# WLAN for Voice and Data on the SBCS
# Integrating Cisco Mobility Express on UC520
*Companion doc to what was demonstrated in Webcast on 5/07/2009*

https://cisco.webex.com/ciscosales/lsr.php?AT=pb&SP=EC&rID=39604817&rKey=6E2671135385F43F
SBCS with Mobility Express for Wireless-20090507 1700
Thursday, May 7, 2009 1:00 pm New York (Eastern Time, GMT-04:00)
1 Hour

## Requirements Solved

*DO YOU NEED…*

- WiFi access to your data LAN from wireless data devices?
- Internet only secure "Guest" access for visitors to your SMB that you define
- Advanced Security
- Centralized Management
- Voice over WiFi with seamless (<50ms) roaming
- Dynamic radio power and frequency adjustment of your complete system
- Support for up to 250 users
- A Configuration GUI Assistant

**Cisco Mobility Express** has all this. This document will show you how to add a Mobility Express solution to your SBCS (Smart Business Communication System) allowing you Voice, Data, Video and Wireless in a unified and converged system

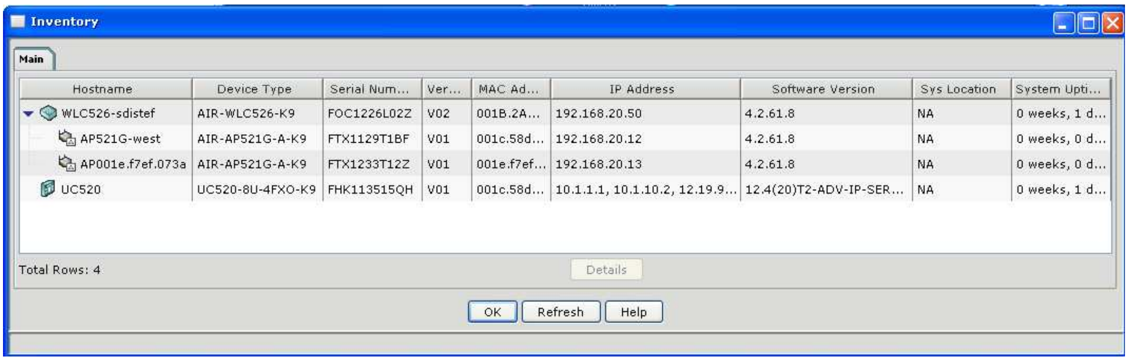
This is a real working reference design that you can use to guide your deployment. It will show you how to configure and operate the system for wireless voice and data clients in the SMB.

## Environment

This is a Cisco lab with a UC520 with public internet access and SIP Trunking.
2 AP521s are connected to the switch ports of the UC520 as well as a WLC526.
Several IP Phones + the C7921 WiFi mobile phone and a SPA525G desktop WiFi phone are included (the 7921 and 525G connect over wireless to the Voice VLAN).

### *SKUS*

1- UC520-8U-4FXO-K9 (non wireless SKU)
1- AIR-WLC526-K9
2 -AIR-AP521G-A-K9 (LWAPP Images)



| Hostname | Device Type | Serial Num... | Ver... | MAC Ad... | IP Address | Software Version | Sys Location | System Upti... |
|---|---|---|---|---|---|---|---|---|
| WLC526-sdistef | AIR-WLC526-K9 | FOC1226L02Z | V02 | 001B.2A... | 192.168.20.50 | 4.2.61.8 | NA | 0 weeks, 1 d... |
| AP521G-west | AIR-AP521G-A-K9 | FTX1129T1BF | V01 | 001c.58d... | 192.168.20.12 | 4.2.61.8 | NA | 0 weeks, 0 d... |
| AP001e.f7ef.073a | AIR-AP521G-A-K9 | FTX1233T12Z | V01 | 001e.f7ef... | 192.168.20.13 | 4.2.61.8 | NA | 0 weeks, 0 d... |
| UC520 | UC520-8U-4FXO-K9 | FHK113515QH | V01 | 001c.58d... | 10.1.1.1, 10.1.10.2, 12.19.9... | 12.4(20)T2-ADV-IP-SER... | NA | 0 weeks, 1 d... |

Total Rows: 4

In addition to the above infrastructure, we have the following WiFi devices:
1- SPA525G Wireless Desktop Phone
1- C7921 WiFi Mobile IP Phone

## *Software/Firmware*

### UC520

7.0.2 bundle zip

- 12.4(20)T2 IOS with CME 7.0(0)
- CUE 3.2.1
- Phone loads
  - 7921 = CP7921G-1.2.1
  - SPA525G = 7.1.7

### Cisco Configuration Assistant

CCA 1.9.1

### WLC526

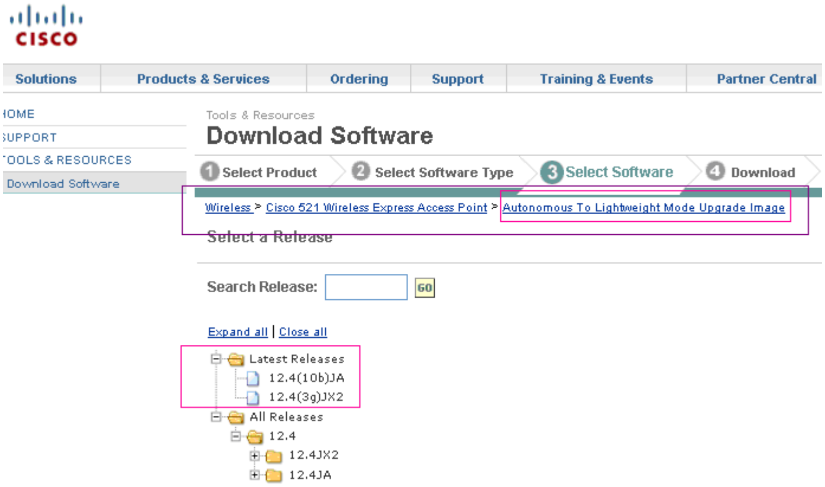
AIR-WLC526-K9 (version 4.2.61.8)

### AP521

Until the AP521s are converted (Standalone → LWAPP) they will not register with the WLC526. Instead they will show up in CCA discovered by the UC520 via CDP, and can be added to the community that way. This then allows CCA to be used to upgrade their SW Images. There are two methods available and I used both (one for each) to convert these:

- On the first AP521 I used the **Convert to LWAPP** tab in the Configuration Drawer
- On the other AP521 I used the Maintenance → SW Upgrade to just install the LWAPP Image.

In both cases, I downloaded the image from CCO and had it on my PC ready to do each of the above.



Download Software

Wireless > Cisco 521 Wireless Express Access Point > Autonomous To Lightweight Mode Upgrade Image

Select a Release

```
Latest Releases
    12.4(10b)JA
    12.4(3g)JX2
All Releases
    12.4
        12.4JX2
        12.4JA
```

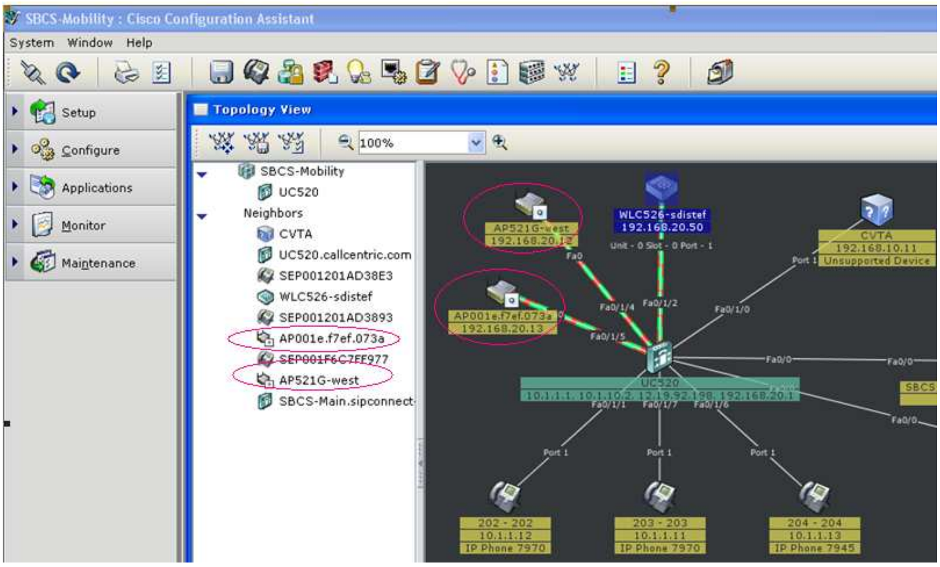
- c520-rcvk9w8-tar.124-3g.JX2.tar
- c520-rcvk9w8-tar.124-10b.JA.tar

In LWAPP (Lightweight Access Point Protocol) mode, the image that runs on the AP521 is received from the WLC526. The AP521 in standalone (autonomous) mode is easily converted to LWAPP, which allows it to register with the WLC526. So in this case, when we talk about the version of AP521, it is the version of the WLC526 = AIR-WLC526-K9 (version 5.2.178.0)

