LINKSYS®
A Division of Cisco

LVS WIZARD GUIDE

Linksys Voice System

Installation, Configuration, and Maintenance Using the LVS Wizard

SPA9000 IP Telephony System
SPA400 PSTN VoIP Gateway with Integrated Voice Mail Server
SPA9x2 IP Phones

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About This Guide

This guide helps you to prepare your site and to complete the basic installation and configuration of the Linksys Voice System (LVS) by using the Configuration Wizard. This guide describes the LVS solution and its components. It also presents step-by-step instructions to help you to install and configure the system, to select the features that the business needs, to verify the installation, and to resolve any problems that occur.

Document Audience

This document is written for Linksys Voice System (LVS) administrators that need to:

- Configure new LVS installations
- Configure existing LVS installations
- Backup and restore LVS configurations

Related Documents

Linksys strongly recommends the use of the LVS Wizard and this Installation and Configuration Guide when installing, configuring and maintaining your LVS systems. Additionally, this section provides additional documentation references for administering the LVS system and its components.

These documents and more are available at Linksys.com and the Linksys Partner Connection (LPC) site.

NOTE: EMEA customers can go to www.linksys-itsp.com and www.linksys-voip.eu.

Document Title	Description	Intended Audience
Linksys Voice System Installation and Configuration Using the Administration Web Server	• Manual installation of LVS, by using the devices' built-in Web User Interface, instead of the LVS Wizard	End Users, VARs, and Service Providers
Linksys Voice System Administration Guide	• 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
Linksys Phone Administration Guide	• 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

Linksys SPA9x2 Phone User Guide	• Phone setup • Phone features • SPA9x2 series IP phones	VARS and phone end-users
Linksys Analog Telephone Adapter Administration Guide	• Administration and use of Linksys ATAs • PAP2T, SPA2102, SPA3102, SPA8000, AG310, RTP300, WRP400, and WRTP54G	VARS, system administrators, and Service Providers
User Guide for chosen switch		
User Guide for chosen router		

Finding Information in PDF Files

The PDF Find/Search tool lets you find information quickly and easily online. You can:

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

Finding Text in a PDF

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

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

2. Optionally, click the arrow next to the *Find* text box to refine your search by choosing special options such as *Whole words only*.
3. Press **Enter**. Acrobat displays the first instance of the search term. 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.

1. Start Acrobat Professional or Adobe Reader.
2. Choose **Edit > Search**. Alternatively, click the arrow next to the *Find* box and then choose **Open Full Acrobat Search**.
3. In the *Search* window, complete the following steps:
   a. Enter the text that you want to find.
   b. Choose **All PDF Documents in**.
   c. From the drop-down box, choose **Browse for Location**.
   d. Choose a directory on your computer or local network, and click **OK**.
   e. If you want to specify additional search criteria, click **Use Advanced Search Options**, and choose the options you want.

f. Click **Search**.

4. When the Results appear, click the plus sign (**+**) to open a folder, and then click any link to open the file where the search terms appear.

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

Online 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	Website
Linksys	www.linksys.com
Linksys International	www.linksys.com/international
Glossary	www.linksys.com/glossary
Network Security	www.linksys.com/security

Copyright and Trademarks

Document Style Conventions

The following style conventions are used in this document.

- **Menus, Tabs, and Buttons:** Bold type is used to indicate the name of a button, menu, or tab in an application.

  Example: Click **Submit All Changes** to save your entries.

- **Screens, Page Areas, and Fields:** Italic type is used to indicate the name of screens, page areas, and fields.

  Example: Scroll down to the *PBX Parameters* area of the screen.

- **Data Input:** The **`Courier`** font is used to indicate characters that you should type into a field exactly as printed in this guide.

  Example: In the *Mailbox Subscribe Expires* field, type **`30`**.

  In this example, you would type the number 30 in the field.

- **Parameters:** Angle brackets and italic type indicate parameters that you need to replace with the appropriate data.

  Example: Type **800**@*<IP address of SPA400>***:5090**

  In this example, you would type the characters 800@, followed by the IP address of your SPA400, followed by a colon and the number 5090.

Getting Started

Before you start installing and configuring your system, you need to become familiar with the features of the Linksys Voice System and the equipment and services that are required to meet the needs of the business.

This chapter is essential reading before you begin installing the equipment or configuring the system. Refer to the following topics:

- "LVS Solution Overview " on page 9
- "Introducing LVS Equipment" on page 10

LVS Solution Overview

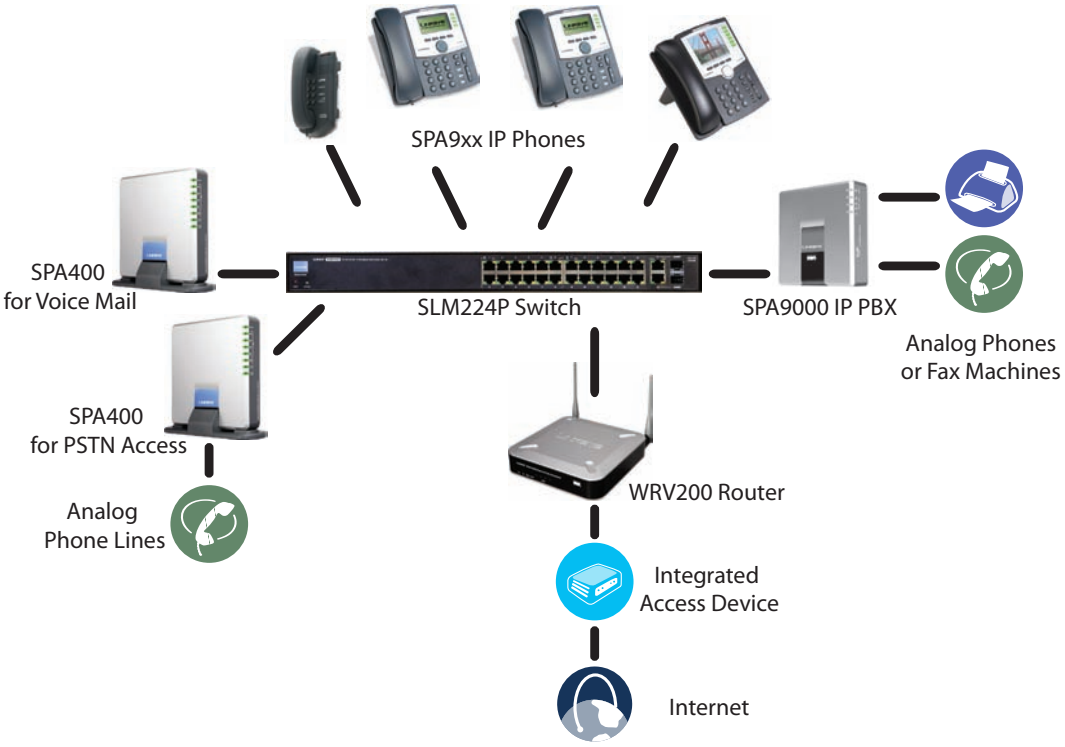
The Linksys Voice System (LVS) is an affordable, feature-rich, multi-line voice over IP (VoIP) telephone system that provides sophisticated communication services to small business users. The LVS uses standard TCP/IP protocols (although UDP is also supported) and can provide global connectivity through any Internet Telephony Service Provider (ITSP) that supports Session Initiation Protocol (SIP).

The IP PBX system (SPA9000) provides powerful business-class services on a small business budget. The system capitalizes on VoIP service savings for long distance outbound and toll-free inbound calling. Features include Auto Attendant, shared line appearances, configurable call routing, multiple DID numbers per VoIP line, call hunting (sequential, round robin, random), call park/unpark, call transfer, call forward, group paging, call pick-up, music on hold, "find me" service, Do Not Disturb, call hold, call waiting, and more. Administrative tasks can be performed using an Interactive Voice Response system or a built-in Web Server.

With the optional SPA400 PSTN Gateway, the LVS provides full inter-connectivity with the Public Switched Telephone Network (PSTN). Thus, a small business can maintain its legacy PSTN lines and existing telephone numbers. The SPA400 also provides an integrated local voice mail server for up to 32 individual mail boxes.

Additional third party products such as Mediatrix® 4400 ISDN VoIP Gateways and Plantronics® and GNNetcom®/Jabra® headsets provide enhanced connectivity for supporting additional business deployment scenarios. Please contact your linksys distributor or sales representative for further information on Linksys LVS third party products.

LVS Solution Overview



As illustrated, the complete LVS solution typically includes the SPA9000 IP PBX system, the SPA400 PSTN gateway with voice mail, and several SPA9xx series IP phones. The system has VoIP telephone service through an Internet Telephony Service Provider (ITSP) but also supports legacy telephone lines (PSTN lines) through the SPA400.

The following devices can be connected to an LVS system:

- **Analog phones, fax machines:** Up to two analog phones or fax machines can be connected to the VoIP network through the SPA9000.
- **Telephone service through PSTN, ITSP, and ISDN:**
  - **ITSP VoIP Service:** The SPA9000 can be configured to subscribe to an Internet Telephone Service Provider for VoIP service. Up to four different ITSP accounts can be configured.
  - **PSTN Analog Phone Access:** The SPA400 can accommodate up to four PSTN lines, to support legacy phone numbers. Typically, one SPA400 is reserved for voice mail service. If your system has ITSP service, you can add up to two SPA400 devices with a total of 8 PSTN lines. If your system does not have ITSP service, you can add a third SPA400 device with 4 additional PSTN lines, for a total of 12 PSTN lines.
  - **ISDN services:** The LVS can be deployed with a Mediatrix® 4400 ISDN BRI Digital gateway for ISDN access.

Introducing LVS Equipment

This chapter describes the features of the LVS equipment, including the SPA9000, the SPA400, and the various models of SPA9xx phones.

- "Getting to Know Your SPA9000 " on page 11
- "Getting to Know Your SPA400 " on page 12
- "Getting to Know Your SPA9xx Phones and Accessories" on page 13

- "Getting to Know Your WRV200 Router" on page 15
- "Getting to Know the SLM224P Switch" on page 17

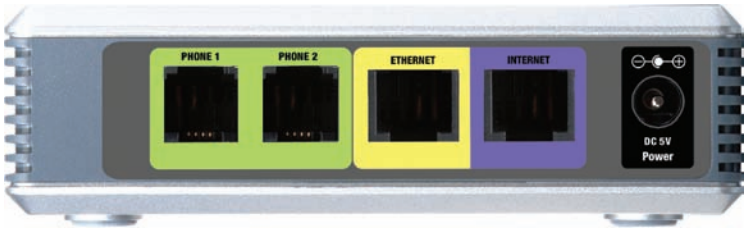
Getting to Know Your SPA9000

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	• 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.
Internet	• 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	• 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	Use this port to connect a computer for administration of the SPA9000.
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 sets up and tears down calls between the PSTN and IP phones, offering seamless telephone service with Linksys VoIP equipment.

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	• 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	• Steady green: The SPA9000 is registered to the SPA400. • Flashing: The SPA9000 is not registered to the SPA400.
Ethernet	• Steady green: The SPA400 has an active connection through the Ethernet port. • Flashing: Network activity is occurring over the Ethernet port.

LED	Description/Notes
Line 1, 2, 3, 4	• Steady green: The line is active. • Flashing: The line is ringing. • Off: The line is idle.
USB	• 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 SPA9xx Phones and Accessories

Linksys provides are variety of phone models to suit the needs of small businesses. The following table provides a comparison of the various SPA9xx phones.

Product Name		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

Product Name		RJ-45	Voice Lines	Additional Features/Notes
SPA962*		2	6	Six-line IP Phone with high-resolution color display and Power over Ethernet (PoE) support
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, SPA400 and SPA9x1 phones
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:** PoE units (SPA922, SPA942, and SPA962) do not come with an external power adapter. The PA100 power supply must be ordered separately if you are not using a PoE switch.

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 Linksys Voice System.

WRV200 Front Panel

LED/Port	Description
Power	• Green: The router is receiving power. • Flashing Green: The router is running a diagnostic test.
DMZ	• Green: The router has an available DMZ port. • Flashing Green: The router is sending or receiving data over the DMZ port.
Internet	• Green: The router is connected to a Broad Band Access device at the indicated speed (10, 100, 1000). • Flashing Green: The router is transmitting or receiving data over the Internet port.
Wireless	• 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)	These four LEDs correspond to the router's four Ethernet ports. • 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	The port is used to connect the router to AC power, using the provided power cable.
Reset	• 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 Broad Band 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) uplink interfaces for connecting the switch to the core network.

NOTE: In this guide, the SLM224P switch is used in all examples. However, various Linksys switches can be used with the LVS. Linksys recommends use of SLMxxxP, SRWxxxP and SRWxxxMP switch product families with the LVS.

SLM224P Front Panel

LED/Port	Description
System	• Green: Power is being supplied to the switch. • Solid Amber: The switch is performing the Power-On Self Test (POST).
Link/Act (1-24)	• 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)	• 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)	• 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)	• 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)	• Amber: The switch has a functional 1000 Mbps connection on the corresponding port with an attached device.
Reset	• 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.
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 and Configuring the LVS Using the Wizard

In this phase, you will physically connect the LVS equipment to the LAN, configure the voice features, call routing, localization and business features using the LVS Wizard. Chapter 4, "Connecting and Configuring Your System" explains step-by-step use of the Wizard for the purpose of Installing and Configuring your system.

C. Testing the LVS Installation and Configuration

After the system is installed and configured using the LVS Wizard, it is recommended that you perform some basic tests to ensure that the LVS system is properly installed and configured. Chapter 5, "Testing Your LVS System" provides basic steps for verifying your LVS system is properly installed and is operational.

D. Maintaining the LVS Using the Wizard

After the system is installed, configured and operational, it is possible that you require to update the system (e.g. to add a new extension because there is a new employee on the business, or to add a new SPA400 because of additional PSTN traffic). Chapter 6, "Maintaining Your LVS" explains all individual menu options for performing basic and advanced configuration tasks.

Preparation

To ensure that the installation process goes smoothly, verify that you have the services, equipment, and information described in the following sections. This chapter is essential reading before you begin installing the equipment or configuring the system. Refer to the following topics:

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 LVS equipment (for example, ordering the LVS components 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 e-mail.

Various site survey templates can be used. Appendix A, "Installation Workbook", contains a site survey template example, used to fill the customer information.

System Design Considerations

When installing and configuring the LVS, 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 LVS components, 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.

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
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

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.

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

http://www.erlang.com/calculator/lipb/

http://www.packetizer.com/voip/diagnostics/bandcalc.html

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, Linksys 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 LVS 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 LVS system. Below are the general recommendations for Local Area Networks running LVS communications:

Infrastructure, Cabling and PSTN/ISDN Lines:

- **AC outlets:** Ensure there is an AC outlet available for every LAN and LVS 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 outlets setup for every LVS component to install. 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 LVS components.
- **UPS:** If you are using an Uninterrupted Power Supply (UPS) mechanism, ensure that the LVS design is covered by the UPS by securing the router and switch AC connections, and the LVS components, 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. In this case, and if the external (public) IP address is static, then it is recommended to perform a static (permanent) mapping on SPA9000. Instructions are available in the *LVS Administration Guide*.

- Configuring NAT Mapping with STUN

  Configuring NAT mapping in the SPA9000 is recommended only if the ITSP network does not provide a Session Border Controller functionality. In this 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 is considered a practice of last resort and should be used only if the other methods are unavailable. For more information, see the *LVS Administration Guide*.

Quality of Service

Linksys recommends using the LVS with QoS-capable networking equipment that can prioritize the VoIP application traffic. QoS features are available on many Linksys 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 IP TOS (recommended for its simplified setup) or 802.1 Q/p VLAN ID and priority setting.

Instructions for the SLM224P are provided in this guide.

Local Area Network Design

Use the following guidelines to manage the LAN setup for the LVS.

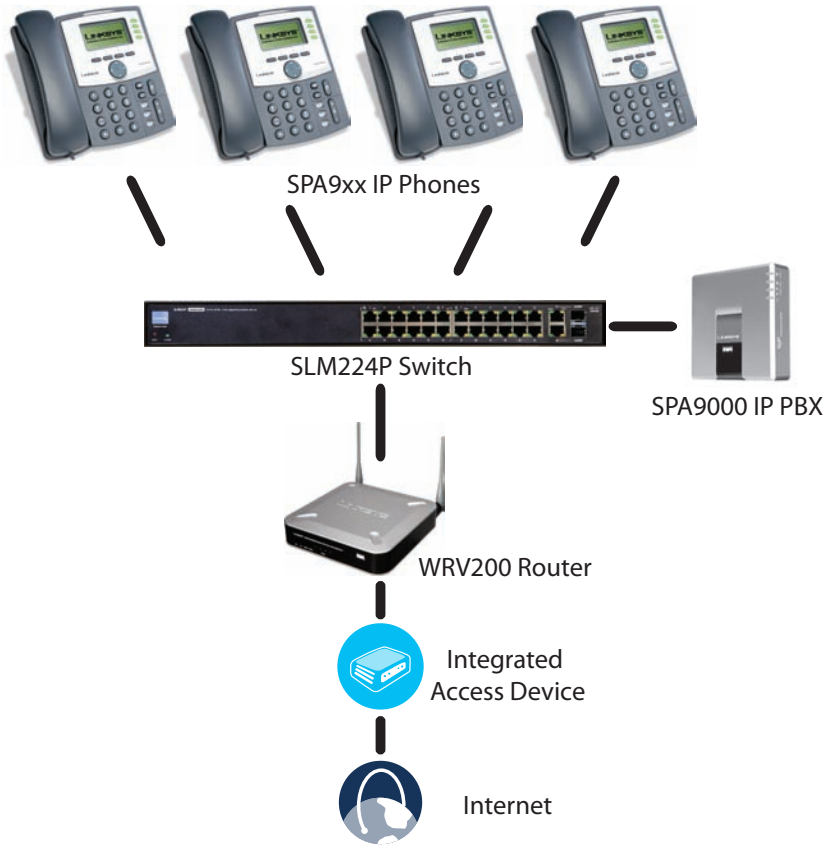
- Ensure that all LVS components are located in the same local area network subnet.
- Although all LVS components support static IP addressing, we recommend the use of a DHCP server, as a means to easily add IP telephones to the system. Ensure that the DHCP server can assign up to enough IP addresses to serve the LVS phones and the existing networked components such as PCs, servers, and so on.
- If using DHCP, use a long lease time. LVS components 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.

Deployment Scenarios

To ensure that the system meets the customer's needs, consider the requirements for PSTN access, VoIP service, voice mail, and legacy equipment such as analog phones and fax machines. Also consider the number of IP phones that are required to handle the expected call volume.

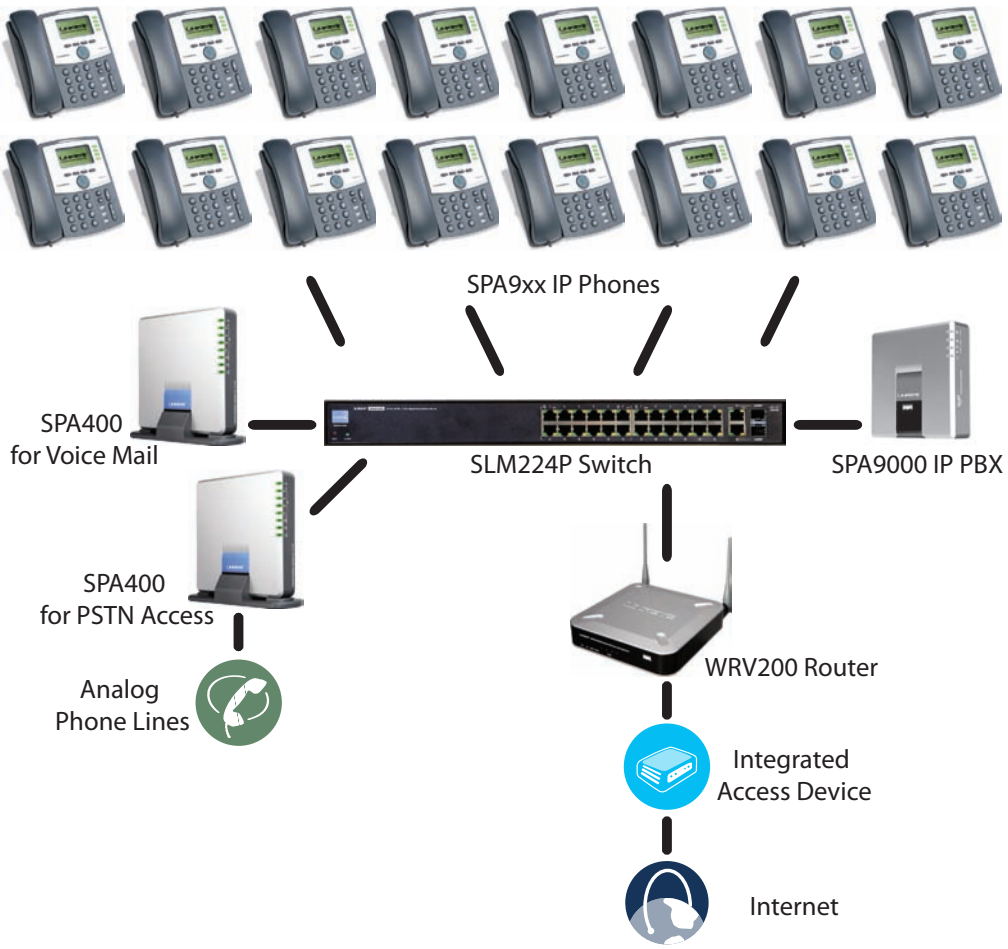
ITSP Service without Local PSTN Access or Voice Mail

In this scenario, the customer requires a robust phone system but is not using VoIP services. The LVS is deployed with a SPA9000 IP PBX, one SPA400 for PSTN access with four FXO ports, and another SPA400 for local voice mail service. Four phones are connected at this time, but the LVS can be expanded to include up to 16 SPA9xx IP phones. Optionally, analog phones or fax machines (not illustrated) can be connected to the two phone ports on the SPA9000.



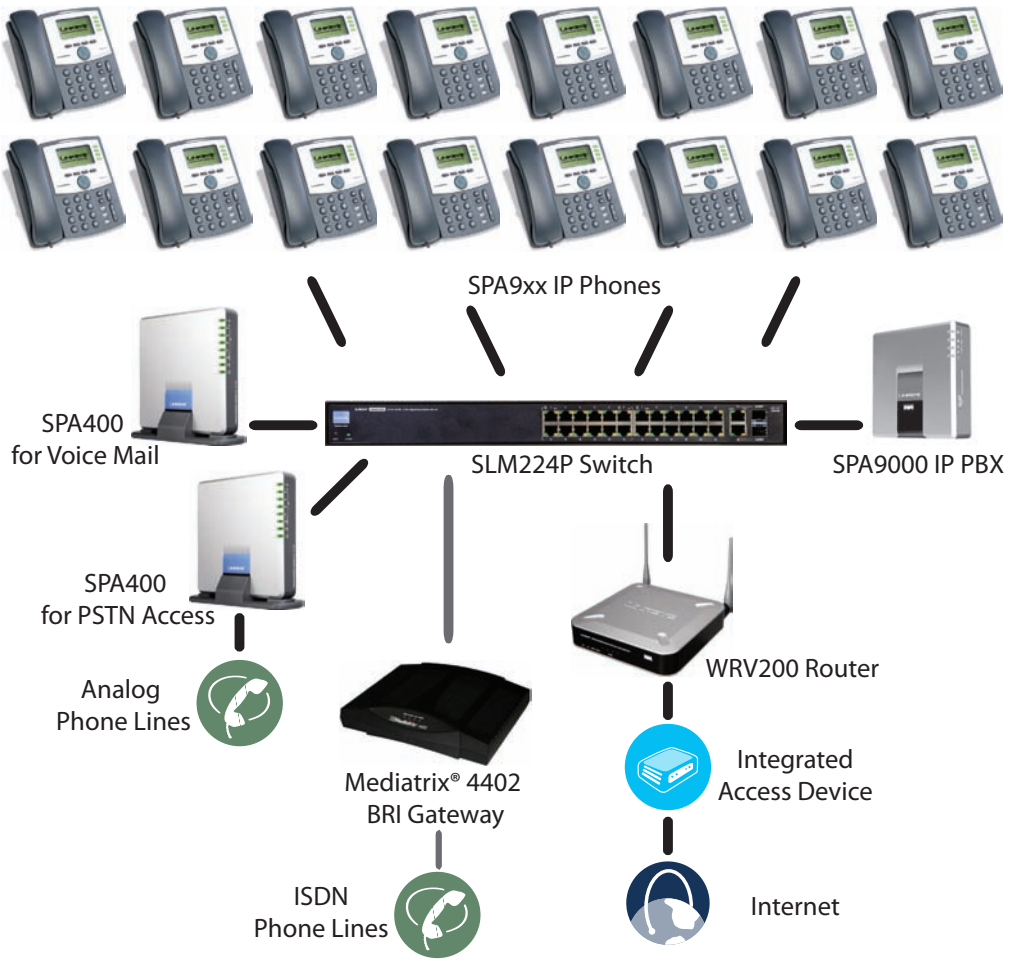
LVS with ITSP Service, PSTN Access and Local Voice Mail Service

In this scenario, a customer wants to use ITSP service for reduced long distance fees but needs to support legacy local telephone numbers (for example, to receive calls over the original-legacy telephone number, or to route local telephone calls). This customer also prefers local voice mail service. The solution is to deploy LVS with the SPA9000 IP PBX, VoIP service, one SPA400 unit for voice mail service, and one or two additional SPA400 units for PSTN access (four FXO ports per unit), and up to 16 SPA9xx phones. Optionally, analog phones and fax machines can be added.



ITSP Service, PSTN and ISDN Access and Local Voice Mail Service

In this scenario, the customer takes full advantage of the LVS solution, with the SPA9000 IP PBX, VoIP service, one SPA400 unit for voice mail service, and one additional SPA400 unit for PSTN access (four FXO ports per unit), one ISDN Gateway for ISDN BRI access (up to four BRI ports per unit), and up to 16 SPA9xx IP phones. Optionally, analog phones and fax machines can be added.



Services and Equipment

To install and configure LVS, 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

  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
- Optional Mediatrix® gateway for ISDN connectivity

Linksys Equipment and Services

The following LVS 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 LVS 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

Before installing and configuring your system, download the latest LVS Wizard and firmware for your SPA9000, SPA400 (if present), and SPA9xx phones.

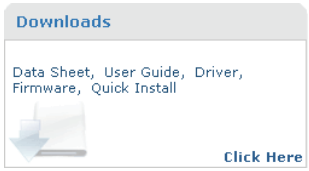
This guide supports the following firmware releases. The installed firmware must be at least the indicated in the table below.

Product	Firmware Version
SPA9000	5.2.5
SPA400	1.0.1.9
SPA922/942/962	5.2.8
SPA901	5.1.5
SPA921/SPA941	5.1.8

NOTE: This firmware is included as part of the LVS Wizard compressed archive file. If you install newer firmware, follow the instructions below. For ease of installation via the Wizard, extract the files to the same root directory of the Wizard.

1. Start Internet Explorer, and enter the following URL: http://www.linksys.com
2. From the menu at the top of the page, select **Support > Technical Support**.
3. Click **Choose a Product**.

   NOTE: If you are visiting the site for the first time, you may be prompted to choose your location before continuing.
4. On the *Select Product Category* page, choose **IP PBX** from the *Voice over IP (VoIP)* drop-down list.
5. On the *Choose The Device* page, choose **SPA9000**.
6. Under *Downloads*, choose the **Click Here** link.



7. Choose the version in the drop-down list.

8. Under *Firmware*, click the link for the latest version of the firmware.

   NOTE: If you are using Windows XP Service Pack 2 (SP2) and Internet Explorer, you may see the *"Pop-up blocked"* message in your browser information bar. If you see this message, click the information bar and select **Temporarily Allow Pop-ups**. Then click the link again.
9. Click **Save** in the *File Download* dialog box that appears.
10. In the *Save As* dialog box, choose a location for the file and then click **Save**.
11. When the download is complete, if prompted, click **Close**.

    NOTE: The name of the file depends on the firmware file of your device. If the firmware file you download is in zip format, double-click the file and extract its contents to a single folder or to the desktop. To extract the firmware file from the archive, use a utility such as WinZip, or use the built-in decompression features of Windows XP.

12. Continue as needed for the other devices in your LVS:
    - **SPA400**
        a. Click **Choose A Product** in the left navigation pane.
        b. On the *Choose A Product* page, choose **IP PBX** from the *Voice over IP (VoIP)* drop-down list.
        c. Choose **SPA4000** on the *Choose The Device* page.
        d. On the SPA400 page, choose the **Click Here** link under *Downloads*.
        e. Choose the version in the drop-down list.
        f. Under *Firmware*, click the link for the latest version of the firmware.
        g. Save the file.
    - **SPA9xx IP Phones**
        a. Click **Choose A Product** in the left navigation pane.
        b. On the *Choose A Product* page, choose **VoIP Phones** from the *Voice over IP (VoIP)* drop-down list.
        c. On the *Choose The Device* page, scroll down to the end of the page. Choose the correct model from the drop-down list for the SPA9xx phones.

           NOTE: There are separate drop-down lists for the SPA962 and the SPA932.
        d. On the SPA400 page, choose the **Click Here** link under *Downloads*.
        e. Choose the version in the drop-down list.
        f. Under *Firmware*, click the link for the latest version of the firmware.
        g. Save the file.

NOTE: You will install the firmware after connecting the devices.

Connecting and Configuring Your System

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

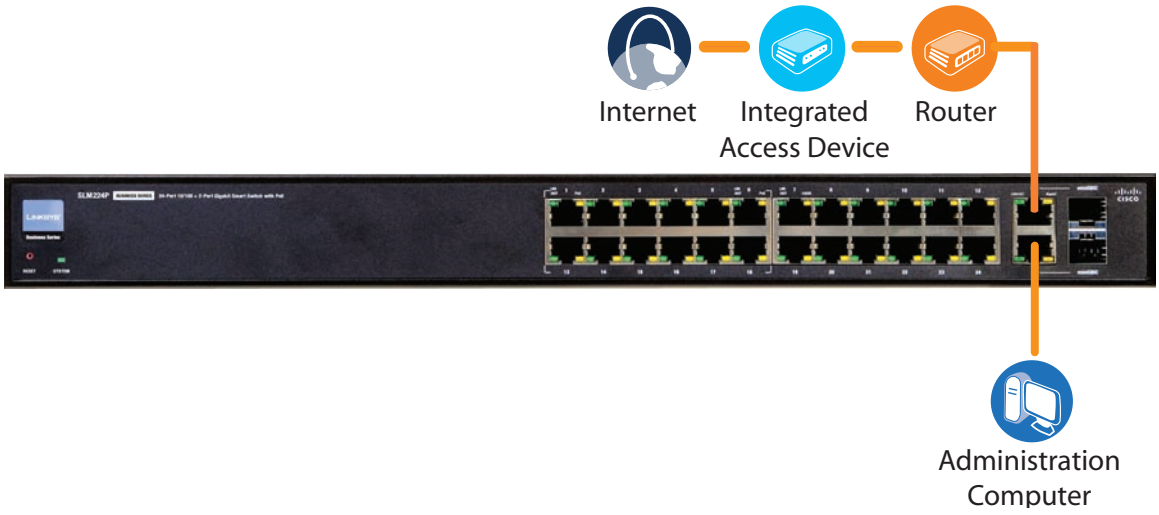
Connecting and Configuring the Switch

Before installing any LVS 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, Linksys recommends the use of the WRV200 broadband router to connect to the access device.)

NOTE: In this guide, the Linksys SLM224P switch is used in all examples. However, various Linksys switches can be used with LVS. Linksys recommends use of SLMxxxP, SRWxxxP and SRWxxxMP switch product families with LVS. For more information, visit www.linksys.com..

- "Connecting the Switch to the Router" on page 29
- "Configuring the Switch" on page 30

Connecting the Switch to the Router



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

1. Connect an Ethernet network cable to one of the Ethernet ports on your router. Then connect the other end of the cable to an Ethernet port on the switch.
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.
3. Connect the power cord to the power port, 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.

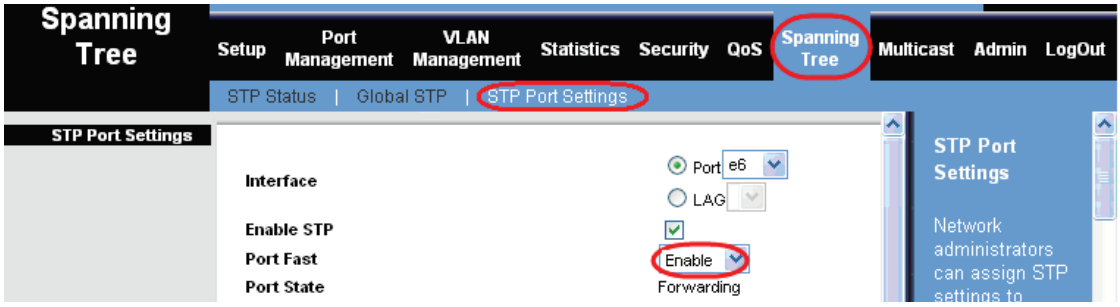
Enabling Port Fast on the SLM224P Switch

To avoid timing issues related to Spanning Tree Protocol (STP) and to allow multicasting to work correctly for LVS, 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.

1. Choose the ports that you will use to connect the SPA9000 and the IP phones.
2. Connect the administration computer to the switch.
3. Start Internet Explorer, and enter the IP address of the switch.

   NOTE: 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.
4. Click **Spanning Tree tab > STP Port Settings**.
5. From the *Port* drop-down list, choose the port number for the SPA9000.
6. Make sure that the **Enable STP** check box is checked, to enable STP on the port.
7. From the *Port Fast* drop-down list, choose *Enable*.

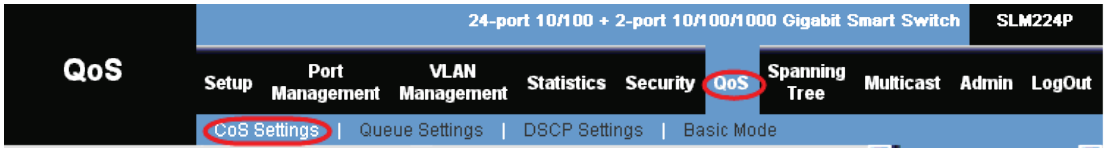


8. Click **Update**.
9. Repeat the previous steps, to enable Port Fast on each port where an IP phone or a SPA400 will be connected.
10. Click **Save Settings**.

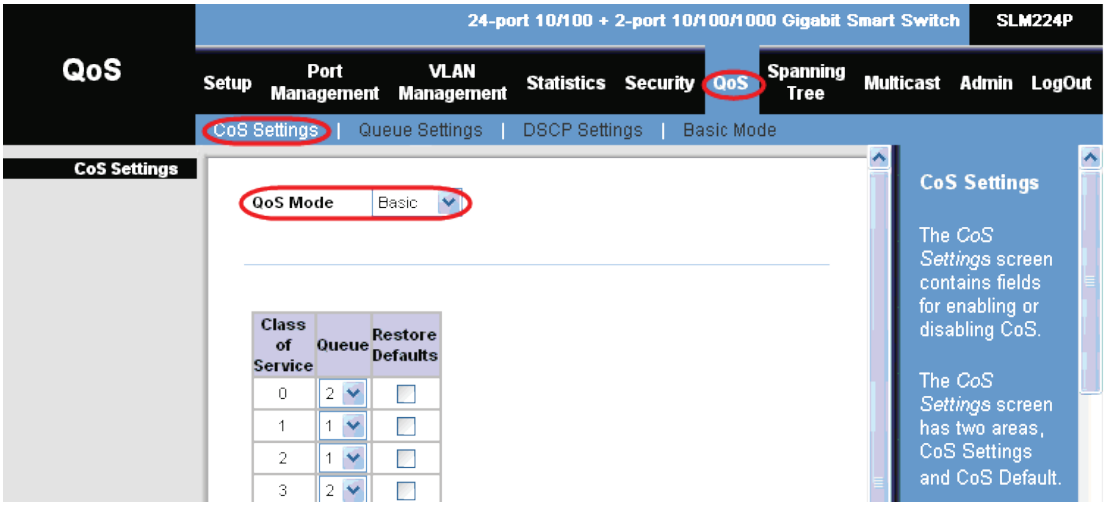
Setting QoS on the SLM224P Switch

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

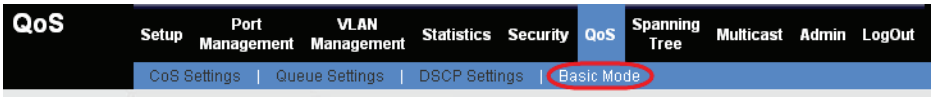
1. Click **QoS tab > CoS Settings**.



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



3. Click **Save Settings**.
4. Click **QoS tab > Basic Mode**.



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

6. Click **Save Settings**.

Introduction to the Wizard

The Wizard steps you through the entire installation process, from connecting cables, powering on, configuring the Auto Attendant.

Wizard Capabilities

The Wizard assists with advanced tasks, including:

- Backing up and restoration of device configuration
- Changing device's network settings
- Upgrading device's firmware
- Configuring NAT settings
- Configuring SIP trunks in only a few clicks

Extracting the Wizard

You must unzip all of the files from the zip archive before starting the Wizard. The Wizard will not properly function if you double-click the Wizard file within the compressed archive file.

LVS Wizard User Guide

Click **User Guide** to display this User Guide. The User Guide must exist in the Wizard's messages directory. In the event that the file is not found, download the LVS Wizard User Guide from the SPA9000 download page at the Linksys.com site. Then open the Wizard folder, move the file to the *messages* sub-directory, and change its name to **ug_english.pdf**.

Connecting and Configuring the LVS Equipment (New Installation)

Refer to this section if you have a new installation and configuration to perform.

This section assumes that:

- You have some basic networking knowledge.
- The LVS Equipment is not connected or powered on.
- You are configuring an Internet telephony service provider (ITSP) account and a public switched telephone network (PSTN) account.
- You have completed the Site Survey. See Appendix A, "Installation Workbook".

Required Information

Be prepared to provide the following information in response to the Wizard prompts:

NOTE: When choosing static IP addresses for your LVS equipment, 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 192.168.1.50 to 192.168.1.254, you should select a static IP address between 192.168.1.2 and 192.168.1.49.

IP Addresses:

- SPA9000 static IP address: __ __ __ . __ __ __. __ __ __ . __ __ __
- SPA400 static IP address: __ __ __ . __ __ __. __ __ __ . __ __ __
- Subnet mask: __ __ __ . __ __ __. __ __ __ . __ __ __
- Gateway IP address: __ __ __ . __ __ __. __ __ __ . __ __ __
- Primary DNS server IP address: __ __ __ . __ __ __. __ __ __ . __ __ __
- Secondary DNS server IP address: __ __ __ . __ __ __. __ __ __ . __ __ __
- NTP server name or IP address: __ __ __ . __ __ __. __ __ __ . __ __ __

ITSP Information:

- SIP Proxy: sip. _____.com
- User ID: _____
- Password: _____

Steering Digits:

- Steering digit for the ITSP Line 1 SIP trunk: 0 1 2 3 4 5 6 7 8 9
- Steering digits for each SPA400:
  - Line 1 (if no ITSP):0 1 2 3 4 5 6 7 8 9
  - Line 2: 0 1 2 3 4 5 6 7 8 9
  - Line 3: 0 1 2 3 4 5 6 7 8 9
  - Line 4: 0 1 2 3 4 5 6 7 8 9

Voice Mail Configuration (Choose one of the following):

- ITSP voice mail:
  - Mailbox subscribe URL: _____
  - Mailbox Deposit URL: _____
  - Mailbox Manage URL: _____
- Separate voice mail server
  - Voice mail Proxy: _____
  - Mailbox subscribe URL: _____
  - Mailbox deposit URL: _____
  - Mailbox manage URL: _____
  - User ID: _____
  - Password: _____
    - No voice mail
    - SPA400 voice mail server

Phones

Name	Primary Extension	Voice Mail (Yes or No)	MAC Address Ending
SPA9000 FXS 1			
SPA9000 FXS 2			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			

Call Routing Rule (choose one method):

- Auto Attendant to answer all calls in _____ seconds
- Ring extension _____ for _____ seconds
- Ring the Auto Attendant immediately

Hunt Groups (Optional):

Group Name	Group Extension Number	Member Extension Numbers

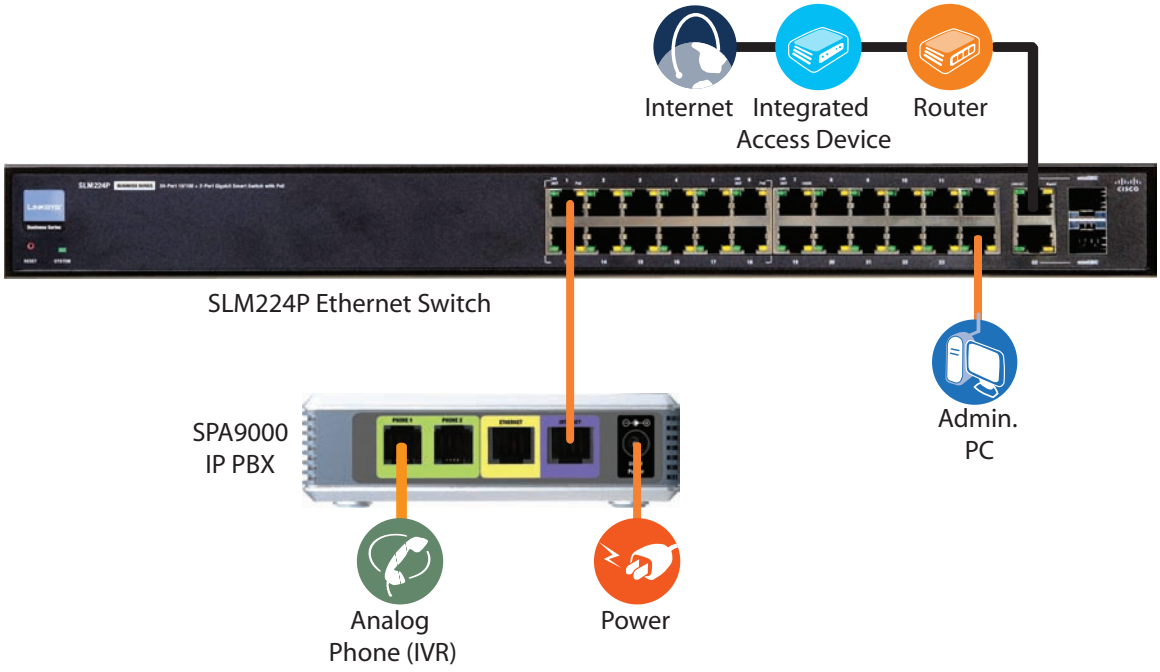
Starting the Wizard

Double-click the **SetupWizard.exe** file to start the LVS Wizard. When the *Welcome* page appears, click **Next** to continue.

