Maîtrisez les templates Catalyst Center

community.cisco.com en français

Jerome Durand – Technical Solutions Architect
https://gblogs.cisco.com/fr/reseaux/

14 mai 2024

Connectez, Engagez, Collaborez !

Solutions

Acceptez les solutions qui sont correctes et complimentez ceux qui vous ont aidé ! Aidez autres utilisateurs à trouver les réponses correctes dans la fenêtre de recherche.

Accepter comme solution

Compliments

Mettez en évidence les autres membres. Les votes utiles motivent les membres enthousiastes en leur offrant un signe de reconnaissance !

0 Compliments

Prix Spotlight Awards

De nouveaux lauréats tous les mois !

Démarquez-vous par vos efforts et votre engagement à améliorer la communauté et à aider les autres membres.

Les Spotlight Awards sont décernés chaque trimestre pour récompenser les membres les plus remarquables.

Rencontrez les gagnants de novembre-janvier 2024

Vous pouvez désormais également proposer un candidat ! Cliquez ici

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2

Notre expert

Jérôme Durand

Technical Solutions Architect

Jérôme a intégré le GIP RENATER en 2002, d'abord sur des projets R&D puis comme responsable des opérations en 2006, et enfin en charge de l'équipe services en 2009.

Jérôme a rejoint CISCO en 2011 comme expert sur les technologies de routage et commutation. Actuellement, il est très impliqué sur la programmation et l'automatisation des réseaux et notamment les solutions SD-WAN et SD-Access. Il est aussi auteur du RFC 7454 - BGP Operations and Security.

- Accompagnement des clients et partenaires sur Campus sur les projets Catalyst Campus et SD-WAN
- Evangéliste, Blogueur et Youtubeur
- Il a commencé l'aventure SD-Access depuis le tout début
- RFC 7454 – BGP Security BCP (et quelques Internet drafts...)

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slido

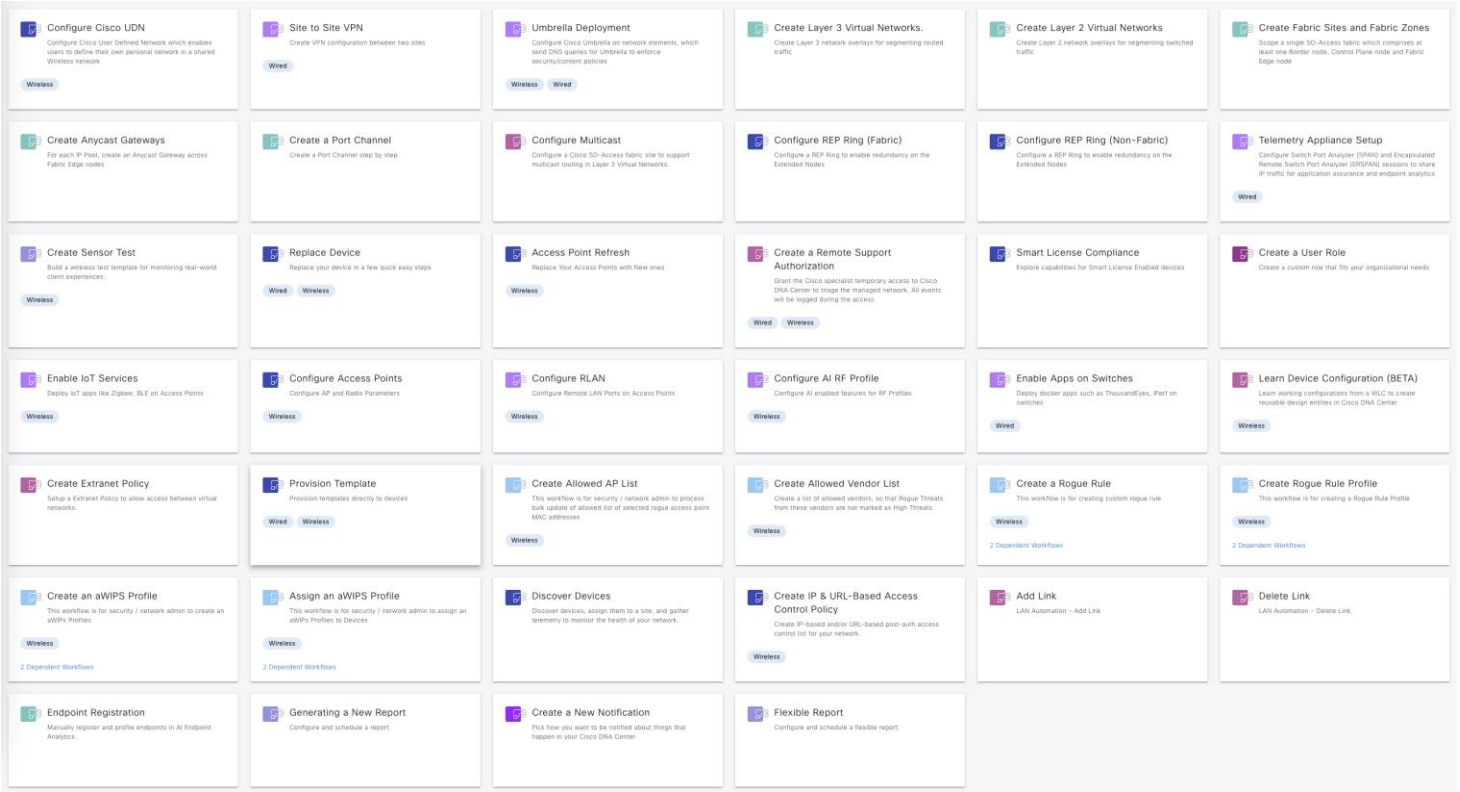
Join at

slido.com

#2194 815

Passcode: **smzgdn**

We all love Catalyst Center workflows !



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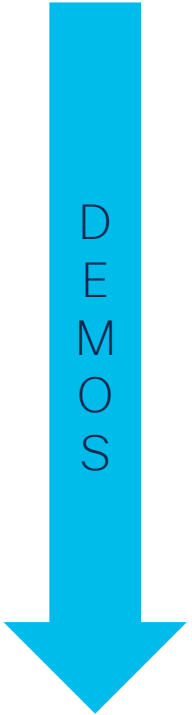
Agenda

- Templates Basics
- Variables
- Advanced use cases
- Compliance
- API and integrations
- Plug and Play



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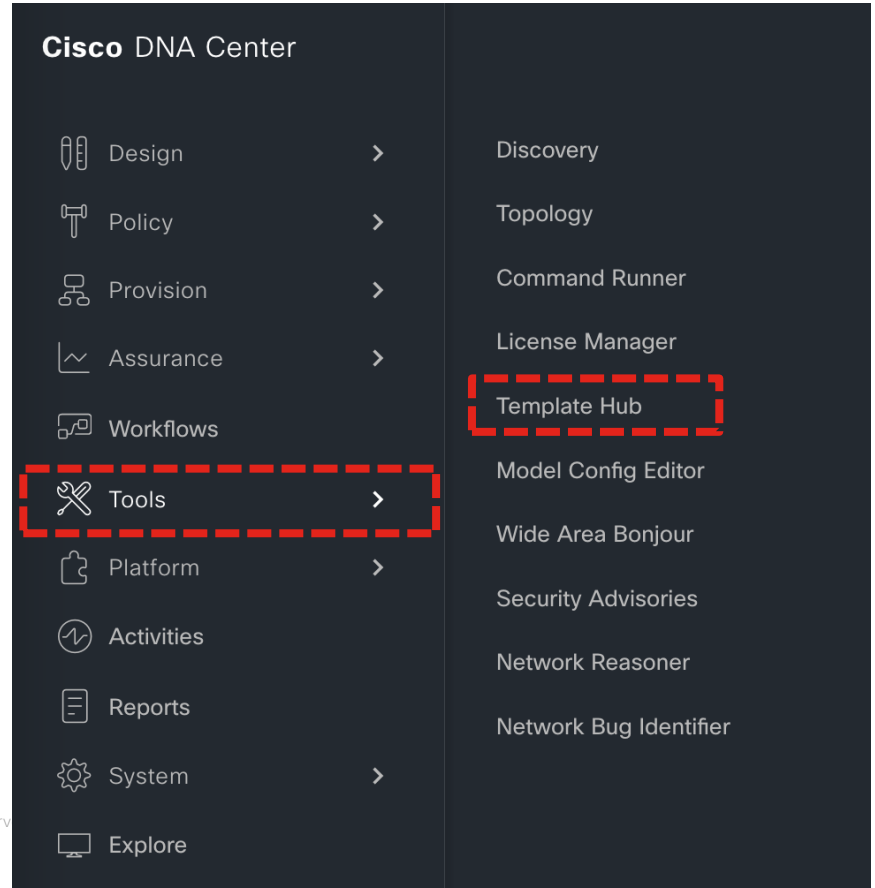
Template Basics

Catalyst Center Tools – Template Hub (2.3.5)



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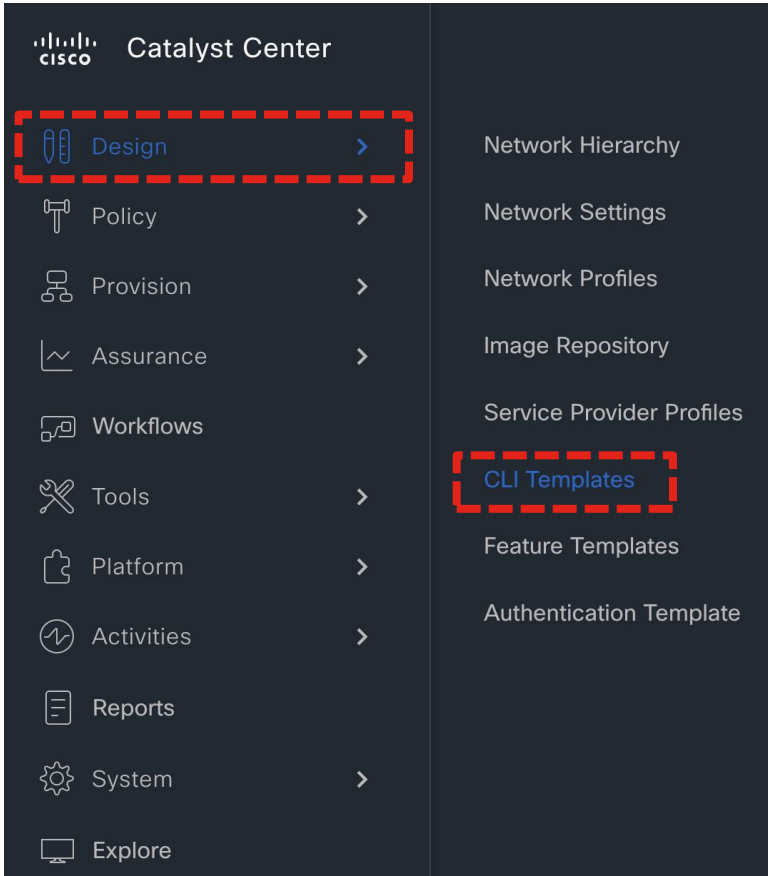
Catalyst Center Tools – CLI Templates (2.3.7)



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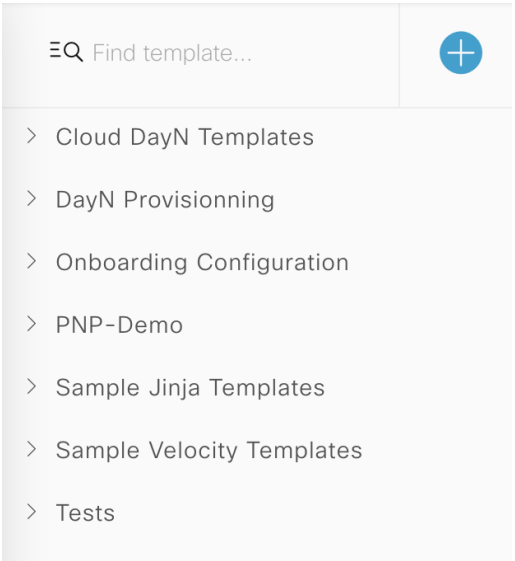
Projects and templates



Projects are templates « directories »

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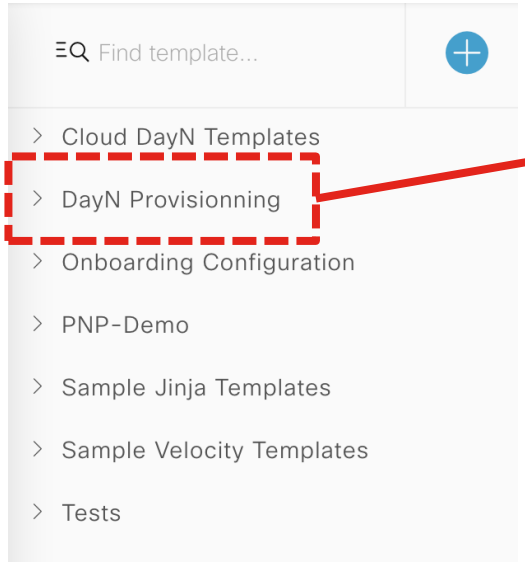
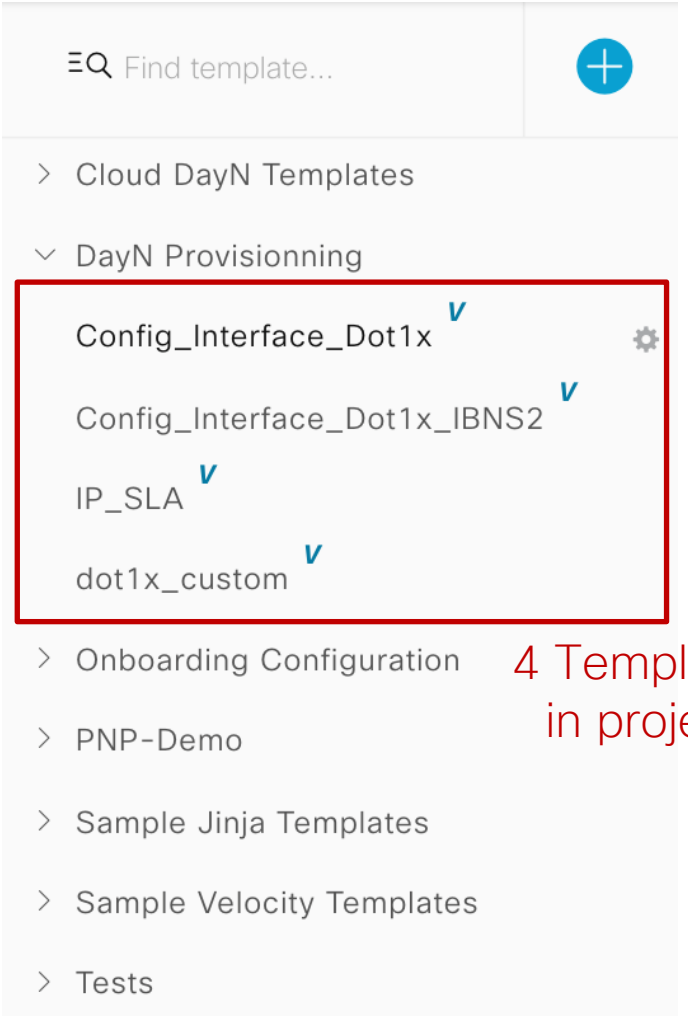
Projects and templates





4 Templates in project

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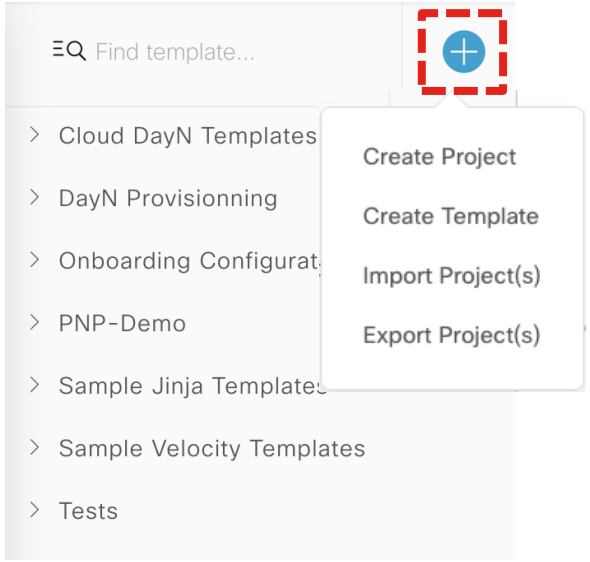
Projects and templates



Create your own projects

Create your own templates

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Add New Template

Template Details

Define the properties for the template.

