

# CCENT Study Guide

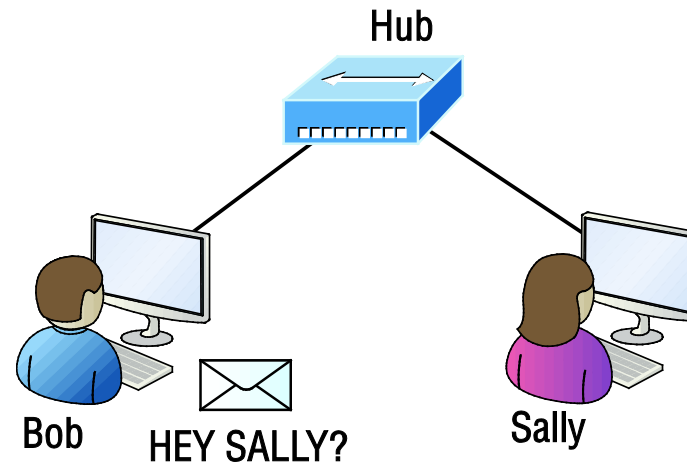
## Chapter 1

### Internetworking

# Chapter 1 Objectives

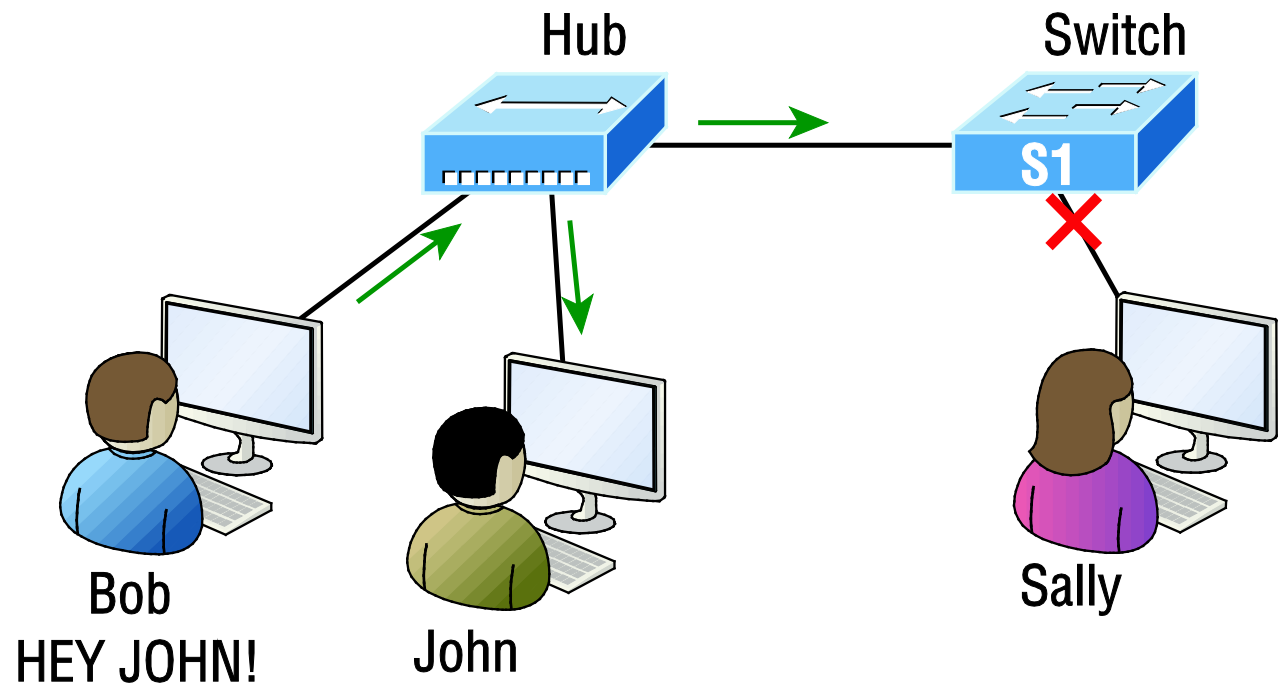
- The CCENT Topics Covered in this chapter include:
- ✓ **Network Fundamentals**
- 1.3 Describe the impact of infrastructure components in an enterprise network
  - . 1.3.a Firewalls
  - . 1.3.b Access points
  - . 1.3.c Wireless controllers
- 1.5 Compare and contrast network topologies
  - . 1.5.a Star
  - . 1.5.b Mesh
  - . 1.5.c Hybrid

