

Deploy Yang Suite and Test XPath on Catalyst 9800 WLC

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Introduction

This document describes how to deploy Yang Suite in Python environment and test XPath on Cisco Catalyst 9800 WLC.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Catalyst 9800 WLC configuration
- Basic knowledge of Python and virtual environments

Components Used

The information in this document is based on these software and hardware versions:

- Cisco Catalyst9800 WLC Cisco IOS® XE Version 17.15.3
- Microsoft Windows 11 Enterprise with Python 3.8.2 installed

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Configure

Step 1. Install **Python** on Windows PC.

Download and install **Python 3.8.2** for Windows.

Download Link: [Python Releases for Windows](#)

Explanation:

Python is required to run YANG Suite. Version 3.8.2 is used here for compatibility.

Step 2. Verify Python and PIP Installation.

After installation, confirm that Python and PIP are working correctly.

Commands:

```
C:\Users\Administrator>python --version  
C:\Users\Administrator>pip --version
```

Expected Result (example):

```
C:\Users\Administrator>python --version  
Python 3.8.2  
C:\Users\Administrator>pip --version  
pip 25.0.1 from c:\users\administrator\appdata\local\programs\python\python38-32\lib\site-packages\pip
```

Step 3. Upgrade **PIP** to the latest version to ensure compatibility with YANG Suite.

Command:

```
C:\Users\Administrator>python -m pip install --upgrade pip
```

Explanation:

This command uninstalls the old version of PIP and installs the latest one to ensure compatibility with YANG Suite.

Expected Result (example):

- Old version (for example, pip 19.2.3) is uninstalled.
- New version (for example, pip 25.0.1) is successfully installed.

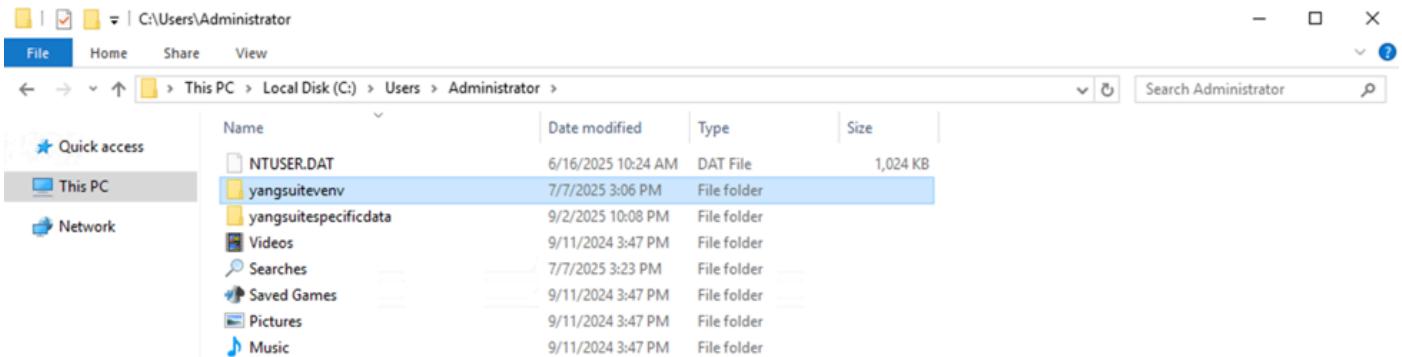
Step 4. Create a **Virtual Environment** to keep dependencies isolated from the system Python.

Command:

```
C:\Users\Administrator>python -m venv yangsuitevenv
```

Expected Result:

A new folder named yangsuitevenv is created on your PC C:\Users\Administrator.



Step 5. Activate the Virtual Environment.

Activate the **environment** before installing packages.

Command:

```
C:\Users\Administrator>.\yangsuitevenv\Scripts\activate
```

Expected Result:

The command prompt changes to show the active environment, for example:

```
(yangsuitevenv) C:\Users\Administrator>
```

```
C:\Users\Administrator>.\yangsuitevenv\Scripts\activate  
[yangsuitevenv] C:\Users\Administrator>  
[yangsuitevenv] C:\Users\Administrator>
```

Step 6. Install YANG Suite.

