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**User manual LINKSYS SPA921**  
**User guide LINKSYS SPA921**  
**Operating instructions LINKSYS SPA921**  
**Instructions for use LINKSYS SPA921**  
**Instruction manual LINKSYS SPA921**

**LINKSYS®**  
A Division of Cisco Systems, Inc.

**Linksys 900 Series IP Phone Administrator Guide**  
Document Version 3.0

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**Manual abstract:**

and/or its affiliates in the U.S. and certain other countries. @@@@This product bears the CE Marking indicating compliance with the 89/336/EEC directive. Standards to which conformity is Declared: EN 61000-4-2:1995, EN 61000-4-3:1997, EN 61000-4-4:1995, EN 61000-4-5:1995, EN 61000-4-6:1996, EN 61000-4-8:1994, EN 61000-4-11:1994, EN 61000-3-2:2001, EN 61000-3-3:1995 & EN 55022:1998 Class B Modifications to this product not authorized by Linksys could void FCC approval, thereby terminating end user authority to use this product. For indoor use only. Read installation instructions before connecting to a power source. The electric plug and socket must be accessible at all times as this is the main method to disconnect power from the device.

**Shock Hazard:** Do not operate near water or similar fluid. Do not work with this device during periods of lightning activity.

Do not touch wires at the end of cables or within sockets. One Year Limited Hardware Warranty Linksys provides a one (1) year limited hardware warranty. Linksys warrants to customer that this product conforms to its published specifications and will be free from defects in material and workmanship at the time of delivery and for a period of one year thereafter. Without limiting the foregoing, this warranty does not cover any defect resulting from (i) any design or specification supplied by an entity other than Linksys, (ii) non-observance of technical operating parameters (e.g.

, exceeding limiting values), or (iii) misuse, abuse, abnormal conditions or alteration by anyone other than Linksys. Replacement, Repair, Refund: After the receipt of an RMA (Return Materials Authorization) request, Linksys will attempt to refund, repair or replace this device. To receive an RMA number for this device, contact the party from whom it. CONTENTS Preface xi xi xi xii Document Audience Linksys 900 Series IP Telephones How This Document is Organized Document Conventions Related Documentation Technical Support 1 xiii xii xiii CHAPTER Introducing Linksys 900 Series IP Phones Overview 1-1 1-1 SPA900 Series Features 1-2 SPA901 Features 1-4 SPA92x, SPA94x, and SPA962 Features Ensuring Voice Quality 1-4 Feature Descriptions 1-6 SIP Proxy Redundancy 1-6 Supported Codecs 1-6 Other Features 1-7 1-4 Technology Background 1-10 Session Initiation Protocol 1-10 Using 900 Series Phones with a Firewall or Router Network Address Translation 1-11 NAT Overview 1-12 NAT Types 1-12 Simple Traversal of UDP Through NAT 1-13 SIP-NAT Interoperation 1-13 Where to Go From Here 2 1-14 1-11 CHAPTER Getting Started 2-1 Linksys 900 Series IP Phones 2-1 Caring for Your Hardware 2-2 SPA901 2-2 Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 iii Contents Front Panel and Side of Phone 2-2 Back Panel 2-3 SPA92x, SPA94x, and SPA962 Hardware Features SPA921 2-4 Front Panel 2-4 Back Panel 2-5 SPA922 2-5 SPA941 2-5 Front Panel 2-6 Back Panel 2-6 SPA942 2-7 SPA962 2-7 Front Panel 2-8 Back Panel 2-8 2-3 Establishing Connectivity 2-8 Bandwidth Requirements 2-8 Installing the SPA900 Series IP Phone 2-9 Assembling the Phone and Connecting to the Network Attaching the Desk Stand 2-10 Mounting the Phone to the Wall 2-10 Turning on the Phone 2-11 Using the Administration Web Server 2-11 Connecting to the Administration Web Server Administrator Account Privileges 2-12 Web Interface URLs 2-13 Upgrade URL 2-13 Resync URL 2-13 Reboot URL 2-14 Provisioning 2-14 Provisioning Capabilities 2-14 Configuration Profile 2-14 Using the Interactive Voice Response Interface 2-15 Using the IVR Menu 2-15 IVR Options 2-16 Entering a Password through the IVR 2-18 3 2-11 2-9 CHAPTER Managing Linksys 900 Series IP Phones Using the LCD Display 3-1 LCD Display Controls 3-1 Linksys 900 Series IP Phone Administrator Guide 3-1 iv Document Version 3.0 0 Contents Using Soft Keys 3-3 Entering and Saving Settings Localization 3-5 3-4 Changing the Display Background (SPA962) Call Appearances and Extensions Line Key LEDs 3-9 3-8 3-7 Using Call Features 3-10 Selecting the Audio I/O Device and Line 3-11 Making Calls 3-11 Answering and Ending Calls 3-12 Hold and Resume 3-12 Call Waiting 3-12 Speed Dialing 3-13 Three-Way Conferencing 3-13 Attended Call Transfer 3-13 Blind Call Transfer 3-14 Call Back 3-14 Message Waiting Indication (MWI) 3-14 Accessing Voicemail 3-15 Muting Calls 3-15 Shared Call Appearances 3-15 Personal Directory 3-15 Caller and Called Name Matching 3-16 Dialing Assistance 3-16 Supplementary Services 3-16 Call Logs 3-17 Audio Volume Adjustment 3-18 Managing Ring Tones 3-19 Configuring a Dial Plan 3-20 Dial Plan Digit Sequences 3-20 Dial Plan Rules 3-21 Digit Sequence Syntax 3-21 Element Repetition 3-21 Subsequence Substitution 3-21 Intersequence Tones 3-22 Number Barring 3-22 Interdigit Timer Master Override 3-22 Local Timer Overrides 3-22 Pause 3-22 Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 v Contents Dial Plan Examples 3-23 Dial Plan Timers 3-23 Interdigit Long Timer 3-24 Interdigit Short Timer 3-24 Dial Plans 3-24 System Administration 3-24 Reboot and Restart 3-25 Factory Reset 3-25 Password Protection 3-25 Managing the Time/Date 3-25 Daylight Saving Time 3-25 Using Star Codes to Activate/Deactivate Services Disabling Services 3-28 Error and Log Reporting 3-29 Troubleshooting FAQ 4 3-29 3-26 CHAPTER LCD Command Reference Guide 4-1 1 Directory 4-2 Entering Names and Numbers into the Directory 4-2 Entering Directory Names, Numbers and Ring Default 4-2 2 Speed Dial 4-3 3 Call History 4-3 Redial List 4-3 Answered Calls 4-4 Missed Calls 4-4 4 Ring Tone 4-4 5 Preferences 4-4 5.1 Block Caller ID 4-5 5.2 Block Anonymous Call 4-5 5.3 Do Not Disturb 4-5 5.4 Secure Call 4-5 5.5 Dial Assistance 4-6 5.6 Preferred Audio Device 4-6 6 Call Forward 4-6 6.1 CFWD All Number 4-6 6.2 CFWD Busy Number 4-6 6.