End User License Agreement

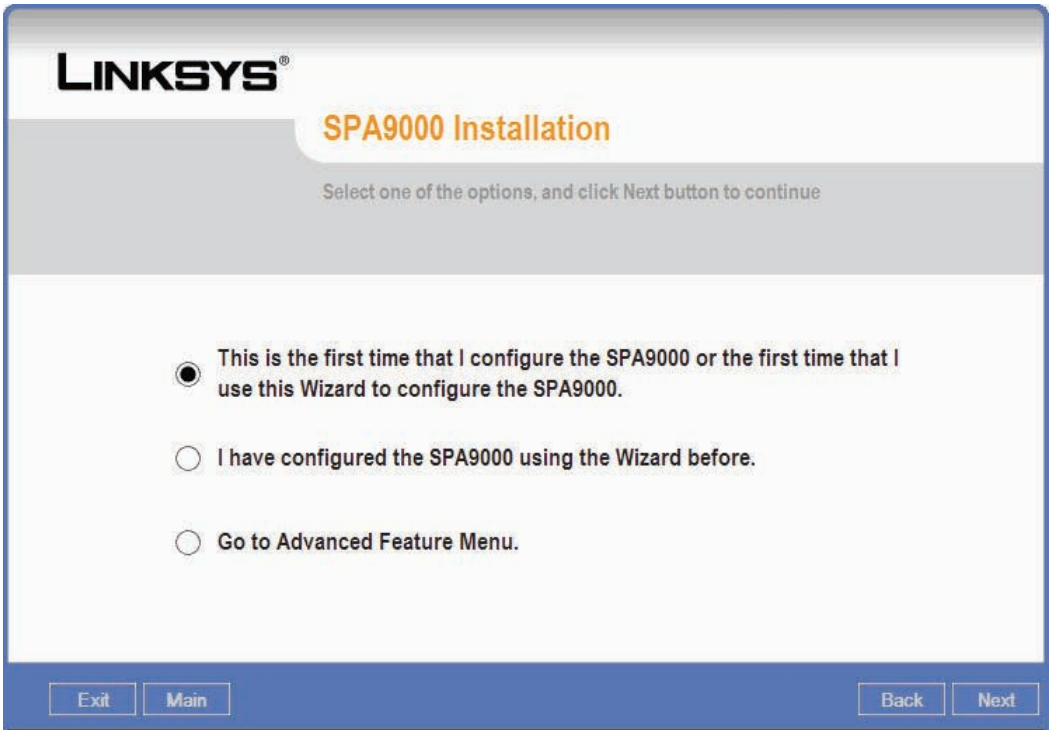
You must click EULA, read the license agreement, and click **Accept** in order to use the Wizard for the first time. The Wizard displays the SPA9000 Installation page once you have accepted the EULA.

Installing the SPA9000



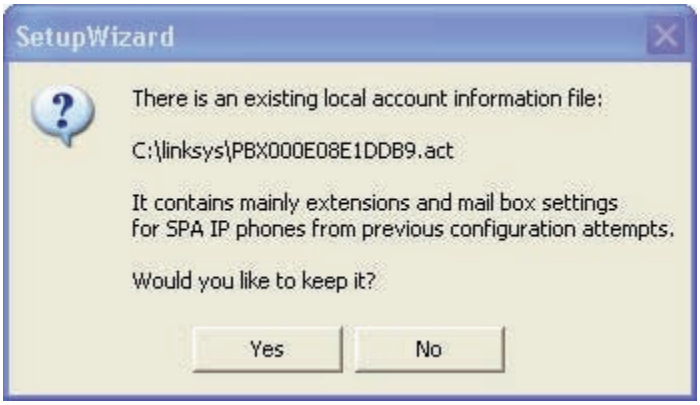
The Wizard guides you through the process of installing the SPA9000.

1. Start the Wizard.
2. To install and configure a new system, click the first option, **This is the first time...**.

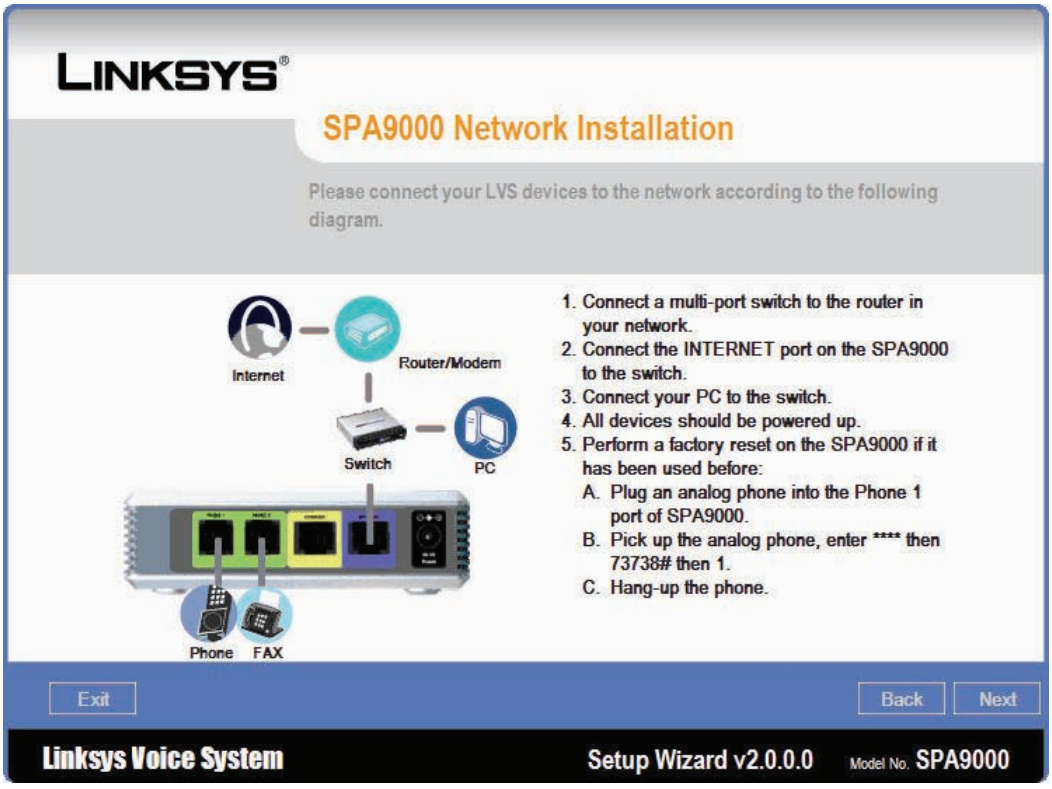


NOTE:

- Use the second option if you have previously configured this SPA9000, and the *C:\linksys\PBX<mac address>.act* file exists.
- The Advanced Feature Menu is for experienced users only. See Chapter 6, "Maintaining Your LVS".
- The Wizard will notify you if you select the first-time option but have previously configured the SPA9000. Select **Yes** to cause the Wizard to extract and use the configuration from the *C:\linksys\PBX<mac_address_SPA9000>.act* file. Select **No** to cause the Wizard to delete the *C:\linksys\PBX<mac_address_SPA9000>.act* file.



3. Click **Next** to continue to the *Network Installation* page.



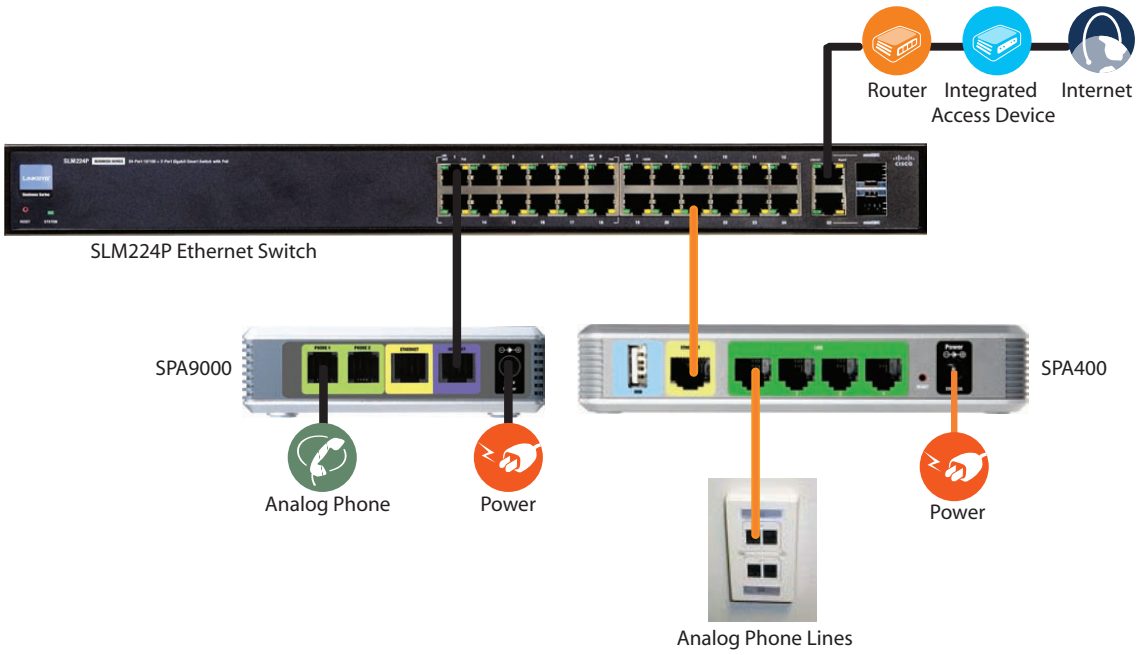
4. Follow the instructions on the *SPA9000 Network Installation* page to connect the SPA9000.

   NOTE:

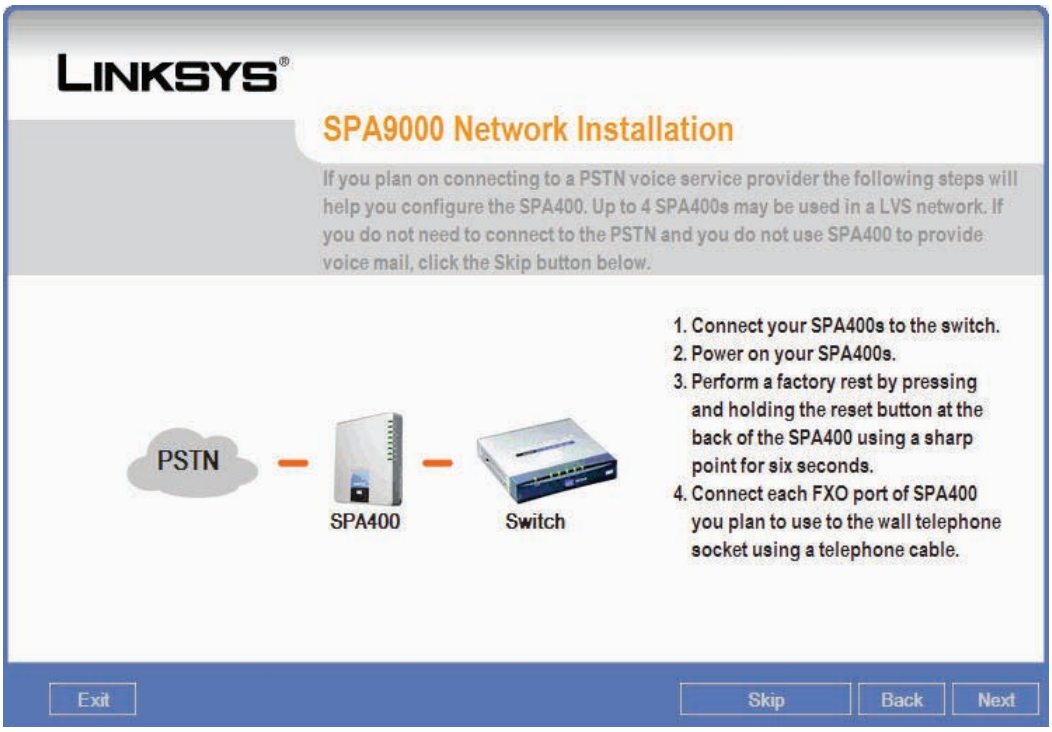
   - Do not connect anything to the SPA9000's ETHERNET port. Refer to the *LVS Administration Guide* for more information about the ETHERNET port. Use only the SPA9000's INTERNET port.
   - You will not hear sound from the analog phone when you take it off-hook. Press **** (star/asterisk 4 times) to hear the integrated voice response (IVR) system.

5. Click **Next** to continue to the next page. Continue with the next procedure, "Installing the SPA400 (Optional)" on page 38.

Installing the SPA400 (Optional)



When you click the *Next* button on the first *SPA9000 Network Installation* page, the Wizard guides you through the process of installing the SPA400.

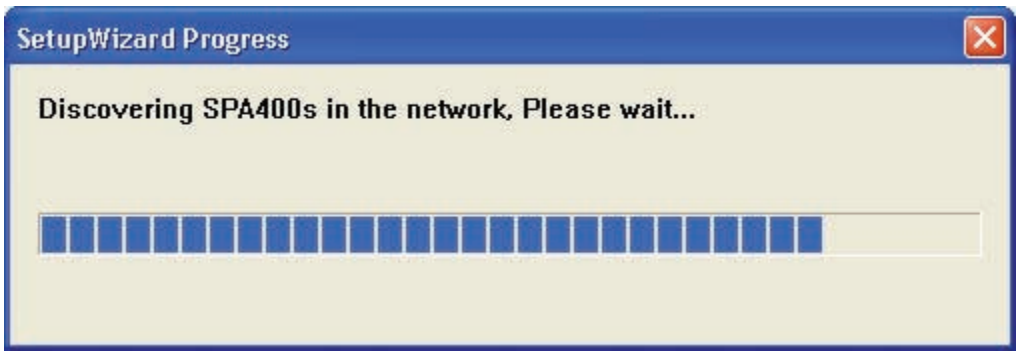


1. Follow the instructions on the *SPA9000 Network Installation* page to connect your SPA400 devices.

   NOTE:

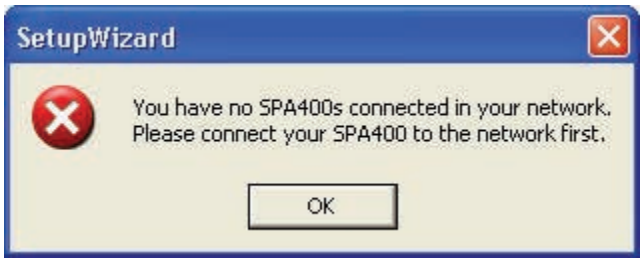
   - If you are not connecting a SPA400 at this time, click **Skip** to bypass the SPA400 installation steps. The *Main Menu* appears.
   - Insert the SPA400's Linksys, 128MB USB 2.0 memory stick into the SPA400's USB port.
   - Connect the SPA400's ETHERNET port to your switch.
   - The SPA400 device takes significantly longer to power up than does the SPA9000. Wait at least 2 minutes after powering the SPA400 before you click **Next**.

2. Click **Next** to cause the Wizard to discover all connected SPA400 devices connected to the network.



NOTE:

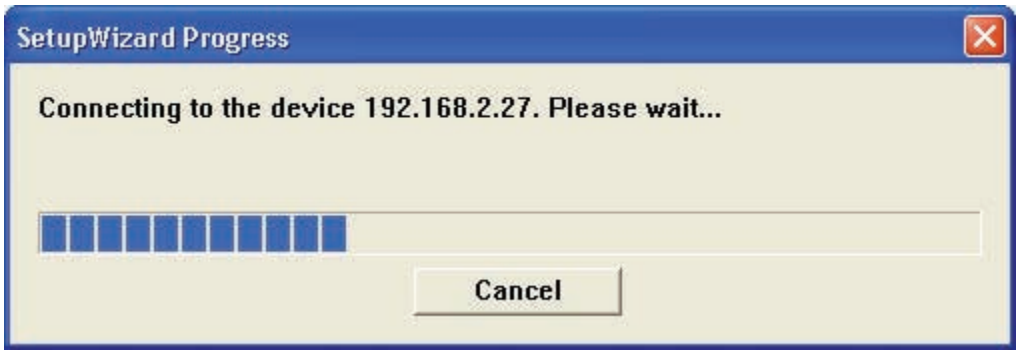
– In the event that no SPA400 devices are found, the Wizard displays the following message: *You have no SPA400s connected in your network*.



- This message may occur in error if you click **Next** too soon after connecting the SPA400 to power.
- The computer running the Wizard and the SPA9000 must be on the same Local Area Network in order for the Wizard to auto-detect the SPA9000.
- Click **OK** to close the message.

– If the SPA400 previously was configured with a password, the Wizard prompts you to enter the password. The Wizard expects the SPA400's administrative user name to be the default **Admin** with a capital A. By default, the SPA400 has no password.

The Wizard connects to the detected SPA400 devices.

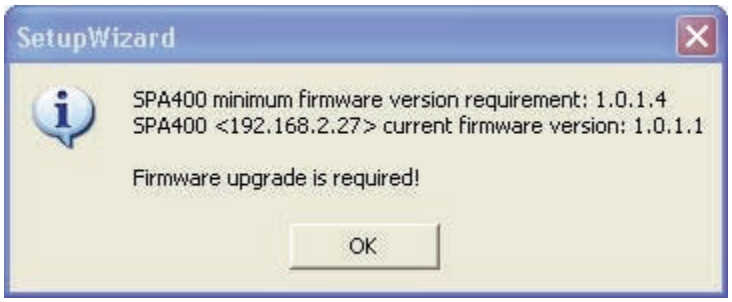


3. Proceed according to the prompts that appear:
   - If the *Firmware upgrade is required!* message appears, upgrade the SPA400 firmware. See "Upgrading the SPA400 Firmware" on page 41.
   - If the *Device is configured to use DHCP* message appears, configure a static IP address. See "Configuring a Static IP Address on the SPA400" on page 43.
   - If the Main Menu appears, continue with the LVS configuration. See "Configuring the SPA9000" on page 45.

Upgrading the SPA400 Firmware

The Wizard verifies that each SPA400 device passes the minimum firmware version requirement and will notify you in the event that out of date firmware is detected.

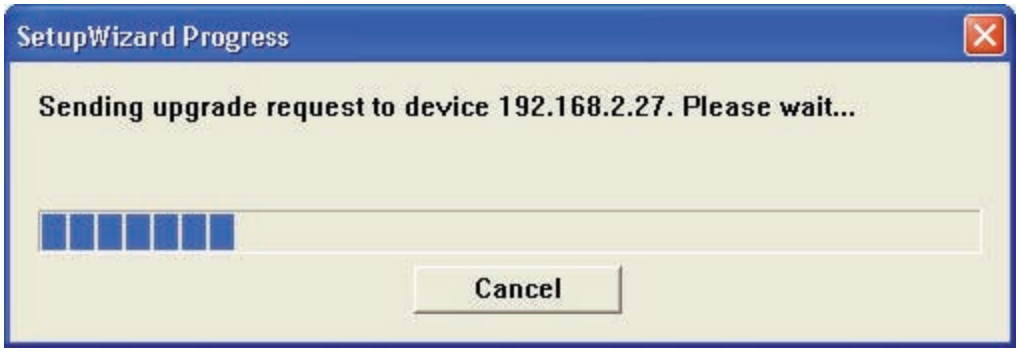
Complete this procedure if the following message appears: *Firmware upgrade required!*

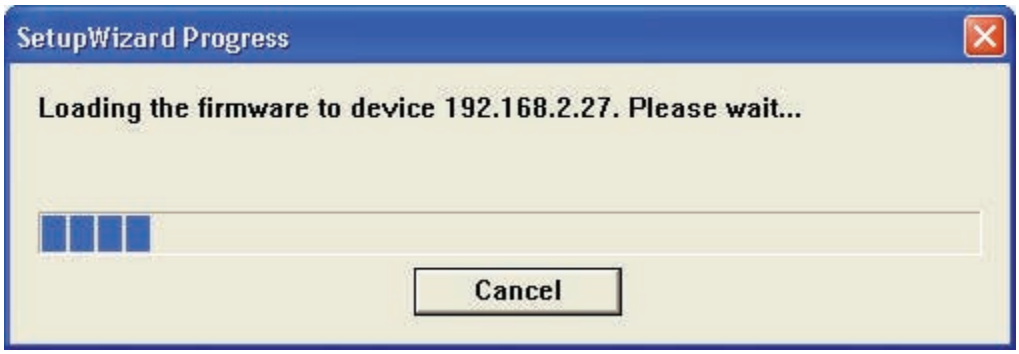


NOTE: You must upgrade the SPA400's firmware if the above message appears. The Wizard will close and exit if you press cancel instead of selecting a valid version of firmware for the device.

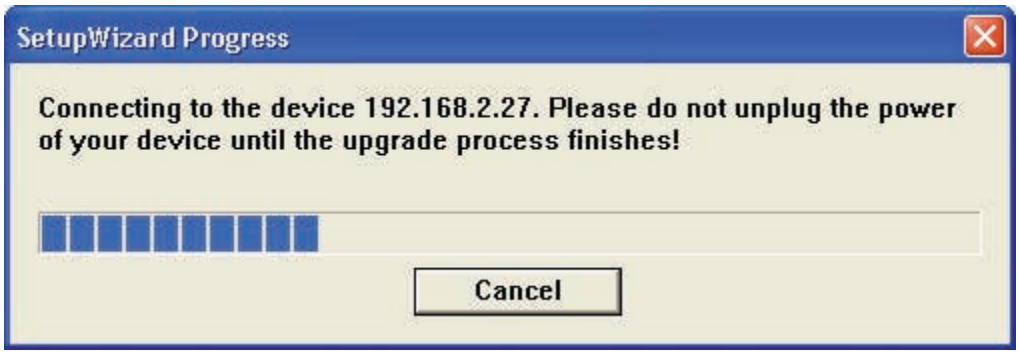
1. Click **OK** to navigate to the current version of SPA400 firmware that you downloaded from the Linksys.com site.

2. On the **Firmware Upgrade** page, click **Browse** to select the *spa400-xx-xx-xx-xx.bin* firmware file and click **Open** to select the appropriate file.
3. Click **OK** to begin the upgrade process. A series of messages appear, as shown in the following examples.




SetupWizard Progress
Loading the firmware to device 192.168.2.27. Please wait...
Cancel


SetupWizard Progress
Upgrading the device 192.168.2.27. Estimated time: 120s. Please do not unplug the power of your device until the upgrade process finishes!
Cancel


SetupWizard Progress
Connecting to the device 192.168.2.27. Please do not unplug the power of your device until the upgrade process finishes!
Cancel

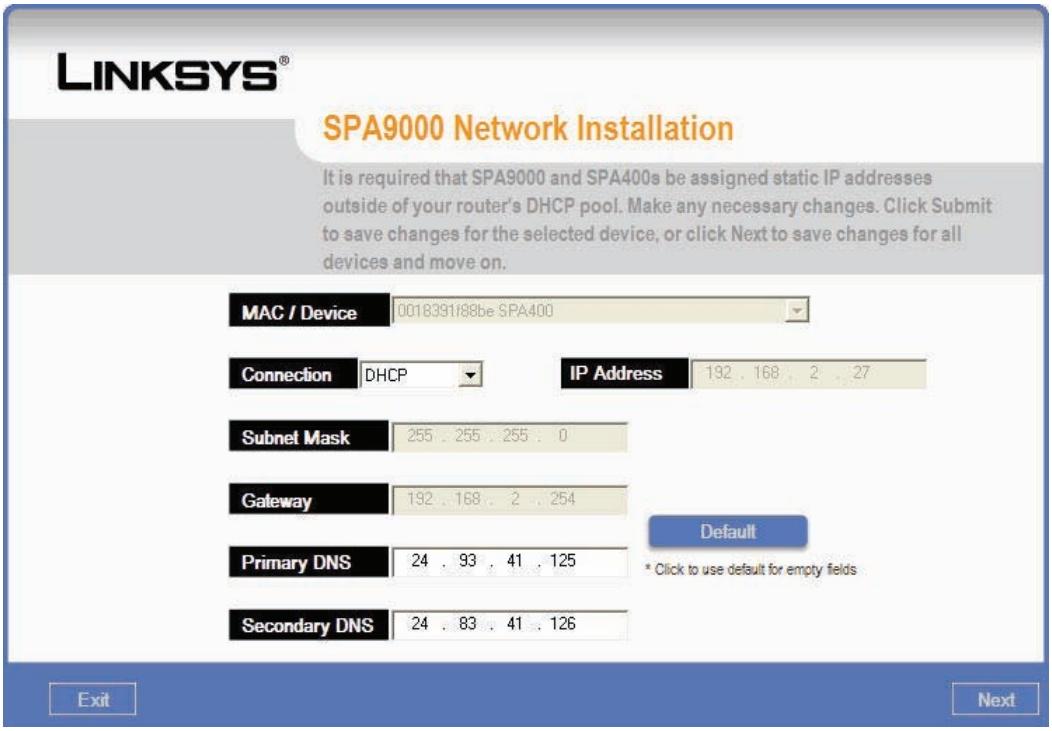
Configuring a Static IP Address on the SPA400

The Wizard tests each SPA400 device to verify that it is configured with a static IP address in order to ensure professional-grade uptime. The SPA400 devices would not be available for PSTN calls or voice mail services if its IP address was changed by a DHCP server.

NOTE: By default, the SPA400 uses dynamic IP addresses assigned by a DHCP server.

Complete this procedure if the Wizard displays the following message: *Device is configured to use DHCP*.

1. Click **OK** to display the Network Settings page.

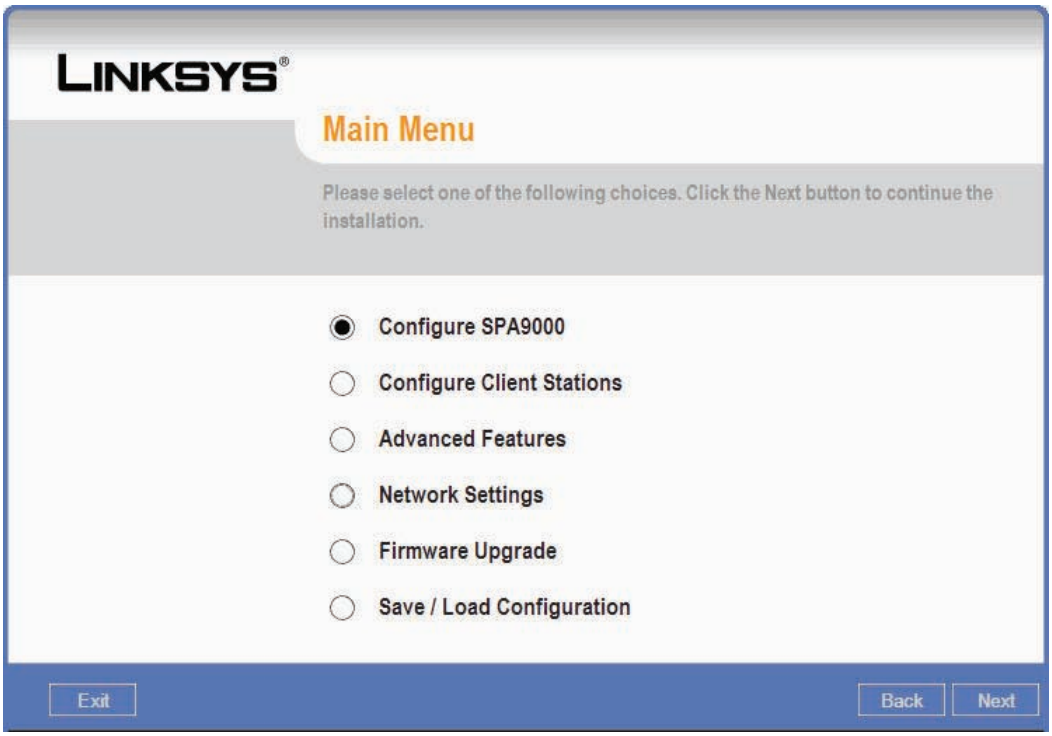


2. From the *Connection* drop-down list, choose Static IP.

   NOTE: Do not guess at values for the fields on this page because your SPA400 devices will not properly function without proper network settings.

3. Set the IP address to a static IP address that is out of the scope of the LAN's DHCP server, 192.168.2.192 for this example. Use the period "." key to move between address octets.
4. Set the Subnet Mask as appropriate for your network, 255.255.255.0 for this example.
5. Set the Gateway IP address as appropriate for your network, 192.168.2.254 for this example.
6. Set the Primary and Secondary DNS server's IP addresses as appropriate for your network.

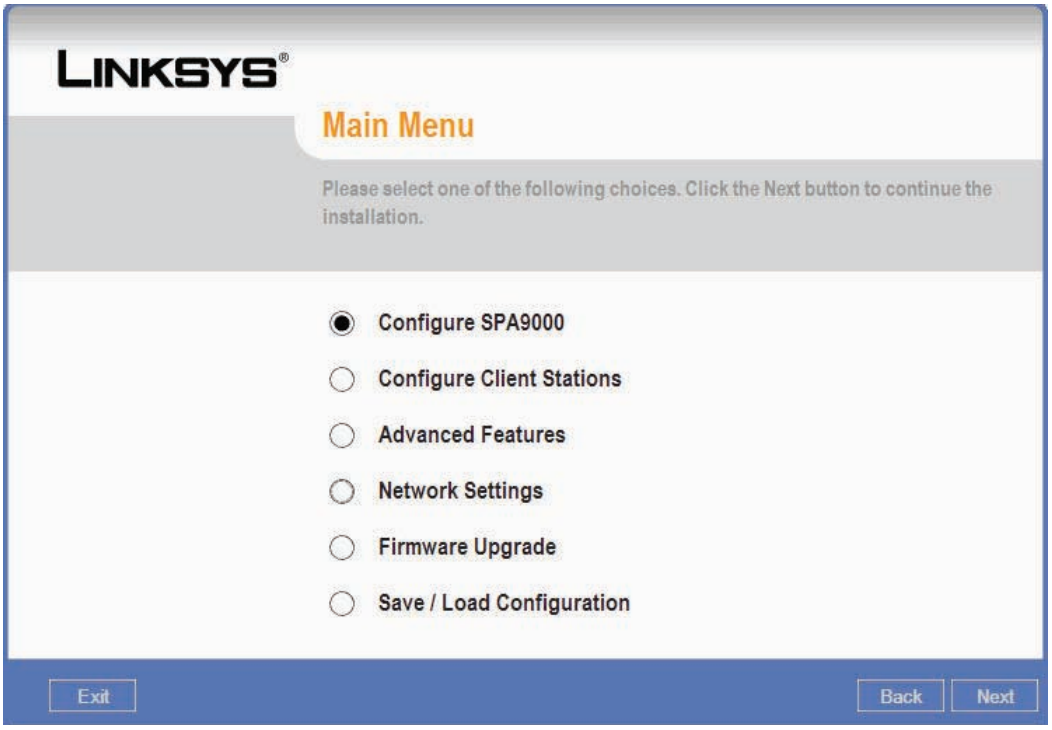
7. Click **Next** to display the Main Menu.



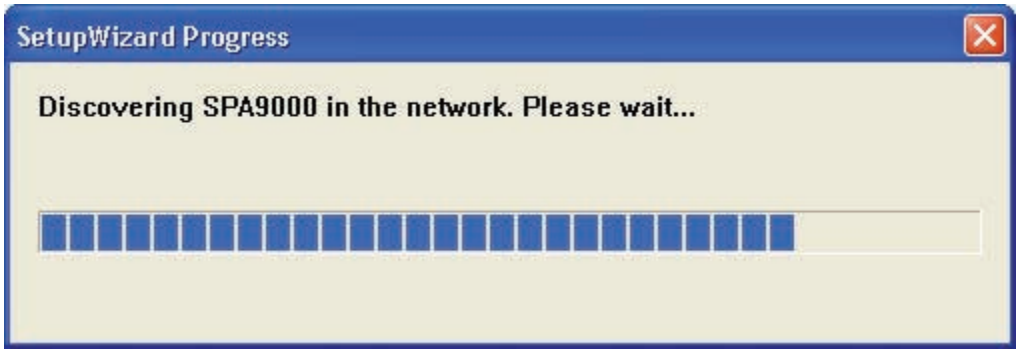
Configuring the SPA9000

When the Main Menu appears, you are ready to configure the SPA9000. You will set a static IP address and upgrade firmware if needed.

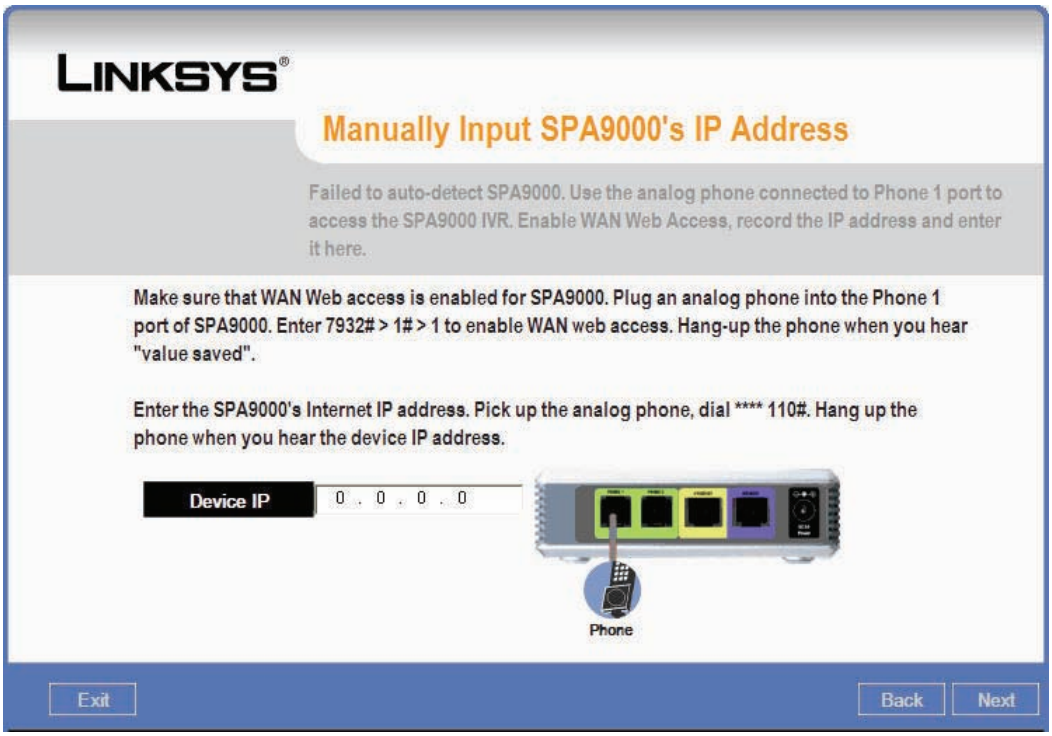
1. On the Main Menu, select **Configure SPA9000**.



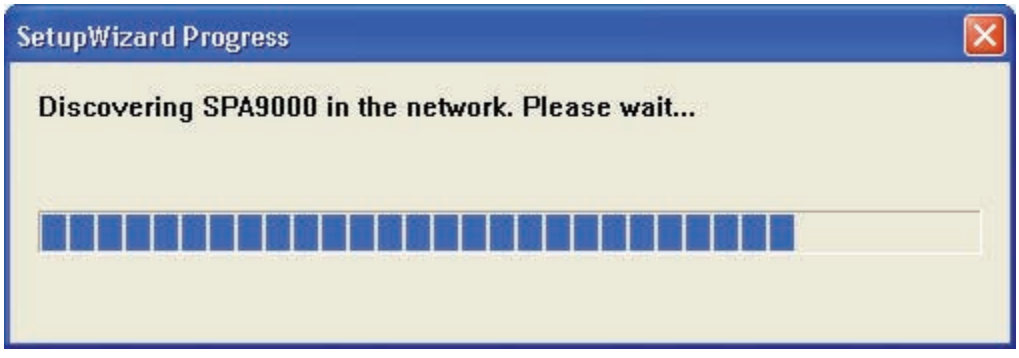
2. Click **Next** to cause the Wizard to discover all connected SPA9000 devices connected to the network.



NOTE: In the event that no SPA9000 devices are found, the Wizard displays the following message: *Manually Input SPA9000's IP Address. Failed to auto-detect SPA9000.*



- This message may occur in error if the network cable is not connected to the SPA9000 Internet port or to the switch port.
- The computer running the Wizard and the SPA9000 must be on the same Local Area Network in order for the Wizard to auto-detect the SPA9000.
- Click **OK** to close the message. Click **Back**, correct the network problem, and click **Next** to cause the Wizard to attempt to discover the SPA9000.



NOTE: Only one SPA9000 is supported. Any unused SPA9000 devices should be disconnected from the LAN.

3. Proceed according to the prompts that appear:
   - If the *Device is configured to use DHCP* message appears, set a static IP address. See "Configuring a Static IP Address on the SPA9000" on page 47.
   - If the *Firmware upgrade required!* message appears, upgrade the SPA9000 firmware. See "Upgrading SPA9000 Firmware" on page 48.

– If the Wizard displays the *Configure SPA9000 Voice Services* page, continue to the next step in the configuration process. See "Configuring SPA9000 Voice Services Lines" on page 50.

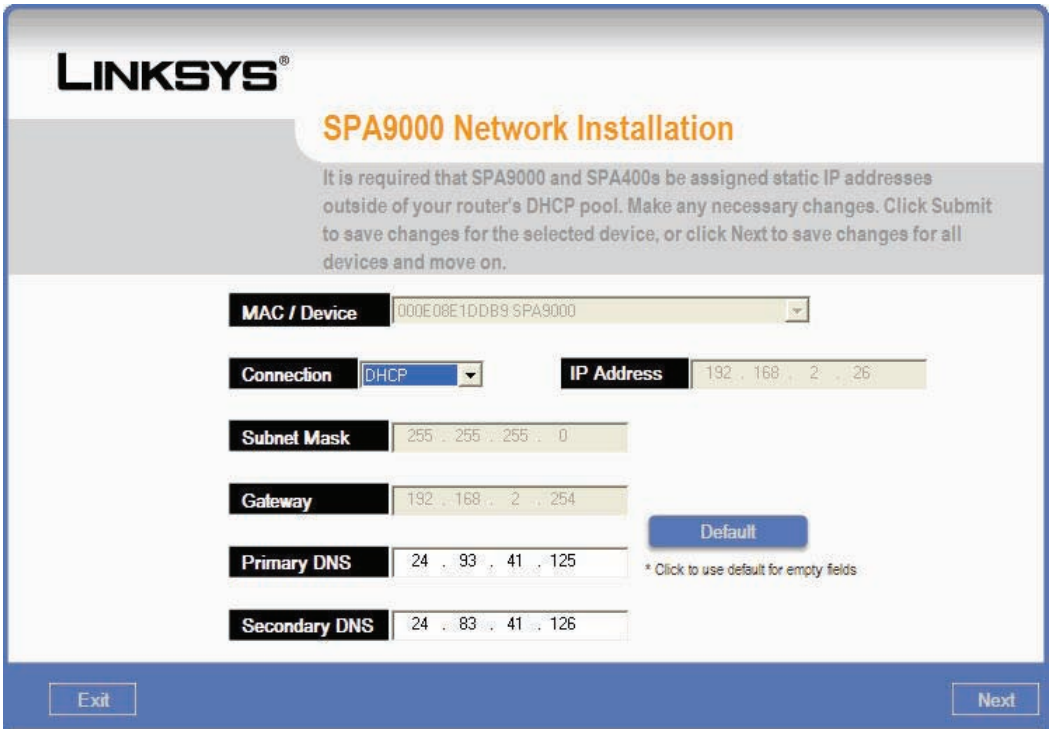
Configuring a Static IP Address on the SPA9000

The Wizard tests the SPA9000 device to verify that it is configured with a static IP address in order to ensure professional-grade uptime. The SPA9000 device would not be able to provide PBX functions to devices that cannot locate it if its IP address was changed by a DHCP server.

NOTE: By default, the SPA9000 uses dynamic IP addresses assigned by a DHCP server.

Complete this procedure if the Wizard displays the following message: *Device is configured to use DHCP*.

1. Click **OK** to display the *Network Settings* page.

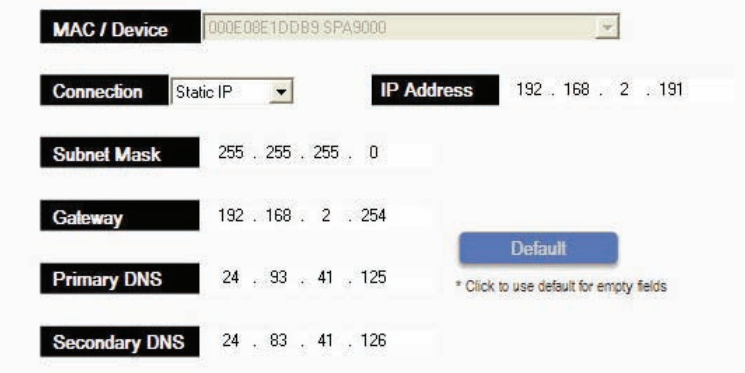


2. From the *Connection* drop-down list, choose **Static IP**.

   NOTE: Do not guess at values for the fields on this page because your SPA9000 device will not properly function without proper network settings.

3. Set the IP address to a static IP address that is out of the scope of the LAN's DHCP server, 192.168.2.191 for this example. Use the period "." key to move between address octets.
4. Set the Subnet Mask as appropriate for your network, 255.255.255.0 for this example.

5. Set the Gateway IP address as appropriate for your network, 192.168.2.254 for this example.
6. Set the Primary and Secondary DNS server's IP addresses as appropriate for your network.

