

# ***Real World Scenario & Lesson Companion***

## **Real World Scenario**

### **Network Foundations**

Read the scenario. Then, use this guide as you work through the lesson. Answer the questions to help you connect your learning to the scenario.

### **Scenario:**

#### **Expanding Clinic Network: Infrastructure Enhancement**

You've been appointed as a network administrator for Saltwater Family Medicine, a small medical clinic on the East Coast. The clinic has been rapidly growing within its current location, leading to the addition of more rooms and staff members. As part of your role, you need to evaluate the existing network setup, pinpoint any gaps, and design a solution to accommodate the expansion within the Saltwater Family Medicine premises.

Currently, the clinic's network comprises a wireless network and a few wired connections, serving 25 computers, 10 printers, and 20 mobile devices. However, the existing wireless network lacks the capacity to cover the expanded area effectively. To support this internal growth, your task involves creating a network design that mirrors the original clinic's infrastructure. Moreover, the current wired connections are outdated and unable to handle the amplified bandwidth requirements of the growing operation.

The clinic's current bandwidth usage is approximately 50 Mbps, which needs to be upgraded to at least 100 Mbps to cater to the increased load. Additionally, the new rooms will necessitate video and audio conferencing capabilities for staff interactions, each requiring a minimum bandwidth of 5 Mbps.

Your objective is to assess the network, fulfill the requirements of the expanded Saltwater Family Medicine clinic, and devise a robust solution ensuring dependable and secure connectivity. The primary aim is to establish an enhanced network infrastructure that seamlessly supports communication among the various sections of the clinic while ensuring secure connectivity for both staff and patients.

### **Task 1: Define the Dependencies**

What are the key factors that influence the scenario?

What are the prerequisites required to understand the scenario?

What are the main assumptions underlying the scenario?

## **Task 2: Assess the Needs**

What resources are required to address the needs of the scenario and how can they be acquired?

What are the potential challenges or barriers that may be faced when attempting to address the needs of the scenario?

What are the potential risks or consequences of not addressing the needs of the scenario and how can they be mitigated?

## **Task 3: Create an Implementation Plan**

What are the main steps required to implement the solution to the scenario?

What priority should be given to tasks required to implement the solution?

What potential challenges or obstacles may arise during the implementation process and how can they be overcome?

## **Lesson Companion**

### **Network Foundations**

Use this lesson companion to help you retain and synthesize the information that is integral to your progress. As you engage with the lesson material alongside your instructor, take note of key points and extract pertinent details.

### **Network Types and Devices**

List the common types of networks and provide their descriptions.

#### **Real World Scenario Connection**

What type of network does the Saltwater Family Medicine Clinic currently use?

Will this network be sustainable after the expansion?

What type of network would you recommend the clinic use when they expand their operations?

List the common types of devices and their descriptions.

**Real World Scenario Connection**

Which devices are currently connected to the Saltwater Family Medicine Clinic's network?

What types of devices will need to be added or removed from the clinic's current network to allow it to support the expansion?

Does accreditation as a medical provider and the need to maintain patient privacy force the need for any specific devices?

What are intermediary devices?

What is a switch and how does it work?

List the three types of switches and describe each one.

**Real World Scenario Connection**

What type of switch do you think the original Saltwater Family Medicine Clinic has?

Will you be able to institute the same type of switch after the expansion or will you have to change switches for the expanded network to function?

Fill in the charts.

| Type of Domain    | Description |
|-------------------|-------------|
| Collision Domains | SWITCH      |
| Broadcast Domain  | SWITCH      |

| Duplex Models     | Description |
|-------------------|-------------|
| Half Duplex Model |             |
| Full Duplex Model | FULL        |

**Real World Scenario Connection**

Do you think the Saltwater Family Medicine Clinic network should use a hub or a switch? Why do you think this type of device would work best? Which duplex model is going to enable the clinic network to function best and why?

What is a router and how does it work?

List and describe four other devices that are important for the creation of networks.

ROUTER Layer3 – IP Address

### Real World Scenario Connection

Can you recommend any other devices that the Saltwater Family Medicine Clinic should consider including in their network expansion plan? Router AP with Firewalls

## Network Media and Cables

What does the term media refer to? Data in either of the 3-states  
What is the most common way to connect to a network? Router  
List the five ethernet cable types and provide their specifications.

### Real World Scenario Connection

Which ethernet cable should be used to ensure reliable and fast connectivity after the expansion?

–CAT6 Should be suitable

How did you determine which type of ethernet cable should be used for the clinic's expansion?

–Determining the distances needed to be traveled, possibly installing switches between 100m ranges.

