RF Management

SSID Limit

- Description— Number of WLANs should be less than 4.

  We recommend limiting the number of service set identifiers (SSIDs) configured at the controller. You can configure 16 simultaneous SSIDs (per radio on each AP), but as each WLAN/SSID needs separate probe responses and beaconing, the RF pollution increases as more SSIDs are added. Furthermore, some smaller wireless stations like PDA, WiFi Phones, and barcode scanners cannot cope with a high number of basic SSID (BSSID) information. This results in lockups, reloads, or association failures. Also the more SSIDs, the more beaconing needed, so less RF time is available for real data transmits. For example, the recommendation is to have one to three SSIDs for corporate, and one SSID for high-density designs. AAA override can be leveraged for per user VLAN/ settings on a single SSID scenario.

- Status:
  - Selected—Less than or equal to 4
  - Unselected—Greater than 4

- CLI Option:
  - Verify the number of WLANs by entering this command:

    ```
    (Cisco Controller) >show wlan summary
    ```

> • Disable unwanted WLANs by entering this command:
>
> ```
> (Cisco Controller) >config wlan disable wlan-id
> ```

Client Band Select

- Description—Band Selection should be enabled. Clicking **Fix it Now** enables Band Selection.

Band selection enables client radios that are capable of dual-band (2.4 and 5 GHz) operation to move to a less congested 5 GHz AP. The 2.4 GHz band is often congested. Clients on this band typically experience interference from Bluetooth devices, microwave ovens, and cordless phones as well as co-channel interference from other APs because of the 802.11b/g limit of three non-overlapping channels. To prevent these sources of interference and improve overall network performance, you can configure band selection on controller:

- Band selection is enabled/disabled globally by default.

- Band selection works by regulating probe responses to clients. It makes 5 GHz channels more attractive to clients by delaying probe responses to clients on 2.4 GHz channels.

- Evaluate band selection for voice, particularly focusing on roaming performance. See below for further explanation.

- Most newer model clients prefer 5 GHz by default if the 5 GHz signal of the AP is equal to or stronger than the 2.4-GHz signal.

- Band select should be enabled for high-density designs

Also, in high-density designs, the study of available UNII-2 channels should be made. Those channels that are unaffected by Radar and also usable by the client base should be added to the RRM DCA list as usable channels.

Dual-band roaming can be slow depending on the client. If a majority of the base of voice clients exhibits a slow roaming behavior, it is more likely that the client sticks to 2.4 GHz. In this case, it has scanning issues on 5 GHz. Generally when a client decides to roam, it scans its current channel and band first. The clients generally scan for an AP that has a significantly better signal level, maybe as much as 20 dB and/or a significantly better SNR. Failing such available connection, the client may remain with its current AP. In this case, if the CU on 2.4 GHz is low and the call quality is not poor, then disabling the selected band maybe fine. However, the preferred design is to enable band selection on 5 GHz with all data rates enabled and 6 Mbps as mandatory. Then, set the 5 GHz RRM minimum Tx power level 6 dBm higher than the average 2.4 GHz power level set by RRM.

The goal of this configuration recommendation is to enable the client to obtain a band and channel with better SNR and Tx power initially. As already stated, generally when a client decides to roam, it scans its current channel and band first. So, if the client initially joins the 5 GHz band, then it is more likely to stay on the band if there are good power levels on 5 GHz. SNR levels on 5 GHz are generally better than 2.4 GHz because 2.4 GHz has only three Wi-Fi channels and is more susceptible to interference such as Bluetooth, iBeacons, and microwave signals.

802.11k is recommended to be enabled with dual-band reporting. This enables all 11k enabled clients to have the benefit of assisted roaming. With dual-band reporting enabled, the client receives a list of the best 2.4-GHz and 5-GHz APs upon a directed request from the client. Here, the client most likely looks at the top of the list for an AP on the same channel, and then on the same band as the client is

currently on. This logic reduces scan times and saves battery power. Having 802.11k enabled on the WLC does not have a downside effect for non-802.11k clients.

- Status:
    - Selected—Enabled on all WLANs
    - Unselected—Disabled

- CLI Option:
    - Verify Band Select by entering this command:

    ```
    (Cisco Controller) >show band-select
    ```

    - Enable Band Select on a WLAN by entering this command:

    ```
    (Cisco Controller) >config wlan band-select allow enable wlan-id
    ```

40-MHz Channel Width

- Description—Channel width should be set to 40 MHz. Clicking **Fix it Now** sets the channel width to 40 MHz.

