

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.

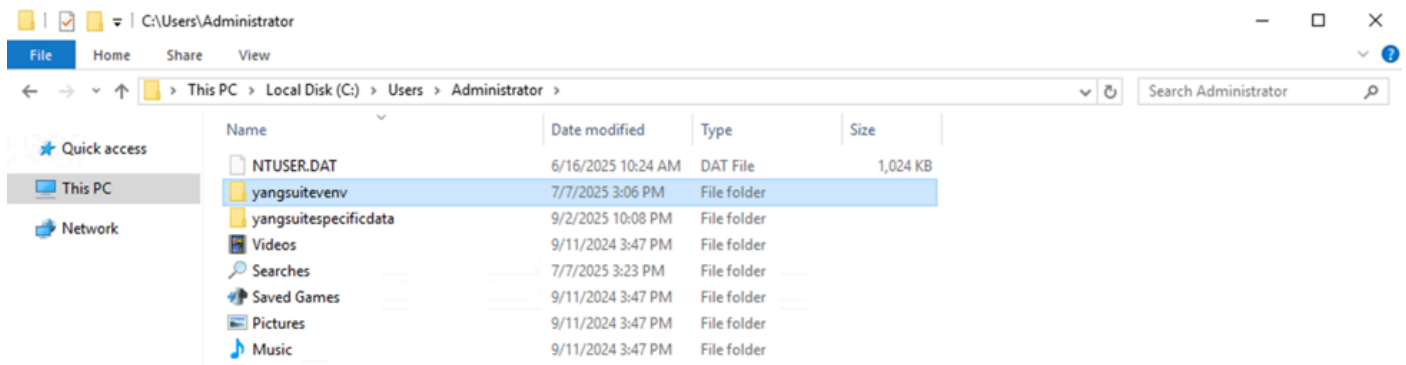
Step 4. Create a **Virtual Environment** to keep dependencies isolated from the system Python.

Command:

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

Expected Result:

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



Step 5. Activate the Virtual Environment.

Activate the **environment** before installing packages.

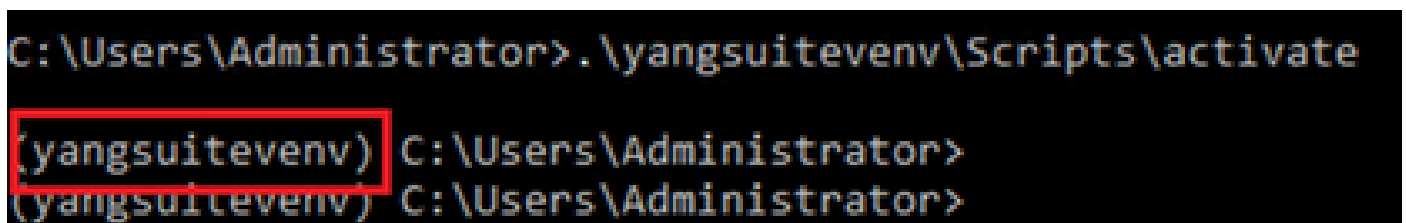
Command:

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

Expected Result:

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

(yangsuiteenv) 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:

```
(yangsuiteenv) 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

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

Command:

```
(yangsuiteenv) 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-c
```

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:

```
(yangsuiteenv) 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-OLG3K8256N3
    127.0.0.1
    fe80::292e:95d8:29b4:8a45
    fe80::1c01:0e0b:9d17:d2c
    fe80::99f0:b829:47a5:150
    10.124.44.144
    192.168.111.1
    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
to 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: admin@f13c.com
Password:
Password (again):
Superuser created successfully.
*****

