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BRKNMS-2702

# Ten Cool Prime Infrastructure Tricks to Better Manage Your Network

Lewis Hickman, Customer Solutions Architect

Jennifer Valentine, Systems Engineer

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# ~~Ten~~ Cool Prime Infrastructure Tricks to Better Manage Your Network

Lewis Hickman, Consulting Systems Engineer

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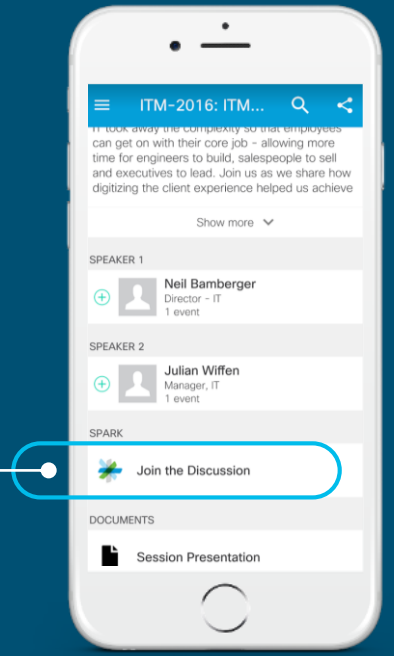
# Cisco Spark

## Questions?

Use Cisco Spark to communicate with the speaker after the session

## How

1. Find this session in the Cisco Live Mobile App
2. Click “Join the Discussion”
3. Install Spark or go directly to the space
4. Enter messages/questions in the space

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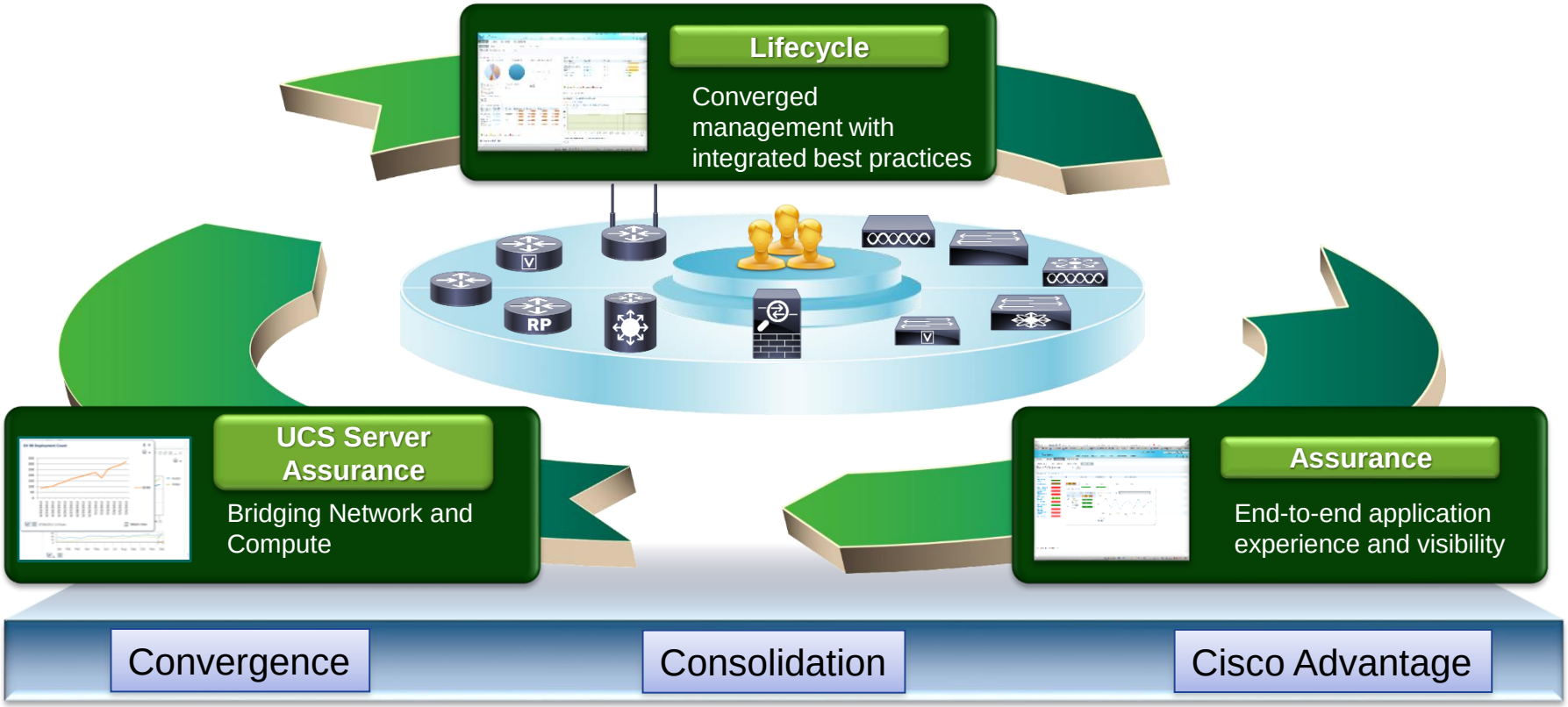
# Agenda

- A Brief Overview
- Tips and Tricks
  1. Installation and Setup
  2. Device Discovery/Device Groups
  3. Customizing Configuration templates
  4. Setting up and using Baseline Compliance
  5. Customizing Reports
  6. Tips for Client/Host Tracking
  7. Software Image Mgmt (SWIM)
  8. Implementing High Availability
  9. Troubleshooting with Prime Infrastructure
  10. Integration w. other systems
- And A Look Ahead

# Overview

# Cisco Prime Infrastructure - Overview



# Operations Center

## Centralized Visualization of Multiple PI Instances

Ops Center

**Distributed**

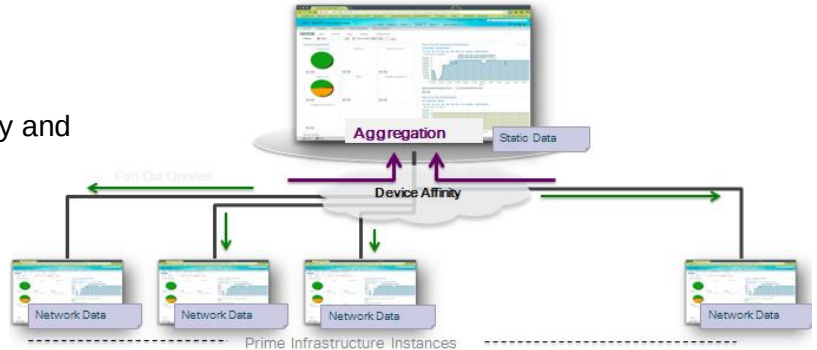
- Supports up to 10 Prime Infrastructure instances
- Addresses geographic distribution, scalability, resiliency and visibility
- Single pane of glass monitoring with click-through management

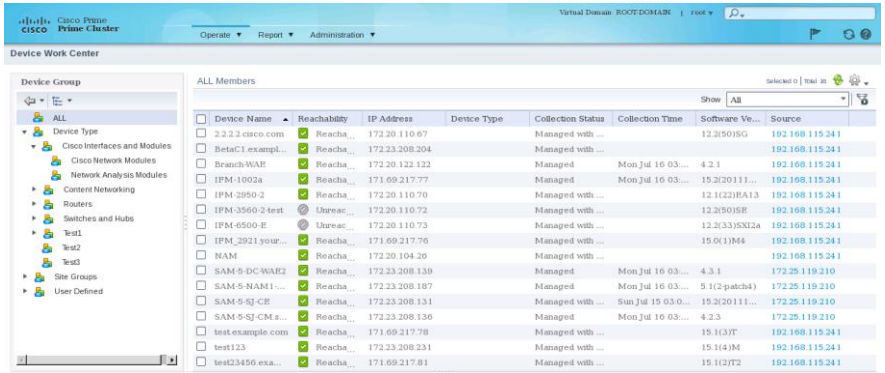
**Centralized**

- Central view of assets, alarms and clients
- Single sign-on
- Dashlets aggregated from PI instances

**Scalable**

- Consolidated view of network health
- Consolidated view of health of each PI instance
- Reports scheduling from one interface

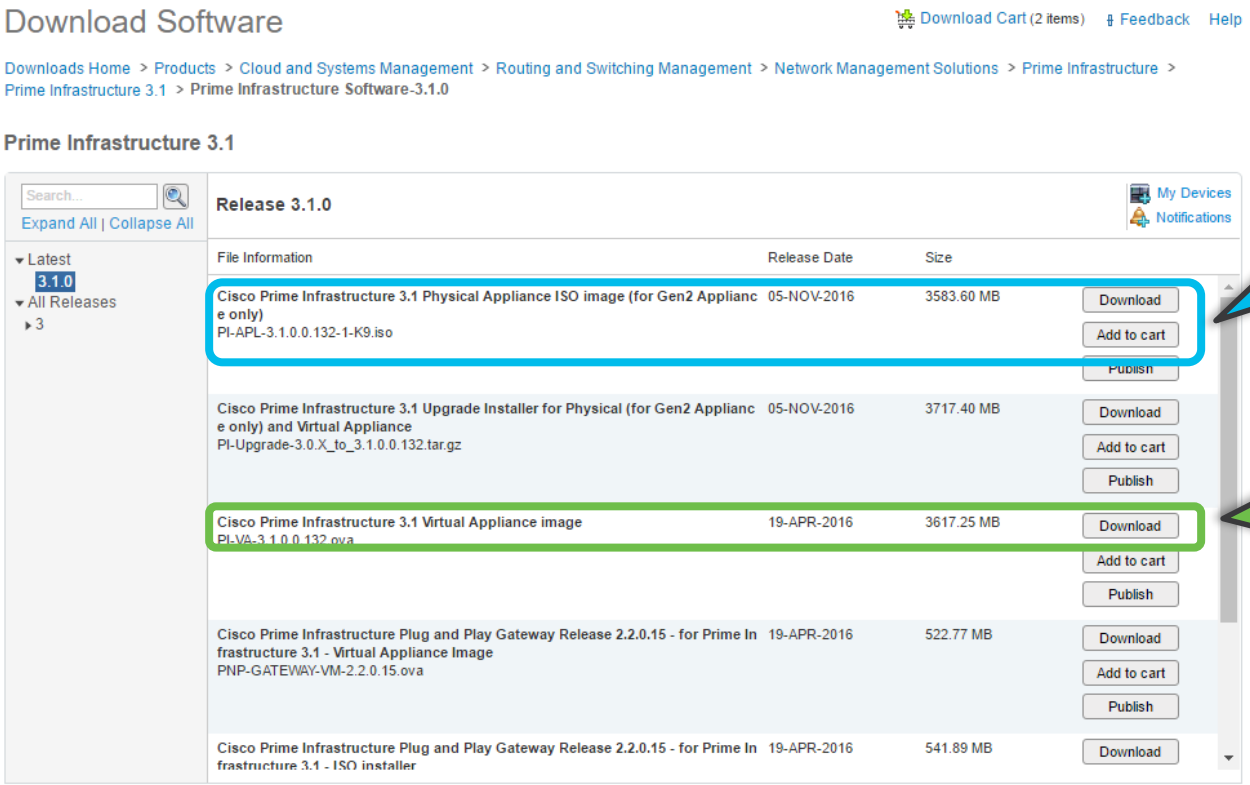


# Top Tips and Tricks

# Installation and Setup

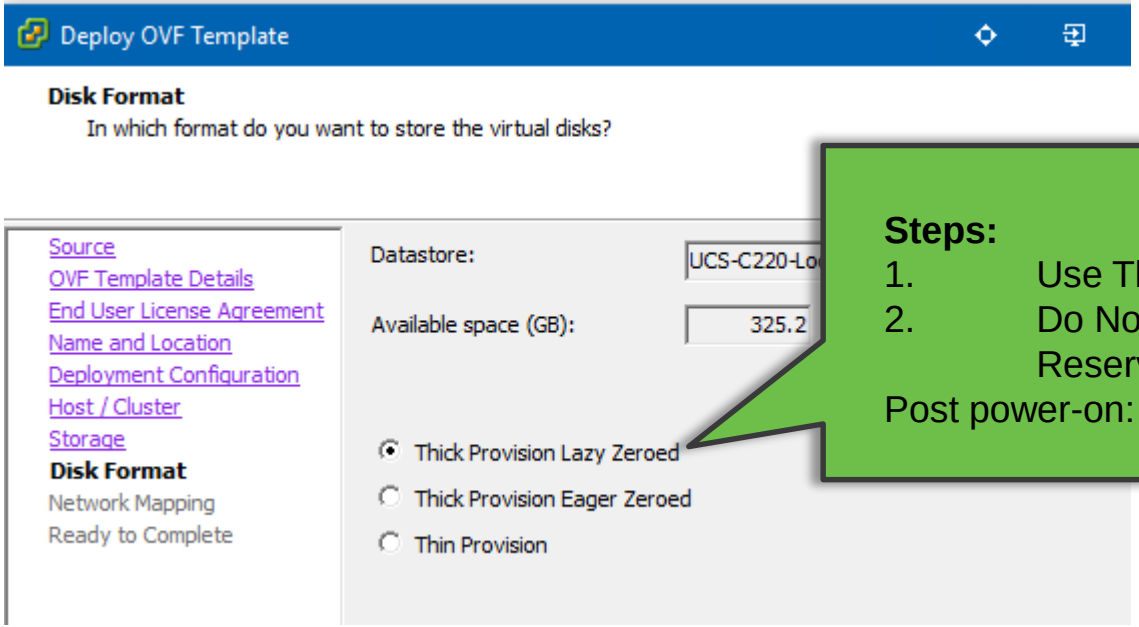
# Finding the files you need




Use the ISO file for Physical Appliance or HyperV deployments

Use the OVA file for an ESXi deploymnet

# Deploying PI Virtual Appliance –Pro Tips




**Steps:**

1. Use Thick Provision Lazy Zeroed for Storage
2. Do Not Change the OVA Resource Reservations

Post power-on: Be Patient!

# Deploying PI Physical Appliance-Pro Tip


**Maximize Performance:**

1. Use the CIMC web interface
2. Click Storage Tab>Controller> Virtual Drive
3. Click on Edit Virtual Drive
4. Select Write Back Good BBU

# Deploying PI Physical Appliance-Pro Tip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# Deploying PI Physical Appliance-Pro Tip


**Maximize Performance:**

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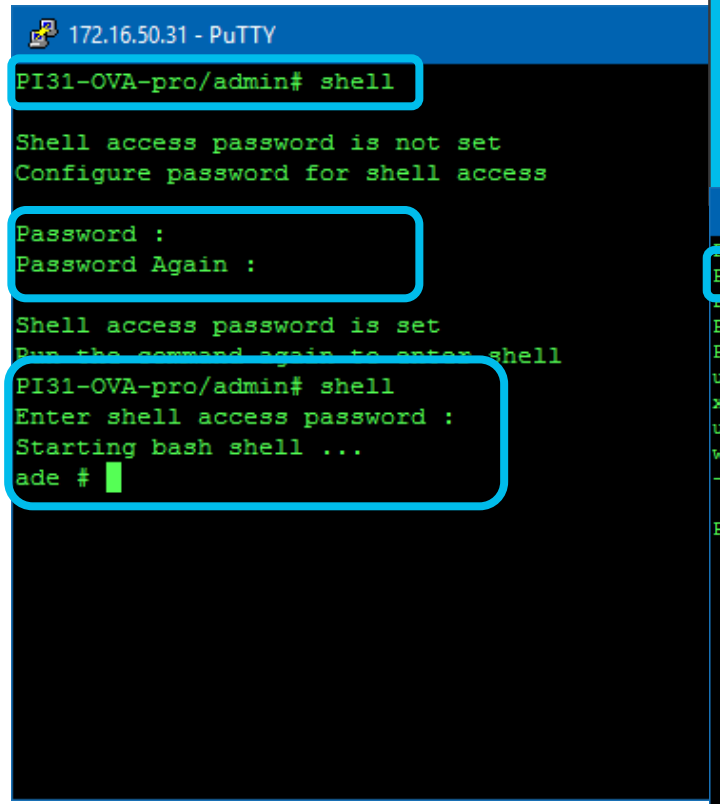
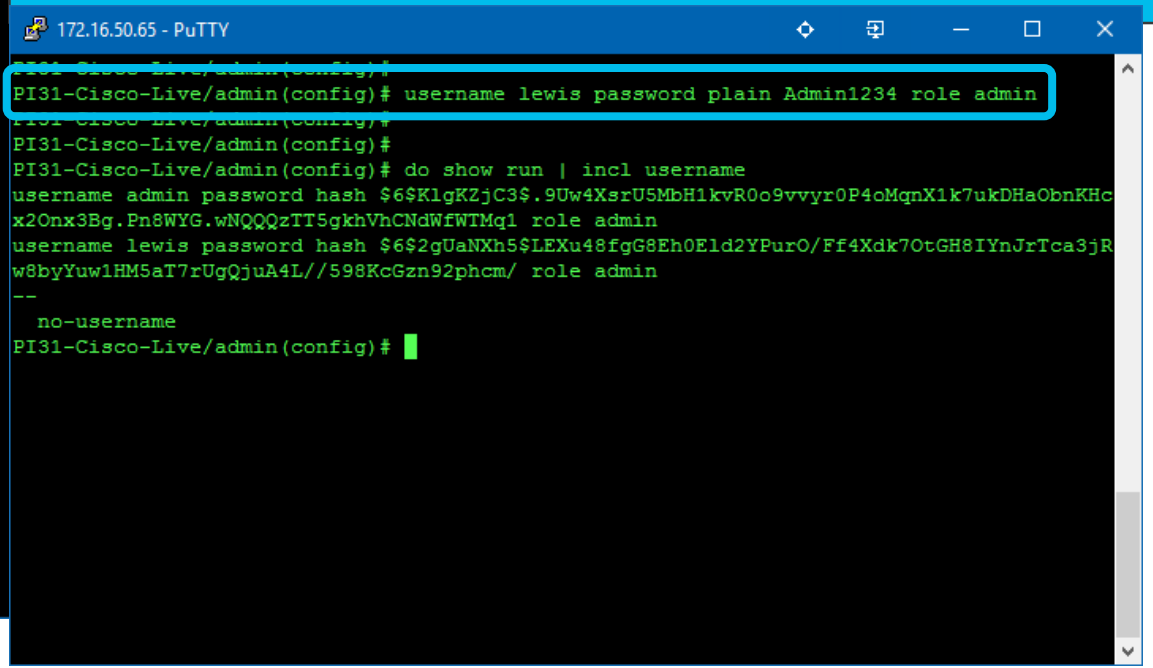
# Shell Access from CLI – Pro Tip