Template Name*

Project Name*

Template Type

Regular Template Composite Sequence

Template Language

JINJA VELOCITY

Software Type*

Device Type Details

Add the types of devices you want to associate with the template

DEVICE DETAILS* Add Device Details

Device Family

Devices

Additional Details

Device Tags

Device Tags

Software Version

Template Description

Add New Template / Add Device Details

Add Device Details

Device Family*

Switches and Hubs ×

9300

Type Device Series Device Models

Device

Cisco Catalyst 9300 Series Switches

Cisco Catalyst IE9300 Rugged Series

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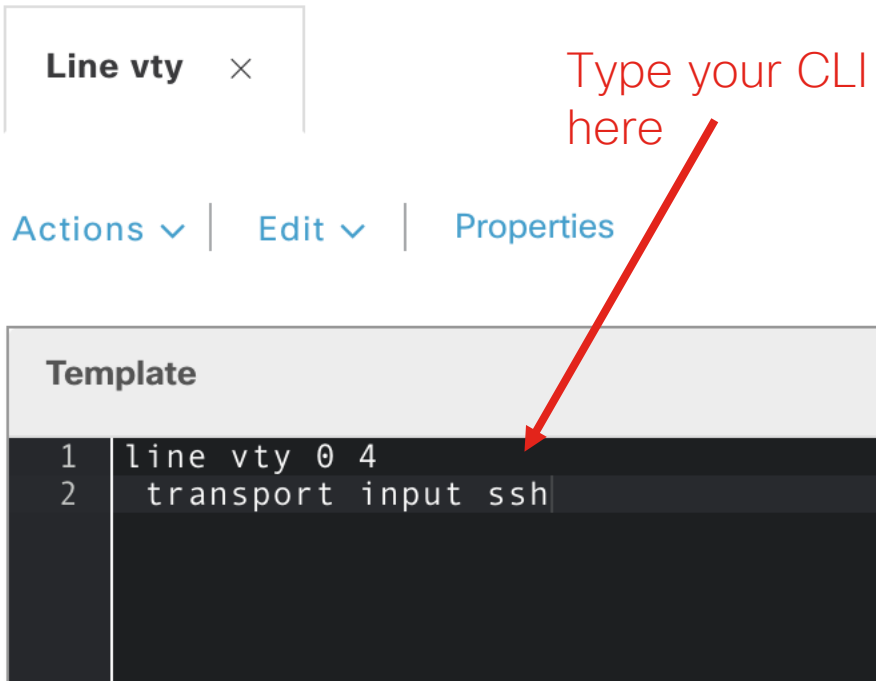
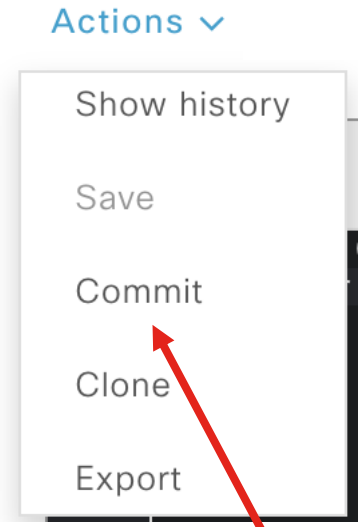
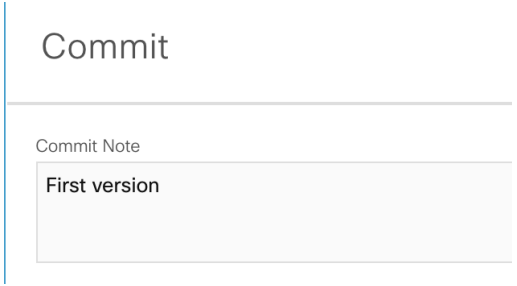
Templates at a glance





Commit to validate and track changes



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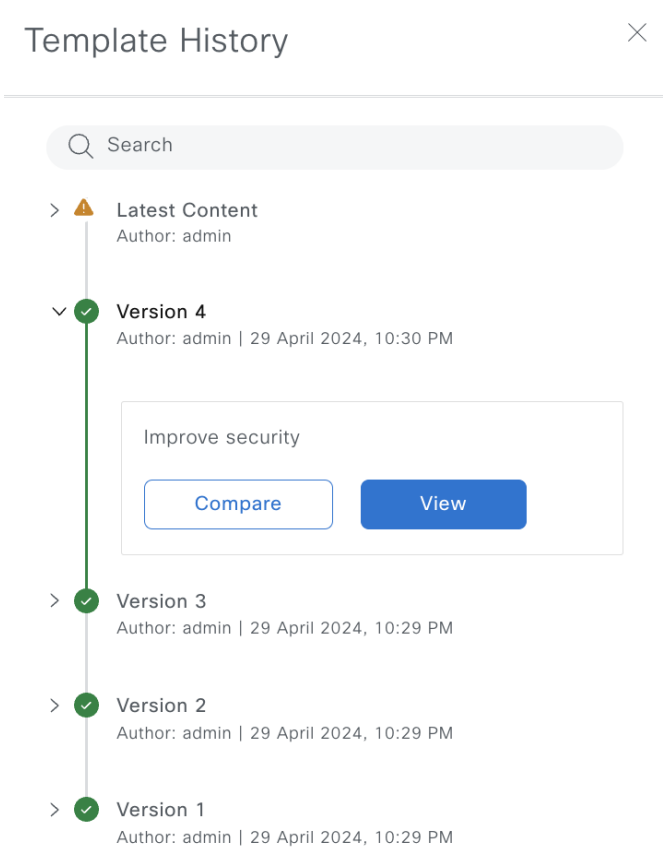
Template history



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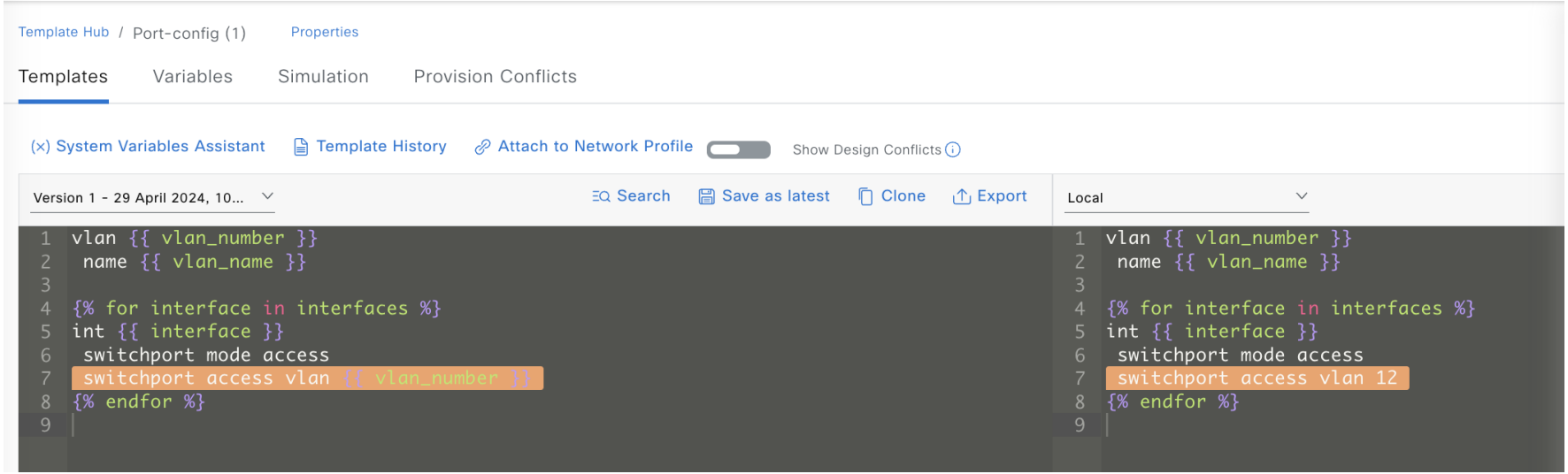
Compare template versions



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Apply a template to a device

Template

```
1 line vty 0 4
2  transport input ssh
```

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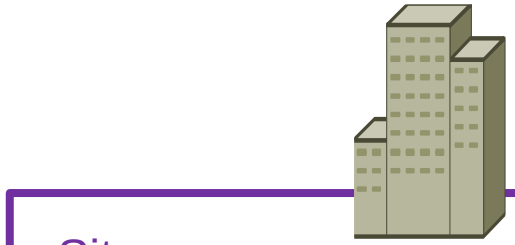
Apply a template to a device

Template

```
1  line vty 0 4
2   transport input ssh
```



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Apply a template to a device

Template

```
1  line vty 0 4
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```

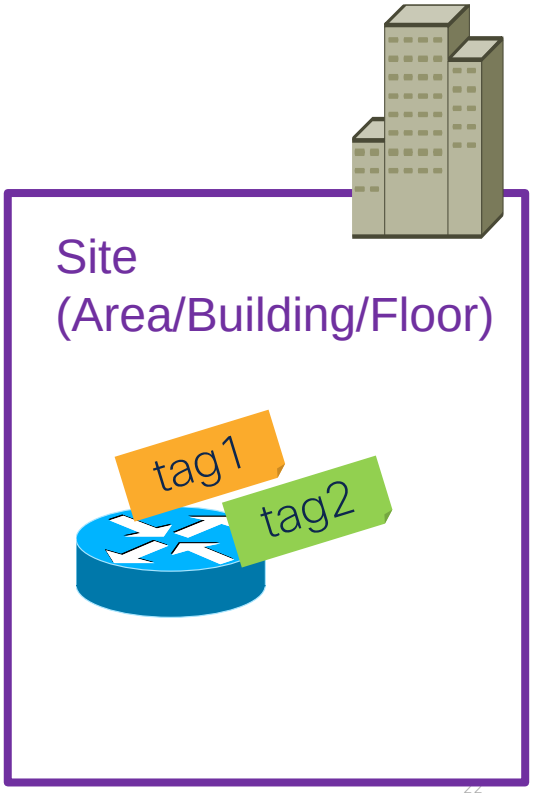

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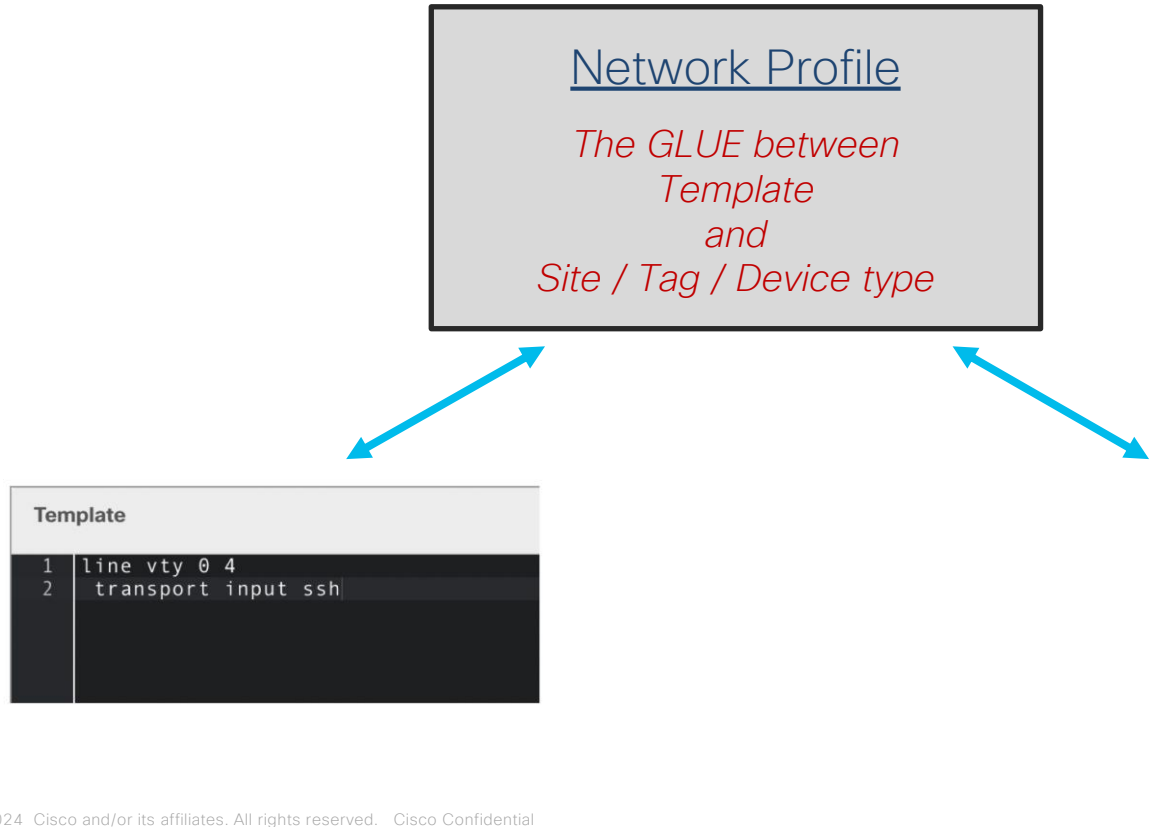
Apply a template to a device



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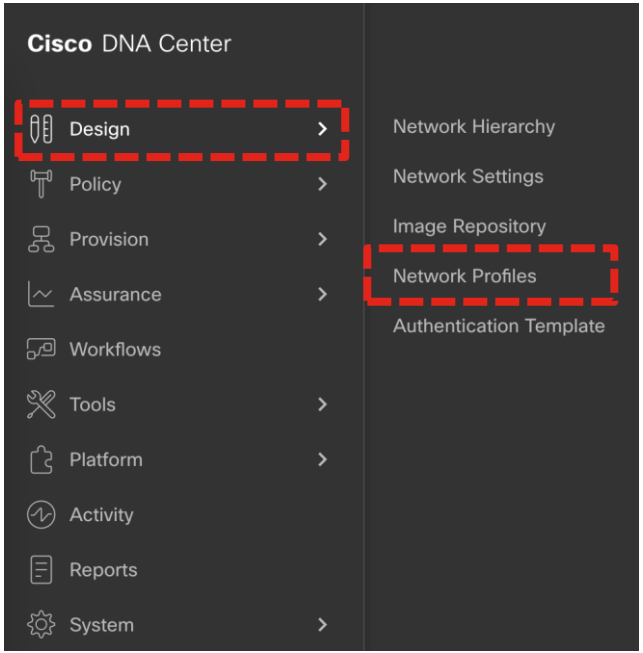
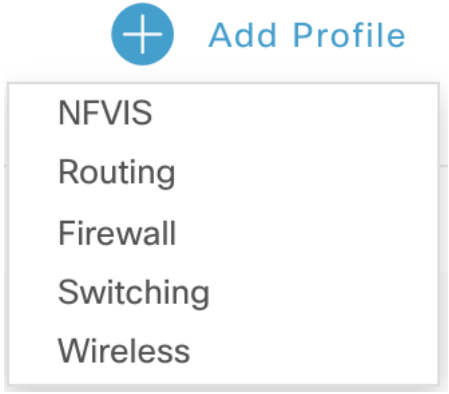
Create network profile





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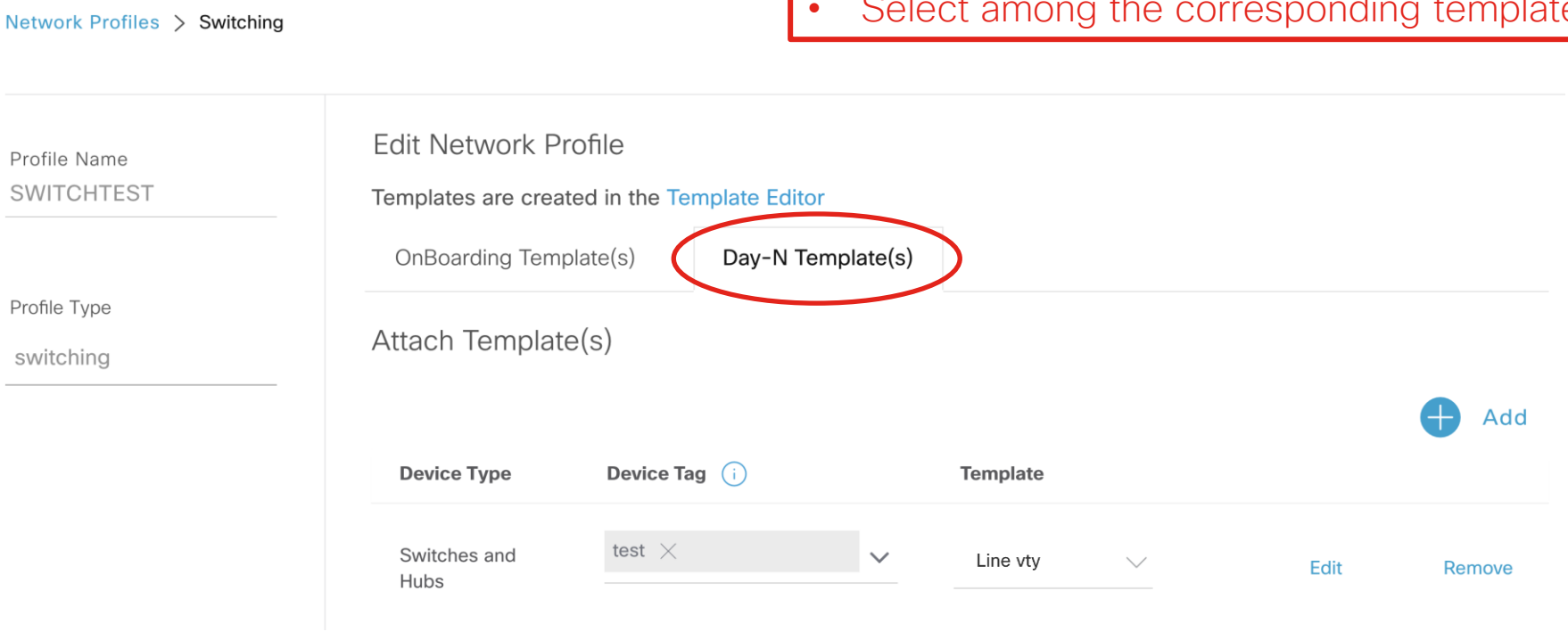
Define network profile

Specify:
- Device Type
- Tags (if any)
- Select among the corresponding template



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Associate network profile with sites

Profile Name ▲	Type	Sites	Action
ILM-PROFILE	switching	3 Sites	Edit | Delete
Italy profile	switching	3 Sites	Edit | Delete
Madrid-Wireless	Wireless	3 Sites	Edit | Delete
Router	Routing	3 Sites	Edit | Delete
SDA-BOULOGNE-PROFILE	Wireless	2 Sites	Edit | Delete
SDA-ILM-PROFILE	Wireless	3 Sites	Edit | Delete
SWITCH-PNP-BCN	switching	3 Sites	Edit | Delete
SWITCHTEST	switching	Assign Site	Edit | Delete

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Profile Name ▲	Type	Sites	Action
ILM-PROFILE	switching	3 Sites	Edit | Delete
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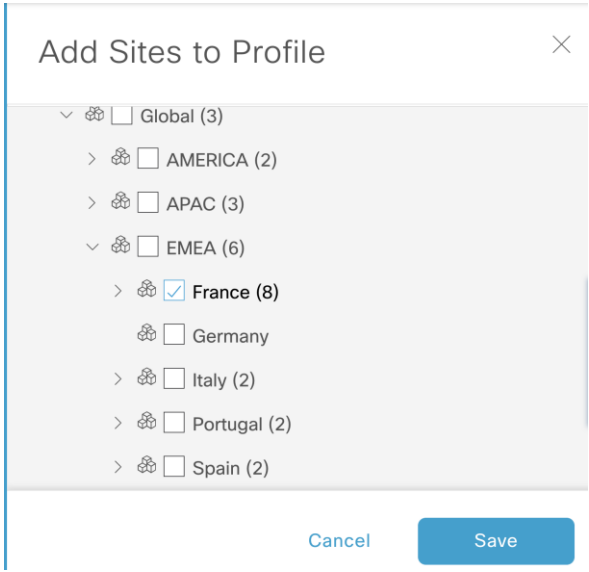
SDA-ILM-PROFILE	Wireless	3 Sites	Edit | Delete
SWITCH-PNP-BCN	switching	3 Sites	Edit | Delete
SWITCHTEST	switching	Assign Site	Edit | Delete



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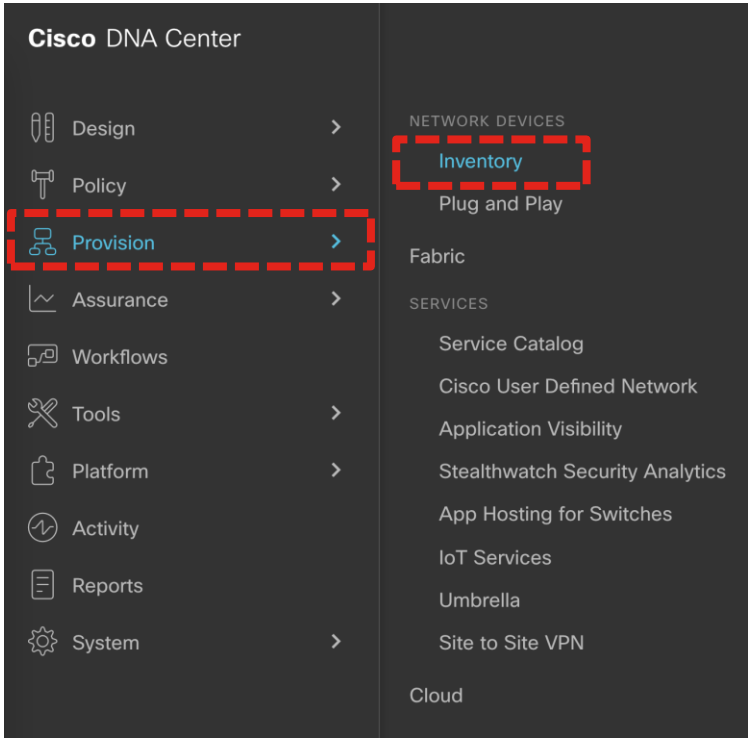
Provision devices with template



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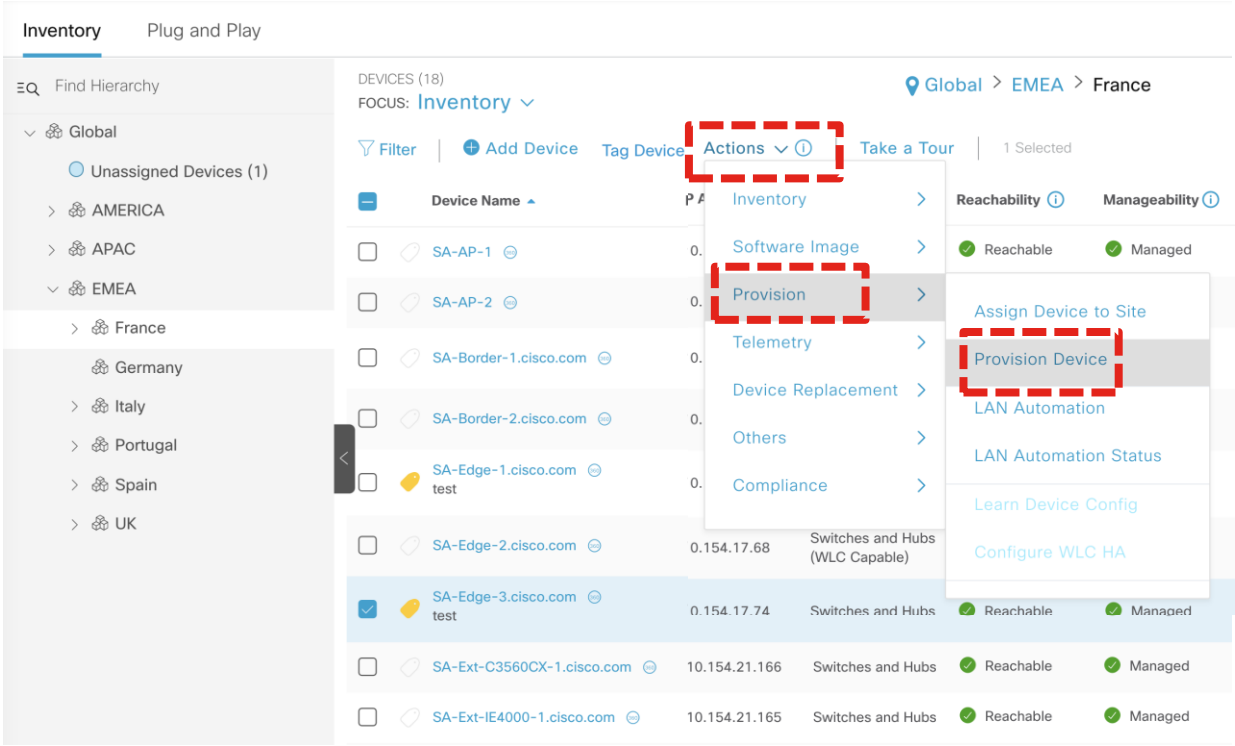
Select devices and provision



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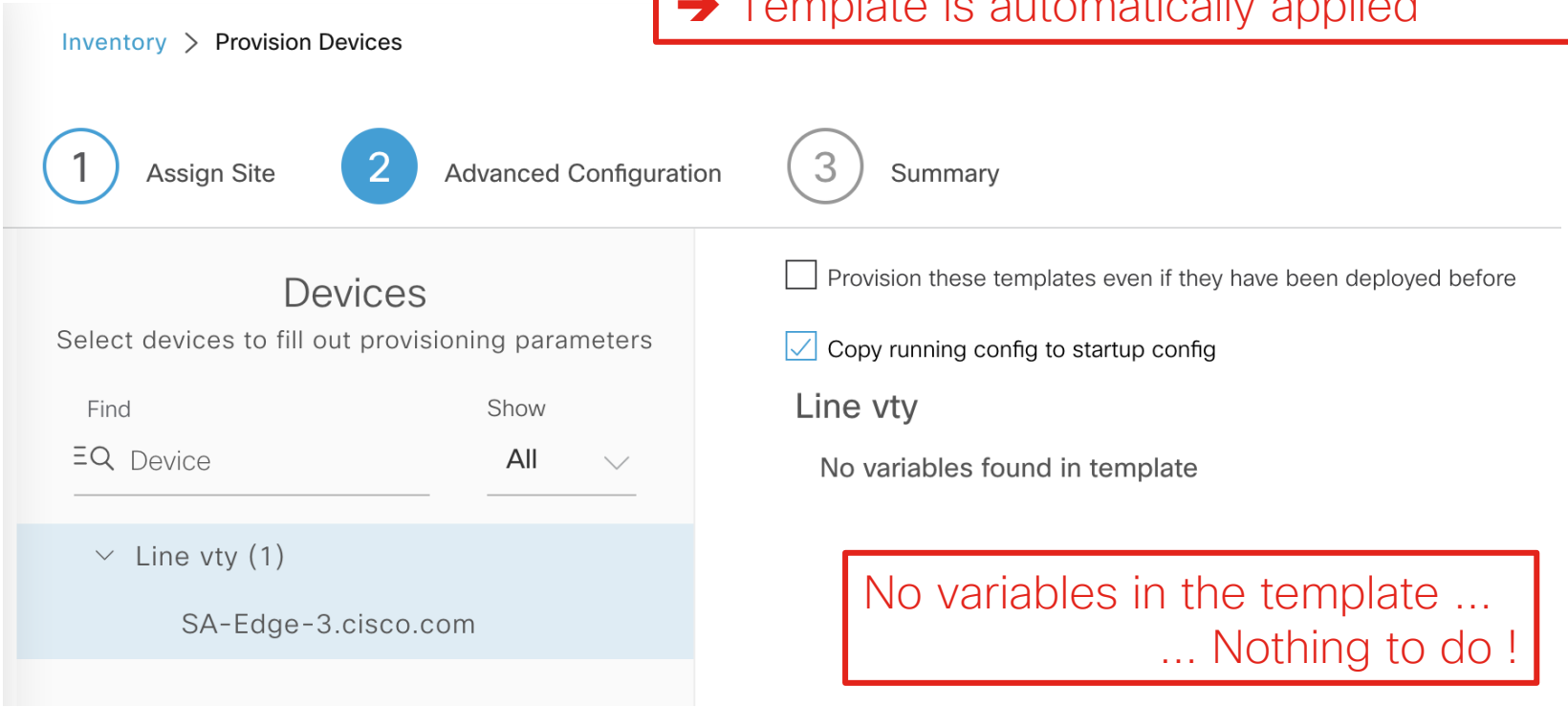
Provisioning step 2

Device is in a site with a Network Profile and a template is defined for device category / tag
➔ Template is automatically applied



No variables in the template ...
... Nothing to do !

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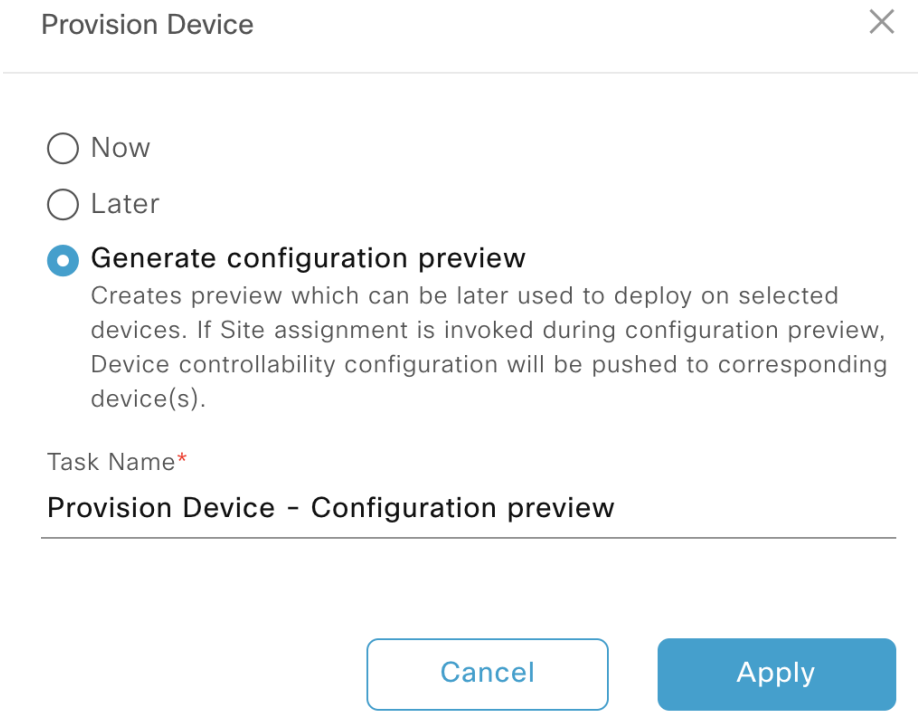
Configuration preview



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Configuration preview

PROVISION

Provision Device - Configuration preview

May 1, 2021 11:16 PM | Status: Success Last updated: 11:17:01 PM

DEVICES

10.154.17.74

Configuration Preview

Device Name : SA-Edge-3.Cisco.Com

