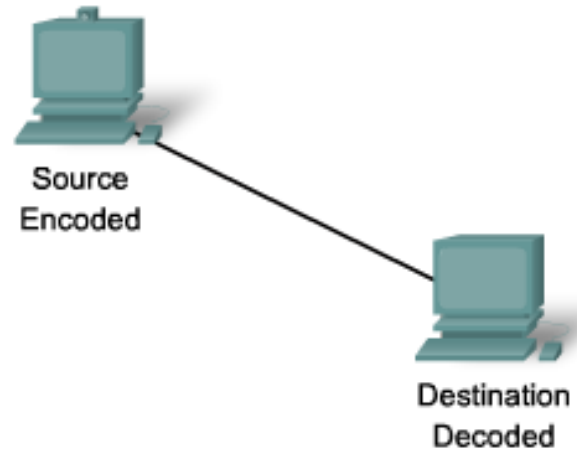
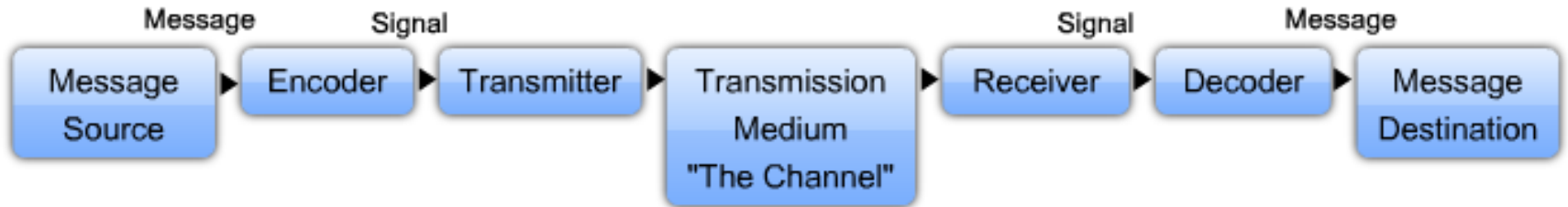


