

Access Point as a Workgroup Bridge Configuration Example

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Introduction

This document provides a sample configuration that configures an access point (AP) to function as a workgroup bridge (WGB) with use of the GUI.

Prerequisites

Requirements

Ensure that you meet these requirements before you attempt this configuration:

- Configuration of basic parameters on the Cisco Aironet APs
- Knowledge of the basic wireless concepts

Components Used

The information in this document is based on these software and hardware versions:

- Cisco Aironet 1240 Series AP that runs Cisco IOS[®] Software Release 12.3(8)JEA firmware
- Cisco Aironet 1200 Series AP that runs Cisco IOS Software Release 12.3(7)JA
- Aironet 802.11 a/b/g Client Adapter that runs firmware version 2.5
- Aironet Desktop Utility (ADU) version 2.5

Note: You can download the latest version of the firmware for the AP and the client adapter from Downloads – Wireless LAN Access (registered customers only) .

Note: This document uses an AP/bridge that has an integrated antenna. If you use an AP/bridge which requires an external antenna, ensure that the antennas are connected to the AP/bridge. Otherwise, the AP/bridge cannot connect to the wireless network. Certain AP/bridge models come with integrated antennas,

whereas others need an external antenna for general operation. For information on the AP/bridge models that come with internal or external antennas, refer to the ordering guide/product guide of the appropriate device.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

Refer to the Cisco Technical Tips Conventions for more information on document conventions.

Background Information

A WGB can provide a wireless infrastructure connection for Ethernet-enabled devices. Devices that do not have a wireless client adapter in order to connect to the wireless network can be connected to the WGB through the Ethernet port. The WGB connects up to eight Ethernet-enabled devices to a wireless LAN (WLAN). The WGB associates to the root AP through the wireless interface. In this way, wired clients get access to the wireless network. A WGB can associate to:

- An AP
- A bridge (in AP mode)
- A base station (in AP mode)
- An AP in repeater mode (if the repeater is associated with a root AP)

You can also implement WGB functionality with the use of a normal AP. You can configure APs as WGBs. In WGB mode, the unit associates to another AP as a client. The unit provides a network connection for the devices that are connected to its Ethernet port.

For example, if you need to provide wireless connectivity for a group of network printers, you can perform these steps:

1. Connect the printers to a hub.
2. Connect the hub to the AP Ethernet port.
3. Configure the AP as a WGB.

The WGB associates to an AP on your network. An AP in WGB mode can associate only to an Aironet AP or bridge (in AP mode). The AP to which a WGB associates can treat the WGB as an infrastructure device or as a simple client device. By default, APs and bridges treat WGBs as client devices. For increased reliability, you can configure APs and bridges to treat WGBs, not as client devices, but as infrastructure devices, like APs or bridges. When these devices treat a WGB as an infrastructure device, the AP reliably delivers multicast packets, which include Address Resolution Protocol (ARP) packets, to the WGB. In order to configure APs and bridges to treat WGBs as infrastructure devices, perform one of these two options on your root AP:

- Command-line interface (CLI) Issue the **infrastructure-client** configuration command under the radio interface on the AP.
- GUI Choose **Enable** for the Reliable Multicast to WGB option in the Network Interfaces: Radio Settings window.

If you configure APs and bridges to treat a WGB as a client device, you allow more WGBs to associate to the same AP or to associate with use of a service set identifier (SSID) that is not an infrastructure SSID. The performance cost of reliable multicast delivery in which the duplication of each multicast packet is sent to each WGB limits the number of infrastructure devices (which includes WGBs) that can associate to an AP or

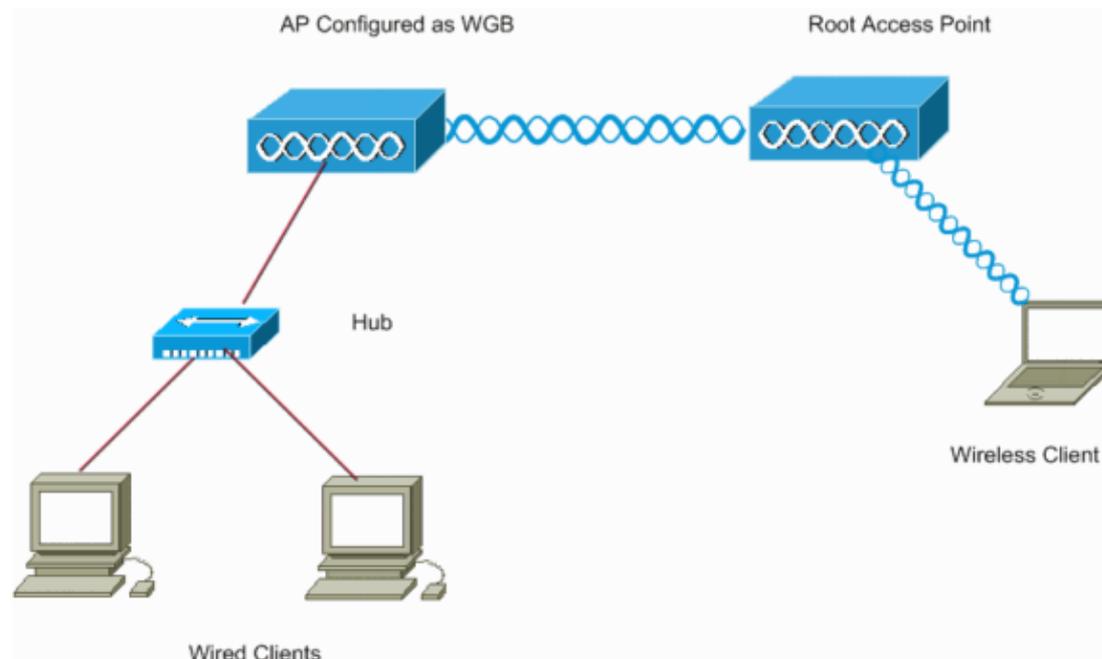
bridge. In order to increase beyond 20 the number of WGBs that can associate to the AP, the AP must reduce the delivery reliability of multicast packets to WGBs. With reduced reliability, the AP cannot confirm whether multicast packets reach the intended WGB. So WGBs at the edge of the AP coverage area can lose IP connectivity.

