Performing Administrative Tasks

This chapter describes how to perform administrative tasks using Cisco CMX. Users who are assigned administration privileges can perform administrative tasks.

Cisco CMX User Accounts

Prior to Cisco CMX 10.2 all Cisco CMX processes ran under the Linux root user account. Cisco CMX 10.2 introduces two new user accounts (cmx and cmxadmin) to prevent any potential risks and secure the system.

- root—Root user account. Users should not use this account.

Note The password of the root account is now being set and maintained by the system owners, and no longer has a default password configured. This way, the account is still available for special-case installation and tackling debugging issues, and the root user will be owned by the end-user. Password recovery is accomplished through the use of the single user login process. For more information see Recovering Password, on page 3.

- cmx—A no login account that now owns all the CMX processes with the exception of postgress.
- cmxadmin—Primary account used for the performance of all administrative tasks using CLI. User will *sudo* from this account to perform tasks requiring root-level access. This account is used to upgrade Cisco CMX 10.2 to a future release using GUI.

- admin—Admin user account for configuring maps, and Cisco WLCs, and restart services using Cisco CMX Web UI.
- normal user accounts—User-defined accounts.

Unlocking Users

You can unlock CMX access for a command line interface (CLI) or graphical user interface (GUI) user after they have been locked out, using the **cmxctl users unlock** command. For caveats and full details, refer to see the *Release Notes for Cisco CMX* at:

https://www.cisco.com/c/en/us/support/wireless/connected-mobile-experiences/products-release-notes-list.html

Before you begin

You must have root access credentials to modify these settings.

Procedure

Step 1 Connect to CMX via SSH.

Step 2

Step 3 Enter one of the following commands to unlock a CMX user:

- **cmxctl users unlock cli** *username* to unlock a CLI user.
- **cmxctl users unlock gui** *username* to unlock a GUI user.

The user can log in again from the user interface you unlocked.

Setting Strong Password Authentication

You can enable strong password authentication with or without enabling FIPS or UCAPL mode. If you do plan to enable FIPS or UCAPL, set the correct minimums for that mode.

Before you begin

You must have CMX admin user credentials to modify these settings.

If FIPS or UCAPL is enabled, you must connect directly from the console, or access the console through VMware VSphere client.

Procedure

Step 1 Connect to CMX via SSH.

Step 2 Enter the **cmxctl config auth settings** command to set password authentication settings.

Step 3 Respond to the following prompts:

Prompt	Action
Enable strong password [yes / no] [yes]:	Enable strong password authentication. Default is yes. UCAPL: Yes.
Minimum password length [8-20] [8]:	Set minimum password length. Range is 8-20 characters. Default is 8 characters. CMX default: 8 characters.
Unsuccessful login attempts before account lock [3-5] [3]:	Set the number of times a user can attempt to login before they are locked out for 30 minutes. Range is 3-5. Default is 3. CMX default: Not required.
Set session timeout in minutes:	Set the number of minutes a user can be inactive on the system before CMX times out. Range is 10-120 minutes. There is no default session timeout. CMX default: Not required.

CMX then restarts its authorization services.

Recovering Password

Cisco CMX Release 10.2 uses a single user mode to reset the root and cmxadmin user passwords.

To enter into the single user mode you require:

- A (non-SSH) console connection to the Cisco Mobility Services Engine (Cisco MSE).
- A power-cycle of the Cisco MSE appliance

The GUI admin user password can be reset to the default of admin from the Cisco MSE CLI using the following command:

cmxctl users passwd username

You should know the cmxadmin user password for CLI access.

To reset the root or cmxadmin password, perform the following tasks:

Procedure

Step 1 Establish console access.

Step 2 Power on the Cisco MSE.

Step 3 Press the Up arrow key within 6 seconds of the first text appearing on screen.

Step 4 When the GRUB menu is displayed:

a) Verify if the first entry is highlighted.

b) Press the **e** key to edit.

Step 5 Use the Down arrow key to highlight the entry that begins with the word *kernel*.

a) Press the **e** key to edit the entry.
b) Press the space bar, type the word **single**, and then press Enter.
c) Press the **b** key to boot the selected entry.

