

Configuring Cisco SPA5xx IP Phones in an Asterisk® Environment:

Using the Web-User Interface (web-UI)



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Introduction

The Cisco® SPA5xx IP Telephone family is the next generation of small business IP phones that are perfectly suited to interoperate with Asterisk systems. This new family of phones inherits all of the features that Asterisk users loved in the Sipura > Linksys > Cisco SPA9xx family of phones.

The following table provides a summary of the SPA5xx phone family's features:

IP Phone	Line Keys	Color	Attendant Console	WiFi	BlueTooth	PoE	PC Switch Port	Wideband Audio G.722
SPA525G	5	Y	Y	Y	Y	Y	Y	Y
SPA509	12	N	Y	N	N	Y	Y	Y
SPA508	8	N	Y	N	N	Y	Y	Y
SPA504	4	N	Y	N	N	Y	Y	Y
SPA502	1	N	Y	N	N	Y	Y	Y
SPA501	8	n/a	Y	N	N	Y	Y	Y

Audience

This application note is targeted to Asterisk administrators, users, enthusiasts, and those considering for the first time, Cisco's small business IP phones in a hosted environment. It is expected that readers of this document are somewhat familiar with the administration tasks involved with configuring VoIP in an Asterisk environment.

Scope

This scope of this document is limited to manually configuring the SPA5xx IP phones in an Asterisk environment and does not address the following topics:

- Installing an Asterisk server
- Advanced Asterisk configuration
- Security

Refer to the Related Documents for additional configuration and background information.

Related Documents

- Asterisk: <http://www.asterisk.org>
- Asterisk Book from O'Reilly: <http://www.asteriskdocs.org/>
- [Cisco SPA500 Series and WIP310 IP Phone Administration Guide](#)
- [Cisco IP Telephony Devices Provisioning Guide](#)
- Cisco Community Central: [Small Business Community IP Phone Support](#)

Cisco SPA5xx IP Phone Family Overview

The SPA5xx IP Phone Family caters to a broad spectrum of users, spanning from the basic SPA501 to the feature rich SPA525 IP phone. Following is a summary of the product family's features:

<p>SPA 501</p>  <p>SPA 501</p> <p>Paper label Buttons on phone: SPA 501: 8</p>	<p>SPA 502 / 504</p>  <p>SPA 502 SPA 504</p> <p>Buttons on phone: SPA 502: 0 SPA 504: 4</p>	<p>SPA 508 / 509</p>  <p>SPA 508 SPA 509</p> <p>Buttons on phone: SPA 508: 8 SPA 509: 12</p>	<p>SPA 525</p>  <p>Buttons on phone: SPA 525: 5</p> <p>WiFi, Bluetooth, Color LCD, and MP3 Music Player</p>
<p>Dynamic Softkeys, Line Keys and Monochrome Backlit Display</p>			
<p>Full-duplex Speakerphone, Integrated Ethernet switch port, Wideband audio, AUX port for up to two expansion module, Monochrome Backlit Display, Supports SIP and SPCP</p>			
<p>Retail Desk or Break Room</p>	<p>Office Employee</p>	<p>Admin and Manager</p>	<p>Executive</p>

Cisco SPA5xx IP Phone Family Feature Summary

The following table summarizes the main features of each model phone in the Cisco SPA5xx IP Phone family.

Cisco IP Phone Model	SPA501	SPA502	SPA504	SPA508	SPA509	SPA525	WIP310
							
Display	Paper Label	Monochrome backlit display				Color backlit display	Color backlit display
Programmable Line Keys	8	None	4	8	12	5	None
Full Duplex Speakerphone	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2.5mm Headset Port	Yes	Yes	Yes	Yes	Yes	Yes / stereo	Yes
Wideband Audio (HD Voice)	Yes	Yes	Yes	Yes	Yes	Yes	No
Missed, Placed, Received directories	No	Yes	Yes	Yes	Yes	Yes	Yes
Company and Personal directories	No	Yes	Yes	Yes	Yes	Yes	Yes
Picture Slideshow	No	No	No	No	No	Yes	No
Music Player	No	No	No	No	No	Yes	No
Expansion Module	Yes	Yes	Yes	Yes	Yes	Yes	No
Power Over Ethernet	Yes	Yes	Yes	Yes	Yes	Yes	N/A
10/100 PC Port	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Bluetooth	No	No	No	No	No	Yes	No
Wireless (WiFi)	No	No	No	No	No	Yes	Yes

Phone Overview: A Closer Look

Following are some basics that you should know about the phones and their controls.



