Configuring Radio Settings

This chapter describes how to configure radio settings for your bridge. This chapter includes these sections:

Disabling and Enabling the Radio Interface

The bridge radio is enabled by default. Beginning in privileged EXEC mode, follow these steps to disable the bridge radio:

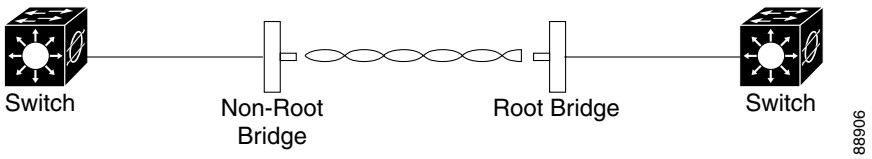
	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**shutdown**	Disable the radio port.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no** form of the shutdown command to enable the radio port.

Configuring the Role in Radio Network

You can configure your bridge as a root bridge or as a non-root bridge. Figure 6-1 shows a root bridge communicating with a non-root bridge in a point-to-point configuration.

Figure 6-1 Point-to-Point Bridge Configuration



Beginning in privileged EXEC mode, follow these steps to set the bridge's radio network role:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**station-role bridge** {**root** | **non-root** | **install**}	Set the bridge role. • Set the role to root or non-root, or put the bridge in installation mode to help align the antennas. In installation mode, the bridge polls the radio for the received signal strength indication (RSSI) value and updates the LEDs and the RSSI voltage port.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Configuring the Radio Distance Setting

Use the **distance** command to specify the distance from a root bridge to the non-root bridges with which it communicates. The distance setting adjusts the bridge's timeout values to account for the time required for radio signals to travel from bridge to bridge. If more than one non-root bridge communicates with the root bridge, enter the distance from the root bridge to the non-root bridge that is farthest away. Enter a value from 0 to 99 km. You do not need to adjust this setting on non-root bridges.

Note In installation mode, the default distance setting is 99 km. In other modes, the default distance setting is 0 km. When you change the role in radio network from Install Mode to Root or Non-Root, the distance setting changes automatically from 99 km to 0 km, and you might need to adjust the distance setting.

Beginning in privileged EXEC mode, follow these steps to configure the bridge distance setting:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**distance** *kilometers*	Enter a distance setting from 0 to 99 km.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no** form of the **distance** command to return to the default distance setting.

Configuring Radio Data Rates

You use the data rate settings to choose the data rates the bridge uses for data transmission. The rates are expressed in megabits per second. The bridge always attempts to transmit at the highest data rate set to **Basic**, also called **Require** on the browser-based interface. If there are obstacles or interference, the bridge steps down to the highest rate that allows data transmission. You can set each data rate to one of three states:

- Basic (this is the default state for all data rates)—Allows transmission at this rate for all packets, both unicast and multicast. At least one of the bridge's data rates must be set to Basic.
- Enabled—The bridge transmits only unicast packets at this rate; multicast packets are sent at one of the data rates set to Basic.
- Disabled—The bridge does not transmit data at this rate.

Note At least one data rate must be set to **basic**.

You can use the Data Rate settings to set up the bridge to operate at specific data rates. For example, to configure the bridge to operate at 54 megabits per second (Mbps) service only, set the 54-Mbps rate to **Basic** and set the other data rates to **Enabled**. To set up the bridge to operate at 24, 48, and 54 Mbps, set 24, 48, and 54 to **Basic** and set the rest of the data rates to **Enabled**.

You can also configure the bridge to set the data rates automatically to optimize either range or throughput. When you enter **range** for the data rate setting, the bridge sets the 6-Mbps rate to **basic** and the other rates to **enabled**. When you enter **throughput** for the data rate setting, the bridge sets all data rates to **basic**.

