Device Management Using Templates

Overview of Device Management using Device Templates

Device templates enable deployment of multiple branch devices with pre-provisioned initial device configurations. You can use device templates to perform bulk zero-touch provisioning of multiple devices, apply configuration changes to multiple devices with different interface configurations, and clone configuration

parameters from existing devices. You can also register more than one device at a time with the Management Center using serial numbers.

A new Add Device wizard is introduced that enables you to perform the following tasks:

- Register device using registration key or serial number
- Use access policy or device template for registration
- Use CSV template file to register multiple Threat Defense devices at a time by using the serial number registration method
- Apply pre-provisioned initial configurations to devices at registration

Note You can register Threat Defense devices with the Management Center using serial numbers only when Cisco Security Cloud Integration is enabled in the Management Center.

You can also configure Site-to-site VPN connections in a device template. These configurations define the site-to-site VPN topologies that a device should be a part of. The VPN configurations along with the other device template policies and configurations enable easy deployment of the branch device to your network. Device templates support the configuration of a device only as a spoke. A device can be part of multiple hub and spoke site-to-site VPN topologies.

After the configured device template is applied to a device, the variables are resolved, the protected network overrides are configured, and the device is added as a spoke in the specified VPN topology.

Variables and Network Object Overrides

You can templatize configurations using template parameters such as variables and network object overrides.

A variable is an object type that is supported for template configurations. A variable in a template defines specific configuration values for a device. You can define values for these variables during device registration and during application of the template on the device. You can see the variable icon (x) for the fields that use a variable. The variables are displayed with a $ prefix to distinguish these values from the other values.

For information on supported variable types and creating variables, see Supported Variables.

Network object overrides are similar to variables. But, these are used for values where a network object is required. When you declare a network object as a network object override in the template, a network object override is created for this network object during the application of the template on the device. For example, if you define a host network object as a network override, you can provide a relevant value during the application of the template on the device. The network object override is unique to a device.

For more information on supported network objects and adding a network object override, see Supported Network Object Overrides.

Model Mapping

As interface configurations vary for different device models, the interface configurations in the template have to be copied to the target interfaces on the device. Model mapping enables you to define mapping of interfaces defined in the template to the interfaces of the required Threat Defense model. During application of the template on the device, the variables in the interface configurations are replaced with the values that you

provide and copied to the mapped interfaces on the device. Note that you have to create the model mappings in the template before initiating application of the template on the device. For more information on setting up model mapping, see Add Model Mapping.

Requirements and Prerequisites for Device Management using Device Templates

Model Support

Device templates are supported on On-Prem Management Center, cloud-delivered Firewall Management Center (cdFMC), with the following models running Secure Firewall version 7.4.1 and later versions:

- Firepower 1000 series
- Firepower 2100 series
- Secure Firewall 3100 series
- Secure Firewall 1200 series

Supported Domains

Any

User Roles

- Admin
- Network Admin

Prerequisites for VPN Connections

- Configure site-to-site VPN topologies that must be used in the device template.
- Ensure that you have configured all hub and VPN topology-related configurations such as authentication methods, IKE and IPsec policies.
- Supported types of VPN hub and spoke topologies are:
  - Policy-based
  - Route-based
  - SD-WAN
- Assign appropriate logical names and IP addresses to the interfaces of the threat defense devices. For example, use *inside* for the interface connected to the LAN, and *outside* for the interface connected to the internet or WAN.
- Spoke devices must be version 7.4.1 and later.

Licenses for Device Management using Device Templates

- Device templates does not have any specific license requirements.
- License entitlements for the target device must be present in the Smart Licensing account.
- To configure VPN connections in the template, the Essentials license must allow export-controlled functionality. Choose **System > Licenses > Smart Licenses** to verify this functionality in the management center.
- When you apply a template on a device, note the following conditions for Secure Client licensing:

Device with Secure Client License	Template with Secure Client License	Secure Client License after Device Template Application
Yes	Yes	Template License
Yes	No	Device License
No	Yes	Template License

Guidelines and Limitations for Device Management using Device Templates

General Guidelines for Device Templates

- All device configurations other than VNI and VTEP are supported.
- You can attach shared policies and S2S VPN policies to a template. These policies are assigned during template application.
- Templates can be applied on HA devices. However, application of device templates during HA device pair registration is not supported. You also cannot manage HA-related configurations such as failover links, standby IP addresses, and so on. For more information, see Device Template Operations on Threat Defense HA Devices.
- If manager access is changed from management to data interface or vice-versa, you must reestablish the management connection with the device.
- Templates that are created and configured for devices that are managed through the data interface cannot be used to register and apply to devices that are managed through the management interface.
- Device registration and application of template does not come under the Change Management workflow. Only approved data, such as access policies, templates, template variables, network overrides declared in template, and template configurations, are used.
- You can add a maximum of 250 device templates to the Management Center.
- Device registration with serial number and access control policy is supported for only one device at a time.

- Devices with IPv6 DHCP discoverability are not supported when you add devices using serial numbers.

Guidelines for VPN Connections

- Supported interfaces for VPN topologies are:

Topology Type	Interface Type

Policy-Based and SD-WAN	• Physical interfaces
	  • Non-management
	  • Interface Mode must be either Routed or None
	• Subinterfaces
	• Redundant interfaces
	• Etherchannel interfaces
	• VLAN interfaces

Route-Based	Static Virtual Tunnel Interfaces

- When you apply a template on a device that is part of a VPN topology, you must ensure that the template includes interface configurations for all interfaces used in the topology.
- When you apply a template with VPN connections to multiple devices, note the following:

  A template is applied to multiple devices in the order in which you have selected the devices. If the template has VPN connections, the corresponding VPN topology is locked.
- For SD-WAN topology VPN connections: Ensure that IP address subnet of the interface does not conflict with the subnet of the IP address pool of the SD-WAN hub.
- Domain:
  - You can define a template in a global or leaf domain. However, you can define a VPN topology only in a leaf domain.
  - You can configure VPN connections in a template for all domains. During template application, VPN connections are applied to the device only if the device is in the same domain as the VPN topology.

  For more information, see Device Templates in Domains, on page 37.
- Change management: Before you apply a device template to a device, ensure that the VPN topology is not locked by a Change management ticket.

Limitations for Device Templates

- The following features and configurations are not supported using device templates:
  - Multi-instance mode

- Clustering
- Non-converged management interface
- Transparent mode
- HA failover configurations
- Chassis configurations
- Logical devices
- Variables for nested objects
- Override support for network groups and other object types

Limitations for VPN Connections

- When you create a template from a device that is part of a VPN topology (**Devices > Device Management > More** ( ) **> Generate Template from Device**), VPN configurations are not part of the template. You must reconfigure the VPN configurations on the template.
- When you export a device template with one or more VPN connections (**Template Settings > General > General** pane > **Export**), the VPN connections are not exported. You must reconfigure the VPN connections on the imported template.
- Certificate-based authentication:
  - Device templates do not support automatic certificate enrolment of a device.
  - When you onboard a device using a template with VPN configurations, if the VPN topology uses certificate-based authentication, the first deployment to the device will fail. Ensure that you manually enroll the device certificate after the device registration and deploy the configurations on the device again.

