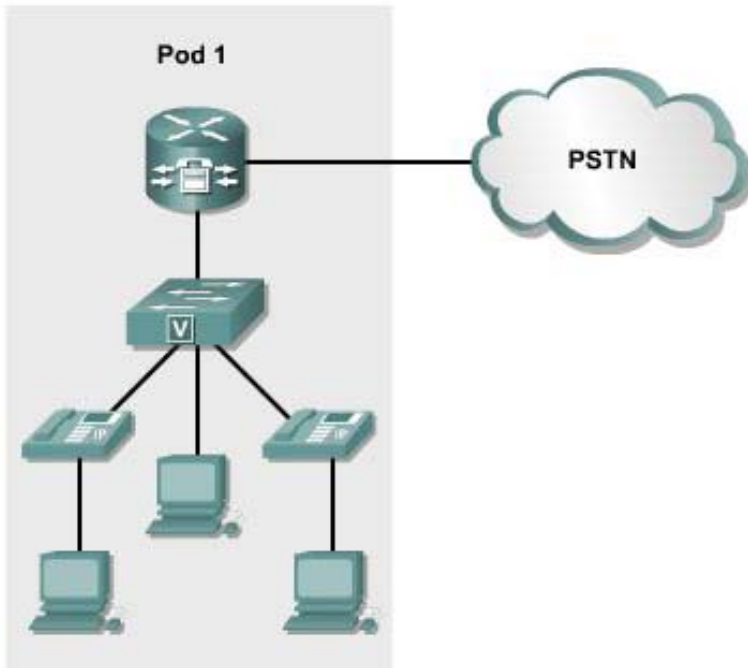


Lab 4.1.3 Configuring PRI Interface and DID



Objective

Configure a router POTS and PRI interface

Equipment Requirements

- Cisco CallManager Express (CME) capable router with a T1 PRI port
- Inline power capable switch or non-inline power switch with power injectors
- Two IP phones
- Two analog phones
- Adtran
- Special T1 cable

This lab relies on labs 2.1.1, 2.1.3, 3.1.1, and 4.1.1, being successfully completed and loaded.

In this lab the ACME.com Company has decided that the analog connection to the PSTN is not sufficient and, as a result, a PRI will be added to give additional capacity and to add DID capability. The analog connection will be kept for a secondary connection to the PSTN. Configure the PRI with the following settings.

Note: This lab uses the Adtran for simulating a PBX. Ensure you have the loaded the latest Adtran IP Telephony configuration for this lab. If you are using the four port Quad T1/PRI card in the Adtran, ensure the card is in slot four of the Adtran chassis. A special cable is used to connect the router T1 PRI port to the Adtran T1 port; a standard crossover or straight-through cable will not work. If you have to make a cable, the RJ-45 connector pinouts are 1-4, 2-5, 4-1, 5-2.

There are multiple types of network modules (NMs) that can be used for T1 connections. If the router has a network module it labeled as NM-DHV2-1T1/E1, the special commands are provided in the lab.

Step 1 Locate the T1 Port on the CME Router

- Use the **show diag** command to view the hardware installed. Locate the T1 card in the command output and determine what slot it is installed.
- In what slot does the **show diag** command show the T1 card? _____
- Perform a **show running-config** command from enable mode.
- Does the T1 interface appear in the output? If so, how does it list _____
Note that the first number listed in the output is the slot number. This number is important in a later command.

IMPORTANT: If the T1 interface does not appear, use the global configuration command **card type t1 slot 1** (where **slot** is the number documented previously). Note that this command is only needed on the NM-HDV2-1T1/E1 module.

- Look at the router ports and locate a port that is labeled CTRL T1/E1 or CTRLR T1. This is the T1 port. The T1 module is integrated into or inserted into the NM-HDV card.
- Connect a cable from the router T1 port to a T1 port on the Adtran (see table below for correct Adtran Port number). The Adtran can have just one T1 port, or an optional card can be installed that provides four more T1s. The optional card is labeled Quad T1/PRI. The cable that is used to connect the router T1 port to any Adtran T1 port is a special cable. Refer to the note at the beginning of the lab for connector pinouts.