```
line vty 0 4
 transport input ssh
```

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Want to change a template ?

Architects design what the network should look like

Operations roll out changes at the right pace

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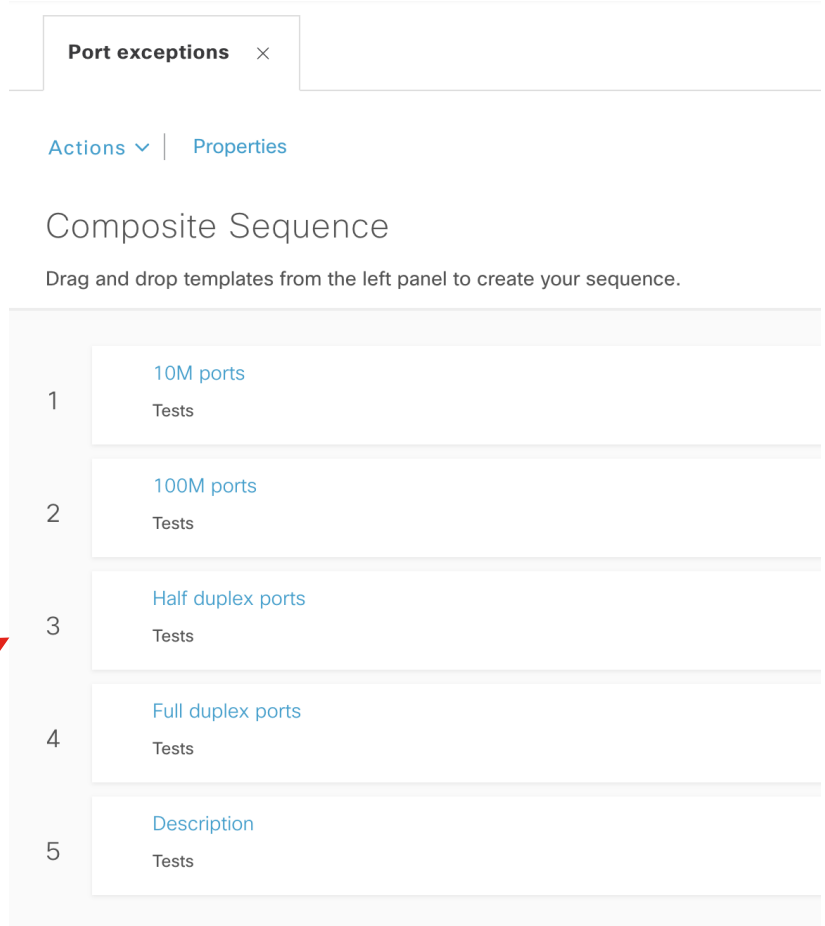
Composite template

Add New Template

Template Type *

◯ Regular Template ◉ Composite Sequence

Control sequence order of templates



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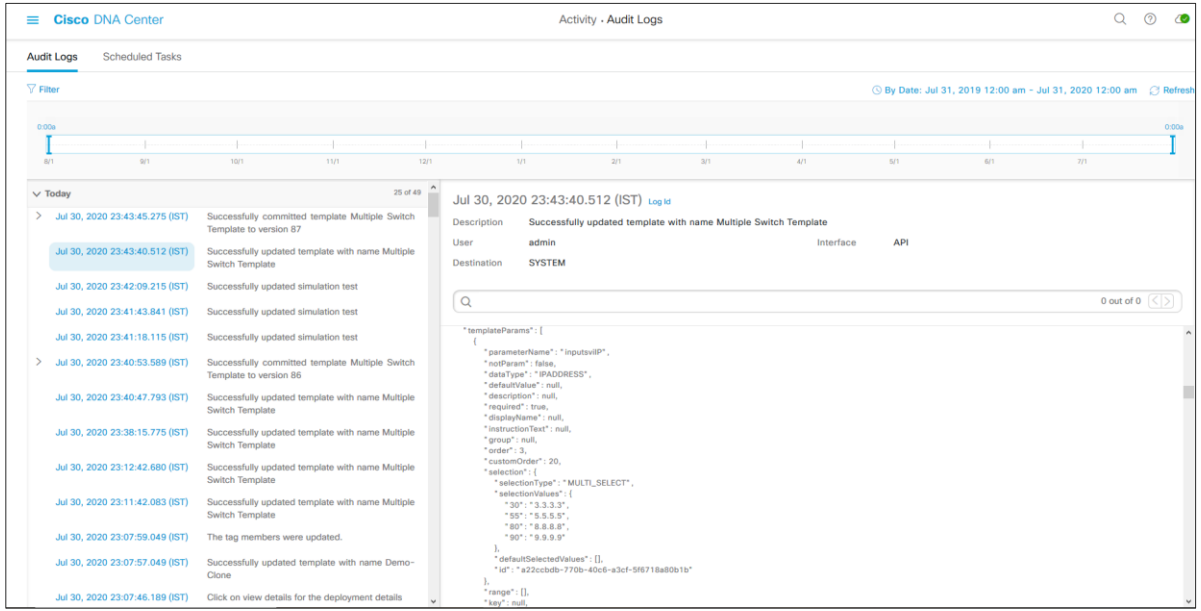
Audit Logging



- Audit Logging capturing the modifications made to the Template in detail
- Also provides details on which user did the modification and at what time stamp
- Flexibility to do Time travel to check the logs

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Active poll

0

Join at

slido.com

#2194 815

Passcode:

smzgdn

Quelle est l'action qui permet de déployer un template sur un équipement ?

a) commit

0%

b) provision

0%

c) deploy

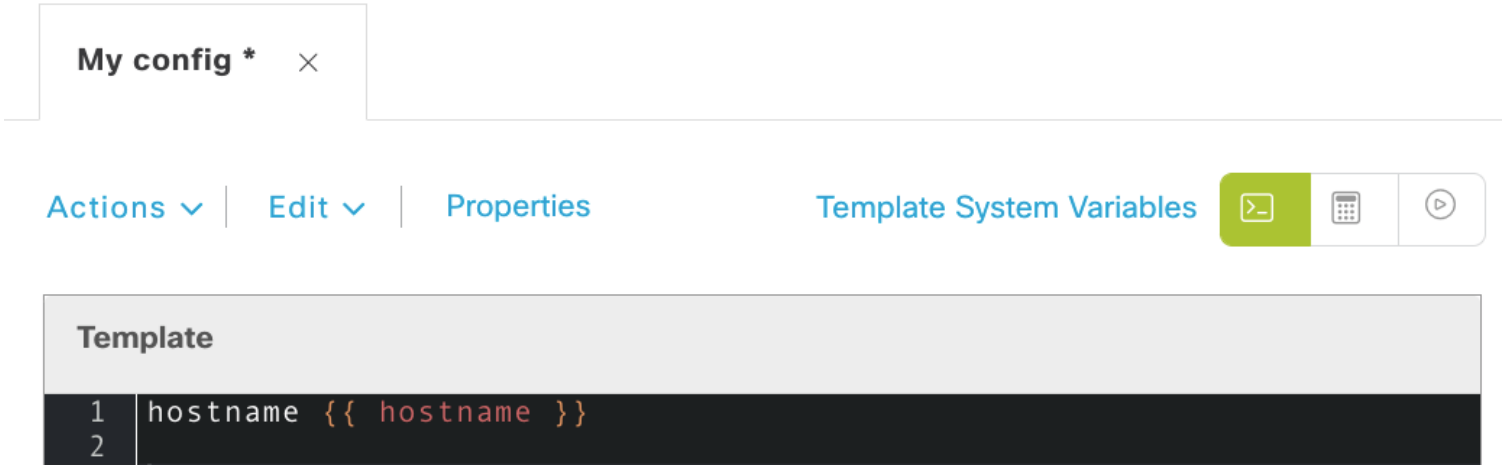
0%

d) audit

0%

Variables

Use variables in templates



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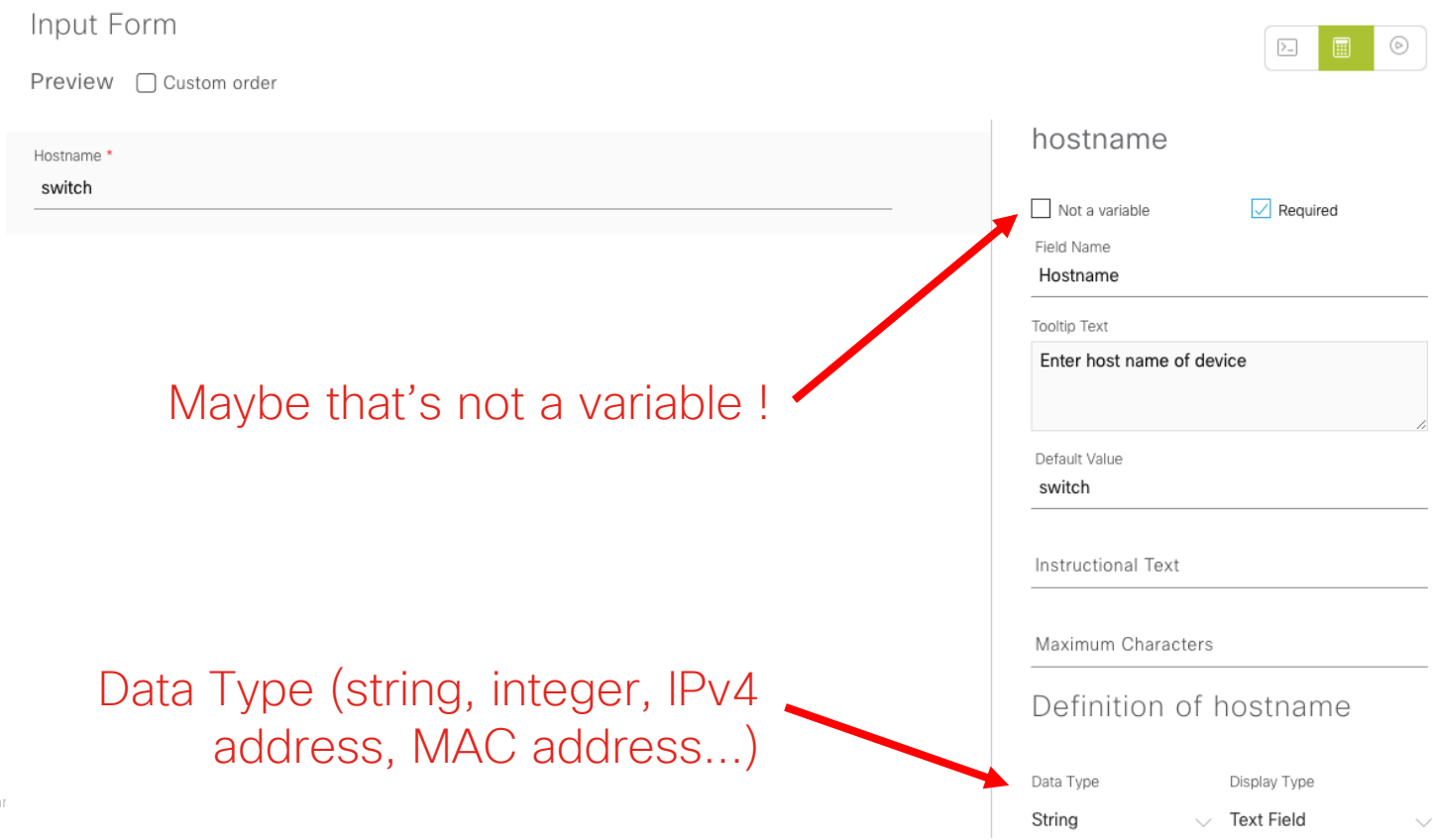
Variables details



Maybe that's not a variable !

Data Type (string, integer, IPv4 address, MAC address...)

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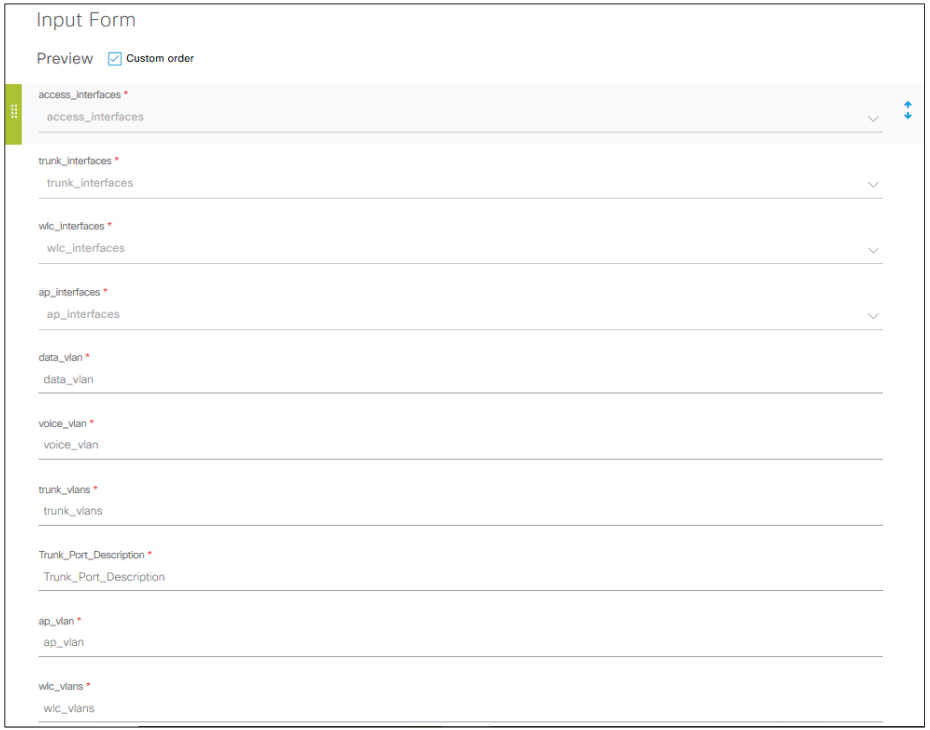
Many variables into a same form



Each variable can have different set of form attributes like “Data_Type”, “FieldName”, “Bind to Source” etc.

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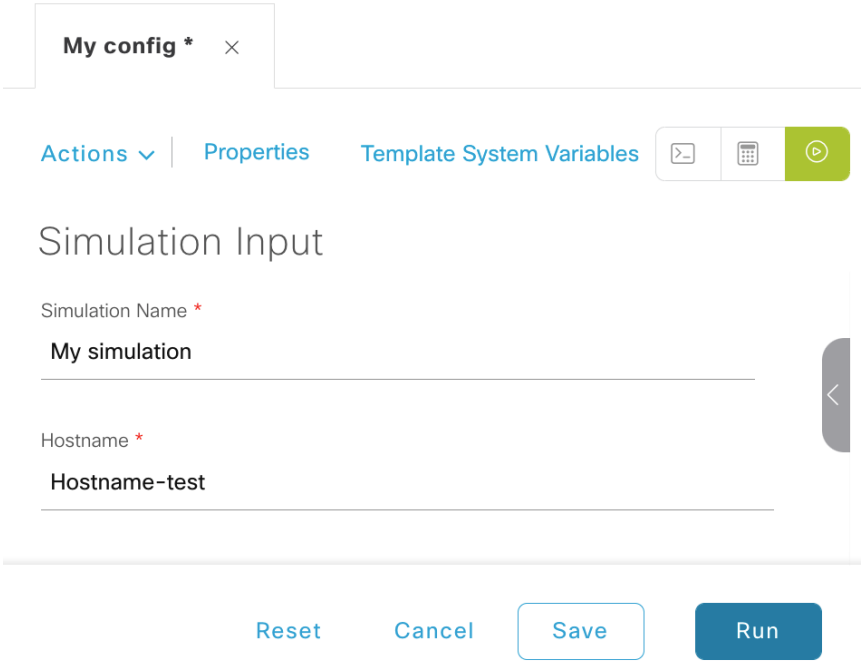
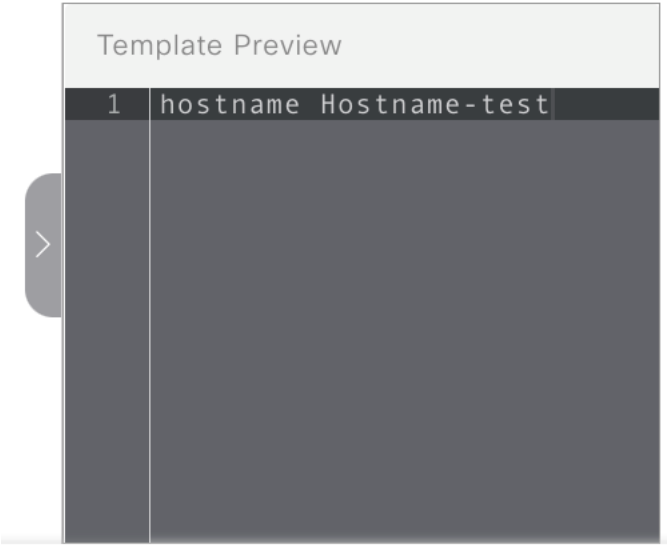
Test your template / form





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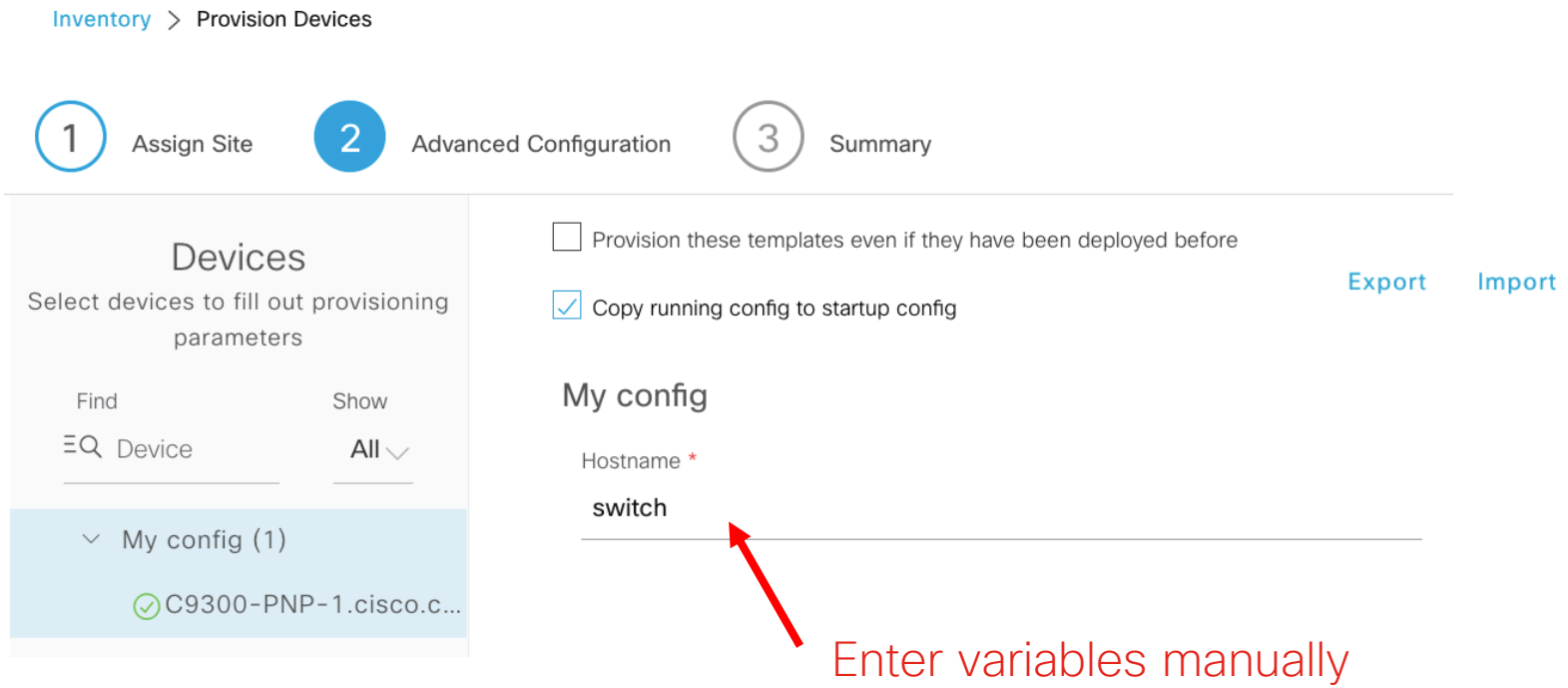
Provision template with variables



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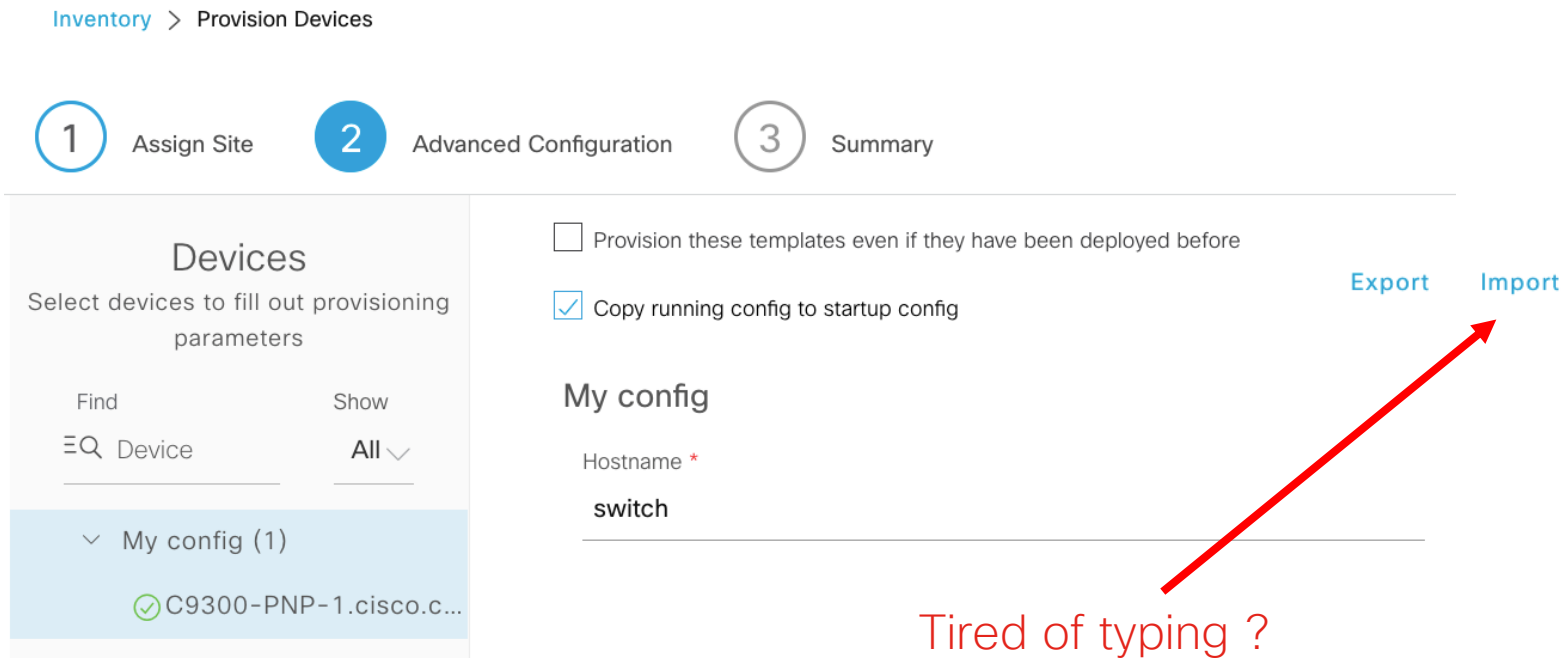
Import variables



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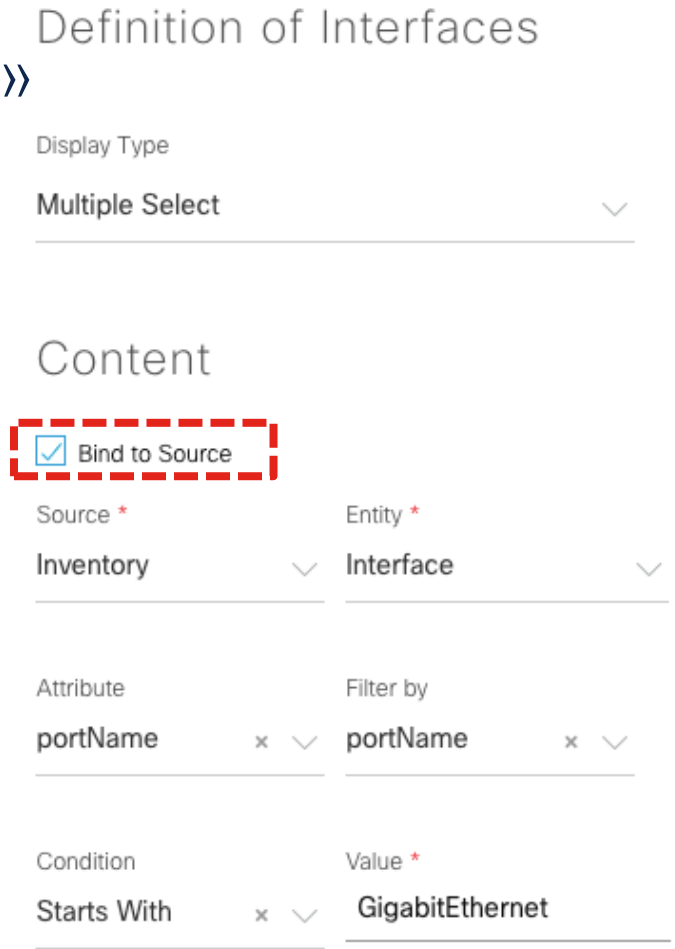
Bind variable to a « source »

Tons of possibilities

- Inventory (serial number, interfaces, IP addresses, OSPF status, device type…)
- Common settings (NTP, DHCP…)
- Network profile (SSID)



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Advanced use cases

Scripting !

Template Language *

◯ Velocity ◉ Jinja

100M ports * ×

Actions | Edit | Properties | Template System Variables

Template

