CompTIA Network+ Exam N10-008

Lesson 1
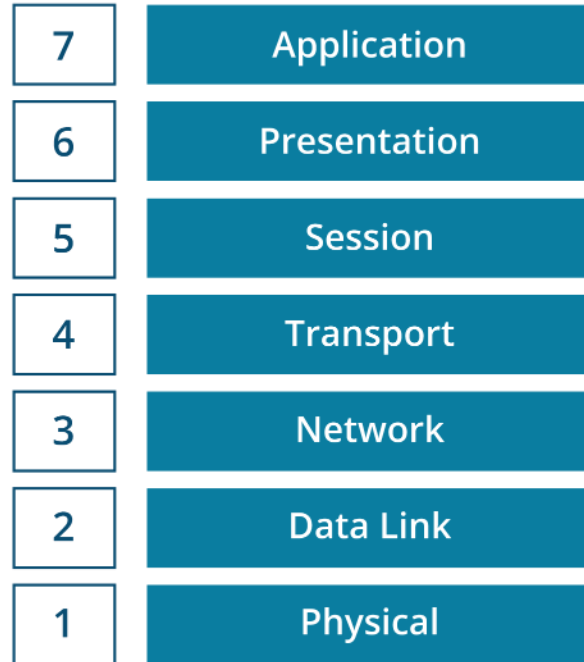
Comparing OSI Model Network Functions

Objectives

- Compare and contrast OSI model layers
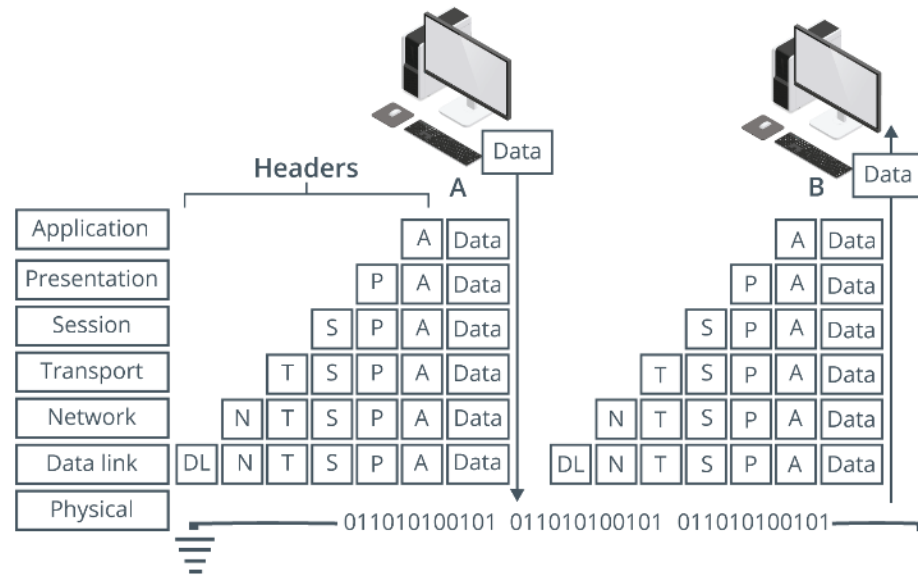
- Configure SOHO networks