Template Management

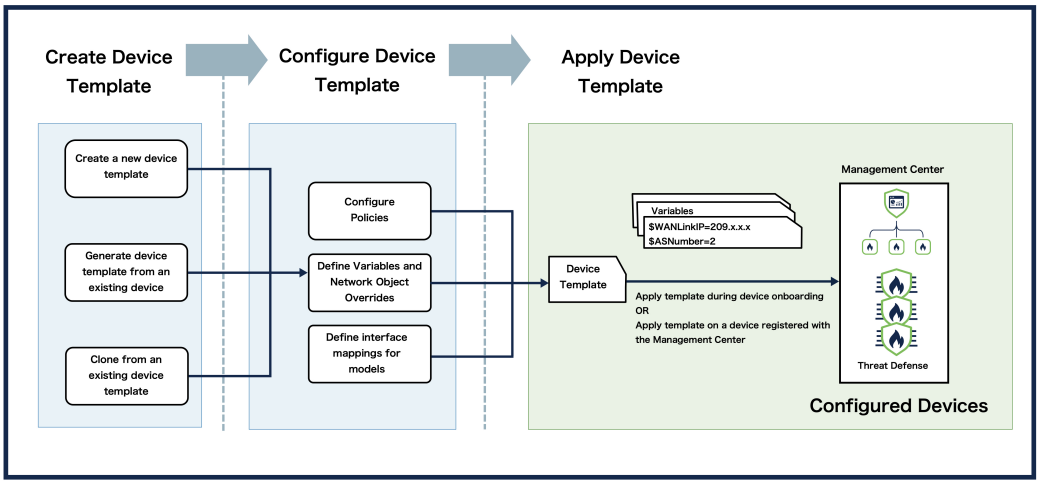
Choose **Devices > Template Management** to bring up the Template Management window. This window provides you with a range of information and options to manage templates. All the created device templates are listed on this window.

Information on each template is provided under the following columns:

- **Name** - Displays the name of the template.
- **Domain** - Displays the domain in which the template is present.
- **Variables** - Displays the variables and network object overrides in the template.
- **Access Control Policy** - Click the link in the Access Control Policy column to view the policy that is deployed on the device.
- **Model Interface Mapping** – Displays the device model interfaces that are mapped to the template interfaces.

Against each template, there is an **Edit** ( ) icon and a **More** ( ) icon. When you click the **Edit** ( ) icon, the **Device Management** window appears with several tabs. You can use the tabs to configure interfaces, inline sets, routing, DHCP, VPN, and template settings. Click the **More** ( ) icon to **Apply** or **Delete** the template.

Workflow for Device Management using Device Templates



Create a New Device Template

You must be an admin user to create a new device template. You can specify the device template name, description, access control policy, and routing mode. You can add more configurations after the template has been created. Perform the procedure given below to create a device template.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click **Add Device Template**.

Step 3 In the **Add Device Template** window, enter a **Name** for the template.

Step 4 (Optional) Enter a **Description** for the template.

Step 5 Choose an **Access Control Policy** from the drop-down list.

Step 6 Choose a **Mode** from the drop-down list.

Step 7 Click **OK**.

Generate a New Device Template from an Existing Device

An admin user with *modify* privileges can generate a new device template from a device that is registered with the Management Center. The new template has the same configuration as the device from which it is generated. You can generate a new device template from standalone and HA devices. However, if you generate a template from HA devices, the new template will not contain the failover configurations.

Perform the procedure given below to generate a new device template from an existing device.

Procedure

Step 1 Choose **Devices > Device Management**.

Step 2 Click the **More** (⋮) icon, and click **Generate Template from Device**.

Step 3 In the **Generate template from device** window, enter a **Name** for the template.

Step 4 (Optional) Enter a **Description** for the template.

Step 5 Choose an **Access Control Policy** from the drop-down list.

Note This policy is assigned to the generated template. Any other shared policies that are associated with the device from which the template is generated are assigned to the generated template only if these policies are visible in the domain in which the template is being generated.

Step 6 Click **OK**. You can view the status of template creation in the **Notifications > Tasks** window.

Step 7 Choose **Devices > Template Management** to view the newly created template.

Clone an Existing Device Template

To clone or create a copy of the existing device template, click **Export** under **Template Settings**. The cloned version of the template is downloaded as an SFO file. To import the SFO file into the Management Center, click **Import** under **Template Settings**.

This feature is useful in the following scenarios:

- Generate a copy of the template from a device and import that template into another Management Center or cloud delivered Management Center.
- Generate a copy of the template in the same Management Center and modify, as required, to create a variation of the existing template.
- Generate a copy of the template and import that template into another domain in which the source template is not visible.

When you import a template into a domain, any objects that are part of the configuration are either newly created or reused if the objects with the same name are visible in the domain into which the template is imported. Any object with matching names that is not visible, due to domain hierarchy, is imported as a new object with the name suffixed with a _x.

If there is a mismatch in the variable names when you want to onboard devices in a domain using the cloned template from another domain, you must specify the new variable names in the .csv file to onboard the devices.

Export a Device Template

Perform the procedure given below to export an existing device template from the Management Center to your local system.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click the **Edit** ( ) icon of the template that you want to clone.

Step 3 Click **Template Settings**.

Step 4 In the **General** pane, click **Export**.

Step 5 View the status of the export task in the **Notifications** > **Tasks** window.

Step 6 In the **Notifications** > **Tasks** window, you will see a notification informing you that the export task is successfully completed. Click **Download Export Package** to download the template configuration as an SFO file.

Import a Device Template

Perform the procedure given below to import an existing device template into the Management Center from your local system.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click the **Edit** ( ) icon for the template into which you want to import the template configuration (SFO) file.

Step 3 Click **Template Settings**.

Step 4 In the **General** pane, click **Import**.

Step 5 Click **Yes** to confirm import of the SFO file and select the SFO file to import from your local system. This template SFO file that you import can be newly created, generated from a device, or cloned from an existing template.

Step 6 View the status of the import task in the **Notifications** > **Tasks** window.

Step 7 In the **Notifications** > **Tasks** window, you will see a notification informing you that the import task is successfully completed.

Configure Device Template

After creating the template, you can set up device configurations and configure settings that you want to apply on the device by editing the template.

Add a Physical Interface

By default, a device template will enable the device to come up with the following physical interfaces:

- Management interface
- Inside interface
- Outside interface

Perform the procedure given below to create a physical interface.

Procedure

Step 1 Choose **Devices > Template Management**.

Step 2 Click the **Edit** ( ) of the template in which you want to add the physical interface.

Step 3 In the **Interfaces** tab, click **Add Physical Interface**.

Step 4 Choose a **Slot** and **Port Index** number from the drop-down list.

Step 5 Click **Create Interface**.

Add a Logical Interface

You can create a logical interface in the same way as you do on the Management Center without using the template. Perform the procedure given below to create a logical interface.

Procedure

Step 1 Choose **Devices > Template Management**.

Step 2 Click the **Edit** ( ) icon of the template in which you want to add the logical interface.

Step 3 In the **Interfaces** tab, click **Add Interface**, and choose the type of interface that you want to create from the drop-down list. You can create the following types of interfaces:

- Sub-interface
- Ether channel interface
- Bridge group interface
- VLAN interface

- Virtual tunnel interface
- Loopback interface

For more information, see Interface overview and Regular Firewall Interfaces.

Edit an Interface

You can edit an interface in the same way as you do on the Management Center without using the template. Use template variables to set up the IPv4 and IPv6 addresses. The device template supports the configurations that are supported on Firepower 1000, 2100, Secure Firewall 3100, and 1200 Threat Defense devices. Perform the procedure given below to edit an interface.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click the **Edit** ( ) icon of the template in which you want to edit the physical interface.

Step 3 In the **Interfaces** tab, click the **Edit** icon for the interface that you want to edit.

Step 4 In the **Edit Physical Interface** window, you can edit any of the following settings:

- General
- PoE
- IPv4
- IPv6
- Path Monitoring
- Hardware Configuration
- Manager Access
- Advanced

Note Use variables to configure IPv4 and IPv6 addresses. For more information on templatizing variables, see Configure Template Parameters.

For more information on editing the settings mentioned above, see Interface overview and Regular Firewall Interfaces.

Configure Device-Specific Settings

Configure device-specific configuration in the same way as you do on the Management Center without using the template. Perform the procedure given below to edit an interface.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click the **Edit** ( ) icon for the template in which you want to configure the settings.

