



Newer Cisco SBA Guides Available

This guide is part of an older series of Cisco Smart Business Architecture designs. To access the latest Cisco SBA Guides, go to <http://www.cisco.com/go/sba>

Cisco strives to update and enhance SBA guides on a regular basis. As we develop a new series of SBA guides, we test them together, as a complete system. To ensure the mutual compatibility of designs in Cisco SBA guides, you should use guides that belong to the same series.





SBA

MIDSIZE

BORDERLESS
NETWORKS

Wireless CleanAir Deployment Guide

● ● ● SMART BUSINESS ARCHITECTURE

February 2012 Series

Preface

Who Should Read This Guide

This Cisco® Smart Business Architecture (SBA) guide is for people who fill a variety of roles:

- Systems engineers who need standard procedures for implementing solutions
- Project managers who create statements of work for Cisco SBA implementations
- Sales partners who sell new technology or who create implementation documentation
- Trainers who need material for classroom instruction or on-the-job training

In general, you can also use Cisco SBA guides to improve consistency among engineers and deployments, as well as to improve scoping and costing of deployment jobs.

Release Series

Cisco strives to update and enhance SBA guides on a regular basis. As we develop a new series of SBA guides, we test them together, as a complete system. To ensure the mutual compatibility of designs in Cisco SBA guides, you should use guides that belong to the same series.

All Cisco SBA guides include the series name on the cover and at the bottom left of each page. We name the series for the month and year that we release them, as follows:

month year Series

For example, the series of guides that we released in August 2011 are the “August 2011 Series”.

You can find the most recent series of SBA guides at the following sites:

Customer access: <http://www.cisco.com/go/sba>

Partner access: <http://www.cisco.com/go/sbachannel>

How to Read Commands

Many Cisco SBA guides provide specific details about how to configure Cisco network devices that run Cisco IOS, Cisco NX-OS, or other operating systems that you configure at a command-line interface (CLI). This section describes the conventions used to specify commands that you must enter.

Commands to enter at a CLI appear as follows:

```
configure terminal
```

Commands that specify a value for a variable appear as follows:

```
ntp server 10.10.48.17
```

Commands with variables that you must define appear as follows:

```
class-map [highest class name]
```

Commands shown in an interactive example, such as a script or when the command prompt is included, appear as follows:

```
Router# enable
```

Long commands that line wrap are underlined. Enter them as one command:

```
wrr-queue random-detect max-threshold 1 100 100 100 100 100  
100 100 100
```

Noteworthy parts of system output or device configuration files appear highlighted, as follows:

```
interface Vlan64  
ip address 10.5.204.5 255.255.255.0
```

Comments and Questions

If you would like to comment on a guide or ask questions, please use the forum at the bottom of one of the following sites:

Customer access: <http://www.cisco.com/go/sba>

Partner access: <http://www.cisco.com/go/sbachannel>

An RSS feed is available if you would like to be notified when new comments are posted.

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What's In This SBA Guide

About SBA

Cisco SBA helps you design and quickly deploy a full-service business network. A Cisco SBA deployment is prescriptive, out-of-the-box, scalable, and flexible.

Cisco SBA incorporates LAN, WAN, wireless, security, data center, application optimization, and unified communication technologies—tested together as a complete system. This component-level approach simplifies system integration of multiple technologies, allowing you to select solutions that solve your organization's problems—without worrying about the technical complexity.

For more information, see the *How to Get Started with Cisco SBA* document:

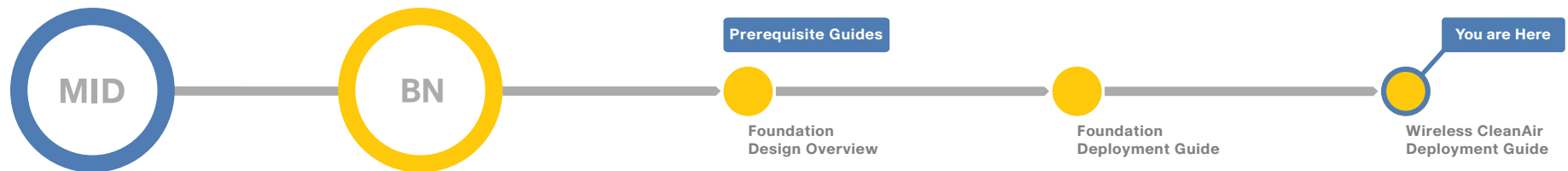
http://www.cisco.com/en/US/docs/solutions/Enterprise/Borderless_Networks/Smart_Business_Architecture/SBA_Getting_Started.pdf

About This Guide

This *additional deployment guide* includes the following sections:

- **Business Overview**—The challenge that your organization faces. Business decision makers can use this section to understand the relevance of the solution to their organizations' operations.
- **Technology Overview**—How Cisco solves the challenge. Technical decision makers can use this section to understand how the solution works.
- **Deployment Details**—Step-by-step instructions for implementing the solution. Systems engineers can use this section to get the solution up and running quickly and reliably.

This guide presumes that you have read the prerequisites guides, as shown on the Route to Success below.



Route to Success

To ensure your success when implementing the designs in this guide, you should read any guides that this guide depends upon—shown to the left of this guide on the route above. Any guides that depend upon this guide are shown to the right of this guide.

For customer access to all SBA guides: <http://www.cisco.com/go/sba>
For partner access: <http://www.cisco.com/go/sbachannel>

Business Overview

The challenges of running a wired data network are beyond the expectations of most other jobs. The challenges go beyond simply adding a machine and handing it over to the desktop IT department or to the end user to leverage as they desire. Of the numerous challenges that arise with any application, the network is always the easiest entity to blame for failure. Now add a *wireless* data network to the picture, and you triple the challenges and skill set required to maintain and troubleshoot the network. Wireless networking brings a new set of unknowns that an administrator of a wired network never had to address.