Beginning in privileged EXEC mode, follow these steps to configure the radio data rates:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**speed** {[**6.0**] [**9.0**] [**12.0**] [**18.0**] [**24.0**] [**36.0**] [**48.0**] [**54.0**] [**basic-6.0**] [**basic-9.0**] [**basic-12.0**] [**basic-18.0**] [**basic-24.0**] [**basic-36.0**] [**basic-48.0**] [**basic-54.0**] | **range** | **throughput**}	Set each data rate to **basic** or **enabled**, or enter **range** to optimize bridge range or **throughput** to optimize throughput. • (Optional) Enter **6.0**, **9.0**, **12.0**, **18.0**, **24.0**, **36.0**, **48.0**, and **54.0** to set these data rates to **enabled**. • (Optional) Enter **basic-6.0**, **basic-9.0**, **basic-12.0**, **basic-18.0**, **basic-24.0**, **basic-36.0**, **basic-48.0**, and **basic-54.0** to set these data rates to **basic**. • (Optional) Enter **range** or **throughput** to automatically optimize radio range or throughput. When you enter **range**, the bridge sets the lowest data rate to basic and the other rates to **enabled**. When you enter **throughput**, the bridge sets all data rates to **basic**.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no** form of the **speed** command to disable data rates. When you use the **no** form of the command, all data rates are disabled except the rates you name in the command. This example shows how to disable data rate 6.0:

```
ap1200# configure terminal
ap1200(config)# interface dot11radio 0
ap1200(config-if)# no speed basic-9.0 basic-12.0 basic-18.0 basic-24.0 basic-36.0
basic-48.0 basic-54.0
ap1200(config-if)# end
```

Data rate 6 is disabled, and the rest of the rates are set to basic.

This example shows how to set up the bridge for 54-Mbps service only:

```
ap1200# configure terminal
ap1200(config)# interface dot11radio 0
ap1200(config-if)# speed basic-54.0
ap1200(config-if)# end
```

Data rate 54 is set to basic, and the rest of the data rates are set to enabled.

Configuring Radio Transmit Power

Beginning in privileged EXEC mode, follow these steps to set the transmit power on your bridge radio:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**power local** { **12** | **15** | **18** | **21** | **22** | **23** | **24** | **maximum** }	Set the transmit power to one of the power levels allowed in your regulatory domain. All settings are in dBm. **Note** If your bridge is configured at the factory for use in a regulatory domain other than North America or Korea, the transmit power options on your bridge are **16**, **13**, **12**, **10**, **9**, **8**, **7**, and **4** dBm. Note that the maximum transmit power for your bridge depends on your regulatory domain.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no** form of the power command to return the power setting to **maximum**, the default setting.

Configuring Radio Channel Settings

The default channel setting for the bridge radios is least congested; at startup, the bridge scans for and selects the least-congested channel. For most consistent performance after a site survey, however, we recomend that you assign a static channel setting for each bridge. The channel settings on your bridge correspond to the frequencies available in your regulatory domain. See Appendix A, "Channels and Antenna Settings," for the frequencies allowed in your domain.

The 5-GHz radio operates on four channels from 5745 to 5805 MHz. Each channel covers 20 MHz, and the bandwidth for the channels overlaps slightly. For best performance, use channels that are not adjacent (such as 5745 and 5785) for bridges that are close to each other.

Beginning in privileged EXEC mode, follow these steps to set the bridge's radio channel:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**channel** *frequency* | **least-congested**	Set the default channel for the bridge radio. To search for the least-congested channel on startup, enter **least-congested**. • channel 149—**5745** • channel 153—**5765** • channel 157—**5785** • channel 161—**5805** **Note** The frequencies allowed in your regulatory domain might differ from the frequencies listed here.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Disabling and Enabling Aironet Extensions

By default, the bridge uses Cisco Aironet 802.11 extensions to improve communication with other 1400 series bridges. You cannot disable Aironet extensions on the bridge.

Configuring the Ethernet Encapsulation Transformation Method

When the bridge receives data packets that are not 802.3 packets, the bridge must format the packets to 802.3 using an encapsulation transformation method. These are the two transformation methods:

- 802.1H—This method provides optimum performance for Cisco Aironet wireless products.
- RFC1042—Use this setting to ensure interoperability with non-Cisco Aironet wireless equipment.

Beginning in privileged EXEC mode, follow these steps to configure the encapsulation transformation method:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio** { **0** | **1** }	Enter interface configuration mode for the radio interface. The 2.4-GHz radio is radio 0, and the 5-GHz radio is radio 1.
Step 3	**payload-encapsulation** **snap** | **dot1h**	Set the encapsulation transformation method to RFC1042 (**snap**) or 802.1h (**dot1h**).

