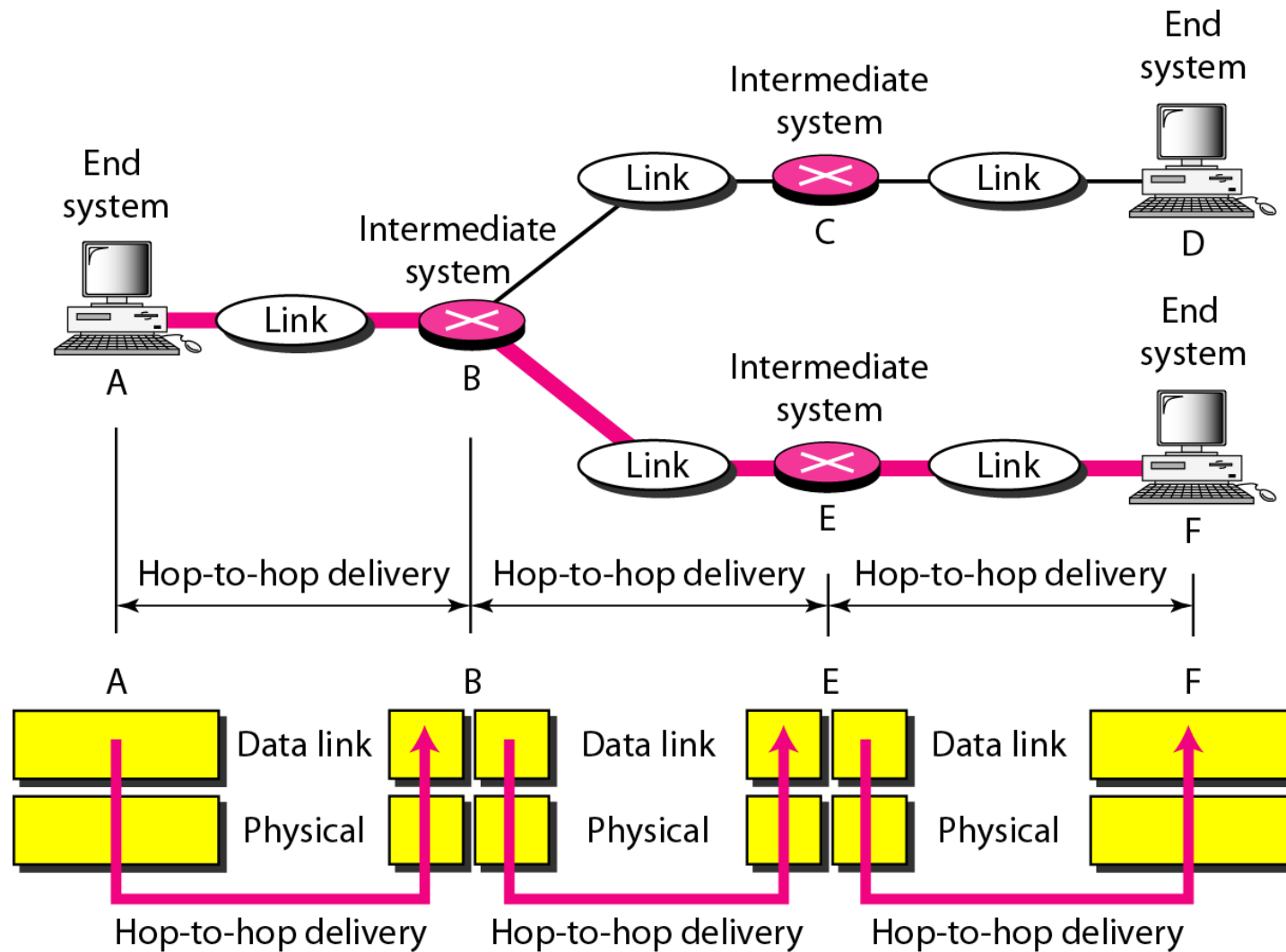


The physical layer is responsible for movements of individual bits from one hop (node) to the next.

