Alcatel-Lucent Mobility Master

Alcatel·Lucent Enterprise

Licensing Guide

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Contacting Support

Table 1: *Contact Information*

Contact Center Online	
Main Site	https://www.al-enterprise.com
Support Site	https://businessportal2.alcatel-lucent.com
Email	ebg_global_supportcenter@al-enterprise.com
Service & Support Contact Center Telephone	
North America	1-800-995-2696
Latin America	1-877-919-9526
EMEA	+800 00200100 (Toll Free) or +1(650)385-2193
Asia Pacific	+65 6240 8484
Worldwide	1-818-878-4507

Revision History

The following table lists the revisions of this document.

Table 2: *Revision History*

Revision	Change Description
Revision 02	Updated the **License Types and Usage** table.
Revision 01	Initial release.

AOS-W supports a variety of optional add-on licenses that enhance the base OS and provide advanced features such as wireless intrusion protection, advanced cryptography, policy-based traffic management and controls, web content classification, and stateful user firewalls.

Getting Started with AOS-W Licenses

This section describes AOS-W license types and licensing features and lists the procedures to configure a licensing solution.

Learn more about Licenses and Licensing Features

Select any of the links below to view detailed information about AOS-W license types, licensing features and examples of deployment topologies that support these features.

- License Types and Usage on page 10
- Centralized Licensing on page 6
- Licensing Pools on page 16
- WebCC Operation modes on page 13
- Best Practices and Limitations on page 14

Configure a Licensing Management Solution

The following sections describe the procedures to configure centralized licensing clusters and licensing pools, and to add, remove, and monitor individual licenses.

- Creating and Managing Licensing Pools on page 19
- License Installation on page 23
- Adding License to Stand-alone Switch on page 26
- Associating Mobility Master or Stand-alone Switch to External License Server on page 28
- Removing License on page 28

Centralized Licensing

AOS-W supports a centralized licensing architecture, which allows a group of managed devices to share a pool of licenses. A primary and backup Mobility Master can share a single set of licenses, eliminating the need for a redundant license set on the backup server. Managed Devices maintain information sent from Mobility Master, even if the managed device and Mobility Master can no longer communicate.

This section describes the following licensing features:

- Supported Topologies on page 7
- Licensing Pools on page 16
- Mobility Master Redundancy on page 8
- Communication between the License Server and License Clients on page 8
- Failover Behaviors on page 9

Supported Topologies

AOS-W 8.x supports centralized licensing for the following topologies, where:

- a Mobility Master acts as a licensing server to all its associated managed devices, stand-alone Switches, or another Mobility Master acting as a licensing client.
- a stand-alone Switch acts as a licensing server to other stand-alone Switches.

License Pools

Mobility Master uses licensing pools to distribute licenses to a large number of managed devices across geographic locations. By default, all managed devices associated to Mobility Master share a single global pool of all the sharable licenses added to that Mobility Master. However, AOS-W also allows you to create additional licensing pools at a configuration node, allowing a group of managed devices at or below that configuration level to share licenses among themselves, but not with other groups.

> **NOTE**
>
> The following example shows how licenses can be allocated within one or more license pools. The following examples use only AP licenses for simplicity, but the same methodology applies to all sharable licenses. For more information and additional examples for licensing pool types, see Licensing Pools on page 16.

If you create a license pool for the configuration node **/USA**, as shown in Figure 1, the four managed devices below this node use licenses from the **/USA** pool, while the other managed devices continue to use the global pool. If the **/USA** license pool is allocated 40 of the 100 AP licenses installed on Mobility Master, the four managed devices using the **/USA** pool can share 40 AP licenses from Mobility Master. The global license pool now contains only 60 of the AP licenses from Mobility Master.

Figure 1 *Managed Nodes Use Global or Custom License Pools*
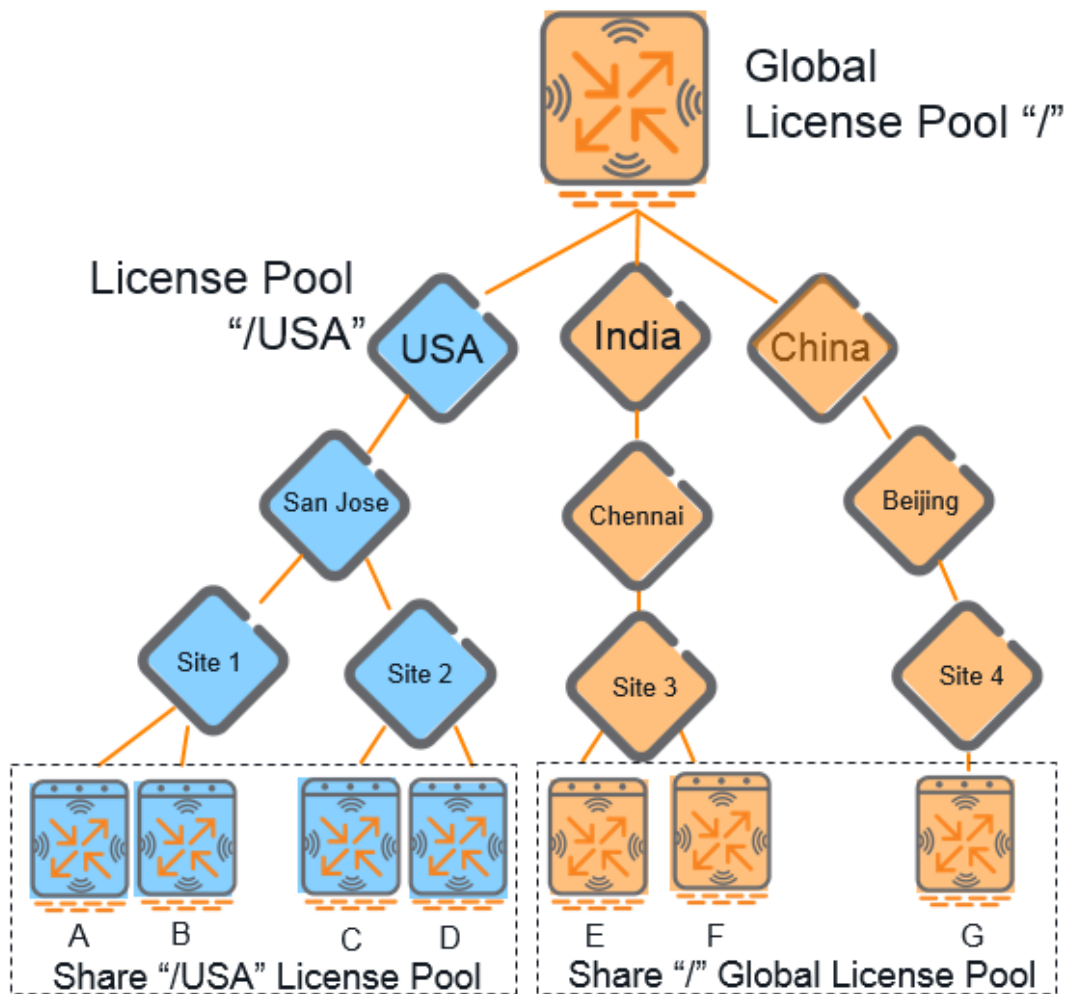
Mobility Master Redundancy

A primary and backup Mobility Master connected on the same broadcast domain using the Virtual Router Redundancy Protocol (VRRP) can share a single set of licenses. Managed devices on the network connect to Mobility Master using the VRRP virtual IP address configured for that set of redundant servers. The primary Mobility Master uses the configured virtual IP address by default. However, if the primary Mobility Master becomes unavailable, the secondary Mobility Master will take ownership of the virtual IP address, allowing managed devices to retain seamless connectivity to a Mobility Master device.

