Coverage Hole Detection

Coverage hole detection and correction

A coverage hole detection and correction algorithm is a wireless LAN management mechanism that

- identifies areas with insufficient radio coverage for reliable performance
- alerts administrators when access points fail to provide adequate coverage, and
- adjusts AP transmit power to mitigate correctable coverage holes.

If clients on a lightweight AP are detected at threshold levels such as RSSI, failed client count, percentage of failed packets, and number of failed packets that are lower than those specified in the RRM configuration, the AP sends a “coverage hole” alert to the device. The alert indicates that clients cannot connect to a usable AP because of poor signal coverage.

The device discriminates between coverage holes that can and cannot be corrected. For coverage holes that can be corrected, the device mitigates the coverage hole by increasing the transmit power level for that specific AP.

The device does not mitigate coverage holes caused by clients that are unable to increase their transmit power or are statically set to a power level. Increasing downstream transmit power could increase interference in the network.

Configure coverage hole detection (GUI)

Enable Coverage hole detection (CHD) to configure client accounting using the GUI.

Procedure

Step 1 Choose **Configuration** > **Radio Configurations** > **RRM**.

Step 2 Configure the Radio Resource Management parameters for 802.11a/n/ac (5 GHz) and 802.11b/g/n (2.4 GHz) radios, and flexible radio assignment parameters.

Step 3 Check the **Enable Coverage Hole Detection** check box to activate the feature.

CHD is enabled. The system identifies and reports wireless coverage gaps.

Configure coverage hole detection (CLI)

CHD is based on upstream RSSI metrics observed by the AP. Enable CHD on your wireless device using CLI commands.

Note To revert back radios from 5-GHz to 24-GHz for CHD, ensure that the 5-GHz radio is UP and client network preference value is other than the default.

Before you begin

Disable the 802.11 network before applying the configuration.

Procedure

Step 1 Configure the 802.11 coverage level for data packets.

Example:

```
Device(config)# ap dot11 {24ghz | 5ghz | 6ghz} rrm coverage
```

The options are:

- **24ghz**: Configure 802.11b parameters.
- **5ghz**: Configure 802.11a parameters.
- **6ghz**: Configure 802.11 6 GHz parameters.

Step 2 Configure the 802.11 coverage level for data packets.

Example:

```
Device(config)# ap dot11 {24ghz | 5ghz | 6ghz} rrm coverage data {fail-percentage |
packet-count | rssi-threshold} 60
```

The options are:

- **fail-percentage**: Configures 802.11b coverage failure rate threshold for uplink data packets.

- **packet-count**: Configures 802.11b coverage minimum failure count threshold for uplinkvoice packets.
- **rssi-threshold**: Configures 802.11b minimum receive coverage level for voice packets.

Step 3 Configure the 802.11 6-GHz coverage hole detection for data packets.

Example:

```
Device(config)# ap dot11 6ghz rrm coverage data {fail-percentage | packet-count} 60
```

The options are:

- **fail-percentage**: Configures 802.11b coverage failure rate threshold for uplink data packets.
- **packet-count**: Configures 802.11b coverage minimum failure count threshold for uplinkvoice packets.

Step 4 Configure the 802.11 Cisco AP coverage exception level as a percentage that ranges from zero to 100%.

Example:

```
Device(config)# ap dot11 24ghz rrm coverage exception global 50
```

Step 5 Configure the 802.11 Cisco AP client minimum exception level that ranges from one to 75 clients.

Example:

```
Device(config)# ap dot11 24ghz rrm coverage level global 10
```

Step 6 Configure the 802.11 coverage hole detection for voice packets.

Example:

```
Device(config)# ap dot11 24ghz rrm coverage voice {fail-percentage | packet-count |
rssi-threshold} 10
```

The options are:

- **fail-percentage**: Configures 802.11b coverage failure rate threshold for uplink data packets.
- **packet-count**: Configures 802.11b coverage minimum failure count threshold for uplinkvoice packets.
- **rssi-threshold**: Configures 802.11b minimum receive coverage level for voice packets.

Step 7 Configure the 802.11 6-GHz coverage hole detection for voice packets.

Example:

```
Device(config)# ap dot11 6ghz rrm coverage voice {fail-percentage | packet-count} 10
```

The options are:

- **fail-percentage**: Configures 802.11b coverage failure rate threshold for uplink data packets.
- **packet-count**: Configures 802.11b coverage minimum failure count threshold for uplinkvoice packets.

Step 8 Save the configuration and return to privileged EXEC mode.

Example:

```
Device(config)# end
```

Step 9 Verify the CHD details.

Example:

```
Device# show ap dot11 {24ghz | 5ghz | 6ghz} coverage
```

This displays CHD status and statistics.

Note If both the number and percentage of failed packets exceed the values entered in the **packet-count** and **fail-percentage** commands for a five-second period, the client enters a pre-alarm condition. The controller uses this information to distinguish between real and false coverage holes. False positives typically result from poor roaming logic implemented on most clients.

A coverage hole is detected if both the number and percentage of failed clients meet or exceed the values entered in the coverage level global and coverage exception global commands over a 90-second period. The controller determines if the coverage hole can be corrected and, if appropriate, increases the transmit power level for that specific AP.

Configure CHD for RF tag profile (GUI)

Enable and configure CHD parameters for an RF tag profile using the GUI to ensure optimal wireless coverage.

Procedure

Step 1 Choose **Configuration** > **Radio Configurations** > **RRM**.

Step 2 On the **Coverage** tab, select the **Enable Coverage Hole Detection** check box.

Step 3 In the **Data RSSI Threshold** field, enter the actual value in dBm. The valid value ranges from -60 dBm to -90 dBm; the default value is –80 dBm.

Step 4 In the **Voice RSSI Threshold** field, enter the actual value in dBm. The valid value ranges from -60 dBm to -90 dBm; the default value is –80 dBm.

Step 5 In the **Minimum Failed Client per AP** field, enter the minimum number of clients on an AP with a signal-to-noise ratio (SNR) below the coverage threshold. The valid value ranges from one to 75 and the default value is three.

Step 6 In the **Percent Coverage Exception Level per AP** field, enter the maximum desired percentage of clients on an AP's radio operating below the desired coverage threshold and click Apply. The valid value ranges from zero to 100% and the default value is 25%.

Step 7 In the **Voice Packet Count** and **Voice Packet Percentage** fields, enter the number and percentage of voice data packets.

Step 8 In the **Data Packet Count** and **Data Packet Percentage** fields, enter the number and percentage of data packets.

Step 9 Click **Apply**.

Configuring CHD for RF profile (CLI)

Enable CHD for a specified RF profile on your wireless device using CLI commands.

Before you begin

Ensure that the RF profile is already created.

Procedure

Step 1 Enter the global configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Configure the 802.11 coverage hole detection for data packets.

Example:

```
Device(config)# ap dot11 24ghz rf-profile alpha-rfprofile-24ghz
```

Step 3 Configure the minimum RSSI value for data packets received by the AP. The valid values range is from -90 to -60 in dBm.

Example:

```
Device(config-rf-profile)# coverage data rssi threshold -80
```

Step 4 Save the configuration and return to privileged EXEC mode.

Example:

```
Device(config-rf-profile)# end
```

Step 5 Verify the summary of the available RF profiles.

Example:

```
Device# show ap dot11 24ghz rf-profile summary
```