Monitoring SDWAN Services (Final Draft - Cisco Internal)

Monitoring Cisco SD-WAN and Meraki SD-WAN Services in MSX   2

Monitoring Cisco SD-WAN and Meraki SD-WAN Services in MSX

Cisco MSX new GUI includes a MSX Dashboard and a Tenant Workspace, that are visible only if users have subscribed to the Cisco MSX Enterprise Access (EA) service pack.

This chapter contains the following sections:

Monitoring SD-WAN Service Status on the Cisco MSX GUI

The new GUI has the following workspaces:

- **Operator workspace**: Lists all the tenants and the services these tenants have subscribed to. The Operator Workspace has dashlets such as Tenants and Services. The tenant-centric portal is role-based and is accessible by operators.

Figure 1: Operator Workspace
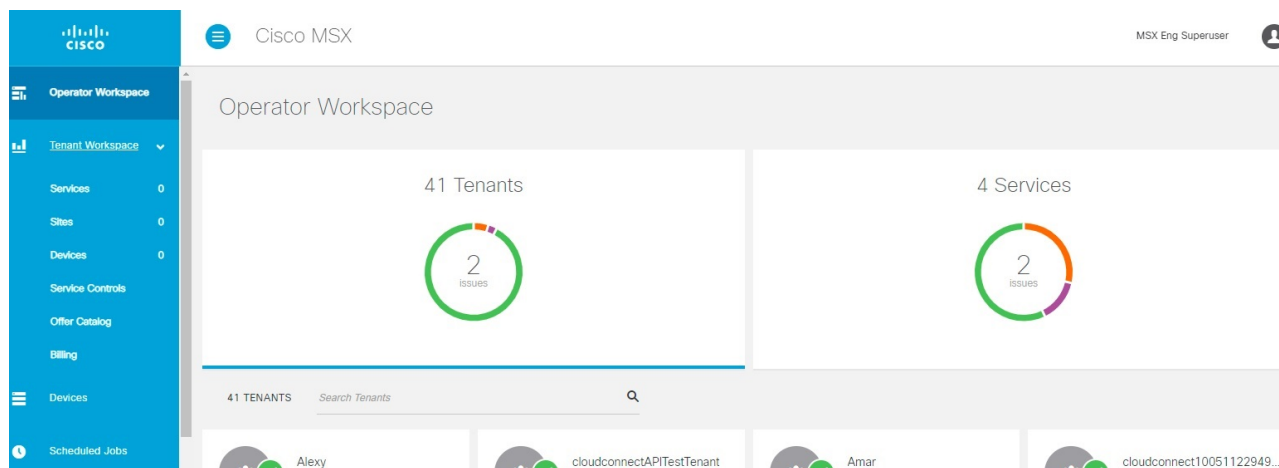
- **Tenant Workspace**: Allows tenants to access information related to their subscribed services. The following are the menus that are available in the tenant workspace:

Figure 2: Tenant Workspace
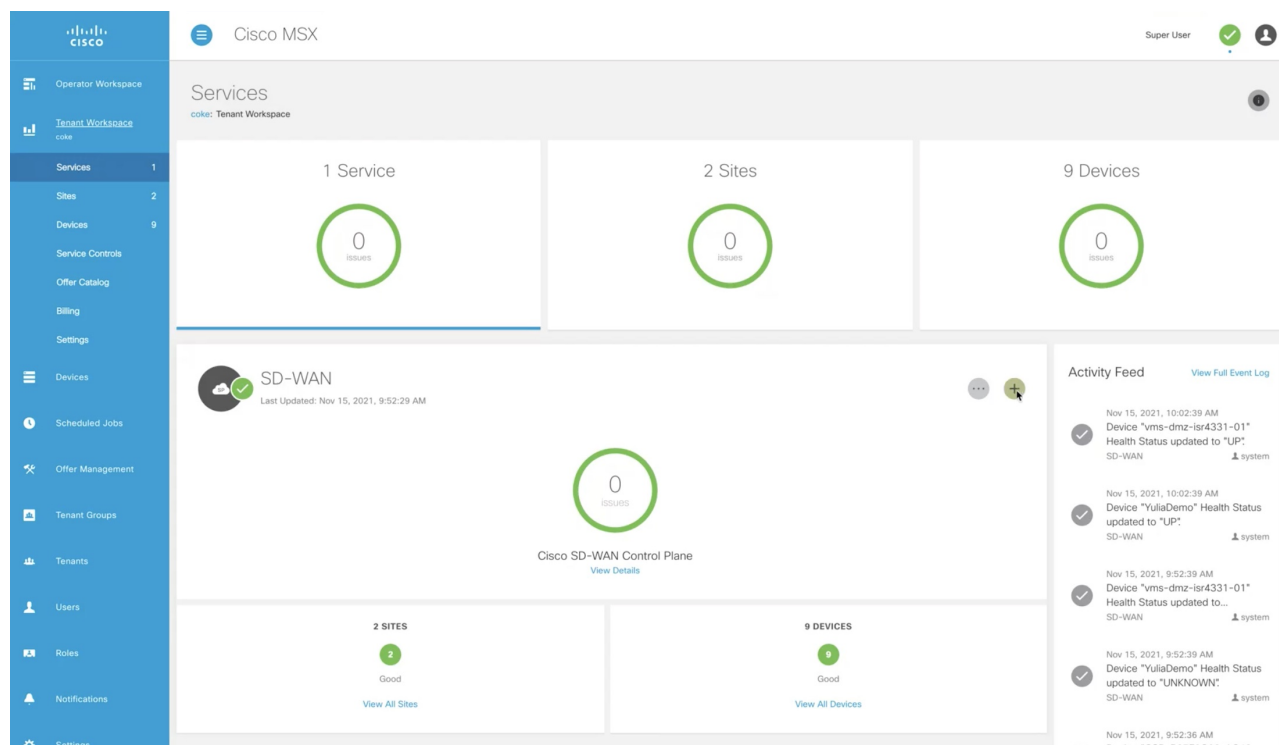
- **Services:** Display all services subscribed by a tenant, service status, other service metrics, and control plane status.