Introduction

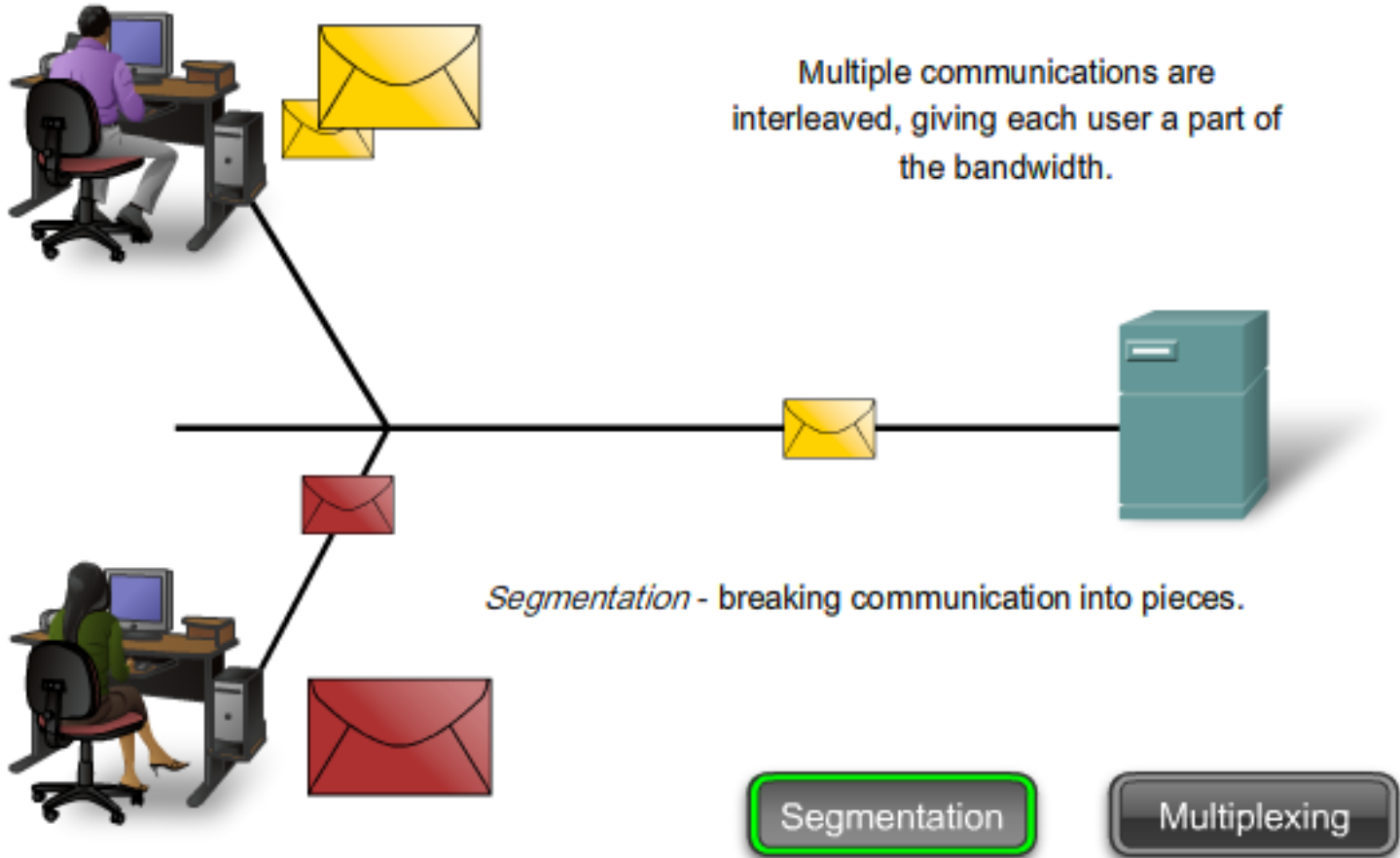
CCN Spring2014

The Elements of Communication



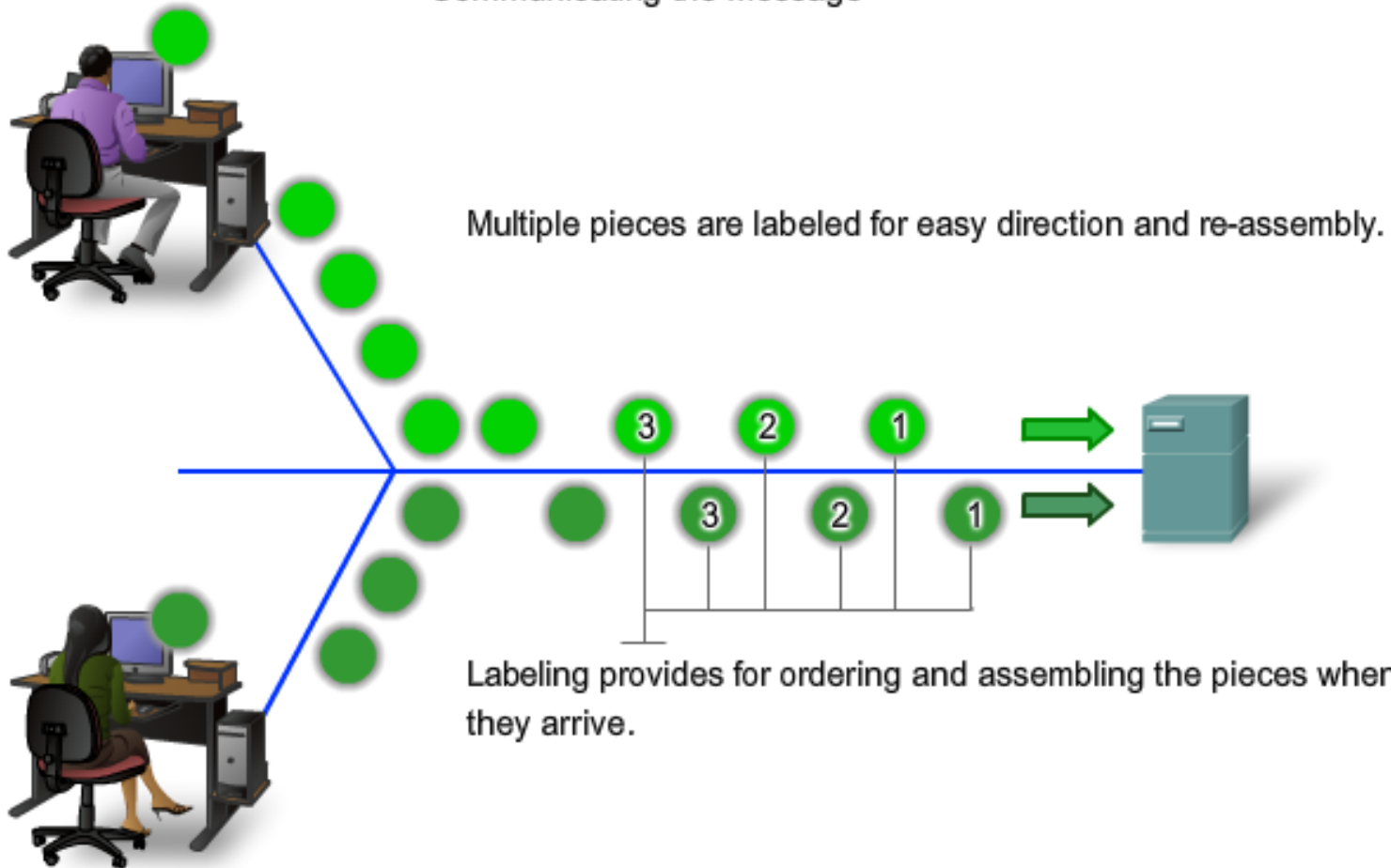
Communicating the Messages

Communicating the Message



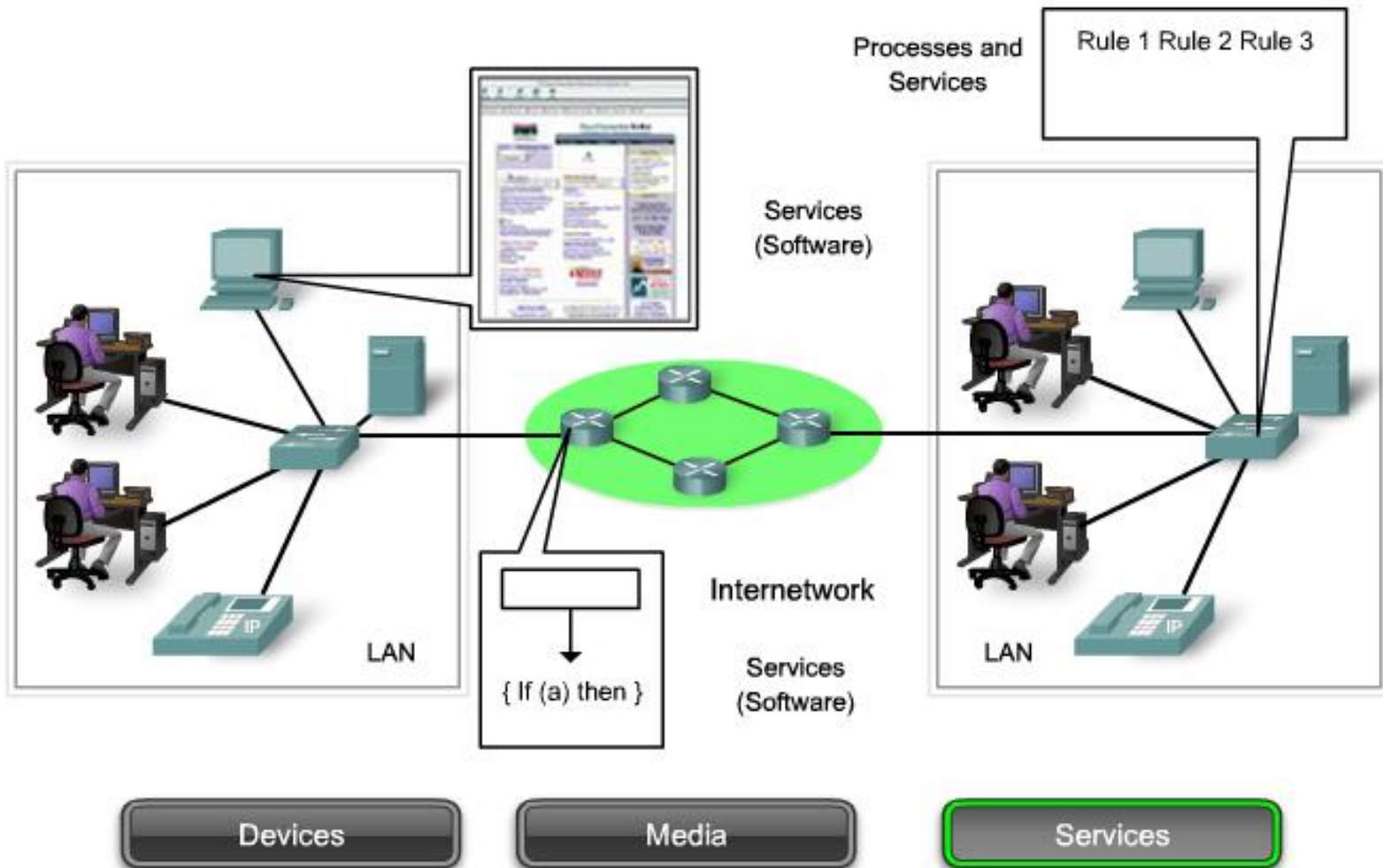
Communicating the Messages...

Communicating the Message



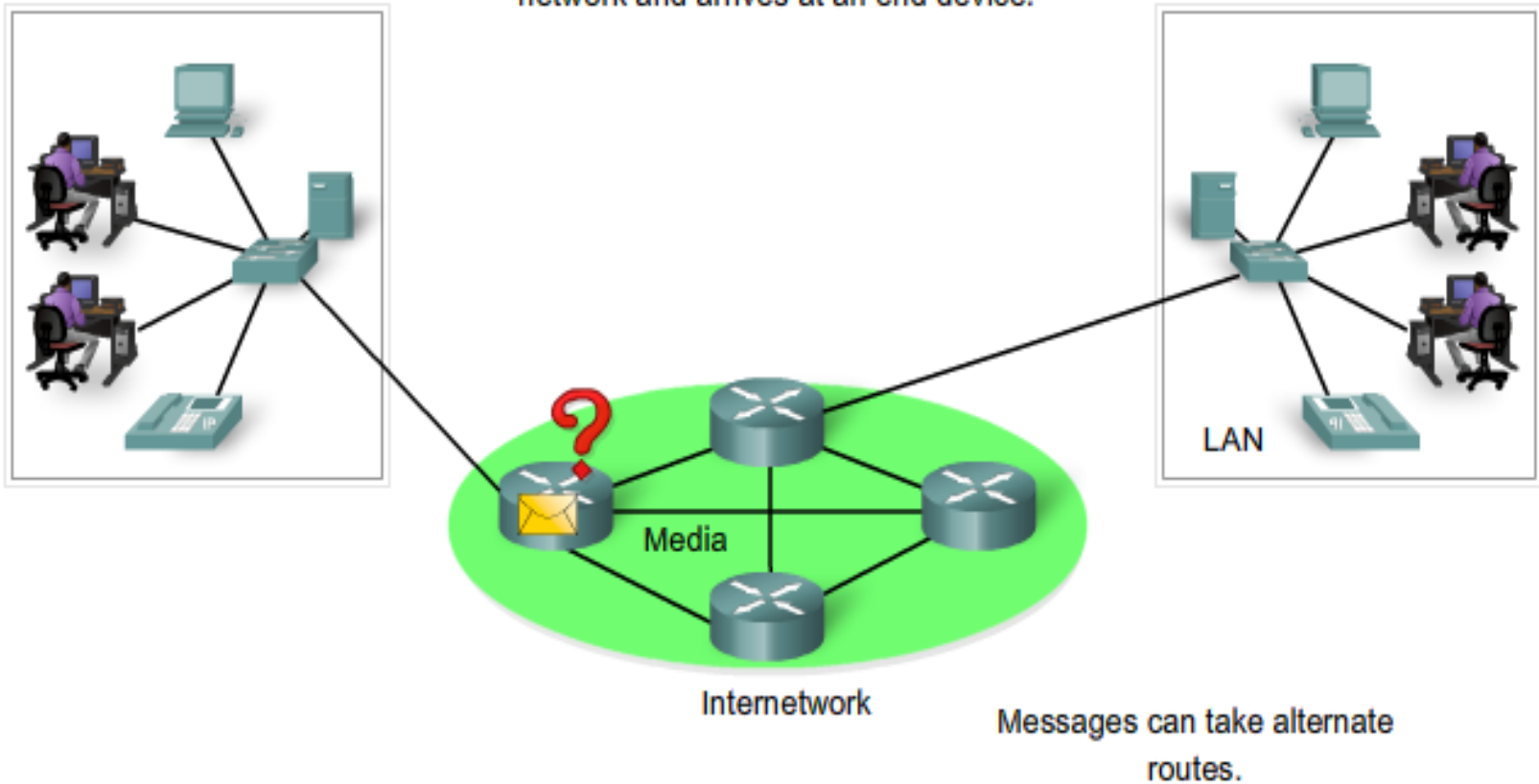
Components of the Network

Networks use devices, media and services.



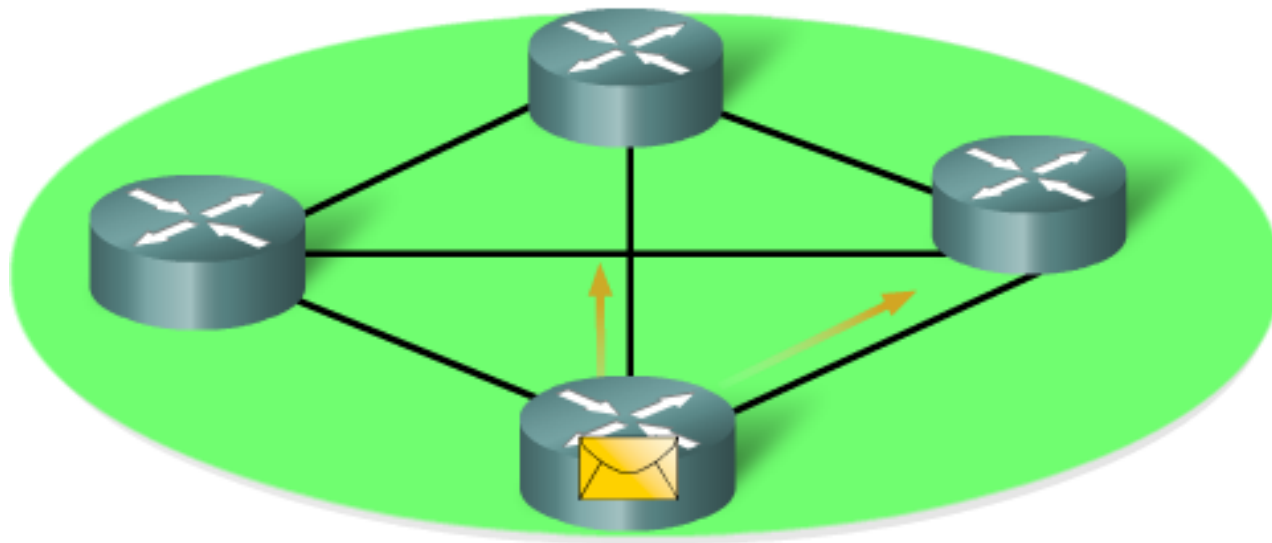
End Devices and their Role in the Network

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



Intermediary Devices and their Role in The Network

Intermediary devices direct the path of the data but do not generate or change the data content.