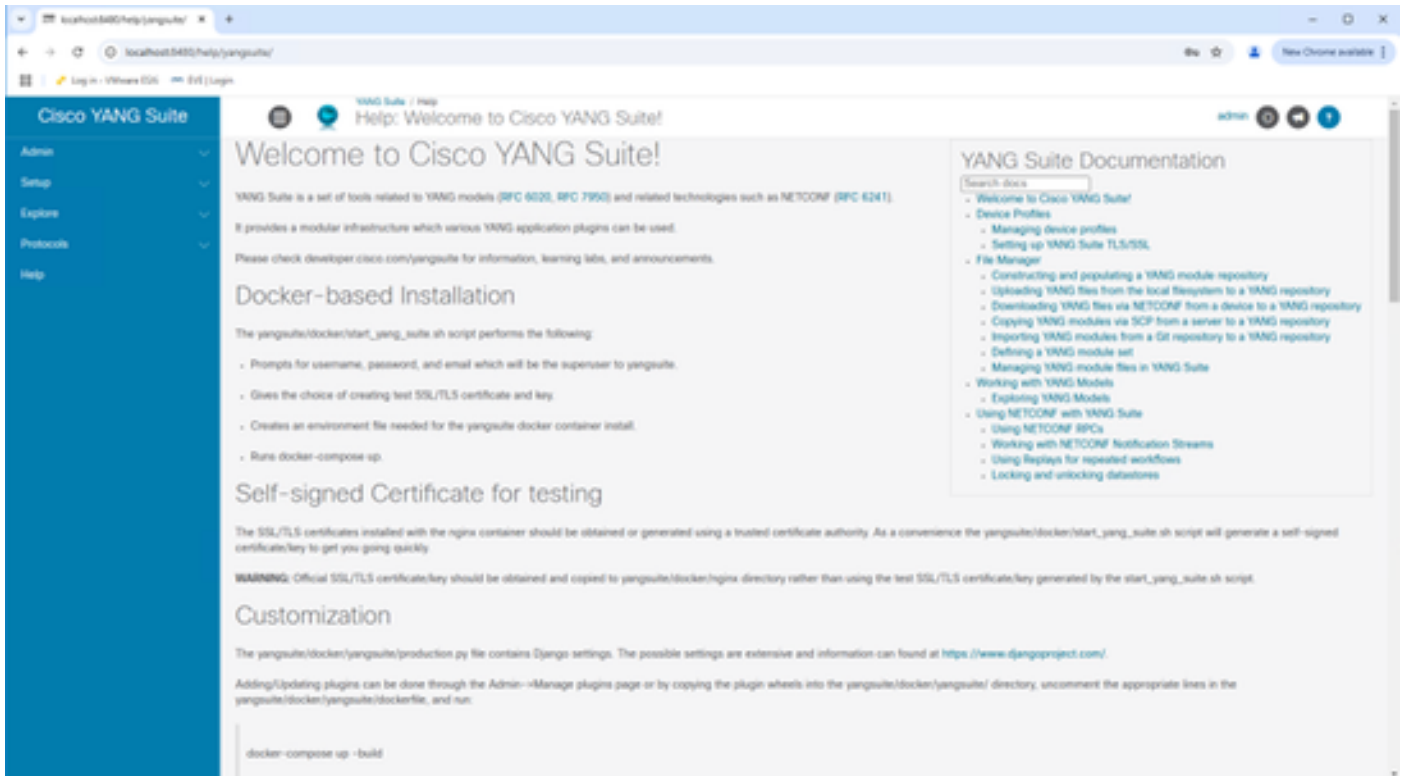
```

Expected Result:

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

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

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



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
```

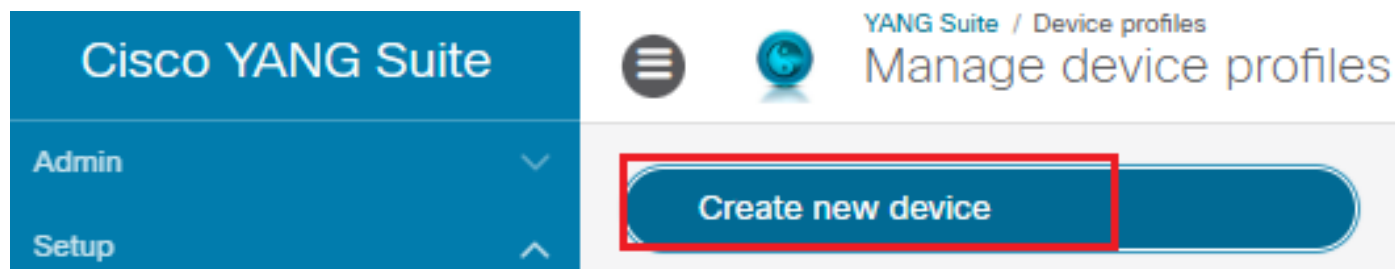
Configure **AAA** Settings.

