Cisco Managed Services Accelerator (MSX) 4.3 Managed Device Service Pack User Guide

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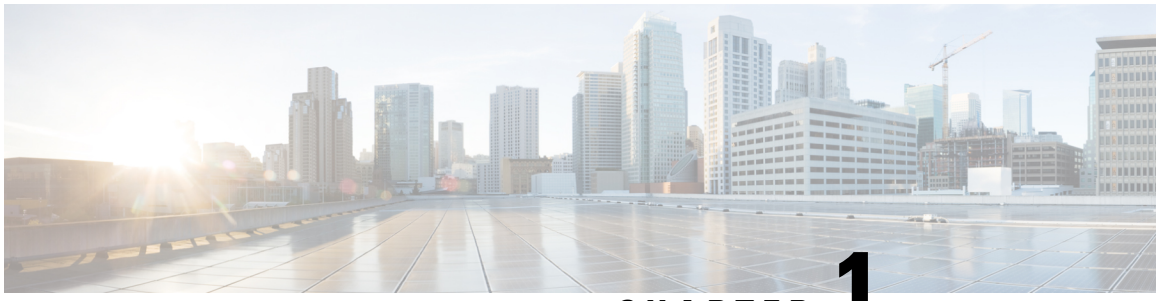

CHAPTER 1

About this Document

This chapter provides information about the intended audience of Cisco MSX Managed Device Service Pack, what's new in the current release, and the related documentation.

This chapter contains the following topics:

About this Content

This section provides information about related documentation of Cisco MSX and trademarks used in this content.

Document Revision History

Table 1: Document Revision History

Revision Date	Change Summary
May 20, 2022	This is the first release of this guide.

Audience

This guide is designed for service provider operators and tenants who deploy, manage, configure Cisco MSX Managed Device service pack, and troubleshoot various Managed Device service issues.

Related Documentation

You can access Cisco MSX 4.3.0 content at Cisco MSX End User Documentation.

The documents listed here are available for additional reference. To access API documentation on the Swagger GUI, log in to the Cisco MSX GUI and navigate to **My Profile > Swagger API**.

Cisco MSX SDK documentation is available at https://developer.cisco.com/site/msx/.

Document	Description
Cisco Managed Services Accelerator (MSX) 4.3 Release Notes Documentation	This documentation provides information about the new features in Cisco MSX 4.3.
Cisco Managed Services Accelerator (MSX) 4.3 Administration Documentation	This documentation covers the post-install configuration information that is required to set up Cisco MSX.
Cisco Managed Services Accelerator (MSX) 4.3 Platform and Service Pack Permissions Addendum	This addendum covers all the permissions that are required to operate Cisco MSX and the service packs.
Cisco Managed Services Accelerator (MSX) 4.3 SD-WAN Service Pack Documentation	This documentation includes details that are related to deploying, managing, configuring the Cisco MSX SD-WAN service pack, and troubleshooting service errors.
Cisco Managed Services Accelerator (MSX) 4.3 SD-WAN Out-of-the-Box Applications Addendum	This document is an addendum to the *Cisco MSX SD-WAN Service Pack* content. It has details about the out-of-the-box applications of Cisco MSX 4.3 and the comparison of applications in older releases with applications in Cisco MSX 4.3 based on possible application mapping.
Cisco Managed Services Accelerator (MSX) 4.3 Enterprise Access Service Pack Documentation	This documentation includes details that are related to deploying, managing, configuring the Cisco MSX Enterprise Access service pack, and troubleshooting service errors.
Cisco Managed Services Accelerator (MSX) 4.3 Managed Device Service Pack Documentation	This documentation includes details related to subscribing the Cisco MSX Managed Device service pack, configuring the service, and troubleshooting service errors.
Cisco Managed Services Accelerator (MSX) 4.3 Solution Overview Documentation	This documentation provides a comprehensive explanation of the design of the Cisco MSX solution that enables service providers to offer flexible and extensible services to their business customers.
Open Source Used in Cisco MSX and Service Packs Documentation	This documentation contains licenses and notices for Open Source software that is used in this product.

Bias-free Doc Disclaimer

Note The documentation set for this product strives to use bias-free language. For purposes of this documentation set, bias-free is defined as language that does not imply discrimination based on age, disability, gender, racial identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality. Exceptions may be present in the documentation due to language that is hardcoded in the user interfaces of the product software, language used based on RFP documentation, or language that is used by a referenced third-party product.

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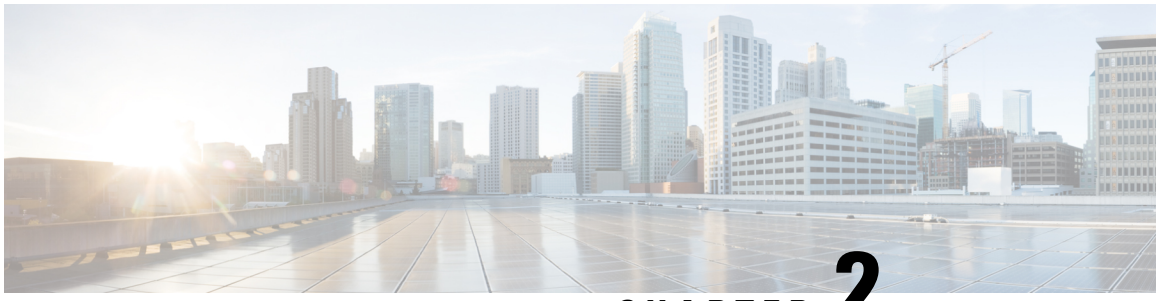
identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality. Exceptions may be present in the documentation due to language that is hardcoded in the user interfaces of the product software, language used based on standards documentation, or language that is used by a referenced third-party product.

What's New in Cisco MSX 4.3 Managed Device

Features	Description
Meraki Configuration Enhancements	Cisco MSX provides the ability to create switch port configurations from a list of adaptive and access policies, switch network configurations for Quality of Service (QoS), and wireless configurations for Identity PSKs. The configuration can be applied across Meraki organizations based on switch port, network, and wireless SSID tags. For more information, see Managing Configurations.
Meraki Site Sync with Device and Network Information	After a synch operation, Cisco MSX now identifies Meraki sites, and assigns networks and devices to a site based on their address or latitude and longitude information.
Full Device Compliance Configuration	Cisco MSX now allows you to set up or manage compliance for either full device configuration or standard configuration. For more information, see Full Device Configuration in Device Compliance.



CHAPTER 2

Cisco MSX Managed Device Service Pack Overview

Cisco MSX is an open software platform that enables service providers to create and manage services across physical and virtual network elements. The Cisco MSX solution utilizes Network Function Virtualization (NFV) and enables service providers to provide their customers with a flexible selection of services that are easily customized through a self-service portal. It reduces the costs for service creation, customer acquisition, service fulfillment, time to repair, and maintenance.

With the Cisco MSX solution, you can automate end-to-end provisioning for different use cases and service topologies. Each release of the Cisco MSX provides out-of-the-box capabilities to orchestrate particular use cases, also called service packs (such as Cisco MSX SD-WAN, Cisco MSX Managed Device, and Cisco MSX Enterprise Access). The Cisco MSX service packs are a suite of prepackaged software capabilities that fully automate the end-to-end service creation including ordering, service chaining, orchestration, service assurance, user self-care, real-time performance reporting, and user-defined policy changes. With these fully validated service level packages, end userscan quickly turn on, control, and assure cloud-based managed services offered by the service provider.

For detailed information about Cisco MSX solution, see Cisco Managed Services Accelerator (MSX) Solution Overview Guide.

This chapter contains the following topic:

Overview

The Managed Device service pack provides the ability for the service providers to manage the configurations of their customer devices through a self-service portal in an operator-driven configuration template environment.

The Cisco MSX Managed Device service pack allows you to onboard devices located at the customer premise (CPEs) and apply or manage configuration settings remotely from its Network Operations Center (NOC). The service providers can prepare parameterized configuration template files and deploy them on the CPEs. Using the Managed Device service pack, device deployment and its configurations are simplified.

Some of the advantages are:

- Zero-touch provisioning for initial device connectivity through the PnP server process.
- Service provisioning of on-premise routers through devices and VNFs.

- User Interface portal for templates configuration, ordering service, and performance or fault monitoring.

The following are some of the key concepts in the Cisco MSX Managed Device service pack:

- **Device Models**: Device models are the pre-defined set of constructs available in Cisco MSX for devices, which enables the users to capture the essential metrics data for a device. Cisco MSX Managed Device service pack provides metrics for Cisco IOS devices.

  To facilitate the metrics data collection for the new device types, the device model construct should be modified to capture the details that are utilized to collect metrics for these new device types. For more information, see the topic 'Preparing Device Model Information for New Device Type'.

- **Device Templates**: The device templates have parameters that are used to define a device's complete operational configuration.

  A device template, when applied to a service ordering workflow, gathers the parameter values entered during the service ordering process. These values are then passed to the Cisco MSX orchestration engine (NSO) to configure the devices.

  The device templates are created from the device CLI configurations.

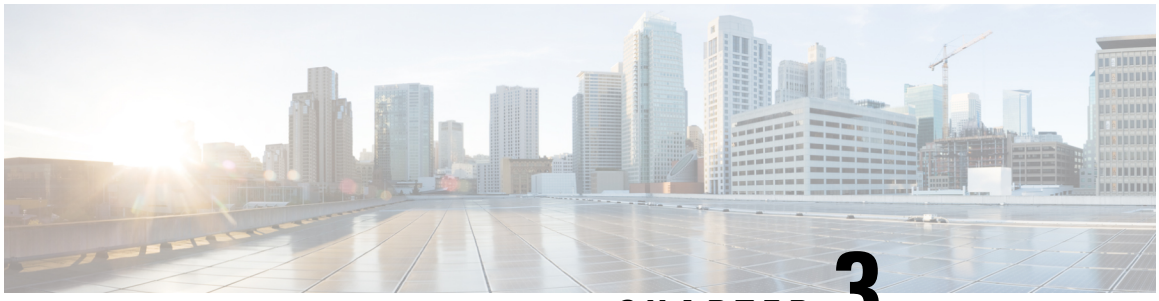
- **Adding a Device**: Using the Managed Device service pack, service providers can onboard devices located at customer premises into their network to apply and manage configurations remotely from their Network Operations Centre (NOC). This functionality allows you to onboard the devices and to apply templates during the add device procedure. For more information, see the topic 'Adding a Device'.

- **Bulk Imports**: The bulk import option allows you to import multiple devices at once into Cisco MSX. The Site Template file allows you to add multiple devices and also apply the templates. For more information, see the topic on 'Importing Multiple Devices'.

- **Onboarding New Device Type**: Out-of-the-box, Managed Device service pack consists of Cisco IOS Network Elements Driver (NED), which allows to onboard any Cisco IOS-XE device in the Cisco MSX system.

  To extend the support to any other new device type, see the topic 'Provisioning a Device that is Not Supported Out-of-the-Box by Managed Device'.

- **Support for Meraki**: Manage Meraki appliances and automate provisioning actions without the need for manual intervention. For more information, see Managing Meraki.



CHAPTER 3

Getting Started with Managed Device Service Pack

This chapter provides information about how to get started with the Cisco MSX Managed Device service pack.

This chapter contains the following topics:

Logging In and Out of the Cisco MSX Portal

To log in to the Cisco MSX user interface, enter the following URL in your web browser address field, where server-ip is the IP address or fully qualified domain name (FQDN) name of the Cisco MSX server:

https://<server-ip>Cisco MSX or https://www.example.com/

Depending on your network configuration, the first time your browser connects to the Cisco MSX web server, you may have to update your client browser to trust the security certificate of the server. This ensures the security of the connection between your client and the Cisco MSX web server.

What you can see and do in the user interface is determined by your user account privileges. For information on Cisco MSX users and the actions, they can perform, see the topic on 'Managing Users'.

To log out, select the user and click **Logout**.

Role-Based Access in Cisco MSX

In Cisco MSX, user permissions are managed using Role-Based Access Control (RBAC). RBAC restricts or authorizes the system access for users based on that user's roles. Based on the permissions that are assigned to a user by an administrator, a user can define and customize how their services are exposed to customers.

The permissions allow customizing the various aspects of a service workflow, such as managing tenants, notifications, integration with BSS systems, announcements, and so on. The role-based access permissions are categorized into:

- **Service Pack Specific Permissions**: Include permissions for controlling various settings for the service packs.
- **Services, Configurations, and Devices Specific Permissions**: Include permissions for configuring various settings for the devices and services.
- **Integrations, Settings, and Log Specific Permissions**: Include permissions for controlling integration, log, and SSO configurations.
- **Users, Roles, and Tenants-Specific Permissions**: Include permissions to configure user, remote users, tenants, roles, provider settings, and so on.

For more information on Cisco MSX out-of-the-box roles, see 'User and Role-Based Access in Cisco MSX' in *Cisco MSX Administration*. For a complete list of all the permissions available in Cisco MSX, see *Cisco MSX Platform and Service Packs Permissions Addendum*.

Managing the Managed Device-Specific User Roles

In Cisco MSX, you must create a new role (such as Managed Device Operator) and assign the permissions required to operate the platform tasks.

To create a new role and assign it to users:

Table 2: Procedure for Creating Managed Device Specific User Roles

	Task	Reference Topics
1.	Log in to the Cisco MSX Portal (as an Admin/Super user).	—
2.	Create the tenants.	For more information on creating a new tenant, see Managing Tenants.
3.	The SP_OPERATOR role available in Cisco MSX has the permissions necessary to create and manage Managed Device services. You may also create a role specifically for Managed Device and assign the permissions required to operate Managed Device.	For more information on creating a new user role, see Managing Users.
4.	Create a user (such as Tenant Operator user), assign the role that is defined in Step 3 to this user, and select all the tenants that the user must access.	For more information on creating a new user, see Managing Users.

Managing User Roles

A user is granted access to desired system resources only if the assigned role grants access privileges. For example, the user with the admin role can define a new role, create tenants, create users, and so on. For more information on assigning roles to a user, see Managing Users.

Adding User Role

To add a user role:

Procedure

Step 1 Log in to the Cisco MSX Portal.

Step 2 In the main menu, click **Roles**.

The **Manage Roles** window appears.

Step 3 Click **Add Role**.

Step 4 Enter the Role Name, Display Name, and Description.

Step 5 To assign permission for the roles, click **Category** and select the corresponding check box for the permission(s) that you must grant to the role.

The types of permission you can grant are:

Table 3: Types of Permission

Permission	Description
View	Provides read-only access to the function.
Manage	Provides access to read and manage tasks associated with the functions.

The table below lists the Managed Device category of permissions.

Table 4: Category of Permissions

Display Name	Description
Templates	Allow users to manage permission to add or modify the templates required for the Managed Device Sites. The templates can be added or modified only by using the Managed Service API. For more information on the Manage Device API, refer to the Swagger documentation accessible from the Cisco MSX Portal > User Profile icon > Account Settings > Swagger > SFI SDK > Manage Device API.
Managed Device Sites	Allow users to manage permission to add or modify sites to apply the template, remove the template or deprovision device. The templates can be added or modified only by using the Managed Service API. For more information on the Manage Device API, refer to the Swagger documentation accessible from the Cisco MSX Portal > User Profile icon > Account Settings > Swagger > SFI SDK > Manage Device API.

Display Name	Description
Templates Parameters	Allow users to manage permission to configure parameters of the uploaded templates. The templates can be added or modified only by using the Managed Service API. For more information on the Manage Device API, refer to the Swagger documentation accessible from the Cisco MSX Portal > User Profile icon > Account Settings > Swagger > SFI SDK > Manage Device API.
Metrics	Allow users to manage permission to add or modify the metrics data of the sites namely UP, DOWN, CPU, memory utilization, Uptime, Internet traffic, LAN traffic, and Status History. For more information on the Manage Device API, refer to the Swagger documentation accessible from the Cisco MSX Portal > User Profile icon > Account Settings > Swagger > SFI SDK > Manage Device API.
Running Configuration of Devices	Show running config of devices capability

For more information on permissions that are required for managing Meraki and other devices supported by Managed Device, see Cisco MSX Platform Addendum.

Step 6 Click **Save**.

Modifying User Role

To modify a user role:

Procedure

Step 1 Log in to the Cisco MSX Portal.

Step 2 In the main menu, click **Roles**.

The **Manage Roles** window appears.

Step 3 Select the role that you want to modify and click the **Edit** icon.

Step 4 To assign or revoke the permission for the roles, click **Category** and then select or unselect the corresponding check box for the permissions.

The table below describes the type of permissions that you can grant:

Table 5: Types of Permission

Permission	Description
View	Provides read-only access to the function.
Manage	Provides access to read and manage tasks associate with the functions.

Step 5 Click **Save**.

Managing Tenants Groups

After you create tenants, you can configure the tenant groups, which are a collection of tenants that are grouped for assigning a common list of functions such as, service extensions parameter values, and so on.

To manage tenant groups:

Procedure

Step 1 Log in to the Cisco MSX Portal.

Step 2 In the main menu, click **Tenant Groups** to view the list of tenant groups with their details in the Manage Tenant Groups window.

Step 3 Click **Add Tenant Group**.

Step 4 Enter the Name and Display Name of the new tenant group.

Step 5 (Optional) Enter the Description.

Step 6 (Optional) From the **Associate Tenants** drop-down list, choose the tenant to associate with the new tenant group.

Note A tenant can be associated with only one tenant group. The **Tenant** drop-down list displays only the tenants that are not associated with any tenant group.

Step 7 Click **Save**.

Managing Tenants

The multi-tenant architecture of Cisco MSX can segment the data stored by a tenant. When tenants are defined, data is partitioned by the tenant. Thus, provides data security and privacy for each tenant while allowing cloud or managed service providers the flexibility to consolidate many smaller customer configurations on a set of infrastructure servers.

The key points that you should know, while configuring tenants are:

- Tenant administrators are linked to their data by a tenant object.
- Tenant objects have to be consistent and unique across all clusters.
- A tenant administrator cannot view or modify the data of another tenant.

To manage tenants:

Procedure

Step 1 Log in to the Cisco MSX Portal.

Step 2 In the main menu, click **Tenants**.

The **Tenanats** window appears.

Displays the list of existing tenants with their details.

Step 3 To add a new tenant:

a) Click **Add Tenant**.
b) Enter the Name, Website URL, External ID, Parent Tenant, and Description.
c) Click **Save**.

The new tenant details appears in the Tenants window.

Step 4 To update the tenant details:

a) Select the Tenant from the list.
b) Click the **Edit** icon to edit the data in the desired field.
c) Click **Save**.

Step 5 To delete the teanant:

a) Select the Tenant from the list.
b) Click the **Delete** icon.

The **Delete Tenant** confirmation dialog box appears for you to confirm the tenant deletion.

c) Click **Delete**.

Managing Users

As an administrator, you can add new user details, assign an appropriate role to a user, and associate the new user to a tenant.

Note You can also disable the creation and modification of users, by choosing **Single Sign On** and using Identity Provider. The procedure below describes the use of local user accounts.

Before you begin

You should have administrator privilege for managing users.

Procedure

Step 1 Log in to the Cisco MSX Portal.

Step 2 In the main menu, click **Users**.

The **Users** window appears. Displays the list of users and their details.

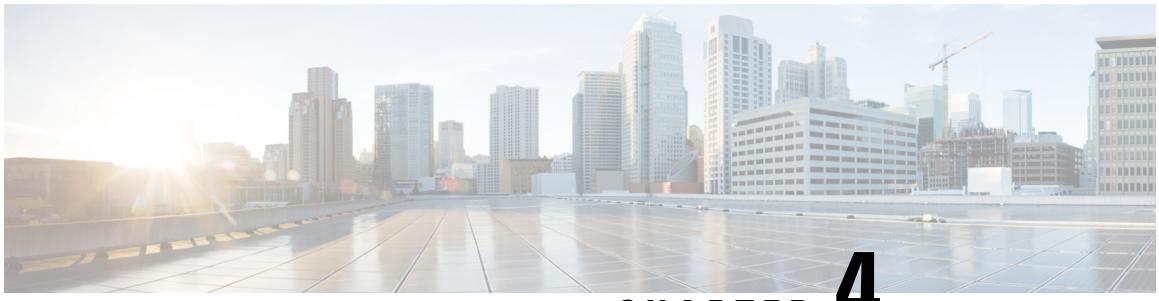
Step 3 To add user:

a) Click **Add User**.
b) Enter details such as First Name, Last Name, User ID, and Email Address.
c) From the **Language** drop-down list, choose the desired language.
d) From the **Assign Role** drop-down list, choose the desired roles.
e) From the **Associate Tenants** drop-down list, choose one or more tenants to be associated with a user. .
f) From the **Password Policy** drop-down list, choose the desired password policy.
g) Click **Save**.

Step 4 To assign a role:

Note For more information on categories and permissions for the Managed Device service pack, see Managing Users.

a) Select the User to modify the role.
b) Click the **Edit** icon.
c) From the **Assign Role** drop-down list, choose the desired roles.
d) Click **Update**.



CHAPTER 4

Preparing Cisco MSX Before Provisioning Devices

This chapter provides information about how to prepare Cisco MSX before provisioning the devices.

This chapter contains the following topics:

Network Element Driver Package

Note Download the NED package only when you onboard a new device type into Cisco MSX Managed Device service pack.

The Cisco Network Services Orchestrator (NSO) uses Network Element Drivers (NEDs) to orchestrate a multivendor network for different devices types and services. You can add a new NED after the Cisco MSX is installed and deployed into production.

The NED management functionality in Cisco MSX allows you to add, replace, and delete NED for device management.

The Cisco MSX service packs have a predefined set of NED package that is uploaded into NSO. The Managed Device service pack consists of Cisco IOS NED. Thus allows you to onboard any IOS-XE device. Similarly, for onboarding ASR9000, you need a new Cisco IOS-XR NED added into the Managed Device NSO using the NED management functionality.

This service pack also extends its support for devices such as Cisco IOS-XR, Cisco CAT, Cisco NX-OS, Cisco ASA, Juniper SRX, and FORTINET.

Uploading a NED Package

To upload a new NED package using the Cisco MSX portal:

Before you begin

- Download the NED. Use the following URL.
- Use Cisco credentials to log in.

The downloaded NED package contains the following files:

```
README.signature
cisco_x509_verify_release.py
ncs-4.7.6-juniper-junos-4.5.13.signed.bin
ncs-4.7.6-juniper-junos-4.5.13.tar.gz
ncs-4.7.6-juniper-junos-4.5.13.tar.gz.signature
tailf.cer
```

Table 6: NED Package Files

Downloaded NED Package Files	Name of Each NED Tar Files
ncs-4.7.6-juniper-junos-4.5.13.tar.gz	Main NED file
ncs-4.7.6-juniper-junos-4.5.13.tar.gz.signature	Signature File
tailf.cer	Certificate File

Procedure

Step 1 Log in to the Cisco MSX Portal.

Step 2 In the main menu, go to **Settings > NED Management**.

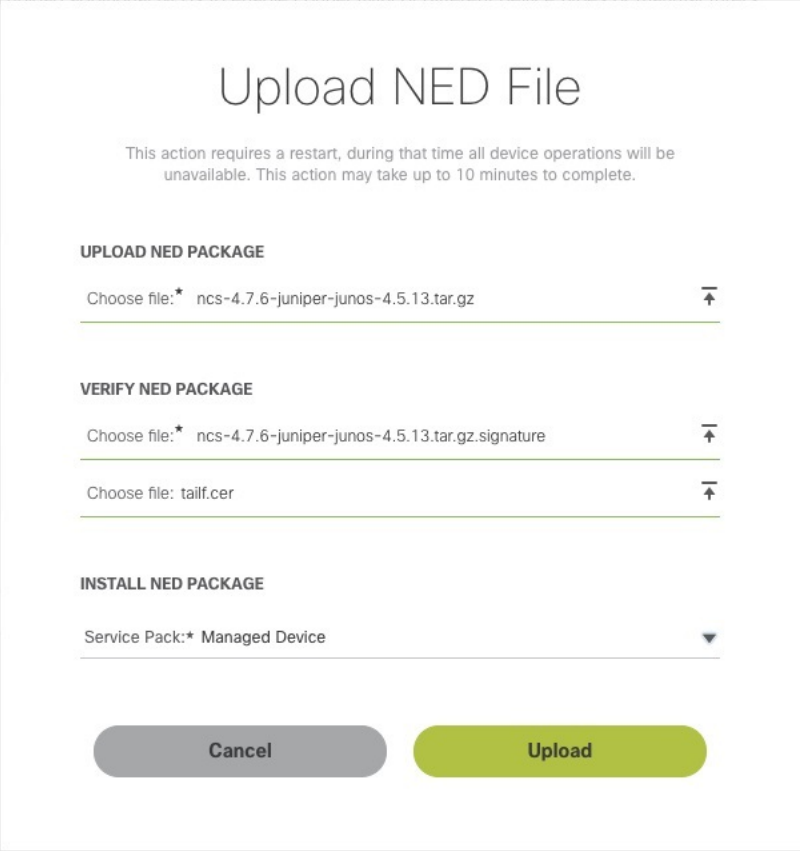
Displays the list of NEDs that are currently installed in the system.

Step 3 Click **Add NED**.

The **Upload NED File** dialog box appears.

Step 4 Upload the downloaded NED package files in their respective fields:

Figure 1: Uploading a NED File



- In the **Upload NED Package** section, select the main NED file from the downloaded NED package and upload it.

  Note The same NED file cannot be uploaded more than once unless we delete the existing file.

- In the **Verify NED Package** section, select the Signature file and Certificate file from the downloaded NED package and upload it.
- In the **Install NED Package** section, choose the **Managed Device** from the Service Pack drop-down list.

Step 5 Click **Upload**.

The **Upload NED** dialog box appears for you to confirm the upload.

Step 6 Click **Upload** again.

Note Now the NSO POD restarts; during this time, the device operations are unavailable.

The **Validating and Installing NED file** dialog box appears.

The installation process takes a few minutes to complete.

Displays the validation message after installing the NED file.

Step 7 Click **Close**.

The **NED Management** home page displays the list of NEDs that are installed in the system.

Note Ensure that the newly installed NED is displayed on the home page.

Deleting a NED Package

To delete a NED package using the Cisco MSX Portal:

Before you begin

- Ensure that you delete all the sites that are using the NED.
- On deleting NED, the device models that use the NED namespace cannot be used in Managed Device anymore.

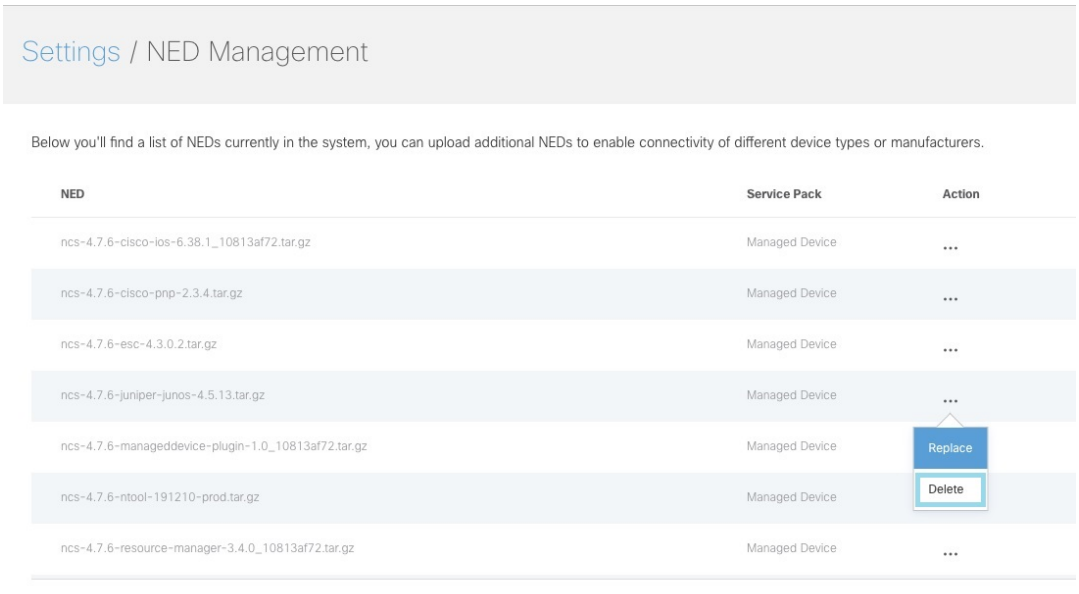
Procedure

Step 1 Log in to the Cisco MSX Portal.