Install **YANG Suite** and its required modules to ensure YANG Suite and its dependencies are installed without errors.

Command:

```
(yangsuitevenv) C:\Users\Administrator>pip install yangsuite[core]
```

If you encounter proxy errors:

```
WARNING: Retrying (Retry(total=4, connect=None, read=None, redirect=None, status=None)) after connection error to https://pypi.org (read timeout=10)
```

Please check the network connectivity or proxy. If your environment requires the use of a proxy, please use this command instead:

Command:

```
(yangsuitevenv) C:\Users\Administrator>pip install yangsuite[core] --proxy http://x.x.x.x:port
```

Step 7. Upgrade YANG Suite Modules.

Update all YANG Suite modules to ensure the full functionality.

Command:

```
pip3 install --upgrade yangsuite yangsuite-devices yangsuite-filemanager yangsuite-yangtree yangsuite-cc
```

Explanation:

This step ensures that YANG Suite has the latest plugins for NETCONF, RESTCONF, gNMI, and telemetry.

Step 8. Initialize YANG Suite.

Run the **initialization** process to enter interactive configuration mode.

Command:

```
(yangsuitevenv) C:\Users\Administrator>yangsuite
```

Step 9. Configure YANG Suite Settings.

During initialization, you are prompted to configure the service port, hostname, username and password :

Create a folder named **yangsuitespecificdata** to store the user specific data (YANG modules, device profiles and so on).

```
YANG Suite stores user specific data (YANG modules, device profiles, etc.)  
Set new path or use: [] yangsuitespecificdata
```

Service port number: default is 8480.

```
What port number should YANG Suite listen on? [8480]  
*****  
YANG Suite can be accessed remotely over the network.  
*****  
Allow remote access? [n] y  
*****
```

Host name: recommended to use localhost or 127.0.0.1.

Define hosts/ IPs that YANG Suite will accept connections as.

Examples:

```
WIN-OLCJX8255N3  
127.0.0.1  
fe80::292e:95d%:2:8a45  
fe80::1c01:0+80:5d17:d2c  
fe80::99f0:b%25-17%6:150  
10.42.4.144  
192.168.1.1  
192.168.61.1
```

If the IP is not routable and you are behind NAT, use the public NAT address.

Save settings: confirm with y.

```
Interactive configuration complete
-----
Save this configuration to
C:\Users\Administrator\yangsuiteenv\Lib\site-packages\yangsuite\yangsuite.ini
so YANG Suite can automatically use it next time you start YANG Suite? [y] y
-----
Updating YANG Suite preferences file (C:\Users\Administrator\yangsuiteenv\Lib\site-packages\yangsuite\yangsuite.ini)
-----
C:\Users\Administrator\AppData\Local\yangsuite\yangsuite directory doesn't exist. Saving configuration file to C:\Users\Administrator\yangsuiteenv\Lib\site-packages\yangsuite\yangsuite.ini
```

Create **username** and **password**: for accessing the YANG Suite web UI.

```
*****
Your input is required to define an admin user
*****
Username (leave blank to use 'administrator'): admin
Email address: brian@fixo.com
Password:
Password (again):
Superuser created successfully.
*****
```

Expected Result:

Configuration is saved, and services can be started with the command **yangsuite**:

(yangsuitevenv) C:\Users\Administrator>yangsuite

Step 10. Log in to **Yang Suite** via the browser: <http://localhost:8480/> to access Cisco Yang Suite.

The screenshot shows the Cisco YANG Suite web interface. On the left, a sidebar menu includes Admin, Setup, Explore, Protocols, and Help. The main content area has a title "Welcome to Cisco YANG Suite!" and a sub-section "Docker-based Installation". It describes the `yangsuite/docker/start_yang_suite.sh` script, which prompts for username, password, and email; creates a test SSL/TLS certificate and key; and runs `docker-compose up`. A note says the generated certificate/key is for testing. A "Customization" section mentions modifying `yangsuite/docker/yangsuite/production.py` for Django settings. The right side features a "YANG Suite Documentation" sidebar with a search bar and a tree view of topics like Welcome to Cisco YANG Suite!, Device Profiles, File Manager, and Working with YANG Models.

