Create Templates to Automate Device Configuration Changes

About Template Hub

Cisco DNA Center provides an interactive template hub to author CLI templates. You can design templates easily with a predefined configuration by using parameterized elements or variables. After creating a template, you can use the template to deploy your devices in one or more sites that are configured anywhere in your network.

With Template Hub, you can:

- View the list of available templates.

- Create, edit, clone, import, export, and delete a template.

- Filter the template based on the **Project Name**, template **Type**, **Template Language**, **Category**, **Device Family**, **Device Series**, **Commit State** and **Provision Status**.

- View the following template attributes on the **Templates Hub** window in the **Templates** table:

  - **Name**: Name of the CLI template.

  - **Project**: Project under which the CLI template is created.

- **Type**: Type of CLI template (regular or composite).

- **Version**: Number of versions of the CLI template.

- **Commit State**: Shows if the latest version of the template is committed. You can view the following information under the **Commit State** column:

  - The timestamp of the last committed date.

  - A warning icon means the template is modified but not committed.

  - A check icon means the latest version of the template is committed.

> **Note** The last template version must be committed to provision the template on the devices.

- **Provision Status**: You can view the following information under the **Provision Status** column:

  - The number of devices on which the template is provisioned.

  - A check icon displays the number of devices for which the CLI template was provisioned without any failures.

  - A warning icon displays the number of devices for which the latest version of the CLI template is not yet provisioned.

  - A cross icon displays the number of devices for which the CLI template deployment failed.

- **Potential Design Conflicts**: Displays potential conflicts in the CLI template.

- **Network Profiles**: Displays the number of network profiles attached to a CLI template. In the **Network Profiles** column, click **Attach** to attach a CLI template to network profiles.

- **Actions**: In the **Actions** column, hover your cursor over the ellipsis icon ⋮ to clone, commit, delete, or edit a template; edit a project; or attach a template to a network profile.

- Add interactive commands.

- Autosave the CLI commands.

- Version control the templates for tracking purposes.

  You can view the versions of a CLI template. On the **Template Hub** window, click the template name and click the **Template History** tab to view the template version.

- Detect errors in templates.

- Simulate templates.

- Define variables.

- Detect run-time conflict.

Note　Ensure that your template does not overwrite a network-intent configuration pushed by Cisco DNA Center.

Create Projects

Step 1　Click the menu icon (≡) and choose **Tools** > **Template Hub**.

Step 2　Click **Add** and then choose **New Project**.

The **Add New Project** slide-in pane is displayed.

Step 3　Enter a unique name in the **Project Name** field.

Step 4　(Optional) Enter a description for the project in the **Project Description** field.

Step 5　Click **Continue**.

The project is created and appears in the left pane.

What to do next

Add a new template to the project. For more information, see Create a Regular Template, on page 3 and Create a Composite Template, on page 5.

Create Templates

Templates provide a method to easily predefine configurations using parameter elements and variables. Templates allow an administrator to define a configuration of CLI commands that can be used to consistently configure multiple network devices, reducing deployment time. Variables in the template allow customization of specific settings per device.

Create a Regular Template

Step 1　Click the menu icon (≡) and choose **Tools** > **Template Hub**.

Note　By default, the **Onboarding Configuration** project is available for creating day-zero templates. You can create your own custom projects. Templates, created in custom projects, are categorized as day-n templates.

Step 2　In the left pane, click **Project Name** and choose the project under which you are creating templates.

Step 3　Click **Add** and then choose **New Template** from the drop-down list.

Note　The template that you create for day zero can also be applied for day n.

Step 4　In **Add New Template** slide-in pane, configure the settings for the regular template.

In the **Template Details** area, do the following:

a. Enter a unique name in the **Template Name** field.

b. Choose the **Project Name** from the drop-down list.

c. **Template Type**: Click **Regular Template**.

d. **Template Language**: Choose either the **Velocity** or **Jinja** language to use for the template content.

> • **Velocity**: Use the Velocity Template Language (VTL). For information, see http://velocity.apache.org/engine/devel/vtl-reference.html.
>
> The Velocity template framework restricts the use of variables that start with a number. Make sure that the variable name starts with a letter and not with a number.
>
> | Note | Do not use the dollar (\$) sign while using Velocity templates. If you use the dollar (\$) sign, any value after it is treated as a variable. For example, if a password is configured as "\$a123\$q1ups\$va112", the Template Hub treats this as variables "a123", "q1ups", and "va112". To work around this issue, use the Linux shell style for text processing with Velocity templates. |
> |---|---|
>
> • **Jinja**: Use the Jinja language. For information, see https://www.palletsprojects.com/p/jinja/.

e. Choose the **Software Type** from the drop-down list.

