# Lab 5.4.5 Configure Radio Interface through the IOS CLI

Estimated Time: 30 minutes

Number of Team Members: Students will work in teams of two.

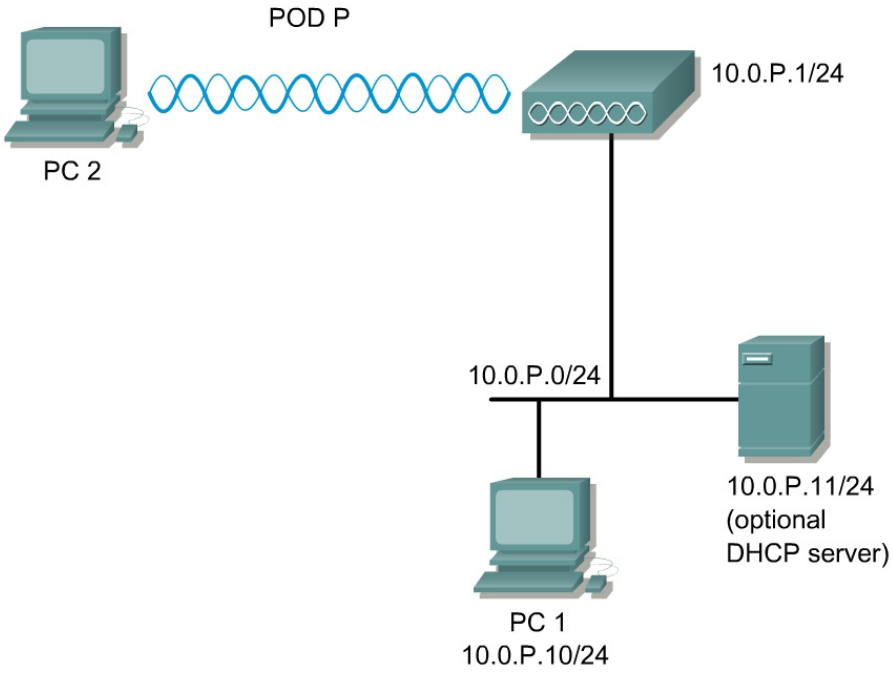
## Objective

In this lab, the student will enter basic channel and data rate information for the AP radio.

## Scenario

This section describes how to configure the AP radio. Use the AP Radio interface pages in the management system will be used to set the radio configuration.

## Topology




## Preparation

Configure a PC and AP according to the Topology

## Tools and Resources

- One AP
- PCs with properly installed Cisco wireless client adapters and utility.
- Several PCs on the wired network that can maintain connectivity to the configuration management pages on the AP.

## Command List

In this lab exercise, the following commands will be used. Refer to this list if assistance or help is needed during the lab exercise.

| Command | Description |
|---|---|
| **configure terminal** | enter global configuration mode |
| **interface dot11radio *number*** | enter the device radio interface. The *number* is 0 for 11b and 1 for 11a. Depending on the installed radio(s), one or both will be available. |
| **station-role** | set the role of the AP device |
| **speed basic** | set the data rate of the AP |
| **power client** | set the power level output of the AP |
| **channel** | set the channel of the AP |
| **world-mode** | set world-mode on the AP |
| **preamble** | set the preamble |
| **antenna** | set the receive or transmit antenna |

## Step 1 Connect to the AP

Connect to the AP using the console or telnet.

Enter global configuration mode with the following command:

```
PodP#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
PodP(config)#
```

## Step 2 View the available 802.11b radio settings

The AP radio has many available settings.

Use the following commands to view the available commands for the 802.11b radio:

```
PodP(config)#interface dot11radio 0
PodP(config-if)#?
  antenna                  dot11 radio antenna setting
  beacon                   dot11 radio beacon
  channel                  Set the radio frequency
  description              Interface specific description
  dot11                    IEEE 802.11 config interface commands
  dot1x                    IEEE 802.1X subsystem
  exit                     Exit from interface configuration mode
  fair-queue               Enable Fair Queuing on an Interface
  mac-address              Manually set interface MAC address
  power                    Set radio transmitter power levels
  preamble-short           Use 802.11 short radio preamble
  rts                      dot11 Request To Send
  shutdown                 Shutdown the selected interface
  speed                    Set allowed radio bit rates
  ssid                     Configure radio service set parameters
  station-role             role of the radio
  world-mode               Dot11 radio world mode
```

Notice that there are many more configuration settings available.

