



CHAPTER 4

Configuring Voice

This chapter explains how to configure voice interfaces and ports, which convert telephone voice signals for transmission over an IP network.

This chapter presents the following major topics:

- [Prerequisites, page 4-1](#)
- [Configuring the Voice Interface, page 4-2](#)

VoIP enables your Cisco VG202 and Cisco VG204 voice gateways (VG) to carry live voice traffic (for example, telephone calls and faxes) over an IP network. VoIP offers the following benefits:

- Toll bypass
- Unified voice and data trunking
- Plain old telephone service (POTS)–Internet telephony gateways

For more information on understanding and configuring VoIP, see the [Configuring Voice over IP](#) document.

Prerequisites

Before you can configure your Cisco VG to use VoIP, you must first do the following:

- Establish a working IP network.
- Implement a dial plan, including the following tasks:
 - Complete your company’s dial plan. That is, decide what patterns of dialed numbers will access what telephony endpoints.
 - Establish a working telephony network based on your company’s dial plan.
 - Integrate your dial plan and telephony network into your existing IP network topology.

Configuring the Voice Interface

Whenever you install a new interface or want to change the configuration of an existing interface, you must configure the interface.



Note

The Cisco VG202 and Cisco VG204 voice gateways are fixed voice gateways and do not support interface cards.

Before you configure an interface, have the following information available:

- Protocols you plan to route on the new interface
- IP addresses, subnet masks, network numbers, zones, or other information related to the routing protocol



Timesaver

Obtain this information from your system administrator or network plan before you begin configuring your Cisco VG.

To configure a voice interface, you must use configuration mode (manual configuration). In this mode, you can enter Cisco IOS commands through the command-line interface (CLI).

To configure the voice interface configuration mode, follow these steps:

Step 1 Connect a console to the Cisco VG. If you need instructions for connecting a console, see the installation chapter of your Cisco VG installation and configuration guide.

Step 2 Power on the Cisco VG. If the current configuration is no longer valid, after about one minute you see the following prompt:

```
Would you like to enter the initial dialog? [yes/no]:
```

Answer **no**. You now enter the normal operating mode of the Cisco VG.



Note If the current configuration is valid, you enter the normal operating mode automatically.

Step 3 After a few seconds, you see the user EXEC prompt (VG>). Type **enable** and the password to enter enable mode:

```
VG> enable
Password: <password>
```

The prompt changes to the privileged EXEC (enable) prompt (VG#):

```
VG#
```

Step 4 Enter the **configure terminal** command to enter configuration mode:

```
VG# configure terminal
VG(config)#
```

The Cisco VG enters global configuration mode, indicated by the VG(config)# prompt.

Step 5 If you have not configured the Cisco VG before, or you want to change the configuration, use Cisco IOS commands to configure global parameters, passwords, network management, and routing protocols. In this example, IP routing is enabled:

```
VG(config)# ip routing
```

For complete information about global configuration commands, see the Cisco IOS configuration guides and command references.

Step 6 To configure another interface, enter the **exit** command to return to the `VG(config)#` prompt.

Step 7 To configure the Cisco VG for voice traffic, see the VoIP references in the “Prerequisites” section on page 4-1.

Step 8 To exit configuration mode and return to the enable prompt, when you finish configuring interfaces, press **Ctrl-Z**. To see the current operating configuration, including any changes you just made, enter the **show running-config** command:

```
VG# show running-config
```

To see the configuration currently stored in NVRAM, enter the **show startup-config** command at the enable prompt:

```
VG# show startup-config
```

Step 9 The results of the **show running-config** and **show startup-config** commands differ if you have made changes to the configuration but have not yet written them to NVRAM. To write your changes to NVRAM and make them permanent, enter the **copy running-config startup-config** command at the enable prompt:

```
VG# copy running-config startup-config
Building configuration. . .
[OK]
VG#
```

The Cisco VG is now configured to boot in the new configuration.