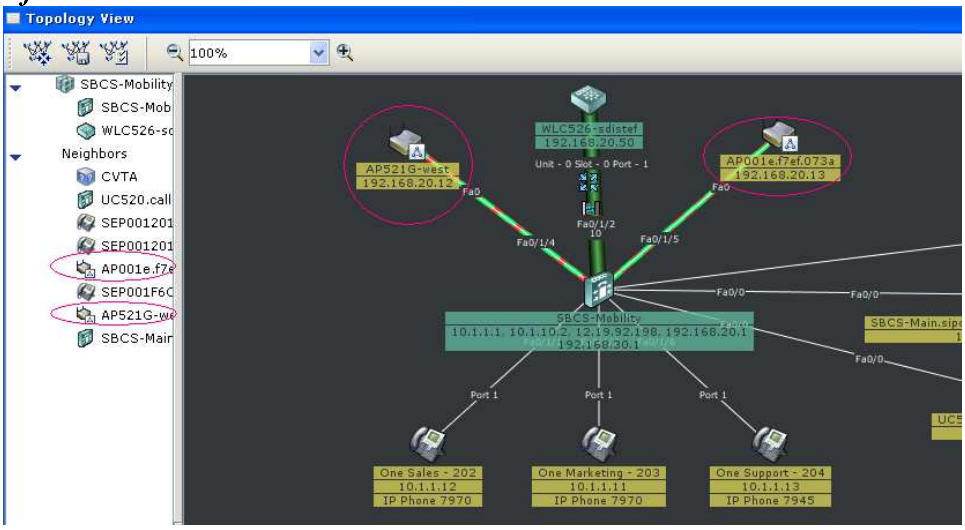
The AP521s started out in Standalone mode and were configured with CCA and supported the wireless devices, but without the controller, management overhead was higher (each AP521 had to be managed on its own) and we had no seamless roaming (very noticeable handoff from AP521 to AP521).

Note, on the Topology of CCA the AP521 appears with a circle when in Standalone mode, and with a Triangle in LWAPP mode.

***Before:***



***After:***



## *Initial configuration and starting configuration.*

When you start with the WLC526, it will need to have some initial configuration setup. You can do this by plugging your laptop into the PORT 1 and pointing a browser at https://192.168.1.1 ← by default http is disabled, but you could enable it if you like later.

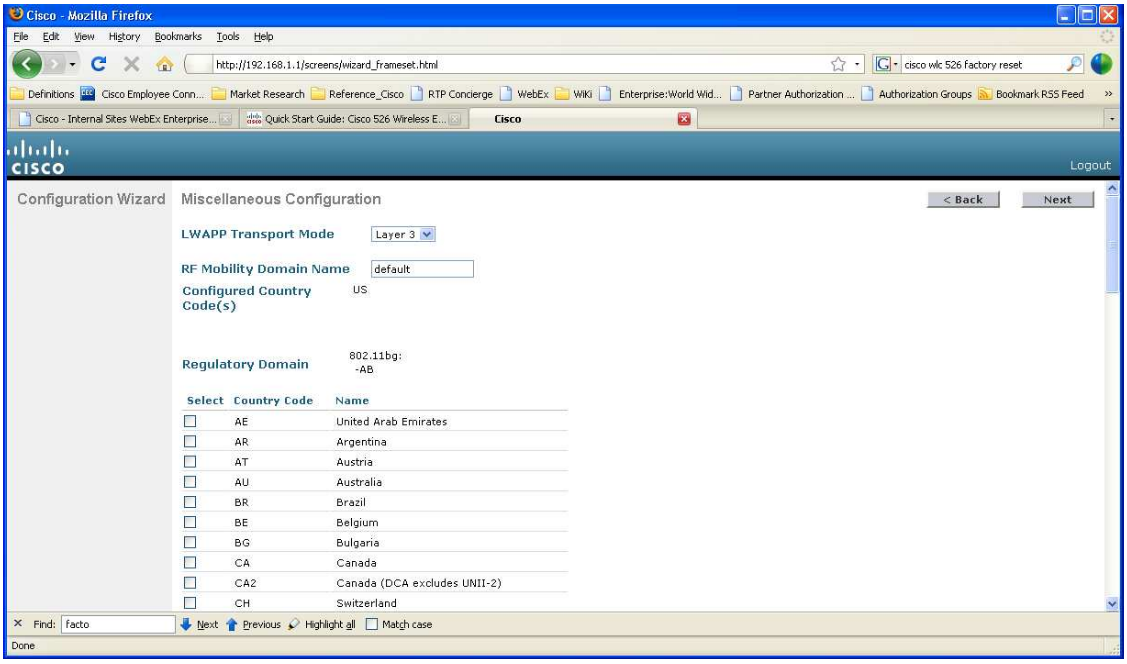
Then just enter the following information from the Startup Wizard GUI

- System (controller) name
  WLC526-sdistef
- Administrative username and password (default admin/admin)
  admin/<secret>
- Management interface
  - IP address – 192.168.20.50
  - Subnet Mask – 255.255.255.0
  - DGW – 192.168.20.1

    - optional VLAN identifier - `0' for untagged
- AP manager interface
    - IP address – 192.168.20.51
    - Subnet Mask – 255.255.255.0
    - DGW – 192.168.20.1
    - optional VLAN identifier - `0' for untagged

*Note The AP manager interface IP address MUST be different than the management interface IP address)*

- The Country Code for this installation – Mine was US



Miscellaneous Configuration

LWAPP Transport Mode: Layer 3

RF Mobility Domain Name: default

Configured Country Code(s): US

Regulatory Domain: 802.11bg: -AB

| Select | Country Code | Name |
|---|---|---|
| □ | AE | United Arab Emirates |
| □ | AR | Argentina |
| □ | AT | Austria |
| □ | AU | Australia |
| □ | BR | Brazil |
| □ | BE | Belgium |
| □ | BG | Bulgaria |
| □ | CA | Canada |
| □ | CA2 | Canada (DCA excludes UNII-2) |
| □ | CH | Switzerland |

Find: facto

Once that's done, unplug you PC and plug PORT 1 of the WLC526 into any of the switch ports of the UC520 LAN or the CE520 switch.  It will reset and come on line.
The AP521s will hear broadcast from WLC526 and find it, register with it, and get their FW from it as well.

While we can continue to use the Web GUI to configure the system, we will do the remained of the configuration from CCA, since this is about integrating with SBCS.

## CCA Discovery

WLC526 now discovered by the UC520 using CDP and gets added to the CCA community (right mouse click and select 'add to community').
Note: this is the point where the AP521 units will show up with (triangle markings instead of circles, indicating LWAPP mode)

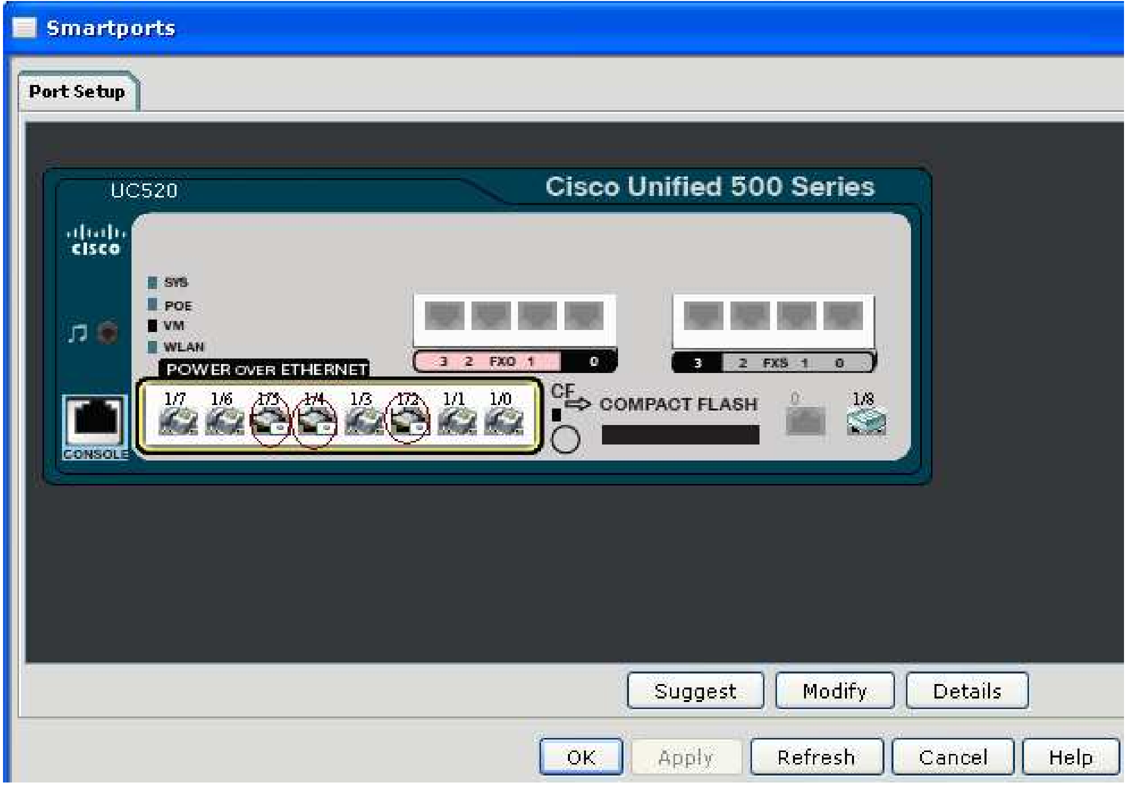
# Configuration

## *Smartports*

**Configure → Smartports**

The first thing you want to do is adjust AP521 and WLC526 APs, using native VLAN 1 (the data VLAN of the UC520 with IP address 192.168.20.1). Use the 'suggest' and 'modify' and apply the changes one at a time.