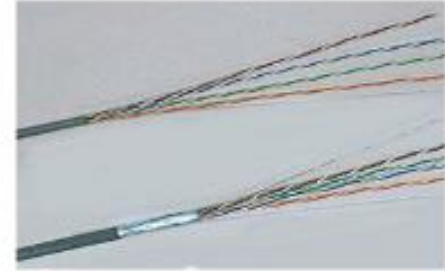
Internetwork

Network Media

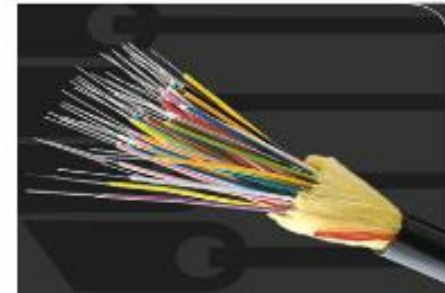
Network Media



Copper



Fiber Optics

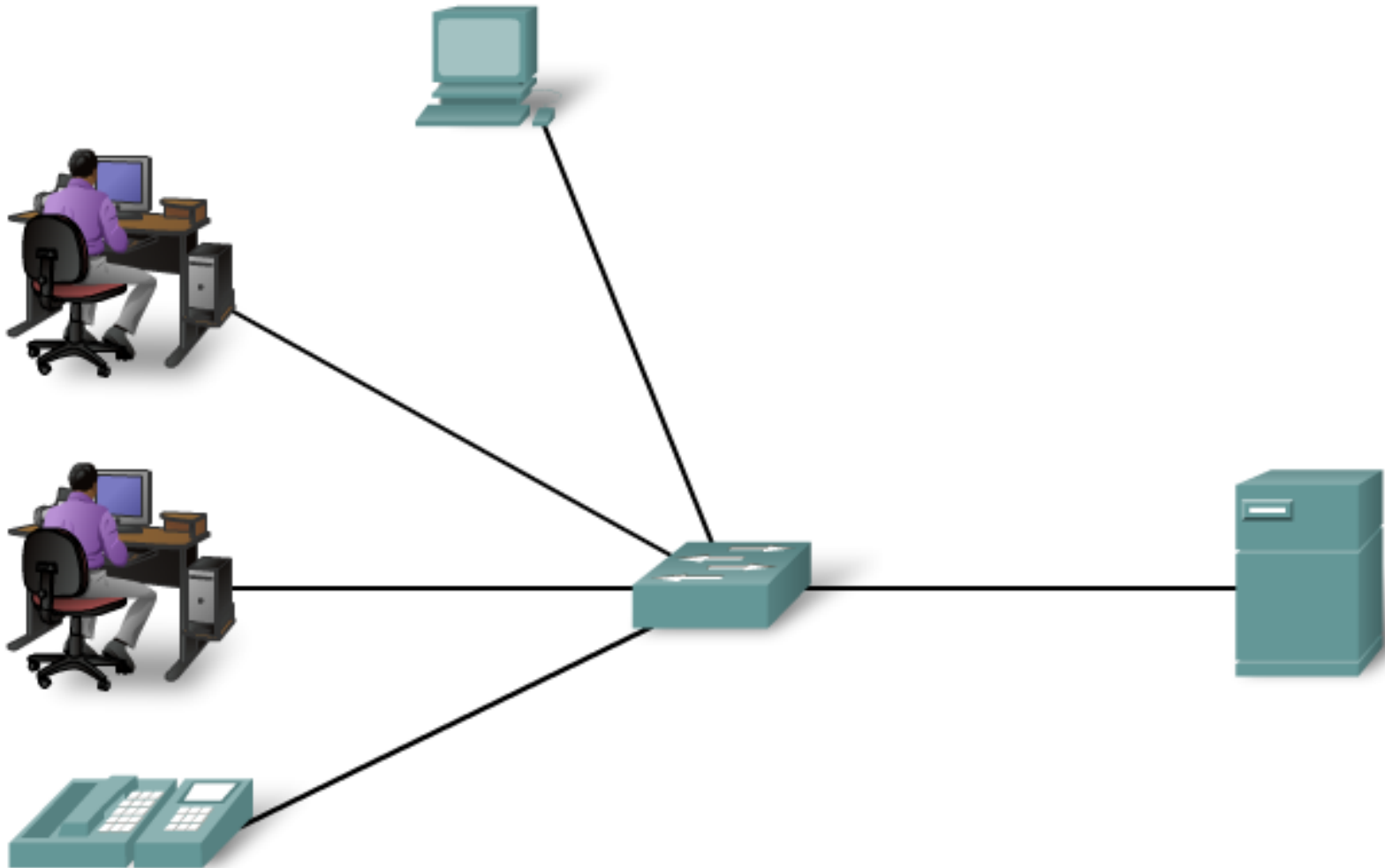


Wireless



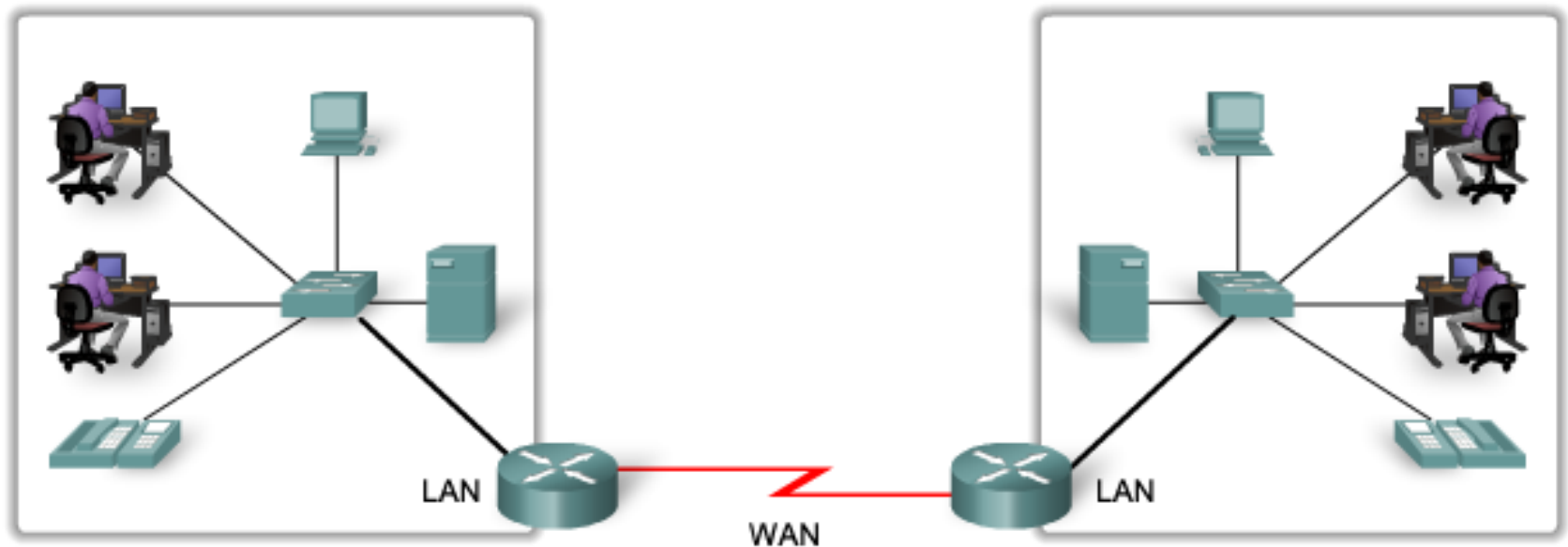
LAN

A network serving a home, building or campus is considered a Local Area Network (LAN).



