



INSTALLATION AND CONFIGURATION GUIDE

Cisco Small Business Pro SPA9000 Voice System Version 6.1

Web-UI (Legacy) Based Product Configuration

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Related Documentation

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About This Document

The *SPA9000 Voice System Installation and Configuration Guide for Web UI* is intended to help VARs and Service Providers to manage and configure the SPA9000 Voice System. This preface provides helpful information about this guide and other resources that are available to you. Before you begin to use this guide, refer to the following topics:

- “Purpose,” on page vi
- “Audience,” on page vii
- “Firmware,” on page vii
- “Organization,” on page viii
- “Document Conventions,” on page ix
- “Finding Information in PDF Files,” on page x

Purpose

This document provides information that an administrator needs to configure the SPA9000 Voice System, which typically consists of a SPA9000 IP PBX, one or more SPA900 Series IP phones, and the optional SPA400 PSTN gateway and voice mail server. This guide focuses primarily on the tasks that an administrator performs to configure a SPA9000 with the SPA9000 administration web server.



NOTE This guide does not cover initial installation and configuration, SPA900 Series phone configuration, the Setup Wizard, or provisioning. See “[Related Documentation](#),” on page 158.

Audience

This document is written for the following audience:

- Service providers who offer services using the SPA9000 Voice System
- VARs and resellers who need configuration references for the SPA9000 Voice System
- System administrators or anyone who installs and manages the SPA9000 Voice System



NOTE This guide does not provide the configuration information required by specific service providers. Please consult with the service provider for specific service parameters.

Firmware

This guide describes the features that are available in the following firmware releases.

Product	Firmware Version
SPA9000	6.1.5
SPA400	1.1.2.2
SPA901	5.1.5
SPA921/SPA941	5.1.8
SPA922/942	6.1.3
SPA962	6.1.3
WIP310	5.0.8

Organization

The information in this guide is organized into the following chapters and appendices:

Chapter	Description
Chapter 1, "Getting Started"	This chapter introduces you to the SPA9000 Voice System by describing the components and presenting several deployment scenarios.
Chapter 2, "Installation and Configuration Process Overview"	This chapter provides an overview of the installation and configuration process.
Chapter 3, "Preparation"	This chapter is essential reading before you begin installing the equipment or configuring the system. To ensure that the installation process goes smoothly, verify that you have the required services, equipment, and information.
Chapter 4, "Connecting the Equipment"	This chapter explains how to connect your equipment and upgrade the firmware. At the end of each section, you verify that the installation is progressing correctly.
Chapter 5, "Configuring Phone Service and Voice Mail"	This chapter guides you through the basic tasks that are required to get your voice system running. After you complete these procedures, users will be able to place and receive calls from the ITSP and from the PSTN. Callers will be able to leave voice mail, and users will be able to retrieve it.
Chapter 6, "Configuring Special Features"	This chapter helps you to get started setting up various features that may be useful to your customer.
Chapter 7, "Localization"	This chapter explains how to localize your SPA9000 Voice System with the language files, tones, and ring patterns for your region.

Chapter	Description
Appendix A, "Installation Workbook"	This workbook is intended to help you to record information about the customer's network environment as well as the order and service information, before installing the SPA9000 Voice System. By using this workbook, you can minimize the installation time and ensure that all setup requirements are met.
Appendix B, "Troubleshooting"	This appendix provides solutions to problems that may occur during the installation and operation of the SPA9000 Voice System.
Appendix C, "Where to Go From Here"	This appendix provides links to other resources that may be helpful to you.

Document Conventions

The following table describes the typographic conventions that are used in this document.

Typographic Element	Meaning
Boldface	May indicate either of the following: <ul style="list-style-type: none"> A user interface element that you need to click, select, or otherwise act on A literal value to be entered in a field.
<i>Italic</i>	May indicate either of the following: <ul style="list-style-type: none"> A variable that should be replaced with a literal value. The name of a page, section, or field in the user interface
Monospaced Font	Indicates code samples or system output.

Finding Information in PDF Files

The SPA9000 Voice System documents are published as PDF files. The PDF Find/Search tool within Adobe® Reader® lets you find information quickly and easily online. You can perform the following tasks:

- Search an individual PDF file.
- Search multiple PDF files at once (for example, all PDFs in a specific folder or disk drive).
- Perform advanced searches.

Finding Text in a PDF

Follow this procedure to find text in a PDF file.

STEP 1 Enter your search terms in the Find text box on the toolbar.



NOTE By default, the Find tool is available at the right end of the Acrobat toolbar. If the Find tool does not appear, choose **Edit > Find**.



STEP 2 Optionally, click the arrow next to the Find text box to refine your search by choosing special options such as Whole Words Only.

STEP 3 Press **Enter**.

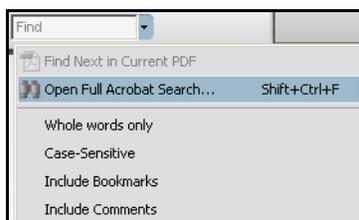
STEP 4 Acrobat displays the first instance of the search term.

STEP 5 Press **Enter** again to continue to more instances of the term.

Finding Text in Multiple PDF Files

The *Search* window lets you search for terms in multiple PDF files that are stored on your PC or local network. The PDF files do not need to be open.

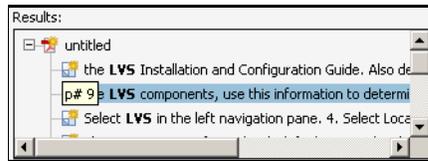
- STEP 1** Start Acrobat Professional or Adobe Reader.
- STEP 2** Choose **Edit > Search**, or click the arrow next to the *Find* box and then choose **Open Full Acrobat Search**.



- STEP 3** In the *Search* window, complete the following steps:
- Enter the text that you want to find.
 - Choose **All PDF Documents in**.
From the drop-down box, choose **Browse for Location**. Then choose the location on your computer or local network, and click **OK**.
 - If you want to specify additional search criteria, click **Use Advanced Search Options**, and choose the options you want.
 - Click **Search**.



- STEP 4** When the Results appear, click + to open a folder, and then click any link to open the file where the search terms appear.



For more information about the Find and Search functions, see the Adobe Acrobat online help.

Getting Started

This chapter introduces you to the SPA9000 Voice System by describing the components and presenting several deployment scenarios.



NOTE This chapter is essential reading before you begin installing the equipment or configuring the system.

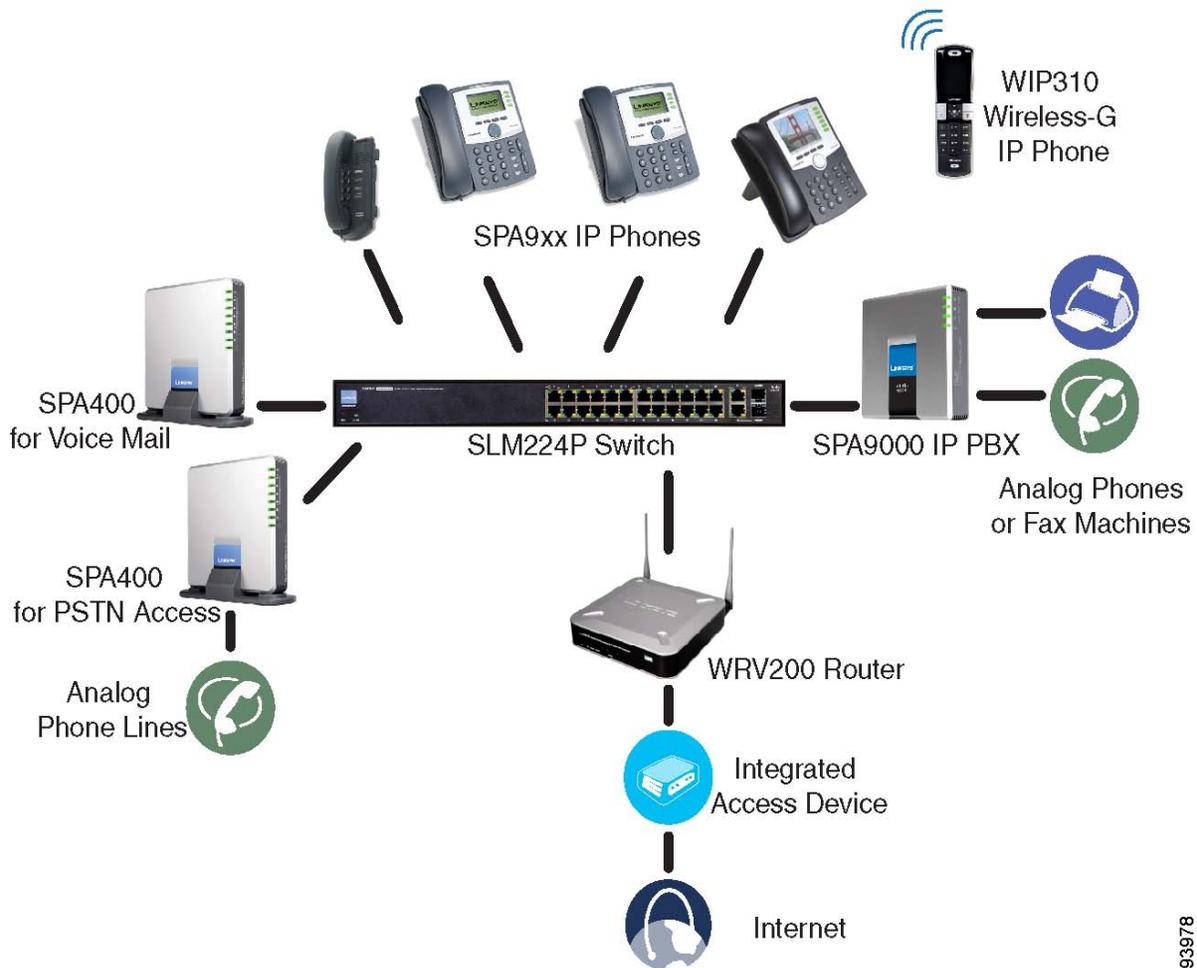
- “Introduction to the SPA9000 Voice System,” on page 13
- “Deployment Scenarios,” on page 15
- “Introducing Components of the SPA9000 Voice System,” on page 20

Introduction to the SPA9000 Voice System

The SPA9000 Voice System is an affordable and feature-rich IP telephone system that is designed especially for the Small and Home Office. The SPA9000 Voice System uses standard TCP/IP protocols and can provide global connectivity through any Internet Telephony Service Provider (ITSP) that supports the Session Initiation Protocol (SIP).

At minimum, the SPA9000 Voice System includes a SPA9000 IP PBX and one or more SPA900 series IP phones. These devices are connected through a switch to a local area network. With an Internet connection, the SPA9000 Voice System can subscribe to ITSP services to take advantage of low calling rates. With the SPA400, the SPA9000 Voice System can connect to the Public Switched Telephone Network (PSTN) to support analog phone lines. See [Figure 1 “SPA9000 Voice System with the SPA9000 and SPA400” on page 14](#) to learn more about a typical deployment.

Figure 1 SPA9000 Voice System with the SPA9000 and SPA400



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SPA9000 IP PBX

The SPA9000 is an IP PBX that supports up to 16 phones. It also has a built-in Analog Telephone Adapter (ATA) with two FXS ports for analog telephones, fax devices, or an external music source for the music on-hold service. Devices connected to the FXS ports are not included in the device count.

The SPA9000 has four line interfaces, which can be configured in any combination for ITSP service, ISDN access, SPA400 PSTN access, or SPA400 voice mail service. A different ITSP account can be configured on each line interface. If a service provider supplies a group of sequential direct inward dial (DID) phone numbers (such as 408-555-0100 through 555-0145) the SPA9000 can support all of the assigned numbers on a single line interface.

The SPA9000 includes an Auto Attendant service that plays pre-recorded voice messages to offer the caller a menu of choices and to direct the call. When the Auto-Attendant is enabled, it parses and operates on user key presses according to the rules that are specified in the Auto Attendant script.

SPA400 SIP-PSTN Gateway and Voicemail Server

The SPA400 provides a SIP-PSTN gateway for voice connectivity between the PSTN and the local client stations that are connected to the SPA9000. It also includes an integrated voice mail application that supports up to 32 voice mail accounts with customized greetings, providing the ability to receive and playback voice mail messages.

Each SPA400 occupies one of the four line interfaces on the SPA9000. The SPA400 has four ports for that can be connected to PSTN or ISDN lines.

IP Phones and Accessories

The SPA9000 Voice System supports any of the Cisco SPA900 Series SIP IP Phones, as well as the Cisco WIP310 Wireless IP Phone.



NOTE This guide explains how to configure the SPA9000 and the SPA400 to support the calling features on the phones. For more information about the phones, see the *SPA9x2 Phone Administration Guide*, the *SPA9x2 Phone User Guide*, and the *Cisco Wireless-G IP Phone User Guide*.

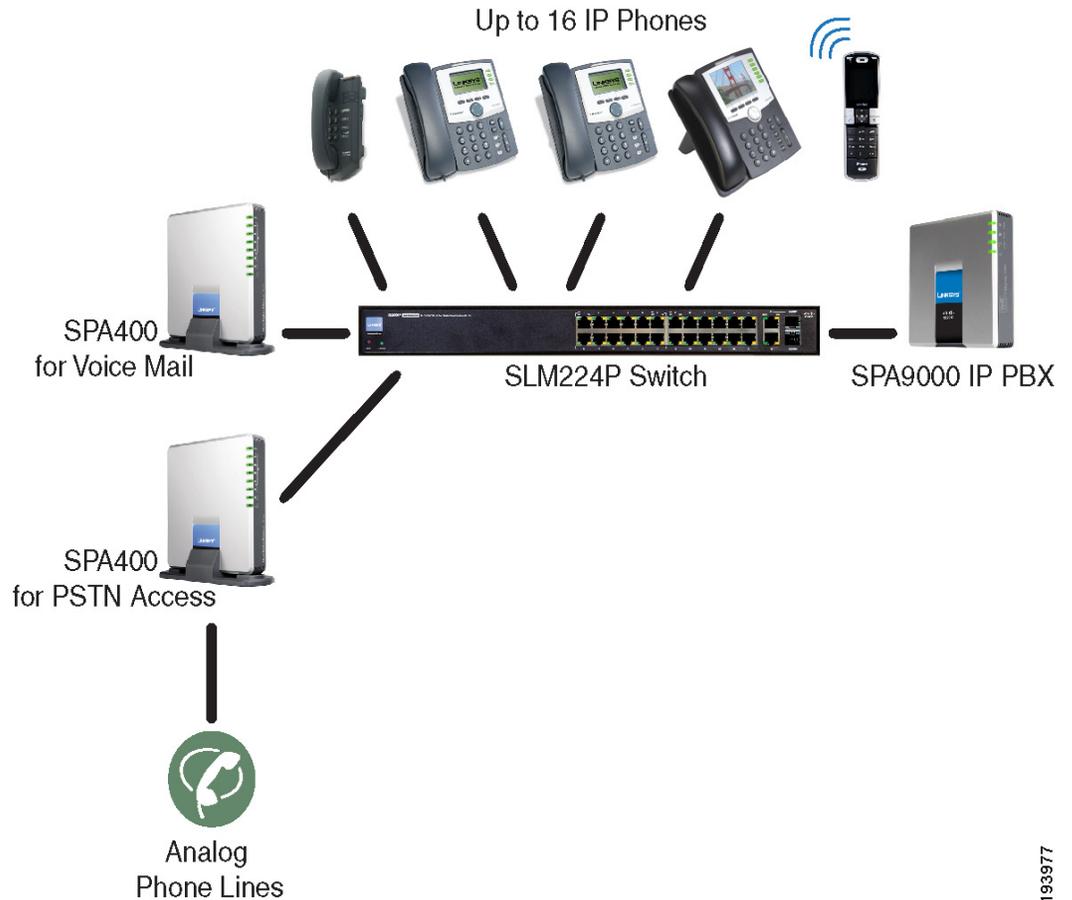
Deployment Scenarios

The SPA9000 Voice System can meet the calling needs of many small businesses. Various deployment scenarios are possible. This section includes the following examples:

- “PSTN Access and Local Voice Mail,” on page 16
- “ITSP Service Only,” on page 17
- “ITSP Service, PSTN Access and Local Voice Mail,” on page 18
- “ITSP Service, PSTN and ISDN Access and Local Voice Mail,” on page 19

PSTN Access and Local Voice Mail

In this scenario, the customer requires a robust phone system but is not using VoIP services. The SPA9000 Voice System is deployed with a SPA9000 IP PBX, one SPA400 for PSTN access with four FXO ports, and another SPA400 for local voice mail service. Up to 16 IP phones can be installed. Optionally, analog phones or fax machines (not illustrated) can be connected to the two phone ports on the SPA9000.



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ITSP Service Only

In this scenario, a customer has no legacy telephone numbers and either needs no voice mail at all or has voice mail hosted by the ITSP. The SPA9000 Voice System is deployed with the SPA9000 IP PB and VoIP service. Up to 16 IP phones can be installed. Optionally, analog phones or fax machines (not illustrated) can be connected to the two phone ports on the SPA9000.



ITSP Service, PSTN Access and Local Voice Mail

In this scenario, the customer wants to use ITSP service for reduced long distance fees but needs to support legacy local telephone numbers (for example, to receive calls to a legacy telephone number or to place outbound calls in the local area). This customer also prefers local voice mail service. The SPA9000 Voice System is deployed with the SPA9000 IP PBX, VoIP service, one SPA400 unit for voice mail service, and another SPA400 unit for PSTN access with four FXO ports. Up to 16 IP phones can be installed. Optionally, analog phones or fax machines (not illustrated) can be connected to the two phone ports on the SPA9000.



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ITSP Service, PSTN and ISDN Access and Local Voice Mail

In this scenario, the customer takes full advantage of the SPA9000 Voice System solution. This customer has the SPA9000 IP PBX, VoIP service, one SPA400 unit for voice mail service, and another SPA400 for PSTN access with four FXO ports. In addition, this installation includes an ISDN Gateway for ISDN BRI access with four BRI ports. Up to 16 IP phones can be installed. Optionally, analog phones or fax machines (not illustrated) can be connected to the two phone ports on the SPA9000.



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Introducing Components of the SPA9000 Voice System

This section describes the features of the components of the SPA9000 Voice System, including the SPA9000, the SPA400, and the various models of SPA9xx phones.

- “Getting to Know Your SPA9000,” on page 20
- “Getting to Know Your SPA400,” on page 22
- “Getting to Know Your IP Phones and Accessories,” on page 24
- “Getting to Know Your WRV200 Router,” on page 26
- “Getting to Know the SLM224P Switch,” on page 28

Getting to Know Your SPA9000

The SPA9000 is an IP PBX system with high-end features comparable to traditional large business voice services. This section describes the LEDs on the front panel and the ports on the back panel of the device.

SPA9000 Front Panel



LED	Description/Notes
POWER	<ul style="list-style-type: none"> ▪ Green: The device is receiving power and is connected to the Internet. ▪ Flashing Green: The device is receiving power but is not connected to the Internet. ▪ Unlit: The device is not receiving power.

LED	Description/Notes
INTERNET	<ul style="list-style-type: none"> Green: The device is connected to the Internet. Flashing Green: The device is experiencing network activity. Unlit: The device is not connected to the Internet.
PHONE 1, PHONE 2	<ul style="list-style-type: none"> Green: The phone is on hook and is registered with an active Internet phone service account. Unlit: The phone is on hook but is not registered with an active Internet phone service account. Flashing Green: The phone is off hook.

SPA9000 Back Panel



Port	Description/Notes
PHONE 1, PHONE 2	Use these ports to connect analog phones or fax machines to your IP phone account.
ETHERNET	The use of this port is deprecated. You can use it for direct connection of an administration computer, but the recommended best practice is connect your administration computer to a LAN switch that is connected to the SPA9000's INTERNET port.
INTERNET	Use this port to connect the SPA9000 to the Local Area Network (LAN). The cable may be connected to a switch, router or Integrated Access Device.
POWER	Use this port to connect to the external Power adapter (PA100).

Getting to Know Your SPA400

The SPA400 provides the SPA9000 access to the PSTN by connecting the FXO ports to analog lines. The SPA400 also has a built-in voice mail server.

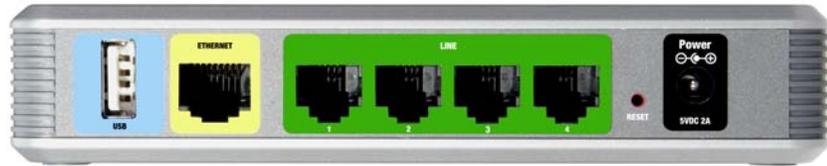
This section describes the LEDs on the front panel and the ports on the back panel of the device.

SPA400 Front Panel



LED	Description/Notes
POWER	<ul style="list-style-type: none"> Steady green: The SPA400 is receiving power and is connected to the Internet. Flashing: The SPA400 is not connected to the Internet, booting, or upgrading firmware.
STATUS	<ul style="list-style-type: none"> Steady green: The SPA9000 is registered to the SPA400. Flashing: The SPA9000 is not registered to the SPA400.
ETHERNET	<ul style="list-style-type: none"> Steady green: The SPA400 has an active connection through the Ethernet port. Flashing: Network activity is occurring over the ETHERNET port.
LINE 1, 2, 3, 4	<ul style="list-style-type: none"> Steady green: The line is active. Flashing: The line is ringing. Off: The line is idle.
USB	<ul style="list-style-type: none"> Steady green: The USB voice mail module is registered. Off: No module is detected.

SPA400 Back Panel

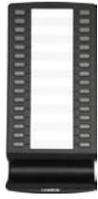


Port	Description/Notes
USB	Use this port for the USB voice mail module, which contains the voice mail prompts and provides the storage location for saving voice mailbox messages.
ETHERNET	Use this port to connect to the Local Area Network (LAN) for communications with SPA9000.
LINE 1, 2, 3, 4	These FXO ports are used to connect to an analog phone lines.
RESET	This button is used to reset the device.
POWER	Use this port to connect to the external Power adapter (PA100).

Getting to Know Your IP Phones and Accessories

Cisco provides a variety of phone models to suit the needs of small businesses. The following table provides a comparison of Cisco IP phones and accessories that can be used with the SPA9000 Voice System.

Product		RJ-45	Voice Lines	Additional Features/Notes
SPA922*		2	1	One-line IP phone with Power over Ethernet (PoE) support
SPA942*		2	4	Four-line IP phone with Power over Ethernet (PoE) support
SPA962*		2	6	Six-line IP Phone with high-resolution color display and Power over Ethernet (PoE) support
WIP310		N/A	1	Wireless-G IP phone

Product		RJ-45	Voice Lines	Additional Features/Notes
SPA932		—	—	Attendant console (sidecar) for SPA962 with 32 buttons and LEDs for monitoring and call transfer
POES5		1	N/A	Provides an 802.3af PoE port for connection back to a PoE switch for SPA9000 and SPA400
WBP54G		1	N/A	Converts your IP phone into a wireless device, so it can connect to your wireless network without an Ethernet cable



NOTE * SPA922/942/962 do not include an external power adapter. If you are using a non-PoE switch, a PA100 power adapter is required.

Getting to Know Your WRV200 Router

WRV200 is a VPN router with a Wireless-G access point for small offices and home offices. It is strongly recommended for use with the SPA9000 Voice System.



NOTE A Wireless-G router is required if you are using wireless components such as the WIP310 telephone.

WRV200 Front Panel



LED/Port	Description
POWER	<ul style="list-style-type: none"> Green: The router is receiving power. Flashing Green: The router is running a diagnostic test.
DMZ	<ul style="list-style-type: none"> Green: The router has an available DMZ port. Flashing Green: The router is sending or receiving data over the DMZ port.
INTERNET	<ul style="list-style-type: none"> Green: The router is connected to a Broadband Access device at the indicated speed (10, 100, 1000). Flashing Green: The router is transmitting or receiving data over the INTERNET port.

LED/Port	Description
Wireless	<ul style="list-style-type: none">Green: The router has a successful wireless connection.Flashing Green: The Router is actively sending or receiving data over the wireless network.
1-4 (Ethernet)	<p>These four LEDs correspond to the router's four Ethernet ports.</p> <ul style="list-style-type: none">Green: The Router is connected to a device through the corresponding port (1, 2, 3, or 4).Flashing Green: The Router is actively sending or receiving data over the corresponding port.

