



## Lab 5.4.8 Configure an AP as a Repeater through the IOS CLI

Estimated Time: 30 minutes

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

### Objective

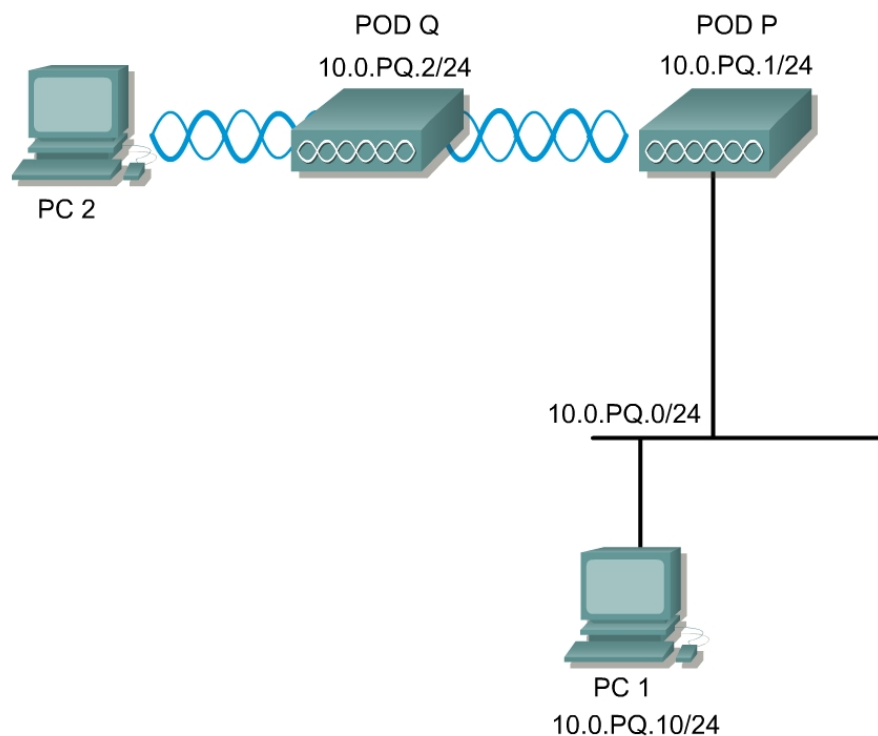
The student will extend the coverage of a basic service set topology by implementing an AP as a repeater.

### Scenario

An AP can be configured as a repeater to extend the wireless infrastructure range or to overcome an obstacle that blocks radio communication. The repeater forwards traffic between wireless users and the wired LAN by sending packets to either another repeater or to an AP connected to the wired LAN. The data is sent through the route that provides the best performance for the client. In this lab, the Root AP will be Pod **P**. The repeater AP will be Pod **Q**.

A chain of several repeater APs can be setup, but throughput for client devices at the end of the repeater chain will be quite low. Because each repeater must receive and then re-transmit each packet on the same channel, throughput is cut in half for each repeater you add to the chain.

### Topology



## Preparation

<u>Team</u>	<u>AP Name</u>	<u>SSID</u>	<u>Address</u>
1	Pod1 (root) P	AP12	10.0.12.1/24
	Pod2 (repeater) Q	AP12	10.0.12.2/24

PC1 should be connected to the wired network. A second team can use the BR350s for the lab, however students must use the VxWorks GUI to configure the steps. It is recommended that students use IOS based APs first.

## Tools and Resources

Each team will need:

- 2 APs
- A wired PC (PC1)
- A wireless PC or laptop (PC2)
- Console cable

## Additional Materials

[http://www.cisco.com/en/US/products/hw/wireless/ps430/products\\_installation\\_and\\_configuration\\_guide\\_book09186a0080147d69.html](http://www.cisco.com/en/US/products/hw/wireless/ps430/products_installation_and_configuration_guide_book09186a0080147d69.html)

## Step 1 Basic AP Configuration to both APs

Console into the AP. Clear the configuration on both of the APs. Then put a basic configuration in the APs.

