Antenna Disconnection Detection

Antenna disconnection detection

The Antenna Disconnection Detection feature monitors the signal strength across antennas on a receiver.

- Having multiple antennas on both transmitters and receivers enhances performance and reliability of APs
- Multiple antennas offer better reception by choosing the stronger signal or combining signals
- Detecting impaired antennas or physical damage is crucial for AP reliability

Whenever the signal strength delta goes beyond a set limit for a certain period, the antenna is likely experiencing issues.

For every detection time period that you configure, the AP sends an Inter-Access Point Protocol (IAPP) message that carries the antenna condition. This message is sent only once when the issue is detected and is displayed in the controller trap messages, SNMP traps, and controller debug logs.

Feature History

Release	Feature	Feature Information
Cisco IOS XE Bengaluru 17.4.1	Antenna Disconnection Detection	This feature detects the signal strength delta across the antennas on the receiver. If the delta is more than the defined limit for a specific duration, the corresponding antenna is considered to have issues.

Supported APs

The feature is supported only on these APs

- Cisco Catalyst 9120AX Series Access Points
- Cisco Catalyst 9130AX Series Access Points
- Cisco Aironet 2800e Access Points
- Cisco Aironet 3800e Access Points

Configuration workflow

1. Configure APs.
2. Configure an AP profile.
3. Enable the feature in AP profile.
4. Configure feature parameters.
5. Verify the configuration.

Limitations

This document outlines limitations for specific APs.

- The SNMP trap is not supported on the Cisco Embedded Wireless Controller.
- The IAPP message is sent only when there is a change in the error condition.

How antenna disconnection detection works

Summary

The antenna disconnection detection process monitors signal strength across antennas and identifies malfunctioning antennas based on relative and absolute RSSI thresholds. It improves access point reliability by flagging weak or failed antennas early.

The key components involved in the process are

- Access point (AP): Compares RSSI values of all antennas and monitors for signal anomalies.
- RSSI thresholds: Include both relative (RSSI failure threshold) and absolute (weak RSSI) values.
- Detection timer: Sets the evaluation duration before confirming a disconnection.
- IAPP messaging: Sends a one-time alert when a disconnection is detected.

Workflow

The process involves these stages

1. Signal monitoring: The AP measures the received signal strength (RSSI) of all antennas.
2. Relative comparison: Each antenna's RSSI is compared to the antenna with the highest RSSI. If the delta exceeds the RSSI failure threshold, that antenna is marked as broken.
3. Absolute check: If all antennas have RSSI values below the weak RSSI threshold, they are all marked as malfunctioning, regardless of delta comparison.
4. Failure fallback: If neither condition is satisfied (e.g., threshold not met), the system defaults to reporting all antennas as malfunctioning.
5. Alert transmission: When a failure condition is confirmed, an IAPP message is generated once to notify monitoring systems via controller logs, SNMP traps, or debug logs.

Result

This process ensures reliable antenna monitoring by combining relative and absolute RSSI evaluations, resulting in faster detection of signal degradation and hardware faults.

Configure antenna disconnection detection

Enable antenna disconnection detection via CLI to monitor and alert on failing antennas.

This task applies to compatible Cisco access points. It uses RSSI thresholds and detection timers to identify and alert on signal anomalies that may indicate hardware failure.

Before you begin

Identify the AP profile to configure.

Procedure

Step 1 Enter global configuration mode

Example:

```
Device# configure terminal
```

Enters global configuration mode.

Step 2 Configure an AP profile and enter AP profile configuration mode

Example:

```
Device(config)# ap profile xyz-ap-profile
```

Configures an AP profile and enters AP profile configuration mode.

Step 3 Enable antenna disconnection detection

Example:

```
Device(config-ap-profile)# antenna monitoring
```

Enables antenna disconnection detection.

To disable antenna disconnection detection, use the **no antenna monitoring** command.

Step 4 Configure RSSI failure threshold value

Example:

```
Device(config-ap-profile)# antenna monitoring rssi-failure-threshold 20
```

Configures RSSI failure threshold value, in dB. Valid values range from 10 to 90, with a default of 40.

Step 5 Configures weak RSSI value

Example:

```
Device(config-ap-profile)# antenna monitoring weak-rssi -90
```

Configures weak RSSI value, in dBm. Valid values range from -90 to -10, with a default of 60.

Step 6 Configure the antenna disconnection detection time

Example:

```
Device(config-ap-profile)# antenna monitoring detection-time 20
```

Configures the antenna disconnection detection time, in minutes. Valid values range from 9 to 180, with a default of 120.

Step 7 Return to privileged EXEC mode

Example:

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

Saves the configuration and returns to privileged EXEC mode.

