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**Documentation**

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## Network Scenarios

This chapter includes some network scenarios and their configurations for the Cisco 827 routers. This chapter is useful if you are building a new network and want some guidance. If you already have a network set up and you want to add specific features, refer to ["Feature-By-Feature Router Configurations."](#)

The following sections are included in this chapter:

- [Cisco 827 Routers Network Connections](#)
- [Internet Access Scenarios](#)
- [Voice Scenario](#)

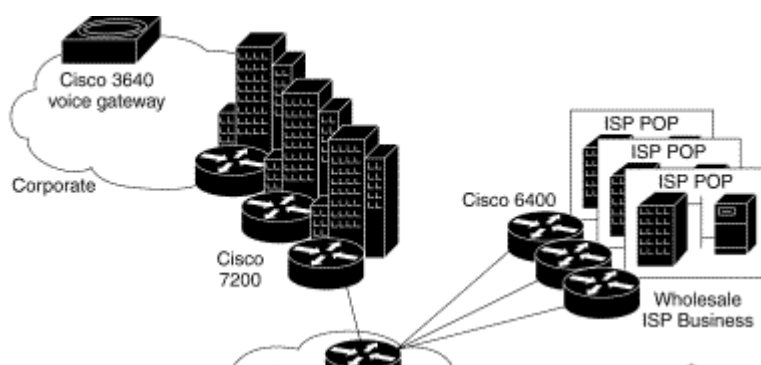
Each scenario in this chapter is described with a network diagram and configuration network examples are provided as models after which you can pattern your network. They cannot, however, anticipate all of your network needs. You can choose not to use features presented in the examples or to add or substitute features that better suit your needs.

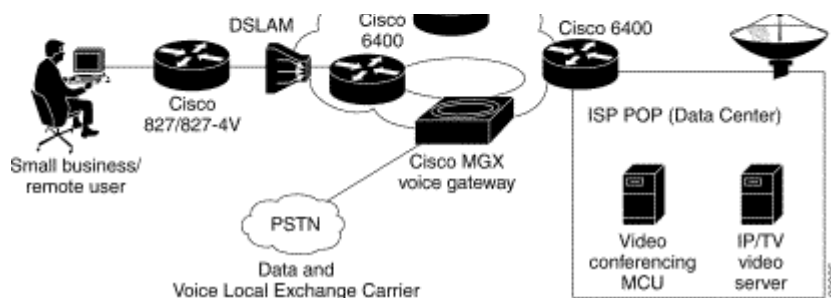
### Cisco 827 Routers Network Connections

[Figure 2-1](#) shows a network topology with the Cisco 827 routers connecting to the following:

- Public Switched Telephone Network (PSTN)
- Corporate intranet
- Service provider on the Internet
- Service provider data center

**Figure 2-1: Cisco 827 Routers Network Connections**





The Cisco 827 routers send data or voice packets from the remote user to the service provider or corporate network through a high-speed, point-to-multi-point asymmetric digital subscriber line (ADSL) technology.

## Internet Access Scenarios

The following scenarios are described for Internet access:

- [Replacing a Bridge or Modem with the Cisco 827 Router](#)
- [PPP over ATM with NAT](#)
- [RFC 1483 Encapsulation with NAT](#)
- [Integrated Routing and Bridging](#)
- [Concurrent Routing and Bridging](#)
- [Data Network](#)
- [Voice Network](#)

Each scenario is described with a network diagram, configuration steps to set up the network, and an example configuration.

### Before You Configure Your Internet Access Network

You need to gather the following information before configuring networks based on the Internet access scenarios:

- Order an ADSL line from your public telephone service provider, and determine that the ADSL signaling type is DMT, also called ANCI T1.413, or just DMT Issue 2.
- Gather information to set up a PPP Internet connection, including the PPP client name authentication type, and PPP password.
- Determine the IP routing information, including IP address, and ATM permanent virtual circuits (PVCs). These PVC parameters are typically virtual path identifier (vpi), virtual circuit identifier (vci), and traffic shaping parameters if applicable.
- Gather DNS server IP address and default gateways.

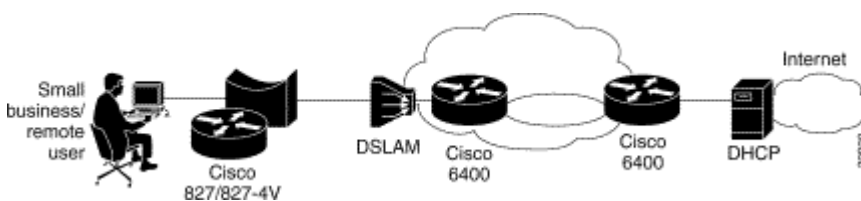
## Replacing a Bridge or Modem with the Cisco 827 Router

This scenario shows a remote user connected to the Internet. You may want to use a network similar to this one if you want to set up a minimal connection to the Internet and bridge it through the 827 routers.

This network replaces an Alcatel 1000 bridge or modem with a Cisco 827 or 827-4V router by using AAL5SNAP encapsulation and bridging (RFC 1483 bridge mode) on the ATM interface.

[Figure 2-2](#) shows the network topology for this scenario.

**Figure 2-2: Replacing a Bridge or Modem with a Cisco 827 Router**



The 827 router is configured to act as a bridge on the WAN, so the data packets are bridged through the 6400 router onto the Internet. This network setup creates the simplicity of bridging data but also maintains router control. This network is very simple but limits more complex services such as stopping broadcast traffic. If you want more services available on your network, you may want to consider Scenario 2 or 3.

### Configuring the Scenario

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**Note** If you have only a single ATM PVC for your bridging network, you do not have to configure the protocol bridge broadcast.

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This scenario includes configuration tasks and a configuration example. To add additional features to this network, refer to ["Feature-By-Feature Router Configurations."](#)

After configuring your router, you need to configure the PVC endpoint. For a general configuration example, refer to ["Cisco 3640 Gateway Configuration Example"](#) at the end of this chapter.

Follow the steps below to replace a bridge or modem with the Cisco 827 router, beginning in global configuration mode. Each step includes the same values that are shown in the bridging configuration example at the end of this section.