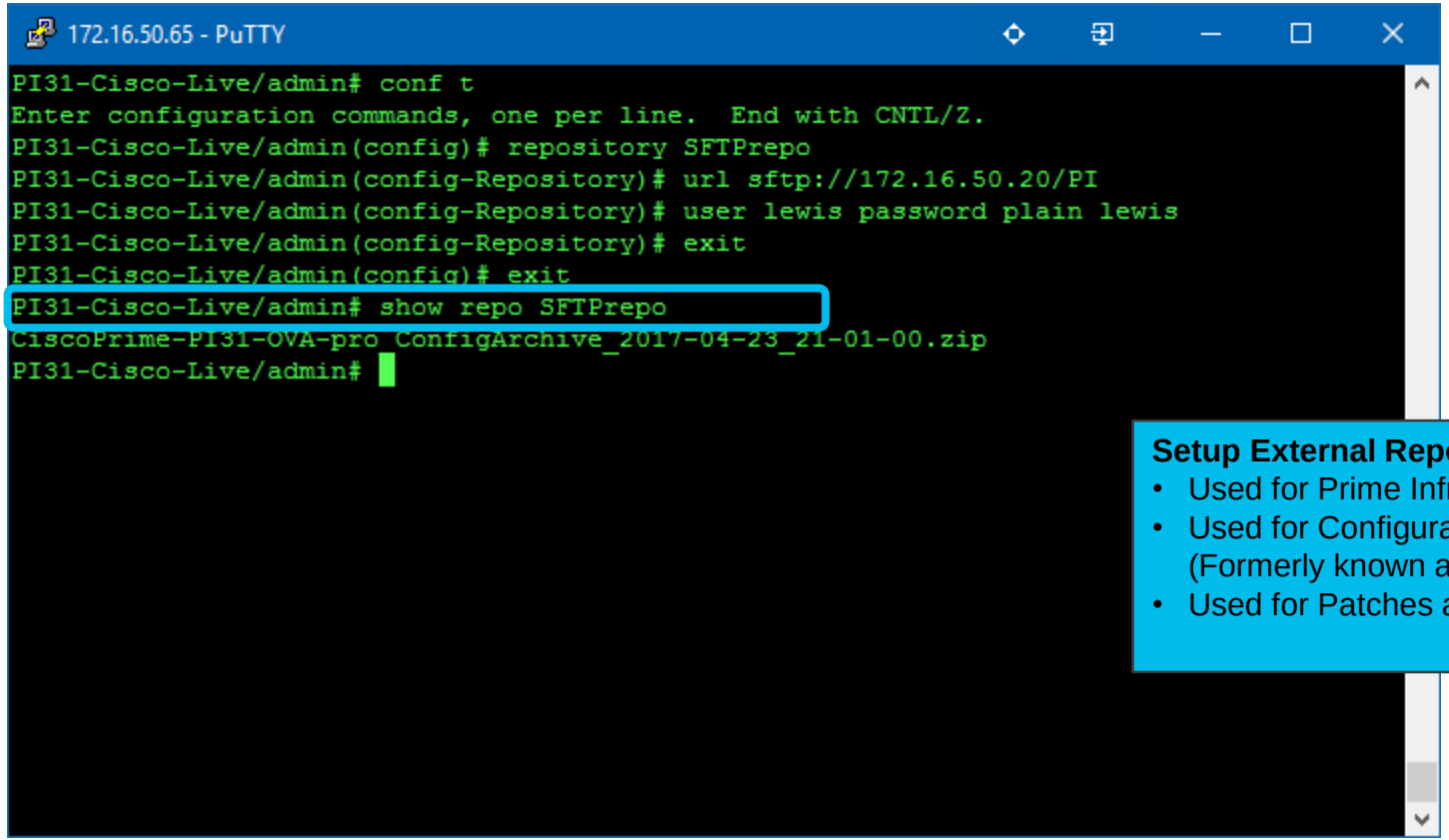



**Enabling Shell access:**

1. Record the username and password from initial setup (default is admin)
2. Enable Shell access using the **shell** CLI command
3. Setup more usernames using CLI **username** command



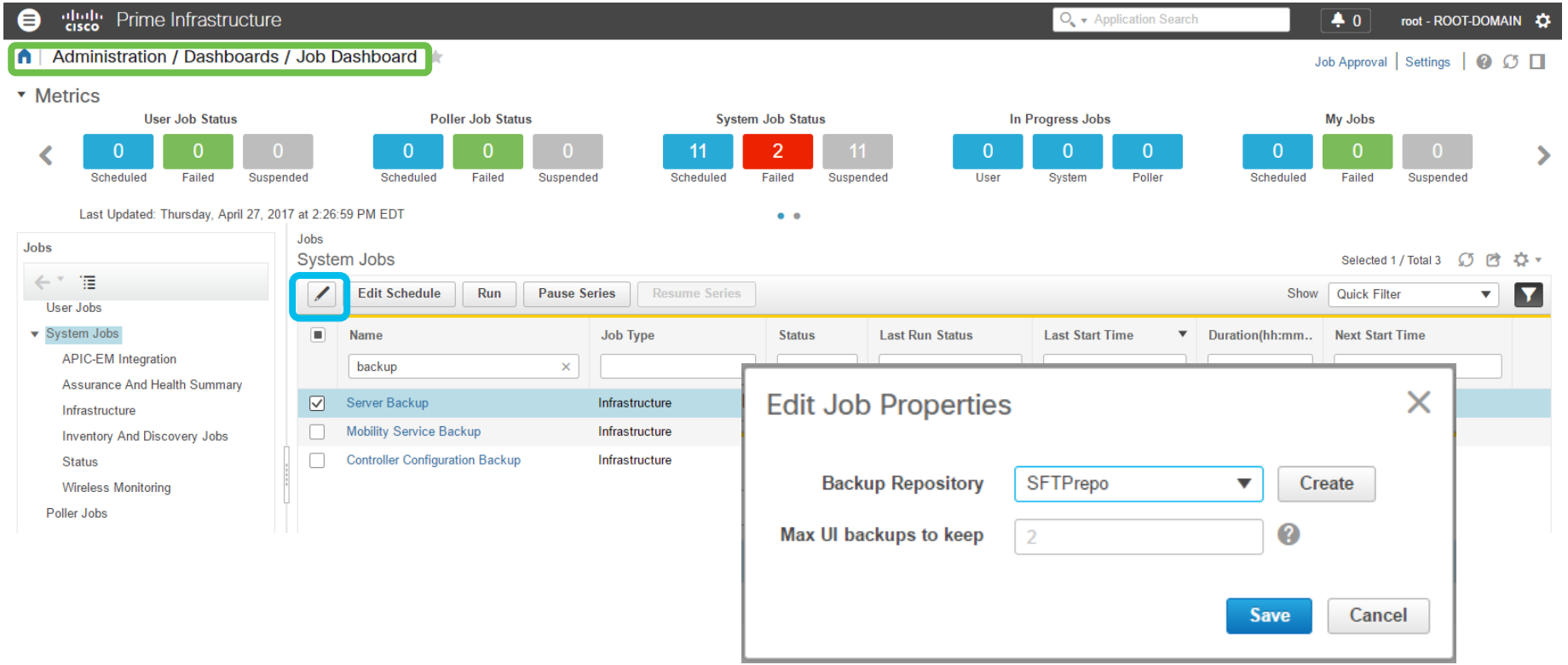
# Setup Repository



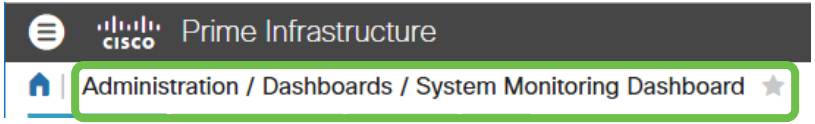

**Setup External Repository:**

- Used for Prime Infra Backups
- Used for Configuration Archiving (Formerly known as shadow directory)
- Used for Patches and upgrades

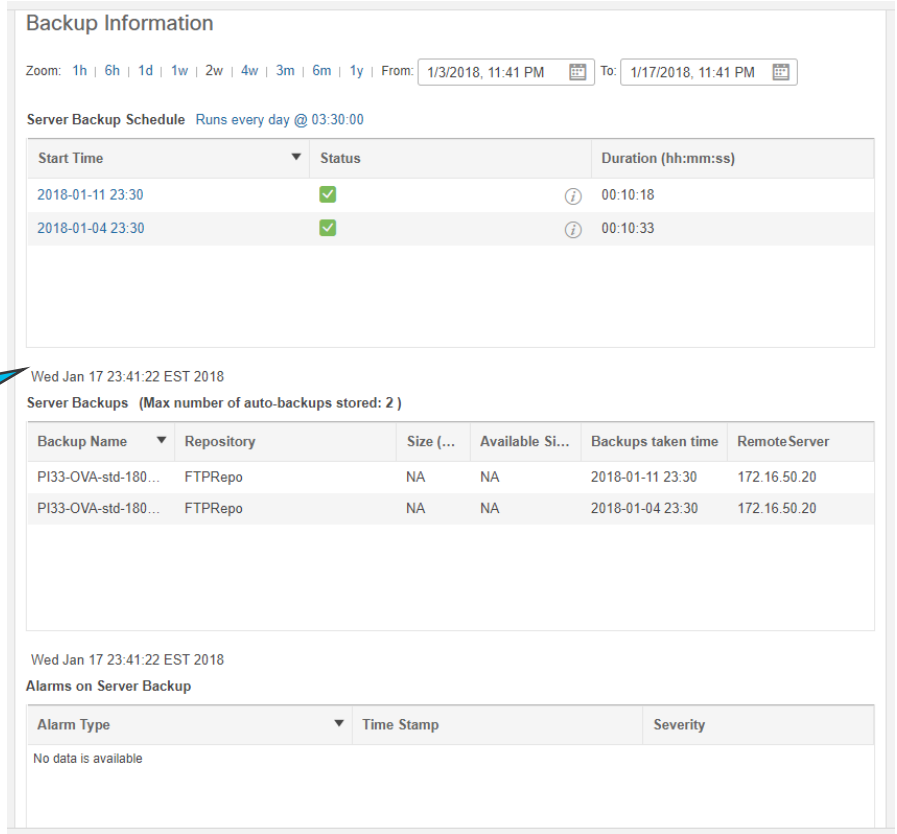
# Pro Tip - Set backups to external repository



# Pro Tip - Set backups to external repository




PI 3.3 offers Backup Monitoring via the System Monitoring Dashboard



# Pro Tip – Upgrading/Licensing

- Install PI 3.1.0 OVA
- Restore DB from previous version/import inventory/run discovery
- Install PI 1.x or PI 2.x licenses
- Install Device Pack 16 (6 or higher required) –Restart required
- Install Maintenance Release 7 –Restart required

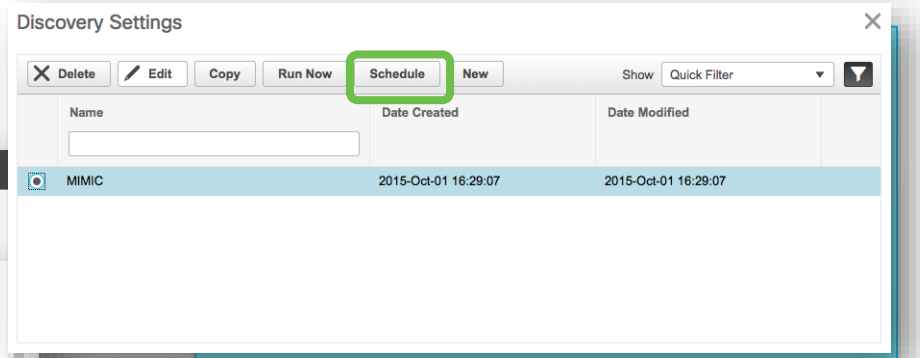
**DP 16 is the last Planned Device Pack release for PI 3.1**

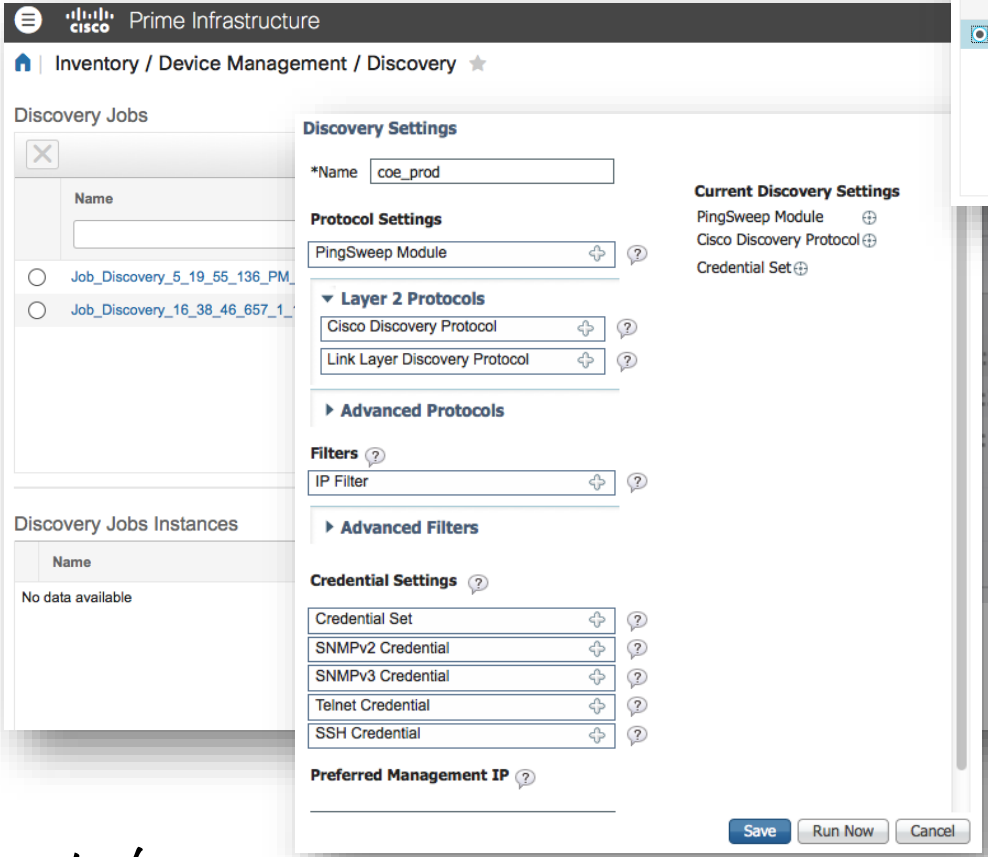
If Staying on 3.1
- Install 3.1.7 Update 1 – Restart required

If you are upgrading to PI 3.3
- Perform the PI 3.3 upgrade – Restart required
  - Reconfigure the Controller Configuration Backup job to resume it from the suspended state.
  - Reconfigure the Server Backup job if the period was other than 1 day (Default)

# Device Discovery + Device Groups

# Discovery Settings



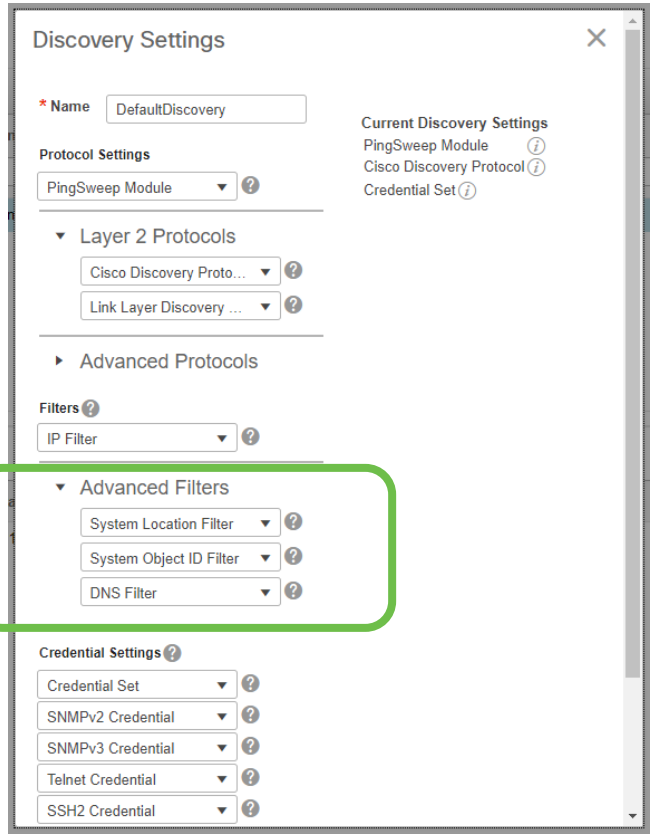




Pro-Tip: Ping sweep and CDP are the two most commonly used discovery modules.

Pro-Tip: Using loopback is the best way to pick a management address.

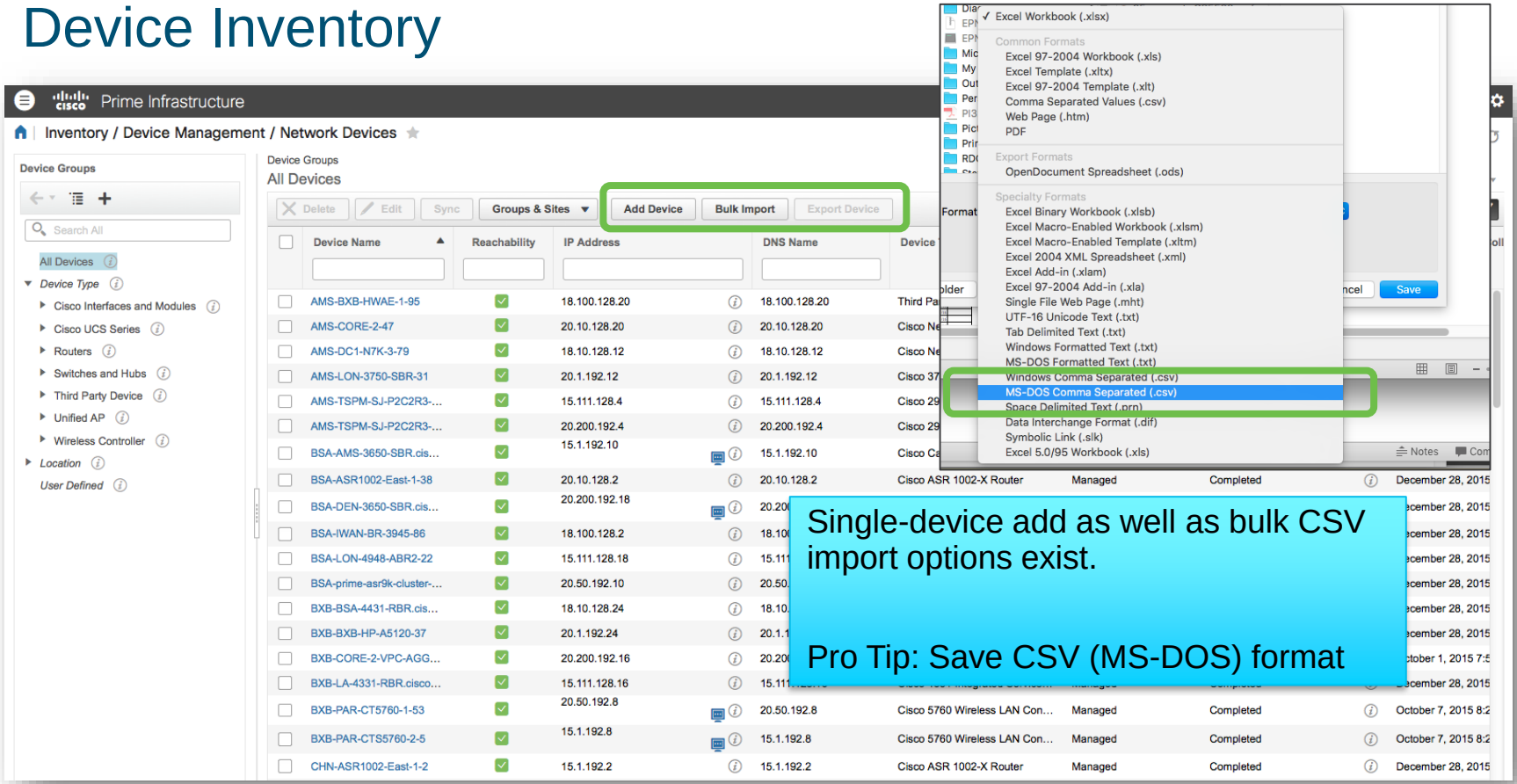
Discovery asks for CLI credentials so that full inventory can be done.