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' form. At the top is a blue header bar with the title 'New Device Profile' and a close icon. Below the header is a light blue box with an information icon and the text 'Fields marked with * are required.' The form is titled 'General Info' and contains several input fields. The 'Profile Name *' field contains 'WLC38.111'. The 'Address *' field contains '10.124.38.111'. The 'Username' field contains 'admin'. The 'Password' field contains a series of dots. The 'Timeout *' field contains '30'. A red rectangular box highlights the 'Profile Name', 'Address', 'Username', and 'Password' fields.

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

NETCONF

	☒ Device supports NETCONF
Device Variant *	(Default - RFC-compliant device)
NETCONF port *	830
	☒ 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

	☒ 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

☒ Device allows SSH login

Device variant *

generic_termserver

Address

10.124.38.111

SSH Port *

22

Delay Factor

1.0

Username

admin

Password

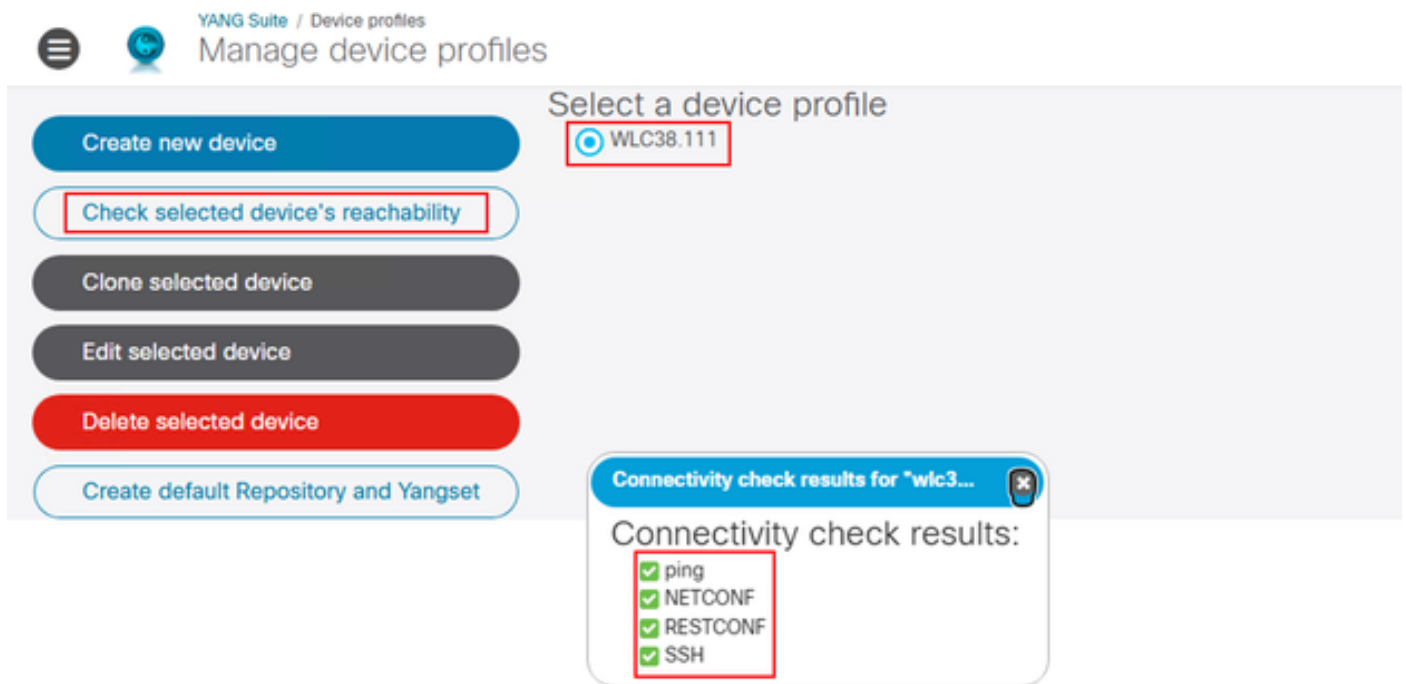
Timeout

30

☐ Use SSL Certificate

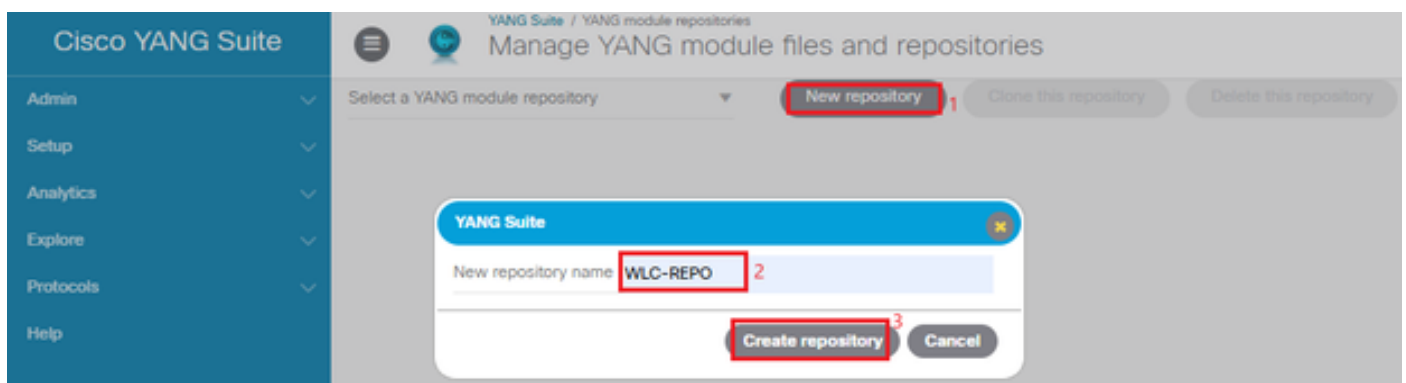
Step 3. Verify the Device Reachability.

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

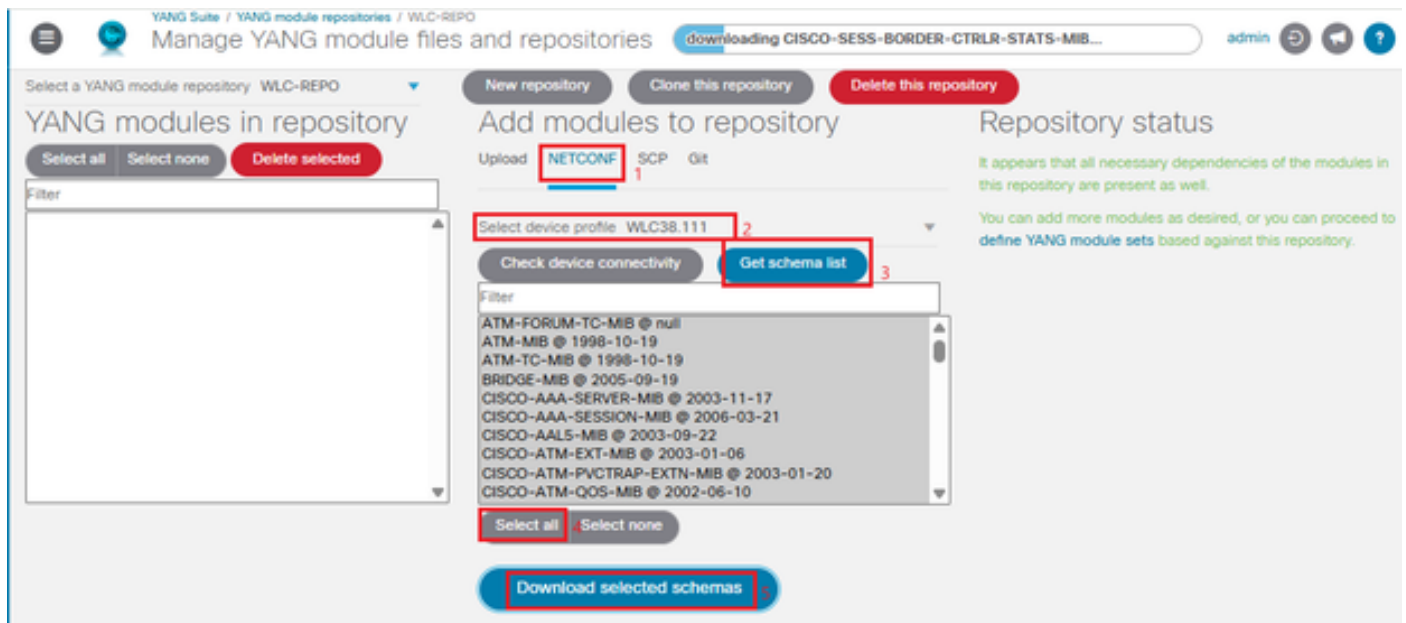


Step 4. Create a **YANG Suite Repository**.