```
1  {% for accessInterface in Interfaces -%}
2    interface {{ accessInterface }}
3    speed 100
4  {% endfor %}
5
```

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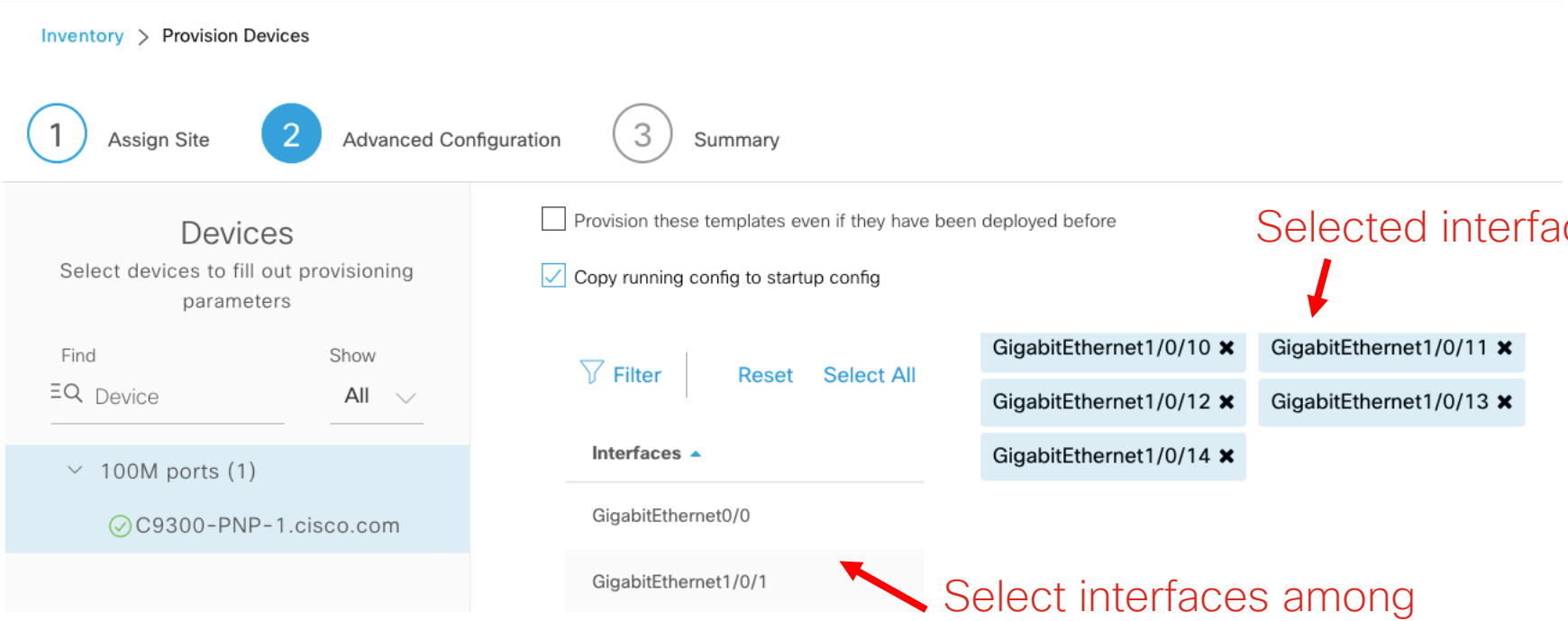
Provision



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Jinja Template Language

Sample Jinja Template Multi-Switch with Macro × | **Sample Jinja Templa**

Actions | Edit | Sample Jinja Template Singl... ⓘ ⚠ This template is not in order to use it for pr

Template