Pod Number	Adtran T1/PRI Port Number
1	T1 Network Module- Port
2	Quad T1/PRI – Port 1
3	Quad T1/PRI – Port 2
4	Quad T1/PRI – Port 3
5	Quad T1/PRI – Port 4

Step 2 Configure the ISDN Switch Type

- a. From global configuration mode, use the command **isdn switch-type primary-ni** to set the PRI switch type. Note that this type must be the same one being used by the provider. In this lab, the provider is the Adtran unit, and it has been configured with the primary-ni ISDN switch type.

```
CMERouterX(config)# isdn switch-type primary-ni
```

- b. What other ISDN switch types are available? _____

Step 3 Configure the T1 Controller

- a. The **network-clock-participate** command allows the ports on a specific module or voice WAN interface card (VWIC) to use the network clock for timing. The alternative is to restrict a device to use its own clocking signals.

- b. From global configuration mode, enter the command **network-clock-participate wic slot_number** (where **slot_number** is the physical slot where the T1 port is installed). An example is as follows: `CMERouterX(config)# network-clock-participate wic 1`

```
or CMERouterX(config)# network-clock-participate slot 1
```

```
CMERouterX(config)# network-clock-participate wic slot number
```

- c. From global configuration, type **controller t1 ?** to determine what slot numbers are available. If there is only one T1 card installed, only one number lists.
- d. How many slot numbers are available in the help output? _____
- e. From global configuration mode, enter the mode to control the T1 port by using the **controller t1 slot/port_or_subslot/port** command. The **slot/port_or_subslot/port** parameters are the same as what was researched earlier. An example in the 2811 router would be **controller t1 1/0/0** or **controller t1 1/0** (depending on NM-HDV2-1T1/E1 type).

```
CMERouterX(config)# controller t1 slot/port_or_subslot/port
```

- f. In T1 controller mode, enter the command **framing esf** to set the type of framing used.

```
CMERouterX(config-controller)# framing esf
```

- g. In T1 controller mode, enter the command **linecode b8zs** to set the line coding.

```
CMERouterX(config-controller)# linecode b8zs
```

- h. Set the clocking to the line with the **clock source line** command.

```
CMERouterX(config-controller)# clock source line
```

- i. Use the command **pri-group timeslots 1-12** to assign the first 12 channels to the PRI.

```
CMERouterX(config-controller)# pri-group timeslots 1-12
```

Note: If an error appears that there are not enough DSP resources, reduce the number of timeslots to 8 (1-8 in the command).

The B channels on the T1 should go up and messages to that effect should be seen on the console.

- j. Use the command **show isdn status** and verify that Layer 1 is ACTIVE, and that Layer 2 shows MULTIPLE_FRAME_ESTABLISHED.

```
CMERouterX# show isdn status
```

- k. Did the **show isdn status** command output show the proper states (ACTIVE and MULTIPLE_FRAME_ESTABLISHED)? If not, perform appropriate troubleshooting. _____
- l. In the **show isdn status** output notice on the second line of the output that a serial port is listed.
- m. Write the serial interface port number as this number is shown in the command output. This number is needed in the next step. _____
- n. Use the **show interface serial mod/port_or_subslot/port:23** to verify that the interface status is up and up. Examples of this command on a 2811 router are **show interface serial 1/0/0:23** or **show interface serial 1/0:23** (depending on the hardware being used).

```
CMERouterX# show interface serial mod/port_or_subslot/port:23
```

Step 4 Configure the Dial-Peer to Call the Analog Phone

- a. Reference Table 2 to test the configuration. Before testing the TI, test standard phone configuration by calling one of the IP phones from the analog phone attached to the router FXS port. (Note: only four digits are needed for dialing.)

Note that if any connection exists between the router FX0 port and the Adtran unit, remove that connection.

- b. Does the analog phone to IP phone connection work properly? If not, troubleshoot as necessary. _____
- c. Connect a second analog phone to the port on the Adtran Octal FXS that corresponds to your pod number. For example, if pod 2 is being used, connect the analog phone to port 2 of the Adtran Octal FXS card. Place a call from one of the IP phones to the analog phone connected directly to the Adtran. (**Note:** The Adtran analog (FXS) port 1 phone number is 555-6001; port 2 is 555-6002; port 3 is 555-6003, etc.) Note that the call should **not** connect.