Configure

In this section, you are presented with the information to configure the features described in this document.

Network Diagram

This document uses this network setup:



This setup uses two APs with a 1240 Series Aironet AP acting as a root AP, and a 1200 Series AP configured as a WGB. Wireless clients are associated to the root AP. Wired clients connect through a hub to the AP that is configured as a WGB. All the devices use IP addresses that are in the range 10.0.0.0/24. The section [Configure the Root AP](#) explains how to configure the devices in order to establish the connection for this network scenario.

Configure the Root AP

This section presents the information to configure the AP as a root AP.

For this configuration, you need to:

1. Enable the radio and define the role of the AP as a root AP.
2. Configure the SSID for the AP to use for wireless communication.

Complete these steps:

1. Access the 1240 AP through the GUI.

The Summary Status Window appears.

The screenshot shows the Cisco Aironet 1240AG Series Access Point configuration page. The browser title is "Cisco IOS Series AP - Home - Microsoft Internet Explorer provided by Cisco Systems, Inc.". The address bar shows "http://10.77.244.194/ap_home.shtml". The page title is "Cisco Aironet 1240AG Series Access Point". The hostname is "ap" and the uptime is "1 hour, 41 minutes".

The "Home: Summary Status" section includes the following information:

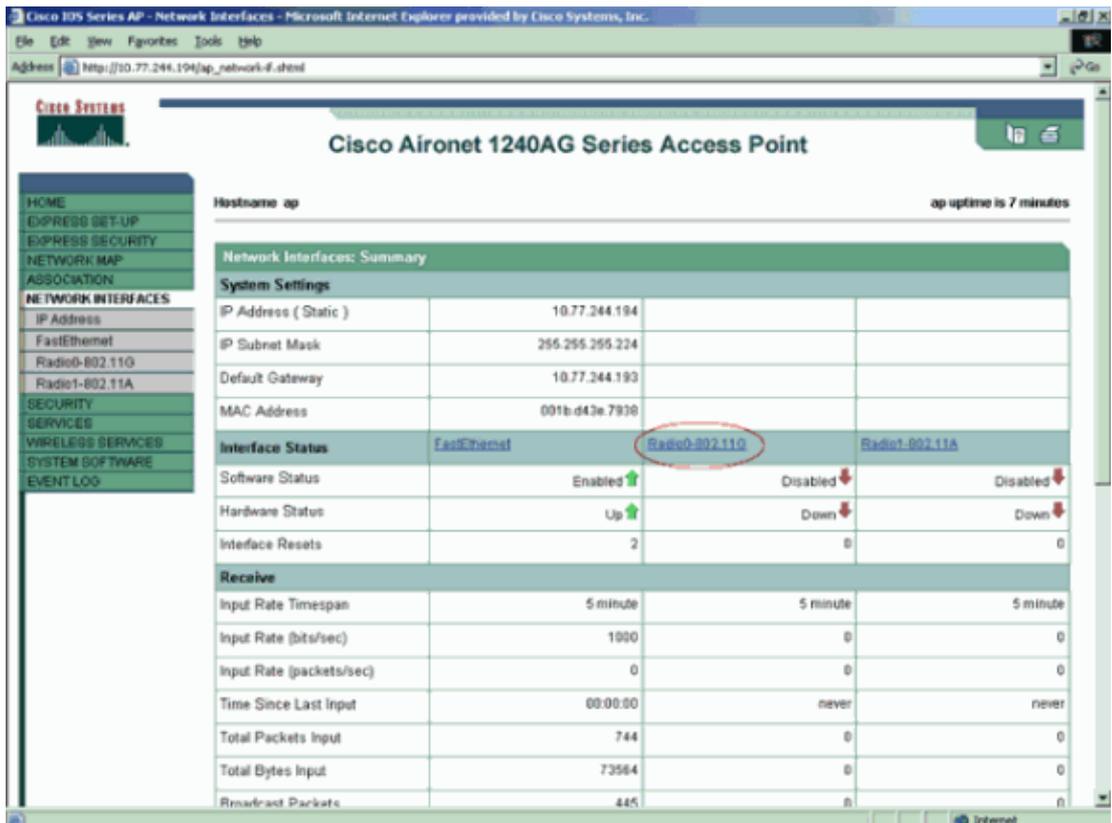
- Association:** Clients: 6, Routers: 1
- Network Identify:** IP Address: 10.77.244.194, MAC Address: 001b.d43e.7938
- Network Interfaces:**

Interface	MAC Address	Transmission Rate
FastEthernet0	001b.d43e.7938	10Mb/s
Radio0-802.11G	001b.2ba7.c7a0	54.0Mb/s
Radio1-802.11A	001b.2bab.c7a0	54.0Mb/s
- Event Log:**

Time	Severity	Description
Mar 1 01:40:17.952	Information	Interface Dot11Radio0, Station 000b.8551.5ae0 Associated to Parent 001b.2a79.3dea
Mar 1 01:40:17.951	Information	Interface Dot11Radio0, Station 001a.a154.308d Associated to Parent 001b.2a79.3dea
Mar 1 01:40:17.951	Information	Interface Dot11Radio0, Station 000b.8548.53c0 Associated to Parent 001b.2a79.3dea
Mar 1 01:40:17.951	Information	Interface Dot11Radio0, Station 000e.834e.6700 Associated to Parent

- Note:** This document assumes that static IP addresses are assigned to all the devices in the Network Diagram. For information on how to configure IP addresses to APs, refer to the *Obtaining and Assigning an IP Address* section of the document *Configuring the Access Point for the First Time*.
2. Choose **Network Interfaces** from the menu on the left and, in the Network Interfaces: Summary window, click the appropriate radio to use for wireless communication.