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. . . SPA901--One line, small, affordable, no display. SPA921--One-line business phone. SPA922--One-line business phone with Power over Ethernet (PoE) support and an extra Ethernet port for connecting another device to the LAN. Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 xi Preface How This Document is Organized . . . SPA941--Default two lines, upgradeable to four lines. SPA942--Default is two lines, upgradeable to four lines. Power over Ethernet (PoE) support and an extra Ethernet port for connecting another device to the LAN. SPA962--Six lines, hi-res color display. Power over Ethernet (PoE) support and an extra Ethernet port for connecting another device to the LAN. 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. Note How This Document is Organized This document is divided into the following chapters and appendices. Chapter Chapter 1, "Introducing Linksys 900 Series IP Phones" Chapter 2, "Getting Started" Contents This chapter introduces the Linksys 900 Series IP phones. This chapter describes how to use the different administration and configuration tools provided for managing a Linksys 900 Series IP phone. This chapter describes how to configure and monitor a Linksys 900 Series IP phone.

This chapter lists the function and usage for each field or parameter on the Linksys 900 Series IP phone administration web server pages. This appendix provides the expansion of acronyms used in this document. This appendix defines the terms used in this document. Chapter 3, "Managing Linksys 900 Series IP Phones" Chapter 5, "SPA900 Series Phone Field Reference" Appendix A, "Acronyms" Appendix B, "Glossary" Document Conventions The following are the typographic conventions used in this document. Typographic Element Boldface <parameter> Meaning Indicates an option on a menu or a literal value to be entered in a field.

Angle brackets (<>) are used to identify parameters that appear on the configuration pages of the 900 Series phone administration web server. The index at the end of this document contains an alphabetical listing of each parameter, hyperlinked to the appropriate table in Chapter 5, "SPA900 Series Phone Field Reference" Indicat00 Series IP Phone Administrator Guide 1-2 Document Version 3.0 Chapter 1 Introducing Linksys 900 Series IP Phones SPA900 Series Features . . . . . Call Conferencing Call Pick Up - Selective and Group \*\* Call Park and UnPark \*\* Call Swap Call Back on Busy Call Blocking - Anonymous and Selective Call Forwarding - Unconditional, No Answer, On Busy Hot Line and Warm Line Automatic Calling Call Logs (60 entries each): Made, Answered, and Missed Calls Do Not Disturb (callers hear line busy tone) URI (IP) Dialing Support (Vanity Numbers) Date and Time with Intelligent Daylight Savings Support Call Duration and Start Time Stored in Call Logs Ten-User Downloadable Ring Tones - Ring Tone Generator Free from www.linksys.com Speed Dialing Automatic Redial Configurable Dial/Numbering Plan Support - per Line Intercom \*\* Group Paging \*\* DNS SRV and Multiple A Records for Proxy Lookup and Proxy Redundancy Syslog, Debug, Report Generation, and Event Logging Secure Call Encrypted Voice Communication Support Built-in Web Server for Administration and Configuration with Multiple Security Levels Automated Provisioning, Multiple Methods. Up to 256-Bit Encryption: (HTTP, HTTPS, TFTP) Optionally Require Admin Password to Reset Unit to Factory Defaults NAT Traversal Set Preferred CODEC, Per Call, All Calls Call Return - Redial Last Caller Configurable Dial/Numbering Plan Support Support Linksys Voice System Automatic Configuration \*\* Feature requires support by SIP server SPA901 Features The SPA901 provides the following features that are not needed with the SPA900 Series IP phones that provide an LCD display: · Built-in Interactive Voice Response (IVR) system to check status and change configuration Linksys 900 Series IP Phone Administrator Guide Document Version 3.



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0 1-3 Chapter 1 SPA900 Series Features Introducing Linksys 900 Series IP Phones · · Ringer and Handset Volume Controls Handset Input Gain Adjustment SPA92x, SPA94x, and SPA962 Features The SPA921, SPA922, SPA941, SPA942, and SPA962 provide an LCD display and additional features that are not provided with the SPA901, including the following: · · · · · Line Status Indicators: Active Line, Name, and Number Menu-Driven User Interface Digits Dialed with Number Auto-Completion Caller ID Name and Number and Outbound Caller ID Blocking On-Hook Dialing Redial from Call Logs Personal Directory with Auto-dial (100 entries) On Hook Default Audio Configuration (Speakerphone and Headset) Called Number with Directory Name Matching Call Number using Name - Directory Matching or via Caller ID Subsequent Incoming Calls with Calling Name and Number Name and Identity (Text) Displayed at Start Up Distinctive Ringing Based on Calling and Called Number Ensuring Voice Quality Voice quality perceived by the subscribers of the IP Telephony service should be indistinguishable from that of the PSTN. Voice quality can be measured with such methods as Perceptual Speech Quality Measurement (PSQM), with a scale of 15, in which lower is better; and Mean Opinion Score (MOS), with a scale of 15, in which higher is better. Table 1-2 displays speech quality metrics associated with various audio compression algorithms. Table 1-2 Speech Quality Metrics Algorithm G.

711 G.726 G.729a G.729 G.723.1 Bandwidth 64 kbps 16, 24, 32, 40 kbps 8 kbps 8 kbps 6.3, 5.3 kbps Complexity Very low Low Lowmedium Medium High MOS Score 4.5 4.1 (32 kbps) 4 4 3.

8 Linksys 900 Series IP Phone Administrator Guide 1-4 Document Version 3.0 Chapter 1 Introducing Linksys 900 Series IP Phones SPA900 Series Features Note SPA900 Series IP phones support all the above voice coding algorithms. The following factors contribute to voice quality: · Audio compression algorithm--Speech signals are sampled, quantized, and compressed before they are packetized and transmitted to the other end. For IP Telephony, speech signals are usually sampled at 8000 samples per second with 1216 bits per sample. The compression algorithm plays a large role in determining the voice quality of the reconstructed speech signal at the other end.