```
1  {% include "Sample Jinja Templates/Macros Library" %}
2  {% extends "Sample Jinja Templates/Base Config" %}
3
4  {% block interfaces %}
5
6  interface range g{{ stack_num }}/0/1 - 40
7  {{ user_port() }}
8
9
10 int range g{{ stack_num }}/0/45 - 48
11 {{ ap_port() }}
12
13 int ten{{ stack_num }}/1/4
14 {{ uplink_trunk() }}
15
16 {% endblock %}
17
```

Jinja Template Language

- A modern and designer-friendly templating language for Python
- Community driven development
- User friendly
- Good documentation
- Python scripting language
- Powerful filtering & macro capabilities

Create Macro libraries to reuse code

Special keywords in templates

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

```
#INTERACTIVE
<IQ>Question<R>Reponse
#END_INTERACTIVE
```

Template

```
1  #MODE ENABLE
2  crypto key generate rsa modulus 4096
3  #MODE_END_ENABLE
4
```

Template

```
1  template Inter_Template_dot1x_Mab
2    dot1x pae authenticator
3    switchport mode access
4    switchport access vlan 580
5    mab
6    #INTERACTIVE
7    access-session closed<IQ>continue<R>yes
8    #END_INTERACTIVE
9    access-session port-control auto
10   authentication periodic
11   authentication timer reauthenticate server
```

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Multiline Commands

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

Template

```
1  crypto pki certificate chain TEST-CA
2   certificate ca 00AC1165BD4C3208A0
3    <MLTCMD>308202F7 308201DF A0030201 02020900 AC1165BD 4C3208A0 300D0609 2A864886
4    F70D0101 0B050030 12311030 0E060355 04030C07 6B756265 2D636130 1E170D31
5    39303130 34313130 3633355A 170D3231 30393330 31313036 33355A30 12311030
6    0E060355 04030C07 6B756265 2D636130 82012230 0D06092A 864886F7 0D010101
7    .. snip ..
8    05000382 010F0030 82010A02 82010100 BDE69ED0 EC47A51E F437161D D85C73A8
9    4BCFCCFC 41C5D331 4934C923 4C5696F6 8C1F64FD 3F250379 E63BCDA8 E11C32B9
10   702F1C03 DB42968C A23B18EA 882A9841 4376A4E7 040920D5 0220A214 830F4CAC</MLTCMD>
```

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Automate EEM script deployment

```
event manager applet _L3Applet_FortyGigabitEthernet1/0/1
event timer countdown time 1
action 1.0 cli command "enable"
action 1.1 cli command "config t"
action 1.2 cli command "interface FortyGigabitEthernet1/0/1"
action 1.3 cli command "no switchport"
action 1.4 cli command "ip address 10.32.58.37 255.255.255.252"
action 1.5 cli command "ip router isis"
action 1.6 cli command "isis network point-to-point"
action 1.7 cli command "no shutdown"
action 1.8 cli command "bfd interval 100 min_rx 100 multiplier 3"
action 1.9 cli command "no bfd echo"
action 2.0 cli command "dampening"
action 2.1 cli command "logging event link-status"
action 2.2 cli command "load-interval 30"
action 2.3 cli command "description Fabric Physical Link"
action 2.5 cli command "exit"
action 3.1 cli command "no event manager applet _L3Applet_FortyGigabitEthernet1/0/1"
action 3.2 cli command "end"
action 3.3 cli command "exit"
```

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NETCONF templates
For NFVIS (UCPE) and Catalyst 9800 WLC only

Template