### Step 3 Configuring the role in radio network

To configure the AP as a root device that is connected to the wired LAN or as a repeater (non-root) device that is not connected to the wired LAN.

View the available station roles. Then configure the AP as a root AP:

```
PodP(config-if)#station-role ?
  repeater  Repeater access point
  root      Root access point

PodP(config-if)#station-role root
```

### Step 4 Configuring radio data rates

To use the data rate settings to choose the data rates the AP uses for data transmission. The rates are expressed in megabits per second.

View the available speeds.

```
PodP(config-if)#speed ?
  1.0         Allow 1 Mb/s rate
  11.0        Allow 11 Mb/s rate
  2.0         Allow 2 Mb/s rate
  5.5         Allow 5.5 Mb/s rate
  basic-1.0   Require 1 Mb/s rate
  basic-11.0  Require 11 Mb/s rate
  basic-2.0   Require 2 Mb/s rate
  basic-5.5   Require 5.5 Mb/s rate
  range       Set rates for best range
  throughput  Set rates for best throughput
  <cr>
PodP(config-if)#
```

Use the following commands to set up the AP for 11-Mbps service only:

```
PodP(config-if)#speed basic-11.0 1.0 2.0 5.5
PodP(config-if)#
```

### Step 5 Configuring radio transmit power

The power level on client devices that associate to the AP and the AP radio power can be manually set. Use the help to view the power settings which can be configured.

```
PodP(config-if)#power ?
  client  Client radio transmitter power level
  local   Local radio transmitter power level
PodP(config-if)#
```

See which power levels are configurable on the AP.

```
PodP(config-if)#power local ?
  <1-100>  One of: 1 5 20 30 50 100
  maximum  Set local power to allowed maximum
PodP(config-if)#
```

Configure the AP radio power to 5mW.

```
PodP(config-if)#power local 5
*Mar  1 02:07:19.457: %LINK-5-CHANGED: Interface Dot11Radio0,
changed state to reset
*Mar  1 02:07:19.475: %LINK-3-UPDOWN: Interface Dot11Radio0, changed
state to up
PodP(config-if)#
```

When a client device associates to the AP, the AP sends the maximum power level setting to the client. Follow these steps to specify a maximum allowed power setting on all client devices that associate to the AP, the example below sets the radio transmit power to 100mW:

```
PodP(config-if)#power client 100
PodP(config-if)#
```

Now lower the setting to 5mw:

```
PodP(config-if)#power client 5
*Mar  1 02:01:42.123: %LINK-5-CHANGED: Interface Dot11Radio0,
changed state to reset
*Mar  1 02:01:42.141: %LINK-3-UPDOWN: Interface Dot11Radio0, changed
state to up
PodP(config-if)#
```

## Step 6 Configuring radio channel settings

The default channel setting for the AP radios is least congested. At startup, the AP scans for and selects the least congested channel. For the most consistent performance after a site survey, it is recommended that a static channel setting for each AP be assigned. The channel settings on your AP correspond to the frequencies available in your regulatory domain.