Step 2 In the main menu, go to **Settings > NED Management**.

Displays the list of NEDs that are currently installed in the system.

Figure 2: Deleting NED



Step 3 Select the NED, and click the **ellipsis (…)** and choose **Delete**.

The **Delete NED** confirmation dialog box appears for you to confirm the delete.

Step 4 Click **Delete**.

Note Now the NSO POD restarts; during this time, the device operations are unavailable.

The **Deleting and Uninstalling NED file** dialog box appears.

The deletion process takes a few minutes.

Displays the validation message after deleting the NED file.

Step 5 Click **Close**.

Replacing a NED Package

Replace option is used to upgrade or change an existing version of the NED package.

To replace a NED package using the Cisco MSX Portal:

Procedure

Step 1 Log in to the Cisco MSX Portal.

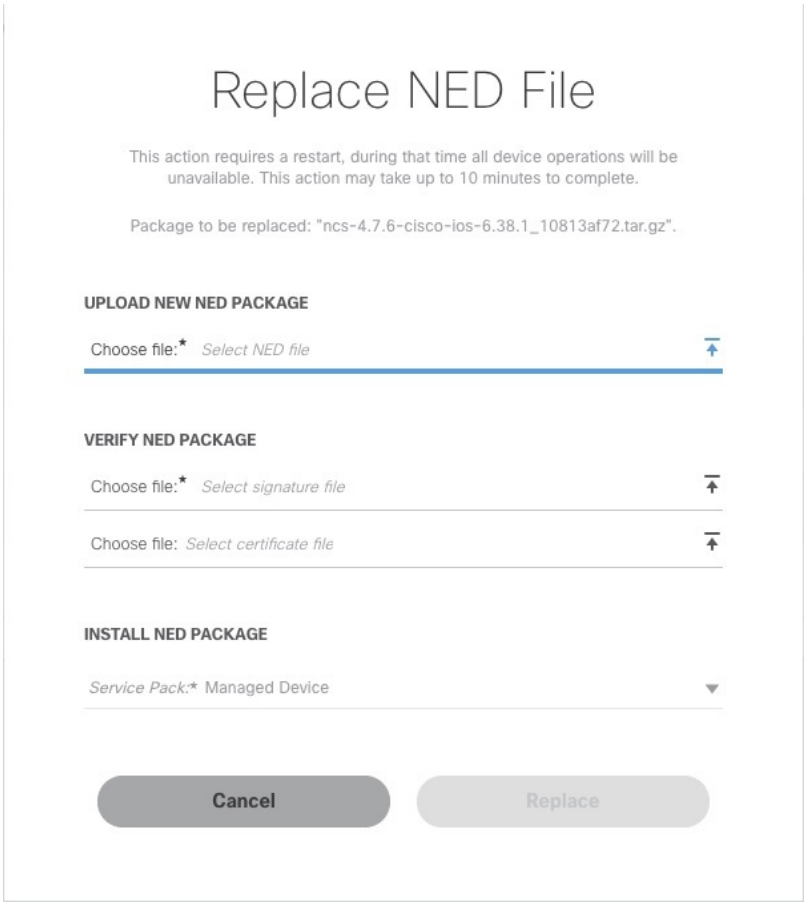
Step 2 In the main menu, go to **Settings > NED Management**.

Displays the list of NEDs that are currently installed in the different service packs.

Step 3 Select the NED and click **Replace**.

The **Replace NED File** dialog box appears.

Figure 3: Replacing NED



Step 4 Upload the downloaded NED package files in their respective fields:

- In the **Upload NED Package** section, select the main NED file from the downloaded NED package and upload it.
- In the **Verify NED Package** section, select the Signature file and Certificate file from the downloaded NED package and upload it.
- In the **Install NED Package** section, choose the **Managed Device** from the Service Pack drop-down list.

Step 5 Click **Replace**.

The **Replace NED** dialog box appears for you to confirm the replacement.

Step 6 Click **Replace** again.

Note Now the NSO POD restarts; during this time, the device operations are unavailable.

The **Validating and Replacing NED File** dialog box appears.

Displays the validation message after replacing the NED file.

Step 7 Click **Close**.

Preparing Device Model

Cisco MSX Managed Device service pack supports out-of-the-box device models. To facilitate the SNMP metric collection for new device type, use the device model construct with several fields that capture all the necessary metrics data.

Sample device model fields:

```
"deviceModelName": "", ---> Unique Name
"platformDeviceType": "",  --> This is a global field and a big category where this particular
 device belongs. For example "CPE".
"platformDeviceSubType": "", --> This is sub category. For example, Sub category of a Juniper
 Device can be "SRX", "EX" etc..
"interfaces": [], ---> List of interfaces for the device model.
"lan": [], ---> Interfaces that can be categorized as LAN.
"wan": [], ---> Interfaces that can be categorized as WAN.
"nedId": "", --> NSO NED ID for this device
"deviceType": "",  --> NSO Device-Type for this device
"directTemplate":"" --> This field allows you to apply configurations to a device while it
 is onboarded to MSX. In this case, use this for applying SNMP configuration. Create a new
 file and name it. Save the NSO XML template in this file.
 Note:  Ensure that you keep a note of the file name used for the XML template. You can
reuse this later during device model preparation.
"deviceMetricConfigurations": [{
        "snmpDetails": {  ----> This is needed to connect to the device. This step is for
preparing the CLI configuration for the SNMP support. Enter your choices for authentication
 protocol, privacy protocol, user used, and so on. Ensure to make a note of it.
            "snmpAuthProto": "",
            "snmpVersion": "",
            "snmpPrivProto": "",
            "snmpUserName": ""
        },
        "platformDeviceType": "",  ---> This must be similar to the device model section.
       "platformDeviceSubType": "", ---> This must be similar to the device model section.

        "snmpOidList":[], -----> The set of OIDs that is required to retrieve the data
        "snmpCpuMemoryUptimeQueryTemplate": { ---> This is a query template that explores
the data collected from SNMPBEAT and provides a representation on the UI based on device
OIDs and MIBs that are specific to this new device type.
        }
    }]
}
```

The two important fields in the data model construct are given in the table below:

Note This table contains the list of default OIDs that work only for specific Cisco devices. These OIDs may vary for the new device type. Therefore, the list of extra OIDs that helps to fetch the necessary data has to be imported into Cisco MSX.

Table 7: SNMP OID and Query Template

Data Model Field	List of Default OID/Query Template	Metrics Data
snmpOidList	"oid":".1.3.6.1.2.1.1.3"	System / System Uptime
	"oid":".1.3.6.1.6.3.10.2.1.3"	snmpEngineBoots
	"oid":".1.3.6.1.4.1.9.9.109.1.1.1.1.6"	CPU / MEM
	"oid":".1.3.6.1.4.1.9.9.109.1.1.1.1.7"	CPU / MEM 1 min
	"oid":".1.3.6.1.4.1.9.9.109.1.1.1.1.8"	CPU / MEM 5 min
	"oid":".1.3.6.1.4.1.9.9.48.1.1.1"	CiscoMemoryPool
	"oid":".1.3.6.1.2.1.2.2.1"	InterfaceTable
snmpCpuMemoryUptimeQueryTemplate	"enterprises.2636.3.1.13.1.11.9.1.0.0"	Memory consumption value in terms of percentage (%)

SNMP OID List: In the Managed Device service pack, SNMP metrics are collected using the OIDs of the device type. OIDs are ISO specific, but the OIDs for CPU and memory are enterprise-specific.

The collected SNMP metric data are as follows:

- Interface traffic
- Interface BW utilization
- CPU
- Memory
- System Uptime

For examples:

Table 8: SNMP OID

Name of the Vendor	OID for CPU	Description
CISCO	1.3.6.1.4.1.9.9.109.1.1.1	(1.3.6.1.4.1) – This prefix is the standard OID and must not be changed. (9.9.109.1.1.1)-This is Cisco enterprise-specific code.
JUNIPER	1.3.6.1.4.1.2636.3.1.13.1.21	(1.3.6.1.4.1.) - This prefix is the standard OID and must not be changed. (2636.3.1.13.1.21) - This is Juniper enterprise-specific code.

SNMP QUERY Template: The Managed Device service pack can process the data that is collected as a part of SNMP polling using the Query Template. The metrics data is represented differently for each vendor. Query template is defined based on these returned metric values.

For example: The table below lists some of the sample query templates.

Table 9: SNMP Query Template

Name of Vendor	OID for Memory Usage Metrics	Description
JUNIPER SRX	"enterprises.2636.3.1.13.1.11.9.1.0.0"	Represents the memory usage value in terms of percentage (%).
Cisco ASA	".1.3.6.1.4.1.9.9.48.1.1.1"	• Cisco has no OID for representing values in terms of percentage (%). • But, Cisco uses the query calculation on the data fields to calculate the memory metrics. • Execute this OID to get the metrics of both free memory and used memory. Use these two values to compute memory usage in terms of percentage (%).

Preparing Device Model Information for New Device Type

To facilitate the SNMP metric collection for the new device type, you can utilize the device model construct to collect metrics details.

For more details on how to build each SNMP field in the device model construct, see 'Sample device model field with description' in the Preparing Device Model.

Sample device model construct of Juniper:

```
{
    "deviceModels": [{
        "deviceModelName": "Juniper SRX",
        "platformDeviceType": "",
        "platformDeviceSubType": "",
        "interfaces": [],
        "lan": [],
        "wan": [],
        "nedId": "",
        "deviceType": "",
        "directTemplate":""


    }],
    "deviceMetricConfigurations": [{
        "snmpDetails": {
            "snmpAuthProto": "",
            "snmpVersion": "",
```

```
            "snmpPrivProto": "",
            "snmpUserName": ""
        },
        "platformDeviceType": "",
        "platformDeviceSubType": "",
        "snmpOidList":[],
        "snmpCpuMemoryUptimeQueryTemplate": {
        }
    }]
}
```

Next step:

After preparing the device model information (JSON file) for the new device type, upload this JSON file into Cisco MSX. For more information, see Importing Device Model.

Importing Device Model

Note For onboarding new device type, prepare the device model information and then import the JSON file into the Cisco MSX. For more information, see Preparing Device Model Information for New Device Type.

Ensure that you update the device model as per the latest Cisco MSX version.

To import a device model:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Settings**.

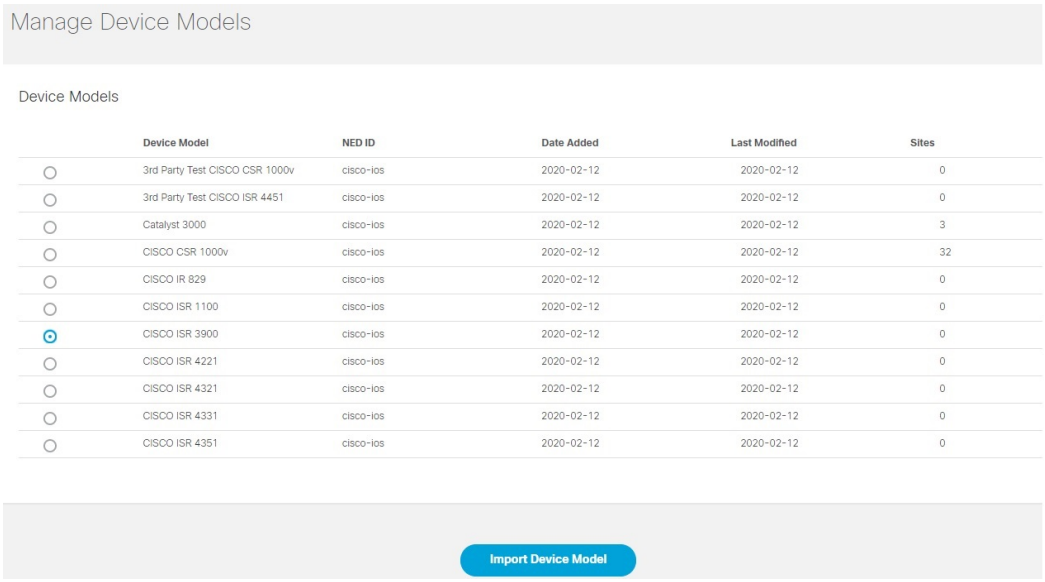
The **Settings** window appears.

Step 3 Click **Device Model Management**.

Step 4 Click **Managed Device**.

The **Managed Device Models** window is displayed.

Figure 4: Device Model Table

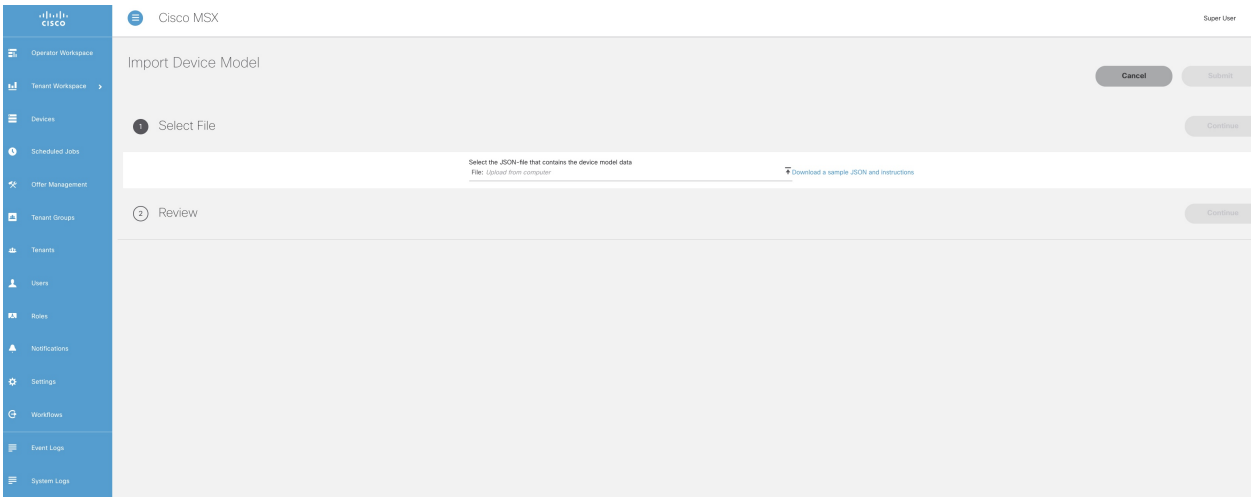


The list of device model appears. These device models can be deleted or added again according to your requirement. Existing device models can be overwritten depending on the requirements of the interfaces used.

Step 5 Click **Import Device Model**.

The **Import Device Model** is displayed.

Figure 5: Import Device Model



Step 6 Upload the JSON file from your local file storage. This JSON file contains device model data.

The Managed Device service pack supports out-of-the box device models.

Note Download the sample JSON file and follow the instructions. You can modify the JSON file and upload with the same device model name. For more information, see 'Sample JSON File for Importing New Device Model'.

To import device model for new device type, see Sample JSON File for Importing a Device Model on the New Device Type.

For more information on the sample JSON file of the third-party device, see 'Sample JSON File for Importing a Device Model on the New Device Type'.

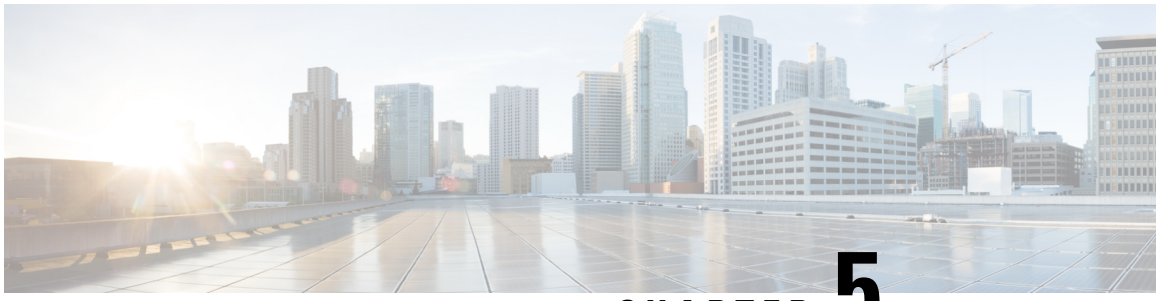
Step 7 Click **Review** to view the Device Model status. You can see the details about the interfaces and the capabilities of the WAN and LAN.

Step 8 Click **Submit** .

Now the newly imported device model appears on the list of Device Model table.

Next Steps

- Add a device into the Cisco MSX. For more information, see 'Adding a Device'.



CHAPTER 5

Managing Device Templates

This chapter provides information about how to manage Cisco MSX Managed Device templates.

This chapter contains the following topics:

Cisco MSX Managed Device Templates

The device template defines a complete operational configuration of the device. When the device template is applied to the service ordering workflow, the Cisco MSX service workflow gathers the parameter values; a tenant user enters these values during the service ordering process. These values are passed to NSO, which uses these values in the device configurations.

Managing Templates

Cisco MSX Managed Device service pack provides the parameterized device templates. The template data is configured into the device and orchestrated. You can apply the template on the tenant site, remove the template, or deprovision the template.

Creating a Device Template

The Cisco MSX platform allows you to convert both Cisco and non-Cisco native device configuration formats to device template formats.

Adding Device Templates

To add a Managed Device template in Cisco MSX:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Settings**.

Step 3 In the **Settings** window, choose **Template Management**.

Step 4 In the **Template Management** window, choose **Device Templates**.

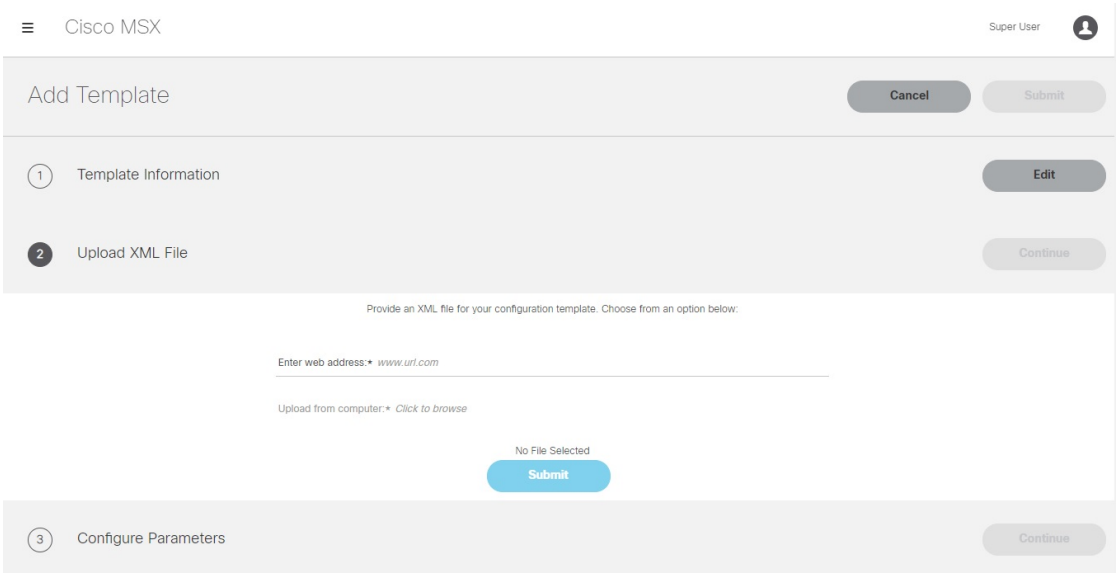
The **Template** window is displayed.

Step 5 In the **Select A Configurational Template** section, click **New Template**.

The **Add Template** window is displayed.

Step 6 Enter the template name and description, then click **Continue**.

Figure 6: Adding New Template



Step 7 In the **Upload XML File** section:

- Enter a URL that hosts the XML file, which is uploaded as a GET request.
- Upload the XML file from your local file storage for the template configuration.

  Here, you can reuse the template XML file that was obtained while executing the workflow.

Step 8 Specify the template configuration parameters.

Cisco MSX allows you to configure how the user will be prompted to enter the value for the variables.

For example: You can create a drop-down list from which the users can choose the variable.

Step 9 Click **Save**.

Managing Template Access for Tenants

To assign or revoke template access for tenants:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Settings**.

Step 3 In the **Settings** window, choose **Template Management**.

Step 4 In the **Template Management** window, choose **Device Templates**.

The **Template** window is displayed.

Step 5 To assign template access to a tenant:

a) In the **Select A Configurational Template** pane, select the template that you want to assign to a tenant.

b) In the **Manage Template Access** pane, select the tenant from the Available Tenants list.

c) Click >.

The selected tenants move to the Access Granted list.

d) To assign the template access for all the tenants in the Available Tenants list, click **Select all**.

Note You can click **Change to Unrestricted** to grant access for all the tenants to use the template.

e) Click >.

All the tenants in the Available Tenants list are moved to the Access Granted list.

f) Click **Apply**.

The tenant access is applied.

Step 6 To revoke template access from the tenant:

a) In the **Select A Configurational Template** pane, select the template for which you want to revoke access from the tenant.

b) In the **Manage Template Access** pane, select the tenant from the Access Granted list for whom you want to revoke access.

c) Click <.

The tenant is moved from the Access Granted list to the Available Tenants list.

d) To revoke the template access for all the tenants for whom access is granted, click **Select all**.

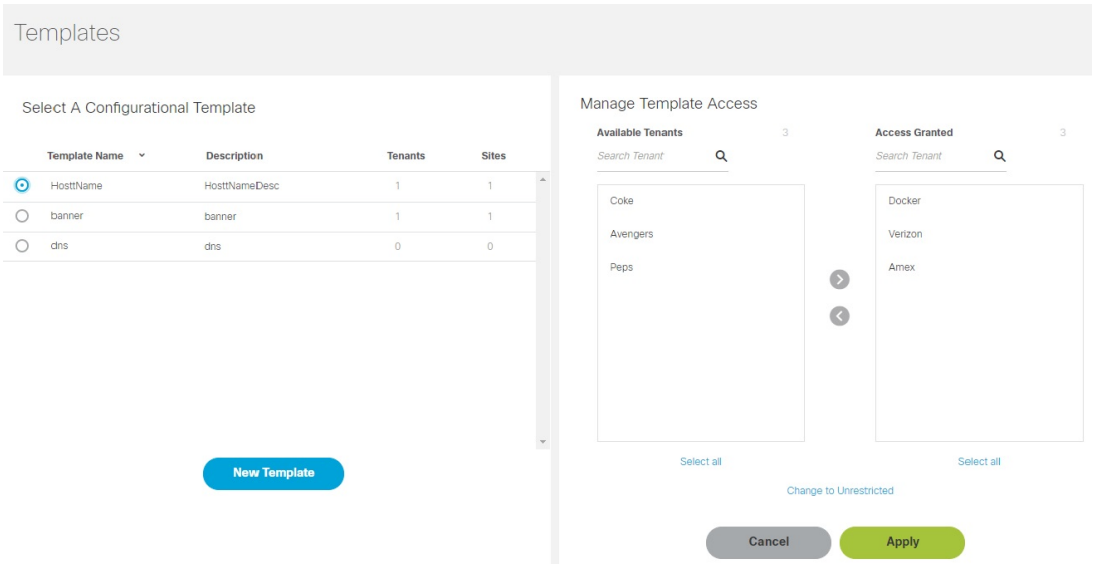
e) Click <.

Access is revoked for all tenants for whom access was granted. The tenants are moved from Access Granted list to Available Tenants list.

f) Click **Apply**.

The tenant access is revoked.

Figure 7: Managing Template Access



Deleting Managed Device Templates

Ensure that the template is not used by any tenant or site before deleting. Else, the deleting option to delete remains unavailable.

To remove a Managed Device template:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Settings**.

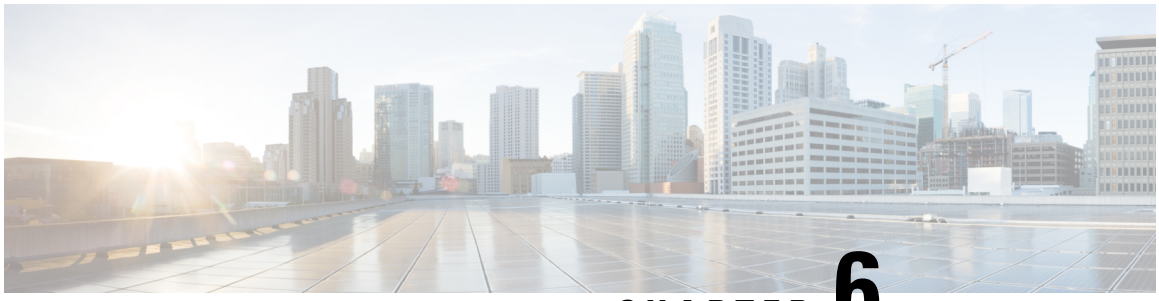
Step 3 In the **Settings** window, choose **Template Management**.

Step 4 In the **Template Management** window, choose **Device Templates**.

The **Template** window is displayed with the list of templates.

Step 5 Hover the mouse pointer over the template name that you want to delete, and click the **Delete** icon that appearss on the right of the template name.

Step 6 Click **Delete Template**.



CHAPTER 6

Provisioning Tasks

This section describes the tasks for provisioning Managed Device services pack in Cisco MSX.

This section contains the following topics:

Provisioning Tasks

This section describes the tasks for provisioning Managed Device services pack in Cisco MSX.

This section contains the following topics:

Provisioning a Device Supported Out-of-the-Box by Managed Device

Out-of-the-box, Managed Device service pack support for Cisco IOS-XE based devices by default.

Table 10: Provisioning a Supported Device in the Service Pack

Task	See
Onboarding the device.	Adding a Device
Bulk provisioning	Importing Multiple Devices
Configuring the template parameters to the default device using the Cisco MSX Portal.	Applying Template from Cisco MSX Portal
Deconfiguring the applied template parameter from the device.	Removing Templates from Device
Deleting and removing the site information from Cisco MSX.	Deleting Sites

Subscribing to Managed Device Service

The Cisco MSX Managed Device service pack allows you to onboard devices to the Cisco MSX platform and monitor their status and metrics. You can onboard a single device manually or multiple devices at once using the Bulk Import feature.

Before you begin

The prerequisites for the task are:

- A tenant and a tenant user are created.
- The device template is defined and is available for the tenant user.
- Import the device model.

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Offer Catalog**. Alternatively, you can go to **Services** tile and click **View Offer Catalog**.

The **Offer Catalog** window is displayed with the available services.

Step 3 Click **Managed Device**.

Step 4 Click **Subscribe**.

The **Confirm Subscription** dialog box is displayed for you to confirm the subscription.

Step 5 Click **Subscribe**.

Step 6 Click **Continue**.

The Managed Device service pack is subscribed and is shown as a service in the **Services** tile.

Next step:

Now add a new device into the Cisco MSX. For more information, see Adding a Device.

Adding a Device

To add a device:

Before you begin

If you are adding a Meraki device, make sure to create Meraki network. For more information, see Creating Networks.

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Services**, and select a tenant, and click **Continue**.

The list of services available for the tenant is displayed.

Step 3 Click the Managed Device service panel to expand, and click the **ellipsis (…)**and choose **Add Device** from the menu. You can also click the **Add Device** button.

The **Add New Device** wizard is displayed.

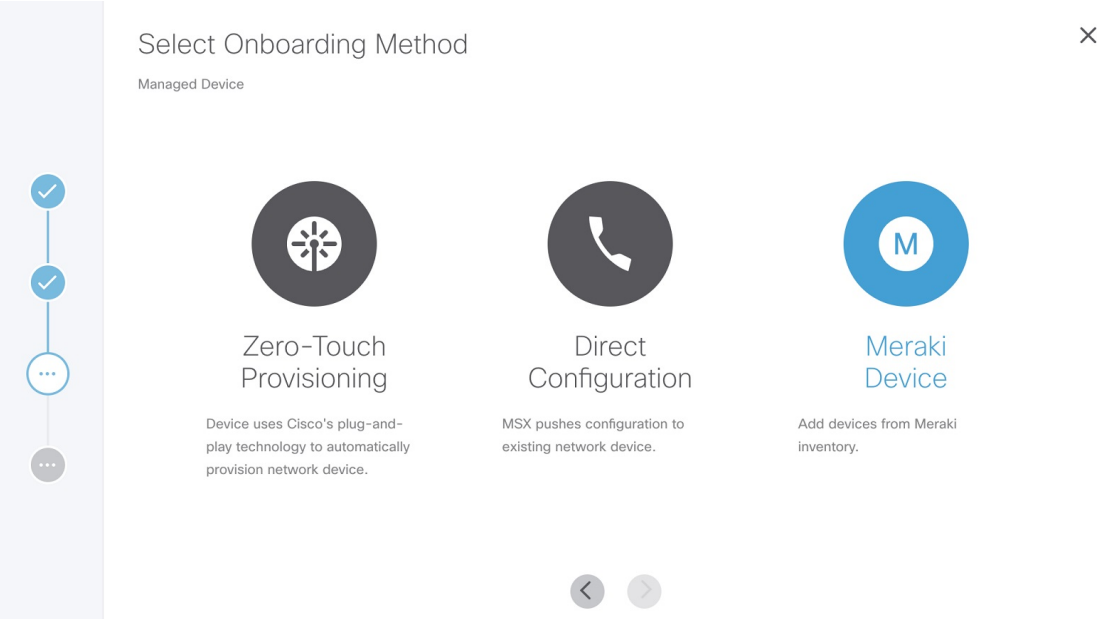
Step 4 Click **Get Started**.