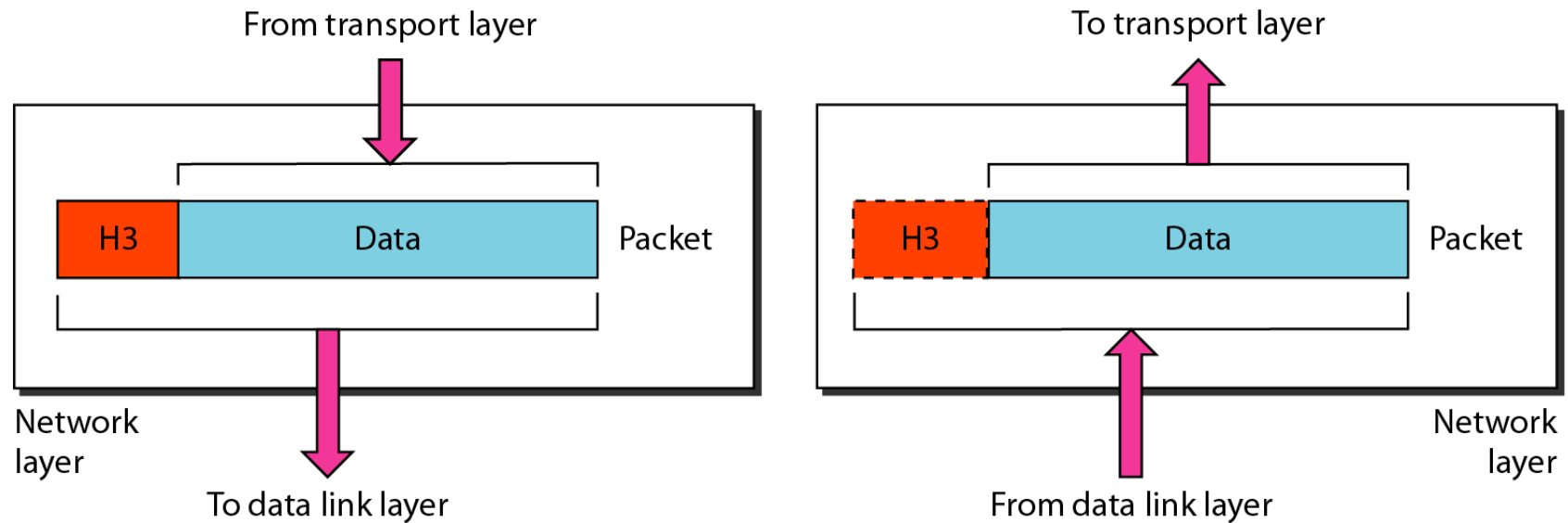
Data Link Layer



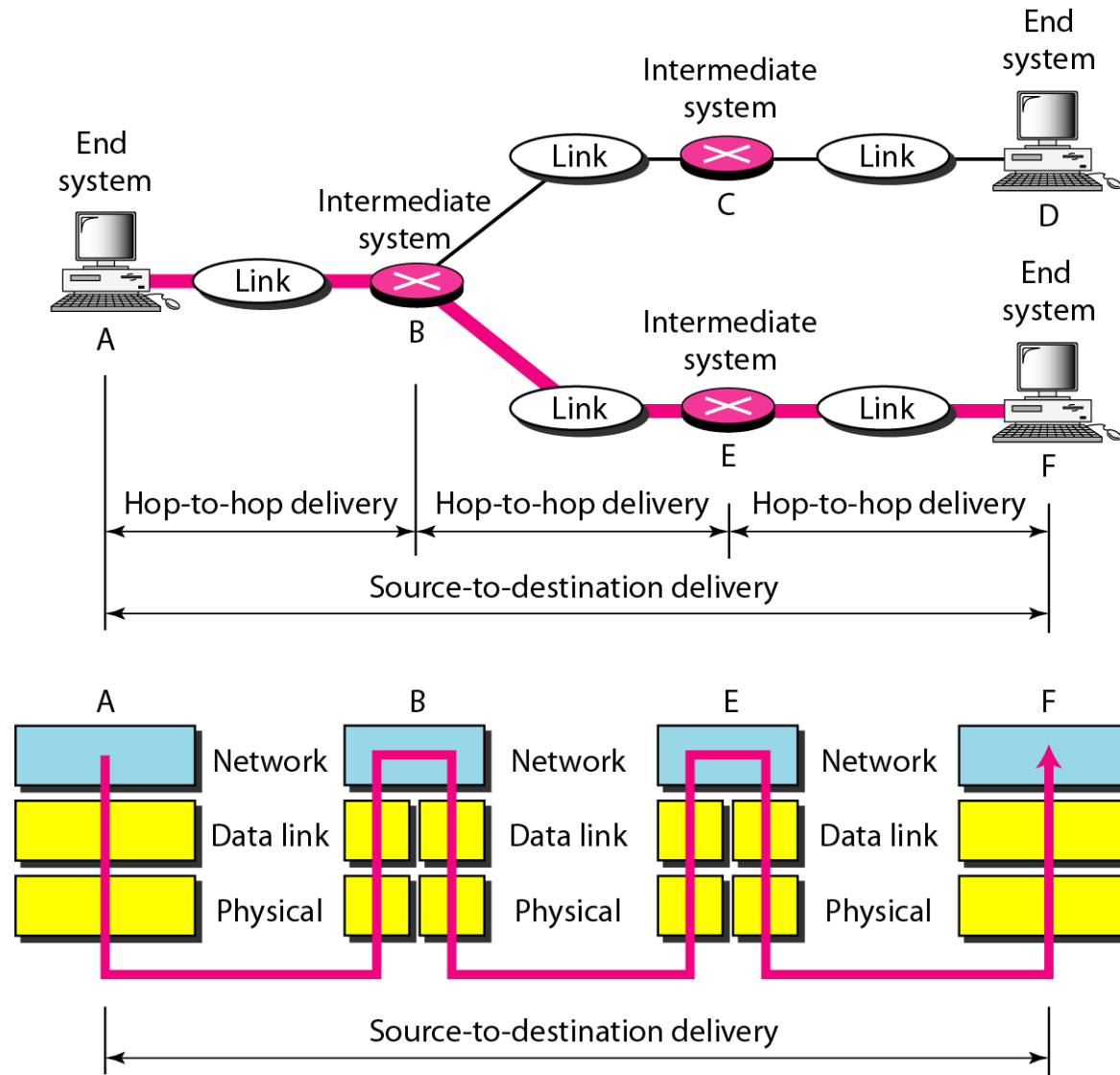
The data link layer is responsible for moving frames from one hop (node) to the next.



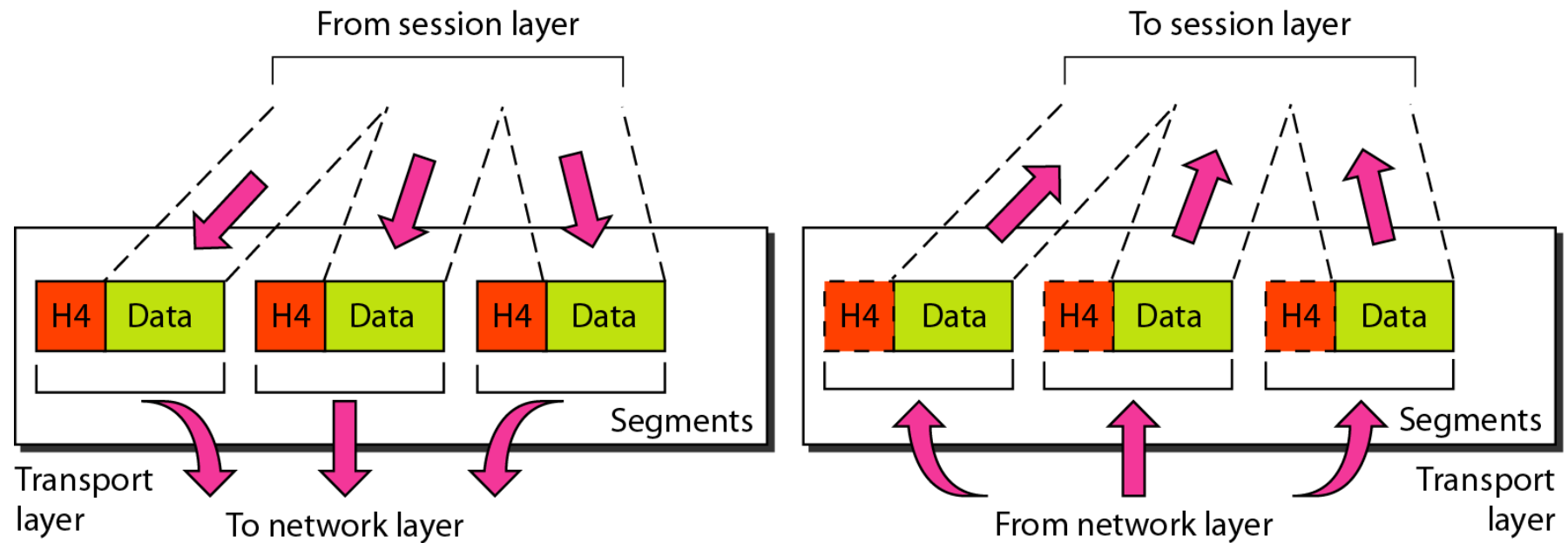
Network Layer



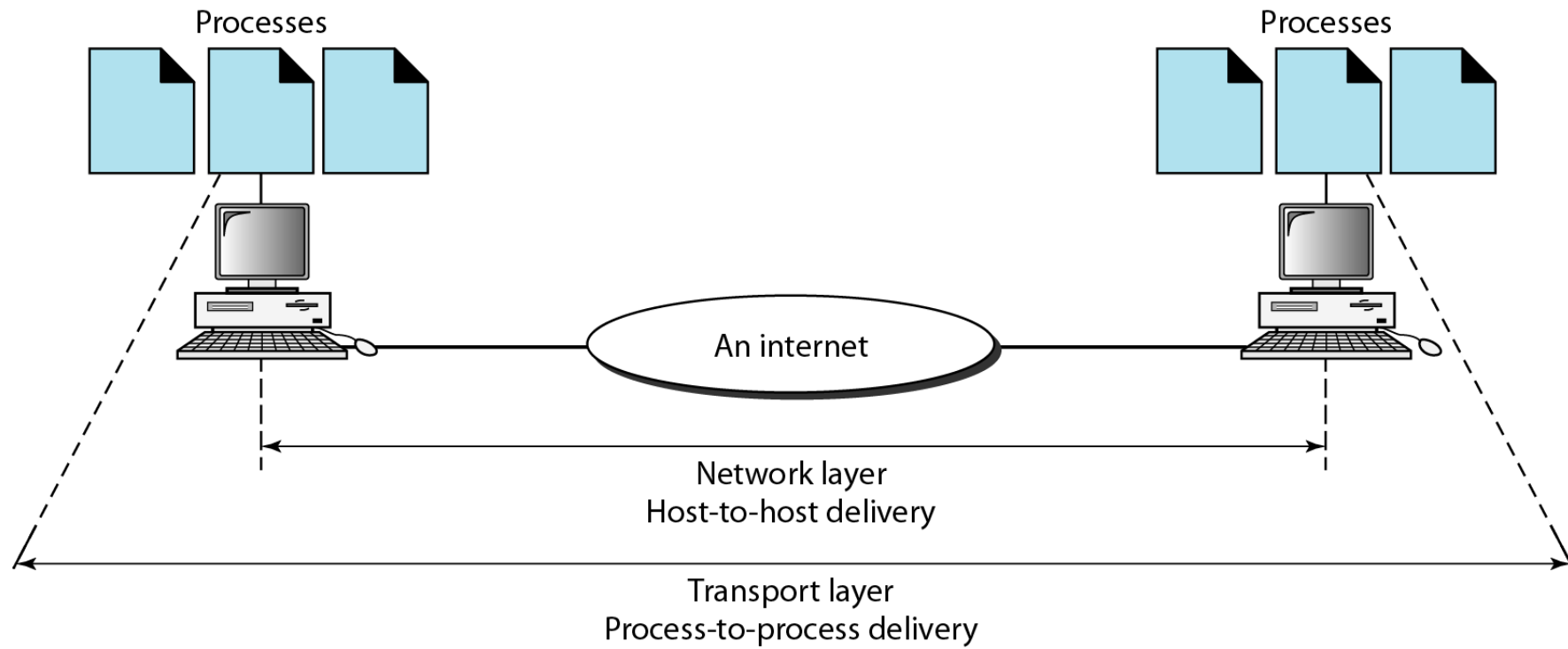
The network layer is responsible for the delivery of individual packets from the source host to the destination host.