#	Component	Description
1	Handset	Speaker or headset available too
2	Speaker	Full duplex speaker
3	MWI	Red—Voice mail Flashing red—phone is ringing
4	Screen	Varies by model, refer to phone user guide
5	Line keys	Line status: <ul style="list-style-type: none"> • Green: Line is idle. • Red (steady): Line is active or in use. • Red (flashing): Line is on hold. • Orange: Line is unregistered (cannot be used). • Flashing Orange: The phone is not connected to the network.
6	Softkeys	View phone's display for current function.
7	Navigation	Use to navigate menu options
8	Select	Press to select menu option
9	Voice mail	Access voice mail
10	Hold	Place call on hold
11	Setup	Access phone's user, status, and administrative features
12	Mute	Disable microphone. Red when there's no network connection
13	Volume	Adjust handset, headset, and ringer volume levels
14	Speaker	Direct audio to speaker or handset
15	Headset	Direct audio to headset or handset
16	Keypad	Dial or select menu options

Configuration Tasks Overview

Configuring the SPA5xx in an Asterisk environment is no different from configuring a SPA9xx phone in an Asterisk environment. For the purposes of this document, the SPA525G 5-line color IP phone with BlueTooth, MP3, and wideband audio support is used in most examples.

By the end of this document, you will be able to install a SPA5xx IP phone to register against an Asterisk server and will be able to make and receive calls with your new phone.

You must complete the following tasks in order to deploy a SPA5xx IP phone in an Asterisk environment:

1. Gather Basic Information
 - a. User name and password for each phone to be installed
 - b. Extension number/s desired, example 212 and 213
2. Configure the Asterisk Server
 - a. Edit the sip.conf file
 - b. Edit the extensions.conf file
 - c. Reload Asterisk modules
3. Connect the SPA5xx IP phone
4. Configure the SPA5xx IP phone
 - a. IP address needs
 - b. Disable SPA9000 provisioning
 - c. Modify Vertical Service Activation Codes
 - d. Dial plan
 - e. Line assignments
 - f. Configuring the Attendant Console (Sidecar)
5. Test the phone for appropriate behavior

Requirements

You need the following equipment and services:

- A functional Asterisk server
- A functional LAN with network connectivity to the new SPA5xx phone
- A functional DHCP server with at least one available IP address for the SPA5xx phone
- A functional TFTP server and administrative access to the server
 - Note:** only needed if you do not want to use the exe file to upgrade phone firmware
- An outbound call route via an Internet and an optional Internet Telephony Service Provider (ITSP), the PSTN, or both

Configuring Asterisk for a SPA5xx IP Phone

Before you configure your Asterisk server for the SPA5xx IP phone, you need to gather some basic information:

1. Extension numbers and assignments for each SPA5xx extension to be configured.
In this document, I use 151, 152 for line keys 1 and 2 of the 5 available on the SPA525G.
2. Line 1 will be display "Fred 151".
3. Line 2 will display "Sally".
4. The phone will display "Asterisk" at the top-right.



Configuring the Asterisk Server

Once you have gathered all of the basic information, configure the Asterisk server. Edit the `sip.conf` and the `extensions.conf` file on the Asterisk server.

The `sip.conf` File

Following is a sample of the minimum `sip.conf` content:

```
...
...
;
[151]
type=friend
nat=no
secret=151secret
context=fxsgroup
host=dynamic
regext=151
;
[152]
type=friend
nat=no
secret=152secret
context=fxsgroup
host=dynamic
regext=152
;
...
...
```

The `extensions.conf` File

Following is a sample of the minimum `extensions.conf` content:

```
...
...
[fxsgroup]
...
...
;
exten => 151,1,Dial(SIP/151,60,rT)
exten => 152,1,Dial(SIP/152,60,rT)
;

;inbound calls from ITSP
[itsp1]
...
...
exten =>
3615551212,2,Dial(SIP/101&SIP/102&SIP/152&SIP/151&SIP/200&SIP/242,25,rt)
...
...
;
```

Loading the Modified Configuration

1. Connect to the Asterisk console:

```
$ sudo asterisk -r  
*CLI>
```

2. Use the reload command to load the changed configuration:

```
*CLI> module reload
```

This completes the Asterisk server configuration. You must now configure the SPA5xx to register to the Asterisk server.