  For more information on service statuses in the Tenant Workspace, see Understanding Cisco SD-WAN Service Statuses.

- **Sites**: Display an overview of the tenant's sites, site status, and allows access to site details.

- **Devices**: Displays an overview of the tenant's devices, device status, and allows access to device details.

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> **Note** Displays both mapped or unmapped sites or devices.

  For more information on device statuses in the Tenant Workspace, see Monitoring Cisco SD-WAN Device Status.

- **Service Controls**: Display the custom service controls that are used by the services. For Cisco MSX SD-WAN service pack, you can view traffic policies used by a tenant and perform bulk import of device templates.

- **Offer Catalog**: Display existing subscriptions and allows subscribing to new services.

- **Billing**: Display billing information about the tenant's subscriptions. For more information on billing, see Managing Billing.

- **Activity Feed**: The Cisco MSX portal allows a tenant to view several events pertaining to the subscriptions, sites, devices, template, and services. The events that are logged in the **Events Log** window are also used in the Activity Feed. To view the Activity Feed, choose **Tenant Workspace > Services** window. These contextual event feeds are also displayed on the **Sites Detail** window and **Devices Detail** window.

Understanding Cisco SD-WAN Service Statuses

The service panel in the Tenant workspace allows tenants to see the next steps that can be performed for their subscribed services. After the services are set up and the network has connectivity, the panel also shows the services-related metrics.

Tenants can monitor the status of the SD-WAN service in the Service tab and the SD-WAN service panel. This overall service status is calculated based on the service lifecycle status.

The following table illustrates the SD-WAN service lifecycle status:

Color	SD-WAN Service Status	Description
Blue	Ready to Provision	SD-WAN control plane is not attached or created.
Purple	Provisioning Deprovisioning	Provisioning: Cisco MSX is attaching, or creating the SD-WAN control plane. Deprovisioning: Cisco MSX is deleting, or detaching the SD-WAN control plane.
Green	Provisioned	Cisco MSX has attached or created the SD-WAN control plane.
Orange	Failed	Provisioning or deprovisioning of the control plane failed.

Monitoring Cisco SD-WAN Device Status

The **Devices** menu option in the **Tenant Workspace** provides the devices' overall status. The **Devices** menu displays both mapped (latitude and longitude defined) or unmapped devices.
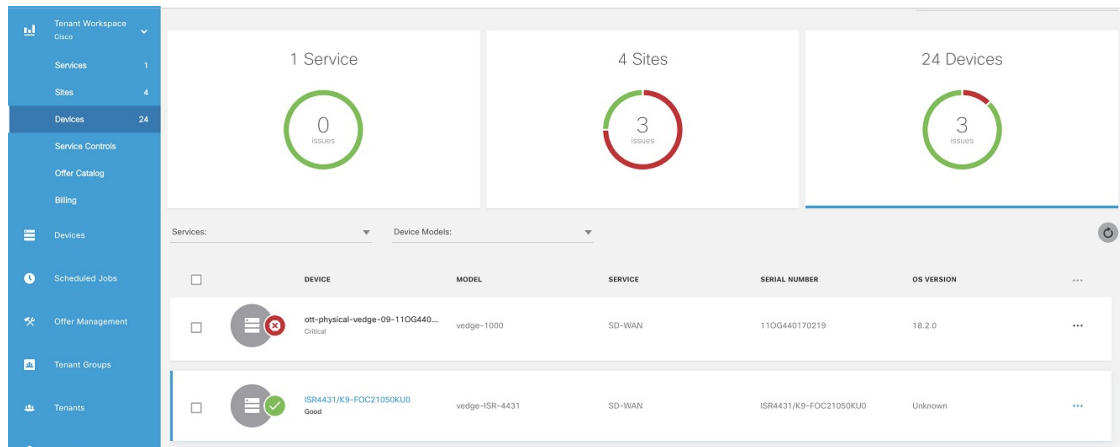
Using this procedure, you can view the SD-WAN and Meraki device statuses.

Procedure

Step 1   Log in to the MSX portal using your credentials.

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

        The **Devices Overview** window is displayed with overall status of the devices.

Figure 3: Device Overview window

Step 3   To view the status of a device, hover the mouse over the device and click to view the device summary.

The device view expands and its overall status is displayed along with its health and lifecycle status.