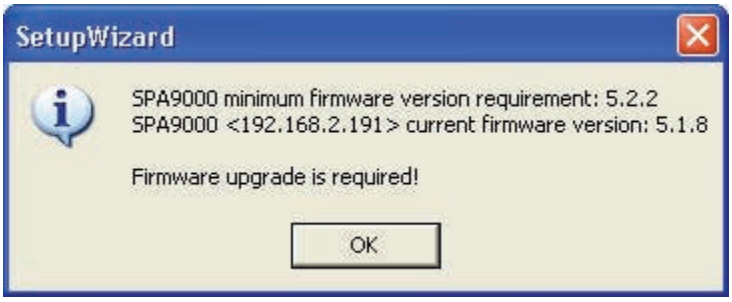


7. Click **Next** to display the Main Menu.

Upgrading SPA9000 Firmware

The Wizard verifies that the SPA9000 passes the minimum firmware version requirement and will notify you in the event that out of date firmware is detected.

Complete this procedure if the following message appears: *Firmware upgrade required!*



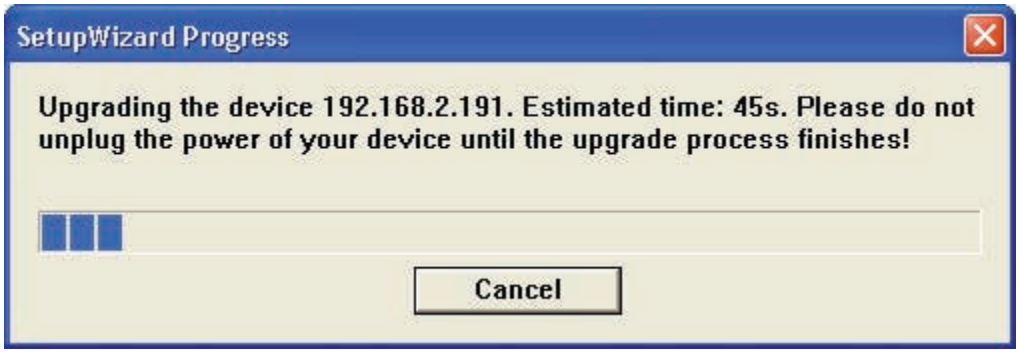
NOTE: You must upgrade the SPA9000's firmware if the above message appears. The Wizard will close and exit if you press cancel instead of selecting a valid version of firmware for the device.

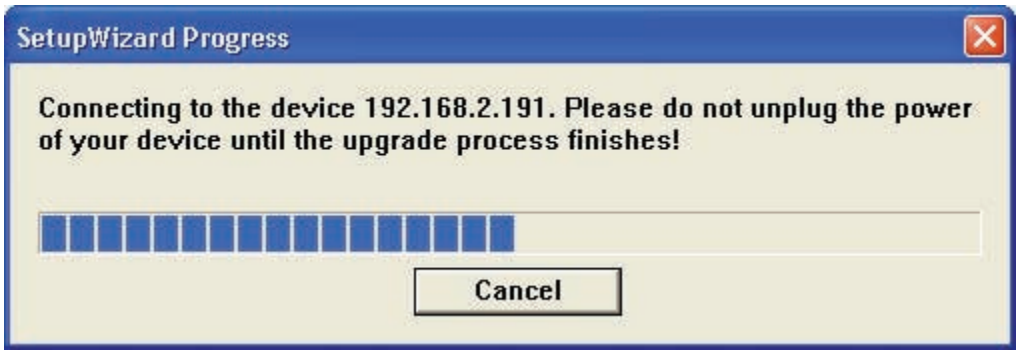
1. Click **OK** to navigate to the current version of SPA9000 firmware that you downloaded from the Linksys.com site.

   NOTE: You must upgrade the SPA9000 firmware at this time. The Wizard will close and exit if you press cancel instead of selecting a valid version of firmware for the device.

2. On the **Firmware Upgrade** page, click **Browse** to select the *spa9000-xxx.bin* firmware file and click **Open**.

3. Click **OK** to begin the upgrade process. A series of messages appear, as shown in the following examples.





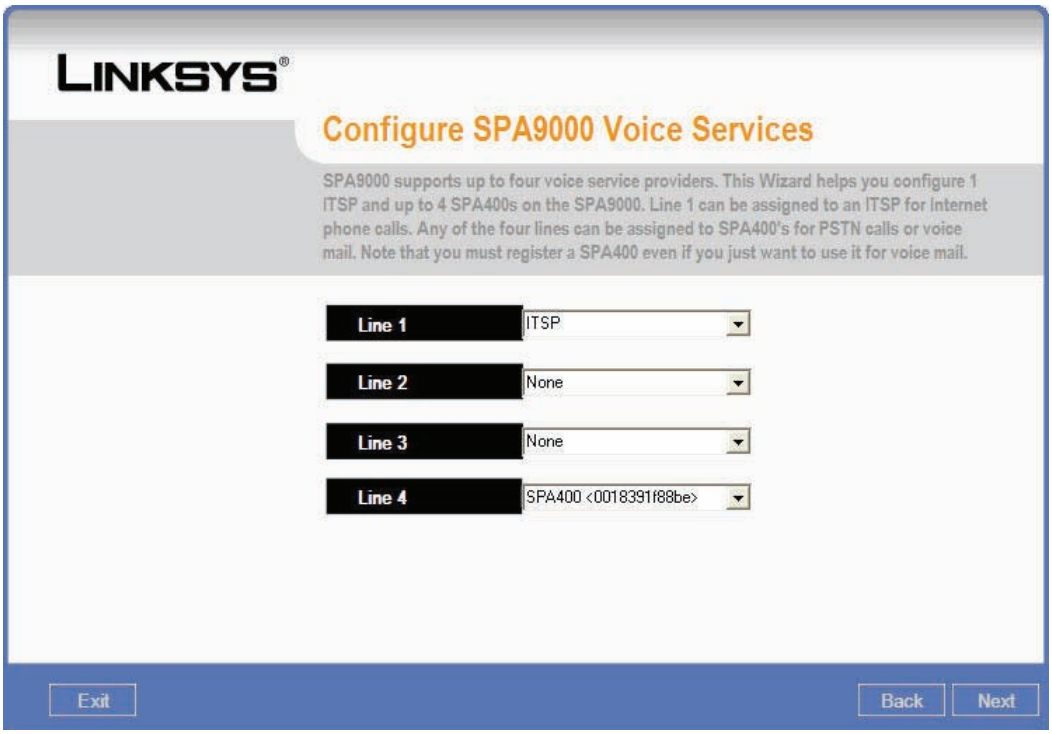
The Wizard displays the *Configure SPA9000 Voice Services* page.

Configuring SPA9000 Voice Services Lines

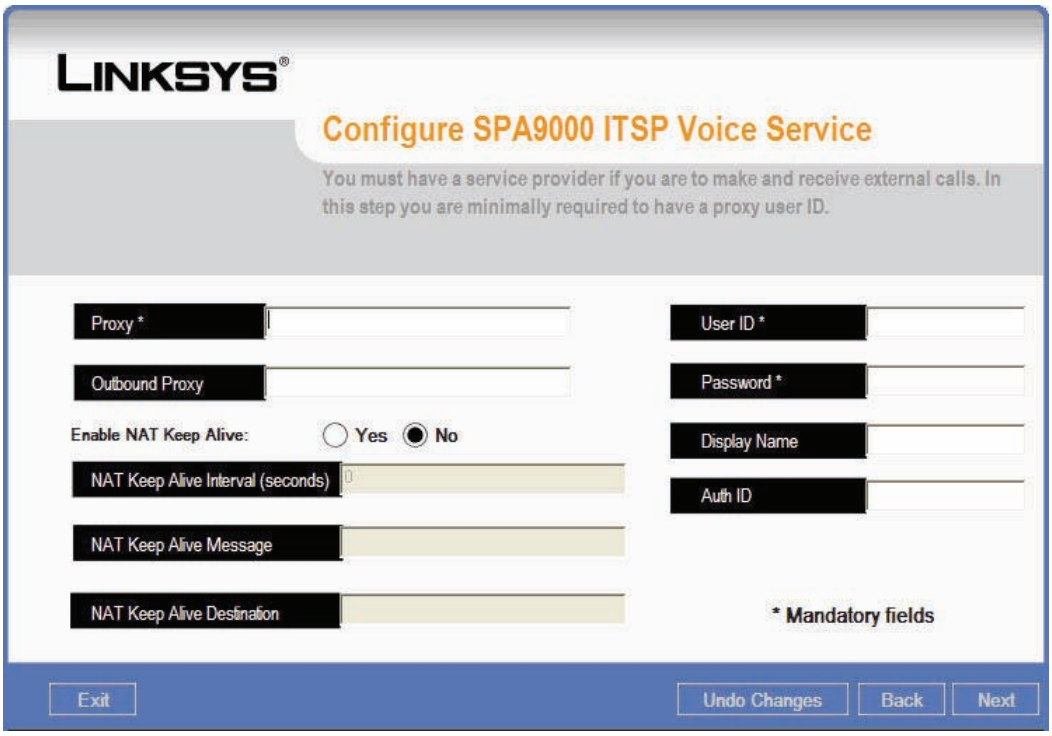
The Wizard allows you to configure an ITSP on Line 1 of the SPA9000. Any of the remaining lines can be associated with your SPA400 devices.

NOTE: Lines 2 - 4 also can be associated with Mediatrix® devices. See "Configuring Mediatrix Services" on page 83.

1. In this example, we select ITSP for *Line 1* and SPA400 for *Line 4*.



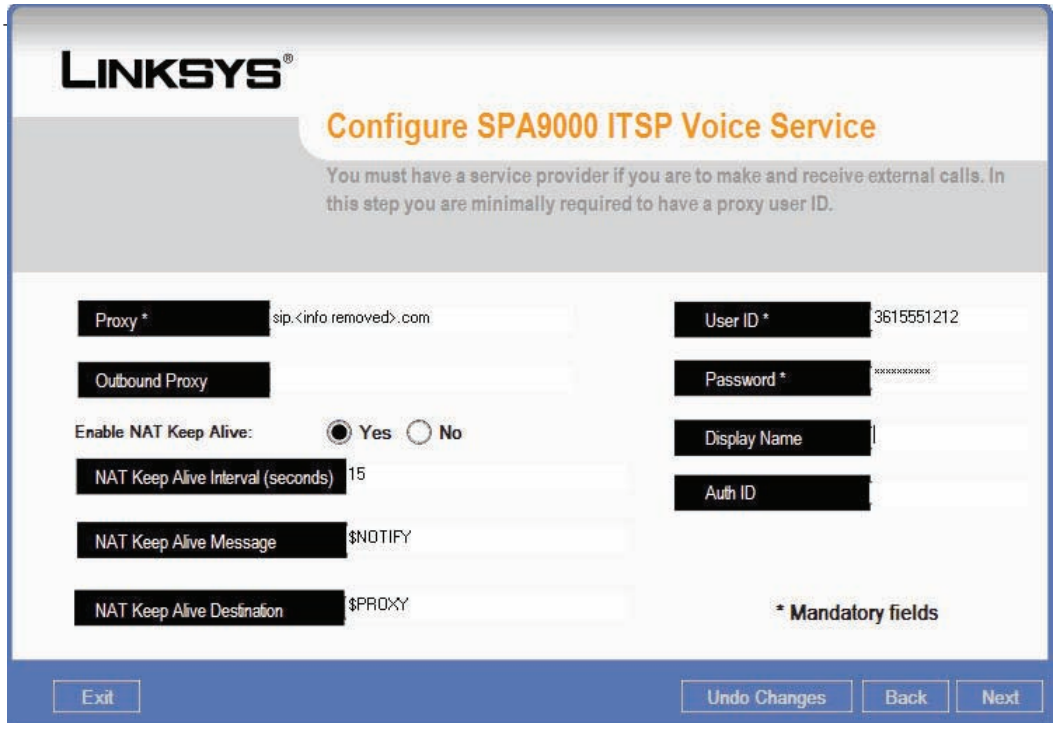
2. Click **Next** to display the *Configure SPA9000 ITSP Voice Service* page.



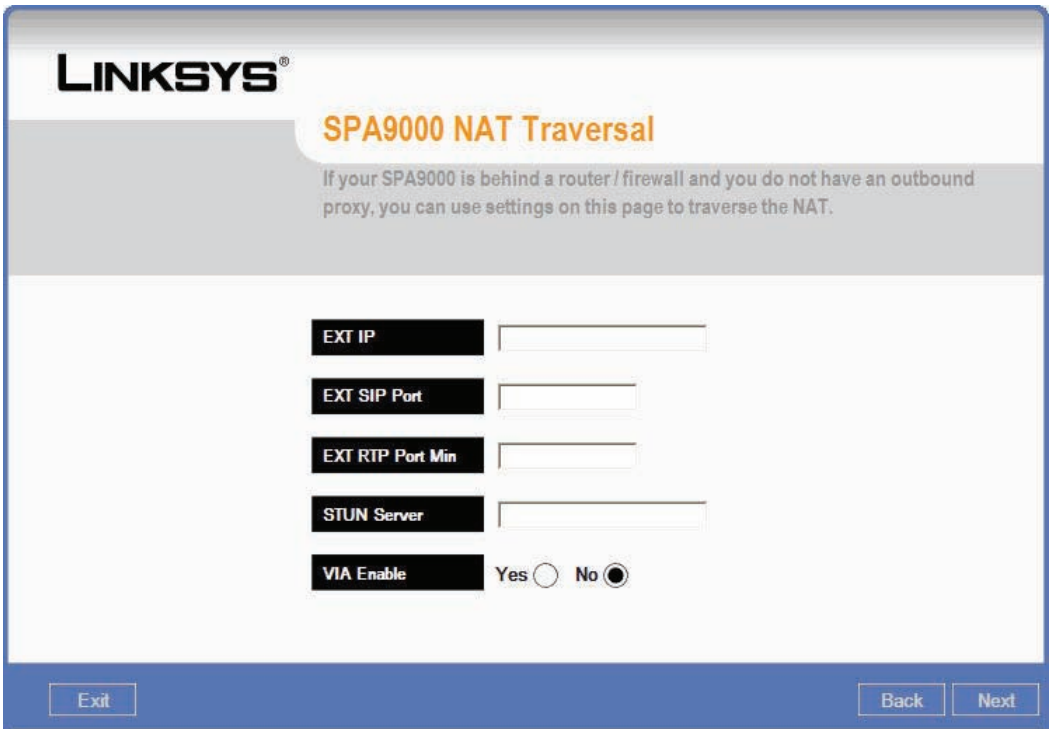
3. Insert the service provider data into the mandatory fields.

   NOTE: Do not guess at values for the fields on this page because your ITSP voice over IP (VoIP) will not properly function with incorrect settings.

   - Proxy: Insert the SIP proxy name.
   - Outbound Proxy: If your ITSP supports Session Border Controller, insert its name or IP address here.
   - User ID: Insert the User ID, this is often the direct inward dial (DID) number.



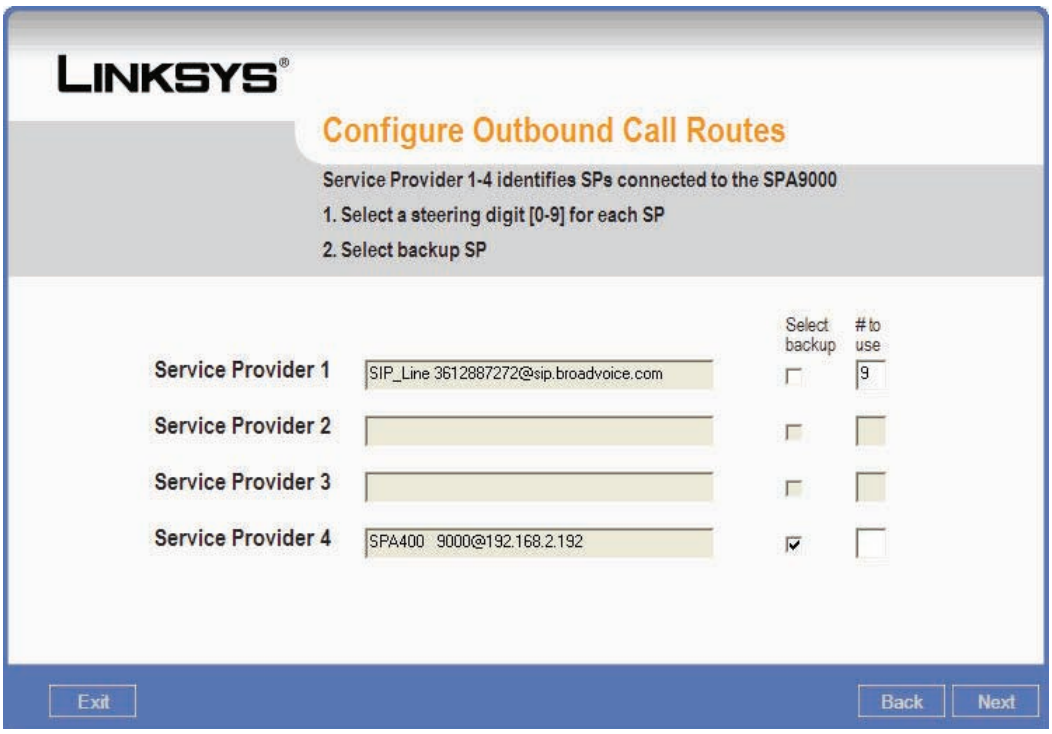
4. Click **Next** to display the *SPA9000 NAT Traversal* page.



5. In most environments, ITSPs deploy Session Border Controllers to deal with traversing networks that deploy network address translation so you can leave all fields blank. Refer to "NAT Settings" on page 92 if you need to configure for NAT traversal.

Configuring Steering Digits and Outbound Call Routes

1. Click **Next** to display the *Configure Outbound Call Routes* page.



2. In the *# to use* field, enter a unique steering digit for each SIP line.

   NOTE:

   - A steering digit is the first number that a user dials to seize an outbound line.
   - You can use a steering digit to determine which line is chosen for a particular type of call. This example uses 8 for *Service Provider 1* and 9 for *Service Provider 2*. These Service Provider fields correspond to Line 1-4 on the *Configure SPA9000 Voice Services* page. In an earlier example, Line 1 was configured for relatively inexpensive ITSP service, and Line 4 was configured for PSTN access. When a user presses 9, the call is transmitted via the ITSP.
   - To choose steering digits, you can use any digit that is not the first digit of an extension number. For example, if your extension numbers are 1xx for primary extensions and 2xx for hunt groups, the numbers 3-9 are available for steering digits.

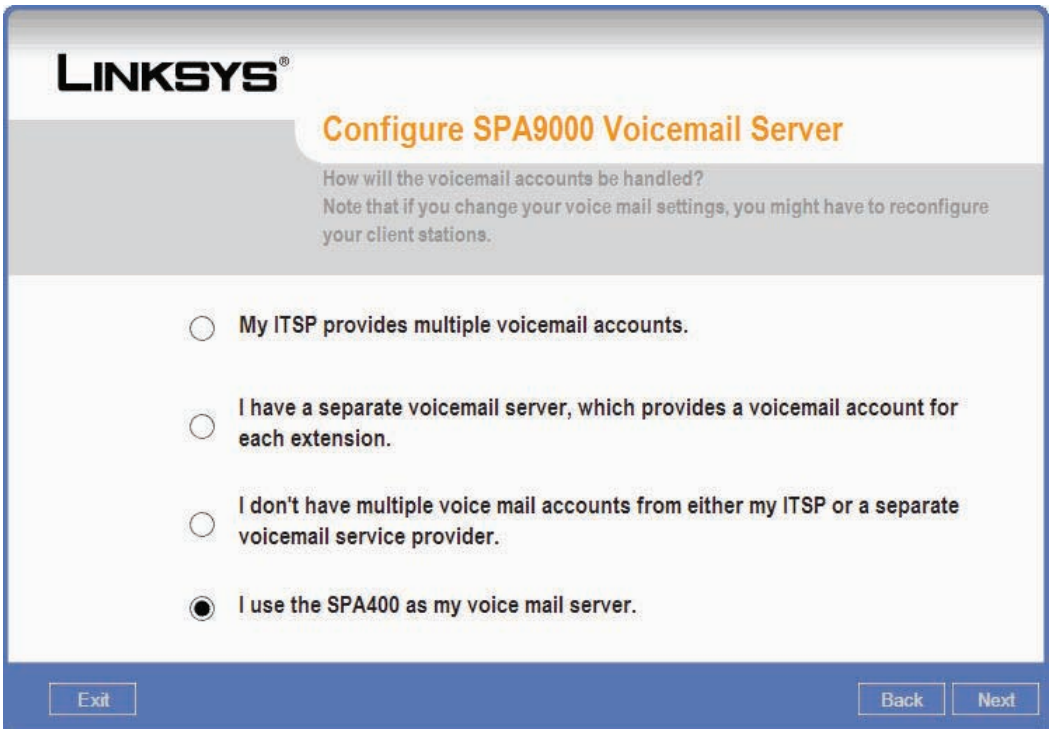
3. Check a *Select backup* check boxes to designate a line to be automatically used by the system in the event that the primary line is not available.

Configuring the SPA400 Voice Mail Server for the SPA9000 (Optional)

The Wizard guides you through the process of setting up the SPA400 voice mail server.

NOTE: Alternatively, you can configure your LVS to use ITSP-hosted voice mail, a separate voice mail server, or no voice mail service.

1. Click **Next** to display the *Configure SPA9000 Voicemail Server* page.

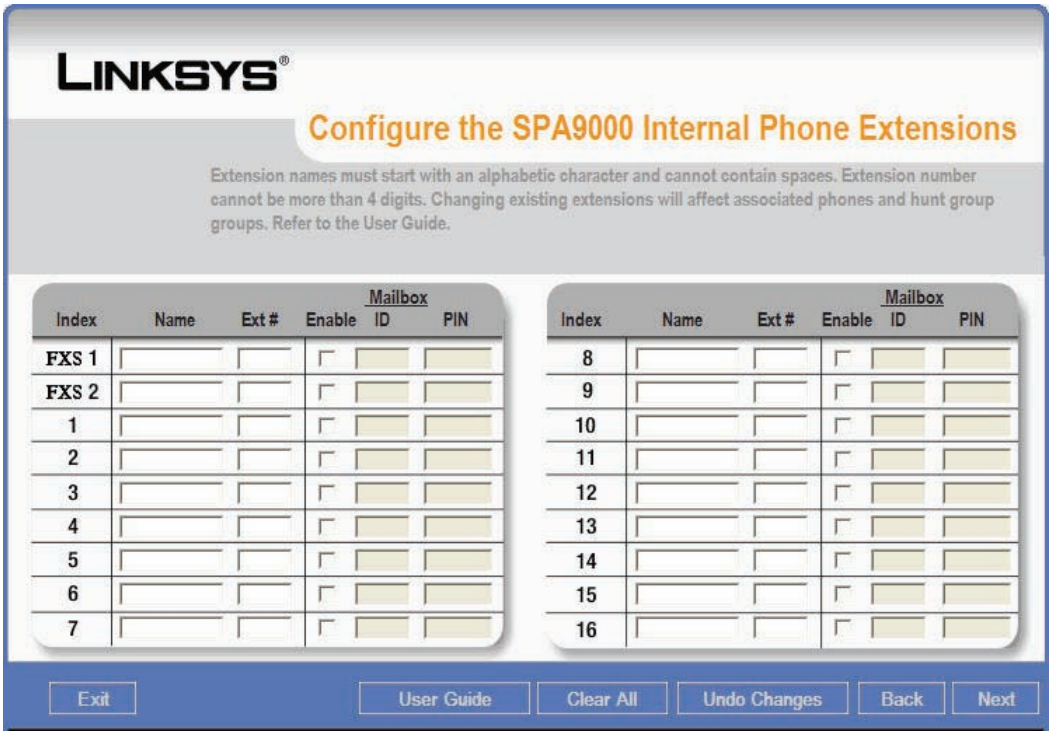


2. Select the fourth option, I use the **SPA400 as my voice mail server**.
3. Click **Next** to go to the *SPA9000 Internal Phone Extensions* page to configure the voice mail boxes for each telephone.

Configuring the Internal Phone Extensions

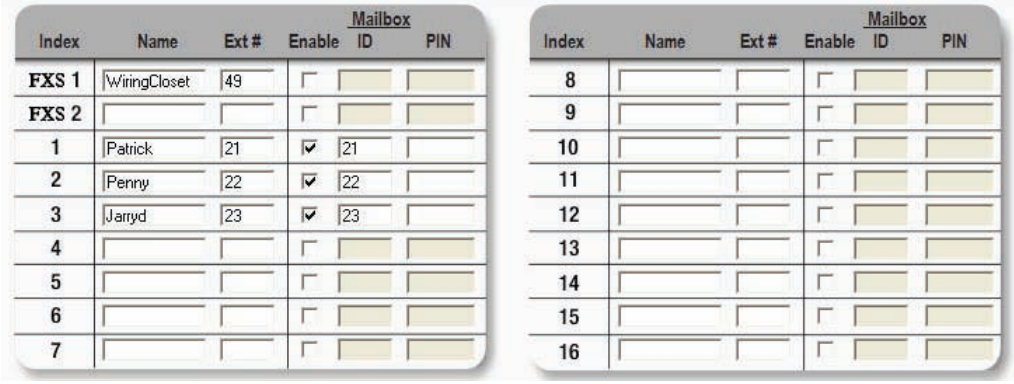
For each phone, you must configure a name and extension number. On this page, you can set up the list of extensions that will be available when you set up the phones. For each extension, you can optionally enable and assign a voice mail box.

1. Click **Next** to display the Configure the SPA9000 Internal Phone Extensions page.



2. Insert phone name, extension, and enable the mailbox as appropriate. Refer to the following example.

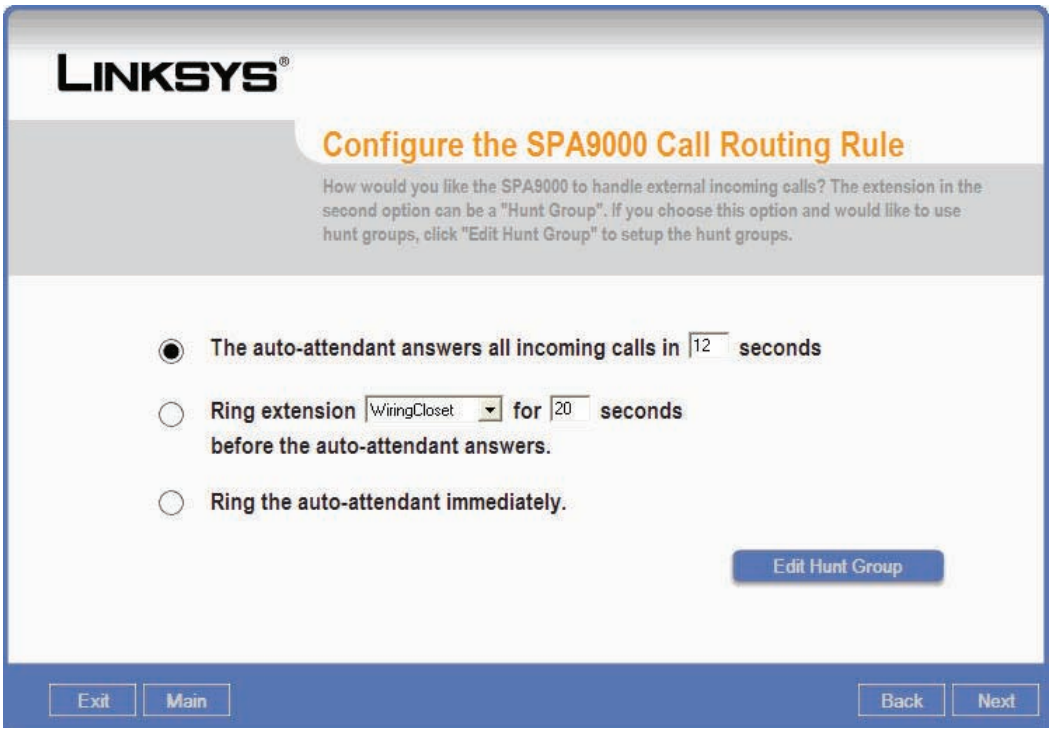
FXS 1: WiringCloset	49	n	[analog]
1: Patrick	21	y	[SPA962 MAC address ending 575e]
2: Penny	22	y	[SPA942 MAC address ending 3a9b]
3: Jarryd	23	y	[SPA901 MAC address ending 29b8]



Configuring Inbound Call Routing

You can determine whether inbound calls are routed to the Auto Attendant or to a particular extension or hunt group. Optionally, you can route calls to the Auto Attendant only if they are not answered by an extension or hunt group within a specified number of seconds.

1. From the *Configure the SPA9000 Internal Phone Extensions* page, click **Next** to display the *Configure the SPA9000 Call Routing Rule* page.



2. Choose the appropriate option:
   - If you want to route all inbound calls to the Auto Attendant, select the first option, and then enter the desired number of seconds to ring before the Auto Attendant greets the caller. The default value is 12 seconds.
   - If you want to route all inbound calls a particular extension, select the second option. Then choose an extension from the drop-down list, and enter the desired number of seconds to ring this extension. If there is no answer within this period, then the call is routed to the Auto Attendant.

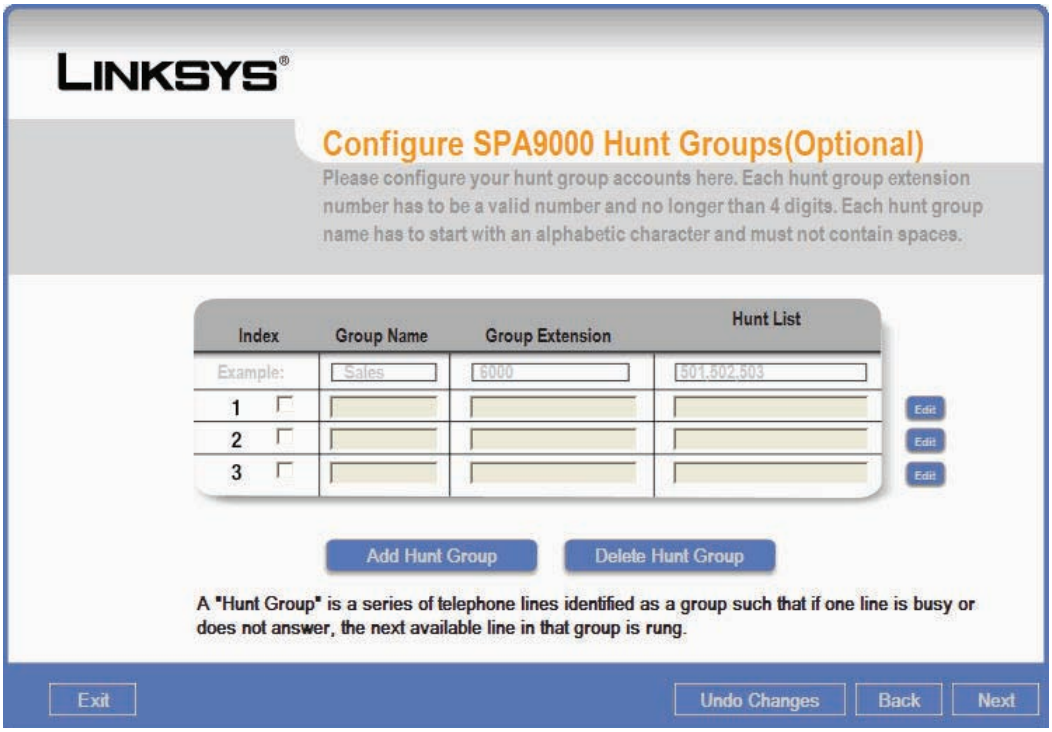
     NOTE: The drop-down list includes all extensions and hunt groups. To configure a new hunt group, click **Edit Hunt Group**. See "Configuring Hunt Groups (Optional)" on page 57.
   - If you want to route the call to the Auto Attendant immediately, choose the third option.
3. Click **Next**.

Configuring Hunt Groups (Optional)

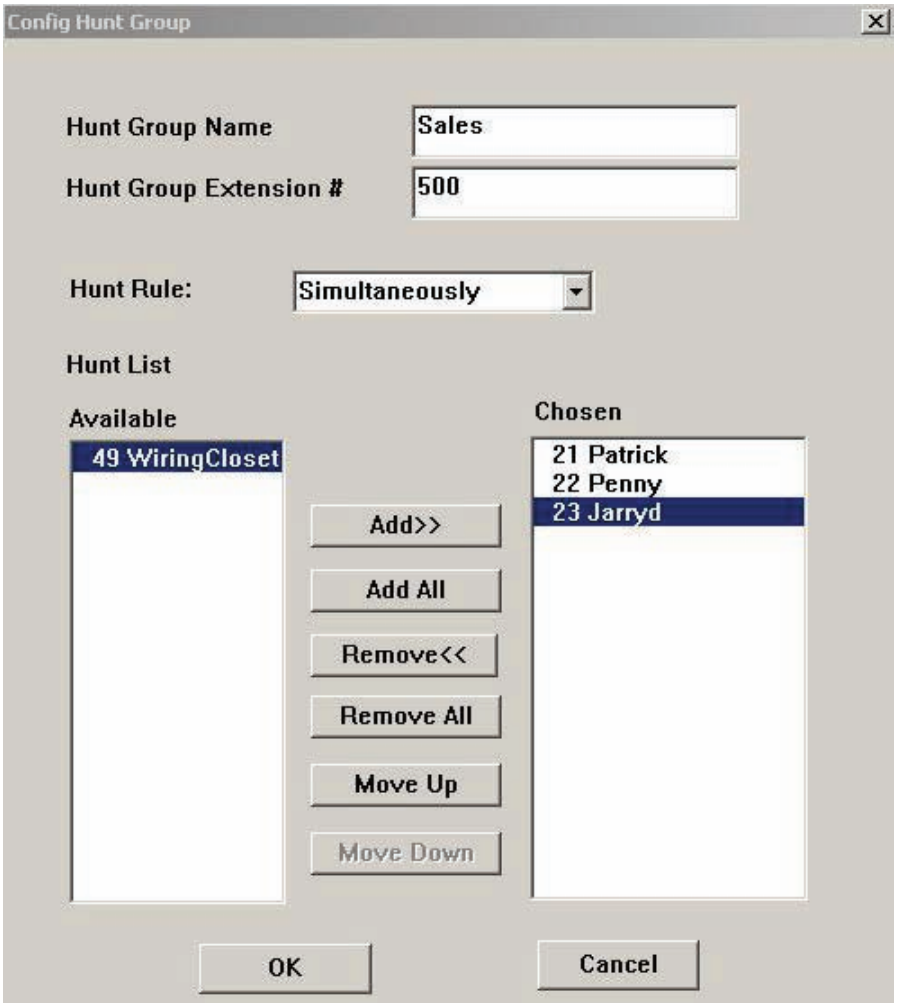
The Wizard guides you through the process of creating hunt groups. A hunt group is a feature that causes an incoming call to ring a group of stations simultaneously or in a chosen sequence.

This example will define a hunt group called Sales so that inbound calls can be directed to Sales' extension.

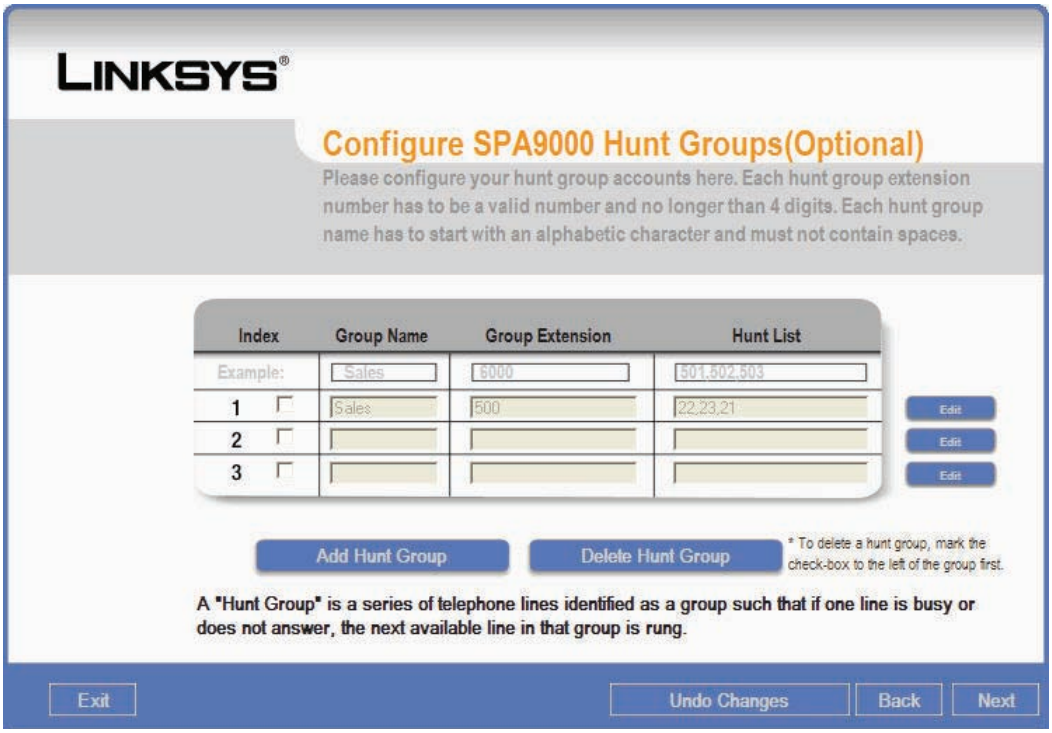
1. From the *Configure the SPA9000 Call Routing Rule* page, click **Edit Hunt Group** to display the *Configure SPA9000 Hunt Groups* page.



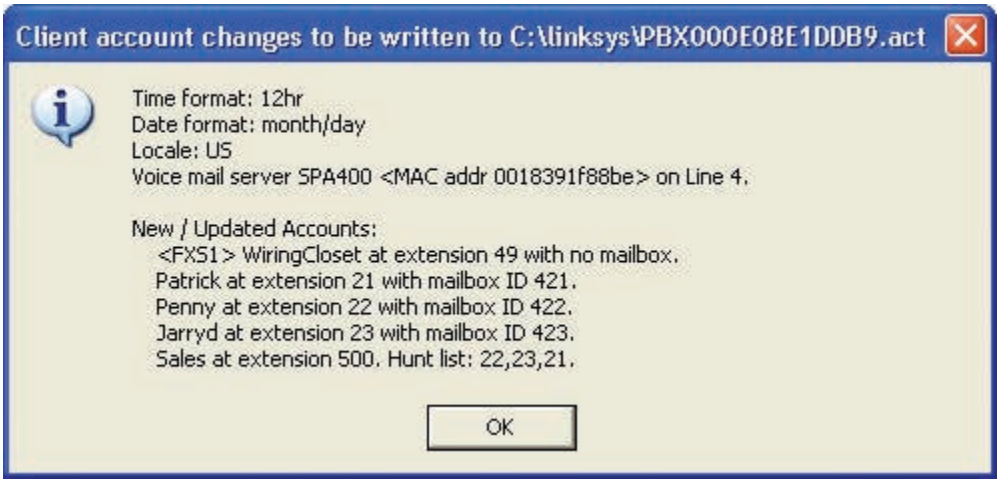
2. Check the **Index** check box for group 1 and then click **Edit**. A dialog box appears.
3. Enter the hunt group information as follows:
   - **Hunt Group Name:** A group name for the corporate directory entry
   - **Hunt Group Extension #:** An extension number [can be more digits, example 500]
   - **Hunt Rule:** A method for alerting the member stations of an incoming call, with the following choices:
     - **Simultaneously:** Rings all phones at the same time
     - **Sequentially (restart):** Rings each phone individually in order; the sequence always starts with the first listed phone
     - **Sequentially (next):** Rings each phone individually in order; if a phone previously answered a call, the sequence starts with the next phone in the list
4. To add a station to the group, click an extension number in the *Available* list, and then click **Add** to move it to the *Chosen* list.



5. To modify the ring order of the *Chosen* stations (for sequential hunt rules), click an extension number and then click **Move Up** or **Move Down** until it appears in the desired position.
6. Click **OK** to return to the *Configure SPA9000 Hunt Groups* page.

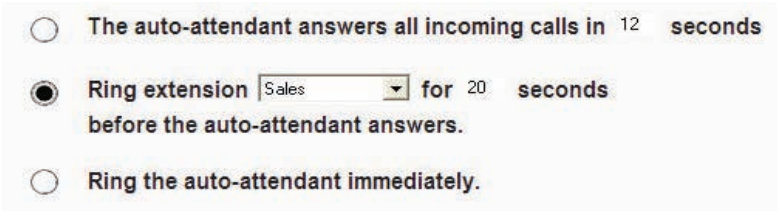


7. Click **Next** to display the client account changes.



8. Click **OK** to return to the *Configure the SPA9000 Call Routing Rule* page.

9. Select the **Ring Extension** radio button.
10. From the **Ring Extension** drop down list, choose the hunt group that you created, *Sales*. Leave the default ring time of 20 seconds.



NOTE: Refer to the Hunt Group Maintenance section on 99 for hunt group maintenance.

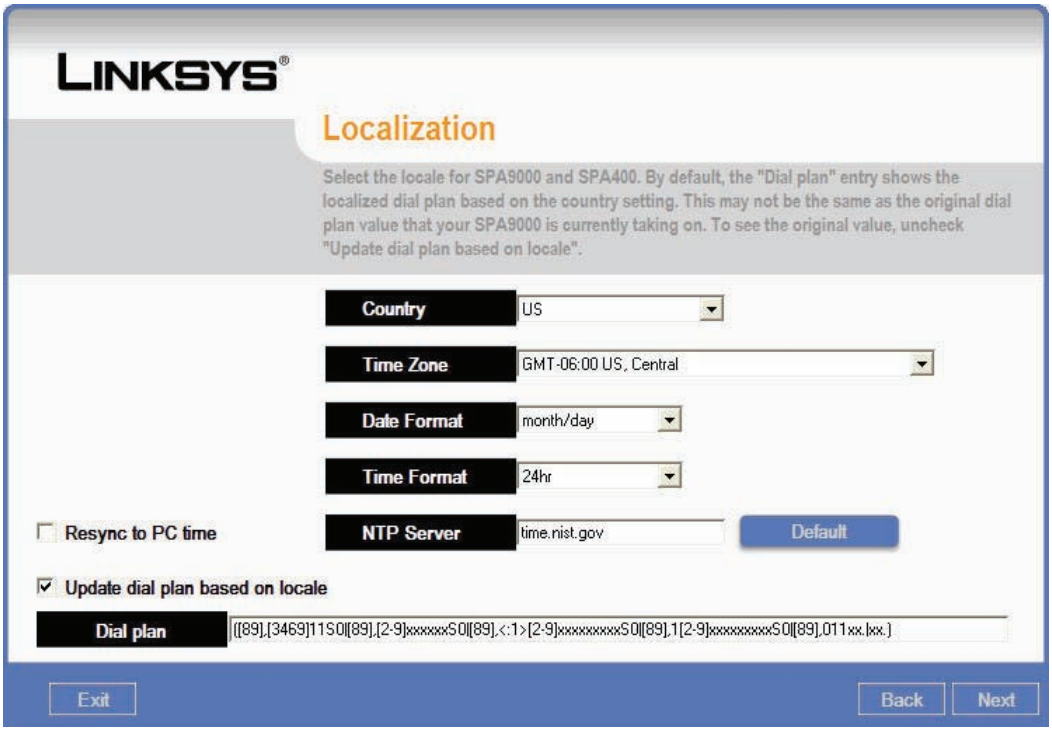
Localizing the SPA9000

You can localize the SPA9000 by selecting your country, time zone, preferred date and time formats, and NTP server. The SPA9000 will update the dial plan and the Auto Attendant prompts based on the selected country.