Step 6 After the system boots and you are at the # prompt:

a) Enter **passwd** <*username*> and press Enter.
b) When prompted, enter the new password for the user (root/cmxadmin) and press Enter.
c) Re-enter the password to verify.

Step 7 Type **reload** and press Enter to reboot the system and load the Cisco CMX services.

Setting Up Audit Logging

You can enable remote logging of system events, and specify which syslog events you want to log and view.

Before you begin

You must have CMX admin user credentials to modify these settings.

Procedure

Step 1 Connect to CMX via SSH.

Step 2 Enter the **cmxctl config audit settings** command.

Step 3 Respond to the following prompts. **`Enter`** selects the prompt default, shown in [brackets].

Prompt	Action
Enable or Disable Remote Syslogging [Enable / Disable] [Enable]:	Choose whether CMX should log system events. Options are Enable or Disable, and defaults to enable.
If logs size goes beyond l gb, drop or overwrite messages? [drop / overwrite] [overwrite]	Select CMX behavior when log size exceeds 1 gigabyte. Options are drop and overwrite, and defaults to overwrite.
Please enter rsyslog port [514]:	Optional. Enter the port number of a remote syslog server if you want to enable remote audit logging. The default is port number 514.
Please enter rsyslog DNS:	Optional. If your system uses a domain name server (DNS) for authentication, enter the DNS address here. There is no default. For example, *yoursyslogserver.yourco.com*

A confirmation message displays.

```
Remote Audit Logging = Enabled
```

Step 4 Select the events you want CMX to log. Yes logs all events. No prompts you to select the event types you want to log, and confirms the update.

```
Show all logs [yes/no] [yes]: no
Enter day [today(1)/yesterday(2)/last week(3)/last month(4)/all(5)] [5]:
Enter event type [MGMT_EVENT(1)/CONN_EVENT(2)/AUTH_EVENT(3)/CONF_EVENT(4)/ALL(5) [5]:
Enter identity [root(1)/admin(2)/all(3)] [3]:
Enter status [success(1)/failure(2)/all(3) [3]:

Settings saved.
```

CMX then restarts the affected loggers.

Example

This example shows how to log everything except Connection, Management, and Misc events.

```
[root@server]# cmxctl config audit settings enable

Enable or Disable Audit Logging [Enable / Disable] [Enable]:enable
If logs size goes beyond lgb, drop or overwrite messages? [drop / overwrite]
[overwrite]:overwrite
Please enter rsyslog IP: 168.172.1.20
Please enter rsyslog port [514]: 514
Please enter rsyslog DNS: sls1296@wowco.com

Remote Audit Logging = Enabled

Please select the events to be logged
All Events [yes/no] [yes]: no
Connection Events [yes/no] [yes]:no
Management Events [yes/no] [yes]:no
Auth Events [yes/no] [yes]:
Configuration Events [yes/no] [yes]:
Security Configuration Events [yes/no] [yes]:
Security Events [yes/no] [yes]:
Misc Events [yes/no] [yes]:no
Settings saved.
```

Using FTP Commands for Cisco CMX

You can use File Transfer Protocol (FTP) commands for backing up and restoring data on Cisco CMX 10.x. We recommend you to follow the below best practice for data backup automation:

Procedure

Step 1 Setup a NAS Storage and mount it to your Cisco CMX box, for example, mount the storage to a local directory such as */mnt/nas*.

Step 2 Write a script to execute the CMX backup program.

A sample backup script is as mentioned below:

```
#!/bin/sh
cd /mnt/nas/backups
```

```
ls -1tr cmx_backup* | head -n -3 | xargs -d '\n' rm -f --
cmxos backup --all --path /mnt/nas/backups --online
```

Step 3 Place the script at */home/cmxadmin/backup-cmx.sh*.

Note We recommend you to remove previous backups to prevent running out of disk space on the NAS storage.

Step 4 Run the **cmxos backup --all --path** */mnt/nas/backups* **--online** command.

Step 5 Add a cron entry to the cmxadmin user to execute the backup script, for example, *run everyday at 1:05am*, *5 1 * * * * /home/cmxadmin/backup-cmx.sh*.

Backing Up Data

After you install and run Cisco CMX successfully, you can take a backup to avoid losing any data.

