



Concepts, FAQs, and Information for Advanced Users

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Supported Browsers

Operating System	Supported Browsers and Versions
Microsoft Windows	<ul style="list-style-type: none">• Internet Explorer 10 and later• Mozilla Firefox 33 and later• Google Chrome 38 and later
Apple Mac OS	<ul style="list-style-type: none">• Safari 7 and later• Mozilla Firefox 33 and later• Google Chrome 38 and later

Cisco Mobility Express Controller Failover and Primary AP Election Process

Mobility Express Controller Redundancy for Failover

In a Cisco Mobility Express network, not all APs have the capability to work as a primary AP. See [Supported Cisco Access Points](#) to know which AP models are capable of working as a primary AP.

In order to have Cisco Mobility Express controller redundancy to enable a failover, your network must have two or more active APs with primary AP capability. In the event of a failover, one of these other APs will automatically be elected as a primary. The newly elected primary will have the same IP and configuration as the original primary. From an administrator perspective, there will be no difference between the original primary and the newly elected primary in case of a failover.



Note Clients that connect to the primary AP will lose connectivity during a failover.

Mobility Express Controller Forced Failover

In a Cisco Mobility Express network, not all APs have the capability to work as a primary AP. See [Supported Cisco Access Points](#) to know which AP models are capable of working as a primary AP.

You can manually force any AP, that has the capability to work as a primary AP, to become the primary AP. This forced failover of the primary AP to another primary-capable AP of your choice can be performed both using the GUI and the CLI.

To perform a forced failover using the GUI:

1. Choose **Wireless Settings > Access Points**.
The **Access Points Administration** window is displayed.
2. Click the **Edit** icon adjacent to the AP you want to set as primary.
The **Edit** window with the **General** tab is displayed.
3. Under the **General** tab, next to the **Operating Mode field**, click **Make me Controller**.



Note For a primary AP, the **Operating Mode** field shows *AP & Controller*. For other associated APs, this field shows *AP Only*. The **Make Me Controller** button is available only for subordinate APs that are capable of participating in the primary election process.

To perform a forced failover using CLI, use the following command:

```
config ap next-preferred-master cisco-ap-name forced-failover
```

When you force the failover of the primary to an AP of your choice, using the GUI or CLI methods, the current primary AP reboots while the new AP takes over as the controller, with the IP address and configuration as the previous primary. The previous primary, after rebooting, comes back online and joins the new primary AP as a subordinate AP.



Note Like any failover, this forced failover causes some downtime in the Cisco Mobility Express network. During this downtime, clients associated to APs that have the standalone feature enabled will not face any disruption in service. Clients of APs that do not have the standalone functionality enabled will be affected.

Primary AP Election Process

In a Cisco Mobility Express network, when the primary AP shuts down, one of the other primary-capable APs in this deployment is automatically designated as the primary AP. The automatic selection of the primary AP among the Cisco Mobility Express-capable APs is as per an internal automatic primary election process. This process is used to both detect the failure of the primary AP and to designate the new primary AP among the eligible APs. This process is based on Virtual Router Redundancy Protocol (VRRP) that algorithmically determines the next primary AP, based on the following parameters listed in the order of descending precedence:

- The AP with highest controller up-time compared to other Cisco Mobility Express-capable APs
- The AP configured as VRRP primary, using the VRRP command **config ap next-preferred-master** on the controller's CLI.
- The AP with the least load in terms of the number of associated clients associated.
- Among APs with a similar client load, the AP with the lowest MAC address.

Configuring VRID

Virtual router identifier (VRID) is used to identify the virtual router. Prior to Cisco Wireless Release 8.8, the VRID of Cisco Mobility Express was fixed as **01** which resulted in a fixed VRRP MAC based on `00:00:5e:00:01:VRID`. This caused VRRP MAC conflict issues on Cisco Mobility Express networks if they used the same VRID. Beginning Cisco Wireless Release 8.8, when a VRRP MAC conflict is detected, you can change the VRID on the primary AP. This new VRRP MAC is then sent to the subordinate AP via a VRRP message. The following commands are available to configure the VRID or display the VRID or VRRP MAC.

