



Chapter 3: Network Protocols and Communications



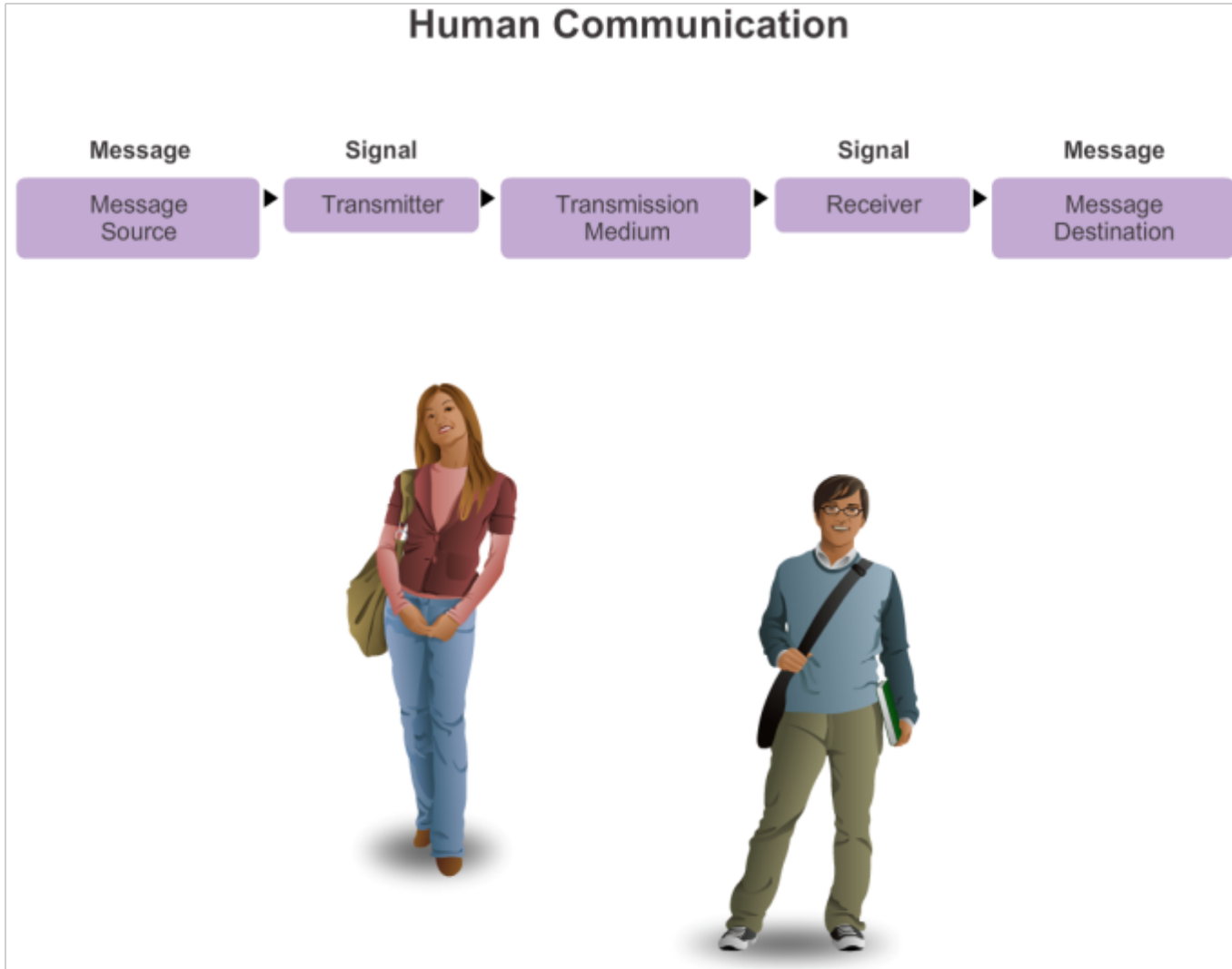
Introduction to Networks

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The Rules