You may lose data on your CMX server, if:

- The hard disk in your CMX server fails
- The data on your CMX server is corrupted while upgrading

Therefore, backing up your data enables you to restore it to the original state. You can back up data on either /tmp or /opt partition. The /tmp folder is allocated 25 GB storage.

If Cisco CMX contains huge amount of saved data, the backup operation will take up extra disk space. In that case, you can consider the following:

- Back up to an external drive if there is not enough space on the Cisco CMX server. You can perform this operation by plugging in a removable hard disk or a mounted hard disk.
- After the backup operation, move the backup file (using scp) to a different server and remove it from the Cisco CMX server.

You can backup data such as location history, current client location, floor maps, and licenses.

Note We recommend that you backup database, floormaps, license and setup components to be compliant with General Data Protection Regulation (GDPR).

The following components are included in the backup:

- Database—Stores configuration data, such as, maps, controllers, location, and aggregated analytics data.
- Cache—Stores analytics repeat visits.
- Cassandra—Stores location history data and analytics raw visits.
- Influxdb—Stores metrics data for systems.
- Consul—Stores Consul configurations.
- Floormaps—Stores floor images for UI display.

- Licenses—Stores Cisco CMX license information.
- Setup—Stores CMX setup data.
- Conf—Stores node configurations.

Procedure

To perform a backup operation, run the **cmxos backup** command using the cmxadmin (non-root user) account.

You can include the -i (for example, cmxos backup -i database) parameter with the backup so that you can choose the components that you want to include in the backup.

The other backup options available are:

- **--all**—Include influxdb in the backup. The default is without influxdb and only includes postgres and Cassandra data.
- **--path**—Specify a location for the backup file. The default location is /tmp.
- **--online**—Perform the backup without stopping cmx services.
- **--offline**—Stop cmx services first and then perform the backup.

Note
- The destination directory for backup file requires rwx permission. When you specify a backup directory other than /tmp, ensure that the directory has "r/w/x" permission by user:cmx.
- If High Availability is enabled on Cisco CMX, online backup is supported only on primary and not secondary. If High Availability is disabled, online and offline backups are supported on both primary and secondary.

The following is a sample output from the **cmxos backup** command:

```
[cmxadmin@test ~]$ cmxos backup
Please enter the path for backup file [/tmp]: /tmp
[17:01:30] Preparing for backup...
Data size 287388806
Available disk space 139165282304
Pre-backup took: 0.0118758678436 seconds
['database', 'cache', 'cassandra', 'influxdb', 'consul', 'floormaps', 'licenses' , 'setup',
 'conf']
[17:01:30] Backup Database...
Backup database took: 1.15777993202 seconds
[17:01:32] Backup Cache...
Backup cache took: 0.383176088333 seconds
[17:01:32] Backup Cassandra...
Backup Cassandra DB took: 2.99715185165 seconds
[17:01:35] Backup InfluxDb...
Backup Influx DB took: 0.0846002101898 seconds
[17:01:35] Backup Consul...
Backup Consul took: 0.0185141563416 seconds
[17:01:35] Backup Floormaps...
Backup floor maps took: 0.000938892364502 seconds
[17:01:35] Backup licenses...
Backup licenses took: 0.000122785568237 seconds
[17:01:35] Backup setup...
Backup setup took: 0.000464200973511 seconds
[17:01:35] Backup node configuration...
```

```
Backup configuration took: 0.476609945297 seconds
[17:01:35] Creating tar file..
Post backup took: 16.3115179539 seconds
[17:01:52] Done Backup. Created backup file
/tmp/cmx_backup_test.cisco.com_2015_07_28_17_01.tar.gz
[cmxadmin@test ~]$
```

What to do next

You can automate the backing up process. For more information, see Using FTP Commands for Cisco CMX, on page 5.

Increasing the Hard Disk Space

You can increase the hard disk space if your Virtual Machine that runs Cisco CMX is run out of disk space for backup.

