

## Configuring a Cisco UC500 to Operate with a Linksys SPA8000 Analog Telephone Adapter (ATA)

**This document provides information on how to configure a Cisco UC500 voice device to operate with the Linksys SPA8000 Analog Telephone Adapter (ATA).**

The Linksys SPA8000 ATA is an intelligent low-density Voice over IP (VoIP) gateway that enables carrier-class residential and business IP telephony services delivered over broadband or high-speed Internet connections. When integrated with a Cisco UC500, the SPA8000 provides an affordable solution for connecting multiple analog devices (up to eight) to the IP telephony network.

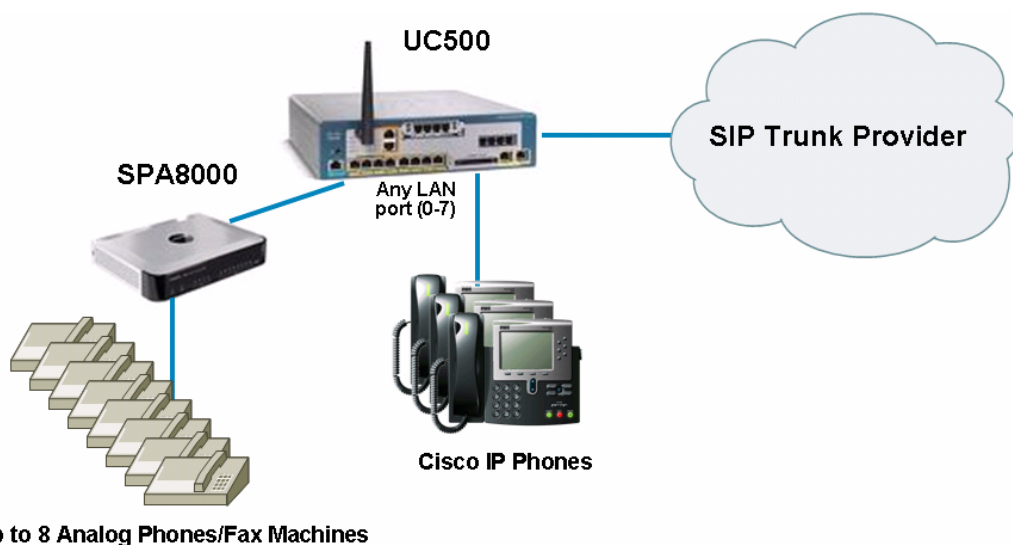
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## Basic Topology

The basic topology used for testing this configuration is shown in Figure 1. In addition to the connection shown, the SPA8000 can also be connected to a Cisco CE520 switch or similar device behind the UC500.

**Figure 1** Basic Topology for SPA8000/UC500 Integration



## Scope and Assumptions

The procedures and guidelines in this Application Note assume that the Cisco UC500 system has been set up using Cisco Configuration Assistant (CCA) and that the VAR user is familiar with the Cisco IOS Command Line Interface (CLI).

The optional voicemail setup section describes basic mailbox creation and activation only. Advanced Cisco Unity Express (CUE) features are not covered in this document.

Fax configuration is not covered in this document, although it has been tested and it is known to work (both T.38 and Fax Passthrough).

Not all tested features are explained in this Application Note. For details on how to enable advanced options, refer to the *Linksys SPA ATA Administration Guide*.

This integration was tested with Cisco Smart Business Communications System (SBCS) version 4.2.7 and Linksys SPA8000 Version 6.1.2.

## SPA8000 Configuration

SPA8000 administration is done via HTTP. By default, DHCP is enabled on the SPA8000 WAN interface.

For this basic integration, default values are used for all Network, SIP Trunk, and Advanced configuration settings. Only basic network and configuration settings that apply to SIP registration of the analog lines are shown.

### Obtaining the SPA8000 MAC Address

You must have the 10-digit hexadecimal MAC address of the SPA8000 for registration against the UC500 device. The MAC address is printed on the label attached to the bottom of the SPA8000 unit.

### Determining the IP Address of the SPA8000

Once you have obtained the MAC address of the SPA8000, perform the following steps to determine the IP address assigned to the SPA8000 by the Data VLAN DHCP server on the UC500:

Step 1. From a PC connected to a LAN port on the UC500 or any switch at the site, point your Web browser to the following URL.

<http://192.168.10.1/level/09/exec/-/show/ip/dhcpbinding/CR>

Step 2. Log in using your UC500 administration credentials for authentication (the default is cisco/cisco).

