Dynamic Frequency Selection

Dynamic frequency selection

Dynamic Frequency Selection (DFS) is a process that

- detects radar signals on DFS-enabled 5.0-GHz (802.11a/h) radios
- automatically sets the frequency to avoid interference with radar signals, and
- ensures radios configured for use in a regulatory domain do not interfere with radar systems.

Flex DFS behavior

In normal DFS, when a radar signal is detected on any of the channels in the 40-MHz or 80-MHz bandwidth, the whole channel is blocked. With Flex DFS, if the radar signals are not detected on the secondary channel, the AP is moved to a secondary channel with a reduction in the bandwidth, usually, by half.

Feature history for channel availability check (CAC)

This table provides release and related information for features explained in this module. These features are available on all releases subsequent to the one they were introduced in, unless noted otherwise.

Table 1: Feature history for channel availability check (CAC)

Release	Feature	Feature Information
Cisco IOS XE Bengaluru 17.5.1	Channel Availability Check (CAC)	When a DFS channel is selected for an AP radio, the AP radio scans the channel to check for any radar signals before transmitting any frames in the DFS frequency. This process is called Channel Availability Check (CAC).

Channel availability check

A channel availability check is a DFS channel scanning process that

- scans DFS channels for radar signals before transmitting any frames in the DFS frequency
- executes before you set a DFS channel for the radio, and
- marks channels as non-available for 30 minutes if radar is detected.

Channel availability check behavior

When a DFS channel is selected for an AP radio, the AP radio scans the channel to check for any radar signals before transmitting any frames in the DFS frequency. This process is called Channel Availability Check (CAC).

Note CAC is executed before you set a DFS channel for the radio.

If the AP detects that a radar is using a specific DFS channel, the AP marks the channel as non-available and excludes it from the list of available channels. This state lasts for 30 minutes after which the AP checks again to see, if the channel can be used for Wi-Fi transmissions.

Note

- The CAC performed during a boot process takes anywhere between 1 and 10 minutes depending on the country. This is the reason as to why the DFS channels are not available immediately when an AP reboots.
- APs in the ETSI domain scan channels which are not supported by the controller, as the hardware has the ability to scan.

DFS verification

Use the following commands to verify the DFS configuration:

To display the 802.11h configuration, use the following command:

```
Device# show wireless dot11h
```

To display the auto-rF information for 802.11h configuration, use the following command:

```
Device# show ap auto-rf dot11 5ghz
```

To display the auto-rF information for a Cisco AP, use the following command:

```
Device# show ap name ap1 auto-rf dot11 5gh
```

To display the channel details for a Cisco AP, use the following command:

```
Device# show ap dot11 5ghz summary
AP Name Mac Address Slot Admin State Oper State Width Txpwr Channel
-----------------------------------------------------------------------------------------------------------------
pnp-ap 04eb.409e.b560 1 Enabled Up 40 *8/8 (3 dBm) (52,56)
BLDG1-9130-RACK-1568 04eb.409f.11a0 1 Disabled Down 40 4/8 (15 dBm) (100,104)#
```

Note In the show command, # is added right next to the channel whenever CAC is running on an AP radio.

Zero wait dynamic frequency selection

Zero wait dynamic frequency selection is a wireless feature that

- eliminates the 60-second to 10-minute service outage when access points move to Dynamic Frequency Selection (DFS) channels
- enables access points to pre-monitor and perform Channel Availability Check (CAC) on potential DFS channels before switching, and
- is supported only in U.S. and Europe regulatory domains.

Channel availability check process

APs monitor and perform Channel Availability Check (CAC) on a potential channel for 60 seconds when AP moves to Dynamic Frequency Selection (DFS) channels. Further, the AP ensures that there is no radar operating in the same frequency range before advertising beacons and serving clients. When the AP moves to a DFS, there is a service outage for a minute. This outage can be higher and extend up to 10 minutes.

Configure zero wait dynamic frequency selection globally (CLI)

Enable Zero Wait Dynamic Frequency Selection to improve channel availability and reduce channel change delays on 5-GHz radios.

Zero Wait Dynamic Frequency Selection optimizes radar detection and channel switching processes by allowing access points to pre-scan DFS channels. This reduces service interruption when radar is detected on the current operating channel.