The **Service Selection** window is displayed.

Step 5 Select the **Managed Device** option, and click >.

Step 6 Select the device **Onboarding Method** from the available options.

Figure 8: Onboarding Method



- **Zero-Touch Provisioning**—The device automatically contacts and connects to Cisco MSX either through Cisco Plug-and-Play using an initial configuration or redirected using devicehelper.cisco.com.
- **Direct**—Cisco MSX initiates a connection to the device directly using the device access details provided through the UI or Site Template file.
- **Meraki** — If Meraki Organizations are attached, you can use this option to associate Meraki devices available in Meraki inventory within Cisco MSX, and associate to site and network details. For more information, see Managing Meraki.

Step 7 Specify the Device Details. Based on the selected onboarding type, enter the device details.

For Zero-Touch Provisioning:

a) Enter the name of the device.

b) From the **Device Model** drop-down list, choose the required device model.

The NED ID and Device Type are displayed based on the selected device model automatically.

c) Enter the **Serial Number** of the device.

You can, optionally, enter the Serial Number after adding the device.

To add a serial number later, check the **Provide Serial Number Later** check box.

Note Cisco MSX onboards the device only after the serial number is added. For more information on adding a serial number, see Adding a Serial Number..

d) To add the device to compliance, check the **Add to compliance** check box.

Adding a device to compliance ensures that the device that is configured to a set of standards remains in that state until it is changed.

e) From the **Tunnel Management** drop-down list, choose either **TLS** or **IPSec**. If you choose **TLS**, you have to choose an appropriate TLS gateway and enter the IP address of the device.

Note The TLS Gateway/Spoke services are optional deployments to Cisco MSX that can be used as an alternative to CSR Hub to extend connectivity from Cisco MSX out to data centers that cannot use traditional IPSec tunnels. If you require TLS Gateway functionality, there are setup steps that must be performed prior to using this feature. For more information, please contact your System Administrator.

f) Enter the **IP Address** of the device.

g) From the **Gateway Pools** drop-down list, choose an appropriate TLS gateway.

h) From the **Bring Up a Secure Management Tunnel to Cisco MSX** drop-down list, choose **Yes** to establish an encrypted management tunnel to connect devices to Cisco MSX cloud. The encrypted tunnel can be used for sending the statistics report and other configuration details to the Cisco MSX or SP Network.

Note The secure management tunnel is enabled only when you select a device model with NED-ID as Cisco-IOS.

From the **Bring Up a Secure Management Tunnel to Cisco MSX** drop-down list, choose **No** to onboard the device without a management tunnel.

i) From the **Onboarding Interface** drop-down list, choose the onboarding interface for monitoring WAN and LAN.

Note By default, if **WAN** is selected, you can change it to **LAN**. But, if **LAN** is selected by default, you cannot change it to **WAN**.

- To monitor the WAN, check the **WAN** check box.
- To monitor the LAN, check the **LAN** check box.
- To clear the entry, uncheck the **WAN/LAN** check box.

j) Click **Next**.

Note The Managed Device home page displays the devices that have no serial number in both the List view and Map view. This device is in the unregistered state.

Only on adding the serial number, the device gets onboarded into the Cisco MSX. For more information on adding a serial number, see Adding a Serial Number..

Figure 9: Zero-Touch Provisioning

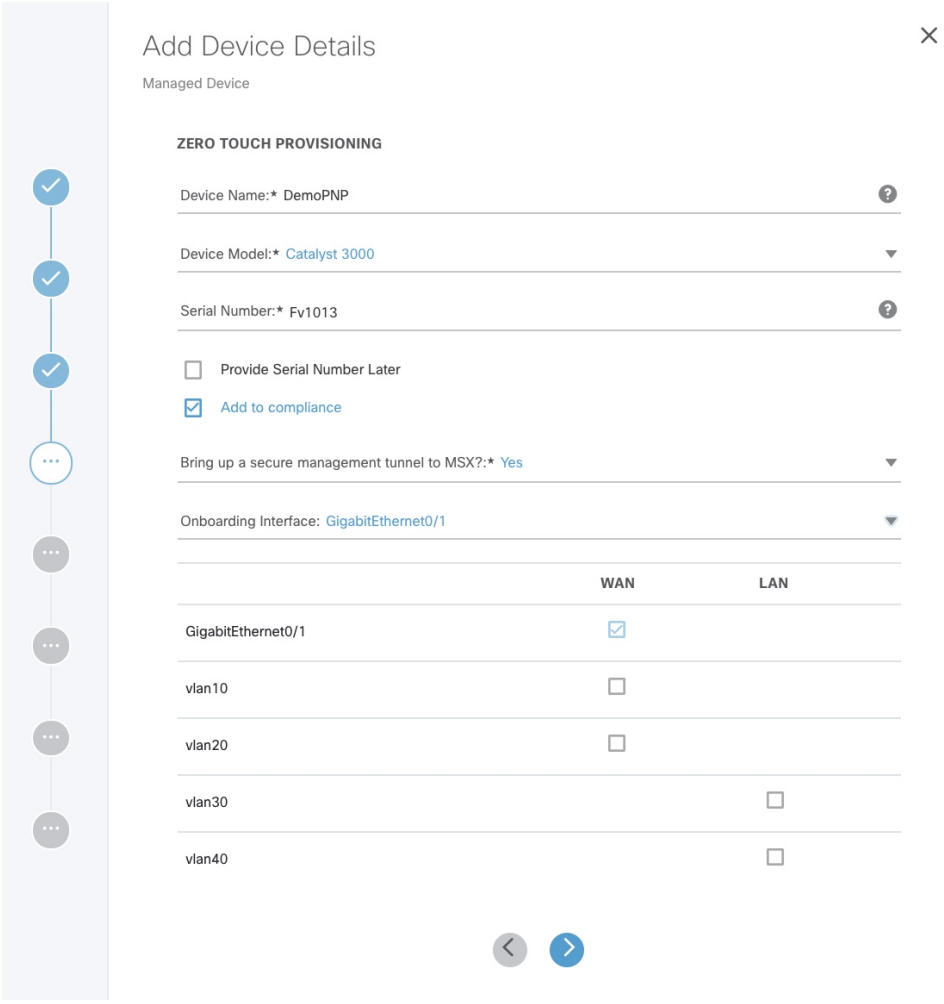
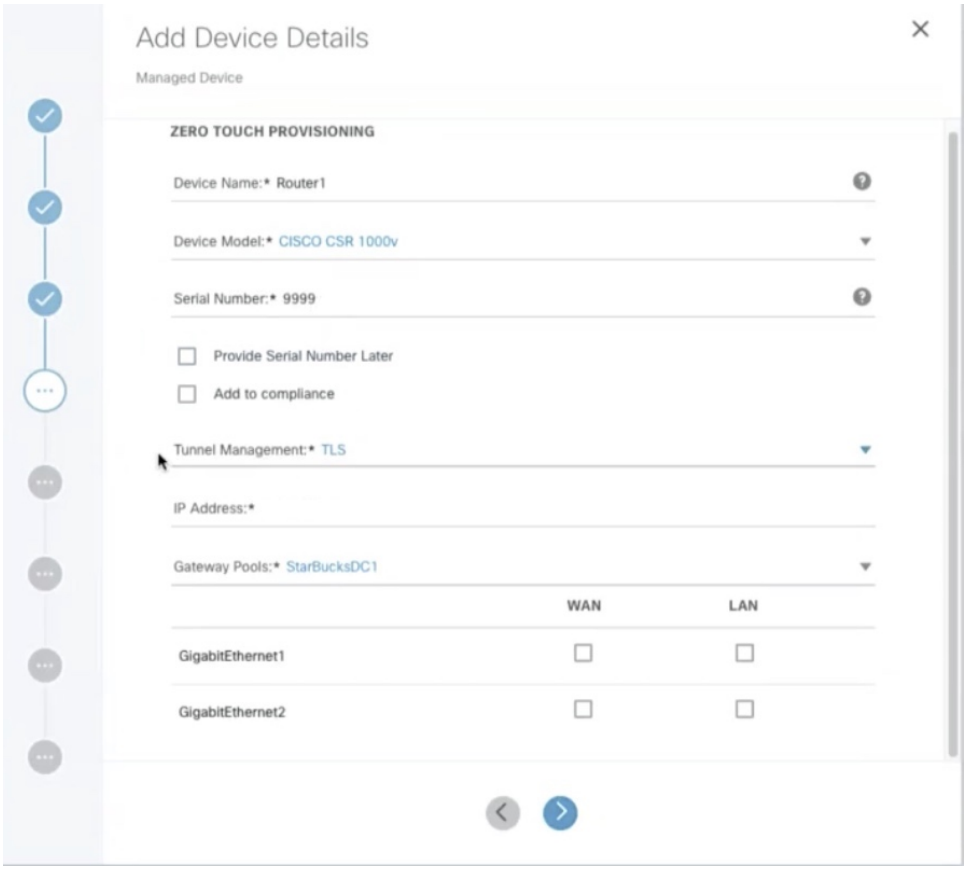


Figure 10: Zero-Touch Provisioning-TLS Gateway



For the Direct onboarding type:

a) In the **Device Name** field, enter the name of the device.
b) From the **Device Model** drop-down list, choose the required device model.

The Device Type and NED ID are displayed based on the selected device model automatically.

c) In the **IP Address** field, enter the IP address of the device.
d) In the **Port** field, enter the port number.
e) In the **User Name** field, enter the user name.
f) In the **Password** field, enter the password.
g) In the **Secondary Password** field, enter the secondary password.

Note The Secondary Password is required for Cisco IOS devices to enter into the privilege mode.

h) Click **Next**.
i) From the **Bring Up a Secure Management Tunnel to Cisco MSX** drop-down list, choose **Yes** to establish an encrypted management tunnel to connect devices to Cisco MSX Cloud. The encrypted tunnel can be used for sending statistics report and other configuration details to the Cisco MSX or SP Network. This option is available only for the Cisco IOS devices.

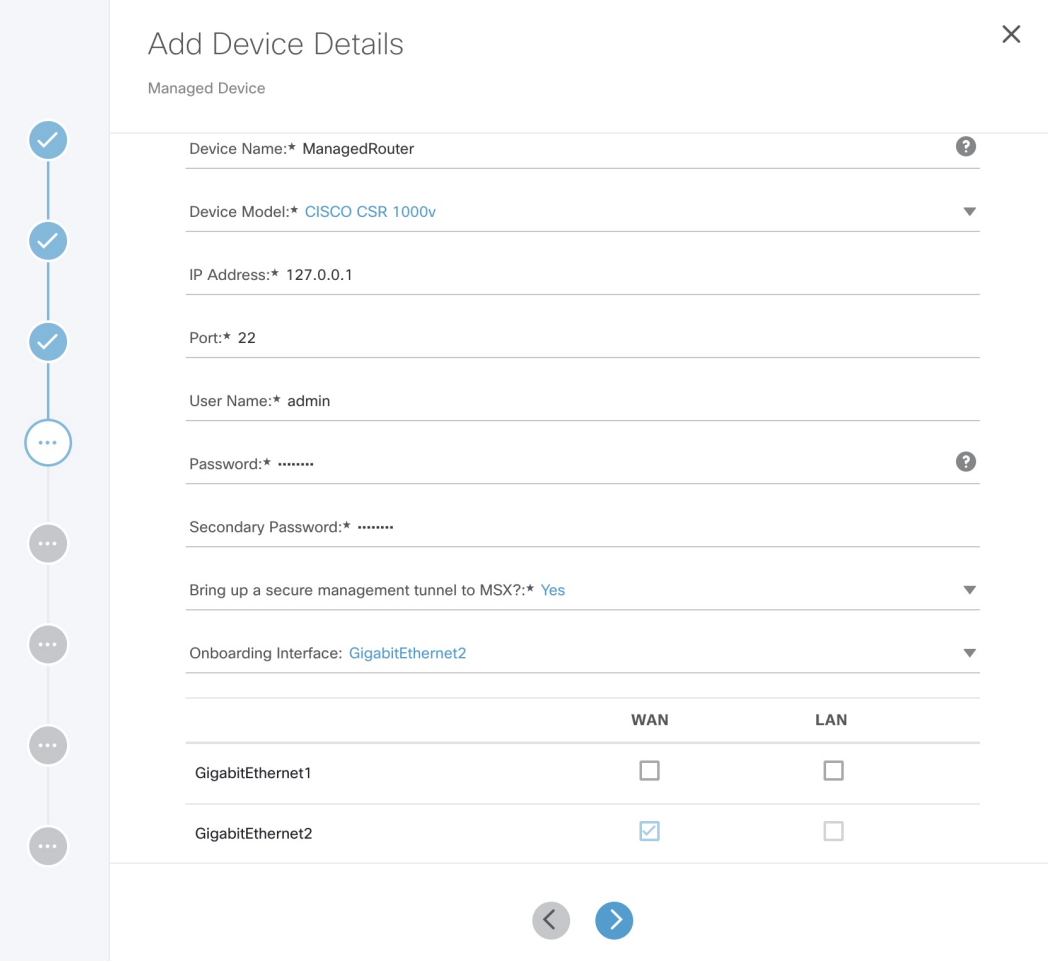
From the **Bring Up a Secure Management Tunnel to Cisco MSX** drop-down list, choose **No** to onboard the device without a management tunnel.

j) From the **Onboarding Interface** drop-down list, choose the onboarding interface for monitoring the LAN and WAN.

Note By default, if **WAN** is selected, you can change it to **LAN**. But, if **LAN** is selected by default, you cannot change it to **WAN**.

- To monitor the WAN, check the **WAN** check box.
- To monitor the LAN, check the **LAN** check box.
- To clear the entry, uncheck the **WAN/LAN** check box.

Figure 11: Direct Onboarding



Meraki

a) On the **Select Site and Network** page, from the **Site Name** and **Meraki network** drop-down options, select a site and network you want to associate your Meraki devices to.

b) On the **Add Meraki Devices** page, select the devices from the available list of active devices for the network that was selected in the previous step. You can filter the devices by device name and device model.

Note For network with appliance device type, you can add only maximum of two devices.

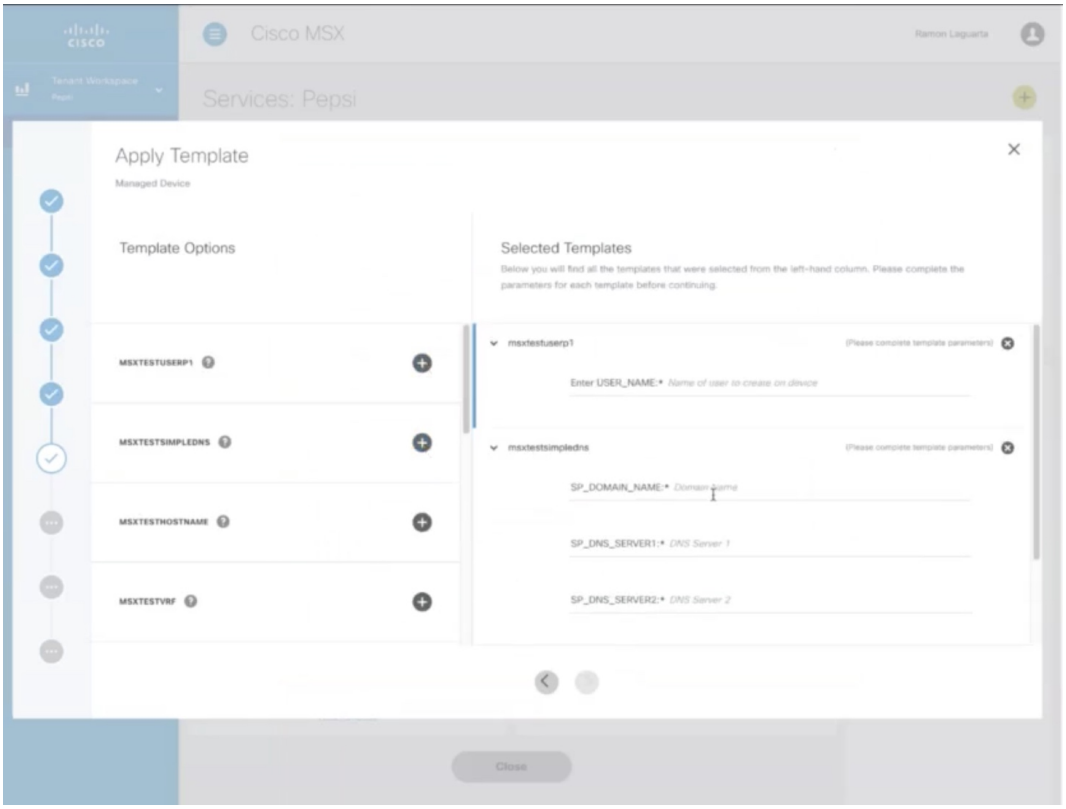
c) Click > to move to the **Review and Submit** page.
d) Review the details and click **Submit** to complete the process.

Step 8 Click **Next**.

Step 9 In the **Select Template** section, you can select one or more templates that you want apply on the device from the **Template Options** pane.

The selected stack of templates appears on the **Selected Templates** pane.

Figure 12: Select Templates



a. To apply multiple templates on the device:

- In the **Template Option** pane, click the + icon to apply the desired device templates on the device.
- In the **Selected Template** pane, enter the value for each template instance.

b. To apply the same template more than once on the device:

- In the **Template Option** pane, click the + icon to apply the desired device templates on the device.
- In the **Selected Template** pane, enter the new set of values for each template instance.

Note Cisco MSX allows you to reapply the same template repeatedly with a new set of values for each template instance.

Each template in the stack is independent of the other template. These templates can be selected in any order.

The latest selected template appears first in the template stack. These configurations are applied to the device in an appropriate order.

Note You can revoke a specific template from the template stack to cancel any of the configurations that is applied to a template.

Step 10 Click **Next**.

The device information you configured is displayed for review.

Step 11 Click **Next**.

The device is added successfully and a message is displayed. From here, you can either view the device details or assign device to a site. Click **View Device** to view the details of the device.

Step 12 Click **Assign Device to Site** to assign the device to a site.

Click **Do not show this introductory step again** to skip the introductory step. Next time this window will not be shown when you assign a site.

Step 13 Click **Next**.

The **Select Site** window is displayed.

Step 14 In the **Site name** field, search for the site name and select a site from the drop-down list.

Step 15 Click **Next**.

The site is assigned to a device.

Step 16 Click **Close**.

Adding a Serial Number

Cisco MSX onboards devices only after the serial number is added. To add a serial number:

Procedure

Step 1 Log in to the Cisco MSX portal.

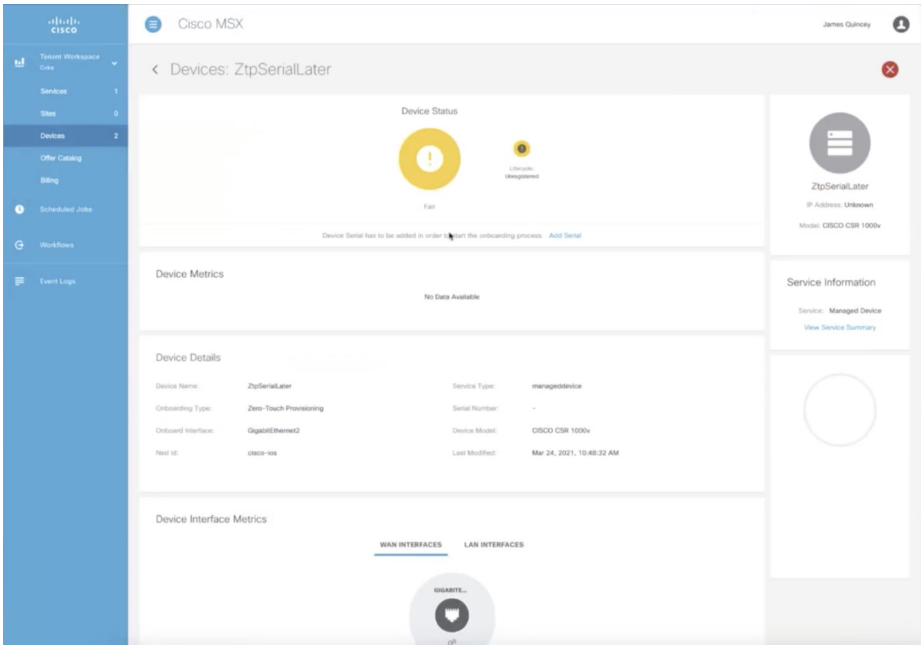
Step 2 From the left pane, choose **Tenant Workspace > Devices**.

The **Devices** tile is displayed with the available devices.

Step 3 Choose a device from the list.

The device information is displayed.

Figure 13: Adding a Serial Number



Step 4 In the **Device Status** section, click **Add Serial**.

The **Add Serial Number** dialog box is displayed.

Step 5 Enter the serial number.

Step 6 Click **Add Serial**.

The serial number is added successfully and a message is displayed.

Step 7 Click **Close**.

Importing Multiple Devices

Cisco Managed Device service pack allows you to import multiple devices at once using the bulk import feature. The Site Template file is used to import multiple devices. This file has a custom header row, and each subsequent row in the file represents a device to be created. You need to enter the required data in the appropriate columns of the file and then import the Site Template file to Cisco MSX.

Note

- Meraki devices cannot be included in the bulk import.
- You must have a role that includes the MANAGE_BULK_IMPORT permission to perform the bulk import operation.

To avoid potential errors, disable the bulk import function if a bulk import job is already running. For example, if an error occurs when the bulk import job includes a device that is already provisioned, then the device gets duplicated in the Cisco MSX. Performing the jobs in sequence ensure that all the devices are added correctly by detecting and ignoring duplicate devices.

To download a Site Template:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Services**.

The **Services** tile is displayed with the Managed Device service.

Step 3 Click the **ellipsis (…)** and choose **Import Devices Using CSV** from the menu.

The **Import Managed Devices using CSV** window is displayed.

Note You can also access this feature from **Service Controls** pane. Choose **Tenant Workspace > Service Controls > Import Managed Devices using CSV**.

Step 4 Prepare the Site Template file.

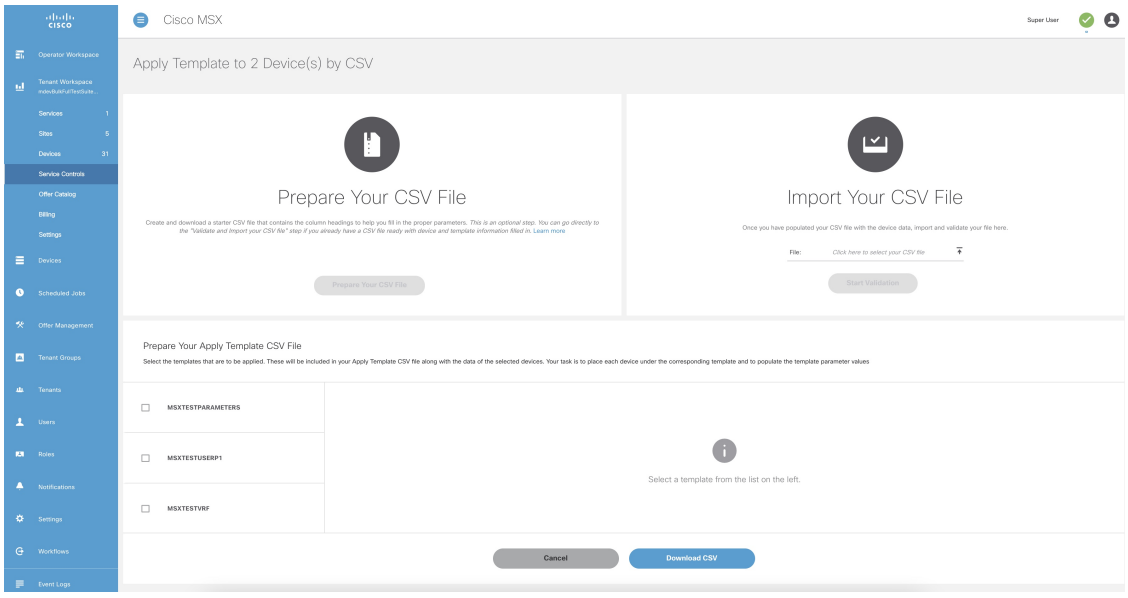
a) Click **Prepare your CSV file**.

The list of all the available templates for the tenant is displayed.

Note If templates are not currently available, add the device templates to the template library. For more information, see Adding Device Templates.

b) Select the templates that are to be applied for the devices at the time of import.

Figure 14: Site Template File Preparation



Step 5 Download a Site Template file.

a) Click **Download CSV**.

Only the tenant users with the access privilege can download the Site Template file.

For more information on assigning the template to tenant users, see Managing Template Access for Tenants.

b) Save the file to your local file storage.

Step 6 Edit the downloaded Site Template file.

The downloaded Site Template file contains only the selected templates. The header of this file depends on the templates you had selected.

You can manually add the devices and parameter values in the Site Template file. Each subsequent row represents a device to be created.

Using the Site Template file, you can apply single or multiple templates and reapply the same template repeatedly to the selected device.

- **For a single site:** You can add a single device and apply the templates. Enter the parameter values manually in the Site Template file. Now import this file into Cisco MSX.
- **For multiple sites:** You can add any number of devices and apply the templates for each device. Enter the parameter values manually for each template instance in the Site Template file. Now import this file into Cisco MSX.
- **Applying a single template multiple times on a device**: Cisco MSX enables you to reapply a single template multiple times to a device with a new set of values using a Site Template file. Enter the parameter values manually for every template instance. Use a comma to separate these parameter values in their respective fields of the Site Template file.

Figure 15: Site Template File

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Site Name	Device Name	Description	Location	Device Onboarding	Serial Number	Device Model	LAN Interface	WAN Interface	Onboarding I	Device IP Address	Device Port	Device Username	Device Password	Device Secondary	Enable Secure	Compliance	Templates To Apply	
2	Ottawa	Rem1	Ottawa	Ottawa	pnp	9TUQOEDDBUI	CISCO CSR 1000v		GigabitEtherne	GigabitEthernet2						TRUE	NO	No Template	

Step 7 Import the Site Template file.

a) Click **Import Your CSV File** to upload the prepared Site Template file from your local storage.

Note You can also access this feature from **Service Controls** pane. Choose **Tenant Workspace > Service Controls > Import Managed Devices using CSV**.

b) Click **Start Validation**.

Once the file is uploaded, the device data is validated.

- If the device data in the Site Template file is valid, the **Validation Complete** dialog box appears.

  Click **Import Devices**. The device data is added to the Cisco MSX.

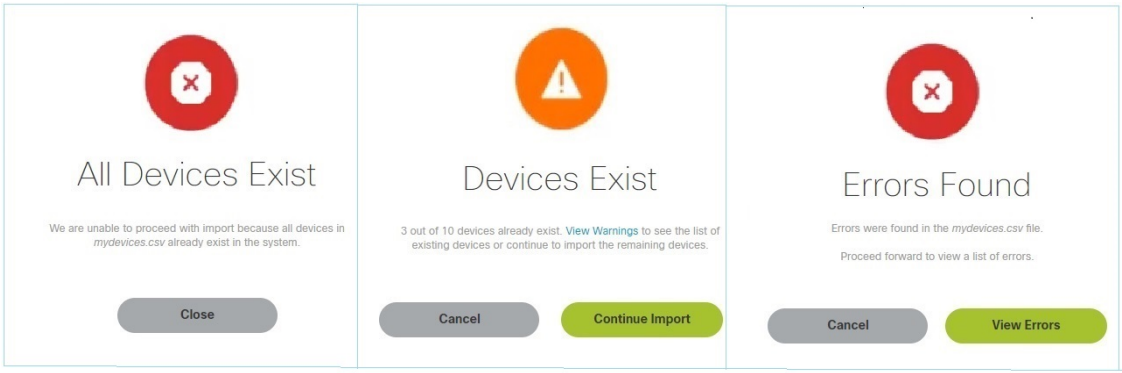
- If the device data in the Site Template file is invalid, the validation process detects and displays the errors.

