# Configuring Assisted Roaming

## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

## Restrictions for Assisted Roaming

- The assisted roaming feature is supported across multiple devices.

- This feature is supported only on 802.11n capable indoor access points. For a single band configuration, a maximum of 6 neighbors are visible in a neighbor list. For dual band configuration, a maximum of 12 neighbors are visible.

- You can configure assisted roaming only using the device CLI.

**Related Topics**

Information About Assisted Roaming, on page 2

Configuring Assisted Roaming (CLI), on page 3

# Information About Assisted Roaming

The 802.11k standard allows clients to request neighbor reports containing information about known neighbor access points that are candidates for a service set transition. The use of the 802.11k neighbor list can limit the need for active and passive scanning.

The assisted roaming feature is based on an intelligent and client optimized neighbor list.

Unlike the Cisco Client Extension (CCX) neighbor list, the 802.11k neighbor list is generated dynamically on-demand and is not maintained on the device. The 802.11k neighbor list is based on the location of the clients without requiring the mobility services engine (MSE). Two clients on the same device but different APs can have different neighbor lists delivered depending on their individual relationship with the surrounding APs.

By default, the neighbor list contains only neighbors in the same band with which the client is associated. However, a switch exists that allows 802.11k to return neighbors in both bands.

Clients send requests for neighbor lists only after associating with the APs that advertize the RRM (Radio Resource Management) capability information element (IE) in the beacon. The neighbor list includes information about BSSID, channel, and operation details of the neighboring radios.

### Assembling and Optimizing the Neighbor List

When the device receives a request for an 802.11k neighbor list, the following occurs:

1. The device searches the RRM neighbor table for a list of neighbors on the same band as the AP with which the client is currently associated with.

2. The device checks the neighbors according to the RSSI (Received Signal Strength Indication) between the APs, the current location of the present AP, the floor information of the neighboring AP from Cisco Prime Infrastructure, and roaming history information on the device to reduce the list of neighbors to six per band. The list is optimized for APs on the same floor.

### Assisted Roaming for Non-802.11k Clients

It is also possible to optimize roaming for non-802.11k clients. You can generate a prediction neighbor list for each client without the client requiring to send an 802.11k neighbor list request. When this is enabled on a WLAN, after each successful client association/reassociation, the same neighbor list optimization is applied on the non-802.11k client to generate the neighbor list and store the list in the mobile station software data structure. Clients at different locations have different lists because the client probes are seen with different RSSI values by different neighbors. Because clients usually probe before any association or reassociation, this list is constructed with the most updated probe data and predicts the next AP that the client is likely to roam to.

We discourage clients from roaming to those less desirable neighbors by denying association if the association request to an AP does not match the entries on the stored prediction neighbor list.

Similar to aggressive load balancing, there is a switch to turn on the assisted roaming feature both on a per-WLAN basis and globally. The following options are available:

• Denial count—Maximum number of times a client is refused association.

• Prediction threshold—Minimum number of entries required in the prediction list for the assisted roaming feature to be activated.

Because both load balancing and assisted roaming are designed to influence the AP that a client associates with, it is not possible to enable both the options at the same time on a WLAN.

**Related Topics**

# How to Configure Assisted Roaming

## Configuring Assisted Roaming (CLI)

### SUMMARY STEPS

1. **configure terminal**
2. **wireless assisted-roaming floor-bias** *dBm*
3. **wlan** *wlan-id*
4. **assisted-roaming neighbor-list**
5. **assisted-roaming dual-list**
6. **assisted-roaming prediction**
7. **wireless assisted-roaming prediction-minimum** *count*
8. **wireless assisted-roaming denial-maximum** *count*
9. **end**

### DETAILED STEPS

|  | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **configure terminal**<br><br>**Example:**<br><br>Device# **configure terminal** | Enters global configuration mode. |
| **Step 2** | **wireless assisted-roaming floor-bias** *dBm*<br><br>**Example:**<br><br>Device(config)# **wireless assisted-roaming floor-bias 20** | Configures neighbor floor label bias. The valid range is from 5 to 25 dBm, and the default value is 15 dBm. |
| **Step 3** | **wlan** *wlan-id*<br><br>**Example:**<br><br>Device(config)# **wlan wlan1** | Enters the WLAN configuration submode. The *wlan-name* is the profile name of the configured WLAN. |
| **Step 4** | **assisted-roaming neighbor-list**<br><br>**Example:**<br><br>Device(wlan)# **assisted-roaming neighbor-list** | Configures an 802.11k neighbor list for a WLAN. By default, assisted roaming is enabled on the neighbor list when you create a WLAN. The **no** form of the command disables assisted roaming neighbor list. |