NOTE

Only one backup Mobility Master can be defined for each primary Mobility Master.

To configure the automatic database synchronization period between the primary and backup Mobility Master, access the mobility master node hierarchy via the command-line interface and issue the command **database synchronized period <time-interval>**.

For example,

```
(host) [mynode] (config) #change-config-node mm
(host) [mm] (config) #database synchronize period 25
```

The example below shows a primary and backup license server connected using VRRP. Licenses must be installed on the primary Mobility Master, but are shared between that redundant pair. If the primary Mobility Master had 32 AP licenses, 32 PEFNG licenses, and 32 xSec licenses installed, both Mobility Masters would share a combined global pool of 32 AP, 32 PEFNG, and 32 xSec licenses. By default, any managed devices connected to this pair of redundant servers use licenses from this shared license pool.

Figure 2 *Shared Licenses on a Primary and Backup Mobility Master*
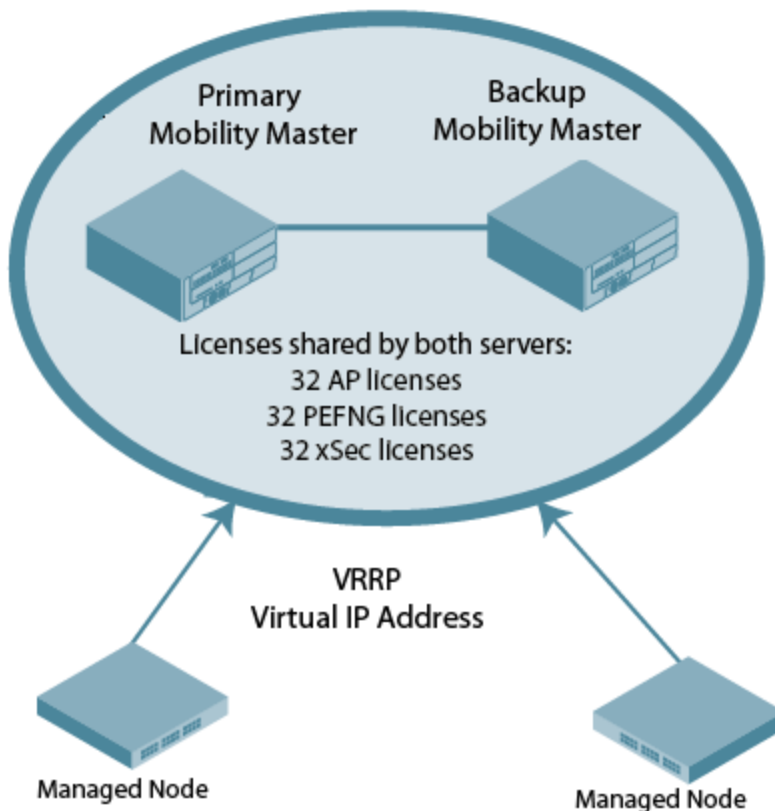
Communication between the License Server and License Clients

The sharable licenses for all managed devices associated with a Mobility Master are managed through the

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Mobility Master license table. The information in this table is then shared with all managed devices as a pool of available licenses. When a managed device uses a license in the available pool, it communicates this change to the Mobility Master, which updates the license pool information, and sends the updated information to the managed devices.

If a Switch had previously installed sharable licenses before it was added to a Mobility Master as a managed device, those licenses are no longer usable on a managed device. These license keys must be added to the Mobility Master and then Mobility Master WebUI and then assign them to the Managed node.

Those license keys must be regenerated and associated with to a managed device or licensing pool using the Mobility Master WebUI.

When a new AP associates with managed devices, the managed devices sends updated licensing information to Mobility Master. Mobility Master then recalculates the available total for that pool, and sends the revised license count back to the managed devices. If a managed device uses an AP license from the license pool, it also consumes a PEFNG and an RFProtect license from the pool, even if that AP has not enabled any features that would require that license. A managed device cannot use more licenses than what is supported by its Switch platform, regardless of how many licenses are available in the license pool.

Multi-Version Licensing

Starting from AOS-W 8.2.0.0, Mobility Master supports multi-version licensing, which allows a managed device to run a different version of AOS-W 8.x software than the primary (and backup) Mobility Master. If a license is introduced in a newer version of AOS-W, Mobility Master can still distribute licenses to licensing clients running an older version of AOS-W, even if the managed device does not recognize the newer license type.

> **NOTE**
> In Mobility Master Redundancy, the standby Mobility Master becomes the standby license server. You must enable database synchronization on both active and standby Mobility Masters for the license database to synchronize.

Failover Behaviors

Managed devices can continue to operate as usual in the event that a managed device fails to contact the Mobility Master. The following sections describe failover behaviors.

Mobility Master Fails Over to a Backup Mobility Master

If the primary Mobility Master fails, the backup Mobility Master will retain the shared license limits until the backup Mobility Master reboots. If both the primary and the backup Mobility Master fail, or if the backup Mobility Master reboots before the primary Mobility Master comes back up, managed devices will retain the license limits sent to them by Mobility Master for 30 days.

> **NOTE**
> Although a managed device retains its licensing information for 30 days after it loses contact with the Mobility Master, if the managed device reboots at any time during this 30-day window, the window will restart, and the managed device will retain its information for another 30 days.

Mobility Master Must be Replaced

If you need to replace a stand-alone Mobility Master, the keys installed on the previous Mobility Master must be regenerated and added to the new Mobility Master. You do not need to reinstall keys on Mobility Master if it is using a redundancy solution with a backup Mobility Master, as the replacement Mobility Master will synchronize its licensing database with the backup Mobility Master once the replacement Mobility Master comes back online.

Mobility Master is Unreachable

If a managed device does not receive three consecutive heartbeats from the Mobility Master, it assumes that Mobility Master is down, but continues to use the licenses it received from its Mobility Master license pool. When a managed device is unable to reach a license server for 30 consecutive days, it removes any shared

licenses pushed to it from Mobility Master. If the 30-day window has passed and the managed device does not have enough installed licenses for all of its associated APs, the managed device will nonetheless continue to support each AP. However, when an AP reboots and its managed device does not have enough licenses that AP will not come up.

NOTE: For more information on replacing a managed device, see the *AOS-W 8.5.0.0 User Guide*.

Managed Device is Unreachable

Mobility Master sends keepalive heartbeats between the license server and the licensing client Switches every 30 seconds. If Mobility Master fails to receive three consecutive heartbeats from a client, it assumes that the licensing client is down, and that any APs associated with that client are also down or have failed over to another Switch. Therefore, Mobility Master adds any licenses used by that client back into the available pool of licenses.

NOTE: The WebUI of the licensing client and Mobility Master display a warning message when a licensing client and Mobility Master are unable to communicate.

AP Fails Over to another Licensing Client

If an AP fails over from one client Switch to another, the AP will be allowed to come up even if there aren't sufficient licenses present on the backup Switch. APs continue to stay active until they reboot; however, if there are not sufficient available licenses to bring up an AP after it reboots, that AP will not become active.

License Types and Usage

Licenses are platform independent and can be installed on any Switch. Installation of the feature license unlocks that feature's functionality for the maximum capacity of the Switch. Table 3 lists the license types and describes how licenses are consumed on the Switches.

Table 3: *Usage per License Type*

License	Usage Basis	What Consumes One License
AP	AP	An AP license is required for each operational LAN-connected, mesh, or remote AP that is advertising at least one BSSID (virtual-AP).
ACR	Client Session	This license enables AOS-W Advanced Cryptography (ACR) features. A license is required for each active client termination using Suite-B algorithms or protocols.
PEF	AP	One operational AP using one or more Policy Enforcement Firewall (PEF) features, such as intelligent application identification, policy-based traffic management and controls, or stateful user firewalls. The PEF license was called PEF-NG in some previous versions of AOS-W.
PEFV	Switch	The PEFV license allows a network administrator to apply firewall policies to clients using a VPN to connect to the Switch. Starting in AOS-W 8.2.0.0, a sharable VIA license is introduced that supports Alcatel-Lucent VIA clients on a per-session basis. The legacy PEFV license is purchased as a single license that enables the functionality up to the full user capacity of the Switch.

