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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 1: 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**.

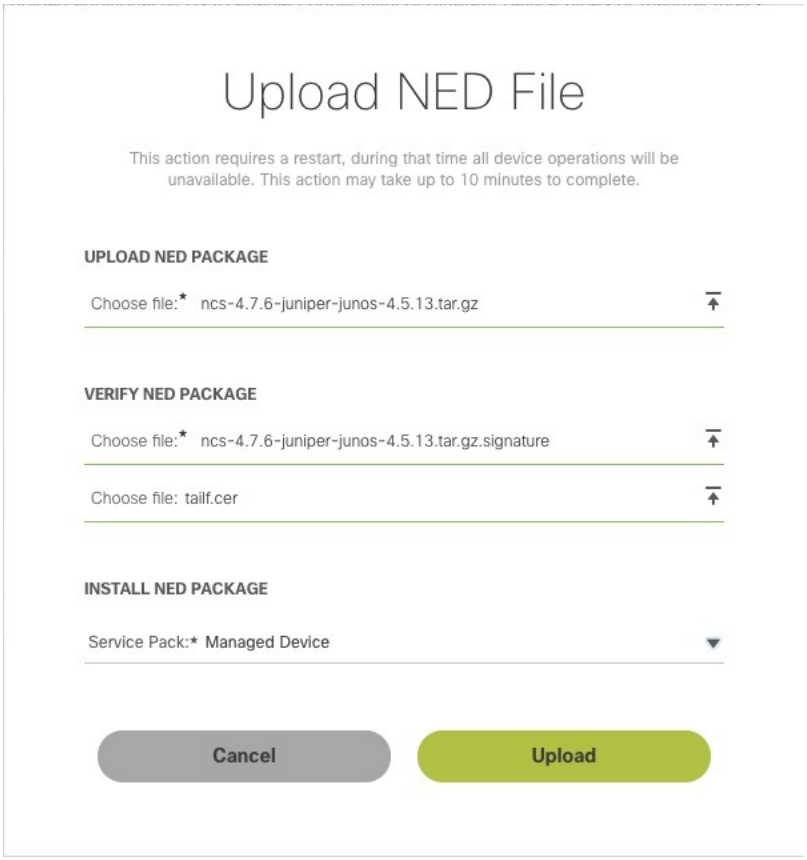
Displays the list of NEDs that are currently installed in the system.

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.

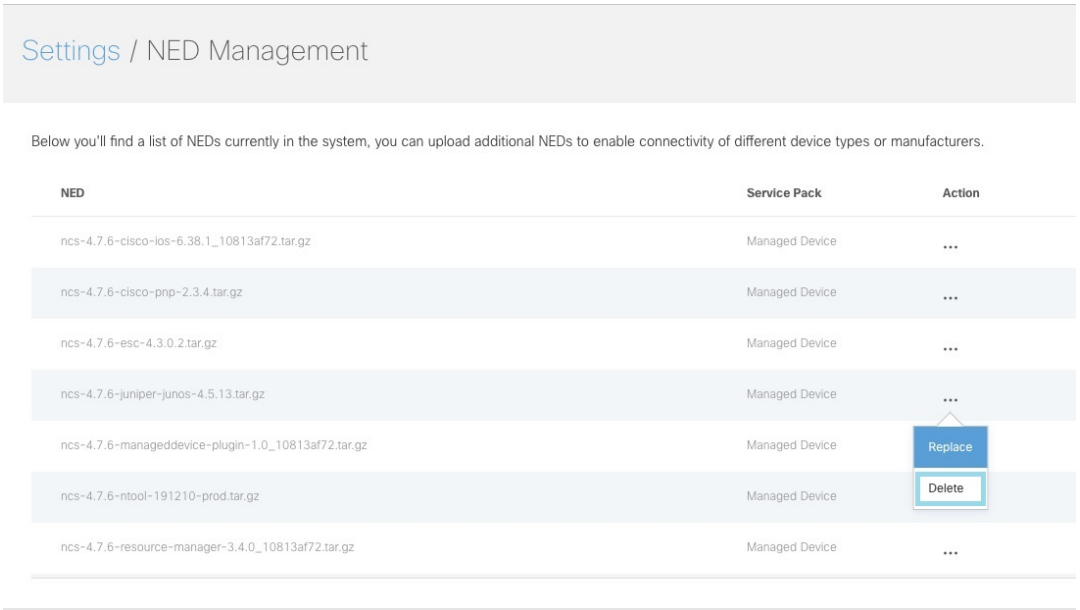
Procedure

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.