NOTE: Phones get the time settings from the SPA9000. The SPA9000 may get its time settings from multiple sources: its internal clock, the specified NTP server, or the service providers (including SPA400 devices).

- When the SPA9000 is offline (not subscribed to a service provider, with no specified NTP server or no connection to a specified NTP server), the internal clock is used.
- When there is an NTP server and one or more service providers, the source that provides the time most recently wins. Usually, this source is the service provider because the time is updated whenever the SPA9000 re-registers with the service provider (order of minutes). The NTP server time update occurs less frequently (order of hours).
- When there is a SPA400, the time source is the designated NTP server. The NTP server set on the localization page applies to both SPA9000 and SPA400.

1. Click **Next** to display the Localization page.
2. As needed, select your Country, Time Zone, Date Format, Time Format, and NTP Server.
3. Check the **Update dial plan based on locale** check box to update the default dial plan (US-based) with the appropriate settings for your location.



NOTE:

- If you check the *Resync PC* check box, then the SPA9000's internal clock will be set to be in sync with the PC. This does not apply to the SPA400 since its internal clock cannot be set.
- If you check the *Update dial plan* check box, the dial plan is automatically updated based on the selected locale. For detailed information about configuring a dial plan, refer to the *Linksys Voice System Administration Guide*.

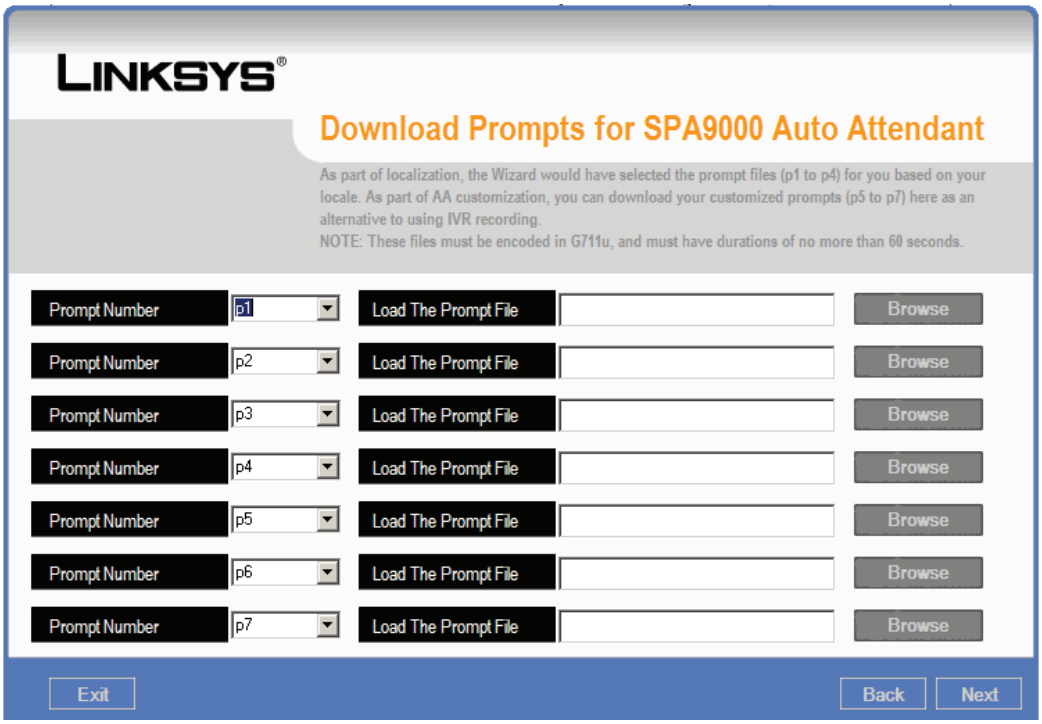
4. Click **Next** to display the *Download Prompts for SPA9000 Auto Attendant* page.

Downloading Custom Auto Attendant Prompts (Optional)

The SPA9000 will choose the Auto Attendant prompts based on the selected country. If you wish, you can choose different language files from the Wizard's prompts folder, or you can download your own custom Auto Attendant prompts.

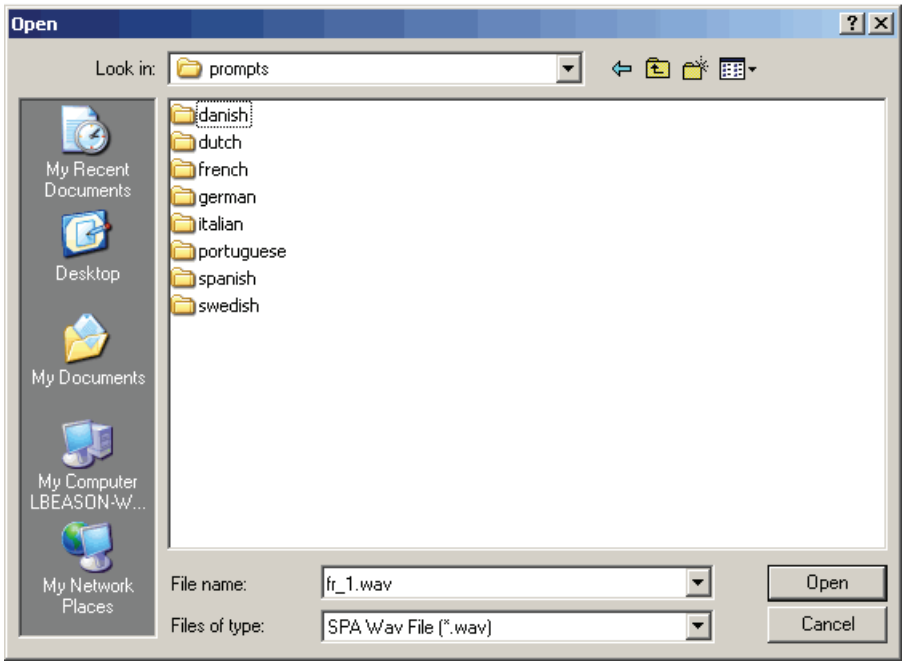
NOTE:

- Custom prompts must be WAV files in G.711u format and must not exceed 60 seconds in length.
- Alternatively, you can record custom prompts by using the IVR. See "Auto Attendant" on page 100.

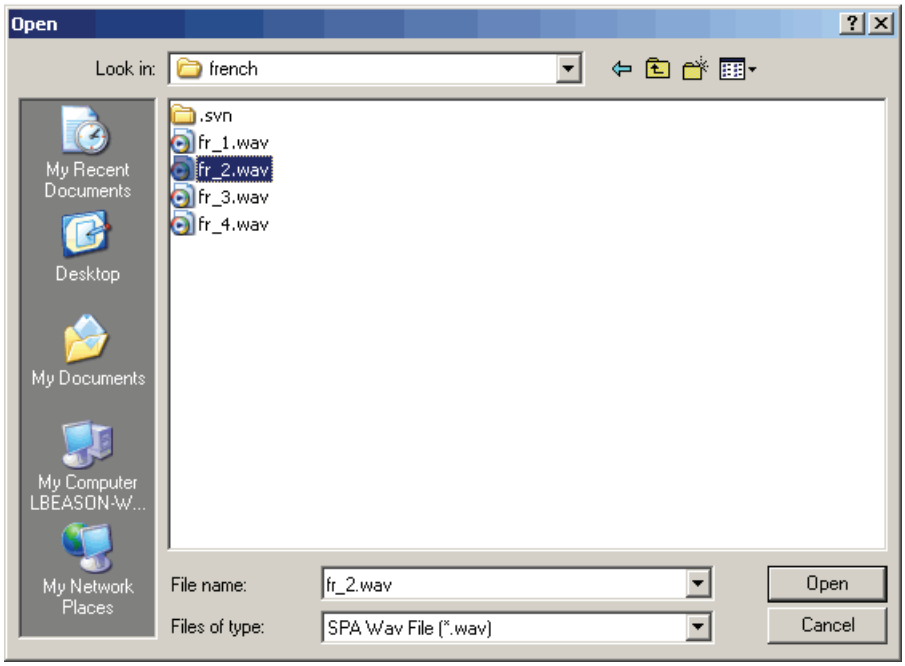


1. Click **Browse** to select a file.

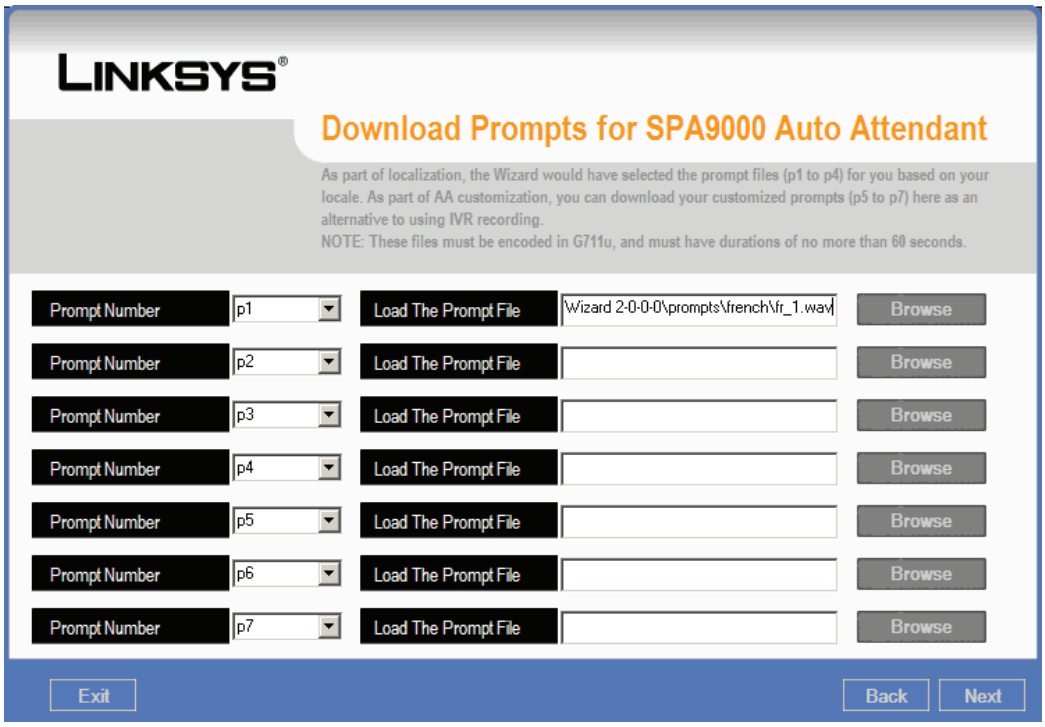
   The *Open* window appears, displaying the contents of the *prompts* directory.



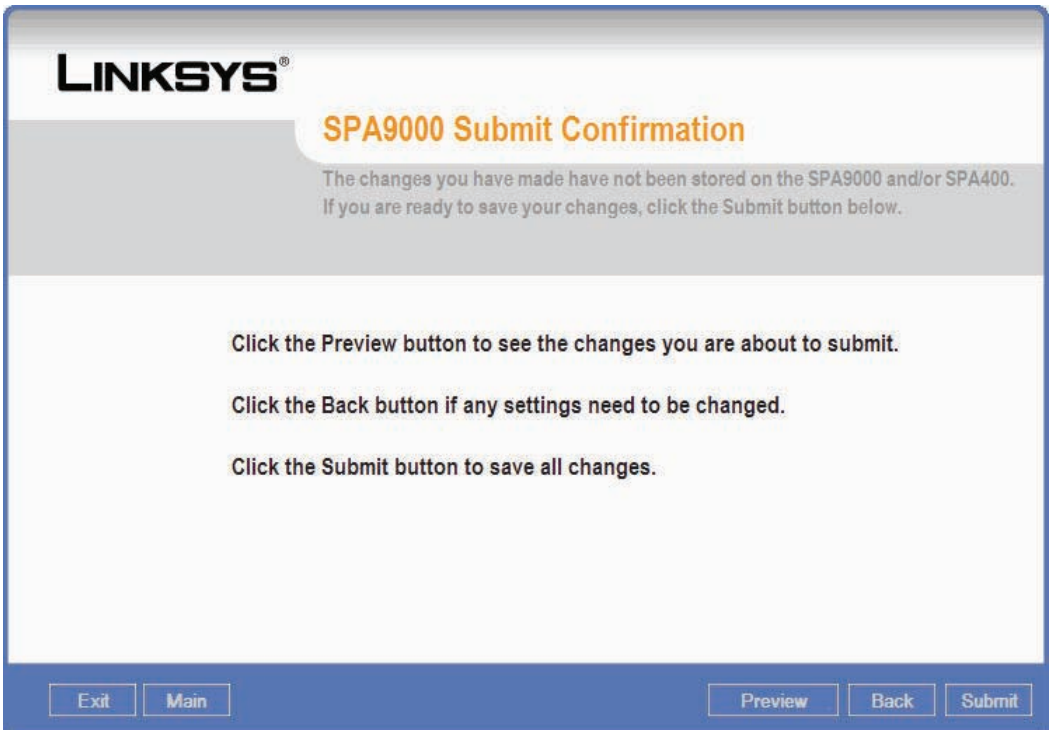
2. Double-click to open a language folder, and then double-click a file to select it.
   OR, navigate to a folder where you have stored your custom files, and then double-click a file to select it.



   Your selection appears on the *Download Prompts for SPA9000 Auto Attendant* page.

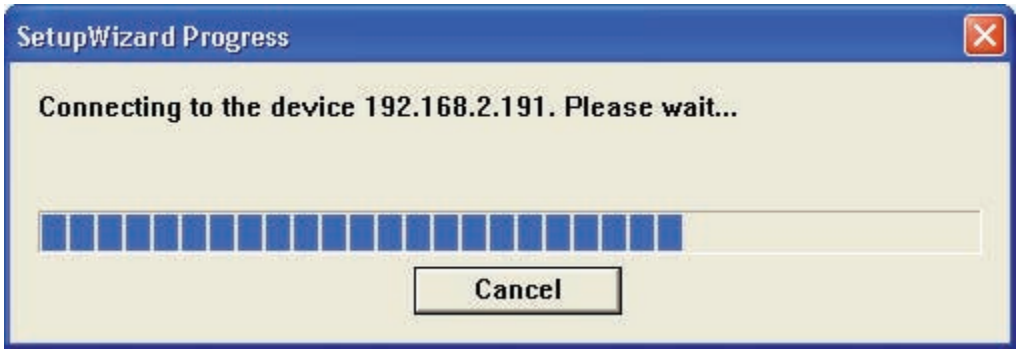


3. Select other files, as needed, and then click **Next** to display the *Submit Confirmation* page.

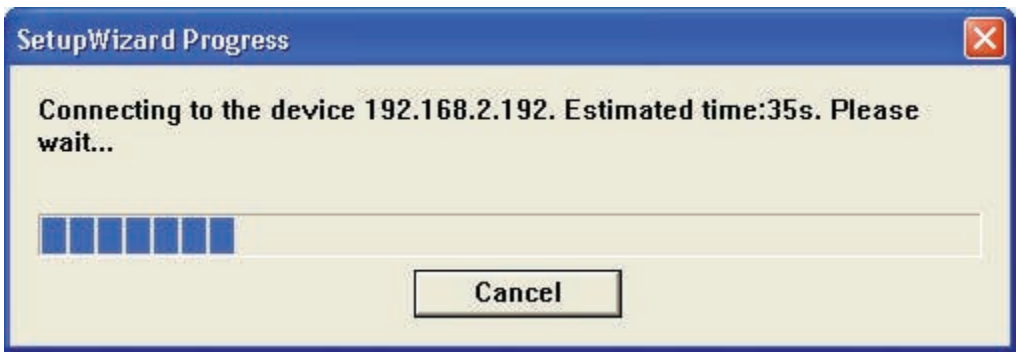


4. Click **Submit** to submit the configuration changes to the SPA9000 and then the SPA400.

   A series of messages appear, as shown in the following examples.

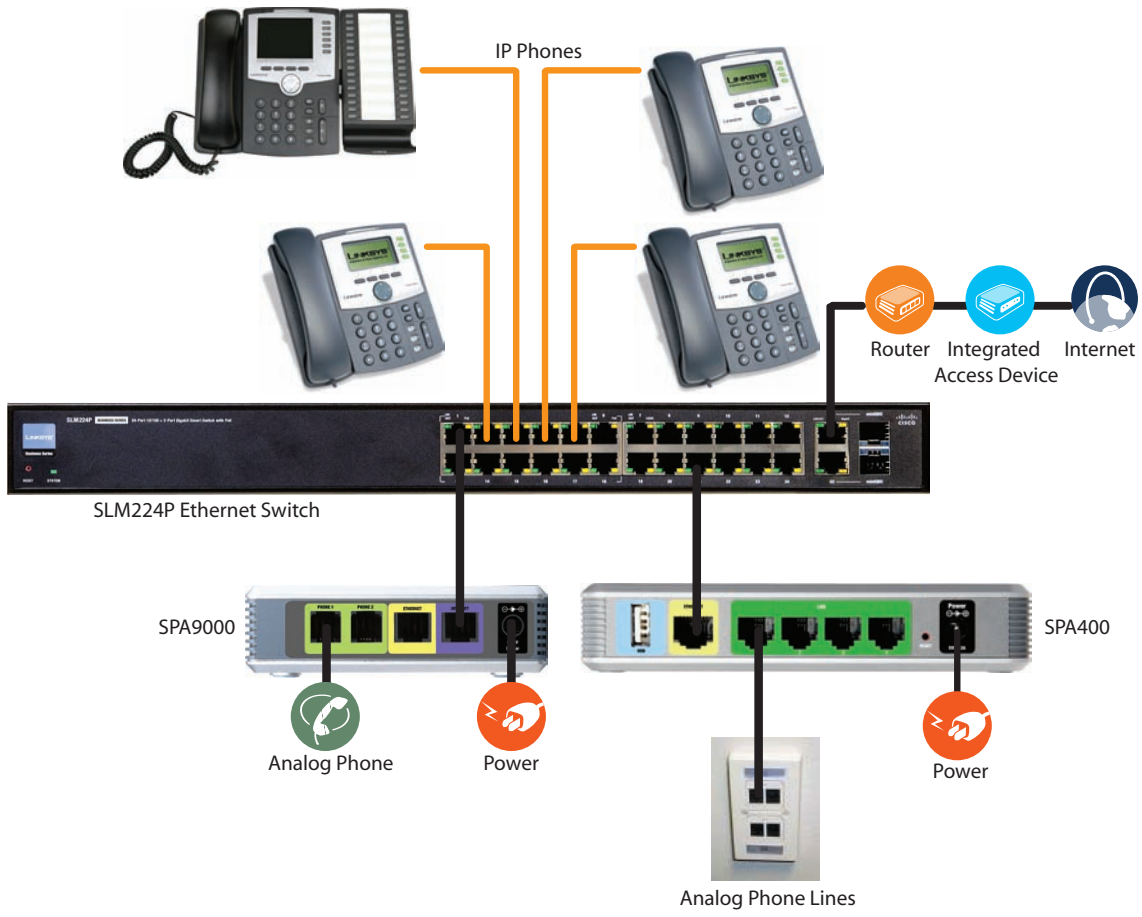


The Wizard restarts the SPA400 after it has successfully set the configuration.



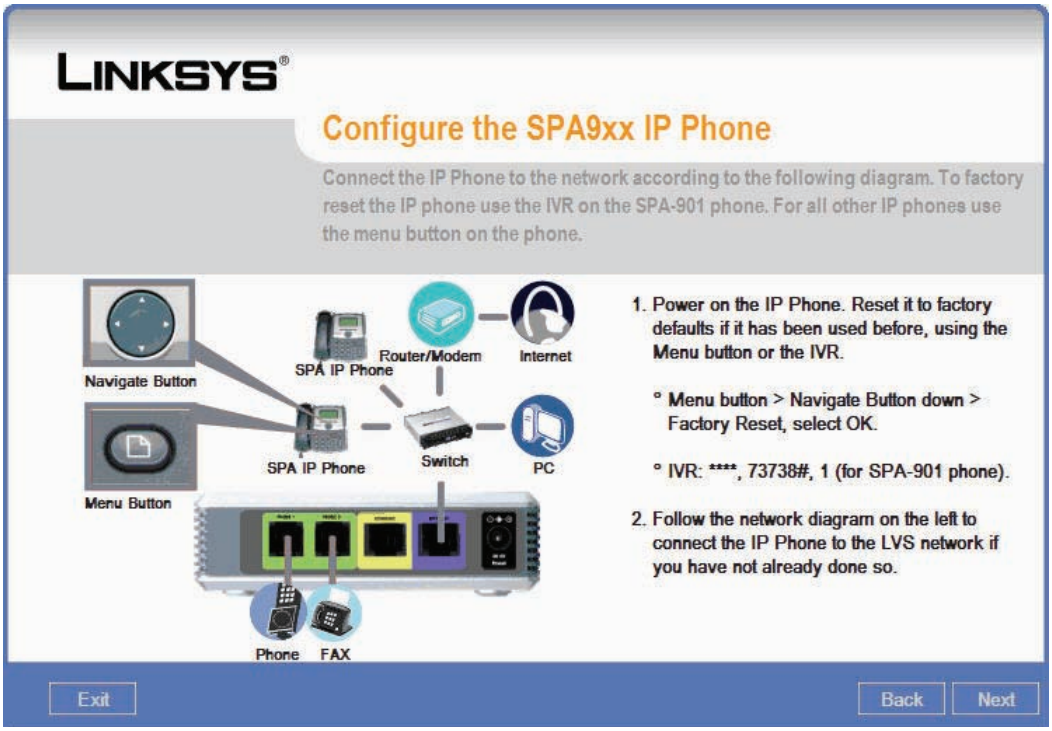
5. Click **OK** to close the message.

Configuring Client Stations



The Wizard guides you through the process of configuring the client stations.

1. From the Main Menu, click **Configure Client Stations**.
2. Click **Next** to display the *Configure the SPA9xx IP Phone* page.



3. Connect SPA9x2 power over Ethernet (PoE) capable phones to PoE ports on your network switch. Connect the WAN port on the phone to the network cable that connects to your switch. You can connect your computer to the PC port on the phone if you only have one network connection in your office.

   The phones will display:

   - Initializing network
   - Checking DNS

   The phone's buttons will:

   - Flash orange
   - Shine solid orange [indicating that the phone cannot properly communicate with the SPA9000 at this time]

4. Reset each phone to the factory default settings:

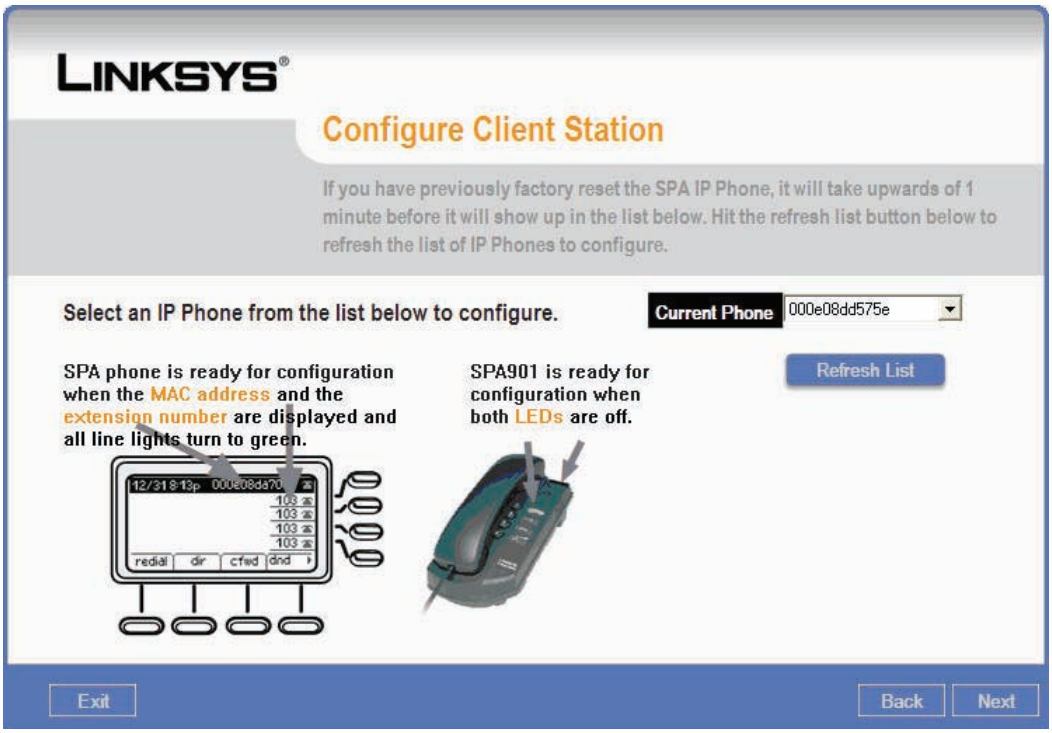
   a. Press the Setup button.

   b. Dial **14** for Factory Reset. A confirmation message appears.

   c. Press **ok** on the phone display to reset the phone.

   The phone reboots three times and the line-key light emitting diodes (LEDs) are solid green. Green indicates that the phone has established proper communications with the SPA9000. The entire factory reset sequence completes in less than two minutes.

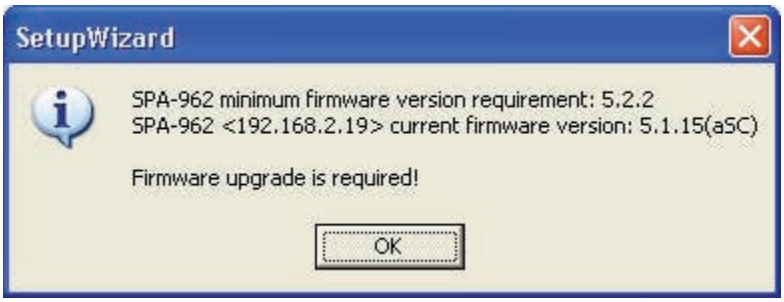
5. Click **Next** to display the *Configure Client Station* page.



6. Click **Refresh List** to cause the Wizard to search for recently added phones.
7. Refer to your list of phones, extensions, and MAC addresses in order to assign each phone to their associated owner.
8. From the *Current Phone* list, choose the MAC address of the phone that you want to configure, and then click **Next** to cause the Wizard to connect to the phone.

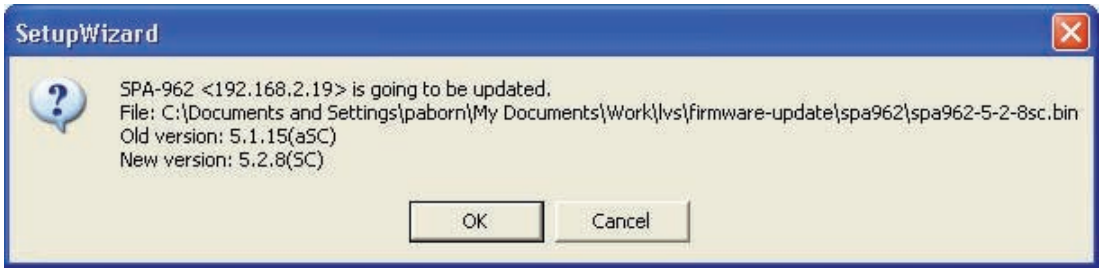
NOTE:

– The Wizard verifies that each device passes the minimum firmware version requirement and notifies you in the event that out of date firmware is detected. You must upgrade the firmware if this message appears. The Wizard will close and exit if you press cancel instead of selecting a valid version of firmware for the device.

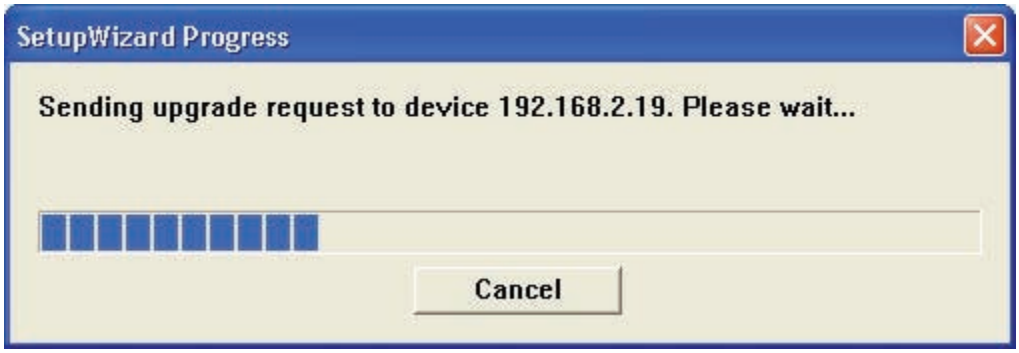


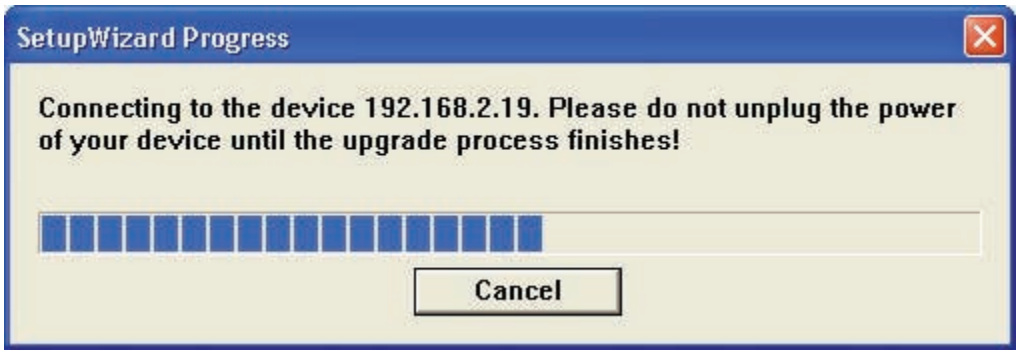
a. Click **OK** to navigate to the current version of SPA9xx firmware (SPA962 in this example) that you downloaded from the Linksys.com site.
b. Select the *spa9xx-xxx.bin* firmware file, and then click **Open**.

   After you click **OK** to upgrade, a confirmation message appears.

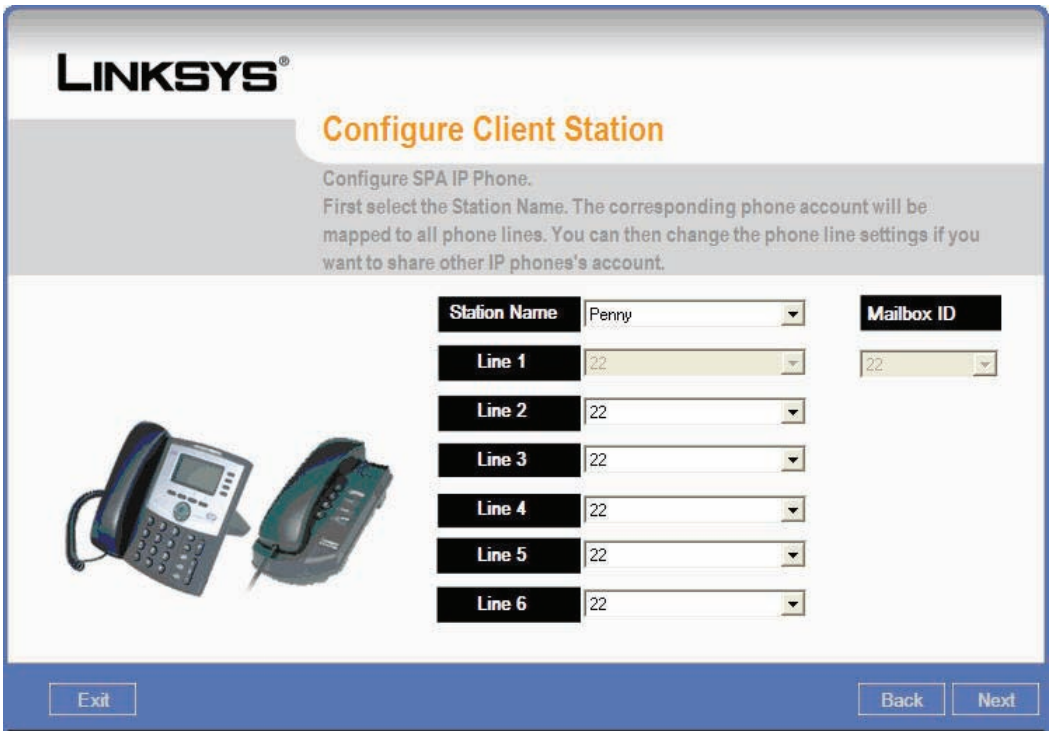


c. Click **OK** to begin the upgrade process. A series of messages appear, as shown in the following examples.



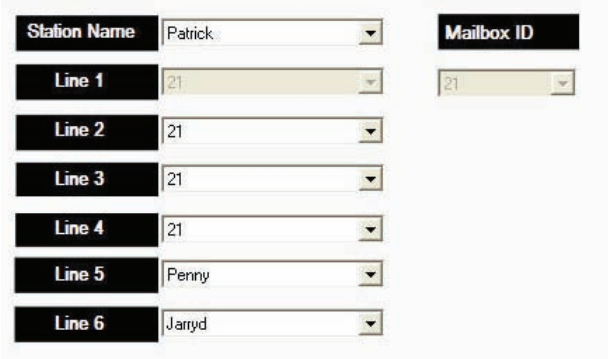


9. Click **OK** to display the *Configure Client Station - Configure SPA IP Phone* page.



10. From the *Station Name* list, choose the correct name for the MAC address that you chose earlier.

11. Assign any shared line appearances (SLA). The following example assigns SLAs to line-keys 5 and 6.

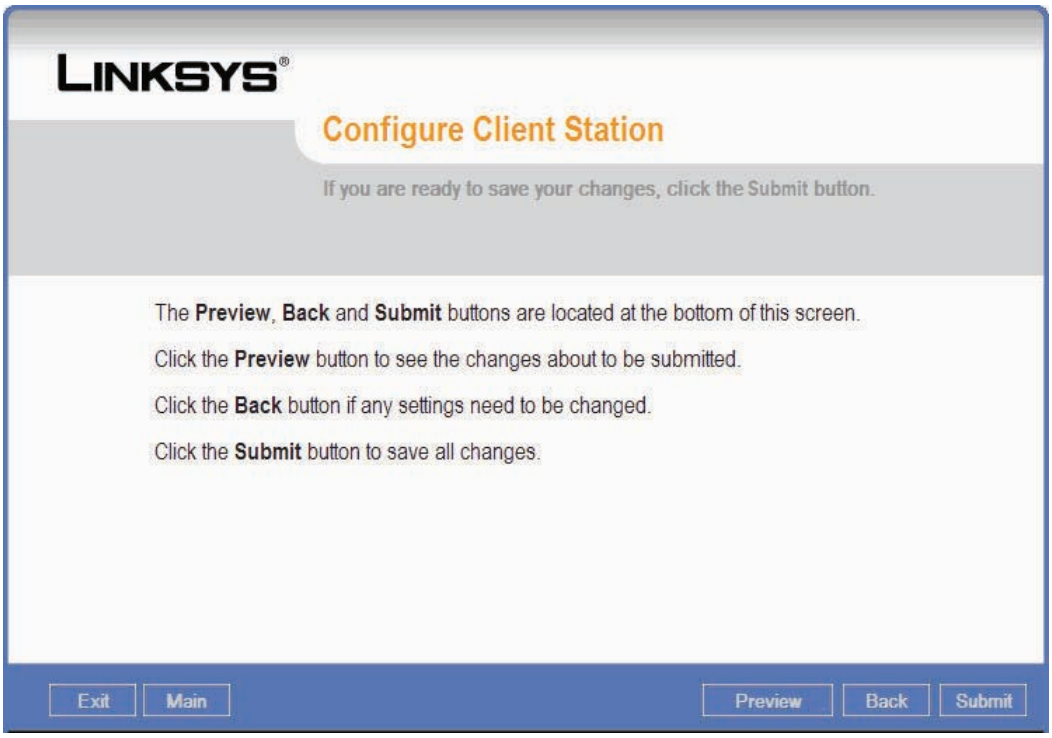


12. Click **Next** to display the *Download Client Dictionary* page.

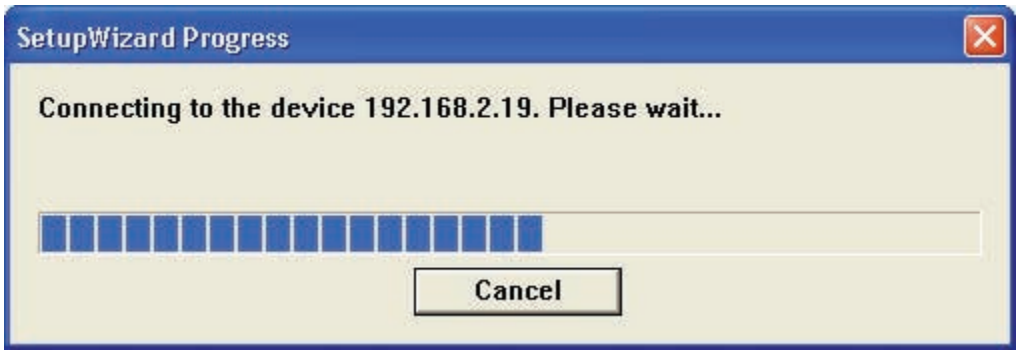
    NOTE: Language dictionary files are available from www.linksys-itsp.com and www.linksys-voip.eu in the **LVS > FW and Tools** section. You must have an ID, Username, and Password for this site. Currently available dictionary languages are:

    - English
    - Spanish
    - German,
    - Dutch
    - Italian
    - French
    - Portuguese
    - Danish
    - Swedish
    - Czech
    - Slovak

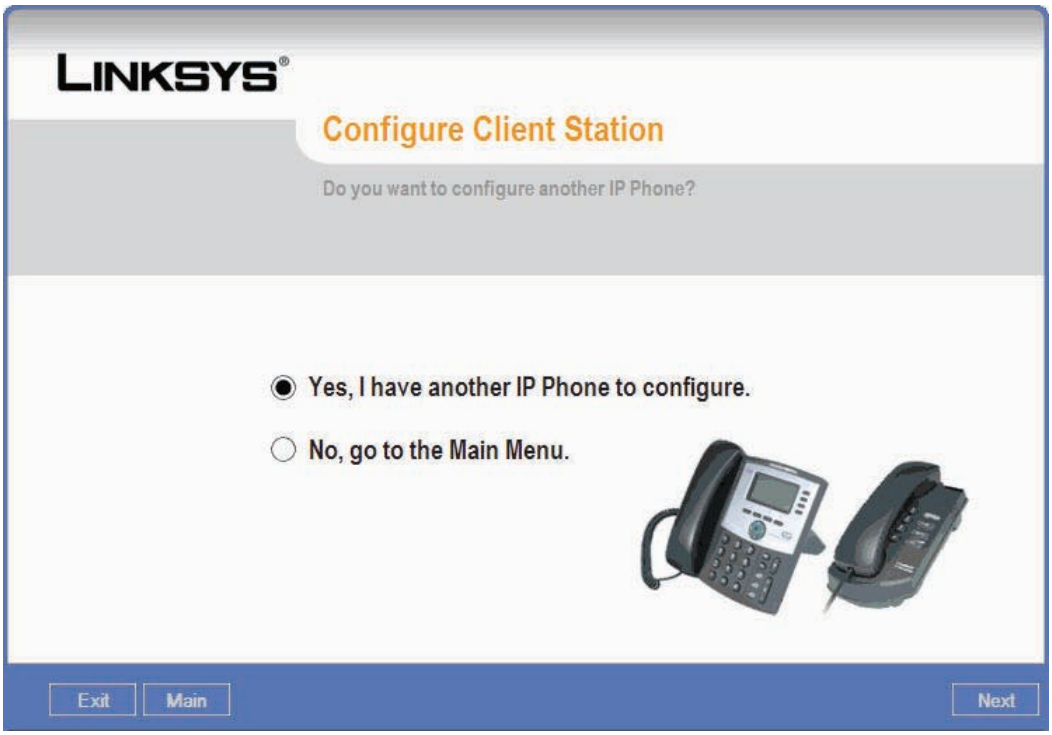
13. Click **Next** to display the *Configure Client Station* confirmation page.



14. Click **Submit** to send the configuration to the phone.



15. Click **OK** to display the *Configure Client Station - Configure Another Phone* page.



16. Proceed as needed:
    - If you need to configure additional phones, click **Yes**, and then click **Next**.
    - If all phones are configured, click **No, go to Main Menu**, and then click **Next**.

Congratulations! You have now completed basic configuration of your IP PBX optional voice mail, and all phones. Click **Exit** to exit the Wizard.

Localizing the SPA400 Voice Mail Prompts (Optional)

By default, English language sound files are provided on the SPA400 USB drive. You can localize the voice mail prompts to use languages other than English.