License	Usage Basis	What Consumes One License
RFprotect	AP	An RFProtect (RFP) license is required for each operational AP using one or more RF Protect features, such as spectrum analysis and Wireless Intrusion Protection (WIP).
MM	Associated device (Switch/AP)	Starting with AOS-W 8.0.1.0, the MM license is required to support Switches or APs on Mobility Master. If the Mobility Master does not have sufficient MM licenses and an AP fails to obtain a license, that AP can get an IP address and connect to its Switch, but will not broadcast an SSID. **NOTE:** You must activate your Mobility Master (MM) license **before** you activate your MM-VA-XX licenses via the HPE My Networking Portal (MNP) website. If you activate a MC-VA-XXS license before the MM license, the Mobility Master passphrase becomes associated to the device using the MC-VA-XX license, and doesn't allow you to use the passphrase to activate the MM license for Mobility Master.
HMM	Mobility Master Hardware Appliance	Only MM-VA license is pre-installed on a Mobility Master Hardware Appliance running AOS-W 8.1.0.0 or later.
MC-VA-US MC-VA-JP MC-VA-IL MC-VA-EG MC-VA-RW	AP	The MC-VA-XX license is a sharable license required to terminate APs on a virtual Switch, and which replaces the VMC license available in previous version of AOS-W 8.x. Starting with AOS-W 8.1.0.0, different MC-VA-XX license types enable APs to support regional channels for the following countries: ■ MC-VA-US: United states ■ MC-VA-JP: Japan ■ MC-VA-IL: Israel ■ MC-VA-EG: Egypt ■ MC-VA-RW: Rest of the world (all other countries)
VIA	Client Session	Each Virtual Intranet Access (VIA) or 3rd party VPN client consumes a single VIA license. VIA licenses are not consumed for site-to-site VPNs. If a managed device or standalone Switch has a PEFV license, that device will not consume VIA licenses from a licensing pool, as a single PEFV license supports all VIA and 3rd party VPN clients, up to the full user capacity for that device. The VIA license has the following advantages over the PEFV license: ■ It is a per user license and hence users can buy the exact count based on their scale needs. ■ It supports centralized licensing and hence the licenses can be distributed to the managed devices from a centralized licensing server based on the individual device needs. ■ It is a single SKU license and is platform independent. ■ It supports both hardware Switches and Mobility Controller Virtual Appliances.
WebCC	AP	The Web Content Classification (WebCC) license is a subscription-based, per-AP license that supports Web content classification features on an AP for the duration of the subscription period (up to 10 years per license.

This section describes the following license types:

Sharable vs Switch-Specific Licenses

Many licenses are consumed on a per-AP, or per-user basis, and are not unique to any specific hardware device.

These sharable license types can be assigned to a licensing pool and used by any device within a group of managed devices. Non-sharable licenses is generated using a Switch serial number, and can only be used by the individual Switch for which it was generated. Both sharable and non-sharable licenses are installed using Mobility Master, allowing network administrators with root-level access to remotely add licenses to any licensing pool or managed devices on the network. For more information on adding a license to a remote managed device, see .

Table 4: *Sharable Licenses vs Switch-Specific Licenses*

Sharable via a Licensing Pool	Switch-Specific License
AP	**PEFV**
ACR	
PEF	
RF Protect	
MC-VA-US **MC-VA-JP** **MC-VA-IL** **MC-VA-EG** **MC-VA-RW**	
MM	
VIA	
WebCC	

Evaluation vs Permanent Licenses

Each license can be either an evaluation or permanent license. A permanent license permanently enables the desired software module on a specific Alcatel-Lucent Switch. You obtain permanent licenses through the sales order process only. Permanent software license keys are sent to you via email.

An evaluation license allows you to evaluate the unrestricted functionality of a software module on a specific Switch for 90 days (in three 30-day increments). Evaluation licenses are added to Mobility Master and made sharable within a licensing pool. An expired evaluation license will remain in the license database until the Switch is reset using the command **write erase all**, where all license keys are removed. An expired evaluation license has no impact on the normal operation of the Switch, but it is kept in the license database to prevent abuse.

To determine your remaining time on an evaluation license, select the Alert flag ( ) in the WebUI title bar. The WebUI displays information about evaluation license status. When an evaluation period expires:

- The Switch automatically backs up the startup configuration and reboots itself at midnight (according to the system clock).
- All permanent licenses are unaffected. The expired evaluation license feature is no longer available and is displayed as **Expired** in the WebUI.

Perpetual vs Subscription Licenses

A perpetual license is a purchased license that has no end date; once installed, it does not expire. Most purchased licenses are perpetual licenses. The Web Content and Classification (WebCC) license is a subscription license that enables WebCC features only for the duration of the subscription (1,3,5,7 or 10 years). The subscription time period starts from the time license key is generated from the licensing Web site. After the license expiration date is passed, the license continues to operate as an active license for an extended grace

period of 120 days. After this final grace period elapses, the license permanently expires.

Thirty days before the license period expires, an alert appears in the WebUI banner and a message appears in the **Mobility Master > Configuration > License** page of the WebUI, warning the user that the license is ready to expire. The **Mobility Master Licenses** page also indicates if the subscription license has expired but is in the expiration grace period, and displays the number of remaining days in the grace period.

> Subscription licenses cannot be renewed. Once a license subscription expires, a new license subscription key must be generated and installed on Mobility Master.

Starting with AOS-W 8.0.1.0, if one or more subscription WebCC licenses expire so that a Switch has fewer active WebCC subscription licenses than AP licenses, that Switch will no longer be able to download WebCC updates from the cloud or perform classification using cloud lookup. The APs associated to that device, can, however, continue to use the cached WebCC date currently on the Switch. For more information on the behavior of the WebCC feature due to expired licenses, see WebCC Operation modes on page 13.

WebCC Operation modes

The Web Content Classification (WebCC) license allows all web traffic to be classified and allows the managed device to apply firewall policies based on Web content category and reputation. The category and reputation data for each URL is obtained from an external WebRoot Server. The WebCC feature can operate in two distinct modes which control whether the Managed Device or Mobility Master performs the WebCC content lookup tasks.

Centralized Mode

In the default **centralized** Mode, only Mobility Master downloads the URL entry database from the WebRoot Server. If a URL for Web traffic sent through the managed device does not appear in its datapath cache, the managed device sends a query request to Mobility Master. Mobility Master queries the WebRoot Server, adds the response to its database, then sends information about the URL back to the managed device.

WebCC license usage is calculated for each license pool, and the total count in each pool is sent to each managed device within that pool. If the WebCC licenses expire, or fewer WebCC licenses are available than AP licenses, then individual managed devices within that pool will no longer be able to send query requests to Mobility Master, and WebCC classification will be blocked.

> In the event that WebCC classification is blocked due to expired or insufficient licenses, individual managed devices will continue to classify requested URLs currently available in the managed device datapath cache until the cache entries time out (usually over a period of 24 to 96 hours, depending upon the reputation level of the URL).

Distributed Mode

In **distributed** mode, each individual managed device downloads the complete URL entry database (approximately 22 MB) directly from the WebRoot Server. If a URL for Web traffic sent through the managed device does not appear in this database, the managed device sends a query to the WebRoot Server, then adds the response its datapath cache.