*NOTE: 192.168.20.1 is my Data VLAN by choice but not a requirement for Mobility.*



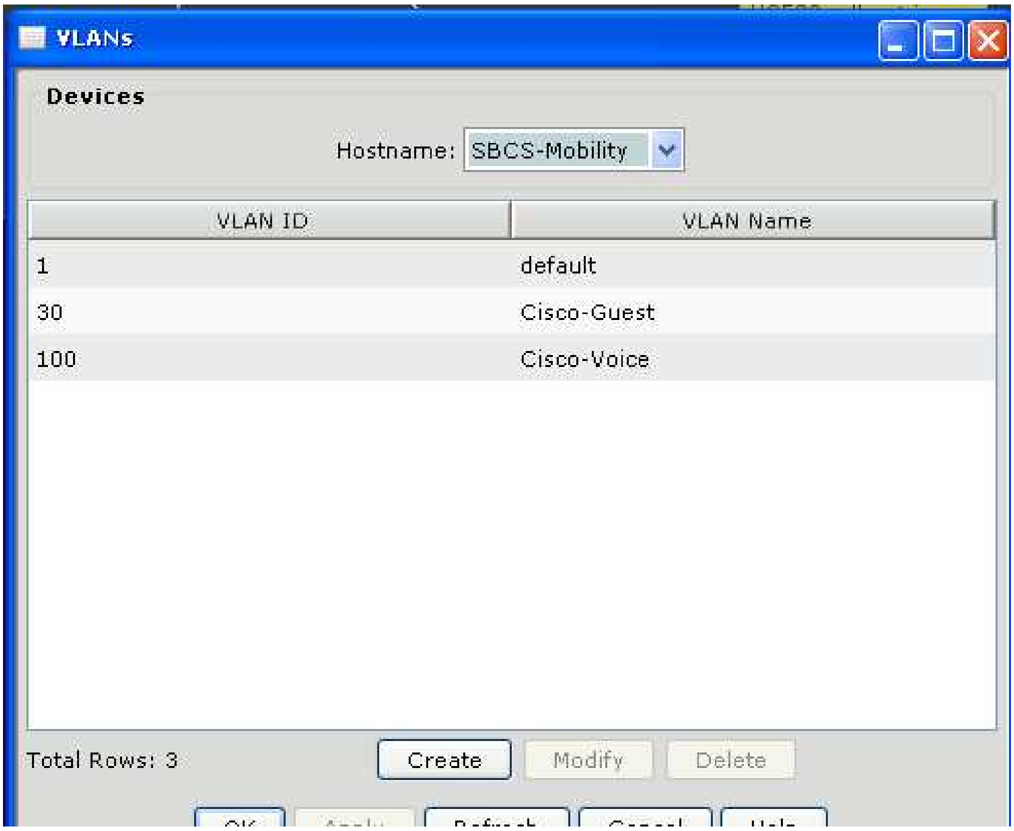
## *VLANS*

Configure → VLANS

Consider there are two managed elements to configure;
UC520 and WLC526, … and CCA lets you do both (one at a time).
Also consider that you already have a Voice VLAN (10.1.1.1 on the UC520), a Data VLAN on the UC520 (192.168.20.1), but you don't yet have a Guest access VLAN.

**UC520**

The UC520 already had the Voice and Data (default) VLAN so just create the Guest VLAN:



Devices

Hostname: SBCS-Mobility

| VLAN ID | VLAN Name |
|---|---|
| 1 | default |
| 30 | Cisco-Guest |
| 100 | Cisco-Voice |

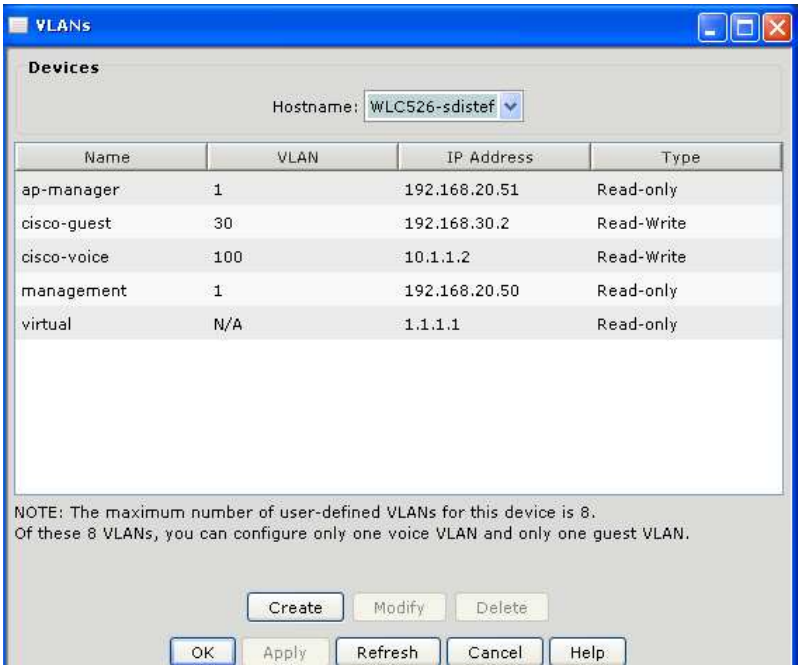
Total Rows: 3

**WLC526**

Associate the Interfaces you created in the WLC526 setup wizard to **the existing** Voice and Data VLANs. Notice we use the 192.168.20.50 and .51 addresses for data and 10.1.1.2 for Voice on the WLC526 side.

*Note: in the sub windows that there are radio buttons to select the type of VLAN, and when you select the proper one, the existing VLAN names will be offered to you. Do not create your own names for existing VLANs or you will end up with VLAN conflicts.*

Then add a Voice VLAN (could be anything; I used 30) and the address on the WLC526 side following the convention 192.168.30.2 since the UC520 side will be the .1 DGW side with the DHCP scope and internet access path.

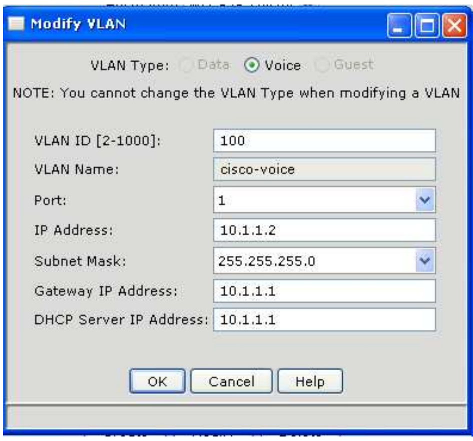


Devices

Hostname: WLC526-sdistef

| Name | VLAN | IP Address | Type |
|---|---|---|---|
| ap-manager | 1 | 192.168.20.51 | Read-only |
| cisco-guest | 30 | 192.168.30.2 | Read-Write |
| cisco-voice | 100 | 10.1.1.2 | Read-Write |
| management | 1 | 192.168.20.50 | Read-only |
| virtual | N/A | 1.1.1.1 | Read-only |

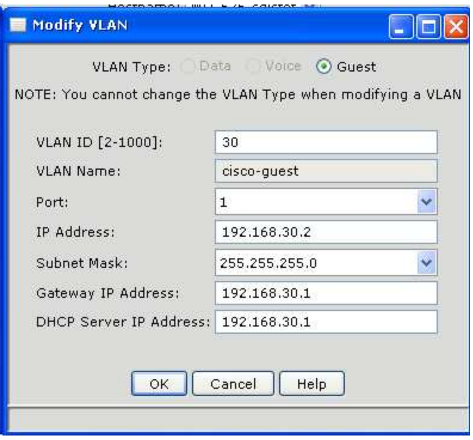
NOTE: The maximum number of user-defined VLANs for this device is 8.
Of these 8 VLANs, you can configure only one voice VLAN and only one guest VLAN.



VLAN Type: ○ Data ● Voice ○ Guest

NOTE: You cannot change the VLAN Type when modifying a VLAN

VLAN ID [2-1000]: 100
VLAN Name: cisco-voice
Port: 1
IP Address: 10.1.1.2
Subnet Mask: 255.255.255.0
Gateway IP Address: 10.1.1.1
DHCP Server IP Address: 10.1.1.1



VLAN Type: ○ Data ○ Voice ● Guest

NOTE: You cannot change the VLAN Type when modifying a VLAN

VLAN ID [2-1000]: 30
VLAN Name: cisco-guest
Port: 1
IP Address: 192.168.30.2
Subnet Mask: 255.255.255.0
Gateway IP Address: 192.168.30.1
DHCP Server IP Address: 192.168.30.1

## *Firewall and DMZ Configuration*

To further isolate SMB internal LAN assets from Guest users, we placed the Guest VLAN on the DMZ.