Installing a Cisco SPA5xx IP Phone (web-UI)

When you receive a new phone, chances are you want to get it working as fast as possible. There are several tasks to perform in order to render the phone usable in your Asterisk environment.

Task Summary

1. Factory reset the phone. This is the only way to make sure that the phone is in a known state.
2. Determine the phone's dynamic IP address.
3. Firmware update.
4. Use the phone's web user interface (web-UI) to configure the phone to register to the Asterisk server.
5. Save the phone's configuration.
6. Make calls

Connecting to a Wired Network

The SPA5xx family of IP phones can connect with 10/100 Mbs CAT5 Ethernet cable. All SPA5xx IP phones support power over Ethernet (PoE).

The SPA525G can be connected to the network with 802.11G wireless or with 10/100 Mbs CAT5 Ethernet cable. Wireless instructions are located at the end of this document.

SPA5xx Ports and Connections



Figure 1 Rear of the SPA5xx IP Phone and its connections

1. Connect the SW (switch) port of the SPA5xx IP Phone to the LAN switch, preferably power over Ethernet (PoE). If you have a computer on the network, remove the network cable from the computer, plug the cable into the SW port and then connect the phone's PC port to your computer. This way only one network port is needed for two devices because of the phone's 10/100 switch port.
2. If PoE is not available, connect the PA100 (purchase separately) power supply to the Power connection as shown in Figure 1.

Manual Configuration

This section assumes that you have read the Installing a Phone Task Summary and that you are familiar with the tasks to be completed in this section.

Factory Resetting the SPA5xx

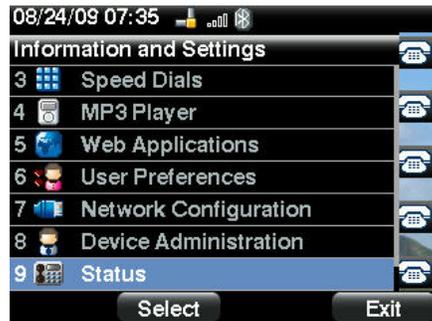
You should factory reset the SPA5xx so that you start from a known point.

1. Press the phone's setup key, #11 in the Phone Overview section.

2. Select Device Administration
3. Select Factory Reset
4. Select OK to factory reset
5. Note: The mute button will illuminate after a factory reset if there is no network connectivity, if for example, the network cable is disconnected.

Determining the SPA5xx's Dynamic IP Address

1. Press the phone's setup key
2. Select Status



3. Select Network Status
4. The IP address is displayed next to IP Address
Note: No IP address will be displayed if a DHCP server does not respond the phone's DHCP DISCOVER messages. For example, if the network cable is disconnected.

Upgrading the SPA5xx's Firmware

1. Direct your browser to the SPA5xx's web user interface (web-UI)
http://<IP_address_of_SPA5xx>/admin/advanced
2. Verify that the Voice tab > Info tab > Product Information > Software Version: is up to date with SPA5xx firmware available at the Cisco.com site, linked from the Cisco [Community](#)
[<https://www.myciscocommunity.com/docs/DOC-2181.jsessionid=F155204DC13BCE04A1057CB5485782FA.node0>]
3. If newer firmware is available, save it to disk and upgrade the SPA5xx using either the spa5xxxxx.exe file or with a local TFTP server as described here.