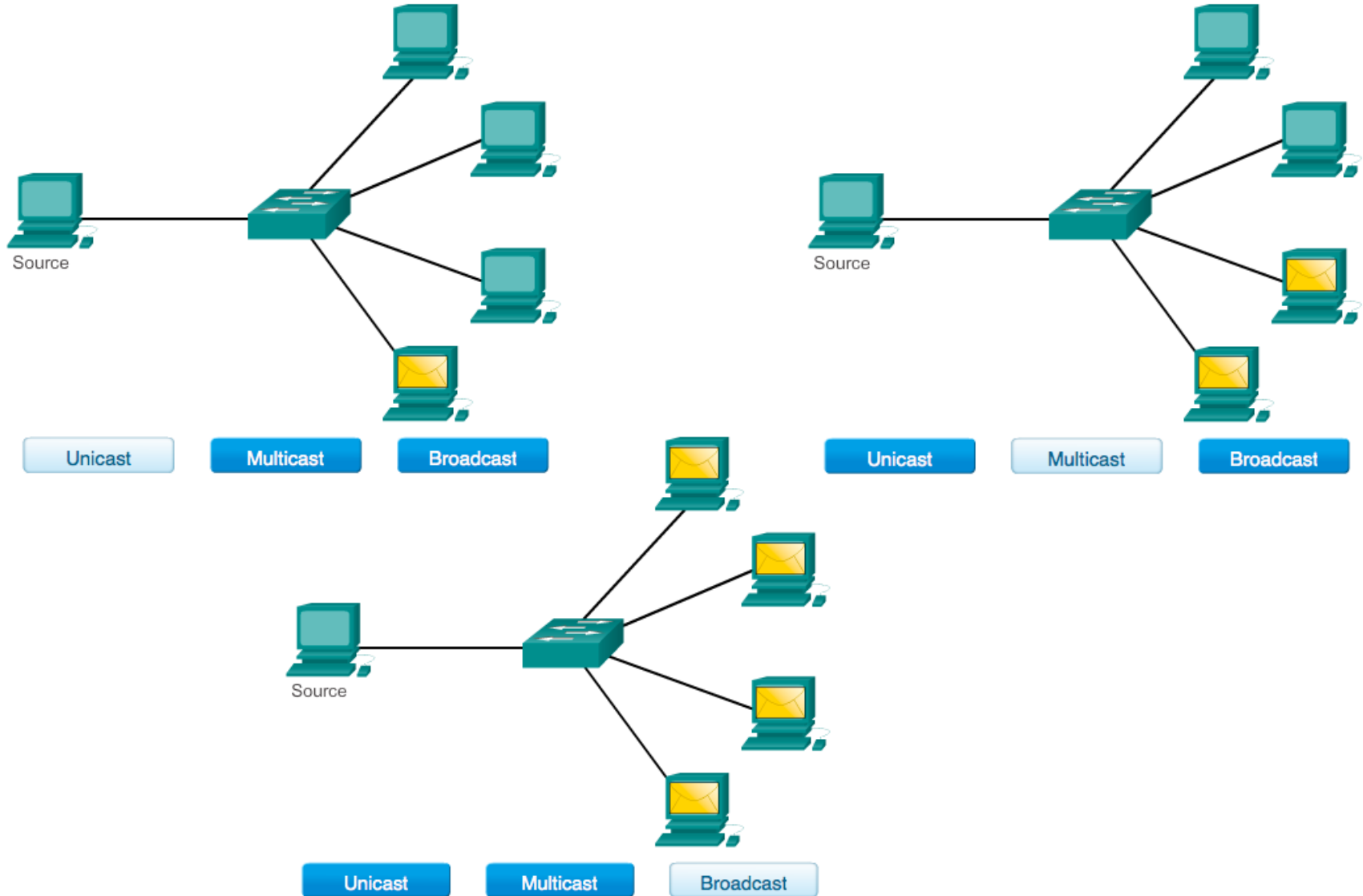
What is Communication?





The Rules

Message Delivery Options





Protocol Suites

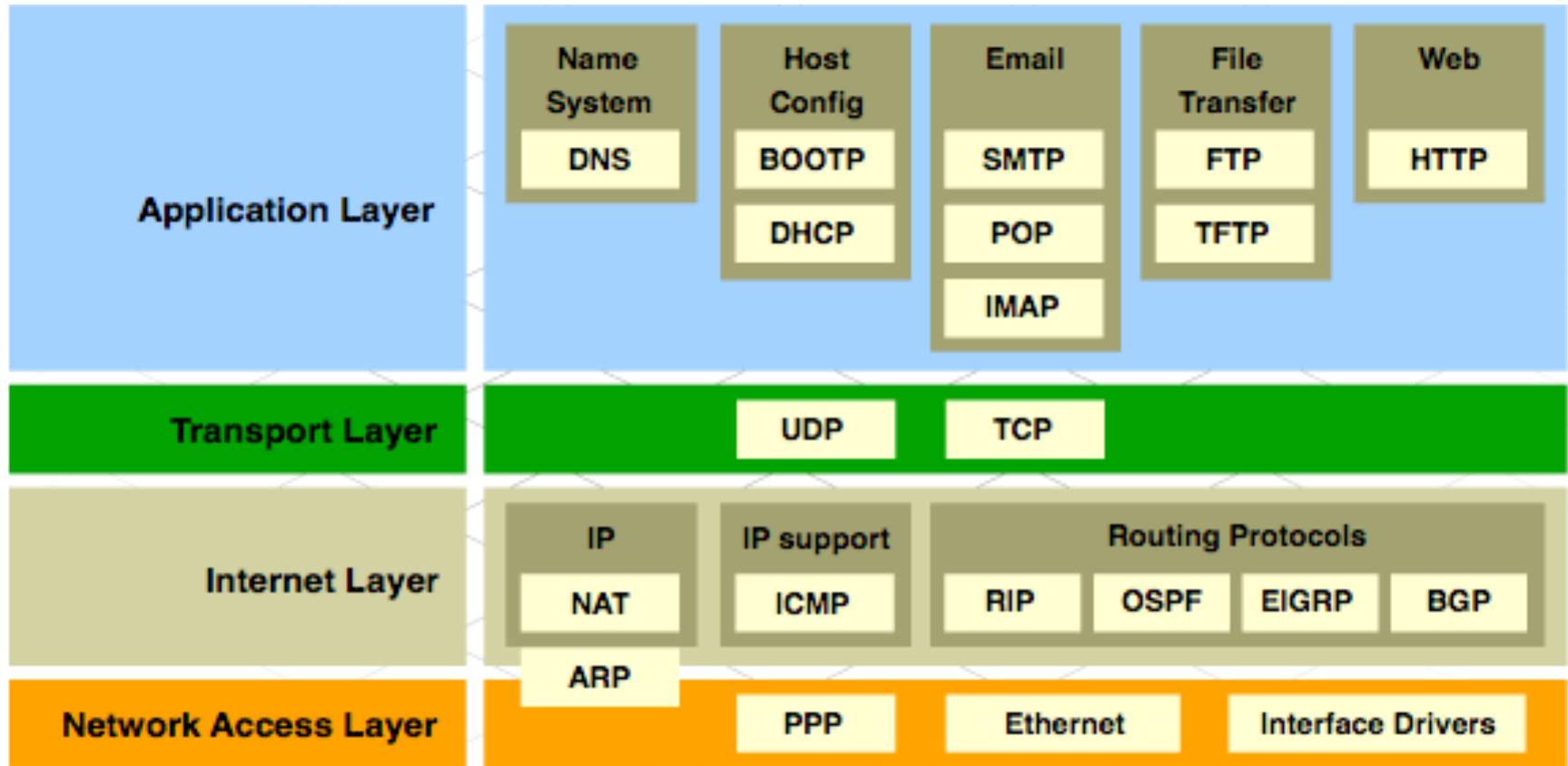
Creation of Internet, Development of TCP/IP