Wi-Fi is no longer just a convenient technology used for casual web surfing or simple connectivity from conference rooms. With 802.11n, wireless performance is now on par with wired networks, and businesses and organizations such as hospitals rely on the wireless network for mission-critical and patient-critical applications. Without running expensive site surveys with a spectrum analyzer every hour and minute of every day, the network administrator cannot tell what is happening in the user space. With limited IT resources and a lack of RF expertise, an organization requires tools to alert for potentially negative issues before a user creates a call ticket in the network call center.

Notes

Technology Overview

Cisco CleanAir Technology

Cisco® CleanAir technology is the integration of Cisco Spectrum Expert Wi-Fi analysis tools with Cisco access points. Before Cisco CleanAir, operators had to walk around with an instrument to detect signals of interest and physically locate the device that generated them. Cisco CleanAir helps to automate these tasks within the system management function by adding additional intelligence over Cisco Spectrum Expert, thereby augmenting the overall experience in proactively reclaiming control over the radio spectrum.

The components of a basic Cisco CleanAir solution are the Cisco Wireless LAN Controller and Cisco Aironet 3500 or 3600 Series Access Points. To take advantage of the entire set of Cisco CleanAir features, Cisco Wireless Control System (WCS) can display in real time the data retrieved from CleanAir. Adding Cisco Mobility Services Engine (MSE) further enhances the available features and provides the history and location of specific interference devices.

Cisco WCS with CleanAir technology allows network administrators to visually see how well their network is performing, remotely troubleshoot client connectivity, manage wireless network resources, analyze interference devices from anywhere in the world, and more. The real power of Cisco WCS with CleanAir combined with Cisco access points is the ability to visually represent the radio environment to the network administrator, so the administrator can better manage and troubleshoot issues before they bring the network to its knees.

Cisco WCS

Cisco WCS enables you to configure and monitor one or more Cisco wireless LAN controllers and associated access points, monitor and troubleshoot radio technology, and visually display Cisco CleanAir data to the network administrator. Cisco WCS includes the same configuration, performance monitoring, security, fault management, and accounting options used at the controller level and adds a graphical view of multiple controllers and managed access points.

Cisco MSE (Optional Component)

Cisco MSE can run multiple related or independent services, such as location and wireless intrusion detection system/intrusion prevention system (IDS/IPS) services and the Cisco CleanAir database functionality, as well as future services. The Cisco MSE is an independent appliance that is leveraged by Cisco WCS.

Location, or Context-Aware, Service

The Cisco location service solution (also referred to as the *context-aware service*) provides the capability to determine the physical location of a tracked entity in the network and additional contextual information, such as the serial number of the tracked entity. The tracked entity can be a wireless endpoint, a wired endpoint (a phone or PC), a wired switch, or a wireless controller. This document does not cover the location service solution.

Deployment Details

For the deployment described in this guide, the Cisco WCS requires Windows 2003 Server. Within the Cisco SBA LAN architecture, we have installed Windows 2003 Server on a VMware ESXi 4.0 platform. This guide leverages the standard server configuration, which supports up to 2000 Cisco Aironet lightweight access points, 1000 standalone access points, and 450 Cisco wireless LAN controllers. A low-end server can support up to 500 Cisco Aironet lightweight access points, 200 standalone access points, and 125 Cisco wireless LAN controllers. This information can help you determine your network needs and future growth. No matter what your organization requires, the same Cisco WCS software runs on different hardware, as described in the product Release Notes.

Process

Installing Cisco WCS

1. Create a Windows 2003 virtual machine
2. Install Cisco WCS

Procedure 1 Create a Windows 2003 virtual machine

Step 1: Create a virtual machine on the VMware server, install the Windows Server 2003 operating system on the newly created virtual machine, and then install all of the latest patches and updates.

Procedure 2

Install Cisco WCS

The installation steps outlined in this procedure are typical for most applications. As with every installation, the more information you know up front, the easier the installation experience will be. With Cisco WCS, planning the host name ahead of time when building the machine makes for a logical and easy-to-troubleshoot network. For the actual installation of the Cisco Wireless Control System service, keep the following information handy for a smooth installation process.

- HTTP, HTTPS, and health monitor port information
The deployment in this guide uses the default ports. You should consult your security policy to be sure your organization's policy allows you to use default ports.
- Root password
- FTP file folder on local machine
- TFTP file folder on local machine
- Installation folder (a default folder will be chosen under Program Files)

Step 1: Navigate to the Cisco WCS application file that you downloaded from Cisco.com. It should have a name similar to **WCS-STANDARD-K9-7.0.220.0.exe**.

Step 2: Double-click the application file, and then follow the instructions in the installer. Note the following:

- On the Select High Availability Node page, choose **No** from the drop-down list. You can create a secondary installation later by running the installer again.
- On the Check Ports page, ensure that your organization's security policy will allow access services in your Cisco WCS installation to use the default HTTP, HTTPS, and health monitor ports. If your security policy specifies different ports for Cisco WCS access services, change the settings

Process

Installing Licenses

1. Request Cisco WCS License
2. Log into Cisco WCS and install license files

Procedure 1

Request Cisco WCS License

Cisco WCS is licensed by the number of access points and services you desire. For this guide, we uploaded a license that includes Spectrum Intelligence as a service and 550 access points.

If you have not already received the licensing files, you must perform this procedure.

Step 1: Determine the Cisco WCS host name and number of access points.

Step 2: Send an email to licensing@cisco.com with the Cisco WCS host name and number of access points.

You will receive the license file, with a .lic extension, in an email from Cisco.

Procedure 2

Log into Cisco WCS and install license files

Step 1: Save the license file to a temporary directory on your hard drive.