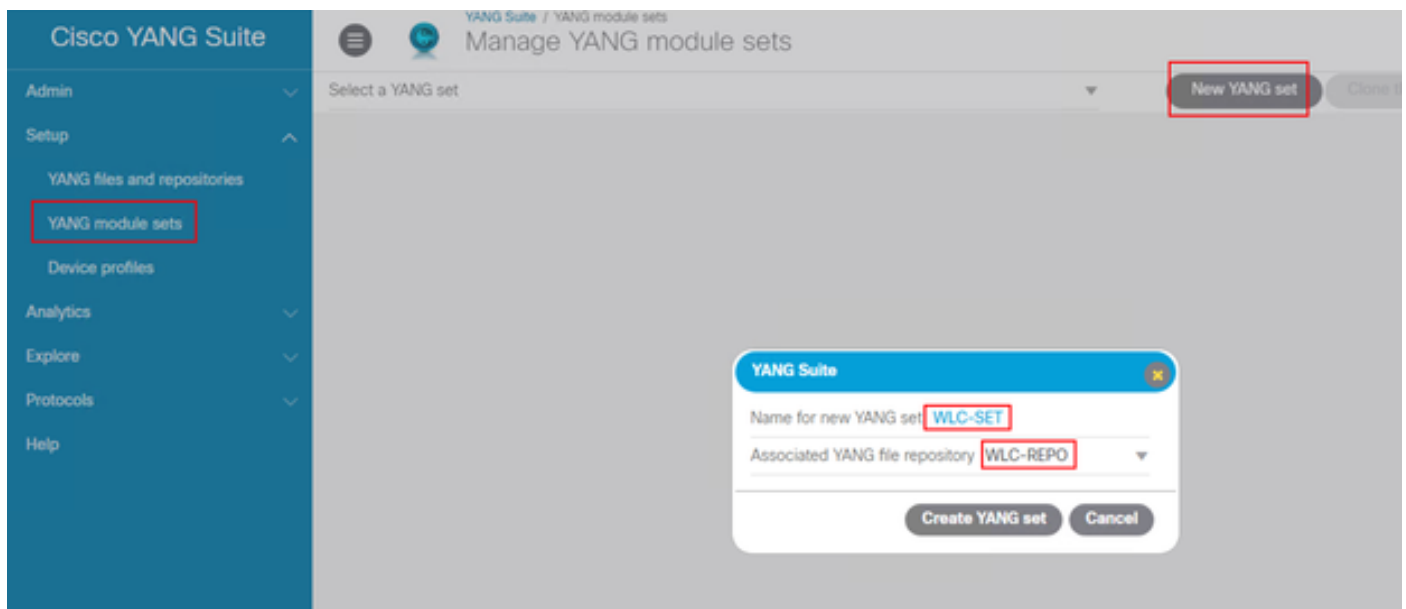
Create a **repository** to store the needed WLC YANG models.