# Advanced Discovery Filter




Pro Tip: Further filtering options available as of PI 3.3

# Device Inventory

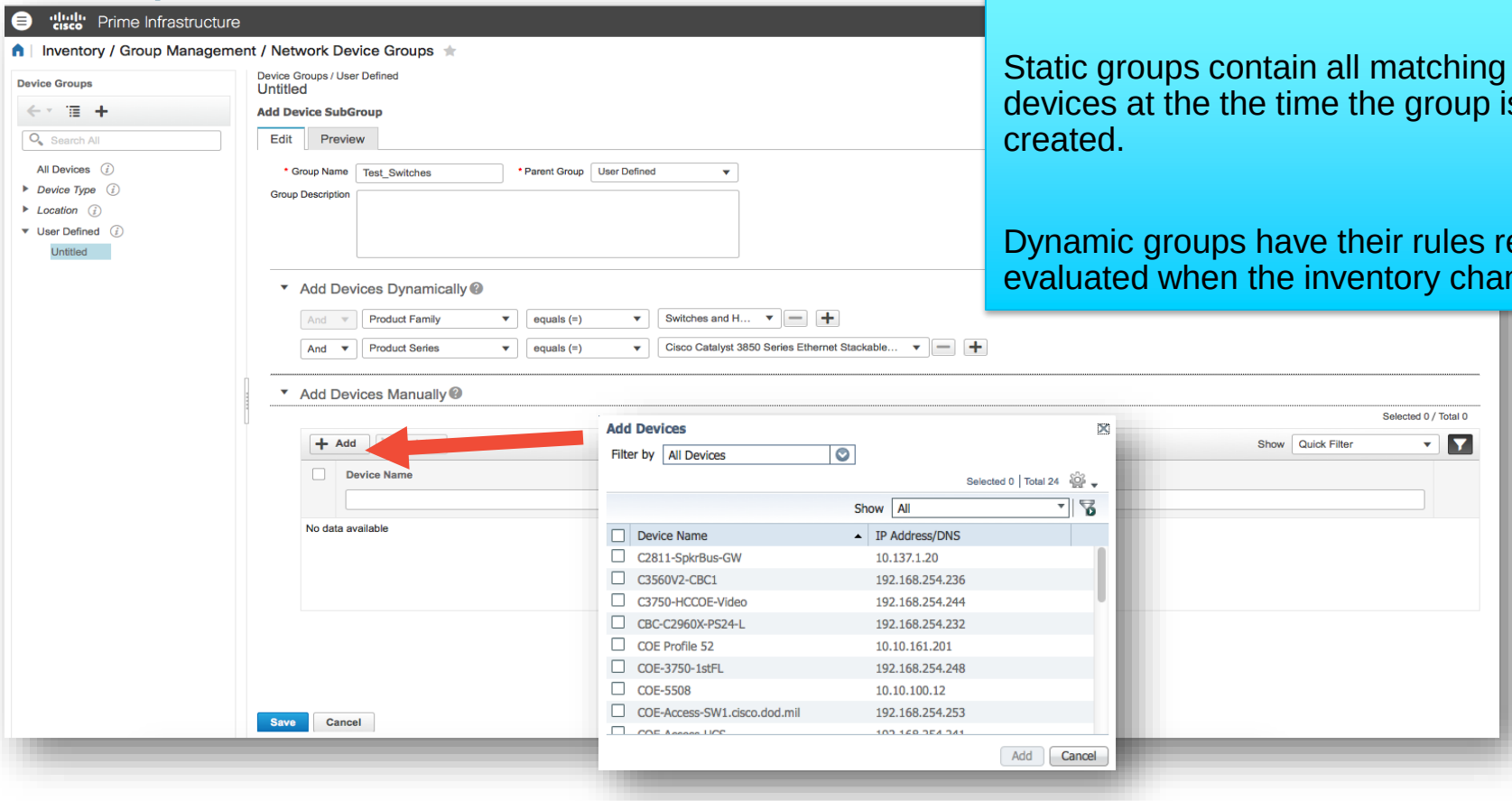


# Group Rules

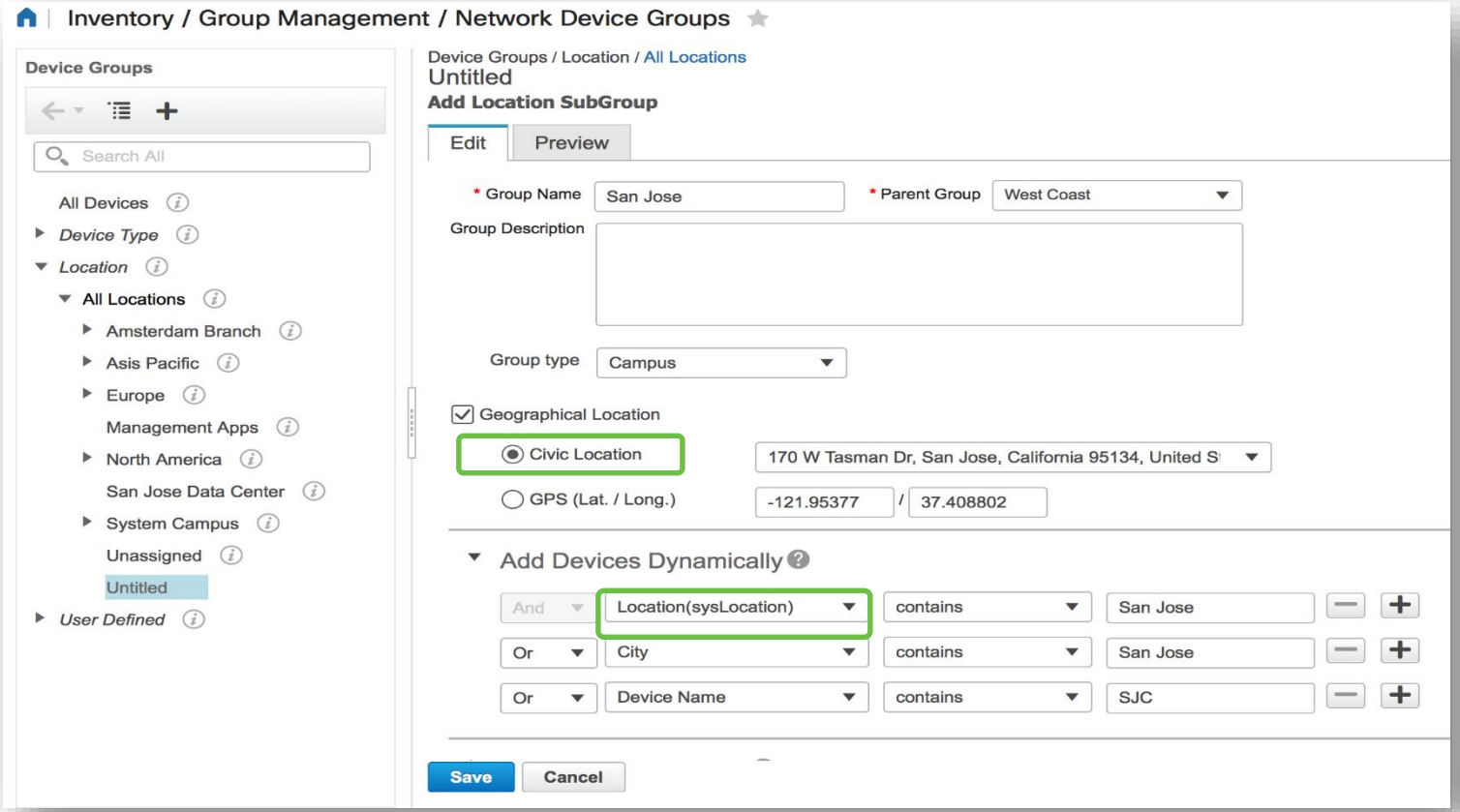
Specify the rules to match devices.

Static groups contain all matching devices at the the time the group is created.

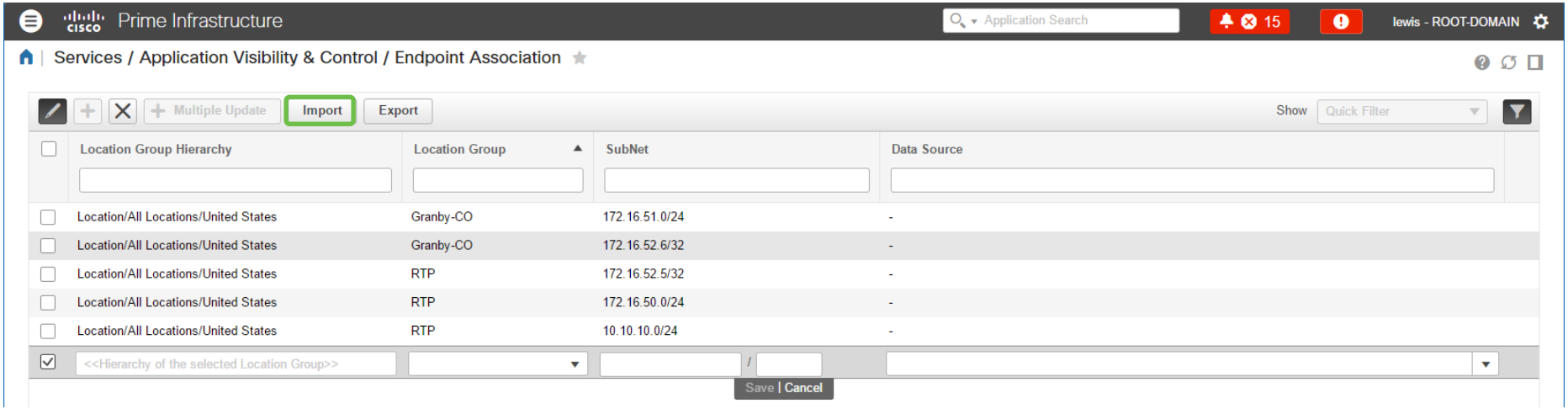
Dynamic groups have their rules re-evaluated when the inventory changes.



# Enhanced Location Based Grouping



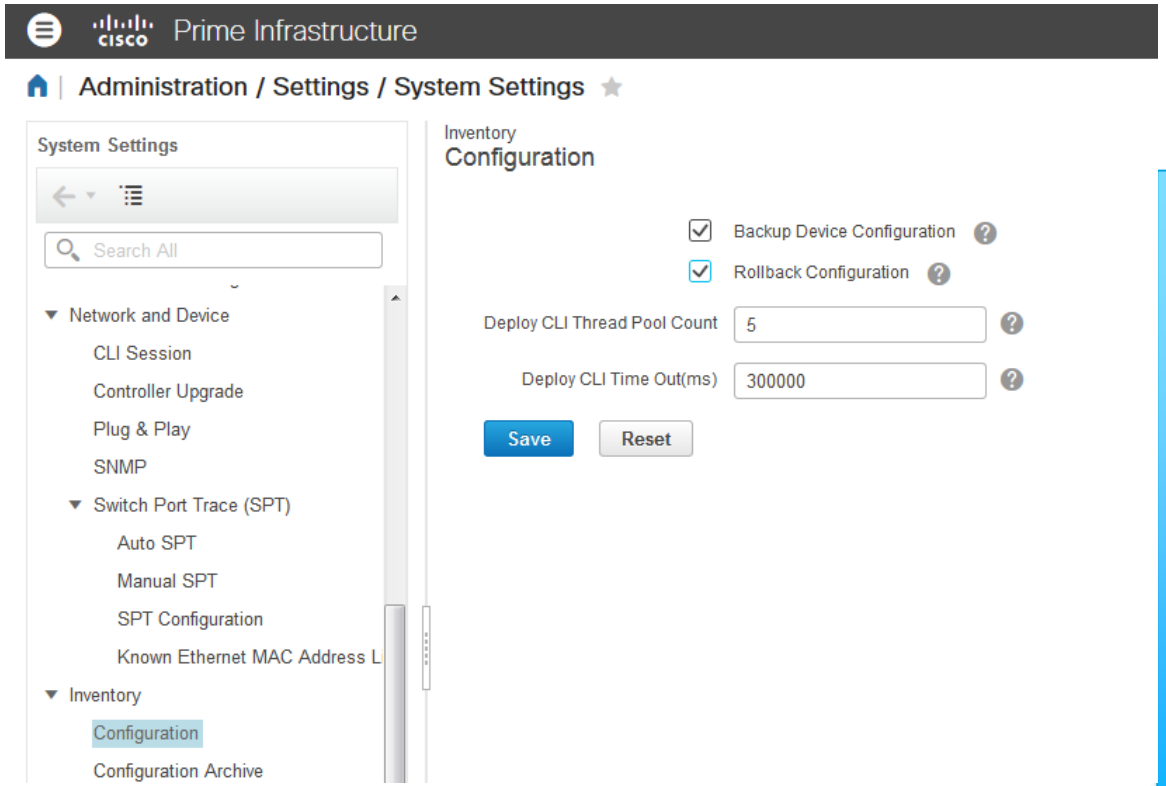
# Pro Tip-End Point Assoc. for better Site Dashboards




Associate subnets with Site location groups for more accurate per site application reporting/monitoring

# Customizing Configuration Templates

# Preparing To Deploy Configurations

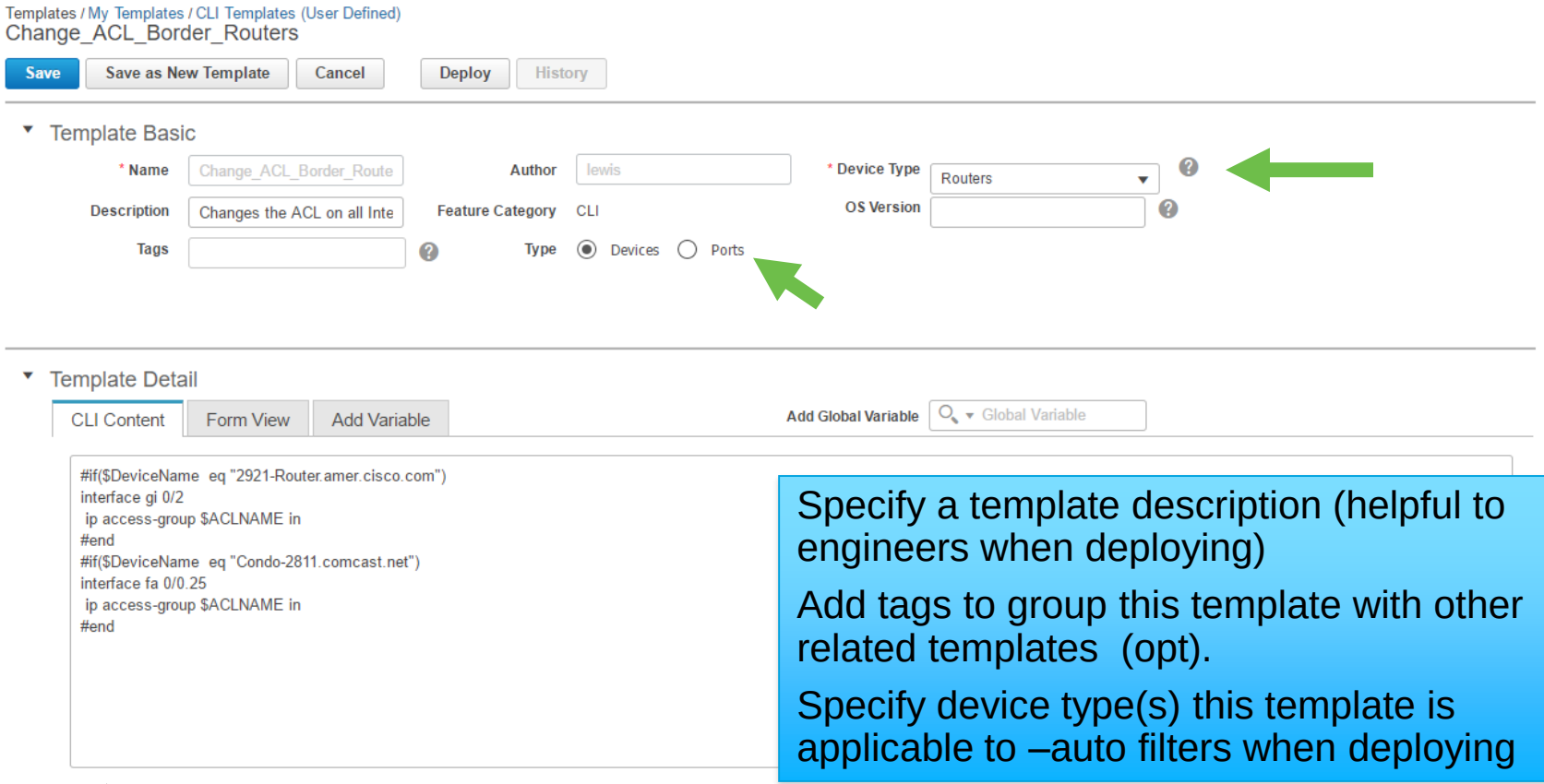



Visit the configuration deployment settings to set desired values.

**Pro-Tip:** Increasing the thread count will allow PI to deploy to more devices faster. Consider 10 or 20 for larger PI servers.

