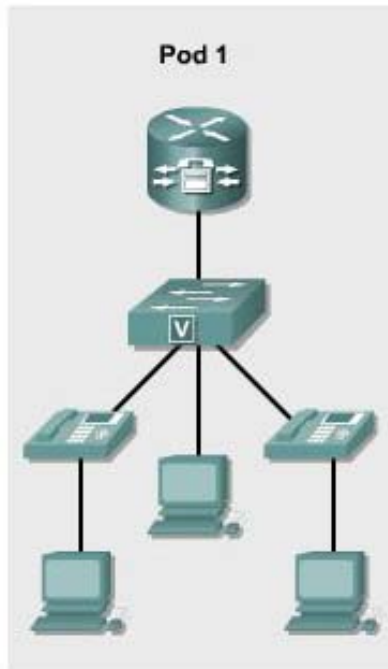


Lab 2.1.1b Basic Setup for the CME Router and Switch



Objectives

- Configure a Cisco router in preparation for CallManager Express (CME)
- Identify the DHCP configuration commands
- Configure a switch in preparation for CME

Equipment Requirements

- Cisco CallManager Express (CME) capable router
- Inline Power capable switch or non-inline power switch with power injectors
- Workstation with an Ethernet 10/100 NIC installed

In this lab, the ACME.com Company has decided to deploy CallManager Express in the enterprise. First, the router portion of CallManager Express must be configured. The routers and switches should be configured using the information found in IP Telephony Table 1.

Step 1 Assign a Pod Number

- a. Ask the instructor to assign a pod number to the lab group.

What pod number was the group assigned? _____

Step 2 Basic CME Router Configuration

- e. Connect to the console port of a Cisco CallManager Express router and power it on. If the router has a configuration already on it, erase the router and reload it.
- f. Enter privilege mode, and then configuration mode.
- g. Change the hostname of the router. Use the command **hostname CMERouterX**, where **X** is the pod number assigned to the group. Throughout the rest of the lab, use IP Telephony Table 1 parameters based on the pod number assigned.

```
Router(config)# hostname CMERouterX
```

- d. Set the enable secret password to **cisco**. (Do not deviate from this password.)
- e. Use the command **no ip domain-lookup** to disable name resolution since there is no DNS server in the classroom lab.

```
CMERouterX(config)# no ip domain-lookup
```

- f. Note that router commands are IOS and model specific. Examples given in this lab are the most common configurations seen. However, the command may vary slightly. For example, on a 1760 router the VTY lines are 0 through 15 instead of 0 through 4. Configure all the router VTY lines with parameters similar to the following:

```
CMERouterX(config)# line vty 0 4
CMERouterX(config-line)# password cisco
CMERouterX(config-line)# login
CMERouterX(config-line)# logging synchronous
```

- g. Configure the console port parameters.

```
CMERouterX(config)# line console 0
CMERouterX(config-line)# password cisco
CMERouterX(config-line)# login
CMERouterX(config-line)# logging synchronous
```

- h. Create a subinterface for the management VLAN by entering global configuration mode, and typing the command **interface fastethernet 0/0.1**. The management VLAN is the VLAN used to remotely manage network devices such as routers and switches.

Note: Depending on the model and physical configuration of the router, the interface could be a FastEthernet port or a Gigabit Ethernet port. Also, the router may have a different physical interface number (i.e., FastEthernet 0 or GigabitEthernet 2/0). If unsure about which interface is installed, verify the name of the Ethernet ports on the router by using the **show running-config** or **show ip interface brief** command.

```
CMERouterX(config)# interface fastethernet 0/0.1
```

What types of Ethernet interface(s) are on the router? _____

- i. Configure the subinterface for trunking by entering the command **encapsulation dot1q 1**. The 1 is the management VLAN number. The command instructs the router to use this subinterface for VLAN 1. If a warning message appears, ignore it. If this command does not work, the proper router is not being used.

```
CMERouterX(config-subif)# encapsulation dot1q 1
```

- j. Configure the management VLAN subinterface with an IP address appropriate for the management VLAN. From the subinterface configuration mode, enter the IP address for the management VLAN based on the information found in IP Telephony Table 1. Use the command **ip address 10.X.0.1 255.255.255.0** command (where **X** is the pod number).

```
CMERouterX(config-subif)# ip address 10.X.0.1 255.255.255.0
```