Step	Task	Router Prompt	Command
1 .	Disable IP routing.	Router (config)#	<b>no ip routing</b>

2 .	Specify the bridge protocol to define the type of Spanning-Tree protocol.	Router (config)#	<b>bridge 1 protocol ieee</b>
3 .	Enter configuration mode for the Ethernet interface.	Router (config)#	<b>interface ethernet 0</b>
4 .	Specify the bridge-group number to which the Ethernet interface belongs.	Router (config-if)#	<b>bridge-group 1</b>
5 .	Enable the Ethernet interface.	Router (config-if)#	<b>no shutdown</b>
6 .	Exit configuration mode for the Ethernet interface and the router.	Router (config-if)#	<b>exit</b>
7 .	Enter configuration mode for the ATM interface.	Router (config)#	<b>interface ATM 0</b>
8 .	Create an ATM permanent virtual circuit (PVC) for each end node with which the router communicates.	Router (config-if)#	<b>pvc 8/35</b>
9 .	Specify the encapsulation type for the PVC.	Router (config-atm-vc)#	<b>encapsulation aal5snap</b>
10 .	Specify the bridge-group number to which the ATM interface belongs.	Router (config-atm-vc)#	<b>bridge-group 1</b>
11 .	Enable the ATM interface.	Router (config-if)#	<b>no shutdown</b>
12 .	Exit the configuration mode for the ATM interface.	Router (config-if)#	<b>exit</b>

### Configuration Example

The following is a configuration example for this network scenario. You do not have to enter the commands marked "default." These commands appear automatically in the configuration file generated when you use the **show running-config** command.

```
no ip routing
!
interface Ethernet0
no ip address
no ip directed-broadcast (default)
bridge-group 1
```

```

!
interface ATM0
no ip address
no ip directed-broadcast (default)
pvc 8/35
encapsulation aal5snap
!
bridge-group 1
!
ip classless (default)
!
bridge 1 protocol ieee
!
end

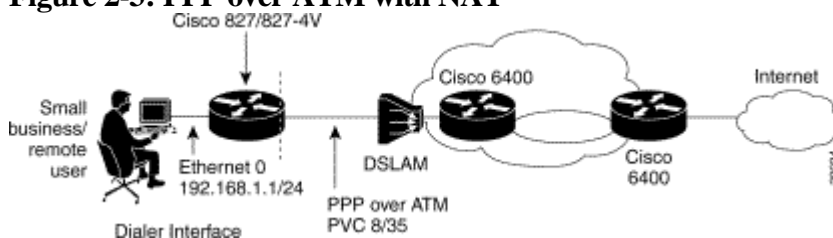
```

## PPP over ATM with NAT

This network shows a user connected to the Internet through PPP over ATM and one static IP address. You may want to use this scenario in your network if you want to access the network with ATM support at the endpoints. PPP over ATM provides a network solution with simplified address handling and gives straight user verification as you would get in a dial network.

[Figure 2-3](#) shows the network topology for this scenario.

**Figure 2-3: PPP over ATM with NAT**



In this scenario, the small business or remote user on the Ethernet LAN can connect to the Internet through ADSL. The Ethernet interface carries the data packet through the LAN and offloads it to the PPP connection on the ATM interface. The dialer interface is used to connect to the Internet or the corporate office. The number of ATM PVCs is set by default.

NAT (represented as the dashed line at the edge of the 827 routers) signifies two addressing domains and the inside source address. The source list defines how the packet travels through the network.

The following configuration topics are covered in this section:

- [Configuring the Ethernet Interface](#)
- [Configuring the Dialer Interface](#)
- [Configuring the ATM Interface](#)
- [Configuring NAT](#)
- [Configuration Example](#)

To add additional features to this network, refer to "[Feature-By-Feature Router Configurations.](#)"

After configuring your router, you need to configure the PVC endpoint. For a general configuration example, refer to "[Cisco 3640 Gateway Configuration Example](#)" at the end of this chapter.

### Configuring the Ethernet interface

Follow the steps below to configure the Ethernet interface, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the Ethernet interface.	Router (config)#	<b>interface ethernet 0</b>
2 .	Set the IP address and subnet mask for the Ethernet interface.	Router (config-if)#	<b>ip address 192.168.1.1 255.255.255.0</b>
3 .	Enable the interface and configuration changes just made to the Ethernet interface.	Router (config-if)#	<b>no shutdown</b>
4 .	Exit configuration mode for the Ethernet interface.	Router (config-if)#	<b>exit</b>

### Configuring the Dialer Interface

Follow the steps below to configure the dialer interface, beginning in global configuration mode

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the dialer interface.	Router (config)#	<b>interface dialer 0</b>
2 .	Configure a negotiated IP address.	Router (config-if) #	<b>ip address negotiated</b>
3 .	Set the interface to be connected to the outside network.	Router (config-if) #	<b>ip nat outside</b>
4 .	Specify the encapsulation type for the PVC to be PPP.	Router (config- atm-vc)#	<b>encapsulation ppp</b>
5 .	Specify which dialer pool number you are using.	Router (config-if) #	<b>dialer pool 1</b>

6 .	Exit configuration mode for the dialer interface.	Router (config-if) #	<b>exit</b>
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### Configuring the ATM Interface

Follow the steps below to configure the ATM interface, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the ATM interface.	Router (config)#	<b>interface ATM 0</b>
2 .	Create an ATM PVC for each end node with which the router communicates.	Router (config-if)#	<b>pvc 8/35</b>
3 .	Specify the encapsulation type for the PVC to be aal5mux (PPP) and point back to the dialer interface.	Router (config-atm-vc)#	<b>encapsulation aal5mux ppp dialer</b>
4 .	Specify a dialer pool-member.	Router (config-atm-vc)#	<b>dialer pool-member 1</b>
5 .	Enable interface and configuration changes just made to the ATM interface.	Router (config-atm-vc)#	<b>no shutdown</b>
6 .	Exit configuration mode for the ATM interface.	Router (config-atm-vc)#	<b>exit</b>

### Configuring NAT

Follow the steps below to configure NAT, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enable dynamic translation of addresses permitted by the access list to one of addresses specified in the dialer interface.	Router (config)#	<b>ip nat inside source list 1 interface dialer 0 overload</b>

2 .	Set the ip route to point to the dialer interface as a default gateway.	Router (config)#	<b>ip route 0.0.0.0.0.0.0 dialer</b>
3 .	Define a standard access list permitting addresses that need translation.	Router (config)#	<b>access-list 1 permit 192.168.1 0 0.0.0.255</b>
4 .	Enter configuration mode for the Ethernet interface.	Router (config)#	<b>interface ethernet 0</b>
5 .	Establish the Ethernet interface as the inside interface.	Router (config-if) #	<b>ip nat inside</b>
6 .	Enable interface and configuration changes just made to the Ethernet interface.	Router (config-if) #	<b>no shutdown</b>
7 .	Exit configuration mode for the Ethernet interface.	Router (config-if) #	<b>exit</b>