Verify

Step 1. Configure the Catalyst 9800 WLC.

Ensure the **Netconf Yang Status** and **SSH Port** are enabled on the WLC.

Navigate to **WLC > Administration > Management > HTTP/HTTPS/Netconf/VTY** to enable the Netconf Yang Configuration Status and enable SSH Port **830**.

Netconf Yang Configuration

Status

ENABLED

SSH Port

830

CLI configuration:

```
9800(config)#netconf-yang
```

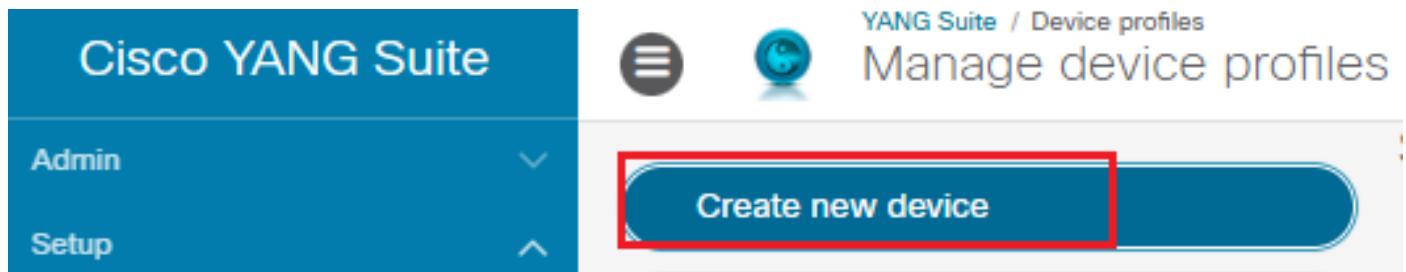
Configure **AAA Settings**.

CLI configuration:

```
9800(config)#aaa authentication login default local  
9800(config)#aaa authorization exec default local
```

Step 2. Add the WLC to YANG Suite.

In YANG Suite, navigate to **Setup > Device Profiles > Create New Device**.



Input the **Profile Name**, **WLC IP address**, **username** and **password**.

The screenshot shows the 'New Device Profile' configuration page. At the top, there's a message: 'Fields marked with * are required.' Below this, the 'General Info' section contains the following fields:

Profile Name *	WLC38.111
Description	(empty)
Address *	10.124.38.111
Username	admin
Password	*****
Timeout *	30

The 'Profile Name' field (containing 'WLC38.111') and the 'Address' field (containing '10.124.38.111') are both highlighted with a red rectangular border.

Activate netconf by clicking **Device supports NETCONF** and clicking **Skip SSH key validation for this device**.

NETCONF

<input checked="" type="checkbox"/> Device supports NETCONF
Device Variant * (Default - RFC-compliant device)
NETCONF port * 830
<input checked="" type="checkbox"/> Skip SSH key validation for this device
Address 10.124.38.111
Username admin
Password
Timeout 30

Activate Restconf by clicking **Device supports RESTCONF** and clear the default RESTCONF base URL to empty.

RESTCONF

<input checked="" type="checkbox"/> Device supports RESTCONF
HTTP or HTTP(secure) encoding https
RESTCONF base URL /restconf clear the default value
RESTCONF port * 443
Address 10.124.38.111
Username admin
Password

Activate SSH by clicking **Device allows SSH login** and verify the WLC info.

SSH

<input checked="" type="checkbox"/> Device allows SSH login	
Device variant *	generic_termserver
Address	10.124.38.111
SSH Port *	22
Delay Factor	1.0
Username	admin
Password	*****
Timeout	30
<input type="checkbox"/> Use SSL Certificate	

Step 3. Verify the Device Reachability.