Step 3. In the IP address bindings list, locate the IP address that corresponds to the MAC address of the SPA8000, as shown in Figure 2.

**Figure 2** IP Address Bindings on the UC500

```

Bindings from all pools not associated with VRF:
IP address      Client-ID/      Lease expiration      Type
                Hardware address/
                User name
192.168.10.11   0100.1a6b.6a4a.6b   Aug 20 2008 07:47 AM   Automatic
192.168.10.12   0100.1c10.5c54.a8   Aug 20 2008 11:40 AM   Automatic
192.168.10.13   0100.1de5.ea9c.19   Aug 20 2008 10:18 AM   Automatic
command completed.

```

### Accessing the Main Voice Administration Screen on the SPA8000

To access the main Voice Administration page for SPA8000 ATA from a PC connected to a LAN port on the UC500, point your browser to the following URL:

<http://<IP Address>/admin/advanced>

The <IP Address> in the above URL is the address of the SPA8000 assigned by the Data VLAN DHCP server on the UC500, as determined in the previous procedure. This is typically an address in the 192.168.10.x range.

The Linksys One Phone Adapter Configuration screen appears, as shown in Figure 3.

Figure 3 Linksys Phone Adapter Configuration Interface

The screenshot shows the Linksys Phone Adapter Configuration interface. At the top, it says "LINKSYS® A Division of Cisco Systems, Inc." and "Linksys Phone Adapter Configuration". Below this, there are tabs for "Network" and "Voice". The "Voice" tab is selected. Underneath, there are sub-tabs for "Info", "System", "SIP", "Provisioning", "Regional", "L1", "L2", "L3", "L4", "L5", "L6", "L7", "L8", "T1", "T2", "T3", "T4", and "Trunk Status". The "Info" sub-tab is active, displaying the following information:

Product Information			
Product Name:	SPA8000	Serial Number:	CQH01G701267
Software Version:	6.1.2	Hardware Version:	1.0.0
MAC Address:	001C105C54A8	Client Certificate:	Installed
Customization:	Open		

System Status			
Current Time:	8/4/2008 15:17:55	Elapsed Time:	00:27:17
RTP Packets Sent:	0	RTP Bytes Sent:	0
RTP Packets Recv:	0	RTP Bytes Recv:	0
SIP Messages Sent:	72	SIP Bytes Sent:	36458
SIP Messages Recv:	16	SIP Bytes Recv:	5936
External IP:			

### Configuring FXS Ports for SIP Registration

On the main Voice configuration tab on the Linksys Phone Adaptor Configuration interface, click on the tabs for individual lines to configure their settings.

- SPA8000 lines are configured on tabs **L1** through **L8**.
- Trunk lines (hunt groups) are configured on tabs **T1** through **T4**.

For example, in Figure 4, the Registrar/Proxy IP is 10.1.1.1, which corresponds to the IP address of the UC500 on the voice VLAN. Line 1 is configured with User ID 101, which represents its extension number. Registration is enabled and the username/password combination for this line is 100/ext100.

Figure 4 SPA8000 Line 1 Configuration Example

The screenshot shows the configuration for Line 1. The "Proxy and Registration" section is expanded, showing the following settings:

Proxy:	10.1.1.1		
Outbound Proxy:			
Use Outbound Proxy:	no	Use OB Proxy In Dialog:	yes
Register:	yes	Make Call Without Reg:	no
Register Expires:	3600	Ans Call Without Reg:	no
Use DNS SRV:	no	DNS SRV Auto Prefix:	no
Proxy Fallback Intvl:	3600	Proxy Redundancy Method:	Normal
Voice Mail Server:	10.1.10.1	Mailbox Subscribe Expires:	2147483647

The "Subscriber Information" section is also expanded, showing the following settings:

Display Name:	Line 1	User ID:	101
Password:	*****	Use Auth ID:	yes
Auth ID:	100		
Mini Certificate:			
S RTP Private Key:			

To configure the rest of the lines, perform the following steps for each line:

- Step 1. Click on the tab that corresponds to the line.
- Step 2. Set the User ID to the extension number for the line (for example, 102).
- Step 3. Make sure that **Use Auth ID** is set to "yes" and enter the **Auth ID/password** combination as shown in Figure 4 (use the value 100/ext100 for all lines).

You have finished the basic SPA8000 configuration. The next section provides details about how to set up the UC500 configuration to work with the Linksys ATA.

### UC500 Configuration

The following configuration guidelines assume that the UC500 has been configured by the Cisco Configuration Assistant (CCA). The commands presented below must be added in addition to the configuration established through CCA.