### Configuration Example

In the following configuration example, you do not have to enter the commands marked "default." These commands appear automatically in the configuration file generated when you use the **show running-config** command.

```
interface Ethernet0
ip address 192.168.1.1 255.255.255.0
no ip directed-broadcast (default)
ip nat inside
!
interface ATM0
no ip address
no ip directed-broadcast (default)
ip nat outside
no atm ilmi-keepalive (default)
pvc 8/35
encapsulation aal5mux ppp dialer
dialer pool-member 1
!
bundle-enable
!
interface Dialer0
ip address negotiated
no ip directed-broadcast (default)
ip nat outside
encapsulation ppp
dialer pool 1
!
ip nat inside source list 1 interface Dialer0 overload
ip classless (default)
```

```

ip route 0.0.0.0 0.0.0.0 Dialer 0 (default gateway)
!
access-list 1 permit 192.168.1.0 0.0.0.255
!
end

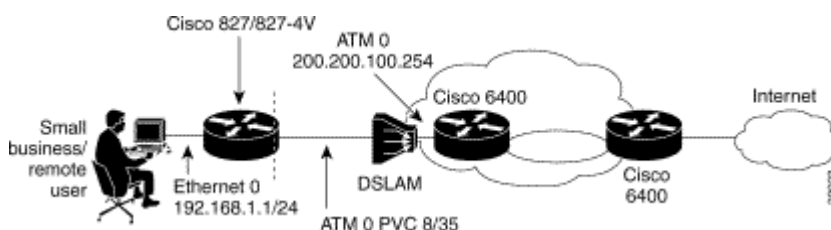
```

## RFC 1483 Encapsulation with NAT

This network shows a remote user connecting to the Internet through an ATM connection with RFC 1483 encapsulation and NAT. You may want to use this scenario if RFC 1483 connections can be used for the network, since there is slightly less overhead than PPP.

[Figure 2-4](#) shows the network topology for this scenario.

**Figure 2-4: RFC 1483 Encapsulation with NAT**



In this scenario, the small business or remote user on the Ethernet LAN can connect to the Internet through ADSL. The Ethernet interface carries the data packet through the LAN and offloads it to the RFC 1483 connection on the ATM interface. The number of ATM PVCs is set by default.

NAT (represented as the dashed line at the edge of the 827 routers) signifies two addressing domains and the inside source address. The source list defines how the packet travels through the network.

The following configuration topics are covered in this section:

- [Configuring the Ethernet Interface](#)
- [Configuring the ATM Interface](#)
- [Configuring NAT](#)
- [Configuration Examples](#)

To add additional features to this network, refer to "[Feature-By-Feature Router Configurations.](#)"

After configuring your router, you need to configure the PVC endpoint. For a general configuration example, refer to "[Cisco 3640 Gateway Configuration Example](#)" at the end of this chapter.

### Configuring the Ethernet Interface

Follow the steps below to configure the Ethernet interface, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the Ethernet interface.	Router (config)#	<b>interface ethernet 0</b>
2 .	Set the IP address and subnet mask for the Ethernet interface.	Router (config-if)#	<b>ip address 192.168.1.1 255.255.255.0</b>
3 .	Enable the Ethernet interface.	Router (config-if)#	<b>no shutdown</b>
4 .	Exit configuration mode for the Ethernet interface.	Router (config-if)#	<b>exit</b>

### Configuring the ATM Interface

Use this table to configure the ATM interface, beginning in global configuration mode.

Step	Task Description	Router Prompt	Command
1 .	Enter configuration mode for the ATM interface.	Router (config)#	<b>interface ATM 0</b>
2 .	Set the IP address and subnet mask for the ATM interface.	Router (config-if)#	<b>ip address 200.200.100.1 255.255.255.0</b>
3 .	Create an ATM PVC for each end node with which the router communicates.	Router (config-atm-vc)#	<b>pvc 8/35</b>
4 .	Set the protocol broadcast for the IP address.	Router (config-atm-vc)#	<b>protocol ip 200.200.100.254 broadcast</b>
5 .	Specify the encapsulation type for the PVC to be AAL5SNAP or AAL5MUX IP.	Router (config-atm-vc)#	<b>encapsulation <i>type</i></b>
6 .	Enable the ATM interface.	Router (config-atm-vc)#	<b>no shutdown</b>

7 .	Exit configuration mode for the ATM interface.	Router (config-atm-vc)#	<b>exit</b>
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## Configuring NAT

Follow the steps below to configure NAT, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enable dynamic translation of addresses permitted by the access list to one of addresses specified in the ATM interface.	Router (config)#	<b>ip nat inside source list 1 pool interface ATM0 overload</b>
2 .	Set the IP route to point to the ATM interface as a default gateway.	Router (config)#	<b>ip route 0.0.0.0.0.0.0 atm0</b>
3 .	Define a standard access list permitting addresses that need translation.	Router (config)#	<b>access-list 1 permit 192.168.1.0.0.0.255</b>
4 .	Enter configuration mode for the Ethernet interface.	Router (config)#	<b>interface ethernet 0</b>
5 .	Establish the Ethernet interface as inside interface.	Router (config-if) #	<b>ip nat inside</b>
6 .	Exit configuration mode for the Ethernet interface.	Router (config-if) #	<b>exit</b>
7 .	Enter configuration mode for the ATM interface.	Router (config)#	<b>interface atm 0</b>
8 .	Establish the ATM interface as outside interface.	Router (config-if) #	<b>ip nat outside</b>
9 .	Exit configuration mode for the ATM interface.	Router (config-if) #	<b>exit</b>

## Configuration Examples

In the following configuration examples, you do not have to enter the commands marked "default." These commands appear automatically in the configuration file generated when you use the **show running-config** command.

The following is an RFC 1483 LLC/SNAP encapsulation over ATM configuration example.

```
!
interface Ethernet0
ip address 192.168.1.1 255.255.255.0
no ip directed-broadcast (default)
ip nat inside
!
interface ATM0
ip address 200.200.100.1 255.255.255.0
no ip directed-broadcast (default)
ip nat outside
no atm ilmi-keepalive (default)
pvc 8/35
                                encapsulation aal5snap
                                protocol ip 200.200.100.254 broadcast
!
bundle-enable
!
ip nat inside source list 1 interface ATM0 overload
ip classless (default)
ip route 0.0.0.0 0.0.0.0 200.200.100.254
!
access-list 1 permit 192.168.1.0 0.0.0.255
!
end
```

The following is an RFC 1483 VC-MUX configuration example.

```
ip subnet-zero
!
interface Ethernet0
ip address 192.168.1.1 255.255.255.0
no ip directed-broadcast (default)
ip nat inside
!
interface ATM0
ip address 200.200.100.1 255.255.255.0
no ip directed-broadcast (default)
ip nat outside
no atm ilmi-keepalive (default)
pvc 8/35
                                encapsulation aal5mux ip
                                protocol ip 200.200.100.254 broadcast
!
bundle-enable
!
ip nat inside source list 1 interface ATM0 overload
ip classless (default)
ip route 0.0.0.0 0.0.0.0 200.200.100.254
!
```

```
access-list 1 permit 192.168.1.0 0.0.0.255
!
end
```