  Cisco MSX spots the exact row number and specific field that has incorrect data and displays a detailed error list. Displays both errors and warning messages to the user.

- **Error message:** Indicates the wrong format, invalid entry, and templates that do not exist. Fix these errors to proceed further with the Site Template import.

  Warning message: Indicates that the site exists in the Cisco MSX system. The warning message allows you to import other new sites that are added in this Site Template file.

Figure 16: Validation Messages



c) The validation messages are:

1. **All Device Exist**: Indicates that the devices added in the Site Template file are already found in the Cisco MSX, therefore unable to proceed further with the file import process.

   Click **Close**.

   Upload the Site Template file with the valid device data again.

2. **Devices Exist**: Indicates that a few of the devices in the Site Template file already exist in the Cisco MSX.

   - Click **View Warnings**.

     The **Device Data Errors** window appears. Displays the warning messages and their corresponding row numbers.

     - Click **Download Error List** to download the error file.
     - Click **Back to File Upload** to import the same Site Template file.
     - Click **Cancel Import** to withdraw the file import and exit from the entire operation.

   - Click **Continue Import** to import the existing Site Template file into the Cisco MSX.

     Displays the new device in the Managed Device home page.

3. **Error Found:** In this case, a combination of both warnings and error messages appear.

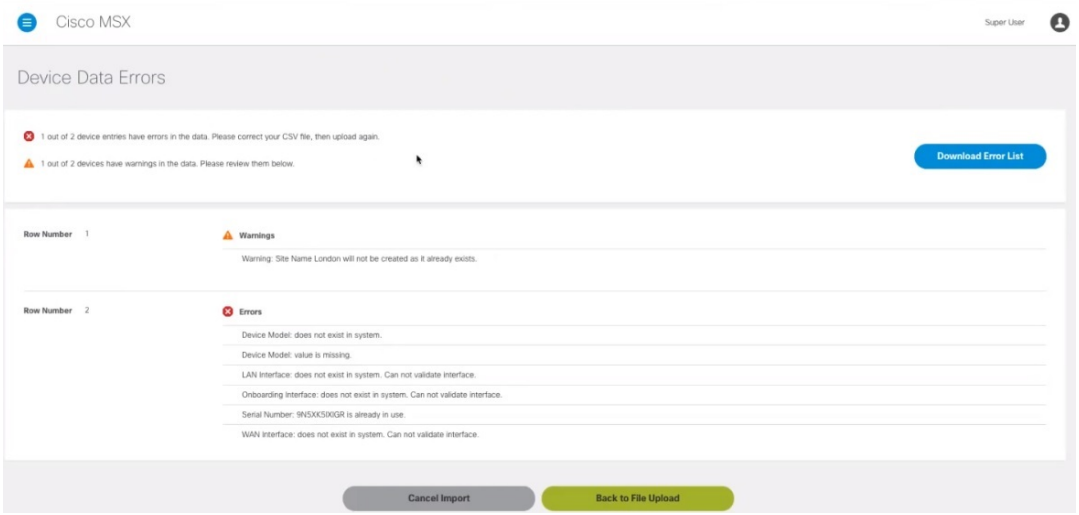
   - Click **View Errors**.

     The **Device data error window** appears. Displays the list of all the validation errors with the corresponding row numbers.

     - Click **Download Error List** to download the validation error file.

Note If you want to add more devices to the Site Template file after it is uploaded to Cisco MSX, you must add the details of these new devices to an existing Site Template file and upload the updated file to Cisco MSX again.

Figure 17: Device Data Errors



Applying Template from Cisco MSX Portal

To apply template to a device:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the list of devices.

Step 3 Click the **ellipsis (...)** that is located far right on the same row and then choose **Apply Template**.

The **Apply Template** window is displayed.

Step 4 From the **Apply Template** window, select one or more templates that you want to apply on the device.

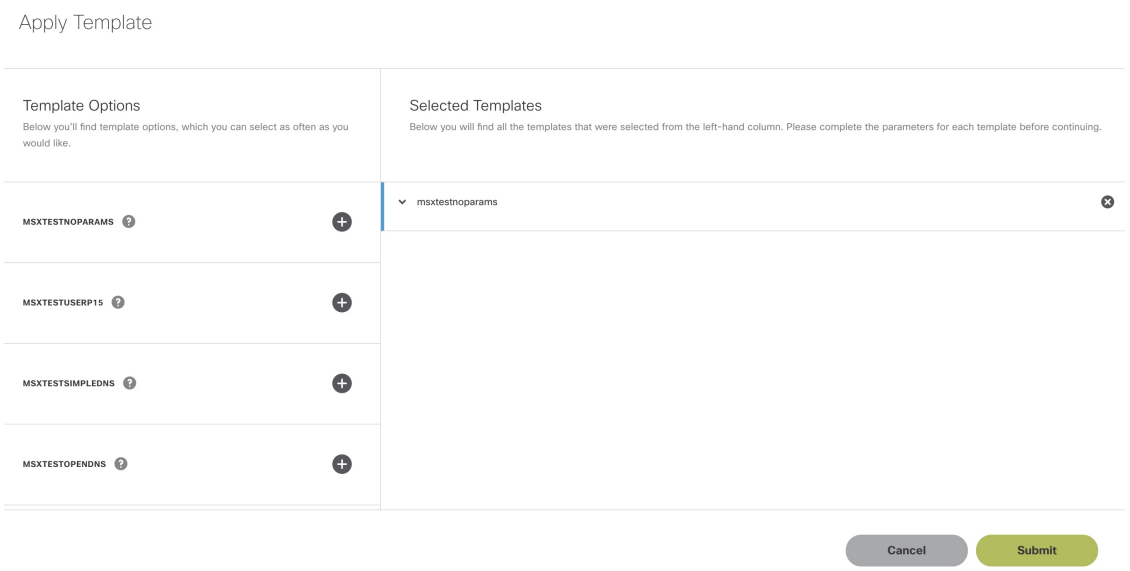
The selected stack of templates appears on the **Selected Templates** pane.

a. To apply the same template more than once on a device:

- In the **Template Options** pane, click the **+** icon to apply the desired device templates on the device.
- In the **Selected Template** pane, enter the new set of values for each template instance.

For example: If you select a template, Cisco MSX allows you to reapply the same template multiple times with a new set of values for the template instance.

Figure 18: Apply Template



Step 5 Click **Submit**.

Applying Template Using CSV File

To apply template on multiple devices using CSV file:

Procedure

Step 1 Log in to the Cisco MSX portal.

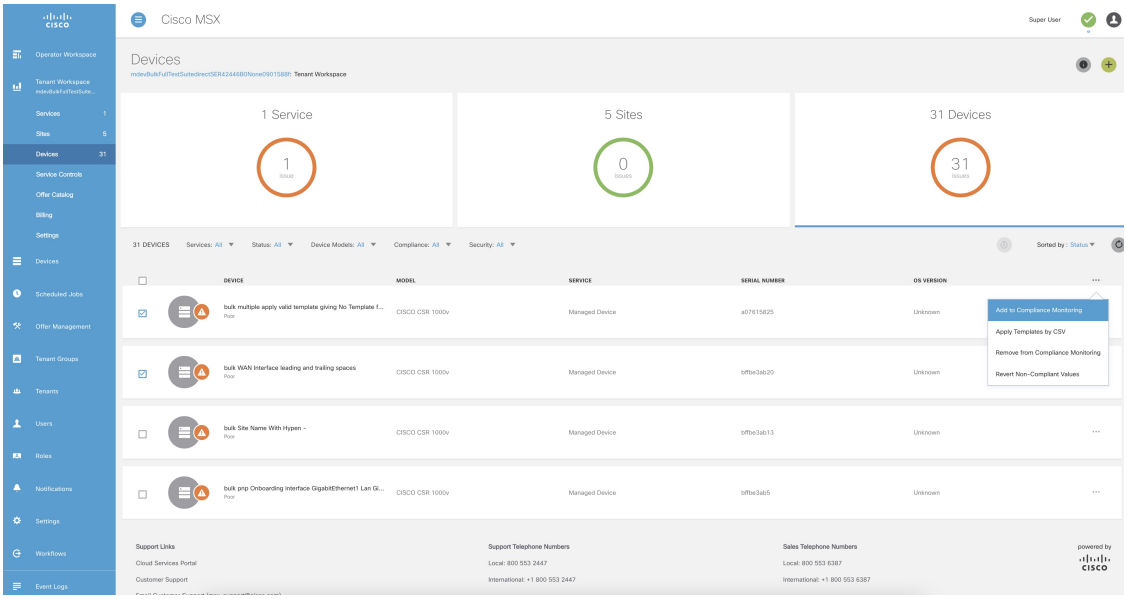
Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the list of devices.

Step 3 Select multiple devices from the list.

Step 4 Click the **ellipsis (...)** that is located far right on the column header and then choose **Apply Template by CSV**.

Figure 19: Applying Template Using CSV File



Step 5 Prepare the Site Template file.

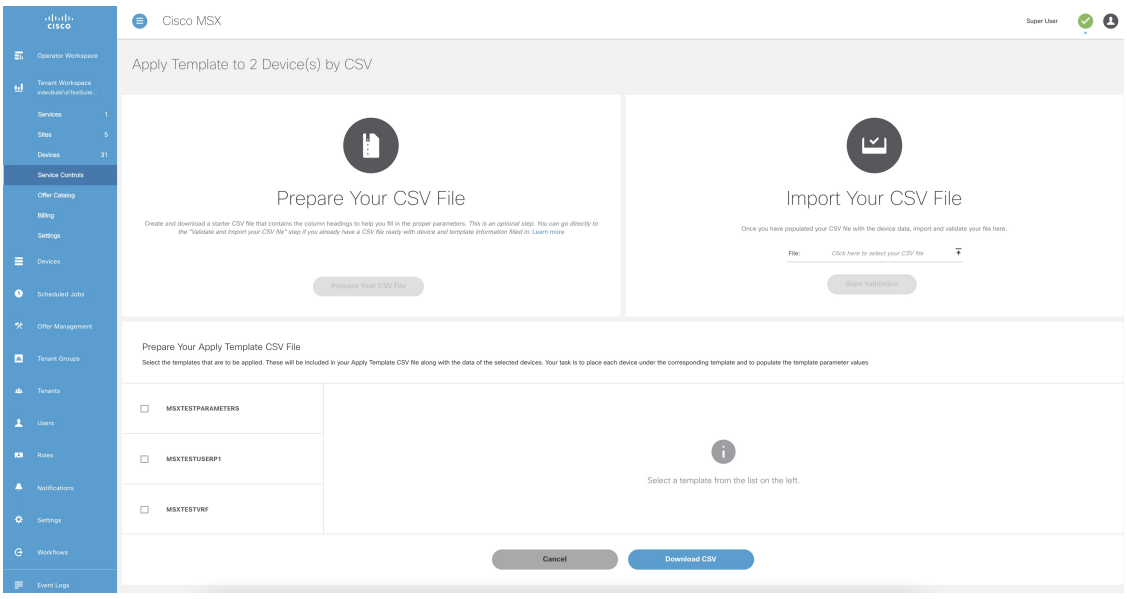
a) Click **Prepare your CSV file**.

The list of all the available templates for the tenant is displayed.

Note If templates are not currently available, add the device templates to the template library. For more information, see Adding Device Templates.

b) Select the templates that are to be applied for the devices at the time of import.

Figure 20: Site Template File Preparation



Step 6 Download a Site Template file.

a) Click **Download CSV**.

Only the tenant users with the access privilege can download the Site Template file.

For more information on assigning the template to tenant users, see Managing Template Access for Tenants.

b) Save the file to your local file storage.

Step 7 Edit the downloaded Site Template file.

The downloaded Site Template file contains only the selected templates. The header of this file depends on the templates you had selected.

You can manually add the devices and parameter values in the Site Template file. Each subsequent row represents a device to be created.

Using the Site Template file, you can apply single or multiple templates and reapply the same template repeatedly to the selected device.

- **For a single site:** You can add a single device and apply the templates. Enter the parameter values manually in the Site Template file. Now import this file into Cisco MSX.
- **For multiple sites:** You can add any number of devices and apply the templates for each device. Enter the parameter values manually for each template instance in the Site Template file. Now import this file into Cisco MSX.
- **Applying a single template multiple times on a device**: Cisco MSX enables you to reapply a single template multiple times to a device with a new set of values using a Site Template file. Enter the parameter values manually for every template instance. Use a comma to separate these parameter values in their respective fields of the Site Template file.

Figure 21: Site Template File

	A	B	C	D	E	F	G	H	I
1	Device Id	Device Name	Templates To Apply	DNS:SP_DNS_SERVER1	DNS:SP_DNS_SERVER2	DNS:SP_DOMAIN_NAME			
2	15f90617-71	MDdevice2	DNS	8.8.8.8	8.8.1.1	cisco.com			
3	c235edc5-b1	MDDevice1	DNS	8.8.8.8	8.8.1.1	cisco.com			

Step 8 Import the Site Template file.

a) Click **Import Your CSV File** to upload the prepared Site Template file from your local storage.

Note You can also access this feature from **Service Controls** pane. Choose **Tenant Workspace > Service Controls > Apply Templates to Managed Devices using CSV**.

b) Click **Start Validation**.

Once the file is uploaded, the device data is validated.

- If the device data in the Site Template file is valid, the **Validation Complete** dialog box appears.

  Click **Import Devices**. The device data is added to the Cisco MSX.

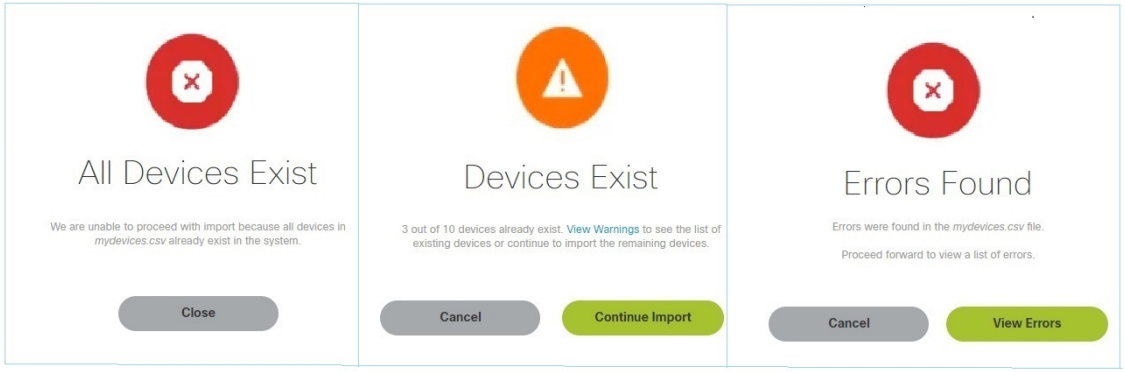
- If the device data in the Site Template file is invalid, the validation process detects and displays the errors.

  Cisco MSX spots the exact row number and specific field that has incorrect data and displays a detailed error list. Displays both errors and warning messages to the user.

- **Error message:** Indicates the wrong format, invalid entry, and templates that do not exist. Fix these errors to proceed further with the Site Template import.

  Warning message: Indicates that the site exists in the Cisco MSX system. The warning message allows you to import other new sites that are added in this Site Template file.

Figure 22: Validation Messages



c) The validation messages are:

1. **All Device Exist**: Indicates that the devices added in the Site Template file are already found in the Cisco MSX, therefore unable to proceed further with the file import process.

   Click **Close**.

   Upload the Site Template file with the valid device data again.

2. **Devices Exist**: Indicates that a few of the devices in the Site Template file already exist in the Cisco MSX.

   - Click **View Warnings**.

     The **Device Data Errors** window appears. Displays the warning messages and their corresponding row numbers.

     - Click **Download Error List** to download the error file.
     - Click **Back to File Upload** to import the same Site Template file.
     - Click **Cancel Import** to withdraw the file import and exit from the entire operation.

   - Click **Continue Import** to import the existing Site Template file into the Cisco MSX.

     Displays the new device in the Managed Device home page.

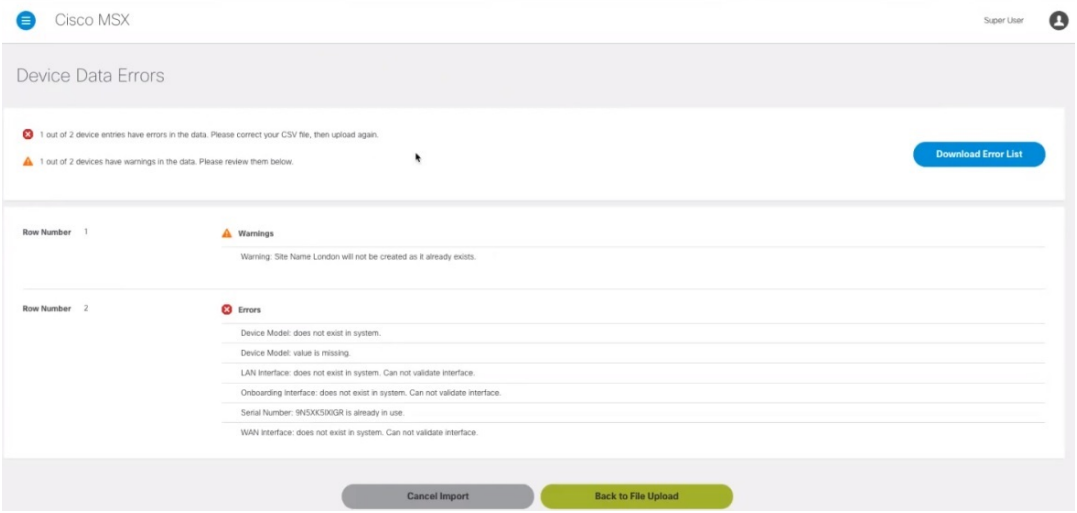
3. **Error Found:** In this case, a combination of both warnings and error messages appear.

   - Click **View Errors**.

     The **Device data error window** appears. Displays the list of all the validation errors with the corresponding row numbers.

     - Click **Download Error List** to download the validation error file.

Figure 23: Device Data Errors



Removing Templates from Device

To remove templates from a device:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the list of devices.

Step 3 From the list, select the device for which you want to remove the template.

Step 4 Click the **ellipsis (...)** that is located far right on the same row and then choose **Remove Templates**.

The **Remove Templates** confirmation dialog box appears for you to confirm the removal of all the templates from the device.

Step 5 Click **Remove Template**.

The applied templates are removed from the device.

Deleting a Device

To delete a device:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the list of devices.

Step 3 From the list view, select the device that you want to delete.

Step 4 Click the **ellipsis (...)** that is located far right on the same row of the device and then choose **Delete Device**.

The **Delete Device** confirmation dialog box appears.

Step 5 Click **Yes** to delete the device from Cisco MSX.

Step 6 Click **Delete Site**.

Unsubscribing Managed Device Service

To unsubscribe Managed Device service pack:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Services**.

The **Services** tile is displayed with the Managed Device service.

Step 3 Click the **ellipsis (…)** and choose **Unsubscribe** from the menu.

The **Unsubscribe from Managed Device** dialog box is displayed.

Step 4 Click **Unsubscribe**.

Note Unsubscribing to the Managed Device service deletes all devices and Meraki networks associated with the service.

Provisioning a Device that is Not Supported Out-of-the-Box by Managed Device

Table 11: Steps Involved in Provisioning New Device Type in Managed Device

Task	See
The Managed Device consists of Cisco IOS NED by default to onboard any Cisco IOS-XE devices. The NED package is decided based on the new device type that is to be onboarded. Upload the new NED into the Managed Device NSO.	Uploading a NED Package

Task	See
Preparing the SNMP device template.	Loading SNMP Configuration Template
Preparing the device model construct (JSON file) to collect the SNMP metrics data for the new device type that is to be onboarded into Cisco MSX.	Preparing Device Model Information for New Device Type
The JSON file now has all the necessary device model fields. Upload this file into the Cisco MSX Portal to capture the SNMP metric data of the new device type.	Importing Device Model
Onboard the new device type in the Managed Device service pack.	Adding a Device

Loading SNMP Configuration Template

To load SNMP configuration template:

Procedure

Step 1 Convert CLI configuration into the NSO XML template for a new device type using the procedure explained here. For more information on workflow, see Creating Device Template.

Convert some of the tags in the XML template to variables. The tags are:

- smmp-user
- snmp-priv-password
- snmp-auth-password

Note While preparing the CLI configuration for SNMP support, ensure that you make a note of authentication protocol, privacy protocol, and user name.

```
"snmpAuthProto": "AuthProto",
"snmpVersion": "3",
"snmpPrivProto": "aes",
"snmpUserName": "username"
```

Step 2 Add the SNMP template to custom-templates folder on kubernetes-master node.

a) To navigate to kubernetes master node, execute the following:

```
cd /data/vms/custom-templates/manageddevice/templates/
```

b) Create a .xml file. Add the NSO XML contents into this file and save it.

For example: junos-snmp.xml file

Note Ensure that you make a note of the .xml file name. The XML file will be later reused while preparing the device model information.

Step 3 Reload the NSO. The XML template should be loaded into NSO database system.

a) Log in to NSO POD and connect to NCS_CLI.

b) To reload NSO, execute the following:

```
vmsnso@ncs> request packages reload
```

c) To verify if the XML template is loaded successfully, execute the following:

```
vmsnso@ncs> show packages package custom-templates templates
templates [ junos-snmp ]
```

Next Steps

- Preparing device model information. For more information, see Preparing Device Model Information for New Device Type.

Preparing Device Model Information for New Device Type

To facilitate the SNMP metric collection for the new device type, you can utilize the device model construct to collect metrics details.

For more details on how to build each SNMP field in the device model construct, see 'Sample device model field with description' in the Preparing Device Model.

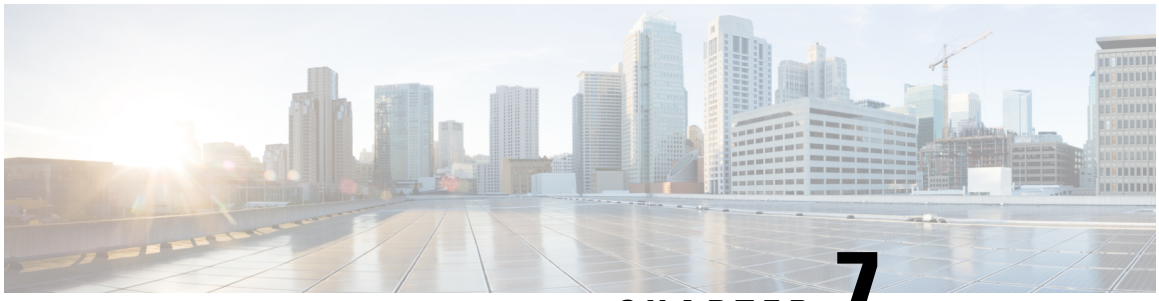
Sample device model construct of Juniper:

```
{
    "deviceModels": [{
        "deviceModelName": "Juniper SRX",
        "platformDeviceType": "",
        "platformDeviceSubType": "",
        "interfaces": [],
        "lan": [],
        "wan": [],
        "nedId": "",
        "deviceType": "",
        "directTemplate":""


    }],
    "deviceMetricConfigurations": [{
        "snmpDetails": {
            "snmpAuthProto": "",
            "snmpVersion": "",
            "snmpPrivProto": "",
            "snmpUserName": ""
        },
        "platformDeviceType": "",
        "platformDeviceSubType": "",
        "snmpOidList":[],
        "snmpCpuMemoryUptimeQueryTemplate": {
        }
    }]
}
```

Next step:

After preparing the device model information (JSON file) for the new device type, upload this JSON file into Cisco MSX. For more information, see Importing Device Model.



CHAPTER 7

Device Compliance

Device Compliance provides detection of device configuration changes by remote users.

There are two modes of device compliance configurations monitored:

- Standard Configuration, or the configuration provisioned by Cisco MSX—Standard configuration monitors only a certain elements on the device. Standard configuration is a subset of values across all devices. You can ensure a set of devices have the same values irrespective of device type and model. These are considered global values such as NTP servers, DNS servers, SNMP trap targets, and so on.
- Full Device Configuration—The full device compliance monitors the entire configuration for any remote changes. Once a remote change is detected the device will be marked out of compliance. Youc can then choose to revert the changes or accept the changes.

Note Only devices onboarded through Managed Devices can be monitored for device compliance.

This chapter contains the following topics:

Device Compliance

Device Compliance provides detection of device configuration changes by remote users.

There are two modes of device compliance configurations monitored:

- Standard Configuration, or the configuration provisioned by Cisco MSX—Standard configuration monitors only a certain elements on the device. Standard configuration is a subset of values across all devices. You can ensure a set of devices have the same values irrespective of device type and model. These are considered global values such as NTP servers, DNS servers, SNMP trap targets, and so on.
- Full Device Configuration—The full device compliance monitors the entire configuration for any remote changes. Once a remote change is detected the device will be marked out of compliance. Youc can then choose to revert the changes or accept the changes.

Note Only devices onboarded through Managed Devices can be monitored for device compliance.

This chapter contains the following topics:

Standard Configuration

The Standard Configuration is the set of values that must be compliant across devices added to compliance monitoring. Devices added to Compliance monitoring will have their configuration validated against the Standard Configuration. Any deviations from the Standard Configuration gets reported immediately in the system, and users are alerted. Devices are also monitored in real-time for any remote changes that may deviate from the Standard Configuration. The values in the Standard Configuration will be applied to all configured device types.

Editing Standard Configuration

The Standard Configuration is the set of values that must be compliant across devices added to compliance monitoring. Devices that are added to Compliance monitoring will have their configuration validated against the Standard Configuration. Any deviations from the Standard Configuration will be reported immediately in the system and users are alerted. Devices are also monitored in real-time for any remote changes that may deviate from the Standard Configuration. The values in the Standard Configuration will be applied to all configured device types.

Standard Configuration involves two parts. The first part is defining the Standard Configuration by creating a set of categories, which is described in Adding Standard Configuration Category. After you create the Standard Configuration categories, the second part is providing any dynamic values required, which is described below.

To edit standard configuration values:

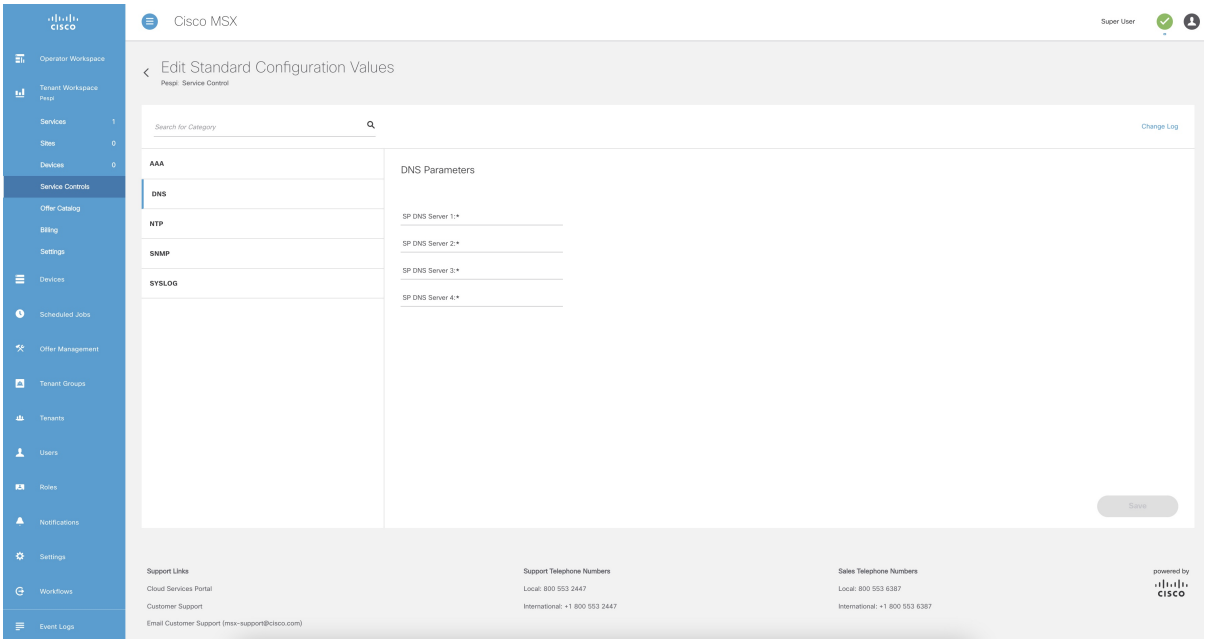
Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Service Controls > Edit Standard Configuration Values**.