The SIP CME feature is used to register the SPA8000 as a generic SIP endpoint. More detailed information can be found at the following URL:

[http://www.cisco.com/en/US/products/sw/voicesw/ps4625/products\\_configuration\\_example09186a00808f33eb.shtml](http://www.cisco.com/en/US/products/sw/voicesw/ps4625/products_configuration_example09186a00808f33eb.shtml)

The following Cisco IOS CLI commands must be added on the UC500/CME device:

```
!  
voice service voip  
    sip  
    registrar server <----- Enables SIP Registrar Server in IOS  
!  
interface BVI100 <----- Voice VLAN  
    ip address 10.1.1.1 255.255.255.0  
!  
voice register global  
    mode cme  
    source-address 10.1.1.1 port 5060  
    max-dn 10  
    max-pool 10  
!  
voice register dn 1 <----- Extension number for FXS port 1  
    number 101  
    no-reg  
!  
voice register dn 2 <----- Extension number for FXS port 2  
    number 102  
    no-reg  
!  
voice register dn 3 <----- Extension number for FXS port 3  
    number 103  
    no-reg  
!  
voice register dn 4 <----- Extension number for FXS port 4  
    number 104  
    no-reg  
!  
voice register dn 5 <----- Extension number for FXS port 5  
    number 105
```

```
no-reg
!
voice register dn 6 <----- Extension number for FXS port 6
number 106
no-reg
!
voice register dn 7 <----- Extension number for FXS port 7
number 107
no-reg
!
voice register dn 8 <----- Extension number for FXS port 8
number 108
no-reg
!
# Only one voice registration pool is required for all SPA8000 Lines
!
voice register pool 1
id mac 001C.105C.54A8 <---- MAC Address of the SPA8000
number 1 dn 1 <---- Extension assigned to Line 1/FXS Port 1
number 2 dn 2 <---- Extension assigned to Line 2/FXS Port 2
number 3 dn 3 <---- Extension assigned to Line 3/FXS Port 3
number 4 dn 4 <---- Extension assigned to Line 4/FXS Port 4
number 5 dn 5 <---- Extension assigned to Line 5/FXS Port 5
number 6 dn 6 <---- Extension assigned to Line 6/FXS Port 6
number 7 dn 7 <---- Extension assigned to Line 7/FXS Port 7
number 8 dn 8 <---- Extension assigned to Line 8/FXS Port 8
dtmf-relay rtp-nte <---- RFC2833 DTMF Relay
voice-class codec 1
username 100 password ext100 <-- Username and password for all lines
no vad
!
end
```

## Voice Mail Integration (Optional)

The FXS ports on the SPA8000 can be integrated with the Voicemail application running on the CUE module in the UC500. The easiest way to do this is via the native CUE administration GUI.

### Configuring the Voicemail Server and Setting Call Forward on the SPA8000

Perform the following steps to specify the voice mail server that the SPA8000 will use and configure lines to forward calls to the voice mail pilot number:

- Step 1. From a PC connected to a LAN port on the UC500 or any switch at the site, access the main Voice administration screen on the of the SPA8000 Phone Adapter Configuration interface.
- Step 2. For each line, click the corresponding tab (L1 through L8, for example) and specify the voicemail server that the SPA8000 will use. The default Cisco Unity Express (CUE) IP address is 10.1.10.1.

Proxy and Registration			
Proxy:	10.1.1.1		
Outbound Proxy:			
Use Outbound Proxy:	no	Use OB Proxy In Dialog:	yes
Register:	yes	Make Call Without Reg:	no
Register Expires:	3600	Ans Call Without Reg:	no
Use DNS SRV:	no	DNS SRV Auto Prefix:	no
Proxy Fallback Intvl:	3600	Proxy Redundancy Method:	Normal
Voice Mail Server:	10.1.10.1	Mailbox Subscribe Expires:	2147483647
Subscriber Information			
Display Name:	Line 1	User ID:	101
Password:	*****	Use Auth ID:	yes
Auth ID:	100		
Mini Certificate:			
SRTP Private Key:			

- Step 3. Configure each line on the SPA8000 to forward calls to the voice mail pilot number when the called party is busy or does not answer (for this example, 299 is used for the voicemail pilot number).

The call forward settings are located near the bottom of the Line configuration page. You must do this for each line that will have a voicemail box in the system.

Call Forward Settings			
Cfwd All Dest:		Cfwd Busy Dest:	299
Cfwd No Ans Dest:	299	Cfwd No Ans Delay:	5

### Creating and Activating Voicemail Boxes in CUE

To access the CUE administration GUI, connect your PC to any LAN port on the UC500 or switch at the site. The configuration of the UC500 features takes place over HTTP.