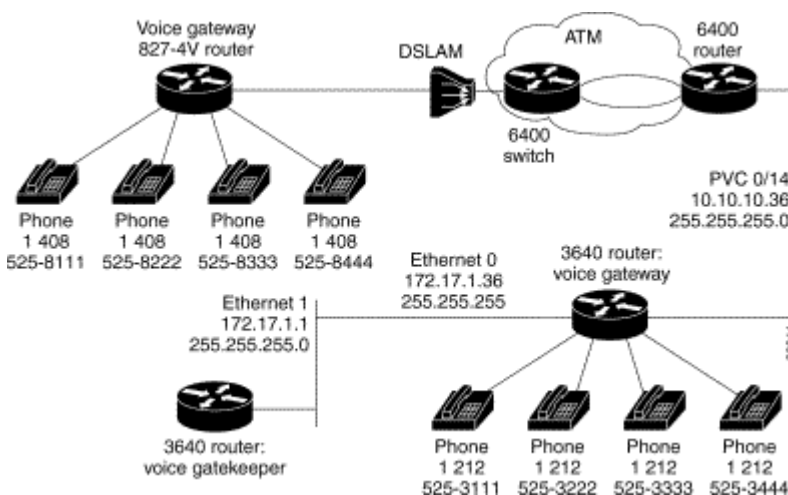
## Integrated Routing and Bridging

This network shows a user connecting to the Internet using integrated routing and bridging (IRB) to use NAT across a bridged interface. This scenario might work for you if you want to add functionality to an endpoint router without reconfiguring the central site. For example, you can provide an IP address and NAT in a bridged network without having to reconfigure the central site for routing.

Exchanging the bridge with a router enables feature additions such as voice and Quality of Service (QoS). IRB provides more secure control of the central site and more efficient use of the WAN link.

[Figure 2-5](#) shows an IRB scenario.

**Figure 2-5: IRB Internet Scenario**



One side of the network (WAN in this scenario) is configured to act as a bridge. The Bridge-Group Virtual Interface (BVI) is configured to act as a routed interface from the WAN bridge-group to the nonbridged LAN interface. From the LAN, the network appears as a router. From the WAN, the network appears as a bridge.

The ATM interface uses AAL5SNAP encapsulation, and the number of PVCs is set by default.

NAT (represented as the dashed line at the edge of the 827 routers) signifies two addressing domains and the inside source address. The source list defines how the packet travels through the network.

The following configuration topics are covered in this section:

- [Configuring the Default Gateway](#)
- [Configuring the Ethernet Interface and IRB](#)
- [Configuring the ATM Interface](#)

- [Configuring the BVI](#)
- [Configuring NAT](#)
- [Configuration Example](#)

To add additional features to this network, refer to "[Feature-By-Feature Router Configurations.](#)"

After configuring your router, you need to configure the PVC endpoint. For a general configuration example, refer to "[Cisco 3640 Gateway Configuration Example](#)" at the end of this chapter.

### Configuring the Default Gateway

Enter the following command to set the IP route for the default gateway:

```
ip route default-gateway ip address-mask
```

### Configuring the Ethernet Interface and IRB

Follow the steps below to configure the Ethernet interface and IRB, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Specify IRB.	Router (config)#	<b>bridge irb</b>
2 .	Enable IP routing to and from bridge-group 1.	Router (config)#	<b>bridge 1 route ip</b>
3 .	Specify the bridge protocol to define the type of Spanning-Tree Protocol (STP).	Router (config)#	<b>bridge 1 protocol ieee</b>
4 .	Enter configuration mode for Ethernet interface.	Router (config)#	<b>interface ethernet 0</b>
5 .	Set the IP address and subnet mask for the Ethernet interface.	Router (config-if)#	<b>ip address 192.168.1.1 255.255.255.0</b>
6 .	Enable the Ethernet interface.	Router (config-if)#	<b>no shutdown</b>
7 .	Exit configuration mode for Ethernet interface.	Router (config-if)#	<b>exit</b>

## Configuring the ATM Interface

Follow the steps below to configure the ATM interface, beginning in global configuration mode.

Step	Task Description	Router Prompt	Command
1 .	Enter configuration mode for the ATM interface.	Router (config)#	<b>interface ATM 0</b>
2 .	Create an ATM PVC for each end node with which the router communicates.	Router (config-if)#	<b>pvc 8/35</b>
3 .	Specify the encapsulation type for the PVC.	Router (config-atm-vc)#	<b>encapsulation aal5snap</b>
4 .	Specify the bridge-group number to which the ATM interface belongs.	Router (config-if)#	<b>bridge-group 1</b>
5 .	Enable the ATM interface.	Router (config-atm-vc)#	<b>no shutdown</b>
6 .	Exit configuration mode for the ATM interface.	Router (config-atm-vc)#	<b>exit</b>

## Configuring the BVI

Follow the steps below to configure the BVI, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the BVI.	Router (config-if)#	<b>interface bvi 1</b>
2 .	Set the IP address and subnet mask for the BVI.	Router (config-if)#	<b>ip address 200.200.100.1 255.255.255.0</b>
3 .	Exit configuration mode for Ethernet interface.	Router (config-if)#	<b>exit</b>

## Configuring NAT

Follow the steps below to configure NAT, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Create pool of global IP addresses for NAT.	Router (config)#	<b>ip nat pool test 200.200.100.1 200.200.100.1 255.255.255.0</b>
2 .	Define a standard access list permitting addresses that need translation.	Router (config)#	<b>access-list 101 permit ip 192.168.1 0.0.0.0.255 any log</b>
3 .	Enable dynamic translation of addresses permitted by access list to one of addresses specified in pool.	Router (config)#	<b>ip nat inside source list 101 pool test overload</b>
4 .	Enter configuration mode for the Ethernet interface.	Router (config)#	<b>interface ethernet 0</b>
5 .	Establish the Ethernet interface as the inside interface.	Router (config-if) #	<b>ip nat inside</b>
6 .	Enable interface and configuration changes just made to the interface.	Router (config-if) #	<b>no shutdown</b>
7 .	Exit configuration mode for the Ethernet interface.	Router (config-if) #	<b>exit</b>
8 .	Enter configuration mode for the ATM interface.	Router (config)#	<b>interface ATM 0</b>
9 .	Establish the ATM interface as the outside interface.	Router (config-if) #	<b>ip nat outside</b>
10 .	Enable interface and configuration changes just made to the interface.	Router (config-if) #	<b>no shutdown</b>
11 .	Exit configuration mode for the ATM interface.	Router (config-if) #	<b>exit</b>