**Pro-Tip:** Uncheck Rollback Configurations if you have dynamic routing protocols

# Defining The Template

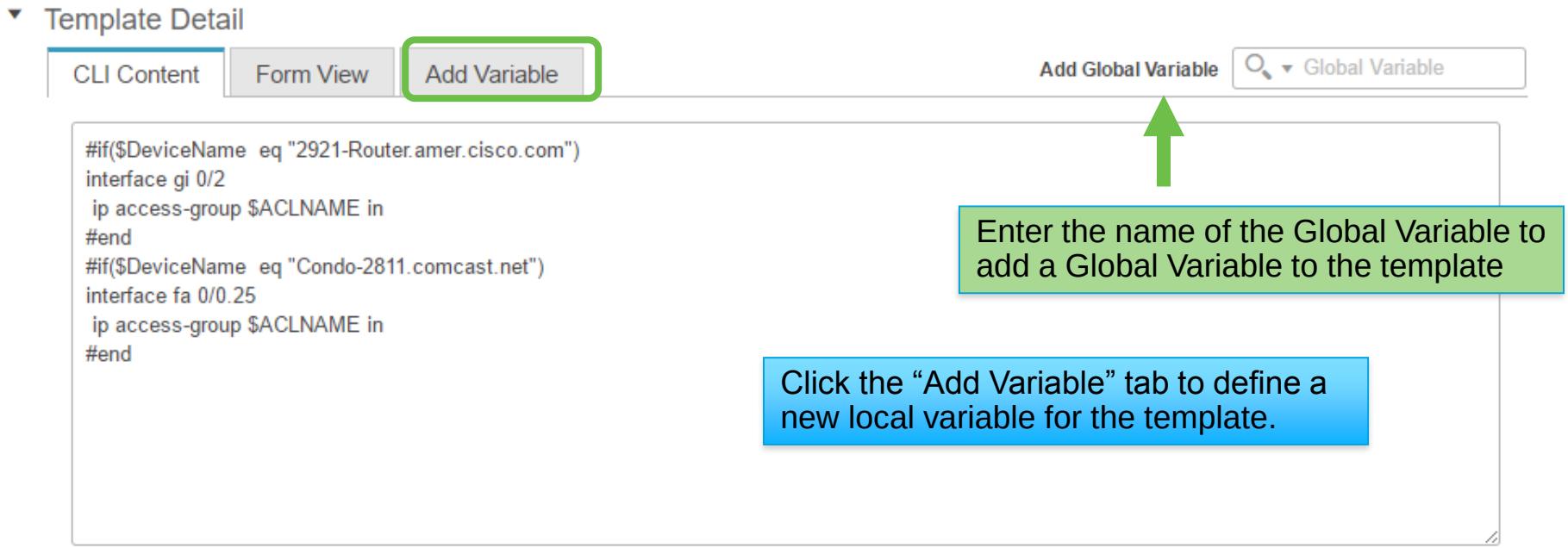



Specify a template description (helpful to engineers when deploying)

Add tags to group this template with other related templates (opt).

Specify device type(s) this template is applicable to –auto filters when deploying

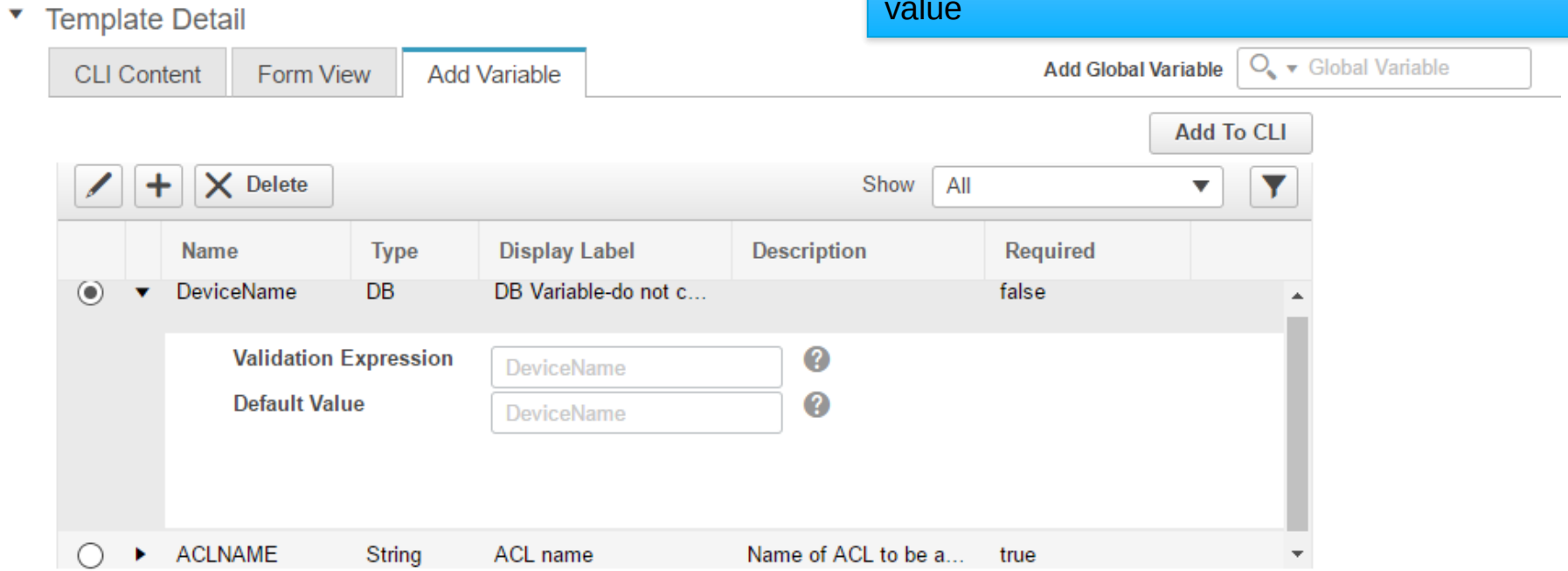
# Defining A New Template Variable



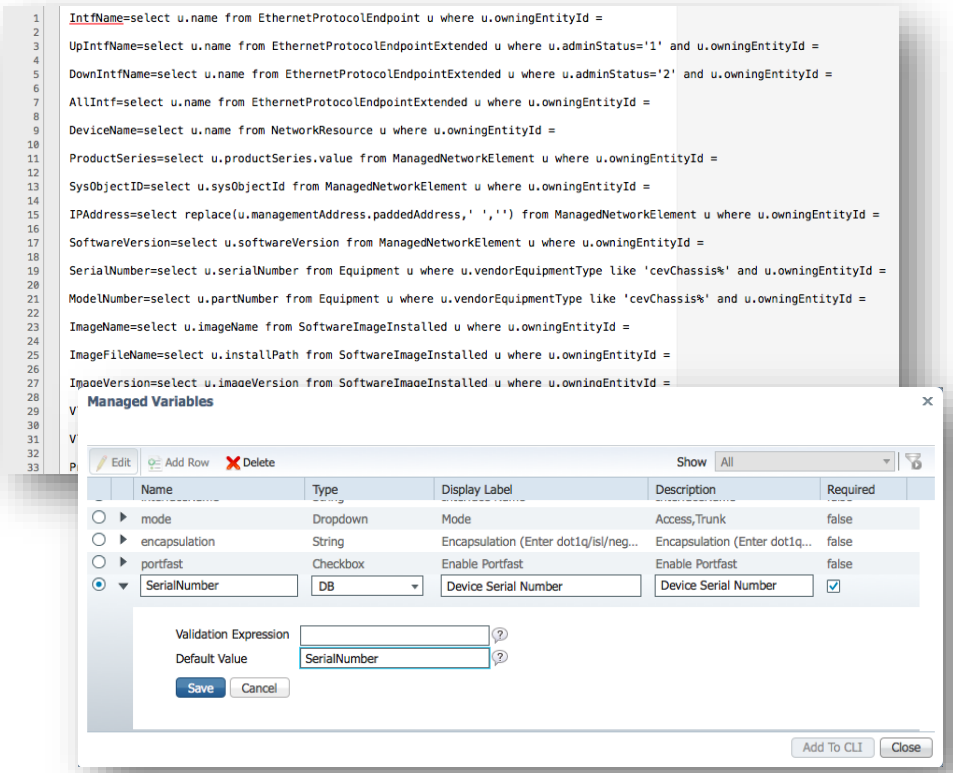
# Defining A DB Variable

Pro-Tip: Name must match DB Variable name

Pro-Tip: use Validation Expression and Default Value to ensure that operator cannot change value



# Pro-Tip: Creating New Built-in Variables



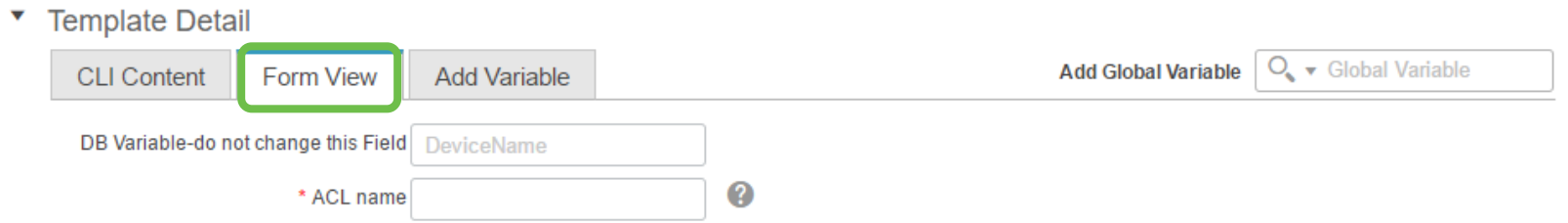

- Additional data can be extracted from the database and used in Velocity expressions
- Reference server file `/opt/CSCOlumos/conf/ifm/template/inventoryTagsInTemplate/CLITemplateDbVariablesQuery.properties` for existing keys or to define your own using SQL
- Define variables in the feature templates using the DB type
- Variable values will be enclosed in '[' ']'; E.g.:
  - `#if($SerialNumber == "[FDO1323Z10Q]")`

# CLITemplateDBVariablesQuery.properties

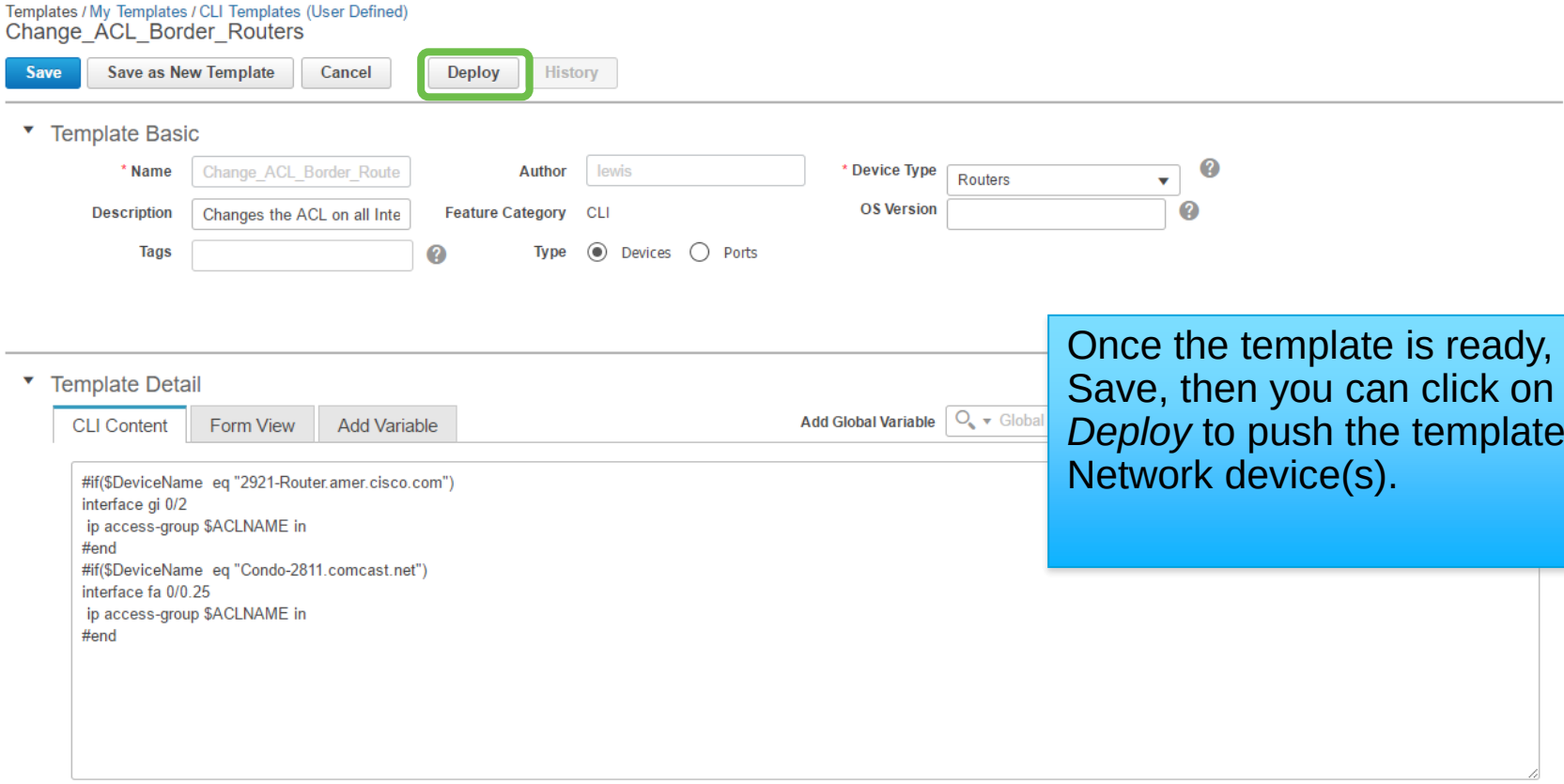
```
IntfName=select u.name from EthernetProtocolEndpoint u where u.owningEntityId = --?%-- order by u.name

UpIntfName=select u.name from EthernetProtocolEndpointExtended u where u.adminStatus='1' and u.owningEntityId = --?%-- order by u.name

DownIntfName=select u.name from EthernetProtocolEndpointExtended u where u.adminStatus='2' and u.owningEntityId = --?%-- order by u.name

AllIntf=select u.name from EthernetProtocolEndpointExtended u where u.owningEntityId = --?%-- order by u.name

EveryIntf=select u.name from InterfaceProtocolEndpoint u where u.owningEntityId = --?%-- order by u.name

DeviceName=select u.name from NetworkResource u where classname = 'ManagedNetworkElement' and u.owningEntityId =

ProductSeries=select u.productSeries.value from ManagedNetworkElement u where u.owningEntityId =

SysObjectID=select u.sysObjectId from ManagedNetworkElement u where u.owningEntityId =

IPAddress=select replace(u.managementAddress.paddedAddress,' ','') from ManagedNetworkElement u where u.owningEntityId =

SoftwareVersion=select u.softwareVersion from ManagedNetworkElement u where u.owningEntityId =

SerialNumber=select u.serialNumber from Equipment u where u.vendorEquipmentType like 'cevChassis%' and u.owningEntityId =

ModelNumber=select u.partNumber from Equipment u where u.vendorEquipmentType like 'cevChassis%' and u.owningEntityId =

ImageName=select u.imageName from SoftwareImageInstalled u where u.owningEntityId =

ImageFileName=select u.installPath from SoftwareImageInstalled u where u.owningEntityId =

ImageVersion=select u.imageVersion from SoftwareImageInstalled u where u.owningEntityId =

VlanId=select STR(u.vlanId) from VLANInterface u where u.owningEntityId =

VlanName=select vlan.name from VLANInterface vlan where vlan.owningEntityId =

ProductType=select u.productType.value from ManagedNetworkElement u where u.owningEntityId =
```

# Previewing The Template Form

Click the *Form View* tab to preview what the template form will look like when it is deployed.

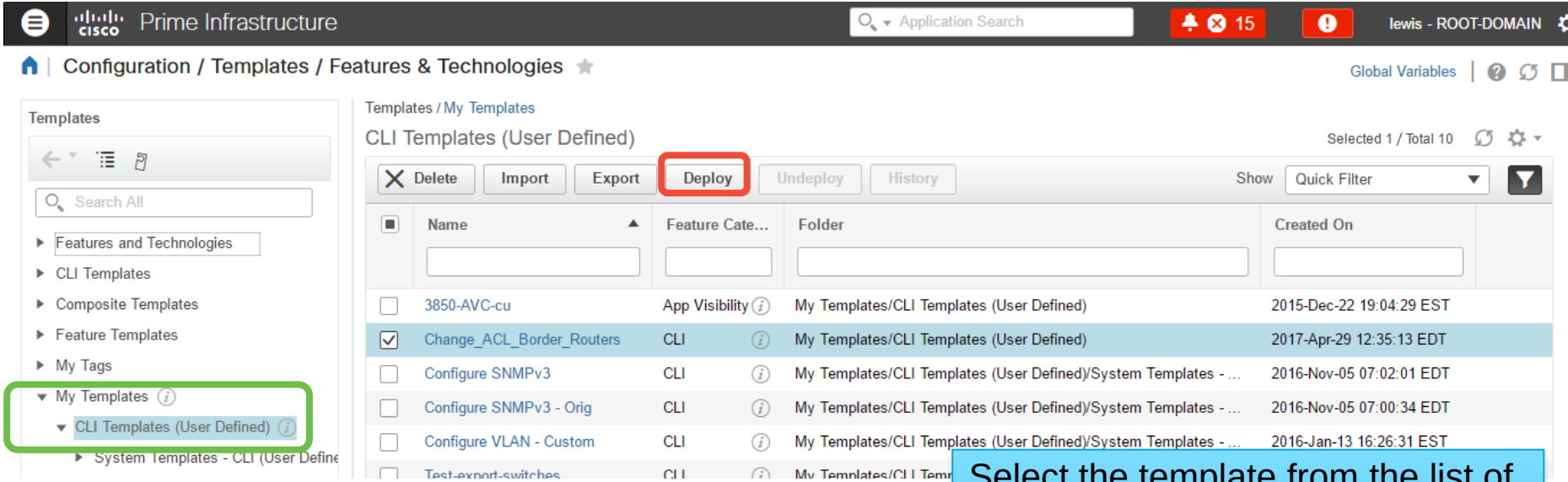


# Deploying The Template



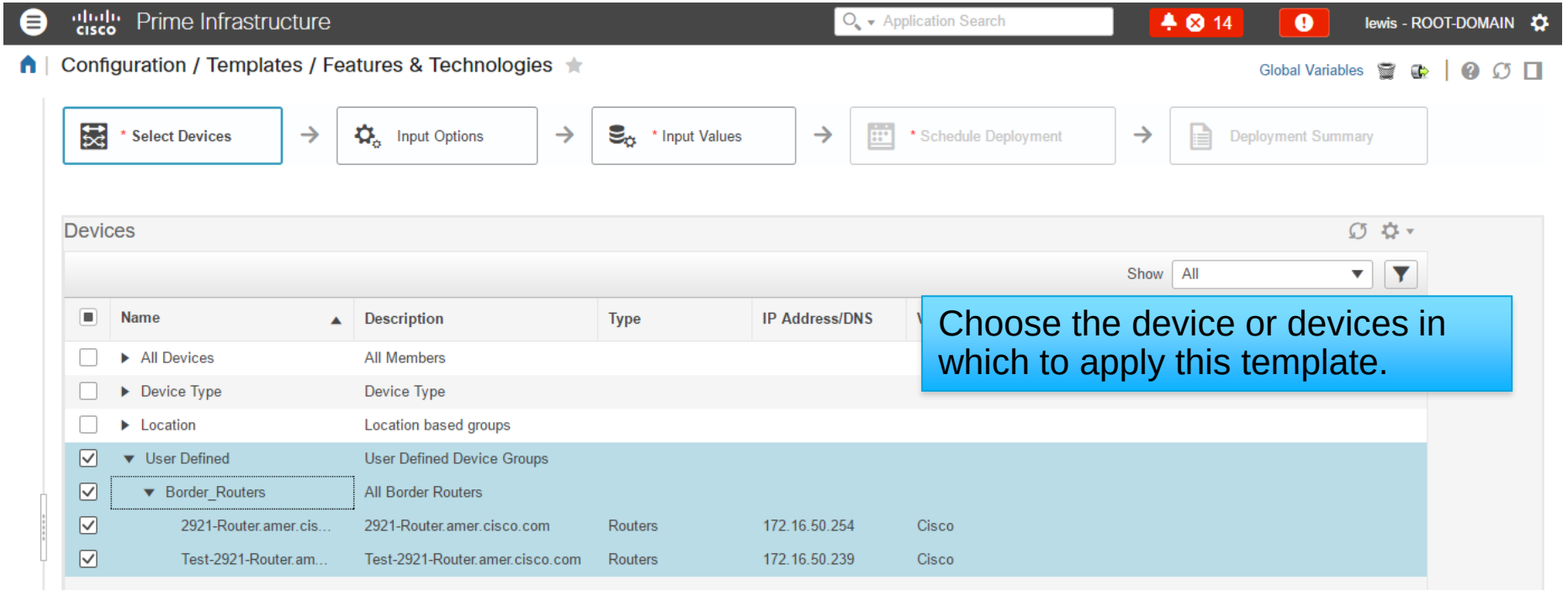

Once the template is ready, click Save, then you can click on *Deploy* to push the template to the Network device(s).