A sample config is shown using Pod 1.(root AP)

```
ap(config)#hostname Pod1
Pod1(config)#enable secret cisco
Pod1(config)#int bvi 1
Pod1(config-if)#ip address 10.0.12.1 255.255.255.0
Pod1(config-if)#no ssid tsunami
Pod1(config-if)#ssid AP12
Pod1(config-if-ssid)#authentication open
Pod1(config-if-ssid)#infrastructure-ssid
Pod1(config-if-ssid)#end
Pod1#copy run start
```

A sample config is shown using Pod 2. (repeater AP)

```
ap(config)#hostname Pod2
Pod2(config)#enable secret cisco
Pod2(config)#int bvi 1
Pod2(config-if)#ip address 10.0.12.2 255.255.255.0
Pod2(config-if)#no ssid tsunami
Pod2(config-if)#ssid AP12
Pod2(config-if-ssid)#authentication open
Pod2(config-if-ssid)#infrastructure-ssid
Pod2(config-if-ssid)#end
Pod2#copy run start
```

Configure a client and make sure it can associate with the first AP and then the second AP. You will probably have to power off the AP that you are not testing. This will confirm that the APs are configured and operational and clients can connect to the APs.

## Step 2 Basic configure the repeater AP

A sample config is shown using Pod 1 as root and Pod 2 as repeater.

- a. Pod **P** will be the root AP and should have a SSID of “AP**PQ**”. Pod **Q** will become the repeater AP. The repeater AP will not require any Ethernet cables when configured in repeater mode. Also, if Aironet extensions are disabled, enable Aironet extensions.
- b. Set the AP role in the wireless LAN to repeater.

```
Pod2#config t
Pod2 (config) #int Dot11Radio 0
Pod2 (config-if) #station-role repeater
Pod2 (config-if) #dot11 extension aironet
Pod2 (config-if) #end
Pod2# copy run start
```

- c. MAC addresses can be entered for up to four parent APs. The repeater attempts to associate to MAC address 1 first; if that AP does not respond, the repeater tries the next AP in its parent list. (Optional) Enter the MAC address for the AP's radio interface to which the repeater should associate.

```
Pod2 (config-if) #parent 1 RRRR.RRRR.RRRR
```

(where RRRR.RRRR.RRRR = the MAC address of Pod1 11.b radio [not the fastethernet interface])

- d. Verify the configuration

Sample config shown

```
Pod2#show run
interface Dot11Radio0
  no ip address
  no ip route-cache
  !
  ssid AP12
    authentication open
    infrastructure-ssid
  !
  parent 1 0987.1234.e345 <MAC address will vary>
  speed basic-1.0 basic-2.0 basic-5.5 basic-11.0
  rts threshold 2312
  station-role repeater
```

## Step 3 Verify client associates with root

After the repeater is setup, force the client to associate with the repeater and not the root. Make sure the TCP/IP settings and SSID are configured on the laptop. The client may be associated with the repeater or the root. To ensure that the client is associated to the repeater AP:

- a. Make sure the configuration on the root AP is saved by using the **copy run start** command.
- b. Remove the power from the root AP.

- c. Verify the client is associated to the repeater using the Aironet Client Utility.
- d. When the client is associated with the repeater, re-power the root AP.
- e. Once the root AP has booted, ping the root bridge from the client.

#### Step 4 Verify connections on repeater

After the client is associated with the repeater AP, check the LEDs on top of the repeater AP. If the repeater is functioning correctly, the LEDs on the repeater and the root AP to which it is associated behave like this:

- The status LED on the root AP is steady green, indicating that at least one client device is associated with it (in this case, the repeater).
- The status LED on the repeater AP is steady green when it is associated with the root AP and the repeater has client devices associated to it. The repeater's status LED flashes (steady green for 7/8 of a second and off for 1/8 of a second) when it is associated with the root AP but the repeater has no client devices associated to it.