Figure 4: Device Expanded View
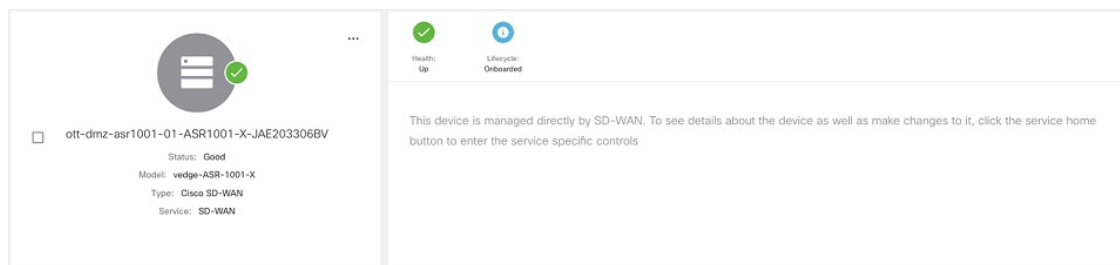
Note   For more information on the Cisco MSX device status for SD-WAN devices, see Understanding Cisco SD-WAN Device Statuses.

Step 4   Click **Device Details** to view additional details of the device such as reachability, control plane name, last sync time, IP address, device template details.

Device template shows the device template and its related information that was applied to that particular device. Related information includes device model, chassis number, system IP, hostname, and device template name.

For more information about the sync time, see Understanding Cisco SDWAN Synchronization.

Understanding Cisco SDWAN Synchronization

MSX synchronizes device inventory and configurations with the Cisco SD-WAN. During the sync time, MSX polls the controller, checks for updates, and updates the device details in MSX. This synchronization occurs every n minutes. By default, the sync time is 60 minutes.

The data presented on the device window is refreshed every (n) minutes depending on the time set.

Configuring the Sync Time

You can use the Task Scheduler Administration API to configure the sync time. As an operator, you can use PUT API (/api/v1/taskscheduler/{taskID} and update the value of recurrenceCronExpression to modify this duration.

Understanding Cisco SD-WAN Device Statuses

The overall device status (indicated by the *Status* option on the left-hand side of the **Devices** window) is categorized as **In Progress**, **Critical**, **Poor**, **Fair**, **Good**, and **Unknown**.

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> **Note** The device status in the legacy GUI is not the same as the status in the new MSX GUI. The overall device status is calculated based on the device lifecycle status (indicated by the *Lifecycle* bubble on the right-hand side). However, in some cases, overall device status also includes the device health status (indicated by the *Health* bubble on the right-hand side). The Device health status is considered only when the devices have system_ip configured or have VNFs successfully deployed and connected.

The following figure illustrates overall device status, device health, and lifecycle status for an SD-WAN device.
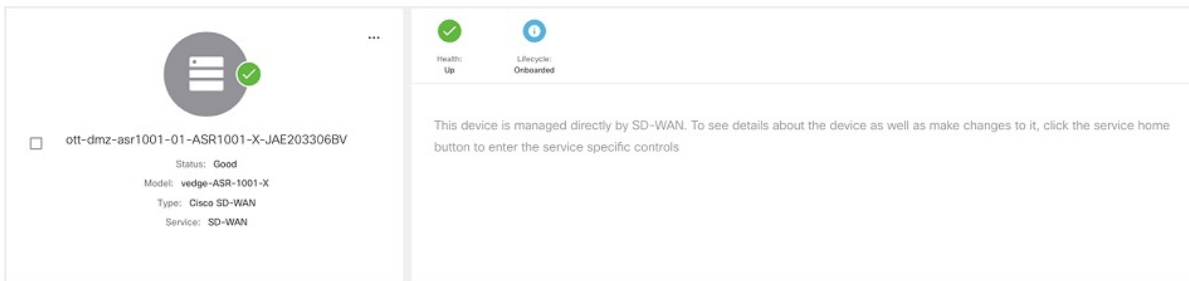
Within Cisco MSX, any status type are numbered from 1 to 7, with the highest number 7 indicating the status as '**Critical**' and the lowest number 1 indicating the status as 'Good'. An overall status looks into the available statuses (lifecycle or device health or both) for a device and picks the highest number and maps it to the below overall statuses.

Overall Status vs Severity Number in Cisco MSX

Overall Status	In Progress	Critical	Poor	Fair	Unknown	Good
Severity Number	9	7	6	5	3	1

The following table illustrates the mapping of SD-WAN lifecycle status and their severity level which defines the overall device status:

SD-WAN Device Lifecycle Status Shown in the Devices Window	What These Lifecycle Status Indicate	Severity Number (Determines the Overall Status in the GUI)	Overall Status Indication Based on the Severity Number
Configuring	Incomplete: Device is not ready to be provisioned because the data filled was incorrect or incomplete. The device will be in this status until the details are corrected, and the template file is imported again into MSX.	3	Unknown