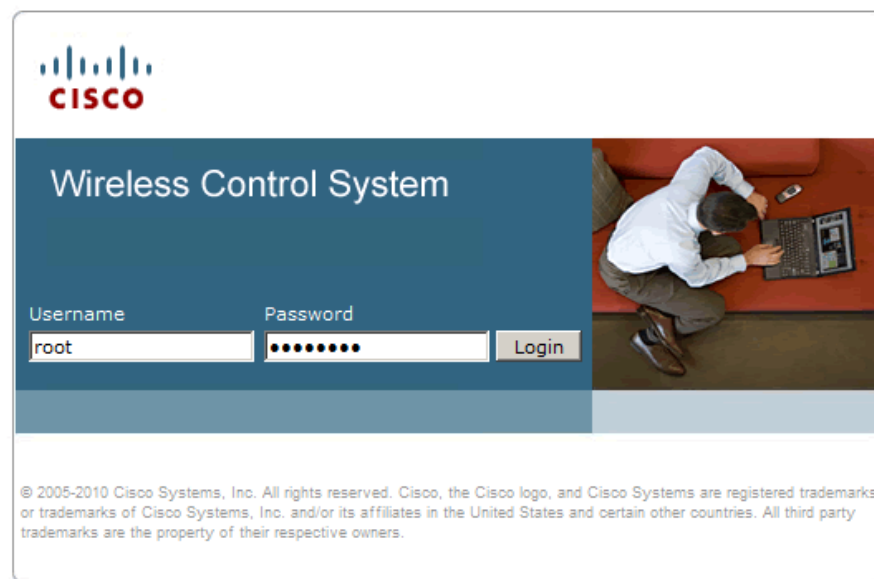
Step 2: In the location or address field of a browser, enter the following URL:

`https://<IP address>`

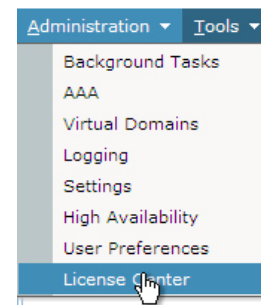
Replace `<IP address>` with the IP address or host name of the Cisco WCS server. In the Cisco SBA installation, the IP address of Cisco WCS is 10.10.48.26.

`https://10.10.48.26`

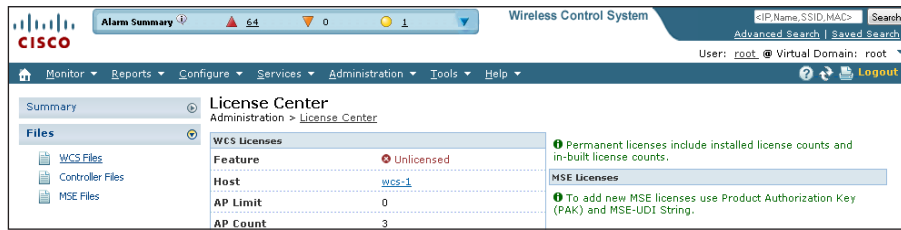
Step 3: Log into the Cisco WCS server as the system administrator. (Be aware that usernames and passwords are case-sensitive.)



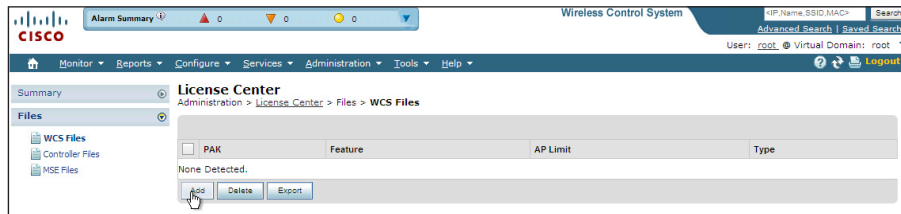
Step 4: From the **Administration** menu, choose **License Center**.



Step 5: In the left pane, expand **Files**, and then select **WCS Files**.



Step 6: Under PAK, click **Add**, and then click **Choose File** to navigate to the location where you saved the .lic file.



Step 7: Click **Upload**. The Cisco WCS server then imports the license.

Repeat this step for each additional license you have received.



Step 8: When you have completed importing licenses, all your license files should appear as shown above. To verify that your license files do indeed provide the access point count and the services you ordered, return to the **Administration** menu, and choose **License Center**.

Process

Adding Wireless LAN Controllers to Cisco WCS

1. Log into Cisco WCS
2. Add each controller to Cisco WCS

You must add each wireless LAN controller to Cisco WCS so that you can monitor and centrally manage the network.

Procedure 1 Log into Cisco WCS

Step 1: In the location or address field of a browser, enter the following URL:

<https://<IP address>>

Replace **<IP address>** with the IP address or host name of the Cisco WCS server. In the Cisco SBA installation, the Cisco WCS is at 10.10.48.26.

<https://10.10.48.26>

Step 2: Log into Cisco WCS as the system administrator. The username and password are case-sensitive.

Procedure 2 Add each controller to Cisco WCS

Step 1: Navigate to **Configure > Controllers**.

The Add Controllers panel contains an empty list of controllers.

Step 2: In the Select a command drop-down list choose **Add Controllers**, and then click **Go**.

Step 3: In the Add Controllers dialog box, enter the controller IP address, the SNMP read/write community string, and the access credentials for the controller; make sure that the **Verify Telnet/SSH Capabilities** check box is selected; use the default settings for all other parameters; and then click **OK**.



Tech Tip

You can enter every controller IP address individually separated by a comma, or you can select a comma-delimited (CSV) spreadsheet with the IP addresses of all controllers. In the Cisco SBA installation, we choose to add a single controller by IP address.

The system tests connectivity to each controller you have specified and provides you with a list of your controllers, their host names, and the connectivity status of each, as shown in the following figure.

IP Address	Controller Name	Type	Location	Software Version	Mobility Group Name	Reachability Status	Audit Status
10.10.15.11	WLC-5508-1	5500		7.0.116.0	SBA-MID2500b	Reachable	Not Available



Tech Tip

If you are getting timeout or communications errors when trying to add a controller, you may be running into an issue where there is more information requested than can fit into a single frame. To correct this, navigate to **Administration > Settings > SNMP Settings**. Reduce the values for **Maximum VarBinds per Get PDU** and **Maximum VarBinds per Put PDU**.