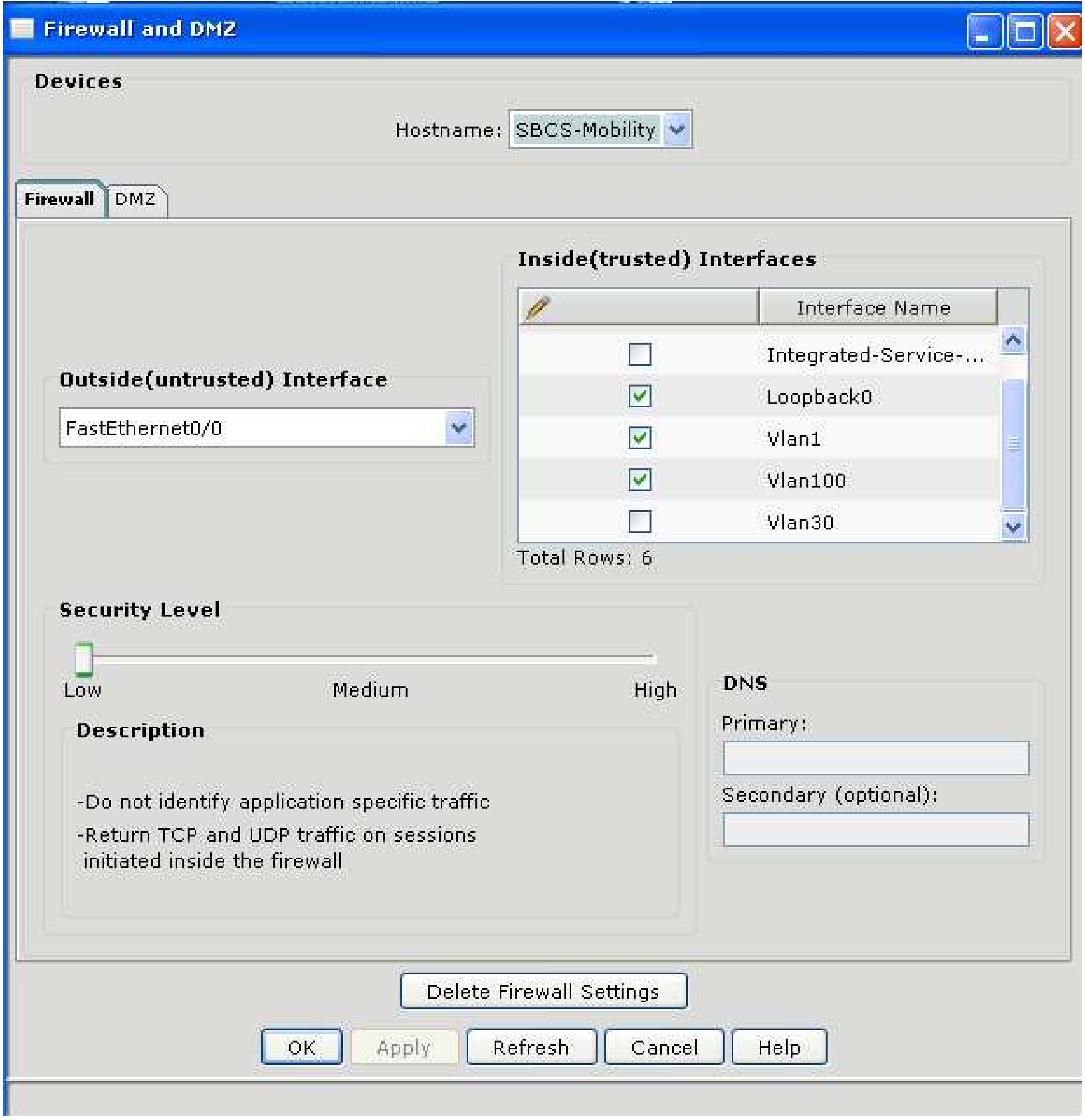
Configure → Security → Firewall

**UC520**

You can place VLAN30 as an inside interface, but you may have to do some manual work with ACLs to get guests to not have access to Data VLAN access in that case. But it will work that way.

I also tried putting it in the DMZ and I noticed that the CCA pushed AL blocked even its ability to get beyond association to the AP (i.e. it didn't even get an IP address until I removed the ACL on the VLAN30). SO more work to do there.

Notice that 192.168.30.1 is not an inside (trusted) interface



Firewall and DMZ

Devices

Hostname: SBCS-Mobility

Firewall | DMZ

Outside(untrusted) Interface

FastEthernet0/0

Inside(trusted) Interfaces

| | Interface Name |
|---|---|
| □ | Integrated-Service-... |
| ☑ | Loopback0 |
| ☑ | Vlan1 |
| ☑ | Vlan100 |
| □ | Vlan30 |

Total Rows: 6

Security Level

Low Medium High

Description

-Do not identify application specific traffic

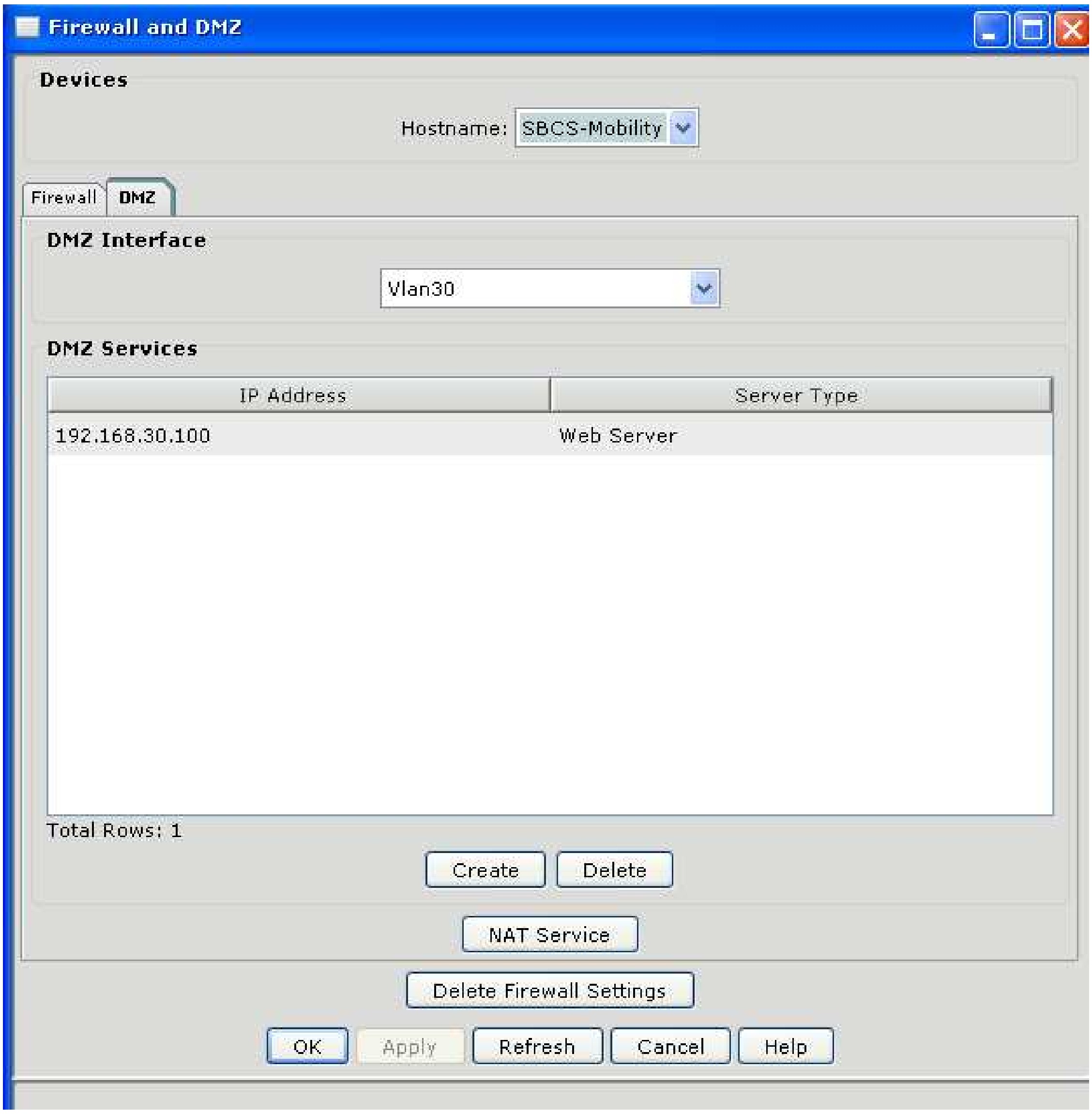
-Return TCP and UDP traffic on sessions initiated inside the firewall

DNS

Primary:

Secondary (optional):

Now click the DMZ tab of this same window and see VLAN 30 is on the DMZ. We actually created a Webserver just to show how this could be leveraged.