SD-WAN Device Lifecycle Status Shown in the Devices Window	What These Lifecycle Status Indicate	Severity Number (Determines the Overall Status in the GUI)	Overall Status Indication Based on the Severity Number
Configuring	Ready to Provision: Device is connected and bulk data is imported. All provisioning details are completed and device is ready to provision.	3	Unknown
Provisioning	Provisioning: Provisioning process pushes the configuration data into the Control Plane such that the site is set up for day one configurations. The provisioning process on the Control Plane takes approximately 5 to 10 minutes.	3	Unknown
Provisioning Failed	Provisioning Failed: The Site Status changes to 'Provisioning Failed' if the configuration data imported does not match with the values on the Control Plane.	6	Poor
Provisioned	Provisioned: Site was provisioned successfully.	1	Good
Onboarded	Deployed: ENCS site is deployed and vEdge is able to communicate to the Control Plane.	1	Good
Onboarding	Deploying: ENCS site deployment with a vEdge is in progress.	3	Unknown
Onboarding Failed	Deployment Failed: Could not bring up vEdge using ENCS.	6	Poor
Deleting	Deleting: Deleting a device is in progress.	3	Unknown
Deleting Failed	Deleting Failed: Deleting the device failed.	6	Poor

Depending on wheter you are provisioning a physical, vEdge cloud, or vEdge SP Cloud, the site statuses and the next steps varies. For more information on these site statuses for these device types, see the sections below:

Device Statuses for Physical Device

The table below shows the status of Physical device (vEdge or IOS XE) with various validation messages shown on MSX, along with next steps.

Table 1: Device Statuses for Physical Device

Summary Status	Description	Next Steps
Unknown	The device is in the process of being shipped to customer site. At this point, MSX portal does not show physical devices on the map as these still do not have any address or map coordinates for the sites to plot them on the map. The site is plotted as 'Unmapped sites' on MSX map.	Connect the device. After the device is installed on the premise, connect the device, it goes through the ZTP (Zero Touch Provisioning) process and gets connected to the Control Plane.
Connected	The device has established connectivity to the Control Plane, but does not have the provisioning data to provision a device.	Import bulk data. For information, on how to import, see Importing Multiple Site Data from Cisco SD-WAN into MSX. After importing, MSX displays various validation messages to indicate the errors or missing information in the template file. You can click **View Details** in the validation message to display the Site Import Summary with the error list. **Note** We recommend that you download the error list as the information this screen is temporary and will disappear after you exit this page.
Incomplete Ready to Provision	• Incomplete: Device is not ready to be provisioned because the data filled was incorrect or incomplete. The device will be in this status until the details are corrected, and the template file is imported again into MSX. • Ready to Provision: Device is connected and bulk data is imported. All provisioning details are complete and device is ready to provision.	• For device with 'Incomplete' status, see Provisioning Details under Device Summary. This section lists the fields that have missing data. Enter the missing details in the Site template file and import again. • For device with 'Ready to Provision' status, see Provisioning Details under Device Summary, click **Provision Device** to initiate the provisioning process.
Up	• Up: Device was provisioned successfully. • Critical: Device was up and was provisioned, but after a while it lost connectivity to the SD-WAN Control Plane.	If the status is 'Critical', troubleshoot SD-WAN control plane connectivity issue. For more information, see Troubleshooting Cisco SD-WAN Reachability Issues.

Summary Status	Description	Next Steps
Site Status ⏳ Provisioning Connected to SD-WAN Control Plane — Ready to Provision — Provisioned ⚠️ Provisioning Failed Connected to SD-WAN Control Plane — Ready to Provision — ⊗ Provisioned	• Provisioning: Provisioning process pushes the configuration data into the Control Plane such that the device is set up for day one configurations. The provisioning process on the Control Plane takes approximately 5 to 10 minutes. • Provisioning Failed: The Device Status changes to 'Provisioning Failed' if the configuration data imported does not match with the values on the Control Plane. See Next Steps for more details.	Provisioning could fail because of one of the following reasons. • Data could not be validated as the template on MSX modified since the last upload. Correct the entries that are missing or incorrect. For information, on how to edit these entries, see Step 5 in Importing Multiple Site Data from Cisco SD-WAN into MSX. • If the information does not match with the data on the control plane, provisioning fails, and the missing or incorrect fields are highlighted in the Device Summary. Correct the entries that are missing or incorrect. For information, on how to edit these entries, see Step 5 in Importing Multiple Site Data from Cisco SD-WAN into MSX. • Unexpected errors on the Control Plane. If the state of the device appears as Out-of-Sync under the Basic Details, check the Event Log to get more details on the errors. For more information, see Viewing Event Logs.
⏻ Offline Connected to SD-WAN Control Plane — Ready to Provision — Provisioned	Offline: A device is in the process of being shipped has been uploaded and provisioned on the Control Plane. When the device is connected and has reachability to the Control Plane, the template on the Control Plane is applied on the device.	Connect the device.

Device Statuses for vEdge SP Cloud

The table below show the statuses for vEdge SP Cloud with various validation messages shown on MSX, along with next steps.