Topic 1A

Compare and Contrast OSI Model Layers

Open Systems Interconnection Model

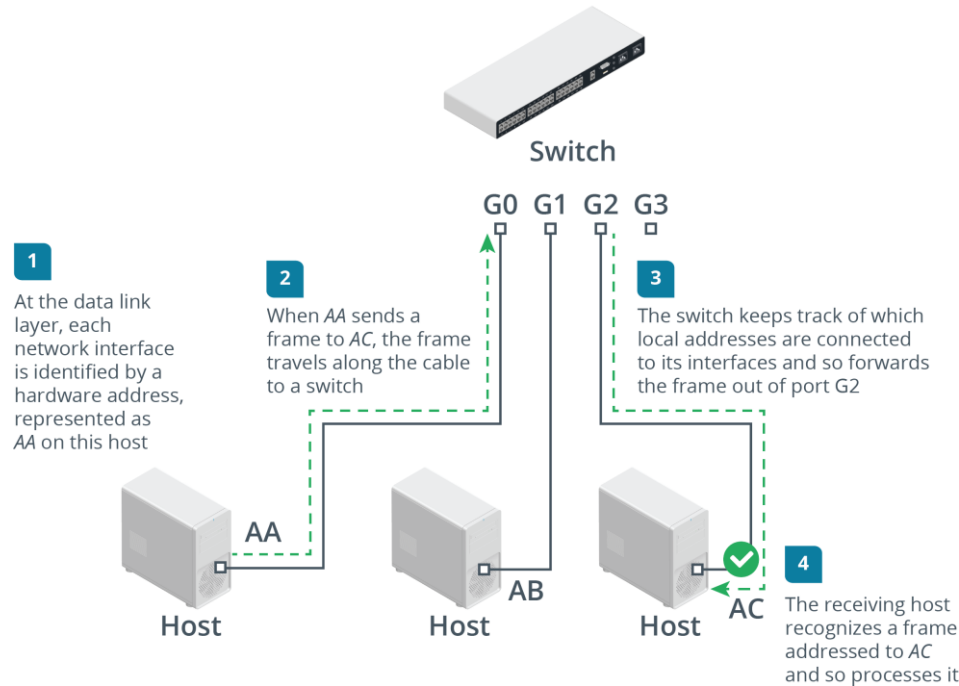# Data Encapsulation and Decapsulation

- Network protocol functions

  - Addressing

  - Encapsulation

- Protocol stack

  - Same layer interaction

  - Adjacent layer interaction

- Protocol Data Unit (PDU)

  - Headers

  - Payload/data
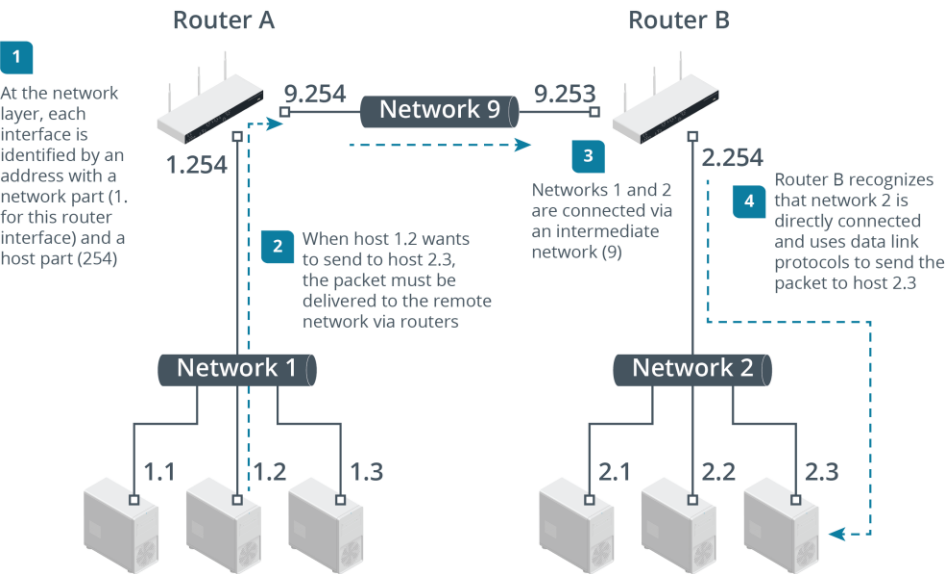
Layer 1—Physical

- Physical (PHY) layer transmission media types

  - Cabled

  - Wireless

- PHY layer features

  - Physical topology and segments

  - Physical interface and transmission of signals

  - Modulation and encoding

- Devices working at layer 1

  - Transceiver, repeater, hub, media converter, modem

Layer 2—Data Link

- Exchange PDUs as frames using hardware addresses within local segment

- Logical versus physical topology

- Intermediate systems versus end systems

- Devices working at layer 2

  - Network interface card (NIC), bridge, switch, wireless access point (AP)

Switch

G0 G1 G2 G3

1 At the data link layer, each network interface is identified by a hardware address, represented as *AA* on this host

2 When *AA* sends a frame to *AC*, the frame travels along the cable to a switch

3 The switch keeps track of which local addresses are connected to its interfaces and so forwards the frame out of port G2