Firewall and DMZ

Devices

Hostname: SBCS-Mobility

DMZ Interface

Vlan30

DMZ Services

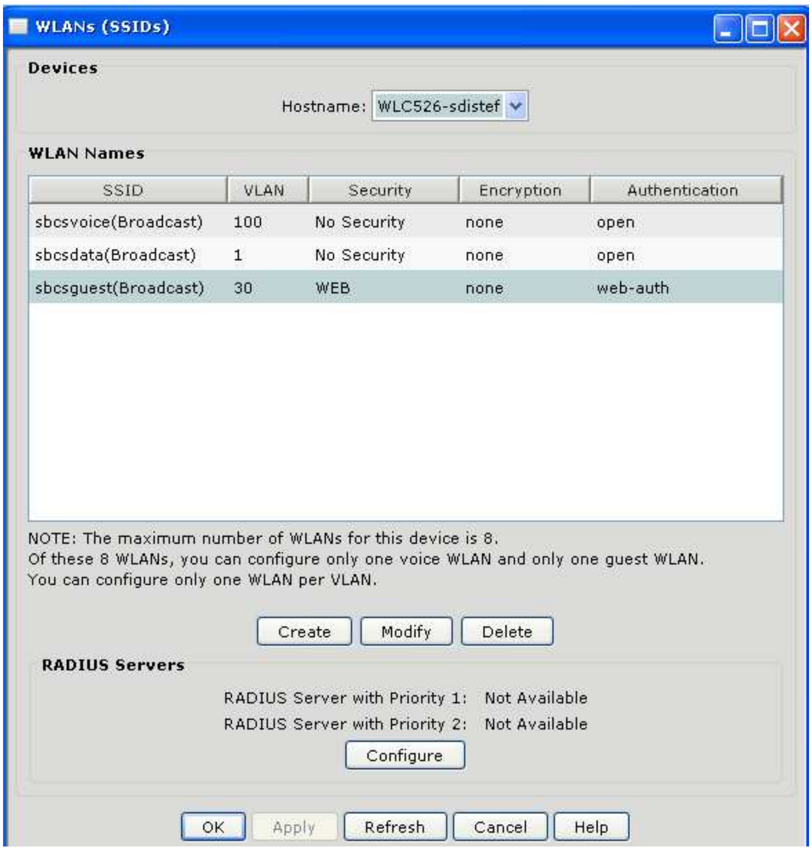
| IP Address | Server Type |
|---|---|
| 192.168.30.100 | Web Server |

Total Rows: 1

## *WLAN (SSID)*

The next thing to do is set up the WLAN SSIDs.
**Configure → Wireless → SSIDs**
I left them 'open' but you can set Authentication (WEP, WPA-PSK or WPA2-PSK) with CCA and can even define a RADIUS based authentication.

From the Voice CAC Type area you can select either Wireless Multimedia Policy, which requires client devices to use WMM, or select 7920 CAC, which supports Cisco 7920 IP telephones on your network. The default setting is Wireless Multimedia Policy.
Note: Do not select Wireless Multimedia Policy if you use Cisco 7920 phones on your network.   But 7921s can use WMM.



WLANs (SSIDs)

Devices

Hostname: WLC526-sdistef

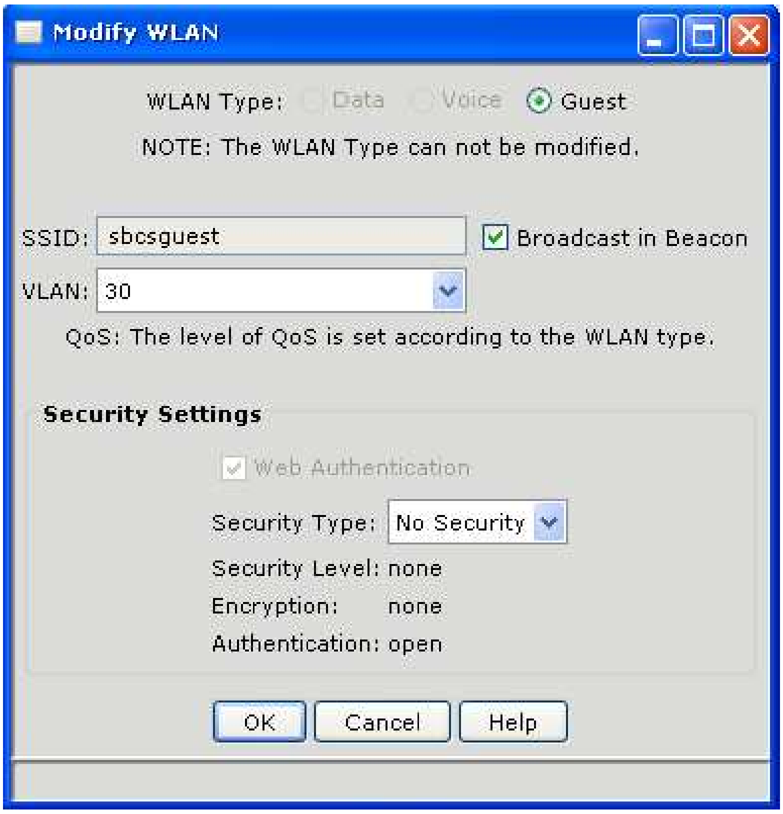
WLAN Names

| SSID | VLAN | Security | Encryption | Authentication |
|---|---|---|---|---|
| sbcsvoice(Broadcast) | 100 | No Security | none | open |
| sbcsdata(Broadcast) | 1 | No Security | none | open |
| sbcsguest(Broadcast) | 30 | WEB | none | web-auth |

NOTE: The maximum number of WLANs for this device is 8.
Of these 8 WLANs, you can configure only one voice WLAN and only one guest WLAN.
You can configure only one WLAN per VLAN.

RADIUS Servers

RADIUS Server with Priority 1: Not Available
RADIUS Server with Priority 2: Not Available



Modify WLAN

WLAN Type: ○ Data ○ Voice ● Guest

NOTE: The WLAN Type can not be modified.

SSID: sbcsguest ☑ Broadcast in Beacon

VLAN: 30

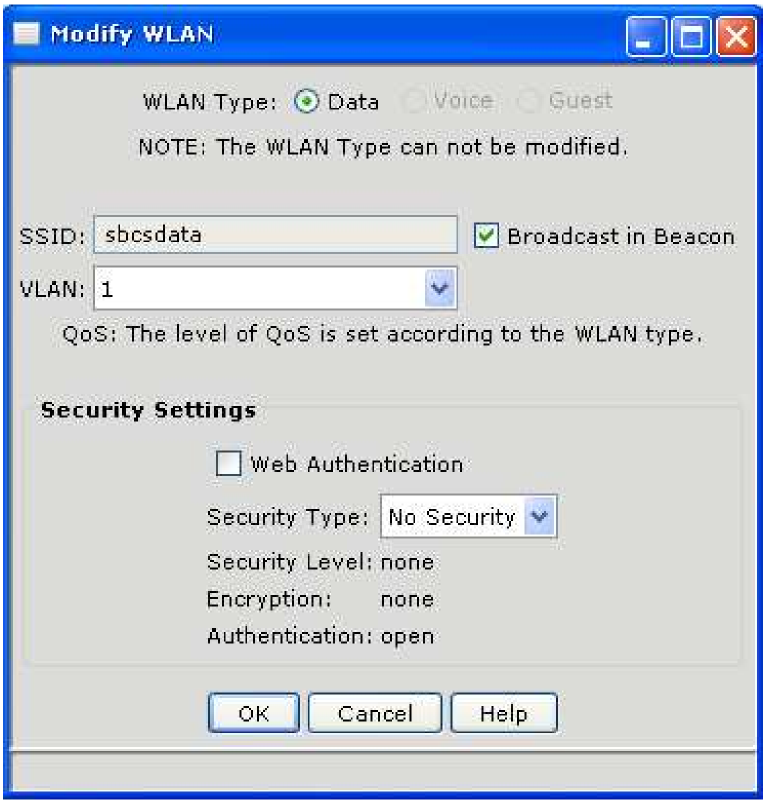
QoS: The level of QoS is set according to the WLAN type.

Security Settings

☑ Web Authentication

Security Type: No Security

Security Level: none
Encryption: none
Authentication: open



WLAN Type: ● Data ○ Voice ○ Guest

NOTE: The WLAN Type can not be modified.

SSID: sbcsdata ☑ Broadcast in Beacon

VLAN: 1

QoS: The level of QoS is set according to the WLAN type.