# Deploying The Template (cont)

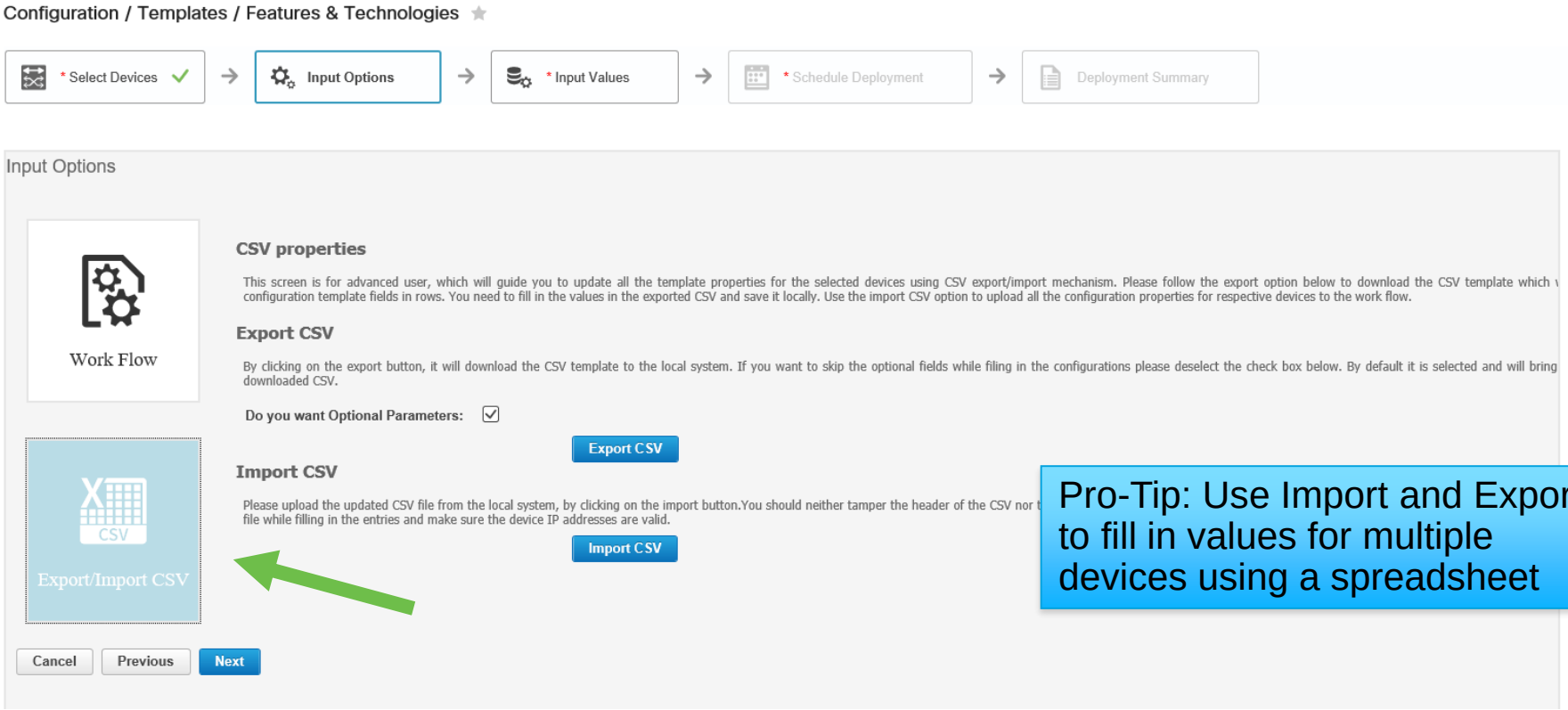



Select the template from the list of "My Templates." Click the Deploy button to begin the workflow.

# Fill In the Template Values

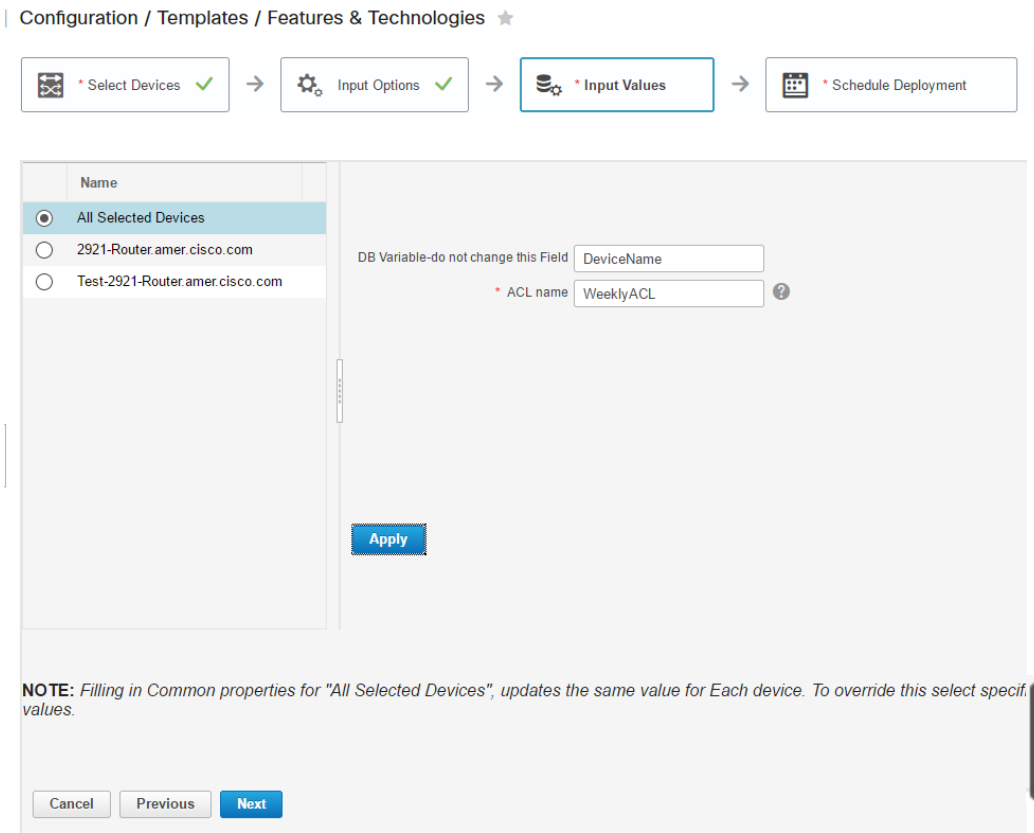


# Fill In the Template Values




Pro-Tip: Use Import and Export to fill in values for multiple devices using a spreadsheet

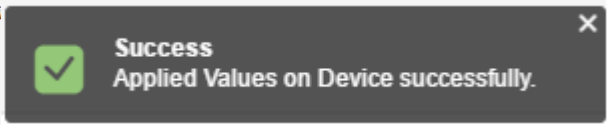
# Fill In the Template Values



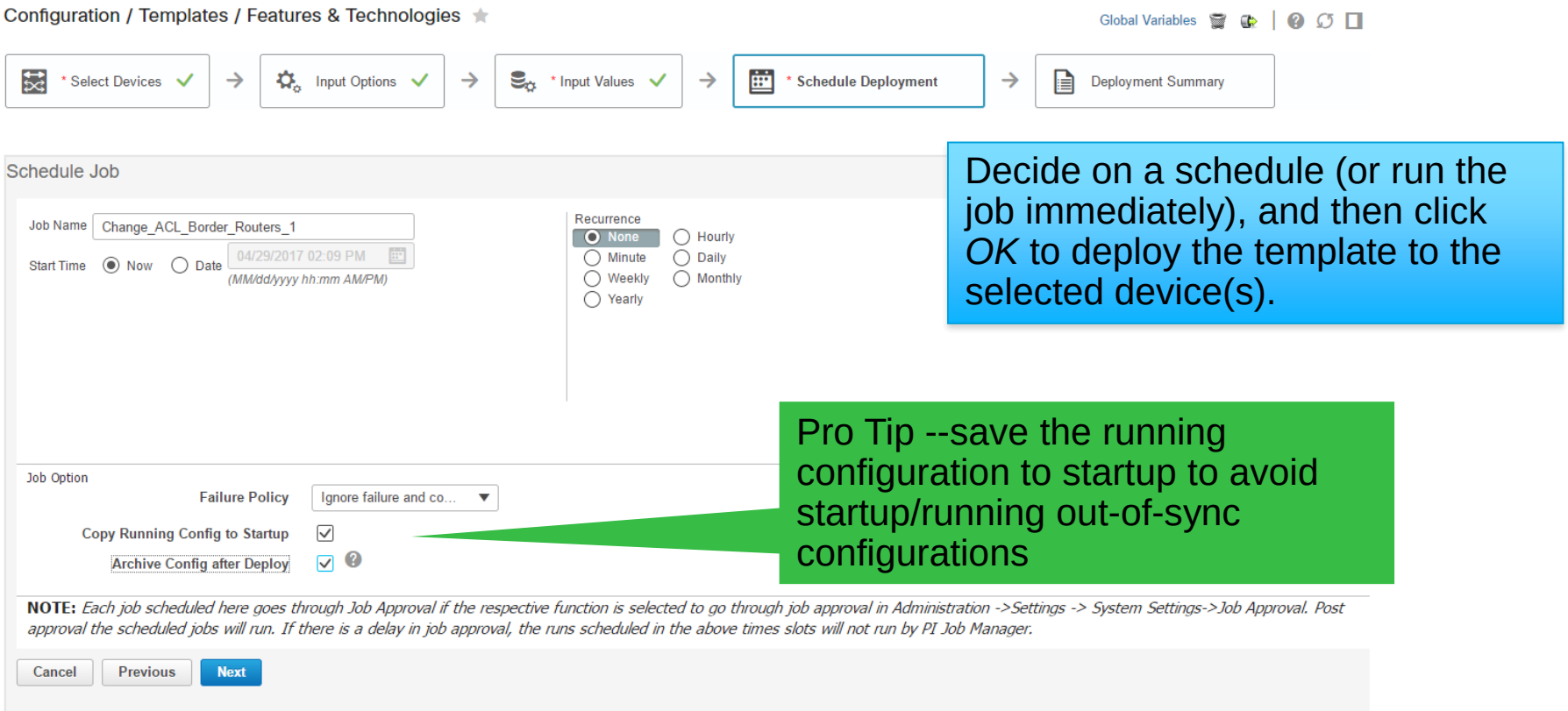

Fill in the parameters.

Common parameters can be applied to all devices with per-device overrides.

Click on Apply



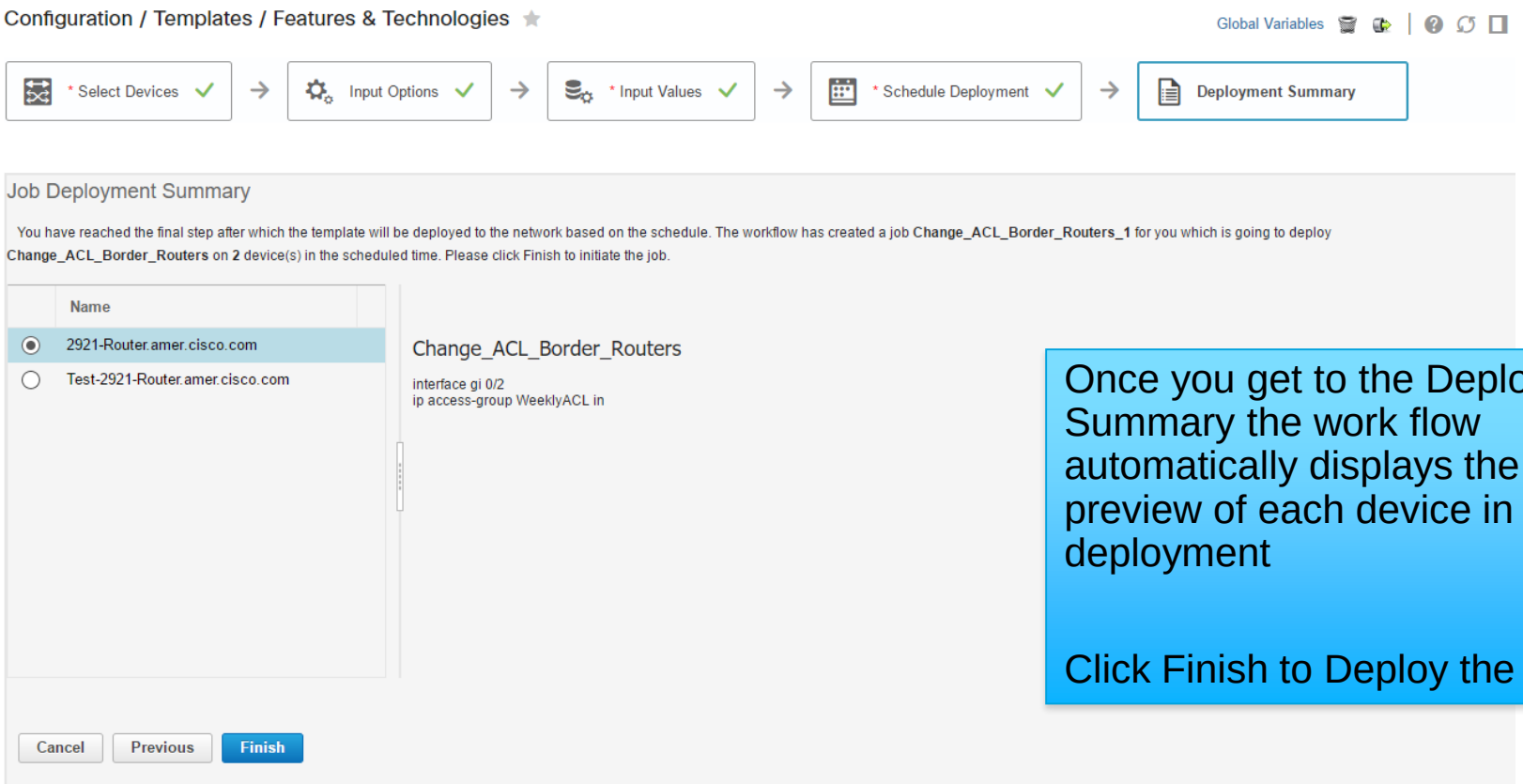
# Select Job Options




Decide on a schedule (or run the job immediately), and then click *OK* to deploy the template to the selected device(s).