# Figure 1.1: A very basic network



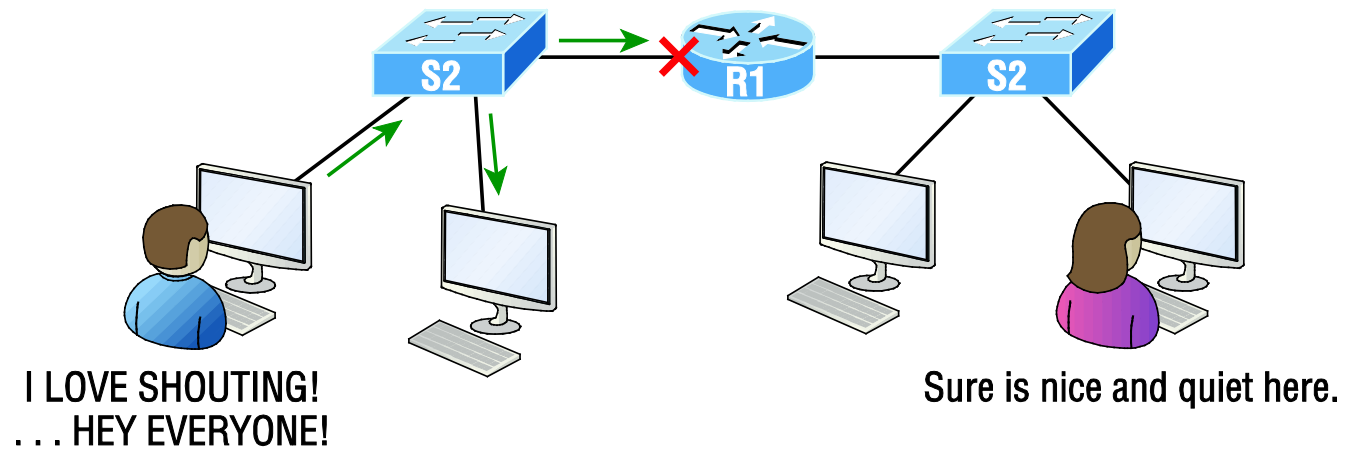
This figure shows a basic local area network (LAN) that's connected using a *hub*, which is basically just an antiquated device that connects wires together.

# Figure 1.2: A switch can break up collision domains



This figure shows a network that's been segmented with a switch, making each network segment that connects to the switch its own separate collision domain. Doing this results in a lot less yelling!

# Figure 1.3: Routers create an internetwork



This figure depicts a router in our growing network, creating an internetwork and breaking up broadcast domains.