WebCC license usage is calculated for each license pool, and the total count in each pool is sent to each managed device within that pool. If the WebCC licenses expire, or fewer WebCC licenses are available than AP licenses, then individual managed devices within that pool will no longer be able to send new query requests to the WebRoot server. However, the WebCC feature continue to classify requested URLs that are already in the URL entry database on the managed device.

Setting and Monitoring the WebCC Operation Modes

To change a managed device from the default centralized WebCC mode to distributed mode, or to revert the

WebCC feature back to the default centralized mode, access that the configuration node for that managed device and issue the following command:

```
(host)[mynode](config) #webcc distributed|centralized
```

To see if the WebCC feature is able to send queries from Mobility Master to the WebRoot server in the cloud, issue the command **show web-cc status**.

```
(host)[mynode](config) #show web-cc status
Web Content Classification Status
--------------------------------
Service Status
------- ------
Web Content Classification enabled :    Yes
DNS/Name Server configured :            Yes
URL Cloud lookup server reachable :     Yes
Mode:                                   MM
Cloud lookup/update available :         Yes
```

A status of **Yes** in the **Cloud lookup/update field** indicates that license pool for that configuration node has a sufficient number of unexpired Web Content Classification licenses. A status of **No** indicates that licenses have expired, or that there are not enough licenses for the managed devices in that pool. The **Mode** field indicates operational mode for the WebCC feature. If the managed device is in the default centralized WebCC mode, Mobility Master contacts the WebRoot server for URL queries. If the managed device is in distributed mode, the managed device contacts the WebRoot server directly.

Using WebCC in Wired-Only Topology

The WebCC feature is most commonly used in network topologies that supports wireless clients. A wireless topology requires a WebCC license to be installed on Mobility Master, enabled via the root licensing pool, and also requires that the number of WebCC licenses on Mobility Master is equal to or greater than the number of AP licenses on Mobility Master. However, if you use WebCC in a topology with only wired clients connected to a VPN concentrator (VPNC) or a managed device, then you can use the WebCC feature without installing a WebCC license just by enabling this feature via the root licensing pool. Note, however, that the WebCC feature is *not* supported if there are any AP licenses on Mobility Master in this type of wired-only topology, as the number of WebCC licenses (in this case, 0) must still be equal to or greater than the number of AP licenses.

Best Practices and Limitations

The following best practices and limitations apply to AOS-W licenses:

- New licenses can only be associated to a managed device via the Mobility Master WebUI or command-line interfaces. Licenses cannot be added directly to a managed device.

- If a Switch had previously installed sharable licenses before it was added to Mobility Master as a managed device, those licenses are no longer usable on a managed device. Those license keys must be regenerated, added to Mobility Master, and assigned to the managed device or licensing pool using the Mobility Master WebUI.

- When allocating licenses, allow for the maximum quantity of licenses required at any given time. A common estimate when calculating user licenses is 20 users per AP. Do not forget to consider occasional large assemblies or gatherings.

- Before you upgrade or make database changes to Mobility Master, back up its configuration (**backup flash**) and its license database (**license export** *filename.db*).

- Rebooting, resetting, or issuing the **write erase** command on Mobility Master does not affect its license key management database. However, issuing the **write erase all** command resets the device to a factory

default state and deletes all databases, including the license key management database. If you reset Mobility Master to its factory default state, you must reinstall all previously-installed license keys.

- Abnormal tampering of the Mobility Master or managed device system clock can disable evaluation licenses on that device. This can disable the features supported by this license, and affect network services.
- The Advanced Cryptography (ACR) license includes the following caveats:
  - On a platform that supports 2048 IPsec tunnels, the maximum number of Suite B IPsec tunnels supported is 2048, even if a larger capacity license is installed.
  - ACR licenses are cumulative. For example, if you want to support 2048 Suite B connections, you can install two ACR licenses that support 1024 connections each.
  - If your Mobility Master or managed device uses an ACR license that allows fewer IPsec tunnels that is supported by that device platform, that device can still support IPsec tunnels using non-Suite B modes (for example, AES-CBC), up to the platform maximum.
  - The ACR license allows Mobility Master or a managed device to use both IPsec Suite B and 802.11i Suite B connections simultaneously. The combined number of these sessions may not exceed the ACR license maximum.
  - A single client using both 802.11i Suite B and IPsec Suite B connections will simultaneously consume two ACR licenses.

AOS-W provides the ability to move a license from one stand-alone Switch to another, for maximum flexibility in managing an organization's network and to minimize an RMA impact. Alcatel-Lucent monitors and detects license fraud. Abnormally high volumes of license transfers for the same license certificate to multiple devices can indicate a breach of the Alcatel-Lucent end user software license agreement and will be investigated.

By default, all managed devices associated to the same Mobility Master share a global pool of licenses that includes all the sharable licenses added to the Mobility Master. However, AOS-W also allows you to create individual licensing pools at a configuration node, allowing managed devices below that node to share licenses amongst themselves but not with other managed devices.

This section describes the following license pools:

- Licensing Pool Topologies on page 16
- Creating and Managing Licensing Pools on page 19

Licensing Pool Topologies

The following examples show how licenses can be allocated within one or more license pools. These examples use only AP licenses for simplicity, but the same methodology applies to all sharable licenses.

For more information on licensing pool configuration, see Creating and Managing Licensing Pools on page 19

Topology 1: Global Pool Only

In the topology shown in Figure 3 , all seven managed devices are part of the default "**/**" global license pool defined at the Mobility Master configuration root. The licenses installed on Mobility Master are all sharable between the managed devices using this global license pool. For example, if there are 100 AP licenses installed on the Mobility Master, all managed devices share the global pool of 100 AP licenses.