Procedure

Step 1 Stop all the Cisco CMX services by entering the following commands:

cmxctl stop

cmxctl stop -a

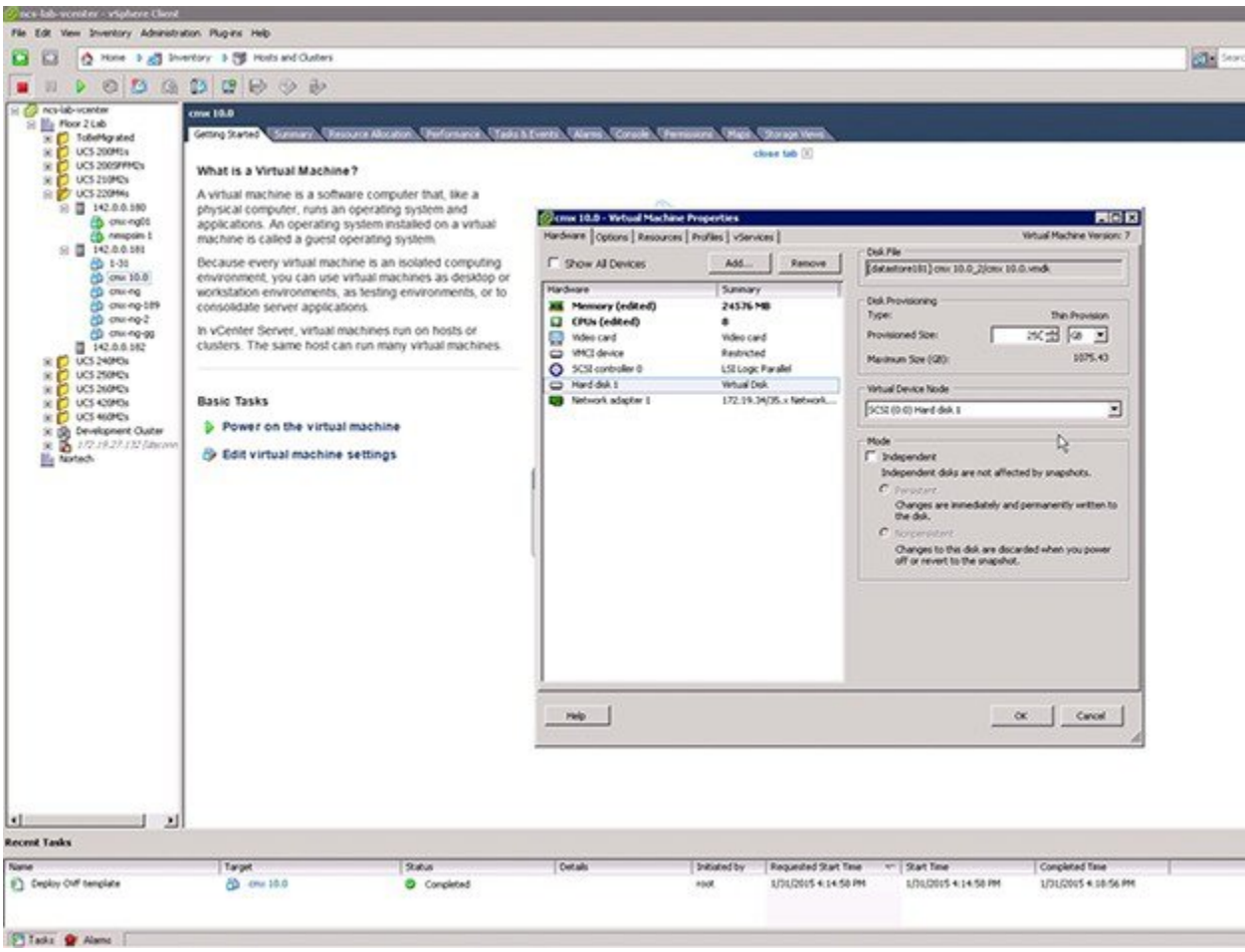
Step 2 Shutdown the virtual machine by entering the following command:

Shutdown –h now

Step 3 Edit the virtual machine settings and increase the hard disk space.

Note You cannot increase the hard disk space if the virtual machine was ever restored from snapshot.

Figure 1: Virtual Machine Settings



Step 4 Reboot the virtual machine.

After performing these steps, you can back up Cisco CMX.

You can enter the **cmxctl status** command to verify the status of CMX services. If any of the services is not running, you may need to restart it by entering the **cmxctl restart** <*service name*> command.

Restoring Data

After the backup, you can save the backup file in a safe location. If required, you can restore from this location.