Note	You can choose the specific software type (such as IOS-XE or IOS-XR) if there are commands specific to these software types. If you choose IOS as the software type, the commands apply to all software types, including IOS-XE and IOS-XR. This value is used during provisioning to check whether the selected device confirms to the selection in the template.

In the **Device Type Details** area, do the following:

a. Click the **Add Device Details** link.

b. Choose **Device Family** from the drop-down list.

c. Click the **Device Series** tab and check the check box next to the preferred device series.

d. Click the **Device Models** tab and check the check box next to the preferred device model.

e. Click **Add**.

In the **Additional Details** area, do the following:

a. Choose the **Device Tags** from the drop-down list.

Note	Tags are like keywords that help you locate your template more easily.
	If you use tags to filter the templates, you must apply the same tags to the device to which you want to apply the templates. Otherwise, you get the following error during provisioning:

```
Cannot select the device. Not compatible with template
```

b. Enter the **Software Version** in the software version field.

Note	During provisioning, Cisco DNA Center checks to see if the selected device has the software version listed in the template. If there is a mismatch, the template is not provisioned.

c. Enter a **Template Description**.

Step 5   Click **Continue**.

The template is created and appears under the **Templates** table.

Step 6   To edit the template content, select the template that you created, click the ellipsis under **Actions**, and choose **Edit Template**. For more information, see .

Blocked List Commands

Blocked list commands are commands that cannot be added to a template or provisioned through a template. If you use blocked list commands in your templates, it shows a warning in the template that it may potentially conflict with some of the Cisco DNA Center provisioning applications.

The following commands are blocked in this release:

- **router lisp**
- **hostname**

Sample Templates

Refer to these sample templates for switches while creating variables for your template.

Configure Hostname

```
hostname$name
```

Configure Interface

```
interface $interfaceName
description $description
```

Configure NTP on Cisco Wireless Controllers

```
config time ntp interval $interval
```

Create a Composite Template

Two or more regular templates are grouped into a composite sequence template. You can create a composite sequential template for a set of templates, which are applied collectively to devices. For example, when you deploy a branch, you must specify the minimum configurations for the branch router. The templates that you create can be added to a single composite template, which aggregates all the individual templates that you need for the branch router. You must specify the order in which templates that are in the composite template are deployed to devices.

Note   You can add only a committed template to a composite template.

Step 1   Click the menu icon (≡) and choose **Tools** > **Template Hub**.

Step 2   In the left pane, click **Project Name** and select the project under which you are creating templates.

Step 3 Click **Add** at the top right of the window, and choose **New Template** from the drop-down list.

The **Add New Template** slide-in pane is displayed.

Step 4 In **Add New Template** slide-in pane, configure the settings for the composite template.

In the **Template Details** area do the following:

a) Enter a unique name in the **Template Name** field.
b) Choose the **Project Name** from the drop-down list.
c) **Template Type**: Choose **Composite Sequence** radio button.
d) Choose the **Software Type** from the drop-down list.

> **Note** You can select the specific software type (such as IOS-XE or IOS-XR) if there are commands specific to these software types. If you select IOS as the software type, the commands apply to all software types, including IOS-XE and IOS-XR. This value is used during provisioning to check whether the selected device confirms to the selection in the template.

In the **Device Type Details** area do the following:

a. Click **Add Device Details** link.

b. Choose **Device Family** from the drop-down list.

c. Click the **Device Series** tab and check the check box next to the preferred device series.

d. Click the **Device Models** tab and check the check box next to the preferred device model.

e. Click **Add**.

In **Additional Details** area do the following:

a. Choose the **Device Tags** from the drop-down list.

> **Note** Tags are like keywords that help you locate your template more easily.
>
> If you use tags to filter the templates, you must apply the same tags to the device to which you want to apply the templates. Otherwise, you get the following error during provisioning:
>
> ```
> Cannot select the device. Not compatible with template
> ```

b. Enter the **Software Version** in the software version field.

> **Note** During provisioning, Cisco DNA Center checks to see if the selected device has the software version listed in the template. If there is a mismatch, the template is not provisioned.

c. Enter the **Template Description**.

Step 5 Click **Continue**.
The composite template window is displayed, which shows the list of applicable templates.

Step 6 Click **Add Templates** link and click ✛ to add the templates and click **Done**.
The composite template is created.

Step 7 Check the check box next to the composite template that you created, click the ellipsis under **Actions** column, and choose **Commit** to commit the template content.

Edit Templates

After creating a template, you can edit the template to include content.

Step 1   Click the menu icon (≡) and choose **Tools** > **Template Hub**.

Step 2   In the left pane, choose the **Project Name** and select the template that you want to edit.

The chosen template is displayed.

Step 3   Enter the template content. You can have a template with a single-line configuration or a multi-select configuration.

Step 4   Click **Properties** next to the template name at the top of the window to edit **Template Details**, **Device Details** and **Additional Details**. Click **Edit** next to the respective area.