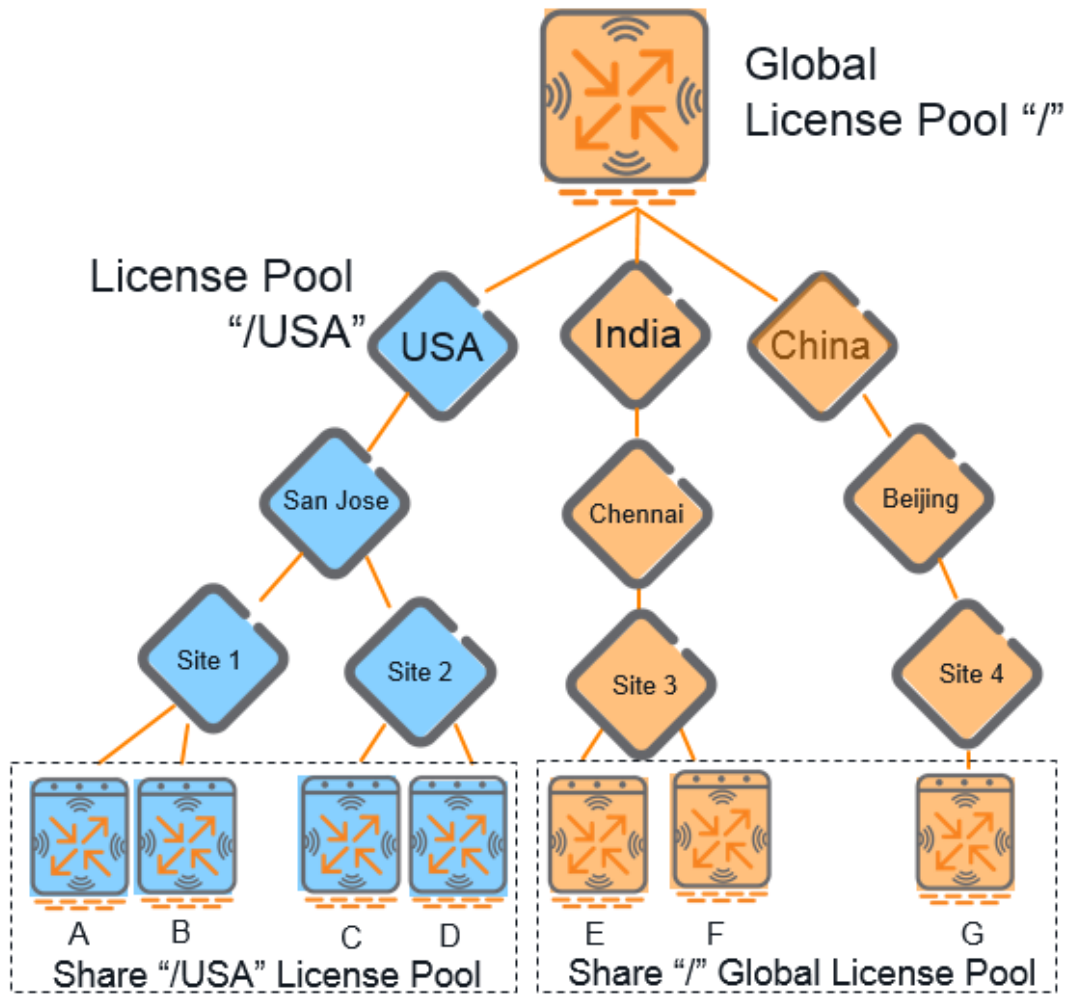**Figure 3** *All Switches Use the Global License Pool*
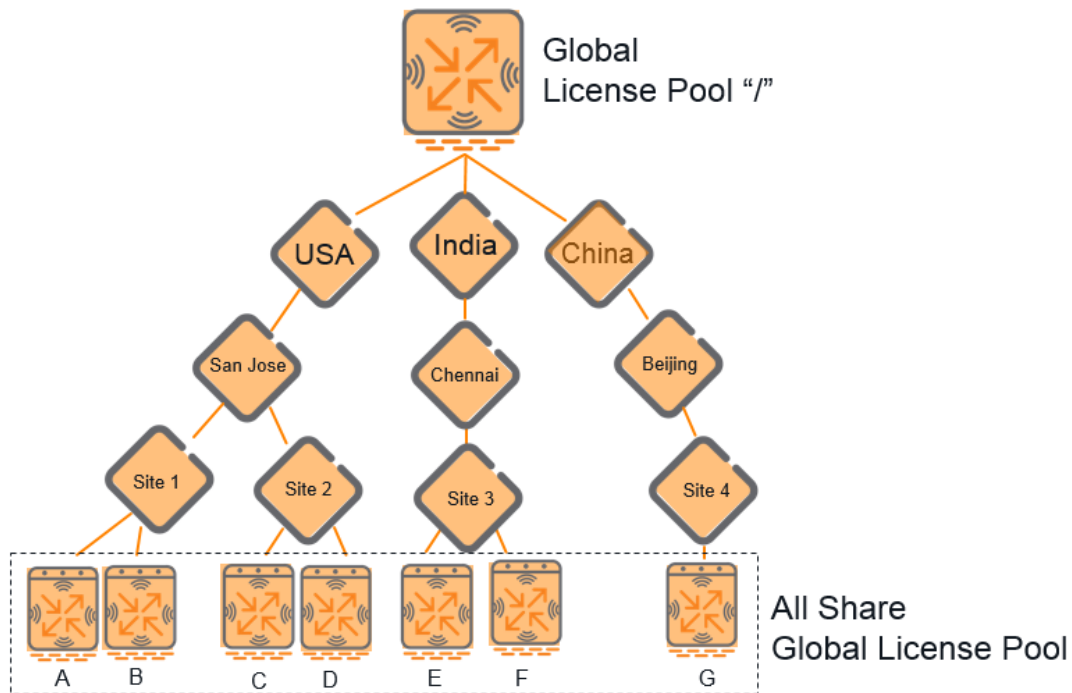
Table 5: *License Pool Allocation for Topology 1*

Pool Name	Licenses from Mobility Master
/ (Global pool)	100b

Topology 2: Global and Custom Pools

If you create a license pool for the configuration node **/USA**, as shown in Figure 4, the four managed devices below this node use licenses from the **/USA** pool, while the other managed devices continue to use the global pool. In the previous example, all managed devices shared a single pool of 100 licenses. If the **/USA** license pool is allocated 40 of the 100 AP licenses installed on Mobility Master, the four managed devices using the **/USA** pool can share 40 AP licenses from Mobility Master. The global license pool now contains only 60 of the AP licenses from the Mobility Master.

**Figure 4** *Switches Use Global or Custom License Pools*

Table 6: *License Pool Allocation for Topology 2*

Pool Name	AP Licenses from Mobility Master
/ (Global pool)	60
/USA	40

Topology 3: All Custom Pools

If you create a separate license pool for each second-level configuration node, as shown in Figure 5, none of the managed devices is associated with the global license pool. All licenses installed on Mobility Master must be allocated to one of the three pools (/USA, /India or /China), or those licenses will not be used.

Figure 5 *All Switches Use a Custom License Pool*
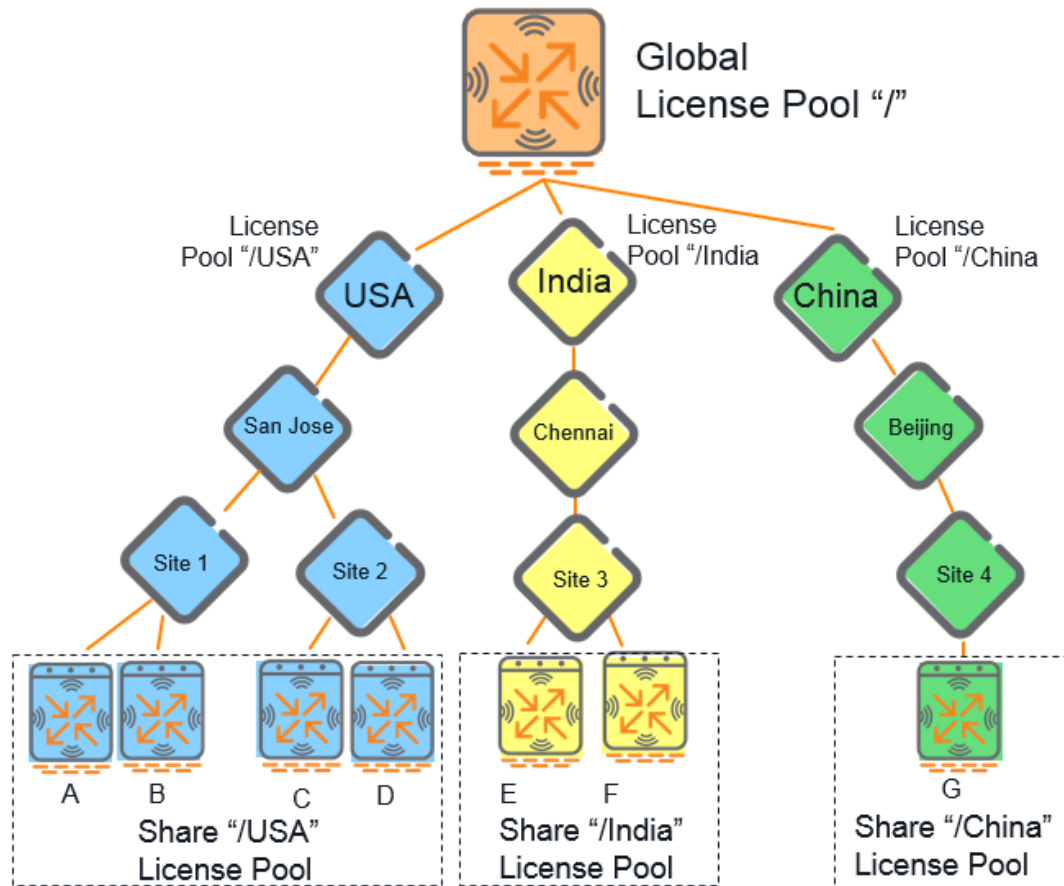
If 40 of the 100 AP licenses installed on the Mobility Master are allocated to the **/USA** pool, 35 AP licenses are allocated to the **/India** pool, and 25 AP licenses are allocated to the **/China** pool, the licenses available to the managed devices within each pool will vary, as shown in Table 7.