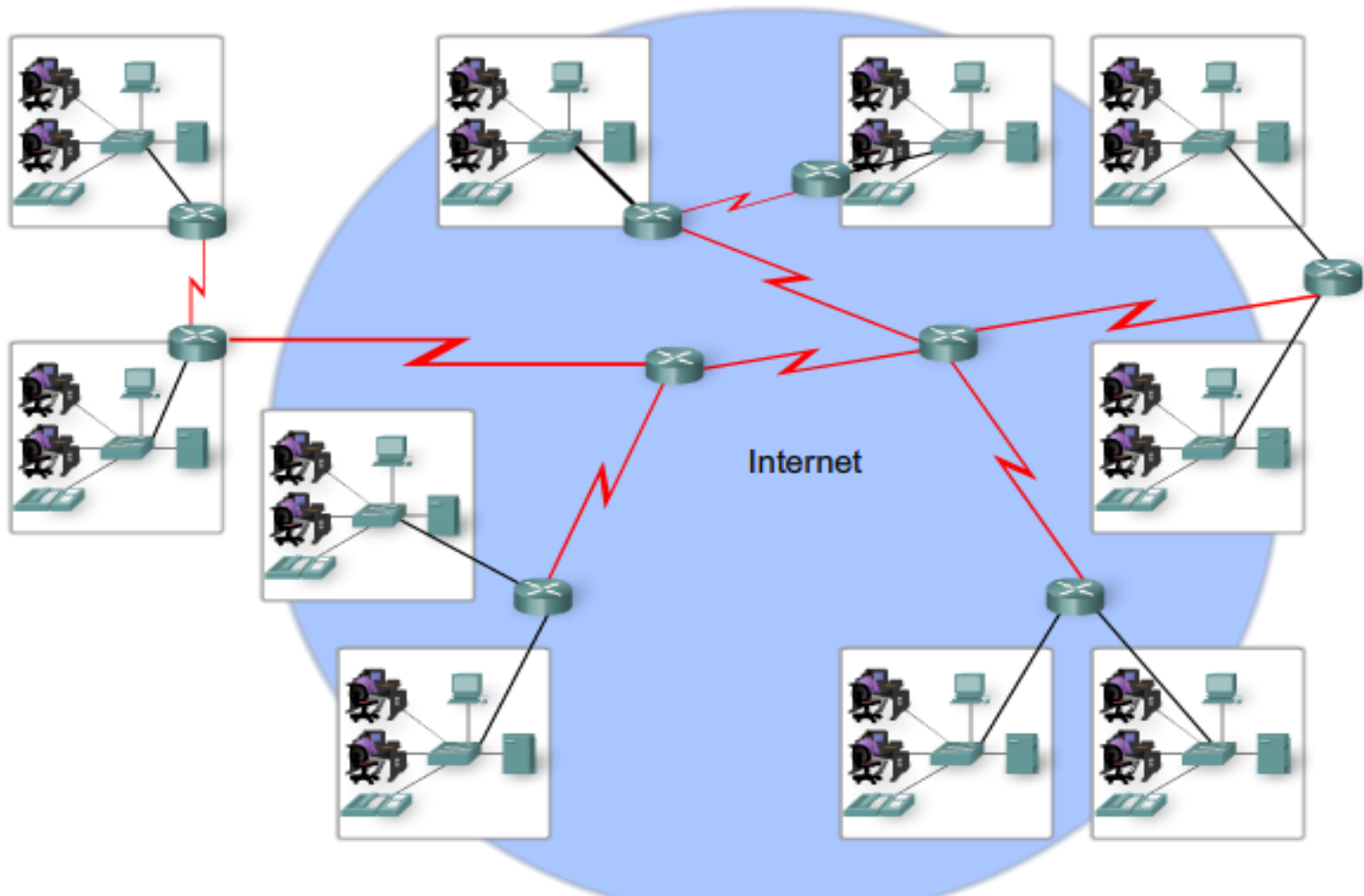
WAN

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



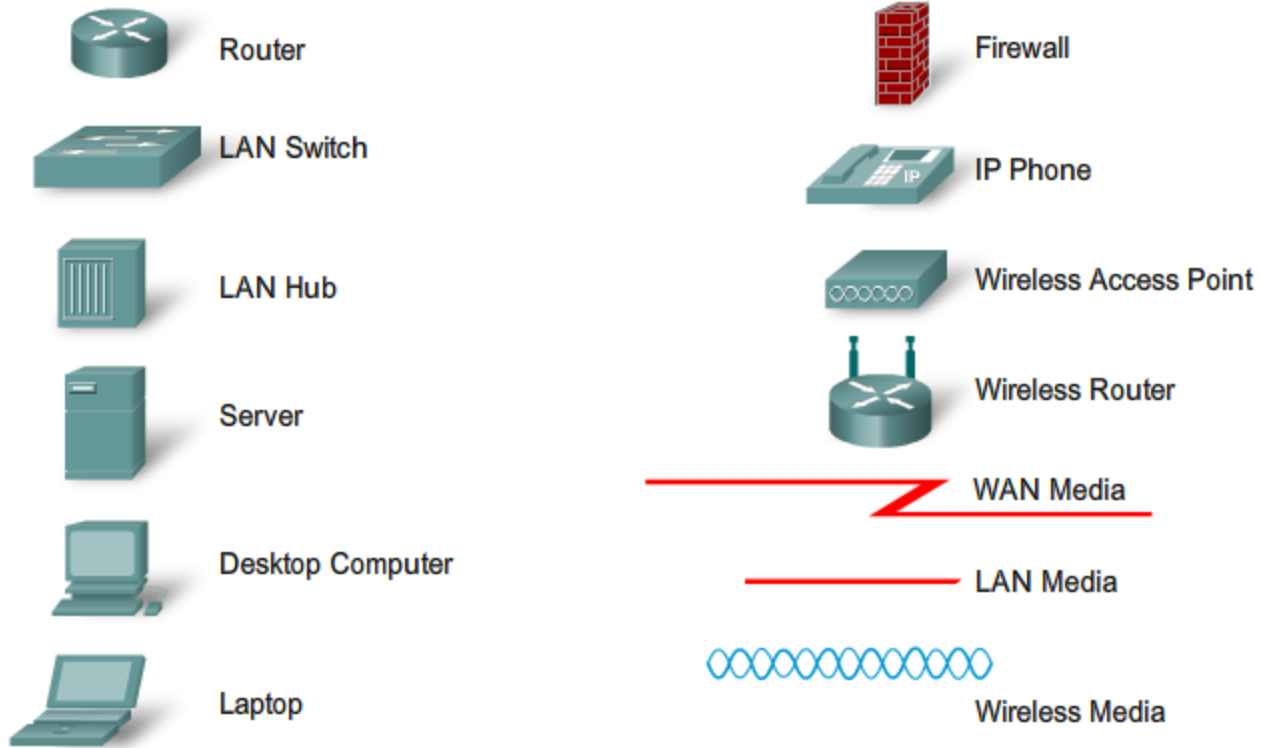
The Internet

LANs and WANs may be connected into internetworks.



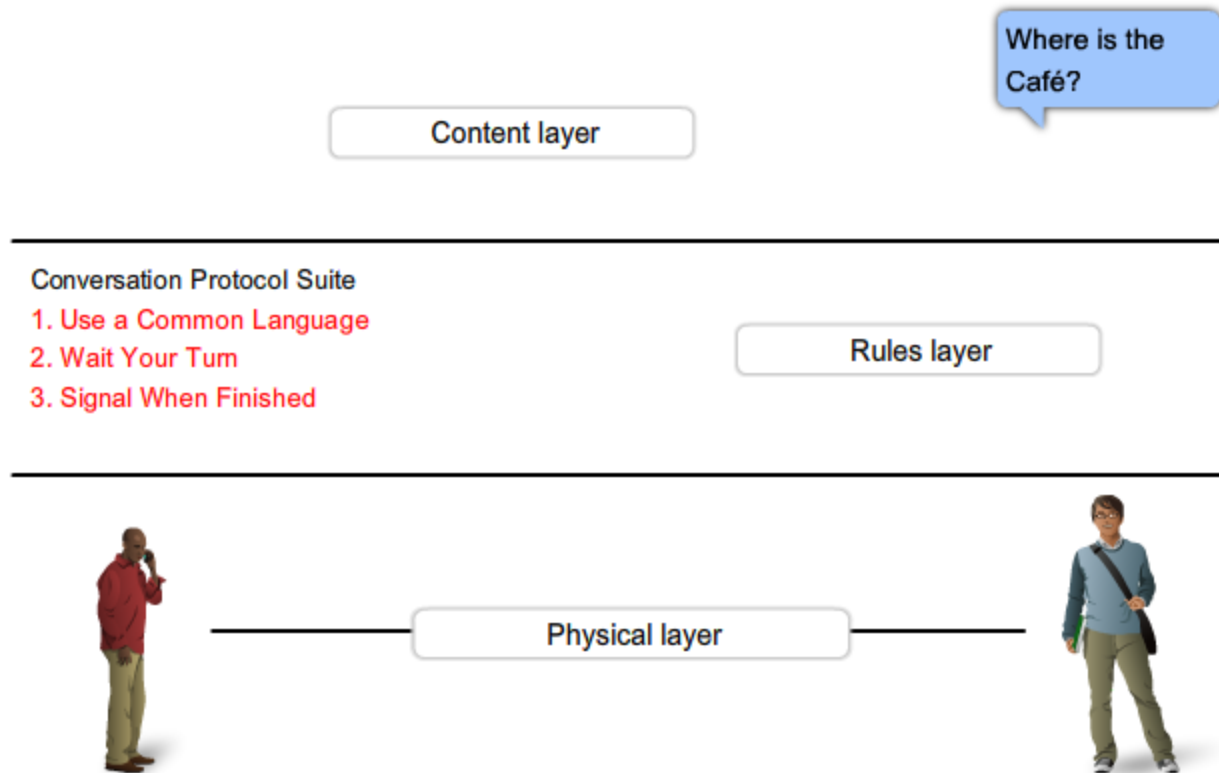
Network representations

Common Data Network Symbols



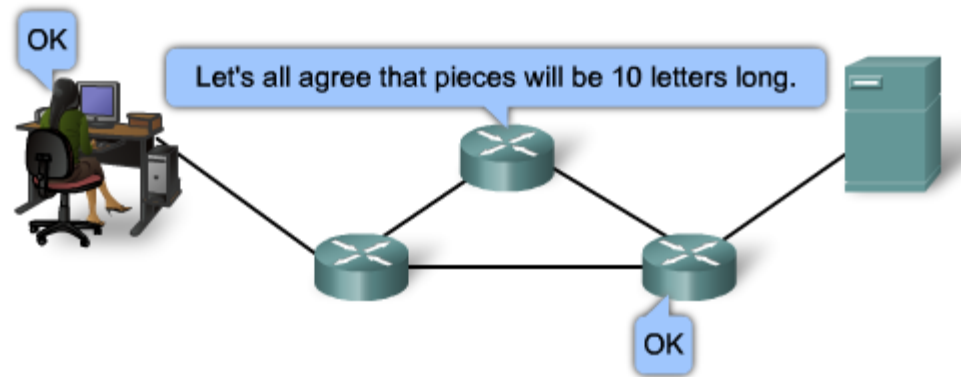
Rules that govern communications

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



Networks Protocols

The Role of Protocols



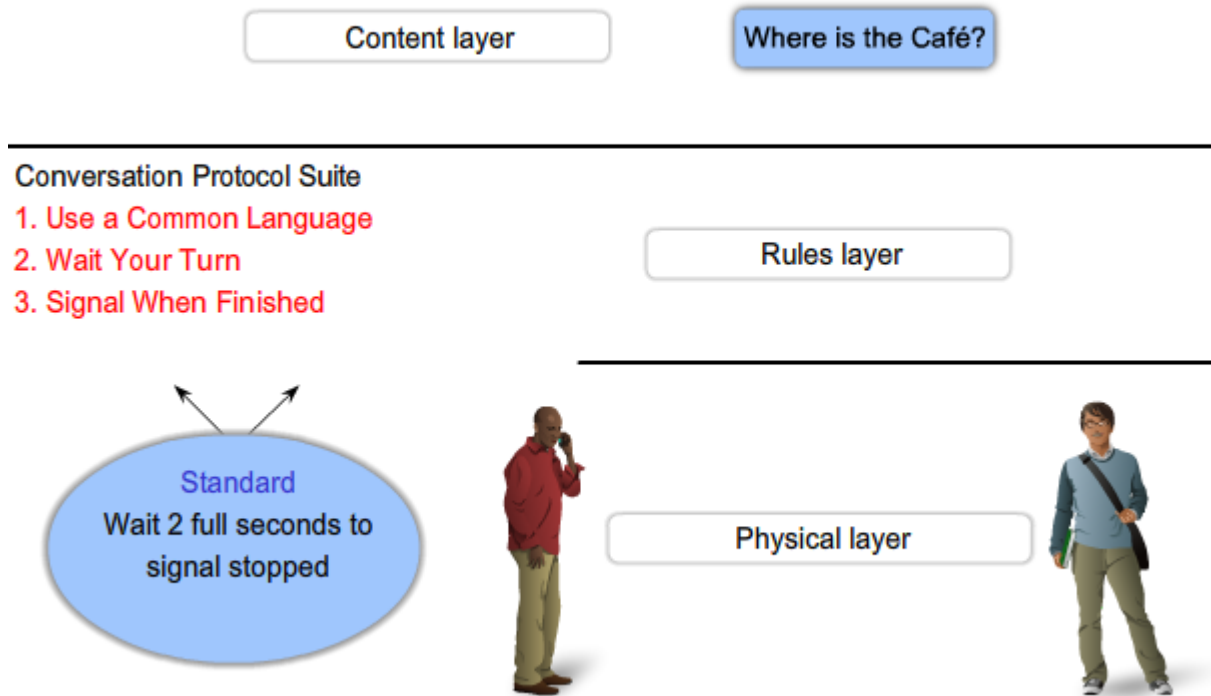
In any communication process, there are rules.

In any communication process, there are rules.

The format or structure of the communication pieces

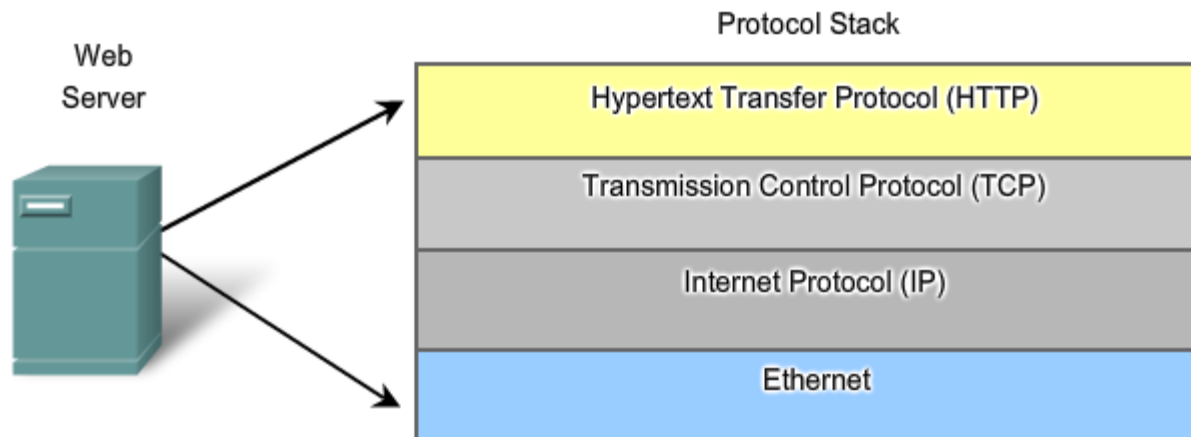
Protocol suites and industry standards

Standards are protocols and agreements that are widely used and accepted.