- The first packet switching network and predecessor to today's Internet was the Advanced Research Projects Agency Network (ARPANET), which came to life in 1969 by connecting mainframe computers at four locations.
- ARPANET was funded by the U.S. Department of Defense for use by universities and research laboratories. Bolt, Beranek and Newman (BBN) was the contractor that did much of the initial development of the ARPANET, including creating the first router known as an Interface Message Processor (IMP).
- In 1973, Robert Kahn and Vinton Cerf began work on TCP to develop the next generation of the ARPANET. TCP was designed to replace ARPANET's current Network Control Program (NCP).
- In 1978, TCP was divided into two protocols: TCP and IP. Later, other protocols were added to the TCP/IP suite of protocols including Telnet, FTP, DNS, and many others.



Protocol Suites

TCP/IP Protocol Suite and Communication





Standards Organizations

Open Standards

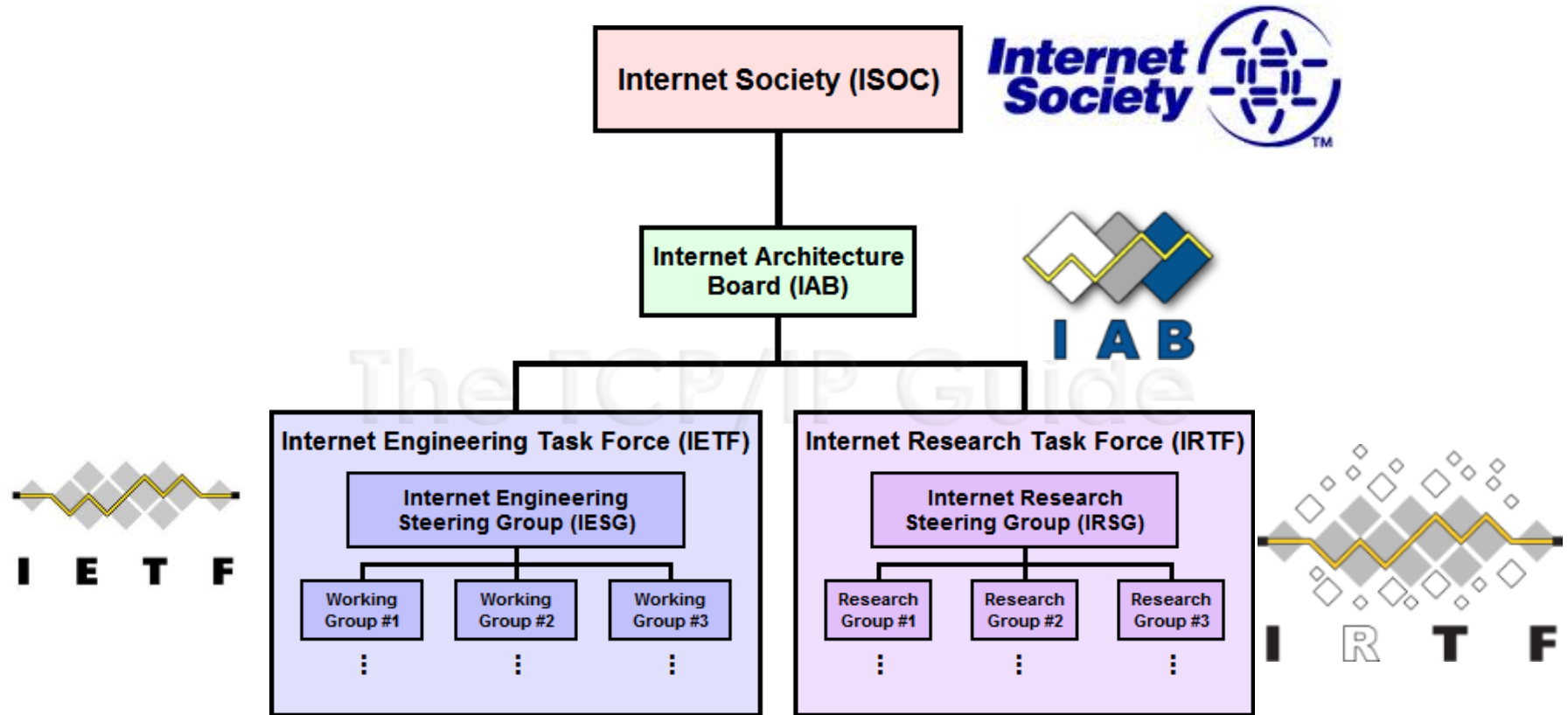
- The Internet Society (ISOC)
- The Internet Architecture Board (IAB)
- The Internet Engineering Task Force (IETF)
- Institute of Electrical and Electronics Engineers (IEEE)
- The International Organization for Standards (ISO)