4. Copy the downloaded firmware image to your TFTP server's root directory
5. Cause the SPA5xx to retrieve the firmware by TFTP and install the new image:

http://IPADDRESSofSPA/upgrade?tftp://TFTPADRESS/SPAFILE.bin

Where:

- **IPADDRESSofSPA** is the SPA5xx IP address
- **TFTPADRESS** is the TFTP server's IP address
- **SPAFILE.bin** is the name of the downloaded firmware image

Example:

http://192.168.2.13/upgrade?tftp://192.168.2.20/SPA525G-7-2-5.bin

Configuring the SPA5xx Using the Web-UI

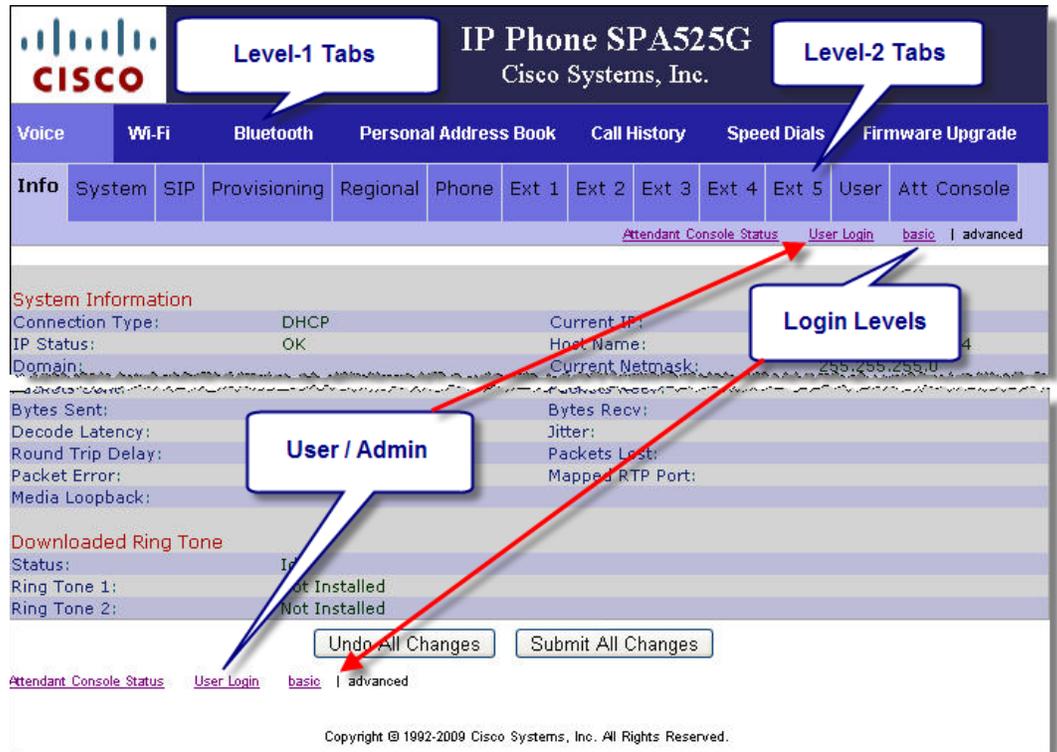
There are two ways to configure a SPA5xx phone, using the phone's web user interface (web-UI) as described in this document and automatic provisioning as summarized in the *Configuring Cisco*

SPA5xx IP Telephones in an Asterisk® Environment: Zero-Touch Deployment document and fully described in the [Cisco IP Telephony Devices Provisioning Guide](#).

1. Direct your browser to the SPA5xx's web user interface (web-UI)

http://<IP_address_of_SPA5xx>/admin/advanced

The SPA5xx phones have a multi-level web-UI, similar to SPA9xx phone family.



2. Configure extension 1 as 151 as follows:

- a. Define the Asterisk server, 192.168.2.22 in this example, as the extension's proxy.
Ext 1 > Proxy and Registration > Proxy: 192.168.2.22:5060
- b. Configure the extension's subscription information.
Ext 1 > Subscriber Information >
Display Name: Asterisk151
User ID: 151 [defined in /etc/asterisk/sip.conf]
Password: 151secret [defined in /etc/asterisk/sip.conf]
Use Auth ID: yes
Auth ID: 151secret
- c. Clear out the default vertical service activation codes.
Voice tab > Regional tab > Vertical Service Activation Codes
Hint: press tab, backspace, tab, backspace, tab to efficiently clear out each code.