If a switch was configured with an IP address on the same management VLAN, what would be the default gateway IP address configured on the switch? _____

- k. Create a subinterface for the data VLAN by entering the global configuration mode and entering the command **interface fastethernet 0/0.X0** (where **X** is the pod number). For example, if the group was assigned to Pod 1, the command would be as follows: **interface fastethernet 0/0.10**

```
CMERouterX(config)# interface fastethernet 0/0.X0
```

- l. Configure the subinterface for trunking by entering the command **encapsulation dot1q X0** (where **X** is the pod number) **native**. The **native** keyword defines this VLAN as the one that is not tagged with VLAN information when a frame (from VLAN **X0**) crosses the trunk between the router and the switch. This allows the PC that connects to the IP phone to be on a different subnet than the IP phone and still receive an IP address from a DHCP server. If a warning message appears, ignore it. If this command does not work, the proper router is not being used.

```
CMERouterX(config-subif)# encapsulation dot1q X0 native
```

What is the purpose of the **dot1q** portion of the command?

- m. Configure the data VLAN subinterface with an IP address appropriate for the data VLAN. From the subinterface configuration mode, enter the IP address for the data VLAN based on the information found in IP Telephony Table 1. Use the command **ip address 10.X0.0.1 255.255.255.0** command (where **X** is the pod number).

```
CMERouterX(config-subif)# ip address 10.X0.0.1 255.255.255.0
```

If a host was configured on the same data VLAN, what would be the host default gateway IP address? _____

- n. Create a subinterface for the voice VLAN by entering the global configuration mode, and entering the command **interface fastethernet 0/0.X5** (where **X** is the pod number).

```
CMERouterX(config-subif)# interface fastethernet 0/0.X5
```

- o. Configure the subinterface for trunking by entering the command **encapsulation dot1q X5** (where **X** is the pod number).

```
CMERouterX(config-subif)# encapsulation dot1q X5
```

- p. Configure the voice VLAN subinterface with an IP address appropriate for the voice VLAN. Enter the IP address for the voice VLAN based on the information found in IP Telephony Table 1. Use the **ip address 10.X5.0.1 255.255.255.0** command (where **X** is the pod number).

```
CMERouterX(config-subif)# ip address 10.X5.0.1 255.255.255.0
```

- q. Bring the Ethernet interface to a useable condition.

```
CMERouterX(config)# interface fastethernet 0/0
```

```
CMERouterX(config-if)# no shutdown
```

- r. Configure the EIGRP routing protocol by using the **router eigrp 100** command to start an EIGRP process with an autonomous system number of 100. Then enter the command **network 10.0.0.0**, which enables and advertises EIGRP updates on all 10.0.0.0-configured interfaces.

```
CMERouterX(config)# router eigrp 100
CMERouterX (config-router)# network 10.0.0.0
```

- s. Connect a straight-through cable between the Ethernet port on the router and port 1 on the switch.
- t. Verify connectivity by viewing the interfaces on the router.

```
CMERouterX# show ip interface brief
```

- u. Is the Ethernet interface in a functional state? _____

If not, troubleshoot and resolve the problem. Do not proceed until the interface is up and up.

What is the status of the Status and Protocol states for the main Ethernet interface (not the subinterfaces)? _____

- v. Save the router configuration.

Step 3 Erasing the CME Switch

Note: The configuration output used in the lab is produced from a 2950 switch. Any other switch or IOS may produce different output. The following steps are to be executed on each model of switch unless specifically instructed otherwise.

- a. Connect a console cable to the switch and power on the switch.
- b. Erase the switch VLAN database and startup-configuration file by using the **delete flash:vlan.dat**, **erase startup-config**, and **reload** commands.

```
Switch# delete flash:vlan.dat
Delete filename [vlan.dat]? [Enter]
Delete flash:vlan.dat? [confirm] [Enter]
Switch# erase startup-config
Switch(config)# reload
```

Step 4 Examine the current switch configuration

- a. Examine the running configuration file:

```
Switch# show running-config
```

- b. How many Ethernet or Fast Ethernet interfaces does the switch have? _____
- c. What is the range of values shown for the VTY lines? _____
- d. Examine the current contents of NVRAM as follows:

```
Switch# show startup-config
%% Non-volatile configuration memory is not present
```

Note that on some switches, the message does not appear.