Standards Organizations

ISOC, IAB, and IETF





Standards Organizations

IEEE

- 38 societies
- 130 journals
- 1,300 conferences each year
- 1,300 standards and projects
- 400,000 members
- 160 countries
- IEEE 802.3
- IEEE 802.11

IEEE 802 Working Groups and Study Groups

- 802.1 Higher Layer LAN Protocols Working Group
- 802.3 Ethernet Working Group
- 802.11 Wireless LAN Working Group
- 802.15 Wireless Personal Area Network (WPAN) Working Group
- 802.16 Broadband Wireless Access Working Group
- 802.18 Radio Regulatory TAG
- 802.19 Wireless Coexistence Working Group
- 802.21 Media Independent Handover Services Working Group
- 802.22 Wireless Regional Area Networks
- 802.24 Smart Grid TAG



Standards Organizations

ISO



OSI Model





Standards Organizations

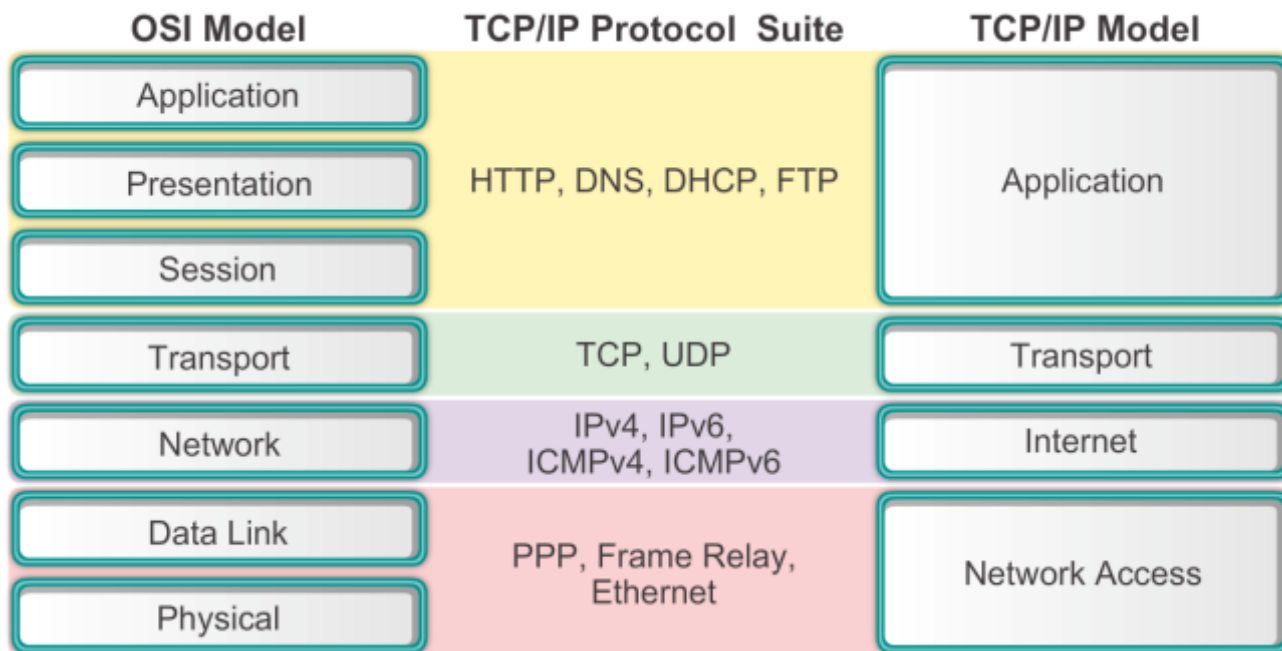
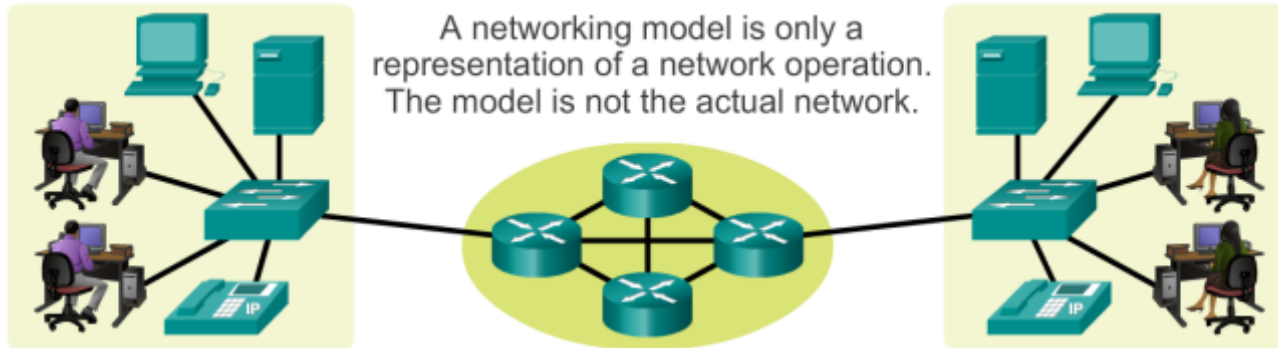
Other Standards Organization