	Command	Purpose
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Configuring the Beacon Period

The beacon period is the amount of time between bridge beacons in Kilomicroseconds. One Kμsec equals 1,024 microseconds. The default beacon period is 100. Beginning in privileged EXEC mode, follow these steps to configure the beacon period:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**beacon period** *value*	Set the beacon period. Enter a value in Kilomicroseconds. **Note** The bridge does not support the **dtim** option in the **beacon period** command.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Configuring RTS Threshold and Retries

The RTS threshold determines the packet size at which the bridge issues a request to send (RTS) before sending the packet. You can enter a setting ranging from 0 to 4000 bytes. If your bridge link is a point-to-point configuration, set the RTS threshold to 4000 on both the root and non-root bridges. If you have multiple bridges set up in a point-to-multipoint configuration, set the RTS threshold to 4000 on the root bridge and to 0 on the non-root bridges.

Maximum RTS Retries is the maximum number of times the bridge issues an RTS before stopping the attempt to send the packet over the radio. Enter a value from 1 to 128.

The default RTS threshold is 4000, and the default maximum RTS retries setting is 32. Beginning in privileged EXEC mode, follow these steps to configure the RTS threshold and maximum RTS retries:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**rts threshold** *value*	Set the RTS threshold. Enter an RTS threshold from 0 to 4000.
Step 4	**rts retries** *value*	Set the maximum RTS retries. Enter a setting from 1 to 128.
Step 5	**end**	Return to privileged EXEC mode.
Step 6	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no** form of the command to reset the RTS settings to defaults.

Configuring the Maximum Data Retries

The maximum data retries setting determines the number of attempts the bridge makes to send a packet before giving up and dropping the packet.

The default setting is 32. Beginning in privileged EXEC mode, follow these steps to configure the maximum data retries:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**packet retries** *value*	Set the maximum data retries. Enter a setting from 1 to 128.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no** form of the command to reset the setting to defaults.

Configuring the Fragmentation Threshold

The fragmentation threshold determines the size at which packets are fragmented (sent as several pieces instead of as one block). Do not configure a fragmentation threshold that is lower than the concatenation size, because the settings can conflict. If concatenation is disabled, use a low setting in areas where communication is poor or where there is a great deal of radio interference.

The default setting is 4000 bytes. Beginning in privileged EXEC mode, follow these steps to configure the fragmentation threshold:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**fragment-threshold** *value*	Set the fragmentation threshold. Enter a setting from 256 to 4000 bytes.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no** form of the command to reset the setting to defaults.

Configuring Packet Concatenation

If your bridge often transmits bursts of data, such as voice packets, you can enable packet concatenation to improve throughput. Concatenation is enabled by default to improve throughput.

Note Not all devices connected through the bridge from the Ethernet LAN can support packet concatenation, such as third party wireless clients connected to access points. Prior to configuring the packet concatenation feature, ensure all your network devices support packet concatenation. Also ensure that all bridges are running Cisco IOS Release 12.2(11)JA or later. If connectivity problems develop after implementing packet concatenation, deactivate the concatenation feature to determine if that is the cause of the problem.

Beginning in privileged EXEC mode, follow these steps to configure packet concatenation:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface dot11radio 0**	Enter interface configuration mode for the radio interface.
Step 3	**concatenation** [**size** *bytes*]	Enable packet concatenation. (Optional) Set a maximum size for concatenated packets in bytes. Enter a value from 1600 to 4000. When concatenation is enabled, the default packet size is 3500.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no** form of the command to disable packet concatenation.

Note For best performance over your bridge links, adjust the CW-min and CW-max contention window settings depending on the number of non-root bridges associated to each root bridge. Refer to the "CW-min and CW-max Settings for Point-to-Point and Point-to-Multipoint Bridge Links" section on page 13-9 for instructions on adjusting these settings.

Performing a Carrier Busy Test

You can perform a carrier busy test to check the radio activity on bridge channels. During the carrier busy test, the bridge drops all associations with wireless networking devices for around 4 seconds while it conducts the carrier test and then displays the test results.

In privileged EXEC mode, enter this command to perform a carrier busy test:

dot11 *interface-number* **carrier busy**

Use the **show dot11 carrier busy** command to re-display the carrier busy test results.