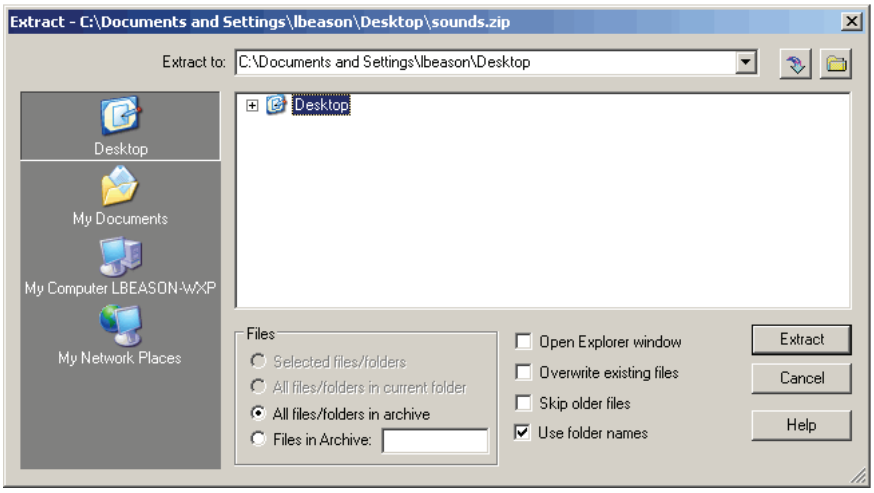
1. Start Internet Explorer, and enter the address of the EMEA Portal (www.linksys-voip.e or www.linksys-itsp.com).

   NOTE: North American partners can find localization files in the Utilities area of the Linksys Partner Connection.

2. In the left navigation pane, select the following links: **FW & Tools > LVS > Localization > SPA400 Voice mail prompts**.
3. Select the download link for the language that you want.

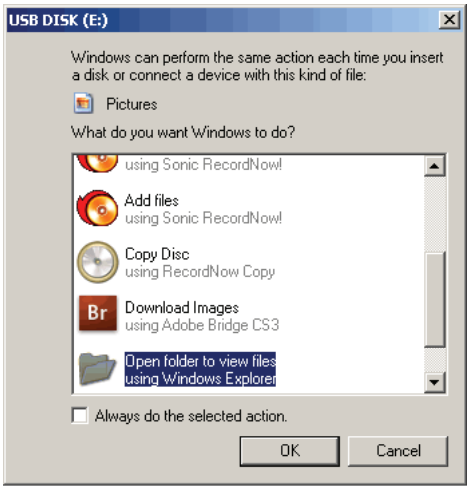
   NOTE: For SPA400 firmware versions above 1.0.1.3, download the PCM format of the files.

4. Save the *sounds.zip* file.
5. Use WinZip to open the *sounds.zip* file that you downloaded.
6. Click **Extract** on WinZip toolbar.
7. Select the Desktop or another temporary destination, select the **Use folder names check box**, and then click **Extract**.



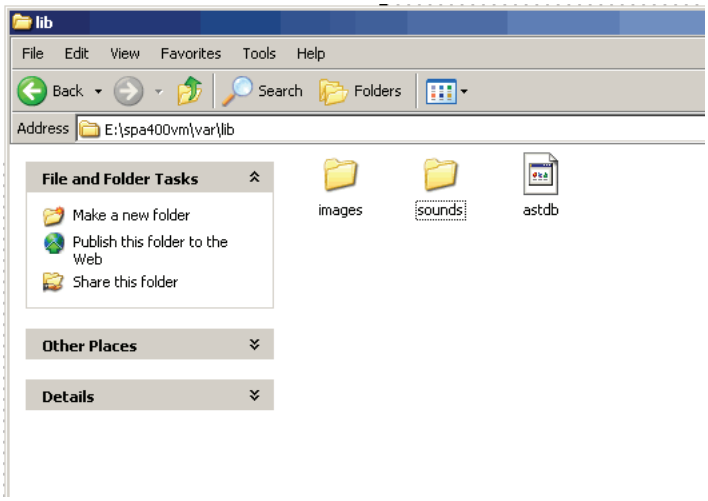
A progress bar appears as the files are extracted. The *sounds* folder appears in the selected location.

8. Power off the SPA400 by removing the power cord, and then remove the USB drive.
9. Insert the SPA400 USB drive into a USB port on the PC where you saved the files in the previous steps.
10. When the *USB Disk* window appears, click **Open folder** to view files using Windows Explorer, and then click **OK**.



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

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



12. 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.

13. Move the new sounds folder into spa400vm\var\lib on the USB drive. When the *Confirm Folder Replace* window appears, click **Yes to All**.
14. Remove the USB drive from the PC and insert it into the SPA400.
15. Power on the SPA400.
16. Place a test call to the voice mail system to confirm that the new language prompts are used.

Testing Your LVS System

Verify that you can successfully perform the following tasks in order to complete your installation:

1. Make and answer extension-to-extension calls. Example, dial 22 from 21. You can also dial 22# for faster dialing.
2. Make outbound calls, remember to start the dial sequence with an appropriate steering digit. Perform these tests for all configured steering digits.
3. Dial a local 7-digit number, example 555-1212
4. Dial a 10-digit number, example 361-555-1212
5. Dial a 10-digit number, prefaced with a 1, example 1-361-555-1212
6. Dial directory services, example 411.
7. Answer inbound calls.
8. Access voice mail.

Congratulations! You have now completed basic testing of your IP PBX optional voice mail, and all phones.

Maintaining Your LVS

Maintaining your LVS includes configuration changes, for example to achieve the following goals:

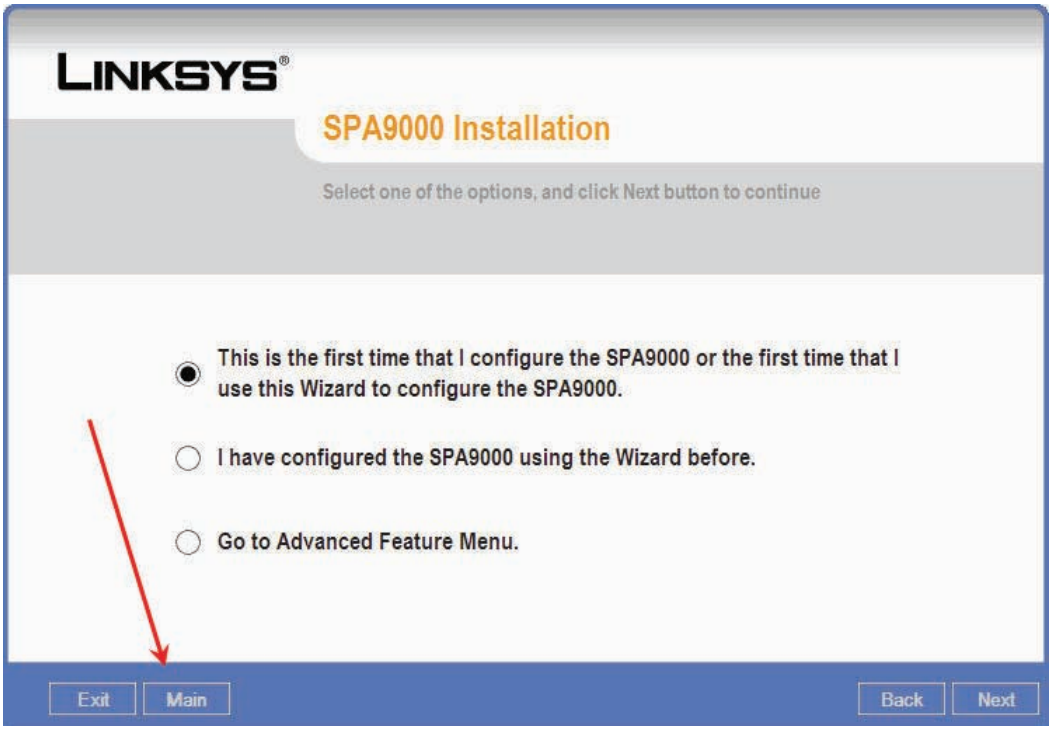
- Add an additional phone (new employee)
- Change ITSP (better rates)
- Add a new SPA400 (additional PSTN traffic)
- Add a Mediatrix Gateway for ISDN connectivity

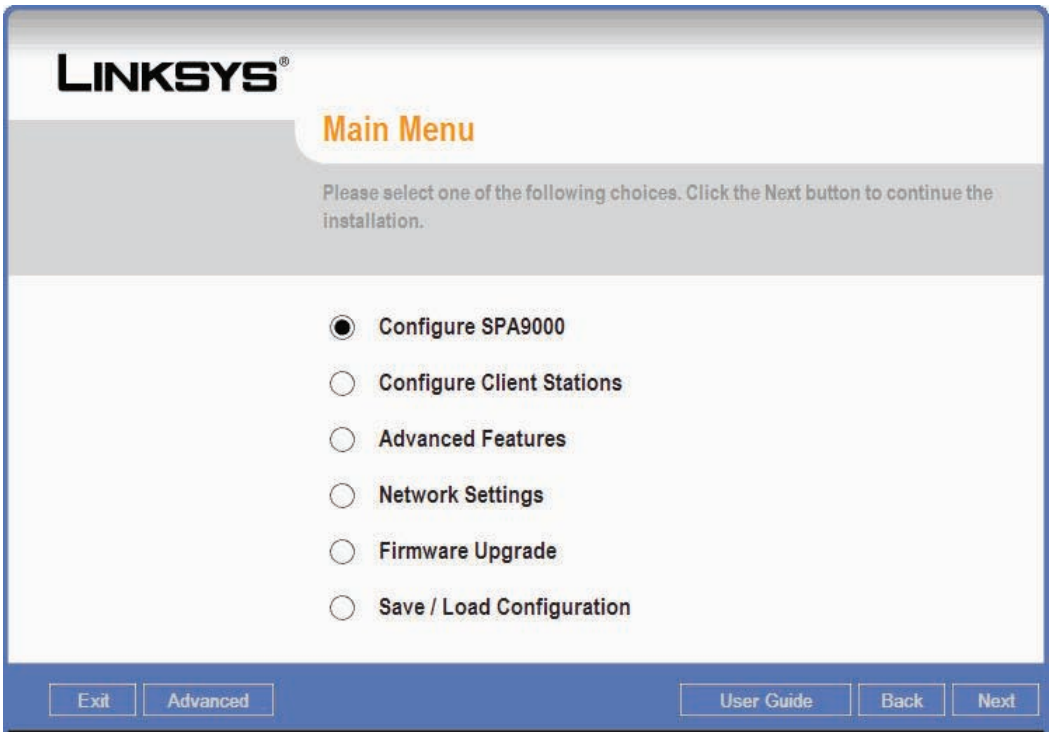
The LVS Wizard provides two functional menus that allow the technician to properly maintain and update the LVS system.

- **Main Menu:** Contains the basic and most used installation and configuration options
  - **Configure SPA9000:** To configure the SPA9000 and SPA400 related parameters
  - **Configure Client Stations:** To configure the IP phones
  - **Advanced Features:** To access advanced configuration options (see below)
  - **Network Settings:** To configure the SPA9000 network settings
  - **Firmware Upgrade:** To Upgrade firmware for the LVS devices
  - **Save / Load Configuration:** To save and load the LVS configuration from/to the wizard to the PC and the devices
- **Advanced Menu:** Contains the advanced configuration options
  - **NAT Settings:** To configure advanced NAT settings
  - **Client Extensions:** To configure the extensions of the system (e.g. to add a new extension)
  - **Hunt Group:** To manage hunt groups in the system
  - **Auto Attendant:** To configure a basic or advanced Auto Attendant, for inbound call handing
  - **Localization:** To localize date, time, dial plan, and prompts
  - **Admin Password:** To manage administrative access
  - **SPA932 Attendant Console:** To configure the console for the SPA962 receptionist phone

Using the Main Menu

You reach the Main Menu by clicking **Main** at the bottom left of the Wizard. You will also reach the Main Menu as part of the step-by-step installation when you select the second option (*I have configured the SPA9000 using the Wizard before*) on the first *SPA9000 Installation* page.





The Main Menu provides access to the following functions:

- **Configure SPA9000:** Choose this option to configure SPA9000 Voice Services. The Wizard expects you to use up to one ITSP, up to 4 SPA400s, or up to 4 Mediatrix® devices. An ITSP must be associated with Line 1 of the SPA9000. SPA400s and Mediatrix devices can be associated with any line. After selecting the voice service for a line, you can click Next to configure features such as steering digits and inbound call routing.

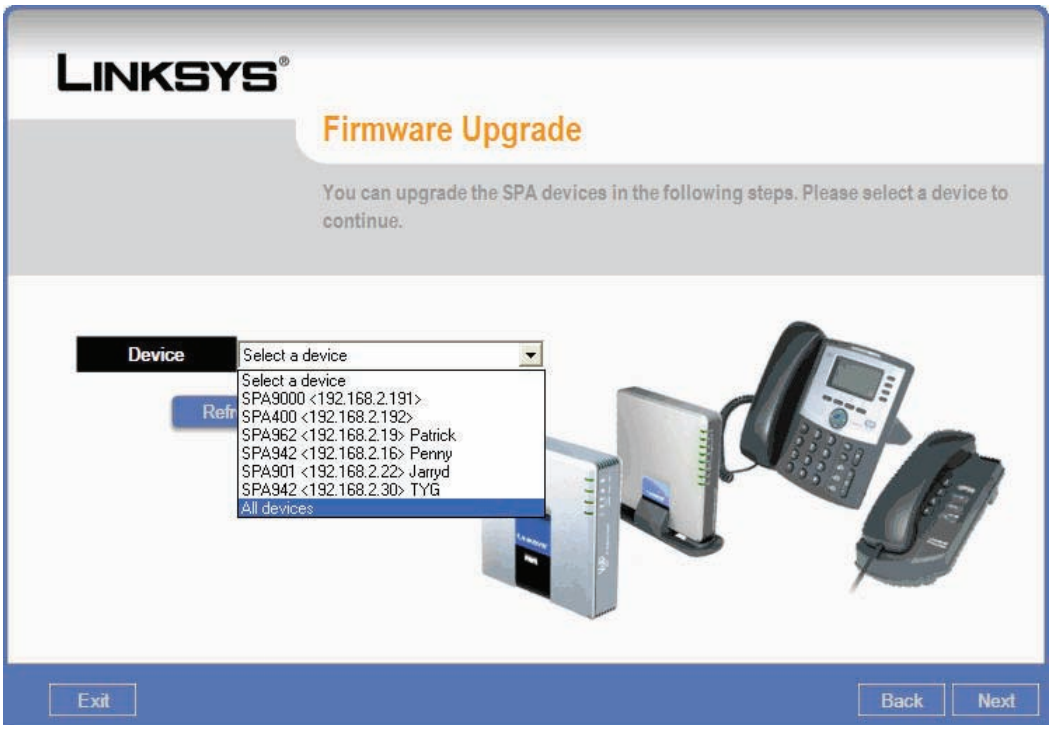
  NOTE: Configuration of ITSP and SPA400 voice services are described in "Configuring SPA9000 Voice Services Lines" on page 50. Configuration of Mediatrix services is described in "Configuring Mediatrix Services" on page 83

- **Configure Client Stations:** Choose this option to associate phones with extensions, to configure shared line appearances, or to load language dictionaries to phones. These procedures are described in "Configuring the Internal Phone Extensions" on page 55.
- **Advanced Features:** Choose this option to configure NAT settings, client extensions, hunt groups, Auto Attendant, localization, administrative passwords, and the SPA932 attendant console. These procedures are described in "Advanced Features Menu" on page 91.
- **Network Settings:** Choose this option to configure dynamic or static IP addresses and to define DNS entries. These procedures are described in "Configuring a Static IP Address on the SPA9000" on page 47.
- **Firmware Upgrade:** Choose this option to upgrade the firmware on the LVS devices. These procedures are described in "Upgrading Firmware" on page 80.
- **Save / Load Configuration:** Choose this option to backup and restore your LVS configuration. These procedures are described in "Backing Up and Restoring Device Configurations" on page 84.

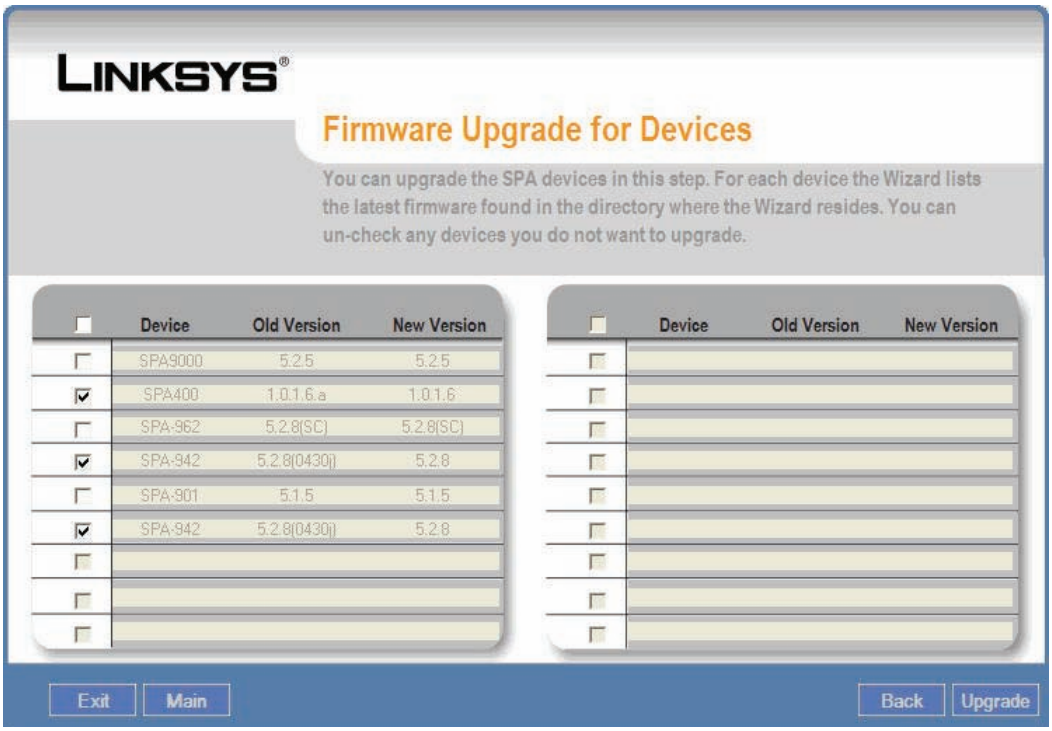
Upgrading Firmware

Use the Firmware Upgrade feature to upgrade the firmware on any or all LVS devices.

NOTE: The Wizard uses the firmware files that are stored in its root directory. If you download new firmware from Linksys.com, you should store it in this location for easy installation via the Wizard.



1. From the Main Menu, choose **Firmware Upgrade**, and then click **Next**.
2. From the *Device* drop-down list, choose **All devices**.
3. Click **Next** to cause the Wizard to contact all LVS devices and retrieve their firmware versions and display the Firmware Upgrade for Devices page.



4. Check the devices that you want to upgrade, and uncheck the devices that you do not want to upgrade.

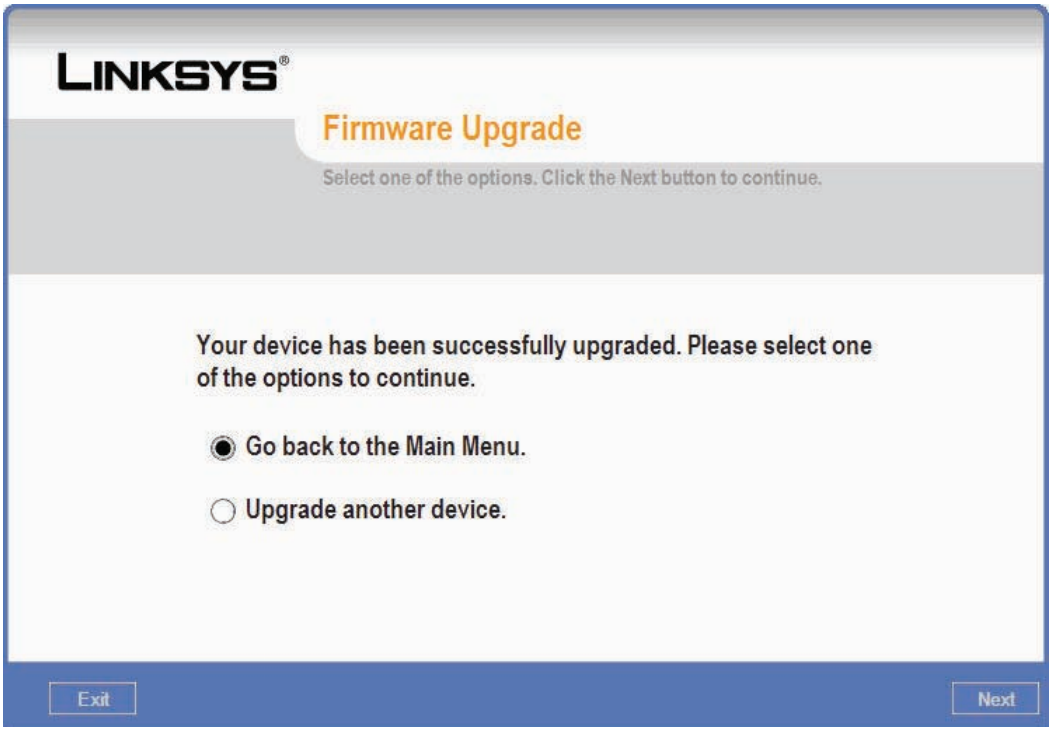
   NOTE: You can use the check box in the top row to check or uncheck all devices.

5. Click **Upgrade** to upgrade the selected devices. The Wizard sends upgrade requests to all selected devices.

The Wizard copies the firmware from the *~\Wizard* directory to the *C:\linksys\firmwaredb* directory. When all relevant files have been copied, the Wizard sends the firmware to the selected devices.

When the file has been copied to the device, the upgrade process is started.

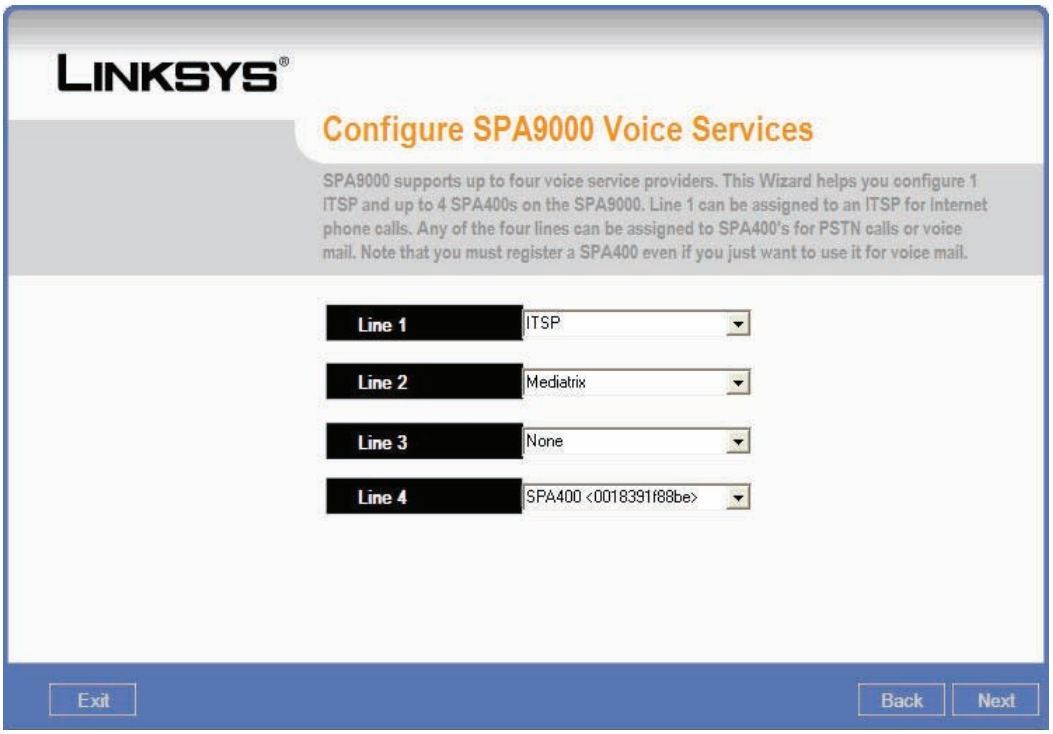
The Wizard displays the *Firmware Upgrade - Success* page when all devices have been upgraded.



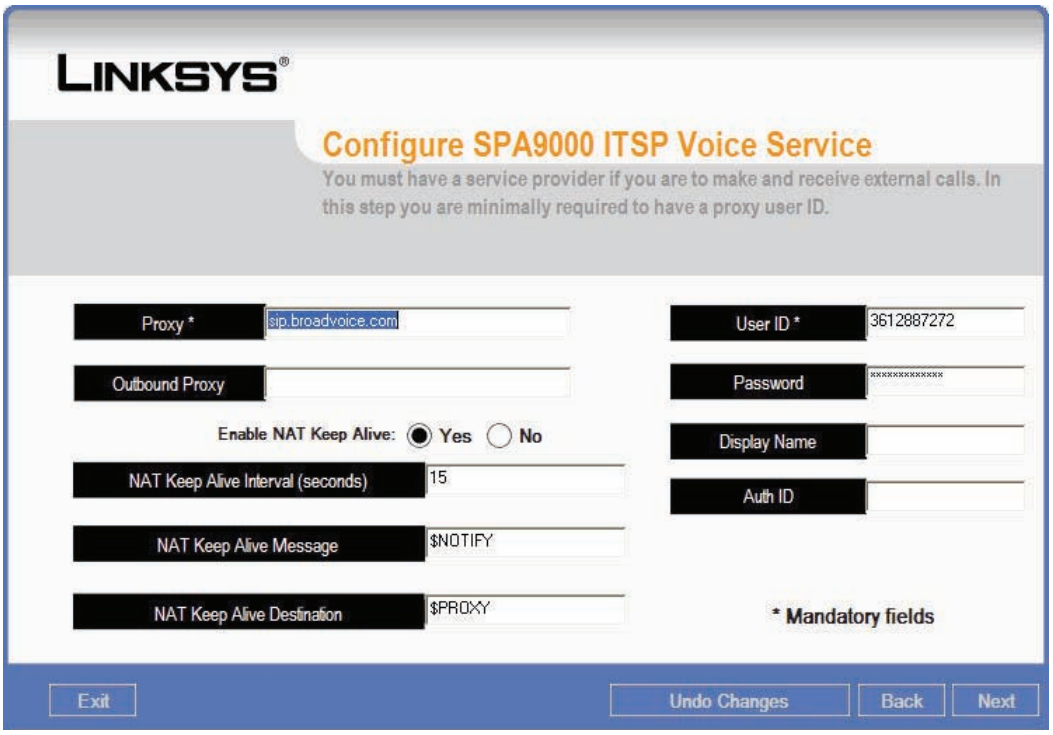
Configuring Mediatrix Services

This procedure explains how to configure your SPA9000 to interoperate with a Mediatrix® device.

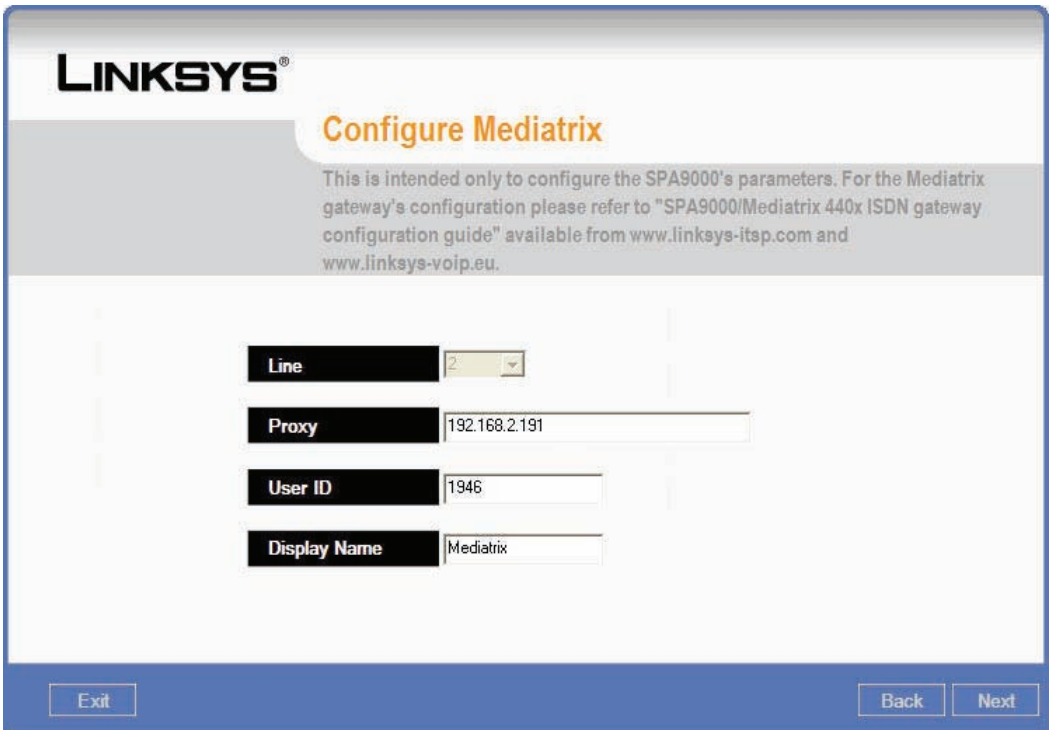
1. From the Main Menu, choose **Configure SPA9000**, and then click **Next**.
2. Select **Mediatrix** from the pull-down menu associated with a SPA9000 line. The example shows line 2.



3. Click **Next** to display the *ITSP Voice Service* page.



4. Click **Next** to display the *Configure Mediatrix* page.
5. Enter the IP address of the Mediatrix device in the Proxy field.



6. Click **Next** to continue with the SPA9000 as described in the "Configuring Steering Digits and Outbound Call Routes" on page 53.

   NOTE: The Wizard configures the SPA9000. To complete the Mediatrix configuration please see the *Mediatrix LVS Configuration Guide* , which can be downloaded from the Linksys partner site.

Backing Up and Restoring Device Configurations

The Wizard makes it easy to back up and restore device configurations.

Main Menu > Save / Load Configuration

You can perform the following tasks:

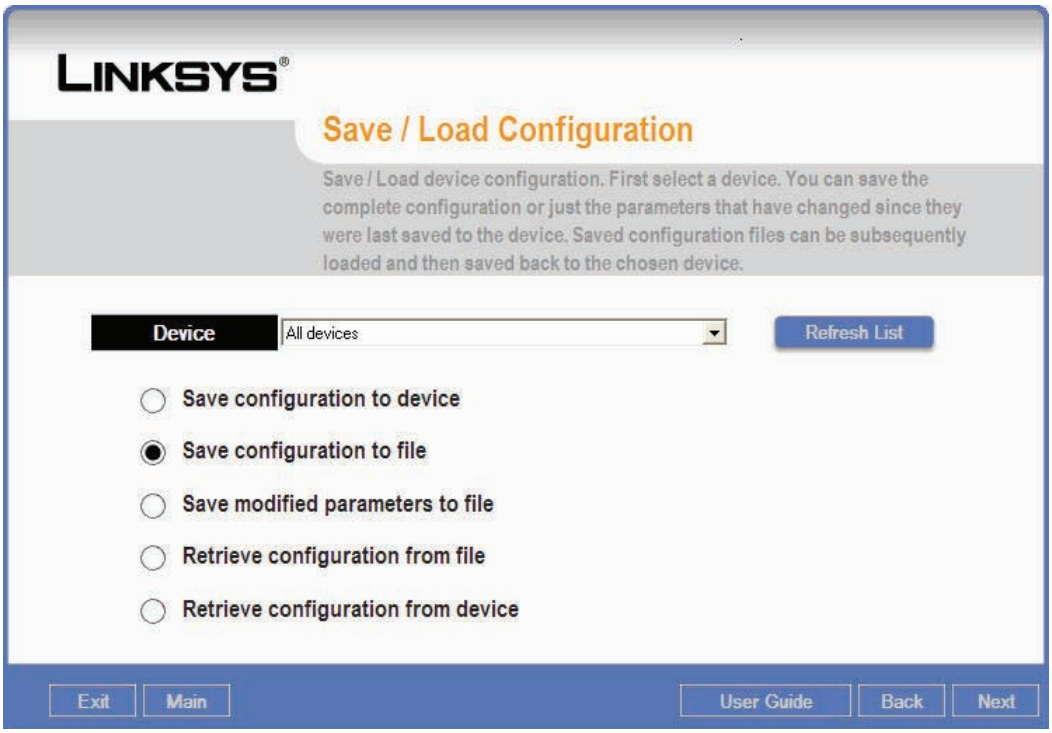
- Save configuration to device
- Save configuration to file
- Save modified parameters to file
- Retrieve configuration from file
- Retrieve configuration from device

Save Configuration to File

Before making any LVS changes, save the configuration of all devices. This provides a way for you to return to a known working configuration at any time.

Save to file as follows:

1. From the Main Menu, choose **Save / Load Configuration**, and then click **Next**.
2. From the *Device* drop-down list, choose **All devices**.
3. Select **Save Configuration to file**.

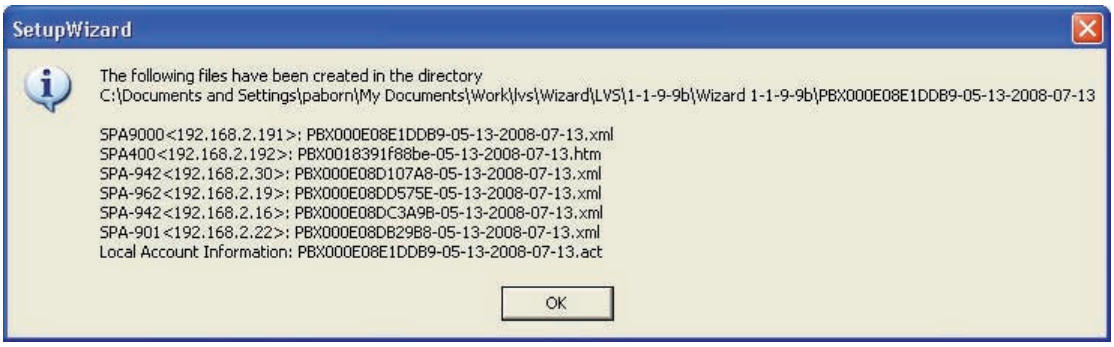


4. Note the file target directory.

   The directory is a subdirectory of the Wizard's directory and is named *PBX<mac address>-<month>-<day>-<year>-<hour>-<minute>* for example: PBX000E08E1DDB9-05-13-2008-07-13 where:

   - PBX000E08E1DDB9 is the SPA9000's MAC address
   - 05-13-2008 represents May 13, 2008
   - 07-13 represents 7:13 AM [07H13]

5. Click **OK** to close the directory notification window. The Wizard will retrieve each device's configuration and display what it has done.



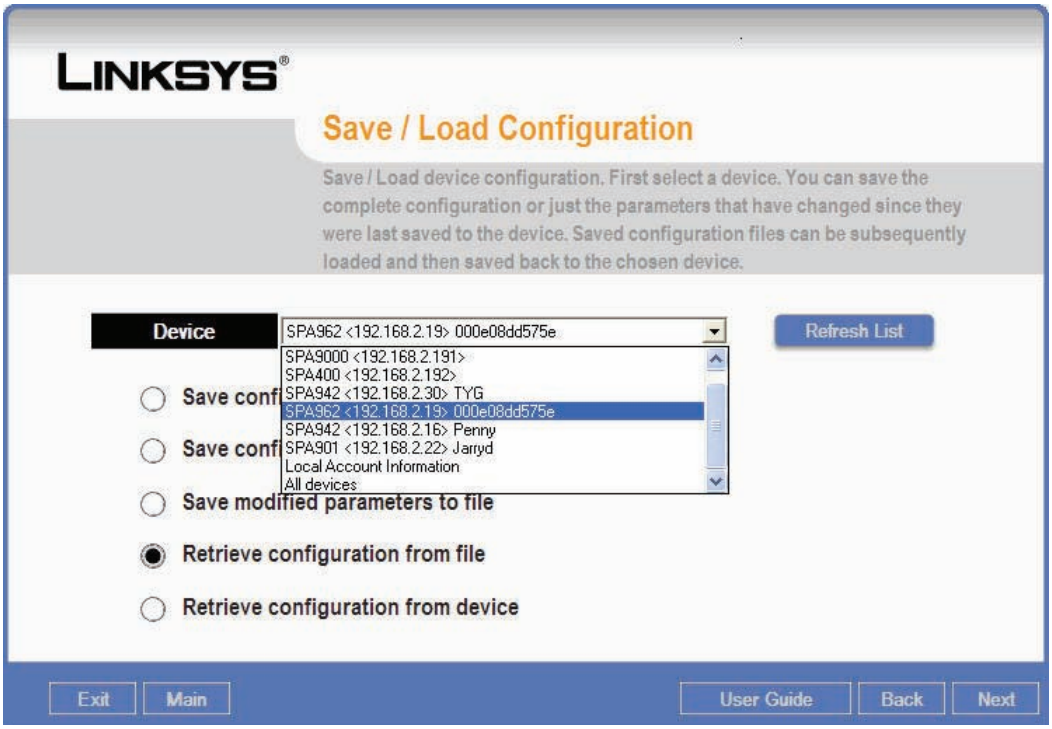
6. Click **OK** to close the backup information window.

Expert Tip: Create a directory called backups and copy all backup files to this directory. Sort the displayed files by name. You can now easily view all backup files per device.

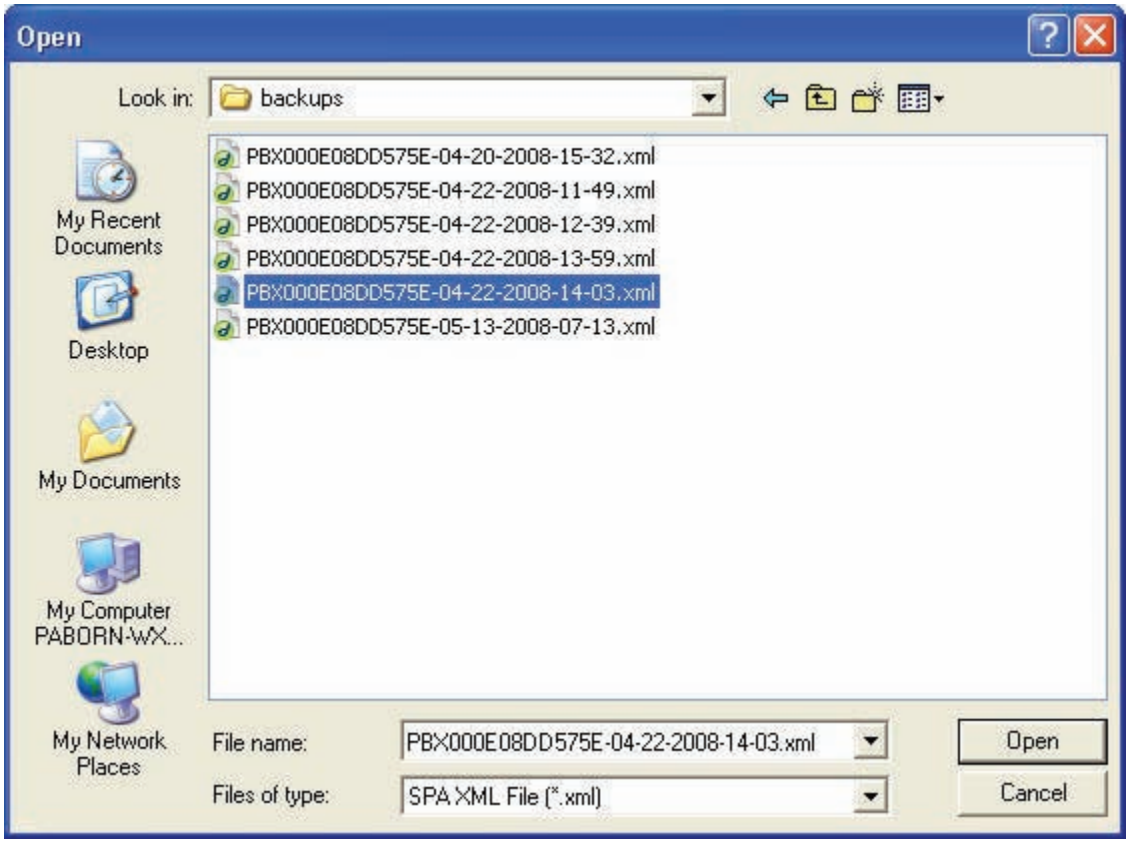
Save Configuration to Device

Use a previously saved file to restore a device's configuration as follows:

1. From the Main Menu, choose **Save / Load Configuration**, and then click **Next**.
2. From the *Device* drop-down list, choose the device.
3. Select **Retrieve configuration from file**.

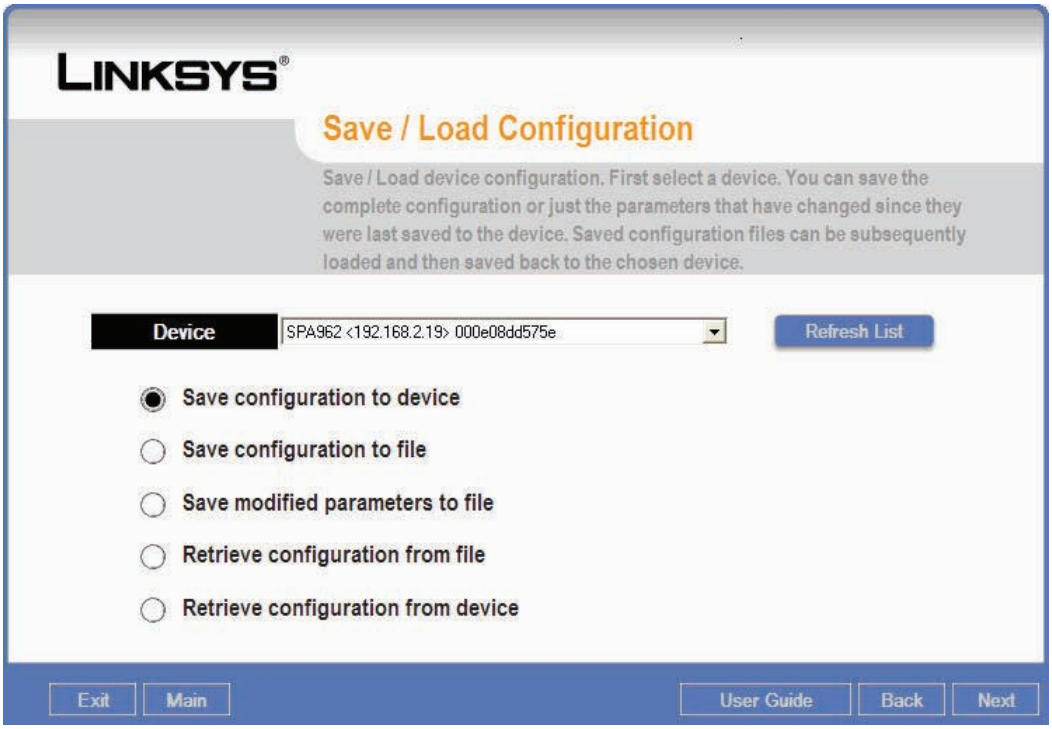


4. Click **Next** to select the backup file. The Wizard displays files associated with the selected device.
5. Select the file from which to retrieve the configuration.