Table 7: *License Pool Allocation for Topology 3*

Pool Name	AP Licenses from Mobility Master
/ (Global pool)	0
/USA	40
/India	35
/China	25

Creating and Managing Licensing Pools

This section describes how to create and manage licensing pools.

Starting with AOS-W 8.0.1.0, centralized licensing is supported on standalone controllers, and is enabled by default. Standalone Switches running AOS-W 8.0.0.0 require that licenses are directly to that individual Switch using the **license add** command.

Before you Begin

If your network includes a Switch running an earlier version of AOS-W that supported the installation of licenses directly on that device, make a note of the licenses installed on that legacy device before you upgrade to AOS-W 8.0.0.0 or later. If you add that Switch as a managed device under a Mobility Master, those locally installed licenses will become inactive and you will need to regenerate those keys and reinstall them via the Mobility Master.

This section contains the following information:

- Adding Sharable License to Global License Pool on page 20
- Creating and Managing Local License pool on page 20
- Adding Non-sharable License to Managed Device on page 22

Adding Sharable License to Global License Pool

The following steps describe the procedure to add a sharable license to the global licensing pool on a Mobility Master.

> **NOTE**
>
> When adding a license, you must enable the global licensing pool in the WebUI, or issue the **licensing-pool-profile-root** command to enable licensing features using the command-line interface before that license can be used. Only AP licenses and VIA license are enabled by default when those licenses are added to Mobility Master, all other licenses must be manually enabled. For more information on the specific commands to enable individual license types, see Adding Sharable License to Global License Pool on page 20.

You can add a sharable license to the global license pool using the WebUI or CLI.

In the WebUI

To add a license via the Mobility Master WebUI:

1. In the **Mobility Master** node hierarchy, navigate to **Configuration > License > Manual**.
2. Click **+** below the **Global License Pool** table. The **Install Licenses** window appears.
3. In the **Install Licenses** window, enter the license key for one or more licenses. Each license key must be on a separate line.
4. Click **OK**.
5. Click **Apply.**
6. Click **Pending Changes**.
7. In the **Pending Changes** window, select the check box and click **Deploy changes**.

In the CLI

From any configuration node, issue the command **license add <key>**.

Example:

```
(host)[mynode](config) #license add lnZSpC2vkLMlJw8KVYdgj2
```

Creating and Managing Local License pool

When you add a local license pool to a configuration node, those licenses in that local pool are reserved for that configuration node, and usable only for managed devices at or below the level of configuration.

> **NOTE**
>
> For an overview of global and local license pool usage, see Licensing Pools on page 16.

You can create and manage local license pools using the WebU or CLI.

In the WebUI

1. In the **Mobility Master** node hierarchy, navigate to **Configuration > License**.

2. Select the **License Usage** sub-tab. The **License Usage** table appears, showing the numbers of licenses currently used for each Mobility Master configuration node.

3. Select the configuration node for which you want to create a local license pool.

4. Select the **Enable Local License Pool** option below the license usage table. Another table appears below the **License Usage** table, showing the numbers of sharable licenses currently allocated to that license pool. If this is the first time you have enabled a local license pool on this configuration node, this table shows zero allocated licenses for all license types.

5. Click the allocated licenses value for any license type to change the number of licenses in that license pool. The **Allocate Licenses** window opens, displaying the number of available licenses that are free to be allocated to a local pool.

6. Enter the number of permanent and/or evaluation licenses to be added to the selected pool, then click **Done**.

7. Repeat steps 6-7 as required to allocate licenses for other license types.

8. Click **Apply.**

9. Click **Pending Changes**.

10. In the **Pending Changes** window, select the check box and click **Deploy changes**.

Starting with AOS-W 8.1.0.0, local license pools are shown as separate pools at the same level as the global licensing pool, instead of within the global licensing hierarchy, to better indicate that those licenses are removed from the global pool.

> **NOTE**
>
> In AOS-W 8.0.1.0 and later releases, the Global License Pool table displays license usage statistics for each configuration pool, as well as the license usage for the devices associated to those license pools. In AOS-W 8.0.0.0, the Global license pool table does not display license usage data at the device level.

In the CLI

From the **/mm** node, you can add a local configuration pool for the specified configuration node using the following command:

```
(host)[mm] (config) #license-pool-profile <profile>
  (host)[mm] (License pool profile "<profile>")# acr-licenses {eval key <key> <num>}|<num>
  (host)[mm] (License pool profile "<profile>")# ap-licenses {eval key <key> <num>}|<num>
  (host)[mm] (License pool profile "<profile>")# license-pool-path <license-pool-path>
  (host)[mm] (License pool profile "<profile>")# mc-va-licenses-eg {eval key <key> <num>}
  |<num>}
  (host)[mm] (License pool profile "<profile>")# mc-va-licenses-il {eval key <key> <num>}
  |<num>}
  (host)[mm] (License pool profile "<profile>")# mc-va-licenses-jp {eval key <key> <num>}
  |<num>}
  (host)[mm] (License pool profile "<profile>")# mc-va-licenses-rw {eval key <key> <num>}
  |<num>}
  (host)[mm] (License pool profile "<profile>")# mc-va-licenses-us {eval key <key> <num>}
  |<num>}
  (host)[mm] (License pool profile "<profile>")# mm-license {eval key <key> <num>}|<num}
  (host)[mm] (License pool profile "<profile>")# pefng-licenses {eval key <key> <num>}|<num>
  (host)[mm] (License pool profile "<profile>")# rfp-licenses {eval key <key> <num>}|<num>
  (host)[mm] (License pool profile "<profile>")# via-licenses {eval key <key> <num>}|<num>
  (host)[mm] (License pool profile "<profile>")# webcc-licenses {eval key <key> <num>}|
  {subscript key <key> <num>}
```

Example:

```
(host)[mm] (config) #license-pool-profile Southwest
(host)[mm] (License pool profile "Southwest") #license-pool-path /USA/southwest
(host)[mm] (License pool profile "Southwest") #ap-licenses 64
(host)[mm] (License pool profile "Southwest") #pefng-licenses 64
```

```
(host)[mm] (License pool profile "Southwest") #rfp-licenses 64
```

After you create the license pool, you must issue the license-pool-profile-root command to enable shared license features within the global licensing pool.

```
(host) [mm](config) #license-pool-profile-root
(host) [mm](License root(/) pool profile) #acr-license-enable
```

The AP, Mobility Master, and virtual mobility controller (mc-va-xx) licenses are automatically enabled for their specific device type. VIA licenses are also enabled by default and do not need to be manually enabled within the global licensing pool.

Adding Non-sharable License to Managed Device

Non-sharable licenses are generated using the serial number of a specific device, and can only be assigned to the device for which they were created. A non-sharable license is associated to an individual managed device using the Mobility Master WebUI or command-line interfaces. You can add non-sharable license to managed device using the WebUI or CLI.

In the WebUI

To add a license via the Mobility Master WebUI:

1. In the **Mobility Master** node hierarchy, navigate to **Configuration > License**.
2. Select the **Manual**.
3. Select the managed device to which you want to add a license.
4. The **Licenses** table appears, showing the licenses currently associated to that device.
5. Click **+** below the **Licenses** table.
6. Enter the serial number for one or more licenses. Each license key must be on a separate line.
7. Click **OK**.
8. Click **Apply.**
9. Click **Pending Changes**.
10. In the **Pending Changes** window, select the check box and click **Deploy changes**.