Pro Tip --save the running configuration to startup to avoid startup/running out-of-sync configurations

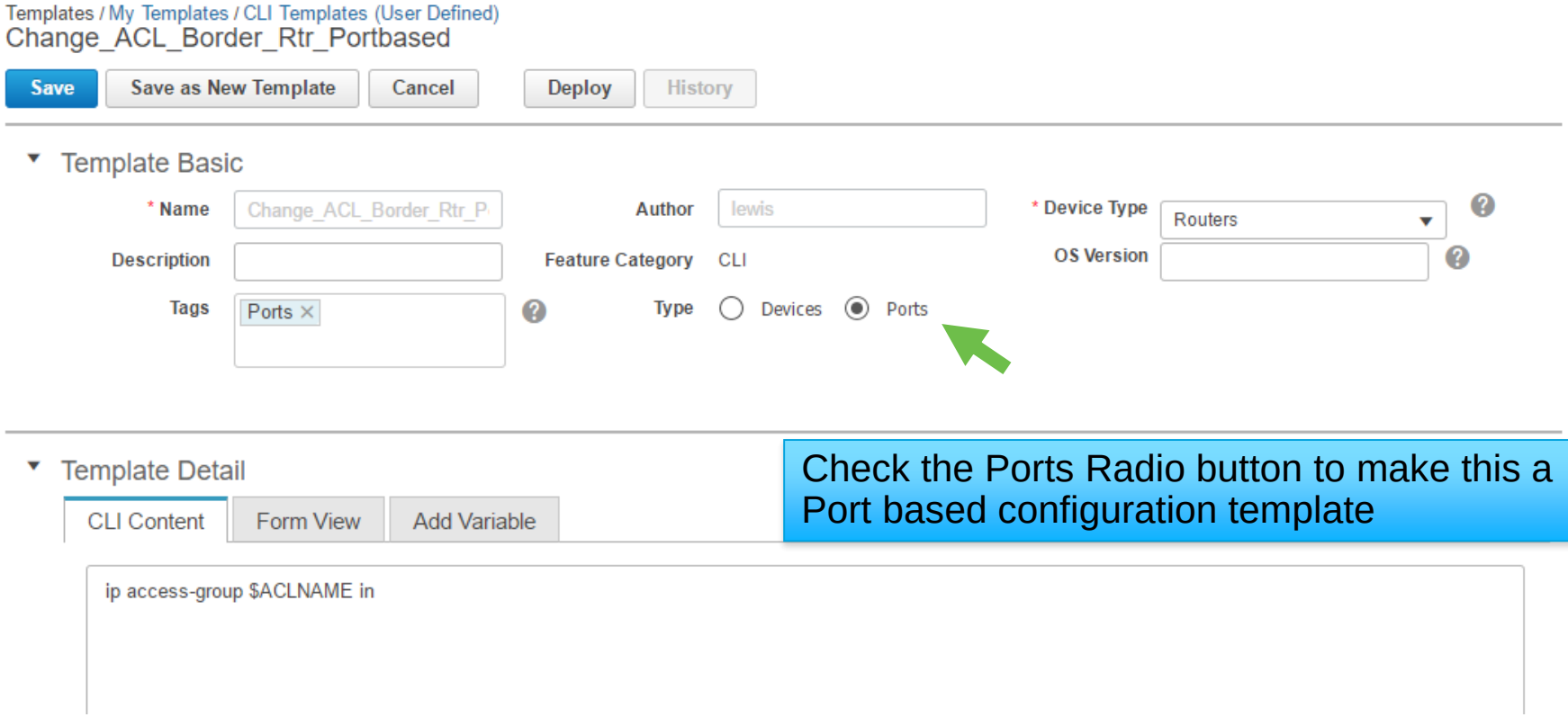
# Preview CLI and Finish



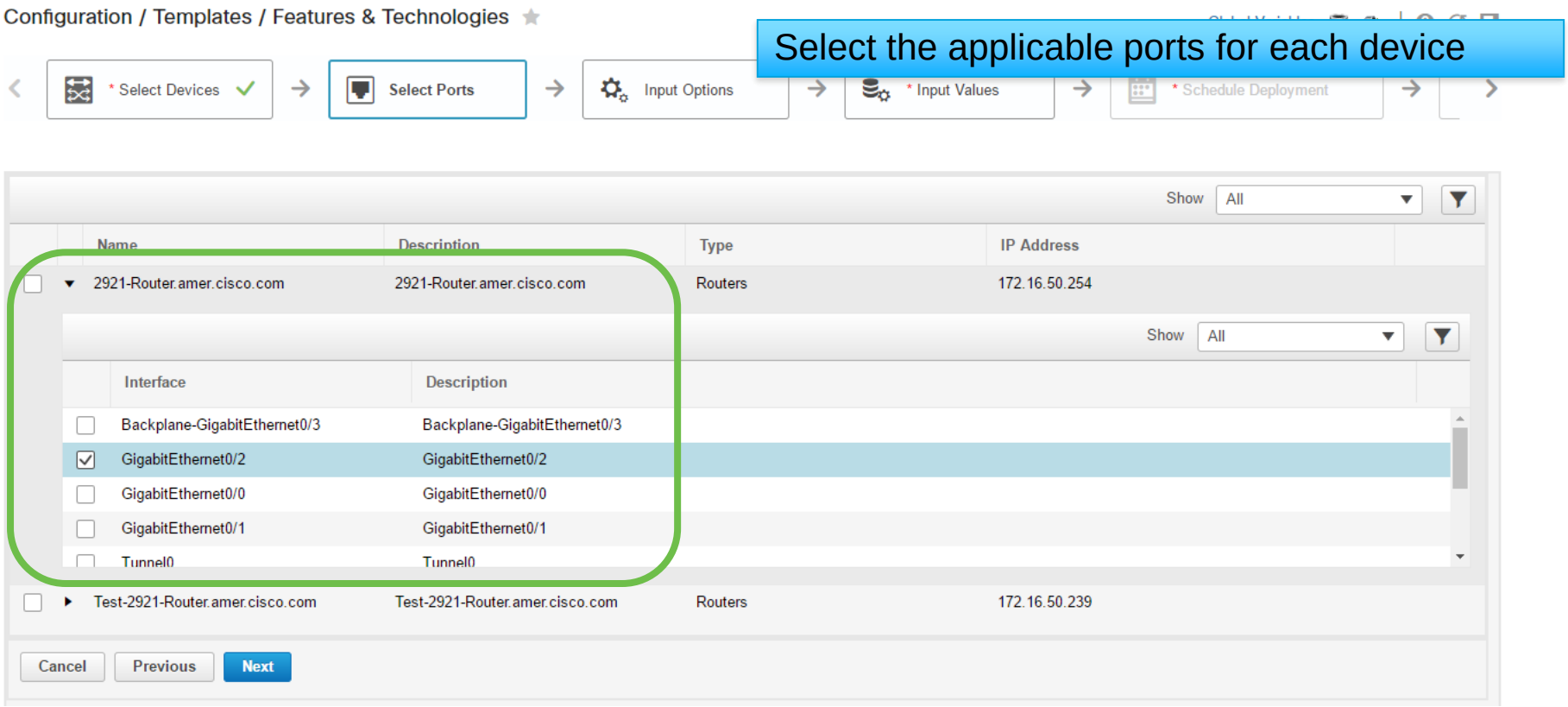

Once you get to the Deployment Summary the work flow automatically displays the CLI preview of each device in the deployment

Click Finish to Deploy the template

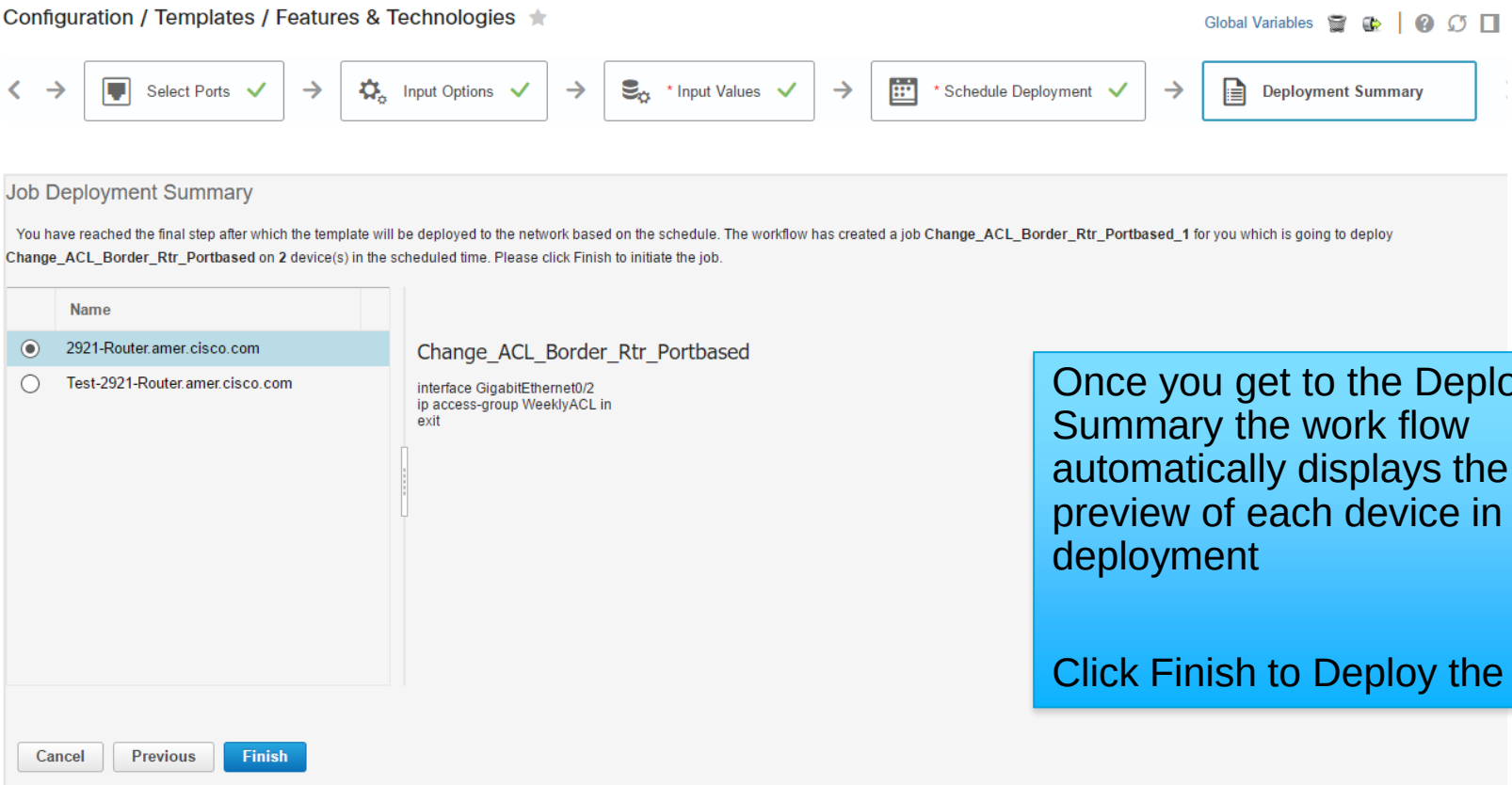
# Defining Port Based Template



# Deploying Port Based Template



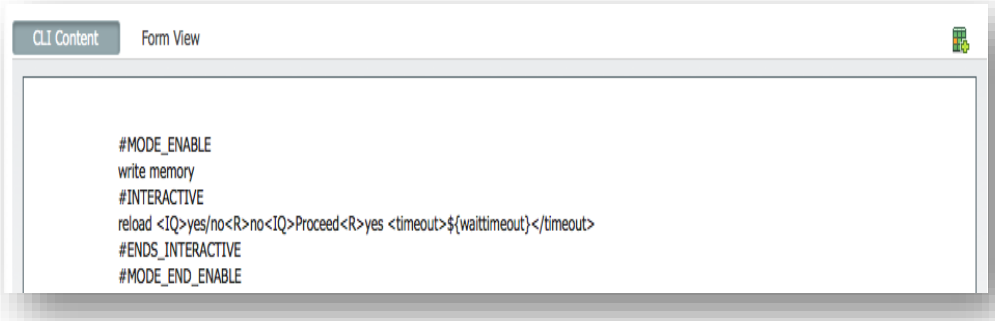
# Preview CLI and Finish

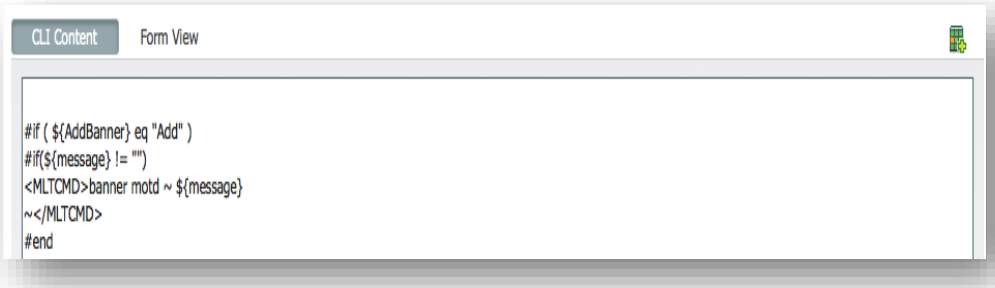



Once you get to the Deployment Summary the work flow automatically displays the CLI preview of each device in the deployment

Click Finish to Deploy the template

# Pro-Tip: Interactive, Enable, and Multiline Commands

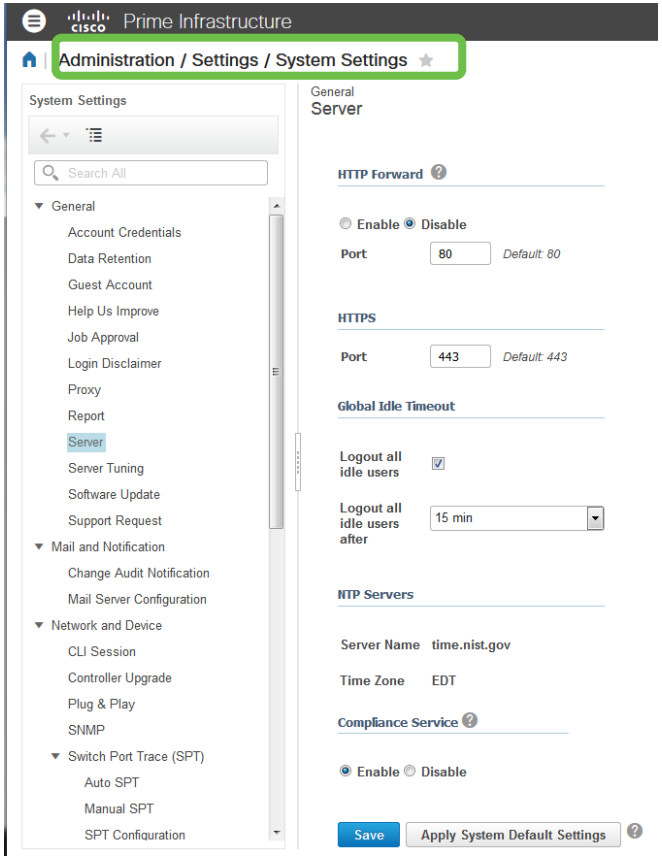



- Interactive commands can be done using the *#INTERACTIVE* command followed by *<IQ>* to denote a question and *<R>* to specify the reply
  - Use *#ENDS_INTERACTIVE* to denote the end of the interactive block
- Multi-line commands can be specified using the *<MLTCMD></MLTCMD>* tags
- Enable (i.e., EXEC) mode commands can be specified within *#MODE_ENABLE* and *#MODE_END_ENABLE* comments

# Setting up and using Baseline Compliance

# Getting Started with Compliance




(3.x) Compliance needs to be enable

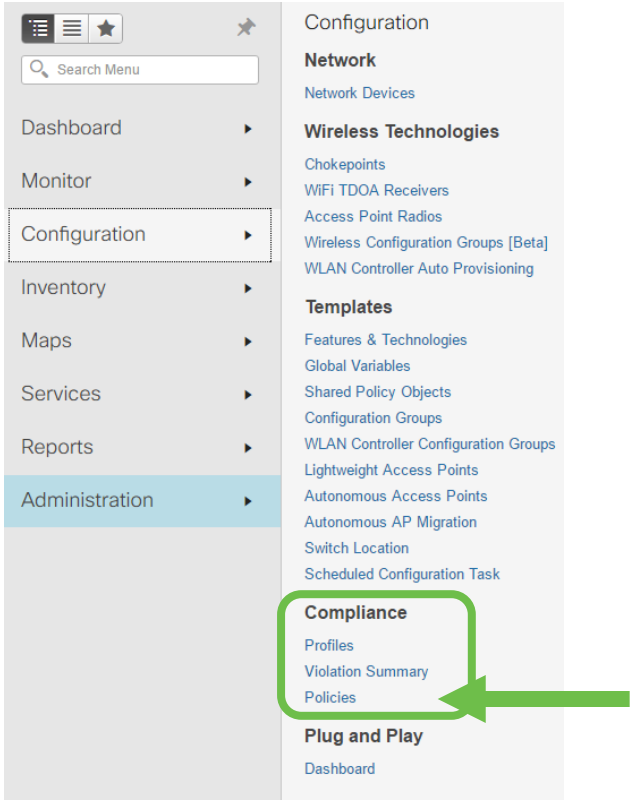
Go to Administration > Settings >System Settings > Server

Select Enable and Click Save

You must Restart the Server for changes to take effect (NCS Stop/NCS start)

Note: *Compliance requires Standard OVA (3.1.3+), Pro OVA, or Gen2 hardware appliance*

# Getting Started with Compliance



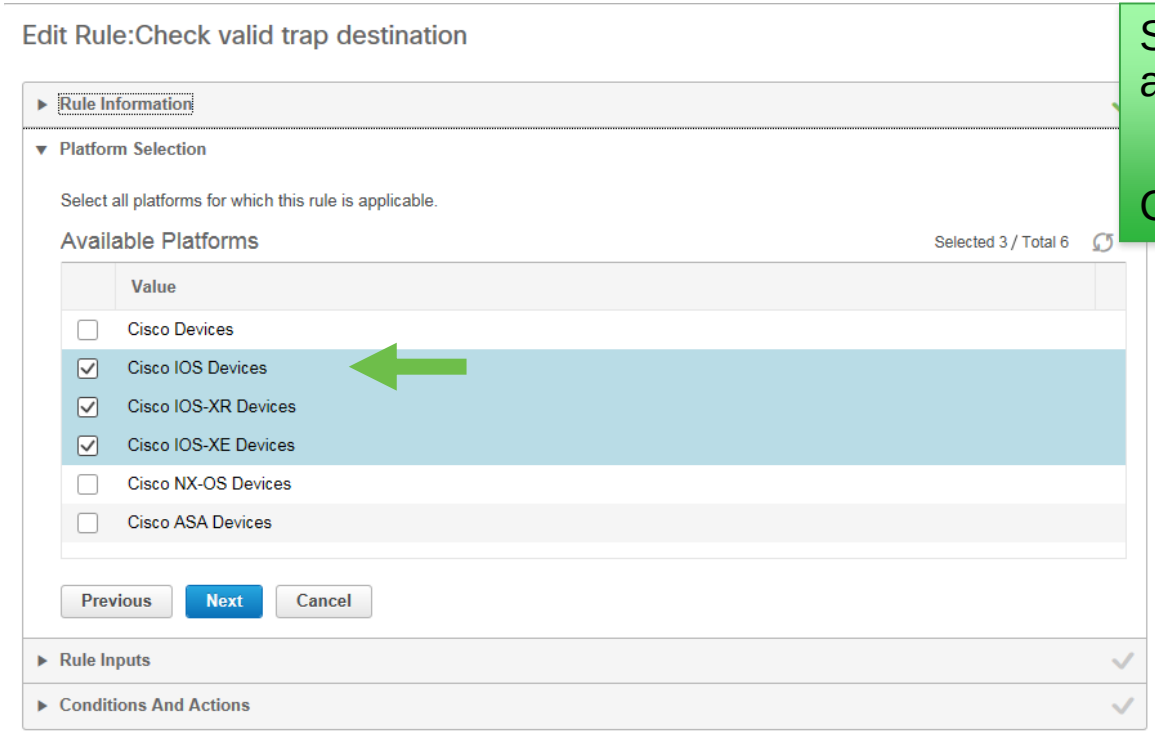

Once enabled, Configuration> Compliance section will appear on the Menu

Compliance follows a 3-Level Model

- Policies
- Profiles
- Violation Summary

To get started, we click on Policies

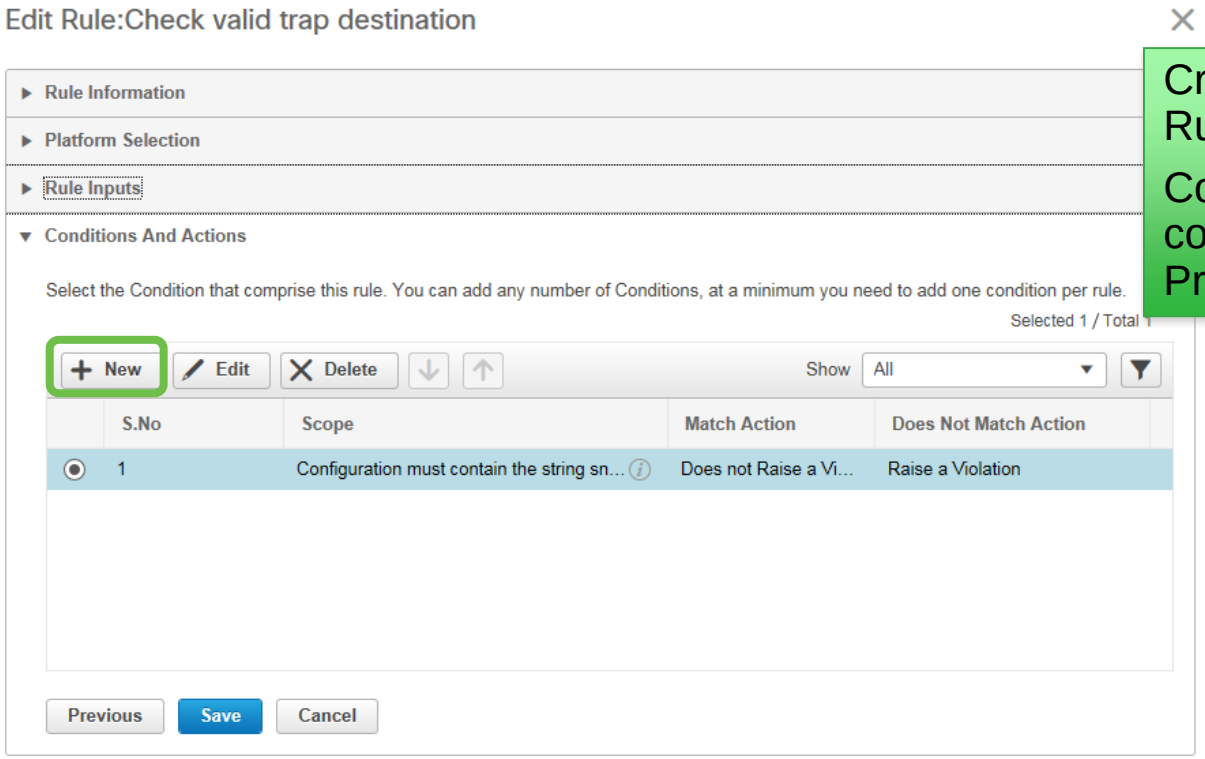
# Define Compliance Policy (cont)