4 The receiving host recognizes a frame addressed to *AC* and so processes it

AA

AB

AC

Host   Host   Host

Layer 3—Network

- Network of networks or internetwork

- Forward datagrams/packets via routers using logical network addresses

- Can contain multiple segments using different physical layer specifications and layer 2 protocols

- Devices working at layer 3

  - Router, basic firewall

Layer 4—Transport

- Identify application data using port numbers

- Load balancer, advanced firewall, intrusion detection system (IDS)
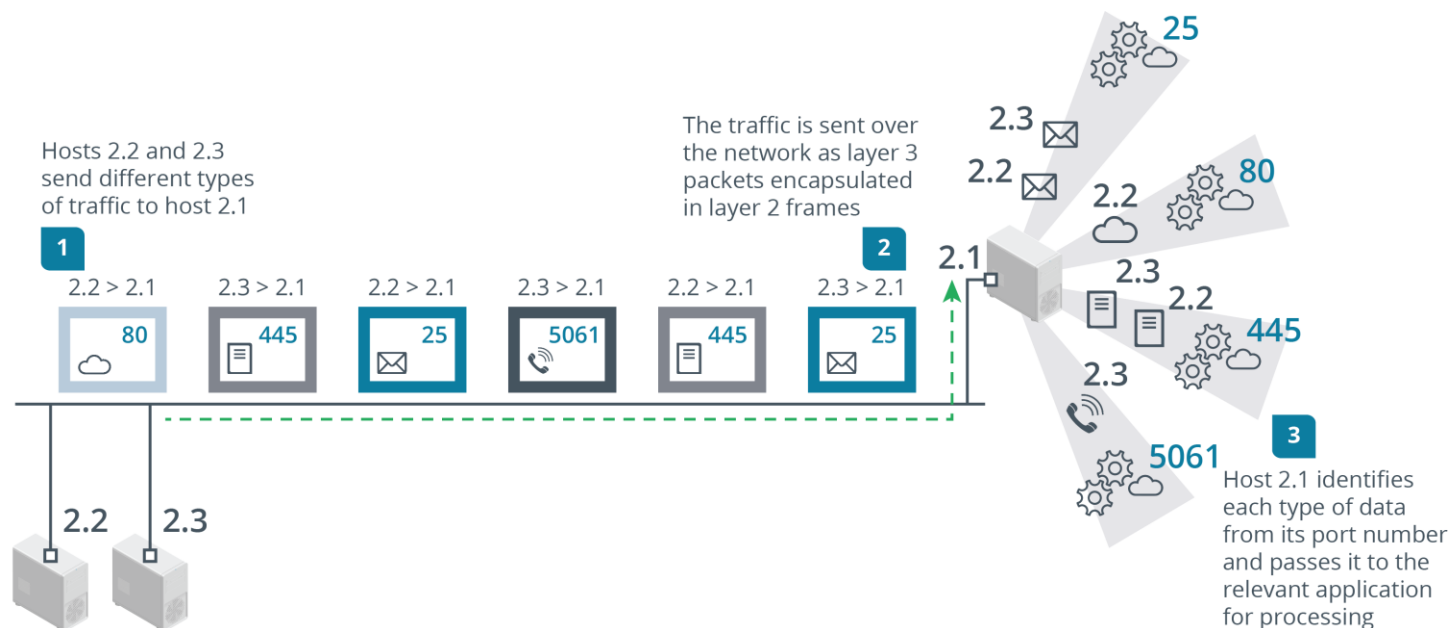
Upper Layers

- Layer 5—Session

  - Establish rules for exchange of messages and sequencing (dialog control)

- Layer 6—Presentation

  - Establish data formats (such as character sets)

- Layer 7—Application

  - Present requests and responses from server or client software with structured headers and data payload