Step 5   The template is auto saved. You can also choose to change the time interval of auto save, by clicking at the time recurrence next to **Auto Saved**.

Step 6   Click **Template History** to view the versions of the template. Also, you can click **Compare** to view the difference in the template versions.

Step 7   Click **Variables** tab to view the variables from the CLI template.

Step 8   Click the **Show Design Conflicts** toggle button to view potential errors in the template.

Cisco DNA Center allows you to view, potential and run-time errors. For more information, see Potential Design Conflicts Detection Between CLI Template and Service Provisioning Intent, on page 21 and Detect CLI Template Run-Time Conflict, on page 21.

Step 9   Click **Save** at the bottom of the window.

After saving the template, Cisco DNA Center checks for any errors in the template. If there are any syntax errors, the template content is not saved and all input variables that are defined in the template are automatically identified during the save process. The local variables (variables that are used in **for** loops, assigned though a set, and so on) are ignored.

Step 10   Click **Commit** to commit the template.

Note   You can associate only a committed template to a network profile.

Step 11   Click **Attach to Network Profile** link, to attach the created template to a network profile.

Template Simulation

The interactive template simulation lets you simulate the CLI generation of templates by specifying test data for variables before sending them to devices. You can save the test simulation results and use them later, if required.

Step 1   Click the menu icon (≡) and choose **Tools** > **Template Hub**.

Step 2   From the left pane, choose a project and click a template, for which you want to run a simulation.

The template is displayed.

Step 3   Click the **Simulation** tab.

Step 4   Click **Create Simulation**.

The **Create Simulation** slide-in pane is displayed.

Step 5   Enter a unique name in **Simulation Name** field.

Note   If there are implicit variables in your template then select a device from the **Device** drop-down list to run the simulation against real devices based on your bindings.

Step 6   Click **Import Template Parameters** to import the template parameters or click **Export Template Parameters** to export the template parameters.

Step 7   To use the variables from the last device provisioning, click **Use Variable Values from the Last Provisioning** link. New variables must be added manually.

Step 8   Choose values of the variables, by clicking on the link and click **Run**.

Export Template(s)

You can export a template or multiple templates to a single file, in JSON format.

Step 1   Click the menu icon (≡) and choose **Tools** > **Template Hub**.

Step 2   Check a check box or multiple check box, next to the template name to select a template or multiple template that you want to export.

Step 3   From the **Export** drop-down list, choose **Export Template**.

Step 4   (Optional) You can filter the templates based on categories in the left pane.

Step 5   The latest version of the template is exported.

To export an earlier version of the template, do the following:

a.   Click the template name to open the template.

b.   Click **Template History** tab.

The **Template History** slide-in pane is displayed.

c.   Choose the preferred version.

d.   Click **View** button below the version.

The CLI template of that version is displayed.

e.   Click **Export** at the top of the template.

The JSON format of the template is exported.

Import Template(s)

You can import a template or multiple templates under a project.

Note	You can import templates only from an earlier version of Cisco DNA Center to a newer version. However, the opposite is not allowed.

Step 1 Click the menu icon (☰) and choose **Tools** > **Template Hub**.

Step 2 In the left pane, choose the project for which you want to import templates, under **Project Name** and choose **Import** > **Import Template**.

Step 3 **Import Templates** slide-in pane is displayed.

    a. Choose the **Project Name** from the drop-down list.

    b. Upload the JSON file by doing one of the following actions:

        1. Drag and drop the file to the drag and drop area.

        2. Click, **Choose a file**, browse to the location of the JSON file, and click **Open**.

        File size should not exceed 10Mb.

    c. Check the check box to create a new version of imported template, if template with the same name already exists in the hierarchy.

    d. Click **Import**.

    The CLI template is successfully imported to the chosen project.

Clone a Template

You can make a copy of a template to reuse portions of it.

Step 1 Click the menu icon (☰) and choose **Tools** > **Template Hub**.

Step 2 Click the ellipsis under **Action** column and choose **Clone**.

Step 3 The **Clone Template** slide-in pane is displayed.

Do the following:

    a. Enter a unique name in **Template Name** field.

    b. Choose the **Project Name** from the drop-down list.

Step 4 Click **Clone**.

The latest version of the template is cloned.

Step 5 (Optional) Alternatively, you can clone the template by clicking the template name. The template is displayed. Click **Clone** above the template.

Step 6 To clone an earlier version of the template, do the following:

   a. Select the template by clicking the template name.

   b. Click the **Template History** tab.

      The **Template History** slide-in pane is displayed.

   c. Click the preferred version.

      The chosen CLI template is displayed.

   d. Click **Clone** above the template.

Attach a CLI Template to the Network Profiles

To provision a CLI template, it needs to be attached to a network profile. Use this procedure to attach a CLI template to a network profile or multiple network profiles.