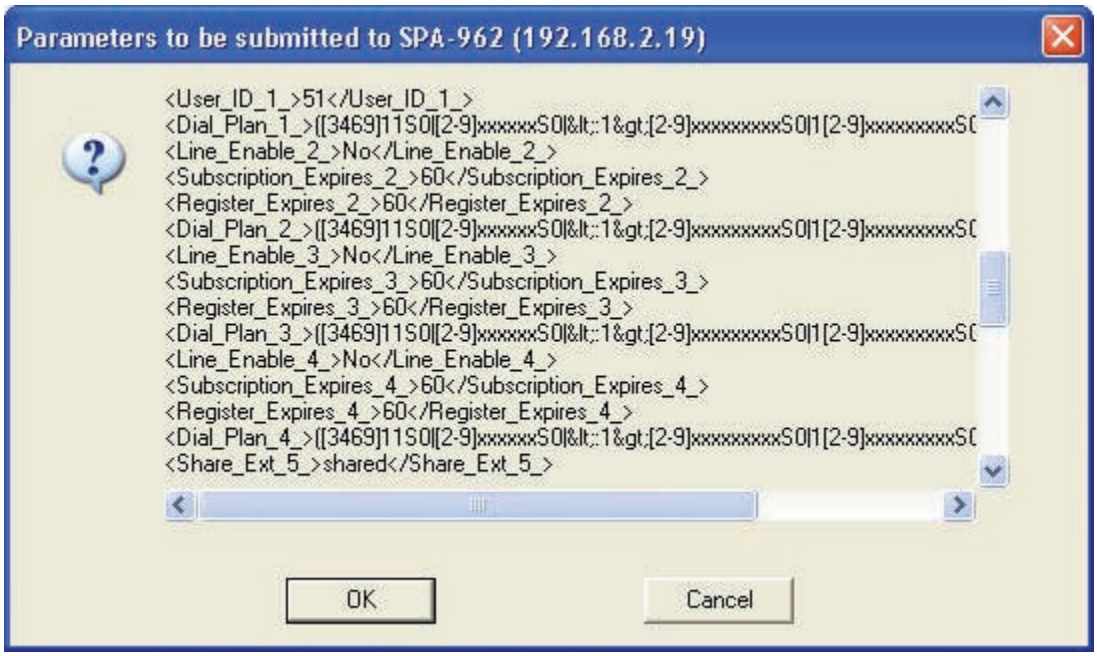


6. Click **Open** to retrieve the configuration.

7. Click **OK** to close the progress window.
8. Select **Save configuration to device**.

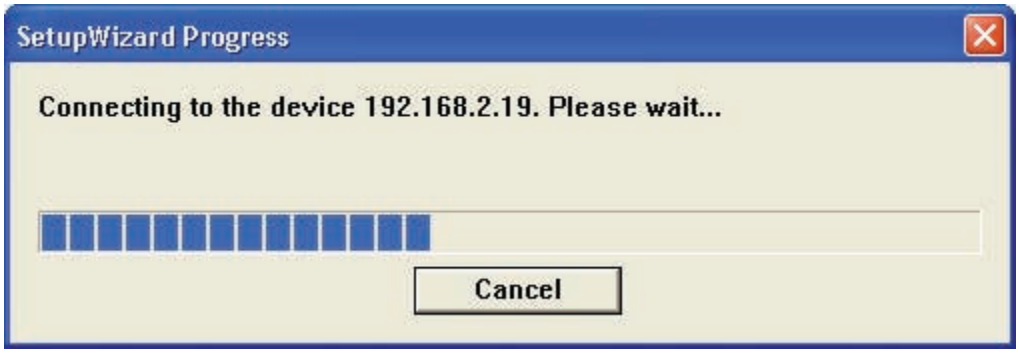


9. Click **Next** to preview the parameters that will be set on the device. This is a good time to verify that you selected the appropriate backup file by scrolling through the preview.



10. Click **OK** to submit the configuration to the device.

The Wizard automatically reboots the device and reconnects to it.



The Wizard displays a success message when the task is completed.

11. Click **OK** to close the status message. The device configuration is now restored.

Expert User

This section of the guide contains information that expert users may find useful when working with the Wizard. In addition, this section describes the Advanced Feature Menu.

End User License Agreement Registry Entry

The Wizard inserts the HKEY_CURRENT_USER/Software/Linksys/SetupWizard registry entry when the EULA is first accepted. Subsequent Wizard use does not require another review of the EULA.

Wizard Directories

Two directories are used by the Wizard:

- ~"\Wizard <version>" [where ~ represents any directory]

  The ~"\Wizard <version>" directory is created when the Wizard's zip archive file is uncompressed and unarchived.

- C:\linksys\

  The C:\linksys directory is automatically created and populated by the Wizard when it is first run.

NOTE: The entire contents of the Wizard's zip file must be extracted from the zip file. Attempting to run the Wizard directly from the zip archive file will result in failure.

The ~"\Wizard <version> Directory

The ~"\Wizard <version> directory contains the following directories:

- ~\config

  Contains locale-specific information

- ~\dict

  Contains language/local phrases that are preloaded with the Wizard. Any additional languages downloaded from linksys-itsp.com should be saved here in order for Wizard to use.

- ~\messages

  Contains the language-specific phrases used in the Wizard

- ~\prompts

  Contains the language-specific Auto Attendant prompts that are preloaded with the Wizard

The C:\linksys\ Directory

The C:\linksys\ directory contains the PBX<MAC address>.act file. This file contains the SPA9000 account information and includes:

- SPA400 definition
- Extension to station name associations
- Hunt group definitions.

The C:\linksys\ directory contains the following directories of interest:

- ~\dict

  Copies of the language dictionaries files are copied here when being downloaded to the phones.

- ~\firmwaredb

  When the firmware on a device is upgraded, a copy of the firmware is automatically copied to this directory.

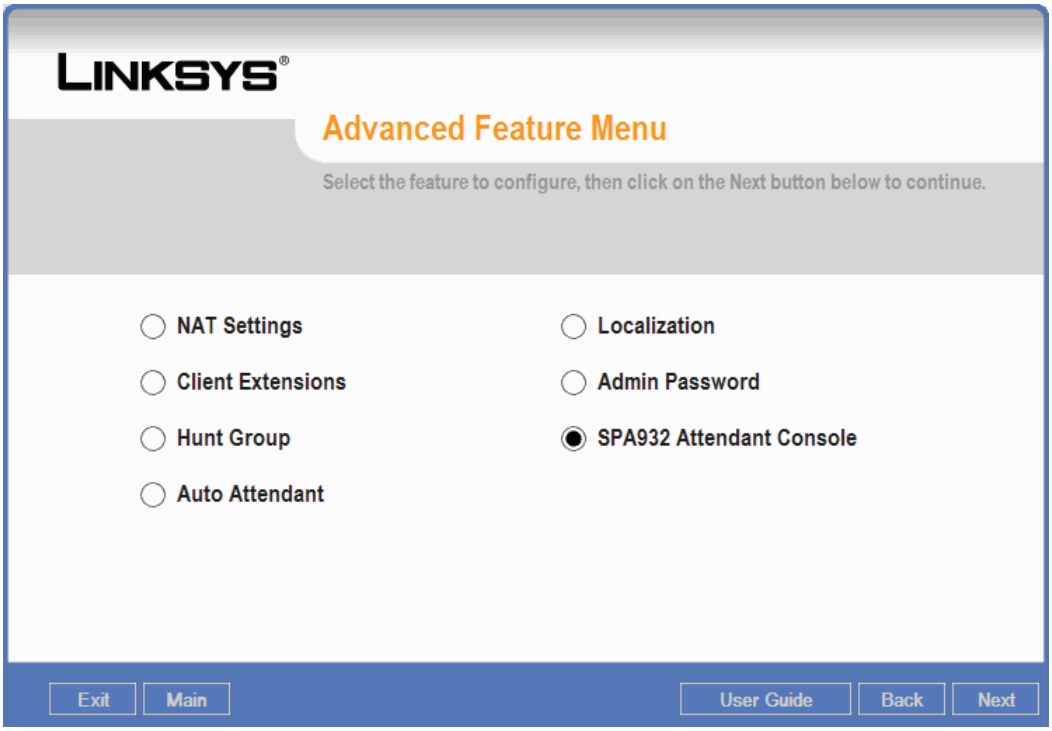
- ~\prompts

  User-selected WAV-format AA prompts are copied here when being sent to SPA9000.

Advanced Features Menu

The Advanced Feature Menu enables you to easily manipulate LVS equipment configuration.

Main Menu > Advanced Features



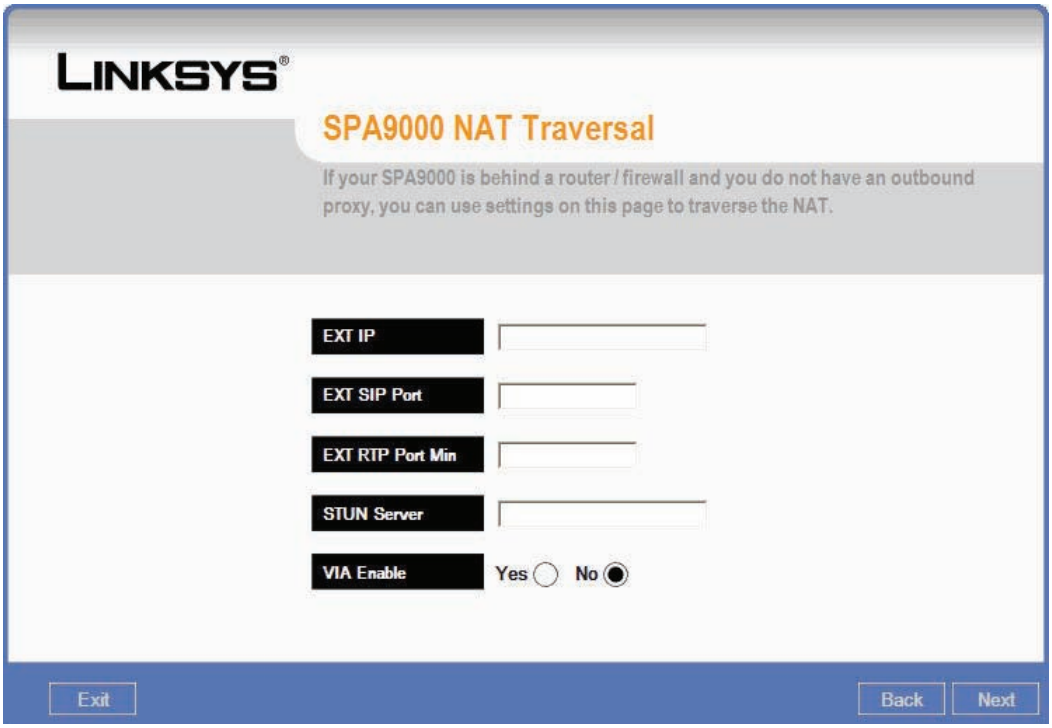
- "NAT Settings" on page 92
- "Client Extensions" on page 97
- "Hunt Groups" on page 98
- "Auto Attendant" on page 100
- "Localizing the Language Dictionaries for the Phone Display" on page 114
- "Admin Password" on page 117
- "SPA932 Attendant Console" on page 117

NAT Settings

The SPA9000 NAT Traversal page allows you to easily manipulate the SPA9000 NAT traversal mechanisms.

Main Menu > Advanced Features > NAT Settings

- EXT IP
- EXT SIP Port
- EXT RTP Port Min
- STUN Server
- Via Enable

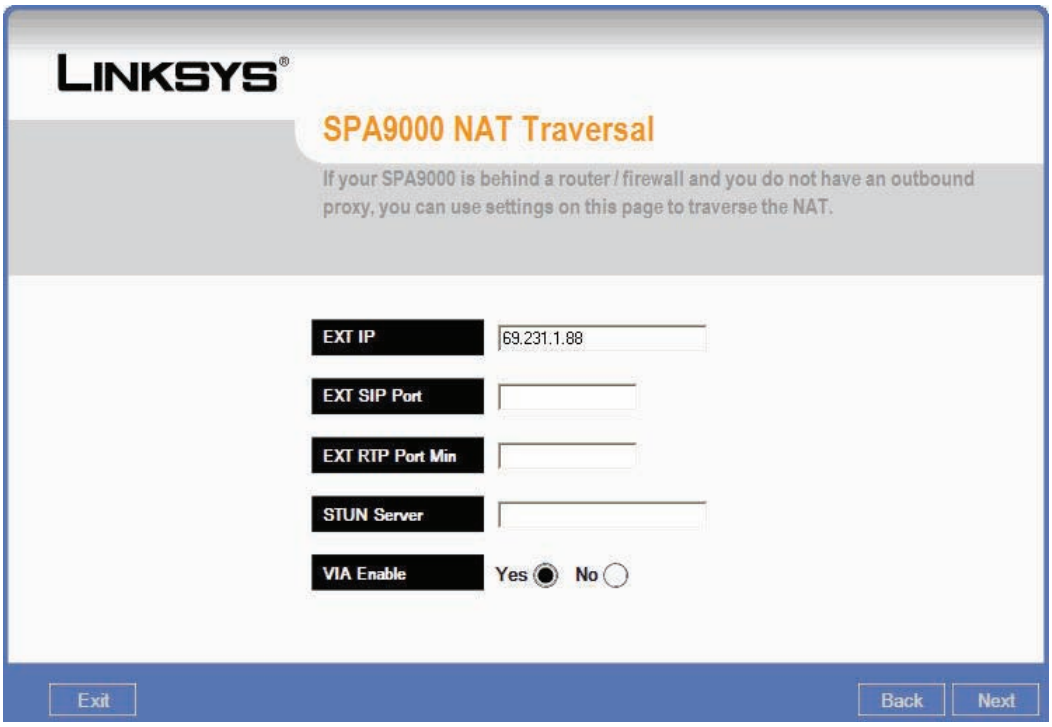


EXT IP

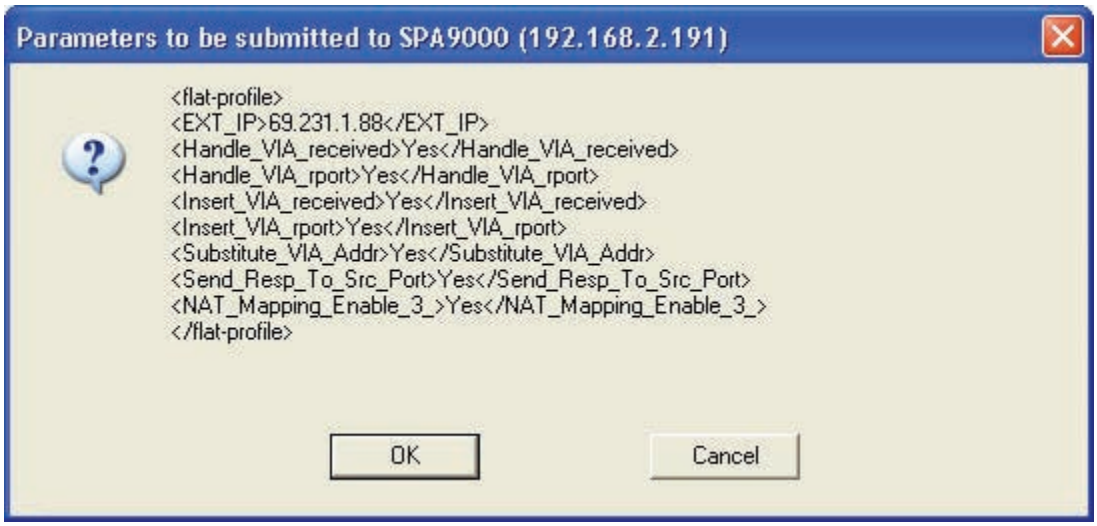
Configuring NAT mapping in the SPA9000 is recommended only if the ITSP network does not provide a Session Border Controller functionality. In this case, and if the external (public) IP address is static, then it is recommended to perform a static (permanent) mapping on SPA9000. This setting is also recommended if NAT mechanism used in the router is symmetric.

NOTE: The LAN switch needs to be configured to enable Spanning Tree Protocol and Port Fast on the ports to which the SPA9000 and the SPA9xx phones are connected.

1. Enter the public IP address of your router in the *EXT IP* field.
2. Select **VIA Enable** to cause the SPA9000 to process the received IP address in the VIA header (this value is inserted by the server in response to any requests).



3. Click **Next** to display the parameters that the Wizard will submit to the SPA9000.



Following is the configuration that the Wizard will submit to the SPA9000.

```
<flat-profile>
<EXT_IP>69.231.1.88</EXT_IP>
<Handle_VIA_received>Yes</Handle_VIA_received>
<Handle_VIA_rport>Yes</Handle_VIA_rport>
<Insert_VIA_received>Yes</Insert_VIA_received>
<Insert_VIA_rport>Yes</Insert_VIA_rport>
<Substitute_VIA_Addr>Yes</Substitute_VIA_Addr>
<Send_Resp_To_Src_Port>Yes</Send_Resp_To_Src_Port>
```

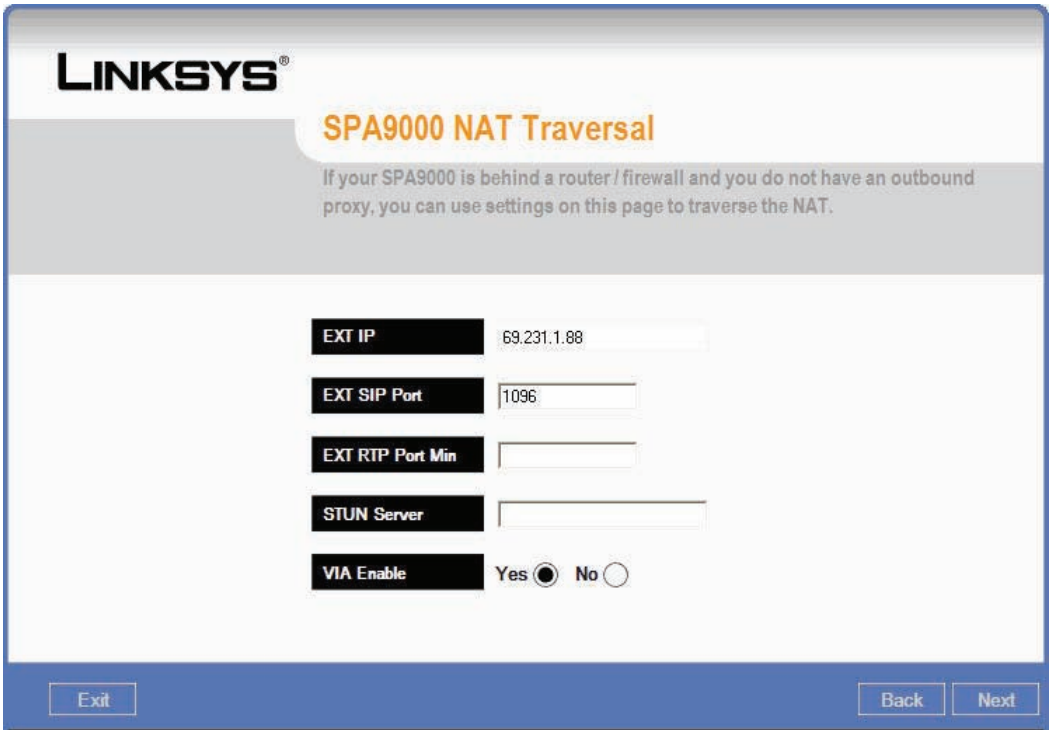
```
<NAT_Mapping_Enable_3_>Yes</NAT_Mapping_Enable_3_>
</flat-profile>
```

4. Click **OK** to close the parameter preview window and cause the Wizard to submit the changes to the SPA9000 and reboot it.

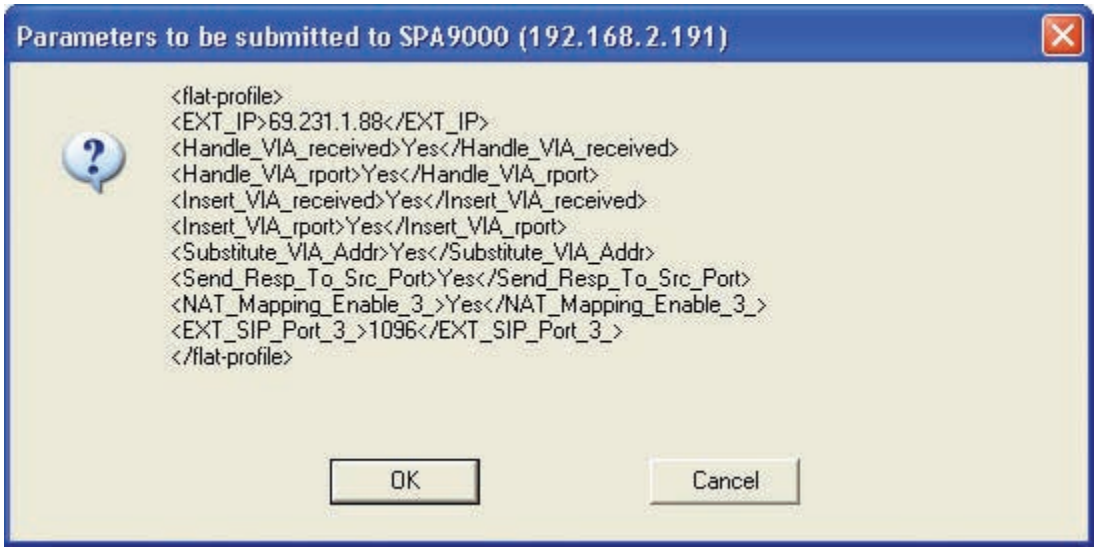
EXT SIP Port

This setting allows you to change the SIP port that the SPA9000 inserts into all outbound SIP messages.

1. Enter the EXT SIP port number that you need to use, 1096 in this example.



2. Click **Next** to preview the parameters the Wizard will send to the SPA9000



Following is the configuration that the Wizard will submit to the SPA9000.

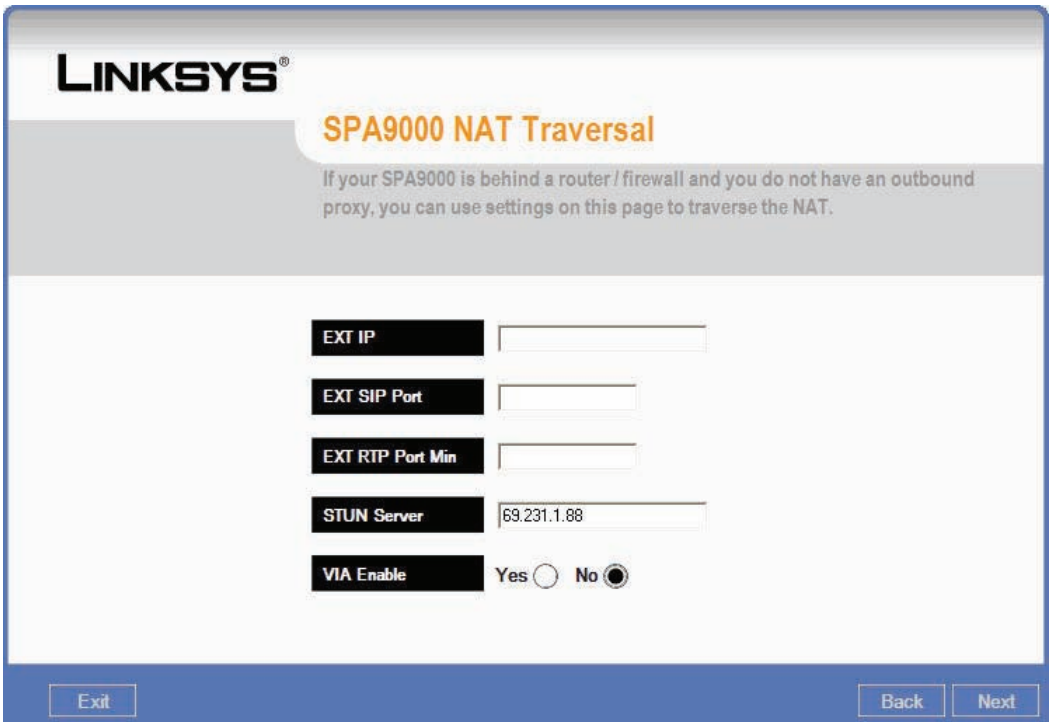
```
<flat-profile>
<EXT_IP>69.231.1.88</EXT_IP>
<Handle_VIA_received>Yes</Handle_VIA_received>
<Handle_VIA_rport>Yes</Handle_VIA_rport>
<Insert_VIA_received>Yes</Insert_VIA_received>
<Insert_VIA_rport>Yes</Insert_VIA_rport>
<Substitute_VIA_Addr>Yes</Substitute_VIA_Addr>
<Send_Resp_To_Src_Port>Yes</Send_Resp_To_Src_Port>
<NAT_Mapping_Enable_3_>Yes</NAT_Mapping_Enable_3_>
<EXT_SIP_Port_3_>1096</EXT_SIP_Port_3_>
</flat-profile>
```

3. Click **OK** to close the parameter preview window and cause the Wizard to submit the changes to the SPA9000 and reboot it.

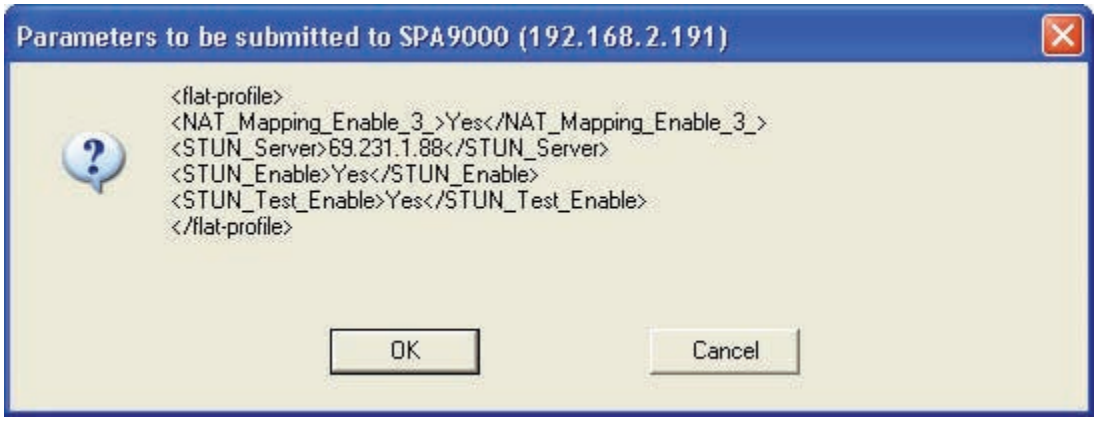
STUN Server

Configuring NAT mapping in the SPA9000 is recommended only if the ITSP network does not provide a Session Border Controller functionality. In this 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 is considered a practice of last resort and should be used only if the other methods are unavailable. STUN is a viable option only if your router uses asymmetric NAT.

1. Enter the STUN Server's IP address in the *STUN Server* field. Example 69.231.1.88



2. Click **Next** to preview the parameters the Wizard will send to the SPA9000.



Following is the configuration that the Wizard will submit to the SPA9000.

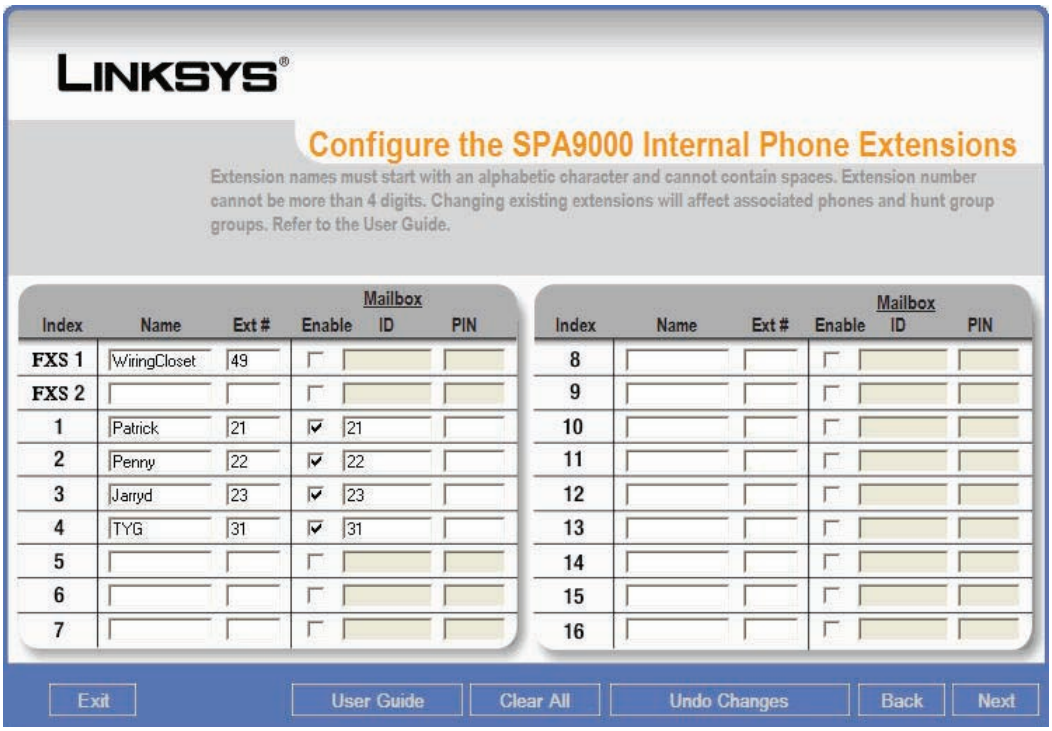
```
<flat-profile>
<NAT_Mapping_Enable_3_>Yes</NAT_Mapping_Enable_3_>
<STUN_Server>69.231.1.88</STUN_Server>
<STUN_Enable>Yes</STUN_Enable>
<STUN_Test_Enable>Yes</STUN_Test_Enable>
</flat-profile>
```

3. Click **OK** to close the parameter preview window and cause the Wizard to submit the changes to the SPA9000 and reboot it.

Client Extensions

Main Menu > Advanced Features > Client Extensions

- Assign names, extension, enable mail, assign mail PIN for FXS ports
- Assign names, extension, enable mail, assign mail PIN for each phone

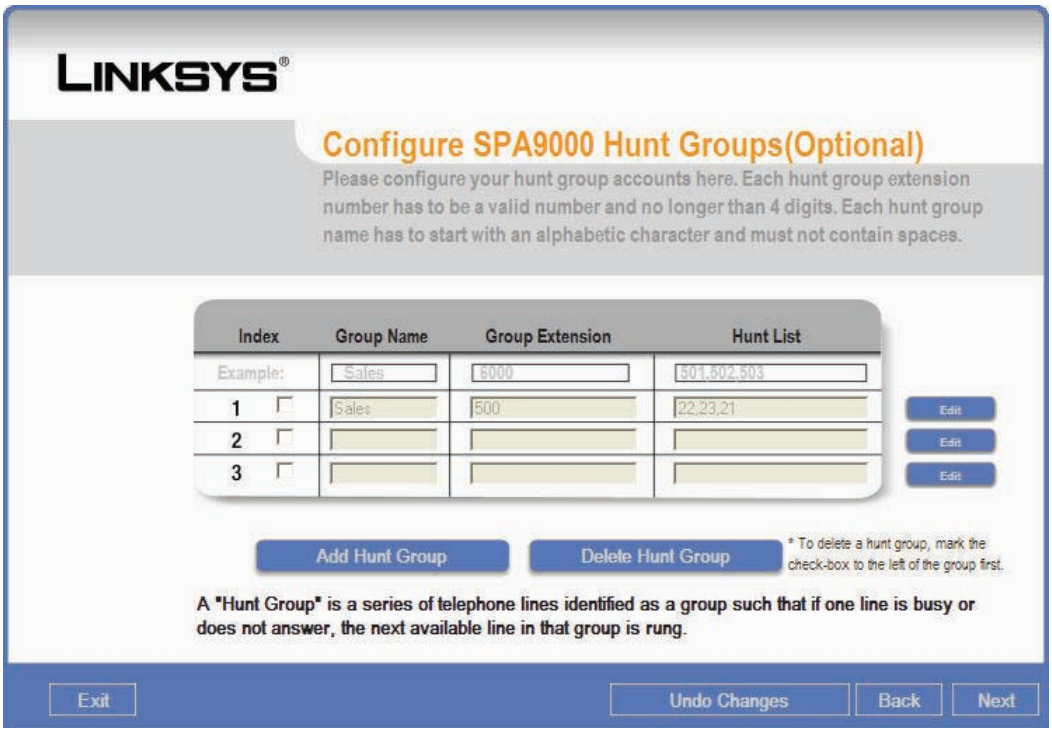


The Client Extensions page is described in "Configuring the Internal Phone Extensions" on page 55.

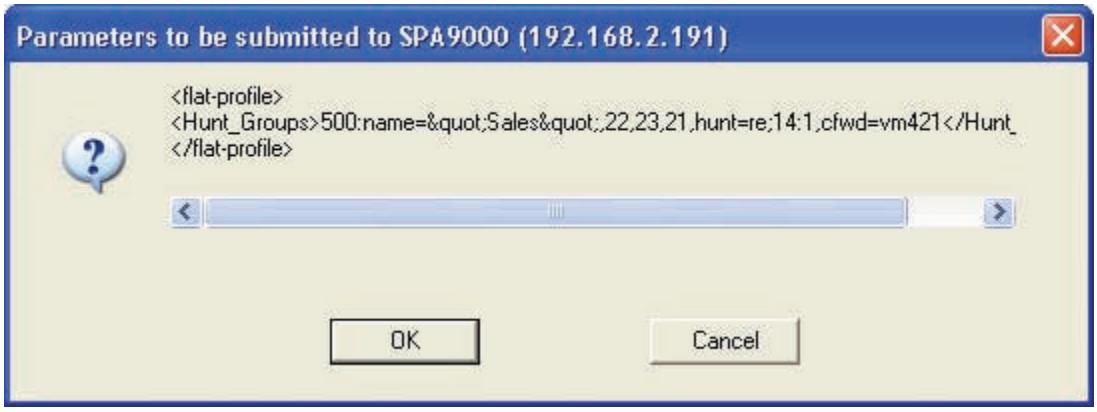
Hunt Groups

Main Menu > Advanced Features > Hunt Group

Assign group name, extension, hunt type, and members.



Following is a preview of the parameters that the Wizard will send to the SPA9000:



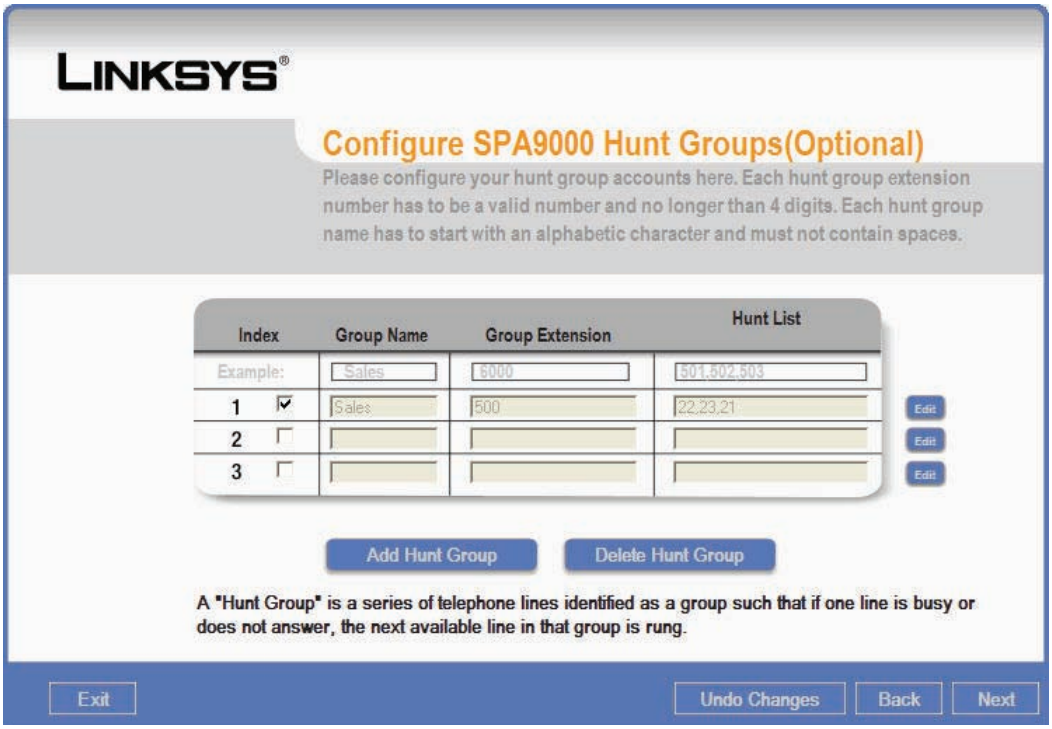
Following is the configuration that the Wizard will submit to the SPA9000.

```
<flat-profile>
<Hunt_Groups>500:name=&quot;Sales&quot;,22,23,21,hunt=re;14:1,cfwd=vm421</Hunt_Groups>
</flat-profile>
```

The *Configure SPA9000 Hunt Groups* page is described in "Configuring Hunt Groups (Optional)" on page 57.

To maintain hunt groups:

- Add hunt groups as described in "Configuring Hunt Groups (Optional)" on page 57.
- Edit a hunt group by clicking the **Edit** button associated with the hunt group.
- Delete a hunt group by clicking the *Index* check box associated with the hunt group and then clicking **Delete Hunt Group**.,



Auto Attendant

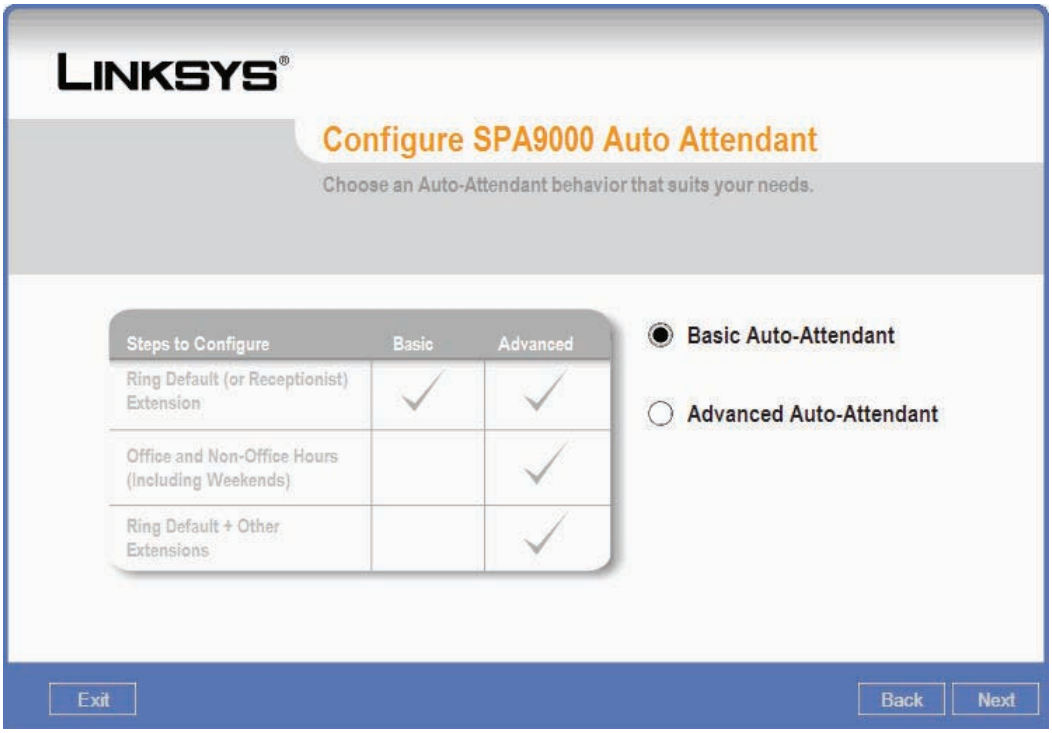
- Configure Basic Auto-Attendant
- Configure Advanced Auto Attendant

Auto Attendant Configuration: Basic

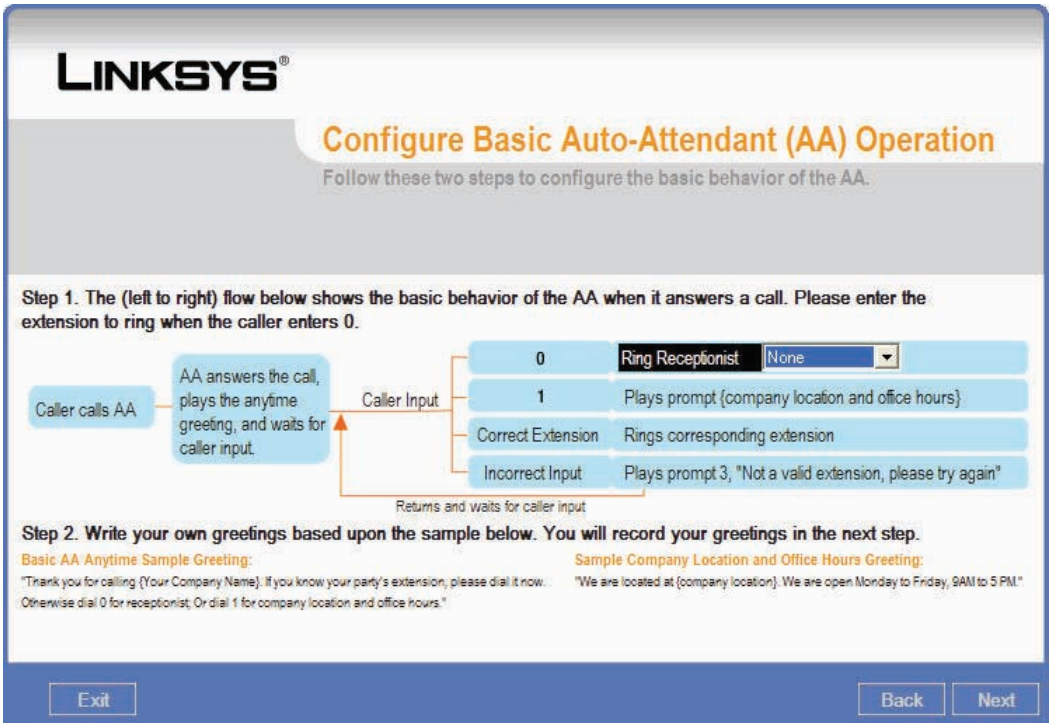
Basic auto attendant configuration assists you with establishing a general greeting, a location and hours message, and an option to dial the operator.