Table 2: Device Statuses for vEdge SP Cloud

Summary Status	Description	Next Steps
	Unknown: Device has been added on MSX portal and the configurations are downloaded by the service provider. The Unknown state indicates the time period when the Service Provider uses the downloaded configurations to brings up a vEdge cloud to finish deployment. The device during this phase waits for the vEdge to be deployed and connected back to SD-WAN Control Plane.	During this state, bulk data can be imported and provision the SP Cloud through MSX. For information, on how to import, see Importing Multiple Site Data from Cisco SD-WAN into MSX.
 	• Connected: Device deployment is complete and vEdge is able to communicate to the Control Plane, but does not have the provisioning data to provision a device. • Not Connected: Not Connected indicates a state when a connection was established once and then connection with Control Plane was lost because of Interface being shutdown.	• If in 'Connected' status, next step is to import bulk data. For information, on how to import, see Importing Multiple Site Data from Cisco SD-WAN into MSX. After importing, MSX displays various validation messages to indicate the errors or missing information in the template file. You can click **View Details** in the validation message to display the Site Import Summary with the error list. **Note** We recommend that you download the error list as the information on this screen is temporary and will disappear after you exit this page. • If the status is 'Not Connected', troubleshoot SD-WAN control plane connectivity issue. For more information, see Troubleshooting Cisco SD-WAN Reachability Issues.
 	Ready to Provision: In both cases, that is, connected to control plane and not connected to control plane, bulk data can be imported, and the devices are ready to be provisioned.	For device with 'Ready to Provision' status, see *Provisioning Details under Device Summary*, click **Provision Device** to initiate the provisioning process.

Summary Status	Description	Next Steps
	Incomplete: Device is not ready to be provisioned because the data filled was incorrect or incomplete. The device will be in this status until the details are corrected, and the template file is imported again into MSX.	For device with 'Incomplete' status, see *Provisioning Details under Device Summary*. This section lists the fields that have missing data. Enter the missing details in the Site template file and import again.

The remaining statuses for the vEdge SP cloud are similar to the Physical devices. For more information on the other statuses, see Device Statuses for Physical Device.

Device Statuses for vEdge Cloud

The table below show the site status for vEdge Cloud with various validation messages shown on MSX, along with next steps.

Table 3: Device Statuses for vEdge Cloud

Summary Status	Description	Next Steps
	ENCS site deployment with a vEdge is in progress.	
	Not Connected: vEdge is deployed but is not able to establish connection with the Control Plane.	• If not connected, troubleshoot SD-WAN control plane connectivity issue. For more information, see Troubleshooting Cisco SD-WAN Reachability Issues. • After the connection is established, you can import bulk data from multiple sites and provisioning one device at a time. For more information, seeProvisioning a Device.
	• Deployed: ENCS site is deployed and vEdge is able to communicate to the Control Plane. • Deployment Failed: Could not bring up vEdge using ENCS.	Troubleshoot the data plane. For more information, see Data Plane Troubleshooting.
	Connected: vEdge is deployed and connected to Control Plane. System is now ready for bulk import of data from multiple sites.	After the connection is established, you can import bulk data for provisioning the site. For more information, see Importing Multiple Site Data from Cisco SD-WAN into MSX.

Summary Status	Description	Next Steps
	Incomplete: Device is not ready to be provisioned because the data filled was incorrect or incomplete. The device will be in this status until the details are corrected, and the template file is imported again into MSX. Ready to Provision: Device is connected and bulk data is imported. All provisioning details is complete and device is ready to provision.	• For site with 'Incomplete' status, see *Provisioning Details under Device Summary*. This section lists the fields that have missing data. Enter the missing details in the Site template file and import again. • For device with 'Ready to Provision' status, see *Provisioning Details under Device Summary*, click **Provision Device** to initiate the provisioning process.
	• Provisioning: Provisioning process pushes the configuration data into the Control Plane such that the site is set up for day one configurations. The provisioning process on the Control Plane takes approximately 5 to 10 minutes. • Provisioning Failed: The Device Status changes to 'Provisioning Failed' if the configuration data imported does not match with the values on the Control Plane. See Next Steps for more details.	Provisioning could fail because of one of the following reasons. • Data could not be validated as the template on MSX was modified since the last upload. Correct the entries that are missing or incorrect, and import the site template file again. For information, on how to edit, see step 5 in Importing Multiple Site Data from Cisco SD-WAN into MSX. **Note** You can directly edit the site template from MSX any number of time as required. • If the information does not match with the data on the control plane, provisioning fails, and the missing or incorrect fields are highlighted in the Device Summary. Correct the entries that are missing or incorrect, and import the site template file again. For information, on how to edit, see step 5 in Importing Multiple Site Data from Cisco SD-WAN into MSX. • Unexpected errors on the Control Plane. If the state of the device appears as Out-of-Sync under the Basic Details, check the Event Log to get more details on the errors. For more information, see Viewing Event Logs.

Summary Status	Description	Next Steps
Up	• Up: Device was provisioned successfully. • Critical: Device was up and was provisioned, but after a while it lost connectivity to the SD-WAN Control Plane.	If the status is 'Critical', troubleshoot SD-WAN control plane connectivity issue. For more information, see Troubleshooting Cisco SD-WAN Reachability Issues.

Site Statuses for Meraki SD-WAN Devices

The table below shows the site statuses for Meraki SD-WAN sites shown on MSX, along with the next steps.

Table 4: Site Statuses for Meraki Devices

Site Summary Status	Description	Next Steps
Up	At least one of the devices has uplink connectivity to the WAN network.	Configure SD-WAN Traffic Shaping rules for the network in the Meraki dashboard.
Down	Devices added to the site do not have connectivity to the WAN network.	Check the uplink configuration for the devices added to the site. For more information, see Checking Device Connections.
Needs Input	No devices added to Meraki site.	Add devices to establish connectivity to a WAN network. For more information, see Adding a New Site or Device for Meraki.
Unknown	Unable to collect information on device status. Unexpected errors on the Control Plane.	• Check if the Meraki beat is operational. For more information, see Checking Meraki Beat. • For a recently added device, wait for a few minutes as the device transitions to the actual status.