Procedure

Step 1 Enter global configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Enable the Zero Wait Dynamic Frequency Selection feature.

Example:

```
Device(config)# ap dot11 5ghz rrm channel zero-wait-dfs
```

By default, the feature is disabled.

Use the **no** form of this command to disable the feature.

Note

The Zero Wait Dynamic Frequency Selection feature is only available on a 5-GHz radio.

Zero Wait Dynamic Frequency Selection is now enabled globally, allowing 5-GHz radios to perform background DFS scanning for improved channel switching performance.

Configure zero wait dynamic frequency selection globally

Zero Wait DFS allows access points to change to Dynamic Frequency Selection channels without experiencing service interruption. This configuration applies globally to all access points in your network.

Follow these steps to configure Zero Wait Dynamic Frequency Selection globally:

Procedure

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

Step 2 In the **RRM** page, click the **5 GHz Band** tab.

Step 3 Click the **DCA** tab.

Step 4 Select the **Zero Wait DFS** check box to allow the AP to change to DFS without a service outage.

Step 5 Click **Apply**.

Zero Wait Dynamic Frequency Selection is now enabled globally for all access points in your network.

Enable zero wait dynamic frequency selection on a RF profile (CLI)

Enable the Zero Wait Dynamic Frequency Selection feature to reduce DFS channel availability delays on 5 GHz RF profiles.

Zero Wait DFS allows access points to immediately use DFS channels by pre-scanning them, eliminating the typical 60-second wait time required for DFS channel availability checks. This configuration is applied at the RF profile level to improve wireless performance and channel utilization.

Procedure

Step 1 Enter global configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Configure a radio frequency (RF) profile and enter RF profile configuration mode.

Example:

```
Device(config)# ap dot11 5ghz rf-profile profile-name
```

Example:

```
Device(config)# ap dot11 5ghz rf-profile test-dfs
```

Step 3 Enable the Zero Wait Dynamic Frequency Selection feature for the RF profile.

Example:

```
Device(config-rf-profile)# channel zero-wait-dfs
```

Use the **no** form of this command to disable the feature.

Zero Wait DFS is now enabled on the RF profile, allowing access points using this profile to immediately utilize DFS channels without the standard waiting period.

Enable zero wait dynamic frequency selection on a RF profile (GUI)

Enable Zero Wait Dynamic Frequency Selection to allow the AP to change to DFS without a service outage.

Before you begin

Follow these steps to enable Zero Wait Dynamic Frequency Selection on a RF Profile:

Procedure

Step 1 Choose **Configuration > Tags & Profiles > RF/Radio**.

Step 2 In the **RF** tab, click **Add**.

The **Add RF Profile** page is displayed.

Step 3 Enter the name for the RF profile.

Step 4 From the **Radio Band** drop-down, choose the **5 GHz** band.

Step 5 Click the **RRM** tab.

Step 6 Click the **DCA** tab.

Step 7 Select the **Zero Wait DFS** check box to allow the AP to change to DFS without a service outage.

Step 8 Click **Apply to Device**.

Zero wait dynamic frequency selection configuration verification

Use the following commands to verify the DFS configuration.

To display the Zero Wait DFS configuration on an AP, use the following command:

```
Device# show ap name ap1 config slot 1 | inc Zero

  Zero Wait DFS Parameters
    Zero Wait DFS Capable                       : Yes
    CAC Domain                                  : None
```

To display the global configuration related to the Zero Wait Dynamic Frequency Selection feature, use the following command:

```
Device# show ap dot11 5ghz channel | inc Zero

  Zero Wait DFS Parameters
```

```
    Zero Wait DFS Capable                       : Yes
    CAC Domain                                  : None
```

To display the RF profile configuration related to the Zero Wait Dynamic Frequency Selection feature, use the following command:

```
Device# show ap rf-profile name test detail | sec Zero

Description                     :
RF Profile Name                 : test
Band                            : 5 GHz
Transmit Power Threshold v1     : -70 dBm
Min Transmit Power              : -10 dBm
Max Transmit Power              : 30 dBm
.
.
.
Guard Interval                  : default
Zero Wait DFS                   : Enabled
```