Process

Adding Buildings and Floor Plans

1. Add the first campus and building
2. Place access points

The real advantage to any management system is that it can present information in a way that helps you make intelligent decisions. Cisco WCS brings visibility to the radio spectrum, which allows the administrator to see the coverage that is being provided to users. Including the building and floor maps in Cisco WCS enables the visibility of this otherwise unknown or convoluted data that Cisco WCS derives from the wireless network. You will need an image of your floor plan before you begin this procedure. The file can be in JPEG, PNG, or GIF format. It can also be in CAD DXF or DWG format.

Procedure 1 Add the first campus and building

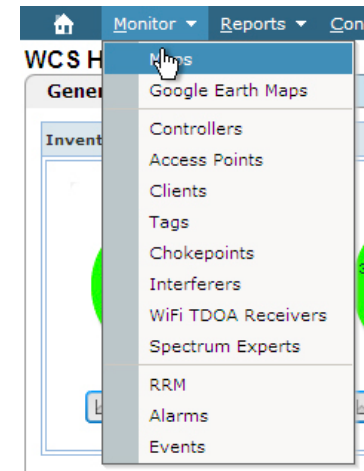
Even though you may only have one building today, you may end up with another building, or perhaps each campus is a single building today, but could have more buildings in the future. The campus, building, floor approach makes it easy to understand as you dig for more information and peel away the layers to find what you are looking for.



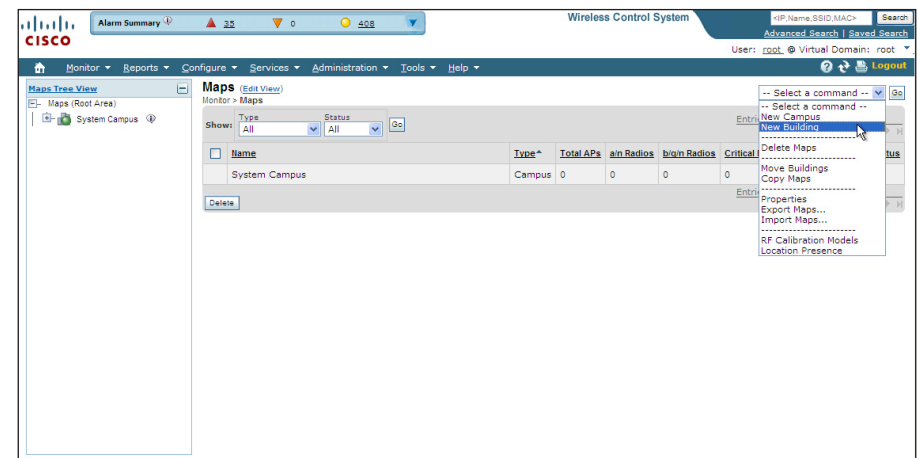
Tech Tip

You need to know the dimension of the campus picture you are bringing into the system so that you can scale the drawing appropriately as each building and floor are added.

Step 1: In Cisco WCS, navigate to **Monitor > Maps**.



Step 2: In the Select a command drop-down list, choose **New Building**, and then click **Go**.



Step 3: Create the name of your building, specify the network administrator contact name, and enter the characteristics of the building:

- Building Name—**SBA-Headquarters**
- Contact—**SBA Admin**
- Number of floors—**1**
- Number of Basements—**0**
- Horizontal Span (feet)—**500**
- Vertical Span (feet)—**300**

Step 4: Select your newly created building.

Name	Type	Total APs	an Radios	h/w Radios	Critical Radio Alarms	Clients	Status
System Campus	Campus	0	0	0	0	0	1
System Campus > SBA-Headquarters	Building	0	0	0	0	0	1

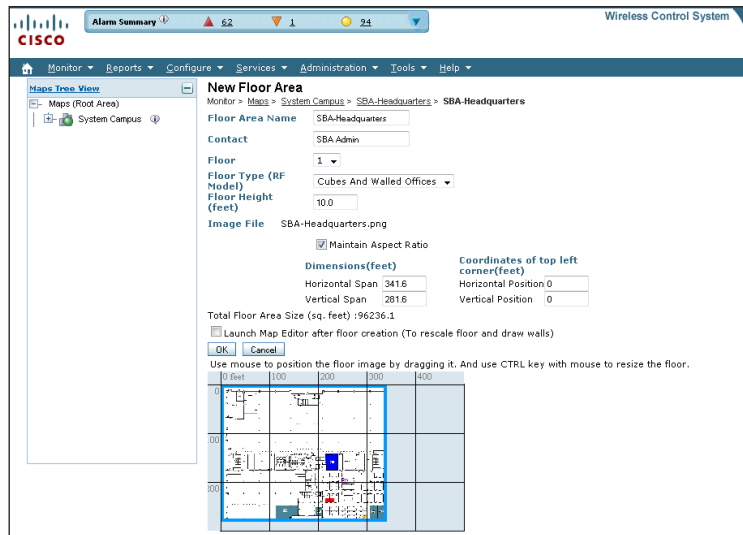
Step 5: In the Select a command drop-down list, choose **New Floor Area**, and then click **Go**.

Step 6: Create a name for the floor area, and specify the network administrator contact name, floor number, and a description of the area. Select the floor plan image. Click **Next**.