```
<secure-overlays xmlns="http://www.cisco.com/nfvis/secure-overlay">
  <secure-overlay>
    <name>TO_DNAC</name>
    <local-id>$local-id</local-id>
    <local-bridge>$local-bridge</local-bridge>
    <local-system-ip-addr>$local-system-ip-addr</local-system-ip-addr>
    <remote-id>$remote-id</remote-id>
    <remote-interface-ip-addr>$remote-interface-ip-addr</remote-interface-ip-addr>
    <remote-system-ip-addr>$remote-system-ip-addr</remote-system-ip-addr>
    <psk>
      <local-psk>$psk</local-psk>
      <remote-psk>$psk</remote-psk>
    </psk>
  </secure-overlay>
</secure-overlays>
```

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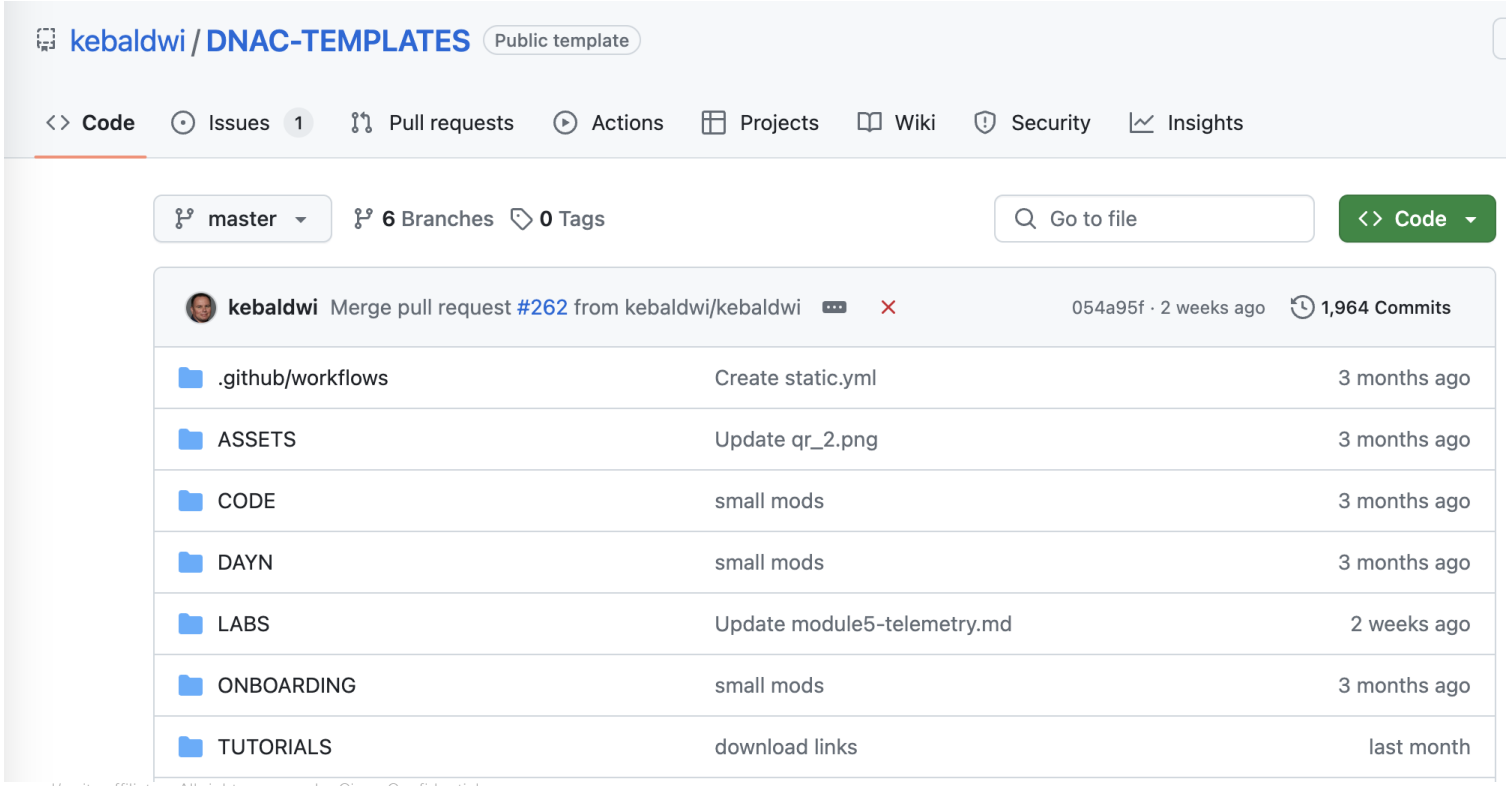
Don’t reinvent the wheel !



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Active poll

0

Join at

slido.com

#2194 815

Passcode:

smzgdn

Quel(s) language(s) de programmation sont supportés dans le Template Hub ?

a) C++

0%

b) Velocity

0%

c) Jinja

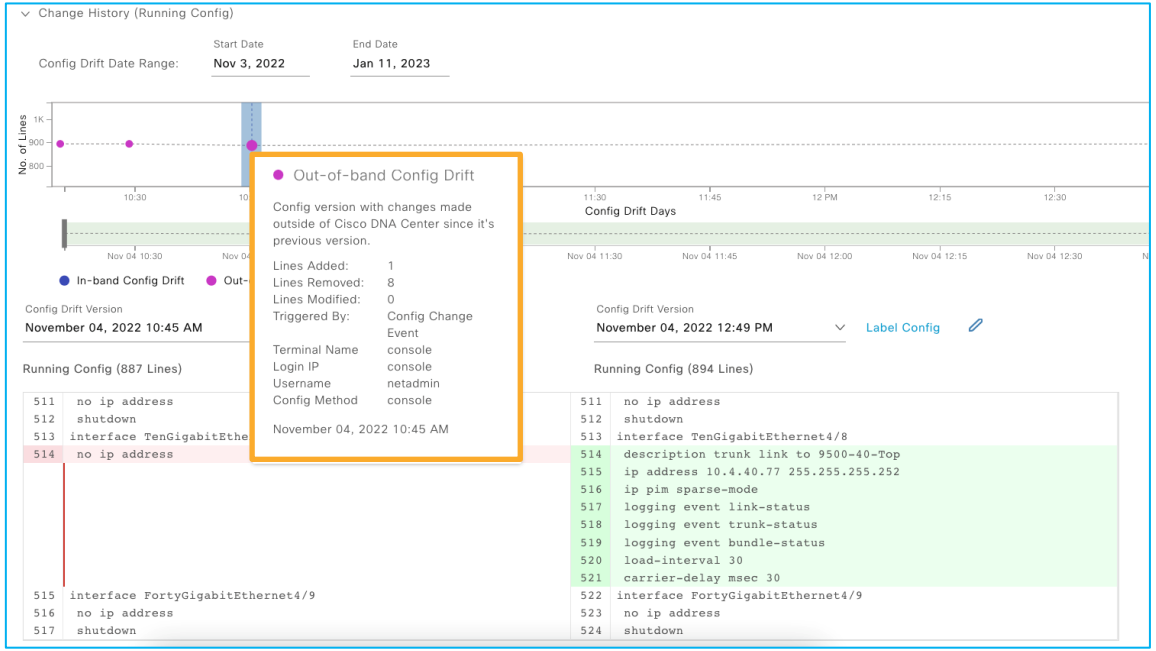
0%

d) Visual Basic

0%

Compliance

Configuration Drift – WHO, WHAT, WHEN



- Time graph for better visualization
- Differentiate In-band and out-of-band changes
- Side by side comparison of changes

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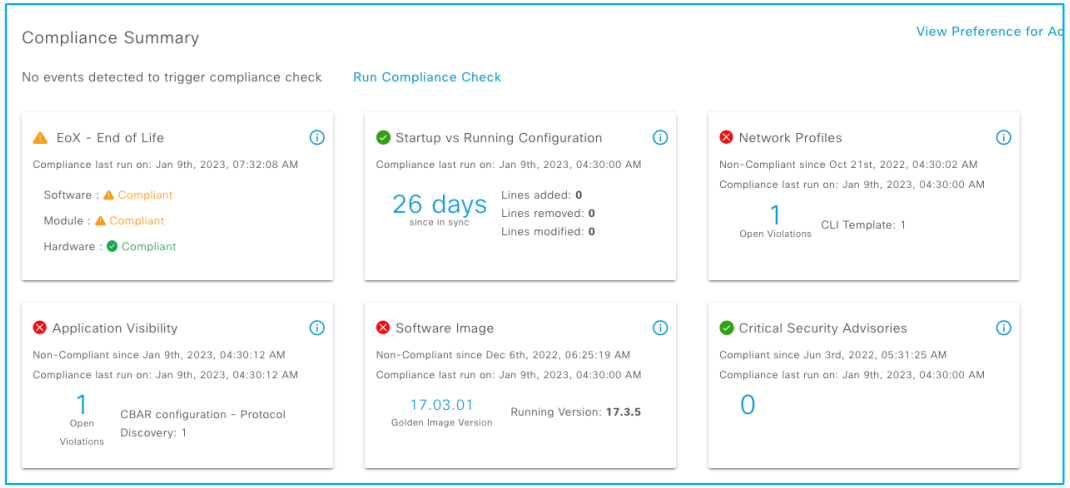
Network Profile Compliance



- Deviations to network profile and CLI templates
- Out of band changes to defined intent
- Intent value vs Current value
- Isolate and report breached intent
- Remediate to reinstate intent
- Support for Wireless, Switching and Routing

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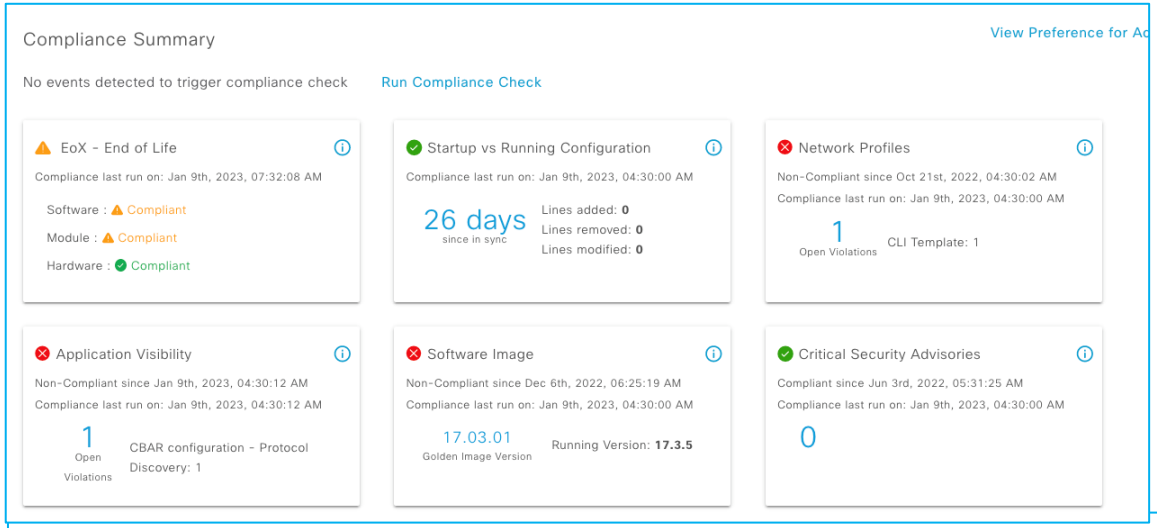
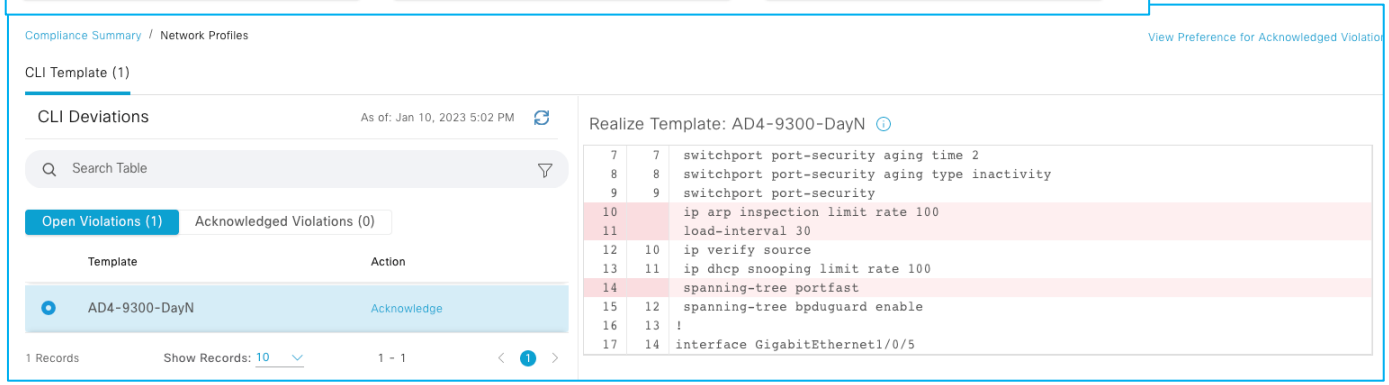
CLI Template Compliance





- Out of band changes to provisioned CLI template
- Lists violated template
- Pinpoint changed CLI

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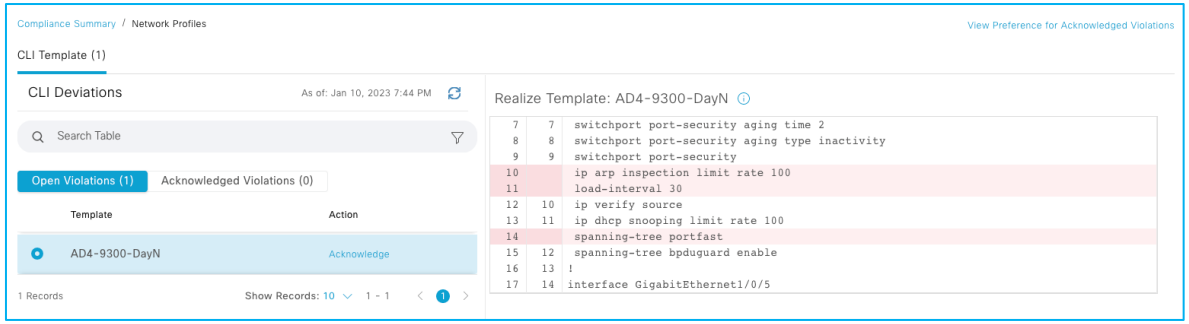
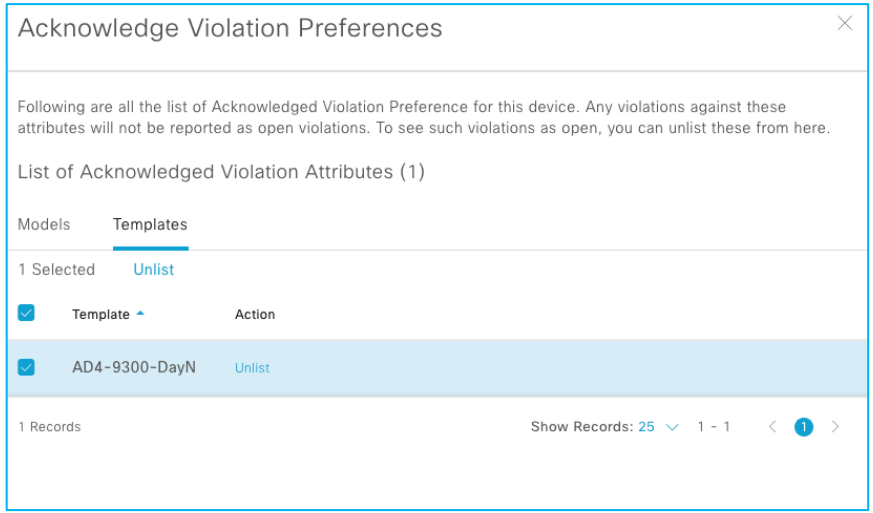
Acknowledge Compliance Violations





- Support for Model based template and CLI Template violations
- Acknowledge insignificant violation to suppress reporting
- Un-list the acknowledged violation to resume reporting
- History of acknowledged violations

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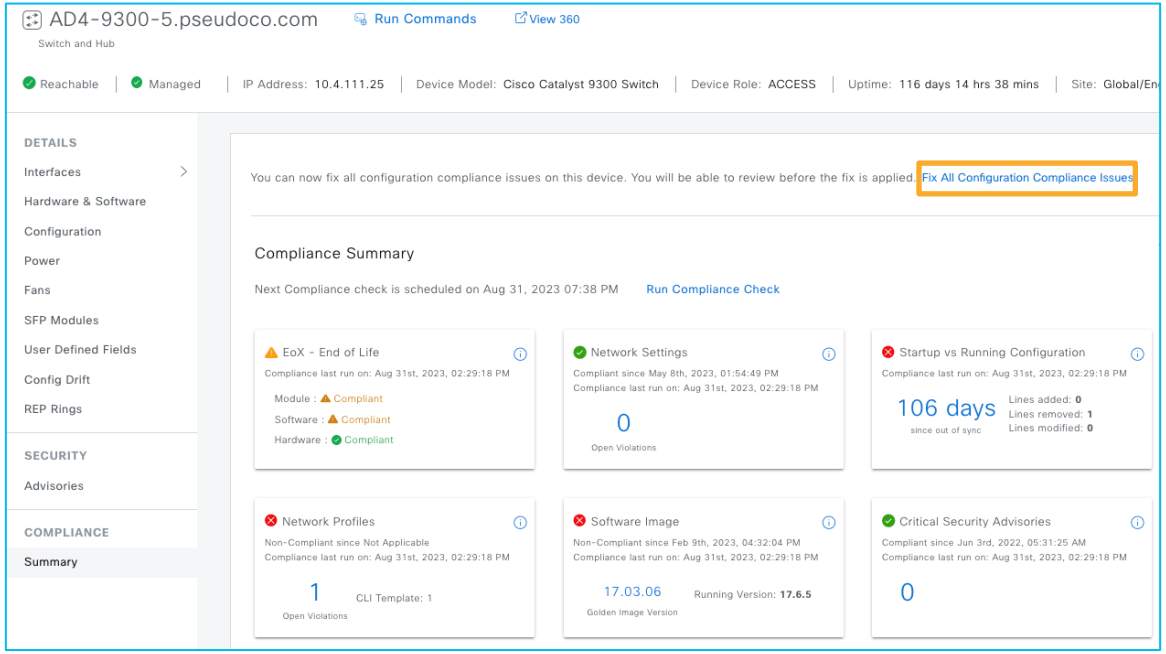
Compliance Remediation



- One click fix for reported non-compliance
- Remediation for
  - Network Profile
  - Network Settings
  - Model Config Templates
  - CLI Templates
  - App Visibility
- Remediate open and acknowledged violations
- Preview configuration prior to remediation
- On-demand and scheduled remediation

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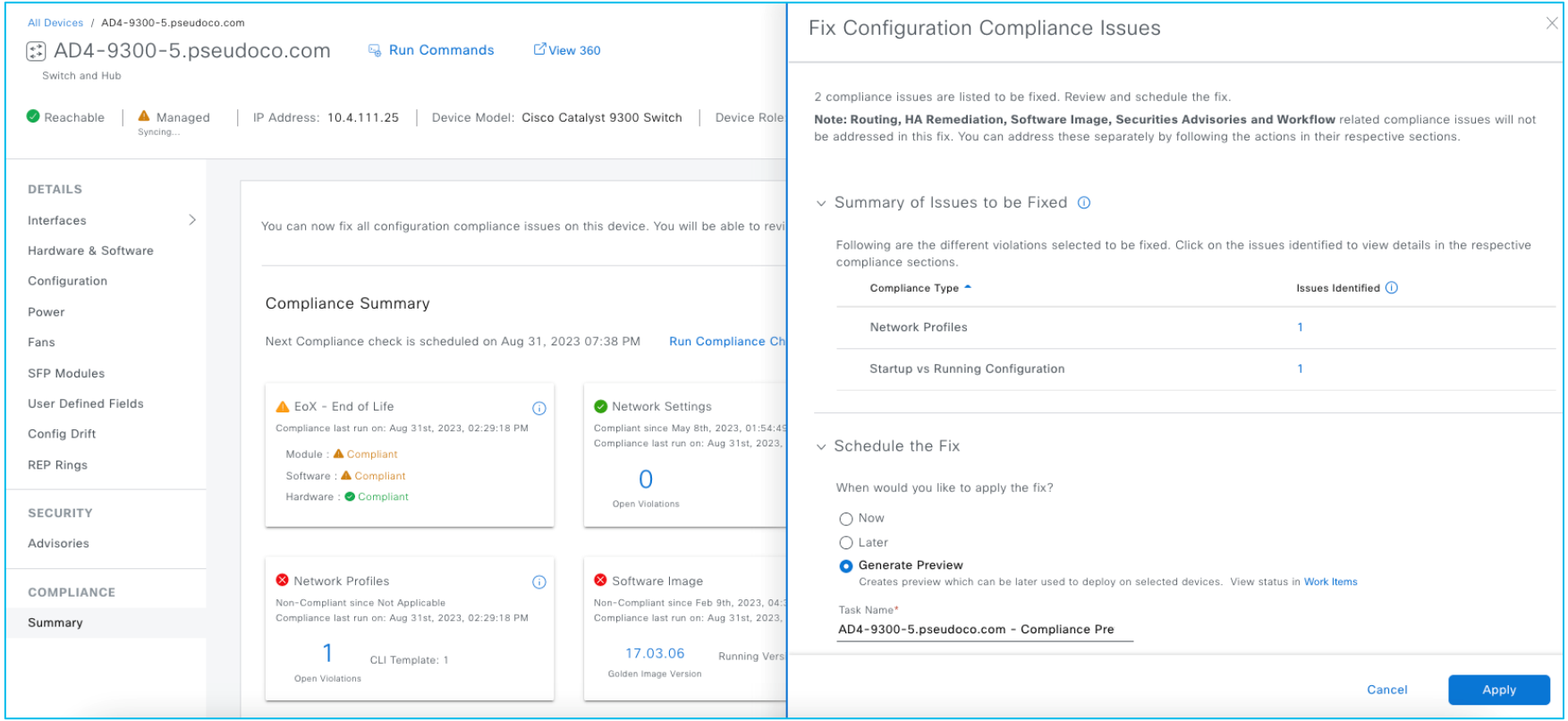
Compliance Remediation



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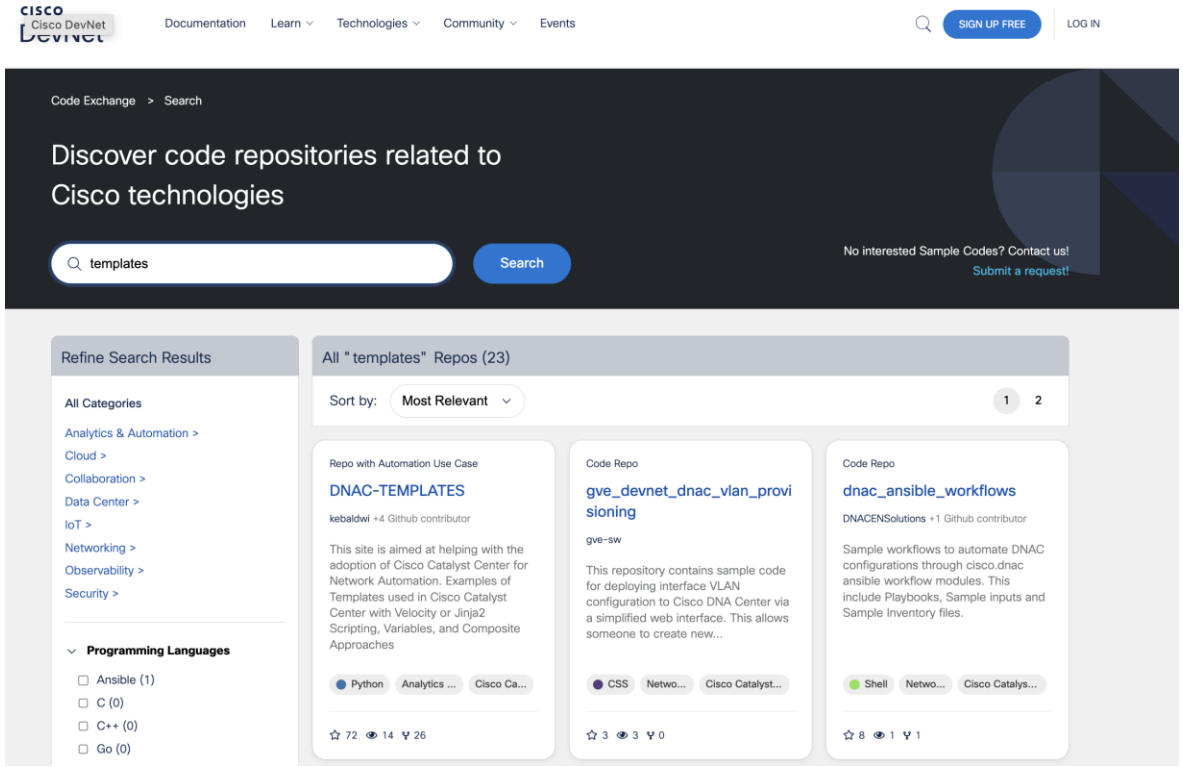
API and integrations

Don’t reinvent the wheel !



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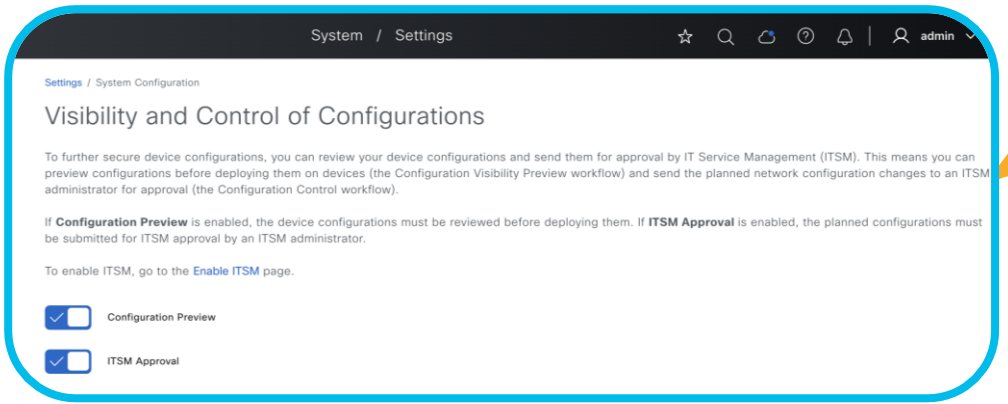
Visibility and Control of Configurations



Catalyst Center ServiceNow Integration:

- Increased IT efficiency by streamlining and customizing processes
- Automated ServiceNow CMDB population with rich asset data
- Enhanced incident management with enriched issue data
- Simplified change management with closed loop functionality
- Endpoint attribute synchronization for client profiling

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Template Editor- API's

Create, Update & Delete Project

Create Project

DESCRIPTION

Creates a new project

Method	URL
POST	https://10.104.49.61/dna/intent/api/v1/template-programmer/project

PARAMETERS

Request Headers Parameters

Name	Description	DataType	Default Value	Required
Content-Type	Request body content type	string	application/json	true

MODEL SCHEMAS

Request

Description : project

Model | Model Schema