SPA900 Series IP phones support the most popular audio compression algorithms for IP Telephony: G.711 a-law and  $\mu$ -law, G.726, G.729a, and G.723. 1. The encoder and decoder pair in a compression algorithm is known as a codec. The compression ratio of a codec is expressed in terms of the bit rate of the compressed speech. The lower the bit rate, the smaller the bandwidth required to transmit the audio packets. Although voice quality is usually lower with a lower bit rate, it is usually higher as the complexity of the codec gets higher at the same bit rate. · Silence suppression--SPA900 Series IP phones apply silence suppression so that silence packets are not sent to the other end to conserve more transmission bandwidth. Instead, a noise level measurement can be sent periodically during silence suppressed intervals so that the other end can generate artificial comfort noise that mimics the noise at the other end (using a CNG or comfort noise generator). Packet loss--Audio packets are transported by UDP, which does not guarantee the delivery of the packets. Packets may be lost or contain errors that can lead to audio sample drop-outs and distortions and lower the perceived voice quality. SPA900 Series IP phones apply an error concealment algorithm to alleviate the effect of packet loss.

Network jitter--The IP network can induce varying delay of received packets. The RTP receiver in SPA900 Series IP phones keeps a reserve of samples to absorb the network jitter, instead of playing out all the samples as soon as they arrive. This reserve is known as a jitter buffer. The bigger the jitter buffer, the more jitter it can absorb, but this also introduces bigger delay. Therefore, the jitter buffer size should be kept to a relatively small size whenever possible. If jitter buffer size is too small, many late packets may be considered as lost and thus lowers the voice quality. SPA900 Series IP phones dynamically adjust the size of the jitter buffer according to the network conditions that exist during a call. Echo--Impedance mismatch between the telephone and the IP Telephony gateway phone port can lead to near-end echo. SPA900 Series IP phones have a near-end echo canceller with at least 8 ms tail length to compensate for impedance match. SPA900 Series IP phones implement an echo suppressor with comfort noise generator (CNG) so that any residual echo is not noticeable. Hardware noise--Certain levels of noise can be coupled into the conversational audio signals because of the hardware design. The source can be ambient noise or 60 Hz noise from the power adaptor. The SPA900 Series hardware design minimizes noise coupling. End-to-end delay--End-to-end delay does not affect voice quality directly but is an important factor in determining whether subscribers can interact normally in a conversation taking place over an IP network. A reasonable delay figure should be about 50/100 ms.

End-to-end delay larger than 300 ms is unacceptable to most callers. SPA900 Series IP phones support end-to-end delays well within acceptable thresholds. · · · · Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 1-5 Chapter 1 Feature Descriptions Introducing Linksys 900 Series IP Phones Feature Descriptions SPA900 Series IP phones are full featured, fully programmable IP phones that can be custom provisioned within a wide range of configuration parameters. This chapter contains a high-level overview of features to provide a basic understanding of the feature breadth and capabilities of SPA900 Series IP phones.

· · · SIP Proxy Redundancy, page 1-8 Supported Codecs, page 1-8 Other Features, page 1-9 SIP Proxy Redundancy In typical commercial IP Telephony deployments, all calls are established through a SIP proxy server. An average SIP proxy server may handle tens of thousands of subscribers. It is important that a backup server be available so that an active server can be temporarily switched out for maintenance. SPA900 Series IP phones support the use of backup SIP proxy servers so that service disruption should be nearly eliminated. A simple way to support proxy redundancy is to configure a static list of SIP proxy servers in the SPA900 Series IP phone configuration profile, where the list is arranged in order of priority. The SPA900 Series IP phone attempts to contact the highest priority proxy server whenever possible. The dynamic nature of SIP message routing makes the use of a static list of proxy servers inadequate in some scenarios.



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*In deployments where user agents are served by different domains, for instance, it would not be feasible to configure one static list of proxy servers per covered domain into every SPA900 Series IP phone. One solution to this situation is through the use of DNS SRV records. SPA900 Series IP phones can be instructed to contact a SIP proxy server in a domain named in SIP messages.*

*The SPA900 Series IP phone consults the DNS server to get a list of hosts in the given domain that provides SIP services. If an entry exists, the DNS server returns an SRV record that contains a list of SIP proxy servers for the domain, with their host names, priority, listening ports, and so on. The SPA900 Series IP phone tries to contact the list of hosts in the order of their stated priority. If the SPA900 Series IP phone is currently using a lower priority proxy server, it periodically probes the higher priority proxy to see whether it is back on line, and attempts to switch back to the higher priority proxy whenever possible. Supported Codecs Negotiation of the optimal voice codec sometimes depends on the ability of SPA900 Series IP phone to "match" a codec name with the far-end device/gateway codec name. SPA900 Series IP phones allow the network administrator to individually name the various codecs that are supported such that the correct codec successfully negotiates with the far-end equipment. Linksys 900 Series IP Phone Administrator Guide 1-6 Document Version 3.0 Chapter 1 Introducing Linksys 900 Series IP Phones Feature Descriptions The administrator can select the low-bit-rate codec used for each line. G.711a and G.*

*711u are always enabled. Table 1-3 describes the codecs supported by the Linksys SPA900 Series IP phones. Table 1-3 Codecs Supported by Linksys SPA900 Series IP Phones Codec (Voice Compression Algorithm) G.711 (A-law and  $\mu$ -law) Description This very low complexity codec supports uncompressed 64 kbps digitized voice transmission at one through ten 5 ms voice frames per packet. This codec provides the highest voice quality and uses the most bandwidth of any of the available codecs.*

*This low complexity codec supports compressed 16, 24, 32, and 40 kbps digitized voice transmission at one through ten 10 ms voice frames per packet. This codec provides high voice quality. The ITU G.729 voice coding algorithm is used to compress digitized speech. Linksys supports G.*

*729. G.729A is a reduced complexity version of G.729. It requires about half the processing power to code G.729. The G.729 and G.729A bit streams are compatible and interoperable, but not identical. SPA900 Series IP phones support the use of ITU G.*

*723.1 audio codec at 6.4 kbps. Up to two channels of G.723.1 can be used simultaneously. For example, Line 1 and Line 2 can be using G.723.1 simultaneously, or Line 1 or Line 2 can initiate a three-way conference with both call legs using G.723.*

*I. G.726 G.729A G.723.*

*1 When no static payload value is assigned per RFC 1890, SPA900 Series IP phones can support dynamic payloads for G.726. Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 1-7 Chapter 1 Feature Descriptions Introducing Linksys 900 Series IP Phones Other Features Table 1-4 summarizes the features provided by SPA900 Series IP Phones. Table 1-4 Linksys ATA Features Feature Music On Hold Description On a connected call, SPA900 Series IP phones may place the remote party on call.*