| | Command or Action | Purpose |
|---|---|---|
| Step 5 | **assisted-roaming dual-list**<br><br>**Example:**<br><br>Device(wlan)# **assisted-roaming dual-list** | Configures a dual-band 802.11k dual list for a WLAN. By default, assisted roaming is enabled on the dual list when you create a WLAN. The **no** form of the command disables assisted roaming dual list. |
| Step 6 | **assisted-roaming prediction**<br><br>**Example:**<br><br>Device(wlan)# **assisted-roaming prediction** | Configures assisted roaming prediction list feature for a WLAN. By default, the assisted roaming prediction list is disabled.<br><br>**Note**    A warning message is displayed and load balancing is disabled for the WLAN if load balancing is already enabled for the WLAN. |
| Step 7 | **wireless assisted-roaming prediction-minimum** *count*<br><br>**Example:**<br><br>Device# **wireless assisted-roaming prediction-minimum** | Configures the minimum number of predicted APs required for the prediction list feature to be activated. The default value is 3.<br><br>**Note**    If the number of the AP in the prediction assigned to the client is less than the number that you specify, the assisted roaming feature will not apply on this roam. |
| Step 8 | **wireless assisted-roaming denial-maximum** *count*<br><br>**Example:**<br><br>Device# **wireless assisted-roaming denial-maximum 8** | Configures the maximum number of times a client can be denied association if the association request is sent to an AP does not match any AP on the prediction. The valid range is from 1 to 10, and the default value is 5. |
| Step 9 | **end**<br><br>**Example:**<br><br>Device(config)# **end** | Returns to privileged EXEC mode. Alternatively, you can also press **Ctrl-Z** to exit global configuration mode. |

**Related Topics**

# Monitoring Assisted Roaming

The following command can be used to monitor assisted roaming configured on a WLAN. .

| Command | Description |
|---|---|
| **show wlan id** *wlan-id* | Displays the WLAN parameters on the WLAN. |

**Related Topics**

# Configuration Examples for Assisted Roaming

This example shows how to configure the neighbor floor label bias:

```
Device# configure terminal
Device(config)# wireless assisted-roaming floor-bias 10
Device(config)# end
Device# show wlan id 23
```

This example shows how to disable neighbor list on a specific WLAN:

```
Device# configure terminal
Device(config)# wlan test1
Device(config (wlan)# no assisted-roaming neighbor-list
Device(config)(wlan)# end
Device# show wlan id 23
```

This example shows how to configure the prediction list on a specific WLAN:

```
Device# configure terminal
Device(config)# wlan test1
Device(config)(wlan)# assisted-roaming prediction
Device(config)(wlan)# end
Device# show wlan id 23
```

This example shows how to configure the prediction list based on assisted roaming prediction threshold and maximum denial count on a specific WLAN:

```
Device# configure terminal
Device(config)# wireless assisted-roaming prediction-minimum 4
Device(config)# wireless assisted-roaming denial-maximum 4
Device(config)(wlan)# end
Device# show wlan id 23
```

**Related Topics**

# Additional References for Assisted Roaming

**Related Documents**

| Related Topic | Document Title |
|---|---|
| System management commands | *System Management Command Reference (Catalyst 3650 Switches)* |

**Error Message Decoder**

| Description | Link |
|---|---|
| To help you research and resolve system error messages in this release, use the Error Message Decoder tool. | https://www.cisco.com/cgi-bin/Support/Errordecoder/index.cgi |

**Standards and RFCs**

| Standard/RFC | Title |
|---|---|
| 802.11k | — |

**MIBs**

| MIB | MIBs Link |
|---|---|
| All supported MIBs for this release. | To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs |

**Technical Assistance**

| Description | Link |
|---|---|
| The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password. | http://www.cisco.com/support |

# Feature History and Information For Performing Assisted Roaming Configuration

| Feature Name | Release | Feature Information |
|---|---|---|
| Assisted Roaming | Cisco IOS XE 3.3SECisco IOS XE 3.3SE | This feature was introduced. |