```
{
    "createTime": "integer",
    "description": "string",
    "id": "string",
    "lastUpdateTime": "integer",
    "name": "string",
    "tags": [
        "string"
    ],
    "templates": "any"
}
```

Update Project

DESCRIPTION

Updates an existing project

Method	URL
PUT	https://10.104.49.61/dna/intent/api/v1/template-programmer/project

PARAMETERS

Request Headers Parameters

Name	Description	DataType	Default Value	Required
Content-Type	Request body content type	string	application/json	true

Delete Project

DESCRIPTION

Deletes an existing Project

Method	URL
DELETE	https://10.104.49.61/dna/intent/api/v1/template-programmer/project/{projectId}

PARAMETERS

Request URL Parameters

Name	Description	DataType	Required
projectId	projectId	string	true

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Template Editor- API's

Create, Update, Delete & Versioning Templates

Create Template

DESCRIPTION

Creates a new template

Method	URL
POST	https://10.104.49.61/dna/intent/api/v1/template-programmer/project/{projectId}/template

PARAMETERS

Request Headers Parameters

Name	Description	DataType	Default Value	Required
Content-Type	Request body content type	string	application/json	true

Request URL Parameters

Name	Description	DataType	Required
projectId	projectId	string	true

Version Template

DESCRIPTION

Creates Versioning for the current contents of the template

Method	URL
POST	https://10.104.49.61/dna/intent/api/v1/template-programmer/template/version

PARAMETERS

Request Headers Parameters

Name	Description	DataType	Default Value	Required
Content-Type	Request body content type	string	application/json	true

Update Template

DESCRIPTION

Updates an existing template

Method	URL
PUT	https://10.104.49.61/dna/intent/api/v1/template-programmer/template

PARAMETERS

Request Headers Parameters

Name	Description	DataType	Default Value	Required
Content-Type	Request body content type	string	application/json	true

Delete Template

DESCRIPTION

Deletes an existing template

Method	URL
DELETE	https://10.104.49.61/dna/intent/api/v1/template-programmer/template/{templateId}

PARAMETERS

Request URL Parameters

Name	Description	DataType	Required
templateId	templateId	string	true

Plug and Play

Day 0 Deployment Challenges

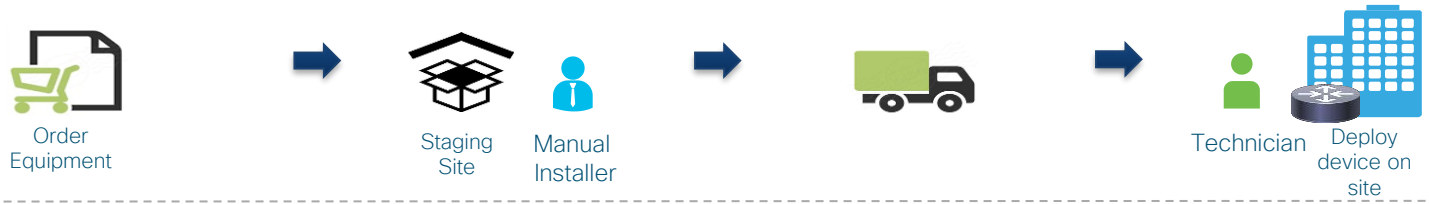
w/o Automation

Direct Costs
- Pre-staging & Shipping costs
- Travel costs

Complexity
- Configuration errors
- Different products, IOS Releases

Security
- 3rd party not secure
- Rogue devices

Time/Productivity
- Manual process
- Shipping , Storage, Travel



Cisco Catalyst Center PnP

~50%
Day 0 OPEX Savings*

- Drop Ship devices
- Centralized device discovery (DHCP, DNS, Cloud)
- Non-technical installer at site
- Template based configurations
- Secure SUDI Authentication

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PnP Server Discovery Options

Automated

1.
   DHCP with options 60 and 43
   PnP string: 5A1D;B2;K4;I10.4.48.182;J80 added to DHCP Server

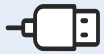
2.

   DNS lookup
   pnpserver.localdomain resolves to Cisco Catalyst Center IP Address

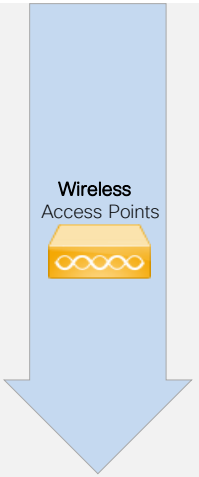
3.

   Cloud re-direction https://devicehelper.cisco.com/device-helper
   Cisco hosted cloud, re-directs to on-prem Cisco Catalyst Center IP Address

Manual

4. 
   USB-based bootstrapping
   router-confg/router.cfg/ciscortr.cfg
   Routers, Switches-Cat9K Only

5.
   Manual - using the Cisco® Installer App*
   iPhone, iPad, Android



Manual discovery not supported for Access Points

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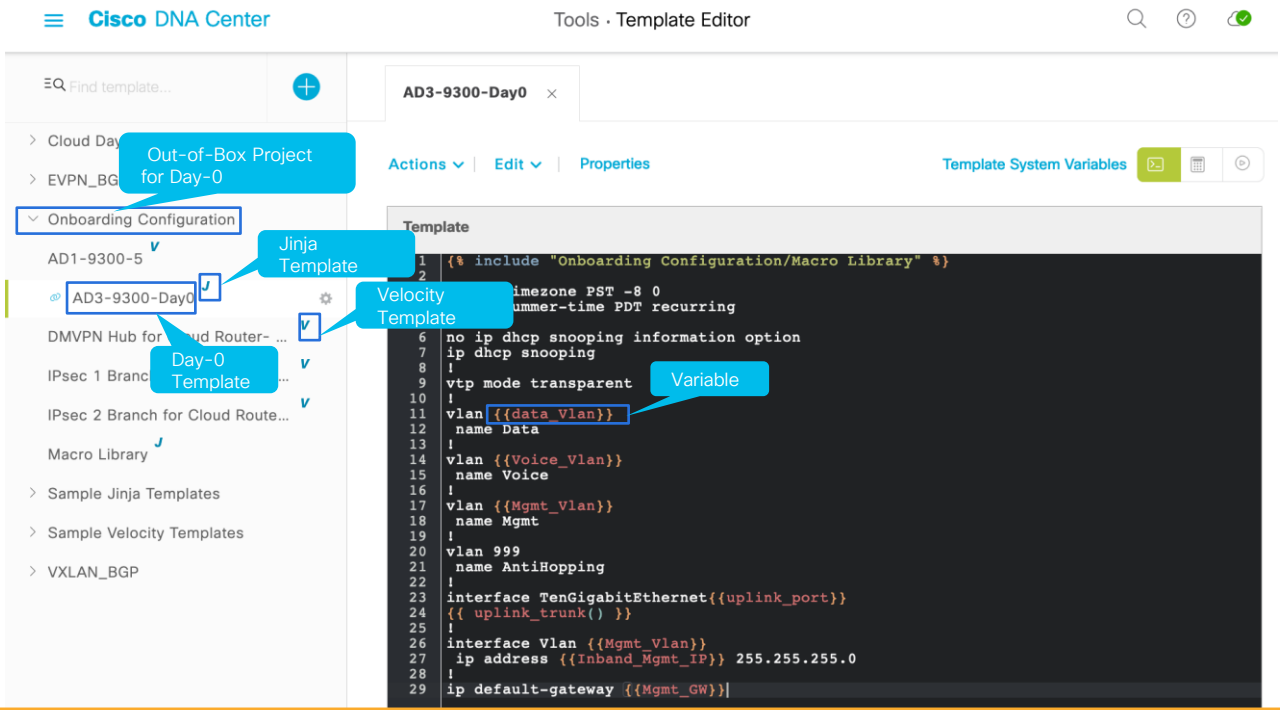