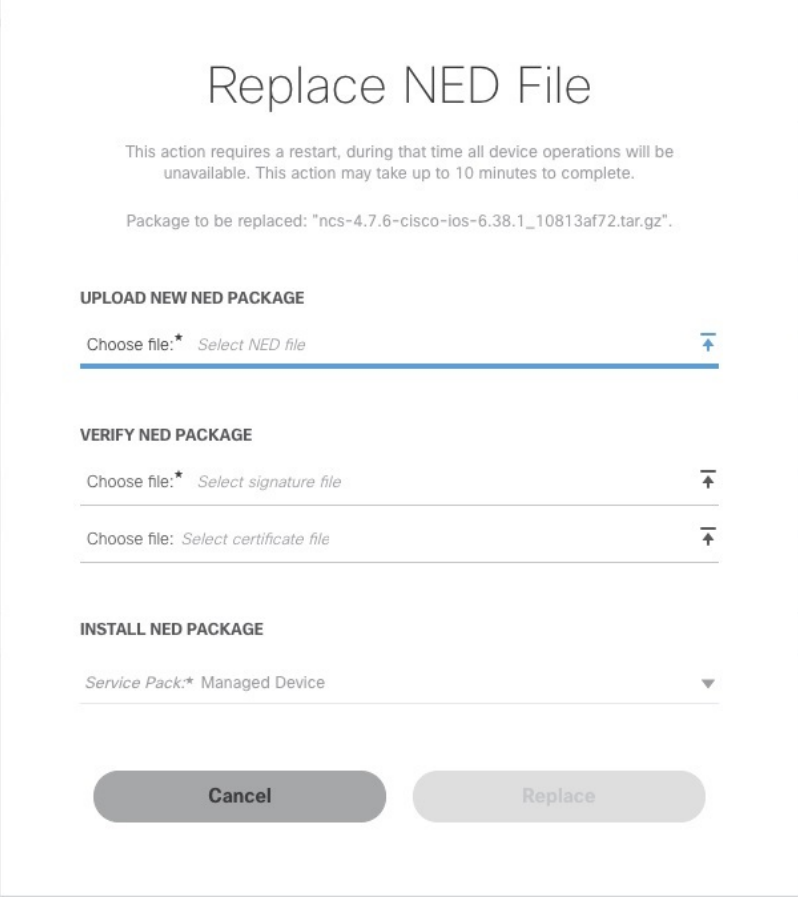
Step 2 In the main menu, go to **Settings > NED Management**.

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 2: 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 3: 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 4: 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**.

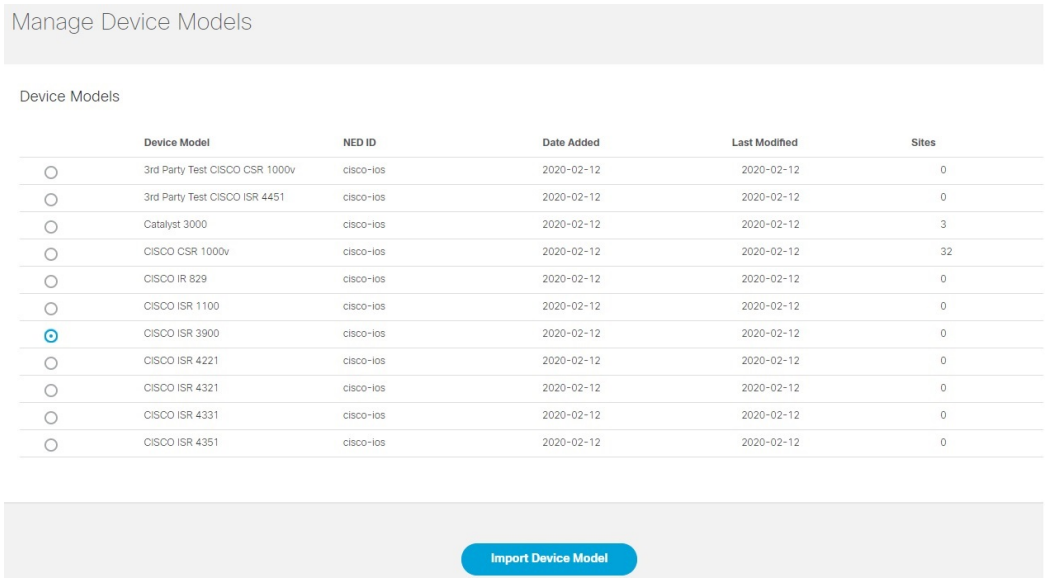
The **Settings** window appears.

Step 3 Click **Device Model Management**.

Step 4 Click **Managed Device**.

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

Figure 4: Device Model Table

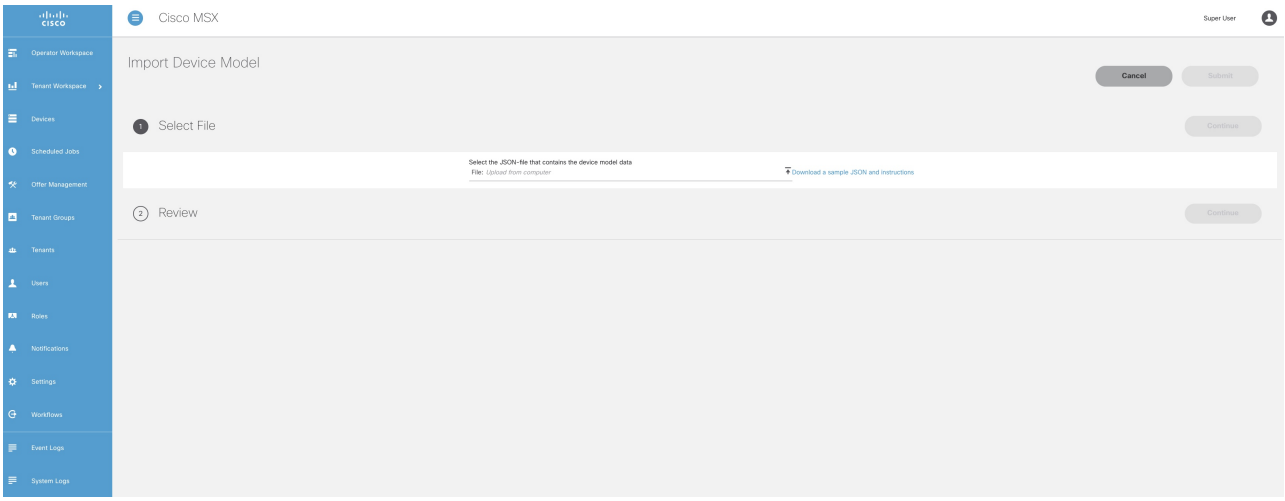


The list of device model appears. These device models can be deleted or added again according to your requirement. Existing device models can be overwritten depending on the requirements of the interfaces used.

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'.

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