Step 1 Click the menu icon (☰) and choose **Tools** > **Template Hub**.

The **Template Hub** window is displayed.

Step 2 In the **Templates** table, under **Network Profile** column, click **Attach** to attach a template to the network profile.

> **Note** Alternatively, you can click the ellipsis ⋮ under **Actions** column and choose **Attach to Profile**, or you can attach a template to network profile from the **Design** > **Network Profiles** window. For more information, see Associate Templates to Network Profiles, on page 19.

The **Attach to Network Profile** slide-in pane is displayed.

Step 3 Check the check box next to the network profile name and click **Save**.
The CLI template is attached to the chosen network profile.

Step 4 The number displayed under **Network Profile** column shows the number of network profiles attached to a CLI template. Click the number to view the network profile details.

Step 5 To attach more network profiles to a CLI template, do the following:

   a. Click the number under **Network Profile** column.

      Alternatively, in **Actions** column, click the ellipsis icon ⋮ and choose **Attach to Profile**.

      The **Network Profiles** slide-in pane is displayed.

   b. Click **Attach to Network Profile** link at the top right of the slide-in pane, check the check box next to the network profile name, and click **Attach**.

Provision CLI Templates

Step 1 Click the menu icon (☰) and choose **Tools** > **Template Hub**.

Step 2 Check the check box next to the template you want to provision and click **Provision Templates** at the top of the table.

You can choose to provision multiple templates.

You are redirected to the **Provision Template** workflow.

Step 3 In the **Get Started** window, enter a unique name in **Task Name** field.

Step 4 In the **Select Devices** window, choose the devices from the applicable devices list, which are based on the device details defined in the template and click **Next**.

Step 5 In the **Review Applicable Templates** window, review the devices and the templates attached to it. If required, you can remove the templates that you do not want to be provisioned on the device.

Step 6 Configure the template variables for each device, in **Configure Template Variables** window.

Step 7 Select the device to preview the configuration being provisioned on the device, in **Preview Configuration** window.

Step 8 In the **Schedule Task** window, select whether to provision the template **Now**, or schedule the provision for a **Later** time, and click **Next**.

Step 9 In the **Summary** window, review the template configurations for your devices, click **Edit** to make any changes; otherwise click **Submit**.

Your devices will be provisioned with the template.

Note Cisco DNA Center allows you to review configurations before deploying on Cisco network devices. The commands used in the CLI templates can be reviewed from **Preview Configuration** window.

For Cisco DNA Center 2.3.6 release, this feature is available on provisioning the device from **Inventory** > **Provision Device**. For more information, see Visibility of Configurations Workflow.

Export Project(s)

You can export a project or multiple projects, including their templates, to a single file in JSON format.

Step 1 Click the menu icon (☰) and choose **Tools** > **Template Hub**.

Step 2 In the left pane, select a project or multiple project that you want to export under **Project Name**.

Step 3 From **Export** drop-down list, choose **Export Project**.

Step 4 Click **Save**, if prompted.

Import Project(s)

You can import a project or multiple projects with their templates, into the Cisco DNA Center Template Hub.

Note	You can import projects only from an earlier version of Cisco DNA Center to a newer version. However, the opposite is not allowed.

Step 1   Click the menu icon (≡) and choose **Tools** > **Template Hub**.

Step 2   From the **Import** drop-down list, choose **Import Project**.

Step 3   The **Import Projects** slide-in pane is displayed.

    a. Upload the JSON file by doing one of the following actions:

        1. Drag and drop the file to the drag and drop area.

        2. Click **Choose a file**, browse to the location of the JSON file, and click **Open**.

        File size should not exceed 10Mb.

    b. Check the check box to create a new version of the template, in the existing project, if the project with the same name already exists in hierarchy.

    c. Click **Import**.

    The project is successfully imported.

Template Variables

The Template Variables is used for adding additional metadata information to the template variables in the template. You can also use the variables to provide validations for variables such as maximum length, range, and so on.

Step 1   Click the menu icon (≡) and choose **Tools** > **Template Hub**.

Step 2   From the left pane, choose a project and click a template.

The template is displayed.

Step 3   Click the **Variables** tab.

It enables you to add meta data to the template variables. All the variables that are identified in the template are displayed. You can configure the following metadata:

    • Choose the variable from the left pane, and click the **Variable** toggle button if you want the string to be considered as a variable.

Note	By default the string considered as a variable. Click the toggle button, if you do not want the string to be considered as a variable.

    • Check the **Required Variable** check box if this is a required variable during the provisioning. All the variables by default are marked as Required, which means you must enter the value for this variable at the time of provisioning. If the parameter is not marked as **Required Variable** and if you do not pass any value to the parameter, it substitutes

an empty string at run time. A lack of a variable can lead to command failure, which may not be syntactically correct. If you want to make an entire command optional based on a variable not marked as **Required Variable**, use the **if-else** block in the template.