# Figure 1.4: Internetworking devices

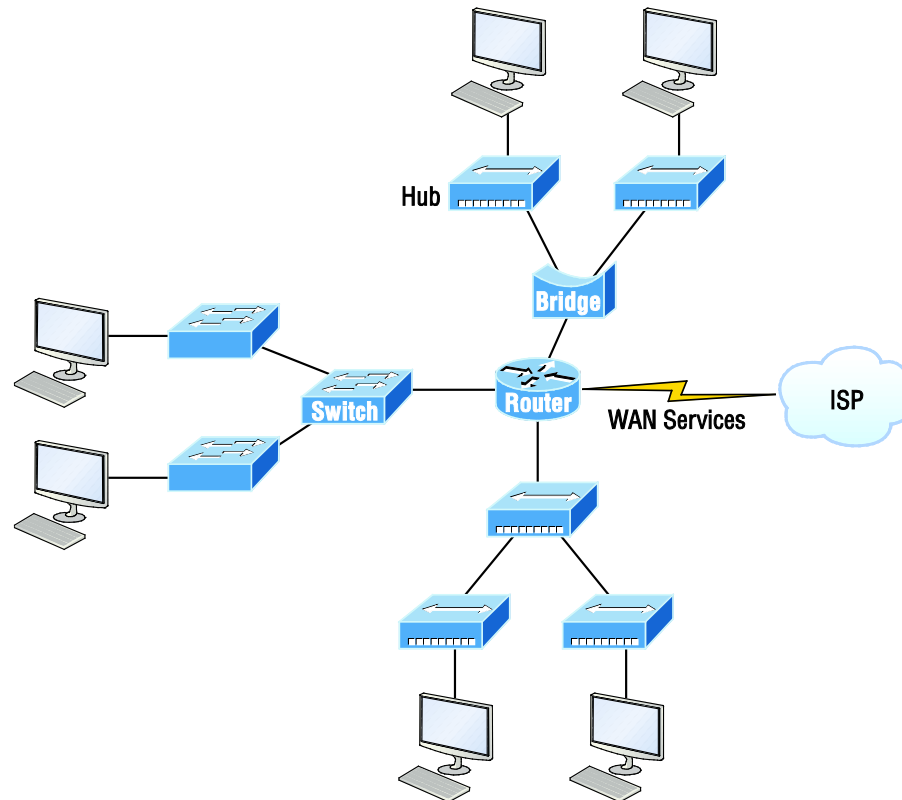
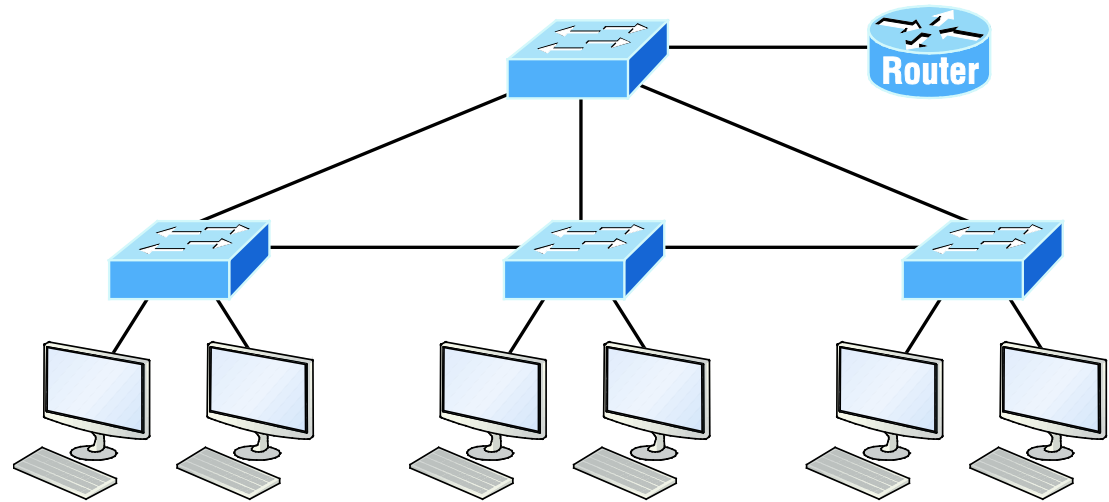


Figure 1.4 shows how a network would look with all these internetwork devices in place. Remember, a router doesn't just break up broadcast domains for every LAN interface, it breaks up collision domains too.

# Figure 1.5: Switched networks creating an internetwork



When there are only switches in our example network, things really change a lot! Figure 1.5 demonstrates a network you'll typically stumble upon today.