Step 3 Click the tabs at the top of the window to configure any of the following settings:

- Inline Sets
- Routing
- DHCP
- VPN
- Template Settings

Configure Template Settings

These are template-specific settings that are copied to the device when the template is applied on the device. In the **Template Settings** window, you can configure the following template settings:

- General
  - Edit General Settings
  - Edit Licenses
  - Edit Applied Policies
  - Edit Advanced Settings
  - Edit Deployment Settings
- Template Parameters
  - Add a Variable
  - Add a Network Object Override
- Add Model Mapping

Edit General Settings

In the **General** tile, you see the following fields:

- **Name** – The display name of the device on the management center.
- **Transfer Packets** – Displays whether or not the managed device sends packet data with the events to the management center.
- **Mode** – Displays the mode of the management interface for the device: routed.

- **Configuration** – Click **Export** to export the template configurations as an SFO file. Click **Import** to import an SFO file that has the template configurations that you require.
- **Manage device by Data Interface** – Toggle the button to enable or disable management of the device using the data interface.

Perform the procedure given below to edit the name of the device, and to enable or disable packet transfer.

Procedure

Step 1 Click the **Edit** ( ) icon in the **General** tile.

Step 2 Change the **Name** of the device as per your requirement.

Step 3 Check the **Transfer Packets** checkbox to allow packet data to be stored with events on the management center.

Step 4 Click **Save**.

Edit Licenses

In the **License** tile, you can see the **License types** that are required based on the configurations used in the template. Choosing a license here does not consume that license on the device.

Perform the procedure given below to edit the license types as per your requirement.

Procedure

Step 1 Click the **Edit** ( ) icon in the **License** tile.

Step 2 Check or clear the check box next to the license you want to enable or disable for the managed device.

Step 3 Click **Save**.

Edit Applied Policies

In the **Applied Policies** tile, you can see the access control policies that are associated with the template.

For policies with links, you can click the link to view the policy.

Perform the procedure given below to edit the policy assignments as per your requirement.

Procedure

Step 1 Click the **Edit** ( ) icon in the **Applied Policies** tile.

Step 2 For each policy type, choose a policy from the drop-down list. Only existing policies are listed.

Step 3 Click **Save**.

Edit Advanced Settings

The **Advanced Settings** tile displays the advanced configuration settings, as described below. You can edit any of these settings.

Table 1: Advanced Section Table Fields

Field	Description
Application Bypass	The state of Automatic Application Bypass on the device.
Bypass Threshold	The Automatic Application Bypass threshold, in milliseconds.
Object Group Search	The state of object group search on the device. While operating, the FTD device expands access control rules into multiple access control list entries based on the contents of any network or interface objects used in the access rule. You can reduce the memory required to search access control rules by enabling object group search. With object group search enabled, the system does not expand network or interface objects, but instead searches access rules for matches based on those group definitions. Object group search does not impact how your access rules are defined or how they appear in Firepower Management Center. It impacts only how the device interprets and processes them while matching connections to access control rules. **Note** By default, the **Object Group Search** is enabled when you add threat defense for the first time in the management center.
Interface Object Optimization	The state of interface object optimization on the device. During deployment, interface groups and security zones used in the access control and prefilter policies generate separate rules for each source/destination interface pair. If you enable interface object optimization, the system will instead deploy a single rule per access control/prefilter rule, which can simplify the device configuration and improve deployment performance. If you select this option, also select the **Object Group Search** option to reduce memory usage on the device.

Perform the procedure given below to edit the advanced settings.

Procedure

Step 1 Click the **Edit** ( ) icon in the **Advanced Settings** tile.

Step 2 You can change the settings as per your requirement. For more information, see the following sections:

- Configure Automatic Application Bypass
- Configure Object Group Search
- Configure Interface Object Optimization

Step 3 Click **Save**.

Edit Deployment Settings

The **Deployment Settings** tile displays the information described in the table below.

Table 2: Deployment Settings

Field	Description
Auto Rollback Deployment if Connectivity Fails	Enabled or Disabled. You can enable auto rollback if the management connection fails as a result of the deployment; specifically if you use data for management center access, and then you misconfigure the data interface.
Connectivity Monitor Interval (in Minutes)	Shows the amount of time to wait before rolling back the configuration.

Deployment settings include enabling auto rollback of the deployment if the management connection fails as a result of the deployment; specifically if you use data for management center access, and then you misconfigure the data interface. You can alternatively manually roll back the configuration using the **configure policy rollback** command.

Perform the procedure given below to edit the deployment settings.

Procedure

Step 1 Click the **Edit** icon in the **Deployment Settings** tile.

Step 2 Set the **Connectivity Monitor Interval (in Minutes)** to set the amount of time to wait before rolling back the configuration. The default is 20 minutes.

Step 3 If a rollback occurs, see the following for next steps.

- If the auto rollback was successful, you see a success message instructing you to do a full deployment.
- You can also go to the **Deploy** > **Advanced Deploy** screen and click the **Preview** icon to view the parts of the configuration that were rolled back (see Deploy Configuration Changes). Click **Show Rollback Changes** to view the changes, and **Hide Rollback Changes** to hide the changes.
- In the Deployment History Preview, you can view the rollback changes.

Step 4 Check that the management connection was reestablished.

In management center, check the management connection status on the **Devices** > **Device Management** > **Device** > **Management** > **FMC Access Details** > **Connection Status** page.

At the threat defense CLI, enter the **sftunnel-status-brief** command to view the management connection status.

If it takes more than 10 minutes to reestablish the connection, you should troubleshoot the connection. See Troubledshoot Management Connectivity on a Data Interface.

Configure Template Parameters

You can templatize configurations using template parameters such as variables and network object overrides.

Supported Variables

The following variable types are supported in device templates.

Variable Name	Description	Type
AS Number	Defines the unique Autonomous System (AS) number.	Integer Example: 2
FQDN	Defines a single Fully Qualified Domain Name (FQDN).	String Example: abc.example.com
IPv4 Host	Defines the IPv4address of the host.	String Example: 209.165.201.8
IPv4 Network	Defines the IPv4 network address block.	String Example: 209.165.200.224/27
IPv4 Range	Defines the range of IPv4 addresses.	String Example: 209.165.200.225-209.165.200.250
IPv6 Host	Defines the IPv6address of the host.	String Example: 2001:DB8::1
IPv6 Network	Defines the IPv6 network address block.	String Example: 2001:DB8:0:CD30::/60
Password	Defines a password string.	String Example: E28@2OiUrhx!
Router ID	Defines an identifier for the router.	Integer Example: 21
String	Defines a custom string.	String Example: testvalue2

Add a Variable

Perform the procedure given below to add a variable.

Procedure

Step 1 Choose **Objects** > **Object Management**.

Step 2 Choose **Variable** from the list of object types.

Step 3 Click **Add Variable**.

Step 4 Enter a **Name**.

In a multidomain deployment, object names must be unique within the domain hierarchy. The system may identify a conflict with the name of an object you cannot view in your current domain.

Step 5 Choose a **Variable Type** from the drop-down list.

Step 6 (Optional) Enter a **Description**.

Step 7 Click **Save**.

Supported Network Object Overrides

The following network objects are supported.

Network Object Name	Description	Type
Network	An address block, also known as a subnet.	String Example: IPv4 - 209.165.200.224/27 IPv6 - 2001:DB8::/48
Host	The IP address of the host.	String Example: IPv4 - 209.165.200.225 IPv6 - 2001:DB8:1::1
Range	A range of IP addresses.	String Example: IPv4 - 209.165.200.225-209.165.200.250 IPv6 - 2001:DB8::1 - 2001:DB8:FFFF:FFFF:FFFF:FFFE:FFFF:FFFF
FQDN	A single fully-qualified domain name (FQDN).	String Example: abc.example.com

Add a Network Object Override

Perform the procedure given below to add a network object override.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click the **Edit** ( ) icon of the template in which you want to add the network object override.

Step 3 Choose **Template Settings** > **Template Parameters**.

Step 4 In the **Network Object Overrides** section, click **Add or Remove Network Object Overrides**.