The minimum requirements to properly access the CUE Administration GUI are presented below:

- PC running Internet Explorer 6 (IE6) SP1
- Issues exist with IE7

More detailed information can be found at the following URL:

[http://www.cisco.com/en/US/docs/voice\\_ip\\_comm/cucme/admin/configuration/guide/cmegui.html#wp1056332](http://www.cisco.com/en/US/docs/voice_ip_comm/cucme/admin/configuration/guide/cmegui.html#wp1056332)

Perform the following steps to create and activate each voice mail box in CUE:

Step 1. To access CUE administration, point your Web browser to the following URL:

<http://10.1.10.1>

The CUE Administration GUI login screen appears:

The default username is cisco, and the default password is also cisco.

Step 2. Next, create a user for each one of the SPA8000 lines.

Follow the link to **Configure > Users** and fill out the appropriate fields. As shown below, under **Primary Extension**, select "Other" and enter the line extension (101 for Line 1 in this example).

Make sure that the **Create Mailbox** check box is ticked.



Step 3. Click **Add** to save the information. Once the information is saved, you are redirected to the **Add a new Mailbox** page.

Step 4. As shown below, verify that the information is correct and click **Add**.

At this point, a mailbox for Line 1 is activated. Voicemails can be left and retrieved from the mailbox by the user.

### Dialplan Considerations

By default, the SPA8000 does not have a dialplan match pattern for 2-, 3- or 4-digit extensions. This means that for internal dialing, the phone user must press the # key at the end of the dialed string. This behavior can be modified per line, in order to speed up the dialing process. For details on how to do this, see the *Linksys SPA ATA Administration Guide*, available on Linksys.com. From the Linksys.com home page, choose **Products > Service Provider Products > Voice Adapters < SPA8000** and click the link to the *ATA Administration Guide*.

### Tested Features

Table 1 lists features that were tested for this integration. Some of these features require advanced configuration that is not shown in this application note.

**Table 1.** Features Tested for this Integration

Tested Feature	Result	Comments
<b>Basic Internal Calls (bidirectional)</b>	Pass	G.711 and G.729 support.
<b>Basic ITSP Calls (bi-directional)</b>	Pass	G.711 and G.729 support. No secondary dial tone is heard for outbound calls from Analog Phone.
<b>Call Hold via Hookflash</b>	Pass	Secondary dialtone heard on Analog Phone.
<b>Call Transfer via Hookflash</b>	Pass	Both consult and blind transfers are supported.
<b>3-way Conference via Hookflash</b>	Pass	
<b>DTMF Relay</b>	Pass	AVT (RFC2833).
<b>Long Duration Voice Calls (bi-directional)</b>	Pass	No call drops.
<b>T.38 Fax</b>	Pass	
<b>Fax Pass-through</b>	Pass	Only G.711u was tested.
<b>Long Duration Fax Calls (bi-directional)</b>	Pass	30 page fax. No call drops.

Tested Feature	Result	Comments
Local Voice Calls (FXS port on UC to SPA8000)	Pass	
Local Fax Calls (FXS port on UC to SPA8000)	Pass	Fax pass-through. T.38 not tested.
Calls to CUE (VM/AA) from SPA8000	Pass	Need to remove ACL applied to Service Engine interface. <b>NOTE:</b> Stutter dialtone and VMWI (visual message waiting indicator), although supported by the SPA8000, were not tested as part of this integration.
AA transfers to SPA8000	Pass	Need to add CUE Username and phone number.

### Limitations and Caveats

Only one (1) SPA8000 is supported with each UC500 deployment. Features across different ATAs registered to the system have not been tested.

Deployment of a SPA8000 at a remote teleworker site has not been tested as part of this integration.

Creating a voicemail box for an FXS user consumes a license slot in CUE.

For the FXS user to be reachable via the Auto Attendant, a user account in CUE must be created. This user account does not consume a CUE voicemail license. For instructions on how to do this, see "Creating and Activating Voicemail Boxes in CUE" on page 8, but press **Cancel** on the **Add a New Mailbox** screen so that a voicemail box is not created.

FXS phones that are part of a hunt group lose the ability to be reached by their individual extensions. Enhancements added to IOS version 12.4(20)T and later can be used to overcome this limitation.

### For More Information

For more information, visit the SBCS Support Wiki at

<http://supportwiki.cisco.com/sbcs/>



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