Auto-Configuration on the Cisco VG202 and Cisco VG204 Voice Gateways

To configure auto-configuration on the Cisco VG202 and Cisco VG204 voice gateways, follow these guidelines and procedures:

- [Restrictions for Configuring Auto-Configuration](#)
- [Auto-Configuration on the Cisco VG202 and Cisco VG204 Voice Gateways](#)
- [Configuring the Voice Interface for Cisco CallManager](#)
- [Configuring the MAC Address Convention](#)

Restrictions for Configuring Auto-Configuration

The following restrictions apply to configuring auto-configuration on the Cisco VG202 and Cisco VG204 voice gateways before connecting them to the network:

- The Cisco Unified Communications Manager (CCM) needs to be provisioned with the voice gateway information.

Auto-Configuration With a DHCP Server

When the DHCP server is available, the voice gateway sends a DHCP server request to provide the IP address for the Fast Ethernet 0/0 interface, and the TFTP server's IP address using the DHCP option 150. When the DHCP server provides the information, the voice gateway provisions itself with the CCM configuration using Skinny Call Control Protocol (SCCP). Analog ports which have been pre-configured on CCM automatically register on CCM as SCCP controlled ports.

To provision the voice gateway with auto-configuration when a DHCP server is available, use the following commands.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type slot/port*
4. **ip address dhcp**
5. **sccp local** *interface-type interface-number port port-number*
6. **ccm-manager sccp local** *interface-type interface-number*
7. **ccm-manager sccp**
8. **voice service voip**
9. **fax protocol t38** [**nse[force]**]
10. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: VG# enable	Enters privileged EXEC mode.
Step 2	configure terminal Example: VG# configure terminal	Enters global configuration mode. You have entered global configuration mode when the prompt changes to VG(config)#.
Step 3	interface <i>type slot/port</i> Example: VG(config)# interface fastethernet 0/0	Enters interface configuration mode and specifies the type of interface you plan to configure. You have entered interface configuration mode when the prompt changes to VG(config-if)#.
Step 4	ip address dhcp Example: VG(config-if)# ip address dhcp	Acquires an IP address on an interface from the Dynamic Host Configuration Protocol (DHCP).

	Command or Action	Purpose
Step 5	sccp local <i>interface-type interface-number port port-type</i> Example: VG(config)# sccp local fastethernet 0/0	Enables SCCP and its related applications (transcoding and conferencing).
Step 6	ccm-manager sccp local <i>interface-type interface-number</i> Example: VG(config)# ccm-manager sccp local fastethernet 0/0	Selects the local interface that the SCCP application uses to register with Cisco CallManager.
Step 7	ccm-manager sccp Example: VG(config)# ccm-manager sccp	Enables Cisco CallManager autoconfiguration of the Cisco IOS gateway. Note The ccm sccp command will remove itself if there is no IP address configured. The command checks every 20 seconds, up to a maximum of 8 times, then the IOS gateway will be automatically unconfigured.
Step 8	voice service voip Example: VG(config)# voice service voip	Enters voice-service configuration mode and specifies a voice-encapsulation type. Note This step is not necessary through auto-configuration.
Step 9	fax protocol t38 [nse[force]] Example: VG(config)# fax protocol t38 nse force	Specifies the global default ITU-T T.38 standard fax protocol to be used for all VoIP dial peers. Note This step is not necessary through auto-configuration.
Step 10	exit Example: VG(config-line)# exit	Exits to global configuration mode.

Auto-Configuration Without a DHCP Server

When the DHCP server is not available, use the following commands to provision the voice gateway with the CCM configuration.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type slot/port*
4. **ip address** *static ip subnet mask*
5. **sccp local** *interface-type interface-number port port-number*
6. **voice service voip**