- Status:
    - Selected—Enabled
    - Unselected—Disabled

Auto Dynamic Channel Assignment

- Description—Auto DCA should be enabled to allow RRM to select best channels for each radio. Clicking **Fix it Now** enables Auto DCA.

    When a wireless network is first initialized, all radios participating require a channel assignment to operate without interference - optimizing the channel assignments to allow for interference free operation is DCA's job. Wireless network does this using the air metrics reported by each radio on every possible channel, and providing a solution that maximizes channel bandwidth and minimizes RF interference from all sources - Self (signal), other networks (foreign interference), Noise (everything else).

    DCA is enabled by default and provides a global solution to channel planning for your network.

- Status:
    - Selected—DCA is enabled for 802.11a/b
    - Unselected—None or one is enabled

- CLI Option—Enable auto DCA by entering this command:

    ```
    (Cisco Controller) >config 802.11a channel global auto
    (Cisco Controller) >config 802.11b channel global auto
    ```

Auto Transmit Power Control

- Description—Auto TPC should be enabled to allow RRM to select best transmit power for each radio. Clicking **Fix it Now** enables Auto TPC.

  The Cisco WLC dynamically controls the access point transmit power based on real-time wireless LAN conditions. You can choose between two versions of transmit power control: TPCv1 and TPCv2. With TPCv1, power can be kept low to gain extra capacity and reduce interference. With TPCv2, transmit power is dynamically adjusted with the goal of minimum interference. TPCv2 is suitable for dense networks. In this mode, there could be higher roaming delays and coverage hole incidents.

  The Transmit Power Control (TPC) algorithm increases and decreases the power of an access poin (AP) in response to changes in the RF environment. In most instances, TPC seeks to lower the power of the AP to reduce interference. But, in the case of a sudden change in the RF coverage-for example, if the AP fails or becomes disabled-TPC can also increase power of the surrounding APs. This feature is different from coverage hole detection, which is primarily concerned with clients. TPC provides enough RF power to achieve desired coverage levels while avoiding channel interference between APs.

  > **Note** For optimal performance, use the Automatic setting to allow best transmit power for each radio.

- Status:

  - Selected—TPC enabled for 802.11a/b

  - Unselected—None or one enabled

- CLI Option—Enable Auto TPC by entering this command:

  ```
  (Cisco Controller) >config 802.11a txPower global auto

  (Cisco Controller) >config 802.11b txPower global auto
  ```

Auto Coverage Hole Detection

- Description—Auto CHD should be enabled.

  The controller uses the quality of client signal levels reported by the APs to determine if the power level of that AP needs to be increased. Coverage Hole Detection (CHD) is controller independent, so the RF group leader is not involved in those calculations. The controller knows how many clients are associated with a particular AP and what are the signal-to-noise ratio (SNR) values for each client.

  If a client SNR drops below the configured threshold value on the controller, the AP increases its power level to try to compensate for the client. The SNR threshold is based on the transmit power of the AP and the coverage profile settings on the controller.

  For instructions on how to configure auto CHD, see the *Cisco Wireless LAN Controller Configuration Guide*.

- Status:

  - Selected—CHD enabled

• Unselected— None or one enabled

CleanAir

• Description—CleanAir should be enabled. Clicking **Fix it Now** enables CleanAir.

To effectively detect and mitigate RF interference, enable CleanAir whenever possible. There are recommendations to various sources of interference to trigger security alerts, such as generic DECT phones, jammer, and so on.

• Status:

• Selected—Enabled

• Unselected—Disabled

• CLI Option:

• Verify CleanAir configuration on a network by entering this command:

```
(Cisco Controller) >show 802.11{a|b} cleanair config
```

• Enable CleanAir functionality on a network by entering this command:

```
(Cisco Controller) >config 802.11{a|b} cleanair enable network
```

• Configure to enable interference detection for specifically jammer by entering this command:

```
(Cisco Controller) >config 802.11{a|b} cleanair device enable jammer
```

Event Driven Radio Resource Management

• Description—Event driven RRM should be enabled. Clicking **Fix it Now** enables event driven RRM.

• Status:

• Selected—Enabled

• Unselected—Disabled