WRV200 Back Panel



LED/Port	Description
POWER	This port is used to connect the router to AC power, using the provided power cable.
RESET	<ul style="list-style-type: none"> ▪ The Reset button has two functions: ▪ If the Router is having problems connecting to the Internet, press the Reset button for just a second with a paper clip or a pencil tip. This is similar to pressing the Reset button on your PC to reboot it. ▪ If you are experiencing extreme problems with the router and have tried all other troubleshooting measures, press and hold in the Reset button for 10 seconds. This action restores the factory defaults and clears all of the Router's settings, such as port forwarding or a new password.
INTERNET	Use this port to connect the router to a Broadband Access device.
1-4 (Ethernet)	Use these ports to connect the router to network devices, such as PCs, print servers, or additional switches.

Getting to Know the SLM224P Switch

The SLM224P switch has 24 10/100 Copper ports with two shared Gigabit copper or optical SFP ports (combo ports) for connecting the switch to the core network.



NOTE In this guide, the SLM224P switch is used in all examples and illustrations. However, various Cisco switches can be used with the SPA9000 Voice System. Cisco recommends use of SLMxxxP, SRWxxxP and SRWxxxMP switch product families with the SPA9000 Voice System.

SLM224P Front Panel



LED/Port	Description
SYSTEM	<ul style="list-style-type: none"> Green: Power is being supplied to the switch. Solid Amber: The switch is performing the Power-On Self Test (POST).
LINK/ACT (1-24)	<ul style="list-style-type: none"> Green: The switch has a functional 10/100 Mbps network link through the corresponding port with an attached device. Flashing: The switch is actively sending or receiving data over the corresponding port.
POE (1-6, 13-18)	<ul style="list-style-type: none"> Flashing Amber: Power is being supplied to an attached powered device (PD) on the corresponding port (1 through 6, 13 through 18).
100M (7-12, 19-24)	<ul style="list-style-type: none"> Amber: The switch has a functional 100 Mbps connection on the corresponding port (7 through 12, 19 through 24) with an attached device.
LINK/ACT (G1-G2)	<ul style="list-style-type: none"> Green: Lights up to indicate a functional 10/100/1000 Mbps network link through the corresponding port (G1 through G2) with an attached device. Flashing Green: The switch is actively sending or receiving data over the corresponding port.
GIGABIT (G1-G2)	<ul style="list-style-type: none"> Amber: The switch has a functional 1000 Mbps connection on the corresponding port with an attached device.
RESET	<ul style="list-style-type: none"> To reboot the switch, press and hold the Reset button for approximately five seconds. To reset the Switch settings to the factory defaults, press and hold the Reset Button for approximately ten seconds.

LED/Port	Description
ETHERNET (1-24)	The Switch is equipped with 24 auto-sensing, Ethernet network ports, which use RJ-45 connectors. The Fast Ethernet ports support network speeds of 10 Mbps, 100 Mbps, or 1000 Mbps. They can operate in half- and full-duplex modes. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10 Mbps, 100 Mbps, or 1000 Mbps), and adjust its speed and duplex accordingly.
G1-G2	The switch is equipped with 2 auto-sensing 10 Mbps, 100 Mbps, or 1000 Mbps Gigabit Ethernet network ports, which use RJ-45 connectors. They can operate in half- and full-duplex modes.
mini-GBIC (1-2)	The mini-GBIC (gigabit interface converter) port is a connection point for a mini-GBIC expansion module, so the switch can be uplinked via fiber to another switch.

SLM224P Back Panel

The back panel has one port, the Power port, which is used to connect the power cord.



Installation and Configuration Process Overview

This chapter provides an overview of the installation and configuration process.

A. Preparation

In **Chapter 3, “Preparation,”** you learn about the equipment and service requirements, bandwidth requirements, call capacity, and related topics, to ensure that the system is well designed to meet the needs of the customer. This chapter also describes basic procedures such as downloading firmware, which should be completed before you begin installing the equipment.

B. Connecting the Equipment

In this phase, you physically connect the SPA9000 Voice System equipment to the LAN. **Chapter 4, “Connecting the Equipment”** explains how to connect the SPA9000, which provides the PBX service for the phones, and the SPA400, which provides voice mail service and PSTN access. You also learn how to install the IP phones and any accessories such as PoE adapters and wall-mount brackets. You also upgrade the firmware with the new files that you downloaded during the Preparation phase.

C. Configuring Voice Services

After you connect the equipment, you need to configure voice features such as ITSP service, PSTN access, and voice mail service. **Chapter 5, “Configuring Phone Service and Voice Mail”** guides you through these steps. You also set up call routing for outbound and inbound calls.

D. Configuring Advanced Features

Now you are ready to begin configuring advanced features, depending on the business needs. In **Chapter 6, “Configuring Special Features,”** you learn how to configure Music On Hold, to set up the SPA962 phone with the SPA932 attendant console, and to route calls with hunt groups and shared line appearances.

E. Localizing the System

For customers outside North America, you need to localize the system. **Chapter 7, “Localization,”** guides you through the steps.

Preparation

This chapter is essential reading before you begin installing the equipment or configuring the system. To ensure that the installation process goes smoothly, verify that you have the required services, equipment, and information.

Refer to the following topics:

- [“Site Survey,” on page 33](#)
- [“System Design Considerations,” on page 34](#)
- [“Network Setup Review,” on page 36](#)
- [“Quality of Service,” on page 38](#)
- [“Local Area Network Design,” on page 38](#)
- [“Services and Equipment,” on page 39](#)

Site Survey

The site surveys consists of gathering relevant information about the customer, the existing infrastructure, the network, the telephone equipment, and the available services. This survey helps you to prepare for the installation of the SPA9000 Voice System (for example, ordering the Cisco SPA devices from the distribution channel) and to anticipate the design considerations. The site survey can be conducted on the customer premises or remotely over the phone and email.

Various site survey templates can be used. [Appendix A, “Installation Workbook,”](#) contains a site survey template example that you can use to record the customer information.

System Design Considerations

When installing and configuring the SPA9000 Voice System, it is necessary to analyze and meet some design considerations to ensure the best quality and user experience. The design considerations cover available bandwidth and quality of service.

Bandwidth Requirements and Call Capacity

The available connection bandwidth determines the maximum number of simultaneous calls that the system can support with the appropriate audio quality. Before installing and configuring the Cisco SPA devices, use this information to determine the maximum number of simultaneous VoIP connections that the system can support. For asymmetric connections, such as ADSL, the maximum number of calls is determined by the upstream bandwidth. In general it is a good practice to use no more than 75% of the total available bandwidth for calls. This provides space for data traffic and helps ensure good voice quality.



NOTE Some ITSP SIP trunk services limit the maximum number of simultaneous calls. Please check with your Service Provider to understand the maximum number of simultaneous calls each SIP trunk supports.

The following table provides the approximate bandwidth budget for different codecs.

Codec	Approximate bandwidth budget for each side of conversation	2 calls	4 calls	6 calls	8 calls
G.711	110 kbps	220 kbps	440 kbps	660 kbps	880 kbps
G.726-40	87 kbps	174 kbps	348 kbps	522 kbps	696 kbps
G.726-32	79 kbps	158 kbps	316 kbps	474 kbps	632 kbps
G.726-24	71 kbps	142 kbps	284 kbps	426 kbps	568 kbps

Codec	Approximate bandwidth budget for each side of conversation	2 calls	4 calls	6 calls	8 calls
G.726-16	63 kbps	126 kbps	252 kbps	378 kbps	504 kbps
G.729	55 kbps	110 kbps	220 kbps	330 kbps	440 kbps

For more information about bandwidth calculation, refer to the following web sites:

www.erlang.com/calculator/lipb/

www.bandcalc.com/

Wide Area Network (WAN) Quality of Service

You can choose from several types of broadband access technologies to provide symmetric or asymmetric connectivity to a small business. These technologies vary on the available bandwidth and on the quality of service. It is generally recommended that you use broadband access with a Service Level Agreement that provides quality of service. If there is not a Service Level Agreement with regard to the broadband connection quality of service, the downstream audio quality may be affected negatively under heavy load conditions (bandwidth utilization beyond 80%).

To eliminate or minimize this effect, Cisco recommends one of the following actions:

- For broadband connections with a bandwidth lower than 2 Mbps, perform the call capacity calculations by assuming a bandwidth value of 50% of the existing broadband bandwidth. For example, in the case of a 2 Mbps uplink broadband connection, assume 1 Mbps. Limit the uplink bandwidth in the Integrated Access Device to this value. This setting helps to maintain the utilization levels below 60%, thus reducing jitter and packet loss.
- Use an additional broadband connection for voice services only. A separate connection is required when the broadband connection services do not offer quality of service and when it is not possible to apply the above mentioned utilization mechanism.

Network Setup Review

The Local Area Network (LAN) is the communication platform used by the SPA9000 Voice System for allowing communications among the telephone users and between the telephone users and the external VoIP, PSTN or/and ISDN network services. This LAN is composed of the data wiring (UTP cabling), networking equipment (switches and routers/access device) and the telecommunication (PSTN or ISDN) lines.

The Local Area Network (LAN) may be already installed or it can be installed and configured at the time of installing the SPA9000 Voice System. Below are the general recommendations to ensure proper operation of the SPA9000 Voice System.

Infrastructure, Cabling and PSTN/ISDN Lines

- AC outlets: Ensure there is an AC outlet available for every LAN and Cisco SPA component that requires AC power. If you are using a Power over Ethernet switch, SPA9x2 phones do not require an AC outlet as they are powered by the switch.
- Ethernet cabling: Ensure there is a Ethernet cabling system and that there is an outlet for each Cisco SPA device. It is recommended that Ethernet cables are UTP CAT 5e or better.
- PSTN and ISDN lines: Ensure that the lines are operative and that any features, such as caller identification, operate properly before starting the installation. Ensure that the cables are available in the location where you are installing the Cisco SPA devices.
- UPS: If you are using an Uninterrupted Power Supply (UPS) mechanism, ensure that the SPA9000 Voice System design is covered by securing the router and switch AC connections and the Cisco SPA devices and by using the Power over Ethernet adapter (POES5) for the non-POE products (SPA9000, SPA400, SPA9x1 phones). Also ensure that devices such as the WAN modem, CSU/DSU, or DDS modem are connected to the UPS.

NAT Mapping

Network Address Translation (NAT) is a function that allows multiple devices to share the same public, routable, IP address to establish connections over the Internet. NAT is present in many broadband access devices to translate public and private IP addresses. To enable VoIP to co-exist with NAT, some form of NAT traversal is required.

Some ITSPs provide NAT traversal, but some do not. If your ITSP does not provide NAT traversal, you have several options.

- NAT mapping with SIP-ALG router: Use a router such as the WRV200, which has a SIP ALG (Application Layer Gateway). With a SIP ALG in the router, you have more choices in selecting an ITSP.
- ITSP that supports NAT mapping through a Session Border Controller: With NAT mapping provided by the ITSP, you have more choices in selecting a router.
- NAT mapping with the SPA9000 EXT IP setting: Configuring NAT mapping in the SPA9000 is recommended only if the ITSP network does not provide a Session Border Controller functionality. If this is the case, and if the external (public) IP address is static, then Cisco recommends mapping a static (permanent) IP address on the SPA9000. Instructions are available in the *SPA9000 Voice System Administration Guide*.
- Configuring NAT Mapping with Simple Traversal of UDP through NAT (STUN): Configuring NAT mapping in the SPA9000 is recommended only if the ITSP network does not provide a Session Border Controller functionality. If this is the case, and if the external (Public) IP address is assigned dynamically by the network (and the router uses asymmetric NAT mechanism), it is possible to use STUN as a mechanism to discover the NAT mapping in SPA9000. This method is considered a practice of last resort and should be used only if the other methods are unavailable. For more information, see the *SPA9000 Voice System Administration Guide*.

Quality of Service

Cisco recommends using the SPA9000 Voice System with QoS-capable networking equipment that can prioritize the VoIP application traffic. QoS features are available on many Cisco data networking switches (such as the SLM224P) and routers (such as WRV200). A QoS-enabled router prioritizes the packets going upstream to the Internet Service Provider. QoS can be enforced using either DSCP (Diffserv Codepoint) ToS (Type of Service) or 802.1 Q/p VLAN ID and priority setting. DSCP ToS is recommended for its simplified setup.

Instructions for the SLM224P are provided in this guide.

Local Area Network Design

Use the following guidelines to manage the LAN setup for the SPA9000 Voice System.

- Ensure that all Cisco SPA devices are located in the same local area network subnet.
- Although all Cisco SPA devices support static IP addressing, we recommend using a DHCP server to add IP telephones to the system. Ensure that the DHCP server can assign enough IP addresses to serve the Cisco IP phones and the existing networked components such as PCs, servers, and so on.
- If you are using DHCP, use a long lease time. Cisco IP phones may reboot on the event of an IP address change because of lease time expiration.
- Use stable DNS server addresses for URL name resolution. Your Internet Service Provider can provide the primary and secondary DNS server IP addresses.

Services and Equipment

To install and configure SPA9000 Voice System, you need the following services and equipment.

Basic Services and Equipment

The following basic services and equipment are required:

- An Integrated access device or modem for broadband access to the Internet; business grade account recommended
- Internet Telephony Service Provider (ITSP) for Voice Over IP telephone service, supporting a “bring your own device” model

You must have at least the following information about your account:

- SIP Proxy (IP address or name)
- Account Information and Password
- Computer with Microsoft Windows XP or Windows Vista (for system configuration)
- Analog phone for administrative use with the SPA9000 Interactive Voice Response (IVR) system
- Uninterruptible Power Source (UPS), recommended for devices such as the Integrated Access Device, network switch, router, and PoE switch to ensure continuous operation during a power failure

Cisco Equipment and Services

The following Cisco equipment is recommended:

- SPA9000 IP PBX

One SPA9000 unit is required for IP PBX features. Only one SPA9000 is supported.

- SPA400 PSTN Gateway and Voice Mail Server

It is recommended that you install one SPA400 unit exclusively for voice mail service and one or more additional SPA400 units for PSTN access. Each unit has four FXO ports and occupies one line interface on the SPA9000. With ITSP

service taking one line interface on the SPA9000, up to three SPA400 units can be installed. With no ITSP service, up to four SPA400 units can be installed.

- SPA9xx series IP phones

The SPA9x1 series phones require access to power outlets. The SPA9x2 series phones can receive power from a Power over Ethernet (PoE) switch and are not supplied with power supplies. If you are not using the recommended PoE switch, you need to purchase a suitable power supply or power injector for the SPA9x2 phones.

- Switch (example: SLM224P)
- Router (example: WRV200)
- Optional POES5 Power over Ethernet adapters, for providing POE-derived power to non-POE devices such as SPA9000, SPA400 and SPA9x1, in case UPS is available.
- Optional WBP54G Wireless-G adapter, for providing Wireless client functionality to IP Phones, if required to connect a phone to the LAN using Wireless technology.

Downloading Firmware

Cisco recommends that you check for recent updates before you install your equipment. Later instructions in this guide will help you to install the firmware that you download in this preparation phase. To find the latest firmware for a device, go to tools.cisco.com/support/downloads and enter the model number in the Software Search box. Repeat for each device in your configuration.

Connecting the Equipment

This chapter explains how to connect your equipment and upgrade the firmware. At the end of each section, you verify that the installation is progressing correctly.

- “Connecting and Configuring the Switch,” on page 41
- “Installing the SPA9000,” on page 46
- “Installing the IP Phones,” on page 53
- “Installing the SPA400,” on page 58

Connecting and Configuring the Switch

Before installing any equipment, you need to connect the SLM224P Ethernet switch to a network broadband router or Integrated Access Device (IAD). If the site is not already equipped with another broadband router/IAD, Cisco recommends the use of the WRV200 broadband router to connect to the access device.

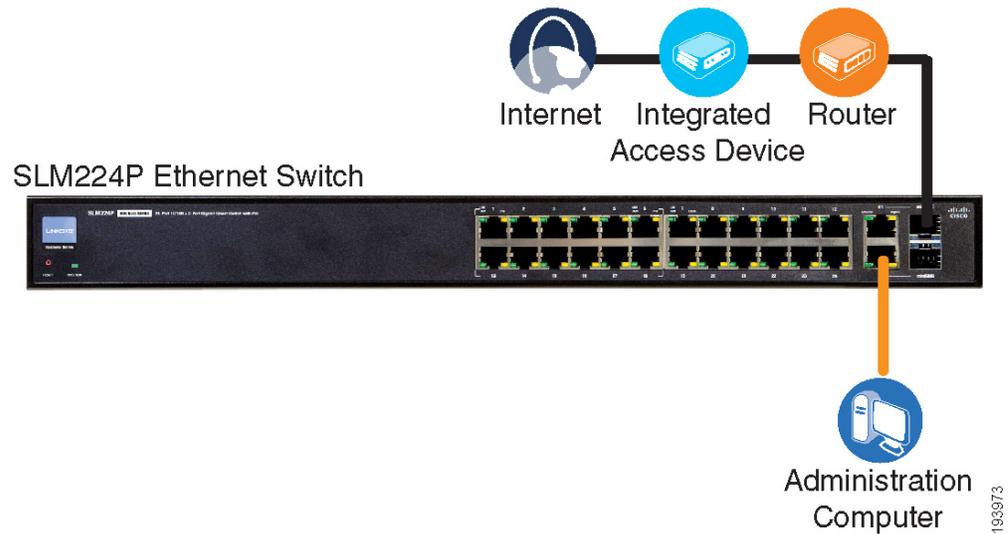
- “Connecting the Switch to the Router,” on page 42
- “Configuring the Switch,” on page 43



NOTE In this guide, the SLM224P switch is used in all examples. However, various Cisco switches can be used with SPA9000 Voice System. Cisco recommends use of the SLMxxxP, SRWxxxP and SRWxxxMP switch product families with SPA9000 Voice System. For more information, visit the following URL:
www.cisco.com/cisco/web/solutions/small_business/products/routers_switches/index.html

Connecting the Switch to the Router

In this procedure, you connect the switch to the router and a power source.



-
- STEP 1** Connect a network cable to one of the LAN ports on your router. Then connect the other end of the cable to a LAN port on the switch.
 - STEP 2** Connect an administrative computer to an Ethernet port on the switch. The PC needs to have an IP address on the same network as the switch, which has a default IP address of 192.168.1.254.
 - STEP 3** Connect the power cord to the back of the switch, and then connect the power adapter to an electrical outlet.

The Power LED is solid amber during the Power-On Self Test (POST). Then the LED is solid green. You are ready to configure the switch.

Configuring the Switch

You need to enable port fast to facilitate the broadcast communications between the SPA9000 and the phones. You also need to configure the Quality of Service settings to help to prevent network delays affecting voice communications.

- Enable spanning tree and port fast.



NOTE If the switch does not provide a way to enable port fast, then you must disable spanning tree. The preferred method is to enable spanning tree and port fast.

- Enable QoS with DSCP.

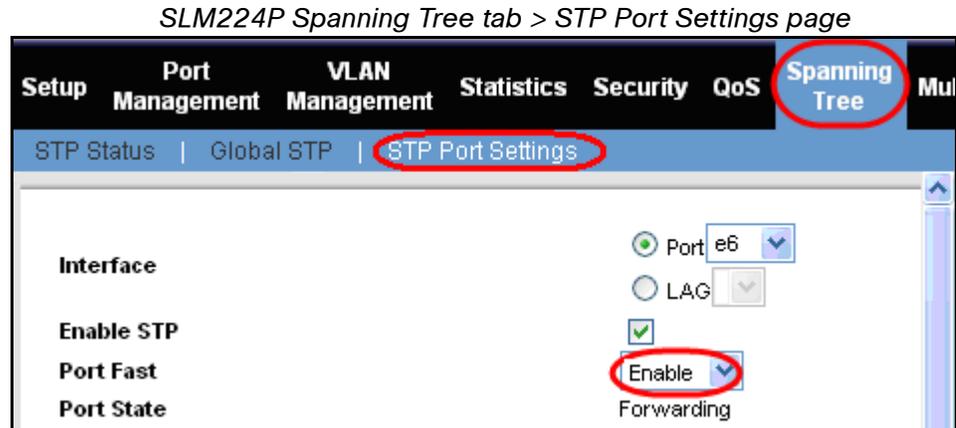
Enabling Spanning Tree and Port Fast on the SLM224P Switch

To avoid timing issues related to Spanning Tree Protocol (STP) and to allow multicasting to work correctly for SPA9000 Voice System, enable port fast on the switch ports that will be connected to the SPA9000 and the SPA9xx IP phones.

When Port Fast is enabled, Fast Link mode is active. In Fast Link mode, the Port State is automatically placed in the forwarding state when the port link is up. Fast Link optimizes the STP protocol convergence. STP convergence can take 30-60 seconds in large networks.

-
- STEP 1** Choose the ports that you will use to connect the SPA9000 and the IP phones.
 - STEP 2** Connect the administration computer to the switch.
 - STEP 3** Start Internet Explorer, and enter the IP address of the switch. The default IP address of the switch is 192.168.1.254. The default User ID is **admin**, with no password. After you log on, the Home page appears.
 - STEP 4** Click **Spanning Tree tab > STP Port Settings**.
 - STEP 5** From the **Port** drop-down list, choose the port number for the SPA9000.
 - STEP 6** Make sure that the **Enable STP** check box is checked, to enable STP on the port.

STEP 7 From the **Port Fast** drop-down list, choose **Enable**.



STEP 8 Click **Update**.

STEP 9 Repeat the previous steps to enable STP and Port Fast on each port where an IP phone or a SPA400 will be connected.

STEP 10 Click **Save Settings**.

Setting QoS on the SLM224P Switch

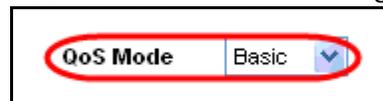
To avoid possible network related delays, configure QoS on the switch.

STEP 1 Click **QoS tab > CoS Settings**.



STEP 2 From the **QoS Mode** list, select **Basic**.

SLM224P QoS tab > CoS Settings page



STEP 3 Click **Save Settings**.

STEP 4 Click **QoS tab > Basic Mode**.



STEP 5 From the **Trust Mode** list, select **DSCP**.

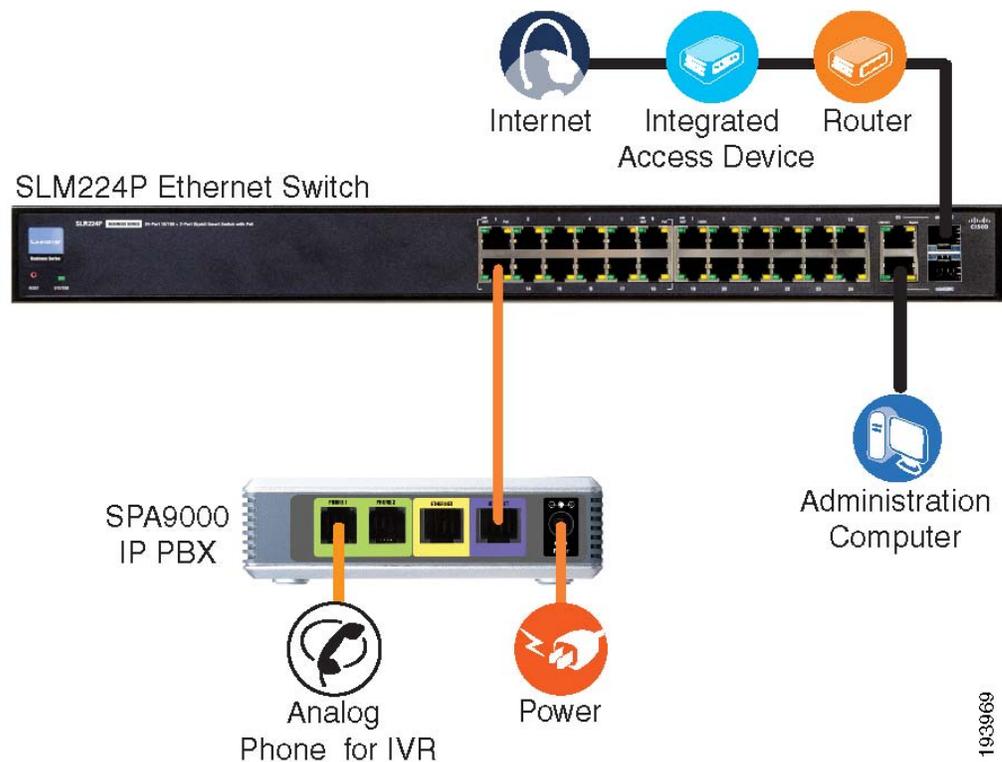
SLM224P QoS tab > Basic Mode page



STEP 6 Click **Save Settings**.