# Figure 1.6: The upper layers

# Figure 1.7: The lower layers

Application	<ul style="list-style-type: none"><li>• Provides a user interface</li></ul>
Presentation	<ul style="list-style-type: none"><li>• Presents data</li><li>• Handles processing such as encryption</li></ul>
Session	<ul style="list-style-type: none"><li>• Keeps different applications' data separate</li></ul>

Transport	<ul style="list-style-type: none"><li>• Provides reliable or unreliable delivery</li><li>• Performs error correction before retransmit</li></ul>
Network	<ul style="list-style-type: none"><li>• Provides logical addressing, which routers use for path determination</li></ul>
Data Link	<ul style="list-style-type: none"><li>• Combines packets into bytes and bytes into frames</li><li>• Provides access to media using MAC address</li><li>• Performs error detection not correction</li></ul>
Physical	<ul style="list-style-type: none"><li>• Moves bits between devices</li><li>• Specifies voltage, wire speed, and pinout of cables</li></ul>

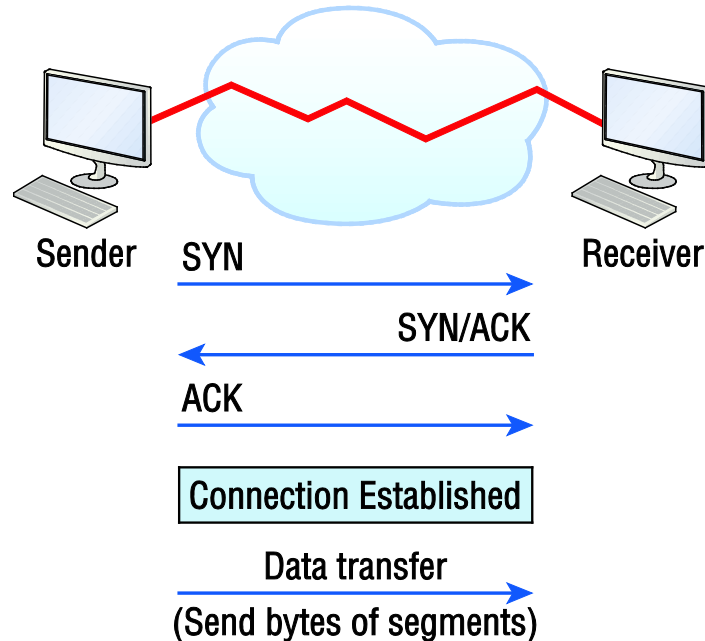


# Figure 1.8: OSI layer functions

Application	• File, print, message, database, and application services
Presentation	• Data encryption, compression, and translation services
Session	• Dialog control
Transport	• End-to-end connection
Network	• Routing
Data Link	• Framing
Physical	• Physical topology

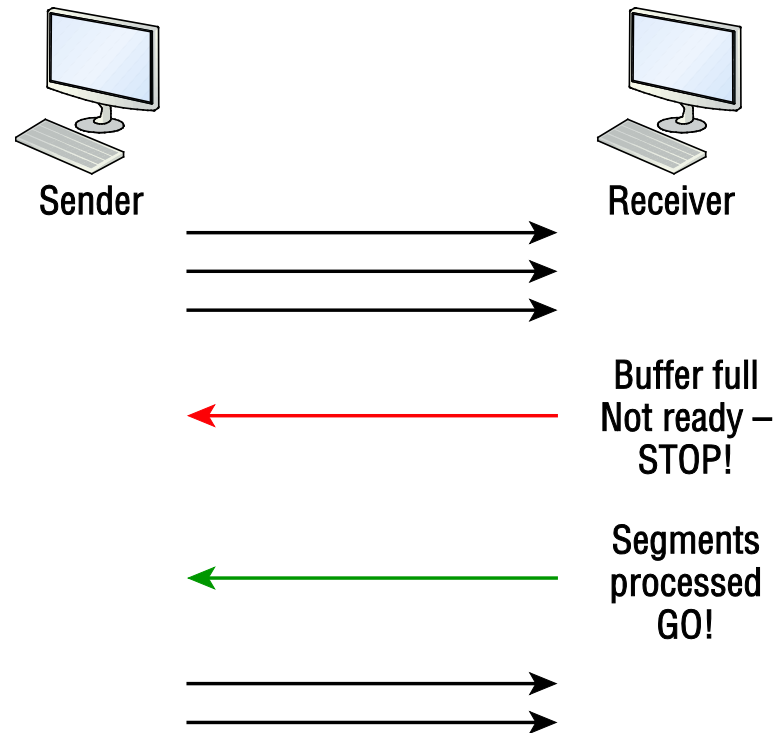
This figure separates the 7-layer model into three different functions. The upper layers, the middle layers and the bottom layers. The upper layers communicate with the user interface and application, the middle layers do reliable communication and routing to a remote network, and the bottom layers communicate to the local network.