7. **fax protocol t38 [nse[force]]**
8. **ccm-manager sccp local** *interface-type interface-number*
9. **ccm-manager config server** *tftp_ip_address*
10. **ccm-manager sccp**
11. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: VG# enable	Enters privileged EXEC mode.
Step 2	configure terminal Example: VG# configure terminal	Enters global configuration mode. You have entered global configuration mode when the prompt changes to VG(config)#.
Step 3	interface <i>type slot/port</i> Example: VG(config)# interface fastethernet 0/0	Enters interface configuration mode and specifies the type of interface you plan to configure. You have entered interface configuration mode when the prompt changes to VG(config-if)#.
Step 4	ip address dhcp Example: VG(config-if)# ip address dhcp	Acquires an IP address on an interface from the Dynamic Host Configuration Protocol (DHCP).
Step 5	sccp local <i>interface-type interface-number port port-type</i> Example: VG(config)# sccp local fastethernet 0/0	Enables the SCCP and its related applications (transcoding and conferencing).
Step 6	voice service voip Example: VG(config)# voice service voip	Enters voice-service configuration mode and specifies a voice-encapsulation type.
Step 7	fax protocol t38 [nse[force]] Example: VG(config)# fax protocol t38 nse force	Specifies the global default ITU-T T.38 standard fax protocol to be used for all VoIP dial peers.
Step 8	ccm-manager sccp local <i>interface-type interface-number</i> Example: VG(config)# ccm-manager sccp local fastethernet 0/0	Selects the local interface that the SCCP application uses to register with Cisco CallManager.

	Command or Action	Purpose
Step 9	<code>ccm-manager config server tftp_ip_address</code> Example: VG(config)# ccm-manager config server tftp 9.13.38.245	Specifies the TFTP server from which the voice gateway downloads Cisco CallManager XML configuration files and enables the download of the configuration port port-number.
Step 10	<code>ccm-manager sccp</code> Example: VG(config)# ccm-manager C	Enables Cisco CallManager autoconfiguration of the Cisco IOS gateway.
Step 11	<code>exit</code> Example: VG(config-line)# exit	Exits to global configuration mode.

Configuring the Voice Interface for Cisco CallManager

To configure voice ports to a Cisco Unified Communications Manager server and set various parameters—including IP address, port number, and version number, use the following commands.



Note

The following steps are required only when the voice interface is configured manually and not through auto-configuration.

SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `stcapp ccm-group group-id`
4. `stcapp`
5. `stcapp feature access-code`
6. `stcapp feature speed-dial`
7. `voice-port slot-number/port`
8. `timeouts initial seconds`
9. `timeouts interdigit seconds`
10. `timeouts ringing seconds infinity`
11. `voice-port slot-number/port`
12. `ccm-manager fax protocol [protocol cisco]`
13. `ccm-manager config [server] ip-address name seconds`
14. `ccm-manager sccp local interface-type interface-number`
15. `ccm-manager sccp`
16. `sccp local interface-type interface-number port port-type`

17. **sccp**
18. **sccp ccm group** *group-number*
19. **associate ccm** *identifier-number* **priority** *priority-number*
20. **dial-peer voice** *tags* **pots**
21. **service stcapp**
22. **port** *port-number*
23. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: VG# enable	Enters privileged EXEC mode.
Step 2	configure terminal Example: VG# configure terminal	Enters global configuration mode. You have entered global configuration mode when the prompt changes to VG(config)#.
Step 3	stcapp ccm-group <i>group-id</i> Example: VG(config)# stcapp ccm-group 1	Configures the Cisco CallManager group number for use by the SCCP Telephony Control Application (STCAPP).
Step 4	stcapp Example: VG(config)# stcapp	Enables STCAPP.
Step 5	stcapp feature access-code Example: VG(config)# stcapp feature access-code	Enables STC application feature access codes and enters their configuration mode.
Step 6	stcapp feature speed-dial Example: VG(config)# stcapp feature speed-dial	Enables STC application feature speed-dial codes and enters their configuration mode.
Step 7	voice-port <i>slot-number/port</i> Example: VG(config)# voice-port 0/0	Enters voice-port configuration mode.
Step 8	timeouts initial <i>seconds</i> Example: VG(config-voiceport)# timeouts initial 60	Configures the initial digit timeout value for a specified voice port.