Installing the SPA9000

This section explains how to connect the SPA9000 to your switch, to administer it with an analog phone and a computer, to upgrade the firmware, and to set up the WAN connection.



NOTE This illustration depicts only the devices that are connected at this stage in the installation.

This section includes the following topics:

- “Connecting the SPA9000,” on page 47
- “Upgrading the Firmware for the SPA9000,” on page 48
- “Setting Up the WAN Connection for the SPA9000,” on page 51

Connecting the SPA9000

Follow this procedure to connect your SPA9000 to your switch.

-
- STEP 1** Connect an analog phone to the Phone 1 port of the SPA9000.



NOTE An analog phone is required for use with administrative Interactive Voice Response module. It also can be used as an extension number.

- STEP 2** Optionally, connect a second analog telephone or fax machine directly to the Phone 2 port or run cable from Port 2 to a phone that is located elsewhere in the office.

- STEP 3** Connect a network cable to the INTERNET port (blue) of the SPA9000. Connect the other end of the cable to an available port on your switch.



NOTE IMPORTANT: Do not connect any cable to the ETHERNET port of the SPA9000. The SPA9000 is connected to the LAN switch only through the INTERNET port (blue).

- STEP 4** Connect the included power cord to the POWER port of the System, and then connect the power adapter to an electrical outlet.

The Power LED turns red and then green, and then the SPA9000 begins the boot process.

- If you would like to provide SPA9000 with Power over Ethernet support, you can connect/use POES5 Power over Ethernet adapter.
- If the SPA9000 has been used previously, reset it to the factory defaults before you proceed to the other steps in the configuration process. See [“To factory reset the SPA9000 \(if needed\),” on page 48.](#)

- STEP 5** After the reboot process is completed, start Internet Explorer, and enter the default IP address of the SPA9000: 192.168.0.109

If the system is properly installed, the *Info* page appears. Your SPA9000 is properly powered and has successfully initialized.

To factory reset the SPA9000 (if needed)



NOTE If your SPA9000 has been used before, we recommend performing a factory reset. Otherwise, proceed with enabling WAN Access.

- a. Lift the receiver on the analog phone that is connected to the Phone 1 port.



NOTE There is no dial tone from the IVR.

- b. Press the star key (*) four times: ****
- c. When the IVR responds, press the code for factory reset: 73738#
- d. When prompted, press the code to confirm: 1#
- e. Wait about 30 seconds while the system reboots.

Upgrading the Firmware for the SPA9000

In this procedure, you install any firmware updates that you downloaded in the Preparation phase.

STEP 1 Use the IVR to check the IP address of the SPA9000:

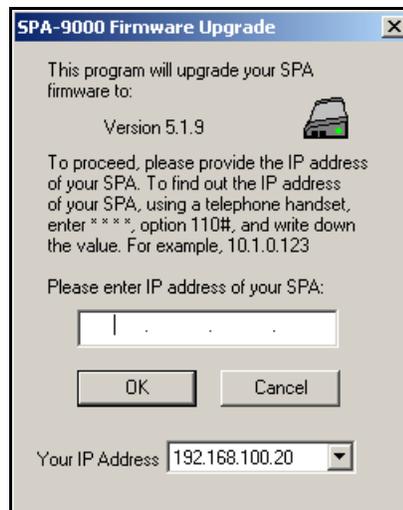
- a. Pick up the receiver of the analog phone that you connected to the SPA9000.
- b. Press **** and then press 110#.
- c. Make a note of the IP address that is announced.

STEP 2 Use the administration computer to install the latest firmware:

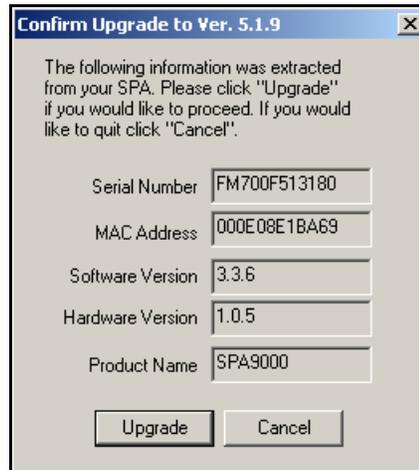
- a. Extract the Zip file, and then run the executable file to upgrade the firmware.
- b. When the *Firmware Upgrade Warning* window appears, click **Continue**.



- c. In the next window that appears, enter the IP address of the SPA9000, and then click **OK**.

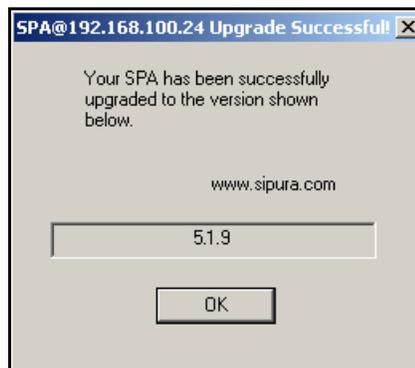


- d. In the *Confirm Upgrade* window, verify that the correct device information and product number appear. Then click **Upgrade**.



A progress message appears while the upgrade is in progress. The success window appears when the upgrade is completed. The device reboots.

STEP 3 Click **OK** to close the confirmation message.



STEP 4 To verify the upgrade, start Internet Explorer, and enter the IP address of the SPA9000. Check the *Router > Status* page. The *Software Version* field should show the firmware version that you installed.

SPA9000 Router tab > Status page

Product Information			
Product Name:	SPA9000	Serial Number:	FM700F513180
Software Version:	5.2.5	Hardware Version:	1.0.5
MAC Address:	000E08E1BA69	Client Certificate:	Installed
Customization:	Open	Licenses:	None



NOTE You may need to refresh your browser to display the updated page reflecting the new version number.

Setting Up the WAN Connection for the SPA9000

The SPA9000 becomes a DHCP client of any server on the network. The recommended setting is to use a static IP address. This configuration provides ease of installation and prevents connectivity issues that would occur if the IP address of the SPA9000 changed.

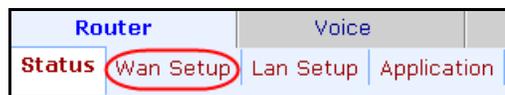
STEP 1 Start Internet Explorer, and enter the IP address of the SPA9000. The *Router > Status* page appears. By default, the page is in Basic User mode.

STEP 2 Log on to the administrator view by clicking **Admin Login**, near the top right corner of the page. Then click **Advanced**.



NOTE By default, no password is required. You can assign an administrative password later, but it is convenient not to use a password during the initial configuration.

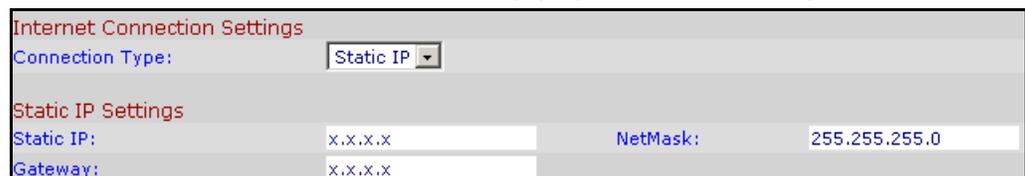
STEP 3 Click **Router tab > Wan Setup**.



STEP 4 From the *Connection Type* drop-down list, choose **Static IP**.

STEP 5 In the *Static IP Settings* area, enter the Static IP of the SPA9000, as well as the *NetMask* and *Gateway* for your network.

SPA9000 Router tab > Wan Setup page: Static IP Settings section



STEP 6 In the *Optional Settings* area, enter the Primary DNS for your network.

SPA9000 Router tab > Wan Setup page: *Optional Settings* section

Optional Settings			
HostName:	<input type="text"/>	Domain:	<input type="text"/>
Primary DNS:	<input type="text" value="x.x.x.x"/>	Secondary DNS:	<input type="text"/>
DNS Server Order:	<input type="text" value="Manual"/>	DNS Query Mode:	<input type="text" value="Parallel"/>



NOTE It is recommended to set an IP address that is outside the address range assigned by the DHCP server. For example, if the DHCP server assigns IP addresses in the range from 192.168.150 to 192.168.1254, you should select a static IP address between 192.168.1.2 and 192.168.1.49.

STEP 7 Click **Submit All Changes**. The SPA9000 reboots.

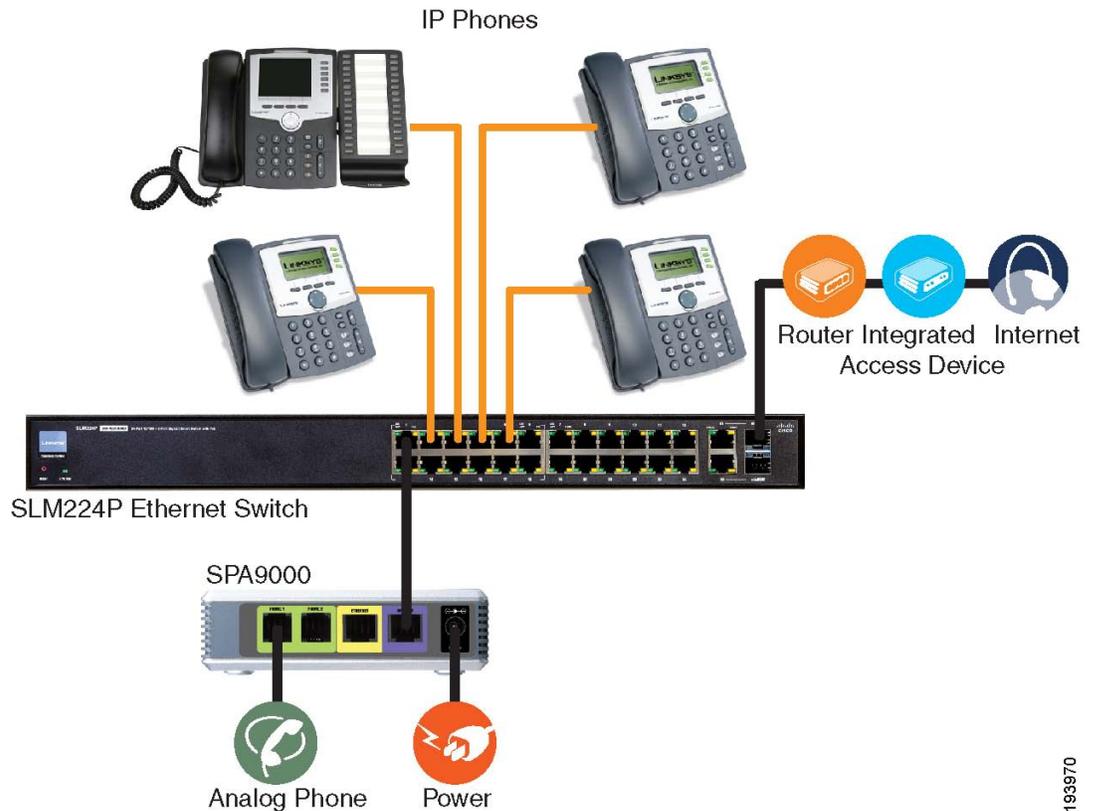
STEP 8 To verify your progress, click **Router tab > Status**. In the *System Status* section, confirm the *WAN Connection Type*, *Current IP*, *Current Netmask*, *Current Gateway*, and *Primary DNS*.

SPA9000 Router tab > Status page: *System Status* section

Product Information			
Product Name:	SPA9000	Serial Number:	FM700F513180
Software Version:	5.1.9	Hardware Version:	1.0.5
MAC Address:	000E08E1BA69	Client Certificate:	Installed
Customization:	Open	Licenses:	K0
System Status			
Current Time:	9/8/2002 07:09:58	Elapsed Time:	03:09:59
Wan Connection Type:	Static IP	Current IP:	192.168.0.109
Host Name:	SipuraSPA	Domain:	
Current Netmask:	255.255.255.0	Current Gateway:	192.168.0.1
Primary DNS:	192.168.0.1		
Secondary DNS:			
LAN IP Address:	192.168.1.1	Broadcast Pkts Sent:	0
Broadcast Bytes Sent:	0	Broadcast Pkts Recv:	125

Installing the IP Phones

Now you can connect the IP phones to the switch.



NOTE The illustration depicts only the devices that are connected at this stage in the installation.

This section includes the following topics:

- “Connecting an IP Phone to the Switch,” on page 54
- “Performing a Factory Reset,” on page 55
- “Connecting Optional Devices,” on page 55
- “Upgrading the Firmware for the IP Phones,” on page 56

Connecting an IP Phone to the Switch

Follow this procedure to connect an IP phone to the switch.

STEP 1 Assemble the IP phone. For more information, refer to the phone user guide.



NOTE If you are connecting the SPA9x1 series phone that requires its own power, connect the phone's power cord to the power port, and then connect the power adapter to an electrical outlet.

STEP 2 Connect the provided Ethernet network cable to the phone, and then connect the other end of the cable to a Ethernet port on the multi-port switch.

After being connected to the switch, the IP phone reboots two to three times. Each reboot may take up to one minute. The system automatically assigns an extension number to the phone. When the IP phone displays the extension number, it is ready to be used for internal (station-to-station) calls.



NOTE Depending on the installation site requirements, you may need an additional accessory to achieve network connectivity. See “[Connecting Optional Devices](#),” on [page 55](#) for additional information.

STEP 3 Repeat this procedure for each additional IP phone.

STEP 4 To verify your progress, perform the following tasks:

- Confirm that each phone is displaying an extension number and is registered. To check the registration, press the **Setup** button on the phone keypad. Press **1 - Status**. Scroll down to **Ext1**, and then press the **select** soft key. Verify that the status is *Registered* and that the *Proxy* is the IP address of the SPA9000.
- Confirm that you can place an internal call from an IP phone by dialing a phone extension.



NOTE You will learn how to configure your system for external calling later in this guide.

Performing a Factory Reset

If an IP phone has been used before, it may not register to the SPA9000 because it has the IP address and registration information from a previous SPA9000. To allow the auto-provisioning feature of the SPA9000 to configure your phone for you, reset it to the factory default settings, as described below.

-
- STEP 1** Press the **Setup** button on the phone keypad. 
 - STEP 2** Press **14 - Factory Reset**.
 - STEP 3** Press the **select** soft key to confirm.
 - STEP 4** After the phone reboots, the system automatically assigns an extension number to the phone.
-

Connecting Optional Devices

Depending on the site requirements, you may need the following additional devices:

- **POES5 Power Adapter:** The POES5 provides an 802.3af PoE port for connection back to a PoE switch. If you have a SPA9x1 series phone and a PoE switch, you can connect the POES5 to the phone to allow it to receive PoE.
- **MB100 Wall-Mount Kit:** The MB100 wall-mount bracket increases the versatility of the SPA9000 Voice System by allowing phones to be mounted on walls in hallways, sales floors, kitchens, and other locations where desktop placement is not practical.
- **WBP54G:** The Wireless-G Bridge for Phone Adapters allows you to connect an IP phone to your wireless network so that you can install the phone in any location within range of your wireless router. The IP phone must be connected to a power adapter since it is not cabled to the switch. The bridge shares electrical power with the IP phone.

Upgrading the Firmware for the IP Phones

In this procedure, you install the most recent firmware files for the phones.



NOTE You need to repeat this procedure to upgrade each phone individually.

- STEP 1** To find the IP address of the phone, complete the following tasks:
- Press the **Setup** button on the phone keypad. 
 - Scroll down to **9 - Network**, and then press the **Select** soft key.
 - Make a note of the Current IP address that is displayed on the phone.
- STEP 2** Use the administration computer to install the latest firmware for this model of IP phone:
- Extract the Zip file, and then run the executable file to upgrade the firmware.
 - When the *Firmware Upgrade Warning* window appears, click **Continue**.



- In the next window that appears, enter the IP address of the phone, and then click **OK**.



- d. When the *Confirm Upgrade* window appears, verify that the correct device information and product number appear. Then click **Upgrade**.



A progress message appears while the upgrade is in progress. The success window appears when the upgrade is completed. The device reboots.

STEP 3 Click **OK** to close the confirmation message.



STEP 4 To verify the upgrade, complete the following tasks:

- a. Press the **Setup** button on the phone keypad. 
- b. Scroll down to **10 - Product Info**, and then press the **Select** soft key.
- c. Scroll down to **3 - Software Version**.
- d. Verify that the new firmware version number appears.

Installing the SPA400

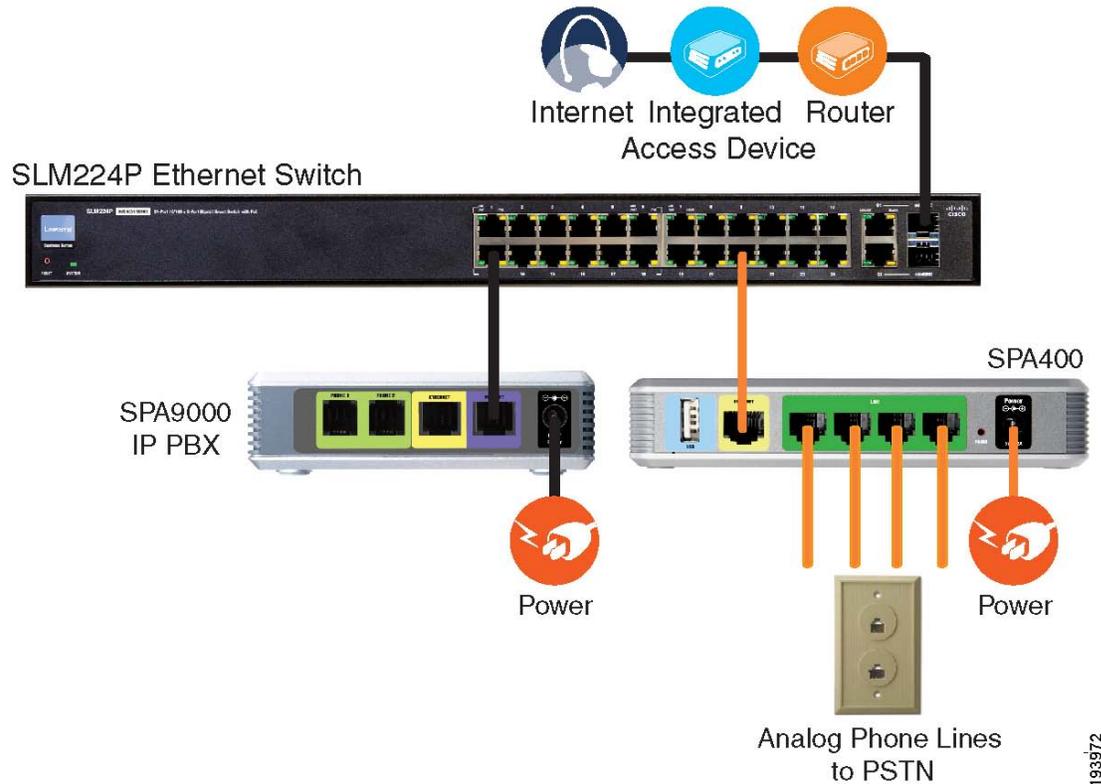
The SPA400 is an integrated part of the SPA9000 Voice System. The SPA400 provides connectivity to the PSTN network and has an integrated voice mail application available on the same platform. Depending on your voice service configuration (i.e. combination of VoIP, PSTN and ISDN line/services), you can connect up to four SPA400 devices to your SPA9000 Voice System.

This section includes the following topics:

- [“Connecting the SPA400 to the Switch,” on page 59](#)
- [“Configuring the SPA400 Network Connection,” on page 61](#)
- [“Upgrading the Firmware for the SPA400,” on page 63](#)

Connecting the SPA400 to the Switch

You can connect up to four SPA400 devices to the system.



NOTE

- This illustration depicts only the devices that are connected at this stage in the installation.
- If you install multiple SPA400 units, keep track of the MAC addresses to ensure that you know which device you are configuring. In the administration web server, you can see the MAC address by clicking the **Status** tab.

-
- STEP 1** Connect the provided Ethernet network cable to the ETHERNET port on the SPA400, and then connect the other end of the cable to an Ethernet port on the SLM224P switch.
- STEP 2** If you are using the SPA400 for PSTN access, connect an RJ11 telephone cable to one of the line ports on the SPA400, and then connect the other end of the cable to the RJ11 wall outlet for the telephone service.
- STEP 3** If you are using the SPA400 as a voice mail server, insert the provided USB 1.1 voice mail module into the USB port.



NOTE IMPORTANT: For optimum voice mail performance, a SPA400 should be dedicated to the voice mail application when either of the following conditions is met:

1. More than 2 FXO connections are required
- OR
2. More than 2 users commonly access voice mail at the same time.
-

- STEP 4** Connect the provided power adapter to the POWER port on the SPA400, and then connect it to an electrical outlet.



NOTE If you would like to provide SPA400 with Power over Ethernet support, connect a POES5 Power over Ethernet adapter.

- STEP 5** To verify your progress, confirm that the Power LED on the SPA400 flashes and then shines steady green. The Status LED remains flashing until the SPA400 is registered to the SPA9000.



NOTE You will learn how to configure the SPA400 in [Chapter 5, “Configuring Phone Service and Voice Mail.”](#)

Configuring the SPA400 Network Connection

You need to configure a fixed IP address for your SPA400.

- STEP 1** Start Internet Explorer, and enter the IP address of the SPA400.
- By default, the SPA400 is configured to obtain an IP Address via DHCP. You can check the obtained IP address on the router DHCP server's client list.
 - If your SPA400 has been used before or it is not reachable, factory reset the unit by pressing the Reset button for 10 seconds.
- STEP 2** When the password prompt appears, enter the default user name, **Admin**, with no password. Then click **OK**.



NOTE The user name must be entered exactly as shown: **Admin**. For information about managing system access, refer to the *Cisco SPA9000 Voice System Administration Guide*.

- STEP 3** Click **Setup tab > Basic Setup**.



STEP 4 Enter the following settings:

Network Setup section:

- **Fixed IP address:** Click the radio button, and then enter a valid IP address.



NOTE To avoid addressing conflicts, enter an IP address that is outside the range of addresses that are automatically assigned by your DHCP server.

- **IP Subnet Mask:** Enter the subnet mask for the subnetwork that the SPA400 is on.
- **Gateway IP Address:** Enter the IP address of the router for this subnetwork.

Domain Name Server (DNS) Address section:

- **Primary DNS:** Enter the IP address of the primary DNS server.
- **Secondary DNS:** Enter the IP address of the secondary DNS server.

NTP section:

- **NTP:** Enter a fully qualified name of a Network Time Protocol server, such as time.nist.gov.
- **Time Zone:** Select the time zone for your region.

STEP 5 Click **Save Settings**. The SPA400 will reboot. To reconnect to the web administration server, enter the new IP address for the SPA400 in the browser Address bar.

Upgrading the Firmware for the SPA400

In this procedure, you install any firmware updates that you downloaded in the Preparation phase.



NOTE You need to repeat this procedure to upgrade each SPA400 individually.

STEP 1 Start Internet Explorer, and enter the IP address of the SPA400.



NOTE By default, the SPA400 is configured to obtain an IP Address via DHCP. You can check the obtained IP address on the router DHCP server's client list.

STEP 2 When the password prompt appears, enter the default user name, **Admin**, with no password. Then click **OK**.



NOTE The user name must be entered exactly as shown: **Admin**. For information about managing system access, refer to the *Cisco SPA9000 Voice System Administration Guide*.

STEP 3 Click **Administration tab > Firmware Upgrade**.

STEP 4 Click **Browse**.