To restore data, the Cisco CMX server must have free disk space which is 4 times the size of the backup file. If there is not enough disk space in the Cisco CMX server, you must increase the disk space. For more information, see Increasing the Hard Disk Space.

Note When you restore data, if there is not enough disk space in the Cisco CMX server, try to untar the file from an external drive. The untarred files will be in binary format, which can be read by database servers. Restoring Cisco CMX data must be done on a device that has the same local time as the device from which the data is collected. Otherwise, you will not be able to correctly access the analytics data. In addition, the data will result in errors or zero values on reports.

Procedure

To restore the data, enter the **cmxos restore** command using the cmxadmin (non-root user) account.

You can include the -i (for example, cmxos restore -i database) parameter with the **restore** command so that you can choose the components that you want to restore.

The following is a sample output from the **cmxos restore** command:

```
[cmxadmin@test~]$ cmxos restore
Please enter the backup file path: /tmp/cmx_backup_test.cisco.com_2015_07_28_17_01.tar.gz
Please enter the path for untar backup file [/tmp]: /tmp
[17:08:54] Preparing for restore...
Restore size 27866720
Available disk space in /tmp is 139137040384
Available disk space is 139424529077
[17:08:54] Untarring backup file...
[17:08:55] Stopping all services...
Pre restore took: 26.4669179916 seconds
[17:09:21] Restoring Database...
Created database mse
Running command /usr/bin/sudo -u postgres  pg_restore -d mse -Fc
/tmp/cmx_backup_test.cisco.com_2015_07_28_17_01/postgres/mse.dump
Restored database mse
Restarting database...
Restore database took: 18.3071520329 seconds
[17:09:39] Restoring Cache...
Stopping cache_6383...
Restarting cache_6383...
Stopping cache_6380...
Restarting cache_6380...
..............
Stopping cache_6382...
Restarting cache_6382...
Stopping cache_6379...
Restarting cache_6379...
Stopping cache_6381...
Restarting cache_6381...
Stopping cache_6378...
Restarting cache_6378...
Restore Cache took: 46.7663149834 seconds
[17:10:26] Restoring Cassandra...
Stopping Cassandra...
Starting casandra
Creating cassandra scehma
..............
Restore Cassandra took: 29.5983269215 seconds
[17:10:56] Restoring Influxdb...
Stopping Influxdb...
Restarting Influxdb...
Restore Influx DB took: 13.9934449196 seconds
```

```
[17:11:10] Restoring consul...
Restore Consul took: 0.761927843094 seconds
[17:11:10] Restoring floormaps...
Restore floor maps took: 0.0269021987915 seconds
[17:11:10] Restoring licenses...
Restore licenses took: 0.00019907951355 seconds
[17:11:10] Restoring setup...
Restore setup took: 0.000532150268555 seconds
[17:11:10] Running Post Restore Tasks...
[17:11:10] Migrating Schemas...
[17:11:11] Migrating Cassandra schemas...
[17:11:12] Restarting all services...
stopping cassandra
Post restore took: 6.64956212044 seconds
[17:11:17] Starting all services...
..............
[17:12:45] Done
$
```

Encrypting the CMX /opt Directory

You can elect to encrypt CMX data in one of two ways:

- **CMX installation.** You have the option to encrypt the `/opt` partition of the disk as part of the installation process, or to skip it. Refer to *Cisco Mobility Services Engine Virtual Appliance Installation Guide for Cisco CMX, release 10.5* for more details.
- The **cmxos encryptdisk** command. You have the option to run the encryption command after installation. The following task uses this option. Refer to *Cisco CMX Command Reference, release 10.5* for more details.

Note We recommend that you enable encryption at installation, or as soon as possible afterward. The encryption process requires time proportional to the amount of data present on the `/opt` partition.

Important Encryption cannot be disabled or undone. It requires someone with root access credentials to manually enter the encrypted disk passphrase from the command line each time the device is rebooted or powered up.

Before you begin

You must have CMX admin user credentials to modify these settings.

Procedure

Step 1 Connect to CMX via SSH, or through the console if FIPS or UCAPL is enabled.

Step 2 Enter the **cmxos encryptdisk** command.