**Security Settings**

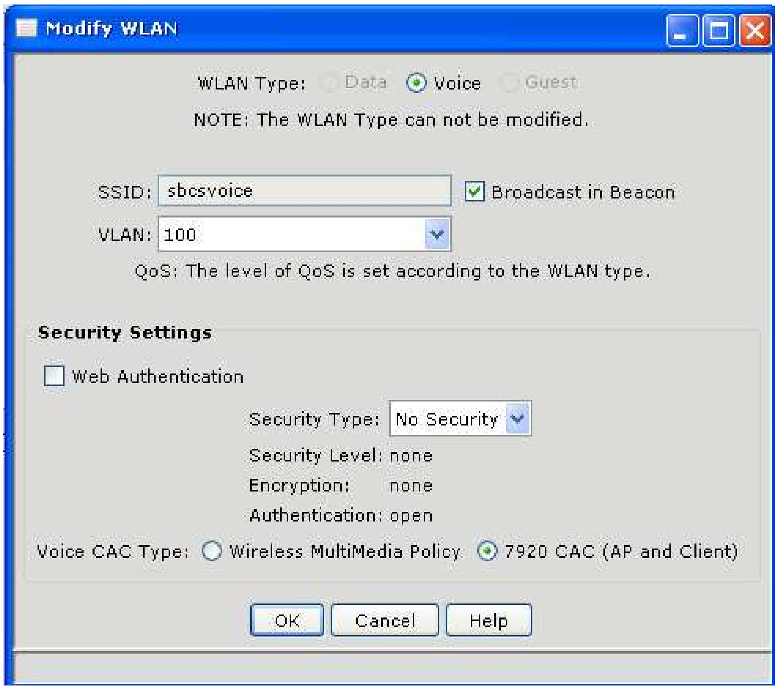
□ Web Authentication

Security Type: No Security

Security Level: none

Encryption: none

Authentication: open



WLAN Type: ○ Data ● Voice ○ Guest

NOTE: The WLAN Type can not be modified.

SSID: sbcsvoice ☑ Broadcast in Beacon

VLAN: 100

QoS: The level of QoS is set according to the WLAN type.

**Security Settings**

□ Web Authentication

Security Type: No Security

Security Level: none

Encryption: none

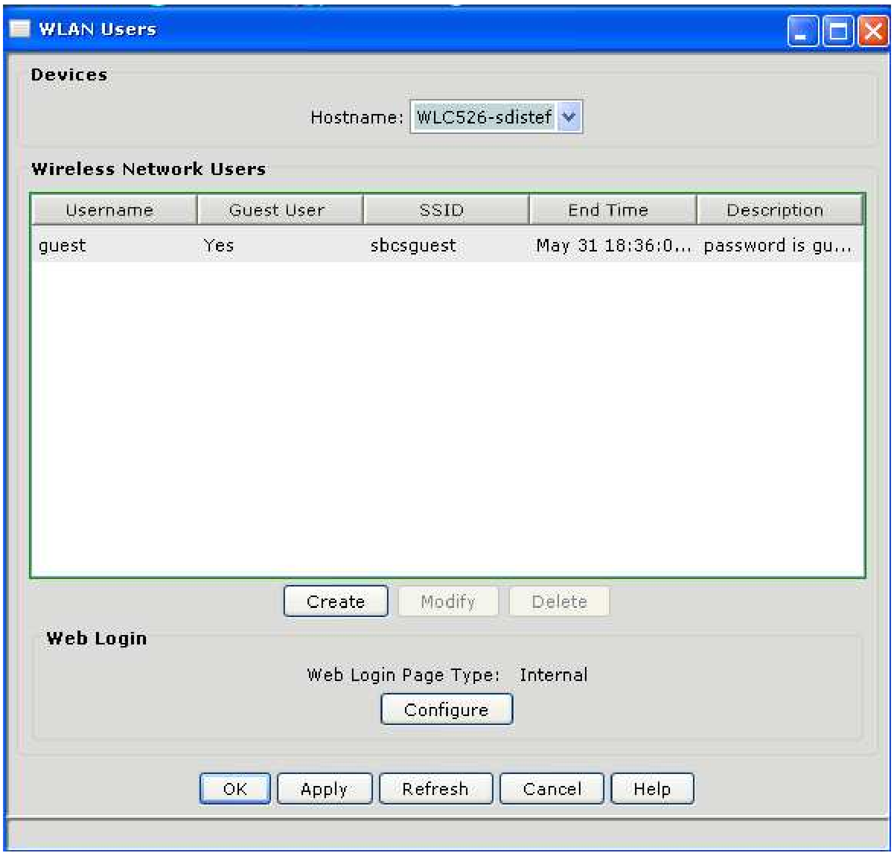
Authentication: open

Voice CAC Type: ○ Wireless MultiMedia Policy ● 7920 CAC (AP and Client)

## *Wireless LAN Users*

You now administer users that can be used for the guest net.
**Configure → Wireless → Users**

## Wireless Network Users



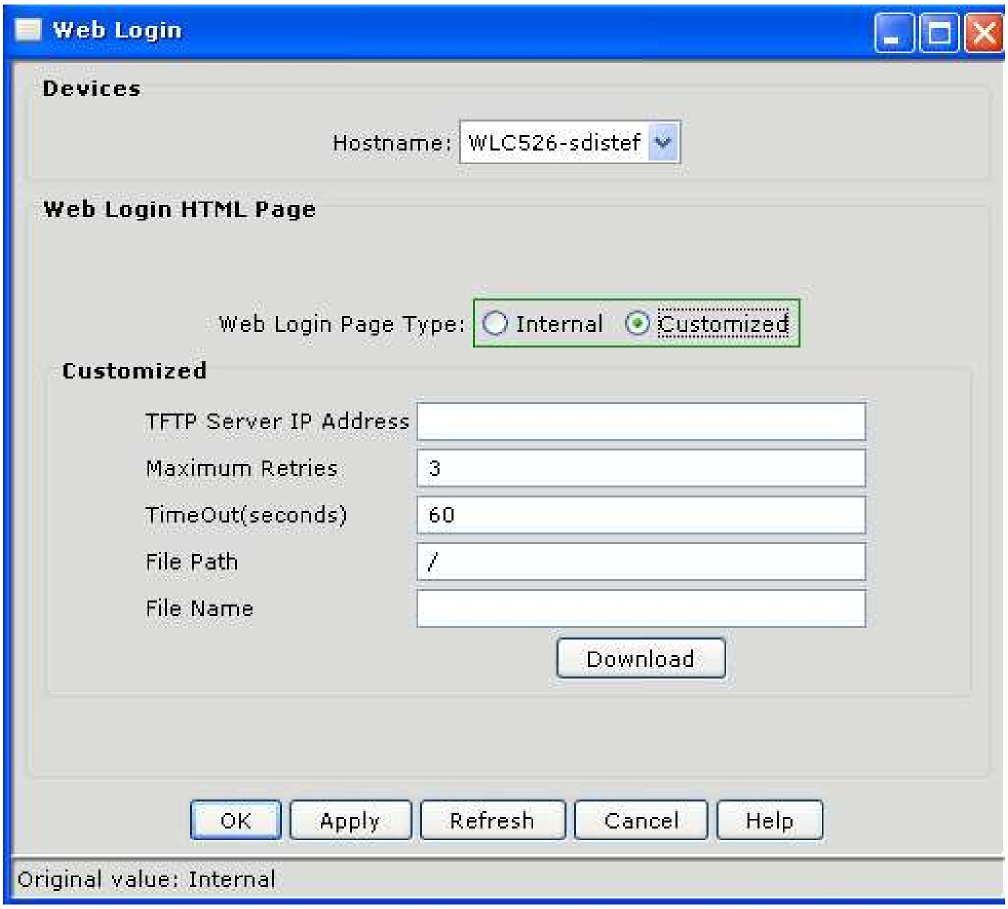
Hostname: WLC526-sdistef

| Username | Guest User | SSID | End Time | Description |
|---|---|---|---|---|
| guest | Yes | sbcsguest | May 31 18:36:0... | password is gu... |

Web Login Page Type: Internal

## Web Login Page

You may customize:



Web Login

Devices

Hostname: WLC526-sdistef

Web Login HTML Page

Web Login Page Type: ○ Internal ● Customized

Customized

TFTP Server IP Address:

Maximum Retries: 3

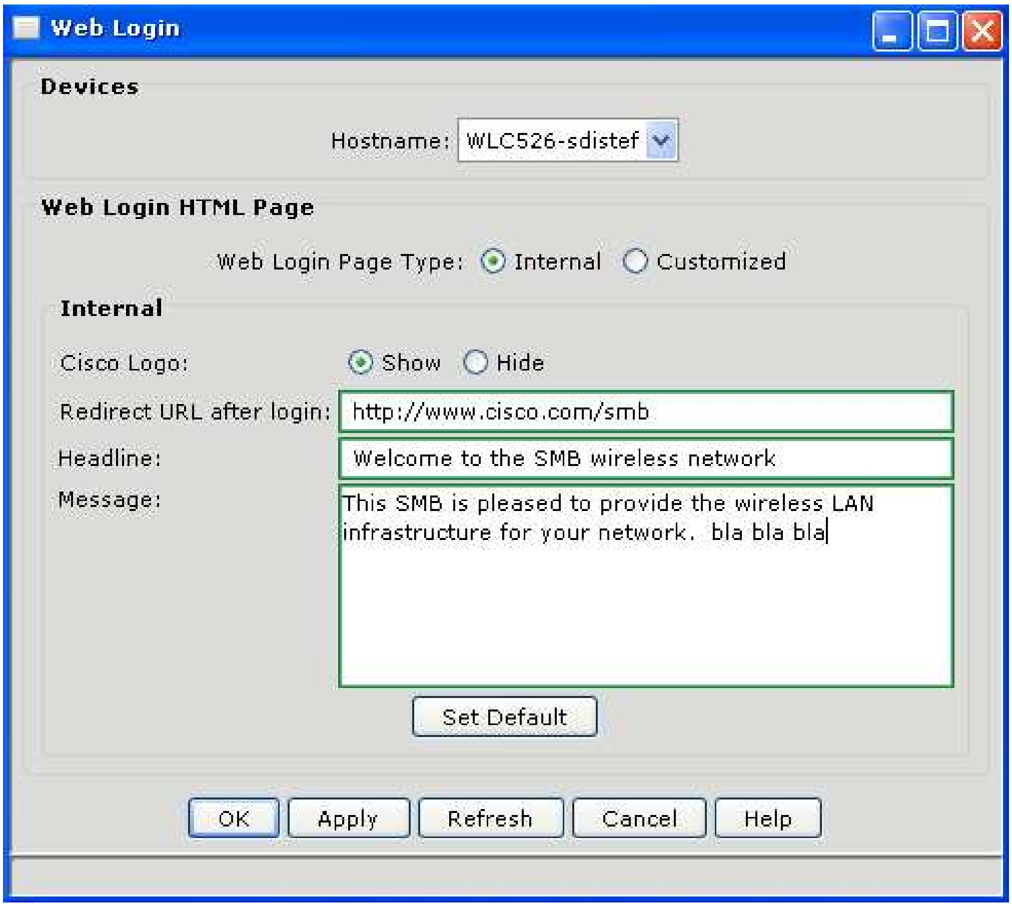
TimeOut(seconds): 60

File Path: /

File Name:

Original value: Internal

Or use Internal:



Hostname: WLC526-sdistef

Web Login Page Type: ● Internal ○ Customized

Cisco Logo: ● Show ○ Hide

Redirect URL after login: http://www.cisco.com/smb

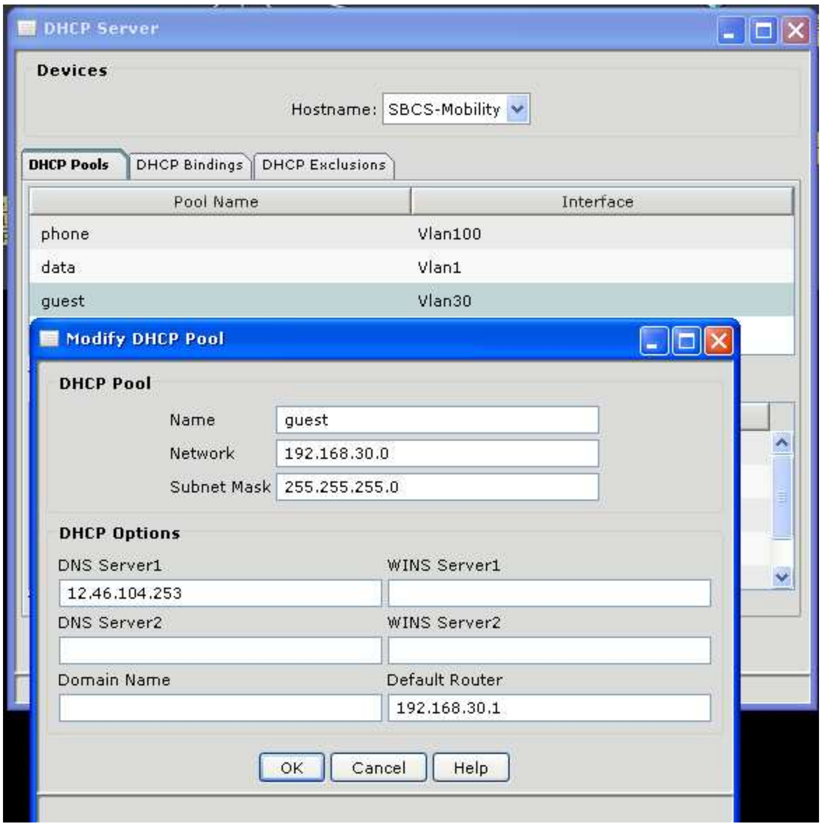
Headline: Welcome to the SMB wireless network

Message: This SMB is pleased to provide the wireless LAN infrastructure for your network. bla bla bla

## *DHCP Server*

Remember that we created a new network for guest access which requires clients to receive DHCP IP addresses. Configure this on the UC520.

**Configure → DHCP Server**



Hostname: SBCS-Mobility

| Pool Name | Interface |
|---|---|
| phone | Vlan100 |
| data | Vlan1 |
| guest | Vlan30 |

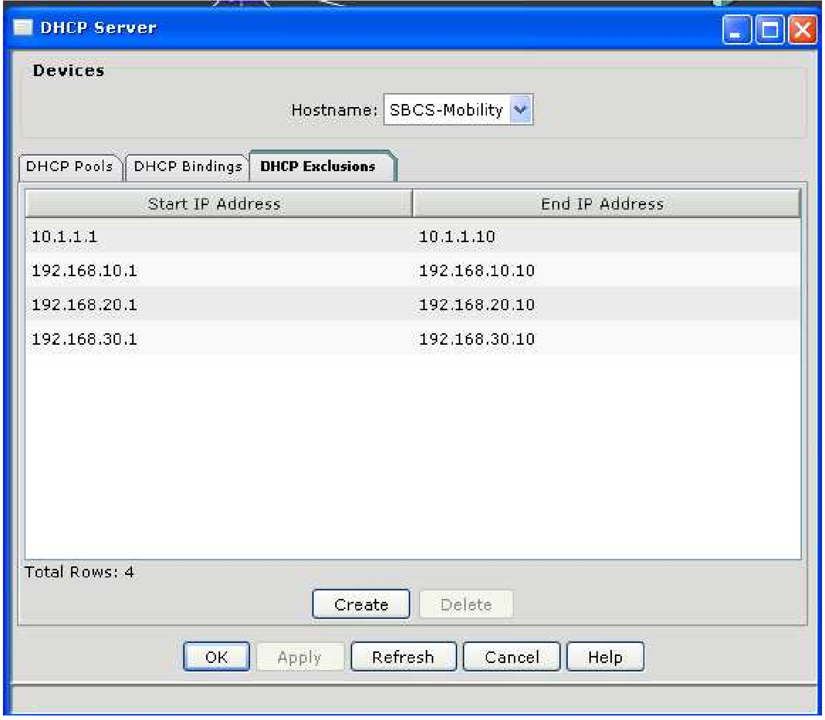
DHCP Pool

| | |
|---|---|
| Name | guest |
| Network | 192.168.30.0 |
| Subnet Mask | 255.255.255.0 |

DHCP Options

| | |
|---|---|
| DNS Server1 | 12.46.104.253 |
| WINS Server1 | |
| DNS Server2 | |
| WINS Server2 | |
| Domain Name | |
| Default Router | 192.168.30.1 |

Also don’t forget to specify exclusions:



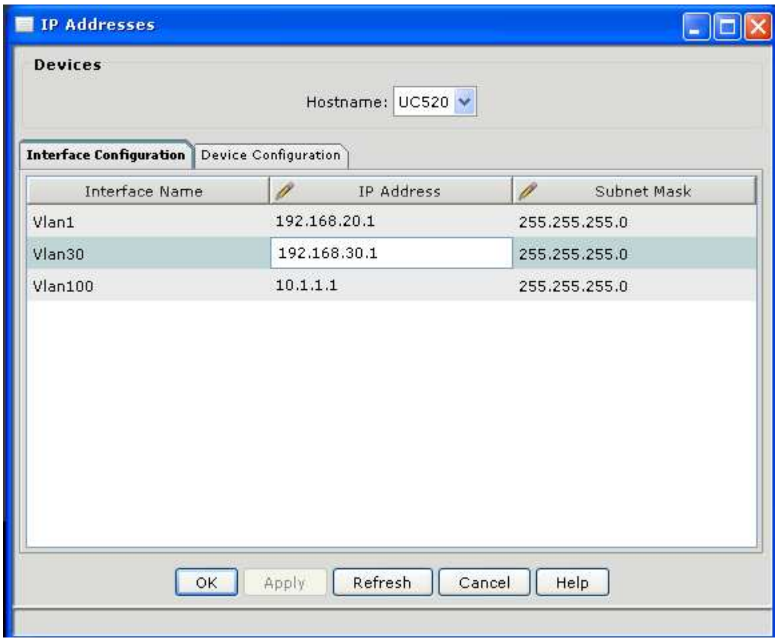
Hostname: SBCS-Mobility

| Start IP Address | End IP Address |
|---|---|
| 10.1.1.1 | 10.1.1.10 |
| 192.168.10.1 | 192.168.10.10 |
| 192.168.20.1 | 192.168.20.10 |
| 192.168.30.1 | 192.168.30.10 |