12 .	Enter configuration mode for the BVI.	Router (config)#	<b>interface bvi 1</b>
13 .	Establish the BVI as the outside interface.	Router (config-if) #	<b>ip nat outside</b>
14 .	Enable interface and configuration changes just made to the interface.	Router (config-if) #	<b>no shutdown</b>
15 .	Exit configuration mode for the BVI.	Router (config-if) #	<b>end</b>

### Configuration Example

In the following configuration example, you do not have to enter the commands marked "default." These commands appear automatically in the configuration file generated when you use the **show running-config** command.

```
bridge irb
!
interface Ethernet0
ip address 192.168.1.1 255.255.255.0
no ip directed-broadcast (default)
ip nat inside
!
interface ATM0
no ip address
no ip directed-broadcast (default)
ip nat outside
no atm ilmi-keepalive (default)
pvc 8/35
encapsulation aal5snap
!
bridge-group 1
!
interface BV11
ip address 200.200.100.1 255.255.255.0
no ip directed-broadcast (default)
ip nat outside
!
ip nat pool test 200.200.100.1 200.200.100.1 netmask 255.255.255.0
ip nat inside source list 101 pool test overload
ip classless (default)
!
bridge 1 protocol ieee
bridge 1 route ip
!
access-list 101 permit ip 192.168.1.0 0.0.0.255 any log
!
ip route 0.0.0.0 0.0.0.0 200.200.100.254 (default gateway)
!
```

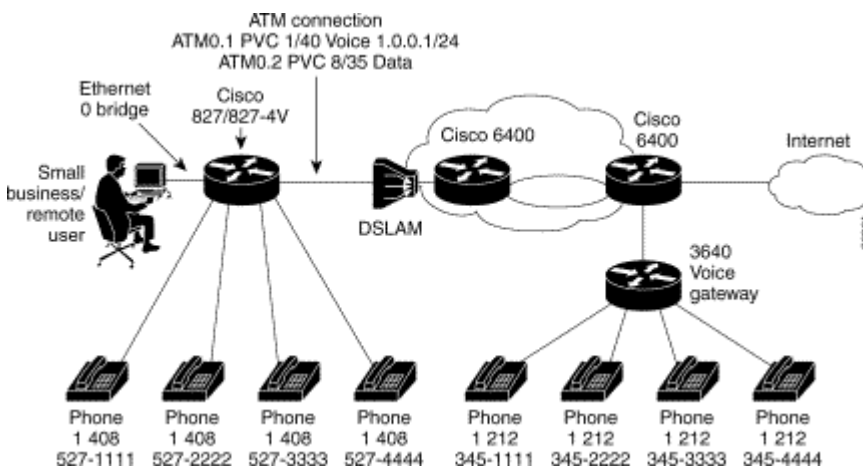
end

## Concurrent Routing and Bridging

This network shows a remote user connecting to the Internet using concurrent routing and bridging (CRB) to route voice traffic and bridge data traffic while keeping each of them separate. This scenario is useful if you want to simplify your network setup for data transmission and then configure voice. The IP address is configured to recognize the difference between data traffic and voice traffic (voice traffic is configured with QoS parameters and virtual circuits). IRB can do routing and bridging on the same interface; CRB does routing and bridging on separate interfaces.

[Figure 2-6](#) shows a CRB Internet scenario with the voice traffic routed and the data traffic bridged.

**Figure 2-6: CRB Internet Scenario**



Concurrent routing and bridging is accomplished using different subinterfaces under the ATM interface. Each ATM subinterface that is created is treated uniquely in the network.

Data traffic in this scenario is bridged across ATM subinterface2, using AAL5SNAP encapsulation. A single PVC is created with a vpi/vci value of 8/35.

Voice traffic is routed across ATM0 subinterface 0.1. There is a single PVC created with a virtual path identifier and virtual channel identifier (vpi/vci) value of 1/40 for voice. The voice subinterface is configured with remote dial peers to determine where outgoing calls are sent and local dial peers to determine what numbers each port should respond to. Each VoIP dial peer is configured for H.323 signaling.

The following configuration topics are covered in this section:

- [Specifying CRB and Configuring the Ethernet Interface](#)
- [Configuring the ATM Interface and Subinterfaces](#)
- [Configuring Voice Ports](#)
- [Configuring the POTS Dial Peers](#)

- [Configuring VoIP Dial Peers for H.323 Signaling](#)
- [Configuration Example](#)

To add additional features to this network, refer to "[Feature-By-Feature Router Configurations.](#)"

After configuring your router, you need to configure the PVC endpoint. For a general configuration example, refer to "[Cisco 3640 Gateway Configuration Example](#)" at the end of this chapter.

### Specifying CRB and Configuring the Ethernet Interface

Use this table to specify CRB and configure the Ethernet interface, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Specify CRB.	Router (config)#	<b>bridge crb</b>
2 .	Enter configuration mode for the Ethernet interface.	Router (config-if)#	<b>interface ethernet 0</b>
3 .	Specify the bridge-group number to which the Ethernet interface belongs.	Router (config-if)#	<b>bridge-group 1</b>
4 .	Exit configuration mode for the Ethernet interface and the router.	Router (config-if)#	<b>exit</b>
5 .	Specify the bridge protocol to define the type of STP.	Router (config-if)#	<b>bridge 1 protocol ieee</b>

### Configuring the ATM Interface and Subinterfaces

Use this table to configure the ATM interface and subinterfaces, beginning in global configuration mode.

Step	Task Description	Router Prompt	Command
1 .	Specify the ATM0.1 subinterface.	Router (config-if)#	<b>interface ATM 0.1 point-to-point</b>
2 .	Set the IP address and subnet mask for the ATM0.1 subinterface.	Router (config-if)#	<b>ip address 1.0.0.1 255.255.255.0</b>

3 .	Create an ATM PVC for each end node with which the router communicates.	Router (config-if)#	<b>pvc 1/40</b>
4 .	Specify the encapsulation type for the PVC.	Router (config-atm-vc)#	<b>encapsulation aal5snap</b>
5 .	Set the protocol broadcast for the IP address.	Router (config-atm-vc)#	<b>protocol ip 1.0.0.2 broadcast</b>
6 .	Specify the ATM0.2 subinterface.	Router (config-if)#	<b>interface ATM 0.2 point-to-point</b>
7 .	Create an ATM PVC for each end node with which the router communicates.	Router (config-if)#	<b>pvc 8/35</b>
8 .	Specify the encapsulation type for the PVC.	Router (config-atm-vc)#	<b>encapsulation aal5snap</b>
9 .	Specify the bridge-group number to which the Ethernet interface belongs.	Router (config-if)#	<b>bridge-group 1</b>
10 .	Enable the ATM interface.	Router (config-atm-vc)#	<b>no shutdown</b>
11 .	Exit configuration mode for the ATM interface.	Router (config-atm-vc)#	<b>exit</b>

### Configuring Voice Ports

To configure voice ports, you must configure the POTS dial peers and the VoIP dial peers for the signaling type; in this case, the type is H.323.