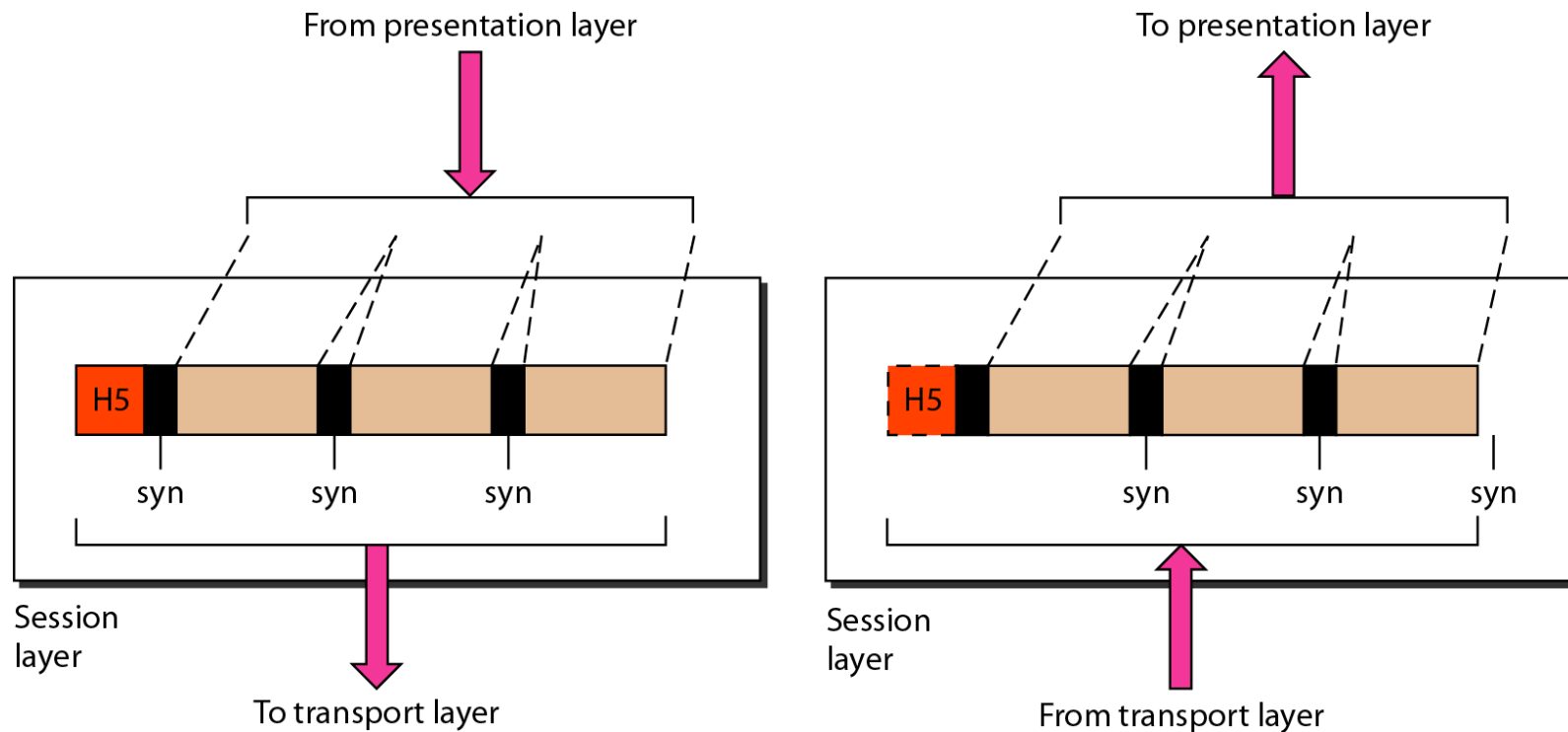
Transport Layer



The transport layer is responsible for the delivery of a message from one process to another.