- Enter the field name in the **Field Name**. This is the label that is used for the UI widget of each variable during provisioning.

- In **Variable Data Value** area, choose the **Variable Data Source** by clicking the radio button. You can choose, **User Defined** value or **Bound to Source** value to hold a specific value.

  Do the following, if you choose **User Defined** value:

  a. Choose the **Variable Type** from the drop-down list: **String**, **Integer**, **IP Address**, or **Mac Address**

  b. Choose the **Data Entry Type** from the drop-down list: **Text Field**, **Single Select**, or **Multi Select**.

  c. Enter the default variable value in the **Default Variable Value** field.

  d. Check the **Sensitive Value** check box for sensitive value.

  e. Enter the number of characters that are allowed in the **Maximum Characters** field. This is applicable only for the string data type.

  f. Enter hint text in the **Hint Text** field.

  g. Enter any additional information in the **Additional Info** text box.

  Do the following, if you choose **Bound to Source** value:

  a. Choose the **Data Entry Type** from the drop-down list: **Text Field**, **Single Select**, or **Multi Select**.

  b. Choose the **Source** from the drop-down list: **Network Profile**, **Common Settings**, **Cloud Connect** and **Inventory**.

  c. Choose the **Entity** from the drop-down list.

  d. Choose the **Attribute** from the drop-down list.

  e. Enter the number of characters that are allowed in the **Maximum Characters** field. This is applicable only for the string data type.

  f. Enter hint text in the **Hint Text** field.

  g. Enter any additional information in the **Additional Info** text box.

     For more details on **Bound to Source** value, see .

Step 4   After configuring metadata information, click **Review Form** to review the variable information.

Step 5   Click **Save**.

Step 6   To commit the template, choose **Commit**. The **Commit** window is displayed. You can enter a commit note in the **Commit Note** text box.

Variable Binding

While creating a template, you can specify variables that are contextually substituted. Many of these variables are available in the Template Hub.

Template Hub provides an option to bind or use variables in the template with the source object values while editing or through the input form enhancements; for example, DHCP server, DNS server, and syslog server.

Some variables are always bound to their corresponding source and their behavior cannot be changed. To view the list of implicit variables, click the template and click **Variables** tab.

Note Variable binding is not supported for day-zero template, it is only supported for day-n template.

The predefined object values can be one of the following:

- Network Profile
  - SSID
  - Policy profile
  - AP group
  - Flex group
  - Flex profile
  - Site tag
  - Policy tag

- Common Settings
  - DHCP server
  - Syslog server
  - SNMP trap receiver
  - NTP server
  - Timezone site
  - Device banner
  - DNS server
  - NetFlow collector
  - AAA network server
  - AAA endpoint server
  - AAA server pan network
  - AAA server pan endpoint
  - WLAN info
  - RF profile info

- Cloud Connect
  - Cloud router-1 Tunnel IP

- Cloud router-2 Tunnel IP

- Cloud router-1 Loopback IP

- Cloud router-2 Loopback IP

- Branch router-1 Tunnel IP

- Branch router-2 Tunnel IP

- Cloud router-1 Public IP

- Cloud router-2 Public IP

- Branch router-1 IP

- Branch router-2 IP

- Private subnet-1 IP

- Private subnet-2 IP

- Private subnet-1 IP mask

- Private subnet-2 IP mask

- Inventory

  - Device

  - Interface

  - AP group

  - Flex group

  - WLAN

  - Policy profile

  - Flex profile

  - Webauth parameter map

  - Site tag

  - Policy tag

  - RF profile

- **Common Settings**: Settings available under **Design** > **Network Settings** > **Network**. The common settings variable binding resolves values that are based on the site to which the device belongs.

Step 1   Click the menu icon (☰) and choose **Tools** > **Template Hub**.

Step 2   Choose the template and click the **Variables** tab to bind variables in the template to network settings.

Step 3   Select the variables in the left pane and check the **Required Variable** check box to bind variables to the network settings.

Step 4   To bind variables to network settings, select each variable from the left pane, and choose **Bound to Source** radio button, under **Variable Data Source** and do the following:

    a.   From the **Data Entry Type** drop-down list, choose the type of UI widget to create at the time of provisioning: **Text Field**, **Single Select**, or **Multi Select**.

    b.   Choose the **Source**, **Entity**, and **Attribute** from the respective drop-down lists.

    c.   For the source type **CommonSettings**, choose one of these entities: **dhcp.server**, **syslog.server**, **snmp.trap.receiver**, **ntp.server**, **timezone.site**, **device.banner**, **dns.server**, **netflow.collector**, **aaa.network.server**, **aaa.endpoint.server**, **aaa.server.pan.network**, **aaa.server.pan.endpoint**, **wlan.info** or **rfprofile.info**.