This example uses 802.11G, as this window shows:

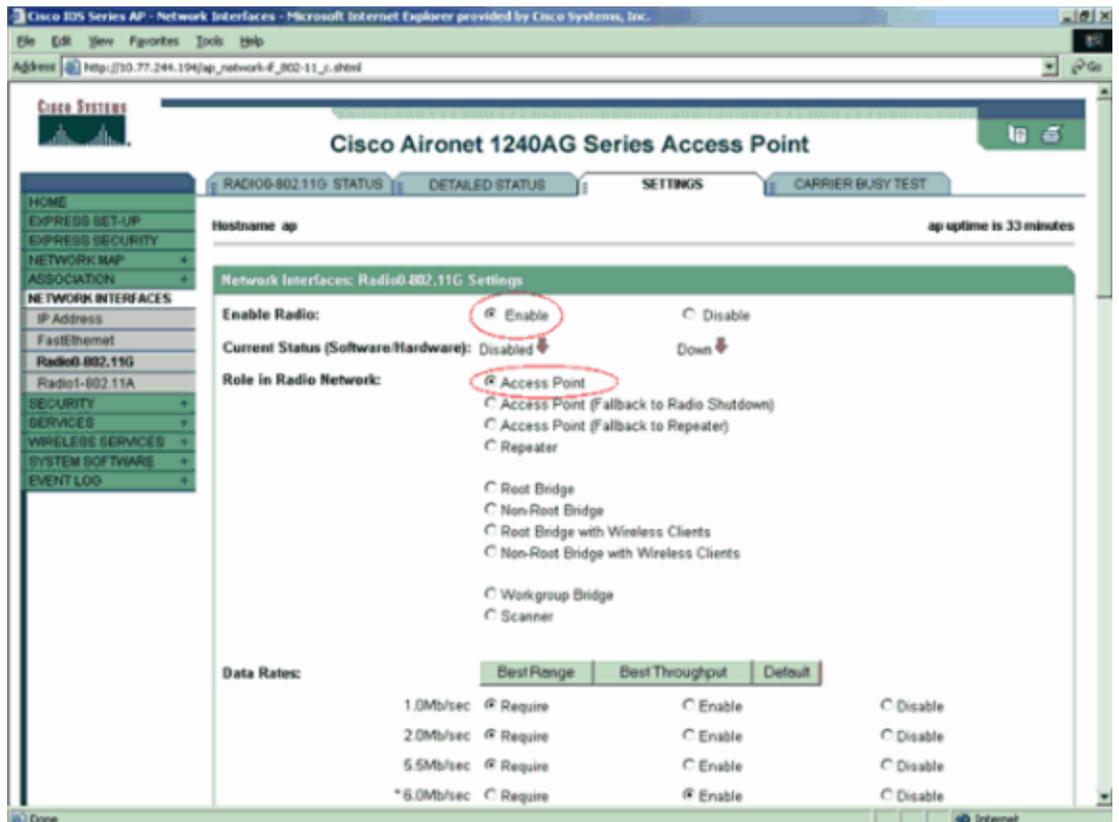


3. Click the **Settings** tab and complete these steps in order to configure the AP as a root AP:

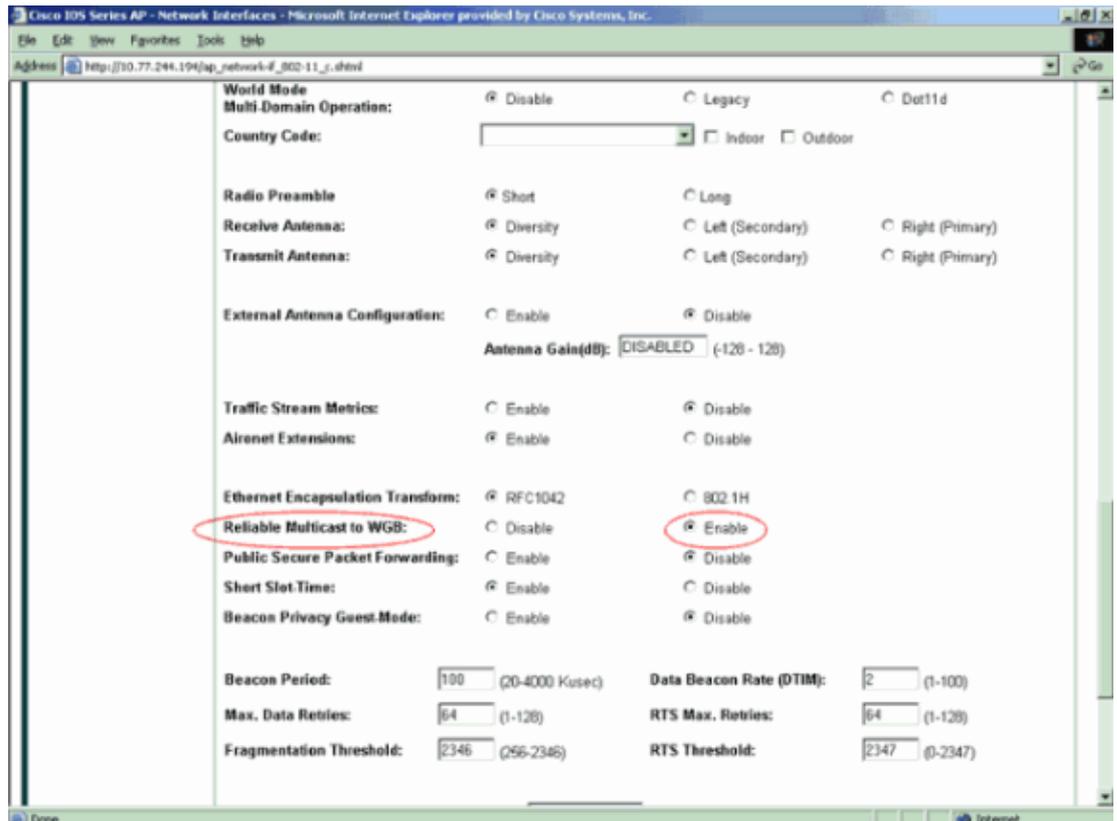
a. In the Enable Radio area, click **Enable**.

This action activates the radio interface.

b. In the Role in Radio Network area, click **Access Point** as shown in the figure.