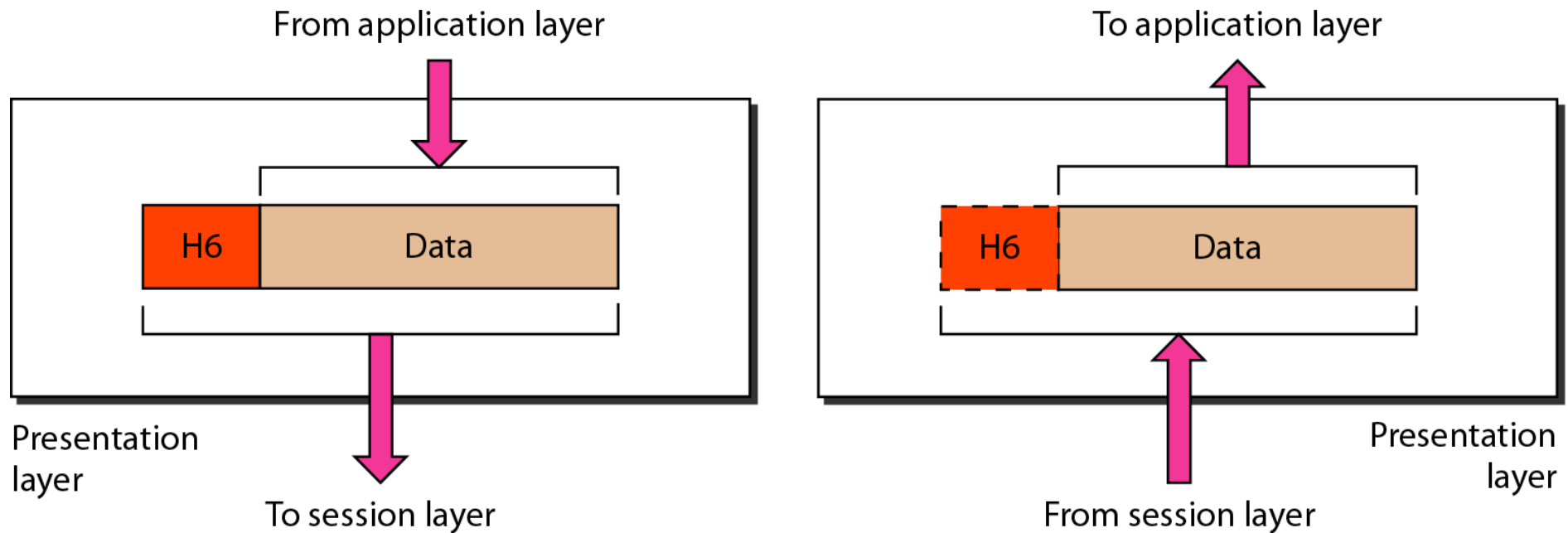


Session Layer



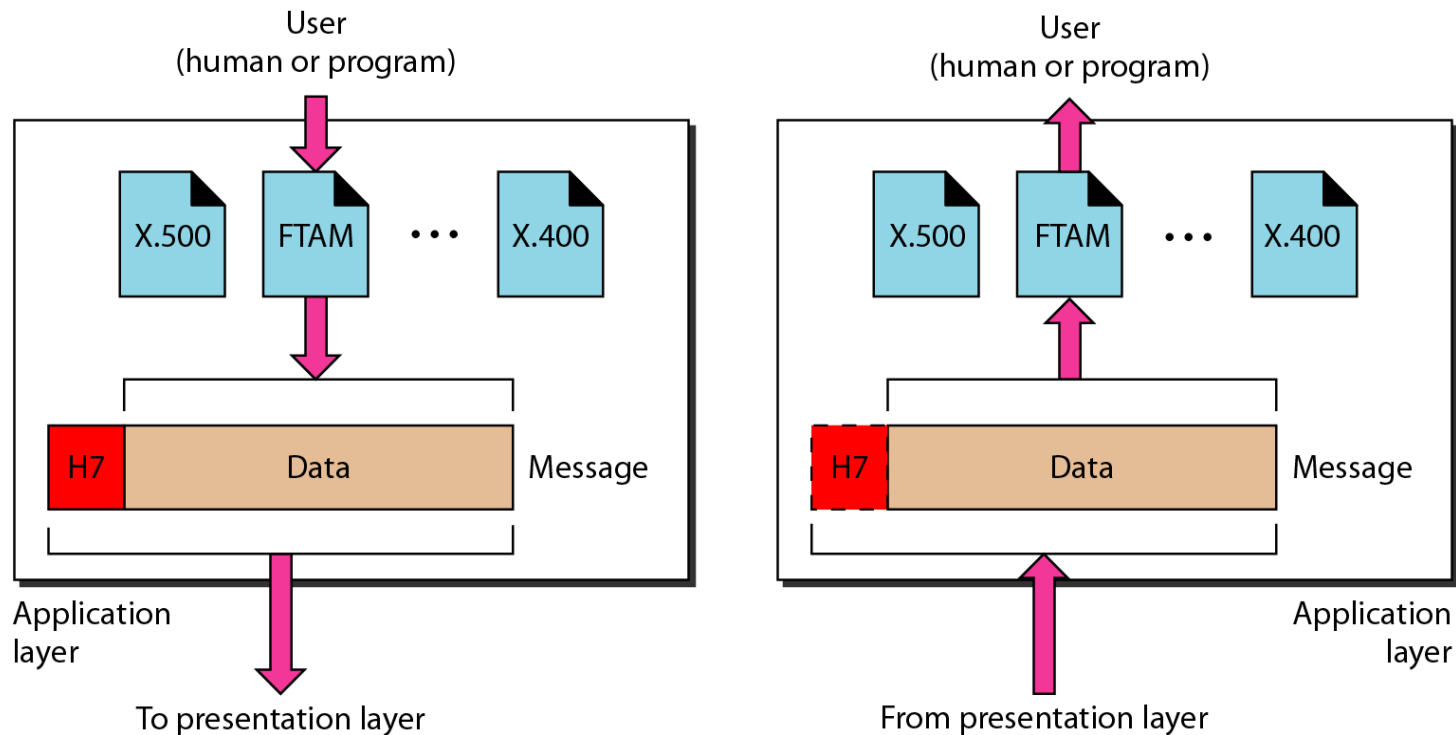
The session layer is responsible for dialog control and synchronization.

Presentation Layer



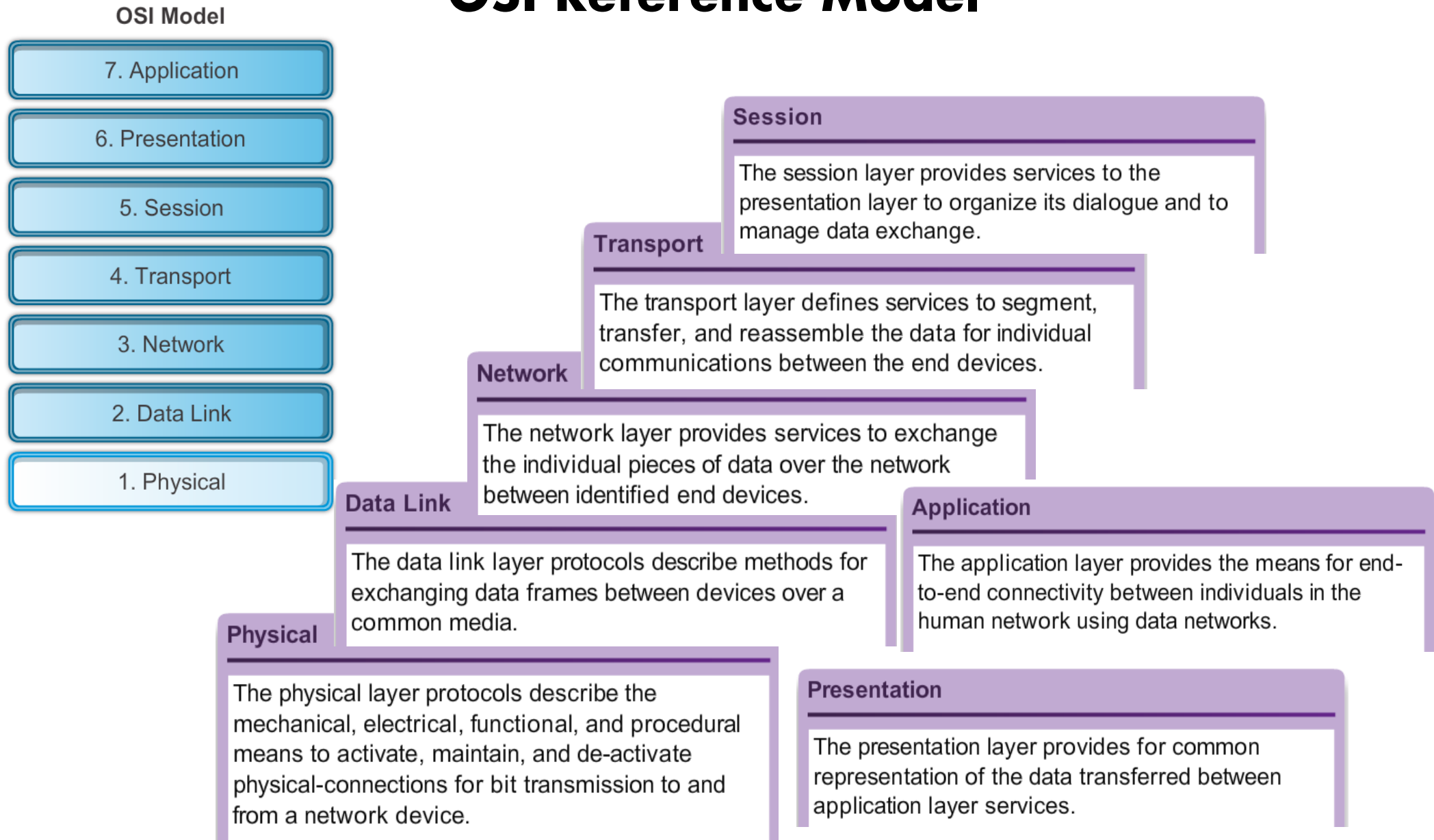
The presentation layer is responsible for translation, compression, and encryption.