Step 5 In the **Add Network Object Overrides** window, choose the network objects for which you want to create network object overrides from the **Available Networks** window and click the > button.

Step 6 Click **Save**.

Add Model Mapping

Perform the procedure given below to add model mapping.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click the **Edit** ( ) icon for the template in which you want to create the model mapping.

Step 3 Choose **Template Settings** > **Model Mapping**.

Step 4 Click **Add Model Mapping**.

Step 5 Choose the **Device Model** from the drop-down list.

Step 6 Map the template interfaces to the device model interfaces by choosing the interface from the **Model Interface** drop-down list. Alternatively, click **Map Default** to map the template interfaces to the device model interfaces based on the slot and port index order.

Step 7 Click **Save**. The interface mappings are listed along with the device model and mapping status on the **Model Mapping** window.

Note Some configurations in the template may not be supported on all device models. Unsupported configurations, if any, are not applied to the device. The Device Template Apply Report provides details about such configurations.

Invalid Model Mappings

Some configurations in the template may not be supported on all device models. Unsupported configurations, if any, are not applied to the device. Valid model mappings can also become invalid when you modify template configurations. For example, when you add a new interface on the template and assign a name to it, the new interface must be mapped to the appropriate interface on the device model.

Model mapping can also be invalidated due to any of the following reasons:

- Number of configured VRF instances exceeds the limit for a specific model.
- Interfaces mapped to incompatible models, versions, or interfaces. See Requirements and Prerequisites for Device Management using Device Templates for more information.
- Number of interfaces exceeds the model limit.
- Deleted an interface that was mapped.

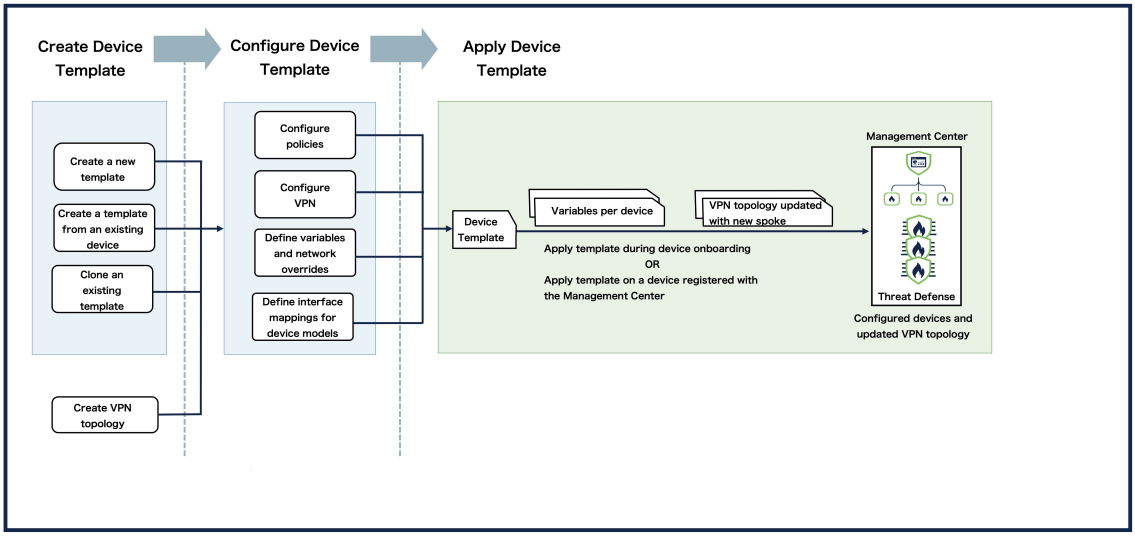
- Newly added physical interfaces are not mapped to a compatible model interface.
- Model mapping is not done for a named interface.
- Model mapping is not done for an interface related to other logical interfaces, such as sub-interfaces, PC interfaces, and so on.
- Making policy or configuration changes that are unsupported on some device models. For example, enabling switch port configuration on interfaces.

You can also save a template with invalid model mappings. However, you must review and fix the model mapping before initiating application of the template on the device.

You can hover over **Invalid** under **Mapping Status** to view the errors that caused the invalid mapping status. Fix the errors before initiating application of the template on the device.

Configure Site-to-Site VPN Connections in a Device Template

Device Template with Site-to-Site VPN Connections Workflow



Configure an SD-WAN VPN Connection

You can configure an SD-WAN VPN connection to add spokes to SD-WAN topologies using the device template.

Before you begin

- Configure a minimum of one SD-WAN topology (**Devices** > **VPN** > **Site To Site**).
- Review Requirements and Prerequisites for Device Management using Device Templates and Guidelines and Limitations for Device Management using Device Templates.

Procedure

Step 1 Choose **Devices > Template Management**.

Step 2 Click the edit icon adjacent to the device template that you want to edit.

Step 3 Click the **VPN** tab.

Step 4 Click **Add VPN Connection**.

Step 5 Choose an SD-WAN topology from the **VPN Topology** drop-down list.

The **Add VPN Connection** dialog box expands and you can configure the following parameters:

a) From the **VPN Interface** drop-down list, choose a WAN-facing or internet-facing physical interface to establish a VPN connection with the hub.

This list contains all the interfaces configured on the device template.

b) **Use IP Address from the VPN Interface**—This drop-down list is auto populated with the IP address variable. For IPv6 addresses, choose an IPv6 address from the drop-down list.

c) Check the **Local Tunnel (IKE) Identity** check box to enable a unique and configurable identity for the VPN tunnel from the spoke to a remote peer.

d) **Identity Type**—Key ID is the only supported identity type. Choose a key ID variable from the drop-down list or click + to create a new key ID variable.

e) Click **OK**.

You can view the VPN connection in the **Site-to-Site VPN Connections** table.

Step 6 Click **Save**.

What to do next

1. Configure the routing policy for the spoke in the device template.
2. Map the device interfaces to the template interfaces (Model Mapping).
3. Apply the template to a device.

Configure a Route-Based Site-to-Site VPN Connection

You can configure a route-based site-to-site VPN connection to add spokes to route-based site-to-site VPN topologies using the device template.

Before you begin

- Configure a minimum of one route-based site-to-site VPN topology (**Devices > VPN > Site To Site**).
- Review Requirements and Prerequisites for Device Management using Device Templates and Guidelines and Limitations for Device Management using Device Templates.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click the edit icon adjacent to the device template that you want to edit.

Step 3 Click the **VPN** tab.

Step 4 Click **Add VPN Connection**.

Step 5 Choose a route-based site-to-site VPN topology from the **VPN Topology** drop-down list.

The **Add VPN Connection** dialog box expands and you can configure the following parameters:

a) From the **Virtual Tunnel Interface (VTI)** drop-down list, choose a VTI interface or click + to create a new VTI.

VTI is a virtual interface used to establish a route-based VPN tunnel. You must configure routing policies for a VTI to set up a VPN tunnel. This list contains all the VTIs configured on the device template. For more information on creating a VTI, see Add a VTI Interface.

b) Check the **Use Public IP Address** check box to override the tunnel source IP address and configure a public IP address variable for the VTI. Click + to create a new public IP address variable.

This IP address is the source IP address for the VPN tunnel. By default, this is the IP address of the VPN interface. However, if the device is behind NAT, the VPN interface has a private address, but the post-NAT public IP address should be configured.

c) Check the **Local Tunnel (IKE) Identity** check box to enable a unique and configurable identity for the VPN tunnel from the spoke to a remote peer.

d) **Identity Type**: Key ID is the only supported identity type. Choose a key ID variable from the drop-down list or click + to create a new key ID variable.

e) (Optional) Check the **Enable Secondary VPN Tunnel** check box to configure the parameters for the secondary VPN tunnel.

f) Click **OK**.

You can view the VPN connection in the **Site-to-Site VPN Connections** table.

Step 6 Click **Save**.