OSI Model Summary
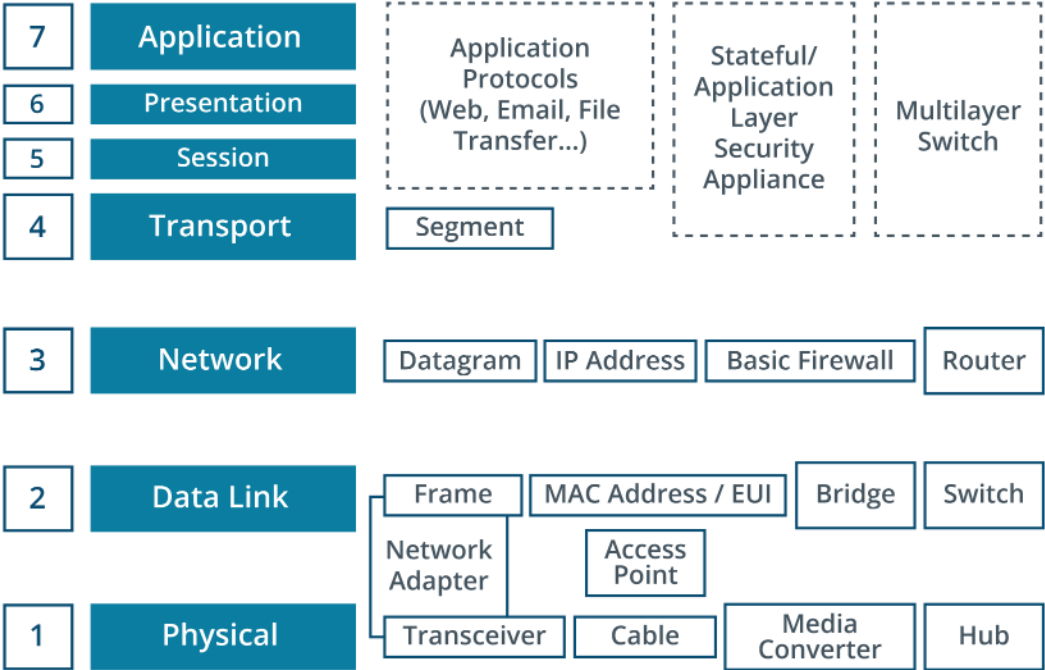
↻ Review Activity: OSI Model Layers

- Open Systems Interconnection Model

- Data Encapsulation and Decapsulation

- Layer 1—Physical

- Layer 2—Data Link

- Layer 3—Network

- Layer 4—Transport

- Upper Layers

🧪 Lab Activity

Assisted Lab: Exploring the Lab Environment

- Lab types
  - Assisted labs guide you step-by-step through tasks
  - Applied labs set goals with limited guidance
- Complete lab
  - Submit all items for grading and check each progress box
  - Select "Grade Lab" from final page
- Save lab
  - Select the hamburger menu and select "Save"
  - Save up to two labs in progress for up to 7 days
- Cancel lab without grading
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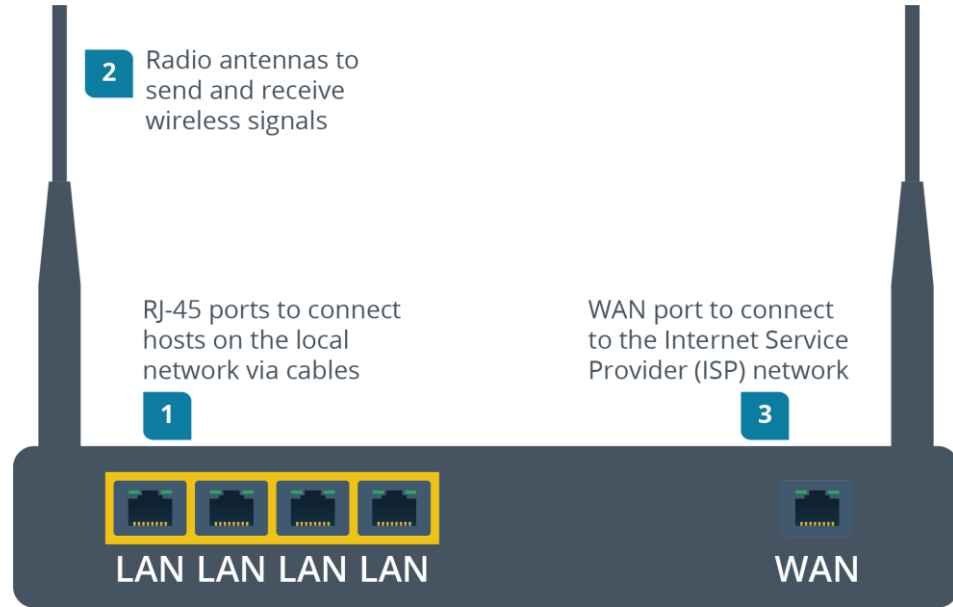
Lesson 1