Step 1 Configure or change the VRID by using the **config mob-exp vrid** *new_vrid* command.

The range for **new_vrid** is 1 to 255 where the default is 1.

Step 2 To display the VRID, use the **show mob-exp vrrp vrid** command.

Step 3 To display the VRRP MAC, use the **show mob-exp vrrp mac** command.

What to do next

Predownloading an Image to an Access Point

To minimize network outages, an upgrade software image is downloaded to the access point from the controller without resetting the access point or losing network connectivity. This means that, first the upgrade image to

the controller is downloaded and then the image is downloaded to the access point while the network is still up. When the controller reboots, the access points are disassociated and reboot. The controller comes up first, followed by the access points, all with their upgraded images. Once the controller responds to the discovery request sent by an access point with its discovery response packet, the access point sends a join request.

Alternative Method for CAPWAP to Mobility Express Conversion



Note

- The recommended method is [Converting from CAPWAP Lightweight AP to Cisco Mobility Express Software](#). The following is an alternative only in case the recommended method does not work.
- The following procedure shows a conversion from the 8.1.122.0 Lightweight AP release on an 1850 series AP, and hence uses the corresponding software file. Ensure that you use the appropriate software file depending on the release you are converting from and the AP model.

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- Step 1** Download the *AIR-AP1850-K9-ME-8-1-122-0.zip* software file from Cisco.com to the TFTP server.
- On the Download Software page, for a given release, this .ZIP file is labeled, "Access point image bundle, to be used for software update and/or supported access points images".
- Step 2** Unzip the contents of the ZIP file to a directory on the TFTP server.
- Step 3** Connect to the console port of the AP.
- Step 4** Log in to the AP using the username **Cisco** and password **Cisco**. Both are case-sensitive.
- This is the default factory-shipped username and password on all Cisco Aironet APs.
- Step 5** Use the command **ap-type mobility-express tftp://<tftp server ip-address>/<filename of ap1g4 TAR file with path from root on the TFTP server>** command.
- The AP reboots, comes back online, and tries to join a controller for about 5 minutes. After this, the AP continues to boot into Mobility Express mode and starts broadcasting the *CiscoAirProvison* SSID.
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CAPWAP Image Conversion

The CAPWAP Image Conversion feature is enhanced to allow the AP to download the image from Mobility Express (ME), and flash the ME image on the AP, to make it ME capable even though build version is the same.

**Note**

- If the image type of the AP is CAPWAP, which is the same as that of the primary AP, then the new ME image is downloaded.
- If the image type of the AP is a different CAPWAP image, regardless of the image type mismatch, the new ME image is downloaded.
- The SFTP support mode of software download is newly added to convert CAPWAP COS AP to Mobility Express AP.
- The new ME image is downloaded from the Image primary. If there is no Image primary, then the new image is downloaded to the AP via the TFTP or SFTP server.

Converting an AP from Mobility Express to CAPWAP Type

To convert a Mobility Express AP into a CAPWAP AP, you must change its ap-type from mobility-express to capwap, though the CLI, as given in this procedure:

1. Connect to the Console Port, Telnet or SSH to the AP.
2. Login to the Mobility Express controller console.
3. In the Mobility Express controller console, use the command **apciscoshell** to connect to the AP console.
4. Login to the AP console using the username *Cisco* and password *Cisco*. Both are case-sensitive.
5. Enter **enable**.
6. Enter the command **ap-type capwap**, and confirm .