The **Edit Standard Configuration Values** window is displayed with the compliance categories.

Figure 24: Edit Standard Configuration Values



Step 3 From the list, click a category you want to edit. You can also search for a category using the search box.

The category parameters are displayed.

Step 4 Edit the parameter values.

Step 5 Click **Save**.

The parameter values are saved to the Standard Configuration.

Adding Standard Configuration Category

A category is a set of configurations, per device type specified, which is to be compliant across all the configured device types. A category consists of templates that specify the device configuration (per device type) and optional parameters to provide values through the UI as opposed to hard-coded in the template. A combination of both is supported, as well as all template hard-coded values. The template configuration will be compared with the device types under compliance.

A category may have one or many device types supported. Only device types under compliance with a specified template configuration will be tested for compliance. It is possible to have different compliance checks per device type, by supplying different templates in a category. A category can also have just one template for a device type, and multiple categories can be defined, one per device type and compliance configuration.

To add a new category to Standard Configuration:

Note You need the following permissions to modify the Standard Configuration:

- Standard Configuration Manage
- Device Templates Manage

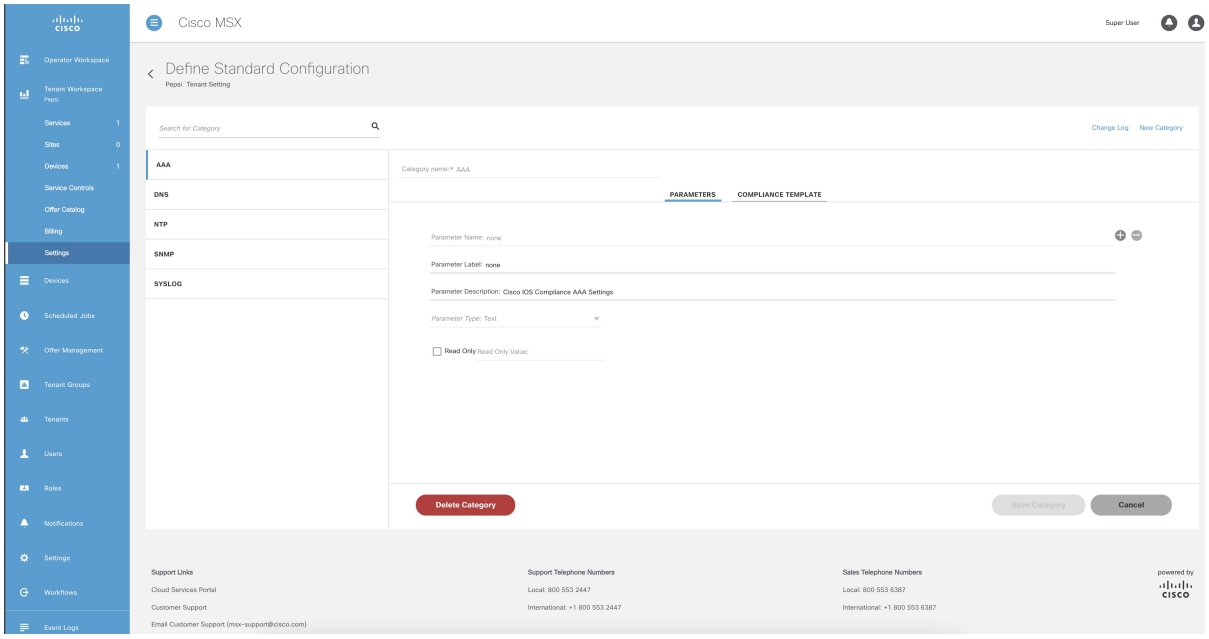
Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Settings > Define Standard Configuration**.

The **Define Standard Configuration** window is displayed.

Figure 25: Define Standard Configuration Settings



Step 3 Click **New Category**.

Step 4 In the **Category Name** field, enter a category name.

Step 5 To create a template, click **COMPLIANCE TEMPLATE** tab.

Step 6 From the **NED ID** drop-down list, choose a NED ID. The NED represents the device type you want the device template configuration to apply. You can specify multiple NEDs, each with their own specific device template or just a single NED and template.

Step 7 Enter the configuration in the textbox provided.

Step 8 Click **Generate Parameters** to generate parameters from the configuration you entered in the template textbox. Parameters that are not already included in the Parameters tab only will be generated.

Step 9 You can add more than one template to a category. To add another template, click the plus (+) icon. Similarly, to delete a template, click the minus (-) icon.

Note To see the template that you already added, scroll down to the bottom of the screen.

Step 10 To add parameters, click **PARAMETERS** tab and then click **Add Parameter**.

The fields to enter parameter details are displayed.

Step 11 Enter the **Parameter Name**, **Parameter Description**, and **Parameter Label** in the fields displayed.

Step 12 From the **Parameter Type** drop-down list, choose a parameter type.

Step 13 Check the **Read Only** option if the parameter is read-only and enter the default parameter value. This value will be displayed as a read-only value when you access the standard configuration. If the option is unchecked, then you are specifying a read or write parameter.

Step 14 You can add more than one parameter to a category. To add another parameter, click the plus (+) icon. Similarly, to delete a parameter, click the minus (-) icon.

Note To see the parameter that you already added, scroll down to the bottom of the screen.

Step 15 Click **Save Category**.

The new category you added will be displayed at the left pane.

Note You can specify only one template per NED type for a category.

Deleting Standard Configuration Category

You can delete a category from the Standard Configuration.

To delete a category:

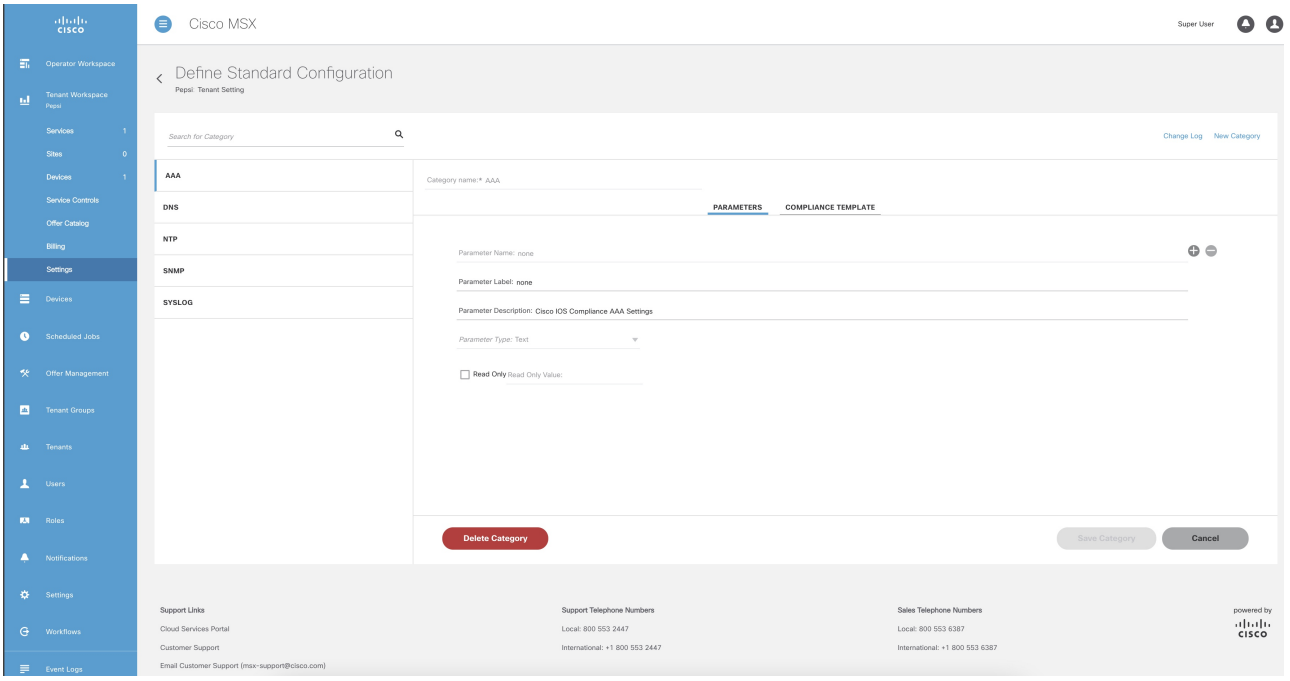
Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Settings > Define Standard Configuration**.

The **Define Standard Configuration** window is displayed.

Figure 26: Define Standard Configuration Settings



Step 3 Click a category from the left pane.

The category information is displayed.

Step 4 Click **Delete Category**.

The **Category Deletion** dialog box is displayed.

Step 5 Click **Delete**.

A message 'Standard Configuration Category Deleted Successfully' is displayed.

Creating a ServiceNow Account

You can create a ServiceNow account for generating incident tickets for compliance drift and remediation actions.

For more information on integrating incident tracking system with Cisco MSX, see Integrating Incident Tracking System with Cisco MSX.

To create a ServiceNow account:

Note You need the following permission to update ServiceNow settings:

- Incidents Manage

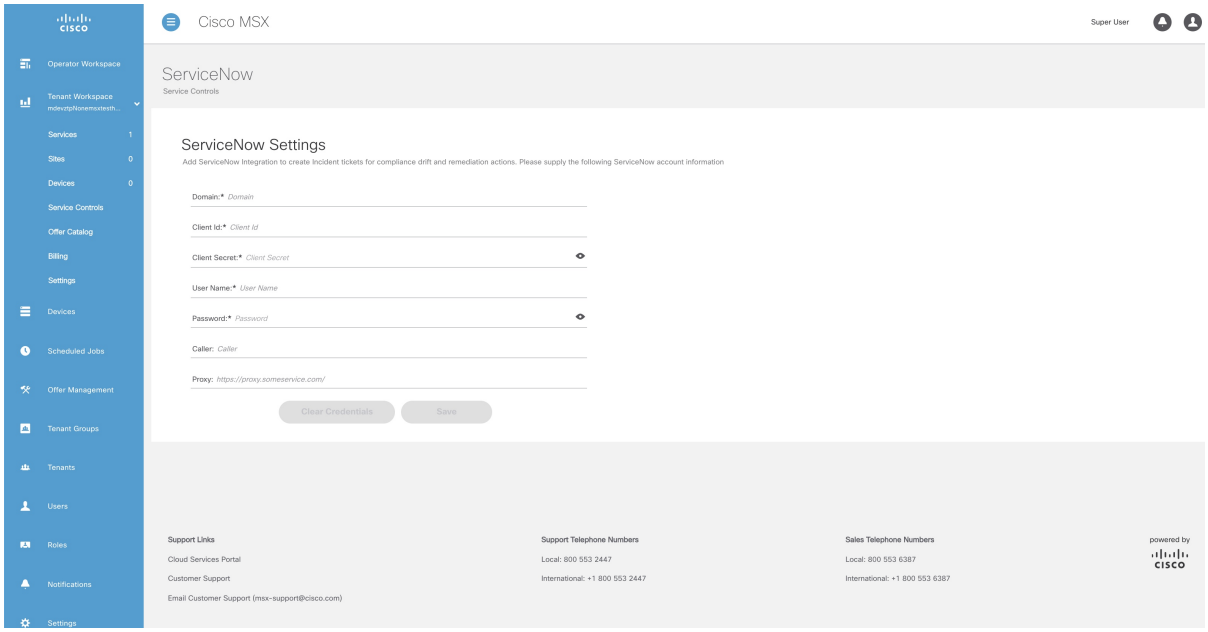
Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Settings > ServiceNow Settings**.

The **ServiceNow** window is displayed.

Figure 27: ServiceNow Settings



Step 3 In the **Domain** field, enter the FQDN of your ServiceNow instance.

Step 4 In the **Client Id** field, enter the client ID provided by ServiceNow.

Step 5 In the **Client Secret** field, enter the client secret provided by ServiceNow.

Step 6 In the **User Name** field, enter the username to log in to the ServiceNow instance.

Step 7 In the **Password** field, enter the accompanying password for logging into the ServiceNow instance.

Step 8 In the **Caller** field, enter the caller name. The Caller is the person contacting the Service Desk to get an incident registered. We recommend creating a ServiceNow user called 'Cisco MSX' (in ServiceNow) and providing 'Cisco MSX' as the Caller in the ServiceNow settings.

Step 9 (Optional) In the **Proxy** field, enter a proxy URL.

Step 10 Click **Save**.

A message 'ServiceNow Configuration Saved Successfully' is displayed.

Note You can delete the configuration by clicking the **Clear Credentials** button. Once you delete a ServiceNow account, Cisco MSX will clear the credentials from the system and disconnect access to ServiceNow. You will not be able to send incident tickets, receive service notifications, or any services from ServiceNow across your organization.

Adding a Device to Compliance Monitoring

Compliance monitoring for devices ensures any deviation from the defined set of compliant values (the Standard Configuration) is detected and reported immediately to system administrators. The deviations can be auto-remediated or invoked by user interaction. A full audit log is available to view activities related to compliance deviation and remediations.

To add a device to compliance monitoring:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the list of devices.

Step 3 Choose a device or devices from the list.

Step 4 If you choose a single device, click the **ellipsis (...)** that is located far right on the same row and then choose **Add to Compliance Monitoring**. If you choose multiple devices, click the **ellipsis (...)** that is located far right on the column header, and then choose **Add to Compliance Monitoring**.

The **Add Devices to Compliance Monitoring** dialog box is displayed. The dialog box provides information about how many devices are already monitored and how many will be added for monitoring.

Step 5 Click **Add to Monitoring**.

A confirmation message is displayed.

Note If you choose a device that is not eligible for compliance, you cannot add that device for compliance monitoring. Remove the unsupported devices from your selection and try again.

Step 6 Click **Close**.

Removing a Device from Compliance Monitoring

You can remove a device or devices from compliance monitoring. After you remove a device from compliance monitoring, it will not be monitored for any changes that deviate from the Standard Configuration.

To remove a device from compliance monitoring:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the list of devices.

Step 3 Choose a device or devices from the list.

Step 4 If you choose a single device, click the **ellipsis (...)** that is located far right on the same row and then choose **Remove from Compliance Monitoring**. If you choose multiple devices, click the **ellipsis (...)** that is located far right above all devices, and then choose **Remove from Compliance Monitoring**.

The **Remove Device from Compliance Monitoring** dialog box is displayed. The dialog box provides information about how many devices will be removed from monitoring.

Step 5 Click **Remove from Monitoring**.

A confirmation message is displayed.

Step 6 Click **Close**.

Configuring the Compliance for Devices

You can configure the compliance remediation settings of devices. You can either choose automatic remediation or user initiated remediation.

To configure compliance settings:

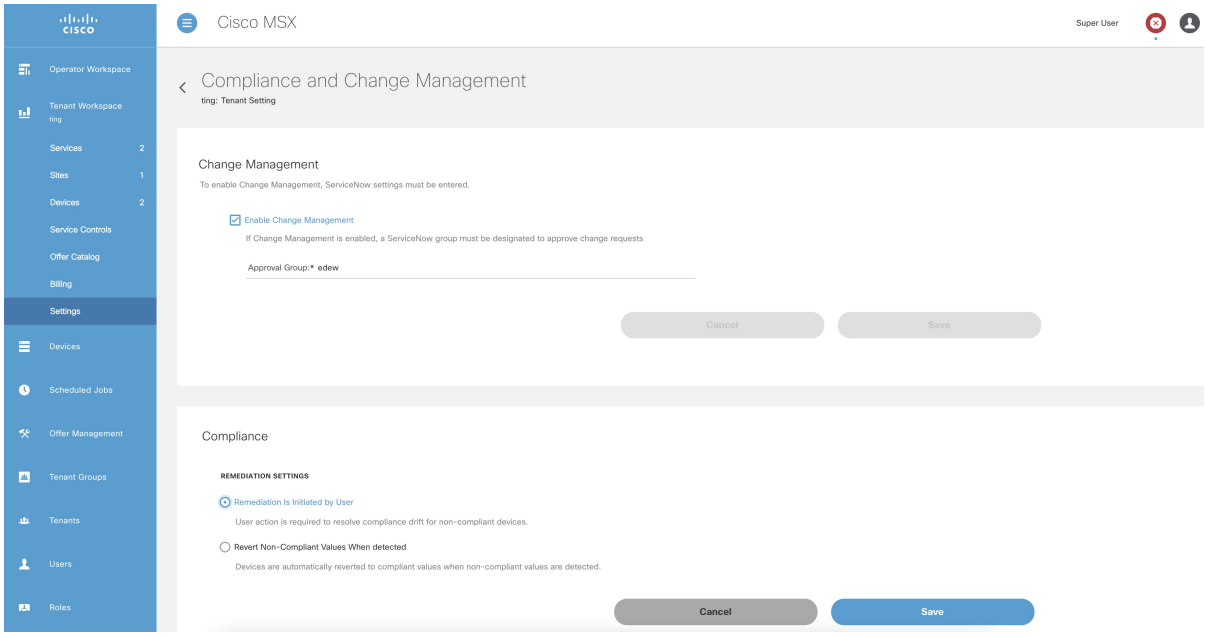
Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Settings > Compliance and Change Management**.

The **Compliance and Change Management** window is displayed.

Figure 28: Compliance and Change Management



Step 3 In the **REMEDIATION SETTINGS** section, click the **Remediation is Initiated by User** radio button if user initiation is required for remediation. If you choose this option, the values will not be reverted to standard values until you initiate it from your side.

a) Click **Save**.

A message 'Compliance Settings were Saved Successfully' is displayed.

Step 4 Click the **Revert Non-compliance Values When Detected** radio button if you want automatic remediation. If you choose this option, devices are automatically reverted to standard configuration values when non-compliant values are detected. You will be notified of the changes.

a) Click **Save**.

A message 'Compliance Settings were Saved Successfully' is displayed.

Remediating Non-compliant Values on a Device

Deviations on a device from the Standard Configuration can be remediated in two ways. The first option is to revert the changes on the device to the Standard Configuration values. The second option is to accept the non- complaint values on the device. This action will track the exception for this device and not warn again if the device is checked again for deviation drift. Changing the Standard Configuration value will negate any exceptions stored for a device against the changed Standard Configuration value.

To remediate non-compliance values:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the list of devices.

Step 3 From the list, click a device.

The device metric page lists the device information.

Step 4 From the **Compliance** section, click **Remediate**.

The **Remediate Non-Compliant Values** window is displayed. From the remediation options, you can either choose **Revert to Standard Configuration Values** or **Accept Non-compliant Values**.

Step 5 Click **Revert to Standard Configuration Values** if you want to revert the values to standard configuration.

a) Click **Next**.

The **Scheduling Options** window is displayed. You can remediate now or schedule the remediation for a later date.

b) Click **Remediate Now** to remediate the values immediately. Click **Next**.

Review the remediation details and click **Next**. The remediation process initiates and a message 'Remediation Initiated' is displayed.

c) Click **Schedule Remediation** to schedule the remediation for a later date.

d) If you click **Schedule Remediation**, you can either schedule a new job or add to an existing job.
e) To schedule a new job, click the **New Schedule Job** radio button.

In the **Schedule Job Name** field, enter a name for the schedule job.

In the **Date and Time** field, choose a date and time.

f) To add to an existing job, click the **Add to Existing Scheduled Job** radio button.

From the **Schedule Job** drop-down list, choose an existing schedule job.

g) Click **Next**.

The **Review Remediation** window is displayed.

h) Review the remediation details and click **Next**.

The remediation process initiates and a message 'Remediation Initiated' is displayed.

i) Click **Done**.

Step 6 Click **Accept Non-compliant Values** if you want to accept the values as compliant despite their differences with the standard configurations.

a) Click **Next**.

The **Review Remediation** window is displayed.

b) Review the remediation details and click **Next**.

The remediation process initiates and a message 'Remediation Initiated' is displayed.

c) Click **Done**.

Configuring Change Management Approvals

The Cisco MSX platform provides an approval process for configuration change requests made by a user. When the approval feature is enabled on Cisco MSX, change request for device configuration changes on Cisco MSX will be subjected to approval. If there is a change request on Cisco MSX, the request is forwarded to ServiceNow through the Change Request service. The changes will take effect once the user approves the request through the ServiceNow portal.

For more information on configuring change management approvals, see 'Configuring Change Management Approvals' in *Cisco MSX Administration*.

Updating Monitored Devices with Standard Configuration

You can update all the monitored devices with standard configuration.

To push standard configuration to monitored devices:

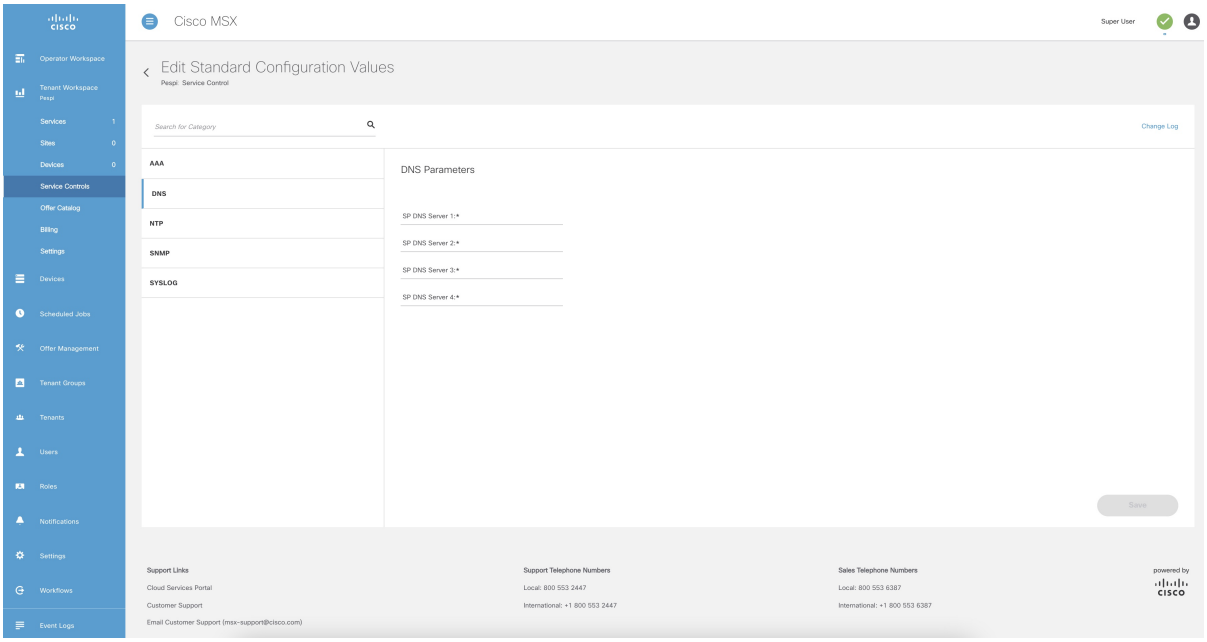
Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Service Controls > Edit Standard Configuration Values**.

The **Edit Standard Configuration Values** window is displayed.

Figure 29: Edit Standard Configuration Values



Step 3 Click **Update Monitored Devices**.

The **Push Standard Config to Monitored Devices** window is displayed.

Step 4 Click **Update Devices**.

A message 'Standard Configuration Saved Successfully' is displayed.

Viewing Device Vulnerabilities

The Cisco MSX platform now detects and reports the software compliance vulnerabilities for both the Cisco devices and third-party software devices. You can see the vulnerability details in the Device Metric page.

For more information on how vulnerabilities are detected, see Managing the Device Compliance Vulnerability Using API.

To view the device vulnerabilities:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the list of devices.

Step 3 From the list, click a device.

The device metric page lists the device information. Go to **Vulnerabilities** tile to see the device vulnerabilities.

Viewing Monitored Devices

You can view the devices under compliance monitoring. The device listing page allows you to filter the devices based on device compliance. The following filtering options are available:

- **All**: Displays all the devices.
- **Non-complaint**: Displays all non-compliant devices.
- **Monitored**: Displays all devices that are monitored for compliance.
- **Eligible**: Displays all the devices that are eligible for compliance.

To view all the devices under compliance monitoring:

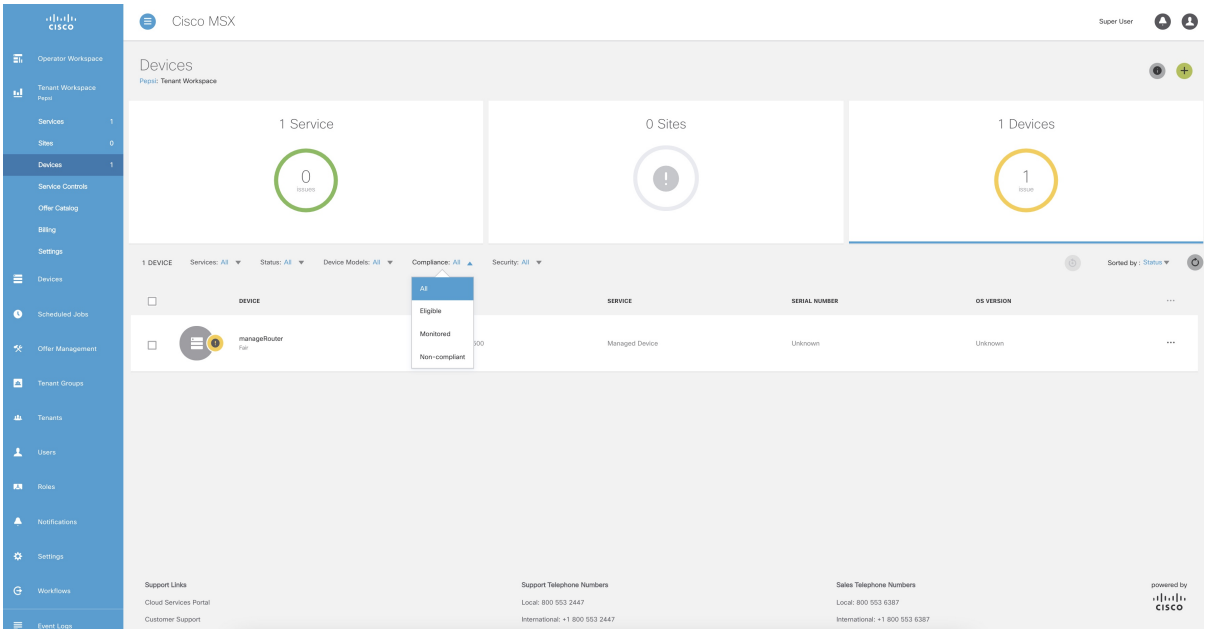
Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the list of devices.

Figure 30: Viewing Monitored Devices



Step 3 To filter the devices based on a compliance criteria, choose a filtering option from the **Compliance** drop-down list.

The list of devices under compliance monitor is displayed.

Converting Device Configuration to Device Template

The Cisco MSX platform allows you to convert both Cisco and non-Cisco native device configuration formats to device template formats. You can import these converted templates into the centralized template service, and any services like MD can use those templates. This feature also allows you to copy or download the converted configuration.

To convert device configuration to device template:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Settings > Template Management > Device Templates**.

The **Templates** window is displayed.

Step 3 In the **Select A Configurational Template** section, click the **ellipsis (…)** and choose **CLI to Template** from the menu.

The **Convert Device Configuration to Template** window is displayed.