	Command or Action	Purpose
Step 9	<code>timeouts interdigit seconds</code> Example: VG(config)# timeouts interdigit 60	Configures the interdigit timeout value for a specified voice port.
Step 10	<code>timeouts ringing seconds infinity</code> Example: VG(config)# timeouts ringing infinity	Configures the timeout value for ringing.
Step 11	<code>voice-port slot-number/port</code> Example: VG(config)# voice-port 0/1 VG(config)# voice-port 0/2 VG(config)# voice-port 0/3	Enters voice-port configuration mode.
Step 12	<code>ccm-manager fax protocol [protocol cisco]</code> Example: VG(config)# ccm-manager fax protocol cisco	Enables fax-relay protocol for endpoints on a gateway.
Step 13	<code>ccm-manager config [server] ip-address name</code> Example: VG(config)# ccm-manager config server 9.13.38.245	Specifies the TFTP server from which the voice gateway downloads Cisco CallManager XML configuration files and enables the download of the configuration.
Step 14	<code>ccm-manager sccp local interface-type interface-number</code> Example: VG(config)# ccm-manager sccp local fastethernet 0/0	Selects the local interface that the SCCP application uses to register with Cisco CallManager.
Step 15	<code>ccm-manager sccp</code> Example: VG(config)# ccm-manager sccp	Enables Cisco CallManager autoconfiguration of the Cisco IOS gateway.
Step 16	<code>sccp local interface-type interface-number port port-type</code> Example: VG(config)# sccp local fastethernet 0/0	Selects the local interface that SCCP applications (transcoding and conferencing) use to register with Cisco CallManager.
Step 17	<code>sccp</code> Example: VG(config)# sccp	Enables SCCP protocol and its related applications (transcoding and conferencing).
Step 18	<code>sccp ccm group group-number</code> Example: VG(config)# sccp ccm group 1	Creates a Cisco CallManager group and enters SCCP Cisco CallManager configuration mode.

	Command or Action	Purpose
Step 19	associate ccm <i>identifier-number</i> priority <i>priority-number</i> Example: VG(config)# associate ccm 1 priority 1	Associates a Cisco Unified CallManager with a Cisco CallManager group and establishes its priority within the group.
Step 20	dial-peer voice <i>tag</i> pots Example: VG(config)# dial-peer voice 999000 pots	Defines a particular dial peer, to specify the method of voice encapsulation, and to enter dial-peer configuration mode. Tag defines a particular dial peer. The tag range is from 1 to 2147483647. The POTS peer uses VoIP encapsulation on the IP backbone.
Step 21	service stcapp Example: VG(config)# service stcapp	Enables STC application feature service.
Step 22	port <i>port-number</i> Example: VG(config)# service stcapp	Configures the port number.
Step 23	exit Example: VG(config)# exit	Exits to global configuration mode.

Configuring the MAC Address Convention

The VG202 and VG204 voice gateways use the MAC address of the Skinny Call Control Protocol (SCCP) local interface to define unique MAC addresses for each voice port by using the last 9 digits of the SCCP local interface of the voice gateway.

For example, if the source interface MAC address is 000C.8639.5833, the MAC address of the voice port MAC address will be C863.9583.3XXX. In the preceding example, the last 9 digits of the SCCP of the local VG202 or VG204 voice gateway become the first 9 digits of the voice port MAC address after dropping the leading 000.

The last 3 digits of the voice port MAC address is the slot number (3-bit) + subunit number (2-bit) + port number (7-bit) in hexadecimal format. You combine the digits to get the last three MAC address digits.

For example, the voice-port 0/0 is slot number 0 (000): subunit 0 (00) and port number 0 (0000000). By stringing the digits together, you get the following: 0000 0000 0000 = 0 0 0. This means that if the source interface MAC address is 001f.cac3.b3f8, the MAC address of voice port 0/0 will be 1FCAC3b3f8000.

Table 4-1 shows the voice port to MAC address conversion table.

Table 4-1 Voice Port to MAC Address Conversion Chart

Port Number	Last Three Digits of the MAC Address
0/0	000
0/1	001
0/2	002
0/3	003

Configuring Calls

This section provides information and provisions for configuring calls on the VG202 and VG204 voice gateways. The following functions are covered:

- [Call Transfer, page 4-11](#)
- [Call Waiting, page 4-12](#)
- [Three-Party Conferencing, page 4-13](#)
- [Call ID, page 4-13](#)

Call Transfer

The VG202 or VG204 voice gateways blind-call transfer functionality allows the transfer of a call from the party you call to a destination caller without and call commit from the original person called. For example, party A (transferee) calls party B (transferor). The transferor wants to transfer the call to party C (transfer-target) and uses hookflash (softkey transfer) to get a dial tone, and then dials party C's number. When CCM gets party C's number, it transfers the party A call to party C without the need of commitment from party B.