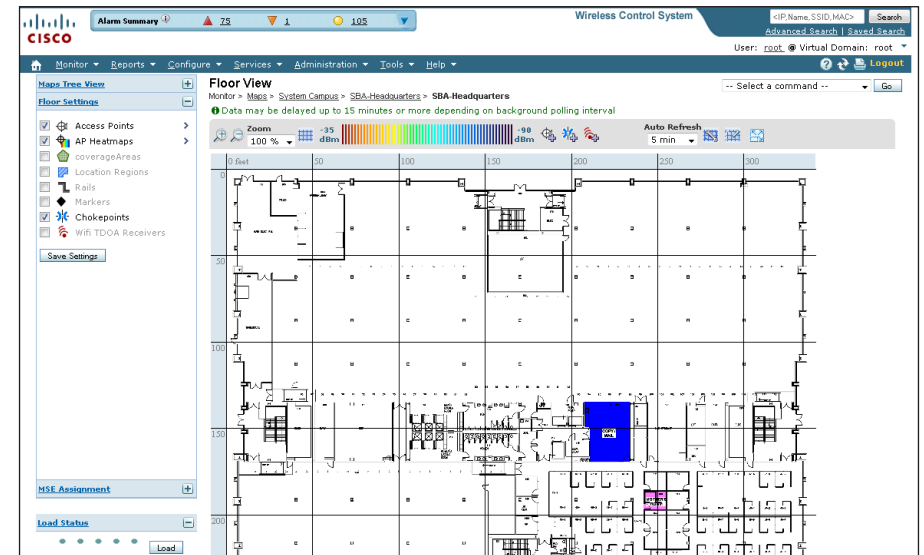
Step 7: The following is an example:

- Floor Area Name—**SBA-Headquarters**
- Contact—**SBA Admin**
- Floor—**1**
- Floor Type (RF Model)—**Cubes And Walled Offices**
- Floor Height (feet)—**10.0**
- Image or CAD File—**C:\SBA-Headquarters.png**
- Convert CAD File to—**PNG**

Step 8: Verify your new floor area details and image, and then click OK.

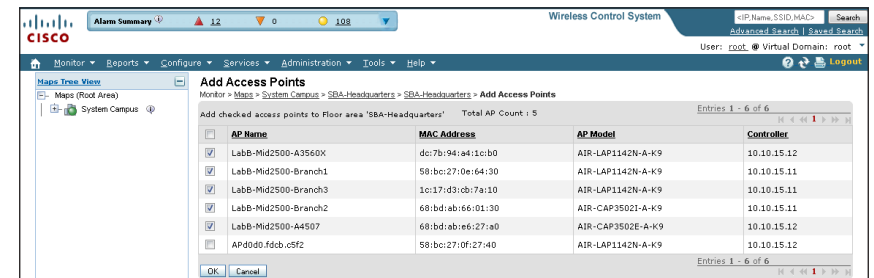


Step 2: Select your new floor area, SBA-Headquarters.



Step 3: In the Select a command drop-down list, choose **Add Access Points**, and then click **Go**.

Step 4: Select access points that are registered with the system but not yet placed for the headquarters building.

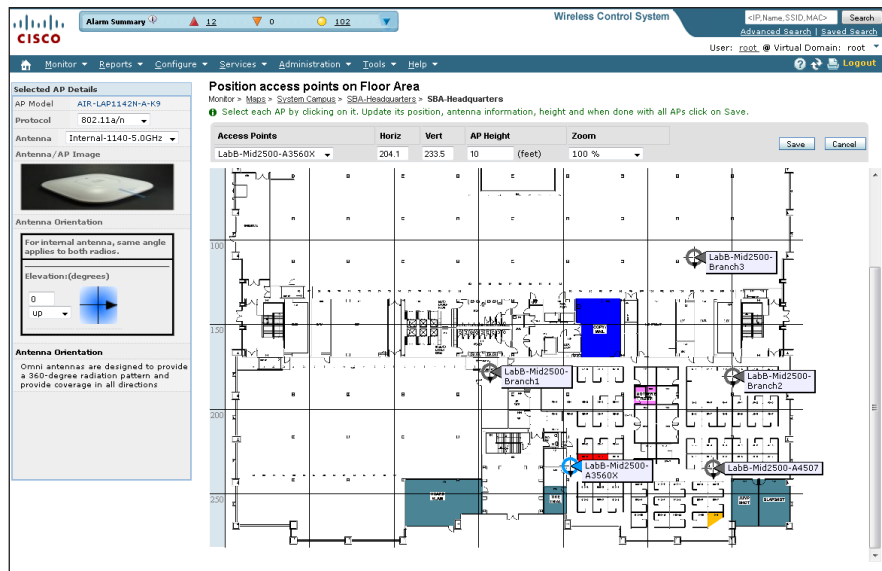


Procedure 2 Place access points

The final piece of the puzzle is to place the access points at the proper locations on your individual floor plans. If you take the time to place your access points where they are actually located, the wireless LAN controllers that work in conjunction with Cisco WCS will give an accurate view of your network and the devices located in it.

Step 1: In Cisco WCS, navigate to **Monitor > Maps**.

Step 5: Carefully place each access point as close to its real position in the building as possible, and then click **Save**.



Wait while the system calculates the heat maps from the placement and floor plan area.

Process

Configuring the Cisco Wireless Solution for CleanAir

1. Create a CleanAir template
2. Enable EDRRM

A Cisco wireless LAN controller with connected Cisco Aironet 3500 or 3600 Series access points is immediately CleanAir-capable. The wireless LAN controllers can give you immediate information about your environment. Where Cisco WCS can take a complete network view, the wireless LAN controller only displays data retrieved from the locally connected CleanAir access points.

Cisco WCS can handle all management in the network. You can perform management tasks at each controller, but it is not recommended. With the CleanAir access point operating from the wireless LAN controller, you can log into Cisco WCS and configure your controller to support CleanAir.

EDRRM

Event-driven radio resource management (EDRRM) is a feature that allows an access point that is in distress to bypass normal RRM intervals and immediately change channels. A Cisco CleanAir access point always monitors Air Quality (AQ), and reports on AQ in 15-second intervals. AQ is a better metric than normal Wi-Fi chip noise measurements, because AQ only reports on classified interference devices. That makes AQ a reliable metric in that we know that what is reported is not caused by Wi-Fi energy (and hence is not a transient, normal spike).