- e. If the switch gave the error message response, why does it appear?

Step 5 Assign a name to the switch

- Enter privilege mode and then configuration mode. Use the **hostname CMESwitchX** command (where **X** is the pod number) to name the switch. Throughout the rest of the lab, use IP Telephony Table 1 parameters based on the pod number assigned.

```
Switch# configure terminal
Switch(config)# hostname CMESwitchX
```

Step 6 Examine the current running configuration

- From privileged mode, exam the current configuration that follows to verify that there is no configuration except for the hostname:

```
CMESwitchX# show running-config
```

- Are there any passwords set on the console or VTY lines? _____
- What does the configuration show as the hostname of this switch? _____

Step 7 Set access passwords

Enter line configuration mode for the console port. Set the password on the console port to **cisco**. Configure the VTY lines with the password of **cisco**.

```
CMESwitchX# configure terminal
CMESwitchX(config)# line console 0
CMESwitchX(config-line)# password cisco
CMESwitchX(config-line)# login
CMESwitchX(config-line)# line vty 0 15
CMESwitchX(config-line)# password cisco
CMESwitchX(config-line)# login
```

Step 8 Set the command mode password

- Set the **enable secret** password to **cisco**.

```
CMESwitchX(config)# enable secret cisco
```

- Which password takes precedence, the enable password or enable secret password?

Step 9 Configure Layer 3 access to the switch

- a. Set the IP address of the switch to 10.X.0.4/24 (where X is the pod number). **Note:** This is done on the internal virtual interface VLAN 1.

```
CMESwitchX(config)# interface vlan 1
CMESwitchX(config-if)# ip address 10.X.0.4 255.255.255.0
CMESwitchX(config-if)# description Management VLAN
```

- b. What is the purpose of the management VLAN? _____

- c. Set the default gateway for the switch to 10.X.0.1 (where X is the pod number).

```
CMESwitchX(config)# ip default-gateway 10.X.0.1
```

- d. What is the purpose of putting a default gateway on a switch? (Be specific.)

Step 10 Verify and activate the management VLANs settings

- a. Verify the interface settings on VLAN 1 as follows:

```
CMESwitchX# show interfaces vlan 1
```

- b. What is the bandwidth on this interface? _____
- c. What are the VLAN states: VLAN1 is _____, line protocol is _____.
- d. What is the queuing strategy being used? _____
- e. Enable the virtual interface using the **no shutdown** command.

```
CMESwitchX(config)# interface vlan 1
CMESwitchX(config-if)# no shutdown
```

Step 11 Save the configuration

- a. The basic configuration of the switch has just been completed. Backup the running configuration file to NVRAM.

Note: This will ensure that the changes made will not be lost if the system is rebooted or loses power.

```
CMESwitchX# copy running-config startup-config
```

Step 12 Configure the switch port as a trunk port

- a. From global configuration mode, access switch interface port 1 that connects to the router.

```
CMESwitchX(config)# interface fastethernet 0/1
```

- b. From interface configuration mode, set the switch to use the IEEE 802.1Q trunking protocol.

Note: If this command does not work on the switch, the switch only supports the 802.1Q trunking protocol and does not have to be programmed with this command. The next step may have to be completed before this step if an older switch is being used.

```
CMESwitchX(config-if)# switchport trunk encapsulation dot1q
```

- c. From interface configuration mode, set the switch to trunking mode.

```
CMESwitchX(config-if)# switchport mode trunk
```

- d. The native VLAN is the one VLAN that does not have the VLAN information tagged onto the frame as it travels across the trunk. From interface configuration mode, specify which VLAN is the native VLAN (where **X** is the pod number).

```
CMESwitchX(config-if)# switchport trunk native vlan X0
```

- e. Besides trunking, what are the other modes for which a switch port can be configured?
-

- f. From enable mode verify the port is properly configured as a trunk port by using the **show interface interface-id switchport** command (where *interface-id* is the switch port used to connect to the router).

```
CMESwitchX# show interfaces fastethernet 0/1 switchport
```

- g. What is the status of the switch port (shown as *switchport* in the command output)?
-

- h. What is the status of the Administrative Mode? _____

- i. What is the status of the Operational Mode? _____

- j. What is the Operational Trunking Encapsulation that has been configured? _____