Once the AP type is CAPWAP, the AP will not start its Mobility Express controller functionality and does not participate in the Mobility Express primary AP election process. This AP can then be deployed in a physical wireless controller-based network (i.e. in a non-Mobility Express network). There the AP will join that controller, and as the image on the controller will be different, the AP will request a CAPWAP image from the controller, reboot, and rejoin the controller as a CAPWAP AP.

To convert multiple access points running Mobility Express image to CAPWAP simultaneously from the Mobility Express controller CLI, execute the following command:

```
(Cisco Controller) > config ap unifiedmode <switch_name> <switch_ip_address>
```

The arguments <switch_name> and <switch_ip_address> are the name and IP address, respectively, of the WLC to which the APs need to be migrated to.

The above command converts all APs to *AP Configuration: NOT MOBILITY EXPRESS CAPABLE*. The APs are then reloaded, and they come back up in local mode.

Mobility Express AP Conversion to CAPWAP via DHCP Option

This feature allows the ME APs to convert to CAPWAP mode from ME mode using DHCP option 43. To achieve this, you must first configure specific values in the DHCP server for DHCP option 43. Once the AP receives the DHCP values for this option, the AP type is changed from ME to CAPWAP.

DHCP Option 43

DHCP option 43 is an option used for providing Wireless LAN Controller IP addresses to the AP. The DHCP option 43 is used to notify the AP to convert into CAPWAP AP.

```
ip dhcp pool vlan177
network <wlc IP>
option 43 hex f205.0907.b10a.01
```

When an AP reloads and gets the IP details from the DHCP server, it receives the option 43 value that consists of a hex value of F205 along with ME-WLC IP, which then converts the AP to CAPWAP mode so that the AP can join AireOS WLC.

RF Parameter Optimization Settings

When making the RF Parameter Optimization settings, use the information in the following table to select the right settings for your deployment. The following table shows the default values when low, typical, or high client density type is selected.



Note If you do not enable RF Parameter Optimization during the initial configuration wizard, then client density is set to **Typical** (the default value), and RF traffic type is set to **Data** (the default value).

	Dependency	Typical (For enterprise deployments. Default profile.)	High Density (Where throughput is most important)	Low Density (For coverage in open spaces)
TX Power	Global per band	Default	Higher	Highest
TPC Threshold, TPC Min, and TPC max (These parameters are equivalent to TX Power)	Specific RF profile per band	TPC Min: Default at -10 dB TPC Max: Default at 30 dB	TPC Threshold: • -65 dB for 5 GHz • -70 dB for 2.4 GHz TPC Min: +7 dB TPC Max: Default at 30 dB	TPC Threshold: • -60 dB for 5 GHz • -65 dB for 2.4 GHz TPC Min: -10 dB TPC Max: Default at 30 dB
RX Sensitivity	Global per band (Advanced RX-SOP) RF profiles	Default (Automatic)	Medium (RX-SOP)	Low

	Dependency	Typical (For enterprise deployments. Default profile.)	High Density (Where throughput is most important)	Low Density (For coverage in open spaces)
CCA Threshold	Global per band 802.11 a only (hidden) RF Profiles	Default (0)	Default (0)	Default (0)
Coverage RSSI Threshold	Global per band Data and voice RSSI RF Profiles	Default (Data: -80 Voice: -80)	Default (Data: -80 Voice: -80)	Higher (Data: -90 Voice: -90)
Coverage Client Count	Global per band (Coverage Exception) RF Profiles (Coverage Hole Detection)	Default (3)	Default (3)	Lower (2) Lower (1 to 3)
Data Rates	Global per band (network) RF Profiles	12 Mbp mandatory 9 Mbp supported 1,2, 5.5, 6, 11 Mbp disabled	12 Mbp mandatory 9 Mbp supported 1,2, 5.5, 6, 11 Mbp disabled	CCK rates enabled 1,2, 5.5, 6, 9, 11, 12 Mbp enabled

RFID Tracking on Access Points

Beginning with Cisco Wireless Release 8.8, Cisco Mobility Express supports tracking of assets that have been appropriately tagged with RFIDs. With Cisco Aironet 4800, 3800, and 2800 Series APs, you can track up to 2000 active RFIDs. With all the other applicable Cisco APs, you can track up to 1000 active RFIDs.