The key benefit of EDRRM is very fast action time (30 seconds). If an interferer is operating on an active channel and is causing enough AQ degradation that it triggers EDRRM, no clients will be able to use that access point or channel. The only thing to do is get the access point off that channel. The EDRRM feature is not enabled by default. You must enable it in two steps: enable CleanAir and then enable EDRRM.

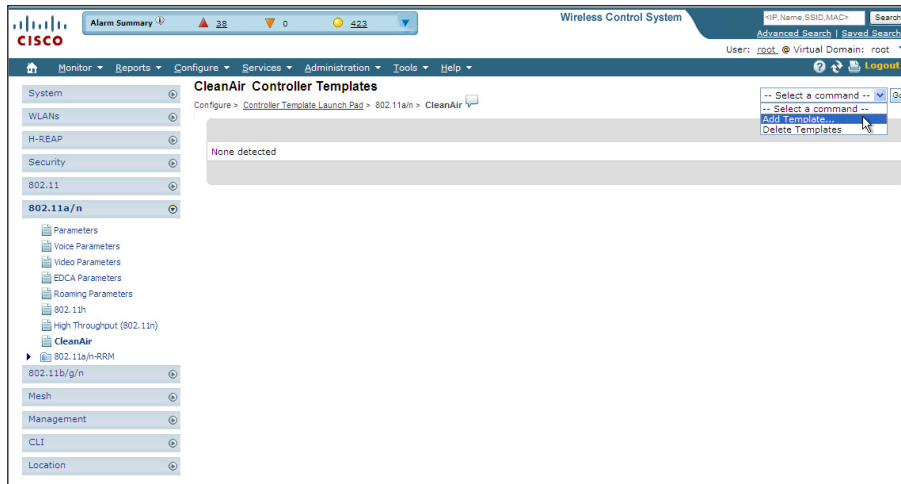
Procedure 1

Create a CleanAir template

Step 1: In Cisco WCS, navigate to **Configure > Controller Template Launch Pad**.

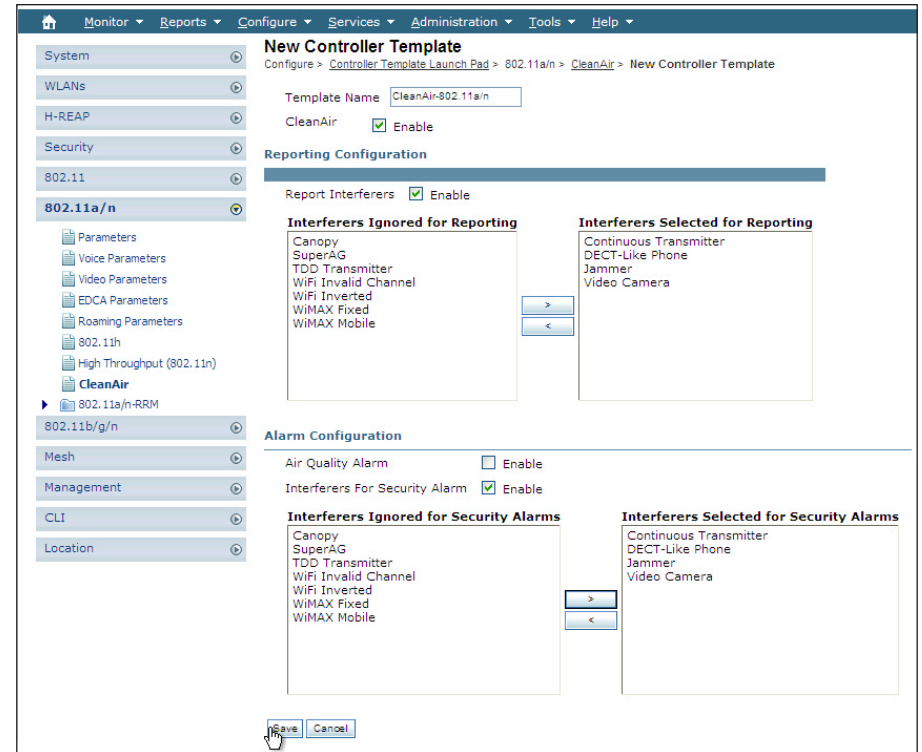
Step 2: Navigate to **802.11a/n > CleanAir**.

Step 3: From the Select a command drop-down list, choose **Add Template**, and then click **Go**.



Step 4: Create a template with a meaningful name, provide the following information, and then click **Save**:

- Select the **CleanAir Enable** check box.
- Select the **Report Interferers Enable** check box.
- To the **Interferers Selected for Reporting** list, add **Continuous Transmitter**, **DECT-Like Phone**, **Jammer**, and **Video Camera**.
- Select the **Interferers For Security Alarm Enable** check box.
- To the **Interferers Selected for Security Alarms** list, add **Continuous Transmitter**, **DECT-Like Phone**, **Jammer**, and **Video Camera**.



Step 5: Click **Apply to Controllers**.

Step 6: Select the controllers to which you want to apply the template and then click **OK**.

Procedure 2 Enable EDRRM

Step 1: Navigate to **Configure > Controller Template Launch Pad**.

Step 2: In the left pane, navigate to **802.11a/n > 802.11a/n-RRM > DCA**.

Step 3: In the Select a command drop-down list, choose **Add Template**, and then click **Go**.

Step 4: Create a template with a meaningful name, provide the following information,, and then click **Save**:

- Select the **Event Driven RRM Enable** check box.
- In the **Sensitivity Threshold** list, choose **Medium**.