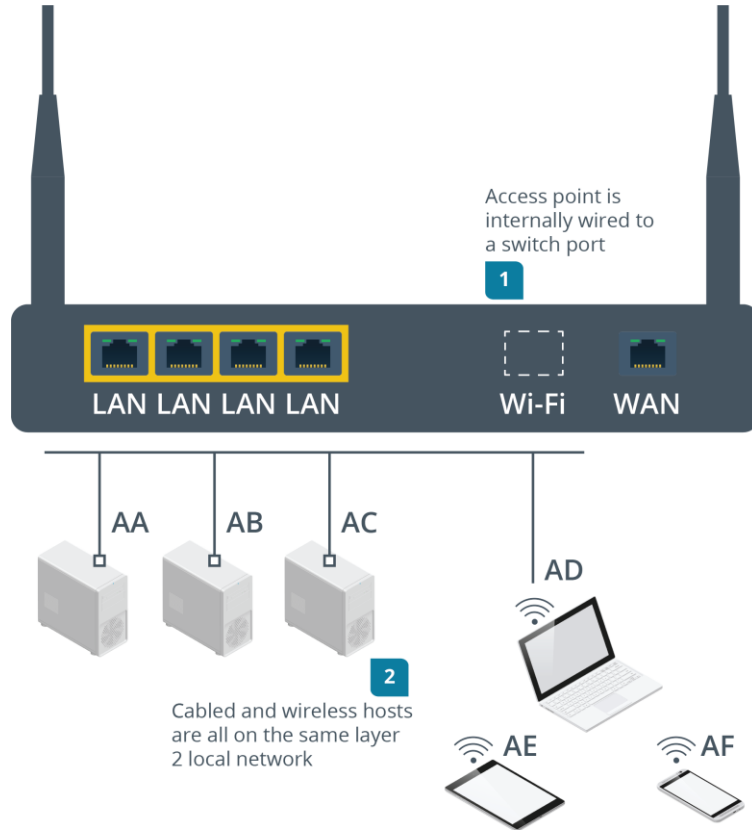# Topic 1B

Configure SOHO Networks

SOHO Routers

- Local area network (LAN) scope

- Small office, home office (SOHO) category LANs

- Wide area network (WAN) scope

- SOHO router

  - Multifunction network appliance

  - Combine modem, switch, wireless access point, router, firewall

  - Establish a local area network and connect it to the Internet WAN

Physical Layer Functions

- RJ-45 ports for cabled network connections

- Radio antennas for wireless signaling
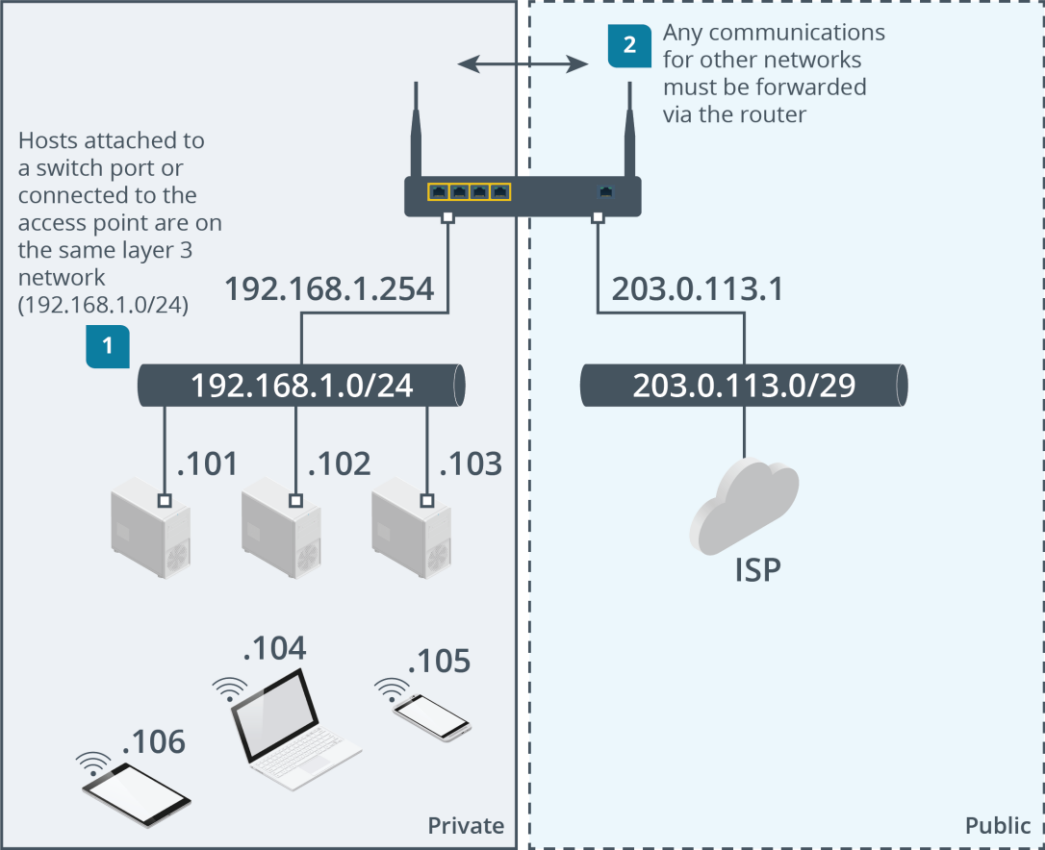
- Modem for WAN connectivity

2 Radio antennas to send and receive wireless signals

RJ-45 ports to connect hosts on the local network via cables

1

WAN port to connect to the Internet Service Provider (ISP) network

3

LAN LAN LAN LAN   WAN

Data Link Layer Functions

Access point is internally wired to a switch port

1

LAN LAN LAN LAN   Wi-Fi   WAN

AA   AB   AC

AD

2

Cabled and wireless hosts are all on the same layer 2 local network

AE   AF

- Ethernet switch

  - Connect the RJ-45 ports

- Wireless access point

  - Implement a Wi-Fi standard

  - Connect stations in a wireless LAN (WLAN)

  - Connected to switch to bridge wired and wireless segments in single data link network

- Media access control (MAC) hardware addresses identify each interface

17

Network Layer Functions

Hosts attached to a switch port or connected to the access point are on the same layer 3 network (192.168.1.0/24)

1

