



# Neighbor Discovery Protocol Mode on Access Points

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## Information About Neighbor Discovery Protocol Mode

In Cisco Catalyst 9124AX outdoor Access Points, the Neighbor Discovery Protocol (NDP) packets are transmitted either ON-channel on the serving radio, or OFF-channel on the RF ASIC conventional radio. The controller has a knob to select the NDP mode for Cisco Catalyst 9124AX outdoor APs based on the deployment requirements. In Cisco IOS XE Bengaluru 17.5.1, Cisco Catalyst 9124AX outdoor APs support both ON-Channel and OFF-Channel NDP mode.

The Cisco Catalyst 9124AX outdoor AP advertises the following NDP mode capabilities while joining the controller:

- ON-Channel (Serving channel)
- OFF-Channel (RF ASIC radio)
- Both (Serving channel and RF ASIC radio)

The supported values for NDP mode are AUTO and OFF-Channel. By default, the NDP mode is set to AUTO.

If the configured NDP mode is AUTO, the AP determines which NDP mode is to be used. The Cisco Catalyst 9124AX outdoor AP uses ON-Channel when the controller is configured for AUTO NDP mode. If the NDP mode that is configured is OFF-Channel, the AP uses OFF-Channel for NDP mode.

### Use Cases

You must configure the controller NDP mode to OFF-channel in order to support brownfield deployment. A brownfield deployment refers to the mixed deployment of Cisco Catalyst 9124AX with other APs that do not

support RF ASIC conventional radio. APs that support RF ASIC conventional radio are Cisco Catalyst 9120 Series Access Points, Cisco Catalyst 9130 Series Access Points, and Cisco Catalyst 9124 Series Access Points.

## Configuring RRM Neighbor Discovery Mode (GUI)

### Procedure

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- Step 1** Choose **Configuration > Radio Configurations > RRM**.
- Step 2** In the **Radio Resource Management** window, click either the **5 GHz Band** or the **2.4 GHz Band** tab.
- Step 3** In the **General** tab, under the **Noise/Interference/Rogue/CleanAir/SI Monitoring Channels** section, click the **RRM Neighbor Discovery Mode** toggle button to configure either of the following modes:
- **AUTO**: If the NDP mode that is configured is **AUTO**, the controller selects ON-Channel as the NDP mode. (The default is set as AUTO).
  - **OFF-CHANNEL**: If the NDP mode configured is **OFF-CHANNEL**, the controller selects **OFF-CHANNEL** as the NDP mode.
- Step 4** Click **Apply**.
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## Configuring the Neighbor Discovery Protocol Mode (CLI)

To configure the NDP mode for an AP, follow these steps:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 2</b>	<b>ap dot11 {24ghz   5ghz} rrm ndp-mode {auto   off-channel}</b>  <b>Example:</b> Device(config)# ap dot11 24ghz rrm ndp-mode off-channel	Configures the operating mode for 802.11a neighbor discovery. The <b>Off-channel</b> command enables NDP packets on the RF ASIC radio and the <b>auto</b> command enables the auto mode.

## Configuring the Neighbor Discovery Protocol Type (CLI)

To configure the NDP type for an AP, follow these steps:

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b> <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 2</b>	<b>ap dot11 {24ghz   5ghz   6ghz} rrm ndp-type {protected   transparent}</b> <b>Example:</b> Device(config)# ap dot11 6ghz rrm ndp-type	Configures the NDP type for 802.11a, 802.11b, or 802.11 6-GHz neighbor discovery. The two types are protected and transparent.

## Configuring Neighbor Discovery Protocol Mode in the RF Profile (GUI)

**Procedure**

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- Step 1** Choose **Configuration > Tags & Profiles > RF**.
  - Step 2** Click **Add**.  
The **Add RF Profile** window is displayed.
  - Step 3** Click the **General** tab.
  - Step 4** Click the **NDP Mode** toggle button to select the NDP mode as **AUTO** or as **OFF-CHANNEL**.
  - Step 5** Click **Apply to Device**.
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## Configuring Neighbor Discovery Protocol Mode in the RF Profile (CLI)

To configure the NDP mode for an AP under the RF profile, follow these steps:

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b> <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 2</b>	<b>ap dot11 {24ghz   5ghz   6ghz} rf-profile rf-profile-name</b>	Enters the RF profile configuration.

	Command or Action	Purpose
	<b>Example:</b> Device(config)# ap dot11 24ghz rf-profile <i>rf-profile-name</i>	
<b>Step 3</b>	<b>ndp-mode {auto   off-channel}</b>  <b>Example:</b> Device(config-rf-profile)# ndp-mode off-channel	Configures the operating mode for neighbor discovery. <b>Off-channel</b> enables NDP packets on the RF ASIC radio and <b>auto</b> enables the auto mode.