The VG202 or VG204 voice gateways consultation call transfer functionality allows happens after a call is established between a transferor and transferee. The transferor wants to transfer the call to a transfer target by using a softkey transfer by getting a dialtone then dialing the transfer-target's phone number. When the call between the transferor and transfer-target is established, the transferor hangs up the phone to commit the transfer. The CCM connects the call between the transferee and the transfer-target.

To configure call transfer on the voice gateways, use the following commands.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **dial-peer voice *tags* pots**
4. **service stcapp**
5. **port *port-number***
6. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: VG# enable	Enters privileged EXEC mode.
Step 2	configure terminal Example: VG# configure terminal	Enters global configuration mode. You have entered global configuration mode when the prompt changes to VG(config)#.
Step 3	dial-peer voice tag pots Example: VG(config)# dial-peer voice 1000 pots VG(config)# dial-peer voice 1001 pots VG(config)# dial-peer voice 1002 pots	Defines a particular dial peer, to specify the method of voice encapsulation, and to enter dial-peer configuration mode. Tag defines a particular dial peer. The tag range is from 1 to 2147483647. The POTS peer uses VoIP encapsulation on the IP backbone.
Step 4	service stcapp Example: VG(config)# service stcapp	Enables STC application feature service.
Step 5	port port-number Example: VG(config)# port 0/0 VG(config)# port 0/1 VG(config)# port 0/2	Configures the port number.
Step 6	exit Example: VG(config)# exit	Exits to global configuration mode.

Call Waiting

If a calling party places a call to another party and the other party is engaged in a call, and the called party has call waiting, the party receiving the call can suspend the current telephone call and switch to the incoming call. For example, when caller A is engaged in a call with Caller B, a second call coming in to caller A from caller C will cause caller A to hear the call-waiting tone (one tone with 300ms duration), which indicates a second call. Caller A should be able to use the softkey transfer button to answer the waiting call and then use softkey transfer to switch between the two calls.

To configure call waiting on the voice gateways, use the same commands and configuration shown in “Call Transfer” section on page 4-11.

Three-Party Conferencing

Three-party conferencing provides a three-way conversation between three call parties. The voice gateways along with CCM support three-party conferencing using Cisco IOS software to perform G.711 (ITU-T standard for audio companding) software mixing for up to three Real-time Transport Protocol (RTP) streams

To configure three-party conferencing on the voice gateways, use the same commands and configuration shown in [“Call Transfer” section on page 4-11](#).

Call ID

Caller ID transmits a caller's number to the called party's telephone during the ringing signal. To configure caller ID on the voice gateways, use the following commands.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice-port** *slot-number/port*
4. **caller-id enable** [type [1|2]]
5. **voice-port** *slot-number/port*
6. **caller-id enable** [type [1|2]]
7. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: VG# enable	Enters privileged EXEC mode.
Step 2	configure terminal Example: VG# configure terminal	Enters global configuration mode. You have entered global configuration mode when the prompt changes to VG(config)#.
Step 3	voice-port <i>slot-number/port</i> Example: VG(config)# voice-port 0/0	Enters voice-port configuration mode.
Step 4	caller-id enable [type [1 2]] Example: VG(config-voice-port)# caller-id enable type 1	Allows the sending or receiving of caller-ID information.

	Command or Action	Purpose
Step 5	<code>voice-port slot-number/port</code> Example: VG(config)# voice-port 0/1	Enters voice-port configuration mode.
Step 6	<code>caller-id enable [type [1 2]]</code> Example: VG(config-voice-port)# caller-id enable type 2	Allows the sending or receiving of caller-ID information.
Step 7	<code>exit</code> Example: VG(config)# exit	Exits to global configuration mode.