- The Electronic Industries Alliance (EIA)
- The Telecommunications Industry Association (TIA)
- The International Telecommunications Union – Telecommunications Standardization Sector (ITU-T)
- The Internet Corporation for Assigned Names and Numbers (ICANN)
- The Internet Assigned Numbers Authority (IANA)



Reference Models

Benefits of Using a Layered Model





Reference Models

The OSI Reference Model

OSI Model

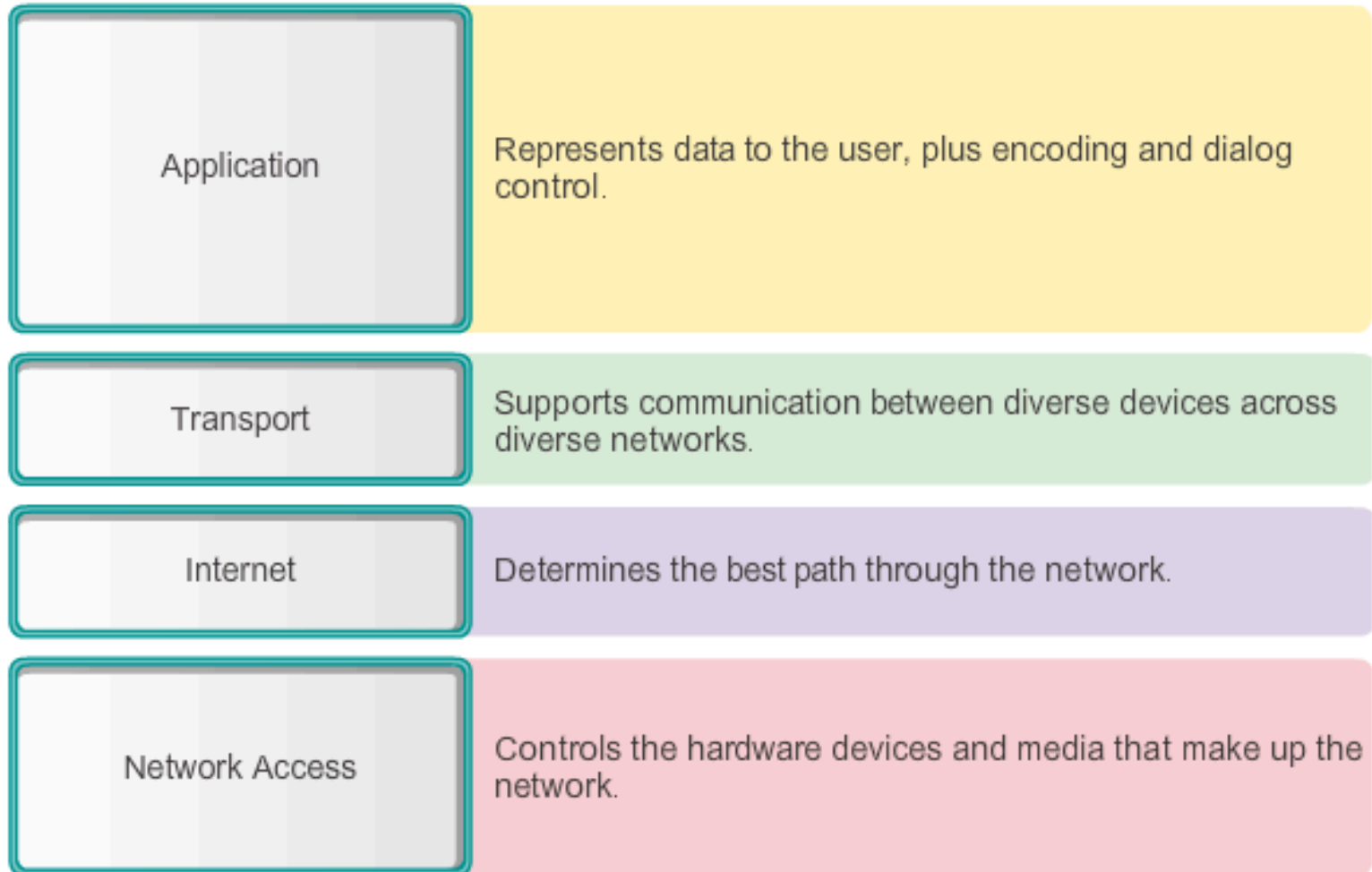




Reference Models

The TCP/IP Reference Model

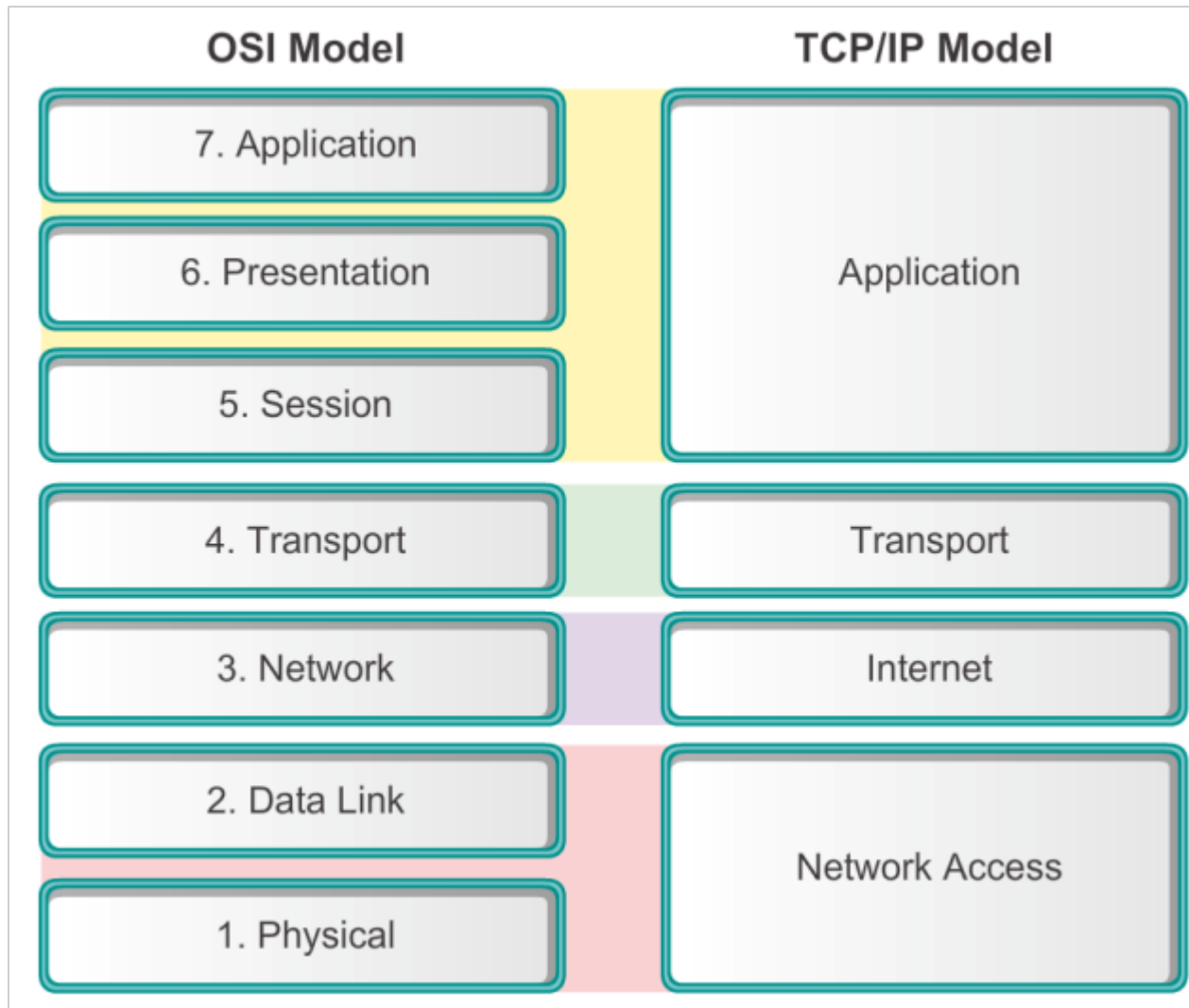