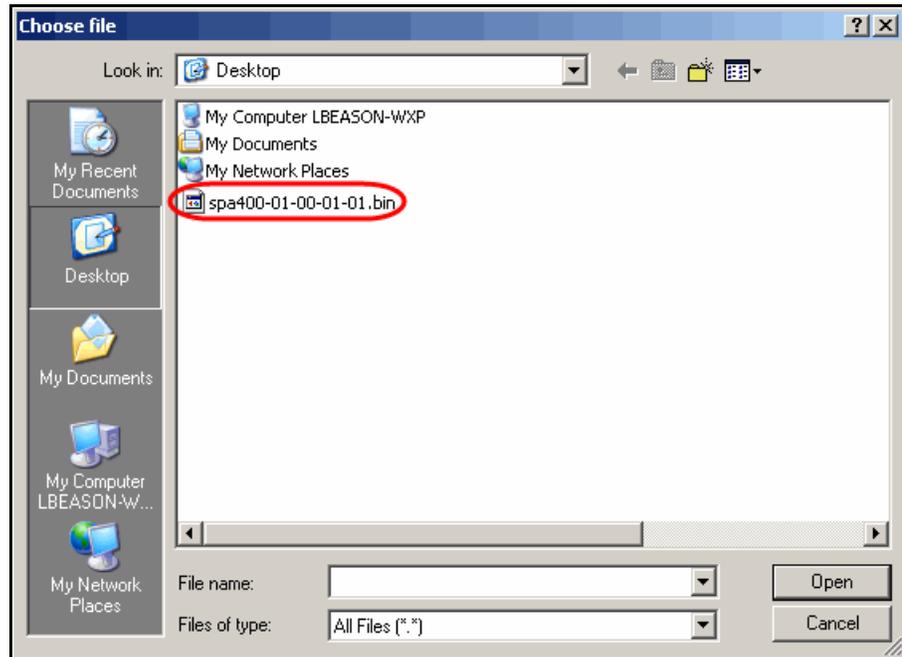
SPA400 Administration tab > Firmware Upgrade page

The upgrade firmware file needs to be downloaded and stored on your PC

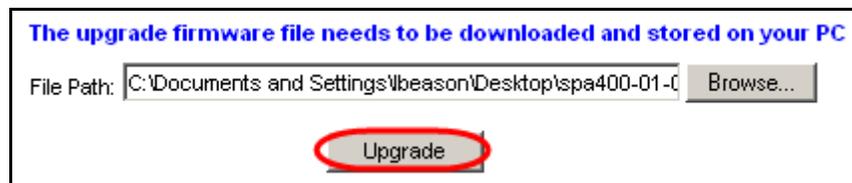
File Path: **Browse...**

Upgrade

STEP 5 Find the binary (.bin file) that you extracted to your Desktop, and click **Open**.



STEP 6 Click **Upgrade**.



STEP 7 When the confirmation message appears, click **OK**.

STEP 8 When the *Setup* page reappears, verify that the Firmware Version number matches the version that you installed. You have successfully upgraded the firmware.



NOTE You may need to refresh your browser to display the updated banner reflecting the new version number.

Congratulations, your SPA9000 Voice System is installed and ready for configuration. Proceed to [Chapter 5, “Configuring Phone Service and Voice Mail.”](#) to start the configuration of the SPA9000 Voice System services.

Configuring Phone Service and Voice Mail

This chapter guides you through the basic tasks that are required to get your voice system running. After you complete these procedures, users will be able to place and receive calls from the ITSP and from the PSTN. Callers will be able to leave voice mail, and users will be able to retrieve it.



NOTE You have several options in setting up your system. For example, you may have Internet phone service, analog telephone service, or both. You may have local voice mail that is integrated into the SPA9000 Voice System, you may have external voice mail, or you may have none. The procedures indicate which steps can be skipped for various scenarios.

It is recommended that you complete the procedures in the order in which they are presented. Refer to the following topics:

- “Configuring the SPA9000,” on page 66
- “Configuring the SPA400,” on page 76
- “Setting Up Each Station,” on page 85
- “Enabling Remote Voice Mail Access (Optional),” on page 88
- “Configuring Third-Party ISDN Gateways (Optional),” on page 90
- “Outbound Call Routing,” on page 90
- “Configuring Inbound Call Routing,” on page 95

Configuring the SPA9000

On the SPA9000, you configure a “line” for ITSP phone service and another “line” for SPA400 services such as PSTN access and voice mail.

- “Configuring General Settings for SPA9000,” on page 66
- “Configuring Internet Phone Service (ITSP) on the SPA9000,” on page 68
- “Configuring SPA9000 Connectivity with the SPA400 for PSTN and Voice Mail Service,” on page 70
- “Configuring SPA9000 Connectivity for PSTN Access Only,” on page 74

Configuring General Settings for SPA9000

There are several settings that are recommended to ensure good performance on your voice network. Complete this procedure before performing any other configuration tasks.

STEP 1 Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.

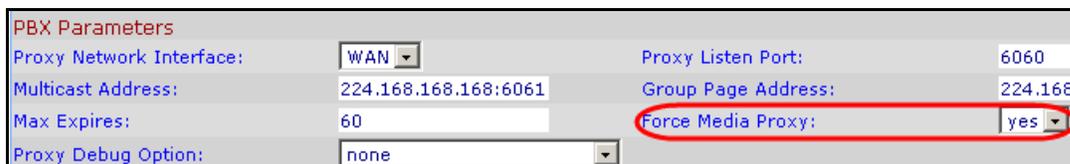
STEP 2 Click **Voice tab > SIP**.



STEP 3 Enter the following settings:

- Under *PBX Parameters*, set *Force Media Proxy* to **Yes**. This setting ensures that the voice path goes through the SPA9000, which acts as a media relay.

SPA9000 Voice tab> SIP page: PBX Parameters section



- In the *PBX Phone Parameters* section, set *CTI Enable* to **Yes**. This setting supports special features such as Busy Lamp Field.

SPA9000 Voice tab > SIP page: PBX Phone Parameters section

PBX Phone Parameters		
Next Auto User ID:	105	Phone Ext Password:
Phone Upgrade Rule:		
Phone Dial Plan:	{[09],[3469]11S0 [09],[2-9]xxxxxx [09],<:1>[2-9]xxxxxxxxS0 [09],1[2-	
Phone Config XML:		
Use LVS_PROXY:	no	CTI Enable: yes

- In the *Auto Attendant Parameters* section, set *AA Decode Inband DTMF* to **Yes**. This setting is required only if the ITSP uses inband signalling. This setting allows the AA to decode the inband signalling and to recognize the caller's key presses.

SPA9000 Voice tab > SIP page: Auto Attendant Parameters section

Auto Attendant Parameters		
AA Dial Plan 1:	(10 xxx.)	
AA Dial Plan 2:	(<:10>x xxx.)	
AA script 1:	<aa><form id="dir" type="menu"><audio src="prompt1" bargein="T"/></	
AA script 2:		
AA script 3:		
DayTime AA:	yes	Day Time:
DayTime AA Script:	1	DayTime Answer Delay:
NightTime AA:	no	NightTime AA Script:
NightTime Answer Delay:	0	Weekend/Holiday AA:
Weekends/Holidays:		Weekend/Holiday AA Script:
Weekend/Holiday Answer Delay:	0	AA LBR Codec:
AA Preferred Codec:	G711u	AA Use Pref Codec Only:
AA Decode Inband DTMF:	yes	

STEP 4 Click the **Submit All Changes** button. The SPA9000 device reboots.

Configuring Internet Phone Service (ITSP) on the SPA9000

If you are using Internet phone service, you need to configure the SPA9000 with the account information. In this procedure, you use the SPA9000 web configuration utility to enter the logon information and the address of the proxy server. After you complete these steps, you will verify that the phone service is registered and that you can place and receive calls.



NOTE This procedure is required if you are using Internet phone service. If you are using PSTN access only (via the SPA400), go to the next procedure, [“Configuring SPA9000 Connectivity with the SPA400 for PSTN and Voice Mail Service,”](#) on page 70.

STEP 1 Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.

STEP 2 Click **Voice tab > Line 1**.



NOTE Any line can be used for ITSP service. However, for simplicity and consistency throughout this Install Guide, Line 1 is used for this purpose.

STEP 3 Enter the account information for your ITSP account:

- **User ID:** The account number or logon name for your ITSP account (often the same as the phone number)
- **Password:** The password for your ITSP account
- **Proxy:** The proxy server for your ITSP account

Use the following illustration as a guide.

SPA9000 Voice tab > Line 1 page

Subscriber Information	
Display Name:	User ID: 19725550100
Password: *****	Use Auth ID: no
Auth ID:	Call Capacity: unlimited
Contact List: 100,103	
Cfwd No Ans Delay: 20	
Dial Plan	
Dial Plan:	(<9:>xx.)
NAT Settings	
NAT Mapping Enable: no	NAT Keep Alive Enable: no
NAT Keep Alive Msg: \$NOTIFY	NAT Keep Alive Dest: \$PROXY
EXT SIP Port:	
Proxy and Registration	
Proxy:	newyork-1.vtnoc.net

- SIP Port: You can keep the default value of 5060 for Line 1. Each line must have a unique SIP port.
- Contact List: Leave the default value, aa, for the Auto Attendant. Later, you can make changes. Using this basic setting at this point simplifies your testing and verification of the configuration.

STEP 4 Click **Submit All Changes**. The SPA9000 reboots.

STEP 5 To verify your progress, perform the following tasks:

- After the devices reboot, click **Voice tab > Info**. Scroll down to the Line 1 Status section. Verify that the line is registered. You may need to refresh the browser screen to see the new status.

SPA9000 Voice tab > Info page: Line 1 Status section

Line 1 Status	
Registration State:	Registered
Next Registration In:	253 s
Mapped SIP Port:	

- Use an external phone, such as a cell phone, to place an inbound call to the telephone number that was assigned by your ITSP. Assuming that you have left the default settings in place, the Auto Attendant answers the call. You can then dial an extension number to verify that the call rings to the station.



NOTE If the line is not registered, you may need to refresh the browser several times because it can take a few seconds for the registration to succeed. If your test call does not go through to the Auto Attendant, you should review the procedure to verify that you entered the correct information. Also verify that your DNS is configured properly.

Configuring SPA9000 Connectivity with the SPA400 for PSTN and Voice Mail Service

The SPA400 acts as a gateway to the PSTN and provides an integrated voice mail application. You can set up your SPA9000 Voice System network to use either or both of these services:

- **PSTN Access** (optional if you have internet telephone service): Each SPA400 can connect up to four standard analog telephone lines to a SPA9000 Voice System VoIP network to provide access to the Public Switched Telephone Network (PSTN). The SPA400 sets up and tears down calls between the PSTN and IP Phones offering seamless telephone service with Cisco VoIP equipment. To enable this service, you assign a User ID and port on the SPA400, and you configure the corresponding “Line” settings on the SPA9000. The SPA9000 Voice System network then recognizes the SPA400 as a service that allows calls to be routed to and from the PSTN.
- **Voice Mail Service** (optional if you have other voice mail service): The SPA400 includes a USB adapter with an integrated voice mail application for users and extensions that are configured on the SPA9000. The integrated voice mail application server supports 32 configurable voice mail accounts. Although a SPA9000 can be configured with up to four SPA400 devices, only one SPA400 can be configured with the voice mail server.

IMPORTANT: For optimal voice mail performance, a SPA400 should be dedicated to the voice mail application when either of the following conditions is met:

1. More than 2 FXO connections are required

OR

2. More than 2 users commonly access voice mail at the same time.

In the following procedure, you configure the SPA9000 to register to the SPA400. If you are using the SPA400 as a voice mail server, you also enter the settings to subscribe to that service.



NOTE The first part of this procedure is required whether you are using the SPA400 for either PSTN access or voice mail. The second part of the procedure is required only if you are using the SPA400 as a voice mail server.

STEP 1 Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.

STEP 2 Click **Voice tab > Line 2**.



NOTE Any line can be used; however, for consistency throughout this Install Guide, Line 1 is used for ITSP service and Line 2 is used for the SPA400 interface.

STEP 3 Enter the following information about the SPA400:

- **User ID: 9000**
This ID corresponds to the User ID that you will enter on the SPA400 configuration page. The entries must match exactly.
- **Proxy:** Enter the IP address of the SPA400.
- **Registration Expires: 60**
This setting ensures that the SPA9000 and SPA400 are resynchronized every 60 seconds. This setting ensures that any changes in settings are synchronized on both devices.

SPA9000 Voice tab > Line 2 page

SIP Settings			
SIP Transport:	UDP	SIP Port:	5061
SIP 100REL Enable:	no	Auth Resync-Reboot:	yes
SIP Proxy-Require:		SIP Remote-Party-ID:	yes
SIP GUID:	no	SIP Debug Option:	none
Restrict Source IP:	no	Referor Bye Delay:	4
Refer Target Bye Delay:	0	Referee Bye Delay:	0
Refer-To Target Contact:	no	Auth INVITE:	no
Subscriber Information			
Display Name:		User ID:	9000
Password:		Use Auth ID:	no
Auth ID:		Call Capacity:	unlimited
Contact List:	aa		
Cfwd No Ans Delay:	20		
Dial Plan			
Dial Plan:	(<9:>xx.)		
NAT Settings			
NAT Mapping Enable:	no	NAT Keep Alive Enable:	no

STEP 4 Also in the Proxy and Registration section, enter the following settings to ensure that calls can be transferred and forwarded to the voice mail server:

- Set *VMSP Bridge* to **all** (required if this line is being used for SPA400 voice mail service).
- Set *XFER Bridge Mode* to **all**.
- Set *CFWD Bridge Mode* to **all**.

SPA9000 Voice tab > SIP page: Proxy and Registration section

Mailbox Manage URL:		VMSP Bridge:	All
CFWD Bridge Mode:	all	XFER Bridge Mode:	all

- **SIP Port:** You can keep the default value of 5061 for Line 2. Each line must have a unique SIP port.
- **Contact List:** Leave the default value, aa, for the Auto Attendant. Later, you can make changes. Using this basic setting at this point simplifies your testing and verification of the configuration.

STEP 5 If you are not configuring SPA400 voice mail, go to **Step 6**. To set up SPA400 voice mail service, enter the following settings:

- Mailbox Deposit URL: 900@<IP address of SPA400>:5090
The SPA9000 uses this address to deposit voice mail on the voice mail server.
- Mailbox Manage URL: 800@<IP address of SPA400>:5090
The SPA9000 uses this address to access voice mail on the voice mail server.
- Mailbox Subscribe URL: 8888@<IP address of SPA400>:5090
The SPA9000 uses this address to subscribe to voice mail service on the voice mail server.
- Mailbox Subscribe Expires: 30
This setting ensures that the SPA9000 and the SPA400 voice mail server are resynchronized every 30 seconds, and prevents problems when you make changes in the settings.

Use the following illustration as a guide.

SPA9000 Voice tab > SIP page: Proxy and Registration section

Proxy and Registration			
Proxy:	192.168.0.110		
Outbound Proxy:			
Use Outbound Proxy:	no	Use OB Proxy In Dialog:	yes
Register:	yes	Make Call Without Reg:	no
Register Expires:	30	Ans Call Without Reg:	no
Use DNS SRV:	no	DNS SRV Auto Prefix:	no
Proxy Fallback Intvl:	3600	Proxy Redundancy Method:	Normal
Mailbox Status:		Mailbox Subscribe URL:	8888@192.168.0.110
Mailbox Deposit URL:	900@192.168.0.110:50	Mailbox Subscribe Expires:	30
Mailbox Manage URL:	800@192.168.0.110:50	VMSP Bridge:	None
CFWD Bridge Mode:	none	XFER Bridge Mode:	none

STEP 6 ****Click **Submit All Changes**. The SPA9000 device reboots. The SPA9000 is now configured to register the SPA400.



NOTE You will perform the verification steps after you configure the SPA400.

Configuring SPA9000 Connectivity for PSTN Access Only

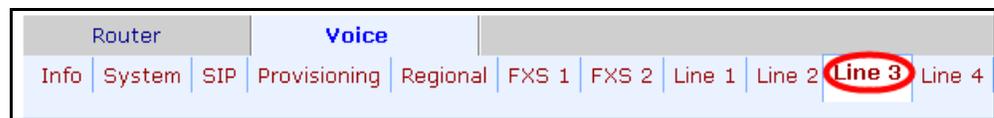
You can configure the SPA9000 so that the users can place and receive calls through PSTN lines that are connected to a SPA400, or to multiple SPA400 devices. Set up a line interface for each SPA400 that you connect.



NOTE This step is required if you want to configure another SPA400 for PSTN access only.

STEP 1 Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.

STEP 2 Click **Voice tab > Line 3**.



NOTE Any line can be used; however, for consistency throughout this Install Guide, Line 1 is used for ITSP service, Line 2 is used for the SPA400 that has voice mail service, and Line 3 is used for a second SPA400 that has PSTN access.

STEP 3 Enter the following information about the SPA400:

- **User ID: 9000**
This ID corresponds to the User ID that you entered on the SPA400 configuration page. They must match exactly.
- **Proxy:** Enter the IP address of the SPA400.

- Register Expires: **60**

This setting ensures that the SPA9000 and SPA400 are resynchronized every 60 seconds. This setting ensures that any future changes in settings are synchronized on both devices.

Use the following illustration as a guide.

SPA9000 Voice tab > SIP page

Subscriber Information			
Display Name:	<input type="text"/>	User ID:	<input type="text" value="9000"/>
Password:	<input type="text"/>	Use Auth ID:	<input type="text" value="no"/>
Auth ID:	<input type="text"/>	Call Capacity:	<input type="text" value="unlimited"/>
Contact List:	<input type="text" value="aa"/>		
Cfwd No Ans Delay:	<input type="text" value="20"/>		
Dial Plan			
Dial Plan:	<input type="text"/>		
NAT Settings			
NAT Mapping Enable:	<input type="text" value="no"/>	NAT Keep Alive Enable:	<input type="text" value="no"/>
NAT Keep Alive Msg:	<input type="text" value="\$NOTIFY"/>	NAT Keep Alive Dest:	<input type="text" value="\$PROXY"/>
EXT SIP Port:	<input type="text"/>		
Proxy and Registration			
Proxy:	<input type="text" value="192.168.1.110"/>		
Outbound Proxy:	<input type="text"/>		
Use Outbound Proxy:	<input type="text" value="no"/>	Use OB Proxy In Dialog:	<input type="text" value="yes"/>
Register:	<input type="text" value="yes"/>	Make Call Without Reg:	<input type="text" value="no"/>
Register Expires:	<input type="text" value="60"/>	Ans Call Without Reg:	<input type="text" value="no"/>
Use DNS SRV:	<input type="text" value="no"/>	DNS SRV Auto Prefix:	<input type="text" value="no"/>
Proxy Fallback Intvl:	<input type="text" value="3600"/>	Proxy Redundancy Method:	<input type="text" value="Normal"/>

STEP 4 Click **Submit All Changes**.

Configuring the SPA400

If you have a SPA400 in your network, you need to configure the SPA400 to communicate with the SPA9000. In addition, if you are using the SPA400 as a voice mail server, you need to configure the voice mail settings.

- “Configuring the SPA400 Network Connection,” on page 76
- “Configuring the SPA400 to Communicate with the SPA9000,” on page 78
- “Configuring the Voice Mail Server and Voice Mail Users,” on page 82

Configuring the SPA400 Network Connection

The SPA400 becomes a DHCP client of any server on the network. The recommended setting is to use a static IP address. This configuration provides ease of installation and prevents connectivity issues that would occur if the IP address of the SPA400 changed.

STEP 1 Start Internet Explorer, and enter the IP address of the SPA400.



NOTE By default, the SPA400 is configured to obtain an IP Address via DHCP. You can check the obtained IP address on the router DHCP server’s client list.

STEP 2 When the password prompt appears, enter the default user name, **Admin**, with no password. Then click **OK**.





NOTE The user name must be entered exactly as shown: **Admin**. For information about managing system access, refer to the *Cisco SPA9000 Voice System Administration Guide*.

STEP 3 Click **Setup tab > Basic Setup**.



STEP 4 Enter the following settings:

Network Setup section:

- Fixed IP address: Click the radio button, and then enter a valid IP address.



NOTE To avoid addressing conflicts, enter an IP address that is outside the range of addresses that are automatically assigned by your DHCP server.

- IP Subnet Mask: Enter the subnet mask for the subnetwork that the SPA400 is on.
- Gateway IP Address: Enter the IP address of the router for this subnetwork.

Domain Name Server (DNS) Address section:

- Primary DNS: Enter the IP address of the primary DNS server.
- Secondary DNS: Enter the IP address of the secondary DNS server.

NTP section:

- NTP: Enter a fully qualified name of a Network Time Protocol server, such as time.nist.gov.
- Time Zone: Select the time zone for your region.

SPA400 Setup tab > Basic Setup page

Network Setup	<input type="radio"/> Dynamic IP Address: (DHCP Client)							
	<input checked="" type="radio"/> Fixed IP Address: <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>192</td><td>.</td><td>168</td><td>.</td><td>1</td><td>.</td><td>110</td></tr> </table>	192	.	168	.	1	.	110
192	.	168	.	1	.	110		
	IP Subnet Mask: <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>255</td><td>.</td><td>255</td><td>.</td><td>255</td><td>.</td><td>0</td></tr> </table>	255	.	255	.	255	.	0
255	.	255	.	255	.	0		
	Gateway IP Address: <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>192</td><td>.</td><td>168</td><td>.</td><td>1</td><td>.</td><td>1</td></tr> </table>	192	.	168	.	1	.	1
192	.	168	.	1	.	1		
Domain Name Server (DNS) Address	<input type="radio"/> Dynamic DNS Address:							
	<input checked="" type="radio"/> Fixed DNS Address:							
	Primary DNS: <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>192</td><td>.</td><td>168</td><td>.</td><td>1</td><td>.</td><td>1</td></tr> </table>	192	.	168	.	1	.	1
192	.	168	.	1	.	1		
	Secondary DNS: <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td><td>.</td><td> </td><td>.</td><td> </td><td>.</td><td> </td></tr> </table>		.		.		.	
	.		.		.			
NTP	NTP Server 1: <input type="text" value="time.nist.gov"/>							
	Time Zone: <input type="text" value="(GMT-05:00) Indiana East, Colombia, Panama"/>							
	<input checked="" type="checkbox"/> Daylight Saving Time							
	Daylight Saving Time Rule: <input type="text" value="start=4/1/7,end=10/-1/7,save=1"/>							

STEP 5 Click **Save Settings**. The SPA400 will reboot. To reconnect to the web administration server, enter the new IP address for the SPA400 in the browser Address bar.

Configuring the SPA400 to Communicate with the SPA9000

In the following procedure, you use the SPA400 web configuration utility to enter the information that enables the SPA400 to communicate with the SPA9000. You also enter QoS settings to ensure good voice quality on your system. In addition, you enter the codec settings.



NOTE This procedure is required whether you are using the SPA400 for PSTN access, for voice mail service, or both.

STEP 1 Click **Setup tab > SPA9000 Interface**.



STEP 2 Enter the following settings:

- **User ID: 9000**
This is the user ID that the SPA9000 will use to register with the SPA400. Any ID can be used, but must match exactly the User ID that you entered on the corresponding SPA9000 Voice > Line page.
- **SPA9000 Address:** Select the **Discover Automatically** radio button (required for SPA9000 operation). This setting enables the SPA400 to learn the IP address and the UDP port of the SPA9000 the from the SIP Registration packets sent by SPA9000.
- **Call Signalling Packets: 68**
- **RTP Packets: b8**
- Leave the *Signalling Port* at the default value of 5060. This port is the source port that is used to originate signaling between the SPA400 and the SPA9000.
- Leave the *RTP Port* at the default value of 10000. This port is the base UDP port for the block of UDP ports that the SPA400 uses to send and receive RTP and RTCP packets.
- Leave the *Session Timer* fields at the default values: Enabled with 0 seconds in both *Refresh Time* fields.

STEP 3 Click **Save Settings** at the bottom of the page.

STEP 4 Click **Setup tab > Voice**.