Monitoring SD-WAN Control Plane Status

In MSX SD-WAN, Control Plane allows you to centrally manage the devices for a tenant, including provisioning, monitoring, and so on.

Before you begin

- Set up a control plane for your tenant.
  - For Cisco SD-WAN control plane, see Setting Up Control Plane for Cisco SD-WAN
  - For Meraki SD-WAN control plane, see Setting Up SD-WAN Control and Management Plane for Meraki.

- Complete control plane's post deployment configurations.

- For Cisco SD-WAN control plane, see Postdeployment Tasks for SD-WAN Control Plane.

- For Meraki SD-WAN control plane, see Maintaining Cisco Meraki SD-WAN Deployments.

To monitor the status of the SD-WAN control plane:

Procedure

Step 1   Log in to the Cisco MSX Portal.

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

Step 3   In the SD-WAN service panel, click on the ellipsis (...) and click **Control Plane Details**.

The following is the Cisco SD-WAN Control plane status after the certification, the security groups, and other configurations are completed.

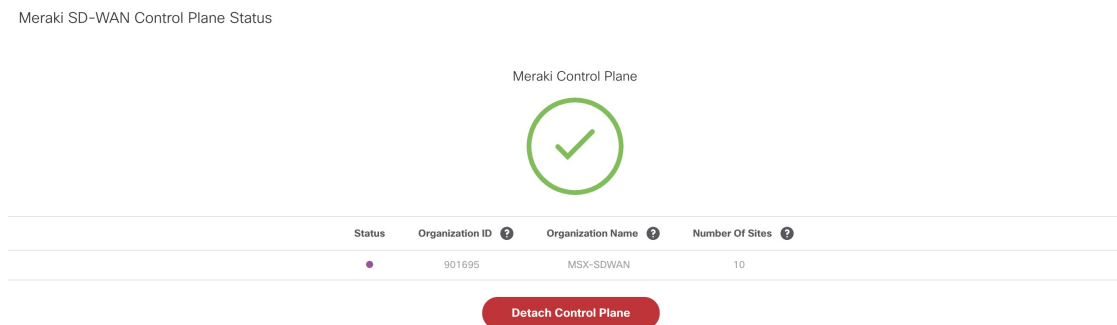*Figure 5: Cisco SD-WAN Control Plane Status*
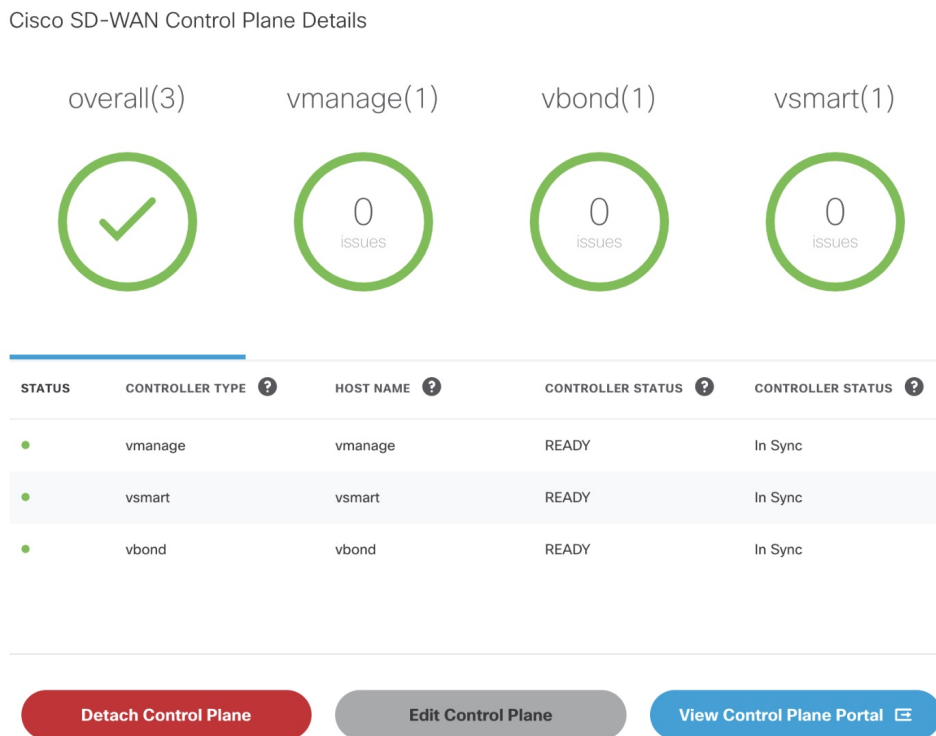
Note   If your Cisco SD-WAN control plane remains in the 'Not Configured' state or is unable to connect to the control plane due to the authentication issue, see Troubleshooting Control Plane.

Step 4   To view the Meraki Control Plane status, click on the ellipsis (...) in the SD-WAN service panel and click **Meraki SD-WAN Home**. You can see this option only if the Meraki fetaure is enabled.