        You can apply a filter on the **dns.server** or **netflow.collector** attributes to display only the relevant list of **bind** variables during provisioning of devices. To apply a filter on an attribute, select an attribute from the **Filter by** drop-down list. From the **Condition** drop-down list, select a condition to match the **Value**.

    d.   For the source type **NetworkProfile**, choose **SSID** as the entity type. The SSID entity that is populated is defined under **Design** > **Network Profile**. The binding generates a user-friendly SSID name, which is a combination of SSID name, site, and SSID category. From the **Attributes** drop-down list, choose **wlanid** or **wlanProfileName**. This attribute is used during the advanced CLI configurations at the time of template provisioning.

    e.   For the source type **Inventory**, choose one of these entities: **Device**, **Interface**, **AP Group**, **Flex Group**, **Wlan**, **Policy Profile**, **Flex Profile**, **Webauth Parameter Map**, **Site Tag**, **Policy Tag**, or **RF Profile**. For the entity type **Device** and **Interface**, the **Attribute** drop-down list shows the device or interface attributes. The variable resolves to the AP Group and Flex Group name that is configured on the device to which the template is applied.

        You can apply filter on the **Device**, **Interface**, or **Wlan** attributes to display only the relevant list of **bind** variables during provisioning of devices. To apply a filter on an attribute, select an attribute from the **Filter by** drop-down list. From the **Condition** drop-down list, select a condition to match the **Value**.

    After binding variables to a common setting, when you assign templates to a wireless profile and provision the template, the network settings that you defined under **Network Settings** > **Network** appear in the drop-down list. You must define these attributes under **Network Settings** > **Network** at the time of designing your network.

Step 5   If the template contains variable bindings that bind to specific attributes and the template code accesses those attributes directly, you must do one of the following:

    • Change the binding to the object instead of to the attributes.
    • Update the template code to not access the attributes directly.

For example, if the template code is as follows, where **$interfaces** binds to specific attributes, you must update the code as shown in the following example, or modify the binding to the object instead of to the attributes.

Old sample code:

```
#foreach ( $interface in $interfaces )
 $interface.portName
      description "something"
#end
```

New sample code:

```
#foreach ( $interface in $interfaces )
 interface $interface
        description "something"
#end
```

Special Keywords

All commands executed through templates are always in the **config t** mode. Therefore, you do not have to specify the **enable or config t** commands explicitly in the template.

Day-zero templates do not support special keywords.

Enable Mode Commands

Specify the **#MODE_ENABLE** command if you want to execute any commands outside of the **config t** command.

Use this syntax to add **enable mode** commands to your CLI templates:

```
#MODE_ENABLE
<<commands>>
#MODE_END_ENABLE
```

Interactive Commands

Specify **#INTERACTIVE** if you want to execute a command where a user input is required.

An interactive command contains the input that you must enter following the execution of a command. To enter an interactive command in the CLI Content area, use the following syntax:

```
CLI Command<IQ>interactive question 1 <R> command response 1 <IQ>interactive question
2<R>command response 2
```

Where **<IQ>** and **<R>** tags evaluate the text provided against what is seen on the device.

The Interactive question uses regular expressions to validate if the text received from the device is similar to the text entered. If the regular expressions entered in the **<IQ><R>** tags are found, then the interactive question passes and a part of the output text appears. This means that you need to enter a part of the question and not the entire question. Entering Yes or No between the **<IQ>** and **<R>** tags is sufficient but you must make sure that the text Yes or No appears in the question output from the device. The best way to do this is by running the command on the device and observing the output. In addition, you need to ensure that any regular expression metacharacters or newlines entered are used appropriately or avoided completely. The common regular expression metacharacters are **. ( ) [ ] { } | * + ? \ $ ^ : &**.

For example, the following command has output that includes metacharacters and newlines.

```
Switch(config)# no crypto pki trustpoint DNAC-CA
% Removing an enrolled trustpoint will destroy all certificates received from the related
Certificate Authority
Are you sure you want to do this? [yes/no]:
```

To enter this in a template, you need to select a portion that does not have any metacharacters or newlines. Here are a few examples of what could be used.

```
#INTERACTIVE
no crypto pki trustpoint DNAC-CA<IQ>yes/no<R>yes
#ENDS_INTERACTIVE


#INTERACTIVE
no crypto pki trustpoint DNAC-CA<IQ>Removing an enrolled<R>yes
#ENDS_INTERACTIVE
```

```
#INTERACTIVE
no crypto pki trustpoint DNAC-CA<IQ>Are you sure you want to do this<R>yes
#ENDS_INTERACTIVE
```

```
#INTERACTIVE
crypto key generate rsa general-keys <IQ>yes/no<R> no
#ENDS_INTERACTIVE
```

Where **<IQ>** and **<R>** tags are case-sensitive and must be entered in uppercase.