Application Layer

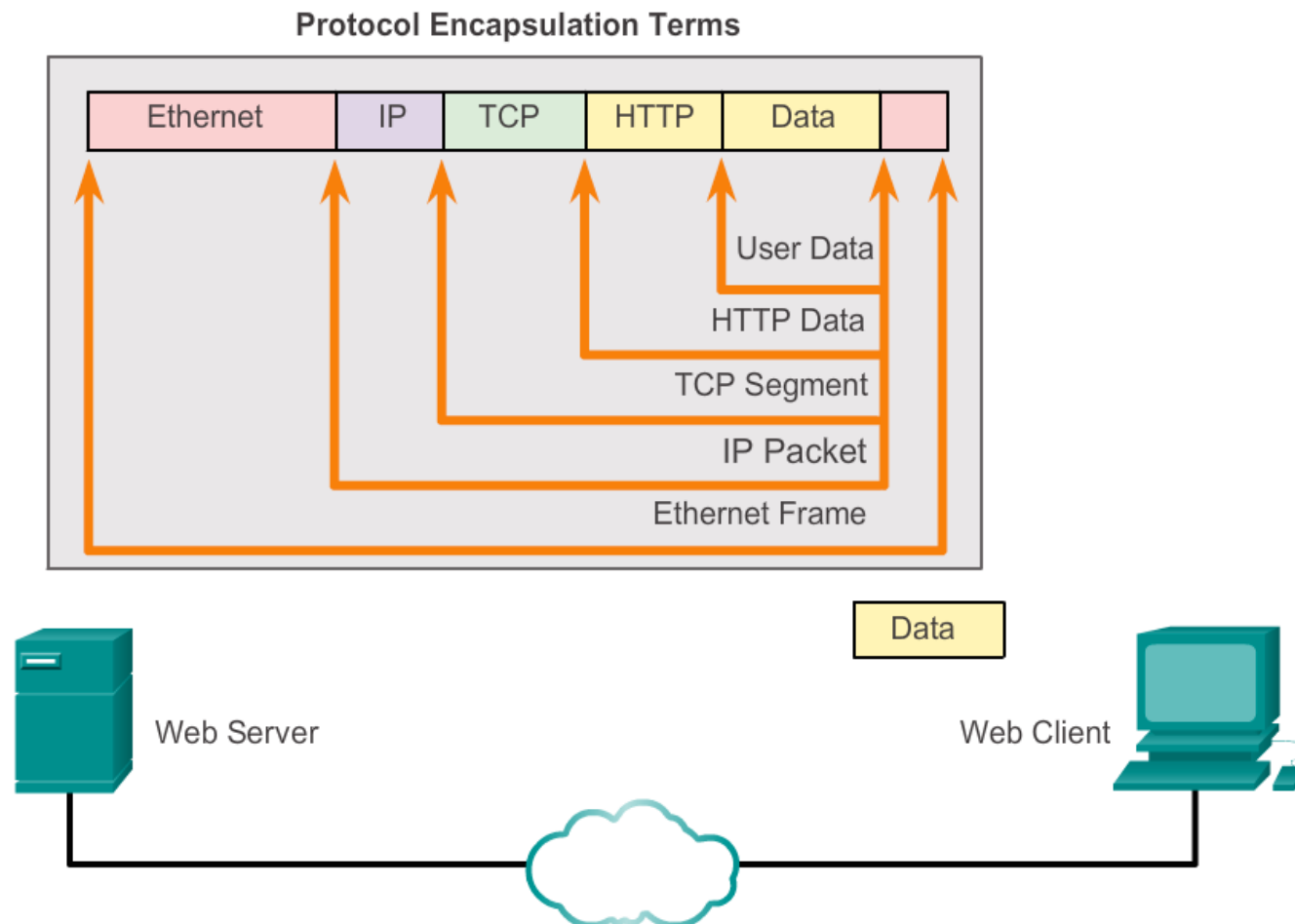


The application layer is responsible for providing services to the user.