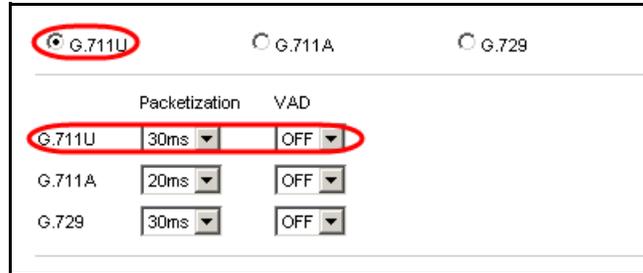


STEP 5 Enter the following settings on the *Voice* page:

- **Preferred Codec:** Select **G.711u**.
- **Packetization:** Choose **30ms** from the *Packetization* drop-down list for G.711U.
- **VAD:** Choose **OFF** from the *VAD* drop-down list for G.711U.

Use the following illustration as a guide.

SPA400 Setup tab > Voice page



STEP 6 Click **Save Settings** at the bottom of the page.

STEP 7 To restart the SPA400, complete the following steps:

- a. Click **Administration tab > Reboot**.
- b. Click **Restart System**.
- c. When the confirmation message appears, click **OK**. The SPA400 reboots.
- d. When the *Reboot OK. Go to Setup Page?* message appears, click **OK** and wait for 60 seconds (the time required for the SPA9000 to re-register with SPA400).

STEP 8 To verify your progress, perform the following tasks:

- a. Click the **Status** tab, and confirm that the SIP registration status is *Registered*.

SPA400 Status tab

Gateway Information	Firmware Version: 1.0.0.9 MAC Address: 00:18:39:23:C5:9C Current Time: Fri Dec 21 11:04:03 2007
Internet Connection	IP Address: 192.168.0.110 IP Subnet Mask: 255.255.255.0 Gateway IP Address: 192.168.0.1 Primacy DNS: 192.168.0.1 Secondary DNS:
SPA400 Status	USB status: Mount Voice mail status: OK USB capacity status: used 1824 kb, remaining 123848 kb SIP registration status: Registered

- b. If you connected PSTN lines to the ports on the SPA400, confirm that you can place an external call to the phone number that is associated with the PSTN line. The Auto Attendant answers the call. You can then dial one of the extension numbers to verify that the call rings to the station. Also verify that a voltage value appears under *Battery Level*.

FXO Line status	
Hook Status	Line 1 status: On-Hook Line 2 status: On-Hook Line 3 status: On-Hook Line 4 status: On-Hook
Battery Level	Line 1: -49 V Line 2: 0 V Line 3: 0 V Line 4: 0 V

- c. Start Internet Explorer, and then enter the IP address of the SPA9000. Log on as Admin, and then click **Voice > Info**. Verify that the *Line 2 Status* is *Registered*. You may need to refresh the browser screen to see the new status.

STEP 9 Proceed as needed:

- If you are using the SPA400 for voice mail service, continue to [“Configuring the Voice Mail Server and Voice Mail Users,” on page 82.](#)
- If you are not using the SPA400 for voice mail service, you have finished configuring your SPA400.

Configuring the Voice Mail Server and Voice Mail Users

In the following procedure, you enter the settings that allow the SPA400 to act as a voice mail server. These settings correspond to those that you entered on the Line 2 page in the SPA9000 configuration. Later you will enter corresponding settings in the phone configuration.



NOTE This procedure is not required if you are using an external voice mail service.

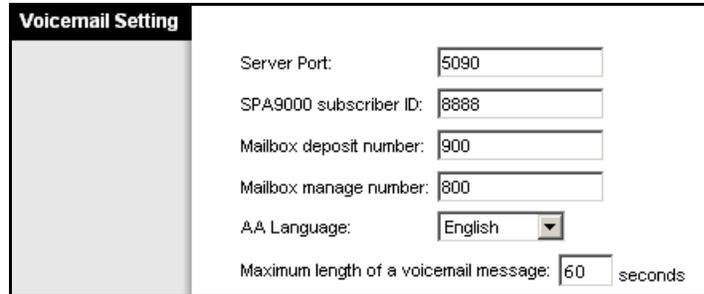
- STEP 1** If your web browser is not already connected to the SPA400 web configuration utility, start Internet Explorer, and enter the IP address of the SPA400, and log on.
- STEP 2** To configure the voice mail server, complete the following tasks (required):
- Click **Setup tab > Voice mail Server**.



- Enter the following information:
 - Server Port: 5090
The voice mail server uses this UDP port to listen for signalling between the SPA400 and the SPA9000. This port must be different from the port number that you entered on the SPA9000 Interface page.
 - SPA9000 subscriber ID: 8888
The SPA9000 uses the subscriber ID to subscribe to the SPA400 Voice mail Server for obtaining notification.
 - Mailbox deposit number: 900
The SPA9000 uses the deposit number to deposit voice mail on the voice mail server.
 - Mailbox manage number: 800
The SPA9000 uses the deposit number to access voice mail on the voice mail server.

Use the following illustration as a guide.

SPA400 Setup tab > Voicemail Server page



c. Click **Save Settings**.

STEP 3 Configure the voice mail users (required):

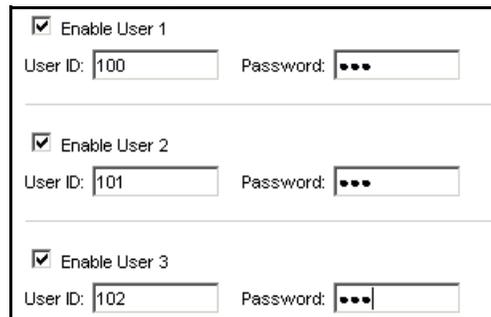
a. Click **Setup > Voicemail Users**.



b. Enable the voice mail accounts and enter the user’s extensions and passwords:

- Enable: Check the check box to enable the voice mail account.
- User ID: Enter the user’s extension number.
- Password: Enter a password for this user. Users can change their own passwords after logging on with the assigned password.

SPA400 Setup tab > Voicemail Users page




NOTE Later you will set up the voice mail for each station.

STEP 4 Click **Save Settings** at the bottom of the page.

STEP 5 Restart the SPA400 by completing the following steps:

- a. Click **Administration** tab > **Reboot**.



- b. Click **Restart System**.
- c. When the confirmation message appears, click **OK**. The SPA400 reboots.
- d. When the *Reboot OK. Go to Setup Page?* message appears, click **OK**.

STEP 6 To verify your progress, click the **Status** tab, and verify the following settings:

- a. USB status: Mount
- b. Voice mail status: OK
- c. SPA9000 Registration status: Registered



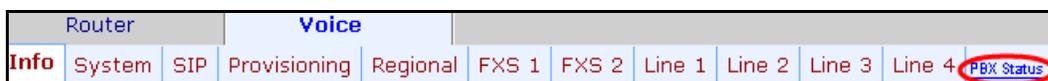
NOTE If the SPA registration status is not Registered, disconnect power to the SPA9000 and then reconnect power after a short wait. After the SPA9000 and the phones reboot, click **Refresh** on the SPA400 Status page.

STEP 7 Continue to the next procedure, “[Setting Up Each Station,](#)” on page 85.

Setting Up Each Station

To set up each station, you need to assign a name, configure general settings, and enable voice mail access (if applicable).

- STEP 1** Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.
- STEP 2** Click **PBX Status**, near the top right corner of the page.



The screen lists each phone by Station Name and Extension number.

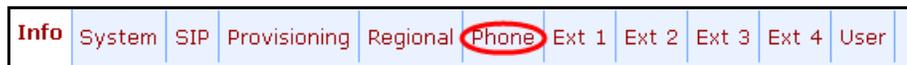
SPA9000 PBX Status page

Registration	Station	User ID	IP Address	Reg Expires(s)	User-Agent
<input type="checkbox"/>	000e08df14c5	100	192.168.1.137	76	Linksys/SPA942-5.2.8
<input type="checkbox"/>	000e08df14cd	101	192.168.1.134	76	Linksys/SPA942-5.2.8
<input type="checkbox"/>	000e08dc3f65	102	192.168.1.105	57	Linksys/SPA942-5.2.8
<input type="checkbox"/>	000e08dc3e8f	103	192.168.1.107	78	Linksys/SPA942-5.2.8
<input type="checkbox"/>	000e08df4e9a	104	192.168.1.101	89	Linksys/SPA942-5.2.8

- STEP 3** Find the phone that you want to configure, and then click the hyperlink in the IP Address column.

The *Telephone Configuration* page appears in a separate browser window.

- STEP 4** To enter a station name for the phone (recommended), complete the following tasks:
 - a. Click the **Phone** tab.



- b. Under **General**, enter a **Station Name**.

Telephone Configuration > Phone page: General section

General			
Station Name:	Accounting	Voice Mail Number:	vmm
Text Logo:			
BMP Picture Download URL:			
Select Logo:	Default	Select Background Picture:	None
Screen Saver Enable:	no	Screen Saver Wait:	300
Screen Saver Icon:	Background Picture		



NOTE This setting assists you in managing the phones.

STEP 5 To configure voice mail service with the SPA400 voice mail server, complete the following tasks:

- a. Click the **Ext 1** tab.
- b. Under *Call Feature Settings*, enter the *Mailbox ID* in the following format:
<lineN><mailbox>
 Example: **2105**
 - lineN: The SPA9000 line (1, 2, 3, or 4) that is configured with the voice mail settings
 In the example, 2 is the first digit in the Mailbox ID because you previously configured Line_2 with the settings for the SPA400 voice mail server. By comparison, if you had configured Line 3 for the SPA400 voice mail server, you would enter_3 as the first number in the Mailbox ID.
 - mailbox: The voice mailbox number for this station, as configured on the SPA400 Voice Mail Users page (see “[Configuring the Voice Mail Server and Voice Mail Users](#),” on page 82.) In the example, 105 is the final set of digits in the Mailbox ID because this station retrieves voice mail from mailbox 105. Enter the appropriate mailbox number for the station that you are configuring.

Telephone Configuration > Ext 1 page: Call Feature Settings section

Call Feature Settings			
Blind Attn-Xfer Enable:	no	MOH Server:	
Message Waiting:	no	Auth Page:	no
Default Ring:	1	Auth Page Realm:	
Conference Bridge URL:		Auth Page Password:	
Mailbox ID:	2105	Voice Mail Server:	192.168.40.109:6060
State Agent:		CFWD Notify Serv:	no

- c. Verify that the *Voice Mail Server* field displays the *SPA400_IPAddress:6060*, such as 192.168.40.109:6060.
- d. Click **Submit All Changes**. The phone reboots.

STEP 6 Close the browser window for this station.

STEP 7 Return to the browser window that shows the list of stations, and then repeat this procedure for each station.



NOTE When you finish configuring stations, you can click the browser's **Back** button to return to the main web configuration page, or you can close the browser.

STEP 8 To verify your progress, perform the following tasks:

- **Station Name:** Verify that the station name appears on the phone display and in the list of stations on the PBX Status page.
- **Mailbox Status:** Click **Voice tab > Line 2**. In the *Proxy and Registration* section, check the *Mailbox Status* field. You should see a listing for each extension that you configured with voice mail.

SPA9000 Voice tab > Line 2 page: Proxy and Registration section

Proxy and Registration			
Proxy:	192.168.0.110		
Outbound Proxy:			
Use Outbound Proxy:	no	Use OB Proxy In Dialog:	yes
Register:	yes	Make Call Without Reg:	no
Register Expires:	30	Ans Call Without Reg:	no
Use DNS SRV:	no	DNS SRV Auto Prefix:	no
Proxy Fallback Intvl:	3600	Proxy Redundancy Method:	Normal
Mailbox Status:	103:0/0,102:0/0,SPA90	Mailbox Subscribe URL:	8888@192.168.0.110:5
Mailbox Deposit URL:	900@192.168.0.110:50	Mailbox Subscribe Expires:	30

- **Voice Mail:** Press the **Message** button. You hear one of the following responses:
 - “Password” prompt: This prompt indicates that the station is configured properly. You can enter the password and manage the mailbox.
 - “Mailbox number” prompt: This prompt indicates that no mailbox is assigned to this station. Review the settings on the *SPA400 Setup tab > Voicemail User* page (see “[Configuring the Voice Mail Server and Voice](#)”).

Mail Users,” on page 82) and the Phone configuration page (see **“Setting Up Each Station,” on page 85)**.

- **Busy Tone:** A busy tone indicates a problem with the configuration. Verify that the USB drive is properly inserted into the SPA400. Verify that the correct data was entered on the SPA9000 > *Line 2* configuration page (see **“Configuring SPA9000 Connectivity with the SPA400 for PSTN and Voice Mail Service,” on page 70)**. Verify that the mailbox was set up on the SPA400 (see **“Configuring the Voice Mail Server and Voice Mail Users,” on page 82)** and that the correct line and mailbox were entered on the Phone configuration page (see **“Setting Up Each Station,” on page 85)**.

Enabling Remote Voice Mail Access (Optional)

Follow this procedure to allow users to access their voice mail remotely.



NOTE If your users will call into your voice mail system through an ITSP line, your ITSP must support out-of-band DTMF.

- STEP 1** Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.
- STEP 2** Click **Voice > SIP**.
- STEP 3** Scroll down to the *Auto Attendant Parameters* section.
- STEP 4** Edit the *AA Dial Plan 1* string to include a code for the voice mail server, as described below.
 - **SYNTAX:** (10x | xxx. | <dialcode:vmmN>)
 - **EXAMPLE:** (10x | xxx. | <8:vmm2>)
 - **dialcode:** The digit that users dial, when prompted by the Auto Attendant, to access voice mail remotely.



NOTE The Contact List for this line must be configured for the Auto Attendant to answer.

- MailboxManageNumber: The Mailbox Manage Number that was entered on the SPA400 Voice mail Settings page.
- vmmN: Replace N with the number of the SPA9000 line interface (Line 1 ... Line 4) that is configured for the SPA400 voice mail server.

SPA9000 Voice tab > SIP page: Auto Attendant Parameters section

Auto Attendant Parameters			
AA Dial Plan 1:	(10x xxx. <8:800@192.168.0.110:5090>)		
AA Dial Plan 2:	(<:10>x xxx. <8:800@192.168.0.110:5090>)		
AA script 1:	<aa><form id="dir" type="menu"><audio src="prompt1" bargein="T"/><i		
AA script 2:	<aa><form id="dir" type="menu"><audio src="prompt1" bargein="T"/><i		
AA script 3:			
DayTime AA:	<input type="text" value="yes"/>	Day Time:	<input type="text"/>
DayTime AA Script:	<input type="text" value="1"/>	DayTime Answer Delay:	<input type="text" value="12"/>

- STEP 5** Copy and paste the same string into the *AA Dial Plan 2* field, for the purpose of allowing remote access of voice mail at all times of day. For more information about AA Dial Plans, refer to the *SPA9000 Administrator Guide*.
- STEP 6** Click **Submit All Changes**. The SPA9000 and the phones reboot.
- STEP 7** To verify your progress, perform the following tasks:
- a. Dial into the site from an external number.
 - b. When the Auto Attendant prompts you for an extension, press **8**.
 - c. When the Voice Mail Server prompts for a mailbox number, enter the mailbox number.
 - d. When prompted for a password, enter the password.

Configuring Third-Party ISDN Gateways (Optional)

Optionally, you can connect an ISDN gateway to your SPA9000 Voice System to provide access to ISDN phone services, typically via one or multiple Basic Rate Interface (BRI) access.

Each ISDN gateway occupies one SIP Line, similar to the SPA400.

The SPA9000 supports the following third party ISDN gateways:

- Mediatrix® 4401 BRI Digital Gateway – 1 BRI
- Mediatrix® 4402 BRI Digital Gateway – 2 BRI
- Mediatrix® 4404 BRI Digital Gateway – 4 BRI

To configure SPA9000 and Mediatrix® 4400 Series ISDN gateways, download and follow the instructions in the *SPA9000-Mediatrix® 4400 ISDN Gateways Configuration Guide*. Partners can find this guide by going to Cisco Partner Central, Voice & Conferencing page, Technical Resources section. Use the following URL:

www.cisco.com/web/partners/sell/smb/products/voice_and_conferencing.html#~vc_technical_resources

Outbound Call Routing

By default, all external calls are placed by pressing 9. You may want to set up different steering digits so that users can choose the line for an outbound call. For example, you may want users to press 8 for the ITSP service that is configured on Line 1, and to press 9 for the PSTN service that is configured on Line 2.

This section includes procedures and examples.

- “Configuring Steering Digits,” on page 91
- “Typical Outbound Call Routing Examples,” on page 93
- “Routing Calls to the Auto Attendant (Default),” on page 95
- “Routing Calls to a Receptionist, Extension, or Hunt Group,” on page 96
- “Using Direct Inward Dialing to Phone Extensions,” on page 98

Configuring Steering Digits

Follow this procedure to configure the steering digits.

-
- STEP 1** Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.
- STEP 2** Click **Voice tab > SIP**.
- STEP 3** To configure the call routing rules for outbound calls, complete the following tasks:
- Scroll down to the *PBX Parameters* section.
 - Edit the **Call Routing Rule** to include a code for the voice mail server, as described below.



NOTE The default string is: (<:L1,2,3,4>9xx.)

SYNTAX: (<:L1,backupline>digitsxx. | <:L2> digitsxx. | <:L3> digitsxx. | <:L4> digitsxx.)

- L1, L2, L3, L4: The lines that are configured on the SPA9000 *Voice tab > Line pages (Line 1 ... Line 4)*.
- Backupline: The line interface number of the PSTN/ISDN line that is used for backup of the ITSP VoIP Service (i.e. 2, 3, 4). It is assumed and recommended that ITSP connection is configured always on Line 1, whereas Line 2, Line 3, and Line 4 can be used for connecting to the PSTN (via SPA400) or ISDN (via a third party gateway).
- Digits: The steering digits that are used to select the corresponding line; for example 9.

EXAMPLE 1: In this example, a user would press 9 for Line 1 and 8 for Line 2:
 <:L1>9xx. | <:L2>8xx.)

EXAMPLE 2: In this example, a user would press 9 for Line 1 (ITSP), 8 for Line 2 (PSTN) and will use Line 2 as backup of Line 1.
 (<:L1,2>9xx. | <:L2>8xx.)

- Under *PBX Phone Parameters*, enter the appropriate code in the *Dial Plan* field:
 - For United States:
 (sdigits,[3469]11S0 | sdigits,<:1408>[2-9]xxxxxx |

```
sdigits,<:1>[2-9]xxxxxxxxxS0 | sdigits,1[2-9]xxxxxxxxxS0
| sdigits,011xx. | sdigits,xx. | [1-8]xx)
```

- For European countries:

```
(sdigits,xxS3 | sdigits,xxxS3 | sdigits,[1-9]xxxxxxxxxS0
| sdigits,xx. | [1-8]xx)
```

- For any other country:

```
(sdigits,xxxS3 | sdigits,[1-9]xxxxxxxxxS0 | sdigits,xx. |
[1-8]xx)
```

NOTES:

- *sdigits*: Steering digits for outbound calling.
- If there is more than one line connected, then include the steering digits in the following format: [sdigit1sdigit2]. For example, if the system is connected to an ITSP via Line 1 (with 9 as steering digit) and to the PSTN via the SPA400 on Line 2 (with 8 as steering digit), you would enter the following dial plan:

```
([89],[3469]11S0 | [89],<:1408>[2-9]xxxxxx |
[89],<:1>[2-9]xxxxxxxxxS0 | [89],1[2-9]xxxxxxxxxS0 |
[89],011xx. | [89],xx. | [1-8]xx)
```

- If there is only one line connected, then include a single steering digit. For example, if system is connected to an ITSP via Line 1 only and a user needs to press 9 to dial out, you would enter the following dial plan:

```
(9,[3469]11S0 | 9,<:1408>[2-9]xxxxxx | 9,<:1>[2-
9]xxxxxxxxxS0 | 9,1[2-9]xxxxxxxxxS0 | 9,011xx. | 9,xx.
| [1-8]xx)
```

STEP 4 Configure the corresponding dial plan rule for each line, as described in the following steps:

- Click **Voice tab > Line 1**.
- Scroll down to the *Dial Plan* section.
- Change the *Dial Plan* string, as needed, to include the same steering digit that you configured for L1 in the Call Routing Rule.



NOTE In case you are using a Line (2, 3, 4) for backup of Line 1, you need to include in the backup Line dial plan, the entry of the Line 1 dial plan.

SYNTAX: (<digit:>xx.)

EXAMPLE 1: A user presses 9 to access Line 1.

Call Routing Rule: (<:L1>9xx.)

Line 1 Dial Plan: (<9:>xx.)

EXAMPLE 2: A user presses 9 to access Line 1 and presses 8 to access Line 2.

Call Routing Rule: (<:L1>9xx. | <:L2>8xx.)

Line 1 Dial Plan: (<9:>xx.)

Line 2 Dial Plan: (<8:>xx.)

EXAMPLE 3: A user presses 9 to access Line 1 and presses 8 to access Line 2. Line 2 is used as backup of Line 1.

Call Routing Rule: (<:L1,2>9xx. | <:L2>8xx.)

Line 1 Dial Plan: (<9:>xx.)

Line 2 Dial Plan: (<8:>xx. | <9:>xx.)

STEP 5 Repeat the previous step to configure each active line.

STEP 6 Click **Submit All Changes**.

STEP 7 To verify call routing rule, place an outbound call to an external cell phone or other phone with caller ID, and confirm that the specified line was used for the call.

STEP 8 To verify that a backup line is working, disable the primary line first, and then place a call to confirm that the call is transmitted through the backup line.

Typical Outbound Call Routing Examples

The following examples show how you can accomplish various call routing goals by editing the call routing rule and the dial plans.

- **ITSP Only:** Line 1 is configured for ITSP service. The user (in USA) would like to press 9 to dial outbound (default configuration).
 - Call Routing Rule: (<:L1>9xx.)
 - Phone dial plan (US): (9,[3469]11S0 | 9,<:1408>[2-9]xxxxxx | 9,<:1>[2-9]xxxxxxxxxS0 | 9,1[2-9]xxxxxxxxxS0 | 9,011xx. | 9,xx. | [1-8]xx)
 - Line 1 Dial plan: (<9:>xx.)

- **ITSP and PSTN Service:** Line 1 is configured for ITSP service and Line 2 for a SPA400 connected to PSTN service. The user (in USA) would like to press 9 for Line 1 and to press 8 for Line 2 to make outbound calls.
 - Call Routing Rule: (<:L1>9xx. | <:L2>8xx.)
 - Phone dial plan (US): ([89],[3469]11S0 | [89],<:1408>[2-9]xxxxxxx | [89],<:1>[2-9]xxxxxxxxxxS0 | [89],1[2-9]xxxxxxxxxxS0 | [89],011xx. | [89],xx. | [1-8]xx)
 - Line 1 Dial plan: (<9:>xx.)
 - Line 2 Dial plan: (<8:>xx.)
- **ITSP and PSTN with Backup Line:** Line 1 is configured for ITSP service and Line 2 for a SPA400 connected to PSTN service. The user (in USA) would like to press 9 for Line 1 and to press 8 for Line 2 to make outbound calls. In addition, in case of broadband failure, the user would like to route all calls to the PSTN services (Line 2 used also as backup line of Line 1).
 - Call Routing Rule: (<:L1,2>9xx. | <:L2>8xx.)
 - Phone dial plan (US): ([89],[3469]11S0 | [89],<:1408>[2-9]xxxxxxx | [89],<:1>[2-9]xxxxxxxxxxS0 | [89],1[2-9]xxxxxxxxxxS0 | [89],011xx. | [89],xx. | [1-8]xx)
 - Line 1 Dial plan: (<9:>xx.)
 - Line 2 Dial plan: (<8:>xx. | <9:>xx.)
- **ITSP, PSTN, and ISDN, with International Dialing:** Line 1 is configured for ITSP service, Line 2 for a SPA400 connected to PSTN service, and Line 3 for a third-party ISDN gateway. The user (in Spain) would like to press 0 for Line 1, which is going to be used for international calls, and to press 9 PSTN and ISDN lines, which are going to be used for national, local, and mobile calls. Then the user would like to route all outbound national and local calls through the ISDN line, with exception of mobile numbers (in this example mobile numbers start with 6). Those calls should be routed to the PSTN line.
 - Call Routing Rule: (<:L1>0xx. | <:L2>96xx. | <:L3>9xx.)
 - Phone dial plan (Spain): ([09],[01][1689][012]S0 | [09],[1-9]xxxxxxxxS0 | [09],xx. | [1-8]xx)
 - Line 1 Dial plan: (<0:>xx.)
 - Line 2 Dial plan: (<9:>xx.)
 - Line 3 Dial plan: (<9:>xx.)