Select the OS(es) the Policy applies to

Click Next

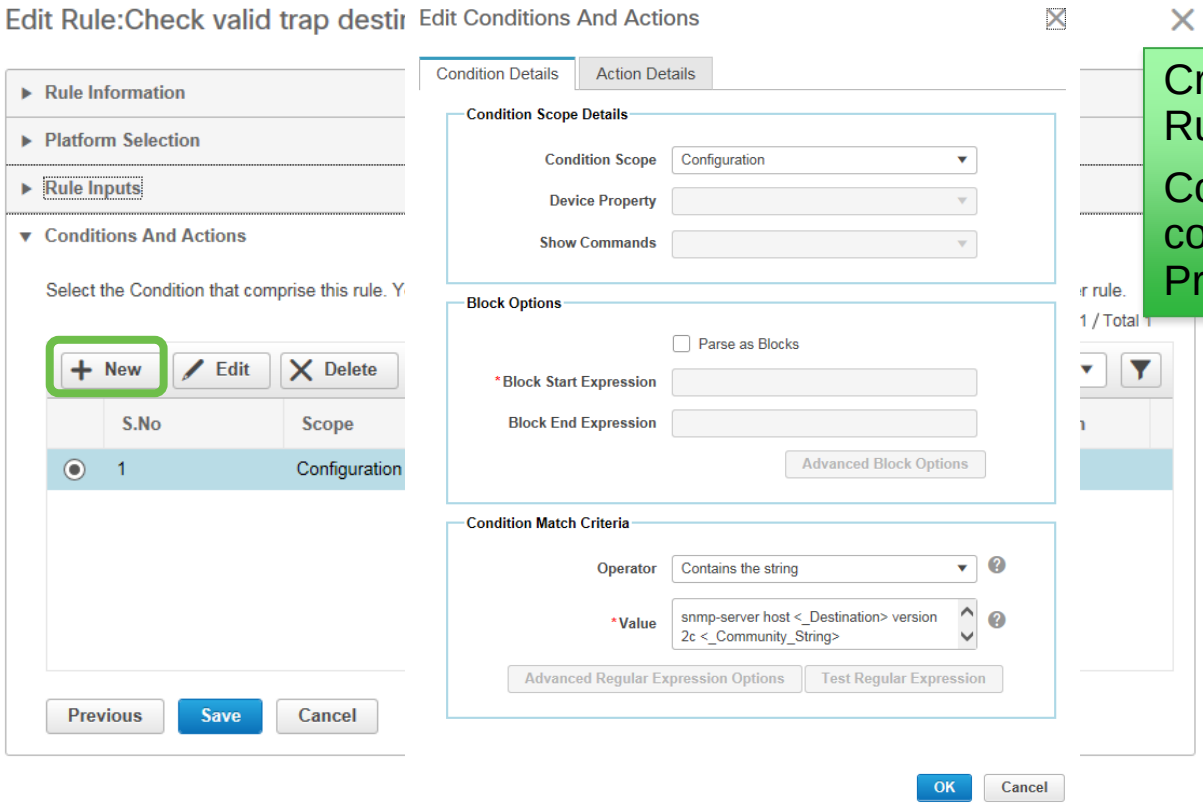
# Define Compliance Policy (cont)




Create the Condition and Action Rules

Condition Scope can be based on config, Command Output, Properties or Previous Blocks

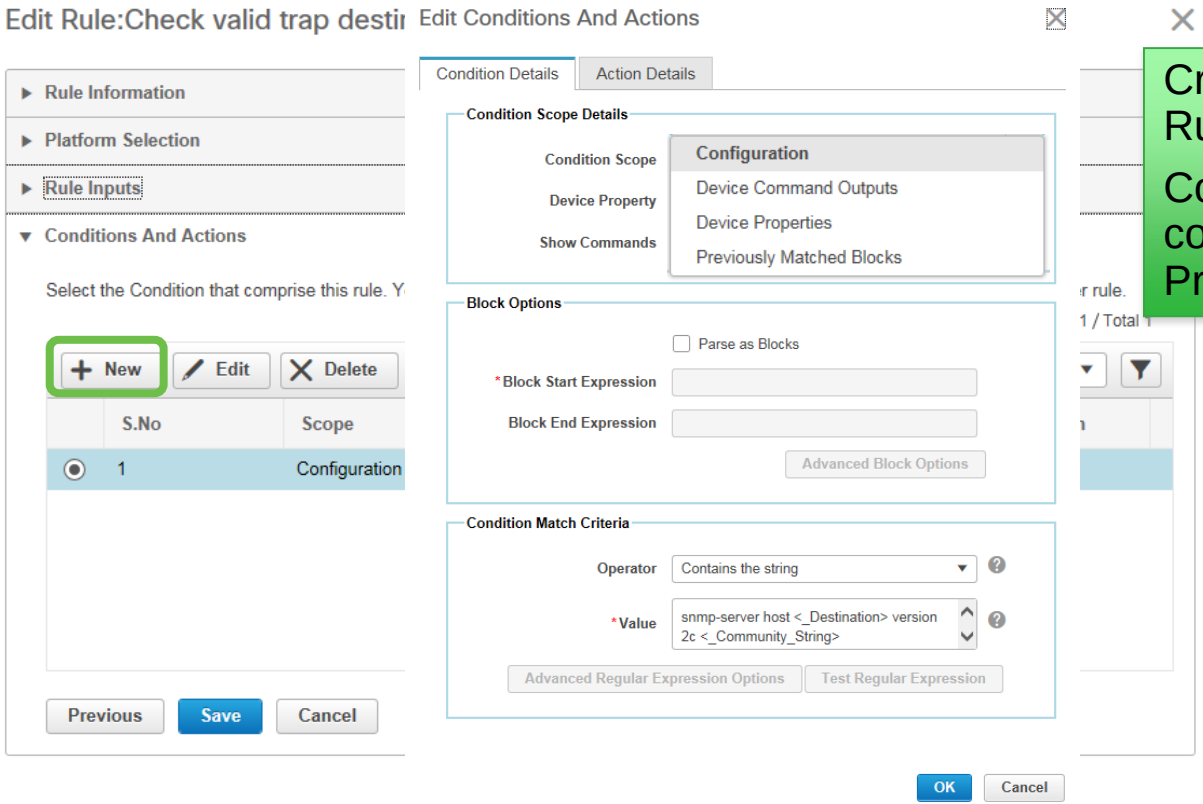
# Define Compliance Policy (cont)




Create the Condition and Action Rules

Condition Scope can be based on config, Command Output, Properties or Previous Blocks

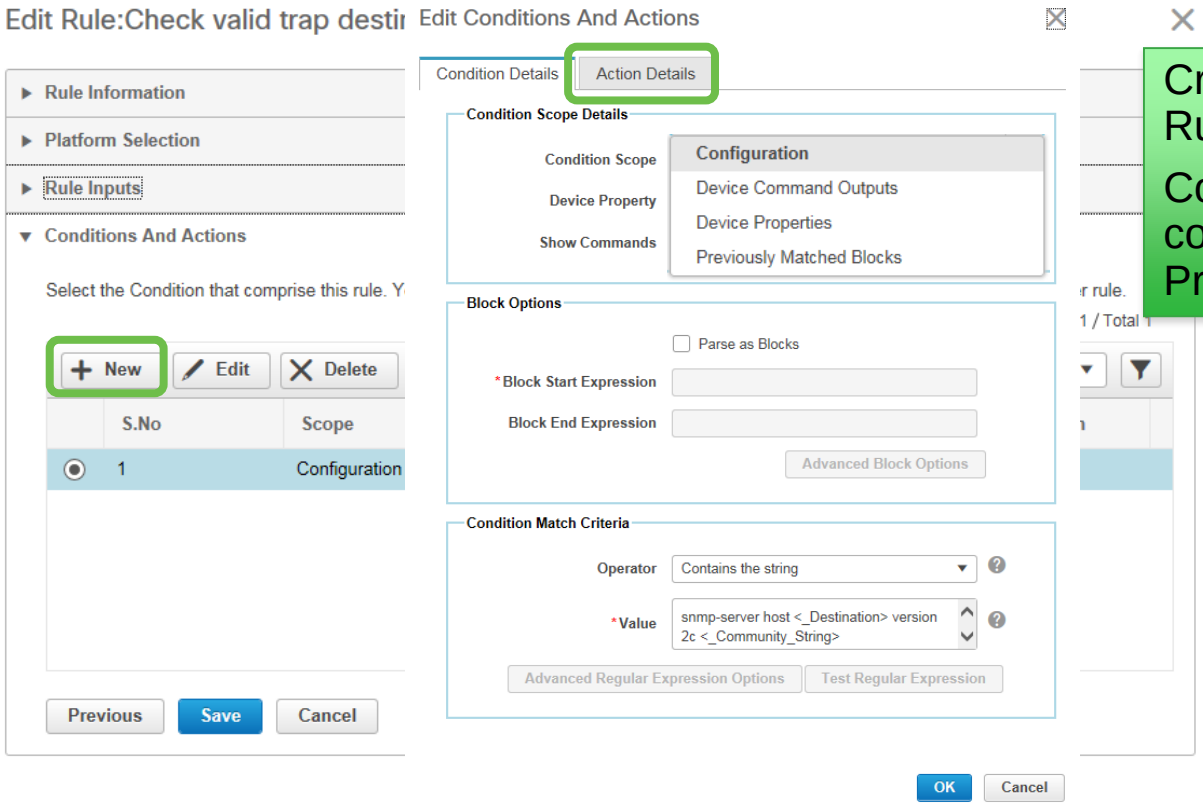
# Define Compliance Policy (cont)




Create the Condition and Action Rules

Condition Scope can be based on config, Command Output, Properties or Previous Blocks

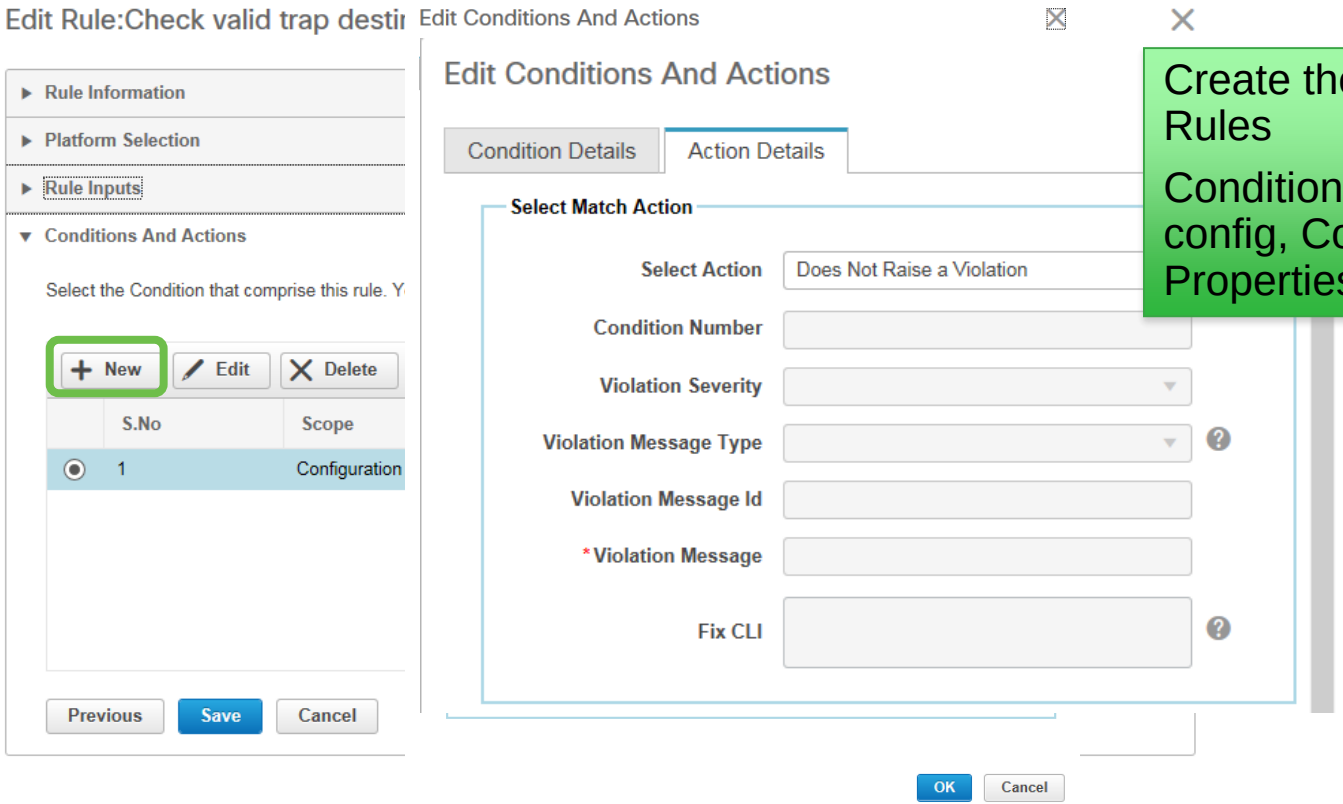
# Define Compliance Policy (cont)




Create the Condition and Action Rules

Condition Scope can be based on config, Command Output, Properties or Previous Blocks

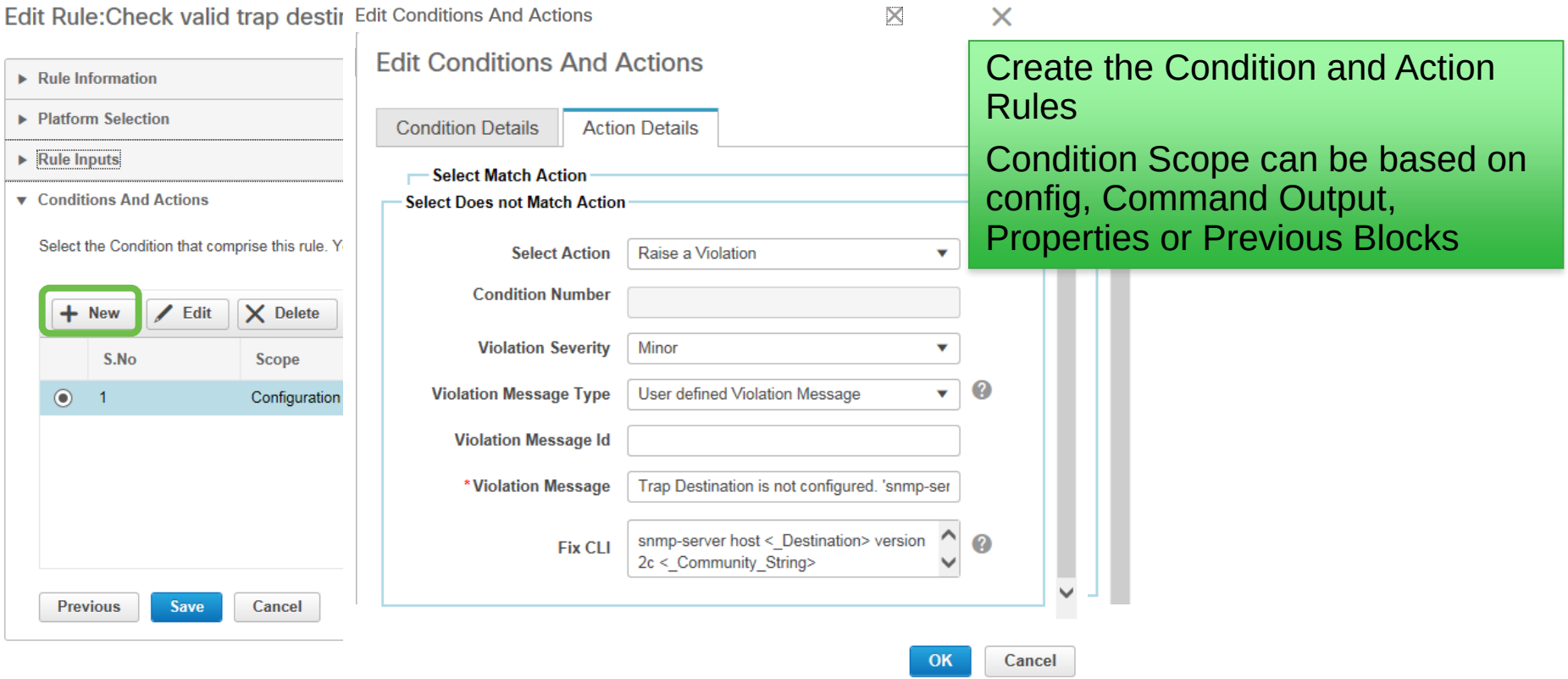
# Define Compliance Policy (cont)