When an active RFID is in range, the primary AP adds the RFID-related information to its own database. RFID tracking can be configured on all APs, primary or subordinate, in the Cisco Mobility Express network. You can configure RFID tracking on any AP in the Cisco Mobility Express network only through the primary AP's CLI.

Configuring RFID Tracking

- Step 1** Configure RFID parameters like custom CCX multicast addresses, message rate limit or timeout by using the **config rfid {ccx | rate-limit | timeout}** command.
- Step 2** To enable or disable RFID tag data collection, use the **config rfid status {enable | disable}** command.
- Step 3** To display the default RFID configuration, use the **show rfid config** command.
- Step 4** To display a summary of RFID tags and closest APs, use the **show rfid summary** command.

Step 5 To display RFID tag details, use the **show rfid detail** *mac-id* command.

Step 6 To display RFID statistics, use the **show rfid stats** command.

Related Documents

- [Cisco Mobility Express Release Notes](#)
- [Cisco Mobility Express Command References](#)
- [Cisco Aironet Access Points Ordering Guide](#)
- [Cisco Aironet Universal AP Priming and Cisco AirProvision User Guide](#)
- [Cisco Aironet AP Hardware Guides](#)
 - [Cisco Aironet 1560 Access Point Hardware Guide](#)
 - [Cisco Aironet 1815i Access Point Hardware Guide](#)
 - [Cisco Aironet 1815w Access Point Hardware Guide](#)
 - [Cisco Aironet 1830 Series Access Points Hardware Guide](#)
 - [Cisco Aironet 1850 Series Access Points Hardware Guide](#)
 - [Cisco Aironet 2800 Series Access Points Hardware Guide](#)
 - [Cisco Aironet 3800 Series Access Points Hardware Guide](#)

FAQs

Which access points can host the Cisco Mobility Express wireless LAN controller function and which access points can be managed by it?

See [Supported Cisco Access Points#unique_145](#).

What controller-based modes does the Cisco Mobility Express wireless LAN controller function support?

Access points managed by the Cisco Mobility Express solution will operate with Centralized Control Plane and Distributed Data Plane, similar to the AireOS FlexConnect mode.

What are the licensing requirements for Cisco Mobility Express?

The Cisco Mobility Express solution does not require any licenses for access points.

Can I expand the scale of access points and convert to a wireless controller deployment?

Yes, you can simply point the APs to the WLAN controller IP address as the primary controller. This is independent of modes. The WLAN controller will push the right AP image and respective configuration. For detailed information, see [Converting an AP from Mobility Express to CAPWAP Type, on page 5](#).

If my deployment needs to downsize to 25 access points or less, can they convert from existing controller-based deployment to Cisco Mobility Express?

Yes. You can convert your wireless controller-based deployment to Cisco Mobility Express, as long as your deployment has APs capable of hosting the Cisco Mobility Express controller functionality (listed as primary APs in [Supported Cisco Access Points#unique_145](#)).

If the number of APs connected to the primary AP is less than or equal to 25, the maximum clients for the internal AP is limited to 20. What is the workaround for more efficiency and reducing traffic congestion?

The workaround is to move Cisco Mobility Express to some other AP that has lower loads. Complete the following steps to move Cisco Mobility Express to other APs:

1. Enter the **show ap summary** command. The list of APs are listed.
2. Identify the APs with the least number of clients.
3. Enter the **config ap next-preferred-master <new_ap_name> forced-failover** command. This command will move the Cisco Mobility Express controller to the new AP and the current AP will serve the clients.

Where can I get more information on the Cisco Mobility Express solution?

Go to <http://www.cisco.com/go/mobilityexpress>.