* Cisco Catalyst Center Support in Roadmap

Onboarding templates



Only latest committed version of template can be used for provisioning, including PnP claim.

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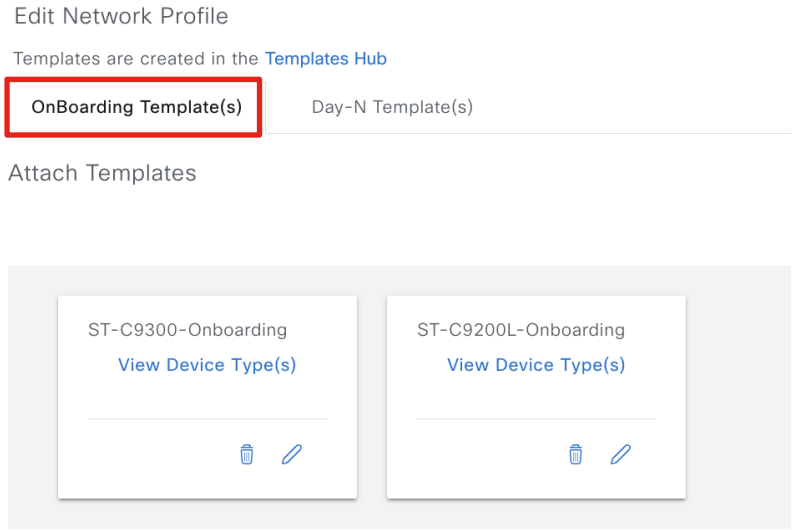
Onboarding templates in Network Profile



Recommendation : keep OnBoarding templates as simple as possible (management)
Keep the main configuration in Day-N Template

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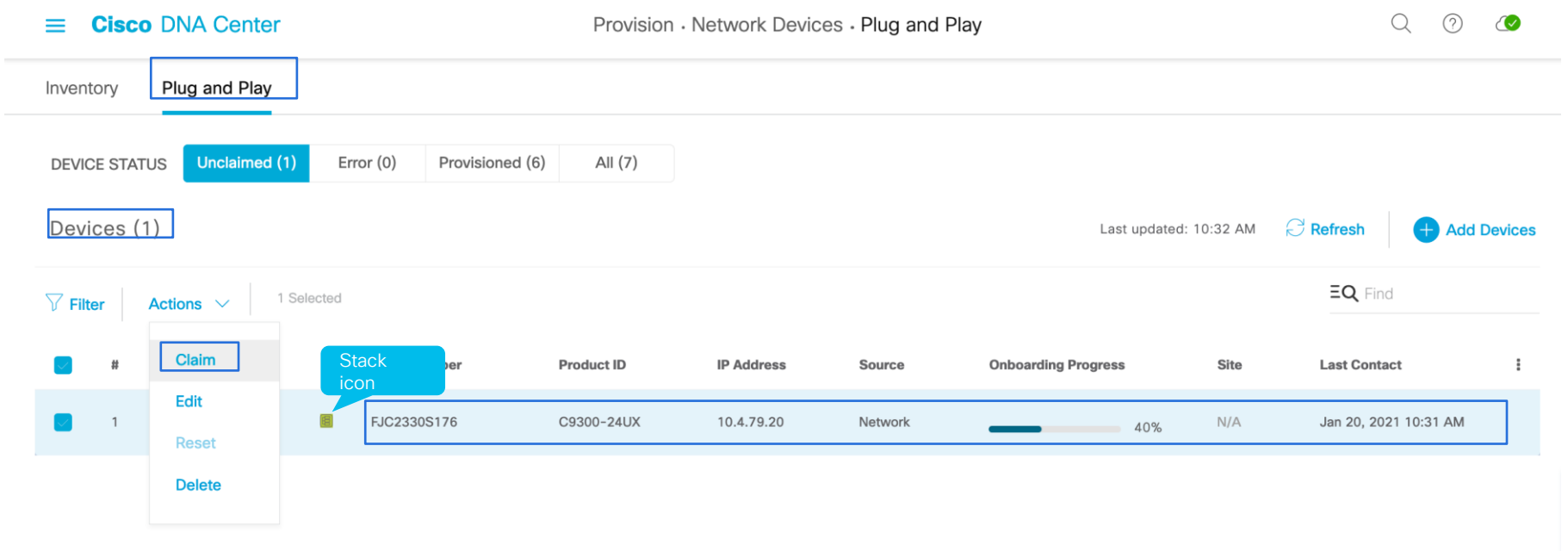
Step 1 PnP Claim

1a) Start Claiming



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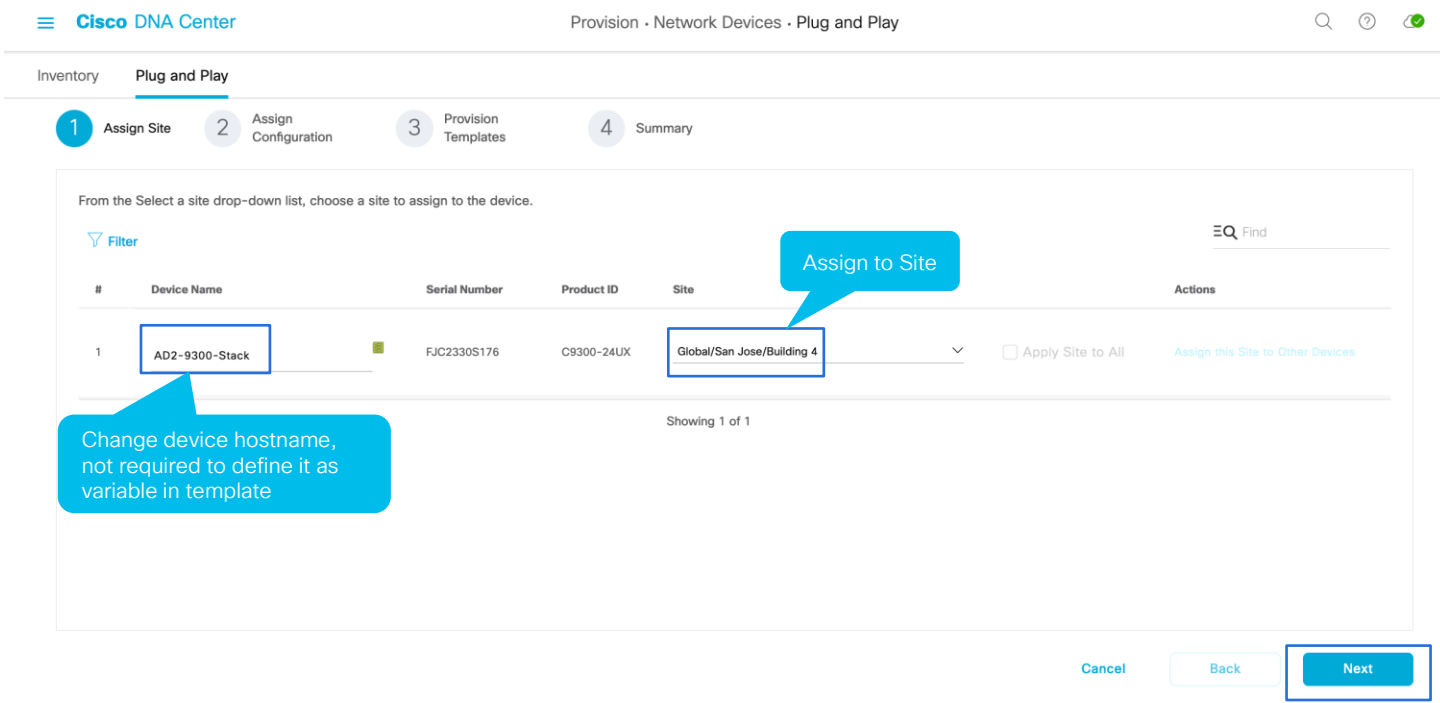
Step 1 PnP Claim

1b) Site Assignment



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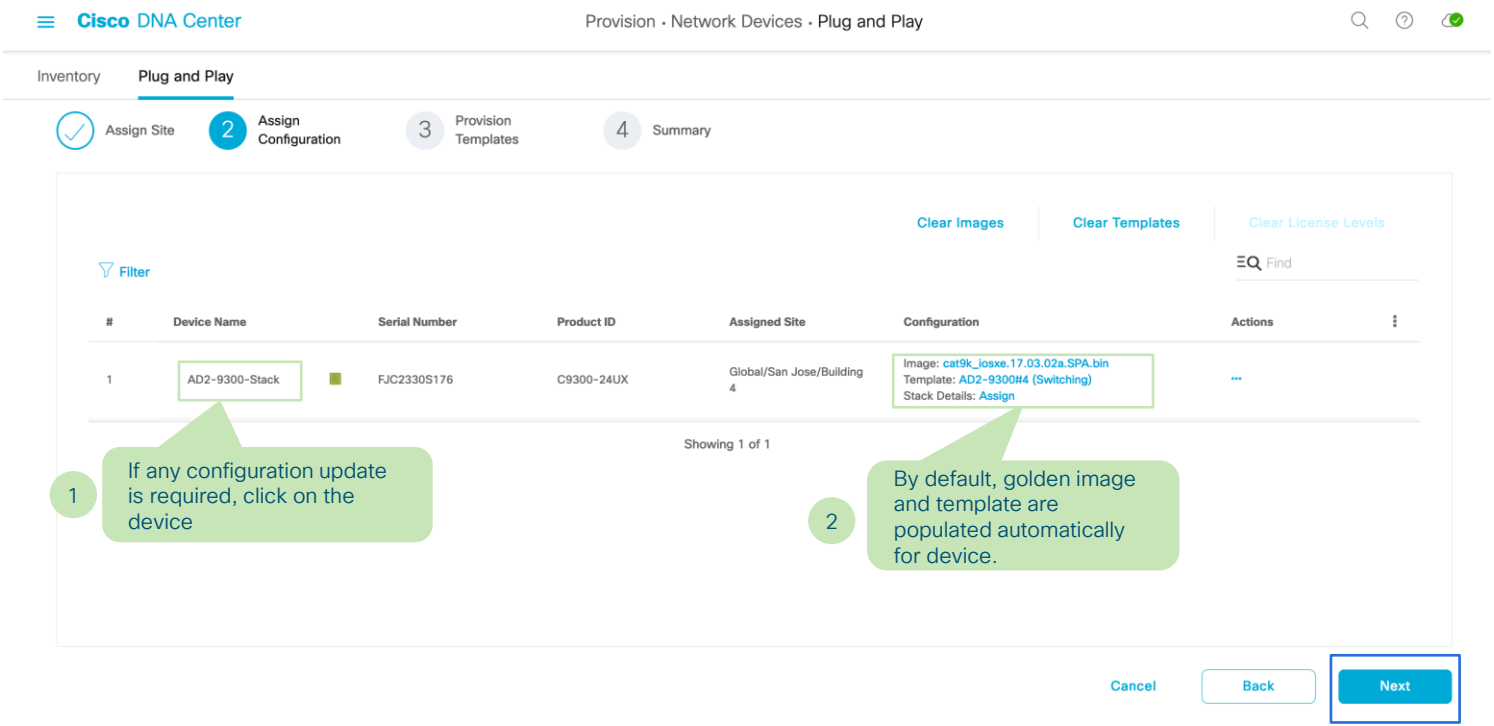
Step 1 PnP Claim

1c) Configuration



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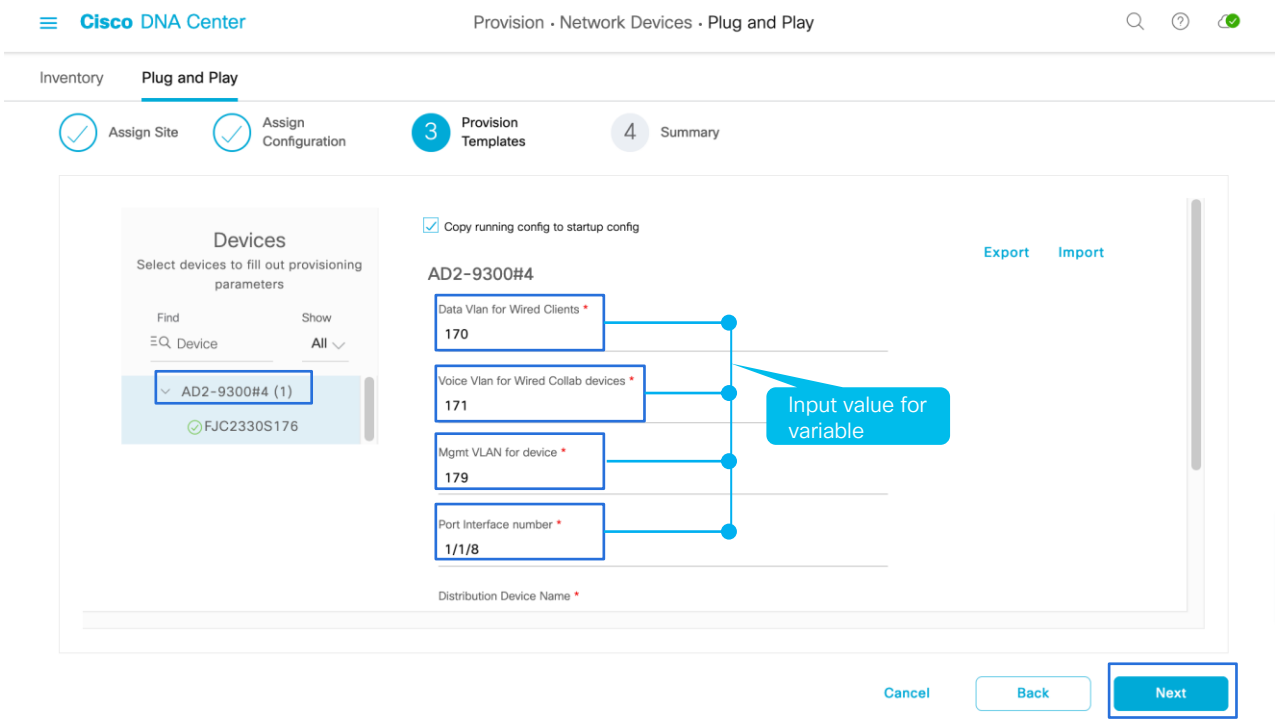
Step 1 PnP Claim

1g) Advanced Configuration



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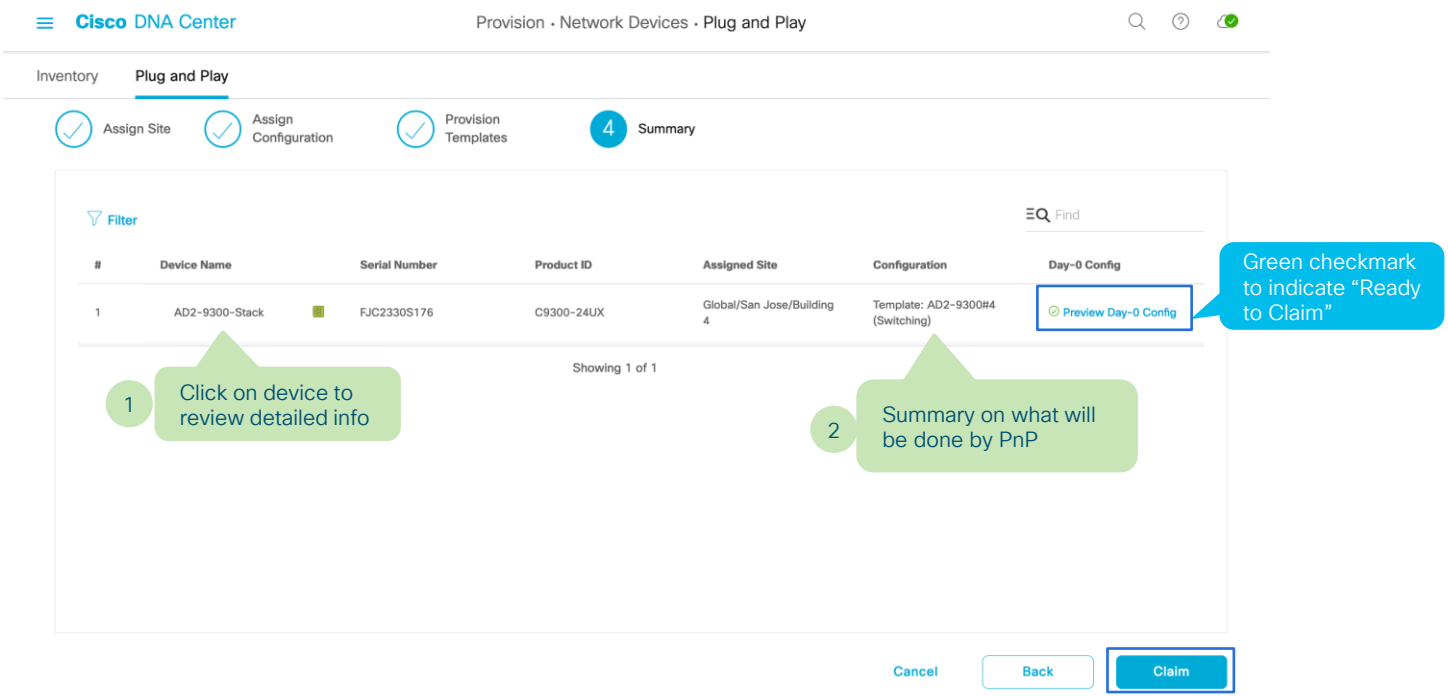
Step 1 PnP Claim

1h) Summary



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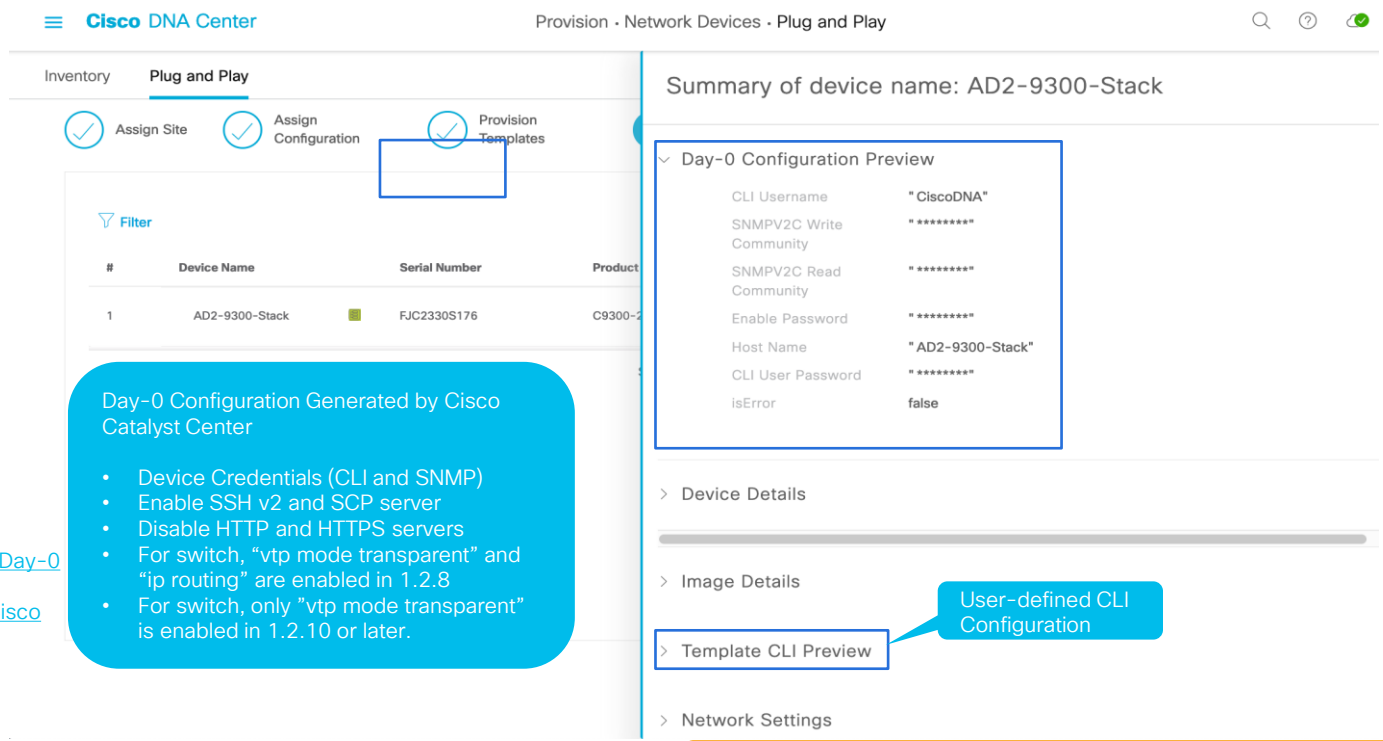
Step 1 PnP Claim

1i) Summary



Day-0 Configuration Generated by Cisco Catalyst Center

- Device Credentials (CLI and SNMP)
- Enable SSH v2 and SCP server
- Disable HTTP and HTTPS servers
- For switch, “vtp mode transparent” and “ip routing” are enabled in 1.2.8
- For switch, only ”vtp mode transparent” is enabled in 1.2.10 or later.

Sample Switch Day-0 Configuration - Generated by Cisco Catalyst Center

Note that Day-0 configuration generated by Cisco Catalyst Center is applied first, then user-defined configuration.

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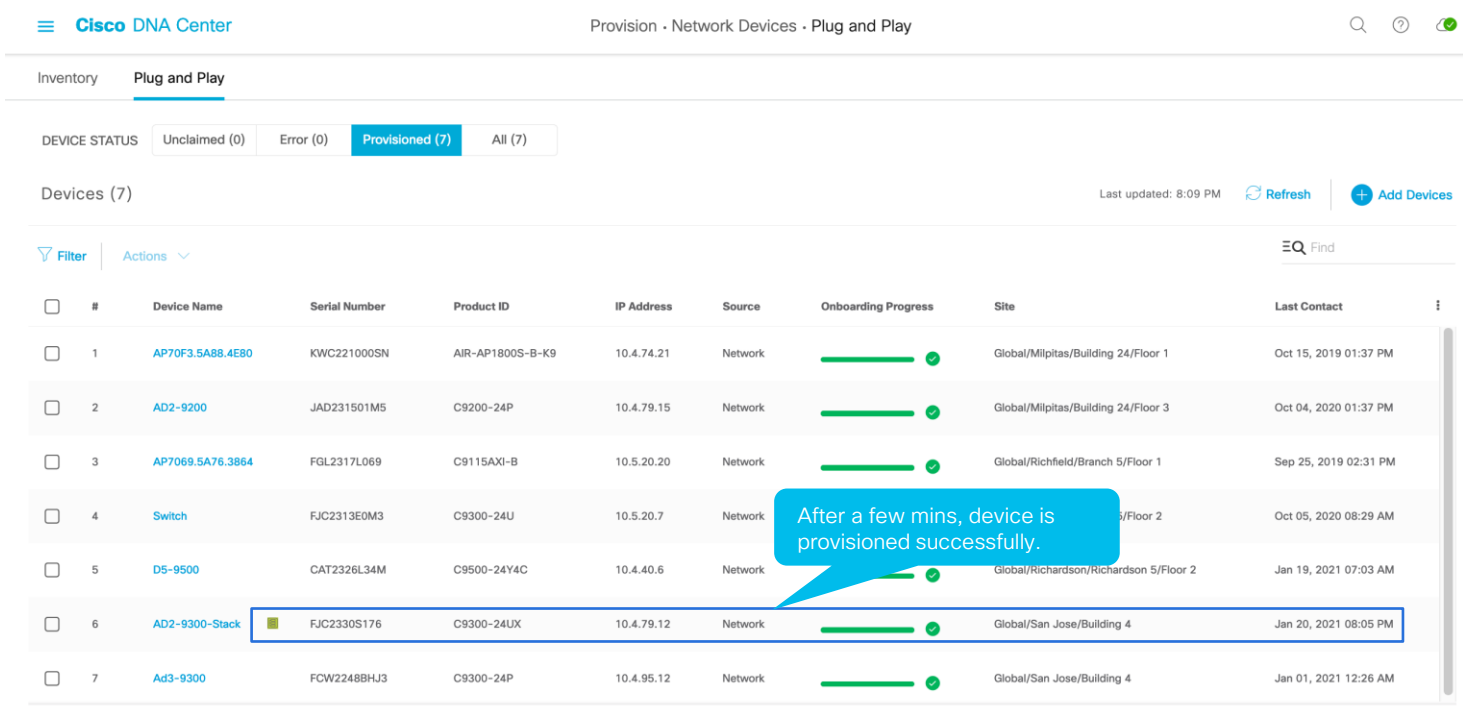
Step 1 PnP Claim

1j) PnP Complete- Provision Success



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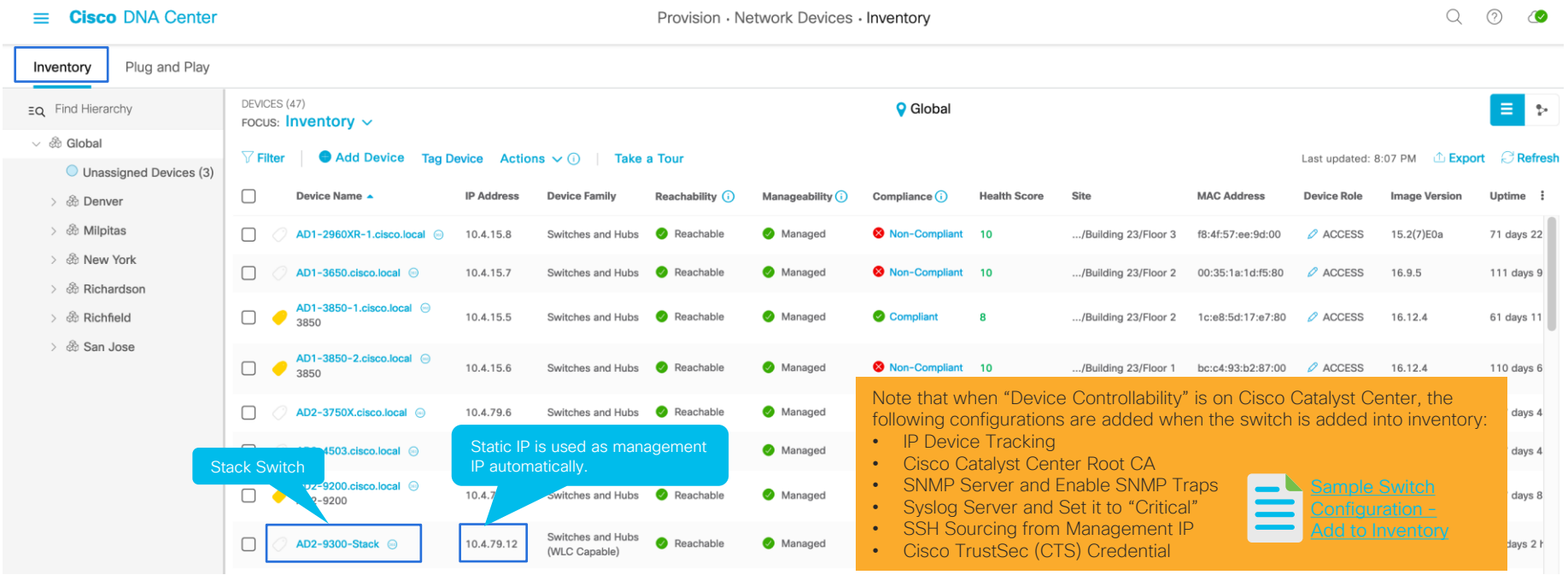
Step 1 PnP Claim

1k) PnP Complete
-Add to Inventory



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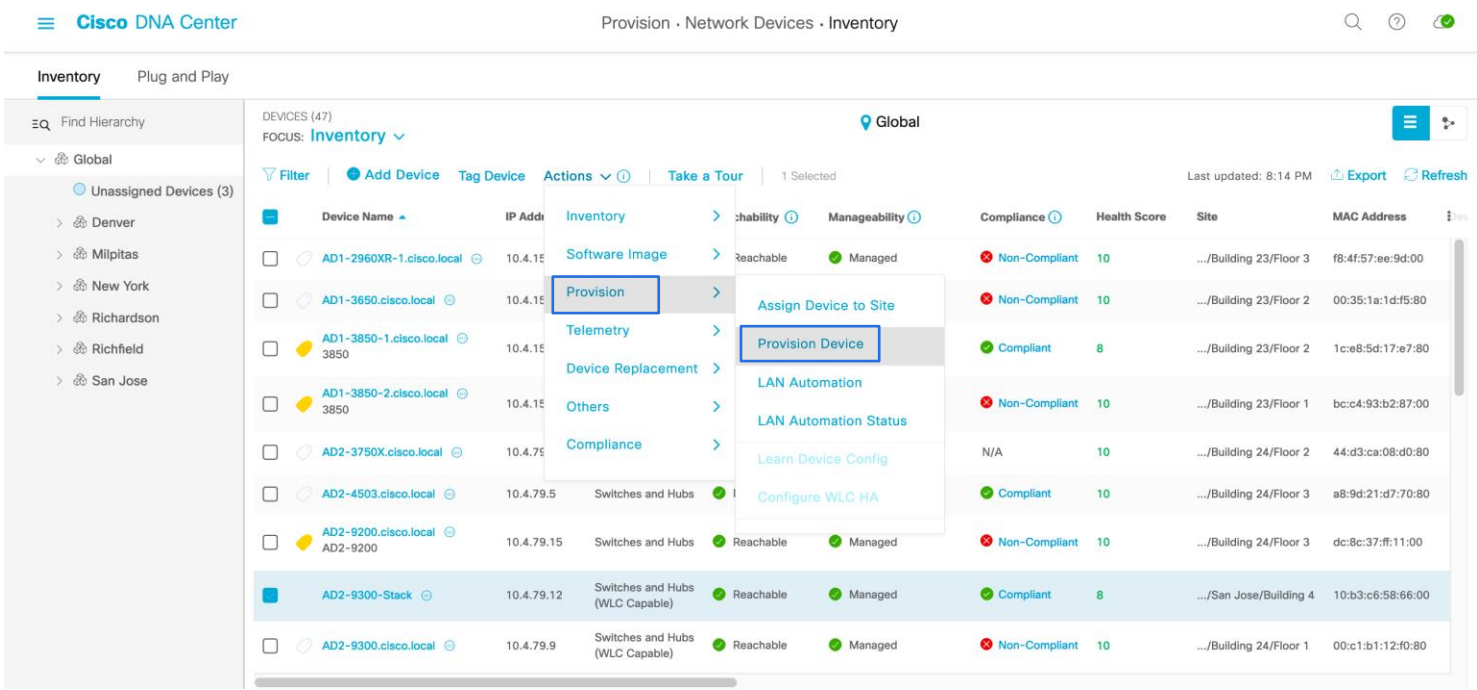
Step 2 Complete Provisioning (as seen before)



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Active poll

0

Join at

slido.com

#2194 815

Passcode:

smzgdn

Quelle méthode NE peut PAS être utilisée par un équipement réseau pour découvrir le serveur Plug-and-Play ?

a) DHCP

0%

b) DNS

0%

c) Bluetooth

0%

d) Cloud redirection

0%

e) USB Bootstraping

0%

Conclusion

Conclusion

- Templates can automate any IOS-XE feature
- Switching / Routing / Wireless / IoT…
- It unleashes capabilities of Catalyst Center
- It’s not just pushing config !
- And remember … It’s just a small part of what Catalyst Center can do for you ☺

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Q&R

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Avez-vous des questions ?

Si vous avez posé une question sur le panneau de Q&R (Q&A en anglais) ou que vous revenez sur la communauté dans les jours qui suivent notre webinaire, nos experts peuvent encore vous aider !

Soumettez vos questions jusqu'au 24 mai 2024.

https://bit.ly/AMA-may24

Faites valoir votre opinion

Répondez à notre enquête pour...

- Proposer des nouveaux sujets
- Évaluer nos experts et contenus
- Envoyer vos commentaires ou suggestions

À la fin de cette session, une enquête s'ouvrira dans la fenêtre de votre navigateur, cliquez sur le lien.

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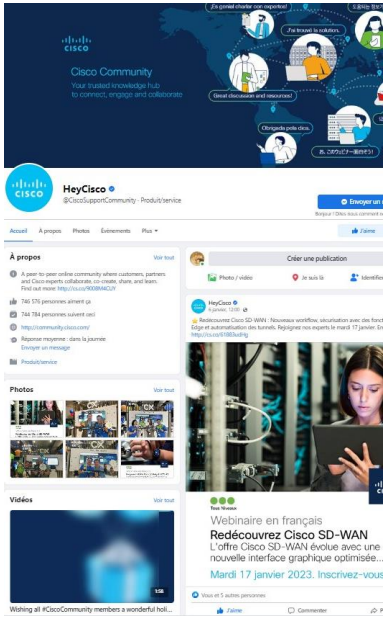

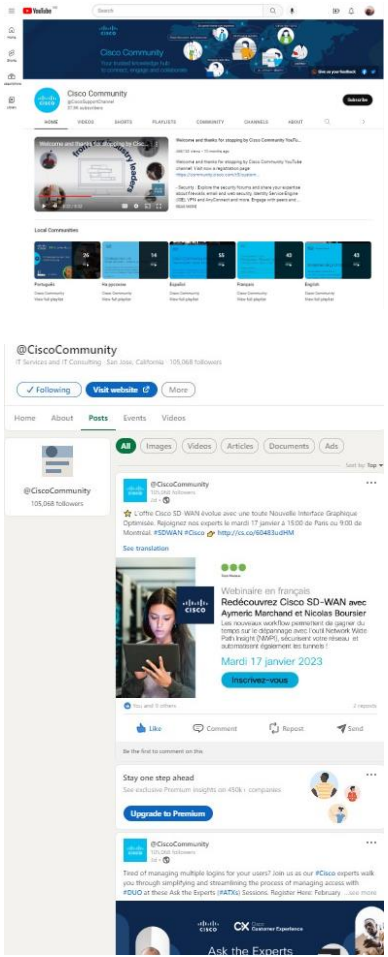

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The bridge to possible