# Figure 1.9: Establishing a connection-oriented session

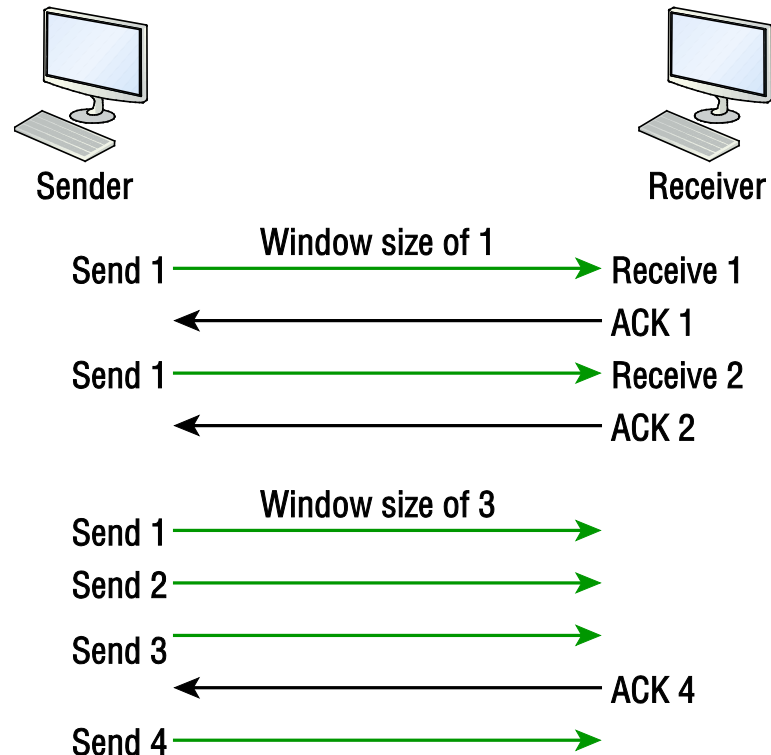


This figure depicts a typical reliable session taking place between sending and receiving systems. In it, you can see that both hosts' application programs begin by notifying their individual operating systems that a connection is about to be initiated.