Note   In response to the interactive question after providing a response, if the newline character is not required, you must enter the **<SF>** tag. Include one space before the **<SF>** tag. When you enter the **<SF>** tag, the **</SF>** tag pops up automatically. You can delete the **</SF>** tag because it is not needed.

For example:

```
#INTERACTIVE
config advanced timers ap-fast-heartbeat local enable 20 <SF><IQ>Apply(y/n)?<R>y
#ENDS_INTERACTIVE
```

Combining Interactive Enable Mode Commands

Use this syntax to combine interactive **Enable Mode** commands:

```
#MODE_ENABLE
#INTERACTIVE
commands<IQ>interactive question<R> response
#ENDS_INTERACTIVE
#MODE_END_ENABLE
```

```
#MODE_ENABLE
#INTERACTIVE
mkdir <IQ>Create directory<R>xyz
#ENDS_INTERACTIVE
#MODE_END_ENABLE
```

Multiline Commands

If you want multiple lines in the CLI template to wrap, use the **MLTCMD** tags. Otherwise, the command is sent line by line to the device. To enter multiline commands in the CLI Content area, use the following syntax:

```
<MLTCMD>first line of multiline command
second line of multiline command
...
...
last line of multiline command</MLTCMD>
```

- Where **<MLTCMD>** and **</MLTCMD>** are case-sensitive and must be in uppercase.

- The multiline commands must be inserted between the **<MLTCMD>** and **</MLTCMD>** tags.

- The tags cannot start with a space.

- The **<MLTCMD>** and **</MLTCMD>** tags cannot be used in a single line.

Associate Templates to Network Profiles

Before you begin

Before provisioning a template, ensure that the template is associated with a network profile and the profile is assigned to a site.

During provisioning, when the devices are assigned to specific sites, the templates associated with the site through the network profile appear in the advanced configuration.

Step 1   Click the menu icon (≡) and choose **Design** > **Network Profiles**, and click **Add Profile**.

The following types of profiles are available:

- **Assurance**: Click this to create an Assurance profile.
- **Firewall**: Click this to create a firewall profile.
- **Routing**: Click this to create a routing profile.
- **Switching**: Click this to create a switching profile.

  - Click the **Onboarding Templates** or **Day-N Templates**, as required.

  - In the **Profile Name** field, enter the profile name.

  - Click +**Add Template** and choose the device type, tag, and template from the **Device Type**, **Tag Name**, and **Template** drop-down lists.

    If you do not see the template that you need, create a new template in Template Hub. See Create a Regular Template, on page 3.

  - Click **Save**.

- **Telemetry Appliance**: Click this to create a Cisco DNA Traffic Telemetry Appliance profile.
- **Wireless**: Click this to create a wireless profile. Before assigning a wireless network profile to a template, ensure that you have created wireless SSIDs.

  - In the **Profile Name** field, enter the profile name.

  - Click + **Add SSID**. The SSIDs that were created under **Network Settings** > **Wireless** are populated.

  - Under **Attach Template(s)**, from the **Template** drop-down list, choose the template that you want to provision.

  - Click **Save**.

Note   You can view the Switching and Wireless profiles in the **Cards** and the **Table** view.

Step 2   The **Network Profiles** window lists the following:

- **Profile Name**
- **Type**
- **Version**
- **Created By**
- **Sites**: Click **Assign Site** to add sites to the selected profile.

Step 3 For day-*n* provisioning, choose **Provision** > **Network Devices** > **Inventory** and do the following:

a) Check the check box next to the device name that you want to provision.

b) From the **Actions** drop-down list, choose **Provision**.

c) In the **Assign Site** window, assign a site to which the profiles are attached.

d) In the **Choose a Site** field, enter the name of the site to which you want to associate the controller, or choose from the **Choose a Site** drop-down list.

e) Click **Next**.

f) The **Configuration** window appears. In the **Managed AP Locations** field, enter the AP locations managed by the controller. You can change, remove, or reassign the site. This is applicable only for wireless profiles.

g) Click **Next**.

h) The **Advanced Configuration** window appears. The templates associated with the site through the network profile appear in the advanced configuration.

- Check the **Provision these templates even if they have been deployed before** check box if you overwrote any configurations from intent in the template, and you want your changes to override. (This option is disabled by default.)

- The **Copy running config to startup config** option is enabled by default, which means that after deploying the template configuration, **write mem** will be applied. If you don't want to apply the running config to the startup config, you must uncheck this check box.

- Use the **Find** feature to quickly search for the device by entering the device name, or expand the templates folder and select the template in the left pane. In the right pane, select values for those attributes that are bound to the source.