*If the remote party indicates that they can still receive audio while the call is holding, the MOH server sends streaming audio. A user (if enabled by service provider or administrator) has the option to make an outbound call secure in the sense that the audio packets in both directions are encrypted. This feature allows the user to set the number of audio frames contained in one RTP packet. Packets can be adjusted to contain from 110 audio frames. Increasing the number of packets decreases the bandwidth utilized, but it also increases delay and may affect voice quality. In-Band and Out-of-Band (RFC 2833) (SIP INFO \*) SPA900 Series IP phones may relay DTMF digits as out-of-band events to preserve the fidelity of the digits. This can enhance the reliability of DTMF transmission required by many IVR applications such as dial-up banking and airline information. SPA900 Series IP phones have configurable call progress tones. Parameters for each type of tone may include number of frequency components, frequency and amplitude of each component, and cadence information. This feature allows the user to hear the call progress tones (such as ringing) that are generated from the far-end network.*

*SPA900 Series IP phones can buffer incoming voice packets to minimize out-of-order packet arrival. This process is known as jitter buffering. The jitter buffer size proactively adjusts or adapts in size, depending on changing network conditions. SPA900 Series IP phones have a Network Jitter Level control setting for each line of service. The jitter level decides how aggressively SPA900 Series IP phones try to shrink the jitter buffer over time to achieve a lower overall delay. If the jitter level is higher, it shrinks more gradually. If jitter level is lower, it shrinks more quickly. Secure Calls Adjustable Audio Frames Per Packet DTMF Call Progress Tone Generation Call Progress Tone Pass Through Jitter Buffer--Dynamic (Adaptive) Linksys 900 Series IP Phone Administrator Guide 1-8 Document Version 3.0 Chapter 1 Introducing Linksys 900 Series IP Phones Feature Descriptions Table 1-4 Linksys ATA Features (continued) Feature Voice Activity Detection with Silence Suppression and Comfort Noise Generation Description Voice Activity Detection (VAD) with Silence Suppression is a means of increasing the number of calls supported by the network by reducing the required bidirectional bandwidth for a single call. VAD uses a very sophisticated algorithm to distinguish between speech and non-speech signals.*

*Based on the current and past statistics, the VAD algorithm decides whether or not speech is present. If the VAD algorithm decides speech is not present, the silence suppression and comfort noise generation is activated. This is accomplished by removing and not transmitting the natural silence that occurs in normal two-way connection. The IP bandwidth is used only when someone is speaking. During the silent periods of a telephone call, additional bandwidth is available for other voice calls or data traffic because the silence packets are not being transmitted across the network.*

*Comfort Noise Generation provides artificially-generated background white noise (sounds), designed to reassure callers that their calls are still connected during silent periods. If Comfort Noise Generation is not used, the caller may think the call has been disconnected because of the "dead silence" periods created by the VAD and Silence Suppression feature. SPA900 Series IP phones have three configurable interdigit timers: · · · Configurable Dial Plan with Interdigit Timers Initial timeout (T)--Handset off hook; no digit pressed yet.*



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Long timeout (L)--One or more digits pressed, more digits needed to reach a valid number (as per the dial plan). Short timeout (S)--Current dialed number is valid, but more digits would also lead to a valid number.

Report Generation and Event Logging SPA900 Series IP phones report a variety of status and error reports to assist service providers in diagnosing problems and evaluating the performance of their services. The information can be queried by an authorized agent, using HTTP with digested authentication, for instance. The information may be organized as an XML page or HTML page. SPA900 Series IP phones support detailed logging of all activities for further debugging. The debug information may be sent to a configured Syslog server. SPA900 Series IP phones provide configuration settings that determine the type of activity/events that should be logged, as for instance, a debug level setting. When no static payload value is assigned per RFC 1890, SPA900 Series IP phones can support dynamic payloads for G.726. The statistics collected by SPA900 Series IP phones during normal operation statistics are available in the Info tab. Line status is reported for each line (1 and 2).

Each line maintains up to 2 calls: Call 1 and 2. Syslog and Debug Server Records Dynamic Payload Call Statistics and Reporting Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 1-9 Chapter 1 Technology Background Introducing Linksys 900 Series IP Phones Technology Background This section provides background information about the technology and protocols used by the ATA. It includes the following topics: . . . Session Initiation Protocol, page 1-12 Using 900 Series Phones with a Firewall or Router, page 1-12 Using 900 Series Phones with a Firewall or Router, page 1-12 Session Initiation Protocol Linksys 900 Series IP phones are implemented using open standards, such as Session Initiation Protocol (SIP), allowing interoperability with all ITSPs supporting SIP. Figure 1-2 illustrates a SIP request for connection to another subscriber in the network. The requestor is called the user agent server (UAS), while the recipient is called the user agent client (UAC). Figure 1-2 SIP UA 2 SIP Requests and Responses 4 SIP Proxy RTP SIP Proxy 3 SIP Proxy 1 SIP UA In a SIP VoIP network, when the SIP proxy receives a request from a UAS for a connection and it does not know the location of the UAC, it forwards the message to another SIP proxy in the network. Once the UAC is located and the response is routed back to the UAS, a direct peer-to-peer session is established between the two UAs. The actual voice traffic is transmitted between UAs over dynamically assigned ports using the Real-time Protocol (RTP). Using 900 Series Phones with a Firewall or Router When using a 900 Series phone behind a firewall or router, make sure that the following ports are not blocked: Linksys 900 Series IP Phone Administrator Guide 1-10 Document Version 3.

0 Chapter 1 Introducing Linksys 900 Series IP Phones Technology Background . . . SIP ports--By default, UDP port 5060 and 5061 RTP ports--16384 to 16482 If security is not a concern in your environment, you can consider disabling SPI, if this function exists on your firewall. Network Address Translation This section describes issues that arise when using the LVS system on a network behind a network address translation (NAT) device. It includes the following topics: . . . . NAT Overview, page 1-13 NAT Types, page 1-14 Simple Traversal of UDP Through NAT, page 1-14 SIP-NAT Interoperation, page 1-15 NAT Overview Network Address Translation (NAT) allows multiple devices to share the same public, routable, IP address for establishing connections over the Internet. NAT is typically performed by a router that forwards packets between the Internet and the internal, private network. The association between a private address and port and a public address and port is called a NAT mapping.

This mapping is maintained for a short period of time, that varies from a few seconds to several minutes. The expiration time is extended whenever the mapping is used to send a packet from the source device. The ITSP may support NAT mapping using a Session Border Controller (see Figure 1-3). Figure 1-3 NAT Support with Session Border Controller Provided by ITSP Private IP address 192.168.