The following is the Meraki Control Plane status.

Figure 6: Meraki Control Plane Status

Meraki SD-WAN Control Plane Status

Meraki Control Plane

| Status	Organization ID	Organization Name	Number Of Sites
●	901695	MSX-SDWAN	10

Detach Control Plane

Monitoring Tunnel Health

The tunnel health graph gives an overview of the health of the IPSec tunnels from the SD-WAN device.

The tunnel report in MSX shows how many of these tunnels are up, which is an indication of whether the device is at risk of losing connectivity.

For example: In the following figure, tunnels are established for vEdge with every other vEdge in the network. If more tunnels are down, it could indicate that vEdge device from where tunnels are established is experiencing degradation. If only a small subset of tunnel links are down, it means other vEdge devices may be possibly experiencing degradation.

Figure 7: Tunnel Connectivity Between vEdge Devices
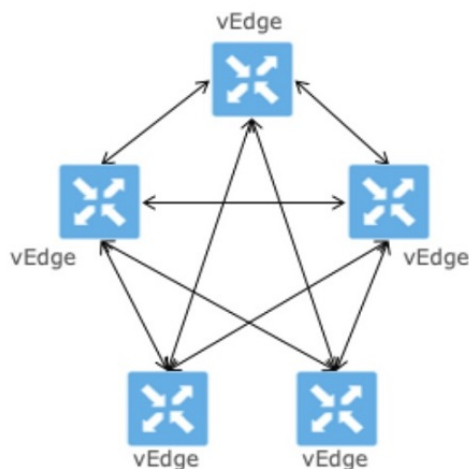
Tunnel Health Reporting or Tunnel Health Status Calculations:

Tunnels Up % = (Number of Tunnels in Up state / Total Number of Tunnels) * 100

For example:

If there are 200 tunnels and 80 tunnels are up, the Tunnel Up % will be (80/200)*100 = 40%

For other tunnel performance metrics, such as data loss, latency, jitter information, click **View Tunnel details on Control Plane** to launch the tunnel details. For more information on these metrics, see *Cisco SD-WAN documentation*.

To view the control plane status for the SD-WAN service:

Before you begin

To monitor tunnel health, make sure users have the following permission assigned:

  • Under **Services, Configurations, and Devices** category, select **Service Metrics** (View) permission permission.

Procedure

Step 1   Log in to the MSX portal using your credentials.

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

The **Services Overview** window is displayed.

Step 3   Click on the **SD-WAN Home** option to display the tenant-specific **Site Summary** window.

Step 4   Click the **Toggle** button on the top right-hand side of the page to toggle between the list and map view with the list of sites for the selected tenant.

Note   Both list view and map view displays all the sites (Meraki and Cisco SD-WAN) for the selected tenant.

Step 5   Select a site/device from the list of devices. The Site Summary window appears with site information and basic device details, such as chassis number, system IP, site ID, and so on.

The Site Status in the details page changes based on the various status of SD-WAN devices along with status of tunnel health. For more information on the the the site/device lifecycle statuses, see Monitoring Cisco SD-WAN Device Status.

The following table displays the Tunnel Health status that appears below the overall Site Status image based on the Tunnel Up %.

Tunnel Health Status	Tunnel Up %
Good	70-100
Fair	35-69
Critical	0-34

Note   If MSX is unable to determine the tunnel health, the Tunnel Health status changes to an 'Unknown' state.

The following are a few examples of the overall Site/Device Status depending on control plane status and the text beneath the image is based on the tunnel health status.

*Figure 8: Connected to control plane but the tunnels are starting to degrade (fair)*
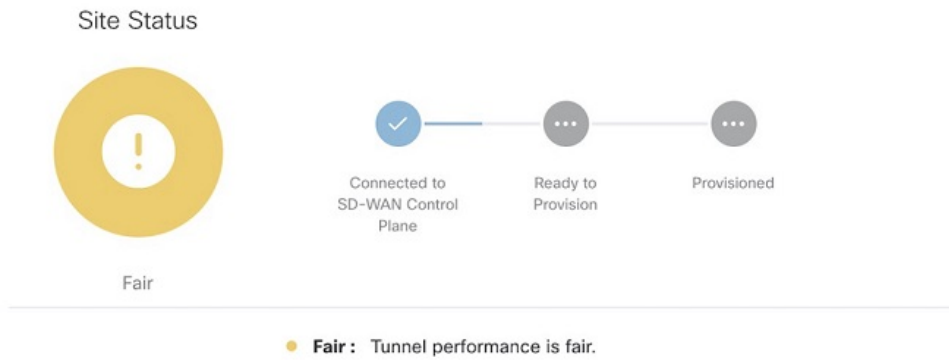
Figure 9: No connectivity to Control Plane but tunnel performance is fair

Step 6   On the **Site Summary** window, scroll down to the Tunnel Health section to view the current tunnel metrics. A graphical representation of all existing tunnels for the device appears.