Define UTP and STP.

How are wires and cables connected in the straight-through ethernet cable configuration?

How are wires and cables connected in the crossover cable configuration?

### Real World Scenario Connection

Which type of ethernet cable configuration should be used to provide reliable and secure connectivity between the original clinic rooms and the new rooms?

How will the cable length and cable quality affect the network performance and speed, and which ethernet cable configuration should be chosen to optimize network performance? CAT6 or CAT6A

What are optical fiber cables and why are they used?

- Glass fiber optical cables offer much higher speed but also require much more initial investment.

## Network Topologies and Architecture

Define network topology.

Fill in the table for network topologies.

| Network Topology Type | Description                                   |
|-----------------------|---|
| Point-to-Point        | Home Router                                   |
| Star                  | WLC Wireless Lan Controller                   |
| Mesh                  | Satellite 'controllers' which look at the WLC |
| Hybrid                | Combination of one or all                     |

#### Real World Scenario Connection

Which type of network topology would be best suited to connect the Saltwater Family Medicine Clinic? Why?

What considerations should be taken into account when designing a network topology that can support the clinic's video and audio conferencing needs?

– Either a virtualization layer or MSP business class internet

Define 3-tier architecture.

List the three layers of 3-tier architecture and describe each layer.

What is collapsed architecture and how is it different from 3-tier architecture?

#### Real World Scenario Connection

What are the advantages and disadvantages of implementing a 3-tier architecture versus a collapsed architecture for the Saltwater Family Medicine Clinic's network infrastructure?

How would you design the network architecture for the new Saltwater Family Medicine Clinic, considering the existing infrastructure of the original clinic?

What does MAC stand for and what is a MAC address?

Which two parts are included in a MAC address?

What does IP stand for and what are the two versions of IP? IPV4 IPV6

Complete these sentences:

The first IP address of each subnet is 255 or 172

The last IP address of each subnet is 192.168

#### Real World Scenario Connection

Which network class would be most appropriate for the Saltwater Family Medicine Clinic's network infrastructure given the current number of devices and the anticipated growth of the clinic's operations?

Class B and Possibly subdivide that further.

## Physical and Logical Addresses

What does MAC stand for and what is a MAC address?

Which two parts are included in a MAC address?

What does IP stand for and what are the two versions of IP?

Complete these sentences:

The first IP address of each subnet is \_\_\_\_\_.

The last IP address of each subnet is \_\_\_\_\_.

### Real World Scenario Connection

Which network class would be most appropriate for the Saltwater Family Medicine Clinic's network infrastructure given the current number of devices and the anticipated growth of the clinic's operations?

## Network Protocols and Commands

What are protocols?

Fill in the chart about network protocols.

| Network Protocol | Description |
|------------------|-------------|
| IP               |             |
| DNS              |             |
| DHCP             |             |
| HTTP             |             |
| HTTPS            |             |

### Real World Scenario Connection

How can network protocols be used to ensure secure communication between the original Saltwater Family Medicine Clinic and the expanded Clinic, particularly when sensitive patient information is being transmitted?

Fill in the chart about network commands.

| Network Commands | Descriptions |
|------------------|--------------|
| PING             |              |
| IPCONFIG         |              |
| NSLOOKUP         |              |
| TRACERT          |              |
| NETSH            |              |

#### Real World Scenario Connection

Which command will you use to test the connectivity between the original Saltwater Family Medicine Clinic and the new Saltwater Family Medicine West Clinic?

What commands will you use to diagnose and troubleshoot connectivity issues, such as IP address conflicts or DNS configuration problems, in the clinic's network?

## Wireless Technology

What are the advantages of wireless networks?

List and describe four security issues with wireless networks.

**Real World Scenario Connection**

What security measures can be implemented to ensure that the wireless network is secure and protected from unauthorized access, especially since the clinic handles sensitive medical information?

How can the wireless network be expanded to provide coverage for the new Saltwater Family Medicine West Clinic and what type of equipment and technology will be required to ensure seamless connectivity between both clinics?

Define AP.

What is a Wireless NIC adapter?

Fill in the chart describing wireless technologies.

| Wireless Technology | Description |
|---------------------|-------------|
| Wi-Fi               |             |
| Wi-Max              |             |
| Bluetooth           |             |

**Real World Scenario Connection**

Which wireless LAN components should be considered when designing a solution for the expanded Saltwater Family Medical Clinic?

Fill in the chart describing media types.

| Media Type | Description |
|------------|-------------|
| Copper     |             |
| Fiber      |             |
| Wi-Fi      |             |