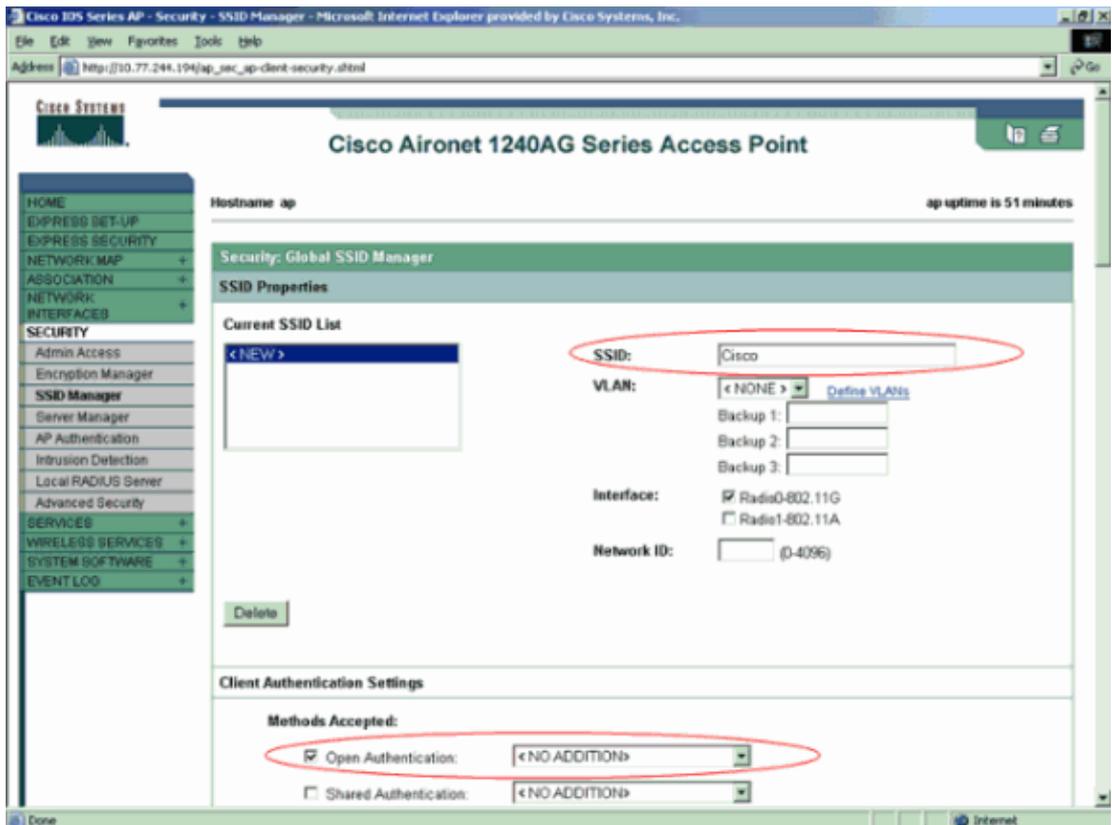


- c. By default, APs and bridges treat WGBs as client devices. In order to make the AP treat the **WGB** as an **infrastructure** device, scroll down the page and choose **Enable** for the **Reliable Multicast to WGB** option as shown in the figure. Then, click **Apply** at the bottom of the window.



4. Choose **Security > SSID Manager** from the menu on the left and, in the Security: Global SSID Manager window, enter a new SSID in the SSID field and click **Apply**.

This example uses Cisco as the SSID.



Note: This document does not concentrate on the security options that you can configure on the AP. For this reason, the example leaves all the other values, which include the authentication methods, at the default values. By default, **open authentication** is used on APs. For more information on the authentication methods that you can use on APs, refer to *Configuring Authentication Types*.

After you complete this step, the AP in root mode allows clients with the SSID Cisco to associate to this AP.

Configure the Second AP for WGB Mode

Next, configure the second AP as a WGB.

For this configuration, you need to:

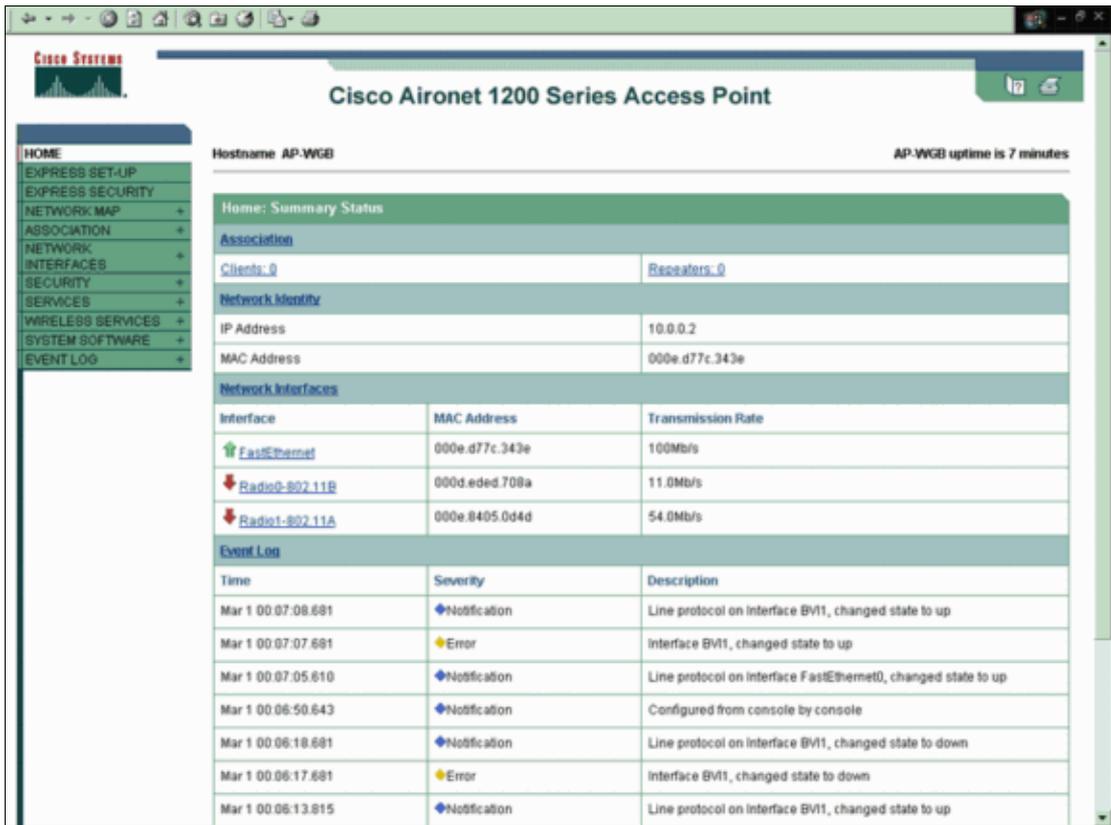
1. Enable the radio on the AP and define the role of the AP as a WGB.
2. Configure the SSID to be used for association with the root AP.