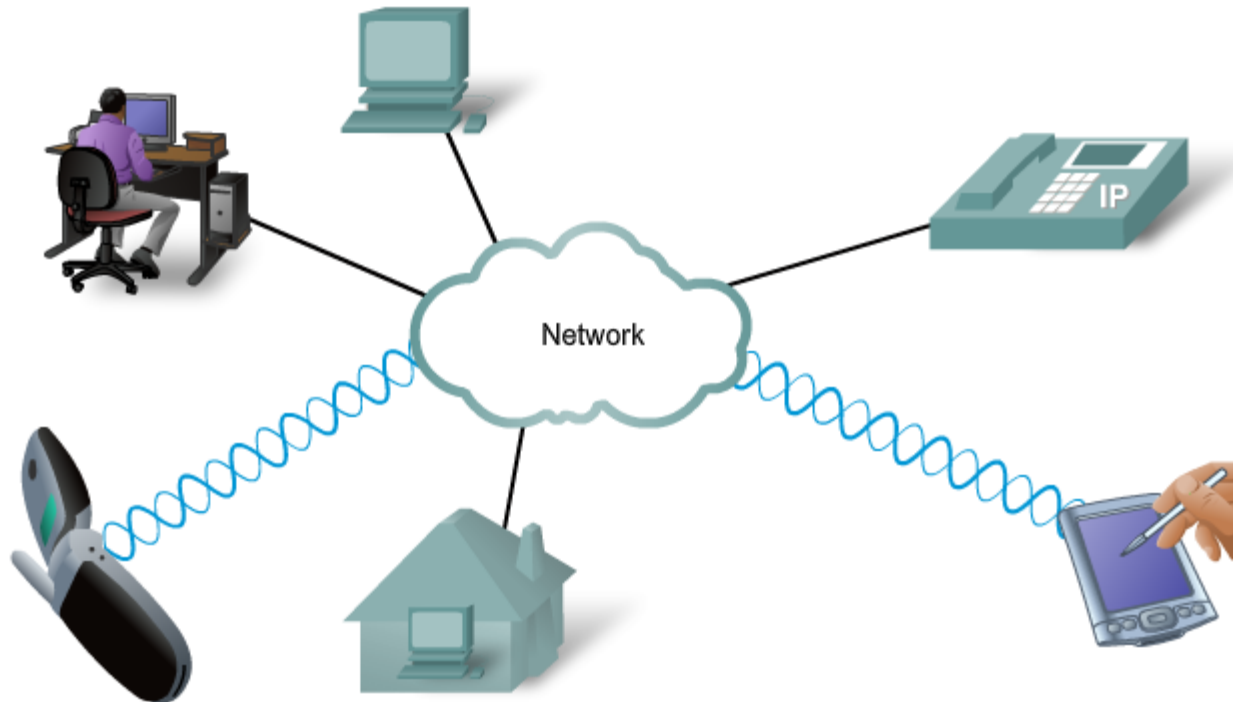


The interaction of protocols

Interaction

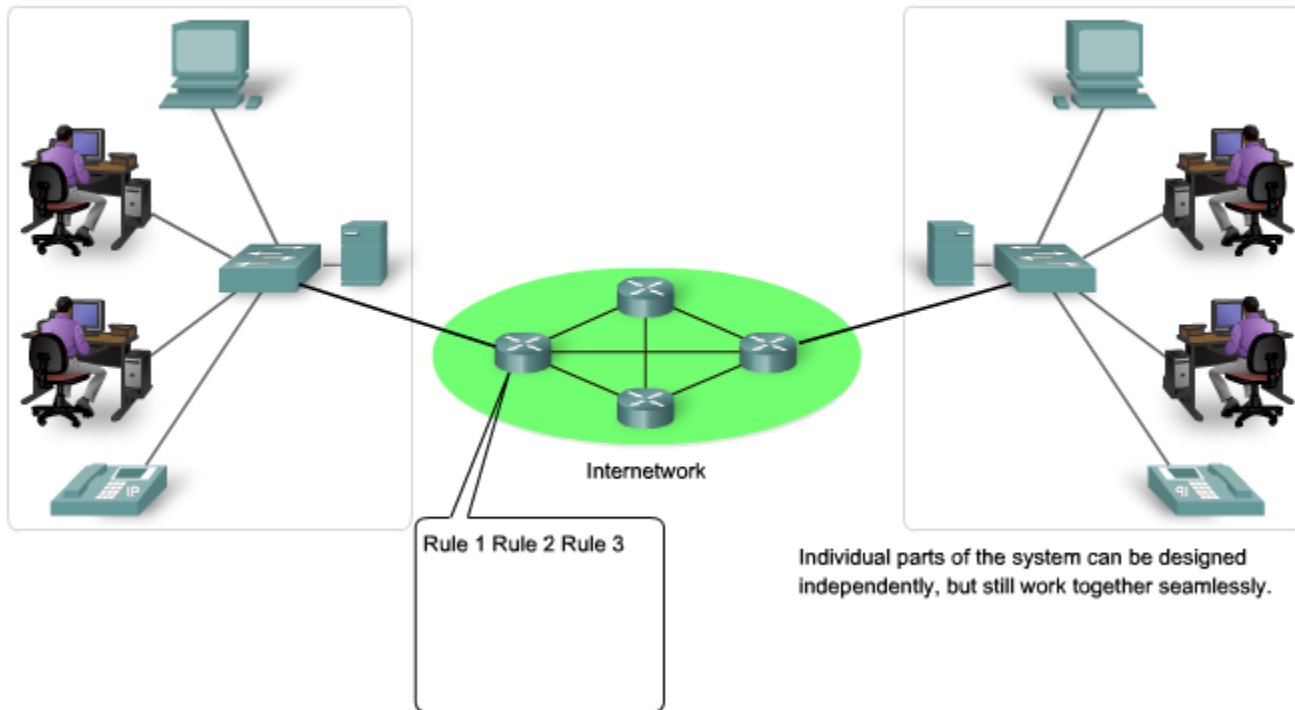


Technology independent protocols



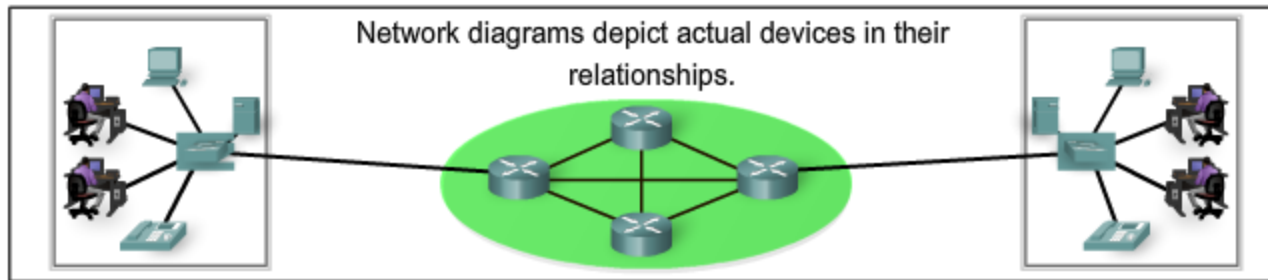
The benefits of using layered model

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



Protocols and reference models

Models Provide Guidance



OSI Model

Application

Presentation

Session

Transport

Network

Data Link

Physical

TCP/IP Model

Application

Transport

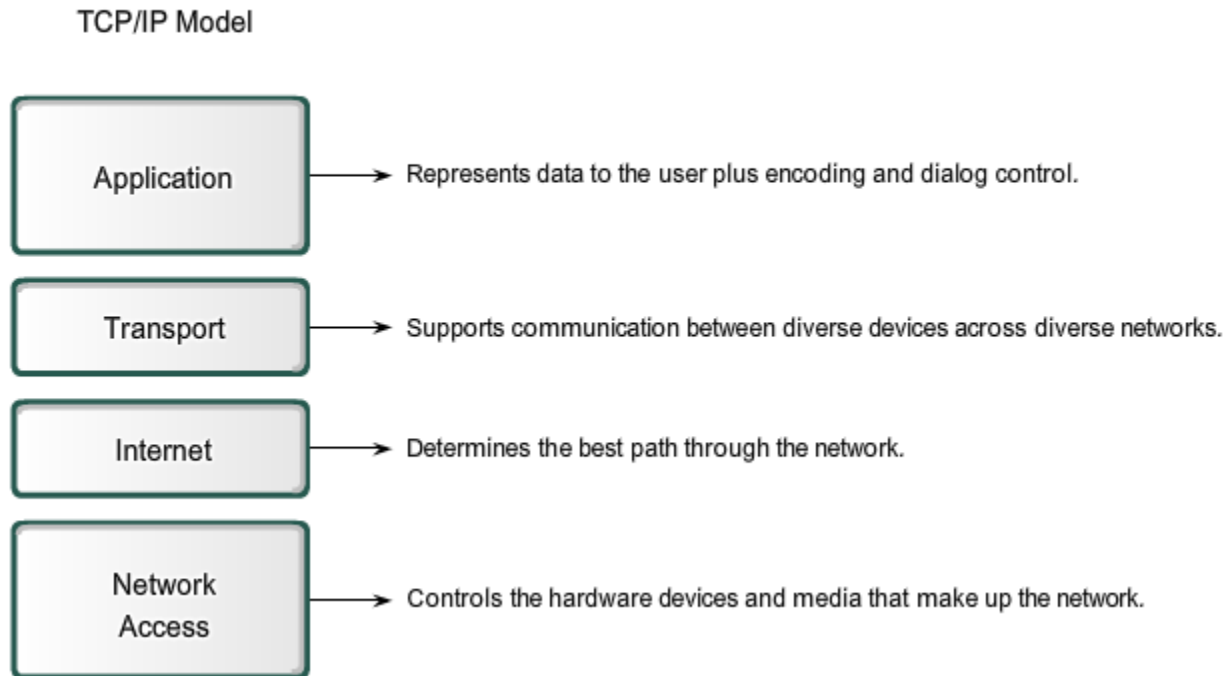
Internet

Network Access

A networking model is only a representation of network operation.
The model is not the actual network.