What to do next

1. Configure the routing policy for the spoke in the device template.
2. Map the device interfaces to the template interfaces (Model Mapping).
3. Apply the template to a device.

Configure a Policy-Based Site-to-Site VPN Connection

You can configure a policy-based site-to-site VPN connection to add spokes to policy-based site-to-site VPN topologies using the device template.

Before you begin

- Configure a minimum of one policy-based site-to-site VPN (**Devices > VPN > Site To Site**).
- Review Requirements and Prerequisites for Device Management using Device Templates and Guidelines and Limitations for Device Management using Device Templates.

Procedure

Step 1 Choose **Devices > Template Management**.

Step 2 Click the edit icon adjacent to the device template that you want to edit.

Step 3 Click the **VPN** tab.

Step 4 Click **Add VPN Connection**.

Step 5 Choose a policy-based site-to-site VPN topology from the **VPN Topology** drop-down list.

The **Add VPN Connection** dialog box expands and you can configure the following parameters:

a) From the **VPN Interface** drop-down list, choose a WAN-facing or internet-facing physical interface to establish a VPN connection with the hub.

This list contains all the interfaces configured on the device template.

Do one of the following to configure the IP address of the VPN interface:

- Click the **Use IP Address from the VPN Interface** radio button to use the IP address of the VPN interface.

  This IP address is auto populated. For IPv6 addresses, choose an IPv6 address from the drop-down list.

- Click the **Use Public IP Address** radio button to configure a public IP address for the VPN interface.

  Choose an IP address variable from the drop-down list or click + to add an IP address variable.

b) Check the **Local Tunnel (IKE) Identity** check box to enable a unique and configurable identity for the VPN tunnel from the spoke to a remote peer.

c) **Identity Type**: Key ID is the only supported identity type. Choose a key ID variable from the drop-down list or click + to add a new key ID variable.

d) **Protected Networks**: Click + to configure a protected network for the VPN connection.

Do one of the following:

- Choose a protected network and click **OK**.
- Click **Add** to configure a network object and click **Save**.

  When you create a protected network object, note the following:

  - Click either the **Host** or the **Network** radio button.
  - Check the **Allow Overrides** check box.

e) Click **OK**.

You can view the VPN connection in the **Site-to-Site VPN Connections** table.

Step 6 Click **Save**.

What to do next

1. Note that before you apply a template to a device, to configure device-specific values for the protected networks, add these objects in **Template Settings > Template Parameters > Add Network Objects Overrides**.
2. Map the device interfaces to the template interfaces (Model Mapping).
3. Apply the template to a device.

Register a Device Using Device Template and Add it to a Route-Based VPN Topology

This section provides instructions to register a device using device template and add it to a route-based VPN topology.

Step	Task	GUI Path	More Information
1	Create a device template.	**Devices > Template Management > Add Device Template**	Create a New Device Template, on page 7
2	Configure a route-based VPN connection in the template.	**Devices > Template Management > VPN > Add VPN Connection**	Configure a Route-Based Site-to-Site VPN Connection, on page 20
3	Configure routing policies in the template.	**Devices > Template Management > Routing**	—
4	Add a model mapping for the device model in the template.	**Devices > Template Management > Template Settings > Model Mapping**	Add Model Mapping, on page 18
5	Register the device using a device template.	**Devices > Device Management > Add > Device Using Template**	Add a Device to the Management Center using a Registration Key and a Device Template, on page 25

Step	Task	GUI Path	More Information
6	Deploy configurations on the hub of the VPN topology.	**Deploy**	—

Add a Device to an SD-WAN Topology in a Dual ISP Deployment

This section provides instructions to add a device to an SD-WAN topology in a dual ISP deployment using a device template.

Step	Task	GUI Path	More Information
1	Create a device template.	**Devices > Template Management > Add Device Template**	Create a New Device Template, on page 7
2	Add a physical interface in the template. By default, a template has only one outside interface. Rename the outside interfaces, for example, ISP1, ISP2.	**Devices > Template Management > Interfaces > Add Physical Interface**	Add a Physical Interface, on page 10
3	Configure an SD-WAN VPN connection using ISP1 interface.	**Devices > Template Management > VPN > Add VPN Connection**	Configure an SD-WAN VPN Connection, on page 19
4	Configure an SD-WAN VPN connection using ISP2 interface.		
5	Add static routes from ISP1 and ISP2 interfaces to the SD-WAN hub network.	**Devices > Template Management > Routing > Static Route**	-
6	Add the ISP1 and ISP2 interfaces to an ECMP zone.	**Devices > Template Management > Routing > ECMP**	-

Step	Task	GUI Path	More Information
7	Configure the network object overrides.	**Devices > Template Management > Template Settings > Template Parameters > Add Network Objects Overrides**	Add a Network Object Override, on page 17
8	Map the template interfaces to the device model interfaces (Model Mapping).	**Devices > Template Management > Template Settings > Model Mapping**	Add Model Mapping, on page 18
9	Apply template to the device.	**Devices > Template Management >**	Apply Template on Existing Devices, on page 30
10	Deploy configurations on the device.	**Deploy**	—
11	Deploy configurations on the hubs of the SD-WAN topologies.	**Deploy**	—

Add a Device to the Management Center

You can add a device to the management center using any of the following options:

- Add a Device to the Management Center using a Registration Key and a Device Template
- Use Zero-Touch Provisioning (ZTP) to add a device using one of the following options:
  - Add a Device to the Management Center using the Serial Number and Access Control Policy
  - Add Devices to the Management Center using Serial Numbers and a Device Template (Zero-Touch Provisioning)

Add a Device to the Management Center using a Registration Key and a Device Template

You can use a template to add a device, register the device with the Management Center, and bring up the device with the given template configurations. Before initiating application of the template on the device, you must specify any required variables and network object overrides for each device and ensure that model mapping is done for the target Threat Defense device model.

We recommend that you create a checklist to ensure that all configurations in the template have been entered correctly before applying the template on the device.

A sample checklist is given below.

- Check version, model, operation modes.
- Check list of variables and overrides.
- Check sanity of variable and override values.
- Check if the required Model Mappings exist.
- Check if parallel device template operations are in progress.

Note If you are adding a Threat Defense device that will be managed by a data interface for Management Center connectivity, ensure that you configure the template to be compatible with the connectivity parameters of the device. For more information, see Configure a Template for Threat Defense Devices Managed Through the Data Interface.

Perform the procedure given below to add a device using a registration key and a device template.

Procedure

Step 1 Choose **Devices** > **Device Management**.

Step 2 Click **Add** > **Device (Wizard)**.

Step 3 On the **Add Device** window, choose **Use Registration Key** to register a device using registration key.

Step 4 Choose a template from the **Device Template** drop-down list.

Step 5 In the **Host** field, enter the IP address or the hostname of the device you want to add.

The hostname of the device is the fully qualified domain name or the name that resolves through the local DNS to a valid IP address. Use a hostname rather than an IP address if your network uses DHCP to assign IP addresses.

Step 6 In the **Display Name** field, enter a name for the device as you want it to display in the management center.

Step 7 In the **Registration Key** field, enter the same registration key that you used when you configured the device to be managed by the management center. The registration key is a one-time-use shared secret. The key can include alphanumeric characters and hyphens (-).

Step 8 From the **Device Group** drop-down list, choose a device group in which the device is added.

Step 9 Enter values for the **Variables** and **Network object overrides**.

Step 10 Click **Add Device** to initiate device registration. The template configurations are applied after the device is successfully registered with the Management Center.

Zero-Touch Provisioning

Zero-Touch Provisioning (ZTP) lets you add devices to the management center by serial number without having to perform any initial setup on the device. The management center integrates with Cisco Defense Orchestrator (CDO) for this functionality.