This SSID must be the same as the SSID that you configured on the root AP.

Complete these steps:

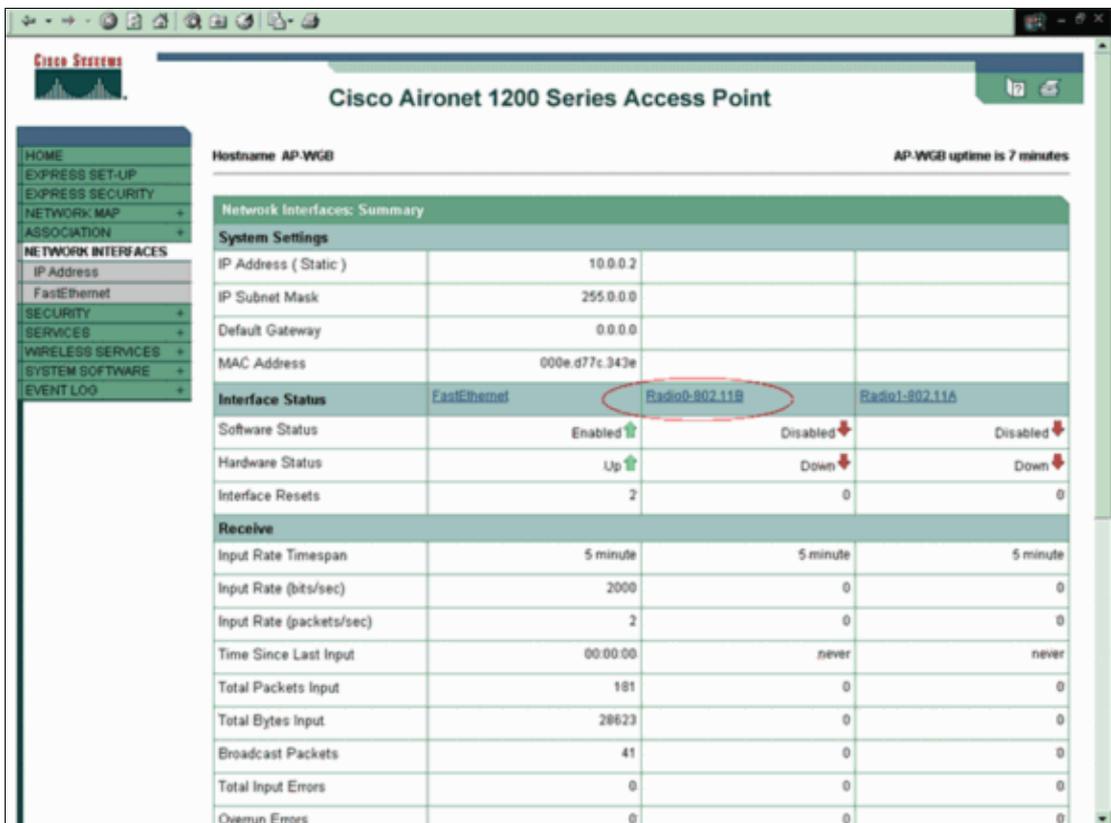
1. Access the 1200 AP through the GUI.

The Summary Status window appears.



2. Choose **Network Interfaces** from the menu on the left and, in the Network Interfaces: Summary window, click the appropriate radio to use for wireless communication.

This example uses 802.11B, as this window shows:



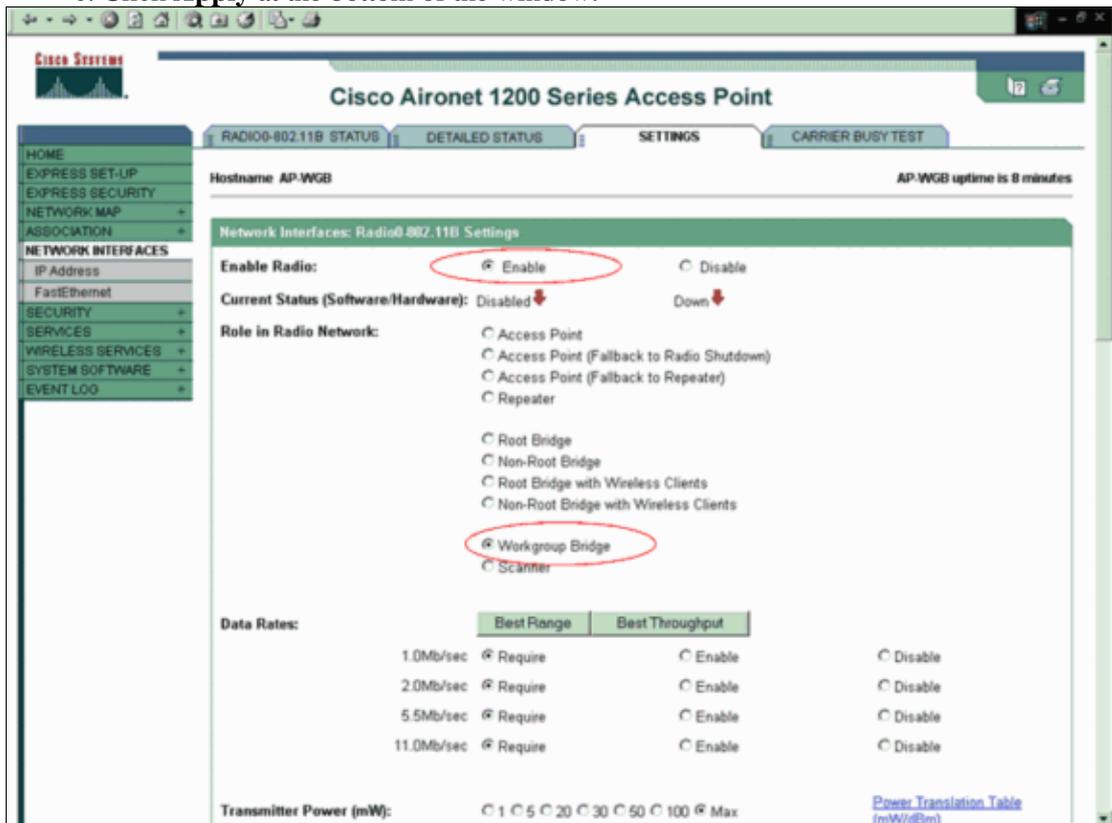
3. Click the **Settings** tab and complete these steps in order to configure the AP as a WGB:

a. In the Enable Radio area, click **Enable**.

This action activates the radio interface.

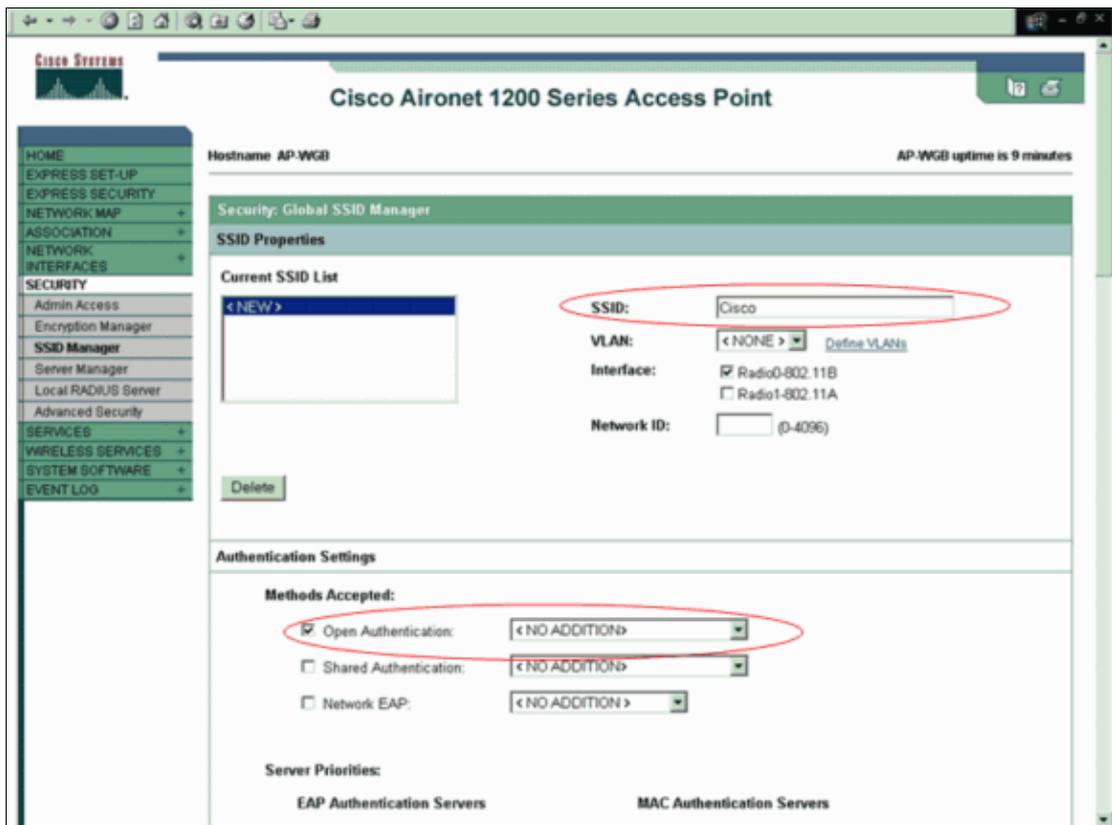
b. In the Role in Radio Network area, click **Workgroup Bridge**.

c. Click **Apply** at the bottom of the window.



4. Choose **Security > SSID Manager** from the menu on the left and, in the Security: Global SSID Manager window, enter **Cisco** in the SSID field and click **Apply**.

Enter this SSID because it is the SSID that you configured on the root AP.



At this point, you have successfully configured the root AP and the WGB AP. Observe that the AP that you configured as a WGB now associates with the root AP as an infrastructure device.

Configuration using CLI

This section explains how to configure both the AP and WGB with CLI. Complete these steps:

1. Open Authentication is used on both AP and WGB.

```
root#Configure Terminal
root(config)#station-role root

!--- This command configures the device in root mode

root(config)#dot11 ssid wgb_ex

!--- Enters SSID mode

root(config-ssid)#authentication open

!--- Authentication is set to default open authentication.

root(config-ssid)#exit
root(config)#interface dot11radio 0
```

```
!--- Enters the interface mode and enables the SSID on the interface.
```

```
root(config-if)ssid wgb_ex
```

```
root(config-if)exit
```

WGB configuration

Here is the sample CLI configuration for WGB

```
wgb#configure terminal
```

```
wgb(config)#station role WGB
```

```
!--- This command configures the device in Workgroup bridge mode
```

```
wgb(config)dot11 ssid wgb_ex
```

```
wgb(config-ssid)#authentication open
```

```
!--- Authentication is set to default open authentication.
```

```
wgb(config-ssid) exit
```

```
wgb(config)interface dot11radio 0
```

```
wgb(config-if) ssid wgb_ex
```