1.1 192.168.1.101 192.168.1.102 NAT Device ISP DHCP server Internet External IP address assigned by ISP SPA9000 ITSP SIP Proxy 192.168.1.

100 Session Border Controller Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 1-11 Chapter 1 Technology Background Introducing Linksys 900 Series IP Phones This is the preferred option because it eliminates the need for managing NAT on the 900 Series phone. If this is not available, you need to discuss with the ITSP how to use the NAT Support Parameters provided by the 900 Series phone, such as <Outbound Proxy> and <STUN Server Enable>. A typical application of a NAT is to allow all the devices in a subscriber home network to access the Internet through a router with a single public IP address assigned by an ISP. The IP header of the packets sent from the private network to the public network is substituted by NAT with the public IP address and a port assigned by the router. The receiver of the packets on the public network sees the packets as coming from the external address instead of the private address of the device. NAT Types The ways that NAT is implemented can be divided into the following categories: . Full cone NAT--Also known as one-to-one NAT. All requests from the same internal IP address and port are mapped to the same external IP address and port. An external host can send a packet to the internal host, by sending a packet to the mapped external address Restricted cone NAT--All requests from the same internal IP address and port are mapped to the same external IP address and port. Unlike a full cone NAT, an external host can send a packet to the internal host only if the internal host had previously sent a packet to it.

Port restricted cone NAT/symmetric NAT--Port restricted cone NAT or symmetric NAT is like a restricted cone NAT, but the restriction includes port numbers. Specifically, an external host can send a packet to a particular port on the internal host only if the internal host had previously sent a packet from that port to the external host. . . With symmetric NAT, all requests from the same internal IP address and port to a specific destination IP address and port are mapped to a unique external source IP address and port. If the same internal host sends a packet with the same source address and port to a different destination, a different mapping is used. Only an external host that receives a packet can send a UDP packet back to the internal host.

Simple Traversal of UDP Through NAT Simple Traversal of UDP through NATs (STUN) is a protocol defined by RFC 3489, that allows a client behind a NAT device to find out its public address, the type of NAT it is behind, and the port associated on the Internet connection with a particular local port.



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This information is used to set up UDP communication between two hosts that are both behind NAT routers. Open source STUN software can be obtained at the following website: <http://www.voip-info.org/wiki-Open+Source+VOIP+Software> STUN does not work with a symmetric NAT router.

To determine the type of NAT your router uses, complete the following steps: Step 1 Enable debugging on the 900 Series phone: 1. Make sure you do not have a firewall running on your PC that could block the syslog port (by default this is 514). Linksys 900 Series IP Phone Administrator Guide 1-12 Document Version 3.0 Chapter 1 Introducing Linksys 900 Series IP Phones Technology Background 2. On the administration web server, System tab, set <Debug Server> to the IP address and port number of your syslog server. Note that this address and port number has to be reachable from the SPA900 Series IP phone. 3. 4. Step 2 Step 3 Set <Debug level> to 3, but do not change the value of the <syslog server> parameter. To capture SIP signaling messages, under the Line tab, set <SIP Debug Option> to Full.

The output is named syslog.514.log. To determine the type of NAT your router is using set <STUN Test Enable> to yes. View the syslog messages to determine if your network uses symmetric NAT. SIP-NAT Interoperation In the case of SIP, the addresses where messages/data should be sent to a 900 Series phone system are embedded in the SIP messages sent by the device. If the 900 Series phone system is sitting behind a NAT device, the private IP address assigned to it is not usable for communications with the SIP entities outside the private network. Note If the ITSP offers an outbound NAT-Aware proxy, this discovers the public IP address from the remote endpoint and eliminates the need to modify the SIP message from the UAC. The 900 Series phone system must substitute the private IP address information with the proper external IP address/port in the mapping chosen by the underlying NAT to communicate with a particular public peer address/port. For this, the 900 Series phone system must perform the following tasks: · Discover the NAT mappings used to communicate with the peer.

This can be done with the help of an external device, such as a STUN server. A STUN server responds to a special NAT-Mapping-Discovery request by sending back a message to the source IP address/port of the request, where the message contains the source IP address/port of the original request. The 900 Series phone system can send this request when it first attempts to communicate with a SIP entity over the Internet. It then stores the mapping discovery results returned by the server. · Communicate the NAT mapping information to the external SIP entities.

If the entity is a SIP Registrar, the information should be carried in the Contact header that overwrites the private address/port information. If the entity is another SIP UA when establishing a call, the information should be carried in the Contact header as well as in the SDP embedded in SIP message bodies. The VIA header in outbound SIP requests might also need to be substituted with the public address if the UAS relies on it to route back responses. · Extend the discovered NAT mappings by sending keep-alive packets. Because the mapping is alive only for a short period, the 900 Series phone system continues to send periodic keep-alive packets through the mapping to extend its validity as necessary.

Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 1-13 Chapter 1 Where to Go From Here Introducing Linksys 900 Series IP Phones Where to Go From Here To do this ... Use the different administration and configuration tools provided for managing Linksys 900 Series IP phone. Configure and monitor a Linksys 900 Series IP phone. Refer to the function and usage for each field or parameter on the Linksys 900 Series IP phone administration web server pages. Find the expansion of an acronym used in this document. Find the definition of a term used in this document. Refer to Chapter 2, "Getting Started" Chapter 3, "Managing Linksys 900 Series IP Phones" Chapter 5, "SPA900 Series Phone Field Reference" Appendix A, "Acronyms" Appendix B, "Glossary" The following documentation provides additional documentation for Linksys SPA900 Series IP phones: · · IVR Quick Guide SPA Provisioning Guide The following documentation describes how to use other Linksys Voice System products: · · · · SPA9000 Administrator Guide LVS CTI Integration Guide LVS Integration with ITSP Hosted Voicemail Guide Linksys Voice over IP Product Guide: SIP CPE for Massive Scale Deployment SPA 2.