Figure 10: Tunnel Health Graph
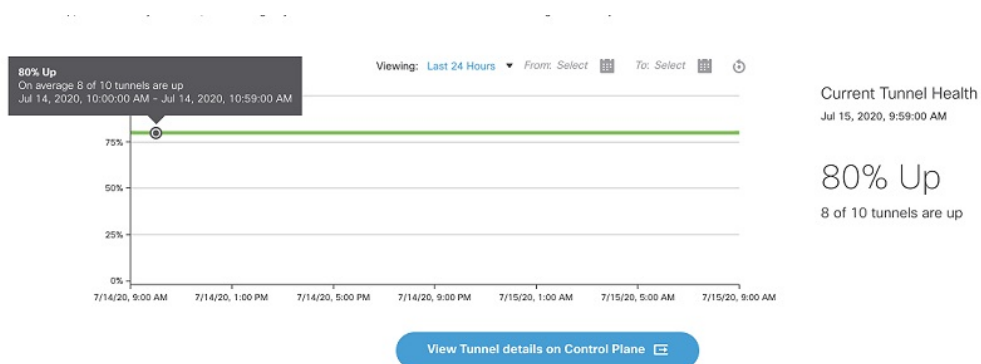
Where:

X axis - Time range

Y axis - Tunnels Up % (values 0-100)

Step 7   Select the time interval for displaying the tunnel health for that period. Choose one of the available time intervals from the **Viewing** drop-down list or click **Custom** to choose a time duration of your choice for which the reporting is displayed. Provide the day and time from when the reporting data must be collected until the specified end time. By default, last 24 hours chart is loaded.

Hover over the aggregated data points on the chart to get specific details, including the timestamp when the event occurred. These aggregated data points are system-generated. For more information on these data points, click on the **Learn More** link.

Monitoring SD-WAN Reporting Metrics Using Third-Party Network Monitoring Applications

You can integrate third-party network monitoring applications with SD-WAN on Cisco MSX, for example, LiveAction for real-time network insight. If integrated with SD-WAN, users can launch the application dashboard from the MSX Portal.

Before You Begin

Integrate LiveAction with MSX.

To launch a third-party monitoring portal from the Cisco MSX Portal:

Procedure

Step 1   Log in to the MSX portal using your credentials.

Step 2   From the left hand pane, click **Dashboard**. The **Dashboard** window is displayed.

Step 3   Click the **SD-WAN Home** button. The **SD-WAN Home** window is displayed.

Step 4   Select the tenant from the drop-down. The **SD-WAN Home** window refresh and displays the control plane status for the selected tenant.

Step 5   To launch the application dashboard, click **Launch Monitoring Portal**. The application dashboard opens up in a separate browser.

Monitoring the Traffic Policy

Monitoring the Traffic Paths

To confirm traffic path:

Procedure

Step 1   Log in to the vEdge or cEdge (IOX XE) server.

Step 2   Turn on application visibility on the vEdge or cEdge. To do so use the following commands:

Example:

```
config
policy
flow-visibility
commit
```

Step 3 Send traffic through the vEdge or cEdge.

Step 4 Check the path for vEdge and cEdge:

    • For vEdge, use the following command:

Example:

```
show app cflowd flows | tab
```

    • For cEdge, use the following command:

Example:

Monitoring the Application Queue

To confirm application queues:

Procedure

Step 1 Log in to the vEdge or the cEdge server.

Step 2 Send traffic through the vEdge or cEdge.

Step 3 Check the queues for vEdge and cEdge:

    • For vEdge, use the following command:

```
show policy data-policy-filter
```

    • For cEdge, use the following command:

```
show sdwan policy data-policy-filter
```

The output will show all the available application queue.

Viewing Event Logs

To view the event logs:

Before you begin
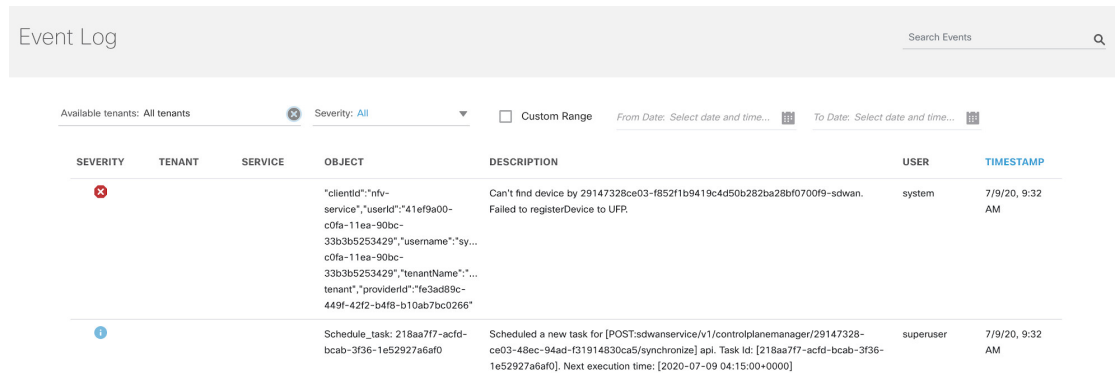
Ensure you have the **View Event Log** permissions to view the status of the policies in the event log.

Procedure

Step 1 Log in to the Cisco MSX Portal.

Step 2 In the main menu, click **Event Log**. The Event Log screen appears.

Figure 11: MSX Event Log

Step 3 Select the tenant from the drop-down for which the event log has to be displayed.

Step 4 To filter the event log records, select the filter type from the drop-down. To list event logs for a specific duration, select the **Custom Range** check box and specify the dates.