See what channels are available.

```
PodP(config-if)#channel ?
<1-2462>         One of: 1 2 3 4 5 6 7 8 9 10 11 2412 2417 2422 2427
2432 2437 2442 2447 2452 2457 2462
  least-congested  Scan for best frequency
PodP(config-if)#
```

Follow the steps below to assign a static channel setting for the AP. The example below sets the radio to channel 1:

```
PodP(config-if)#channel 1     (or the channel frequency)
*Mar  1 02:10:46.872: %LINK-5-CHANGED: Interface Dot11Radio0,
changed state to reset
*Mar  1 02:10:46.890: %LINK-3-UPDOWN: Interface Dot11Radio0, changed
state to up
PodP(config-if)#
```

Now assign a least congested channel setting for the AP. The example below sets the radio to the least congested channel setting:

```
PodP(config-if)#channel least-congested
*Mar  1 02:12:38.761: %LINK-5-CHANGED: Interface Dot11Radio0,
changed state to reset
*Mar  1 02:12:39.760: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Dot11Radio 0, changed state to down
*Mar  1 02:12:43.265: %DOT11-6-FREQ_USED: Interface Dot11Radio0,
frequency 2412 selected
*Mar  1 02:12:43.285: %LINK-3-UPDOWN: Interface Dot11Radio0, changed
state to up
*Mar  1 02:12:44.267: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Dot11Radio 0, changed state to up
PodP(config-if)#
```

Notice the output on the console displays the AP selecting the frequency that is least congested at that point and time.

## Step 7 Enabling and disabling world-mode

When **world-mode** is enabled, the AP adds channel carrier set information to its beacon. Client devices with **world-mode** enabled receive the carrier set information and adjust their settings automatically. For example, a client device used primarily in Japan could rely on **world-mode** to adjust its channel and power settings automatically when it travels to Italy and joins a network there. World mode is disabled by default.

To enable **world-mode** on the AP, follow the steps below:

```
PodP(config-if)#world-mode
*Mar  1 02:14:32.793: %LINK-5-CHANGED: Interface Dot11Radio0,
changed state to reset
*Mar  1 02:14:32.811: %LINK-3-UPDOWN: Interface Dot11Radio0, changed
state to up
PodP(config-if)#
```

To disable **world-mode** on the AP, follow the steps below:

```
PodP(config-if)#no world-mode
*Mar  1 02:15:00.730: %LINK-3-UPDOWN: Interface Dot11Radio0, changed
state to down
*Mar  1 02:15:00.732: %LINK-5-CHANGED: Interface Dot11Radio0,
changed state to reset
*Mar  1 02:15:00.750: %LINK-3-UPDOWN: Interface Dot11Radio0, changed
state to up
PodP(config-if)#
```

## Step 8 Disabling and enabling short radio preambles

The radio preamble (sometimes called a *header*) is a section of data at the head of a packet that contains information that the AP and client devices need when sending and receiving packets. The radio preamble can be set to long or short:

- Short—A short preamble improves throughput performance. Cisco Aironet Wireless LAN Client Adapters support short preambles. Early models of Cisco Aironet's Wireless LAN Adapter (PC4800 and PC4800A) require long preambles.

- Long—A long preamble ensures compatibility between the AP and all early models of Cisco Aironet Wireless LAN Adapters (PC4800 and PC4800A). If these client devices do not associate to your APs, you should use short preambles.

Follow these steps to disable short radio preambles:

```
PodP(config-if)#no preamble-short
*Mar  1 02:16:03.156: %LINK-5-CHANGED: Interface Dot11Radio0,
changed state to reset
*Mar  1 02:16:03.174: %LINK-3-UPDOWN: Interface Dot11Radio0, changed
state to up
PodP(config-if)#
```

Follow these steps to enable short radio preambles:

```
PodP(config-if)#preamble-short
*Mar  1 02:16:24.843: %LINK-5-CHANGED: Interface Dot11Radio0,
changed state to reset
*Mar  1 02:16:24.861: %LINK-3-UPDOWN: Interface Dot11Radio0, changed
state to up
PodP(config-if)#
```

## Step 9 Configuring transmit and receive antennas

The AP can be set to select the antenna the AP uses to receive and transmit data. There are three options for both the receive and the transmit antenna:

- Diversity—This default setting tells the AP to use the antenna that receives the best signal. If your AP has two fixed (non-removable) antennas, you should use this setting for both receive and transmit.
- Right—If your AP has removable antennas and you install a high-gain antenna on the AP's right connector, you should use this setting for both receive and transmit. When you look at the AP's back panel, the right antenna is on the right.
- Left—If your AP has removable antennas and you install a high-gain antenna on the AP's left connector, you should use this setting for both receive and transmit. When you look at the AP's back panel, the left antenna is on the left.