0 Analog Telephone Adapter Administrator Guide Linksys 900 Series IP Phone Administrator Guide 1-14 Document Version 3.0 CHAPTER 2 Getting Started This chapter describes the tools and utilities available for administering Linksys SPA900 Series phones. It includes the following sections: · · · · · Linksys 900 Series IP Phones, page 2-1 Establishing Connectivity, page 2-9 Using the Administration Web Server, page 2-11 Web Interface URLs, page 2-13 Provisioning, page 2-14 Using the Interactive Voice Response Interface, page 2-16 Note If the SPA900 Series IP phone is supplied or sponsored by an Internet telephone service provider (ITSP), certain network and service settings may be preconfigured. Depending on the configuration policy, access by an end user to specific configuration settings may be restricted or blocked. Linksys 900 Series IP Phones The Linksys SPA900 Series provides fully-featured VoIP phones that integrate with the Linksys SPA9000 to provide connectivity to other local stations, and through an ITSP to IP phones over the Internet. In addition, the optional SPA400 integrates with the SPA9000 and provides connectivity between SPA900 IP phones and the PSTN. This section summarizes the ports and hardware features provided by each device. It includes the following topics: · · · · · · · · Caring for Your Hardware, page 2-2 SPA901, page 2-2 SPA92x, SPA94x, and SPA962 Hardware Features, page 2-3 SPA92x, SPA94x, and SPA962 Hardware Features, page 2-3 SPA922, page 2-5 SPA941, page 2-5 SPA942, page 2-7 SPA962, page 2-7 Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 2-1 Chapter 2 Linksys 900 Series IP Phones Getting Started Caring for Your Hardware The Linksys 900 Series IP phones are electronic devices that should not be exposed to excessive heat, sun, cold or water. To clean the equipment, use a slightly moistened paper or cloth towel. Do not spray or pour cleaning solution directly onto the hardware unit. SPA901 The SPA901 provides an entry-level IP phone that can be wall mounted (see Figure 2-1).



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The following are the hardware features provided by the SPA901: . . . . . Voice Mail Message Waiting Indicator Light Redial Button Dedicated Flash Button Volume Control Button Cycles Through Volume Levels. Controls Ringer and Handset Volume. Standard 12-Button Dialing Pad High Quality Handset and Cradle Ethernet LAN 10BaseT RJ-45 5-volt DC Universal (100-240 Volt) Switching Power Adaptor SPA901 Figure 2-1 The following tables describe the status indicators and controls on the front of the device and the ports on the back panel of the device. Linksys 900 Series IP Phone Administrator Guide 2-2 Document Version 3.

0 Chapter 2 Getting Started Linksys 900 Series IP Phones Front Panel and Side of Phone Feature Message waiting light STATUS Function On: you have a voicemail message. Off: make a call. On: make a call; line is shared. Flashing: shared line on hold. On red: line in use. Flashing red: local call on hold. On orange: phone not registered. Press to pickup a second incoming call, transfer a call, or setup a three-way conference call. Press the redial the last number called. FLASH REDIAL Back Panel Port Phone jack Ethernet port Power Function Connect to the handset. Connect to the SPA9000 through a local switch. Connect to the 5-volt power supply. SPA92x, SPA94x, and SPA962 Hardware Features The SPA921, SPA922, SPA941, SPA942, and SPA962 provide LCD displays and other additional hardware features, including the following: . . . . Four Illuminated Call Appearance Line Buttons with Tricolor LED's LED Indicates Line State Active, Idle, On-Hold, Unregistered Line LED Configurable to 13 Different States (On/Off, Color, Flash) Dedicated Illuminated Buttons for: . . . Audio Mute On/Off Headset On/Off Speakerphone On/Off . . . . . Four Soft Key Buttons Four Way Rocking Directional Knob for Menu Navigation Voice Mail Message Waiting Indicator Light Voice Mail Message Retrieval Button Dedicated Hold Button Settings Button for Access to Feature, Set-up, and Configuration Menus Volume Control Rocking Up/Down Knob Controls Handset, Headset, Speaker, Ringer Standard 12-Button Dialing Pad Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 2-3 Chapter 2 Linksys 900 Series IP Phones Getting Started . . . . . High Quality Handset and Cradle Built-In High Quality Microphone and Speaker Headset Jack 2.5 millimeter LED Test Function Two Ethernet LAN ports (100BaseT RJ-45) 802.

3af Compliant Power over Ethernet (PoE) Optional 5 volt DC Universal (100-240 Volt) Switching Power Adaptor - Power Supply is Ordered Separately SPA921 The SPA921 has one RJ-11 phone port and one 100BaseT RJ-45 port for connecting the phone to the LAN (see Figure 2-2). Figure 2-2 SPA921 The following tables describe the status indicators and controls on the front of the device and the ports on the back panel of the device. Front Panel Feature LCD display Telephone keypad Navigation button Soft keys 1-4 Linksys 900 Series IP Phone Administrator Guide Function Lists device status and configuration options. Enters numeric digits for initiating a call or for entering configuration information. Scrolls between display and configuration options in the LCD display. Selects options on the LCD display 2-4 Document Version 3.0 Chapter 2 Getting Started Linksys 900 Series IP Phones Back Panel Port Phone jack Ethernet ports Function Connects to the handset. Connects to the SPA9000 through a local switch. The SPA922 has two ports. Use the other port to connect to a PC or other LAN device.

Connect to the 5-volt power supply. Power SPA922 The SPA922 is similar to the SPA921, but provides Power over Ethernet (PoE) and an extra Ethernet port for connecting another device to the LAN (see Figure 2-3). The SPA100 power supply must be ordered separately if you are not using a PoE switch. Figure 2-3 SPA922 SPA941 The SPA941 provides two lines by default and is upgradeable to four lines (see Figure 2-4). Linksys 900 Series IP Phone Administrator Guide Document Version 3.

0 2-5 Chapter 2 Linksys 900 Series IP Phones Getting Started Figure 2-4 SPA941 The following tables describe the status indicators and controls on the front of the device and the ports on the back panel of the device. Front Panel Feature LCD display Telephone keypad Navigation button Soft keys 1-4 Line status indicators 1-4 Function Lists device status and configuration options. Enters numeric digits for initiating a call or for entering configuration information. Scrolls between display and configuration options in the LCD display. Selects options on the LCD display.

Displays status of each extension. Back Panel Port Phone jack Ethernet ports Function Connects to the handset. Connects to the SPA9000 through a local switch. The SPA942 has two ports. Use the other port to connect to a PC or other LAN device. Connects to the 5-volt power supply. Power Linksys 900 Series IP Phone Administrator Guide 2-6 Document Version 3.0 Chapter 2 Getting Started Linksys 900 Series IP Phones SPA942 The SPA942 is similar to the SPA941, but provides two Ethernet ports for connecting to the LAN and supports Power over Ethernet (see Figure 2-5). The PA100 power supply must be ordered separately if you are not using a PoE switch. See the table for SPA941.