ZTP is only supported on the following device models:

- Firepower 1000
- Secure Firewall 1200
- Firepower 2100
- Secure Firewall 3100

You can use the ZTP method to add devices to the management center using any of the following options:

- Add a Device to the Management Center using the Serial Number
- Add Devices to the Management Center using Serial Numbers and a Device Template (Zero-Touch Provisioning)

Add Devices to the Management Center using Serial Numbers and a Device Template (Zero-Touch Provisioning)

You can use a template to add a device, register the device with the Management Center, and bring up the device with the given template configurations. Before initiating application of the template on the device, you must specify any required variables and network object overrides for each device and ensure that model mapping is done for the target Threat Defense device model.

Use this procedure to add devices to the management center using serial numbers and a device template. To add a device without using a template, see Add a Device to the Management Center Using the Serial Number (Zero-Touch Provisioning).

We recommend that you create a checklist to ensure that all configurations in the template have been entered correctly before applying the template on the device.

A sample checklist is given below.

- Check version, model, operation modes.
- Check list of variables and overrides.
- Check sanity of variable and override values.
- Check if the required Model Mappings exist.
- Check if parallel device template operations are in progress.

Note If you are adding a Threat Defense device that will be managed by a data interface for Management Center connectivity, ensure that you configure the template to be compatible with the connectivity parameters of the device. For more information, see Configure a Template for Threat Defense Devices Managed Through the Data Interface.

Perform the procedure given below to add devices using serial numbers and a device template.

Before you begin

Ensure that you read the following prerequisites before you perform the procedure to add devices using serial numbers and a template:

- Cisco Security Cloud integration must be enabled if you want to add devices using serial numbers.
- Threat Defense device must be in factory-shipped state, or must have been reset or reimaged. This means that there must be no configuration done using FDM, and the device must be in on-box mode in the CLI.
- The first data interface or the management interface on the Threat Defense device must have internet connectivity and must be able to get an IPv4 DHCP lease.
- If data interface is used for connectivity, do not plug in the management interface. Usually, the first data interface, Ethernet1/1, is used for Manager Access.

Procedure

Step 1 The first time you add a device using a serial number, integrate the management center with Cisco Security Cloud.

Note For a management center high-availability pair, you also need to integrate the secondary management center with Cisco Security Cloud.

a) Choose **Integration** > **Cisco Security Cloud**.
b) Click **Enable Cisco Security Cloud** to open a separate browser tab to log you into your Cisco Security Cloud account and confirm the displayed code.

Make sure this page is not blocked by a pop-up blocker. If you do not already have a Cisco Security Cloud and CDO account, you can add one from the Cisco Security Cloud webpage. See the CDO documentation for information about requesting a new CDO tenant.

For detailed information about this integration, see the "System Configuration" chapter in the Cisco Secure Firewall Management Center Administration Guide.

CDO onboards the on-prem management center after you integrate the management center with Cisco Security Cloud. CDO needs the management center in its inventory for low-touch provisioning to operate. However, you do not need to use CDO directly. If you do use CDO, its management center support is limited to device onboarding, viewing its managed devices, viewing objects associated with the management center, and cross-launching the management center.

Step 2 Choose **Devices > Device Management**.

Step 3 Click **Add > Device (Wizard)**.

Step 4 On the **Add Device** window, choose **Use Serial Number** to register one or more devices using the serial number. This is the Zero-Touch Provisioning (ZTP) method.

Step 5 Choose the **Domain** in which the devices will be registered.

Step 6 Choose **Device Template** as the **Initial device configuration** method to use a device template with preconfigured settings.

Step 7 Choose the **Device Template** from the drop-down list. After choosing the device template, the access control policy that is assigned to the template and the device models supported with the template are displayed on the window.

Step 8 Verify the details and click **Next**.

Step 9 In the **File Upload** section, download the **CSV Sample Template File** to have a look at the required header details that have to be used in the template. For more information on the CSV template file fields, see CSV Template File.

Step 10 **Drag & drop** your CSV template file or **Browse** to select the CSV template file that you want to upload. A validation check is done on the file after you upload it.

After the CSV template file has been uploaded successfully, a summary of the configuration information in the file is displayed. The section below the **Filename** field displays the total count of entries or records in the file along with information on how many records have passed or failed the validation check.

The section at the bottom of the window displays the content of the CSV template file in a table format.

Step 11 If there are no errors in the user input provided using the CSV template file, click **Add Device** to register the device with the Management Center.

When device registration is completed on the Management Center, the device hostname is displayed as *{serialNumber}.local*. In the **General** tile under the **Device** tab, the **Onboarding Method** is shown as **Serial Number**.

CSV Template File

The CSV template file must be less than 2 MB in size. The filename must satisfy the following criteria:

- Can have a maximum of 64 characters.
- Only alphanumeric characters and special characters such as dash (-), period (.), and underscore (_) are allowed.
- Must not contain any spaces

.

A properly formatted .csv file has the following fields:

Mandatory fields

- Display Name - Name of the device. Type: string. Example: test1
- Serial Number - Serial number of the device. Type: string, Example: JADX345670EG

Optional fields

- Device Group - Name of the device group, Type: string, Example: testgroup
- Admin Password - Password for admin access, Type: string, Example: E28@2OiUrhx

Variables

Use the following format: $<*varName*>.

Sample variable: $LAN-Devices-IPv4Address - IPv4 address of the LAN device. Type: string. Example: 1.2.3.4.

Network object overrides

Use the following format:<*objType*>:<*objName*>.

Sample network object override: Network:LAN-Devices-Network - IP address of the network of LAN devices. Type: string. Example: 1.2.3.4

FQDNs

Fully Qualified Domain Names (FQDNs) are populated automatically.

Value for the variable used in the **Hostname** field of **DDNS settings on Manager access interface** must be given as *${serial-number}.local.*.

A sample CSV template file containing configuration for two devices is as given below.

DisplayName	SerialNumber	AdminPassword	$WANLinkIP	Host:gateway
Branch A FTD	JADX345410AB	C15c05n0rt#	10.20.30.1	10.2.3.1
Branch B FTD	JADX345670CE	Admin123!	10.20.30.5	10.2.3.1

Apply Template on Existing Devices

You can apply a template to devices that are already registered with the Management Center. Application of a template on a device clears existing configurations and applies configurations from the template. However, the Threat Defense HA failover configurations are not cleared.

Application of a template changes device configurations only on the Management Center. You must explicitly deploy these device configuration changes to the Threat Defense device. You cannot roll back the applied configuration changes. However, you can apply another template with the required configurations.

Perform the procedure given below to apply the template on existing devices.

Procedure

Step 1 To apply the template from the **Template Management** window, choose **Devices > Template Management**.

a) Click the **More** (⋮) icon next to the template that you want to apply, and click **Apply**.
b) From the **Device** dropdown list, choose the **Device** on which you want to apply the template.
c) Click **Confirm** to initiate application of template on the device.

Step 2 (Optional) To apply the template from the **Associated Devices** window, choose **Devices** > **Template Management**.

a) Click the **Edit** () icon of the template that you want to apply to a device.
b) Choose **Template Settings** > **Associated Devices**.
c) In the **Associated Devices** window, click **Apply Template**.
d) From the **Device** drop-down list, choose the **Device** on which you want to apply the template.
e) Enter values for the **Variables** and **Network object overrides** fields.
f) Click **Confirm** to initiate application of template on the device.

Reapply Template on a Device

If you make any changes to the device or template that results in the configuration being outof- sync, you can reapply the template to make the configuration in sync with the template.

Perform the procedure given below to reapply the template on a device.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click the **Edit** () icon of the template that you want to reapply to a device.

Step 3 Choose **Template Settings** > **Associated Devices**.

Step 4 In the **Associated Devices** window, click **Re-Apply Template** for the device on which you want to reapply the template.

Step 5 On the **Re-Apply template** window, you can reuse the autopopulated **Variables** and **Network object overrides** values or enter new values.

Step 6 Click **Confirm** to initiate reapplication of the template on the device.

Validation of Template Configuration Before and After Application of Template on Device

Validation of template configuration is done before and after application of the template on the device.