# Figure 1.10: Transmitting segments with flow control

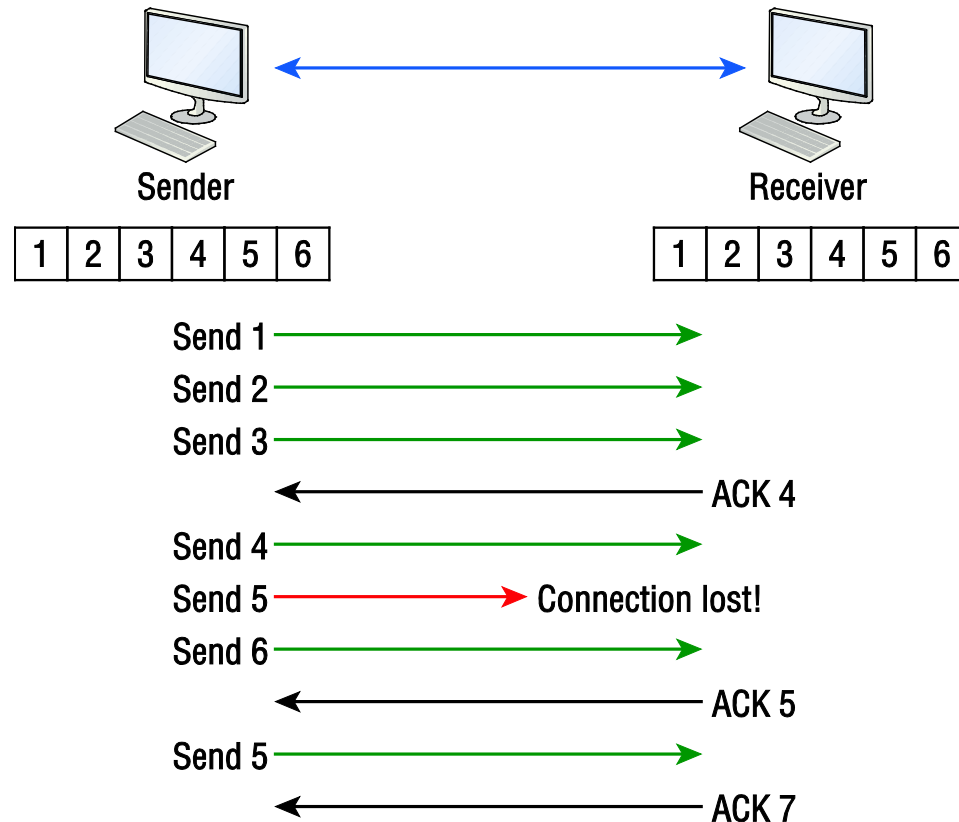


# Figure 1.11: Windowing



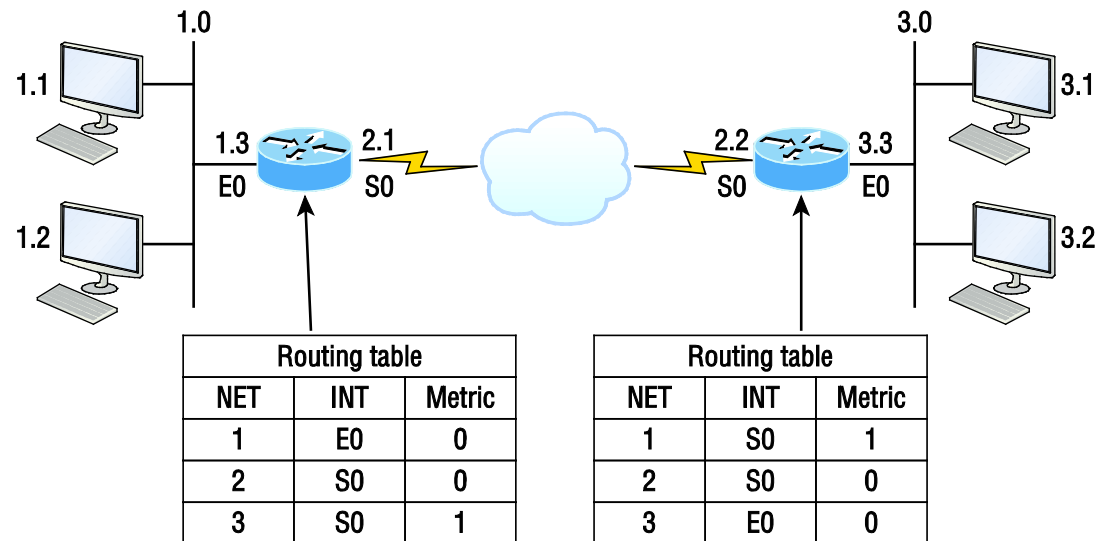
If you've configured a window size of 1, the sending machine will wait for an acknowledgment for each data segment it transmits before transmitting another one but will allow three to be transmitted before receiving an acknowledgment if the window size is set to 3.