Configuring Inbound Call Routing

Inbound call routing defines how external incoming calls are handled and routed by the SPA9000 Voice System. You can configure the following options to handle the incoming calls:

- Step “Routing Calls to the Auto Attendant (Default),” on page 95
- “Routing Calls to a Receptionist, Extension, or Hunt Group,” on page 96

Routing Calls to the Auto Attendant (Default)

By default, all incoming calls are routed to the Auto Attendant, where users are prompted to enter the extension number of the destination phone.

- STEP 1** Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.
- STEP 2** Click **Voice tab > Line 1**.
- STEP 3** In the *Contact List* field, enter: **aa**
- STEP 4** Repeat steps 3-4 for all active lines.

Subscriber Information			
Display Name:	LVS test	User ID:	34700766702001
Password:	*****	Use Auth ID:	no
Auth ID:		Call Capacity:	unlimited
Contact List:	aa		
Cfwd No Ans Delay:	20		

- STEP 5** Adjust the Day Time Answer Delay:
 - Click **Voice tab > SIP**, and scroll down to the *Auto Attendant Parameters* section.
 - In the *Daytime Answer Delay* field, enter the number of seconds that the Auto Attendant will wait before answering a call. The default value is 12 seconds.

Auto Attendant Parameters			
AA Dial Plan 1:	(10x xxx. <8:800@192.168.1.71:5090>)		
AA Dial Plan 2:	(<:10>x xxx. <8:800@192.168.1.71:5090>)		
AA script 1:	<aa><form id="dir" type="menu"><audio src="prompt1" bargein="T"/></i		
AA script 2:			
AA script 3:			
DayTime AA:	yes	Day Time:	
DayTime AA Script:	1	DayTime Answer Delay:	12
NightTime AA:	no	NightTime AA Script:	1

STEP 6 Click **Submit All Changes**. SPA9000 and phones will reboot.

STEP 7 To verify the operation, use an external phone to make an incoming call. The Auto Attendant will answer after the time specified.



NOTE There are additional customization options for the Auto Attendant. For more information, see the *SPA9000 Voice System Administration Guide*.

Routing Calls to a Receptionist, Extension, or Hunt Group

The SPA9000 Voice System is able to route incoming call to any extension, including the receptionist phone, defined in the system.

STEP 1 Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.

STEP 2 Click **Voice tab > Line 1**.

STEP 3 In the *Contact List* field, enter the extension number of the phone or hunt group where you want the calls to be routed. To ring multiple phone simultaneously, type a comma between each number.

Subscriber Information			
Display Name:	test	User ID:	34700766702001
Password:	*****	Use Auth ID:	no
Auth ID:		Call Capacity:	unlimited
Contact List:	100		
Cfwd No Ans Delay:	20		



NOTE For information about how to configure hunt groups or shared extensions, see “Managing Inbound Calls with Hunt Groups,” on page 109.

STEP 4 Optionally, add call forward information to the Contact List to specify how unanswered calls are handled.



NOTE It is useful to add call forward information to ensure that calls are answered when the designated phone is unstaffed, as may be the case during lunch time or after hours. In this case, if the call is not answered within a specified time, the call is routed to another phone or to the Auto Attendant.

a. Add the call forward information to the *Contact List* field, as shown below:

SYNTAX: <target_extension_number>, cfwd=<forwarded_number>

EXAMPLE: 100, cfwd=102

b. Modify the *Cfwd No Ans Delay* parameter, which defines the number of seconds that elapse before a call is considered to be unanswered.

Subscriber Information			
Display Name:	LVS test	User ID:	34700766702001
Password:	*****	Use Auth ID:	no
Auth ID:		Call Capacity:	unlimited
Contact List:	100,cfwd=101		
Cfwd No Ans Delay:	20		

EXAMPLE: Incoming calls are routed to the receptionist (extension number 100). If the receptionist does not answer the call in 15 seconds, the incoming call is forwarded to the Auto Attendant.

- Contact list: 100 , cfwd=aa
- Cfwd No Ans Delay: 15

STEP 5 Repeat this procedure for all active lines.

STEP 6 Click **Submit All Changes**. The SPA9000 and the phones reboot.

STEP 7 To verify your progress:

- a. Verify that incoming calls are routed directly to the desired extension number.
- b. If you configured a call forward option, verify that the call is forwarded correctly after the specified Call Forward No Answer time.

Using Direct Inward Dialing to Phone Extensions

Direct Inward Dialing allows the external users to dial directly any phone extension in the SPA9000 Voice System, without passing through the Auto Attendant or the receptionist.

Before proceeding with the configuration you need to have the full correspondence between the external (DID) number and the extension number.



NOTE

- Direct Inward Dialing requires network support for SIP trunking DID.
- It is important that the DID number format match exactly the format of the number signaled in the SIP trunk.
- Please check with your Service Provider to confirm the availability of this feature and the correct DID number format, before proceeding with this configuration.

SYNTAX: <DIDn1>:+<Extn1> | <DIDn2>:+<Extn2> |
 <DIDn3>:+<Extn3> | <DIDn4>:+<Extn4> | <DIDn5>:+<Extn5> |
 <DIDn6>:+<Extn6> | <DIDn7>:+<Extn7> | <DIDn8>:+<Extn8> |
 <DIDn9>:+<Extn9> | <DIDn10>:+<Extn10> | <DIDn11>:+<Extn11> |
 <DIDn12>:+<Extn12> | <DIDn13>:+<Extn13> | <DIDn14>:+<Extn14>
 | <DIDn15>:+<Extn15> | <DIDn16>:+<Extn16> | <default_route>

- Enter a plus (+) or a minus (-) before the extension number to achieve the desired results for caller ID and call routing:
- **+<Extn1>** The extension will be alerted when there is an incoming call to the DID number, and the DID number will be used as the local user-ID in outbound SIP requests, along with the display-name of the extension.

- **-<Extn1>** The extension will not be alerted when there is an incoming call to the DID number. However, the DID number will be used as the local user-ID in outbound SIP requests, along with the display-name of the extension.
- **DIDn#:** DID number, matching the format of the number signaled in the SIP trunk
- **Extn#:** Target extension number or `aa` for Auto Attendant
- **Default route:** The default route (extension, hunt group or Auto Attendant) to be used in case the incoming target number does not match any of the DID numbers in the contact list with the format described in the sections above.
- **Call forward:** Optionally, add call forward information to the Contact List to specify how unanswered calls are handled.



NOTE It is useful to add call forward information to ensure that calls are answered when the designated phone is unstaffed, as may be the case during lunch time or after hours. If the call is not answered within a specified time, it is routed to another phone or to the Auto Attendant.

SYNTAX: <DIDn1>:+<Extn1>,cfwd=<target> |
 <DIDn2>:+<Extn2>,cfwd=<target> |
 <DIDn3>:+<Extn3>,cfwd=<target>

EXAMPLE: 4085555550:aa | 4085555551:+101,cfwd=aa |
 4085555552:+102 | 4085555553:+103 | 4085555554:+104 |
 4085555650:+500

STEP 1 Plan the DID-to-extension mapping. Refer to the following example.

DID Number	Extension Number	User
408-555-5550	aa	Auto Attendant
408-555-5551	101	User 1
408-555-5552	102	User 2
408-555-5553	103	User 3
408-555-5554	104	User 4
408-555-5650	500	Support (hunt) group

-
- STEP 2** Start Internet Explorer, and enter the IP address of the SPA9000.
 - STEP 3** Click **Admin Login**, and then click **Advanced**.
 - STEP 4** Click **Voice tab > Line 1**.
 - STEP 5** Configure the *Contact List* parameter as described earlier in this section.
 - STEP 6** If you entered call forwarding in your rule, modify the *Cfwd No Ans Delay* parameter, as needed, to specify the number of seconds that elapse before a call is considered to be unanswered.
 - STEP 7** Repeat this procedure for all active lines.
 - STEP 8** Click **Submit All Changes**. The SPA9000 and the phones reboot.
 - STEP 9** To verify your progress, make an inbound call to the DID number and verify that the call is directed to the specified target extension.

You have completed the basic installation and configuration. If you are interested in configuring additional advanced features, continue to [Chapter 6, “Configuring Special Features.”](#)

Configuring Special Features

This chapter helps you to get started setting up various features that may be useful to your customer.



NOTE For complete information about configuring SPA9000 Voice System features, refer to the *Cisco SPA9000 Administration Guide*.

- “Using the Internal Music Source for Music On Hold,” on page 101
- “Configuring the SPA932 Sidecar to Work with the SPA9000,” on page 103
- “Managing Inbound Calls with Hunt Groups,” on page 109
- “Managing Inbound Calls with Shared Line Appearances,” on page 115

Using the Internal Music Source for Music On Hold

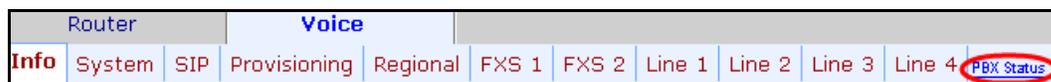
The SPA9000 has an internal music source that plays an internally stored music file repeatedly. The SPA9000 ships with a default music file (*Romance de Amor*). Follow this procedure to enable the internal music source.



NOTE For other Music On Hold options, see the *Cisco SPA9000 Voice System Administration Guide*.

STEP 1 Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.

STEP 2 Click the **PBX Status** link, near the top right corner of the page.



The screen lists each phone by Station Name and Extension number.

SPA9000 PBX Status page

Registration	Station	User ID	IP Address	Reg Expires(s)	User-Agent
<input type="checkbox"/>	Sales2	101	192.168.1.134	50	Linksys/SPA942-6.1.2
<input type="checkbox"/>	Sales2	103	192.168.1.134	54	Linksys/SPA942-6.1.2
<input type="checkbox"/>	Accounting	103	192.168.1.108	40	Linksys/SPA942-6.1.2
<input type="checkbox"/>	Manager	104	192.168.1.250	51	Linksys/SPA962-5.2.9(0714)

STEP 3 Find the phone that you want to configure, and then click the hyperlink in the *IP Address* column. The *Telephone Configuration* page appears in a separate browser window.

STEP 4 Click the **Ext 1** tab.



STEP 5 Under *Call Feature Settings*, find the *MOH Server* field, and enter: **imusic**

Telephone Configuration > Ext 1 page: Call Feature Settings section

Call Feature Settings	
Blind Attn-Xfer Enable:	<input type="text" value="no"/>
Message Waiting:	<input type="text" value="yes"/>
Default Ring:	<input type="text" value="1"/>
Conference Bridge URL:	<input type="text"/>
MOH Server:	<input type="text" value="imusic"/>
Auth Page:	<input type="text" value="no"/>
Auth Page Realm:	<input type="text"/>
Auth Page Password:	<input type="text"/>

STEP 6 Click **Submit All Changes**.

STEP 7 To verify, place a test call to the extension. When the call is answered and put on hold, the caller should hear the default music file (*Romance de Amor*).

STEP 8 Repeat as needed for each extension on the phone, and for each phone that needs music on hold.

Configuring the SPA932 Sidecar to Work with the SPA9000

The SPA932 is an attendant console, also known as a sidecar, that operates with the SPA962 IP phone to allow a user to manage calls and monitor the status of other stations. Up to two sidecars can be attached. Each provides up to 32 programmable buttons for speed dial, busy lamp field (BLF), and call pickup features.



NOTE

- All phones that are associated with SPA932 keys must have station names on their phone configuration pages. For more information, see “Setting Up Each Station” on page_57. In addition, CTI (computer telephone interface) must be enabled. For more information, see “Configuring General Settings” on page_45.
- SPA901, SPA921, SPA941 cannot be monitored for Busy Lamp Function (BLF) by the SPA962/SPA932, as these phones do not support CTI.
- Each station can be monitored only by one SPA962/932 at a time.

- STEP 1** To connect the SPA962 and the SPA932 together, complete the following tasks:
- Turn both the SPA962 and the SPA932 over so that the ports on the back of the device are facing up.
 - Align the hole in the SPA962 alignment recess with the hole on the attachment arm.
 - Using the attachment arm screw, secure the attachment arm to the SPA962.



- Using the other attachment arm screw, secure the attachment arm to the SPA932.



- Locate the AUX IN port on the back of the SPA932. Connect one end of the auxiliary cable to this port.



- f. Route the auxiliary cable through the cable relief channel.
- g. Locate the AUX port on the back of the SPA962. Connect the other end of the auxiliary cable to this port.



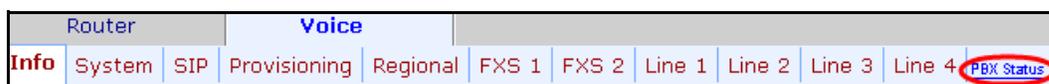
- h. Attach the supplied desktop stand to each unit.
 - i. To connect another SPA932 unit to the first SPA932, use the supplied attachment arms and screws. Connect the auxiliary cable from the AUX OUT port of the first unit, to the AUX IN port of the second unit.
- STEP 2** Connect a cable from the WAN port of the SPA962 to a port on your switch. The display flickers briefly and then the color display appears with the assigned extension number.
- STEP 3** Use the administration computer to install the latest firmware for the SPA962.

STEP 4 Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.



NOTE Alternatively, if you know the IP address of the SPA962, you can enter the IP address in Internet Explorer, and then skip ahead to **Step 7**.

STEP 5 Click **PBX Status**, near the top right corner of the web page.



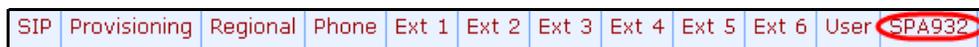
The screen lists each phone by station name and extension number.

Registration	Station	User ID	IP Address	Reg Expires(s)	User-Agent
<input type="checkbox"/>	Sales2	101	192.168.1.134	50	Linksys/SPA942-6.1.2
<input type="checkbox"/>	Sales2	103	192.168.1.134	54	Linksys/SPA942-6.1.2
<input type="checkbox"/>	Accounting	103	192.168.1.108	40	Linksys/SPA942-6.1.2
<input type="checkbox"/>	Manager	104	192.168.1.250	51	Linksys/SPA962-5.2.9(0714
<input type="checkbox"/>	ConferenceRm	115	192.168.1.137	59	Linksys/SPA942-5.2.9(0714

STEP 6 Find the User ID for the SPA962, and then click the hyperlink in the IP Address column.

The *Telephone Configuration* page appears in a separate browser window.

STEP 7 Click the **SPA932** tab.



STEP 8 In the **Server Type** list, select **SPA9000**.

STEP 9 Under **Unit 1**, configure each key by using the following syntax:

`fnc=type;nme=Name;sub=stationname@$PROXY;ext=extension#@$PROXYvid=#`

OR: `fnc=type;nme=Namesub=stationname@SPA9000ipaddress:6060;ext=extension#@SPA9000ipaddress:6060;vid=#`

Example 1: Busy Lamp Field and Speed Dial:

```
fnc=blf+sd;sub=Accounting@$PROXYext=102@$PROXY
```

Example 2: Busy Lamp Field and Call Pickup:

```
fnc=blf+cp;sub=Accounting@$PROXY;ext=102@$PROXY
```

- **fnc** (required): The function of this key. The following functions can be used independently or in combination.
- **blf**: Busy Lamp Field
Indicates the state of the monitored line.
 - **Green**: Idle
 - **Red**: Busy
 - **Red Fast Blink**: Ringing
 - **Amber**: Failed Subscribe (received 4xx response)
 - **Amber Slow Blink**: Undefined (may be no response to subscribe, or BLF not specified)



NOTE Busy Lamp Field works only with SPA9x2 series phones, when CTI is enabled. SPA9x1 series phones do not support CTI.

- **sd**: Speed Dial
Allows the user to dial the selected extension quickly, either to place an internal call or to perform a blind transfer of an active call.
- **cp**: Call Pickup (in combination with BLF)
Allows the user to pick up an unanswered call on the selected extension; can be used only in combination with blf (cp+blf)



NOTE For a multi-function key, enter a plus sign (+) between the functions.

- **nme** (optional): Display name for SPA932 key. It may be overwritten with successful SUBSCRIBE.

- **sub (required):** The station name of the device and the IP address of the SPA9000



NOTE The station name must exactly match the name that is entered in the phone configuration web page. The assigned names are displayed on the PBX Status page (click the PBX Status link on the main administration web page). For more information about entering a station name, see “Setting Up Each Station” on page_57.

- **ext (required):** The extension number on the specified phone, as in the following example: `xt=101@$PROXY`. Alternatively, you can enter the `usr` parameter with the assigned user ID, as in the following example: `usr=smith@$PROXY`.
- **vid (optional):** Extension ID of the phone lines on the SPA962 (corresponds to Ext 1 to 6; valid values, 1-6)

STEP 10 Click **Submit All Changes**.

STEP 11 To verify your progress, perform the following tasks:

- Verify that the keys on the SPA932 are shining green. A flashing red light indicates a problem with the syntax.
- To test a speed dial key, press the key and verify that the destination phone rings.
- To test a BLF key, place a call from the destination phone and verify that the BLF key flashes red on the SPA932.

Managing Inbound Calls with Hunt Groups

A Hunt Group is a group of client stations that are treated as one extension for the purpose of managing inbound calls. The client stations in the hunt group can be alerted simultaneously or sequentially. The first client station to pick up the call establishes a private connection to the caller.



NOTE Compare a Shared Line Appearance to a Hunt Group. A Hunt Group may ring several stations simultaneously, but only one station can answer and manage the call. A Shared Line Appearance also rings multiple lines simultaneously but allows multiple stations to share and manage the call. For more information, see [“Managing Inbound Calls with Shared Line Appearances,”](#) on page 115.

There are two types of hunt rules:

- **Global Hunt Rule:** The hunt rule applies to all line interfaces. Enter this type of hunt rule on the Voice tab > SIP page > PBX Parameter section, Hunt Groups field.
- **Line-Specific (Contact List) Hunt Rule:** The hunt rule applies to a particular line interface. Enter this type of hunt rule on the Voice tab > Line *N* page > Subscriber Information section > Contact List field. For example, if you enter this rule on the Line 1 page, it applies only to the calls that are received on Line 1.

The syntax for the two types of rules varies, as described later in this section. If you define a hunt group both in the Contact List and on the SIP page > PBX Parameters section, the call forward parameter from the Contact List is ignored; instead, the call forward parameter defined on the SIP page > PBX Parameter section is used.

Syntax for Hunt Rules

- **Global Hunt Rule**

(SIP page > PBX Parameters section > Hunt Groups field)

SYNTAX: `extension:[name="name",]station[,station[,station[...]]],hunt=hrule[,cfwd=target]`

- **Line-Specific Hunt Rule**

(Line *N* page > Subscriber Information section > Contact List field)

SYNTAX: `station[,station[,station[...]]],hunt=hrule;[,cfwd=target]`

Parameters

- `extension`: An extension number for the hunt group
- `name`: A name for the hunt group, which will appear in the Corporate Directory
- `station`: The extension numbers; the wildcard symbols ? and * can be used to represent one or more characters
- `hunt=hrule`: The hunt order, ring interval, and maximum duration, in the following format: `hunt=algo;interval;max`
 - `algo`: The hunt order.
 - `re`: Restart. Hunting starts at the beginning of the list. If the first station does not answer within the specified `interval` (see below), the hunt proceeds through the stations in sequential order.
 - `ne`: Next. The system determines the station that was chosen in the previous hunt, and hunting starts with the next station in the list. If that station does not answer within the specified `interval` (see below), the hunt proceeds through the stations in sequential order.
 - `ra`: Random order. The system randomly chooses a station from the list. If the selected station does not answer within the specified `interval` (see below), the hunt proceeds randomly through the unchosen stations until each station is tried.
 - `al`: All. The system rings all the stations at the same time.
 - `interval`: The number of seconds to wait for one station to answer, before choosing another station. If `interval` is *, the hunt is stopped at the first station that starts ringing, and rings the station until it answers, or the caller hangs up, or the station's ringer times out.

- `max`: The maximum duration of the hunt, either in seconds or cycles. When this limit is reached, the call is rejected or is forwarded to the specified call forward number (see below).
 - If `max` is greater than `interval`, it represents the total time in seconds to hunt.
 - If `max` is less than `interval`, it represents the maximum number of times to cycle through the hunt group. If `max` is 0, hunting continues indefinitely until the caller either hangs up or the call is answered. Exceptions: This value is ignored if `algo = al`, or `interval = *` (but it must be present and should be set to 1).
- `cfwd=target`: If the call is unanswered and the maximum hunting duration has been met, the call is forwarded to the specified number. When forwarding the call, the device sends a 302 response to the ITSP.

**NOTE**

- The call forward settings for the individual stations are ignored during hunting. Instead, the call forward settings in the Contact List are used.
- You cannot forward from one hunt group to another hunt group.

Examples for Hunt Rules

- Contacting a group of stations simultaneously

Global Rule: `500:name="Sales",101,102,103,hunt=al`

Line-Specific Rule: `101,102,103,hunt=al`

For the global rule, this hunt group is assigned an extension number (500) and is given a name, Sales. For both examples, the rule includes three stations (101, 102, 103). An incoming call rings all three stations simultaneously (`hunt=al`).

- Using wildcard characters to specify a range of station numbers

Global Rule: 500:name="TechSupport",1*,hunt=a1

Line-Specific Rule: 1*,hunt=a1

In this example, the * symbol is a wildcard character that represents any number of digits. An incoming call simultaneously rings all stations that begin with the number 1.

- Creating multiple hunt groups with the pipe character

Global Rule: 500:name="TechSupport",101,102,103,hunt=a1 | 600:name="AccountSupport",2*,hunt=a1

Line-Specific Rule: 101,102,103,hunt=a1 | 2*,hunt=a1

Two hunt groups are created. One hunt rule applies to stations 101, 102, and 103. The other hunt rule applies to all stations that begin with the number 2.

- Ringling stations sequentially with call forwarding to the Auto Attendant

Global Rule: 300:name="TechSupport",101,102,100,hunt=re;20;2,cfwd=aa

Line-Specific Rule: 101,102,100,hunt=re;20;2,cfwd=aa

An incoming call is routed sequentially from the beginning of the list (hunt=re). Every new call is routed to the first station, 101. If the call is unanswered, it cycles to station 102 and then to station 100. Each phone rings for 20 seconds (20). After 2 cycles, an unanswered call is forwarded to the Auto Attendant (cfwd=aa).

- Ringling stations randomly with call forwarding to voice mail

Global Rule: 400:name="Sales",101,102,103,hunt=ra;30;1,cfwd=vm2100

Line-Specific Rule: 101,102,103,hunt=ra;30;1,cfwd=vm2100

An incoming call is routed in random order (hunt=ra). A new call is routed to a randomly chosen station. If the call is unanswered, it cycles through the stations in random order. Each phone rings for 30 seconds (30). After 1 cycle is completed, an unanswered call is forwarded to the voice mail for station 100, where Line 2 is configured for the voice mail service (1,cfwd=vm2100).

- Resuming from a previous hunt with call forwarding to a receptionist

Global Rule: 500:name="Scheduling",102,103,101,hunt=ne;45;240,cfwd=100

Line-Specific Rule: 102,103,101,hunt=ne; 45;240,cfwd=100

An incoming call is routed in “next station” order (`hunt=ne`). When a new call is received, the system resumes the previous hunt. For example, suppose that station 103 answered the most recent call to the group. A new call is routed to the next station in the list, which is station 101. If the call is unanswered, then it cycles to station 102, and so on. Each phone rings for 45 seconds (45;). After a total of 240 seconds has elapsed, the call is forwarded to station 100 (240,cfwd=100).

Creating a Hunt Rule

Use the following procedure to create a global hunt rule or a line-specific hunt rule.