Click the **Check selected device's reachability** and **selected the device profile** to check whether the WLC can be reached from YANG Suite.

The screenshot shows the Cisco YANG Suite interface under the 'Device profiles' section. A device profile named 'WLC38.111' is selected. On the left, there are several buttons: 'Create new device', 'Check selected device's reachability' (which is highlighted with a red border), 'Clone selected device', 'Edit selected device', 'Delete selected device', and 'Create default Repository and Yangset'. To the right, a modal window titled 'Connectivity check results for "wlc3...' displays a list of successful checks: ping, NETCONF, RESTCONF, and SSH, each marked with a green checkmark.

Step 4. Create a YANG Suite Repository.

Create a **repository** to store the needed WLC YANG models.

The screenshot shows the Cisco YANG Suite interface under the 'YANG module repositories' section. In the top right, there are buttons for 'New repository' (highlighted with a red border), 'Clone this repository', and 'Delete this repository'. A modal window titled 'YANG Suite' is open, prompting for a 'New repository name' which is set to 'WLC-REPO' (highlighted with a red border). At the bottom of the modal are 'Create repository' (highlighted with a red border) and 'Cancel' buttons.

Select **NETCONF** and Select **device profile** to **Get schema List** in order to download all schema from WLC

YANG Suite / YANG module repositories / WLC-REPO

Manage YANG module files and repositories

New repository Clone this repository Delete this repository

Select a YANG module repository WLC-REPO

YANG modules in repository

Add modules to repository

Upload NETCONF SCP Git

Select device profile WLC38.111

Check device connectivity Get schema list

Filter

ATM-FORUM-TC-MIB @ null
ATM-MIB @ 1998-10-19
ATM-TC-MIB @ 1998-10-19
BRIDGE-MIB @ 2005-09-19
CISCO-AAA-SERVER-MIB @ 2003-11-17
CISCO-AAA-SESSION-MIB @ 2006-03-21
CISCO-AAL5-MIB @ 2003-09-22
CISCO-ATM-EXT-MIB @ 2003-01-06
CISCO-ATM-PVCTRAP-EXTN-MIB @ 2003-01-20
CISCO-ATM-QOS-MIB @ 2002-06-10

Select all Select none

Download selected schemas

Repository status

It appears that all necessary dependencies of the modules in this repository are present as well.

You can add more modules as desired, or you can proceed to define YANG module sets based against this repository.

Step 5. Create a New YANG module set to associated YANG file repository.

Cisco YANG Suite

Admin

Setup

YANG files and repositories

YANG module sets

Device profiles

Analytics

Explore

Protocols

Help

YANG Suite / YANG module sets

Manage YANG module sets

Select a YANG set

New YANG set

YANG Suite

Name for new YANG set WLC-SET

Associated YANG file repository WLC-REPO

Create YANG set Cancel

For example, if the wireless info of Catalyst 9800-specific YANG models is required, input **wireless** to choose all modules and click **Add selected**.

YANG Suite / YANG module sets / WLC-SET

Manage YANG module sets

Select a YANG set: WLC-SET

YANG repository for this set: WLC-REPO

YANG modules in this set

No modules

Filter

Remove selected Remove all

View selected module(s)