- k. What VLANs are trunked by default? _____

- l. Some switches have another command that can be used to verify trunking operations—**show interfaces trunk**.

```
CMESwitchX# show interfaces trunk
```

- m. If the **show interfaces trunk** command is available, what port(s) have trunking enabled?
-

- n. If the **show interfaces trunk** command is available, what VLAN is the native VLAN? (**Note:** The native VLAN is the VLAN that does not tag a frame from this VLAN as it traverses the trunk with VLAN information. It is also the VLAN that continues to cross the link between the router and the switch if the trunk ever fails for any reason.) _____

- o. If the **show interfaces trunk** command is available, what VLANs are allowed on the trunk based on the output from this command? _____

- p. If the **show interfaces trunk** command is available, what VLANs are participating in spanning tree and are in the forwarding state? _____

Step 13 Test connectivity across the trunk

- a. From enable mode on the switch, ping the router IP address for VLAN1 (the management VLAN). Refer to IP Telephony Table 1 for this address. (**X** in the command below refers to the pod number.)

```
CMESwitchX# ping 10.X.0.1
```

- b. Was the ping successful from the switch? _____
If the ping was unsuccessful, do not proceed until appropriate troubleshooting has been performed and the ping is successful. Note that on some models of routers and switches the speed and duplex must be manually configured on both ports.
- c. Ping the router IP address for the voice VLAN and the data VLAN. Refer to IP Telephony Table 1 for IP addresses, if necessary. All pings should be successful when the trunk is working correctly. Troubleshoot as necessary.

Step 14 Create VLANs on the switch

- a. Manually create the data and voice VLANs in the VLAN database. The **X** in the VLAN number is the pod number.

```
CMESwitchX# vlan database
CMESwitchX(vlan)# vlan X0
CMESwitchX(vlan)# vlan X5
CMESwitchX(vlan)# exit
```

Step 15 Configure switch ports for IP phones

- a. Cable the two IP phones to switch ports 4 and 6 using straight-through cables.
- b. Configure the two IP phone ports to use the IEEE 802.1Q trunking protocol using the **switchport trunk encapsulation dot1q** command. This command is executed from interface configuration mode.

Note that the next step may have to be completed before this step if an older switch is being used.

Configure each switch port for the trunking encapsulation mode.

```
CMESwitchX(config)# interface fastethernet 0/4 (and 6)
CMESwitchX(config-if)# switchport trunk encapsulation dot1q
```

- c. Configure the two IP phone ports to be trunk ports with the **switchport mode trunk** command. This command is executed from interface configuration mode.

```
CMESwitchX(config)# interface fastethernet 0/4 (and 6)
CMESwitchX(config-if)# switchport mode trunk
```


- d. For the ports that connect to the IP phones, the switch must be configured so that 802.1Q knows which VLAN contains voice traffic. This is done with the **switchport voice vlan** command. The voice VLAN is X5, where X is the pod number. Refer to IP Telephony Table 1 for the IP addressing scheme.

```
CMESwitchX(config)# interface fastethernet 0/4 (and 6)
CMESwitchX(config-if)# switchport voice vlan X5
```

- e. The IP phone has a port used to connect a PC. The PC can (and should) be on a separate VLAN from the IP phone. The IP phone connects to the switch via a trunk port. A trunk port can carry multiple VLAN information. In order for the phone to operate on a different VLAN from the phone, the **switchport trunk native vlan X0** (where X is the pod number) command must be used. The native VLAN is the VLAN that does not get tagged with VLAN information as frames from this VLAN traverse the trunk. The native VLAN must be the same as the data VLAN for this to work.

This command is done in interface configuration mode. The interface to use is the switch interface to which one of the IP phones connects (the one that has a PC connected to the PC port on the back of the IP phone). The X in the **switchport** command refers to the pod number.

```
CMESwitchX(config)# interface fastethernet 0/4 (and 6)
CMESwitchX(config-if)# switchport trunk native vlan X0
```

The IP phones will not register at this point because Call Manager Express has not been configured on the router yet.

- f. Save the switch configuration by typing the following command:

```
CMESwitchX# copy running-config startup-config
```

Note: Save the router and switch configurations to a text file as well. These configurations will be required in future labs.