TCP/IP Model





Reference Models

Comparing the OSI and TCP/IP Models

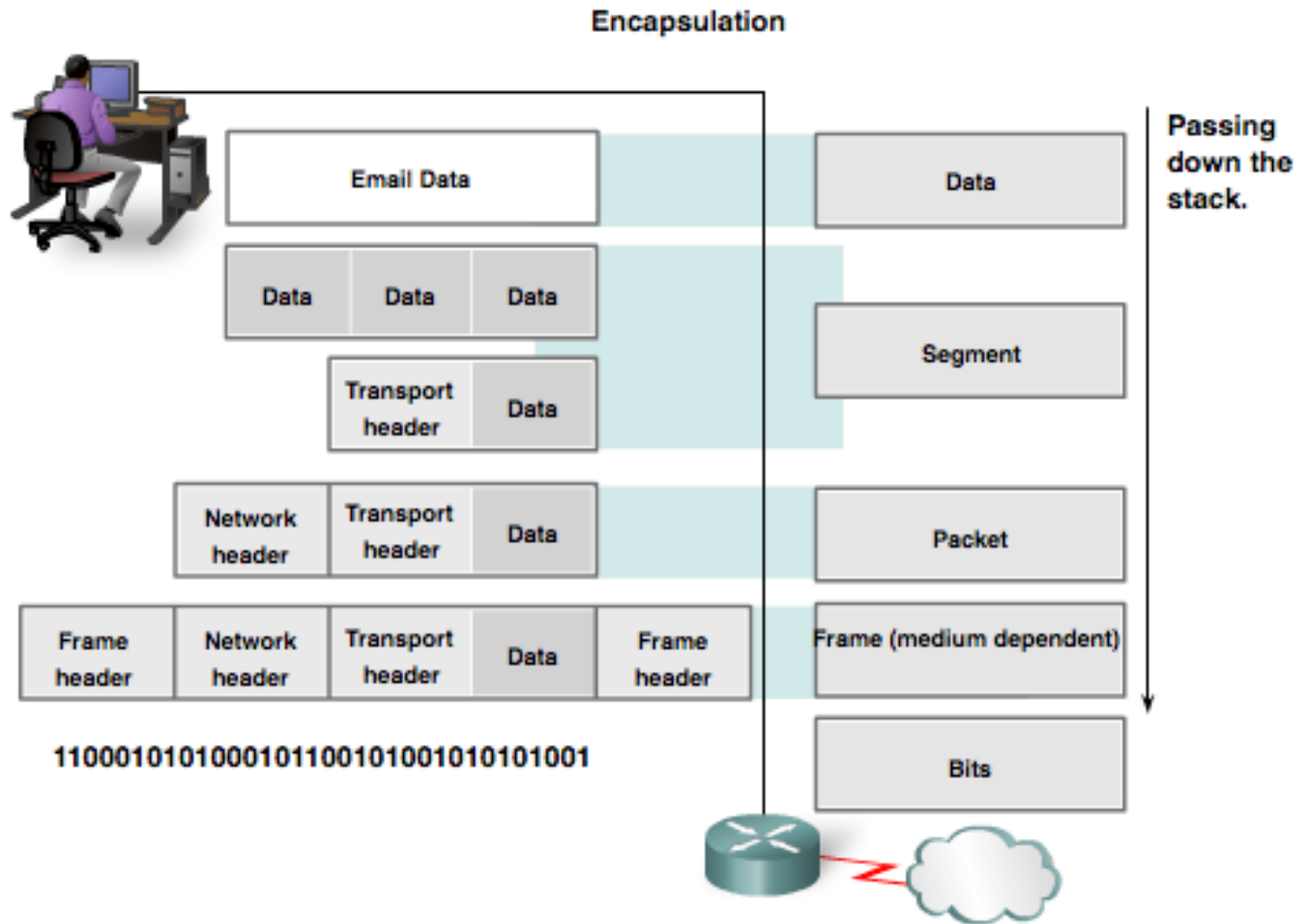




Data Encapsulation

Protocol Data Units (PDUs)

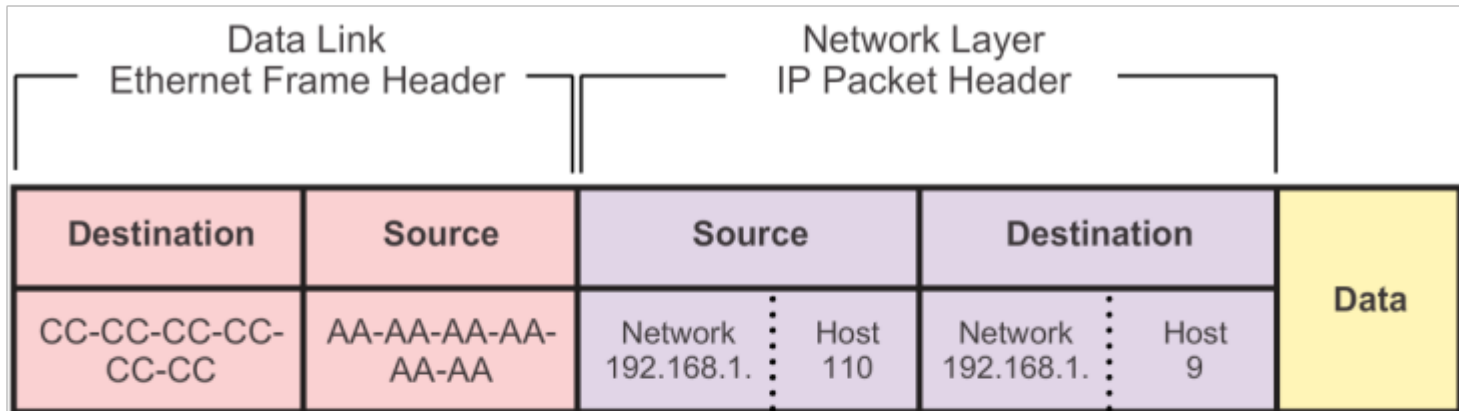
- Data
- Segment
- Packet
- Frame
- Bits