Additional YANG modules in the repository

Filtered 71 from 646

wireless

Add entire repository Add selected

Cisco-IOS-XE-wireless-rmm-global-oper @ 2022-07-10
Cisco-IOS-XE-wireless-rmm-oper @ 2022-07-01
Cisco-IOS-XE-wireless-rmm-types @ 2021-07-01
Cisco-IOS-XE-wireless-rule-cfg @ 2022-07-01
Cisco-IOS-XE-wireless-rule-mdns-oper @ 2020-07-01
Cisco-IOS-XE-wireless-sdavc-oper @ 2021-11-01
Cisco-IOS-XE-wireless-security-cfg @ 2020-07-01
Cisco-IOS-XE-wireless-sisf-global-oper @ 2022-08-10
Cisco-IOS-XE-wireless-site-cfg @ 2022-08-10
Cisco-IOS-XE-wireless-tunnel-cfg @ 2020-11-01
Cisco-IOS-XE-wireless-tunnel-types @ 2020-11-01
Cisco-IOS-XE-wireless-types @ 2022-07-01
Cisco-IOS-XE-wireless-wlan-cfg @ 2022-07-01
cisco-xe-wireless-openconfig-if-ethermet-deviation
cisco-xe-wireless-openconfig-vlan-deviation @ 2022-07-01

YANG set and module validation

New YANG set Clone this YANG set Delete this YANG set

Validate YANG modules in greater depth

Validation complete

Initial "quick" validation of this YANG set was successful, with no errors found.

You may now wish to request a more in-depth validation of the various modules in this set.

If you need more than just the wireless components, you can simply click **Add entire repository** at this step.

If you only add the wireless modules, there is also a button called **Locate and add missing dependencies**. Clicking it automatically pulls in any additional modules required by the wireless module.

YANG Suite / YANG module sets / WLC-SET

Manage YANG module sets

Select a YANG set: WLC-SET

YANG repository for this set: WLC-REPO

YANG modules in this set

71 module(s)

Filter

Remove selected Remove all

View selected module(s)

Additional YANG modules in the repository

Filtered 0 from 575

wireless

Add entire repository Add selected

Cisco-IOS-XE-wireless-access-point-cfg-rpc @ 2022-07-10
Cisco-IOS-XE-wireless-access-point-cmd-rpc @ 2022-07-10
Cisco-IOS-XE-wireless-access-point-oper @ 2022-07-10
Cisco-IOS-XE-wireless-actions-rpc @ 2021-07-01
Cisco-IOS-XE-wireless-ap-cfg @ 2022-07-10
Cisco-IOS-XE-wireless-ap-global-oper @ 2022-07-10
Cisco-IOS-XE-wireless-ap-types @ 2022-08-01
Cisco-IOS-XE-wireless-apf-cfg @ 2022-07-20
Cisco-IOS-XE-wireless-awips-oper @ 2020-11-01
Cisco-IOS-XE-wireless-ble-ltx-oper @ 2022-07-10
Cisco-IOS-XE-wireless-ble-mgmt-cmd-rpc @ 2022-07-10
Cisco-IOS-XE-wireless-ble-mgmt-oper @ 2019-07-01
Cisco-IOS-XE-wireless-client-global-oper @ 2022-07-01
Cisco-IOS-XE-wireless-client-oper @ 2022-07-01
Cisco-IOS-XE-wireless-client-rpc @ 2022-08-10
Cisco-IOS-XE-wireless-client-types @ 2022-07-01
Cisco-IOS-XE-wireless-cts-sxp-cfg @ 2021-03-01

YANG set and module validation

New YANG set Clone this YANG set Delete this YANG set

Validate YANG modules in greater depth

Missing dependencies

The modules in the YANG set depend on these additional modules which are not in this YANG set.

YANG Suite can search your repository and try to Locate and add missing dependencies or you can manually add the modules as desired.

In any case, you should locate these modules and add them to the set.

- Cisco-IOS-XE-event-history-types @ (any revision)
- Cisco-IOS-XE-ntp-oper @ (any revision)
- Cisco-IOS-XE-tunnel-types @ (any revision)
- Cisco-IOS-XE-wsa-types @ (any revision)
- cisco-server @ (any revision)
- cisco-xe-openconfig-vlan-ext @ (any revision)
- ietf-inet-types @ (any revision)
- ietf-yang-types @ (any revision)
- openconfig-if-ethermet @ (any revision)
- openconfig-interfaces @ (any revision)
- openconfig-vlan @ (any revision)

Module validation errors and warnings

Step 6. Test XPath Queries.

Use the XPath provided by YANG Suite to obtain data from WLC.

Get the needed XPath in YANG Suite.