New Controller Template
 Configure > Controller Template Launch Pad > 802.11a/n > DCA > New Controller Template

Template Name: 802.11a/n-EDRRM

Dynamic Channel Assignment Algorithm

Assignment Mode: Automatic

Avoid Foreign AP Interference: ☐ Enable

Avoid Cisco AP load: ☐ Enable

Avoid non 802.11 Noise: ☐ Enable

Avoid Persistent Non-WiFi Interference: ☐ Enable

Signal Strength Contribution: ☒ Enable

Event Driven RRM

Event Driven RRM: ☒ Enable

Sensitivity Threshold: Medium

Save Cancel

Footnotes:

1. Event Driven RRM fields are supported for controller version 7.0.x.x onwards.

Step 5: Click **Apply to Controllers**.

Step 6: Select the check boxes next to all controllers, and then click **OK**.

Controller Template '802.11a/n-EDRRM' > Apply to Controllers...
 Configure > Controller Template Launch Pad > 802.11a/n > DCA > Controller Template '802.11a/n-EDRRM' > Apply to Controllers...

IP Address	Controller Name	Config Group Name
☒ 10.10.15.11	WLC-5508-1	
☒ 10.10.15.12	WLC-5508-2	

OK Cancel

Step 7: Navigate to **Configure > Controller Template Launch Pad**.

Step 8: In the left pane, navigate to **802.11b/g/n > 802.11b/g/n-RRM > DCA**.

Step 9: In the Select a command drop-down list, choose **Add Template** and then click **Go**.

Step 10: Create a template with a meaningful name, provide the following information, and then click **Save**:

- Select the **Event Driven RRM Enable** check box.
- In the **Sensitivity Threshold** list, choose **Medium**.

Step 11: Click **Apply to Controllers**.

Step 12: Select the check boxes next to all controllers, and then click **OK**.

Controller Template '802.11b/g/n-EDRRM' > Apply to Controllers...
 Configure > Controller Template Launch Pad > 802.11b/g/n > DCA > Controller Template '802.11b/g/n-EDRRM' > Apply to Controllers...

IP Address	Controller Name	Config Group Name
☒ 10.10.15.11	WLC-5508-1	
☒ 10.10.15.12	WLC-5508-2	

OK Cancel

Troubleshooting with CleanAir

The real power of CleanAir is that a network administrator can stay on one continent while directly analyzing the Wi-Fi spectrum in another office on the other side of the planet. The Cisco Aironet 3500 and 3600 Series access points can be put in Spectrum Expert-Connect mode and used as a virtual remote interface for the knowledgeable engineer, no matter where this valuable human resource is located. By changing the role of your CleanAir access point and connecting the Cisco Spectrum Expert Wi-Fi 4.0 (or later) software, the Wi-Fi network administrator can now view the environment directly. Your organization no longer needs to fly expensive personnel onsite to troubleshoot physical-layer issues that are challenging and, too often, intermittent.

Process

Accessing Remote CleanAir for Spectrum Expert

1. Configure Spectrum Expert Connect Mode

When the call for assistance arrives, it almost certainly will originate from a location that does not have the knowledgeable human resources to troubleshoot, identify, and fix the issue. Wi-Fi devices are designed to send and receive Wi-Fi signals, but they do not have the capability to identify non-Wi-Fi radio interferers such as microwave ovens, Digital Enhanced Cordless Telecommunications (DECT) phones, analog wireless cameras, or even radio jammers. The specialized radios in the CleanAir radio environment can identify these devices and—with triangulation—can find where these devices are located.

When the call comes in, you need to identify as many facts about the issue as possible to make informed decisions. The information can include the location of the problem (for example, “the street side of the building does not

have connectivity”) and time of day (for example, “the issue is pronounced at lunch time”). With as much information from the end user as possible, you can now look at the radio environment because the system shows that clients are connecting and Cisco WCS indicates that AQ has dropped.

Procedure 1

Configure Spectrum Expert Connect Mode

The Cisco CleanAir-capable access point must be changed from either Monitor Mode or Local Mode of operation to Spectrum Expert Connect Mode (SE-Connect).

Step 1: Log into the Wireless LAN Controller.

Step 2: Navigate to **WIRELESS**.

Step 3: Select the CleanAir access point that is closest to the suspected source of interference.

Step 4: In the AP Mode list, choose **SE-Connect**, and then click **Apply**.

Step 5: Wait for the access point to reboot and reconnect to the Wireless LAN Controller.

The screenshot shows the Cisco Wireless LAN Controller configuration page for LabB-Mid2500-Branch2. The 'General' tab is selected, displaying various configuration parameters. The 'AP Mode' is set to 'SE-Connect', and the 'Interface Key' is 'F22286EC2A08045D'. The 'Versions' section lists software and boot versions. The 'IP Config' section shows the IP address 10.11.12.73. The 'Time Statistics' section provides uptime and association times. The 'Hardware Reset' section includes a 'Reset AP Now' button, and the 'Set to Factory Defaults' section includes 'Clear All Config' and 'Clear Config Except Static IP' buttons.

Step 6: Copy the Network Spectrum Interface Key and the IP address.

All APs > Details for LabB-Mid2500-Branch2

General | Credentials | Interfaces | High Availability | Inventory | H-REAP | Advanced

General

AP Name	LabB-Mid2500-Branch2	Primary Software Version	7.0.116.0
Location	Midsize 2500 Branch 2	Backup Software Version	0.0.0.0
AP MAC Address	1c:df:0f:2a:36:6e	Predownload Status	None
Base Radio MAC	68:bd:ab:66:01:30	Predownload Version	None
Admin Status	Enable	Predownload Next Retry Time	NA
AP Mode	SE-Connect	Predownload Retry Count	NA
AP Sub Mode	None	Boot Version	12.4.23.0
Operational Status	REG	IOS Version	12.4(23c)J2
Port Number	13	Mini IOS Version	7.0.94.21

Network Spectrum Interface Key: **S3F76B5E1160398DF2286EC2A08045D**

IP Config

IP Address	10.11.12.73
Static IP	☐

Time Statistics

UP Time	22 d, 06 h 47 m 02 s
Controller Associated Time	22 d, 03 h 37 m 01 s
Controller Association Latency	0 d, 03 h 10 m 00 s