In the CLI

Navigate to the configuration for the managed device for which you want to add a license, then issue the command **license add <key>**.

Example:

```
(host) [group/node/managed-node-14]# license add lnZSpC2vkLMlJw8KVYdgj2
```

This chapter describes how to add a license in a Mobility Master deployment and stand-alone Switch. It also describes how to associate a Mobility Master or a stand-alone Switch to an external license server and how to remove a license.

Adding License in Mobility Master Deployment

Starting in AOS-W 8.0.0.0, the only way to install a license in a Mobility Master deployment is to install that device on Mobility Master, and then associate that license to either a specific managed device, or a shared pool of licenses. Licenses cannot be added directly to a managed device via the managed device's UI.

Before you can use the Alcatel-Lucent Software License Management Web site to generate licenses for Mobility Master and your managed devices , you must obtain the following:

- A License Certificate ID, which you can request from your sales account manager or authorized reseller. The different MC-VA-XX license types are each region-specific, so ensure that your license order specifies the country where the virtual Switch will be deployed. (For details, see License Types and Usage)
- The auto-generated AOS-W passphrase for Mobility Master
- The auto-generated AOS-W passphrase for any managed device installed on a server VM (virtual Switch)
- The serial numbers of your physical Switches
- Access to the Alcatel-Lucent licensing Web site at https://licensing.alcateloaw.com/

You must activate your Mobility Master license **before** you activate your MM-VA-XX licenses via the HPE My Networking Portal (MNP) website. If you activate a MC-VA-XX license before the MM license, the Mobility Master passphrase becomes associated to the device using the MC-VA-XX license, and doesn't allow you to use the passphrase to activate the MM license for Mobility Master.

This section describes the following procedures:

- Identifying Passphrase of Mobility Master on page 23
- Identifying Serial Number and Passphrase of Managed Devices on page 23
- Enabling Sharable Licensing Features on Mobility Master on page 24
- Creating License Key on page 24
- Adding License in Mobility Master Deployment on page 23
- Installing Licenses on page 25

Identifying Passphrase of Mobility Master

Use the Mobility Master passphrase in the licensing website to generate a Mobility Master (MM) license, or to generate a sharable license that can be added to Mobility Master license pools.

- To identify the Mobility Master passphrase, access Mobility Master via the command-line interface and issue the command **show license passphrase**.
- *(For Mobility Master devices running AOS-W 8.0.0.0 only)*: To identify the Mobility Master serial number, access Mobility Master via the command-line interface and issue the command **show inventory**.

Identifying Serial Number and Passphrase of Managed Devices

Each managed device has a unique identifier that you can use to create a non-sharable, device-specific license for that managed device. A physical Switch uses a serial number, and a virtual Switch installed on a VM uses an

auto-generated VM passphrase.

- To identify the serial number of a physical Switch or a virtual Switch, access that managed device via the command-line interface and issue the command **show inventory**.
- To identify the VM passphrase for a virtual Switch installed on a server VM, access that managed device via the command-line interface and issue the command **show license passphrase.**

Enabling Sharable Licensing Features on Mobility Master

You must enable Mobility Master to support sharable AOS-W licenses by enabling each licensing feature type via the Mobility Master WebUI or command-line interfaces. Enabling a licensing feature in Mobility Master activates all licenses of that type in all licensing pools, allowing managed devices to use that licensing feature.

Best practices is to perform this step before you install your sharable licenses. Installed sharable licenses will not become active until these license features are enabled.

You can enable sharable licensing features on Mobility Master using the WebUI or CLI.

In the WebUI

To enable a sharable license via the Mobility Master WebUI:

1. In the **Mobility Master** node hierarchy, navigate to **Configuration > License > Manual**.

2. Select the **License Usage** tab. The **Global License Pool** and **Usage for Global License Pool** tables appear.

3. In the **Usage for Global License Pool** table, click the check box by each license type to enable features supported by those licenses.

The AP, Mobility Master, virtual mobility controller licenses are automatically for their specific device type. These licenses do not need to be enabled within the global licensing pool.

In the CLI

Access the Mobility Master command-line interface in config mode and execute the following command:

```
(host)[mm] (config) # license-pool-profile-root acr-feature-enable|pefng-feature-enable|rfp-
feature-enable|webcc-feature-enable
```

Creating License Key

The procedures to create a license key vary, depending upon the license type. Sharable licenses and, the license required to install Mobility Master on a server VM must be generated using the Mobility Master passphrase. Device-specific licenses for physical Alcatel-LucentSwitches are generated using the serial number for that Switch. Device-specific licenses for virtual Switches installed on a server VM are generated using the passphrase for that virtual managed device.

Use the following procedure to create a license key via the HPE Alcatel-Lucent License Management Website.

1. From the HPE Alcatel-Lucent License Management website, select **Register License** from the navigation menu.

2. In the **Order number or Registration ID/Certificate ID** field, enter the certificate ID(s) you received from your Alcatel-Lucent sales representative or reseller, then click **Next**.

3. Enter the required information to identify the device that will use the license. This can be the device MAC address, country where the VM is installed, serial number or IP address, depending upon the device or license type.

(For AOS-W 8.1.0.0 and later only) If you are creating a sharable or MM license key for an AOS-W 8.0.0.0 Mobility Master, you must also enter the Mobility Master serial number

NOTE *(For AOS-W 8.0.0.0 only)* If you are creating a sharable or MM license key for an AOS-W 8.0.0.0 Mobility Master, you must also enter the Mobility Master serial number

4. Click **Next** to display the licensing agreement.

5. Select **I accept all of the above terms** to accept the license agreement, then click **Finish** to display a table of license products for that order.

6. In the product order table, select the product name for the license you want to activate.

7. In the **Redeem** field, enter the number of available licenses you would like to redeem for that product, from one license to the maximum quantity available.

8. Click **Next** to display the confirmation page. This page displays transaction details and includes options to download the license key or have the key sent to a specified email address.

9. *(Optional)* Click **Register More** to return to the **Register License** navigation menu, or select **Register More for this order** to return to the product order table for the previous order and activate additional licenses for that order.

Installing Licenses

Use the Mobility Master WebUI and command-line interfaces to add sharable license keys to the global licensing pool, or to assign a non-sharable license to a specific managed device.

After you receive the email with your license key, add a sharable license key to the global licensing pool or install a device-specific license.

Adding Sharable License Key to Global License Pool

You can add a sharable license key to the global license pool using the WebUI or CLI.

In the WebUI

To add a sharable license via the Mobility Master WebUI:

1. In the **Mobility Master** node hierarchy, navigate to **Configuration > License > Manual**.

2. Select the **License Inventory** tab. Select the license type of MM.

3. Click + below the **Key** table. The **Install Licenses** window appears.

4. In the **Install Licenses** window, enter the serial number for one or more licenses. Each license key must be on a separate line.

5. Click **OK**.

6. Click **Apply**.

7. Click **Pending Changes**.

8. In the **Pending Changes** window, select the check box and click **Deploy changes**.

The **Key** table displays detailed information about the licenses added to Mobility Master, including the license type and count, expiration date (if applicable) and current status (active or expired).

In the CLI

From any configuration node, execute the command **license add <key>**.

Example:

```
(host) [mynode] #license add lnZSpC2vkLMlJw8KVYdgj2
```

Adding Device-Specific License

You can add a device-specific license by using the WebUI of CLI.