The following validation checks are performed at the start of the task to apply the template on the device:

- Ensure that the target device model and version are supported.
- Cluster and container checks -The device must not be part of a cluster or multi-instance.
- Model mapping validation - Model mapping for the target device model exists and is valid.
- Sanity check of template parameter values. For example, two variables used as IP addresses of interfaces must not have the same value.

The following validation checks are performed at the end of the task to apply the template on the device to ensure that the applied configurations are valid:

- Interface configuration validation. For example, variables used for the IP address fields of two or more interfaces must not have the same IP address values.
- Routing policy validation. For example, the IPv4 address in BGP neighbor configurations must not overlap with the IP address of any interface.

If the validation checks that are done at the end of the task to apply the template on the device fail, any applied configurations are rolled back and the device is restored to it's original state.

Verify Application of Template

You can verify application of the template by viewing the devices listed in the **Associated Devices** window and by viewing the **Template Apply Report**.

View Associated Devices

The devices that are associated with the templates are listed in the **Associated Devices** window. Each device row displays the **Device Name, Sync Status, Apply Status**, and **Applied Date**. You can also click **Re-apply template** to reapply the template, and click the **View** icon display template configuration details. Click the **Delete** icon to remove the template from the device.

The **Sync Status** can be either **Sync** or **Out-of-Sync**. If the status is displayed as **Sync**, it indicates that the template and device configurations are the same or in sync. If the status is displayed as **Out-of-Sync**, it indicates that there has been a change in configuration either on the device or in the template since the last time that the template was applied..

The association of the device with the template is not altered by the following conditions:

- Pending configuration changes on the device – The **Sync Status** does not change if there are pending configuration changes that have to applied on the device.
- Deployment of pending configuration changes on the device – The **Sync Status** does not change after deployment of pending configuration changes on the device.

The table below shows the **Sync** and **Out-of-Sync** scenarios that may occur.

Device Configurations Modified After Application of Template on Device	Template Configurations Modified After Application of Template on Device	Association Status
No	No	In Sync
Yes	No	Out of Sync
No	Yes	Out of Sync
Yes	Yes	Out of Sync

Template Apply Report

A **Template Apply Report** PDF is generated after the task to apply the template is completed. This report is generated on both successful and unsuccessful application of the template on the device. You will see a link to this report in the **Notifications** > **Tasks** window.

The **Template Apply Report** contains the following details:

- Template name
- Device model name
- Domain from which the template was applied
- Start and end time
- Status of the application of the template on the device
- Interface mapping information
- Variable values

There may be some configurations on the template that are not applied to the device due to incompatible device model or version. The report also contains details about such configurations. The report also contains any errors that are encountered when the application of the template fails. Application of a template on a device may fail due to any of the following reasons:

- Model mapping does not exist for the device model that is used.
- Values used for variables and network object overrides do not conform to routing policy or interface configuration rules. For example, the same IPv4 address has been used for two IPv4 address interface variables.
- Device or template is locked due to some other task that is being executed, such as application or modification of the template.

Update Device Template

Any user with *modify* privileges on a device can modify the device template. To modify routing, interface, inline sets, DHCP configuration, and template settings, perform the procedure given below.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click the **Edit** ( ) icon of the template that you want to modify.

Step 3 Click the respective tabs to modify any **Interface, Inline sets, Routing, DHCP configuration**, and **Template Settings**.

To modify the name of a template, choose **Template Settings** and click the **Edit** icon in the **General** tile. Change the **Name** of the template as per your requirement and click **Save**.

Delete Device Template

Note that you cannot recover a template after deleting it. To backup template configurations, use the **Export** option explained in the Clone an Existing Device Template section. To delete a device template, perform the procedure given below.

Procedure

Step 1 Choose **Devices > Template Management**.

Step 2 Click the **More** (⋮) icon of the template that you want to delete.

Step 3 Click **Delete**.

Step 4 Click **Delete** again in the **Confirm Deletion** window.

Configure a Template for Threat Defense Devices Managed Through the Data Interface

To configure a template that you want to apply to a Threat Defense device managed by a data interface for Management Center connectivity, ensure that the connectivity parameters of the device match the template. This ensures that the Threat Defense device does not lose connectivity with the Management Center after application of the template. A template that you configure for Threat Defense devices managed through the data interface cannot be applied on devices that are not managed by the data interface.

The following is a list of connectivity parameters:

- Data interface used to the manage the Threat Defense device. For example, **Ethernet1/1**.
- Name of the interface. For example, **outside**.
- IP address configured on the data interface. For example, DHCP or static IP.
- Route configured for the data interface. This can be a default or specific route defined on the data interface used for connectivity between the Threat Defense device and the Management Center.
- DDNS hostname configuration on the data interface.

If the connectivity parameters on the template do not match with the ones on the device, the template validation checks that are done to ensure that the template is successfully applied on the device will fail. The template is then not applied on the device. The template validation checks do not enforce an exact match for some parameters such as IP address or DDNS hostname. However, ensure that you configure such parameters to maintain connectivity between the Threat Defense device and the Management Center after deployment.

The following is a list of template validation checks done to ensure sanity of configurations that are required to manage the Threat Defense device through the data interface:

- You cannot apply a template in which manager access to the device is configured with the management interface to a device in which manager access to the device is configured with the data interface.

- You cannot apply a template in which manager access to the device is configured with the data interface to a device in which manager access to the device is configured with the management interface.
- You cannot apply a template in which manager access to the device is configured with the single WAN data interface to a device in which manager access to the device is configured with the dual WAN data interface.
- If any of the connectivity parameters do not match, you cannot apply a template in which manager access to the device is configured with the data interface to a device in which manager access to the device is configured with the data interface.

Perform the procedure given below to configure the template to manage Threat Defense devices through the data interface.

Procedure

Step 1 Choose **Devices** > **Template Management**.

Step 2 Click the **Edit** ( ) icon of the template that you want to configure to manage Threat Defense devices through the data interface.

Step 3 Click the **Template Settings** tab.

Step 4 In the **General** tile, toggle the **Manage device by Data Interface** button.

Step 5 You will see a popup asking you to pick a data interface for manager access. Click **OK**.

Step 6 Click the **Interfaces** tab.

Step 7 Click the **Edit** icon of the data interface that you want to use for manager access. The first data interface – Ethernet1/1 (outside interface), is the data interface that is most commonly used for manager access.

Step 8 In the **Edit Physical Interface** window, click the **Manager Access** tab.

Step 9 Check the **Enable management access** checkbox.

Step 10 Click **OK**. You will see that the interface that you selected for manager access has been marked with **Manager Access**.

Step 11 Click the **DHCP** tab.

Step 12 Click the **DDNS Update Methods** tab.

Step 13 Click **+Add** to add a DDNS update method.

Step 14 In the **Add DDNS Update Method** window, enter a **Method Name** and choose **FMC only**.

Step 15 Set the **Update Interval** as per your requirement.

Step 16 Click **OK**. You will see the method that you created in the **DDNS Update Methods** table.

Step 17 Click the **DDNS Interface Settings** tab.

Step 18 Click **+Add** to add dynamic DNS configuration.

Step 19 In the **Add Dynamic DNS** configuration window, choose values for the following fields:

- **Interface** – Choose the interface enabled for manager access
- **Method Name** – Choose the method that you created.
- **Host Name** – Choose a variable for the hostname.

Do not edit the rest of the fields in this window.

Step 20 Click **OK**. The **DDNS Interface Settings** table is populated with the entry that you created.

Step 21 To configure the model mapping to ensure that the data interface set for manager access in the template matches the data interface selected for manager access on the device, click the **Template Settings** tab and click **Model Mapping**.

Step 22 Click **Add Model Mapping**.

Step 23 Choose the **Device Model** from the drop-down list.

Step 24 Map the date interface that is set for manager access in the template to the appropriate data interface on the device by choosing the interface from the **Model Interface** drop-down list.