-
- STEP 1** Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.
- STEP 2** Proceed as needed, depending on the type of hunt rule:
- **Global Rule:** Click **Voice tab > SIP**. Scroll down to the **PBX Parameters** section. Find the **Hunt Groups** field.
 - **Line-Specific Rule:** Click **Voice tab > Line N**, where *N* is the line interface number. Scroll down to the **Subscriber Information** section. Find the **Contact List** field.
- STEP 3** Type your hunt group rule. See “[Syntax for Hunt Rules](#),” on page 110 and “[Examples for Hunt Rules](#),” on page 111.
- STEP 4** Click **Submit All Changes**. The phones reboot.
- STEP 5** To verify the settings:
- **Global Rule:** Place a call to the new hunt group by entering the extension number or by using the Corporate Directory to select the group name and dial the group.

-
- **Line-Specific Rule:** From an external phone, such as a cellular phone, place a call to the phone number that is associated with the line interface. Verify that the call is routed according to the specified settings.
-

Managing Inbound Calls with Shared Line Appearances

A shared line appearance (SLA) allows multiple stations to share an extension number and to manage a call as a group.

About Shared Line Appearances

An incoming call to an SLA causes all stations to ring simultaneously. The phones display the line status, such as idle, ringing, or busy.

Be aware of the following factors:

- If a shared line is being used by one of the stations in the group, no one can use the corresponding line key until the line is released. A message appears on the phone display to indicate that a shared call is active.
 - All stations with a line key for the SLA can monitor the status based on the appearance of the line key button:
 - Green: The SLA is available.
 - Flashing Red Quickly: A call is ringing the SLA and has not been answered.
 - Flashing Red Intermittently: A call is active at another station.
 - Flashing Red Slowly: A call is on hold.
 - Solid Red: A call is active on this station.
 - All stations with a display can monitor the status of any SLA that is configured. The icon next to the line key will change to show ringing, off-hook, or busy "<-->" until the phone is back on-hook.
 - Comparing the SLA to a Hunt Group, both may ring several stations simultaneously. However, only one station in a Hunt Group can answer and manage the call. For more information, see [“Managing Inbound Calls with Hunt Groups,” on page 109.](#)
-

STEP 1 Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.

STEP 2 Choose the client station that you want to configure:

- a. Click the **PBX Status** link near the top right corner or lower left corner of the page to view the list of client stations.
- b. Click the hyperlink in the *IP Address* column for the first phone that you want to configure. The telephone configuration page appears in a separate browser window.

STEP 3 Configure the shared extension on the selected station:

- a. Click the tab for the extension that you want to configure (*Ext 1 ... Ext n*, depending on the phone model).



NOTE As a general practice, Cisco recommends that you always reserve Extension 1 on the client station as the primary and private extension of the designated user.

- b. Scroll down to the *Share Line Appearance* section, and then enter the following settings:

- **Share Ext:** Choose **shared**.
- **Shared User ID:** Enter a user ID number for this SLA. After the line key is configured, this ID will appear on the phone display and in the Corporate Directory.

SPA9xx Telephone Configuration > Ext: Shared Line Appearance

Share Line Appearance	
Share Ext:	shared
Shared User ID:	200
Subscription Expires:	3600

- c. Scroll down to the *Subscriber Information* section, and then enter a User ID and Display Name for this shared extension.

SPA9xx Telephone Configuration > Ext: Subscriber Information

Subscriber Information			
Display Name:	<input type="text"/>	User ID:	100
Password:	<input type="text"/>	Use Auth ID:	no
Auth ID:	<input type="text"/>		
Mini Certificate:	<input type="text"/>		
SRTP Private Key:	<input type="text"/>		

- d. Scroll down the *Proxy and Registration* section, and enter the same *Proxy* value as on the primary extension for this station.

SPA9xx Telephone Configuration > Ext: Proxy and Registration

Proxy and Registration			
Proxy:	192.168.0.109:6060	Use Outbound Proxy:	no
Outbound Proxy:	<input type="text"/>	Use OB Proxy In Dialog:	yes
Register:	yes	Make Call Without Reg:	no
Register Expires:	3600	Ans Call Without Reg:	no
Use DNS SRV:	no	DNS SRV Auto Prefix:	no
Proxy Fallback Intvl:	3600	Proxy Redundancy Method:	Normal

STEP 4 Configure a line key button for the shared extension:

- a. Click the **Phone** tab.
- b. Scroll down to the *Line Key* area for the line key button that you want to configure (*Line 1 ... Line n*, depending on the phone model).
- c. Enter the following settings to correspond with the entries that you made on the Extension tab:
 - **Extension:** From the drop-down list, choose the number corresponding to the *Ext N* tab that you configured for this SLA. For example, if you configured the SLA on the *Ext 2* page, then choose 2 from the *Extension* drop-down list.
 - **Shared Call Appearance:** From the drop-down list, choose shared.
 - **Short Name:** Type the extension number that you entered as the *Shared User ID* for the extension. This extension number will appear on the phone display and in the Corporate Directory.

SPA9xx Telephone Configuration: Ext: Line Key

Line Key 2			
Extension:	2	Short Name:	200
Share Call Appearance:	shared		

-
- STEP 5** If needed, configure additional line keys for the same SLA.
 - STEP 6** Click **Submit All Changes**.
 - STEP 7** Repeat this procedure for each phone that you want to configure with the SLA.
-

Localization

This chapter explains how to localize your SPA9000 Voice System with the language files, tones, and ring patterns for your region.

- “Localizing the SPA9000 Auto Attendant Prompts,” on page 119
- “Local Time Configuration,” on page 122
- “Configuring the SPA9000 and SPA9xx Call Progress Tones,” on page 122
- “Localizing the SPA400 Voice Mail Prompts,” on page 128
- “Localizing the SPA400 Call Disconnect Tones,” on page 129
- “Localizing the SPA400 Caller ID Method,” on page 131



NOTE For instructions about localizing the phone display, see the *SPA9x2 Phone Administration Guide*.

Localizing the SPA9000 Auto Attendant Prompts

The default Auto Attendant prompts are in English. You can localize your system by downloading and installing the appropriate language files for your region. Store these prompts on a TFTP/HTTP/HTTPS server, and the SPA9000 will download the files at the device boot up time.



NOTE You need TFTP server software to localize the SPA9000.

The set of files includes the following types of prompts:

- Prompt 1: Greets the caller and prompts for an extension number
- Prompt 2: Notifies the caller that the call is being forwarded
- Prompt 3: Notifies the caller of an invalid extension
- Prompt 4: Good-bye
- Prompt 5: Greets the caller with specific prompts for General Information, Sales, and Support.
- Prompt 6: Notifies the caller that the office is currently closed and prompts for an extension number.



NOTE The Auto Attendant prompt files must be encoded in G.711u and must have a total file size (message and header) of 94.5 seconds or less.

STEP 1 Download the SPA9000 Auto Attendant prompts from Cisco Partner Central, Voice & Conferencing page, Technical Resources section, using the following URL:
www.cisco.com/web/partners/sell/smb/products/voice_and_conferencing.html#~vc_technical_resources

STEP 2 Store the downloaded files on a TFTP/HTTP/HTTPS server.

STEP 3 To configure the SPA9000 to download the files from the server, complete the following tasks:

- a. Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.
- b. Click **Voice tab** > the **SIP** tab.
- c. Scroll down to the *Auto Attendant Parameters* area of the page.
- d. In the *AA Prompts URL* field, enter the script for the server, path, and prompt file names.

SYNTAX:

```
serv=scheme://server_addr[:port]/root_path;[p1={prompt1
file path name};][p2={prompt2 file path
name};][p3={prompt3 file path name};][p4={prompt4 file
path name};][p5={prompt5 file path name};][p6={prompt6
```

```
file path name};][p7={prompt7 file path  
name};][p8={prompt8 file path name};][p9={prompt9 file  
path name};][p10={prompt10 file path name};]
```

- **scheme:** Enter one of the following values: `tftp`, `http`, or `https`.
- **port:** The default ports are 69 for `tftp`, 80 for `http`, and 443 for `https`.
- **root_path** can be empty.
- `[]` denotes an optional item.
- If the prompt file name is **none**, the corresponding prompt currently saved in the flash is erased.

EXAMPLE:

```
serv=tftp://192.168.2.150/root/test/;p1=fr_1.wav;  
p2=fr_2.wav;p3=fr_3.wav;p4=none;
```

STEP 4 Click **Submit All Changes**.

The prompts are downloaded when the SPA9000 boots up. If a prompt has already been downloaded from the given URL, the download is not performed.

STEP 5 To verify that the prompts are localized, make a call to the Auto Attendant. From an internal phone, you can press the **Setup** button, then press **1 - Directory**, then **2 - Corporate Directory**, and then scroll down to find and select the number for the Auto Attendant.

Local Time Configuration

You will need to localize the date, time, and daylight saving time rule. See “[Setting the Date and Time](#),” on page 30 and “[Configuring Daylight Saving Time](#),” on page 31. Use the following table to find the correct Daylight Saving Time Rules for EMEA and Australia.

Table 1 SPA9000 Daylight Saving Time Rules

Country	Daylight Saving Time Rule	Time Zone
Australia (ACST)	start=4/1/7/3;end=10/1/7/2;save=-1	GMT+10:30
Australia (AEST)	start=4/1/7/3;end=10/1/7/2;save=-1	GMT+11
Australia (AWST)	start=3/-1/7/3;end=10/-1/7/2;save=-1	GMT+09:00
France	start=3/-1/7/2;end=10/-1/7/2;save=1	GMT+1
Germany	start=3/-1/7/2;end=10/-1/7/2;save=1	GMT+1
Spain	start=3/-1/7/2;end=10/-1/7/2;save=1	GMT+1
UK/Ireland	start=3/-1/7/2;end=10/-1/7/2;save=1	GMT

Configuring the SPA9000 and SPA9xx Call Progress Tones

Call progress tones, such as dial tone and reorder, indicate the call progress to the users. You can configure your SPA9000 and your SPA9xx phones to use the appropriate call progress tones for your region.

STEP 1 Localize the tones for the SPA9000:

- a. Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.
- b. Click **Voice tab > Regional**.
- c. In the *Call Progress Tones* section, enter the values from Table 3-1 into the corresponding fields.
- d. Click **Submit All Changes**.

STEP 2 Localize the tones for the phones:

- a. Click the **PBX Status** link.
- b. Find the phone that you want to configure, and then click the hyperlink in the *IP Address* column.
- c. Click **Regional**.
- d. In the *Call Progress Tones* section, enter the values from [Table 2, ‘SPA9000 Call Progress Tones by Country,’ on page 123](#).
- e. Click **Submit All Changes**.
- f. Repeat this step as needed for each phone.

Table 2 SPA9000 Call Progress Tones by Country

Australia	
Dial Tone	400@-19,425@-19;10(*0/1+2)
Outside Dial Tone	420@-16;10(*0/1)
Prompt Tone	520@-19,620@-19;10(*0/1+ 2)
Reorder Tone	425@-19;*(2.5/5)
Off Hook Warning Tone	480@-10,620@0;10(.125/.125/1+2)
Ring Back Tone	400@-19,425@-19;*(.4/.2/1+2,.4/2/1+2)
Busy Tone	425@-16;10(.375/.375/1)
Call Waiting Tone	400@-20;30(0.1/2/1)
Confirm Tone	600@-16;1(.25/.25/1)
Denmark	
Dial Tone	425@-10;*(*/0/1)
Outside Dial Tone	425@-16;10(*0/1)
Prompt Tone	425@-19,620@-19;*(*/0/1+2)
Reorder Tone	425@-10;*(0.25/0.25/1)
Off Hook Warning Tone	425@-10;*(.2/.2/1,.2/.6/1)

Ring Back Tone	425@-10;*(1/4/1)
Busy Tone	425@-10;10(0.25/0.25/1)
Call Waiting Tone	425@-20;30(0.2/0.2/1,0.2/3.6/1,0.2/0.2/1,0.2/0/1)
Confirm Tone	425@-16;1(.25/.25/1)
France	
Dial Tone	440@-10;*(*/0/1)
Outside Dial Tone	440@-16;10(*/*0/1)
Prompt Tone	440@-19,620@-19;*(*/0/1+2)
Reorder Tone	440@-10;*(.5/.5/1)
Off Hook Warning Tone	425@-10;*(.2/.2/1,.2/.6/1)
Ring Back Tone	440@-10;*(1.5/3.5/1)
Busy Tone	440@-10;10(.5/.5/1)
Call Waiting Tone	440@-20;30(.175/.175/1,.175/3.5/1)
Confirm Tone	440@-16;1(.25/.25/1)
Germany	
Dial Tone	425@-10;10(*/*0/1)
Outside Dial Tone	425@-13,400@-13;10(*/*0/1+2)
Prompt Tone	440@-19,620@-19;30(*/*0/1+2)
Reorder Tone	440@-10;*(.5/.5/1)
Off Hook Warning Tone	425@-10;*(.2/.2/1,.2/.6/1)
Ring Back Tone	440@-10;10(1.5/3.5/1)
Busy Tone	425@-10;10(0.48/0.48/1)
Call Waiting Tone	425@-20;30(0.2/0.2/1,0.2/5/1)
Confirm Tone	440@-16;1(.25/.25/1)
Ireland	
Dial Tone	400@-10;*(*/0/1)
Outside Dial Tone	425@-16;10(*/*0/1)

Prompt Tone	425@-19,620@-19;*(*/0/1+2)
Reorder Tone	425@-10;*(0.25/0.25/1)
Off Hook Warning Tone	425@-10;*(.2/.2/1,.2/.6/1)
Ring Back Tone	425@-10;(0.4/0.2/1,0.4/2/1)
Busy Tone	425@-10;10(0.5/0.5/1)
Call Waiting Tone	425@-20;30(0.18/0.2/1,0.2/4.5/1)
Confirm Tone	425@-16;1(.25/.25/1)
Italy	
Dial Tone	425@-10;*(0.2/0.2/1,0.6/1/1)
Outside Dial Tone	425@-16;10(0.2/0.2/1,0.6/1/1)
Prompt Tone	425@-19,620@-19;*(*/0/1+2)
Reorder Tone	425@-10;*(0.2/0.2/1)
Off Hook Warning Tone	425@-10;*(.2/.2/1,.2/.6/1)
Ring Back Tone	425@-10;*(1/4/1)
Busy Tone	425@-10;10(0.5/0.5/1)
Call Waiting Tone	425@-20;30(0.4/0.1/1,0.25/0.1/1,0.15/14/1)
Confirm Tone	425@-16;1(.25/.25/1)
Netherlands	
Dial Tone	425@-10;*(*/0/1)
Outside Dial Tone	425@-16;10(*0/1)
Prompt Tone	425@-19,620@-19;*(*/0/1+2)
Reorder Tone	425@-10;*(0.25/0.25/1)
Off Hook Warning Tone	425@-10;*(.2/.2/1,.2/.6/1)
Ring Back Tone	425@-10;*(1/4/1)
Busy Tone	425@-10;10(.5/.5/1)
Call Waiting Tone	425@-20;30(0.5/9.5/1)
Confirm Tone	425@-16;1(.25/.25/1)

Norway	
Dial Tone	425@-10;*(*/0/1)
Outside Dial Tone	425@-16;10(*/*0/1)
Prompt Tone	425@-19,620@-19;*(*/0/1+2)
Reorder Tone	425@-10;*(0.2/0.2/1)
Off Hook Warning Tone	1400@-10;*(0.4/15/1)
Ring Back Tone	425@-10;(1/4/1)
Busy Tone	425@-10;10(.5/.5/1)
Call Waiting Tone	425@-20;30(0.2/0.6/1,0.2/10/1)
Confirm Tone	1400@-16;1(20/0/1)
Portugal	
Dial Tone	425@-10;*(*/0/1)
Outside Dial Tone	425@-16;10(*/*0/1)
Prompt Tone	425@-19,620@-19;*(*/0/1+2)
Reorder Tone	425@-10;*(.2/.2/1,.2/.2/1,.2/.6/1)
Off Hook Warning Tone	425@-10;*(.2/.2/1,.2/.6/1)
Ring Back Tone	425@-10;*(1/5/1)
Busy Tone	425@-10;10(.5/.5/1)
Call Waiting Tone	425@-20;30(0.2/0.2/1,0.2/5/1)
Confirm Tone	425@-16;1(.25/.25/1)
Spain	
Dial Tone	425@-10;*(*/0/1)
Outside Dial Tone	425@-16;10(*/*0/1)
Prompt Tone	425@-19,620@-19;*(*/0/1+2)
Reorder Tone	425@-10;*(.2/.2/1,.2/.2/1,.2/.6/1)
Off Hook Warning Tone	425@-10;*(.2/.2/1,.2/.6/1)
Ring Back Tone	425@-10;*(1.5/3/1)

Busy Tone	425@-10;10(.2/.2/1)
Call Waiting Tone	425@-20;30(.175/.175/1,.175/3.5/1)
Confirm Tone	425@-16;1(.25/.25/1)
Sweden	
Dial Tone	425@-10;*(*/0/1)
Outside Dial Tone	425@-16;10(*/*0/1)
Prompt Tone	425@-19,620@-19;*(*/0/1+2)
Reorder Tone	425@-10;*(0.25/0.75/1)
Off Hook Warning Tone	425@-10;*(.2/.2/1,.2/.6/1)
Ring Back Tone	425@-10;*(1/5/1)
Busy Tone	425@-10;10(0.25/0.25/1)
Call Waiting Tone	425@-20;30(0.5/9.5/1)
Confirm Tone	425@-16;1(.25/.25/1)
UK	
Dial Tone	350@-10;440@-10;*(*/0/1+2)
Outside Dial Tone	425@-16;10(*/*0/1)
Prompt Tone	400@-19,620@-19;*(*/0/1+2)
Reorder Tone	400@-10;*(0.4/0.35/1,0.225/0.525/1)
Off Hook Warning Tone	425@-10;*(.2/.2/1,.2/.6/1)
Ring Back Tone	400@-10;(0.4/0.2/1,0.4/2/1)
Busy Tone	400@-10;10(0.375/0.375/1)
Call Waiting Tone	400@-20;30(0.1/2/1)
Confirm Tone	400@-16;1(20/0/1)

Localizing the SPA400 Voice Mail Prompts

By default, the voice mail system is configured for the English language. You can localize the system by downloading and installing the appropriate language files for your region.

STEP 1 Download the necessary language files from Cisco Partner Central, Voice & Conferencing page, Technical Resources section, using the following URL:
www.cisco.com/web/partners/sell/smb/products/voice_and_conferencing.html#~vc_technical_resources

STEP 2 To extract the files, complete the following tasks:

- a. Use WinZip to open the sounds.zip file.
- b. Click **Extract** on WinZip toolbar.
- c. Select the Desktop or other temporary destination, select the **Use folder names** check box, and then click **Extract**.

A progress bar appears as the files are extracted. The Sounds folder appears in the selected location.

STEP 3 To move the files to the SPA400 USB drive, complete the following tasks:

- a. Power off the SPA400 by removing the power cord, and then remove the USB drive.
- b. Insert the SPA400 USB drive into a USB port on the PC where you extracted the files.
- c. When the *USB Disk* window appears, click **Open folder to view files using Windows Explorer**, and then click **OK**. The USB drive contains the *spa400vm* folder.



NOTE If the *USB Disk* window does not appear, use Windows Explorer to navigate to the USB disk drive (usually Drive E).

- d. Open *spa400vm\var\lib*. The window displays the *lib* contents, including the *sounds* folder.

- e. If desired, make a backup copy of the existing *sounds* folder.



NOTE You are not overwriting any user message files in this procedure. However, it is a good practice to make a backup copy of your files before doing any upgrades.

- f. Move the new *sounds* folder into *spa400vm\var\lib* on the USB drive. When the *Confirm Folder Replace* window appears, click **Yes to All**.
- g. Remove the USB drive from the PC and insert it into the SPA400.
- h. Power on the SPA400.

STEP 4 Place a test call to the voice mail system to confirm that the new language prompts are used.

Localizing the SPA400 Call Disconnect Tones

One important aspect of VoIP-PSTN integration is the Call Disconnect operation. This operation allows the gateway to detect that the call has been terminated on the other end, so the local line hangs up automatically. Detecting the tone cadence of the Call Disconnect signal is a trigger for closing the loop.

Each country has its own Call Disconnect Signal tone which needs to be configured on the SPA400 *Tone* page. See [Table 3, 'SPA400 Call Processing Tones,'](#) on page 129.

Table 3 SPA400 Call Processing Tones

Country	First Tone		2nd (optional)		3rd (optional)		4th (optional)		Repeat Count
	On (ms)	Off (ms)	On (ms)	Off (ms)	On (ms)	Off (ms)	On (ms)	Off (ms)	
Australia	360	385	360	385					5
Denmark	430	465	430	270					1
France	490	510							1

Country	First Tone		2nd (optional)		3rd (optional)		4th (optional)		Repeat Count
	On (ms)	Off (ms)	On (ms)	Off (ms)	On (ms)	Off (ms)	On (ms)	Off (ms)	
Germany	230	270							1
Ireland	490	510							1
Italy	190	210							1
Netherlands	180	330	180	330					2
Norway	190	210							1
Portugal	190	210							1
Spain	190	210	190	210	200	600			2
Sweden	250	750							1
UK	400	350	225	525					2

STEP 1 Start Internet Explorer, enter the IP address of the SPA400, and log on.

STEP 2 Click the **Tone** tab.

SPA400 Tone page

Call process tone configuration

Tone on fraction : %

High cutoff frequency : Hz

Low cutoff frequency : Hz

Call process tone detection

Tone Setting

	First Tone		2nd (optional)		3rd (optional)		4th (optional)	
	On (ms)	Off (ms)	On (ms)	Off (ms)	On (ms)	Off (ms)	On (ms)	Off (ms)
Detection time	<input type="text" value="500"/>	<input type="text" value="500"/>	<input type="text"/>					

Repeat

Repeat count :

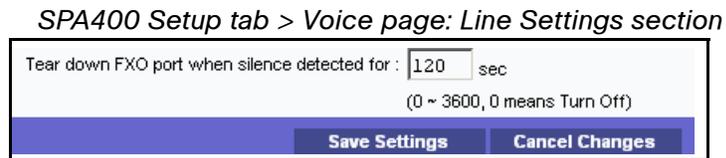
Save Settings **Cancel Changes**

STEP 3 Enter the appropriate settings for your country, as listed in [Table 3, 'SPA400 Call Processing Tones](#).

STEP 4 Click **Save Settings**.

STEP 5 On the menu, click **Setup > Voice**.

STEP 6 Scroll down to the *Tear Down FXO Port* field, and enter **0**. Refer to the following illustration.



STEP 7 Click **Save Settings**.

STEP 8 To restart the SPA400, complete the following steps:

- a. Click **Administration > Reboot**.
- b. Click the **Restart System** button.
- c. When the confirmation message appears, click **OK**. The SPA400 reboots.
- d. When the *Reboot OK. Go to Setup page?* message appears, click **OK**.

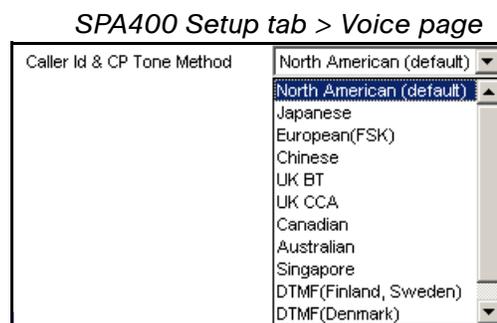
Localizing the SPA400 Caller ID Method

You need to identify the caller ID method to use in your country.

STEP 1 Click **Setup tab > Voice**.

STEP 2 Scroll down to the *Line Settings* section.

STEP 3 From the *Caller Id and CP Tone Method* drop-down list, choose your region.





NOTE In the United Kingdom, choose UK BT or UK CCA. In the rest of Europe, choose European (FSK).

STEP 4 Click **Save Settings**.

STEP 5 To restart the SPA400, complete the following tasks:

- a. Click **Administration > Reboot**.
- b. Click the **Restart** button.
- c. When the confirmation message appears, click **OK**. The SPA400 reboots.
- d. When the *Reboot OK* message appears, click **OK**.

STEP 6 To verify your progress, make a call from outside to any of the PSTN lines connected to the SPA400 (make sure that CID is enable in your PSTN line). In the ringing SPA phone display you should now be able to see the number from the calling number.