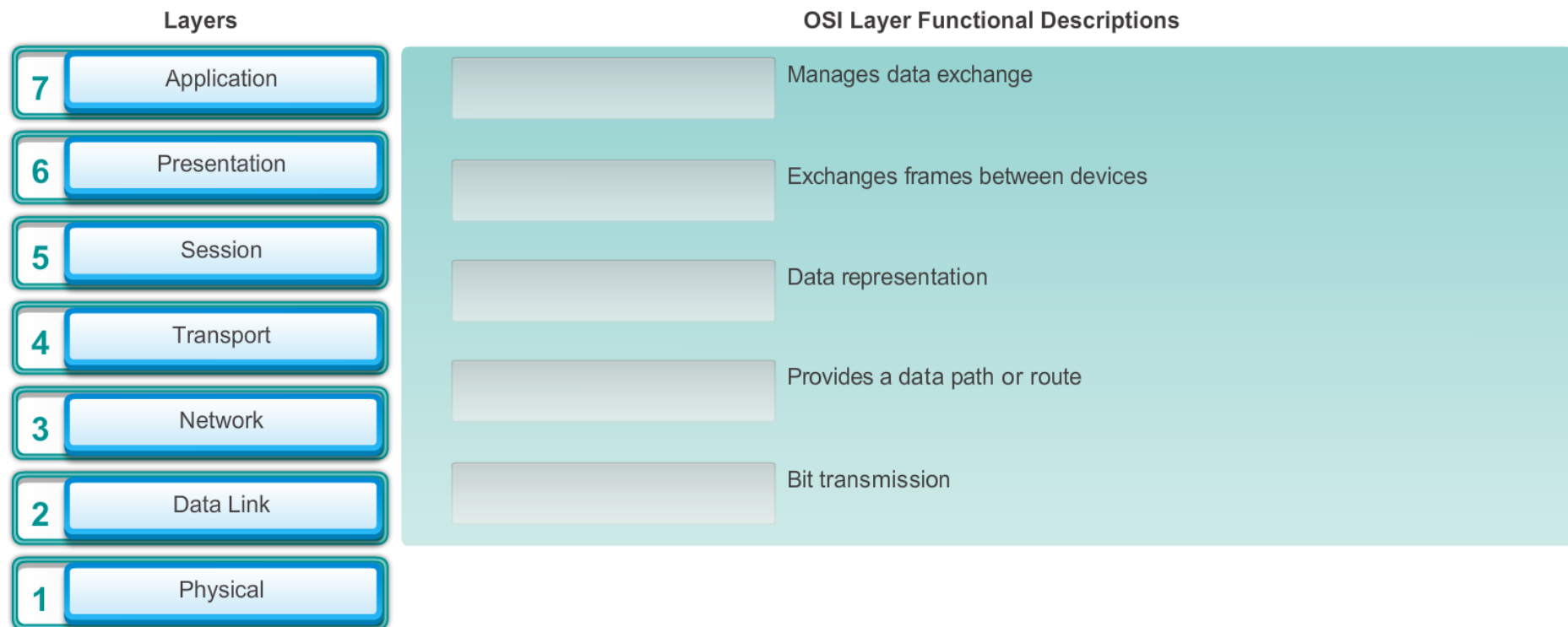
OSI Reference Model



Protocol Operation of Sending and Receiving a Message



Activity - Identify Layers and Function

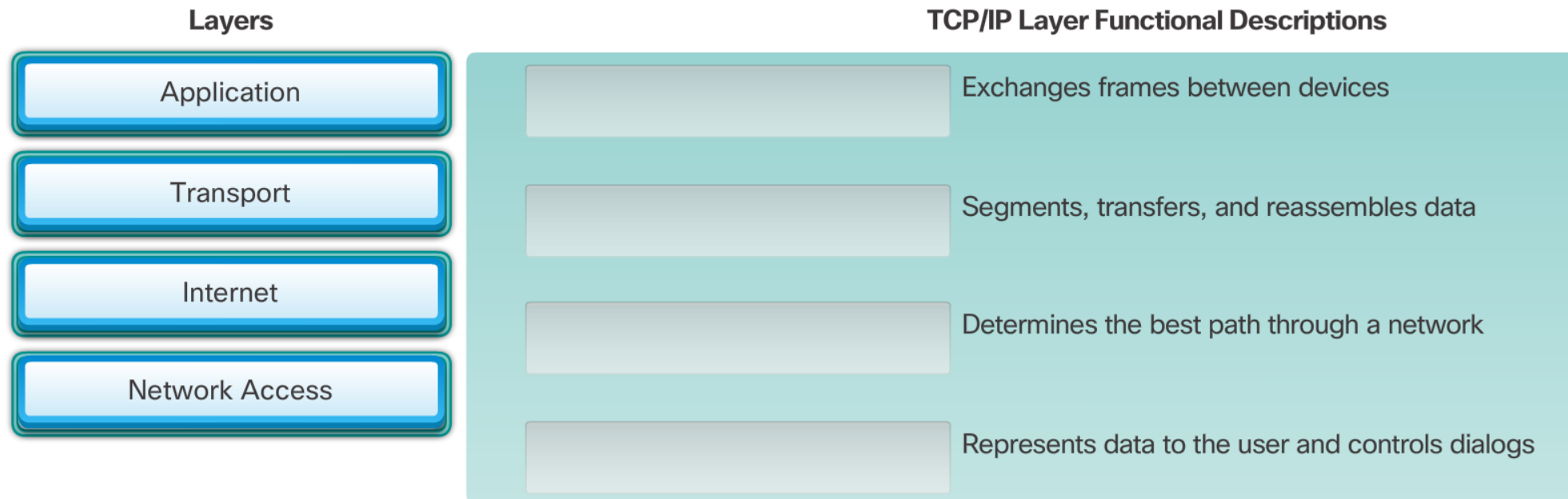


Summary

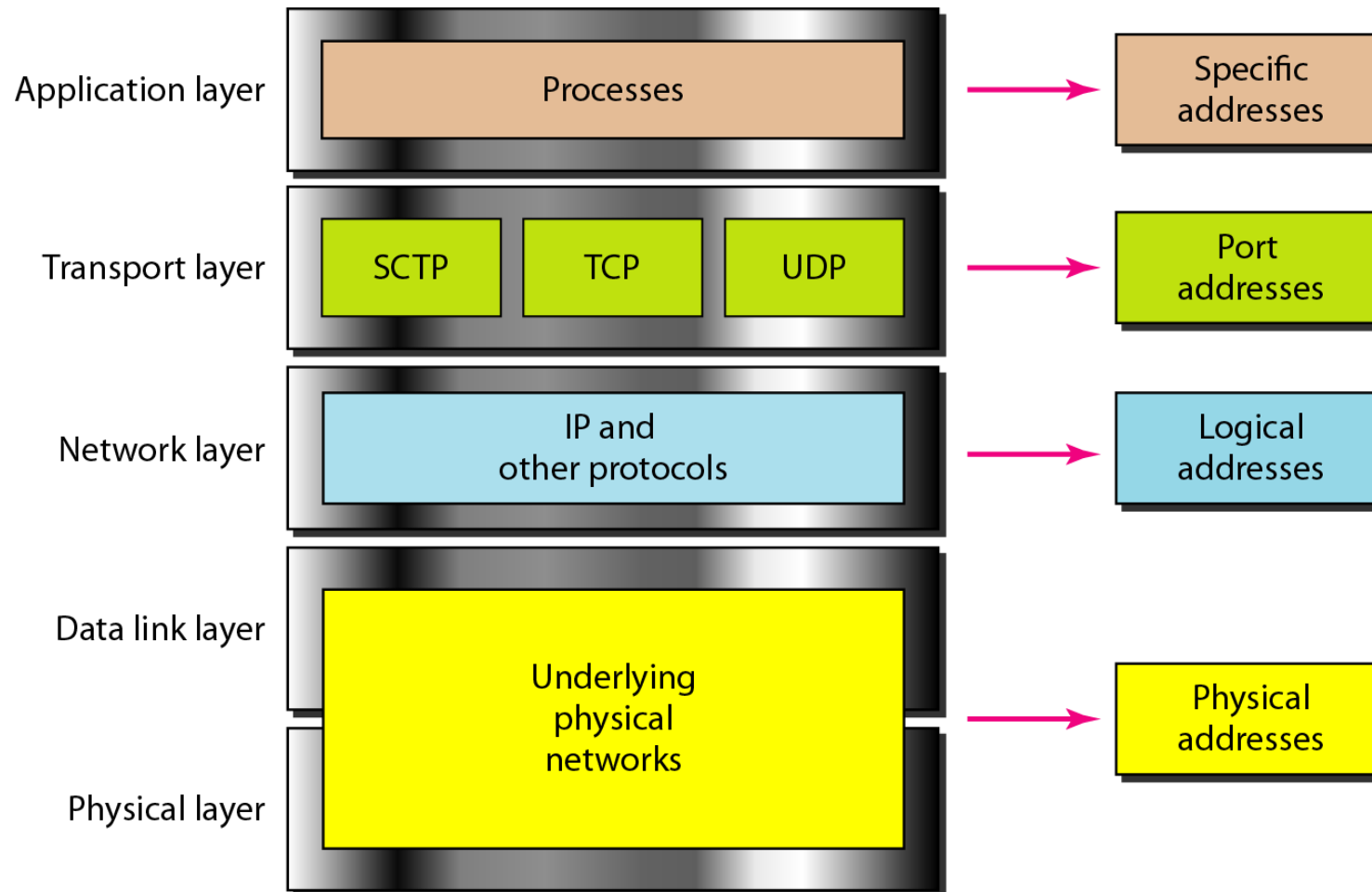
L7	User applications		Network management applications		
L6	Encryption/ decryption		Compression/ expansion		Choice of Syntax
L5	Session control	Session synch.	Session to transport mapping		Session management
L4	Flow control		Error recovery		Multiplexing
L3	Connection control		Routing		Addressing
L2	Data link establishment		Error control	Flow control	Synch. Framing
L1	Access to transmission media		Physical and electrical interface		Activation/deactivation of connections

Base on Understanding Telecommunications, Ericsson & Telia, Student Litterature, 1998