### Configuring the POTS Dial Peers

Follow the steps below to configure the POTS dial peers, beginning in global configuration mode. [Table 2-1](#) shows the destination telephone number and port for each dial peer POTS port.

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the dial peer.	Router (config)#	<b>dial-peer voice</b> <i>number POTS</i>
2 .	Define the telephone number associated with the port.	Router (config- dial-peer)#	<b>destination-pattern</b> <i>string</i>
3 .	Specify the port number.	Router (config- dial-peer)#	<b>voice port-number</b>

**Table 2-1: Mapping of Dial Peer Number to Destination Telephone and Port**

Dial peer number	Destination pattern	Port
101	14085271111	1
102	14085272222	2
103	14085273333	3
104	14085274444	4

### Configuring VoIP Dial Peers for H.323 Signaling

Use this table to configure VoIP dial peers for H.323 signaling, beginning in global configuration mode. [Table 2-2](#) shows the destination telephone number for each voice dial peer.

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the dial peer.	Router (config) #	<b>dial-peer voice</b> <i>number VoIP</i>
2 .	Define the destination telephone number associated with each VoIP dial peer.	Router (config- dial-peer)#	<b>destination-pattern</b> <i>string</i>
3 .	Specify a codec if you are not using the default codec of g.729.	Router (config- dial-peer)#	<b>codec g711ulaw</b>
4 .	Specify a destination IP address for each dial peer.	Router (config- dial-peer)#	<b>session target</b> <b>ipv4:1.0.0.2</b>

**Table 2-2: Mapping of VoIP Dial Peers to Destination Telephone Numbers for H.323**

VoIP dial peer	Destination pattern
1100	12123451111
1200	12123452222
1300	12123453333
1400	12123454444

**Configuration Example**

In the following configuration example, you do not have to enter the commands marked "default." These commands appear automatically in the configuration file generated when you use the **show running-config** command.

```

ip subnet-zero
!
bridge crb
!
interface Ethernet0
no ip address
no ip directed-broadcast (default)
bridge-group 1
!
interface ATM0
no ip address
no ip directed-broadcast (default)
no atm ilmi-keepalive (default)
bundle-enable
!
interface ATM0.1 point-to-point
ip address 1.0.0.1 255.255.255.0
no ip directed-broadcast (default)
pvc voice 1/40
protocol ip 1.0.0.2 broadcast
encapsulation aal5snap
!
interface ATM0.2 point-to-point
no ip address
no ip directed-broadcast (default)
pvc data 8/35
encapsulation aal5snap
!
bridge-group 1
!
ip classless (default)
!
bridge 1 protocol ieee
!
voice-port 1

```

```
local-alerting
!
voice-port 2
local-alerting
!
voice-port 3
local-alerting
!
voice-port 4
local-alerting
!
dial-peer voice 101 pots
destination-pattern 14085271111
port 1
!
dial-peer voice 1100 voip
destination-pattern 12123451111
codec g711ulaw
session target ipv4:1.0.0.2
!
dial-peer voice 102 pots
destination-pattern 14085272222
port 2
!
dial-peer voice 1200 voip
destination-pattern 12123452222
codec g711ulaw
session target ipv4:1.0.0.2
!
dial-peer voice 103 pots
destination-pattern 14085273333
port 3
!
dial-peer voice 1300 voip
destination-pattern 12123453333
codec g711ulaw
session target ipv4:1.0.0.2
!
dial-peer voice 104 pots
destination-pattern 14085274444
port 4
!
dial-peer voice 1400 voip
destination-pattern 12123454444
codec g711ulaw
session target ipv4:1.0.0.2
!
end
```

## Voice Scenario

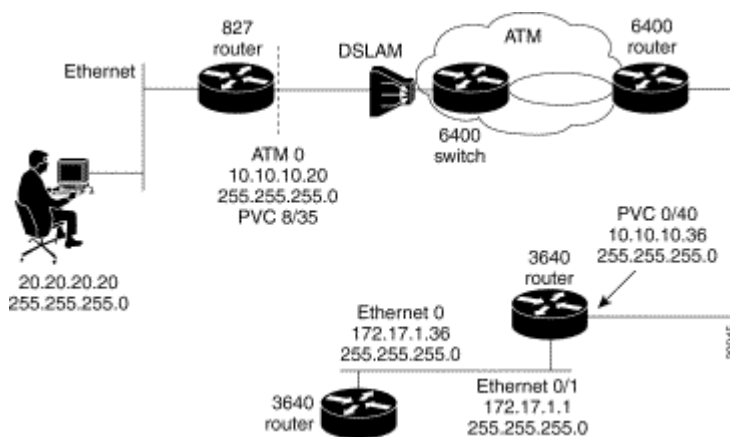
This section describes a voice scenario configuration using the Cisco 827-4V router in an H.323 signaling environment.

Setting up voice on the router actually includes two configurations; one for data and one for voice. When you have completed the configuration for the data scenario, you can add voice by configuring the POTS and VoIP dial peers and voice ports. Scenarios for data and voice are discussed below.

## Data Network

[Figure 2-7](#) shows a data network with traffic routing through the 827 router and then switching onto the ATM interface.

**Figure 2-7: Data Network**



The 827 router is connected through the ATM interface through one PVC and it is associated with a QoS policy called *mypolicy*. Data traffic coming from the Ethernet must have an IP precedence below 5 (critical) to distinguish it from voice traffic.

Enhanced IGRP is configured to send hello packets every 5 seconds to inform neighboring routers that it is functioning. If a particular router does not send a hello packet within a prescribed period, Enhanced IGRP assumes that the state of a destination has changed and sends an incremental update.

NAT (represented as the dashed line at the edge of the 827 routers) signifies two addressing domains and the inside source address. The source list defines how the packet travels through the network.