Installation Workbook

This workbook is intended to help you to record information about the customer's network environment as well as the order and service information, before installing the SPA9000 Voice System. By using this workbook, you can minimize the installation time and ensure that all setup requirements are met.

This workbook is designed to help SPA9000 Voice System installation technicians and can be used as a training guide and checklist for VARs and Service Providers.

Customer Information

Company Name	
Contact Name – Commercial	
Contact Phone Number – Commercial	
Contact Email Address - Commercial	
Alternate Contact Phone Number	
Contact Name – IT Responsible	
Contact Phone Number – IT Responsible	
Contact email address – IT Responsible	
Installation Location	

City and Postal Code	
Site Survey Date and Method (circle one)	Date: _____ ON SITE / BY PHONE
Installation Schedule Date	

Site Survey

Survey date	
Survey by	

Service Provider Information

If you have multiple service providers, copy this page as needed. You can configure the four SPA9000 interfaces with different service providers.

Service Provider Name	
Service Provider Contact Information	
Service Order Number	
Service Activation Date	
Service Order Type	

Provisioning Information

SIP Proxy	
User Name	
Password	
Provisioning Method (Circle one.)	SPA9000 VOICE SYSTEM WIZARD VERSION _____ WEB UI REMOTE PROVISIONING
Service provider additional parameters (e.g. DID numbers)	
Audio preferred codec (Circle one.)	G.711A G.711u G.729a G.726 G.723.1

Telephony System Survey

Number of IP Phones to install	
Is it there an existing KTS or PBX to replace (Circle one.)	YES / NO
If yes, please list the existing features provided by the system	
Is the customer setup requiring any of the following features? (Circle all that apply.)	<p>Receptionist telephone</p> <p>Automatic attendant</p> <p>Direct Inward Dialing</p> <p>Voice mail</p> <p>Other (please specify):</p>

Infrastructure Survey

New Cable wiring required (Circle one.)	YES / NO
If yes, how many and where?	
AC Outlet available for each Cisco SPA device location (Circle one.)	YES / NO
If no, where are the missing locations?	
PSTN Line (Circle one.)	YES / NO
If yes, how many?	
ISDN BRI Line (Circle one.)	YES / NO
If yes, how many?	
Battery backup (Circle one.)	YES / NO
If yes, what devices are covered?	
Fax Machine (Circle one.)	YES / NO
If yes, is there a telephone cable available from SPA9000 to the fax machine?	YES / NO

Broadband Type

Broadband connection type (Circle one.)	T1 / ADSL / xDSL / FTTH / Other If other please specify:
IP addressing type (Circle one.)	DYNAMIC / STATIC
If static, IP address	
If static, network mask	
Primary DNS	
Secondary DNS	
Bandwidth	Uplink (kbps): _____ Downlink (kbps): _____

Bandwidth

Codec Bandwidth per conversation	G.711 – 110 kbps, G.723 – 12.6 kbps, G.726 – 87 to 63 kbps, G.729 – 55 kbps
Minimum bandwidth requirement (including Internet access and VoIP) calculation	

LAN

Gateway LAN IP Address	
Network Mask	
DNS	
DHCP Server	YES / NO
NAT	YES / NO
QoS Router (Circle one.)	YES / NO
If yes, Type of QoS enforcement (Circle one.)	IP TOS / VLAN ID / 802.1p
QoS Switch	YES / NO
If yes, Type of QoS enforcement (Circle one.)	IP TOS / VLAN ID / 802.1p
VLAN tagging (Circle one.)	YES / NO
If yes, Voice VLAN ID	
If yes, Data VLAN ID	
Power over Ethernet	YES / NO
If yes, how many ports available	
Total number of ports on switch	
WiFi Network (Circle one.)	YES / NO
If yes, SSID	
If yes, encryption type (Circle one.)	WEP / WPA / WPA2

New LAN Device(s) needed	YES / NO
If yes, define the type	
Sufficient Ethernet ports for each IP phone location	YES / NO
If no, what type of new device added	
Firewall	YES / NO
If yes, Hardware or Software based	Hardware / Software
Is a specific port need to be opened	YES / NO Port Number:
If yes, does the customer have the administrative access	YES / NO
AC Outlet availability for each installing component	
SPA9000	YES / NO
SPA400 – 1	YES / NO
SPA400 – 2	YES / NO
SPA400 – 3	YES / NO
SPA400 – 4	YES / NO
IP Phone 1	YES / NO
IP Phone 2	YES / NO
IP Phone 3	YES / NO
IP Phone 4	YES / NO

IP Phone 5	YES / NO
IP Phone 6	YES / NO
IP Phone 7	YES / NO
IP Phone 8	YES / NO
IP Phone 9	YES / NO
IP Phone 10	YES / NO
IP Phone 11	YES / NO
IP Phone 12	YES / NO
IP Phone 13	YES / NO
IP Phone 14	YES / NO
IP Phone 15	YES / NO
IP Phone 16	YES / NO
Component	YES / NO

Are office junction boxes accurately labeled between the telco closet and the installation locations?	YES / NO
Is there room in the existing equipment rack for additional equipment	YES / NO

Cisco SPA devices

SPA9000	
Firmware version	
SPA901	
Number of phones	
Firmware version	
SPA921	
Number of phones	
Firmware version	
SPA941	
Number of phones	
Firmware version	
SPA922	
Number of phones	
Firmware version	

SPA942	
Number of phones	
Firmware version	
SPA962	
Number of phones	
Firmware version	
SPA932	
Number of consoles	
SPA400	
Number of gateways	
Firmware version	
POES5 Number of units	
WBP54G Number of units	
MB100 Number of units	

SPA9000 Voice System Configuration

SPA9000

MAC ID	Key Upgrade (opt)	VM
NOTES:		

SPA400 #1

MAC ID	PSTN Phone Numbers	VM
NOTES:		

SPA400 #2

MAC ID	PSTN Phone Numbers	VM
NOTES:		

SPA400 #3

MAC ID	PSTN Phone Numbers	VM
NOTES:		

SPA400 #4

MAC ID	PSTN Phone Numbers	VM
NOTES:		

Phone : _____ (enter station number)

Copy and print this page as needed for each phone.

Link	
Phone Model	
MAC ID	
DID Numbers	
WiFi / POE	

L1	EXT	Share / Private	Hunt Group	Voice Mail
L2	EXT	Share / Private	Hunt Group	Voice Mail
L3	EXT	Share / Private	Hunt Group	Voice Mail
L4	EXT	Share / Private	Hunt Group	Voice Mail
L5	EXT	Share / Private	Hunt Group	Voice Mail
L6	EXT	Share / Private	Hunt Group	Voice Mail

Additional Equipment

Equipment Type	
Model	
MAC Address	
Notes	

Equipment Type	
Model	
MAC Address	
Notes	

Equipment Type	
Model	
MAC Address	
Notes	

Equipment Type	
Model	
MAC Address	
Notes	

Additional Installation and Configuration Notes

Troubleshooting

This appendix provides solutions to problems that may occur during the installation and operation of the SPA9000 Voice System.

If you can't find an answer here, visit the Cisco Small Business Community at the following URL:

<https://www.myciscocommunity.com/community/smallbizsupport/voiceandconferencing/voice>

Q. The SPA9000 did not automatically assign an extension number to the Cisco SPA IP Phone, and the phone Ext LED is yellow instead of green.

A. The yellow LED indicates that the phone and the SPA9000 are not in communication with each other, possibly due to an IP address change or physical network problems.

As a test, reboot the SPA9000, and observe the phone displays to determine if the phones are rebooting as expected. If a phone does not reboot, there is a network connectivity issue between the phone and the SPA9000.

Troubleshoot as follows:

- **Network environment:** Determine if there have been any changes in the network environment that would affect the LAN or VLAN on which the SPA9000 Voice System equipment resides. The SPA9000 Voice System is a LAN-based solution which requires all of the equipment to reside on the same VLAN. Changing the network environment may cause the phones to lose connectivity with the SPA9000.
- **Multicast address settings:** To determine if there is a problem with the multicast address on the phone configuration, complete the following tasks:
 1. To determine the correct multicast address of the SPA9000, connect an analog phone to the SPA9000. Lift the receiver and press **** to access the IVR. Then press **80#** to hear the SPA9000 multicast address and port.



NOTE Alternatively, connect to the SPA9000 administration web server. Go to *Voice > SIP* page, *PBX Parameters* section, and find the address in the *Multicast Address* field.

2. Check the multicast address settings on the phone:

- **SPA901:** Lift the receiver, and press **** to access the IVR. After the greeting plays, press **180#** to hear the multicast address.

If the announced address or port does not match that of the SPA9000, then press **181#**, and enter the correct address and port, as described below.

- Press the * (star) key after each set of digits in the IP address and before the port number; for example, 224*168*168*169*8089.
- Press the # (pound) key to indicate that you have finished your input.
- Press 1 to save the setting. The settings take effect after you hang up the telephone. The phone may reboot at this time.

- **Other SPA phones:** Press the Setup button, scroll down to **9 - Network** and press **select**. Scroll down to view the Multicast Address.

If the address or port does not match that of the SPA9000, press **edit**, and enter the correct address and port. Then press **ok**. Restart the phone.

- **Proxy address settings:** To determine if there is a problem with proxy address settings, complete the following tasks.
 1. To determine the correct proxy listen port of the SPA9000, start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**. View the *Voice > SIP* page, *PBX Parameters* section, *Proxy List Port* field.
 2. On the phone, press the **Setup** button, and scroll down to **9 - Network**. Select **15 - Multicast Address**.
 3. If the address is incorrect, press **edit**, enter the correct address, and then press **ok**.

Q. When the phones boot up, the LEDs flash yellow for several seconds and then turn green.

A. This behavior indicates that the switch is performing spanning tree functions, which may interfere with VoIP performance. For proper performance, both spanning tree and Port Fast should be enabled on the switch. For instructions about configuring these settings on the SLM224P, see [“Enabling Spanning Tree and Port Fast on the SLM224P Switch,” on page 43](#). After you enable Port Fast, the phone LEDs should no longer flash yellow after a reboot.

Q. I am using the SPA400 for voice mail but am having trouble retrieving messages from a phone. When I press the Message button on the phone, I am prompted to enter a mailbox number, or I get a busy tone.

A. If the station is properly configured, you should be prompted for a password when you press the Message button. The other responses are caused by the following issues:

- Mailbox not assigned to the phone: If you are prompted to enter a mailbox number, a mailbox is not assigned to the phone. Review the settings on the SPA400 Voice mail User page to determine which mailboxes are configured. Next, check the *Telephone Configuration > Ext 1* page, *Call Feature Settings* section. Make sure that the *Mailbox ID* field displays the correct line interface number for the SPA400 as well as a valid mailbox number; for example, 2102 (line interface 2, mailbox number 102). For more information, see [“Configuring the Voice Mail Server and Voice Mail Users,” on page 82](#)) and [“Setting Up Each Station,” on page 85](#), in this guide.
- USB drive issues or line interface issues: A busy tone indicates a problem with the configuration. Verify that the USB drive is properly inserted into the SPA400. Verify that the correct data was entered on the Line 2 configuration page (see [“Configuring SPA9000 Connectivity with the SPA400 for PSTN and Voice Mail Service,” on page 70](#)).

Q. When a call comes into a Shared Line Appearance, only one phone rings.

A. Make sure that the SLA is configured properly on each phone. You must configure the information the Ext N page and on the Phone page for each phone. Review the step-by-step instructions in [“Managing Inbound Calls with Shared Line Appearances,” on page 115](#).

Q. I am trying to upgrade a phone with a computer that is connected to the PC port. The upgrade is not successful.

A. You cannot perform a firmware upgrade from a computer that is connected to the phone that you are upgrading. The phone reboots several times during the upgrade process, and as a result the firmware cannot be retrieved from the computer. Unplug the computer from the phone and instead connect it to an available port on the switch.

Q. I manually entered the proxy address into my phone configuration but it doesn't register with the SPA9000.

A. Verify that you entered the correct SPA9000 IP address and the correct proxy listen port (default 6060). For example, enter 192.168.0.1:6060 in the Proxy location of the SPA941.

Q. Why can't I register the FXS ports to an outside proxy?

A. The FXS ports are registered directly with the SPA9000; no options exists for it to connect to another proxy.

Q. Why do only four SPA900 series clients register?

If you need to add more than four phones, install the SPA9000 firmware version 5.2.5, which supports up to 16 IP phones.

Q. The IP phone can make internal calls to other IP phones and analog phones but it cannot make external calls.

- If this is a new installation with no successful outbound calls: Check to see whether the SPA9000 line interface is registered. Follow these steps:
 - a. Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.
 - b. Click **Voice tab > Info**.
 - c. Scroll down to the *Line N Status* section, where *N* is the number of the line interface.
 - d. Verify that the *Registration State* is Registered.
 - e. If the line interface is not registered, then click the **Line N** tab and enter the correct User ID, Proxy, and Password supplied by your Internet Telephony Service Provider (ITSP).
 - f. Click **Submit All Changes**.

- If outbound calls previously were placed successfully: First determine whether or not the dialed digits are accepted by the dial plan. If the problem is not with the dial plan, consider the following possible causes:
 - FXO lines: The PSTN central office connection might be disconnected or disabled on the PSTN side. Connect an analog phone or a test set directly to the FXO line to see if it can get dial tone.
 - ITSP service: The network connection could be down. See if you can browse to an external web site such as www.cisco.com. The ITSP network (Softswitch or Gateway) could be out of service.

Q. My SPA9000 is behind a NAT device or firewall and I'm unable to make a call or I'm only receiving a one-way connection. What should I do?

A. This problem is caused by problems with NAT mapping. There are various methods for resolving the problem. For a brief overview, see ["NAT Mapping," on page 37](#). For instructions, see the *Cisco SPA9000 Voice System Administration Guide*.

Q. When an outside line calls the SPA9000, it rings one time and then goes to the Auto Attendant.

A. By default, if no one answers the call after 12 seconds, then the call goes to the Auto Attendant. To change this setting, follow these steps:

1. Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.
2. Click **Voice tab > SIP**.
3. Scroll down to the *Auto Attendant Parameters* section.



NOTE To allow more time for your staff to answer the phone, enter a higher number of seconds in the appropriate *Answer Delay* setting (DayTime, NightTime, or Weekends/Holidays).

Alternatively, change the Contact List to route the inbound calls to another number or group of numbers. See ["Routing Calls to a Receptionist, Extension, or Hunt Group," on page 96](#).

4. Click **Submit All Changes**.

Q. How can I change greetings for the Auto Attendant?

A. You can record greetings by using the SPA9000 IVR. You also can specify a TFTP server from which recordings can be downloaded by the SPA9000. For more information, see the *Cisco SPA9000 Voice System Administration Guide*.

Q. When I try to connect to voice mail from an external phone, the call does not connect.

A. Make sure that you have properly configured your remote access settings (see [“Enabling Remote Voice Mail Access \(Optional\),” on page 88](#)). Also check the Bridge Mode settings. On the *Voice > Line N* page, *Proxy and Registration* section, make sure that the *VMSP Bridge*, *XFER Bridge Mode*, and *CFWD Bridge Mode* fields are set to all.

Q. I try to dial a number but I hear a reorder (fast busy) tone.

A. This behavior indicates that the dialed digits are not accepted by the dial plan. The *Cisco SPA9000 Voice System Administration Guide* includes instructions for modifying the default dial plan to accommodate various dialing scenarios. To better understand the problem, try dialing the number again, but press the digits somewhat more slowly than you would normally dial. With a slower input, you can determine at what point the tone occurs, and you can adjust the dial plan accordingly.

- If the reorder tone occurs immediately after the first digit, then the dial plan does not allow that digit in the first position.
- If the reorder tone occurs after you dial an extension number, your dial plan may not allow a number in that sequence, or may require a longer or shorter sequence.
- If the reorder tone occurs after you dial a 7-digit or 9-digit telephone number, check the display to see if you dialed the required steering digit before entering the number.
- If you dialed a long-distance number and you hear a recording such as “The number you dialed is incorrect, please try again,” then the dialed sequence is not being accepted by the service provider. You need to check with the service provider to find out what digits are required for long-distance dialing. For example, is a 1 required at the beginning of the string or should the number 1 be omitted?

For detailed instructions, see the *Cisco SPA9000 Voice System Administration Guide*.

Q. I placed a test call from an external number, and I heard a busy tone, or my call was connected to the wrong extension number.

There are three possible causes to consider:

- **Line Registration:** Verify that the line is registered. On the *SPA9000 Voice > Info* page, scroll down to the *Line N Status* section, where *N* is the number of the line interface. Verify that the Status is Registered. If it is not, review your entries on the *Voice > Line N* page to ensure that the correct information is entered. After making a change, you may need to refresh your browser a few times before the new status appears, to allow time to receive a response from the service provider.
- **Contact List:** If the line is registered, then the described behavior suggests that the Contact List is not working as you expected. The busy tone occurs if the Contact List includes a number that is not configured on the system. The unexpected call routing typically is caused by an incorrect entry in the Contact List (for example, you entered 101 but intended the call to go to 111). You need to correct the Contact List to route the incoming calls as desired. For detailed instructions, see the *Cisco SPA9000 Voice System Administration Guide*.
- **Connectivity:** If the line is registered and the Contact List is correct, there may be a connectivity issue between the target phone and the SPA9000. Sometimes a phone will have green LEDs even after it has lost connectivity. As a test, reboot the SPA9000 and watch the phone display for the phone in question. If the phone does not reboot, then there is a connectivity issue, and you need to troubleshoot the network environment. If the phone does reboot, then double-check the dial plan.

Q. I want to use a different computer to access the administration web server. I entered `http://SPA9000_ipaddress`, but this address did not work.

A. Investigate the following possible causes:

- You may have entered an incorrect address for the SPA9000. To determine the correct address, complete the following tasks:
 - a. Connect an analog phone to an available Phone port on the SPA9000.
 - b. Press the star (*) key four times: ****
 - c. Press **110#**. The IP address of the SPA9000 Internet (external) interface is announced.
 - d. If you had the wrong address before, enter the correct IP address in Internet Explorer, and proceed. If you had the correct address, then refer to the other possible causes in this section.

- WAN access may be disabled. To enable access to the administration web server, complete the following tasks:
 - a. Connect an analog one to an available Phone port on the SPA9000.
 - b. Press the star (*) key four times: ****
 - c. Press 7932#.
 - d. Press 1# to enable WAN access to the administration web server.
 - e. Press 1 to save the setting.
- The SPA900 may be unavailable.
 - a. Try pinging the IP address of the SPA9000.
 - b. If you don't get a reply, check the connections.
 - c. Remove the power cord from the SPA9000, wait a short time, and then reconnect the power supply to reboot the device.

Q. I configured a SPA932 button to perform call pickup for an extension, but it is not working.

A. Call pickup can be used only in combination with Busy Lamp Field. Your syntax must include `cp+b1f`. Review the instructions in [“Configuring the SPA932 Sidecar to Work with the SPA9000,” on page 103.](#)

Q. I'm trying to access the SPA9000 administration web server, but I do not see the login screen. Instead, I see a screen saying, “404 Forbidden.”

Complete the following steps:

1. In Internet Explorer, press **CTRL + F5** to perform a hard refresh, which forces the browser to load new web pages, not cached ones.
2. From the **Tools** menu, choose **Internet Options**. Click the **Security** tab. Click the **Default level** button. Make sure the security level is Medium or lower. Then click the **OK** button.

Q. How do I view the status of my VoIP devices when I can't access the administration web server on the network?

Complete the following steps:

1. Connect a computer to the LAN switch that is connected to the SPA9000 INTERNET port (blue).
2. Start a web browser and enter the following URL:
`http://<IP_address_of_SPA9000>/admin/router/status`



NOTE You can use IVR option # 110 to verify the IP address on the SPA9000.

3. Click **PBX Status** to view the status of the devices.

Q. How do I save my current configuration?

Follow the appropriate procedure, below, for the device that you want to back up:

- SPA9000:
 - a. Start Internet Explorer, and then enter the IP address of the SPA9000. Click **Admin Login** and then click **Advanced**.
 - b. From the menu, choose **File > Save As**.
 - c. Save the configuration as **Web Page Complete**. You can use the saved file to review the saved settings in all pages of the administrative GUI.
- SPA900 Series Phones:
 - a. Start Internet Explorer, and then enter the IP address of the phone.
 - b. From the menu, choose **File > Save As**.
 - c. Save the configuration as **Web Page Complete**. You can use the saved file to review the saved settings in all pages of the telephone configuration.
- SPA400:
 - a. Start Internet Explorer, and then enter the IP address of the SPA400. Log on.
 - b. Navigate to the page that has the settings that you want to save.
 - c. From the menu, choose **File > Save As**.
 - d. Save the configuration as **Web Page Complete**.
 - e. Only the currently displayed page is saved. You can use this file to review the settings, as needed.
 - f. Repeat this procedure, as needed, for each page.

Q. How do I debug my SPA? Is there a syslog?

A. SPA sends out debug information via syslog to a syslog server. The ports can be configured (by default the port is 514). Make sure you do not have firewall running on your computer that could block port 514. For more information, see the *SPA9000 Voice System Administration Guide*.



Where to Go From Here

This appendix describes additional resources that are available to help you and your customer obtain the full benefits of the SPA9000 Voice System.

- “Product Resources,” on page 157
- “Related Documentation,” on page 158

Product Resources

Website addresses in this document are listed without **http://** in front of the address because most current web browsers do not require it. If you use an older web browser, you may have to add **http://** in front of the web address.

Resource	Location
Technical Documentation	www.cisco.com/en/US/products/ps10030/tsd_products_support_series_home.html
Firmware Downloads	Go to tools.cisco.com/support/downloads , and enter the model number in the Software Search box.
Cisco Community Central > Small Business Support Community	www.myciscocommunity.com/community/smallbizsupport/voiceandconferencing/voice
Phone Support	www.cisco.com/en/US/support/tsd_cisco_small_business_support_center_contacts.html
Warranty and End-User License Agreement	www.cisco.com/go/warranty

Resource	Location
Open Source License Notices	www.cisco.com/go/osln
Regulatory Compliance and Safety Information	www.cisco.com/en/US/products/ps10030/tsd_products_support_series_home.html
Cisco Partner Central (Login Required)	www.cisco.com/web/partners/sell/smb
Cisco Small Business Home	www.cisco.com/smb

Related Documentation

The following table describes the various documents that Cisco provides to help you to install, configure, and manage the SPA9000 Voice System and its components.

These documents and more are available at the following URL:

www.cisco.com/en/US/products/ps10030/tsd_products_support_series_home.html

Document Title	Description	Intended Audience
<i>SPA9000 Voice System Installation and Configuration Guide Using the Setup Wizard</i>	Installation, configuration and maintenance of the SPA9000 Voice System by using the Setup Wizard.	End Users, VARs, and Service Providers
<i>SPA9000 Voice System Installation and Configuration Guide - Web-UI (Legacy) Based Product Configuration</i>	Manual installation of the SPA9000 Voice System, by using the Web User Interface, instead of the Cisco SPA900 Voice System Setup Wizard.	End Users, VARs, and Service Providers

Document Title	Description	Intended Audience
<i>SPA9000 Voice System Administration Guide</i>	<ul style="list-style-type: none"> ▪ Administration and configuration of system features using the SPA9000 and SPA400 ▪ Deployment options for ITSP, PSTN, and ISDN services ▪ SPA9000, SPA400, SPA900 series phones 	VARs and Service Providers
<i>SPA9x2 Phone Administration Guide</i>	<ul style="list-style-type: none"> ▪ Configuration and management of SPA9x2 series IP phones ▪ Deployment options with or without the SPA9000 IP PBX ▪ SPA9x2 series IP phones 	VARs and Service Providers
<i>SPA9x2 Phone User Guide</i>	<ul style="list-style-type: none"> ▪ Phone setup ▪ Phone features ▪ SPA9x2 series IP phones 	VARs and phone end-users
<i>Analog Telephone Adapter Administration Guide</i>	<ul style="list-style-type: none"> ▪ Administration and use of Cisco Small Business ATAs ▪ PAP2T, SPA2102, SPA3102, SPA8000, WRP400, and WRTP54G 	VARs, system administrators, and Service Providers
User Guide for switch		
User Guide for router		