The network device actively monitors the antenna disconnection status and detect malfunctioning antennas based on configured RSSI thresholds. This enables timely alerts and corrective actions to maintain optimal network performance.

Configure antenna disconnection detection using GUI

Enable and configure antenna disconnection detection using the GUI.

Procedure

Step 1 Choose **Configuration > Tags & Profiles > AP Join**.

Step 2 In the **AP Join Profile** window, click the **General** tab.

Step 3 Check the **Antenna Monitoring** check box to enable antenna monitoring.

Step 4 In the **RSSI Fail Threshold(dB)** field, enter a value, in dB. The values range from 10 to 90 dB, with a default of 40.

Step 5 In the **Weak RSSI(dBm)** field, enter a value, in dBm. Valid values range from -90 to -10 dBm, with a default of 60 dBm.

Step 6 In the **Detection Time(min)** field, enter the antenna disconnection detection time, in minutes. Values range from 9 to 180 min, with a default of 120 min.

Step 7 Click **Update & Apply to Device**.

The system applies the antenna disconnection detection settings to the device according to your specifications.

Detect broken antenna using SNMP trap (CLI)

Configure SNMP traps for antenna failures to enable rapid detection and response to hardware issues in APs.

Procedure

Step 1 Enter global configuration mode

Example:

```
Device# configure terminal
```

Enters global configuration mode.

Step 2 Enable all SNMP notification types

Example:

```
Device(config)# snmp-server enable traps
```

Enables all the SNMP notification types that are available on the system.

Step 3 Configure SNMP trap for broken antenna detection

Example:

```
Device(config)# trapflags ap broken-antenna
```

Enables an SNMP trap, which sends notifications when an antenna fails in any Cisco AP.

Step 4 Return to privileged EXEC mode

Example:

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

Returns to privileged EXEC mode.

SNMP trap notifications is sent when an antenna failure is detected, facilitating prompt maintenance actions.

Detect broken antenna using SNMP trap (GUI)

Detect and report issues with antenna performance automatically using SNMP traps.

Procedure

Step 1 Choose **Administration** > **Management** > **SNMP**.

Step 2 Click the **Wireless Traps** tab.

Step 3 Set the **Access Point** status as **Enabled**, if not done already.

Step 4 Check the **Broken Antenna** check box to enable the trap.

Step 5 Click **Apply**.

The system monitors antenna statuses and generates SNMP traps for any malfunctions, promptly notifying administrators to facilitate quick resolution and improve network reliability.

Verify antenna disconnection detection (Reference)

You must ensure that the antenna disconnection detection feature is configured accurately on both individual access points and their profiles. This involves verifying specific settings like RSSI thresholds and detection times to maintain optimal network performance.

To verify the antenna disconnection detection feature configuration on an AP, use the following command:

```
Device# show ap name 3800-AP config general

Cisco AP Name: 3800-AP
================================================

Cisco AP Identifier                             : f4db.e632.df40
Country Code                                    : Multiple Countries : US,IN,CN,CU
Regulatory Domain Allowed by Country            : 802.11bg:-ACE   802.11a:-ABCDHN
AP Country Code                                 : CN  - China
AP Regulatory Domain
  Slot 0                                        : -E
  Slot 1                                        : -C
MAC Address                                     : f4db.e62f.165a
IP Address Configuration                        : DHCP
IP Address                                      : 9.9.33.3
IP Netmask                                      : 255.255.255.0
Gateway IP Address                              : 9.9.33.1
Fallback IP Address Being Used                  :
Domain                                          :
Name Server                                     :
CAPWAP Path MTU                                 : 1485
Capwap Active Window Size                       : 1

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.
.

AP broken antenna detection                             : Enabled
RSSI threshold                                          : 40
Weak RSSI                                               : -80
Detection Time                                          : 120

.
```

```
.
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```

To verify the antenna disconnection detection feature configuration on an AP profile, use the following command:

```
Device# show ap profile name rf-profile-24g detailed

AP Profile Name: rf-profile-24g
.
.
.
AP broken antenna detection:
  Status                                                : ENABLED
  RSSI threshold                                        : 40
  Weak RSSI                                             : -80
  Detection Time                                        : 120
```

Verify antenna disconnection detection (GUI)

User can verify whether the antenna disconnection detection is supported by the access points, ensuring the system's monitoring capabilities are accurate and reliable.

Procedure

Step 1 Choose **Monitoring > Wireless > AP Statistics**.

Step 2 Click an AP name or anywhere on the row corresponding to an AP to activate the **General** window.

Step 3 Click the **360 View** tab.

The 360 View tab is the default selection. The **Antenna Monitoring** field indicates whether the AP supports monitoring or not.

Verify that the Antenna Monitoring field indicates support status. If supported, monitoring is accurate and reliable.