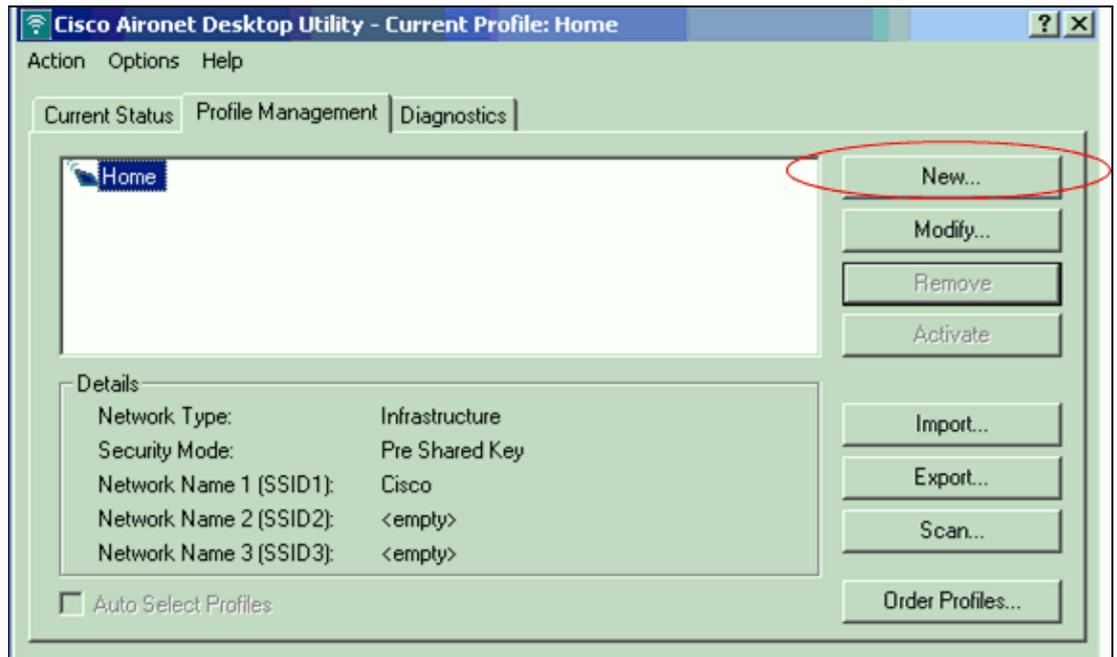
```
wgb(config-if) exit
```

2. Configure the Client Adapter

Next, configure the wireless client adapter for wireless connectivity. In order to configure the client adapter, you need to use the ADU in order to create a profile on the client adapter. Complete these steps:

- a. Click the **Profile Management** tab on the ADU.
- b. Click **New**.

Here is an example:

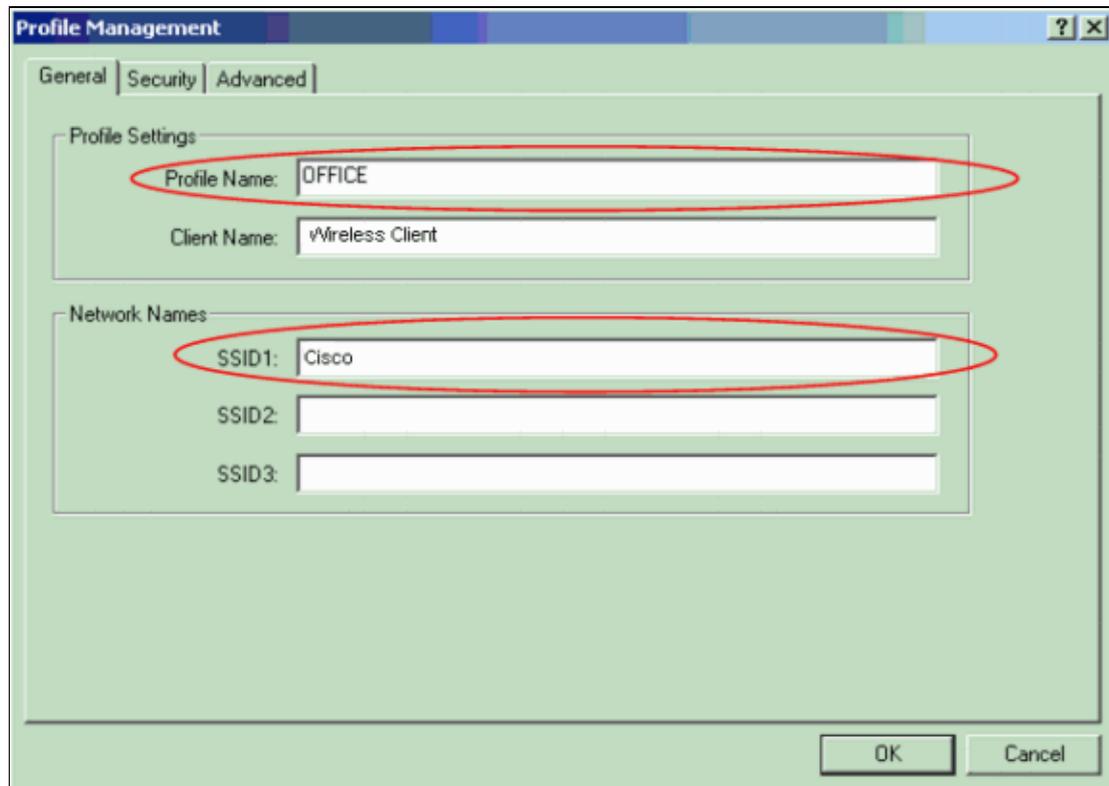


The **Profile Management (General)** window displays.

c. Complete these steps in order to set the profile name, client name, and SSID:

a. Enter the name of the profile in the Profile Name field.

This example uses **OFFICE** as the profile name.



b. Enter the name of the client in the Client Name field.

The client name is used to identify the wireless client in the WLAN. This configuration uses the name Wireless Client for the first client.