Total Rows: 4

### IP Addresses

Add the IP Address for the VLAN 30 interface

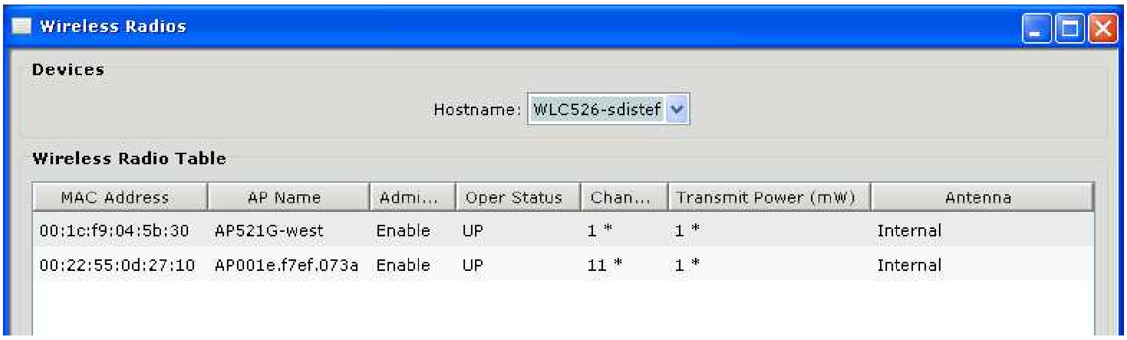


Hostname: UC520

| Interface Name | IP Address | Subnet Mask |
|---|---|---|
| Vlan1 | 192.168.20.1 | 255.255.255.0 |
| Vlan30 | 192.168.30.1 | 255.255.255.0 |
| Vlan100 | 10.1.1.1 | 255.255.255.0 |

# Monitor

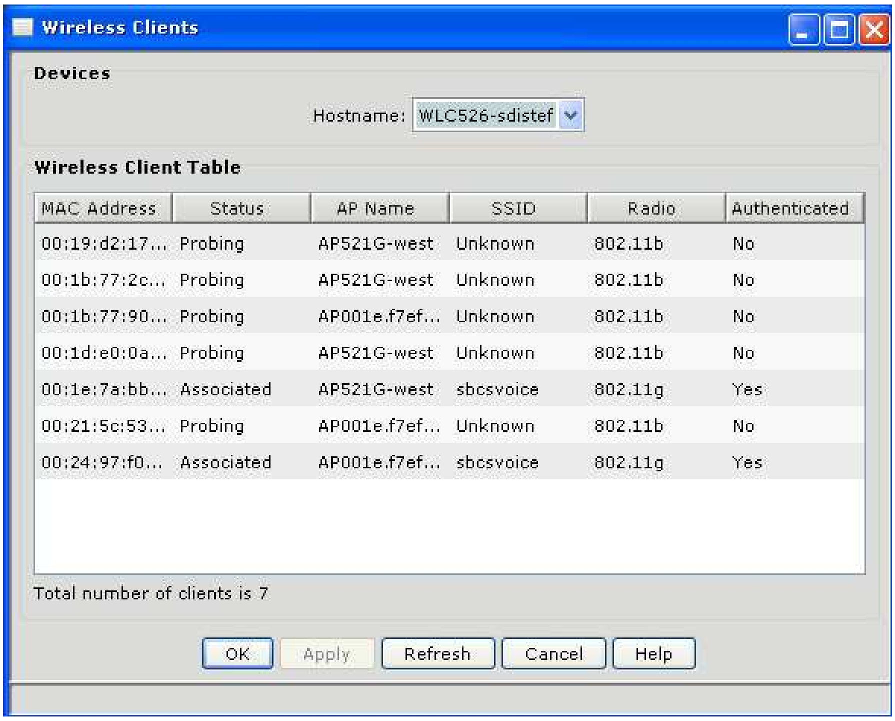
### Wireless Radios



Hostname: WLC526-sdistef

| MAC Address | AP Name | Admi... | Oper Status | Chan... | Transmit Power (mW) | Antenna |
|---|---|---|---|---|---|---|
| 00:1c:f9:04:5b:30 | AP521G-west | Enable | UP | 1 * | 1 * | Internal |
| 00:22:55:0d:27:10 | AP001e.f7ef.073a | Enable | UP | 11 * | 1 * | Internal |

## *Wireless Clients*



**Devices**

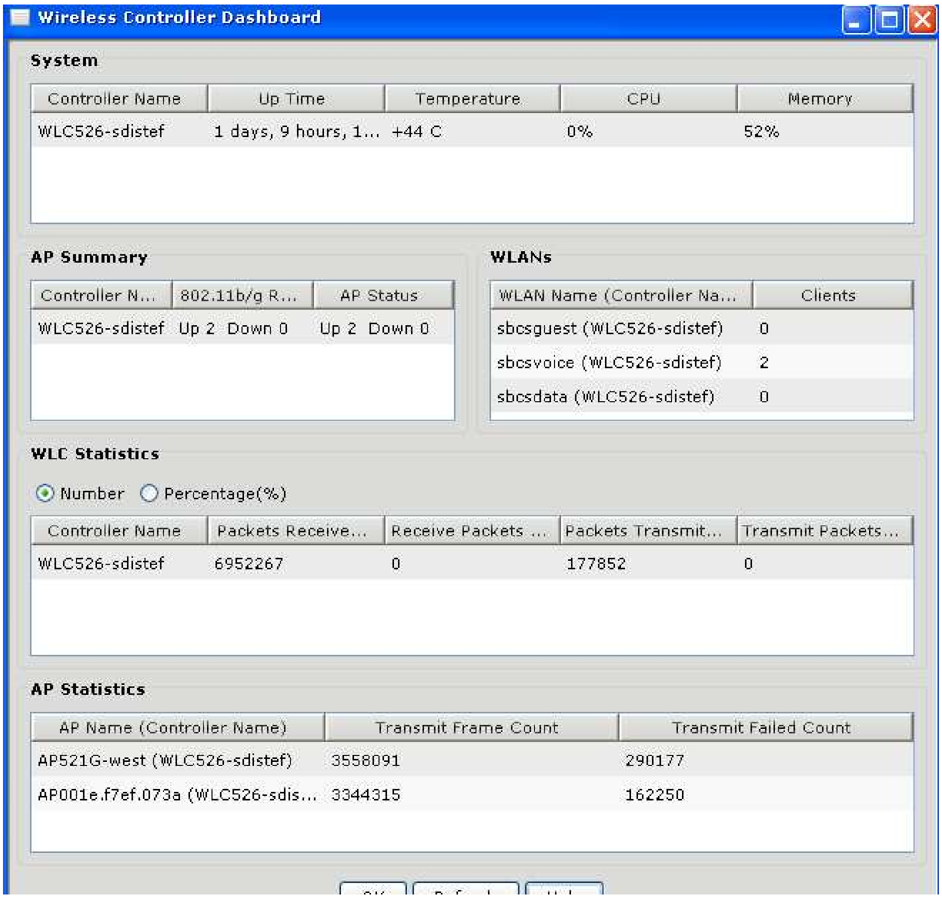
Hostname: WLC526-sdistef

**Wireless Client Table**

| MAC Address | Status | AP Name | SSID | Radio | Authenticated |
|---|---|---|---|---|---|
| 00:19:d2:17... | Probing | AP521G-west | Unknown | 802.11b | No |
| 00:1b:77:2c... | Probing | AP521G-west | Unknown | 802.11b | No |
| 00:1b:77:90... | Probing | AP001e.f7ef... | Unknown | 802.11b | No |
| 00:1d:e0:0a... | Probing | AP521G-west | Unknown | 802.11b | No |
| 00:1e:7a:bb... | Associated | AP521G-west | sbcsvoice | 802.11g | Yes |
| 00:21:5c:53... | Probing | AP001e.f7ef... | Unknown | 802.11b | No |
| 00:24:97:f0... | Associated | AP001e.f7ef... | sbcsvoice | 802.11g | Yes |

Total number of clients is 7

## *Wireless Controller Dashboard*



**System**

| Controller Name | Up Time | Temperature | CPU | Memory |
|---|---|---|---|---|
| WLC526-sdistef | 1 days, 9 hours, 1... | +44 C | 0% | 52% |

**AP Summary**

| Controller N... | 802.11b/g R... | AP Status |
|---|---|---|
| WLC526-sdistef | Up 2 Down 0 | Up 2 Down 0 |

**WLANs**

| WLAN Name (Controller Na... | Clients |
|---|---|
| sbcsguest (WLC526-sdistef) | 0 |
| sbcsvoice (WLC526-sdistef) | 2 |
| sbcsdata (WLC526-sdistef) | 0 |

**WLC Statistics**

● Number ○ Percentage(%)

| Controller Name | Packets Receive... | Receive Packets ... | Packets Transmit... | Transmit Packets... |
|---|---|---|---|---|
| WLC526-sdistef | 6952267 | 0 | 177852 | 0 |

**AP Statistics**

| AP Name (Controller Name) | Transmit Frame Count | Transmit Failed Count |
|---|---|---|
| AP521G-west (WLC526-sdistef) | 3558091 | 290177 |
| AP001e.f7ef.073a (WLC526-sdis... | 3344315 | 162250 |