The repeater AP should also appear as associated with the root AP in the root AP's Association Table. On PodP, verify that PodQ is connected. There may also be other wireless clients associated.

- a. In privilege mode of the repeater, enter the following command to view what information can be displayed

```
Pod2#show dot11 associations ?
```

1. What information is available?

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- b. Now check the detailed status of all clients

```
Pod2#show dot11 associations all-clients
```

```
Pod2#show dot11 associations all-client
Address       : 0007.85b3.8850      Name       : Pod2
IP Address    : 10.0.12.2           Interface  : Dot11Radio 0
Device        : ap1200-Parent       Software Version :

State         : Assoc              Parent      : Our Parent
SSID          : AP12               VLAN        : 0
Hops to Infra : 0                  Association Id : 1
Current Rate  : 11.0               Encryption  : Off
Key Mgmt type : NONE
Supported Rates : 1.0 2.0 5.5 11.0
Signal Strength : -27 dBm
Signal Quality : 80 %
Power-save    : Off
Connected for  : 2541 seconds
Activity Timeout : 66 seconds
Last Activity   : 0 seconds ago

Packets Input  : 444                Packets Output : 145
Bytes Input    : 63984              Bytes Output    : 25975
Duplicates Rcvd : 0                 Data Retries    : 2
Decrypt Failed : 0                  RTS Retries     : 0
MIC Failed     : 0
MIC Missing    : 0
```

- c. In privilege mode of the repeater, verify that the laptop is associated. There may also be other wireless clients associated.
- d. Check the detailed status of all clients

Pod2#**show dot11 associations all-clients**

```
Pod2#show dot11 associations all-client
Address      : 0007.eb30.a37d   Name      : VIAO
IP Address   : 10.0.12.20       Interface : Dot11Radio 0
Device      : 350-client       Software Version : 5.20

State        : Assoc           Parent      : self
SSID         : AP12            VLAN        : 0
Hops to Infra : 1              Association Id : 3
Clients Associated: 0          Repeaters associated: 0
Current Rate : 11.0            Encryption   : Off
Key Mgmt type : NONE
Supported Rates : 1.0 2.0 5.5 11.0
Signal Strength : -32 dBm      Connected for : 2866 seconds
Signal Quality : 88 %          Activity Timeout : 22 seconds
Power-save    : Off            Last Activity : 3 seconds ago

Packets Input : 333             Packets Output : 1
Bytes Input   : 20624           Bytes Output   : 80
Duplicates Rcvd : 0             Data Retries   : 0
Decrypt Failed : 0              RTS Retries    : 0
MIC Failed    : 0
MIC Missing   : 0

Address      : 000b.be0e.27e5   Name      : AP2
IP Address   : 10.0.12.8        Interface : Dot11Radio 0
Device      : ap1200-Rptr       Software Version : 12.2

State        : Assoc           Parent      : self
SSID         : AP12            VLAN        : 0
Hops to Infra : 1              Association Id : 2
Clients Associated: 0          Repeaters associated: 0
Current Rate : 11.0            Encryption   : Off
Key Mgmt type : NONE
Supported Rates : 1.0 2.0 5.5 11.0
Signal Strength : -25 dBm      Connected for : 2870 seconds
Signal Quality : 85 %          Activity Timeout : 43 seconds
Power-save    : Off            Last Activity : 20 seconds ago

Packets Input : 155             Packets Output : 480
Bytes Input   : 29388           Bytes Output   : 69571
Duplicates Rcvd : 0             Data Retries   : 4
Decrypt Failed : 0              RTS Retries    : 0
MIC Failed    : 0
MIC Missing   : 0
```

1. Is the laptop associated? What information can be used to verify the connection?

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## Step 5 Configure the 802.11a radio as a repeater (optional)

Erase the configuration on both APs. Return to step 1 and configure the repeater topology using the 801.11a radio instead. In this case, disable the 11b radios.