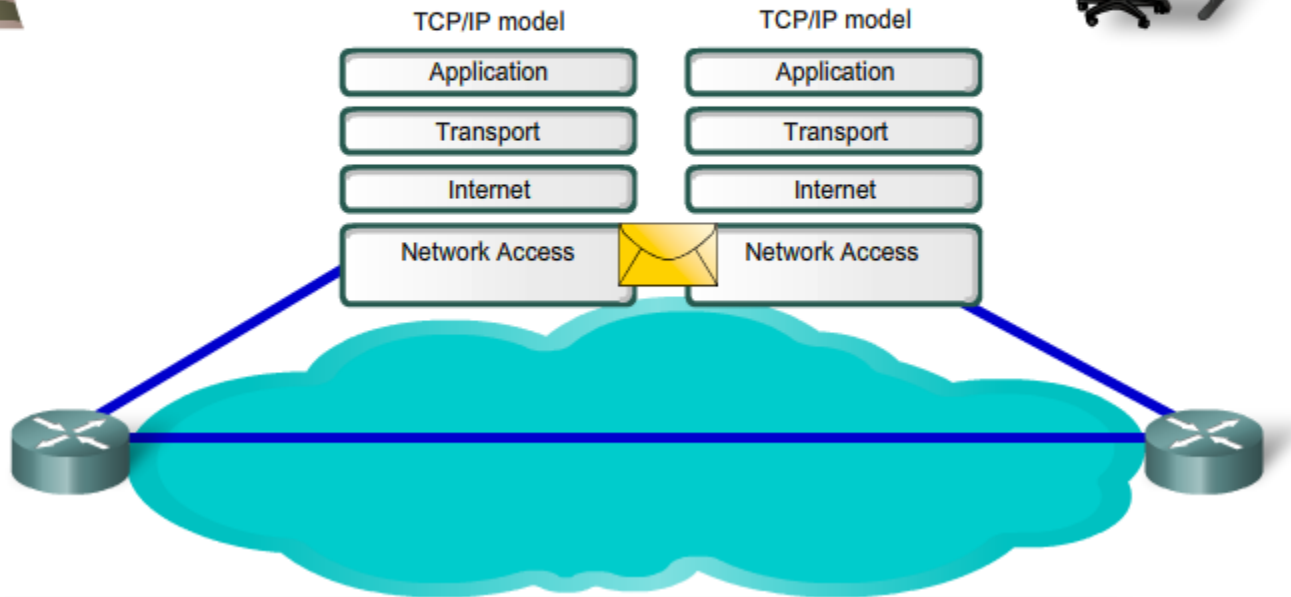
The TCP/IP Model

TCP/IP model

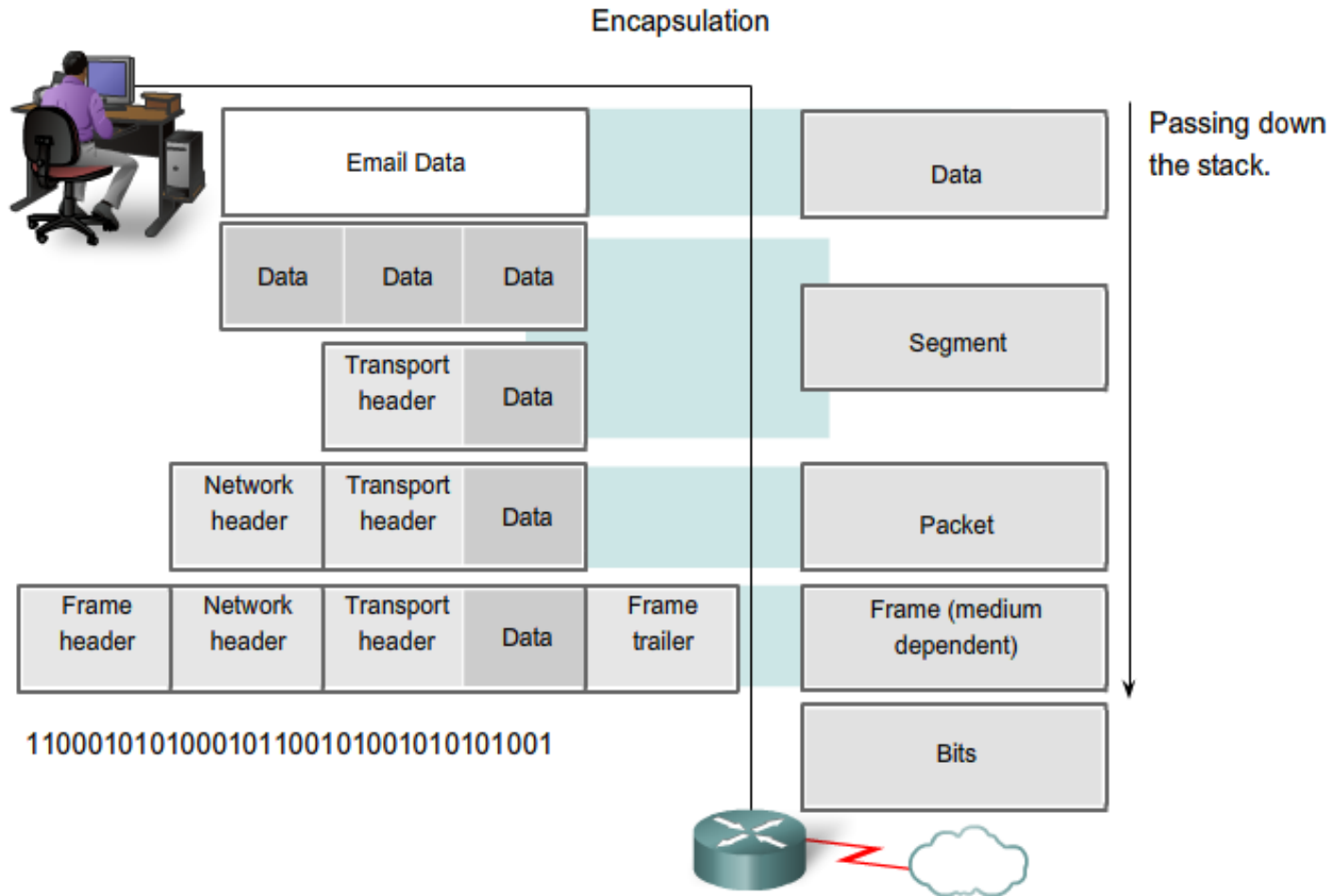


The communication process

Untouched Message Travels through a Network

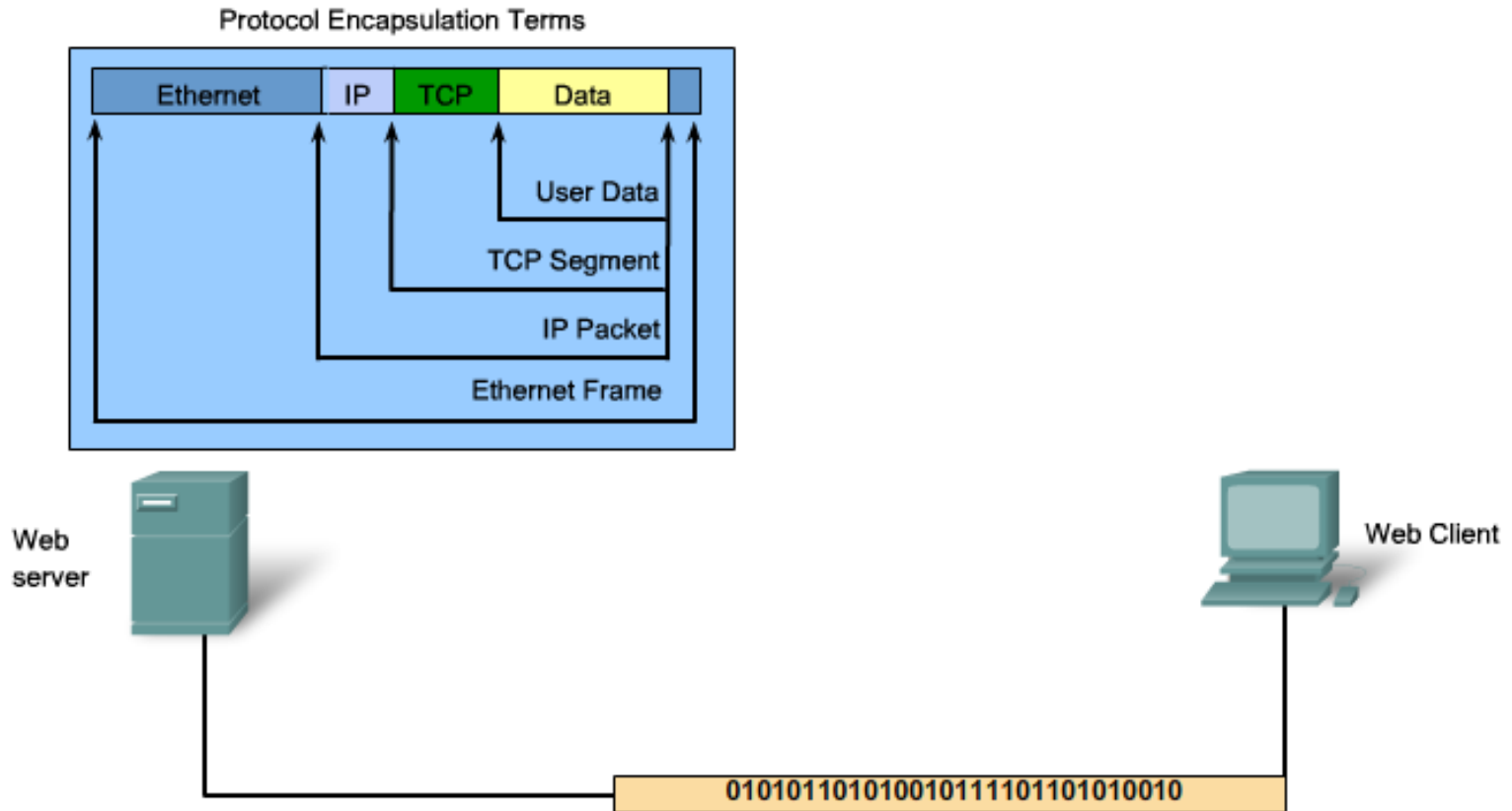


Protocol data units (PDU) and Encapsulation



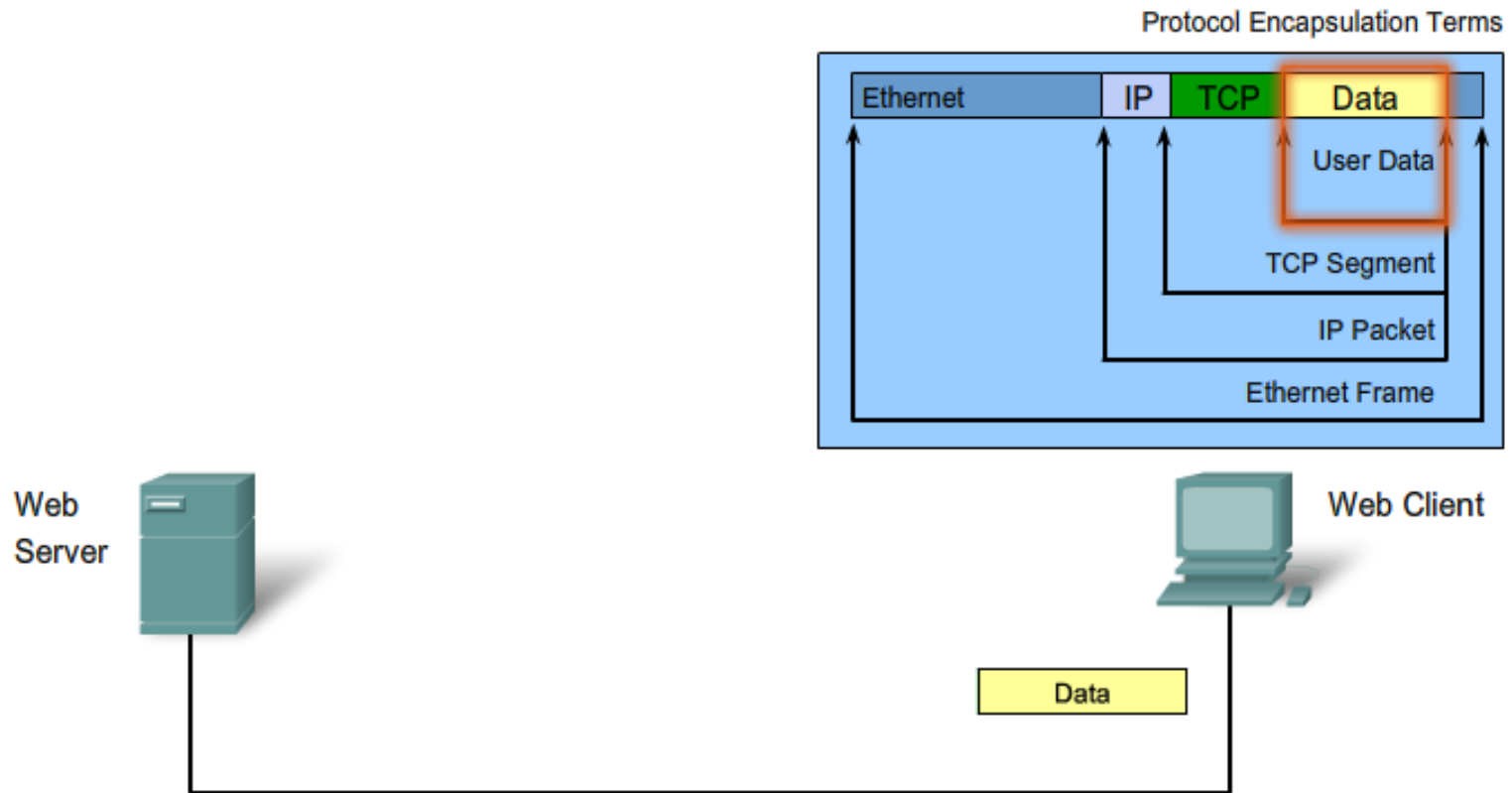
The Sending And Receiving Process

Protocol Operation of Sending and Receiving a Message



The Sending And Receiving Process

Protocol Operation of Sending and Receiving a Message



OSI Model

7. Application

6. Presentation

5. Session

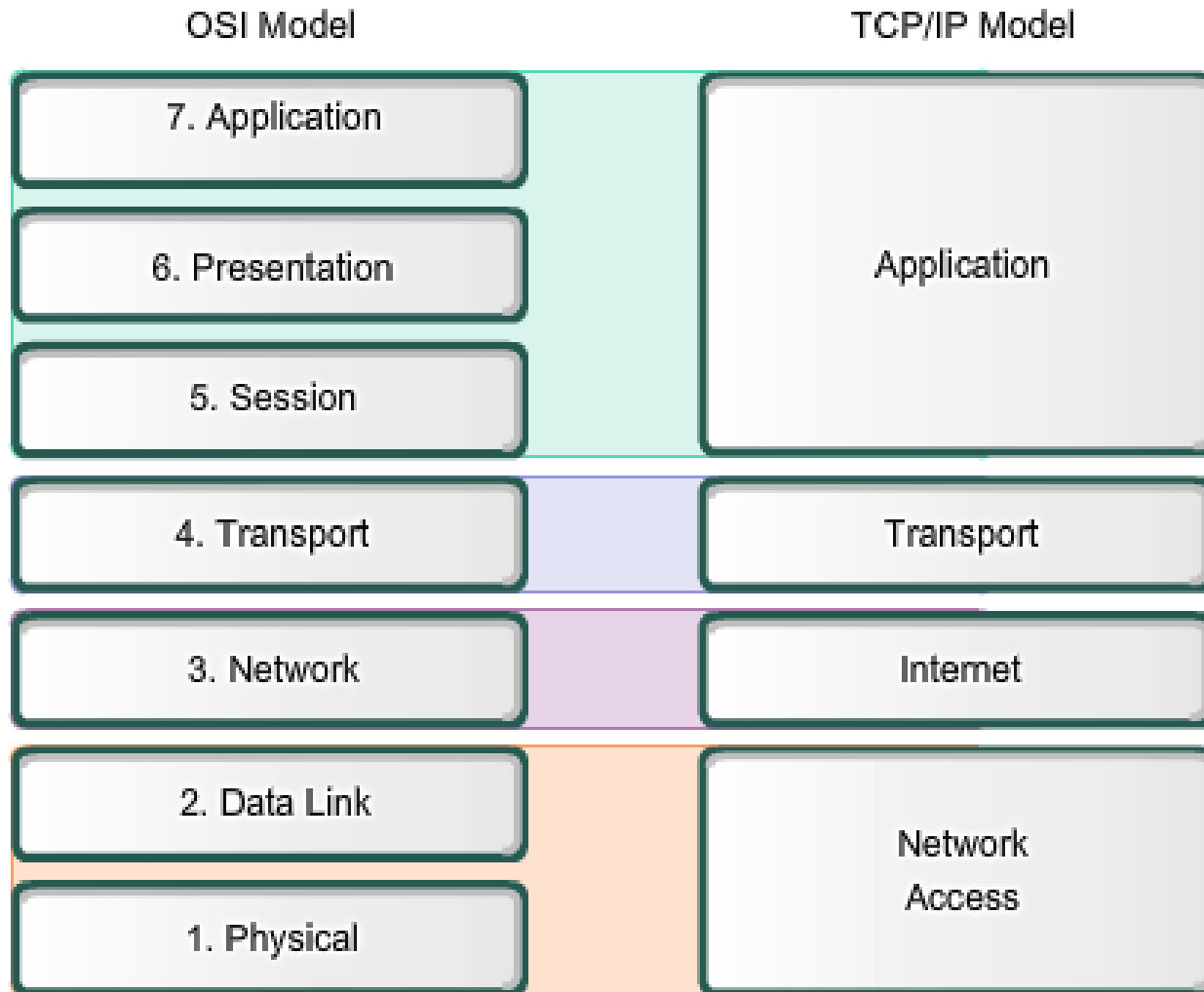
4. Transport

3. Network

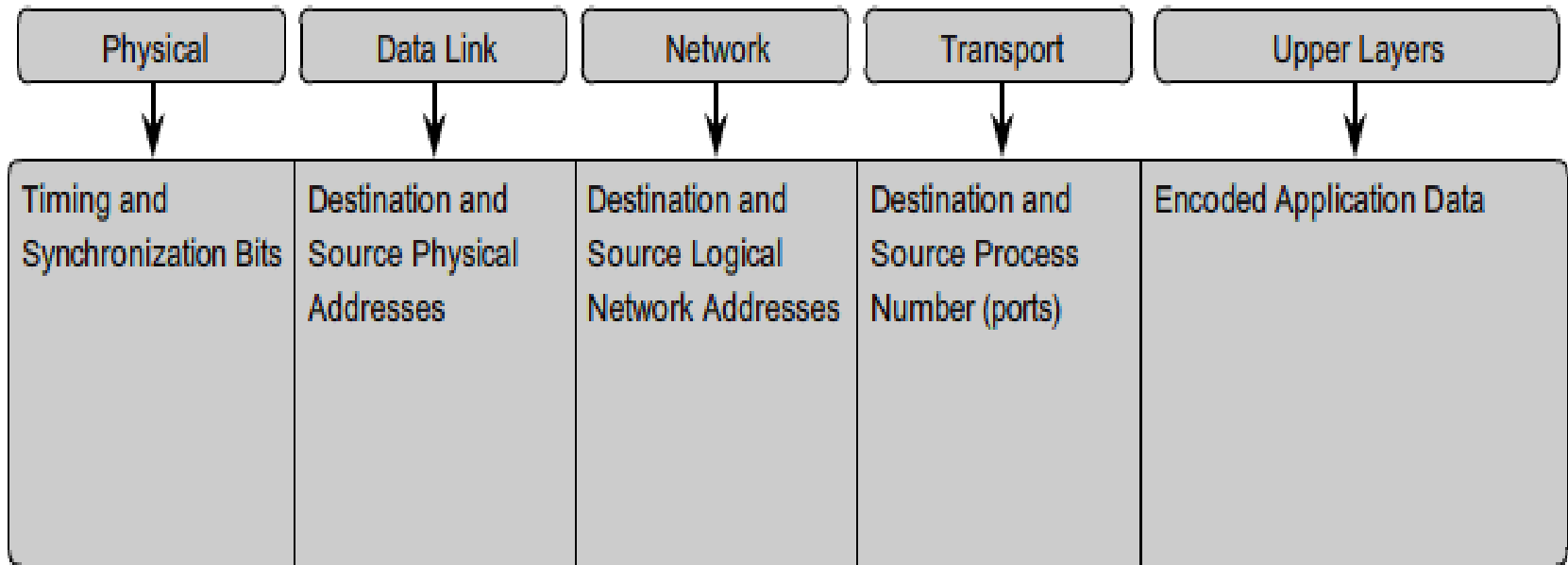
2. Data Link

1. Physical

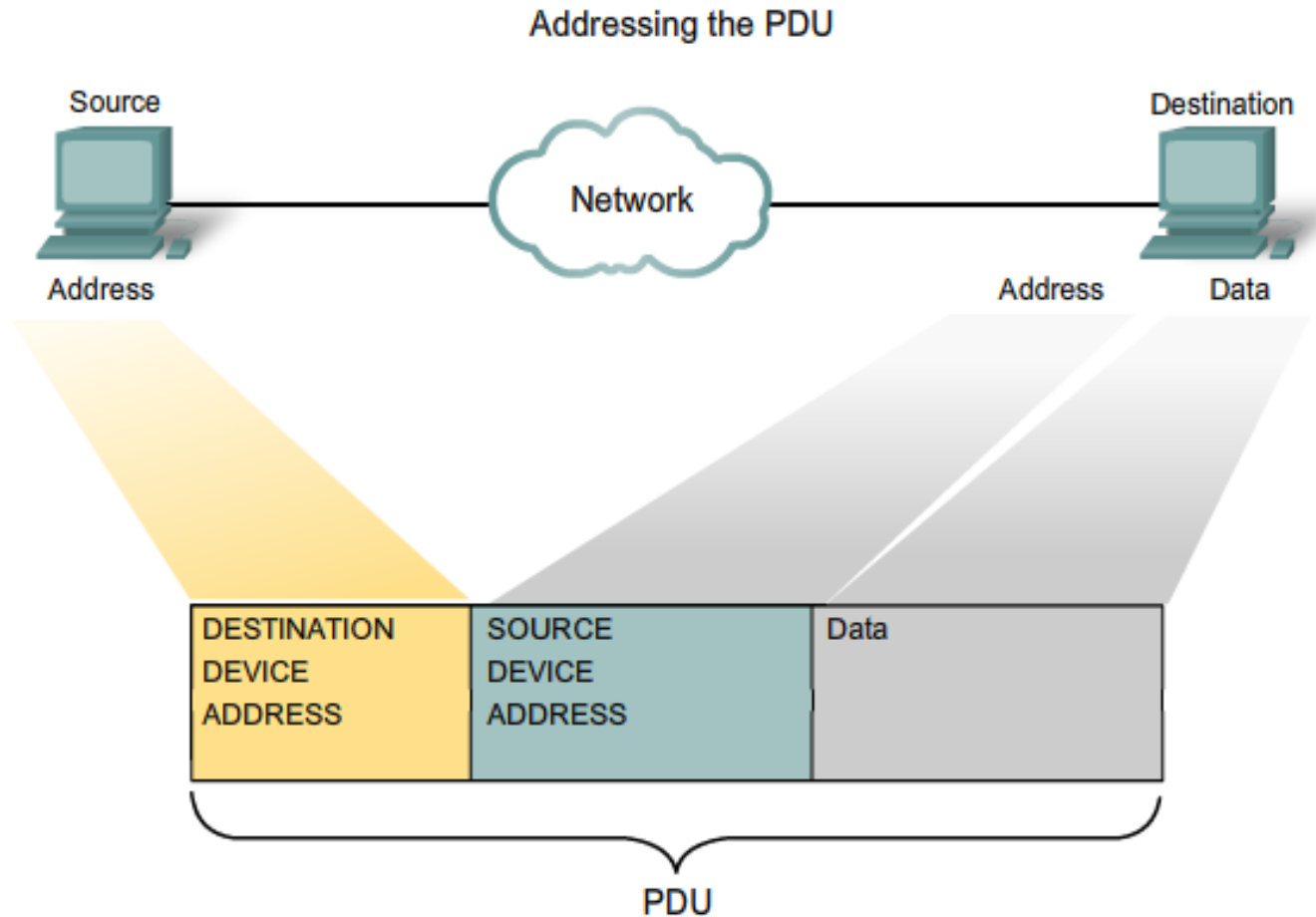
Comparing the OSI Model with TCP/IP Model



Network Addressing