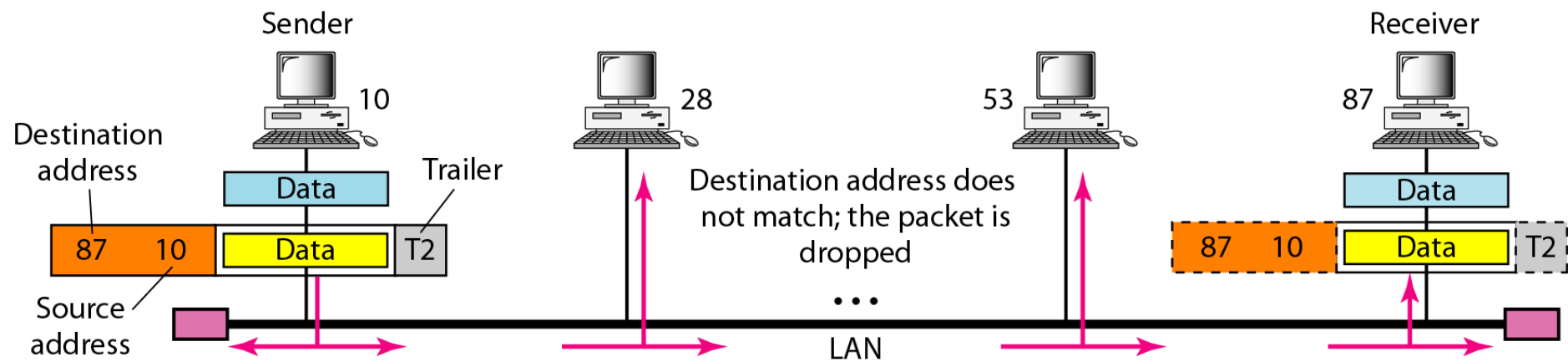
Activity - Identify Layers and Function



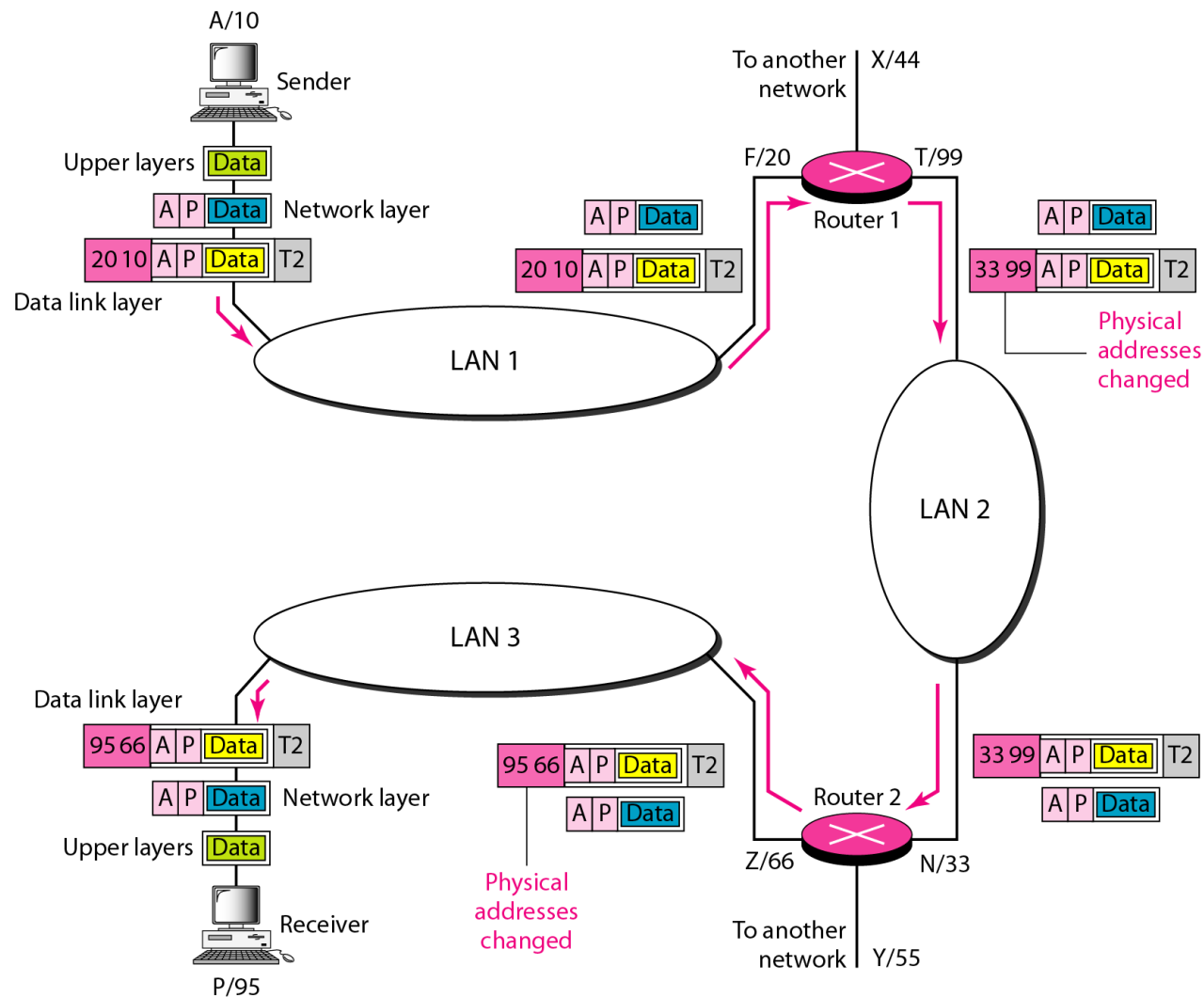
Relationship of layers and addresses in TCP/IP