Figure 2-5 SPA942 SPA962 The SPA962 has a 320 x 240 true color, four-inch, LCD, provides up to six telephone extensions, and supports PoE (see Figure 2-6). The PA100 power supply must be ordered separately if you are not using a PoE switch. Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 2-7 Chapter 2 Linksys 900 Series IP Phones Getting Started Figure 2-6 SPA962 The following tables describe the status indicators and controls on the front of the device and the ports on the back panel of the device. Front Panel Feature Full-color LCD display Telephone keypad Navigation button Soft keys 1-4 Line status indicators 1-6 Function Lists device status and configuration options. Enters numeric digits for initiating a call or for entering configuration information. Scrolls between display and configuration options in the LCD display. Selects options on the LCD display. Displays status of each extension. Back Panel Port Phone jack Ethernet ports (2) Power AUX RJ-11 port Function Connects to the handset.

Connects to the SPA9000 through a local switch. Use the second port to connect to a PC or other LAN device. Connects to the 5-volt power supply. Reserved for future functionality and not for use as a telephone line port. Linksys 900 Series IP Phone Administrator Guide 2-8 Document Version 3.

0 Chapter 2 Getting Started Establishing Connectivity Establishing Connectivity This section describes how to connect the SPA900 Series IP phone hardware.



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It includes the following topics: · · Bandwidth Requirements, page 2-9 Installing the SPA900 Series IP Phone, page 2-10 Bandwidth Requirements Depending on how you have your IP phones configured, each call requires 55 to 110 kbps in each direction. Therefore, using G.729 as the voice codec setting, and with an average business-grade broadband Internet connection supporting 1.5 Mbps downstream and 384 kbps upstream, a total of seven (7) simultaneous conversations can be reliably supported with adequate bandwidth available for file downloads.

Linksys recommends using the 900 Series phone with QoS-capable networking equipment that can prioritize the VoIP application traffic. QoS features are available on many Linksys data networking switches and routers. A QoS-enabled router prioritizes the packets going upstream to the ISP. Table 2-1 illustrates the bandwidth budget using different codecs. Table 2-1 Ethernet Bandwidth Budget for Off-Net VoIP Calling Codec G.711 Approximate bandwidth budget for each side of conversation 110 kbps 2 calls 4 calls 6 calls 8 calls 220 kbps 440 kbps 660 kbps 880 kbps 174 kbps 348 kbps 522 kbps 696 kbps 158 kbps 316 kbps 474 kbps 632 kbps 142 kbps 284 kbps 426 kbps 568 kbps 126 kbps 252 kbps 378 kbps 504 kbps 110 kbps 220 kbps 330 kbps 440 kbps G.726-40 87 kbps G.726-32 79 kbps G.726-24 71 kbps G.726-16 63 kbps G.

729 55 kbps This table is based on the following assumptions: · · Bandwidth Calculated with No Silence Suppression 20 Millisecond of payload per RTP packet Note The use of silence suppression can reduce the average bandwidth budget by 30% or more. For more information about bandwidth calculation, refer to the following websites: <http://www.erlang.com/calculator/lipb/> <http://www.packetizer.com/voip/diagnostics/bandcalc.html> Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 2-9 Chapter 2 Establishing Connectivity Getting Started Installing the SPA900 Series IP Phone This section describes how to install and verify operation of SPA900 Series IP phones. Check to make sure that you have the following package contents: · · · Linksys 900 Series phone Ethernet cable Power adapter (must be ordered separately for PoE units: SPA922, SPA942, and SPA962) Assembling the Phone and Connecting to the Network Perform the following steps to connect 900 Series phone. Step 1 Step 2 Step 3 Find the end of the coiled phone cord that has the longer straightened end.

Plug that end into the back of the phone base (phone symbol). Plug in the short straightened end of the handset cord into the jack at the bottom of the handset. If you are using an external power source, push the power cord into the power supply, and plug the power supply into the phone base unit. Use only the power supply that came with the phone. SPA922, SPA942 and SPA962 can be configured without external power, if connecting to an IEEE powered Ethernet switch.

See [Linksys.com](http://Linksys.com) for details. Plug the Ethernet cable into the back of the base station. Plug the other end of the Ethernet cable into your already prepared network connection. Step 4 If the phone is configured using an optional PoE adapter, see the PoE device documentation for setup instructions.

With the SPA922, SPA942, and SPA962, the second Ethernet port can be used to connect a PC. The AUX RJ-11 port is reserved for future functionality of the SPA962. It is not for use as a telephone line port. Note Do NOT plug a telephone line into the AUX port. Attaching the Desk Stand This and the following sections apply to a SPA900 Series IP phone with an LCD display. For information regarding the SPA901 IP phone, refer to the SPA901 QuickStart Guide. Step 1 Step 2 Step 3 Line up the tabs on the desk stand with the slots on the back of the phone. Slide the bottom tabs into the slots Lightly press down on the top of the desk stand. It should easily slide into the top slots. Do not force.

Linksys 900 Series IP Phone Administrator Guide 2-10 Document Version 3.0 Chapter 2 Getting Started Using the Administration Web Server Mounting the Phone to the Wall Note When mounting the phone to a wall, do not attach the desk stand. Step 1 Step 2 Attach two appropriate screws to the wall. Leave 1/4" distance from the wall. This allows you to slide the mounting brackets on to the screws. Push down slightly to lock the phone in place. You can purchase an optional wall mount kit (MB100) from your retailer or [Linksys.com](http://Linksys.com). Turning on the Phone If you are using an external power source, instead of Power over Ethernet (PoE), plug the adapter to an electrical outlet. Use only the adapter supplied for the specific phone.

· · · · The phone executes a boot-up sequence when the power source is connected. During this sequence, the display first shows LINKSYS® or a customized message and then "Initializing Network." All of the lights on the phone flash. After the sequence, which should take about five seconds, the phone displays the standard menu for the phone. The date, name, and number of the phone will display on the top line of the LCD screen.

At the bottom of the LCD screen, redial, dir, cfwd, and dnd are displayed over their associated soft buttons. A small arrow appears next to dnd indicating that more menus can be accessed by pushing the right side of the navigation button. If the phone does not display the appropriate screen, verify the installation and connectivity. If these are correct, try unplugging the phone and plugging it back in again. If you still do not see the display, refer to the "Troubleshooting FAQ" section on page 3-32.

Using the Administration Web Server This section describes how to use the administration web server to configure the 900 Series phone. It includes the following topics: · · Connecting to the Administration Web Server, page 2-12 Administrator Account Privileges, page 2-12 Linksys 900 Series IP Phone Administrator Guide Document Version 3.0 2-11 Chapter 2 Using the Administration Web Server Getting Started Connecting to the Administration Web Server To access the 900 Series phone administration web server, perform the following steps. Step 1 Step 2 Launch a web browser on a computer connected to the 900 Series phone. Determine the address of the administration web server. For a SPA900 Series phone with an LCD display, press Menu, 9, 2, or following these steps: a. b. c. Press the Menu button. Scroll down to Network and press select.