Accessing Local Resources

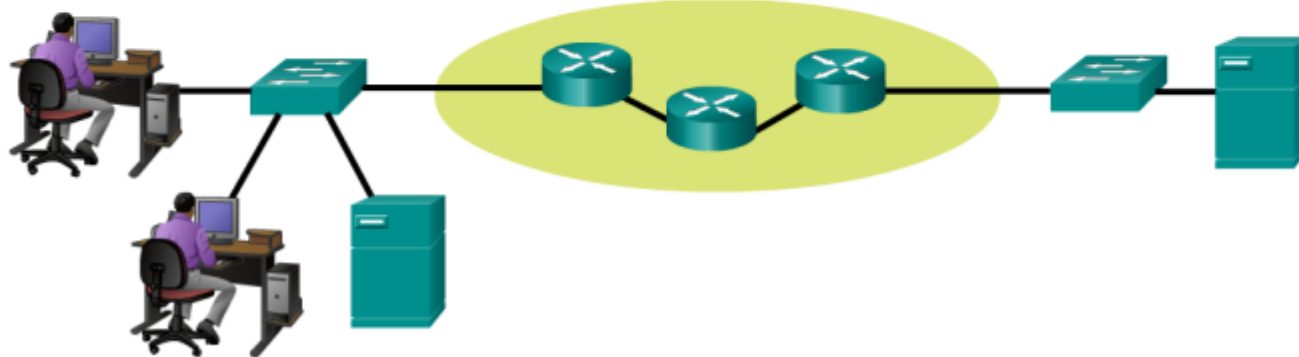
Communicating with Device / Same Network



PC1

192.168.1.110

AA-AA-AA-AA-AA-AA



FTP Server

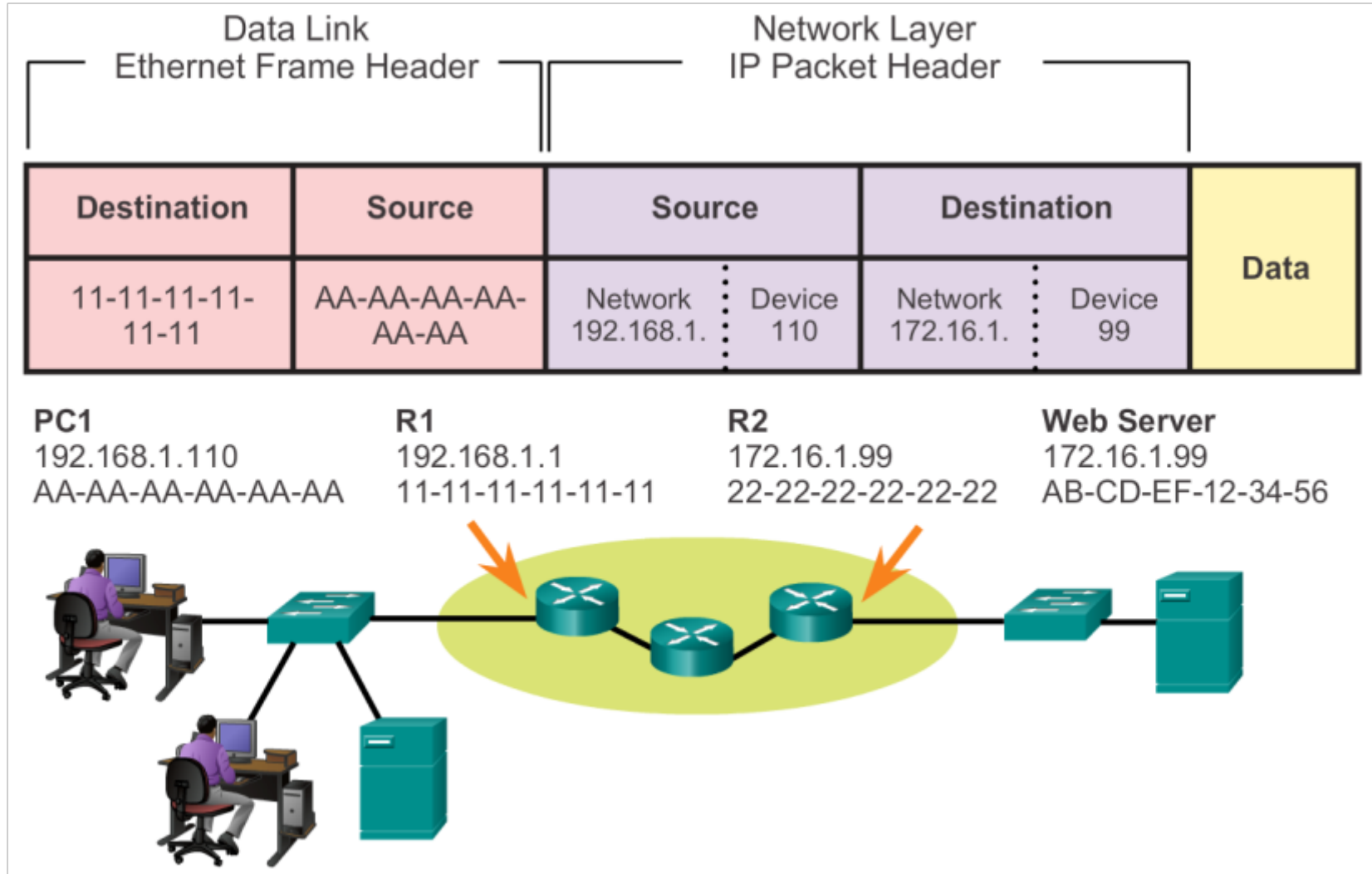
192.168.1.9

CC-CC-CC-CC-CC-CC



Accessing Remote Resources

Communicating Device / Remote Network



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