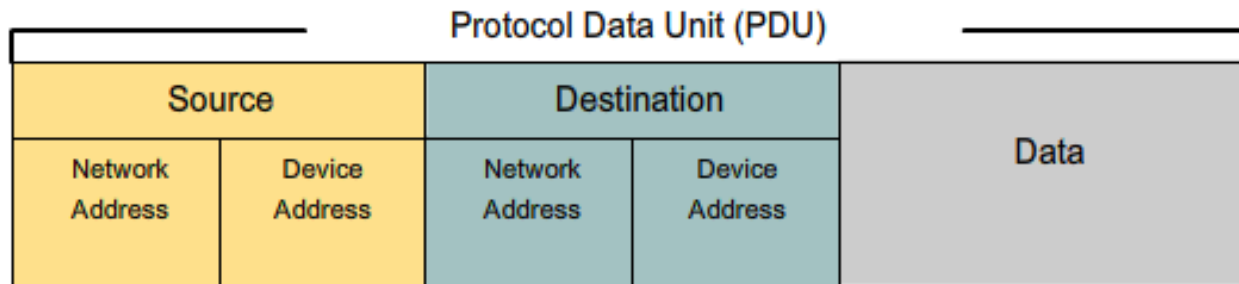
Getting the Data to the End device



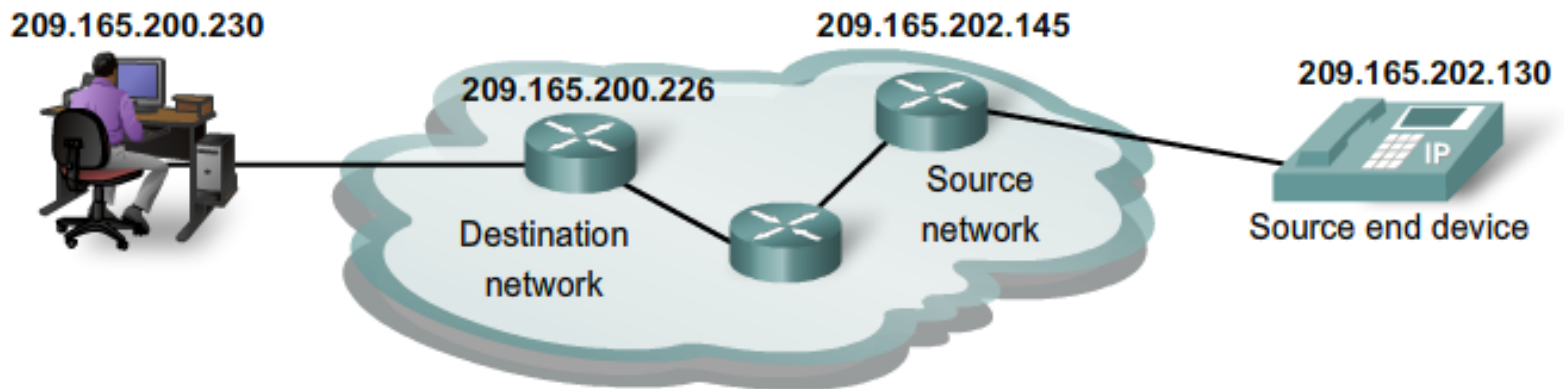
The Protocol Data Unit header contains device address fields.

Getting the Data Through the Internetwork

Getting the Pieces to the Correct Network

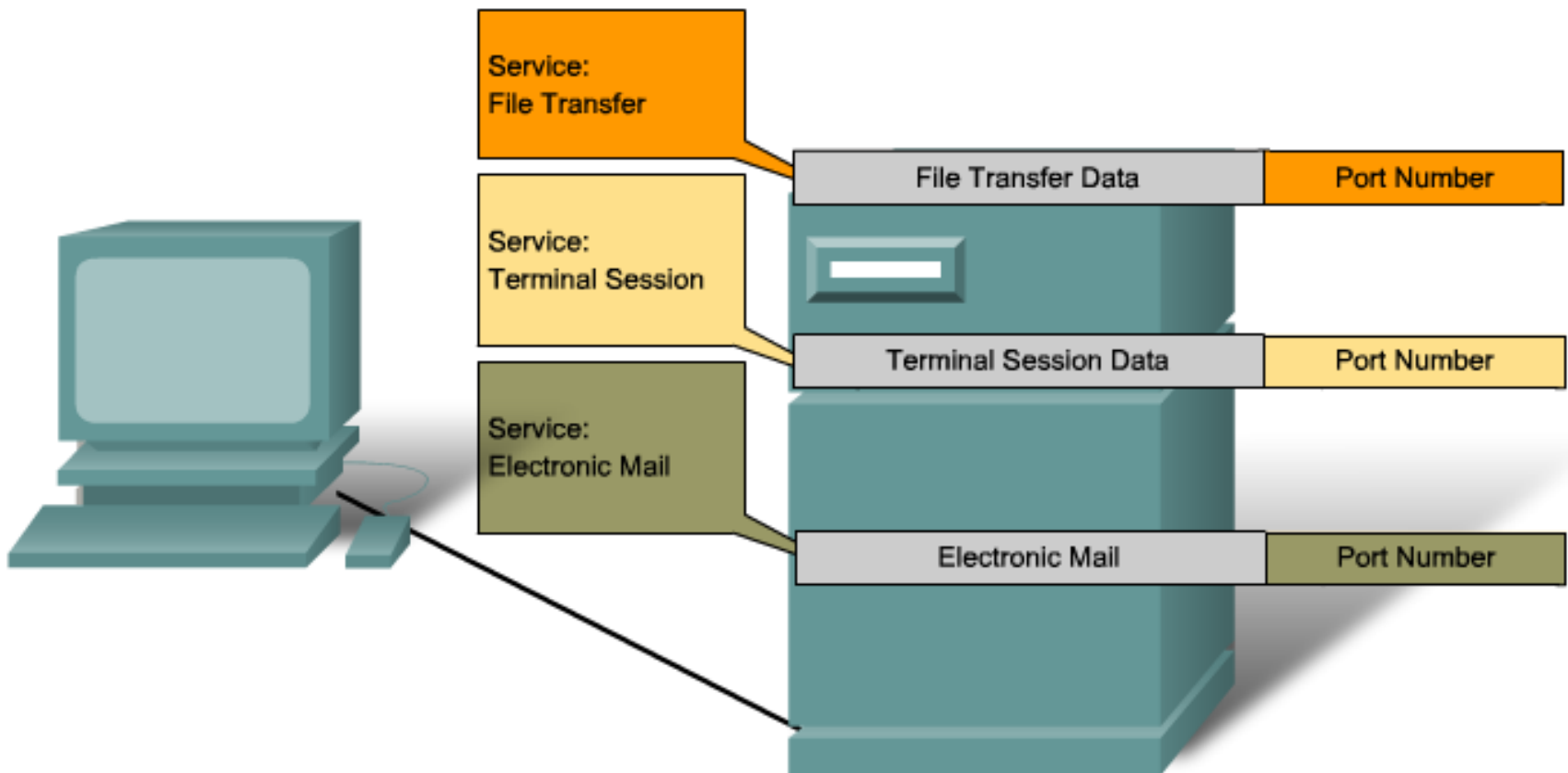


The Protocol Data Unit header also contains the network address.



Getting the Data to the Right Application

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



Summary

- Data networks are systems of end devices, intermediary devices, and the media connecting the devices, which provide the platform for the human network.
- These devices, and the services that operate on them, can interconnect in a global and user-transparent way because they comply with rules and protocols.
- The use of layered models as abstractions means that the operations of network systems can be analyzed and developed to cater the needs of future communication services.
- The most widely-used networking models are OSI and TCP/IP. Associating the protocols that set the rules of data communications with the different layers is useful in determining which devices and services are applied at specific points as data passes across LANs and WANs.
- As it passes down the stack, data is segmented into pieces and encapsulated with addresses and other labels. The process is reversed as the pieces are decapsulated and passed up the destination protocol stack.
- Applying models allows various individuals, companies, and trade associations to analyze current networks and plan the networks of the future.

Next time: Physical Layer