View the Current IP (Option 2). For a SPA901 phone follow these steps: a. b. Step 3 Press \*\*\*\* on the keypad to access the IVR menu. Press 110# to determine the Internet (WAN) IP address. Direct the browser to the IP address of the 900 Series phone. Changing between the tabs on the Voice page does not discard the unsubmitted changes. You can wait until completing all your changes on the Voice pages before submitting them.



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Note Step 4 Step 5 Changing between the Router and Voice pages discards any unsubmitted changes to either page. Click the Voice tab. Click Admin and Advanced. The Administrator account name is admin, and the User account name is user. These account names cannot be changed. The system prompts for the Administrator account password if it has been set. If prompted, type the password provided by the ITSP and press Enter. Step 6 To view the status information for the phone, click Status. Enter the appropriate login information. Two views of the administration web server are available. Click basic to view basic settings, or click advanced to view advanced settings. Step 7 If you make changes on a screen, click Submit All Changes to save the changes, Click Undo All Changes button to undo your changes.

When changes are saved, the 900 Series phone may reboot. Administrator Account Privileges The 900 Series phone support two levels of administration privileges: Administrator and User. Both privileges can be password protected. Note By default, there are no passwords assigned for either the Administrator account or the User account. Linksys 900 Series IP Phone Administrator Guide 2-12 Document Version 3.0 Chapter 2 Getting Started Web Interface URLs The Administrator account has the privilege to modify all the web profile parameters and can also modify the passwords of both Administrator and User account. The User account only has the privilege to access part of the web profile parameters. The parameters that the User account can access are specified using the Administrator account on the Provisioning page of the administration web server. To directly access the Administrator account level privilege, use the following URL: <http://ipaddress/admin/voice> If the password has been set for the Administrator account, the browser prompts for authentication. The User account name and the Administrator account name cannot be changed.

When browsing pages with the Administrator account privilege, you can switch to User account privilege by clicking the User Login link. If the User account password is set, the browser prompts for authentication when you click the User Login link. From the User account, you can switch to the Administrator account by clicking the Admin Login link. Authentication is required if the Administrator account password has been set. Note Switching between User and Administrator accounts or between basic and advanced views discards any uncommitted changes that have already been made on the web pages. Web Interface URLs The 900 Series phone web interface supports several functions through special URLs: · · · Upgrade Reboot Resync Administrator account privilege is needed for these functions. Upgrade URL The Upgrade URL lets you upgrade the 900 Series phone to the firmware specified by the URL, which can identify either a TFTP or HTTP server. Note If the value of the <Upgrade Enable> parameter in the Provisioning page is No, you cannot upgrade the 900 Series phone even if the web page indicates otherwise. The syntax of the Upgrade URL is as follows: · [http://spa-ip-addr/admin/upgrade?\[/protocol:\]\[server-name\[:port\]\]\[/firmware-pathname\]](http://spa-ip-addr/admin/upgrade?[/protocol:][server-name[:port]][/firmware-pathname]) Both HTTP and TFTP are supported for the upgrade operation. Linksys 900 Series IP Phone Administrator Guide Document Version 3.

0 2-13 Chapter 2 Provisioning Getting Started If no protocol is specified, TFTP is assumed. If no server-name is specified, the host that requests the URL is used as server-name. If no port specified, the default port of the protocol is used. (69 for TFTP or 80 for HTTP) The firmware-pathname is typically the file name of the binary located in a directory on the TFTP or HTTP server. If no firmware-pathname is specified, /spa.

bin is assumed, as in the following example: <http://192.168.2.217/admin/upgrade?tftp://192.168.2.251/spa.bin>

2.251/spa.bin Resync URL The Resync URL lets you force the 900 Series phone to do a resync to a profile specified in the URL, which can identify either a TFTP, HTTP, or HTTPS server. Note The SPA resyncs only when it is idle. The syntax of the Resync URL is as follows: [http://spa-ip-addr/admin/resync?\[/protocol:\]\[server-name\[:port\]\]\[/profile-pathname\]](http://spa-ip-addr/admin/resync?[/protocol:][server-name[:port]][/profile-pathname]) If no parameter follows /resync?, the Profile Rule setting from the Provisioning page is used. If no protocol is specified, TFTP is assumed. If no server-name is specified, the host that requests the URL is used as server-name. If no port is specified, the default port is used (69 for TFTP, 80 for HTTP, and 443 for HTTPS). The profile-path is the path to the new profile with which to resync, for example: <http://192.168.2.217/admin/resync?tftp://192.168.2.251/spaconf.cfg>

2.217admin/resync?tftp://192.168.2.251/spaconf.cfg Reboot URL The Reboot URL lets you reboot the 900 Series phone. Note The 900 Series phone reboots only when it is idle. The Reboot URL is <http://spa-ip-addr/admin/reboot>. Provisioning This section describes the provisioning functionality of the 900 Series phone. This section includes the following topics: · · Provisioning Capabilities, page 2-15 Configuration Profile, page 2-15 For detailed information about provisioning the 900 Series phone, refer to the Linksys SPA Provisioning Guide.

Linksys 900 Series IP Phone Administrator Guide 2-14 Document Version 3.0 Chapter 2 Getting Started Provisioning Provisioning Capabilities The 900 Series phone provides for secure provisioning and remote upgrade. Provisioning is achieved through configuration profiles transferred to the device via TFTP, HTTP, or HTTPS. The 900 Series phone can be configured to automatically resync its internal configuration state to a remote profile periodically and on power up. The automatic resyncs are controlled by configuring the desired profile URL into the device.

The 900 Series phone accepts profiles in XML format, or alternatively in a proprietary binary format, which is generated by a profile compiler tool available from Linksys. The 900 Series phone supports up to 256-bit symmetric key encryption of profiles. For the initial transfer of the profile encryption key (initial provisioning stage), the 900 Series phone can receive a profile from an encrypted channel (HTTPS with client authentication), or it can resync to a binary profile generated by the Linksys-supplied profile compiler. In the latter case, the profile compiler can encrypt the profile specifically for the target 900 Series phone, without requiring an explicit key exchange. Remote firmware upgrade is achieved via TFTP or HTTP (firmware upgrades using HTTPS are not supported).

Remote upgrades are controlled by configuring the desired firmware image URL into the 900 Series phone via a remote profile resync. For further information about remote provisioning refer to the LVS SPA Provisioning Guide. Configuration Profile The 900 Series phone configuration profile can be either an XML file or a binary file with a proprietary format.



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