# Figure 1.12: Transport layer reliable delivery

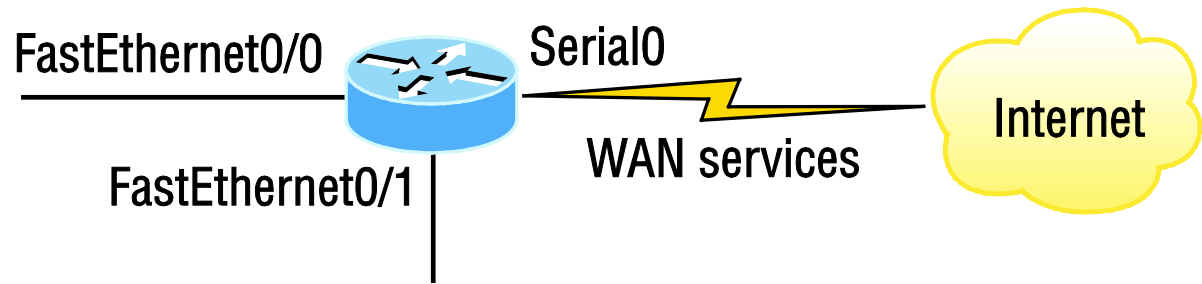


In the figure, the sending machine transmits segments 1, 2, and 3. The receiving node acknowledges that it has received them by requesting segment 4 (what it is expecting next).

# Figure 1.13: Routing table used in a router



# Figure 1.14: A router in an internetwork



Each router LAN interface is a broadcast domain. Routers break up broadcast domains by default and provide WAN services.

# Figure 1.15: Data Link layer

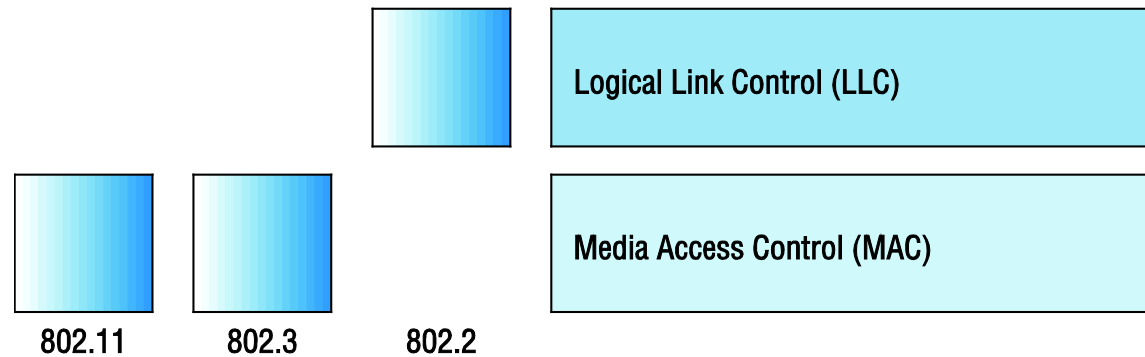
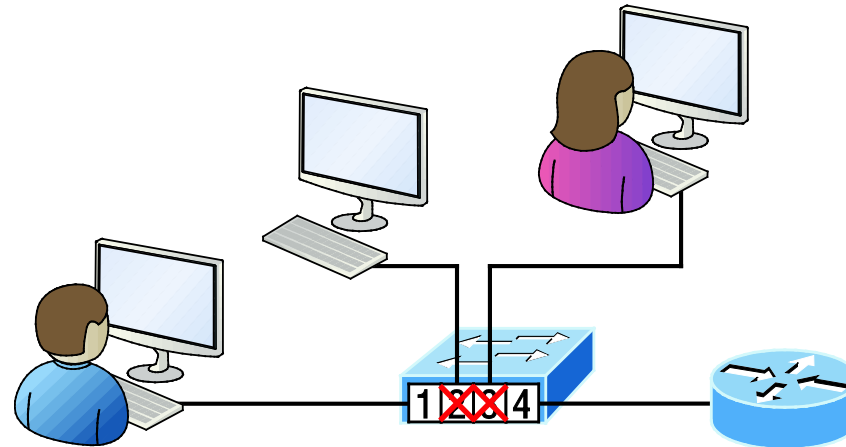