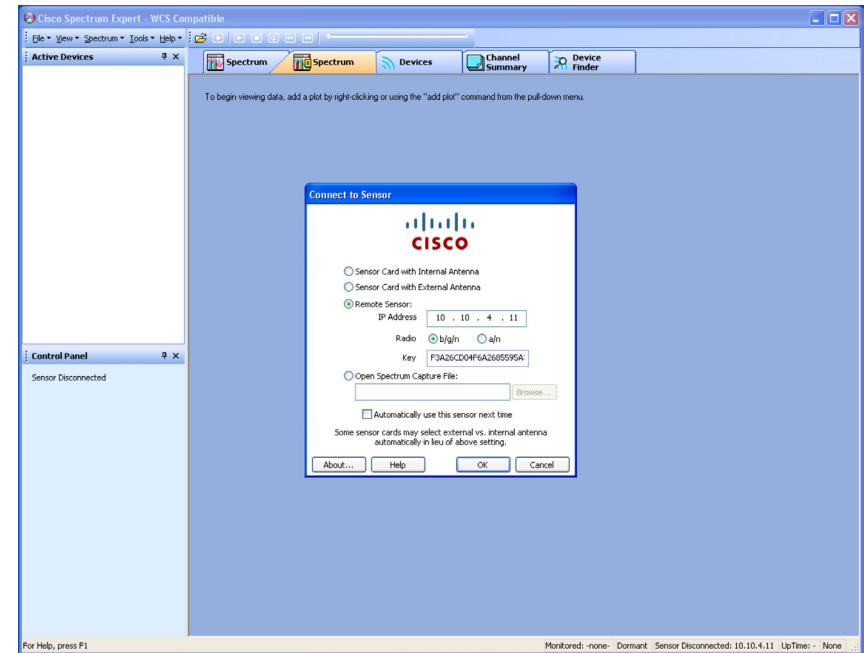
Step 7: On a Supported Windows platform with Cisco Spectrum Expert Wi-Fi (4.0 or later) installed, launch Cisco Spectrum Expert.



Step 8: Select the **Remote Sensor** radio button.

Step 9: Enter the IP address and the Network Spectrum Interface Key of the CleanAir access point that you copied in Step 6.

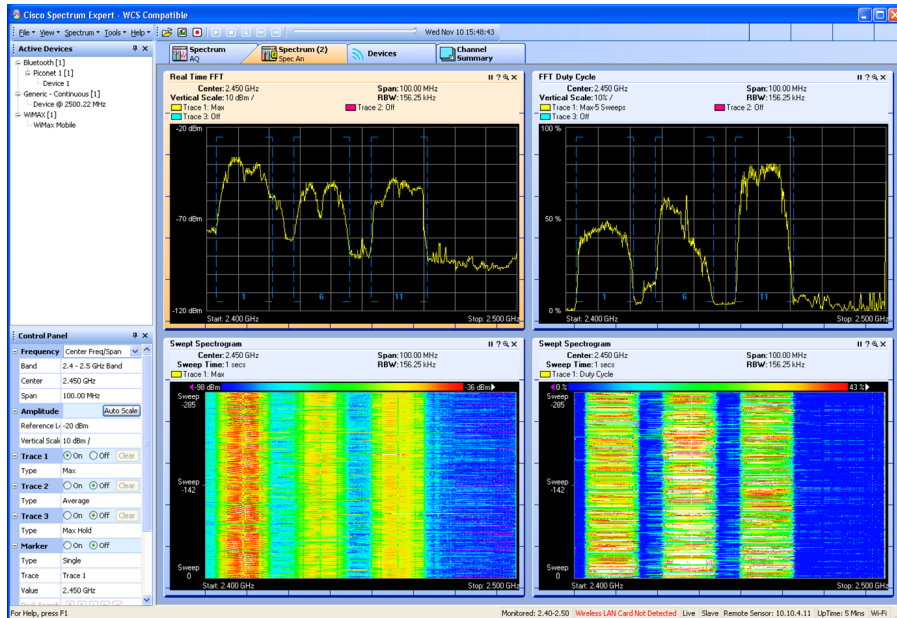
Step 10: Select either the **b/g/n** radio button for 2.4 GHz or the **a/n** radio button for 5 GHz, and then click **OK**.



The connected Windows machine now connects to the remote CleanAir access point on UDP port 37540 (if you selected **b/g/n** in Step 10) or on UDP port 37550 (if you selected **a/n** in Step 10). If connection problems occur, verify that you can ping the CleanAir access point and that no network devices are blocking the necessary UDP port information.

Remote Spectrum Analysis

The remote sensor capability in Cisco Spectrum Expert gives you the ability to get real-time, physical-layer spectrum data without having to drive or fly onsite. The following figure illustrates this capability in a Wi-Fi-only environment and gives you an understanding of how it can show you what is really happening in your remote environment.



Tech Tip

Observe in the previous figure that the Cisco Spectrum Expert does not detect a Wireless LAN card and that the remote sensor is at 10.10.4.11.

Notes

Appendix A:

Wireless CleanAir Deployment Product List

Functional Area	Product	Part Numbers	Software Version
Headquarters	Cisco WCS	WCS-STANDARD-K9 WCS-APBASE-100 WCS-ADV-SI-SE-10= (optional)	7.0.220.0
	Cisco Wireless LAN Controller	AIR-CT5508-100-K9	7.1.91.0
	Cisco Access Point	AIR-CAP3502E-A-K9	7.1.91.0
	Cisco Access Point	AIR-CAP3502I-A-K9	7.1.91.0
	Cisco Access Point	AIR-LAP1142-A-K9	7.1.91.0
	Cisco Spectrum Expert	AIR-CSCO-SE-WIFI-C	4.0.68



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