In the WebUI

1. In the **Mobility Master** node hierarchy, navigate to **Configuration > License > Manual**.

2. Select the **License Inventory** tab.

3. Select the **Controller Licenses** table appears.

4. Expand the **Root** menu in the **Controller Licenses** table to select the device or Mobility Master server on which you want to install the device-specific license. The license table for the selected device appears below the **Controller Licenses** table.

5. Click **+** below the device licenses table. The **Install Licenses** window appears.

6. In the **Install Licenses** window, enter the serial number for one or more licenses. Each license key must be on a separate line.

7. Click **OK**.

8. Click **Pending Changes**.

9. In the **Pending Changes** window, select the check box and click **Deploy changes**.

In the CLI

To add a device-specific license (such as a PEF-V license) in AOS-W 8.0.1.0 and later, navigate to the Mobility Master (mm) configuration node and issue the command **license remote remote-ip-addr <addr> add <key>**, where <remote-ip-addr> is the address of the managed device to which you are adding the license.

For example:

```
(host)[mm] #license remote remote-ip-addr 192.0.2.14 add lnZSpC2vkLMlJw8KVYdgj2
```

In AOS-W 8.0.0.0, the command to add a license is **license remote ip-addr <ip-addr> add <key>**. The **remote-ip-addr** parameter was introduced to this command in AOS-W 8.0.1.0.

Adding License to Stand-alone Switch

You can use the Alcatel-Lucent Software License Management website to generate all the licenses for a stand-alone master Switch, or associate a stand-alone controller to an external licensing server.

Before you can use the Alcatel-Lucent Software License Management website to generate a license for a stand-alone master Switch, you must obtain the following:

- A License Certificate ID, which you can request from your sales account manager or authorized reseller.
- The serial number of the Alcatel-Lucent Switch.
- Access to the Alcatel-Lucent licensing Web site https://licensing.alcateloaw.com/

This section describes the following procedures:

Enable Licensing Features on Stand-Alone Switch

Enable support for sharable AOS-W licenses on a stand-alone Switch by enabling each licensing feature type via the Switch command-line interface. You can skip this step if you are generating a non-sharable license for a specific managed device, as the licensing features for a multi-Switch topology must be enabled via Mobility Master.

Best practices is to perform this step before you install licenses on the Switch. Installed licenses will not become active until the license feature is enabled.

Access the command-line interface of the stand-alone Switch and execute the following command:

```
(host)[node](config) # license-pool-profile-root acr-feature-enable|pefng-feature-enable|rfp-
feature-enable|webcc-feature-enable.
```

Generate License Key

Use the following procedure to create a license key for a specific Switch using the certificate ID, and device serial number.

1. From the HPE Alcatel-Lucent License Management website, select **Register License** from the navigation menu.

2. In the **Order number or Registration ID/Certificate ID** field, enter the certificate ID(s) you received from your Alcatel-Lucent sales representative or reseller, then click **Next**.

3. Enter the required information to identify the device that will use the license. Depending upon the device or license type, this can be the device MAC address, serial number or IP address,

NOTE

(For AOS-W 8.0.0.0 only) If you are creating a sharable or MM license key for an AOS-W 8.0.0.0 Mobility Master, you must also enter the Mobility Master serial number

4. Click **Next** to display the licensing agreement.

5. Select **I accept all of the above terms** to accept the license agreement, then click **Finish** to display a table of license products for that order.

6. In the product order table, select the product name for the license you want to activate.

7. In the **Redeem** field, enter the number of available licenses you would like to redeem for that product, from one license to the maximum quantity available.

8. Click **Next** to display the confirmation page. This page displays transaction details and includes options to download the license key or have the key sent to a specified email address.

9. *(Optional)* Click **Register More** to return to the **Register License** navigation menu, or select **Register More for this order** to return to the previous product order table and activate additional licenses for that order.

Install Licenses

After you receive the email with your license key, use the following procedure to add a license key to the stand-alone Switch. Licenses for managed devices, even non-sharable, device-specific licenses, must be associated to the managed device via Mobility Master. You can install licenses using the WebUI or CLI.

In the WebUI

To add a license via the WebUI of a stand-alone Switch:

1. Access the Switch WebUI.

2. From the Mobility Controller configuration node, navigate to **Configuration > License**.

3. Select the **License Inventory** menu.

4. Select the License type and expand the licenses accordion.

5. Click **+** below the **Key** table. The **Install Licenses** window appears.

6. In the **Install Licenses** window, enter the serial number for one or more licenses. Each license key must be on a separate line.

7. Click **OK**.

In the CLI

From the command-line interface of a stand-alone Switch, execute the command **license add <key>**.

Example:

```
(host)[mm](config) #license add lnZSpC2vkLMlJw8KVYdgj2
```

Associating Mobility Master or Stand-alone Switch to External License Server

You can associate one or more stand-alone controllers or Mobility Masters to an external license server, allowing the Switch or Mobility Master can obtain licenses from a license pool on that external server. If Mobility Master connects to a license server, that Mobility Master then acts a proxy license server, distributing licenses to the managed devices that are part of the root licensing pool on the Mobility Master server.

If you use an external license server, all primary and backup Mobility Master servers, and standalone Switches must be able to communicate with the external license server. Managed devices associated to Mobility Master do not need connectivity with the license server. You can associate Mobility Master or stand-alone Switch to an external license server by using the WebUI or CLI.

In the WebUI

1. Before you begin, access the command-line interface Mobility Master and remove any unnecessary license pool profiles. For details, see .

2. From the Mobility Controller configuration node on a standalone Switch, or from the Mobility Master configuration node for a Mobility Master, navigate to **Configuration > License > External license server**.

3. Enter the IP address of the external license server.

4. Click **Submit** to save your changes.

In the CLI

To associate a standalone Switch to an external license server, issue the command **license server-ip<ip-addr>** to define the external server.

For example:

```
(host)[mm] (config) #license server-ip  10.1.1.91
```

To associate Mobility Master with an external license server, issue the command **no license-pool-profile <profile>** from the Mobility Master (mm) configuration node to remove any local license pools, then issue the command **license server-ip<ip-addr>** to define the external server.

For example:

```
(host)[mm] (config) #no license-pool-profile /USA/southwest
(host)[mm] (config) #no license-pool-profile /USA/northeast
(host)[mm] (config) #no license-pool-profile /APAC/India
(host)[mm] (config) #no license-pool-profile /USA/Beijing
(host)[mm] (config) #license server-ip  10.1.1.91
```

To view license usage details for standalone Switches or Mobility Master servers connected to an external licensing pool, issue the command **show license-usage client**.

Removing License

You can use the WebUI or command-line interfaces to remove a license key from a stand-alone Switch or Mobility Master. You can remove a license by using the WebUI or CLI.

In the WebUI

To remove a sharable license from Mobility Master:

1. In the **Mobility Master** node hierarchy, navigate to **Configuration > License > Manual**.

2. Click the **license Inventory** tab.

3. Click on the license you want to remove. The **licenses** table opens.

4. Select the license key you want to delete, then click the delete icon to the right of the highlighted key.

To remove a device-specific license from a managed device:

1. Navigate to the **Configuration > License** page .
2. Click the **License Inventory** tab.
3. Expand the root configuration group to display the Mobility Master configuration tree, then select the device with the license you want to delete. A list of non-sharable licenses used by that device appears below the Managed device Licenses table.
4. Select a license key from the list, and then click the delete icon to remove that license key.
5. Click **Apply**.
6. Click **Pending Changes**.
7. In the **Pending Changes** window, select the check box and click **Deploy changes**.

In the CLI

To delete any license (sharable or non-sharable) via the command-line interface, access the Mobility Master (mm) configuration in enable mode, and then issue the command **license delete <key>**:

```
(host)[mm] #license delete lnZSpC2vkLMlJw8KVYdgj2
```