Step 3 At each of the following prompts, enter **y** to stop CMX and backup your data, or **N** to cancel. Data backup could take some time.

```
Have you closed all SSH sessions to this CMX? [y/N]:y
Are you sure you want to encrypt the /opt partition of the disk ? [y/N]:y

Checking disk space requirements for backing up /opt folder...
Looks Good.

Proceed with stopping all CMX services? [y/N]:y

Backing up /opt folder into /var ...
tar backup done.
Press Enter key to enter rescue mode and begin the encryption.
```

Step 4 Press **Enter** to continue. This process can take some time.

```
Shredding /opt ...
Shread: List of deleted folders
Shread: List of deleted folders
Shread: List of deleted folders
...
Formatting /opt ...

You will be prompted to set a passphrase for encrypted disk /opt.
Choose a passphrase, Enter and Verify it.

Note:
On every boot / power up, you will be prompted for this passphrase.
System will continue only if this passphrase is correct.
```

Step 5 Respond to the following prompt. If you enter **YES**, encryption is irreversable.

```
WARNING!
========
This will overwrite data on /dir/your_cmx/opt irrevocably.
Are you sure? (Type uppercase yes): YES
```

Step 6 Follow the prompts to select and confirm the encrypted disk passphrase.

```
Enter passphrase:
Verify passphrase:
Command successful.

Opening /opt ...
Enter passphrase for /dir/your_cmx/opt:
```

At this point, the encryption process begins in earnest. This process can take some time.

Step 7 When the process completes, press **Enter** at the prompt to reboot the disk.

```
Encryption of /opt is complete.

System will reboot now.
Upon (every) restart, when prompted to enter passphrase for /opt partition,
enter the passphrase you just set.

Press Enter to continue with reboot
```

Step 8 Once the system reboots, enter the encrypted disk passphrase at the prompt.

```
Please enter passphrase for disk device_name_opt on /opt!:
```

Step 9 Log into Cisco CMX command line.

Display a Login Banner

You can create a banner that displays when users log into CMX.

Before you begin

You must have CMX admin user credentials to modify these settings.

Procedure

Step 1 Connect to CMX via SSH.

Step 2 Enter the **cmxctl config banner edit** command.

If there is an existing banner, CMX displays the text [within brackets]. If none, the brackets are empty.

Step 3 Enter the banner text:

a) Type the text you want to display, and press **Enter**.

b) On the second line, type a period, and press **Enter**.

Your new banner will display the next time a user logs in from a browser or from the command line.

Example

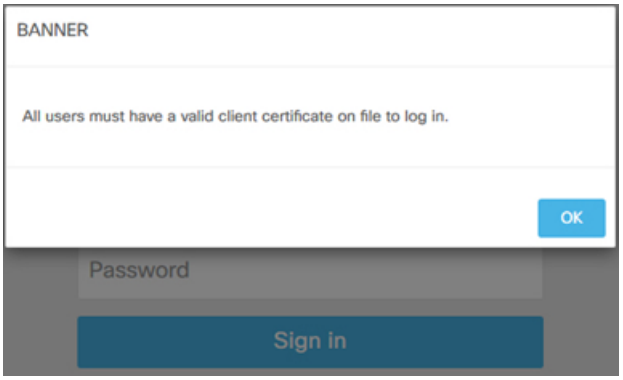
This example creates the following login banner: "All users must have a valid client certificate on file to log in."

```
Current Login Banner = []
Enter text to be displayed as login banner. Enter a single period on a line to
terminate.

All users must have a valid client certificate on file to log in.
.
starting /usr/sbin/sshd... \c
done.
```

When you opened CMX in a browser, you would see something similar to this:

Figure 2: Example of a login banner from a browser



Logging in from the command line, you would see something similar to this:

```
login as: cmxadmin
All users must have a valid client certificate on file to log in.
cmxadmin@192.168.1.20's password:
```

Troubleshooting Cisco CMX Server Shutdown Problems

The Cisco CMX server shuts down all the services when disk space usage reaches 85 percent. If you encounter this issue, create additional disk space on your Cisco CMX server by deleting unnecessary files, if any, from the server. Run the cmxos clean find/normal command to find unnecessary files and delete it to free some disk space.

After you have sufficient space, you can choose to restart your Cisco CMX server by running the **cmxctl start –a** command, if required.