- To export the template variables into a CSV file while deploying the template, click **Export** in the right pane. You can use the CSV file to make necessary changes in the variable configuration and import it into Cisco DNA Center at a later time by clicking **Import** in the right pane.

i) Click **Next** to deploy the template.

j) Choose whether you want to deploy the template **Now** or schedule it for later.
The **Status** column in the **Device Inventory** window shows SUCCESS after the deployment succeeds.

Step 4 Click **Export Deployment CSV** to export template variables from all the templates in a single file.

Step 5 Click **Import Deployment CSV** to import template variables from all the templates in a single file.

Step 6 For day-zero provisioning, choose **Provision** > **Plug and Play** and do the following:

a) Choose a device from the **Actions** drop-down list, and choose **Claim**.

b) Click **Next** and in **Site Assignment** window, choose a site from the **Site** drop-down list.

c) Click **Next** and in **Configuration** window, choose the image and the day-zero template.

d) Click **Next** and in the **Advanced Configuration** window, enter the location.

e) Click **Next** to view the **Device Details**, **Image Details**, **Day-0 Configuration Preview**, and **Template CLI Preview**.

Detect Conflicts in a CLI Template

Cisco DNA Center allows you to detect conflicts in a CLI template. You can view potential design conflicts and run-time conflicts for switching, SD-Access, or fabric.

Potential Design Conflicts Detection Between CLI Template and Service Provisioning Intent

Potential Design Conflicts identify the intent commands in the CLI template and flag them, if the same command is pushed by switching, SD-Access, or fabric. Intent commands are not recommended for use, because Cisco DNA Center reserves when to push the commands to device.

Step 1   Click the menu icon (☰) and choose **Tools** > **Template Hub**.

The **Template Hub** window is displayed.

Step 2   (Optional) In the left pane, from the **Project Name** drop-down list, choose a project with your preferred CLI templates.

> **Note**   To view only the templates with conflicts, in the left pane, under **Potential Design Conflicts**, check the **Conflicts** check box.

Step 3   Click the template name to view the total number of conflicts.

Alternatively, under the **Potential Design Conflicts** column, you can also view the total number of conflicts by clicking the warning icon.

The CLI Template is displayed.

Step 4   In the template, hover your cursor over the warning icon to view the details of the conflict.

The CLI commands that have conflicts are flagged with a warning icon. For new templates, the conflicts are detected after you save the template.

Step 5   (Optional) To show or hide the conflicts, click the **Show Design Conflicts** toggle button.

Step 6   (Optional) You can also view the number of conflicts on newly configured CLI templates by doing following:

    a)   Click the menu icon (☰) and choose **Provision** > **Inventory**.

        On the **Inventory** window, a message with a warning icon is displayed, which shows the number of conflicts in the newly configured CLI template.

    b)   Click the **Update CLI Templates** link to view the conflicts.

Detect CLI Template Run-Time Conflict

Cisco DNA Center allows you to detect run-time conflict for switching, SD-Access, or fabric.

Before you begin

You must configure the CLI template through Cisco DNA Center to detect run-time conflict.

Step 1   Click the menu icon (☰) and choose **Provision** > **Inventory**.

The **Inventory** window is displayed.

Step 2 Under the **Template Provision Status** column, view the template provisioning status of devices, which shows the number of templates provisioned on the device.

The templates that are provisioned successfully are displayed with a tick icon. The templates that have conflicts are displayed with a warning icon.

Step 3 Under the **Template Provision Status** column, click the link to open the **Template Status** slide-in pane.

You can view the following information in the table:

- **Template Name**

- **Project Name**

- **Provision Status**: Displays **Template Provisioned** if the template was provisioned successfully or **Template Out of Sync** if there are any conflicts in the template.

- **Conflict Status**: Displays the number of conflicts in the CLI template.

- **Actions**: Click **View Configuration** to view the CLI template. Commands that have conflicts are flagged with a warning icon.

Step 4 (Optional) You can view the number of conflicts in a CLI template under the **Template Conflicts Status** column in the **Inventory** window.

Step 5 Identify the run-time conflicts by generating a configuration preview:

a) Check the check box next to the device name.

b) From the **Actions** drop-down list, choose **Provision Device**.

c) On the **Assign Site** window, click **Next**. On the **Advanced Configuration** window, make the necessary changes and click **Next**. On the **Summary** window, click **Deploy**.

d) In the **Provision Device** slide-in pane, click the **Generate Configuration Preview** radio button and click **Apply**.

e) Click the **Work Items** link to view the generated configuration preview.

Alternatively, click the menu icon (≡) and choose **Activities** > **Work Items** to view the generated configuration preview.

f) (Optional) If the activity is still loading, click **Refresh**.

g) Click the preview link to open the **Configuration Preview** slide-in pane. You can view the CLI commands with run-time conflicts that are flagged with warning icons.