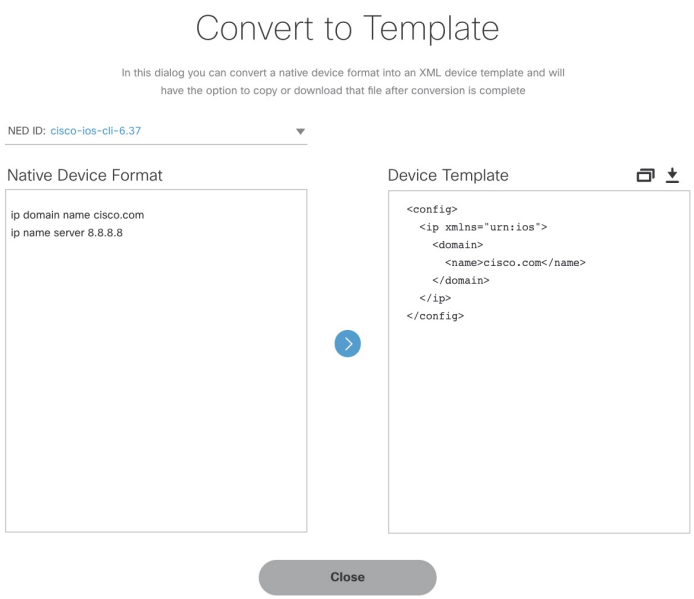


Figure 31: Convert to Template

Step 4 From the **NED IDs** drop-down list, choose a NED ID.

Step 5 In the **Native Device Format** pane, enter the native device configuration.

Step 6 Click **Convert**.

The **Device Template** pane displays the converted configuration in XML format.

Step 7 Click the **Copy** icon to copy the configuration to clipboard.

Step 8 Click the **Download** icon to download the configuration file.

Step 9 Click **Close**.

Full Device Configuration

Device-level compliance in terms of the MSX implementation is monitoring for any remote changes on a device. Cisco MSX can monitor the device now for any changes made on the device remotely. It is a setting that you can enable for compliance. If there are any changes made on the device remotely, Cisco MSX will flag it as an out of compliance scenario with remediation options. Then you can choose to accept or revert the change. This mode of device monitoring is referred to as device-level compliance.

Enabling Device Level Compliance for Monitoring Remote Changes

By default, this feature is disabled in Cisco MSX.

To enable the device level compliance:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Settings > Compliance and Change Management**.

The **Compliance and Change Management** window is displayed.

Step 3 In the **Compliance** section, under **DEVICE COMPLIANCE MONITORING**, click:

a) **Monitor Devices for Any Change Preview** radio button to enable the full device configuration.

b) **Monitor Devices for Changes Against Standard Configuration Values Only** radio button to enable the standard configuration.

Step 4 Click **Save**.

Viewing Compliance Difference and Reverting Changes

As a tenant, you can view the compliance difference and revert to the changes between standard configuration and full device configuration. The device listing page allows you to filter the devices based on device compliance.

To view the compliance difference and revert the cahnges between standard configuration and full device configuration:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the list of devices.

Step 3 Select a device from the list under a tenant.

The status of the selected device and other metrics are displayed.

Step 4 Click **Device Details**.

Step 5 Under the **Compliance** section, select a remote user which does not have any category.

Note Under the **Compliance** section, if you see the category vacant or missing, it is a full device configuration.

Step 6 Click **Details** of any remote user of the full device configuration.

The **Remediation Details** window is displayed. You can view the remediation details that got generated in the previous configuration. Here, you can view the logs or status of the remediation if they are Scheduled, In-progress or Completed. Apart from the previous configuration, you can also view the remote changes

Step 7 Click **Close**.

Step 8 Click **Retry** to remediate.

The **Remediate Non-Compliant Values** window is displayed which shows two columns-Previous Configurations and Remote Changes. This window is similar to the **Remediation Details** window.

Step 9 Click **Revert All Changes** to revert all the previous configuration to the remediations, else click > if you do not want to make any changes.

When you click > if you do not want to make any changes, **Accept All Remote Changes?** window appears. Click **Continue**.

Step 10 Click **Reset Modified Configuration** if you want to revert back the old changes.

Step 11 Click on the arrow for the blue lines in case you want to revert the changes, or click **Revert All Changes** if you want the whole changes to come back.

Note You can also add or edit any changes on the **Remediate Non-Compliant Values** window.

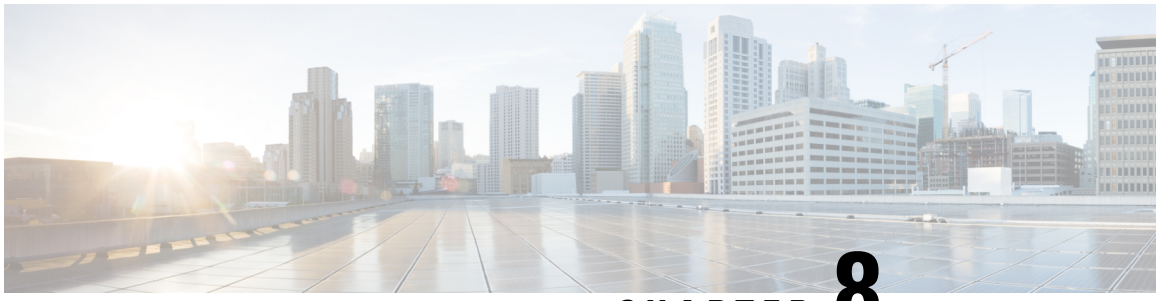
Step 12 Click >.

The **Review Remediation** window is displayed with three columns—Previous Configurations, Remote Changes and Final Configuration.

Note The changes reflect in three colors depending on the change in each iteration.

- Blue—Previous Configurations
- Yellow—Remote Changes
- Green—Final Configurations

Step 13 Click **Remediate** or **Cancel**.



CHAPTER 8

Monitoring Managed Device

This chapter provides information about how to monitor various managed device services.

This chapter contains the following topics:

Monitoring Managed Device Service Status on the Cisco MSX GUI

Cisco MSX 4.0 uses tenant-centric GUI for the Managed Device service pack. The tenant-centric portal displays both the Operator Workspace and Tenant Workspace.

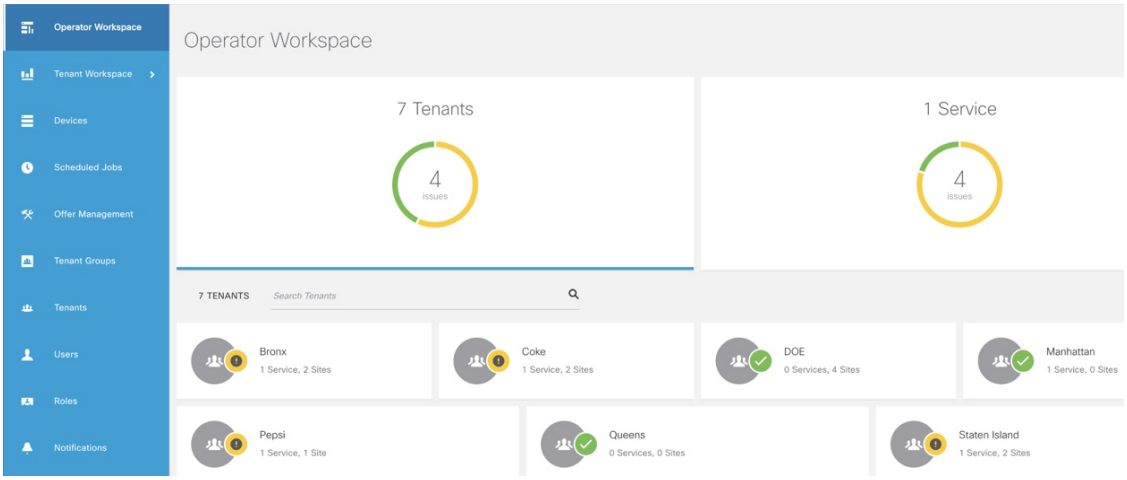
Tenant-centric GUI has the following workspaces:

- Operator workspace—Which lists all the tenants and the services these tenants have subscribed to.
- Tenant Workspace—Which allows tenants to access information related to their subscribed services.

Operator Workspace

The Operator Workspace has dashlets such as Tenants and Services. The tenant-centric portal is role-based and is accessible by both tenants and operators. For more information, see Managing Specific User Roles in Managed Device.

Figure 32: Operator Workspace



Tenants—Displays all the existing tenants for the logged in user.

Services—Displays all the service packs that are provisioned by tenants.

Tenant Workspace

The following are the menus that are available in the Tenant Workspace:

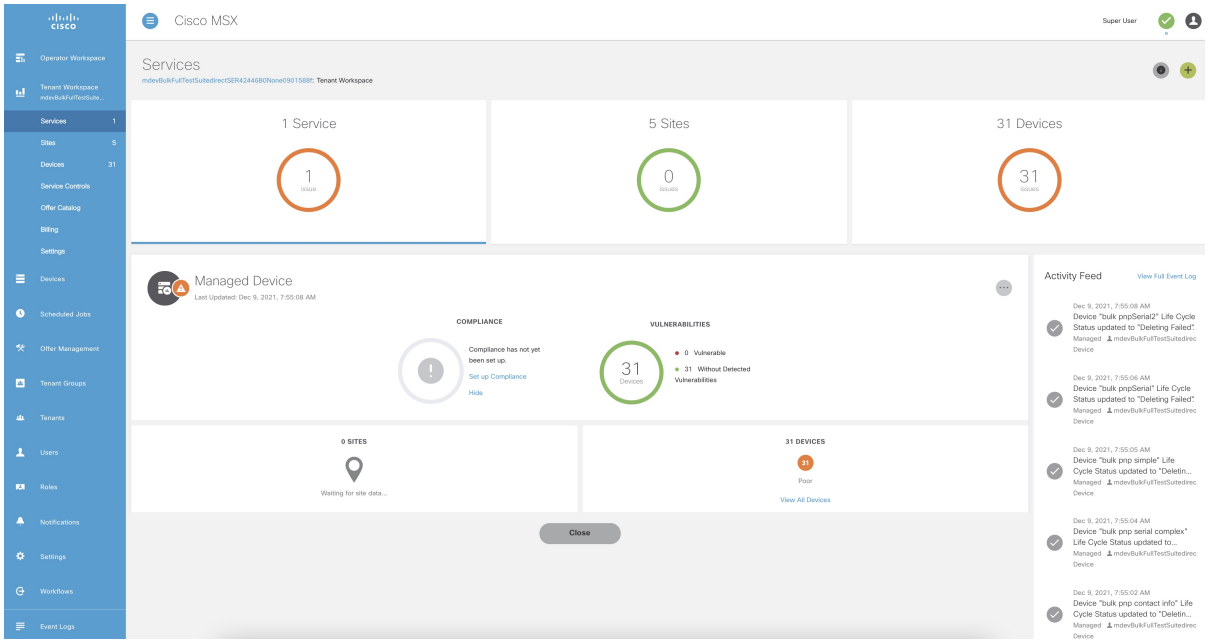
- **Services**— Display the status of all services subscribed by a tenant.
- **Sites**—Display the sites a specific tenant is associated with and the overall health status of the sites.
- **Devices**—Display devices available at all sites for a particular tenant.
- **Service Controls**—Display the custom service controls that are used by the services.
- **Offer Catalog**—Displays existing subscriptions and allows subscribing to new services.

Select the desired tenant to view the subscribed Services, Sites, and Status of the respective tenant. For more information, see Monitoring Managed Device Service from Tenant Workspace.

Monitoring Managed Device Service from Tenant Workspace

The tenant-centric portal displays the status of all the Services, Sites, and Devices of the selected tenant.

Figure 33: Tenant Workspace



Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Operator Workspace**.

The **Operator Workspace** home page appears displaying all the Tenants and Services.

Step 3 Select the required tenant.

The **Services** home page of the Tenant Workspace appears with the list of all the provisioned service pack. Displays the Services, Sites, and Devices of the selected tenant.

Note From the **Services** home page of the Tenant Workspace, you can monitor the status of the Cisco MSX Enterprise Access, Managed Device, and other service packs.

Step 4 From the **Tenant Workspace** main menu, choose **Sites** to monitor the status of the sites.

The map view appears with all the available sites of the selected tenant. Hover the mouse pointer over the site to know the status.

Step 5 From the **Tenant workspace** main menu, choose **Devices** to monitor the status of the devices.

The list view of all the available devices of the selected tenant appears, displaying the information such as Devices, Services, Serial Number, IP Address, Model, and Configuration.

a) From the list view, select a device to view device summary.

Note In the main menu, click **Tenant Workspace** to return to the tenant-centric portal.

b) From the list view, click the **ellipsis (…)** that is located far right on the same row of the selected device.

Step 6 From the **Tenant Workspace** main menu, choose **Service Controls** to view the custom service controls that are used by the services.

Step 7 From the **Tenant Workspace** main menu, choose **Offer Catalog** to view the existing subscriptions and subscribe to new services.

Understanding Managed Device Life Cycle Statuses

The Managed Device service pack provides drill-down views of the operational state of the sites.

To view the device status:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The **Devices** tile is displayed with the available devices.

Step 3 Choose a device from the list.

The device information is displayed. The table below shows the color indicators to describe the site status:

Table 12: Color Indicators for Several Site Status

Serial Number	Status	Color Indicator	Notes
1.	Up	Green	Service is Up at this site, device is reachable and metrics can be viewed.
2.	Down	Red	Service is Down at this site and device may not be reachable to view any metrics information.
3.	Onboarding	Turquoise	• Waiting for the ZTP device to call-home to Cisco MSX. • Initiating connection from Cisco MSX for the Direct connection onboarding method.
4.	Onboarded	Blue	Device has been onboarded to Cisco MSX and ready for applying the configuration template.
5.	Failed	Orange	Device onboarding to Cisco MSX has failed and will require the operator to debug and restore the device.

Serial Number	Status	Color Indicator	Notes
6.	Provisioning	Purple	Configuration template is being applied to the device.
7.	Provisioned	Blue	Configuration template has been successfully applied to the device.
8.	Deleting	Purple	Site deletion is in progress. This could include restoring the device configuration to Day-1 upon successful deletion.
9.	Unregistered	Yellow	Initially, the site is created without providing a device serial number. Therefore, the device exists in an unregistered state. After adding the device serial number, the device transitions from the unregistered state to UP state.

Viewing Site Metrics

Cisco MSX Managed Device service pack provides the capability to monitor the site status.

When the third-party device is on-boarded to Managed Device, device metrics are automatically calculated based on the device model.

To view the site metrics:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Sites**.

The list of sites associated with a tenant is displayed.

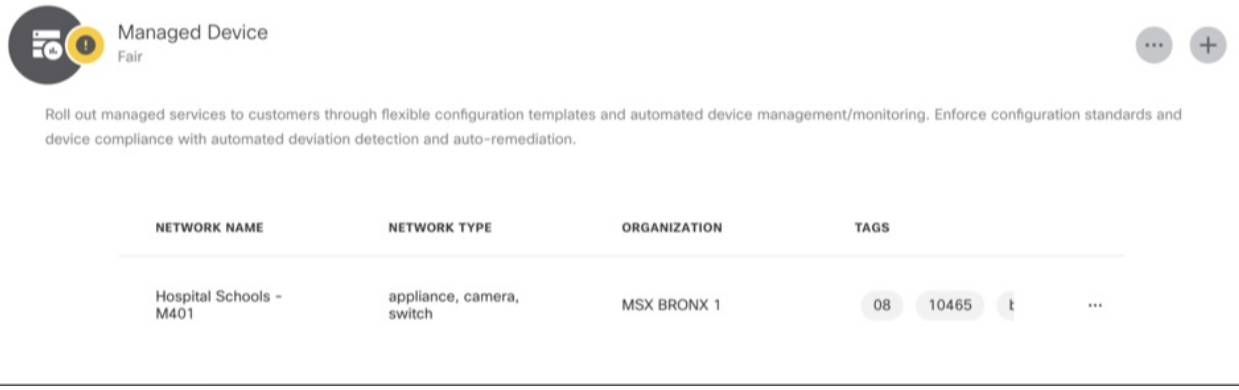
Step 3 Select any one of the sites to view the detailed site status.

This page lists all the site metrics along with status of the selected site.

Under the **Managed Device** section of the page, you can view the list of Meraki networks that were assigned to this site.

For information on adding Meraki network, see Creating Networks.

Figure 34: Site Metrics



Viewing Device Metrics

Cisco MSX Managed Device service pack provides the capability to monitor the device status.

When the third-party device is on-boarded to Managed Device, device metrics are automatically calculated based on the device model.

To view the device metrics:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Devices**.

The list of devices associated with a tenant is displayed.

Step 3 Select a device from the list.

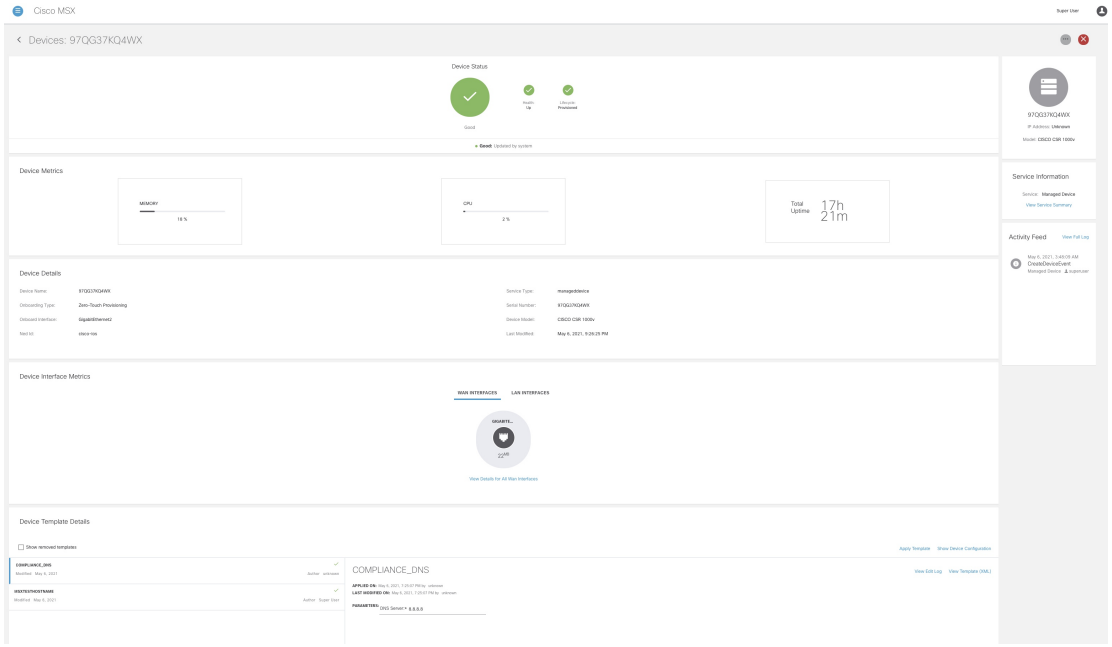
The status of the selected device and other metrics are displayed.

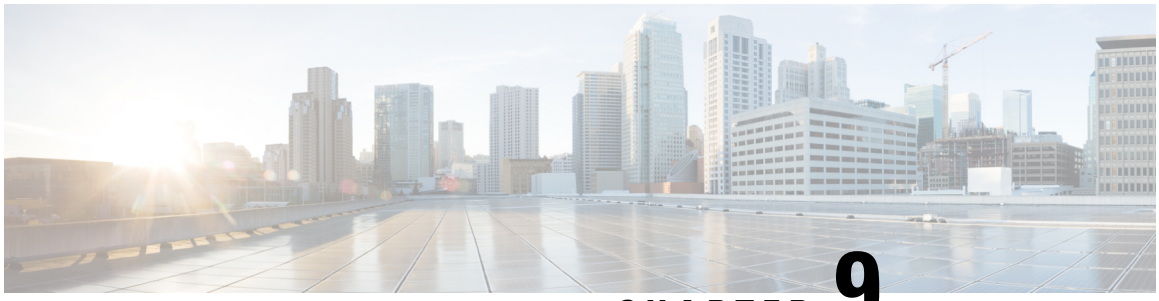
Note For Meraki devices, you will see additional details such as Network ID, Serial Number, and Device Uplink Details. The following table lists the mapping between the Meraki status and Cisco MSX overall device status that is displayed on the Cisco MSX portal:

Meraki Status	Cisco MSX Device Status
Offline	Down
Online	Up
Alerting	Degrading
Dormant	Degrading
Others	Unknown

For more information on Meraki status, see *Cisco Meraki documentation*.

Figure 35: Device Metrics





CHAPTER 9

Managing Meraki

Using Cisco MSX Managed Devices services, operators can manage organizations (attach, edit, or delete) and create networks comprising Meraki devices and services. An organization implies Meraki networks managed by one or more accounts. For deploying a Meraki solution, it is essential to consider an organizational structure that will use this solution. It is recommended to have one organization per customer or one organization per service. For more information on when to use multiple organizations, see the section, 'Building a Scalable Meraki Solution' in Cisco Meraki documentation.

The following are the Meraki wireless and combined device types currently supported on Cisco MSX:

- MX -Security and SD-WAN: The Meraki MX is an enterprise security & also equipped with SD-WAN capabilities that enable administrators to maximize network resiliency and bandwidth efficiency.The following are the MX devices supported on Cisco MSX.
  - MX64, MX65, MX67, and MX68 required for a small branch setup
  - MX84 and MX100 required for a medium branch setup
  - MX250 and MX450 required for a large branch/campus setup
  - vMX device types for virtual devices
- MR- Wireless LAN: MR device types for cloud-managed WLAN access points.
- MS - Switches: MS device types are cloud-managed access and aggregation switches series of access switches. Using these switches, thousands of switch ports can be configured and monitored instantly, over the web.

Managing Organizations

Cisco MSX provides the ability to manage organizations.

You can attach one or more organizations to the tenant's control plane. Organization implies a collection of networks that are part of a single organizational entity. These networks, in turn, can have multiple devices.

Note

- For managing organizations, you need the appropriate permissions. For more information, see Cisco Managed Services Accelerator (MSX) 4.3 Platform and Service Pack Permissions Addendum.
- Only user roles with **Meraki Organization (View)** permission under **Meraki Service** category along with platform permissions can attach, edit, and detach organizations within Cisco MSX.
- Only user roles with **Meraki Cross Launch (View)** permission under **Meraki Service** category can can cross-launch to Meraki dashboard. Meraki Cross Launch allows you to view organization, networks, and device in Meraki.

For more information on these APIs, refer the Swagger documentation that can be accessed from **Cisco MSX portal > Account Settings > Swagger > Meraki Service API**.

Attaching Organizations

To attach oragnizations in Cisco MSX:

Procedure

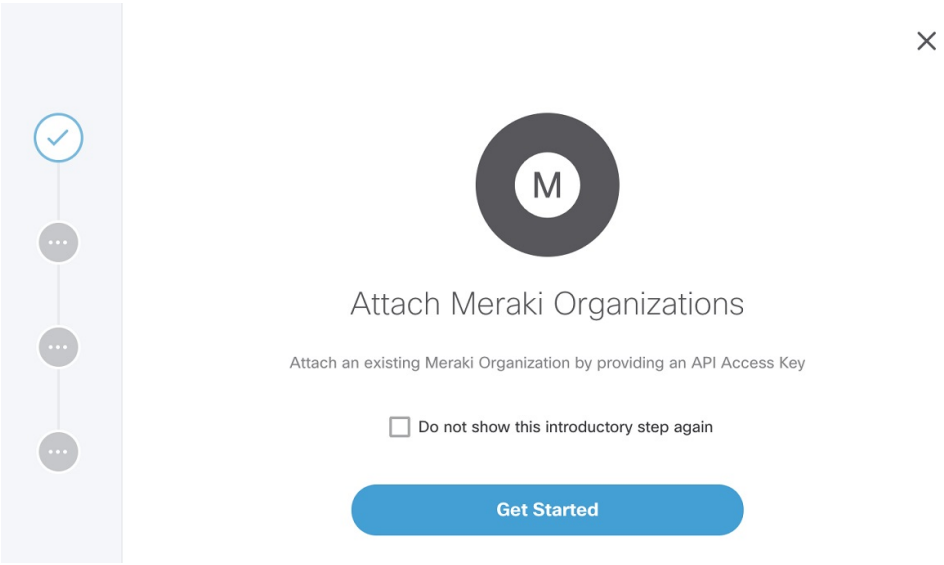
Step 1 Log in to the Cisco MSX portal using your credential.

Step 2 From the left pane, choose **Tenant Workspace > Settings > Meraki Organizations**.

The **Meraki Organization** page is dispalyed.

Step 3 Click **Attach Organizations**.

The Attach Meraki Organizations dialog box is displayed.

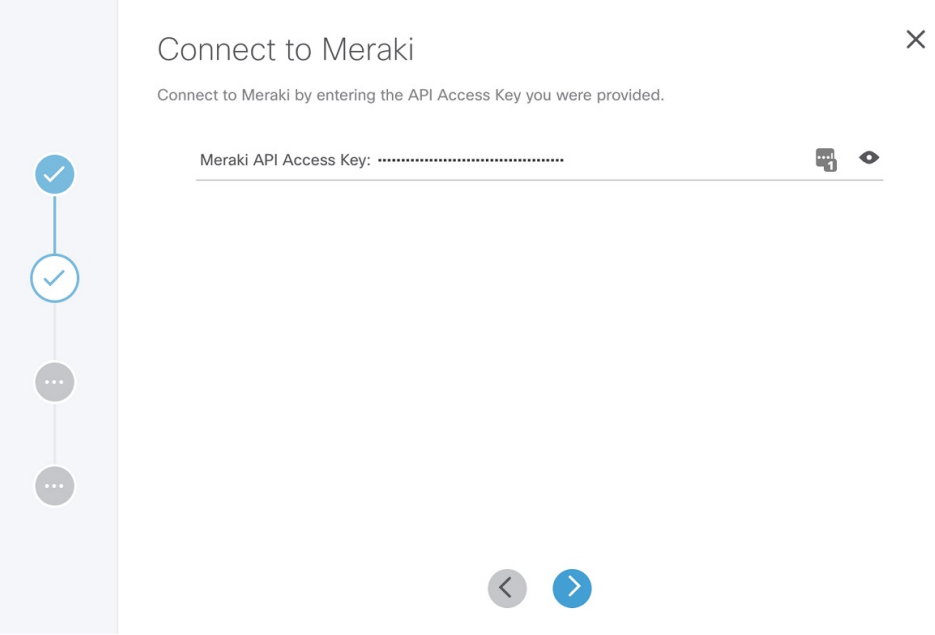


Step 4 Click **Get Started**.

Step 5 Enter the Meraki API Access Key on the **Connect to Meraki** page.

Use the eye icon to view and validate the API key.

Note You can get the Meraki access key by logging in to the Meraki dashboard. Click **User > My Profile > Generate New API Access Key** to generate a new key.



Step 6 Click > to move to the next page.

Step 7 On the **Select Meraki Organization** page, select upto five organizations to attach to your Meraki control plane. The drop-down lists the available organizations for the access key you had provided in the previous step. In case you want to attach more than five organizations, you can do so at the end of this process by selecting **Attach Another Organization** option.

Step 8 Click > to move to the next window and initiate the attaching process. You can close the window or click **Attach Another Organization** to add more organizations to the control plane.

All the organizations added to the tenant's control plane is displayed in **Tenant Workspace > Settings > Meraki Organizations**.

Editing and Detaching Organizations

To edit or detach an attached organization in Cisco MSX:

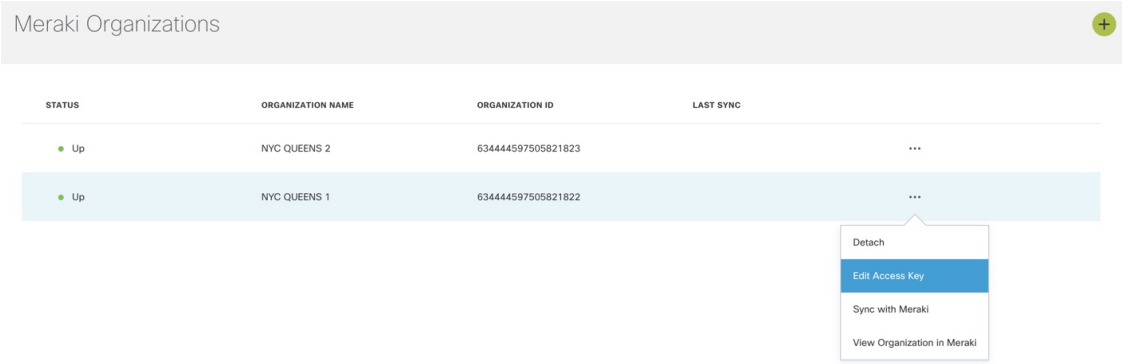
Procedure

Step 1 Log in to the Cisco MSX portal using your credential.