Main Menu > Advanced Features > Auto Attendant

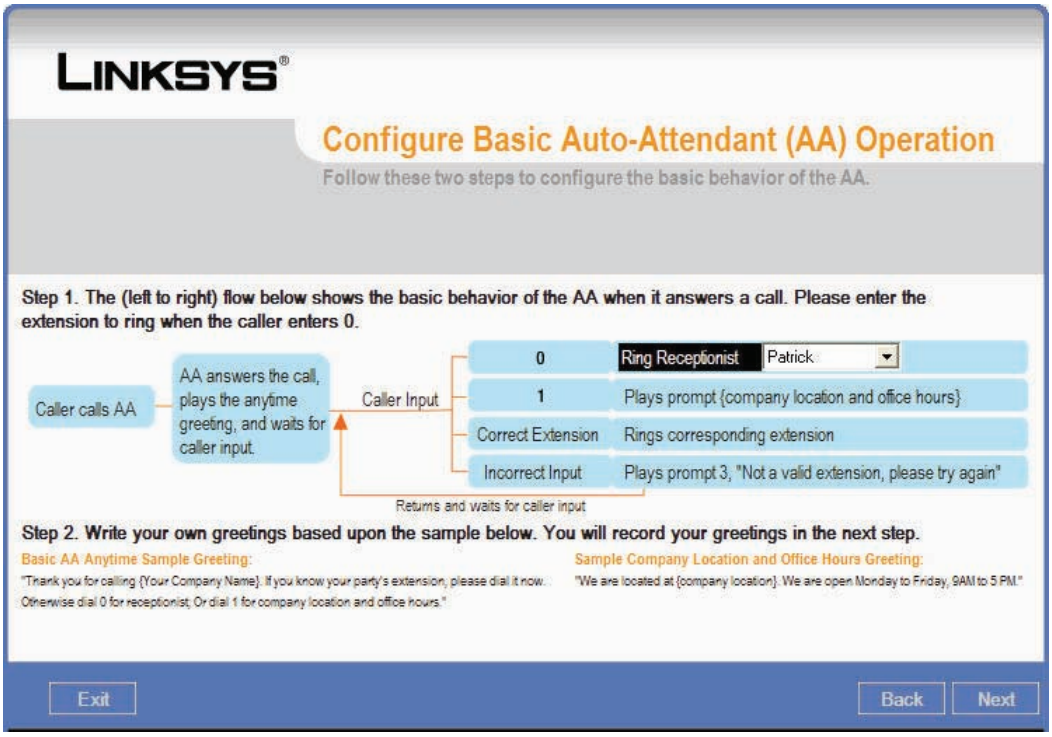
1. From the Main Menu, choose **Advanced Features**, and then click **Next**.
2. From the *Advanced Features* page, choose **Auto Attendant**, and then click **Next**.



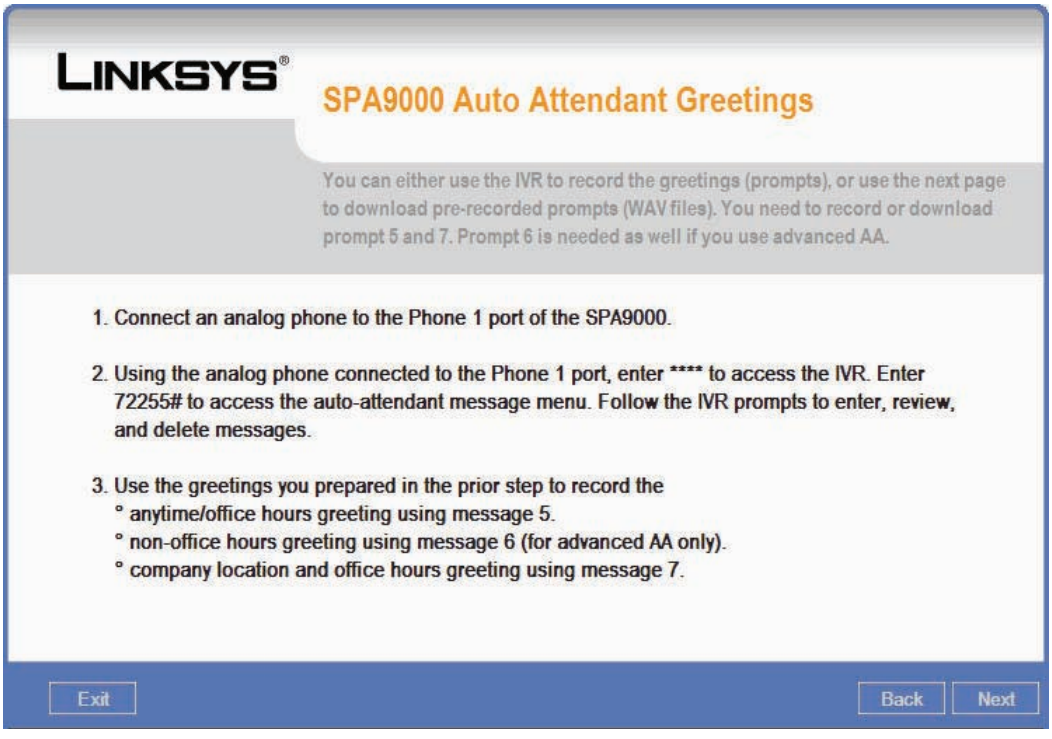
3. Click **Basic Auto-Attendant**, and then click **Next**.



4. Write the script for your AA recordings.
   - **General greeting**. The general greeting is known to the system as Message 5: You have reached <company name>. Dial your party's extension now. Dial 1 for our location and office hours. Dial 0 for the receptionist.
   - **Location and office hours greeting**: This greeting is known to the system as message 7: <company name> is located at <physical address>. Our regular business hours are <days of week>, <hour> AM to <hour> PM. Dial your party's extension now, or dial 0 for the receptionist.
5. Change R*ing Receptionist* as appropriate, Patrick, in this example.



6. Click **Next** to display the *SPA9000 Auto Attendant Greetings* page.



7. Follow the instructions on the *SPA9000 Auto Attendant Greetings* page to record the greetings. Following is the sequence in detail:
   a. Press * * * * on the analog phone connected to the SPA9000 to access the IVR.
   b. Press 72255# to access auto attendant messages.

c. Press 5# to select recording the general greeting.

d. Press 1 to record message 5:
"You have reached <company name>.
Dial your party's extension now.
Dial 1 for our location and office hours.
Dial 0 for the receptionist."

e. Press # to complete the recording of message 5.

f. Press 2 to review or 3 to re-enter

g. Press 1 to save.

h. Press 7# to select recording the location and office hours message.

i. Press 1 to record message 7
"<company name> is located at <physical address>. Our regular business hours are <days of week>, <hour> AM to <hour> PM. Dial your party's extension now, or dial 0 for the receptionist."

j. Press # to complete the recording of message 7.

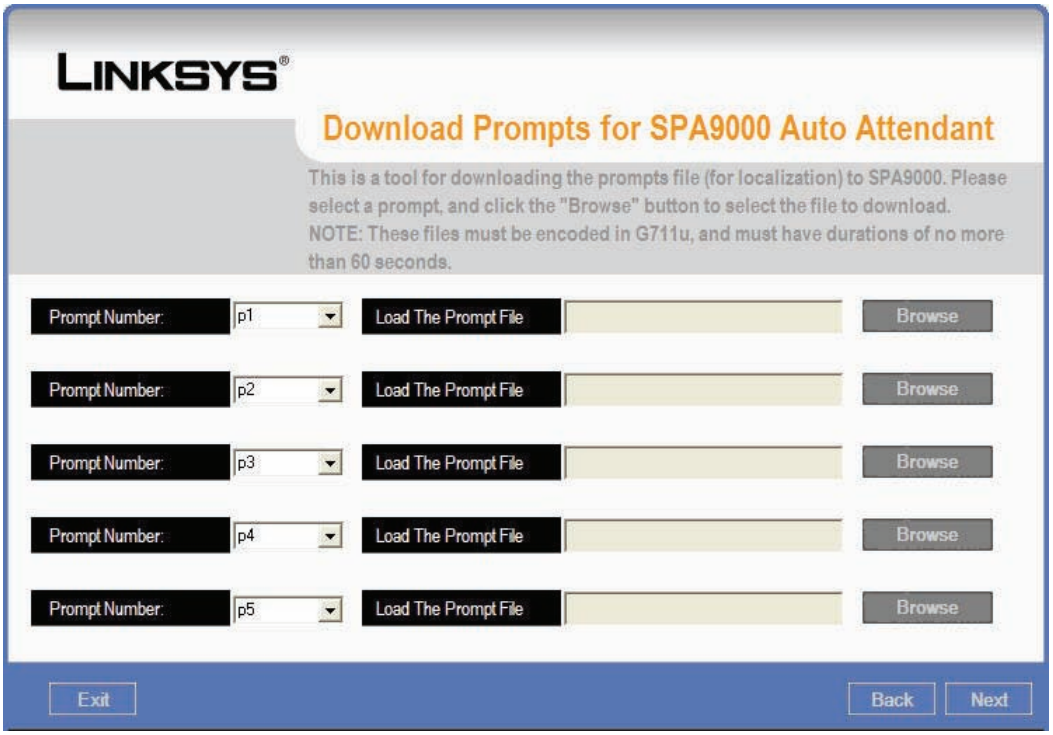
k. Press 2 to review or 3 to re-enter

l. Press 1 to save.

m. Press * to exit.

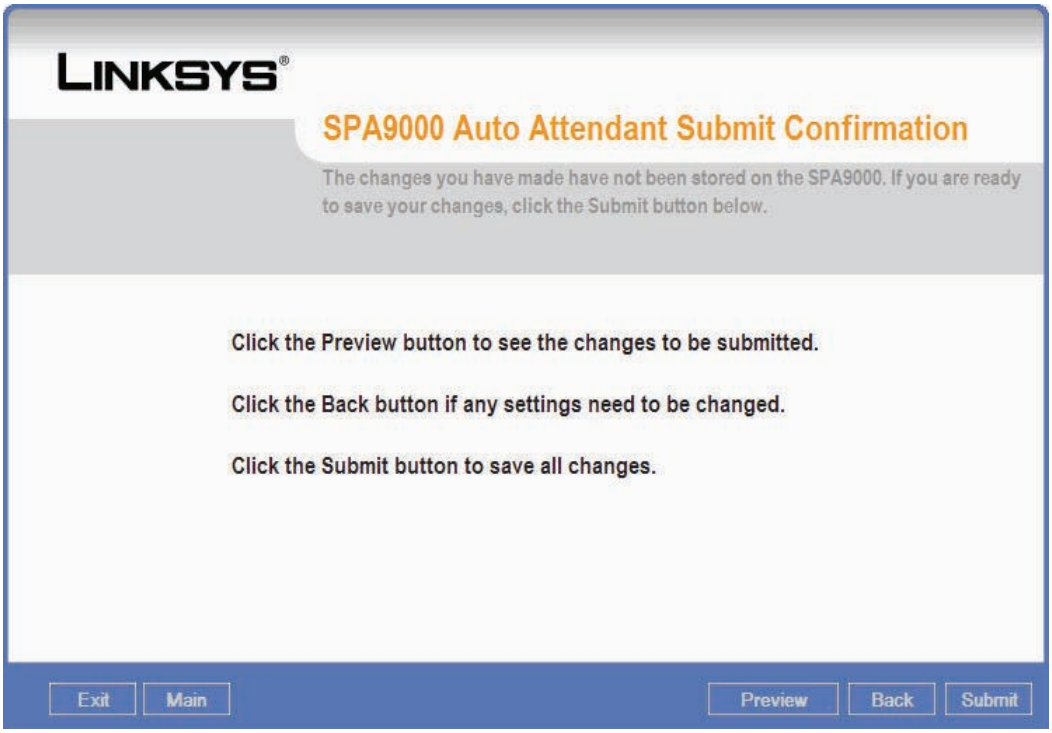
n. Hang up the analog phone.

8. Click **Next** to display the *Download Prompts for SPA9000 Auto Attendant* page.

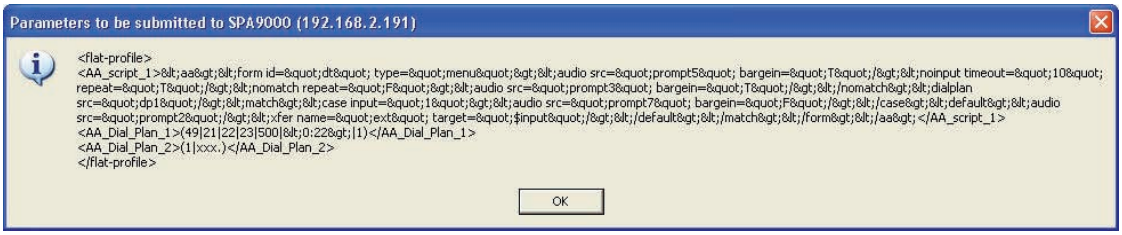


9. If needed, change any prompt by clicking **Browse** and choosing a WAV file. For more information, see "Downloading Custom Auto Attendant Prompts (Optional)" on page 62.

10. Click **Next** to display the *SPA9000 Auto Attendant Submit Confirmation* page.

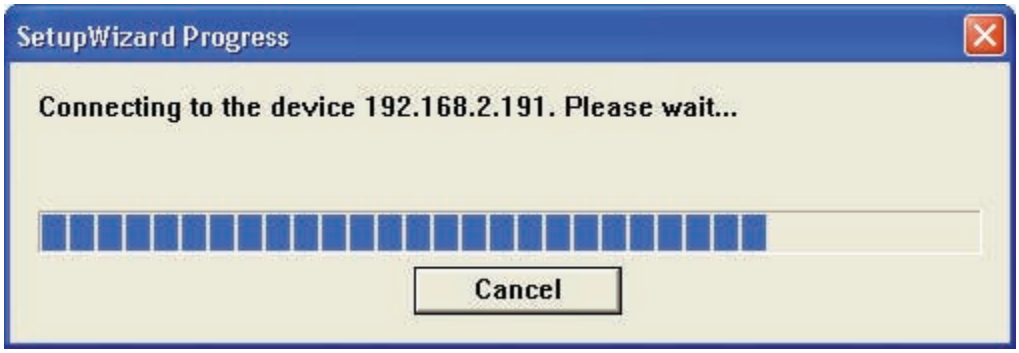


11. Click **Preview** to preview the changes that will be submitted to the SPA9000.



12. Click **OK** to close the preview information.
13. Click **Submit** to save the changes to the SPA9000.

The Wizard reboots the SPA9000 after saving the changes.

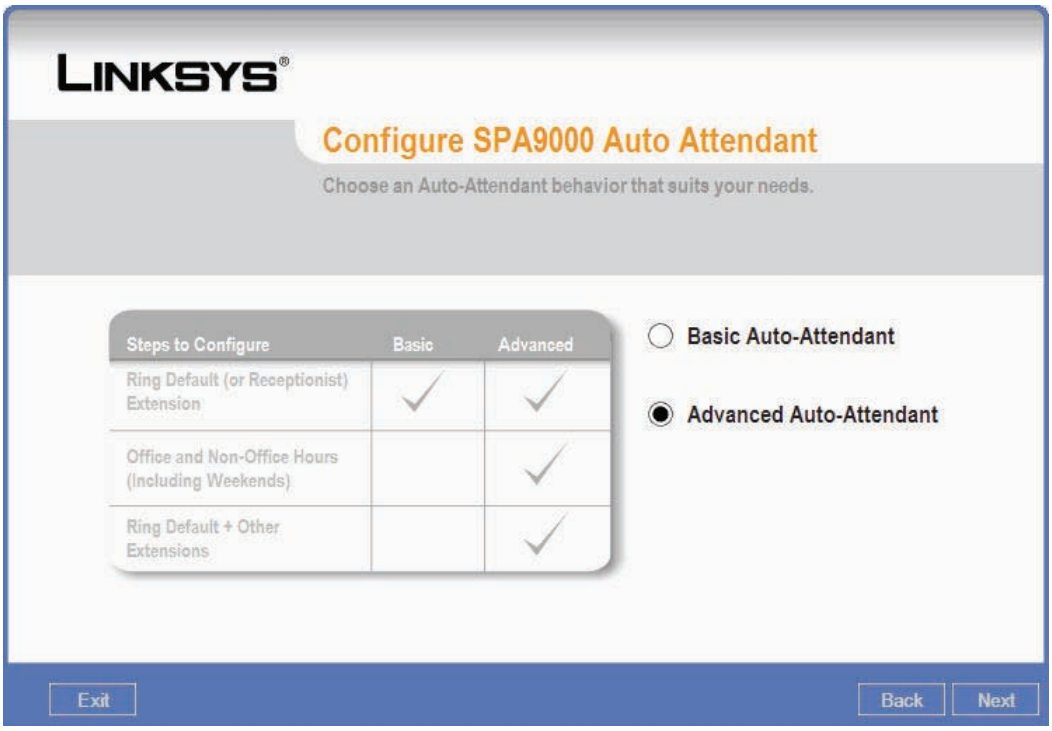


14. Click **OK** to return to the Main Menu.
15. Test the system by making an inbound call and navigating the auto attendant's IVR.

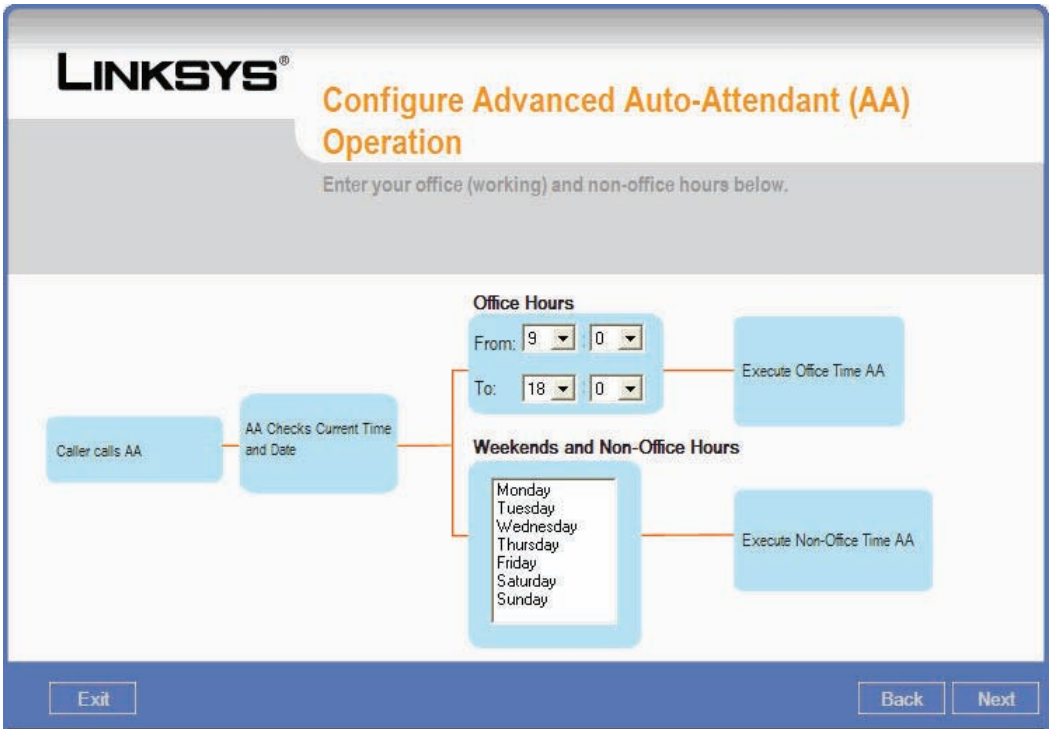
Auto Attendant Configuration: Advanced

Advanced auto attendant configuration assists you with establishing a general greeting, a location and hours message, and an option to dial the operator.

1. From the Main Menu, choose **Advanced Features**, and then click **Next**.
2. From the *Advanced Features* page, choose **Auto Attendant**, and then click **Next**.

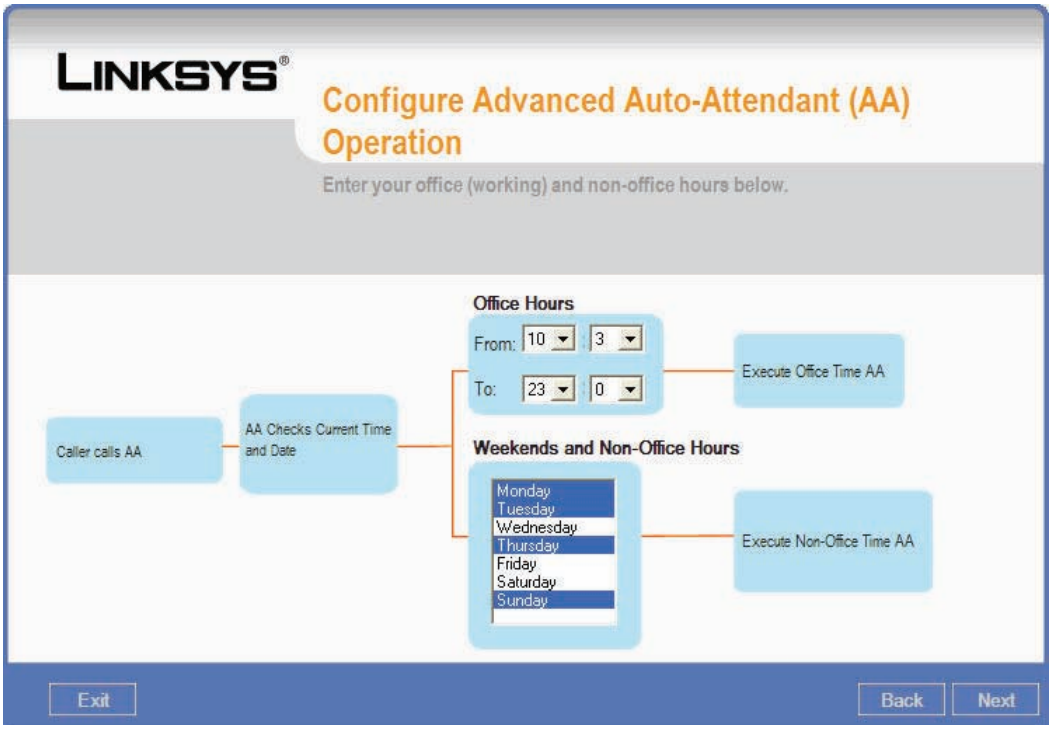


3. Click **Advanced Auto-Attendant**. , and then click **Next**.

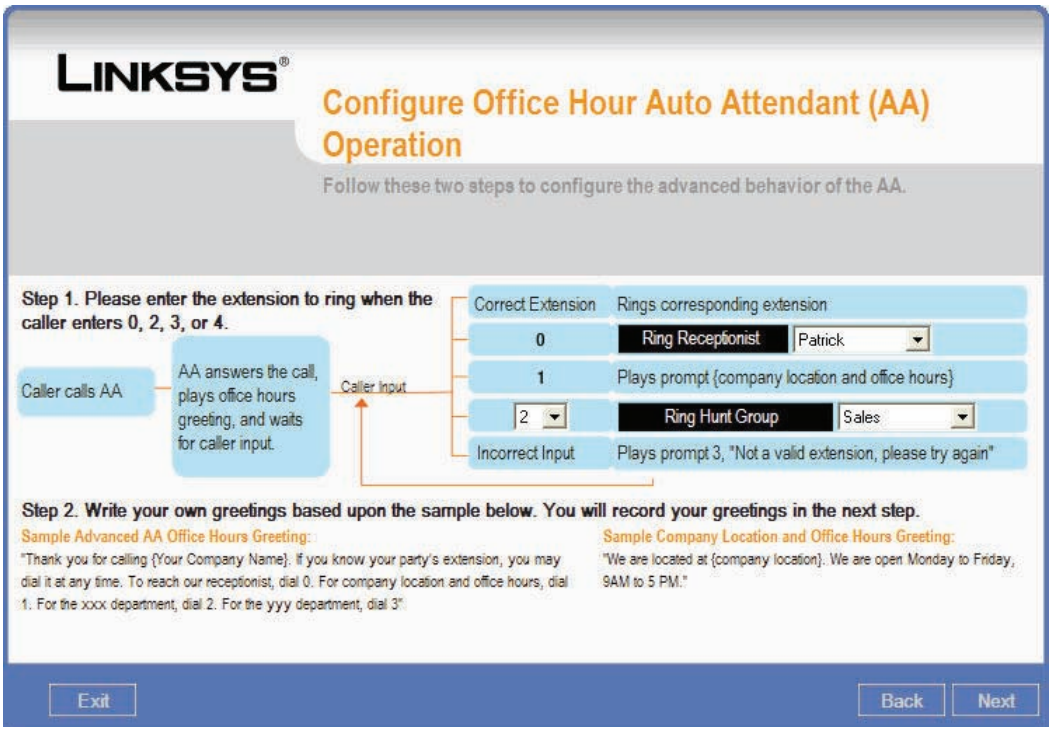


4. Modify the Office Hours to match regular business hours. Example:
   From:10:3
   To: 23:0

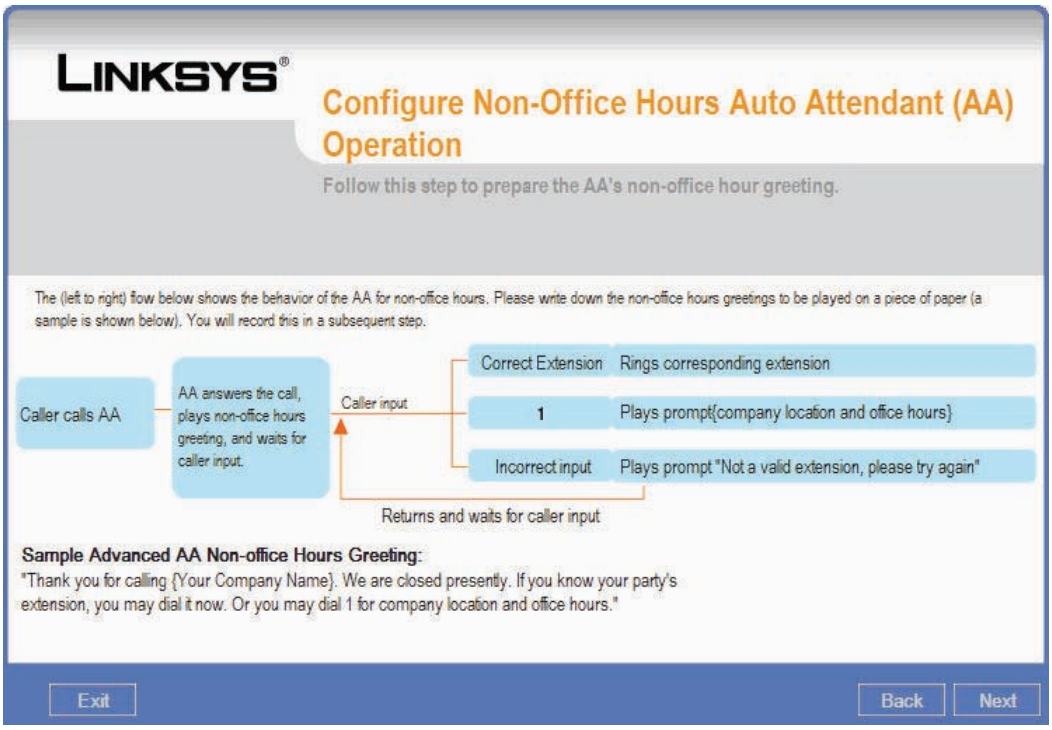
5. Select the days that the business is not open for regular business. Example: Monday, Tuesday, Thursday, and Sunday.



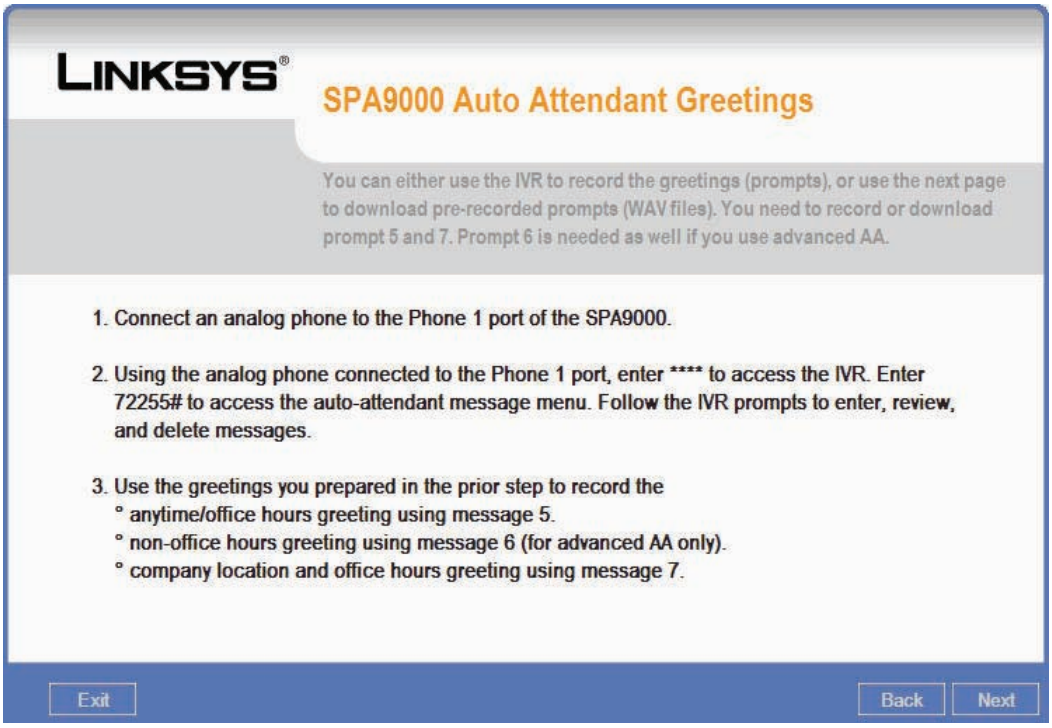
6. Click **Next** to display the Configure Office Hour Auto Attendant (AA) Operation page.
7. Select the *Ring Receptionist* extension from the drop-down menu. This extension will ring when 0 is selected.
8. Select 2, 3, or 4.
9. Select the Hunt Group to ring when 2,3, or 4 are selected.
10. Repeat the previous two steps for up to 3 previously assigned hunt groups.



11. Click **Next** to display the Configure Non-Office Hours Auto Attendant (AA) Operation page.
12. Write the script for your AA recordings.
    After Hours greeting: The greeting is known to the system as message 6:
    <company name> is now closed.
    Dial your party's extension now.
    Dial 1 for our location and office hours.
    Dial 2 for the receptionist.
    General greeting: The general greeting is known to the system as Message 5:
    You have reached <company name>.
    Dial your party's extension now.
    Dial 1 for our location and office hours.
    Dial 2 for the receptionist.
    Location and office hours greeting: This greeting is known to the system as message 7:
    <company name> is located at <physical address>.
    Our regular business hours are <days of week>, <hour> AM to <hour> PM.
    Dial your party's extension now, or dial 2 for the receptionist.
13. Click **Next** to display the SPA9000 Auto Attendant Greetings page.



14. Click **Next** to display the *SPA9000 Auto Attendant Greetings* page.



15. Follow the instructions on the *SPA9000 Auto Attendant Greetings* page to record the greetings. Following is the sequence in detail:
    a. Press * * * * on the analog phone connected to the SPA9000 to access the IVR.
    b. Press 72255# to access auto attendant messages.
    c. Press 5# to select recording the general greeting.

d. Press 1 to record message 5:
"You have reached <company name>.
Dial your party's extension now.
Dial 1 for our location and office hours.
Dial 0 for the receptionist."

e. Press # to complete the recording of message 5.

f. Press 2 to review or 3 to re-enter

g. Press 1 to save.

h. Press 6# to select recording the non-office hours greeting.

i. Press 1 to record message 6:
"<company name> is now closed.
Dial your party's extension now.
Dial 1 for our location and office hours.
Dial 0 for the receptionist."

j. Press # to complete the recording of message 6.

k. Press 2 to review or 3 to re-enter

l. Press 1 to save.

m. Press 7# to select recording the location and office hours message.

n. Press 1 to record message 7
"<company name> is located at <physical address>. Our regular business hours are <days of week>, <hour> AM to <hour> PM. Dial your party's extension now, or dial 0 for the receptionist."

o. Press # to complete the recording of message 7.

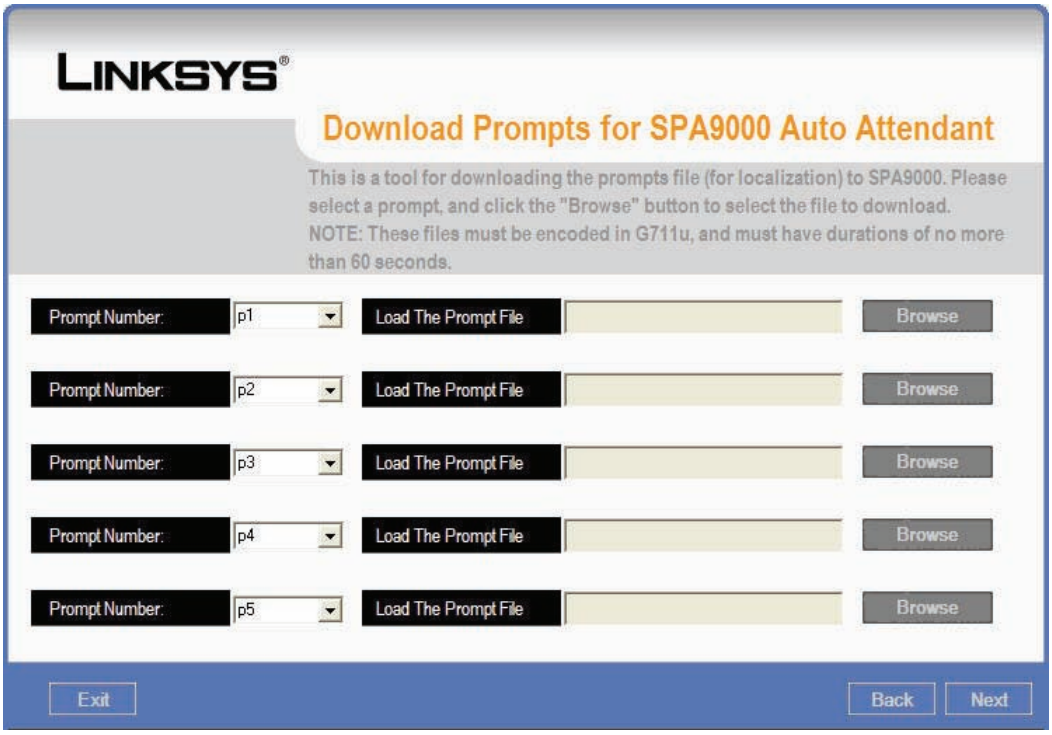
p. Press 2 to review or 3 to re-enter

q. Press 1 to save.

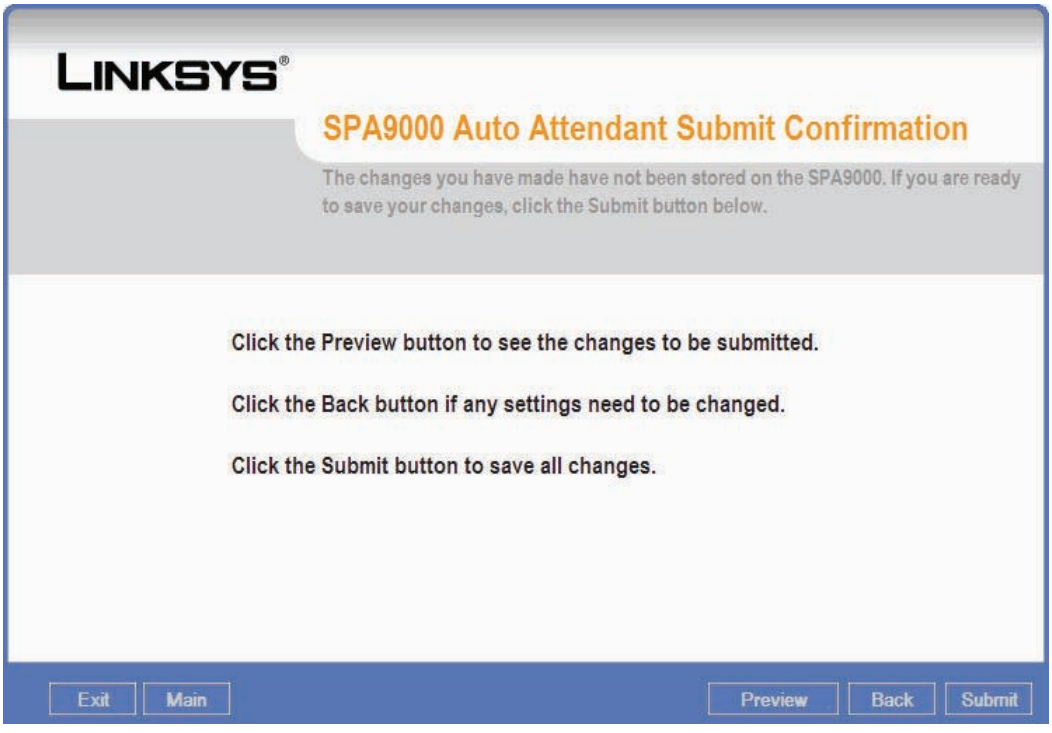
r. Press * to exit.

s. Hang up the analog phone.

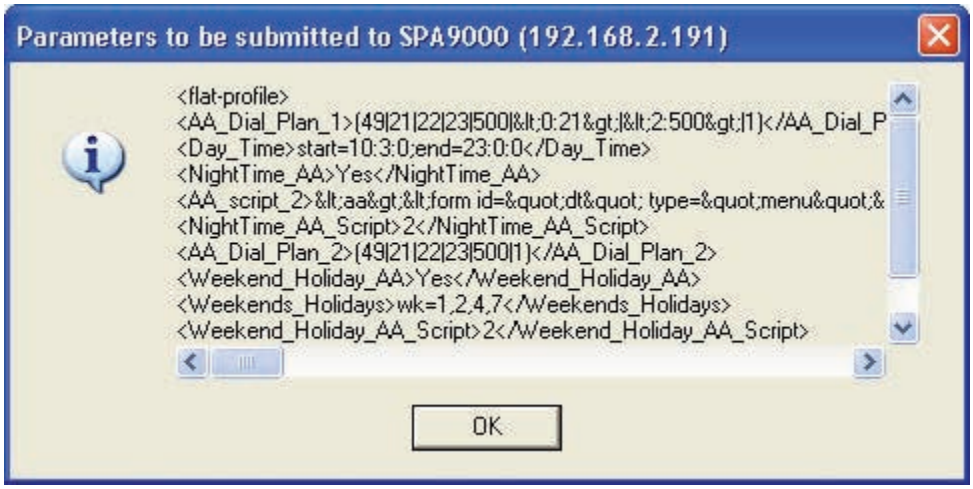
16. Click **Next** to display the *Download Prompts for SPA9000 Auto Attendant* page.



17. If needed, change any prompt by clicking **Browse** and choosing a WAV file. For more information, see "Downloading Custom Auto Attendant Prompts (Optional)" on page 62.
18. Click **Next** to display the *SPA9000 Auto Attendant Submit Confirmation* page.

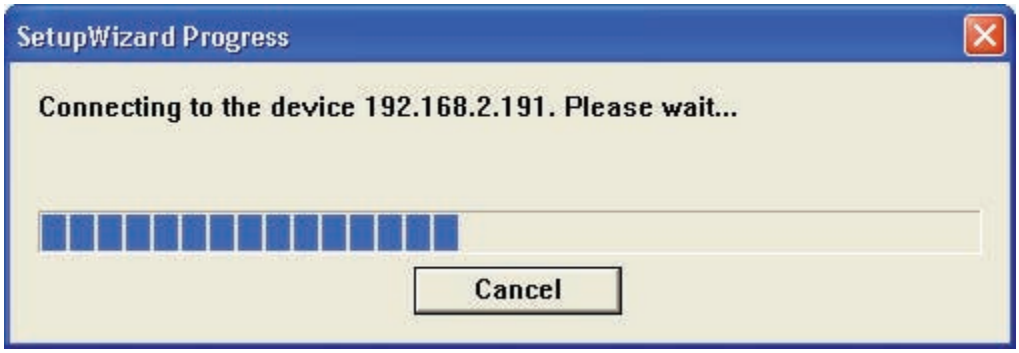


19. Click **Preview** to preview the changes that will be submitted to the SPA9000.

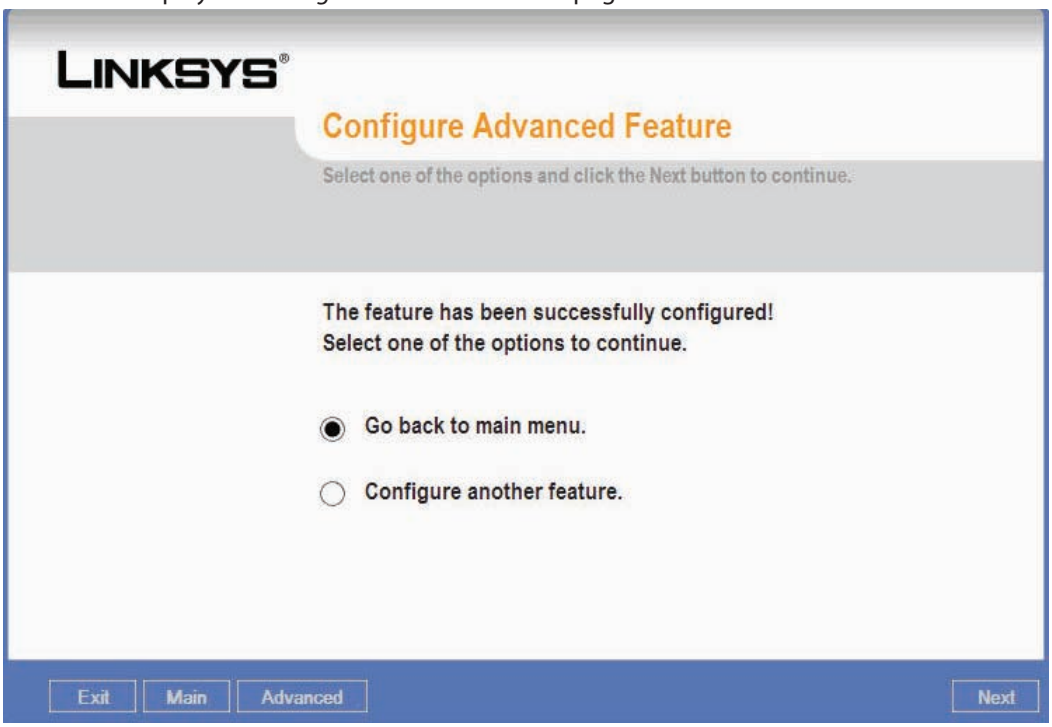


20. Click **OK** to close the preview information.
21. Click **Submit** to save the changes to the SPA9000.

The Wizard reboots the SPA9000 after saving the changes.