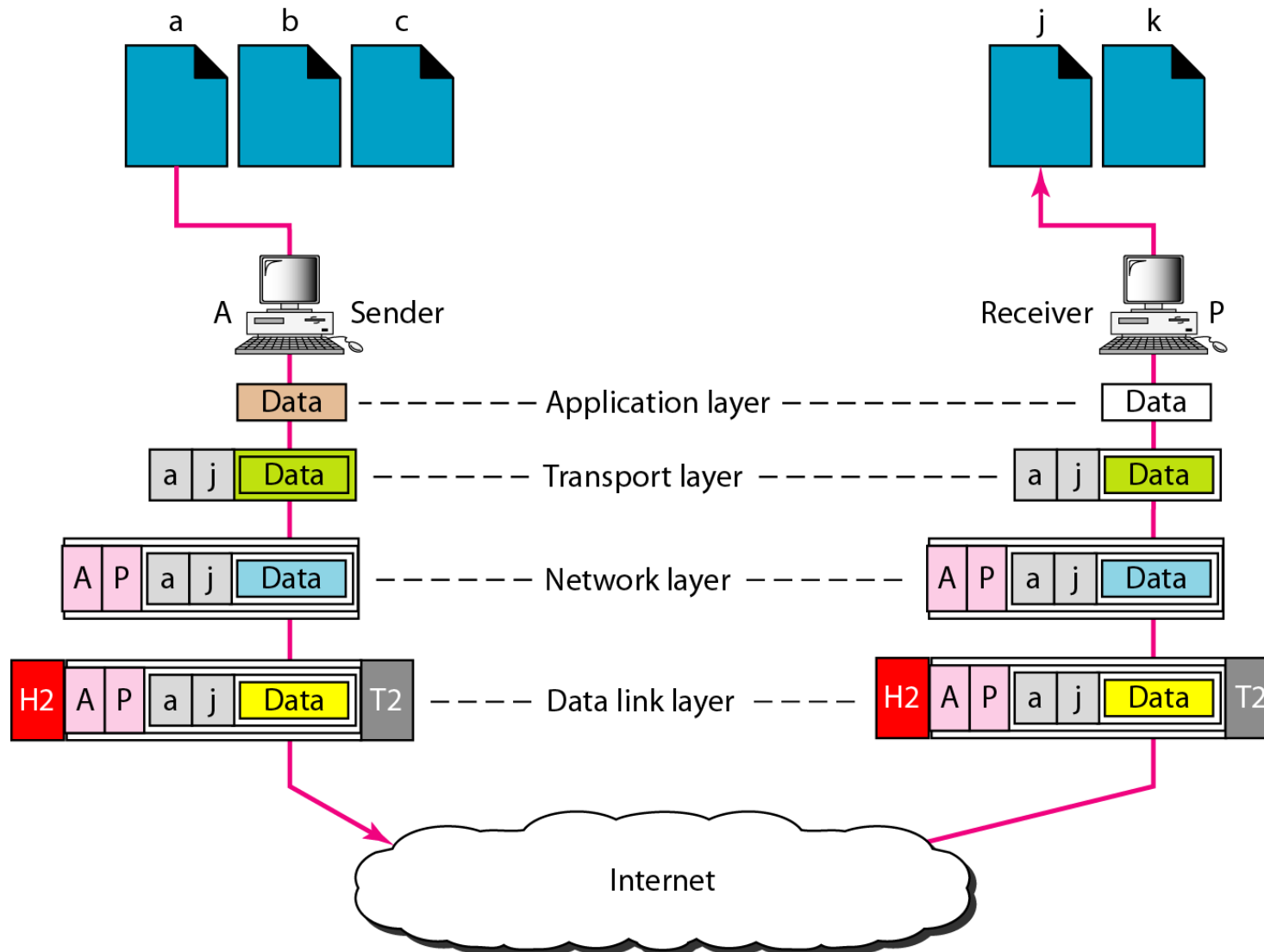
Physical Addresses



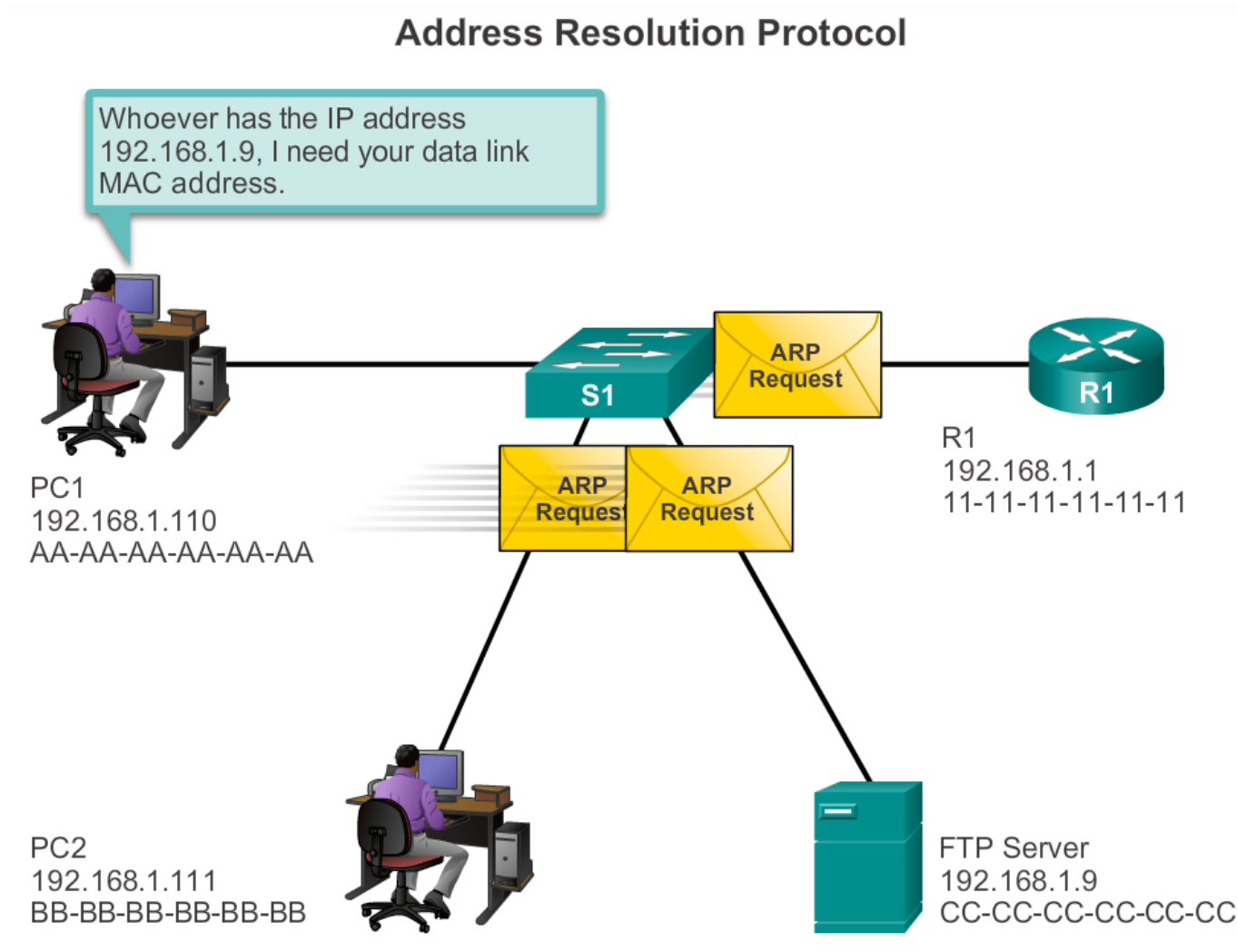
Logical Addresses



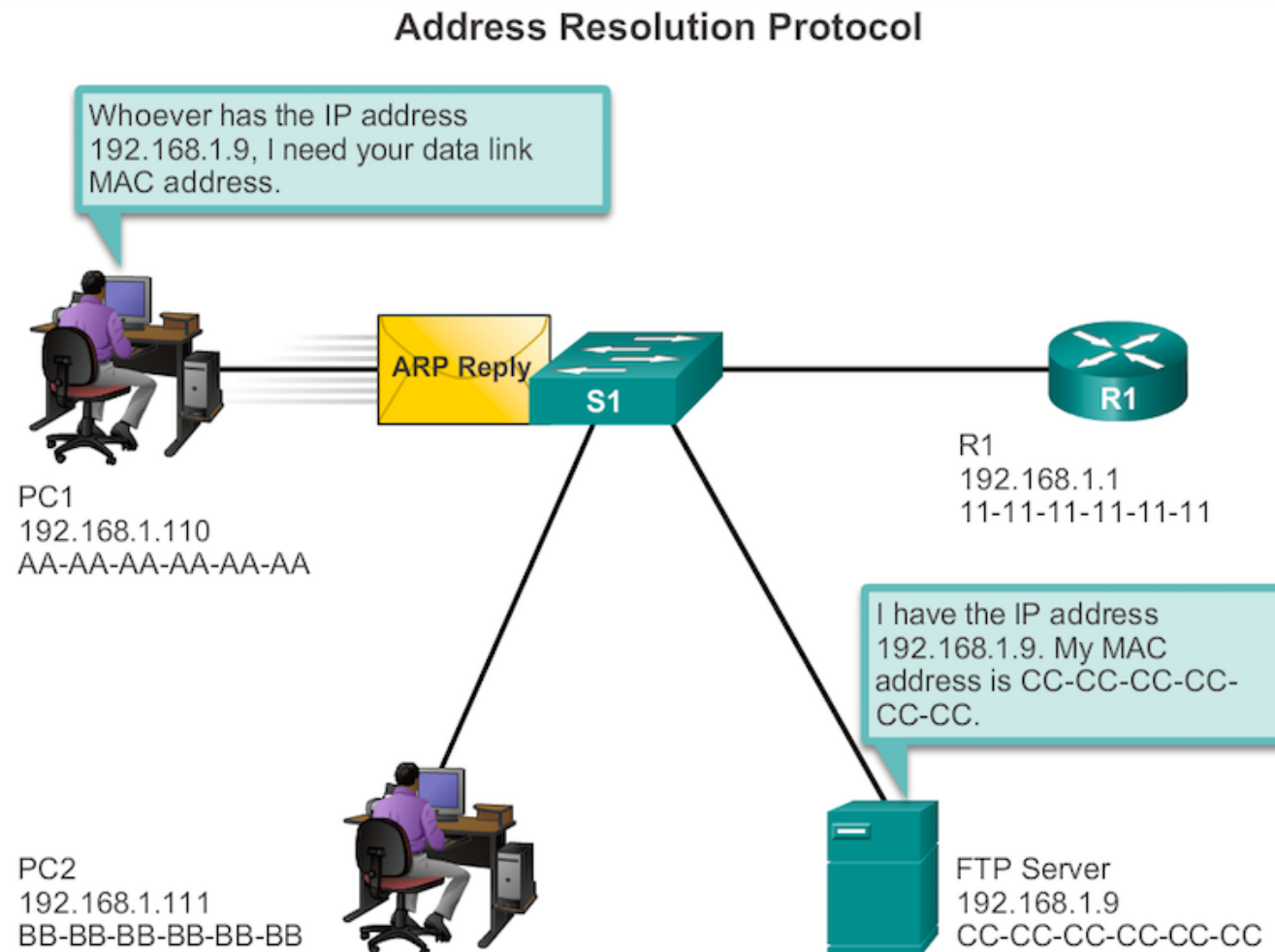
Port Addresses



MAC and IP Address (1)



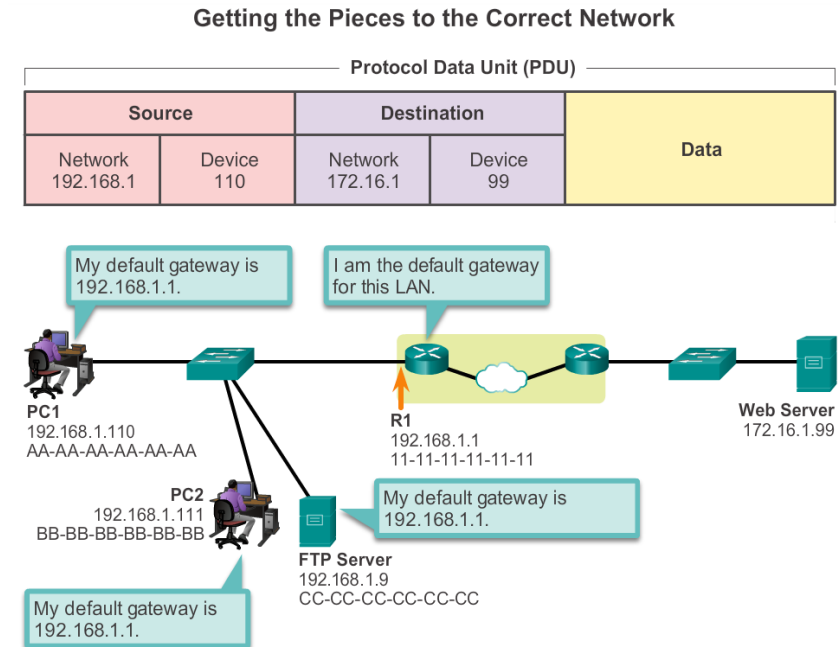
MAC and IP Address (2)



Accessing Remote Resources

Default Gateway

- When a host needs to send a message to a remote network, it must use the router, also known as the default gateway. The default gateway is the IP address of an interface on a router on the same network as the sending host.
- It is important that the address of the default gateway be configured on each host on the local network. If no default gateway address is configured in the host TCP/IP settings, or if the wrong default gateway is specified, messages addressed to hosts on remote networks cannot be delivered.



Network Addresses

- IP addresses indicate the network and device addresses of the source and destination. When the sender of the packet is on a different network from the receiver, the source and destination IP addresses will represent hosts on different networks. This will be indicated by the network portion of the IP address of the destination host.
- Source IP address - The IP address of the sending device, the client computer PC1: 192.168.1.110.
- Destination IP address - The IP address of the receiving device, the server, Web Server: 172.16.1.99.