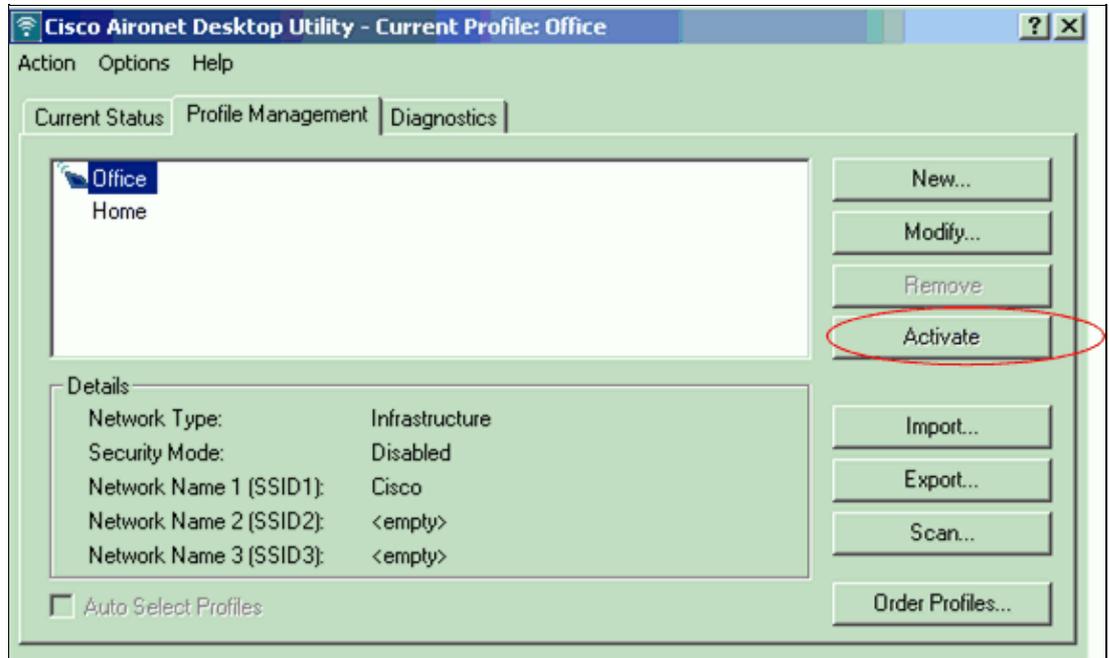
c. In the Network Names area, enter the SSID to use for this profile.

The SSID should be the same as the SSID that you configured on the root AP. The SSID in this example is Cisco.

d. Click **OK**.

Note: No special authentication method is necessary for this configuration.

d. Click the **Profile Management** tab, choose the new profile that you have created, and click **Activate**.



Verify

Use this section to confirm that your configuration works properly.

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

Case 1: WGB associates with the root AP as an infrastructure device

When the **WGB AP** associates with the root AP as a **client device**, the output of the **show dot11 associations client** command on the root AP looks like this:

```
802.11 Client Stations on Dot11Radio0:

SSID [cisco] :

MAC Address      IP address      Device          Name           Parent          State
000b.8548.53c0  0.0.0.0         WGB-client      -              001b.2a79.3dea Assoc
000b.8551.5ae0  0.0.0.0         WGB-client      -              001b.2a79.3dea Assoc
000b.855b.fbd0  0.0.0.0         WGB-client      -              001b.2a79.3dea Assoc
001b.2a79.3dea  10.77.244.197  WGB             ap             self            Assoc
```

Note that the **WGB** is seen in the list now. In the GUI of the root AP, you can see that there is no repeater count under the **Association** menu. However, you will see an increase in client count by 1.

Case 2: WGB associates with the root AP as a client device

When the **WGB AP** associates with the root AP as an **infrastructure device**, the output of the **show dot11 associations client** command on the root AP looks like this:

```
802.11 Client Stations on Dot11Radio0:

SSID [cisco] :

MAC Address      IP address      Device          Name            Parent          State
000b.8548.53c0  0.0.0.0        WGB-client     -              001b.2a79.3dea Assoc
000b.8551.5ae0  0.0.0.0        WGB-client     -              001b.2a79.3dea Assoc
000b.855b.fbd0  0.0.0.0        WGB-client     -              001b.2a79.3dea Assoc
```

Here the **WGB-client** in the output represents the wired clients. Note that the WGB is not listed as a client. However, you can see the WGB listed under the **show dot11 associations all-client** command. In the GUI of the root AP, the **WGB** is listed as a **repeater** under the **Association** menu.

In order to test the end-to-end connectivity between one wireless client and one of the wired clients, issue a ping test from the wired client to the wireless client. The wireless client uses the IP address 10.0.0.3, and the wired client uses the IP address 10.0.0.6.

```
D:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time<10ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

This test confirms that the configuration works as you expect and that the AP that you configured as a WGB bridge functions properly.

Troubleshoot

This section provides information you can use to troubleshoot your configuration. Complete these checks if WGB does not associate to the AP.

- Check if the configurations match between the AP and WGB. Make sure SSID, Security settings and Data Rates match between them.
- Make sure that RF environment between AP and WGB is free from interference. Refer to the RF Impairments section of Troubleshooting Problems Affecting Radio Frequency Communication for more information.
- Ensure that Hardware and Firmware is not corrupted on either devices. Reboot the device and/or upgrade the firmware in order to bring them back to operation.

An AP is configured as a WGB. A printer is connected to the WGB. In such an environment, if the printer sits continuously idle for a significant duration, it might periodically lose connectivity to the rest of the network. In fact, this can affect any device on the WGB's LAN that does not transmit any packets for a significant duration.

This problem is observed mainly with IOS-based workgroup bridges. The AP shows that the MAC address of the client has disassociated when this problem occurs.

This is due to Cisco bug ID CSCsc53460 (registered customers only) . Refer to this bug in order to understand the related workaround for this issue.

The workaround explained in the bug CSCsc53460 does not work if the WGB is running Cisco IOS Software Release 12.3(7)JA* or 12.3(8)JA* . This is due to Cisco bug ID CSCse32424 (registered customers only) . CSCse32424 is fixed in 12.3(8)JEA.

Related Information

- ***Configuring Workgroup Bridge Mode Configuring Repeater and Standby Access Points and Workgroup Bridge Mode***
 - **Workgroup Bridges in a Cisco Unified Wireless Network Configuration Example**
 - **Cisco Aironet Workgroup Bridge FAQ**
 - **Wireless Product Support**
 - **Technical Support & Documentation – Cisco Systems**
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