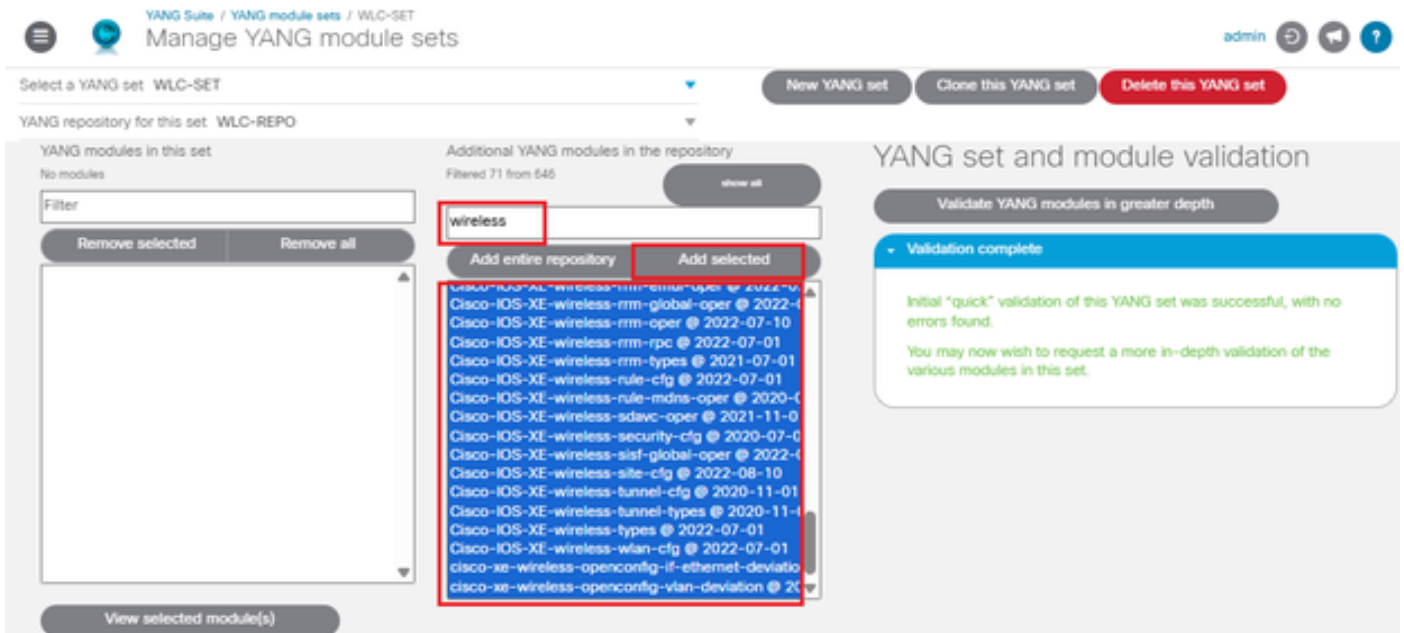
Select **NETCONF** and Select **device profile** to **Get schema List** in order to download all schema from WLC