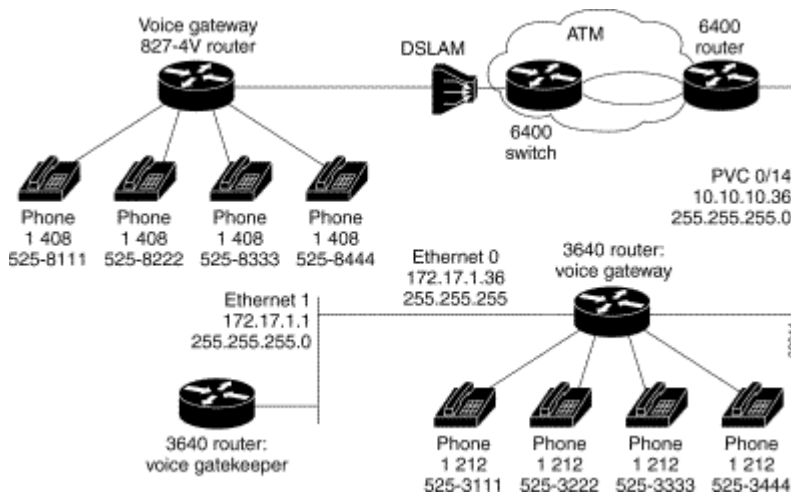
This scenario includes configuration tasks and a configuration example. To add additional features to this network, refer to ["Feature-By-Feature Router Configurations."](#)

After configuring your router, you need to configure the PVC endpoint. For a general configuration example, refer to ["Cisco 3640 Gateway Configuration Example"](#) at the end of this chapter.

## Voice Network

[Figure 2-8](#) shows a voice network with an 827-4V router and a 3640 router as the VoIP gateway using H.323 signaling (H.323 gateway).

**Figure 2-8: Voice Network**



The 3640 router is set up on the LAN as a *gatekeeper*, which provides address translation and control access for the LAN for H.323 terminals and gateways. The gatekeeper may provide other services to the H.323 terminals and gateways, such as managing bandwidth and locating gateways.

In this scenario, the dial endpoint is the 3640 router, with an IP address of 172.17.1.36 and a subnet mask of 255.255.255.0. This configuration assumes a single-zone setup so that both the 827-4V and the 3640 router are in the same zone.

Dialed numbers are stored by the VoIP session application in the 827-4V router, in this case H.323. After enough digits are accumulated to match a configured destination pattern, the telephone number is mapped to a dial peer and session target. In this configuration, the dial peer has a session target of RAS, which is a protocol run between the H.323 session protocol gateway and gatekeeper.

The gatekeeper resolves the destination for each dialed number, and the call signal routes to the 3640 gateway, which assigns the call to a voice port.

The coder-decoder compression schemes (codecs) are enabled for both ends of the connection and QoS parameters are configured for IP precedence.

## Configuration Tasks

To configure the voice scenario, you must configure the data network and then the voice network.

- Configure the data network:
  - Configuring the class map, route map, and policy map
  - Configuring the Ethernet interface
  - Configuring the ATM interface
  - Configuring Enhanced IGRP
- Configure the voice network:
  - Configuring the POTS dial peers

- Configuring VoIP dial peers for H.323 signaling
- Configuration Examples

Use the following tables to configure this scenario. Each command includes the values in the data and voice configuration examples shown at the end of this section. Configuration examples are shown for the 827-4V router and the gateway and gatekeeper endpoint routers.

After configuring your router, you need to configure the PVC endpoint. For a general configuration example, refer to "[Cisco 3640 Gateway Configuration Example](#)" at the end of this chapter.

### Configuring the Class Map, Route Map, and Policy Map

Follow the steps below to configure the class map, route map, and policy map, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Configure the access list.	Router (config)#	<b>access-lists 101 permit ip any any precedence 5</b>
2 .	Configure the class map.	Router (config)#	<b>class-map voice</b>
3 .	Assign access list 101 to the class map.	Router (config-if)#	<b>match access-group 101</b>
4 .	Configure the route map.	Router (config)#	<b>route-map data permit 10</b>
5 .	Set the IP precedence.	Router (config)#	<b>ip precedence routine</b>
6 .	Configure a policy map.	Router (config)#	<b>policy-map mypolicy</b>
7 .	Specify the class for queuing voice traffic.	Router (config)#	<b>class voice</b>
8 .	Specify the bandwidth for queuing. <sup>1</sup>	Router (config)#	<b>priority 176</b>
9 .	Configure the default class for all traffic but voice traffic.	Router (config)#	<b>class class-default</b>

<sup>1</sup>Total bandwidth for the policy map may not exceed 75 percent of the total PVC bandwidth.

### Configuring the Ethernet Interface

Follow the steps below to configure the Ethernet interface, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the Ethernet interface.	Router (config)#	<b>interface ethernet 0</b>
2 .	Set the IP address and subnet mask for the Ethernet interface.	Router (config-if)#	<b>ip address 20.20.20.20 255.255.255.0</b>
3 .	Configure the IP policy route map.	Router (config-if)#	<b>ip policy route-map data</b>
4 .	Enable fast-switching policy routing.	Router (config-if)#	<b>ip route-cache policy</b>
5 .	Enable the Ethernet interface.	Router (config-if)#	<b>no shutdown</b>
6 .	Exit configuration mode for the Ethernet interface.	Router (config-if)#	<b>exit</b>

### Configuring the ATM Interface

Follow the steps below to configure the ATM interface, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the ATM interface.	Router (config)#	<b>interface ATM 0</b>
2 .	Set the IP address and subnet mask for the ATM interface.	Router (config-if)#	<b>ip address 10.10.10.20 255.255.255.0</b>
3 .	Create an ATM PVC for each end node with which the router communicates.	Router (config-if)#	<b>pvc 8/35</b>

4 .	Specify the encapsulation type for the PVC.	Router (config-atm-vc)#	<b>encapsulation aal5snap</b>
5 .	Specify the protocol broadcast for the IP address.	Router (config-atm-vc)#	<b>protocol ip 10.10.10.36 broadcast</b>
6 .	Specify the service policy for the ATM interface.	Router (config-atm-vc)#	<b>service-policy output mypolicy</b>
7 .	Specify the ATM service class.	Router (config-atm-vc)#	<b>vbr-nrt 640 640 1</b>
8 .	Enable the ATM interface.	Router (config-atm-vc)#	<b>no shutdown</b>
9 .	Exit configuration mode for the ATM interface.	Router (config-atm-vc)#	<b>exit</b>

### Configuring Enhanced IGRP

Follow the steps below to configure Enhanced IGRP, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enter router configuration mode, and enable Enhanced IGRP on the router. The autonomous-system number identifies the route to other Enhanced IGRP routers and is used to tag the Enhanced IGRP information.	Router (config)#	<b>router eigrp 100</b>
2 .	Specify the network number for each directly connected network.	Router (config-router)#	<b>network <i>number</i></b>
3 .	Exit router configuration mode.	Router (config-router)#	<b>exit</b>

### Configuring the POTS Dial Peers

Follow the steps below to configure each POTS dial peer, beginning in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the dial peer	Router (config) #	<b>dial-peer voice</b> <i>number POTS</i>
2 .	Define the destination telephone number associated with the VoIP dial peer.	Router (config- dial-peer)#	<b>destination-pattern</b> <i>string</i>
3 .	Specify the port number.	Router (config- dial-peer)#	<b>port</b> <i>number</i>

### Configuring VoIP Dial Peers for H.323 Signaling

Use this table to configure VoIP dial peers for H.323 signaling in global configuration mode.