View the available antenna settings

```
PodP(config-if)#antenna ?
  receive   receive antenna setting
  transmit  transmit antenna setting
```

Follow these steps to set the AP receive and transmit to right: (the interfaces will reset after each change.)

```
PodP(config-if)#antenna receive right
PodP(config-if)#antenna transmit right
PodP(config-if)#
```

Follow these steps to set the AP receive and transmit to left:

```
PodP(config-if)#antenna receive left
PodP(config-if)#antenna transmit left
PodP(config-if)#
```

Follow these steps to set the AP back to receive and transmit to diversity:

```
PodP(config-if)#antenna receive diversity
PodP(config-if)#antenna transmit diversity
PodP(config-if)#
```

### Step 10 Disable the radio

If the PC is connected through wireless, it is important to switch to a console connection.

Use the shutdown command to turn off the radio. Afterwards, re-enable the interface.

```
PodP(config-if)#shutdown
*Mar  1 02:27:18.082: %LINK-5-CHANGED: Interface Dot11Radio0,
changed state to administratively down
*Mar  1 02:27:18.082: %LINK-5-CHANGED: Interface Virtual-
Dot11Radio0, changed state to administratively down
*Mar  1 02:27:19.083: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Dot11Radio0, changed state to down
PodP(config-if)#
PodP(config-if)#no shutdown
*Mar  1 02:28:00.414: %LINK-5-CHANGED: Interface Dot11Radio0,
changed state to reset
*Mar  1 02:28:00.414: %LINK-3-UPDOWN: Interface Virtual-Dot11Radio0,
changed state to down
*Mar  1 02:28:00.433: %LINK-3-UPDOWN: Interface Dot11Radio0, changed
state to up
*Mar  1 02:28:01.432: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Dot11Radio 0, changed state to up
```

## Optional Steps for 802.11a radio if available

### Step 11 View the available 802.11a radio settings

The AP radio has many available settings.

Use the following commands to view the available commands for the 802.11a radio:

```
PodP(config)#interface dot11radio 1
PodP(config-if)#
```

a. What command is needed to see the available commands in the interface mode?

_____

### Step 12 Configuring the Role in Radio Network

Configure the AP as a root AP:

a. What command is needed?

_____

### Step 13 Configuring Radio Data Rates

View the available data rates for the 11a radio.

a. What command is needed?

_____

b. What speeds are available?

_____

_____

_____

## Step 14 Configuring Radio Transmit Power

View the available power settings which can be configured.

a. What command is needed? What power settings are configurable?

_____

See which power levels are configurable on the AP radio.

b. What command is needed? What are the available power levels for the local radio transmitter?

_____

Configure the AP radio power to 10 mW.

c. What command is needed?

_____

Configure the client radio transmit power to 40 mW.

d. What command is needed?

_____

Now lower the setting to 5mw.

e. What command is needed?

_____

## Step 15 Configuring Radio Channel Settings

See what 11a channels are available.

a. What command is needed? What channels are available?

_____

_____

_____

_____

Assign static channel 36 to the AP.

b. What command is needed?

_____

Now assign a least congested channel setting for the AP.

c. What command is needed?

_____

## Step 16 Configuring Transmit and Receive Antennas

View the available antenna settings.

a. What command is needed? What settings are available?

_____

_____

_____

Configure the AP to receive and transmit to right. (the interfaces will reset after each change.)

b. What commands are needed?

_____

_____

Set the AP to receive and transmit to left.

c. What commands are needed?

_____

_____

Set the AP back to receive and transmit to diversity.

d. What commands are needed?

_____

_____

## Step 17 Disable the radio

If the PC is connected through wireless, it is important to switch to a console connection.

Use the shutdown command to turn off the radio. Afterwards, re-enable the interface.

a. What commands are needed?

_____

_____