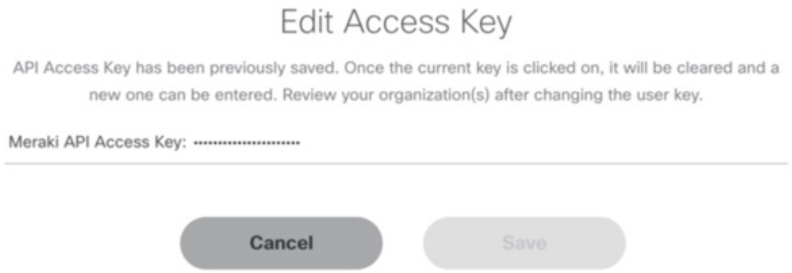
Step 2 From the left pane, choose **Tenant Workspace > Settings > Meraki Organizations**.

The **Meraki Organization** page is displayed with the list of organizations that were added to the tenant's control plane.

Step 3 Select a row and click on the ellipsis (...) and choose **Edit Access Key** to edit the Organization details that were provided while attaching the organization to your tenant's control plane.



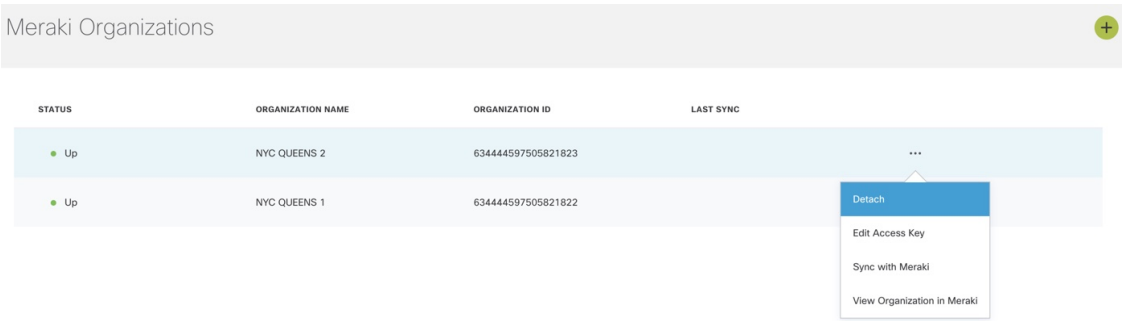
Step 4 On the **Edit Access Key** dialog box, click **Meraki API Access Key** field to clear the previous key and enter a new key and click **Save**. Click **Cancel** to retain the old key.



Detaching Organizations:

If you want to detach or disassociate an organization from a tenants control plane, click on the ellipsis (...) and choose **Detach**.

Note When you detach an organization, the organization is removed from MSX only, however, it is still available in Meraki.



Managing Networks

A network is a logical container of multiple devices that can be created for a site and can be a combination of different device models. Cisco MSX provides the ability to manage networks.

Note

- For managing networks, you need the appropriate permissions. For more information, see Cisco Managed Services Accelerator (MSX) 4.3 Platform and Service Pack Permissions Addendum.
- Only user roles with **Meraki Networks (View and Manage)** permission under **Meraki Service** category can manage the Meraki networks from Cisco MSX.

For more information on these APIs, refer the Swagger documentation that can be accessed from **Cisco MSX portal > Account Settings > Swagger > Meraki Service API**.

Creating Networks

To create a network in Cisco MSX :

Before you begin

Make sure you have an organization attached within Cisco MSX. For more information, see Attaching Organizations.

Procedure

Step 1 Log in to the Cisco MSX portal.

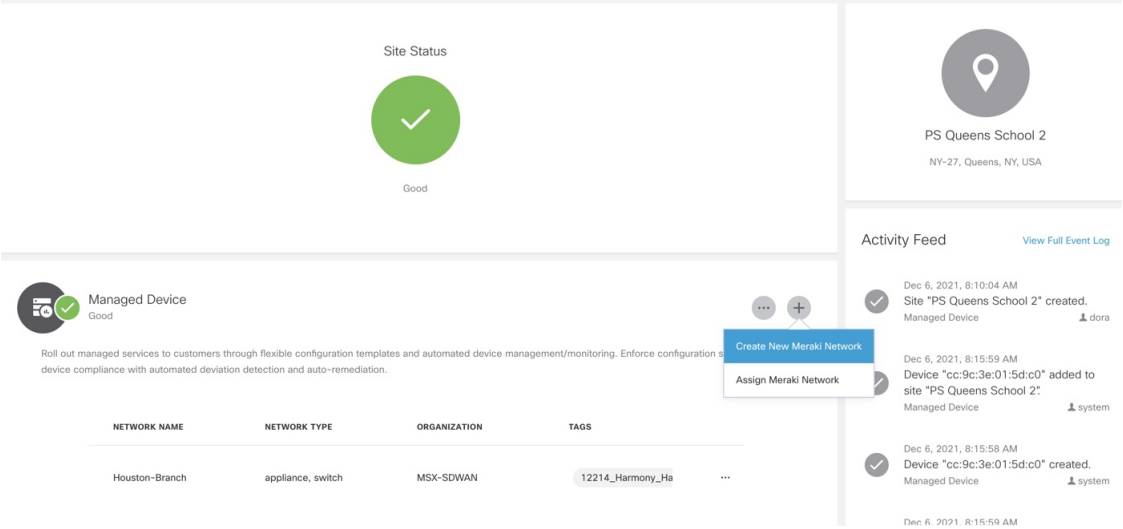
Step 2 From the left pane, choose **Tenant Workspace > Sites**.

The list of sites associated with a tenant is displayed.

Step 3 Select any one of the sites to view the detailed site status.

This page lists all the site metrics along with status of the selected site.

Step 4 Under the **Managed Device** section on the page, click **+ > Create New Meraki Networks** to associate a new network to the selected site.



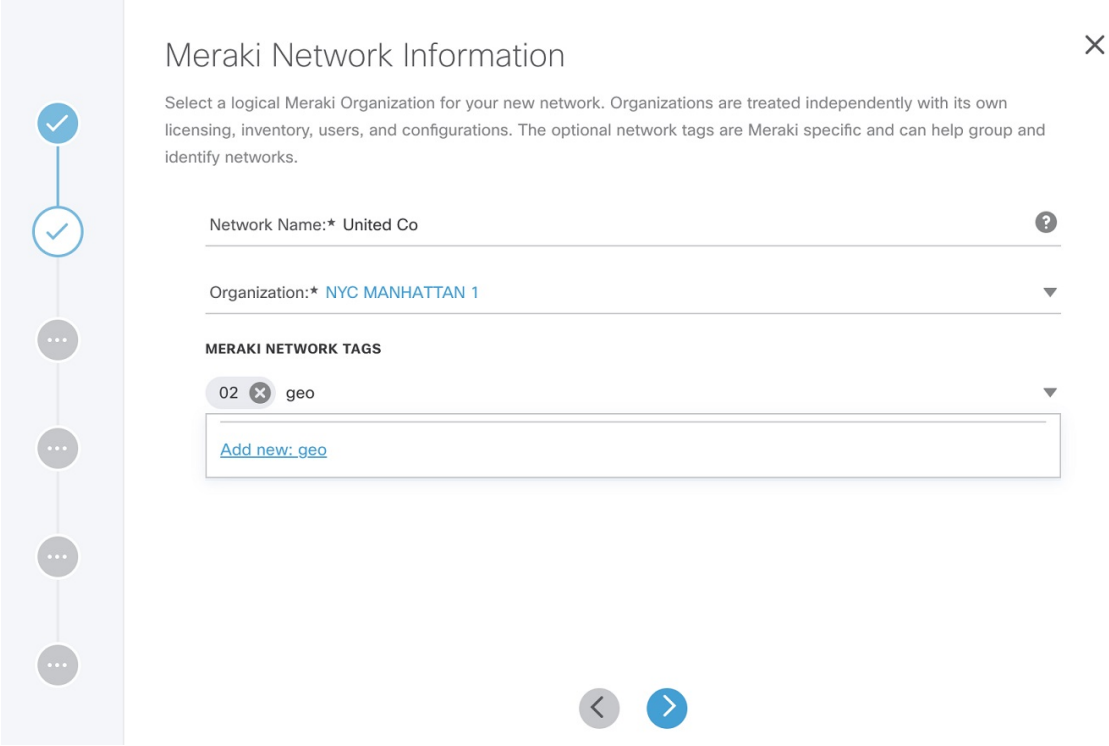
The **Create New Meraki Network** wizard is displayed to set up networks to manage multiple devices.

Step 5 Click **Get Started**.

The **Meraki Network Information** dialog box is displayed.

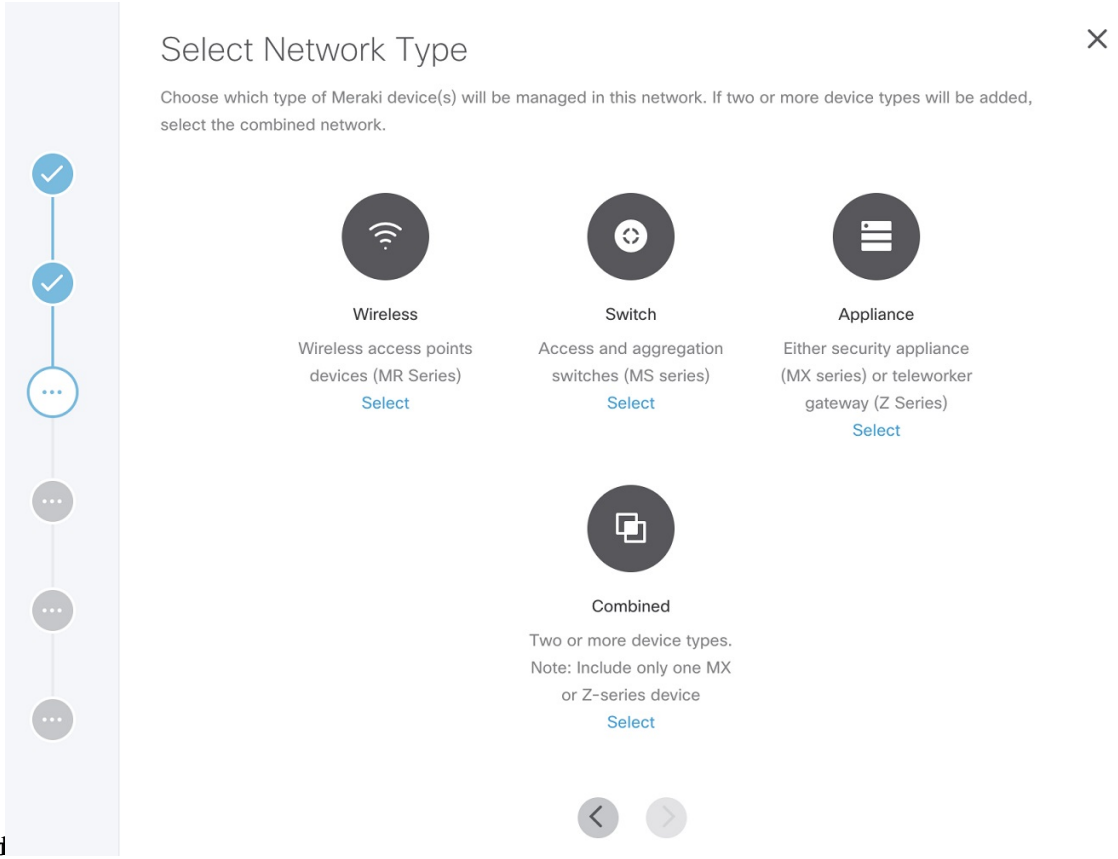
Step 6 Enter the following details on the **Meraki Network Information** page.

- **Network name**: Specify a name for your new network.
- **Organization**: Choose the organization that you want to associate your network to from the drop-down list.
- **Meraki Network Tags**: This field displays all the tags currently available in Meraki. You can also add new tags. Type a new tag and click on the **Add New** option that appears as you type a new tag to save the new tag.



Step 7 Click > to move to the **Select Network Type** page.

Step 8 In the **Select Network Type** page, choose the type of Meraki devices (Wireless, Switch, Appliance) that will be managed in this new network. Choose the **Combined** option to add different device types to your

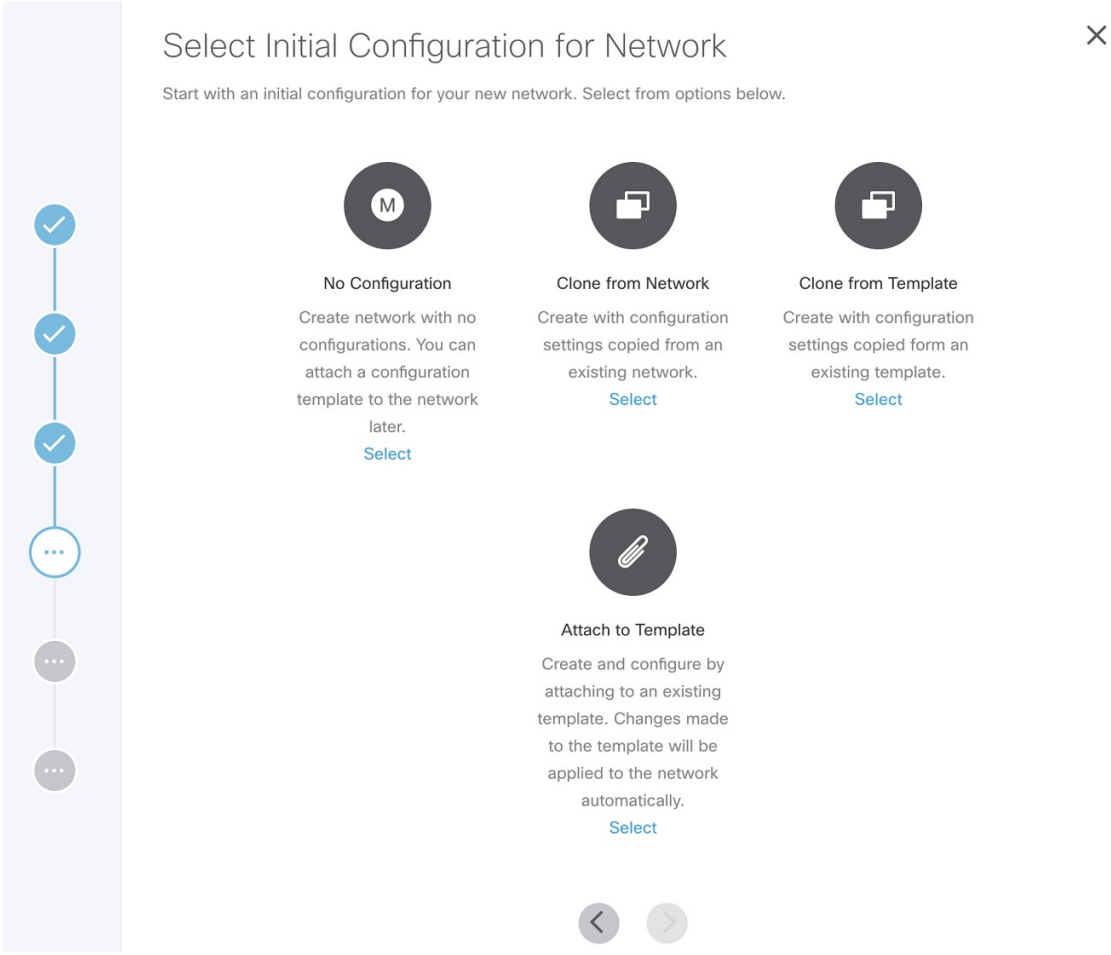


Step 9 Click > to move to the **Select Initial Configuration for Network** page.

Step 10 Set up a network. Choose from one of the following options to setup the network configurations:

- **No Configurations**: Create a network without any template configurations, but later you can attach a configuration template to this network.
- **Clone from Network**: Create a network with configuration settings copied from an existing network to a new network. On the **Select Meraki Network to Clone** page, select a network from the list of available networks from where the configuration settings must be copied. The network list shown depends on the network type you chose in Step 8. The network list can be narrowed down by searching with specific tags in the **Meraki Network Tags** field. After cloning, any configuration changes made to the source network are not inherited into the new network.
- **Clone from Template**: Create a network with configuration copied from an existing template into a new network. On the **Select Meraki Template to Clone** page, select the template from the **Template Name** drop-down list from where the configuration must be copied. The options shown in the drop-down depends on the network type you chose in Step 8. After cloning, any configuration changes made to the source network are not inherited into the new network.
- **Attach to Template**: Create a network and then associate it to an existing template. On the **Select Meraki Template to Attach** page, select a template from the **Template Name** drop-down list to which the network can be attached. The options shown in the drop-down depends on the network type you chose

in Step 8. If you use this option, any changes in the source template are automatically applied to all the associated networks.



Step 11 Click > to move to the **Review and Submit** page.

Step 12 Review the details and click **Submit** to complete the process.

Viewing Meraki Networks for a Site

Cisco MSX Managed Device service pack provides the capability to monitor the site status and the networks associated to the sites.

To view the site details:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Sites**.

The list of sites associated with a tenant is displayed.

Step 3 Select any one of the sites to view the detailed site status.

This page lists all the site metrics along with status of the selected site.

Under the **Managed Device** section of the page, you can view the list of Meraki network assigned to this site.

Assigning Meraki Network to a Site

A Meraki network must be assigned to a site in the following cases:

- When a control plane is attached, and you want to plot network to different site locations.
- When a site is deleted, the network gets unmapped, and you want to assign this network with a site.
- When you want to assign Meraki devices to a site.

Note In a single assign operation, you can assign up to 5 networks to a site that can be managed separately.

Using this procedure, you can assign networks from an organization at a time. However, if you wish to assign sites from more organizations, you must repeat this procedure. To assign a network to a site:

Before you begin

Assign one or more organizations to the tenant's control plane. For more information, see Attaching Organizations.

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace** > **Sites**.

The list of sites assigned with a tenant is displayed.

Step 3 Select any one of the sites to view the detailed site status.

This page lists all the site metrics along with status of the selected site.

Step 4 Under the Managed Device section on the page, click **+** > **Assign Meraki Network** to assign networks already available in a Meraki organization to a selected site.

The **Assign Meraki Network to Site** wizard is displayed to assign networks to a site.

Step 5 Click **Get Started**.

The **Select Meraki Network** dialog box is displayed.

Step 6 Select an organization to which the network needs to be assigned, and select one or more available networks for a site. Narrow down the networks using network name and network type.

Step 7 Click > to move to the **Review and Submit** page.

Step 8 Review the details and click **Submit** to complete the process.

Under the **Managed Device** section of the page, you can view the list of Meraki network assigned to the site. The **Tenant Workspace > Site** tab will also list the devices assigned for a Meraki network.

Unassigning a Network from a Site

You can use the unassign option to disassociate a network and later assign it to another site.

From the Managed Device section of the **Site Details** page, select a Meraki network row, click on the ellipsis (...), and choose **Unassign Network**. This will remove the networks and devices attached to the site.

Note Unassign is only from Cisco MSX, the network remains in Meraki for the organization.

Synchronizing Meraki Data Entities

In Cisco MSX, you can synchorinze Meraki details into Cisco MSX at:

- Organization-level: Use the **Sync with Meraki** option in **Tenant > Setting > Organization** to sync various entities, such as networks, devices, tags, policies available within an Organization.
- Network-level: Using the APIs in the **Meraki-Control-Plane-Controller** section of **Meraki Service** APIs, you can do the following:
  - Schedule a task to synchronize Meraki control plane entities. Use the POST /meraki/api/v1/controlplanes/{controlPlaneId}/schedulesync to periodically synchronize these entities. Specify networkIDs to schedule synchronization for a specific network; otherwise, Cisco MSX synchronizes entities from all networks.
  - Schedule a task to synchronize all Meraki control plane entities. Use the POST /meraki/api/v1/controlplanes/{controlPlaneID}/synchronize to synchronize these entities.

Note This API synchronizes entities from all networks. To specify a particular network ID, use the schedulesync API.

Note

- Only users with **Meraki Synchronization (Manage)** permission under **Meraki Service** section can perform the sychronization within Cisco MSX.
- For more information on these APIs, refer the Swagger documentation that can be accessed from **Cisco MSX portal > Account Settings > Swagger > Meraki Service API**.
- Before synchronizing the devices on Cisco MSX, if the Meraki devices do not have a location set, then MSX by default, will assign all networks and devices to a single site with latitude or longitude mapping to "2409 Leghorn Street, Mountain View".

Editing or Deleting a Network

To edit and delete a Meraki network:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Sites**.

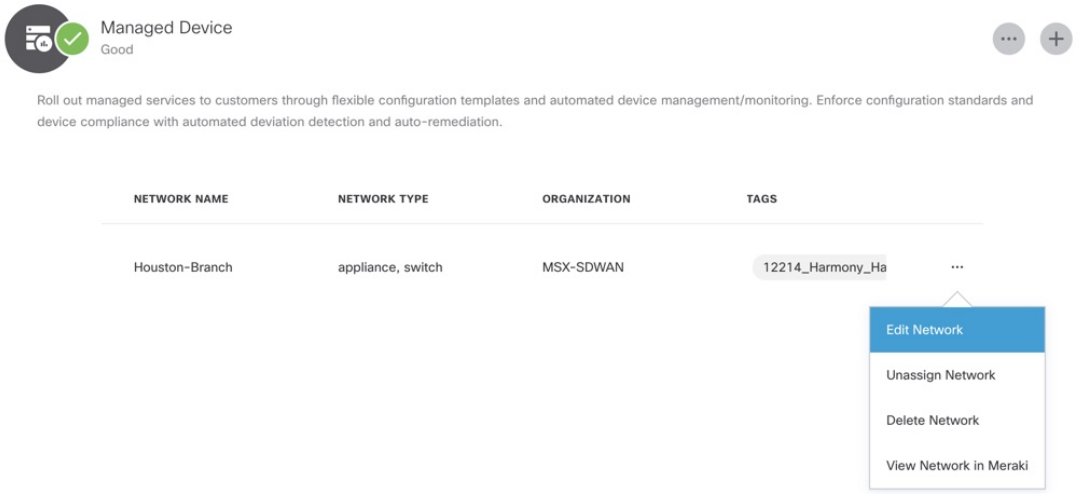
The list of sites associated with a tenant is displayed.

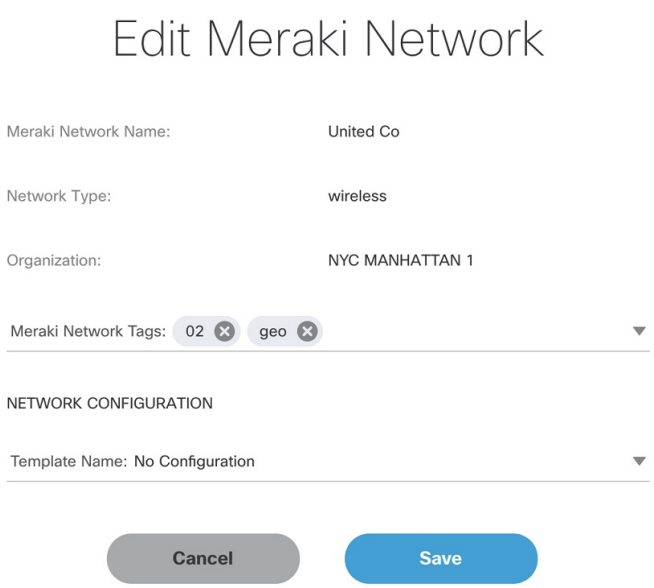
Step 3 Select any one of the sites to view the detailed site status.

This page lists all the site metrics along with status of the selected site.

Under the **Managed Device** section of the page, you can view the list of Meraki network assigned to this site.

Step 4 Select a network, and click on the ellipsis (…) and select **Edit Network**to edit the network details. You can add or edit the existing network tags, and also change template for a network using the **Edit Meraki Network** dialog box.





Deleting the Network:

Click on the ellipsis (…) and select **Delete** to delete the selected network.

Deleting the network completely removes the network from Meraki organization. If there are any devices associated to the network, it places them in the Meraki inventory for other networks.

Managing Configurations

Cisco MSX provides the ability to create configurations and deploy them across Meraki networks or switch ports using the pre-defined out-of-the-box templates that are available within the Cisco MSX. For more information on these templates, see Meraki Feature Templates, on page 95.

Note

- For managing configurations, you need the appropriate permissions. For more information, see Cisco Managed Services Accelerator (MSX) 4.3 Platform and Service Pack Permissions Addendum.
- Only user roles with **Configurations (Manage)** permission under **Integrations, Settings, and Logs** category can manage the Meraki configurations from Cisco MSX. Users with the **(View)** permission can only view the configurations.
- To apply configuration changes to the Meraki network, ensure that the networks are not bound to any Meraki configuration template.

Creating Configurations

Cisco MSX provides feature templates to create new configurations and apply them to Meraki entities within tenant hierarchy. Feature template provides a predefined set of feature properties and attributes values for easy and quick configurations of networks and the switch ports. Once the new configurations are created and tagged appropriately, you can apply these configurations to ports or networks across a tenant hierarchy that uses the same tags. For more information on these templates, see Meraki Feature Templates, on page 95 .

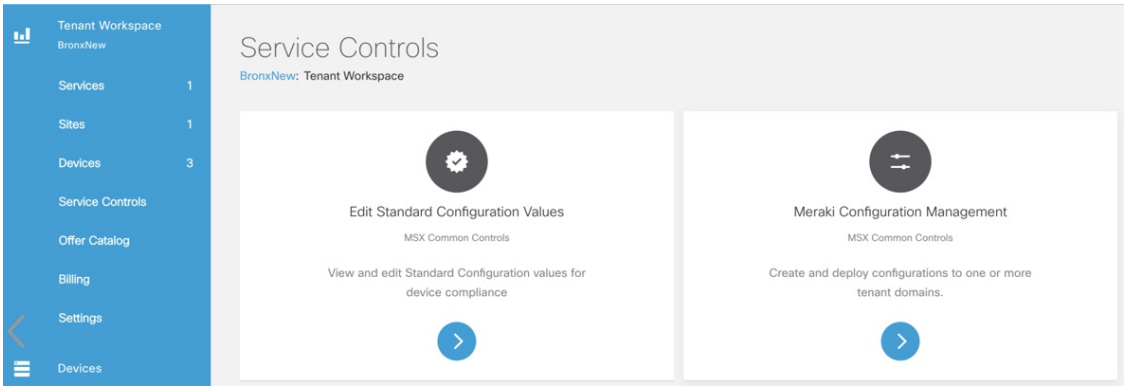
To create a new Meraki configuration using out-of-the-box feature templates available within Cisco MSX, do the following:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Service Controls**.

Step 3 Select **Meraki Configuration Management** to create new configurations.

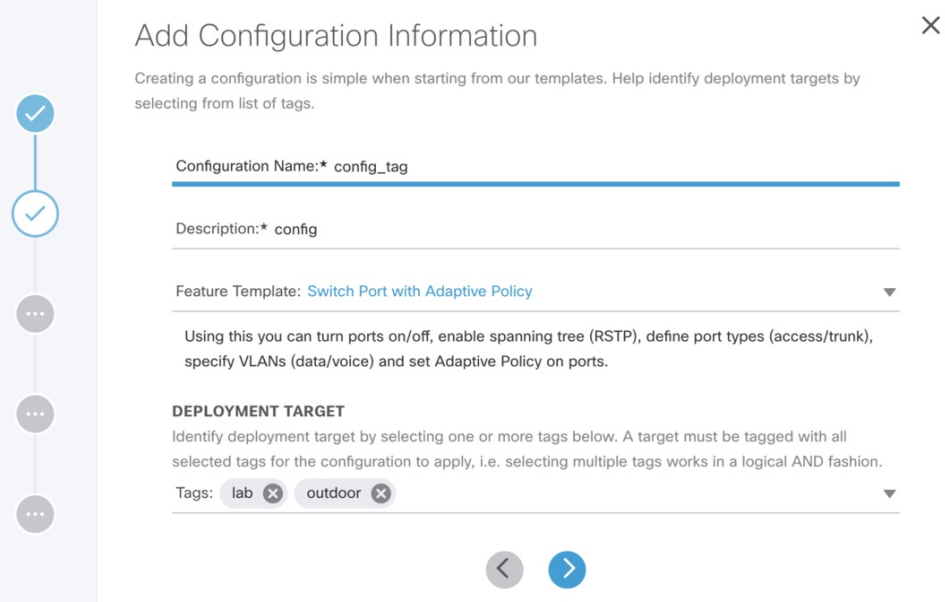


Step 4 On the **Meraki Configuration Management** page, click **+** or **New Configuration** option to create a new Meraki configuration.

The **Create Configuration**wizard is displayed.

Step 5 Click **Get Started**.

The **Add Configuration Information** window is displayed.