Step	Task	Router Prompt	Command
1 .	Enter configuration mode for the dial peer.	Router (config) #	<b>dial-peer voice</b> <i>number VoIP</i>
2 .	Define the destination telephone number associated with each VoIP dial peer.	Router (config- dial-peer)#	<b>destination-pattern</b> <i>string</i>
3 .	Specify a codec if you are not using the default codec of g.729.	Router (config- dial-peer)#	<b>codec g711ulaw</b>
4 .	Set the IP precedence.	Router (config- dial-peer)#	<b>ip precedence 5</b>
5 .	Specify a destination IP address for each dial peer.	Router (config- dial-peer)#	<b>session target ras</b>

### Configuration Examples

This section contains the following configuration examples:

- [Cisco 827-4V Router Configuration Example](#)
- [Cisco 3640 Gateway Configuration Example](#)

- [Cisco 3640 Gatekeeper Configuration Example](#)

### Cisco 827-4V Router Configuration Example

The following is a configuration example for the Cisco 827-4V router portion of the voice network scenario. You do not have to enter the commands marked "default." These commands appear automatically in the configuration file generated when you use the **show running-config** command.

```

!
class-map voice
match access-group 101
!
route-map data permit 10
set ip precedence routine
!
policy-map mypolicy
class voice
priority 176
class class-default
fair-queue 16 (default)
!
ip subnet-zero
!
gateway
!
interface Ethernet0
ip address 20.20.20.20 255.255.255.0
no ip directed-broadcast (default)
ip route-cache policy
ip policy route-map data
!
interface ATM0
ip address 10.10.10.20 255.255.255.0
no ip directed-broadcast (default)
no atm ilmi-keepalive (default)
pvc 1/40
service-policy output mypolicy
protocol ip 10.10.10.36 broadcast
vbr-nrt 640 640 1
! 640 is the maximum upstream rate of ADSL
encapsulation aal5snap
!
bundle-enable
h323-gateway voip interface
h323-gateway voip id gk-twister ipaddr 172.17.1.1 1719
h323-gateway voip h323-id gw-820
h323-gateway voip tech-prefix 1#
!
router eigrp 100
network 10.0.0.0
network 20.0.0.0
!
ip classless (default)
no ip http server
!
access-list 101 permit ip any any precedence critical(5)
!
line con 0

```

```
exec-timeout 0 0
transport input none
stopbits 1
line vty 0 4
login
!
!
voice-port 1
local-alerting
!
voice-port 2
local-alerting
!
voice-port 3
local-alerting
!
voice-port 4
local-alerting
!
dial-peer voice 10 voip
destination-pattern .....
ip precedence 5
session target ras
!
dial-peer voice 1 pots
destination-pattern 4085258111
port 1
!
dial-peer voice 2 pots
destination-pattern 14085258222
port 2
!
dial-peer voice 3 pots
destination-pattern 14085258333
port 3
!
dial-peer voice 4 pots
destination-pattern 14085258444
port 4
!
end
```

### Cisco 3640 Gateway Configuration Example

The following is a configuration example for the 3640 gateway portion of the voice network scenario. You do not have to enter the commands marked "default." These commands appear automatically in the configuration file generated when you use the **show running-config** command.

```
!
class-map voice
match access-group 101
!
policy-map mypolicy
class voice
bandwidth 176
class class-default
fair-queue 16
!
ip subnet-zero
```

```
!  
cns event-service server  
!  
voice-port 1/0/0  
!  
voice-port 1/0/1  
!  
voice-port 1/1/0  
!  
voice-port 1/1/1  
!  
dial-peer voice 10 voip  
destination-pattern .....  
ip precedence 5  
session target ras  
!  
dial-peer voice 1 pots  
destination-pattern 12125253111  
port 1/0/0  
!  
dial-peer voice 2 pots  
destination-pattern 12125253222  
port 1/0/1  
!  
dial-peer voice 3 pots  
destination-pattern 12125253333  
port 1/1/0  
!  
dial-peer voice 4 pots  
destination-pattern 12125253444  
port 1/1/1  
!  
process-max-time 200  
gateway  
!  
interface Ethernet0/0  
ip address 172.17.1.36 255.255.255.0  
no ip directed-broadcast  
h323-gateway voip interface  
h323-gateway voip id gk-twister ipaddr 172.17.1.1 1719  
h323-gateway voip h323-id gw-3640  
h323-gateway voip tech-prefix 1#  
!  
interface ATM2/0  
ip address 10.10.10.36 255.255.255.0  
no ip directed-broadcast  
no atm ilmi-keepalive  
pvc 8/35  
service-policy output mypolicy  
protocol ip 10.10.10.20 broadcast  
vbr-rt 1000 600 1  
encapsulation aal5snap  
!  
router eigrp 100  
network 10.0.0.0  
network 172.17.0.0  
!  
no ip classless  
no ip http server  
!  
access-list 101 permit ip any any precedence critical (5)
```

```
!  
line con 0  
exec-timeout 0 0  
transport input none  
line aux 0  
line vty 0 4  
login  
!  
!  
end
```

### Cisco 3640 Gatekeeper Configuration Example

The following is a configuration example for the H.323 gatekeeper portion of the voice network scenario. You do not have to enter the commands marked "default." These commands appear automatically in the configuration file generated when you use the **show running-config** command.

```
!  
class-map voice  
match access-group 101  
!  
!  
policy-map mypolicy  
class voice  
bandwidth 176  
class class-default  
fair-queue 16  
!  
ip subnet-zero  
!  
ip dvmrp route-limit 20000  
!  
process-max-time 200  
!  
interface Ethernet0/0  
ip address 172.28.9.83 255.255.255.0  
no ip directed-broadcast (default)  
!  
interface Ethernet0/1  
ip address 172.17.1.1 255.255.255.0  
no ip directed-broadcast (default)  
!  
router eigrp 100  
network 172.17.0.0  
!  
ip classless (default)  
no ip http server  
!  
!  
gatekeeper  
zone local gk-router router.cisco.com 172.17.1.1  
zone remote gk-sf1 cisco.com 179.15.2.2  
zone remote gk-sf2 lucent.com 180.4.0.1  
zone prefix gk-sf1 1415525....  
zone prefix gk-sf2 1415527....  
!  
line con 0  
exec-timeout 0 0  
transport input none
```

```
line aux 0
line vty 0 4
password lab
login
!
end
```

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