Here you take controller management interface name as an example.

The screenshot shows the Cisco YANG Suite interface. The left sidebar includes options like Admin, Setup, Analytics, Explore (selected), YANG, Protocols, and Help. The main area is titled 'Explore YANG Models'. At the top, there are dropdowns for 'Select a YANG set' (WLC-SET) and 'Select YANG module(s)' (Cisco-IOS-XE-wireless-general-oper), and a 'Load module(s)' button. Below these are search fields for 'Icon legend', 'Search XPaths', 'Search nodes', and 'Expand all nodes'. A tree view on the left shows the YANG module structure: Cisco-IOS-XE-wireless-general-oper > general-oper-data > mgmt-intf-data > intf-name. The 'intf-name' node is highlighted with a red box. To the right is a 'Node Properties' panel with details for the 'intf-name' node, including Name: intf-name, Node type: leaf, Datatype: string, Description: Controller management interface name, Module: Cisco-IOS-XE-wireless-general-oper, Revision: 2019-05-01, Xpath: /general-oper-data/mgmt-intf-data/intf-name, Prefix: wireless-general-oper, Namespace: http://cisco.com/ins/yang/Cisco-IOS-XE-wireless-general-oper, Schema Node Id: /general-oper-data/mgmt-intf-data/intf-name, Access: read-only, and Operations: "get". Below this is a 'Reference URL' section with a link to https://tools.ietf.org/html/rfc6020#section-7.6.

Configure telemetry ietf on WLC CLI

```
C9800(config)#telemetry ietf subscription <subscription-id>
C9800(config-mdt-subs)#encoding encode-kvpgb
C9800(config-mdt-subs)#filter xpath <>xpath-expression>
C9800(config-mdt-subs)#source-address <wlc-ip>
C9800(config-mdt-subs)#stream yang-push
C9800(config-mdt-subs)#update-policy periodic <interval-in-centiseconds>
C9800(config-mdt-subs)#receiver ip address <collector-ip> <collector-port> protocol grpc-tcp
```

For example:

```
<#root>
C9800(config)#telemetry ietf subscription
```

104

```
C9800(config-mdt-subs)#encoding encode-kvpgb
C9800(config-mdt-subs)#filter xpath

/general-oper-data/mgmt-intf-data/intf-name
```

```
C9800(config-mdt-subs)#source-address
```

10.124.38.111

```
C9800(config-mdt-subs)#stream yang-push  
C9800(config-mdt-subs)#update-policy periodic
```

2500

```
C9800(config-mdt-subs)#receiver ip address
```

10.124.41.144 18800

```
protocol grpc-tcp
```

Enable monitoring in **gRPC telemetry** to get the needed data sent by WLC.

The screenshot shows the Cisco YANG Suite interface. On the left, a sidebar menu includes Admin, Setup, Analytics, Explore, Protocols (with gNMI and gRPC telemetry selected), NETCONF, RESTCONF, and Help. The main area is titled 'YANG Suite / gRPC Telemetry'. It has fields for 'Listen on IP address' (10.124.41.144) and 'Listen at port' (18800). A red box highlights the 'Start receiver' button. Below these fields, a log window displays two entries of JSON telemetry data:

```
timestamp: 2025 Sep 08 12:27:10:981000  
subscription: 104  
node: WLC  
subscribe_path: /Cisco-IOS-XE-wireless-general-oper:general-oper-data/mgmt-intf-data  
child_path: /  
name: intf-name  
value: GigabitEthernet1  
  
timestamp: 2025 Sep 08 12:26:45:981000  
subscription: 104  
node: WLC  
subscribe_path: /Cisco-IOS-XE-wireless-general-oper:general-oper-data/mgmt-intf-data  
child_path: /  
name: intf-name  
value: GigabitEthernet1
```

Related Information

- [Catalyst 9800 Programmability and Telemetry Deployment Guide](#)
- [Welcome to Cisco YANG Suite!](#)
- [Cisco Community for DevNet](#)