From the analog phone connected to the FXS router port, call the analog phone connected directly to the Adtran analog (FXS) port. (555-600x, where x is the pod number).

- d. Based on what has been learned thus far, why did the phone calls fail? _____

- e. What audio and visual indications were shown on the IP phone when the call was made? _____

- f. A previous lab configured a dial-peer for the local FXS port. This step and the ones that follow configure a dial-peer for a phone number on the simulated PBX (Adtran). This dial-peer will use the PRI port on the router to access the cloud (the analog (FXS) port on the Adtran). The **dial-peer voice** command creates a specific dial-peer for an analog connection.

```
CMERouterX(config)# dial-peer voice 2 pots
```

- g. Commands in this step tell the router which port to forward the call through for a specific number. The **destination-pattern number** command defines the phone number that will be forwarded. Different symbols can be used to define the number or range of numbers in the destination

pattern. For example, the command **destination-pattern 555[4,6]...** directs the router to send a call starting with 5554XXX or 5556XXX out the specified port. The numbers in the brackets mean either a 4 or a 6. The three periods represent any number 0-9. This step uses this command syntax to allow any number starting with 5554 or 5556 to send out the port designated in the next step.

```
CMERouterX(config-dial-peer)# destination-pattern 555[4,6]...
```

- h. The **port X/X/X:23** command references the serial interface associated with the T1 controller configured earlier on the router. Type **do show running config** at the command line to verify the serial interface number, or refer to the earlier question. An example of a serial port interface number is as follows: **port 1/0/0:23** or **port 1/0:23** (depending on what model of NM-HDV2-1T1/E1 is being used).

```
CMERouterX(config-dial-peer)# port X/X/X:23
```

- i. The router needs to know which phone number digits to forward for voice calls. Use the command **forward-digits all** to forward all the digits (the full length of the destination dial pattern) to the PSTN (the Adtran).

```
CMERouterX(config-dial-peer)# forward-digits all
```

- j. Test the configuration by calling the analog phone attached to the Adtran analog (FXS) port from an IP phone. The Adtran FXS port 1 phone number is 555-6001; port 2 is 555-6002; port 3 is 555-6003, etc.
- k. Was the call successful? If not, perform appropriate troubleshooting? _____
- l. What message appears on the IP phone when a call is successfully made to the analog phone connected directly to the Adtran FXS port? _____
- m. Save the router configuration.

Step 5 Configure the Dial-Peer to Call from the analog phone on the Adtran

- a. Test the current configuration by calling the analog phone (seven digits) connected to the router FXS port from the analog phone attached to the Adtran analog (FXS) port. The call should fail.
- b. Did the call connect?_____ Why not? _____
- _____
- c. A previous step configured a dial peer from the router to the simulated PBX (the Adtran). The next few steps configure a dial peer that allows a call made from the analog phone connected to the Adtran into the router using the PRI card.

```
CMERouterX(config)# dial-peer voice 3 pots
```

- d. Commands in this step tell the router which numbers to allow from the outside world into the router for processing. The **incoming called-number number** command defines the numbers allowed for an incoming call for a specific dial peer. Note that the three periods that follow the four fives in this command are part of the command.

```
CMERouterX(config-dial-peer)# incoming called-number 5555...
```

- e. Use the **direct-inward-dial** to enable Direct Inward Dialing (DID). DID is a service provided from the local phone company that provides a block of numbers used to call into a company's own PBX. When DID is used, a company can assign a company employee a phone number without requiring a physical line into the PBX (Adtran) for each person.

```
CMERouterX(config-dial-peer)# direct-inward-dial
```

- f. Use the **port X/X/X:23** command to apply the dial peer to a specific interface. This command allows calls that come in from the previously defined numbers (5555xxx) to be allowed through a particular router port. An example of this command is as follows: **port 1/0/0:23** or **port 1/0:23** (depending on what model of NM-HDV2-1T1/E1 is being used). Use the port parameters previously documented in a question.

```
CMERouterX(config-dial-peer)# port X/X/X:23
```

- g. Test the configuration by calling from the analog phone attached to the Adtran analog (FXS) port to the analog phone connected to the FXS port on the router.
- h. Did the call work properly? If not, perform appropriate troubleshooting. _____
- i. Save the router configuration.