Configuring Cisco SPA5xx IP Telephones in an Asterisk® Environment

Vertical Service Activation Codes

Call Return Code:		Blind Transfer Code:	
Call Back Act Code:		Call Back Deact Code:	
Cfwd All Act Code:		Cfwd All Deact Code:	
Cfwd Busy Act Code:		Cfwd Busy Deact Code:	
Cfwd No Ans Act Code:		Cfwd No Ans Deact Code:	
CW Act Code:		CW Deact Code:	
CW Per Call Act Code:		CW Per Call Deact Code:	
Block CID Act Code:		Block CID Deact Code:	
Block CID Per Call Act Code:		Block CID Per Call Deact Code:	
Block ANC Act Code:		Block ANC Deact Code:	
DND Act Code:		DND Deact Code:	
Secure All Call Act Code:		Secure No Call Act Code:	
Secure One Call Act Code:		Secure One Call Deact Code:	
Paging Code:		Call Park Code:	
Call Pickup Code:		Call UnPark Code:	
Group Call Pickup Code:		Media Loopback Code:	
Referral Services Codes:			
Feature Dial Services Codes:			

Clear out all codes

- d. Click Submit All Changes.

This will cause the phone to reboot. The phone's extension will register with the Asterisk server. Successful registration is indicated by the phone's extension LED burning green.

3. Scroll down and click Submit All Changes

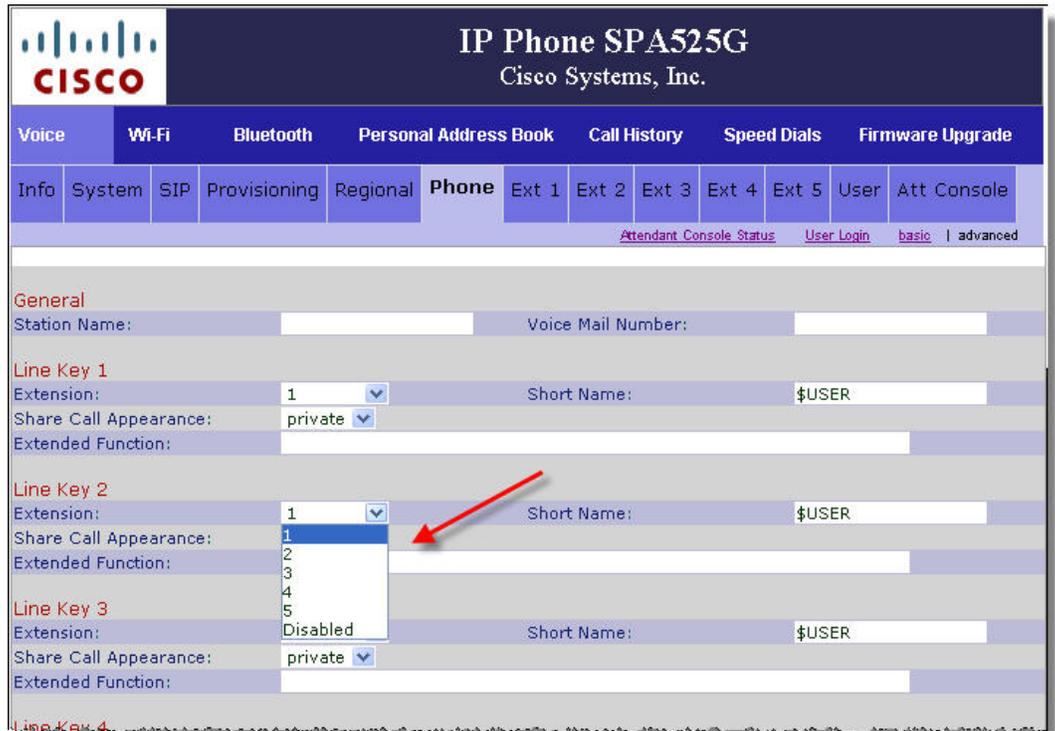
The phone will reboot, register, and be ready to make and receive calls as extension 151.

Configuring Additional Extensions

By default, all of the phone's lines register to the same proxy as line 1.



You can modify this by changing the extension associated with each line key in the Phone tab. Each extension can be associated with line 1 through N, depending on the phone model or the extension can be disabled if you choose to use for XML applications, speed dial, or do not want to use the line.