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

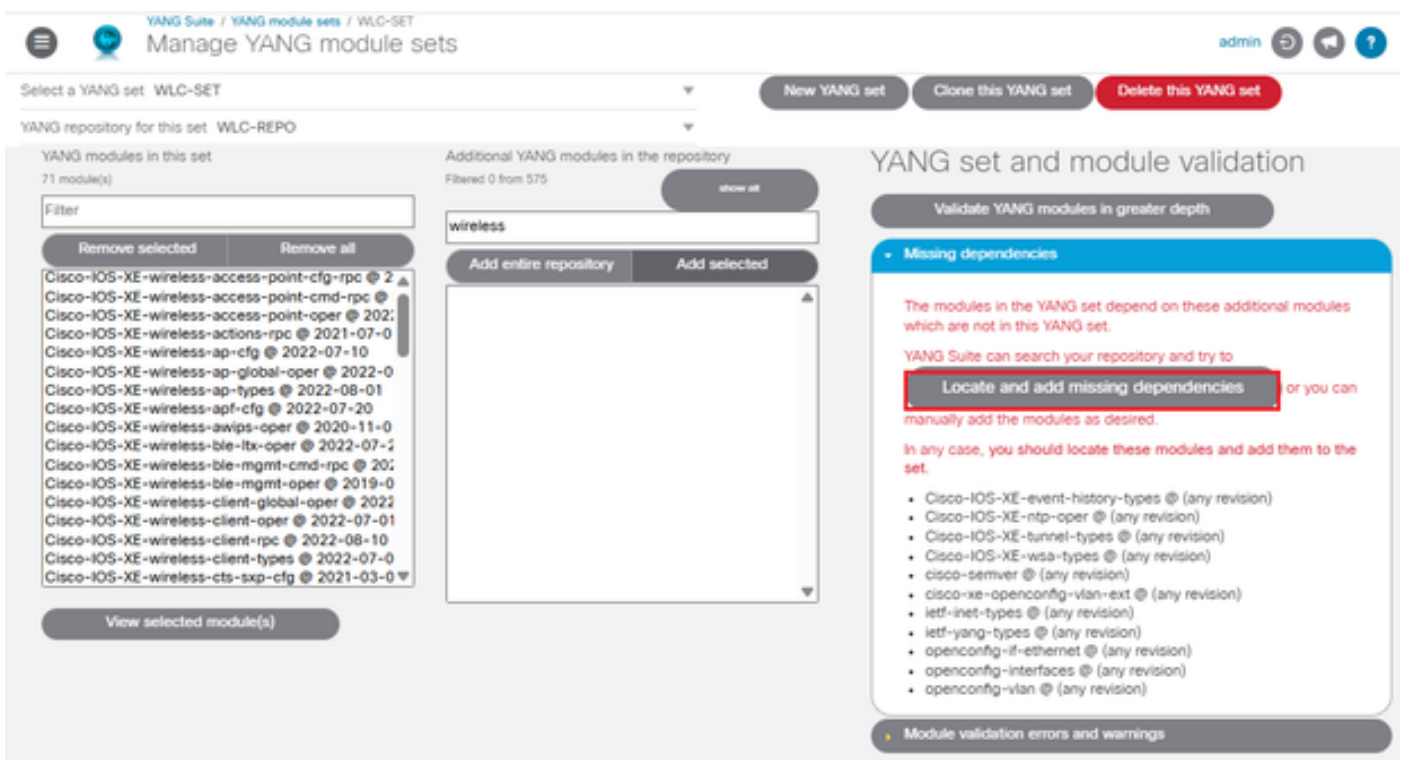


For example, if the wireless info of Catalyst 9800-specific YANG models is required, input **wireless** to choose all modules and click **Add selected**.



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.



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. In the top navigation bar, the 'Explore YANG Models' section is active. The 'Select a YANG set' dropdown is set to 'WLC-SET', and the 'Select YANG module(s)' dropdown is set to 'Cisco-IOS-XE-wireless-general-oper'. The 'Load module(s)' button is highlighted. In the tree view, the 'general-oper-data' node is expanded, and the 'mgmt-intf-data' node is selected. The 'Node Properties' panel on the right shows the following details for the selected node 'intf-name':

Name	intf-name
Nodetype	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/ns/yang/Cisco-IOS-XE-wireless-general-oper
Schema Node Id	/general-oper-data/mgmt-intf-data/intf-name
Access	read-only
Operations	* "get"

The 'Reference URL' is <https://tools.ietf.org/html/rfc6020#section-7.6>. The text below the URL explains the 'leaf' statement and its default value.

Configure telemetry ietf on WLC CLI

```
C9800(config)#telemetry ietf subscription <subscription-id>
C9800(config-mdt-subs)#encoding encode-kvgpb
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-kvgpb
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
```

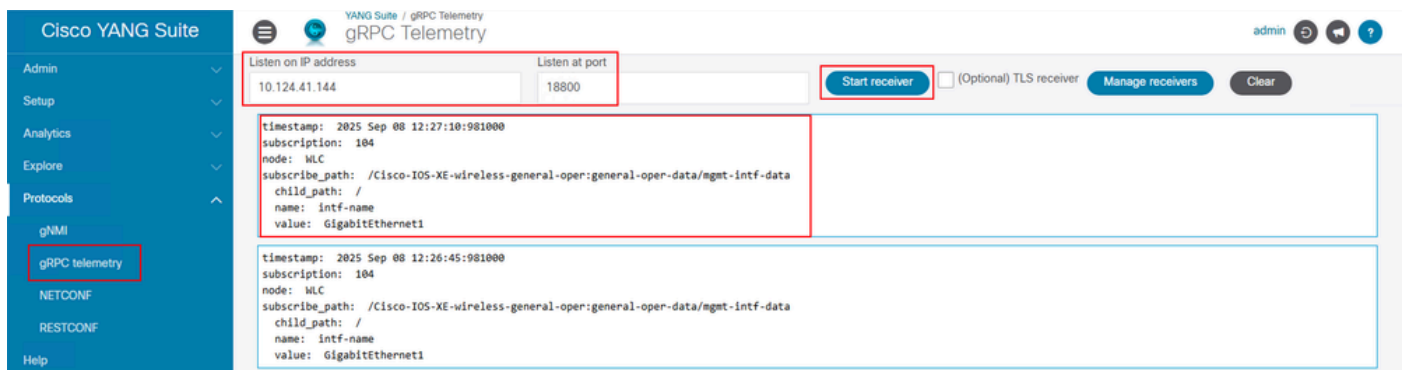
2500

```
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.



Related Information

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