## Monitoring Radio Statistics-NDP Capability and NDP Mode (GUI)

### Procedure

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- Step 1** Choose **Monitoring > Wireless > Radio Statistics**.
- Step 2** Click either **5 GHz Radios**, **2.4 GHz Radios**, or **Dual-Band Radios** tab. The corresponding radio band window displays the list of configured APs.
- Step 3** To view the general attributes of an AP, click the corresponding AP to display the **General** tab. The following information is displayed:
- **AP Name:** Displays the assigned identifier for the AP, which is unique within the network. The AP name can be ASCII characters from 32 to 126, without leading and trailing spaces.
  - **IP Address:** Displays the IP address assigned to the AP in dotted-decimal format.
  - **AP Mode:** Displays the configured AP mode. The supported modes are:
    - **Local:** It is the default mode, and it offers a basic service set (BSS) on a specific channel. When the AP does not transmit wireless client frame, it scans other channels to measure noise interference, discover rogue devices, and check for matches against Intrusion Detection System (IDS) events.
    - **Monitor:** An AP in monitor mode does not transmit. It is a dedicated sensor that checks IDS events, detects rogue APs, and determines the position of wireless stations.
    - **Sniffer:** The controller enables you to configure an AP as a network *sniffer*, which captures and forwards all the packets on a particular channel to a remote machine that runs packet analyzer software. These packets contain information on time stamps, signal strength, packet sizes, and so on. Sniffers allow you to monitor and record network activity and detect problems.
    - **Bridge:** The AP becomes a dedicated point-to-point or point-to multipoint bridge. Two APs in bridge mode can connect two remote sites. Multiple APs can also form an indoor or outdoor mesh. Note that you cannot connect to the bridge with clients.
    - **Clear:** Returns the AP back to client-serving mode depending on the remote site tag configuration.
  - **MAC Address:** Displays the registered MAC address on the controller.
  - **Number of Slots :** Displays the number of slots supported by the AP.

- **Radio Type:** Displays the radio band configured on the controller. By default, both, 802.11b/g/n (2.4-GHz) and 802.11a/n/ac (5-GHz) bands are enabled.
- **Slot ID:** Displays the slot on which radio is installed.
- **Sub band Type:** Displays the configured radio sub-band.
- **NDP Capability:** Displays the supported Neighbor Discovery Protocol (NDP) capability. The AP advertises the following NDP mode capabilities while joining the controller:
  - ON-Channel (Serving channel)
  - OFF-Channel (RHL radio)
  - Both (Serving channel and RHL radio)

**Note** Only Cisco Catalyst 9124AX outdoor Access Points support both ON-channel and OFF-channel NDP capability from Cisco IOS XE Bengaluru 17.5.1.
- **NDP Mode:** Displays the configured NDP mode. If the NDP mode that is configured is AUTO, the controller selects ON-Channel as the NDP mode. If the NDP-mode that is configured is OFF-Channel, the controller selects OFF-Channel as the NDP mode.

## Verifying Neighbor Discovery Protocol Mode

To verify the NDP mode, run the following commands:

```

Device# show ap rf-profile name test-24g
Description                : test
RF Profile Name            : test-24g
Band                       : 2.4 GHz
Transmit Power Threshold v1 : -70 dBm
Min Transmit Power         : -10 dBm
Max Transmit Power         : 30 dBm
.
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.
NDP mode                    : Auto
.
.
.

Device# show ap rf-profile name test-5g detail
Description                : Test
RF Profile Name            : test-5g
Band                       : 5 GHz
Transmit Power Threshold v1 : -70 dBm
Min Transmit Power         : -10 dBm
Max Transmit Power         : 30 dBm
.
.
.
NDP mode                    : Off-channel
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.
.

```

```

Device# show ap name ap-name config dot11 24ghz
Cisco AP Identifier           : 3cxx.0exx.36xx
Cisco AP Name                 : Cisco-9105AXW-AP
Country Code                  : Multiple Countries: US,MK,J4,IN
Regulatory Domain Allowed by Country : 802.11bg:-AEJPQU 802.11a:-ABDEIJNPQU
AP Country Code               : US - United States
AP Regulatory Domain          : -A
MAC Address                   : 5cxx.0dxx.e0xx
IP Address Configuration      : DHCP
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.
.
NDP mode                       : Off-channel
.
.
.

Device# show ap name ap-name config dot11 5ghz
Cisco AP Identifier           : 3cxx.0exx.36xx
Cisco AP Name                 : Cisco-9105AXW-AP
Country Code                  : Multiple Countries: US,MK,J4,IN
Regulatory Domain Allowed by Country : 802.11bg:-AEJPQU 802.11a:-ABDEIJNPQU
AP Country Code               : US - United States
AP Regulatory Domain          : -B
MAC Address                   : 5cxx.0dxx.e0xx
IP Address Configuration      : DHCP
IP Address                    : Disabled
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.
NDP mode                       : On-channel
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Device# show ap dot11 24ghz monitor
Default 802.11b AP monitoring
 802.11b Monitor Mode           : Enabled
 802.11b Monitor Channels       : Country channels
 802.11b RRM Neighbor Discover Type : Transparent
 802.11b AP Coverage Interval   : 180 seconds
 802.11b AP Load Interval       : 60 seconds
 802.11b AP Measurement Interval : 180 seconds
 802.11b AP Reporting Interval  : 180 seconds
 802.11b NDP RSSI Normalization : Enabled
 802.11b Neighbor Timeout factor : 20
 802.11b NDP mode               : Auto

Device# show ap dot11 5ghz monitor
Default 802.11a AP monitoring
 802.11a Monitor Mode           : Enabled
 802.11a Monitor Channels       : Country channels
 802.11a RRM Neighbor Discover Type : Transparent
 802.11a AP Coverage Interval   : 180 seconds
 802.11a AP Load Interval       : 60 seconds
 802.11a AP Measurement Interval : 180 seconds
 802.11a AP Reporting Interval  : 180 seconds
 802.11a NDP RSSI Normalization : Enabled
 802.11a Neighbor Timeout factor : 20
 802.11a NDP mode               : Auto

```