Modifying the Phone and Extension Names

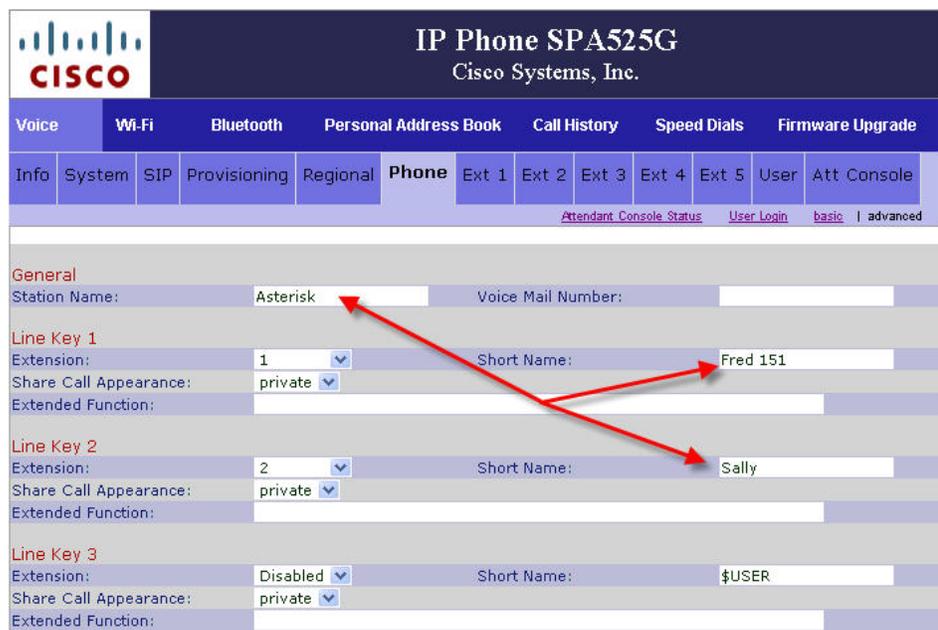
You can modify the phone's name to display text, a phone number, or some identifying information. In this example, the phone is configured to display Asterisk.

You can modify each phone's extension name to display text or numbers of your choice. In this example, line 1 is configured to display Fred 151, line 2 displays Sally, and Lines 3-5 display are not configured.



Modify the phone's name by editing the Phone tab > General > Station Name field.

Modify an extension's name by editing the Phone tab > Line Key 1 Short Name field

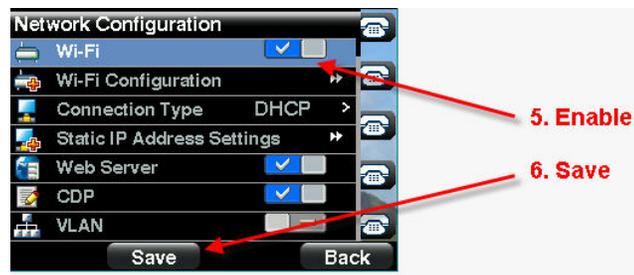


You can change the way a phone displays its name when calling another internal extension by editing the Ext N tab > Subscriber Information > Display Name field

Wireless Connection to Network (SPA525G only)

In this section, I assume that you have a functional 802.11G network and that you have appropriate credentials to access the network.

1. Remove the Ethernet cable from the phone's SW port (if connected)
2. Connect a PA100 (additional purchase) power supply to the DC 5V connection as shown in Figure 1.
3. Press the phone's setup button
4. Select Network Configuration
5. Enable Wi-Fi by pressing the navigation button right
6. Press the Save soft-button



7. Right-button on Wi-Fi Configuration
 8. Select Wireless Profile
 9. Press Option in Select a Profile screen
 10. Select Add New
 11. Right-button on Security Mode
 12. Configure the profile as appropriate for your location and access point
 13. Save the profile
 14. Press the Connect soft-button
- The phone will associate and then connect with the access point
15. Press the phone's setup button to revert to the main display

Gathering Information for Support

In the event that you need to reach out for support, collect the following information first:

A. SPA5xx's configuration

Web-UI > Admin Login > Advanced >

Browser > File > Save As > [save entire page as SPA5xxVoice.html]

<https://www.myciscocommunity.com/docs/DOC-2982>

B. SPA5xx syslog log from debug output:

Web-UI > Admin Login > Advanced >

System tab > Syslog & Debug Server: and Debug Level: 3

<https://www.myciscocommunity.com/docs/DOC-3032>

C. Asterisk sip.conf

D. Asterisk extensions.conf

E. WireShark trace



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