Step 25 Click **Save**. The interface mappings are listed along with the device model and mapping status on the **Model Mapping** window. You can now apply the template on a device that is managed using the data interface.

Device Template Operations on Threat Defense HA Devices

You can apply device templates on Threat Defense HA devices after device registration. Failover configurations are not supported in device templates. Any failover configurations and monitored interfaces that are already part of the target HA device pair configurations are not modified. You cannot map any template interfaces to failover interfaces.

You can generate a device template from a HA device pair. Template operations such as application of template on device, template generation, import, and export of template, can be performed only on primary or active HA devices. You cannot perform these operations on secondary or standby devices.

Device Template Operations on Management Center HA Instance

Device template operations are supported only on the active Management Center. The standby peer does not support device template operations.

View Device Template Audit Logs

Logs related to application of the device template, configuration updates, device template creation, and deletion, are logged under audit logs. The device template audit logs are added to the log both at the start and at the end of the task to apply the template on the device.

An audit diff file is also generated that enables you to view configuration changes that have been done during application of the template on the device. Perform the procedure given below to view the diff file.

Procedure

Step 1 Choose **System** > **Monitoring** > **Audit**.

Step 2 The device template logs are logged under the subsystem **Devices > Template Management**. Click the **diff** icon to open a new window that displays the configuration changes that have been done during the application of the template on the device.

Device Templates in Domains

Device templates can exist in any domain. If you are in the child domain, you have read-only access to the templates above you in the domain hierarchy. You can apply a template to a device from its domain or its parent domains. You can generate a template from a device and apply that template to a device in any domain in the domain hierarchy.

A domain hierarchy sample is given below along with a table displaying the supported device template application and generation scenarios.

Consider the following scenario:

- Domain A and B are child domains of the Global domain.
- Domain A1 is the child domain of Domain A.

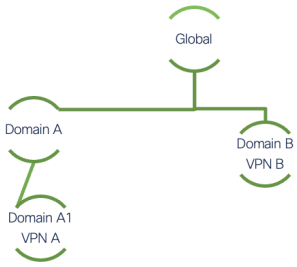
Template Domain	Device Domain	Device Template Application/Generation Supported
Global	A1	Yes
Global	B	Yes
A	A1	Yes
A	B	No
B	A1	No
B	B	Yes
A1	A1	Yes
A1	B	No

Domains and VPN Connections

- You can define a template in a global or child/leaf domain. However, you can define a VPN topology only in a leaf domain.
- You can configure VPN connections in a template for all domains. During template application, VPN connections are applied to the device only if the device is in the same domain as the VPN topology.

A domain hierarchy sample is given below along with a table displaying the supported device template application and generation scenarios.

Consider the following scenario:



- Domain A and B are child domains of the Global domain.
- Domain A1 is the child domain of Domain A.
- VPN A is part of Domain A1.
- VPN B is part of Domain B.

Template Domain	VPN Topology in the Template	Device Domain	Device Template Application/Generation Supported
Global	VPN A VPN B	A1	No
Global	VPN B	B	Yes
A	VPN A	A1	Yes
B	VPN B	A1	No
B	VPN B	B	Yes
A1	VPN A	A1	Yes

Change Management Support with Device Templates

Creation and application of device templates is not supported by change management. The table given below displays a list of device template operations along with the change management support for each operation.

Device Template Operation	Change Management Support
Template creation and deletion	No (same as device behavior)
Template name and description updates	No (same as device behavior)
Template configuration updates	Yes (same as device behavior)
Applying template during registration	No (Not allowed if there are open tickets on target device)
Re-applying template	No (Not allowed if there are open tickets on target device)

Device Template Operation	Change Management Support
Template generation from device	No (Not allowed if there are open tickets on target device)
Template export/import	No (Not allowed if there are open tickets on target device)
Device–template association deletion	No

Management Interface Convergence

Device templates will have a converged management interface. During application of a template, all management configurations are applied to target device. Platform settings that use the management interface will work as usual after applying the template.

You cannot generate a template from devices with non-converged management interface. You also cannot apply a template on devices with non-converged management interface.

Troubleshooting

Initial Troubleshooting

For initial troubleshooting, we recommend looking at the information in the Template Apply Report and notifications that come up on the Management Center UI when you run into an error. The Management Center log files also contain detailed debugging and troubleshooting info.

Follow the procedure given below for initial troubleshooting.

1. Check the errors mentioned in the **Template Apply Report**. For more information, see Template Apply Report.
2. Review variable values and check for overlaps and incompatibilities.
3. Check model mappings to ensure if the correct model mappings exist. Delete or add mappings accordingly.
4. See the Management Center audit logs to find any other issues and resolve them.

Consider the following error scenario. In a device template, the inside interface is configured with a static IPv4 variable - *$insideIPv4*.

The BGP IPv4 address is configured with an IPv4 BGP neighbor.

An overlapping IPv4 address is configured for the BGP neighbor and an interface.

Due to the issues mentioned above, the application of the device template fails and an error is displayed.

To troubleshoot this error, identify the error from the notification displayed on the UI.

```
IP Address 192.168.10.1 same as ip address of interface - 'inside'(Ethernet1/1)
```

Check the **Template Apply Report** for more information.

Enter correct values for the variables and apply the template again to ensure successful application of the template on the device.

Troubleshoot Device Registration

- Issue: Admin Password is incorrect or not provided during registration

  Scenario: If the admin password is not set on the device and if you have not provided the admin password during registration, the Threat Defense device provisioning will fail. In such a scenario, a *Provision Error* along with an **Enter Password** link is displayed.

  Workaround: Click **Enter Password** to enter a new password and click **Save**. Click **Confirm and Proceed** to trigger the onboarding again.

- If the admin password is already set on the device and you provide another admin password during registration, device provisioning will fail.

- Issue: Device registration in Management Center fails

  Workaround: Follow existing device registration troubleshooting steps. For more information, see Configure, Verify, and Troubleshoot Firepower Device Registration.

- Issue: Bulk Registration Request Fails in Management Center

  Scenario: The bulk registration request can fail due to a few scenarios:

  - You do not have the required permissions to perform template-related operations
  - Template is not visible from the request domain
  - Invalid CSV file provided

  Workaround: You can see logs for these errors in the VMS Shared and USM Shared log files. Fix the errors and initiate registration again.

- Issue: Device provisioning fails in CDO due to some generic errors, such as communication with the device fails

  Workaround: Click Retry in the Provision Error to trigger the onboarding in CDO again. You can also see the CDO workflows for more information on the error and troubleshooting information.

Troubleshoot Cisco Security Cloud Integration

Issue: Cisco Security cloud integration not successful

Workaround: Follow Cisco Security Cloud integration troubleshooting steps. For more information, see [link to Cisco Security Cloud integration guide].

Troubleshoot Device Template Configuration Issues

Issue: Device template misconfigurations causing deployment failures after registration

Workaround: Follow the steps given below for initial troubleshooting.

1. Check the errors mentioned in the Template Apply Report.
2. Review variable values and check for overlaps and incompatibilities.
3. Check model mappings to ensure if the correct model mappings exist. Delete or add mappings accordingly.
4. See the Management Center audit logs to find any other issues and resolve them.

Troubleshoot CDO Issues

- Issue: Device with serial number already claimed

  Workaround: Verify serial number and reinitiate onboarding.

- Issue: CDO fails to claim devices

  Workaround: Select the device in the CDO Inventory window for more details on the error. You can see logs related to device claim issues in the VMS Shared and USM Shared log files. Click **Retry** to initiate registration again.

- Issue: Communication failures between Management Center and CDO

  Scenario: Communication failures between Management Center and CDO can cause failures during the Zero-Touch Provisioning (ZTP) device registration request.

  Workaround: Refresh the ZTP device status, retry ZTP registration, and delete the ZTP device. You can see logs regarding communication failure between the Management Center and CDO in the Auth Daemon logs. For operational failures related to ZTP, you can see the logs in the VMS Shared and USM Shared log files.