2 Any communications for other networks must be forwarded via the router

192.168.1.254

192.168.1.0/24

.101   .102   .103

203.0.113.1

203.0.113.0/29

ISP

.104   .105

.106

Private

Public

18

Transport and Application Layer and Security Functions

- Filtering between public and private zones (firewall)

  - Specify allow/block rules for IP addresses

  - Specify allow/block rules for layer 4 port numbers

- Authenticate access to the wireless network

- Protect the SOHO router management interface

The Internet

- The public switched telephone network (PSTN)

- Internet service providers (ISPs)

- Internet standards and authorities

  - Internet Assigned Numbers Authority (IANA)

    - Manages IP address allocation and namespaces

  - Internet Corporation for Assigned Names and Numbers (ICANN)

  - Regional Internet Registries (RIRs) and ISPs

  - Internet Engineering Taskforce (IETF) and requests for comments (RFCs)

Hexadecimal Notation

- Base numbering systems and place position

  - 255 = (2x10x10) + (5x10) + 5

- Binary/base 2

  - 11111111 = (1x2x2x2x2x2x2x2)+(1x2x2x2x2x2x2)+(1x2x2x2x2x2)+(1x2x2x2x2)+(1x2x2x2)+(1x2x2)+(1x2)+1 = 255

- Hexadecimal/base 16

  - A=10,B=11,C=12,D=13,E=14,F=15

  - FF = 255

Review Activity: SOHO Networks

- SOHO Routers

- Physical Layer Functions

- Data Link Layer Functions

- Network Layer Functions

- Transport and Application Layer and Security Functions

- The Internet

- Hexadecimal notation

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Lesson 1

Summary