Figure 1.15 shows the Data Link layer with the Ethernet and IEEE specifications.



# Figure 1.16: A switch in an internetwork

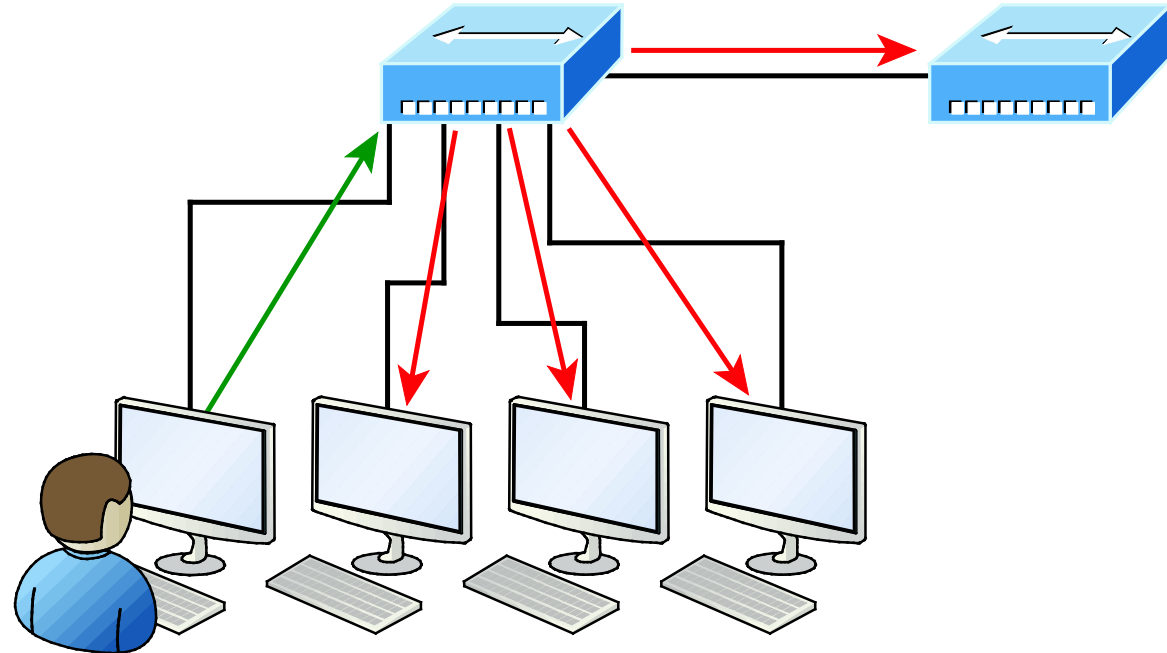


## Mac Address—Table

→	F0/1: 00c0.1234.2211	
	F0/2: 00c0.1234.2212	
	F0/3: 00c0.1234.2213	
	F0/4: 00c0.1234.2214	→

Figure 1.16 shows a switch in an internetwork and how John is sending packets to the Internet and Sally doesn't hear his frames because she is in a different collision domain.

# Figure 1.17: A hub in a network



I love it when everyone has to listen to everything I say!

Figure 1.17 shows a hub in a network, and how when one host transmits, all other hosts must stop and listen.

# Written Labs and Review Questions

- Read through the Exam Essentials section together in class.
- Open your books and go through all the written labs and the review questions.
- Review the answers in class.