Step 6 Enter the following details:

- Enter a unique name for the new configuration and its description.
- Select a feature template depending on the type of configurations to be created. For more information on types of feature templates available within Cisco MSX, see Meraki Feature Templates, on page 95.
- Select one or more tags that categorize entities based on common criteria, such as region or departments. Tag choices are dependant on the type of feature template that was selected in the previous step. Examples of Tags in a School system can be Classroom, Auditorium, and so on. The configurations are applied only to the target entities that use all the specified tags. However, we recommend using only one tag for configuration management.

  Note If no tags are displayed, make sure of the following:

  - A Meraki organization is attached to the Cisco MSX instance. For more information, see Attaching Organizations
  - The target entities are configured with tags outside of Cisco MSX. For example, for Meraki the Switch Ports can be configured with tags using the Meraki dashboard.

Step 7 Click > to move to the **Enter Configuration** page.

Step 8 Enter the values based on the template that was selected to create the new configuration. Some of the fields on the **Enter Configuration** page require additional settings. For more information, see Meraki Feature Templates, on page 95.

Note

- Using the lock button, a parent or the top-level tenant can lock the fields so that the subtenants cannot modify or override values for the locked fields. The locked values are the same across all the subtenants. If fields are not locked, then the subtenant can customize and lock them for their subtenants.
- The configurations defined at the parent level apply to all subtenants that use the same tag as the parent. When a subtenant creates a configuration using the same feature template and tag as the parent, they see the values set by the parents. If the subtenant chooses a different tag combination during configuration creation, the configuration does not show the parent-level values.

Step 9 Click > to move to the **Review and Save** page.

Step 10 Review the details and click **Submit** to complete the process.

On the **Meraki Configuration Management** page, you can view the new configuration, and apply only one configuration at a time to a destination target.

Editing Configurations

To edit Meraki configurations:

Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Service Controls**.

Step 3 Select **Meraki Configuration Management** to edit new Meraki configurations. You cannot edit when a configuration application is in-progress.

The **Meraki Configuration Management** page lists configurations that were created and saved.

Step 4 Select a configuration and click on the ellipsis (…) > **Edit Configuration**.

The **Edit Configuration** window is displayed.

Step 5 Edit to modify an existing configurations. These configurations apply to tenants that use the same tags. If locked, tenants would not be able to modify these values.

During edit configuration, if locked, you can only view values, however, you cannot add new rows, or change orders.

During edit configuration, if unlocked, you can add or remove rows, change orders, and further lock values for the next set of tenants.

Step 6 Click > to move to the **Review and Save** page.

Step 7 Review the details and click **Submit** to complete the process.

Under the **Meraki Configuration Management** page, you can view the edited configuration, and apply these configurations to a destination target. There can be many targets.

Note

- To delete a configuration:

  On the **Meraki Configuration Management** page, select a configuration, and click the **ellipsis (...)**, and choose **Remove Configuration**.

- You cannot delete a configuration while a configuration application is in-progress. While deleting a configuration, the configuration is removed only from Cisco MSX, however, the previously applied configurations in the targets are not impacted. Delete configuration removes the configuration and its deployment history.

Applying Configurations

After creating and tagging the configurations appropriately, you can use these parameters to apply configurations on similarly tagged target entities, such as switch ports. These configurations also include the custom choices. For example, DSCP, Access Policy, Group Policy, and Adaptive Policy are custom choices displayed for various template configurations. These custom choices are synchronized from organizations and networks and displayed based on the tenant hierarchy.

To apply a new configuration:

Before you begin

Make sure the entities where the configurations have to be applied are pre-configured with tags outside of Cisco MSX. For example, for Meraki, the Switch Ports can be tagged from the Meraki Dashboard. For more information, see Manage Tags in Meraki Documentation.

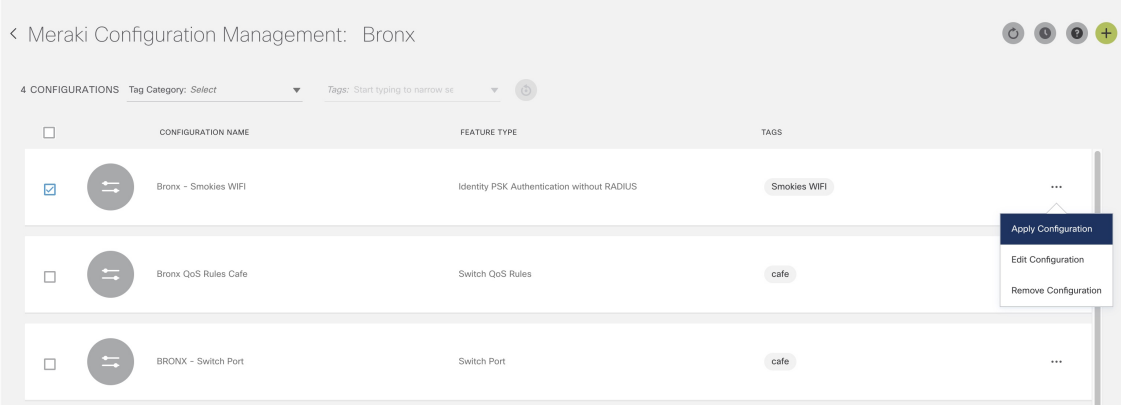
Procedure

Step 1 Log in to the Cisco MSX portal.

Step 2 From the left pane, choose **Tenant Workspace > Service Controls > Meraki Configuration Management** tile.

Step 3 On the **Meraki Configuration Management** page, select a configuration, and click the **ellipsis** (...), and choose **Apply Configuration**.

Figure 36: Apply Configuration

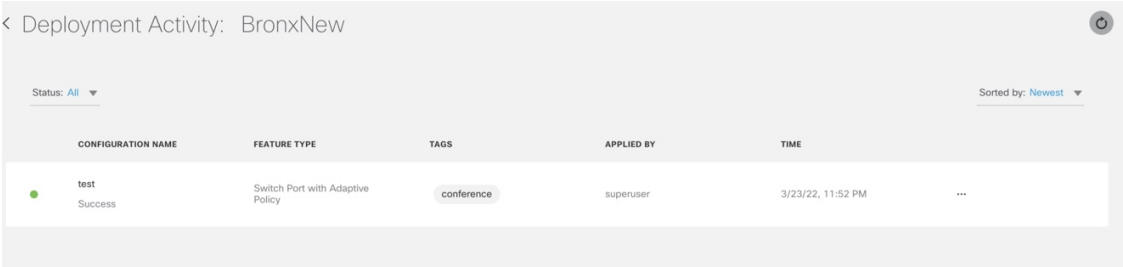


Step 4 Click **Apply Configuration** to deploy the configuration on entities that use similar tags across a tenant hierarchy.

Step 5 To track the status of the deployment, from the **Meraki Configuration Management** page, click on the clock icon on the top right side and choose **Deployment Activity**.

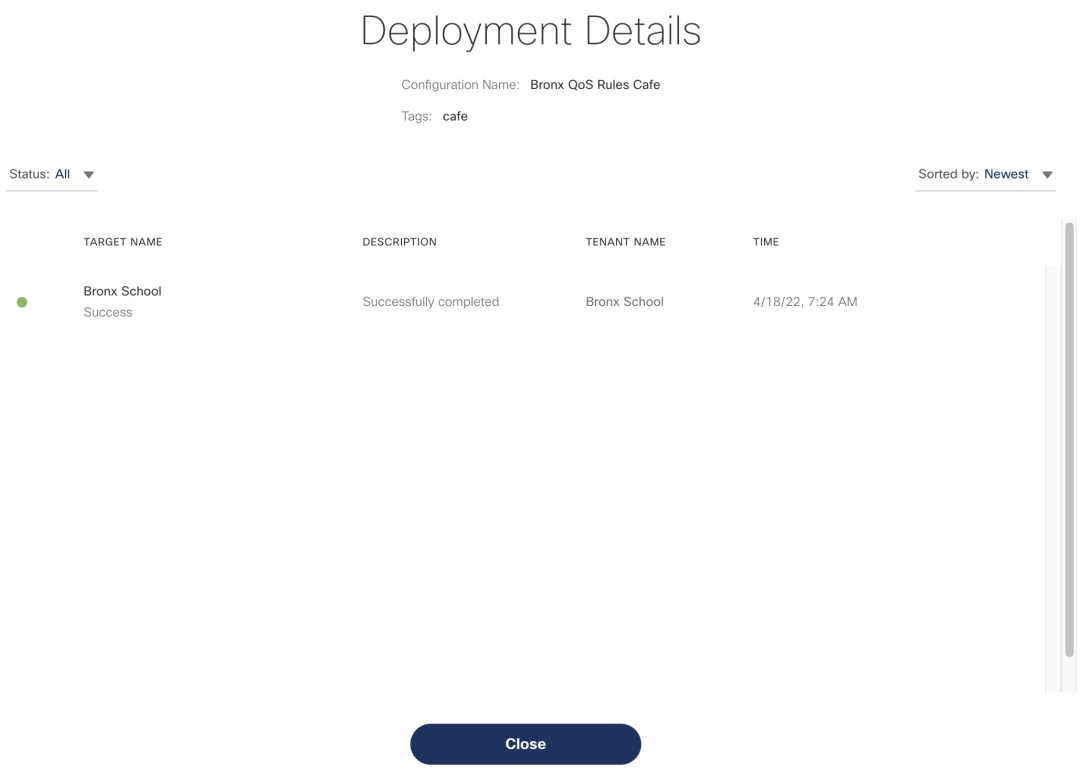
- The **Deployment Activity** page displays the **Status** of applied configurations for entities that used similar tag(s). You can filter the list by Status or sort this list in a particular order.
- The **Applied By** column on the **Deployment Activity** page displays the user id that initiated the configuration.

Figure 37: Deployment Activity Page



On the **Deployment Activity** page, select a configuration, and click the **ellipsis (...)**, and choose **View Deployment Details** to view the deployment details. You can view the target name, description, tenant name, and time on the **Deployment Activity** page.

Figure 38: Deployment Details



- You can view the current deployment values applied for each deployment from the **Deployment History** page.

Note If there is a failure scenario during the applying process, it may be because specific values for the custom choices could not be applied. This scenario may require an additional setup from the Meraki dashboard to enable the missing options, and then retry it from Cisco MSX on the **Deployment Details** window. The errors can happen in both hierarchy and non-hierarchy setups.

Meraki Feature Templates

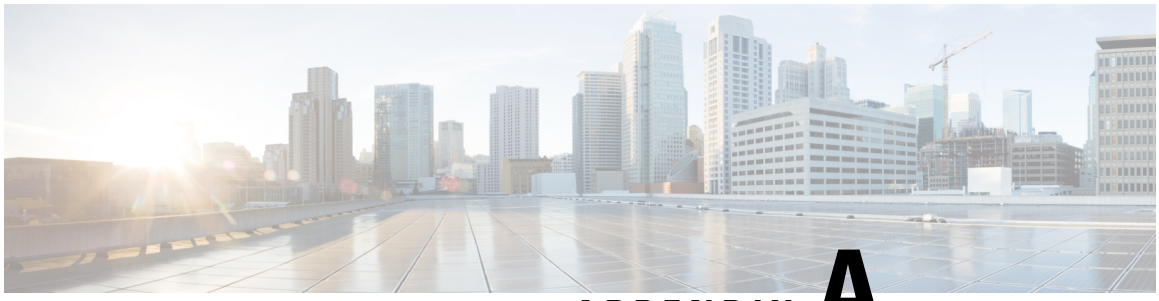
The following section details the various feature templates available within Cisco MSX for managing Meraki configurations.

Feature Template	Description
Switch Port	Use the **Switch Port** template to turn on/off the ports. You can have the ports enabled and the storm control enabled. Storm control is not applicable to all the devices.

Feature Template	Description
	When you select the **Switch Port** template, the tags option displays only the switch port tags. The following are important notes for the **Storm Control** field that is displayed on the **Enter Configuration** page: • Storm control configuration options for enhanced storm control are supported only on MS Series switches; MS210, MS225, MS250, MS350, MS355, MS390, MS400 series switches with firmware MS10.0 and higher. • For storm control functionality to work on Cisco MSX, it must be enabled on a network from the Meraki dashboard. For more information, see Cisco Meraki documentation.
Switch Port with Adaptive Policy	• Use the **Switch Port with Adaptive Policy** template if you wish to apply adaptive policies on MS390 devices. You must first configure adaptive policies on the Meraki dashboard for using these policies from MSX. For more information, see Cisco Meraki documentation. • Use these templates to create configurations with which you can turn ports on/off, enable spanning tree (RSTP), define port types (access/trunk), and specify VLANs (data and voice). • On the **Enter Configuration** page, from the **Adaptive Policy Group Name** field, choose from the list of adaptive policy groups available from multiple organizations and apply these configurations to MS390 devices across organizations that use the same tags. To use adpative policy template for other devices, choose **Not Applicable** • When you select the **Switch Port with Adaptive Policy** template, the tags option displays only the switch port tags.
Switch Port with Access Policy	Use the **Switch Port with Access Policy** template to configure policies that will prevent unauthorized devices from connecting to the network. These access policies are typically applied to ports at network level. For more information, see Cisco Meraki documentation. The access policy shows up with **Access Type** is set to **Access**. Access policies need to be pre-configured

Feature Template	Description
	and synced to Cisco MSX when you sync the organization or network. When you select the **Switch Port with Access Policy** template, the tags option displays only the switch port tags.
Switch QoS Rules	Use the **Switch QoS Rules** template to create and apply QoS configuration to prioritize traffic within a network. Cisco MSX supports complex arrays that you can use to change and maintain the QoS ordering. You can choose VLAN, protocol, source, destination port type, and Differentiated Services Code Point (DSCP) tags to specify the Class-of-Service (CoS) queue for the switches. For more information on these fields, see Cisco Meraki documentation. DSCP choice options come from Meraki and synced to Cisco MSX based on each tenant level. On the **Enter Configuration** page, from the **Protocols** field, choose **TCP** or **UDP** from the choices. When you select **TCP** or **UDP**, you get the following other choices of port ranges—Source Port Type, Destination Port Type, Source Port, and Destination Port. You can either select **Single Port** or **Port Range**. If you select the source port type as: **Port Range**, then the Source Port field changes to Source Port Range where you can enter values between 10-70. You can enter 70 for the Destination Port field. You can also lock the features so that the child tenants cannot change values for locked features.
Identity Pre-Shared Key (PSK) Authentication without Radius	Use the **Identity PSK Authentication without Radius** template to configure multiple PSKs for a single SSID without the use of a RADIUS server. Typically if you want to connect to a particular SSID, you need to use a particular password to connect. Meraki has a special case where you can configure multiple passphrases for the same SSID, and for each passphrase you can assign a specific group. Meraki allows you to add upto 50 PSKs. For more information, see Cisco Meraki documentation. When you select the **Identity PSK Authentication without Radius** template, the tags option displays only the SSID names tags that is present across that hierarchy level.

Feature Template	Description
	Note • Modifying or removing the PSK causes clients to disconnect using that specific PSK only. Other wireless clients using a different PSK will still be connected without any issues. Similarly, adding a new PSK has no impact on the existing client devices connected to the SSID. • **Group Policy** choice options comes from Meraki and synced to Cisco MSX based on each tenant level.



APPENDIX A

Additional Information

This section list the devices currently supported by the Managed Devices service on Cisco MSX and information on the JSON file required to support additional device models on Cisco MSX.

Devices Supported by Managed Device Service Pack

Cisco MSX Managed Device service pack supports various device types, such as:

- CISCO CSR 1000v
- CISCO IR 829
- CISCO ISR 1100
- CISCO ISR 4221
- CISCO ISR 4321
- CISCO ISR 4331
- CISCO ISR 4351
- CISCO ISR 4431
- CISCO ISR 4451
- Catalyst 300 switch
- CISCO IOS XR
- CISCO NX-OS
- CISCO CAT
- CISCO ASA
- Cisco Meraki. For the Meraki devices supported on Cisco MSX, see Managing Meraki.
- Catalyst 9000

- JUNIPER SRX
- FORTINET

Note For adding a new device model, see *Importing Device Model*.

Downloaded Sample JSON File from the Cisco MSX

The downloaded sample JSON file for importing a new device model:

```
{
  "deviceModels": [
    {
     "//comment_1": "'deviceModelName' is where the actual device model needs to be filled,
 'CISCO ISR 4451', 'CISCO IR 829' are used here for as examples.",
     "//comment_2": "The List 'interfaces' is for device models where there is no distinction
 between wan and lan interfaces, i.e. any interface can be selected as WAN or LAN. Ex: ISR
 4451, ISR 4431 etc.",
      "//comment_3": "Lists 'wan' and 'lan' are for device models where the interfaces are
 classified as WAN and LAN and cannot be interchangeably used. Ex: IR 829, ISR 11xx etc.",
      "//comment_4": "Lists 'interfaces', 'wan' and 'lan' are mutually exclusive, i.e. if
interface names are populated in 'interfaces' list, they cannot be populated in 'wan' or
'lan' lists and vice versa.",
     "//comment_5": "'wan' and 'lan' lists can be empty when 'interfaces' is populated and
 'interfaces' can be empty when 'wan' and 'lan' are populated. If 'interfaces' is populated,
 then 'wan' and 'lan' entries must also exist in 'interfaces'",
      "//comment_6": "Because on-boarding interface will be picked from the list of
'interfaces' or from 'wan' list, either of them ('interfaces' or 'wan') lists is mandatory
 but 'lan' list is not mandatory.",
     "//comment_7": "'ned-id' is mandatory parameter which SP has to enter, MSX 3.5 release
 supports cisco-ios ned only, this ned covers all the Cisco devices running ios and ios-xe.",

      "//comment_8": "Multiple device models can be defined in single JSON file upload.",
     "//comment_9": "Maximum number of interfaces which can be defined is 20, individually
 10 each for lan and wan type.",
      "//comment_10": "Overwriting the device model is allowed only if no devices are using
 the device model.",
      "//comment_11": "MSX install comes with pre loaded device model definitions, which
can be overwritten provided no devices are using the device model.",
      "//comment_12": "Device Type was added in 3.7.0 this is a required field. This must
be one of: cli, netconf, snmp or generic",
      "//comment_13": "directSecureTemplate was added in 3.7.0 this is a required filed.In
 this the User has to provide both the secure credentials and onboarding template",
      "//comment_14": "directTemplate was added in 3.7.0 this is a required field.In this
User needs to provide just the onboarding template to be applied on to the device",
     "//comment_15": "pnpDayZeroFile was added in 3.7.0 this is a required field.If provided
 from UI, then it should be pushed to the device instead the one generated from NSO",
     "//comment_16": "platformDeviceType is added in 3.8.0 and is tied to a deviceType for
 collecting health metrics",
      "//comment_17": "platformDeviceSubType is added in 3.8.0 and is tied to a deviceType
 for collecting health metrics",
      "deviceModelName": "CISCO ISR 4451",
      "interfaces": [
        "GigabitEthernet0/0/1",
        "GigabitEthernet0/0/0",
        "GigabitEthernet0/0/2",
        "GigabitEthernet0/0/3"
```

```
  ],
  "lan": [],
  "wan": [],
  "nedId": "cisco-ios",
  "deviceType": "cli",
  "directSecureTemplate": "TestDirectSecureTemplate",
  "directTemplate": "TestDirectTemplate",
  "pnpDayZeroFile": "TestPnpDayZeroFile",
  "platformDeviceType": "CPE",
  "platformDeviceSubType": "ISR",
  "snmpDetails": {
    "snmpAuthProto": "sha",
    "snmpVersion": "3",
    "snmpPrivProto": "PrivateProto",
    "snmpUserName": "Username"
  }
},
{
  "deviceModelName": "CISCO IR 829",
  "interfaces": [],
  "lan": [
    "Vlan1"
  ],
  "wan": [
    "GigabitEthernet0"
  ],
  "nedId": "cisco-ios",
  "deviceType": "cli",
  "directSecureTemplate": "TestDirectSecureTemplate",
  "directTemplate": "TestDirectTemplate",
  "pnpDayZeroFile": "TestPnpDayZeroFile",
  "platformDeviceType": "CPE",
  "platformDeviceSubType": "ISR",
  "snmpDetails": {
    "snmpAuthProto": "sha",
    "snmpVersion": "3",
    "snmpPrivProto": "PrivateProto",
    "snmpUserName": "Username"
  }
},
{
  "deviceModelName": "CISCO All Interfaces Model",
  "interfaces": [
    "GigabitEthernet0",
    "GigabitEthernet1",
    "GigabitEthernet2",
    "GigabitEthernet3"
  ],
  "lan": [
    "GigabitEthernet0"
  ],
  "wan": [
    "GigabitEthernet1",
    "GigabitEthernet2"
  ],
  "nedId": "cisco-ios",
  "deviceType": "cli",
  "directSecureTemplate": "TestDirectSecureTemplate",
  "directTemplate": "TestDirectTemplate",
  "pnpDayZeroFile": "TestPnpDayZeroFile",
  "platformDeviceType": "CPE",
  "platformDeviceSubType": "ISR"
},
{
```

```
      "deviceModelName": "Cisco ASA",
      "platformDeviceType": "CPE",
      "platformDeviceSubType": "ASA",
      "interfaces": [
        "Adaptive Security Appliance 'GigabitEthernet0/1' interface",
        "Adaptive Security Appliance 'GigabitEthernet0/2' interface",
        "Adaptive Security Appliance 'mgmt_int' interface"
      ],
      "lan": [],
      "wan": [],
      "nedId": "cisco-asa",
      "deviceType": "cli",
      "directTemplate": "ASA_CONFIG_TEMPLATE"
    }
  ],
  "deviceMetricConfigurations": [
    {
      "//comment_1": "(Required) 'platformDeviceSubType' is a string that maps the device
metric configuration to matching device model.",
      "//comment_2": "(Required) 'platformDeviceType' is used to identify what type of
device. This is used in conjunction with subtype to match device metric configurations.",
      "//comment_3": "(Required) 'snmpDetails' provides information on how to connect to
the device using SNMP. It will provide information like snmp version, snmp auth protocal,
snmp username, etc",
     "//comment_4": "(Optional) 'snmpOidList' provides a list of oid to append to existing
 list to collect data from. In certain cases of 3rd party device you might have to specify
 which OID to collect data from.",
      "//comment_5": "(Optional) 'snmpCpuMemoryUptimeQueryTemplate' is the query template
defined to retrieve and transform CPU, Memory Free/Used and Uptime. In some cases query
might have to be updated based on device type.",
      "//comment_6": "'snmpCpuMemoryUptimeQueryTemplate' is expected as a JSON object.",
      "//comment_7": "If an existing device metric configuration for subtype exists, we
will overwrite if you proceed.",
      "//comment_8": "NOTE: You may have to create a config template and upload it to NSO
to configure SNMP on device on onboarding. To do this use 'directTemplate' attribute in
device model",
      "snmpDetails": {
        "snmpAuthProto": "md5",
        "snmpVersion": "3",
        "snmpPrivProto": "PrivateProto",
        "snmpUserName": "Username"
      },
      "platformDeviceType": "CPE",
      "platformDeviceSubType": "JUNOS",
      "snmpOidList": [
        ".1.3.6.1.4.1.2636.3.1.13.1.21",
        ".1.3.6.1.4.1.2636.3.1.13.1.11"
      ],
      "snmpCpuMemoryUptimeQueryTemplate": {
        "size": 0,
        "query": {
          "bool": {
            "must": [
              {
                "match": {
                  "deviceId": "{{ device_id }}"
                }
              },
              {
                "match": {
                  "serviceId": "{{ service_id }}"
                }
              },
              {
```

```
            "range": {
              "@timestamp": {
                "gte": "now-5m",
                "lt": "now"
              }
            }
          }
        ]
      }
    },
    "aggs": {
      "per_interval": {
        "date_histogram": {
          "field": "@timestamp",
          "interval": "5m"
        },
        "aggs": {
          "UptimeMS": {
            "max": {
              "field": "sysUpTimeInstance"
            }
          },
          "UptimeHours": {
            "bucket_script": {
              "buckets_path": {
                "uptime": "UptimeMS"
              },
              "script": {
                "inline": "params.uptime / 360000"
              }
            }
          },
          "5minCPU": {
            "avg": {
              "field": "jnxOperating5MinLoadAvg.9.1.0.0"
            }
          },
          "PctMemUsed": {
            "avg": {
              "field": "jnxOperatingBuffer.9.1.0.0"
            }
          }
        }
      }
    }
  }
},
{
  "snmpDetails": {
    "snmpAuthProto": "sha",
    "snmpVersion": "3",
    "snmpPrivProto": "Privateproto",
    "snmpUserName": "Username"
  },
  "platformDeviceType": "CPE",
  "platformDeviceSubType": "ASA",
  "snmpCpuMemoryUptimeQueryTemplate": {
    "query": {
      "bool": {
        "must": [
          {
            "match": {
              "deviceId": "{{ device_id }}"
            }
```

```
      },
      {
        "match": {
          "serviceId": "{{ service_id }}"
        }
      },
      {
        "range": {
          "@timestamp": {
            "lt": "now",
            "gte": "now-5m"
          }
        }
      }
    ]
  }
},
"aggs": {
  "per_interval": {
    "date_histogram": {
      "field": "@timestamp",
      "interval": "5m"
    },
    "aggs": {
      "5minCPU": {
        "avg": {
          "field": "cpmCPUTotal5minRev.6"
        }
      },
      "UptimeHours": {
        "bucket_script": {
          "buckets_path": {
            "uptime": "UptimeMS"
          },
          "script": {
            "inline": "params.uptime / 360000"
          }
        }
      },
      "UsedMem": {
        "avg": {
          "field": "System memory.ciscoMemoryPoolUsed"
        }
      },
      "PctMemUsed": {
        "bucket_script": {
          "buckets_path": {
            "used": "UsedMem",
            "free": "FreeMem"
          },
          "script": {
            "inline": "params.used / params.free * 100"
          }
        }
      },
      "UptimeMS": {
        "max": {
          "field": "sysUpTimeInstance"
        }
      },
      "FreeMem": {
        "avg": {
          "field": "System memory.ciscoMemoryPoolFree"
        }
```

```
            }
          }
        }
      },
      "size": 0
    }
  }
 ]
}
```

Sample JSON File for Importing a Device Model on the New Device Type

Sample JSON file:

```
{
    "deviceModels": [{
        "deviceModelName": "Juniper JUNOS",
        "platformDeviceType": "CPE",
        "platformDeviceSubType": "JUNOS",
        "interfaces": [
            "ge-0/0/0",
            "gr-0/0/0"
        ],
        "lan": [],
        "wan": [],
        "nedId": "netconf",
        "deviceType": "netconf",
        "directTemplate": "junos-snmp"


    }],
    "deviceMetricConfigurations": [{
        "snmpDetails": {
            "snmpAuthProto": "md5",
            "snmpVersion": "3",
            "snmpPrivProto": "PrivProto",
            "snmpUserName": "Username"
          },
        "platformDeviceType": "CPE",
        "platformDeviceSubType": "JUNOS",
        "snmpOidList":[".1.3.6.1.4.1.2636.3.1.13.1.21",".1.3.6.1.4.1.2636.3.1.13.1.11"],
        "snmpCpuMemoryUptimeQueryTemplate": {
          "size":0,
          "query": {
            "bool": {
              "must": [
                {
                  "match": {
                    "deviceId": "{{ device_id }}"
                  }
                },
                {
                  "match": {
                    "serviceId": "{{ service_id }}"
                  }
                },
                {
                  "range": {
                    "@timestamp": {
```

```
                        "gte": "now-5m",
                        "lt":  "now"
                      }
                    }
                  }
                ]
              }
            },
            "aggs": {
              "per_interval": {
                "date_histogram": {
                  "field": "@timestamp",
                  "interval": "5m"
                },
                "aggs": {
                  "UptimeMS": {
                    "max": {
                      "field": "sysUpTimeInstance"
                    }
                  },
                  "UptimeHours": {
                    "bucket_script": {
                      "buckets_path": {
                        "uptime": "UptimeMS"
                      },
                      "script": {
                        "inline": "params.uptime / 360000"
                      }
                    }
                  },
                  "5minCPU": {
                    "avg": {
                      "field": "enterprises.2636.3.1.13.1.21.9.1.0.0"
                    }
                  },
                  "PctMemUsed": {
                    "avg": {
                      "field": "enterprises.2636.3.1.13.1.11.9.1.0.0"
                    }
                  }
                }
              }
            }
          }
        }]
    }
```