22. Click **OK** to display the *Configure Advanced Feature* page.



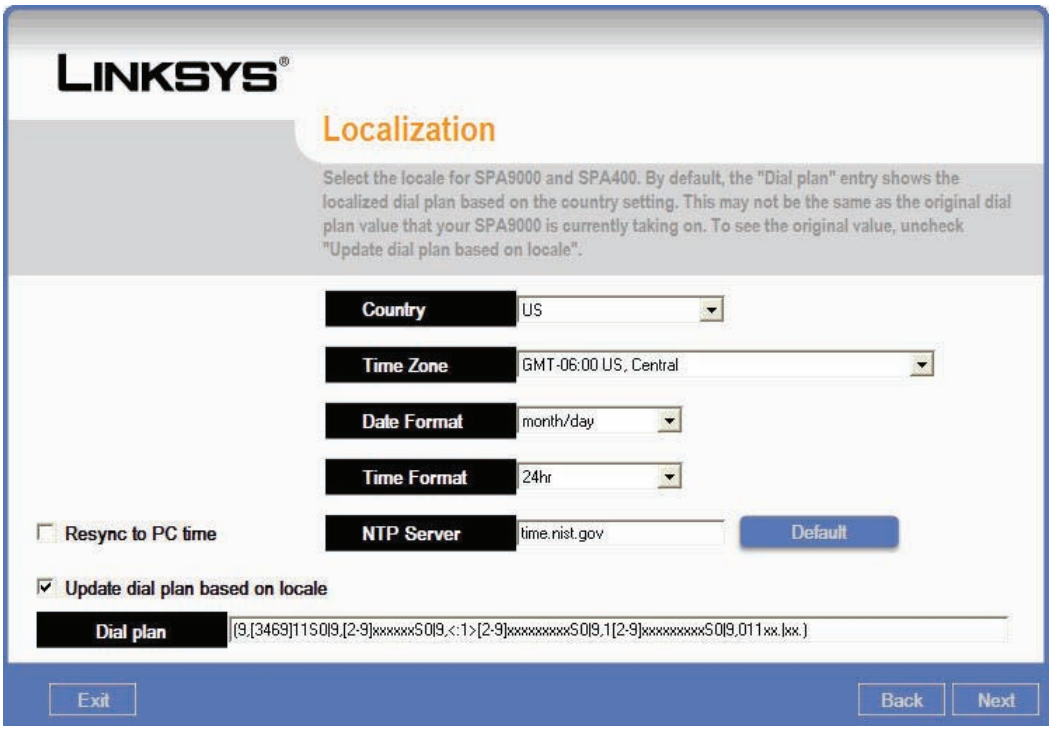
23. Click **Next** return to the Main Menu.
24. Test the system by making an inbound call and navigating the auto attendant's IVR.

Localizing the Language Dictionaries for the Phone Display

You can choose a language for the phone display. The dictionary files are included in the Wizard release package. If you download new dictionary files from Linksys.com, save them in the Wizard's *dict* sub-directory.

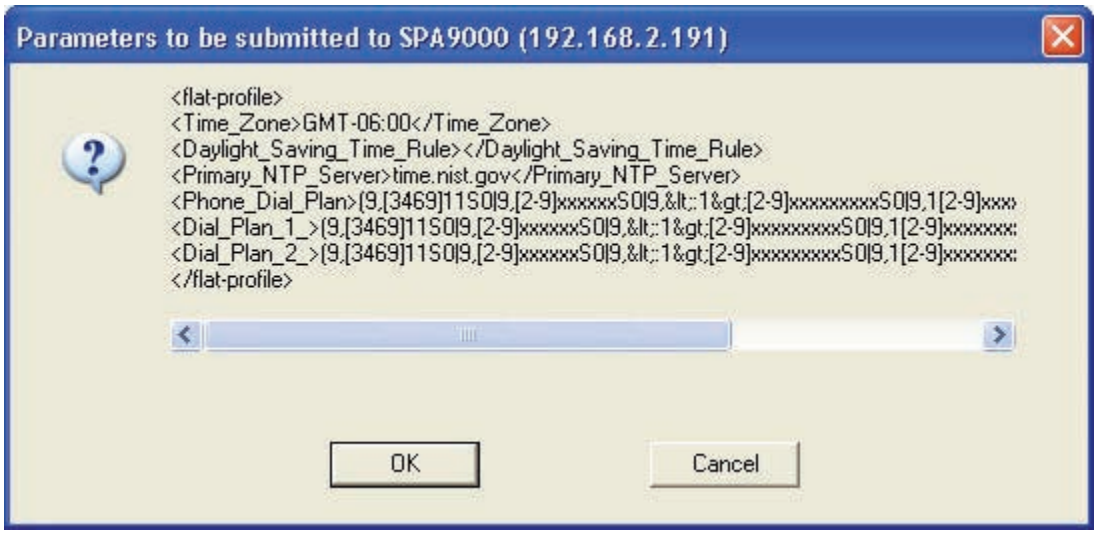
NOTE: For information about choosing the country, time zone, and date formats, see "Localizing the SPA9000" on page 60.

1. From the Main Menu, click **Advanced Features**, and then click **Next**.
2. From the *Advanced Features* page, choose **Localization**, and then click **Next**.



3. Click **Next** to cause the Wizard to connect to all LVS devices and *Display the Download Client Dictionary* page.

4. Click **Next** to preview the changes that Wizard will send to the SPA9000.



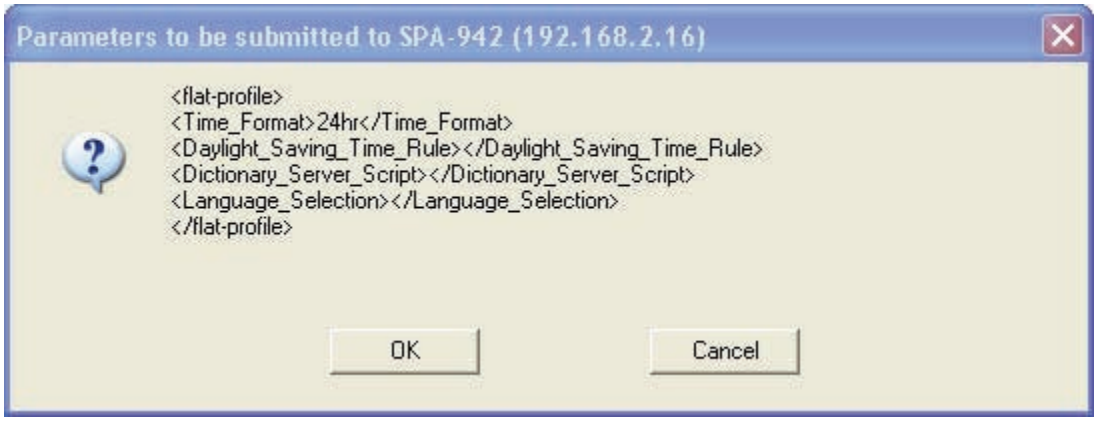
Following are the parameters that the Wizard will send to the SPA9000:

```
<flat-profile>
<Time_Zone>GMT-06:00</Time_Zone>
<Daylight_Saving_Time_Rule></Daylight_Saving_Time_Rule>
<Primary_NTP_Server>time.nist.gov</Primary_NTP_Server>
<Phone_Dial_Plan>(9,[3469]11S0|9,[2-9]xxxxxxS0|9,&lt;:1&gt;[2-9]
xxxxxxxxxS0|9,1[2-9]xxxxxxxxxS0|9,011xx.|xx.)</Phone_Dial_Plan>
<Dial_Plan_1_>(9,[3469]11S0|9,[2-9]xxxxxxS0|9,&lt;:1&gt;[2-9]
xxxxxxxxxS0|9,1[2-9]xxxxxxxxxS0|9,011xx.|xx.)</Dial_Plan_1_>
```

<Dial_Plan_2_>(9,[3469]11S0|9,[2-9]xxxxxS0|9,<:1>[2-9]xxxxxxxxS0|9,1[2-9]xxxxxxxxS0|9,011xx.|xx.)</Dial_Plan_2_>

</flat-profile>

5. Click **OK** to close the SPA9000 preview window and display the next preview window.



Following are the parameters that the Wizard will send to the IP phone:

<flat-profile>

<Time_Format>24hr</Time_Format>

<Daylight_Saving_Time_Rule></Daylight_Saving_Time_Rule>

<Dictionary_Server_Script></Dictionary_Server_Script>

<Language_Selection></Language_Selection>

</flat-profile>

6. Click **OK** to close the SPA9xx preview window and cause the Wizard to display the preview information for the remaining phones.
7. Click **OK** to close the preview windows to cause the Wizard to submit the changes to the devices and then reboot them.

Admin Password

- Change admin password on SPA9000
- Change admin password on SPA400
- Change admin password on selected phone
- Change admin password on every phone

1. From the Main Menu, click **Advanced Features**, and then click **Next**.
2. From the *Advanced Features* page, choose **Admin Password**, and then click **Next**.
3. From the **Device** drop-down list, choose the device.
4. Type the new password and confirm it.
5. Click **Submit** to cause the Wizard to change the password on each phone.

SPA932 Attendant Console

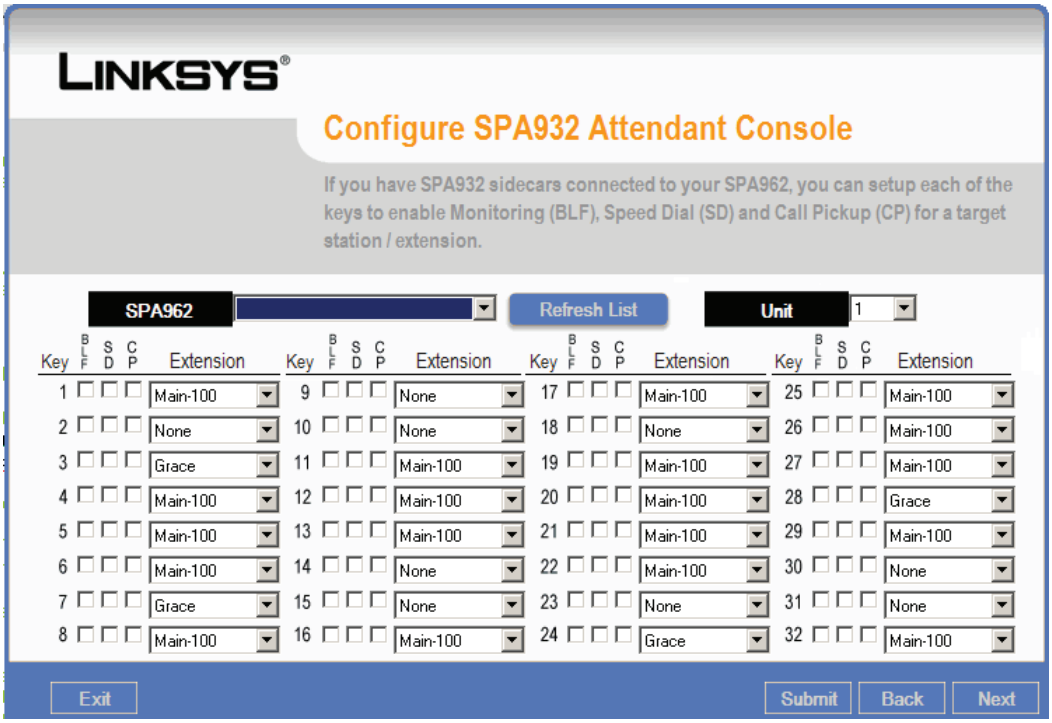
NOTE: Only SPA9x2 IP phones support computer telephony interface (CTI) which is required for SPA932 interaction.

Expert Tip: In the event that you need to monitor a SPA9x1 phone, configure a SLA on a SPA9x2 phone and then configure the SPA932 to monitor the SPA9x1 phone with the Wizard. The Wizard will use the SPA9x2 phone to monitor the SPA9x1's SLA, allowing you to effectively monitor a SPA9x1 phone. In the following example, the SPA932 key 2 is assigned to monitor a SPA901 IP phone.

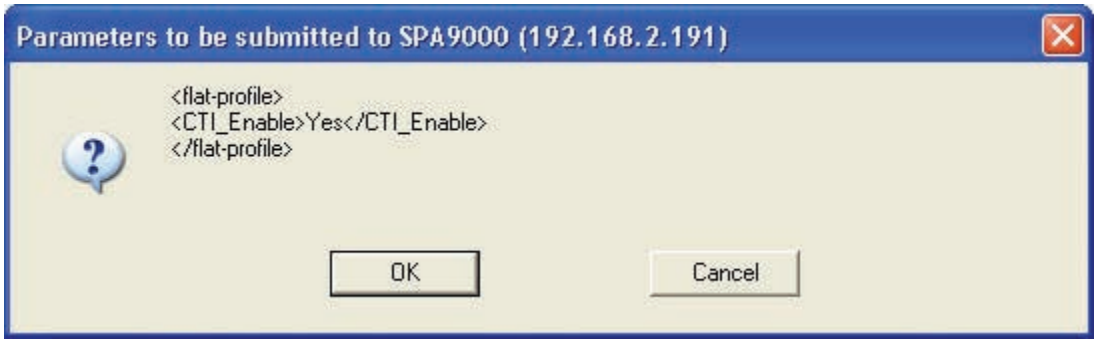
Use the LVS Wizard to configure busy line field (BLF) (call monitoring), speed dial (SD), and call pickup (CP) features on the SPA932 Attendant Console as follows:

1. From the Main Menu, click **Advanced Features**, and then click **Next**.
2. From the *Advanced Features* page, choose **SPA932 Attendant console**, and then click **Next**.
3. Decide which SPA932 Key to assign.

4. Select the extension from the Extension drop-down menu.
5. Select the required features, BLF, SD, & CP in this example.

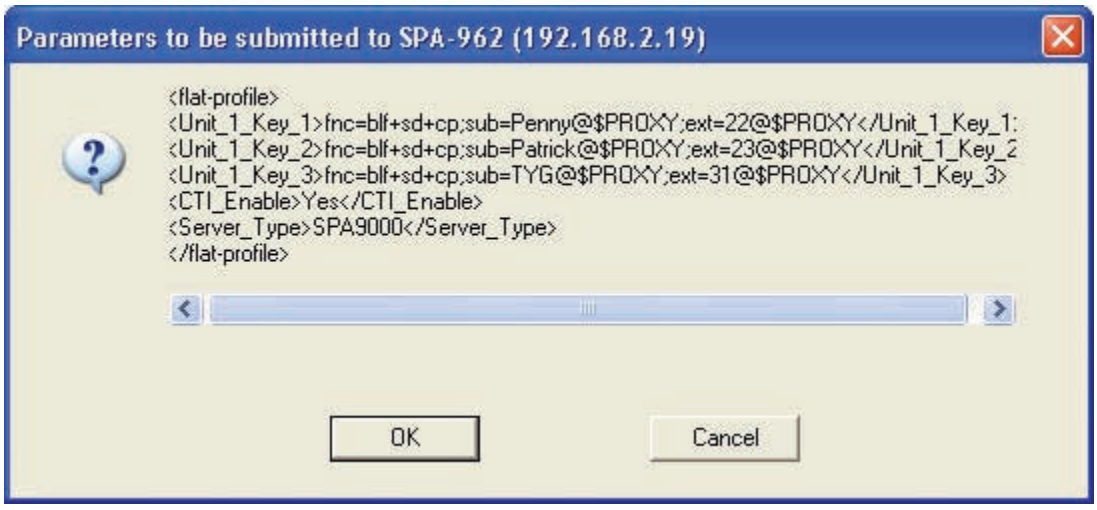


6. When you have multiple SPA962s, the Submit button lets you submit changes for the currently selected SPA962, and the Wizard will stay on the same page after the submission so that you can continue to configure the other SPA962/932s. Clicking Next will submit changes for all devices and the Wizard will display the next page.
7. Click **Submit** or **Next** to display the parameters to be submitted to the SPA9000 and the SPA962 which controls the SPA932 attendant console.



NOTE: CTI represents Computer Telephony Interface.

8. Click **OK** to display the parameters to be submitted to the SPA962.



The following parameters are sent to the SPA962:

```
<flat-profile>
<Unit_1_Key_1>fnc=blf+sd+cp;sub=Penny@$PROXY;ext=22@$PROXY</Unit_1_Key_1>
<Unit_1_Key_2>fnc=blf+sd+cp;sub=Patrick@$PROXY;ext=23@$PROXY</Unit_1_Key_2>
<Unit_1_Key_3>fnc=blf+sd+cp;sub=TYG@$PROXY;ext=31@$PROXY</Unit_1_Key_3>
<CTI_Enable>Yes</CTI_Enable>
<Server_Type>SPA9000</Server_Type>
</flat-profile>
```

Expert Tip: Observe that Key_2 subscribes as "Patrick@$PROXY", yet the device to monitor is Jarryd. The Wizard selected Patrick because it is a SPA962 with a SLA from Jarryd [SPA901]

9. Click **OK** to close the parameter preview window.

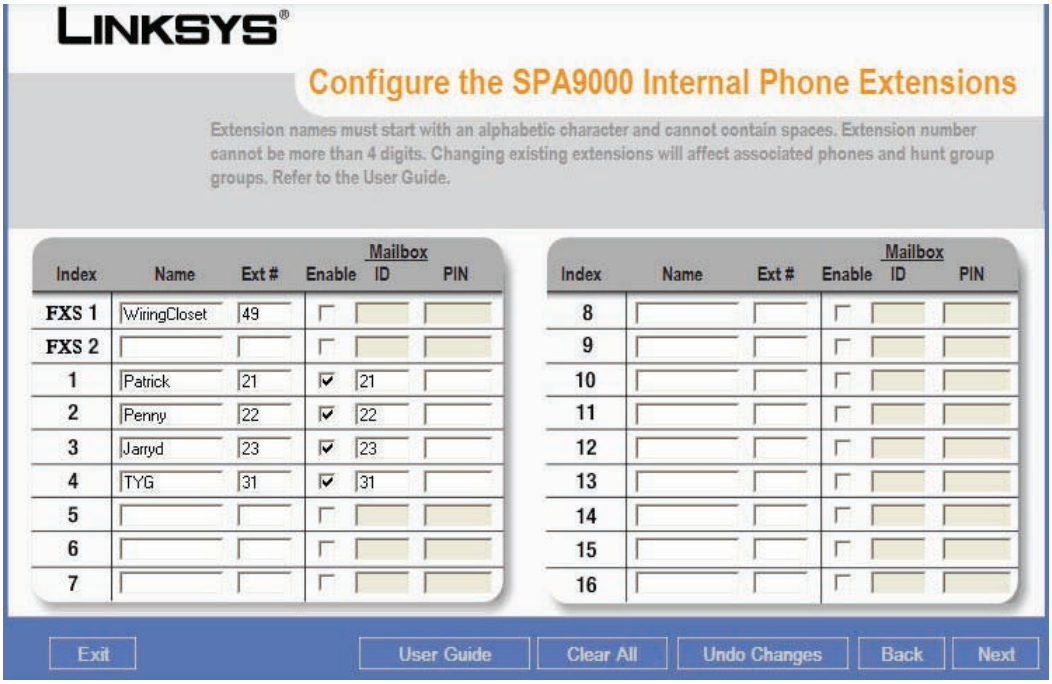
   The Wizard enables CTI on each of the monitored phones and then reboots them.

10. Click **OK** to close the Wizard status window.

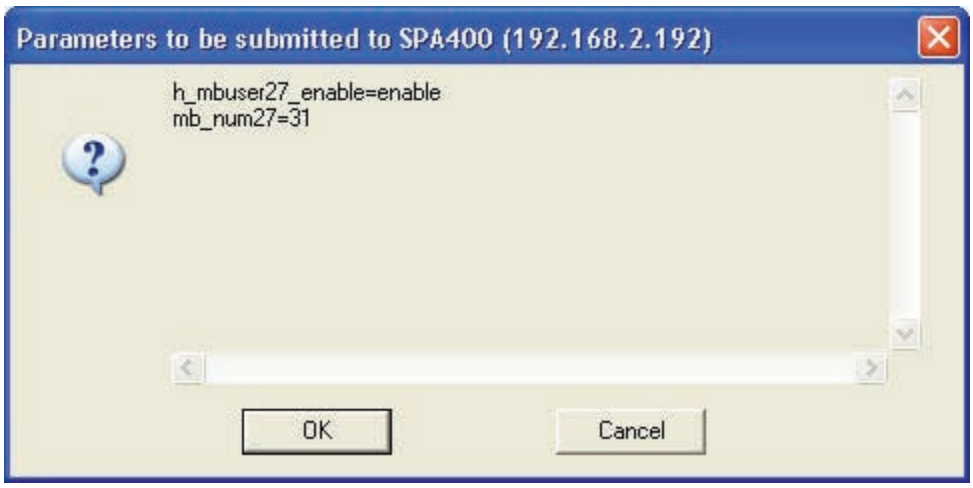
Adding a Phone to an Existing Configuration

This example details adding a phone, called TYG, extension 31, to an existing configuration.

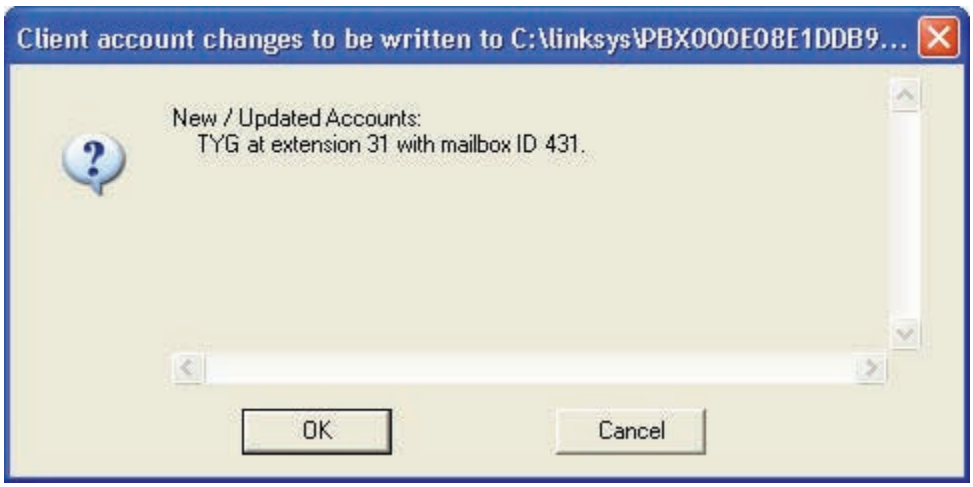
1. Before adding a new phone, you need to define an internal phone extension on the SPA9000 for the new phone. See "Configuring the Internal Phone Extensions" on page 55.



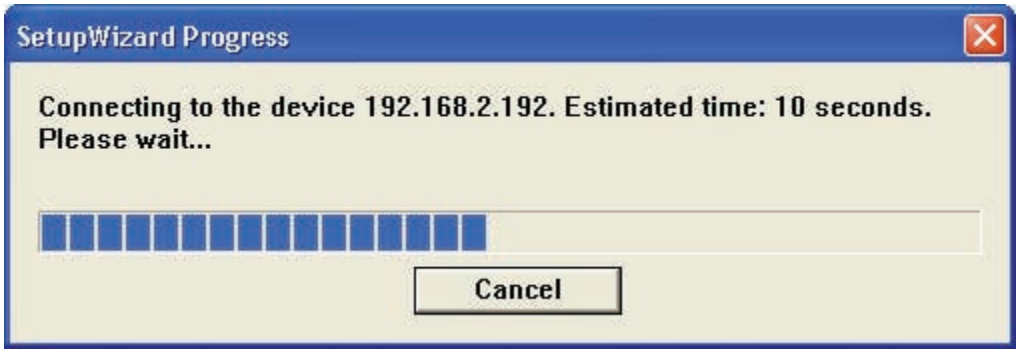
2. Click **Next** to update the SPA400 with the mailbox information. The Wizard displays a preview of the parameter updates.



3. Click **OK** to acknowledge the updates being written to the *C:\linksys\PBX<SPA9000_MAC_Address>.act* file.



4. Click **OK** to allow the updates to be written to the SPA400.



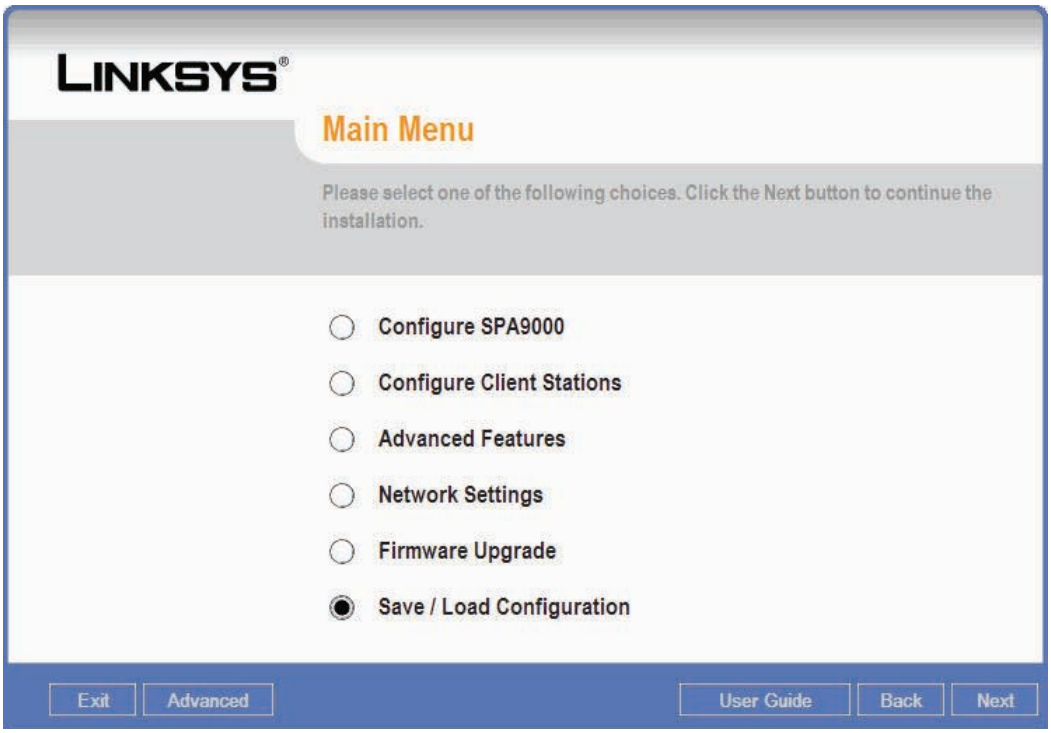
5. Click **OK** to return to the *Configure Advanced Feature* page.

6. Now that you have defined an extension for the new phone, you must associate the new phone with the new extension. Refer to the Associating Phones with Extensions (configuring client stations) on page 64.
7. The phone will reboot and is now available for use. This completes the Adding a Phone to an Existing Configuration sequence.

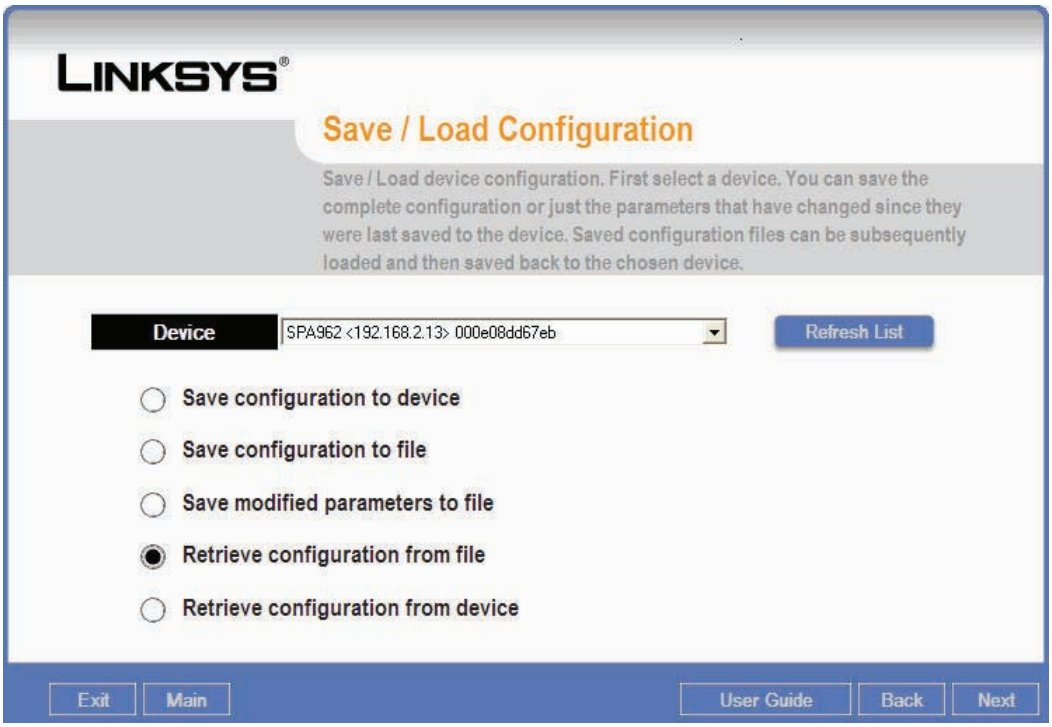
Replacing a Phone [Experts Only]

Replace a phone with an identical replacement model as follows:

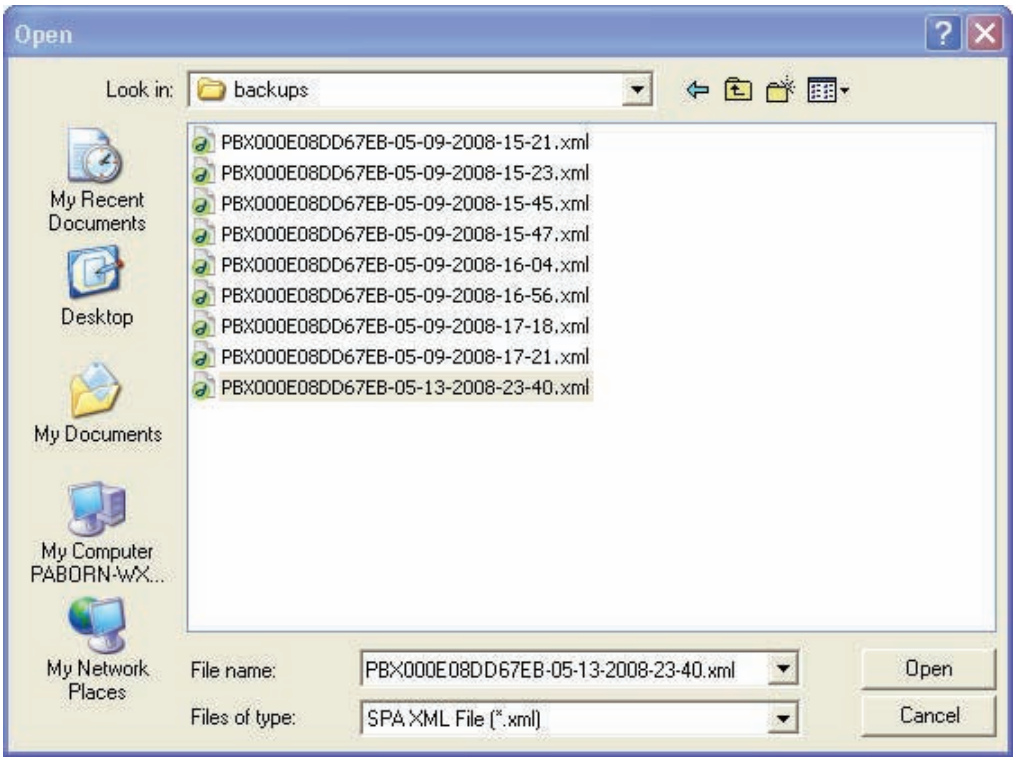
1. Disconnect the phone to be replaced and note its MAC address. [example, ending in 575e]
2. Install the new phone and note its MAC address. [example, ending in 67eb]
3. Locate the most recent backup for the replaced phone.
4. Copy the backup file and save it using the MAC address of the new phone
5. Perform a factory default reset on the new phone.
6. Navigate to the LVS Wizard's Main Menu, select Save / Load Configuration.



7. Click **Next** to display the *Save / Load Configuration* Page.
8. Click **Refresh List** to cause the Wizard to locate the newly added phone.
9. Select the new phone from the *Device* drop-down menu.
10. Select **Retrieve configuration from file**.

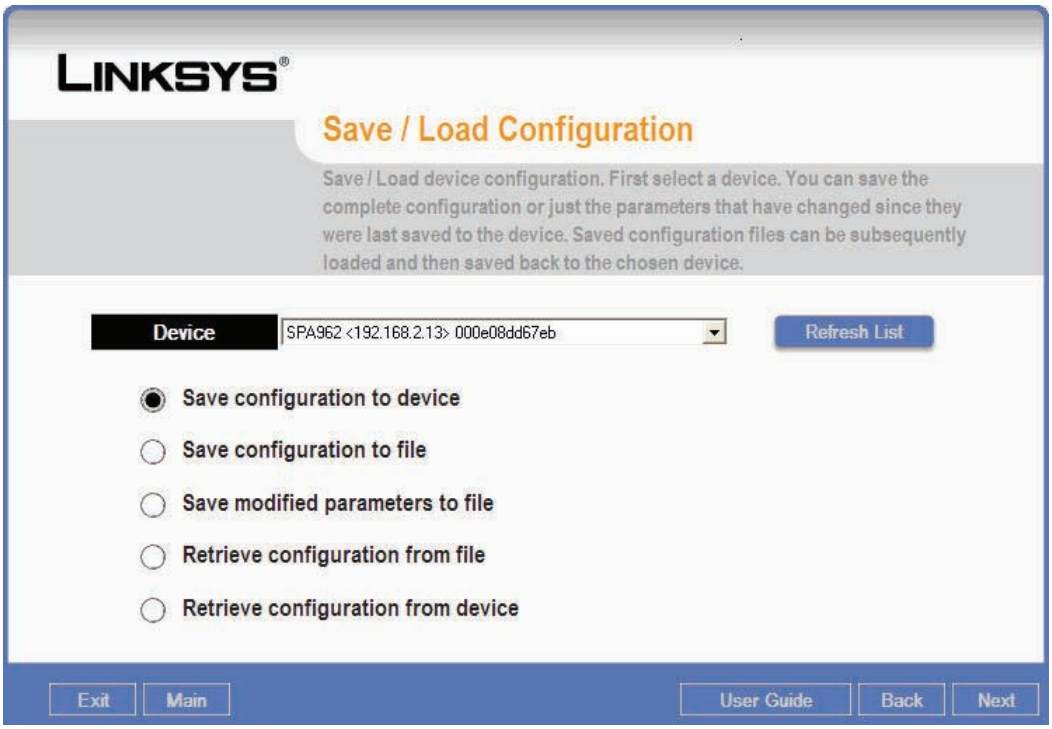


11. Click **Next** to display the *Open file* dialog.
12. Navigate to the renamed backup file.

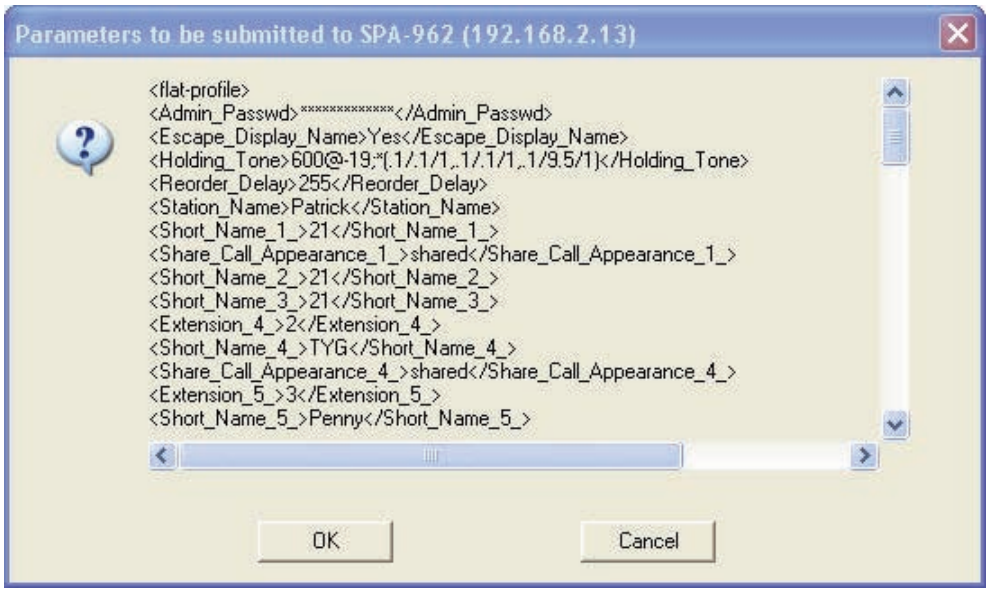


13. Click **Open** to start the load from file.

14. Click **OK** to close the notification window.
15. Select **Save** configuration to device.



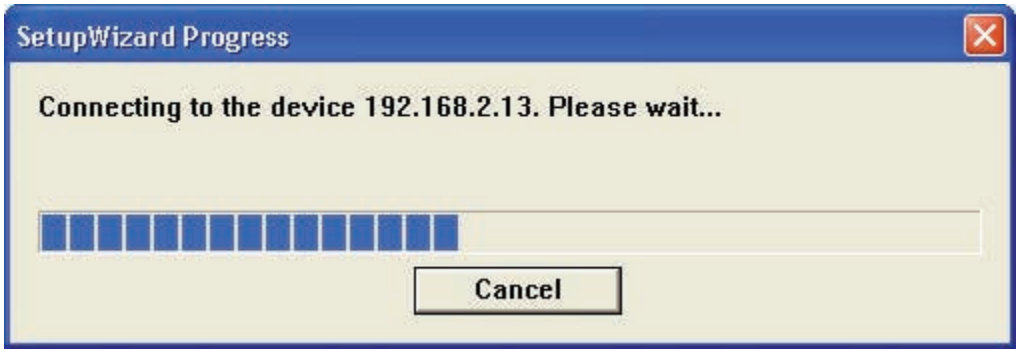
16. Click **Next** to preview the changes that will be sent to the phone.



17. Click **OK** to close the preview window.

    The Wizard submits the changes to the phone.

    The Wizard reboots the phone and reconnects to it.



    The Wizard reports the status of the process.

18. Click **OK** to close the status window.

    The new phone now has the same configuration as the replaced phone and is ready for use.

Removing a Forgotten Password [Expert Only]

In the event that a device's password has been forgotten and needs to be changed, do the following:

1. Locate the device's most recent backup file.
2. Make a copy of the backup file.
3. Edit the copied backup file
4. Locate the <Admin_Passwd>
   Example: `<Admin_Passwd>**********</Admin_Passwd>`
5. Remove all of the asterisks.
6. Save the file.
7. Factory reset the device.
8. Retrieve the configuration from file.
9. Save the configuration to device.

Installation Workbook

Workbook Purpose: This workbook is intended to help you to record information about the customer's network environment as well as the order and service information, in advance of the LVS installation. By using this workbook, you can minimize the LVS installation time and ensure that all setup requirements are met.

Workbook User Target: (1) LVS installation technician. (2) Training and checklist for VARs, Resellers and Service Providers.

Linksys 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	
On premises or phone (Circle one.) site survey date	
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.)	LVS 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.)	Receptionist telephone Automatic attendant Direct Inward Dialing Voice mail Other (please specify):

Infrastructure Survey

New Cable wiring required (Circle one.)	YES/NO
If yes, how many and where?	
AC Outlet available for each LVS component 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 it 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/Secondary DNS	/
Bandwidth Uplink/Downlink (kbps)	/

Bandwidth

Codec Bandwidth per conversation	G.711 – 110 kbps, G.723 – 12.6 kbps, G.726 – 87 to 63 kpbs, 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
Component:	YES / NO
Component:	YES / NO
Component:	YES / NO
Component:	YES / NO
Component:	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

LVS Components

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	

LVS 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

Contacts

North American Contacts

- 24-Hour Technical Support
  US/Canada: 866-606-1866
  Mexico: 800-314-0939
- RMA (Return Merchandise Authorization)
  http://www.linksys.com/warranty
- Website
  http://www.linksys.com
- FTP Site
  ftp://ftp.linksys.com
- Support
  http://www.linksys.com/support
- **Sales Information**
  800-546-5797 (800-LINKSYS)

Global Contacts

- Website
  http://www.linksys.com/international
- Product Registration
  http://www.linksys.com/registration

080523-LB