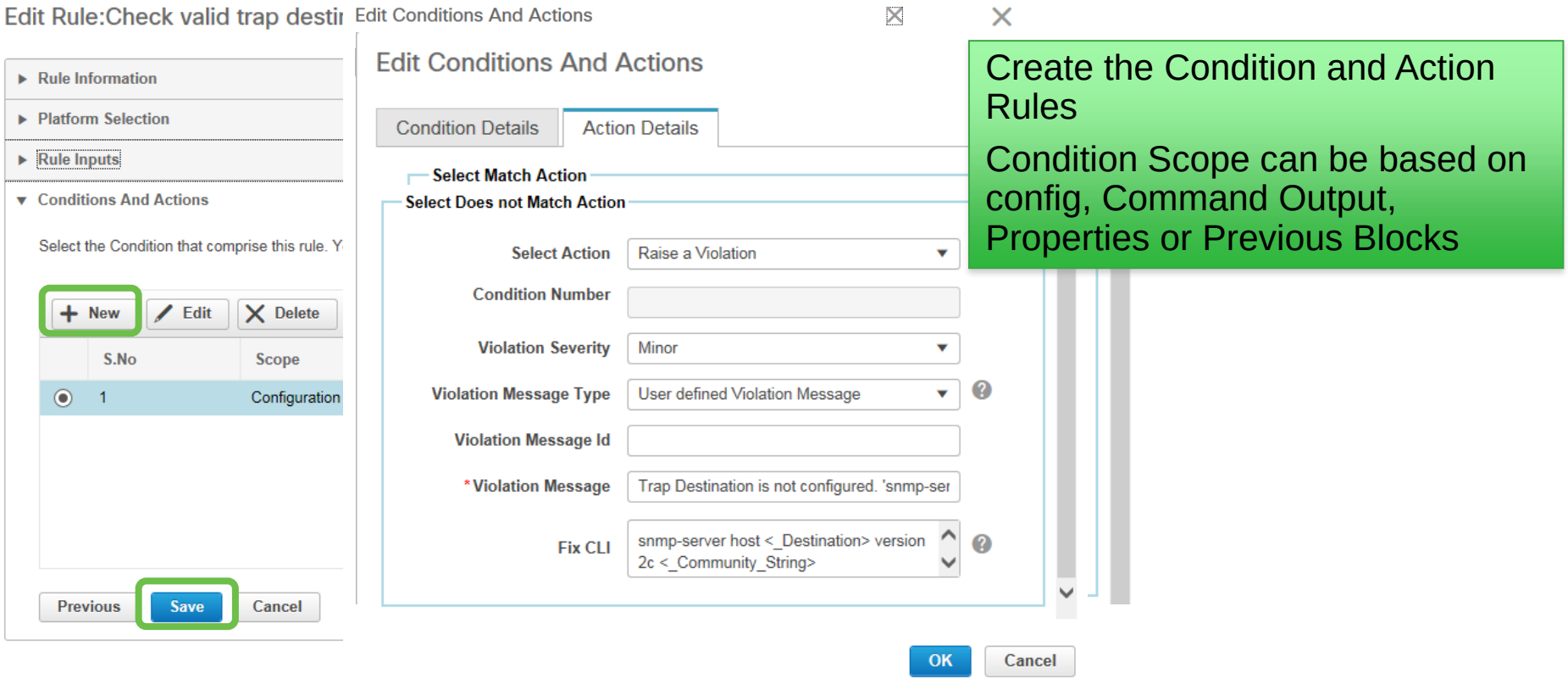

Create the Condition and Action Rules

Condition Scope can be based on config, Command Output, Properties or Previous Blocks

# Define Compliance Policy (cont)

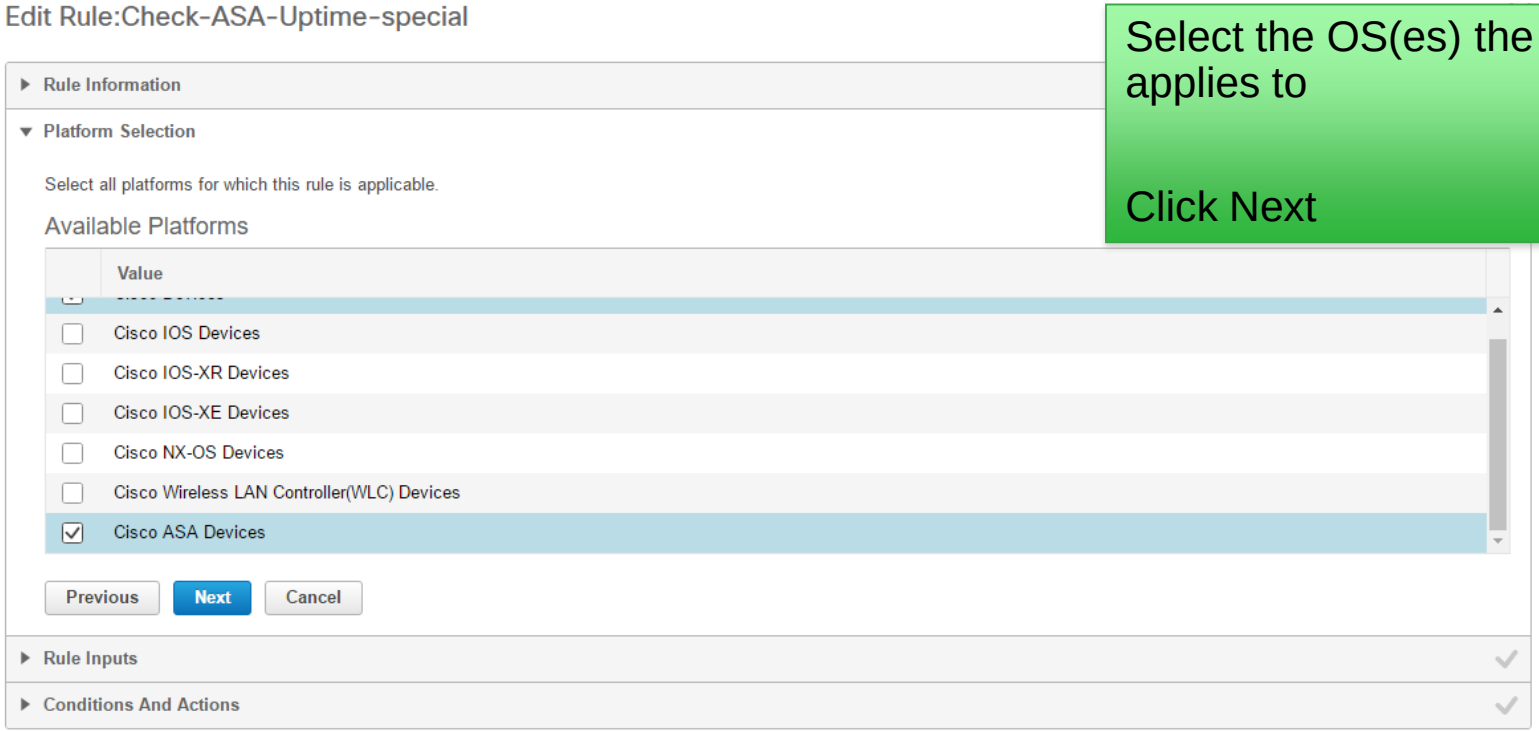


# Define Compliance Policy (cont)



# Compliance Example 2 Command Output

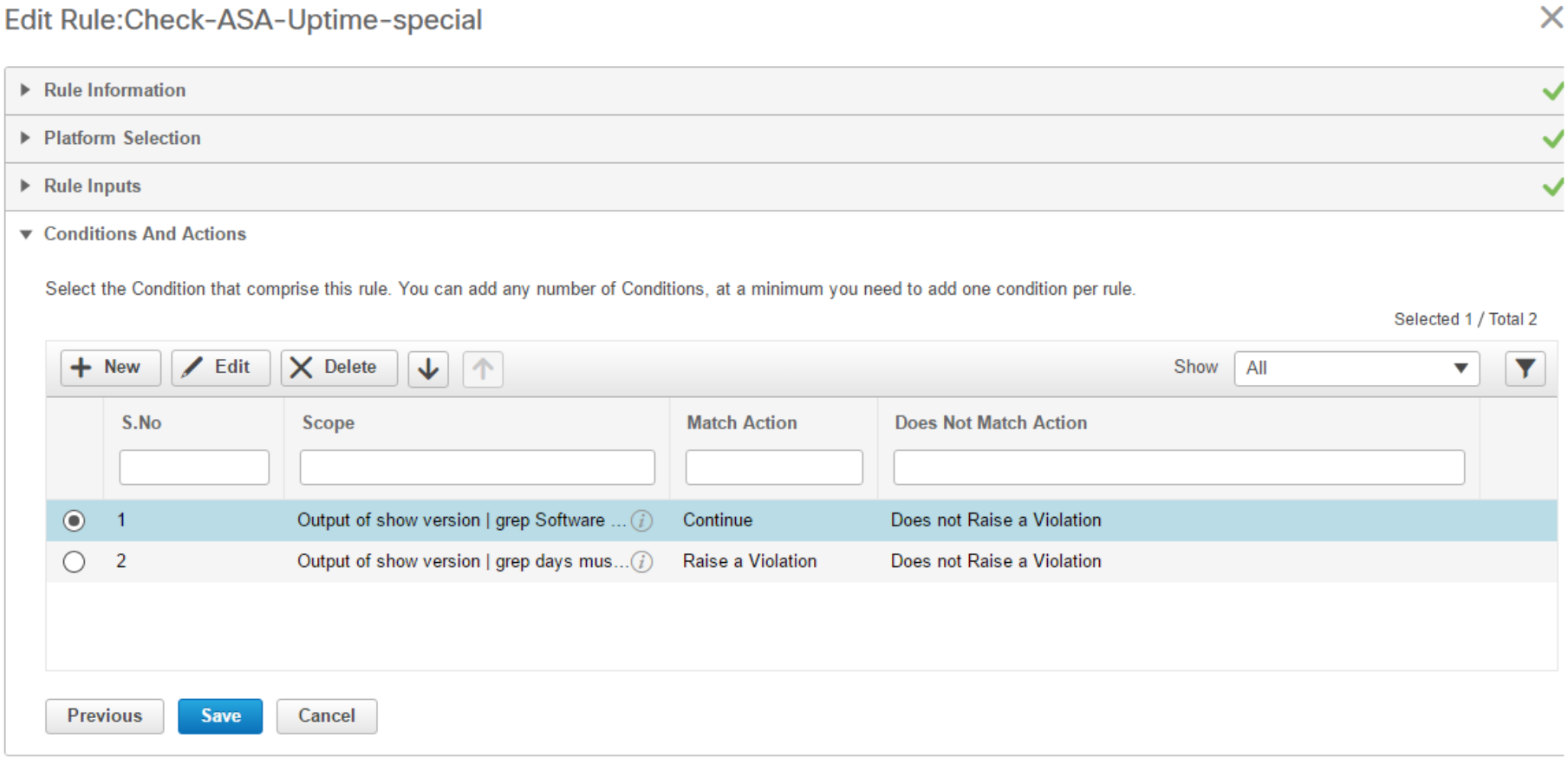
# Command output Compliance Policy



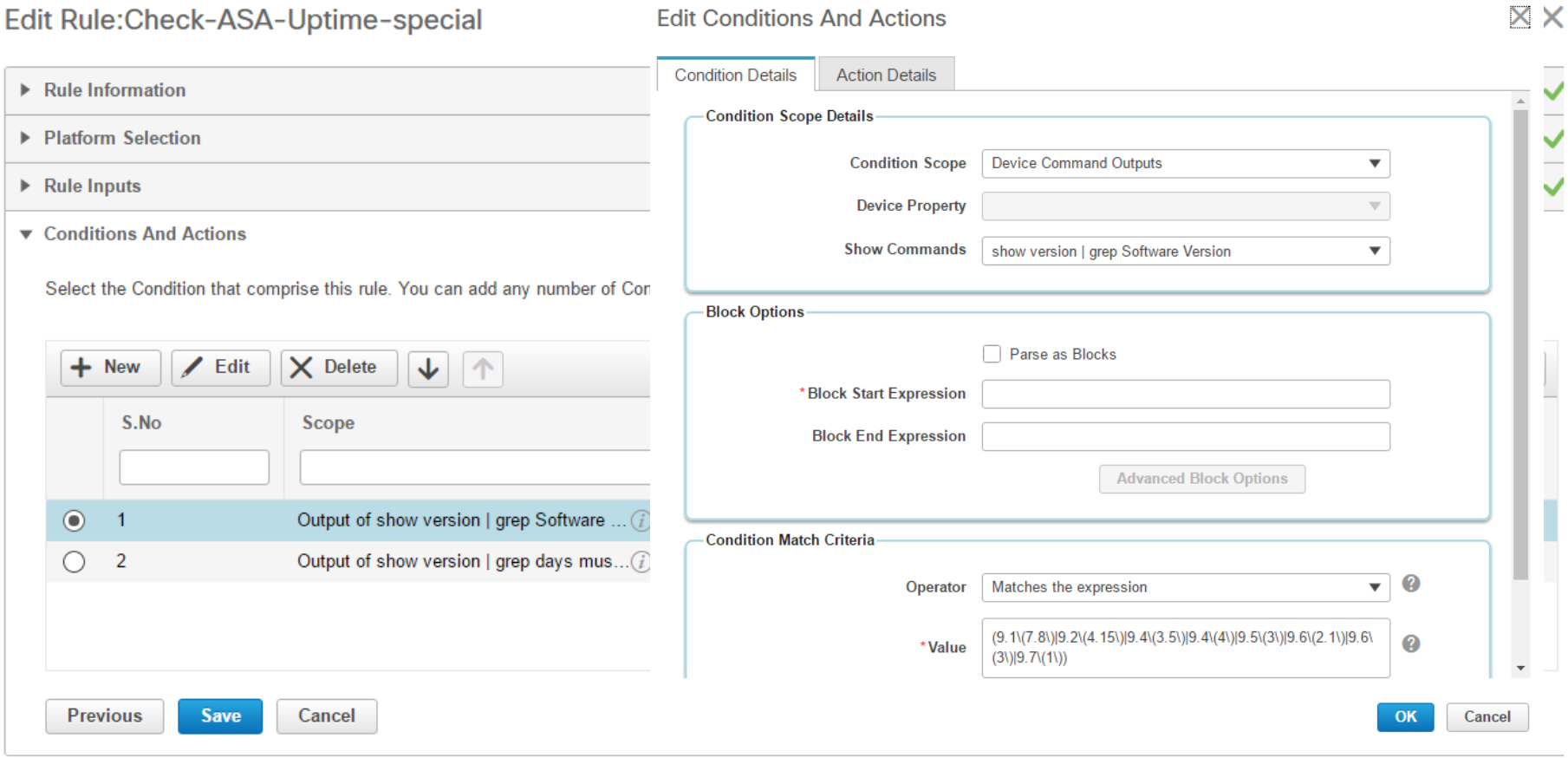

Select the OS(es) the Policy applies to

Click Next

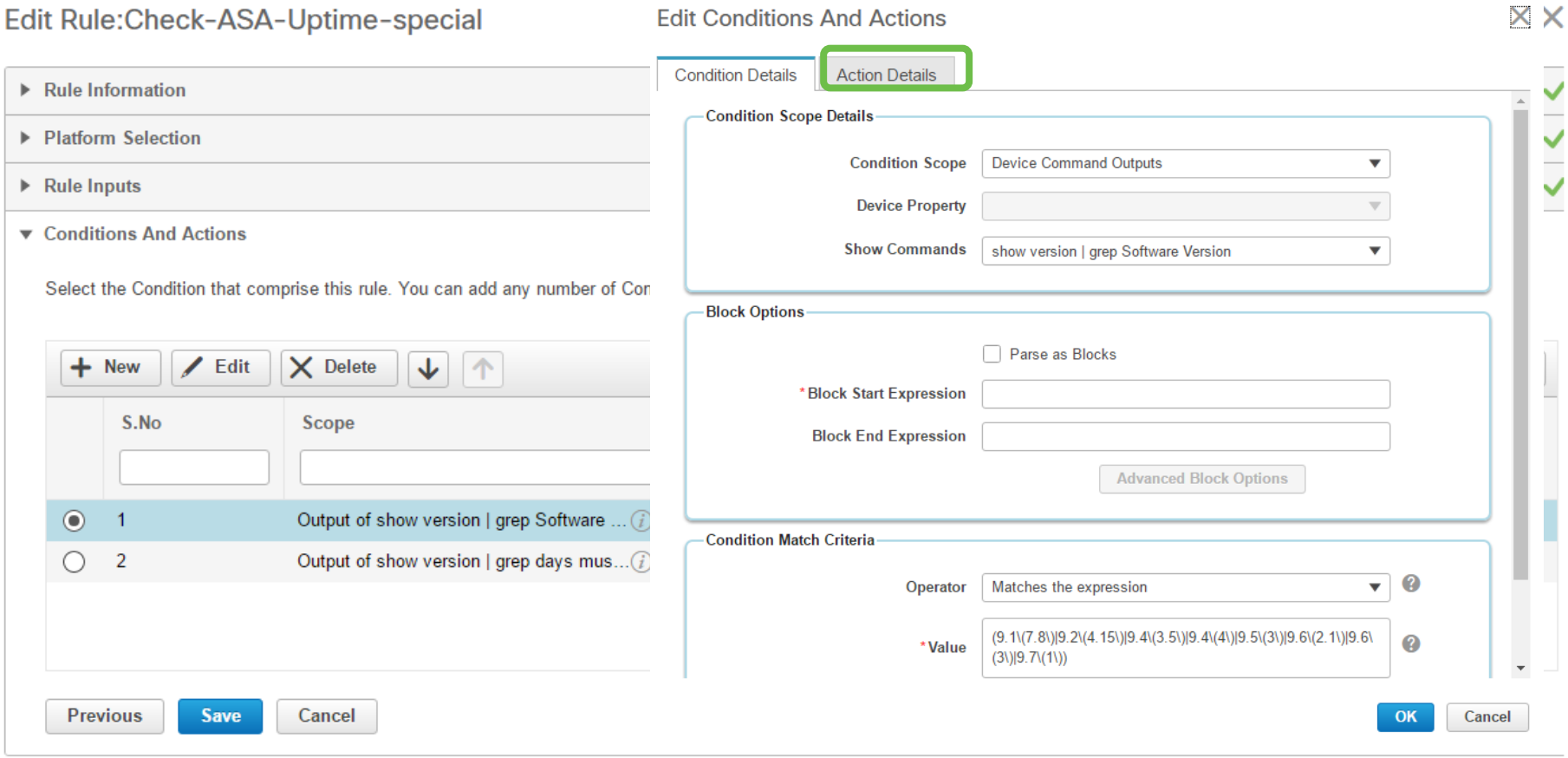
# Command output Compliance Policy (cont)



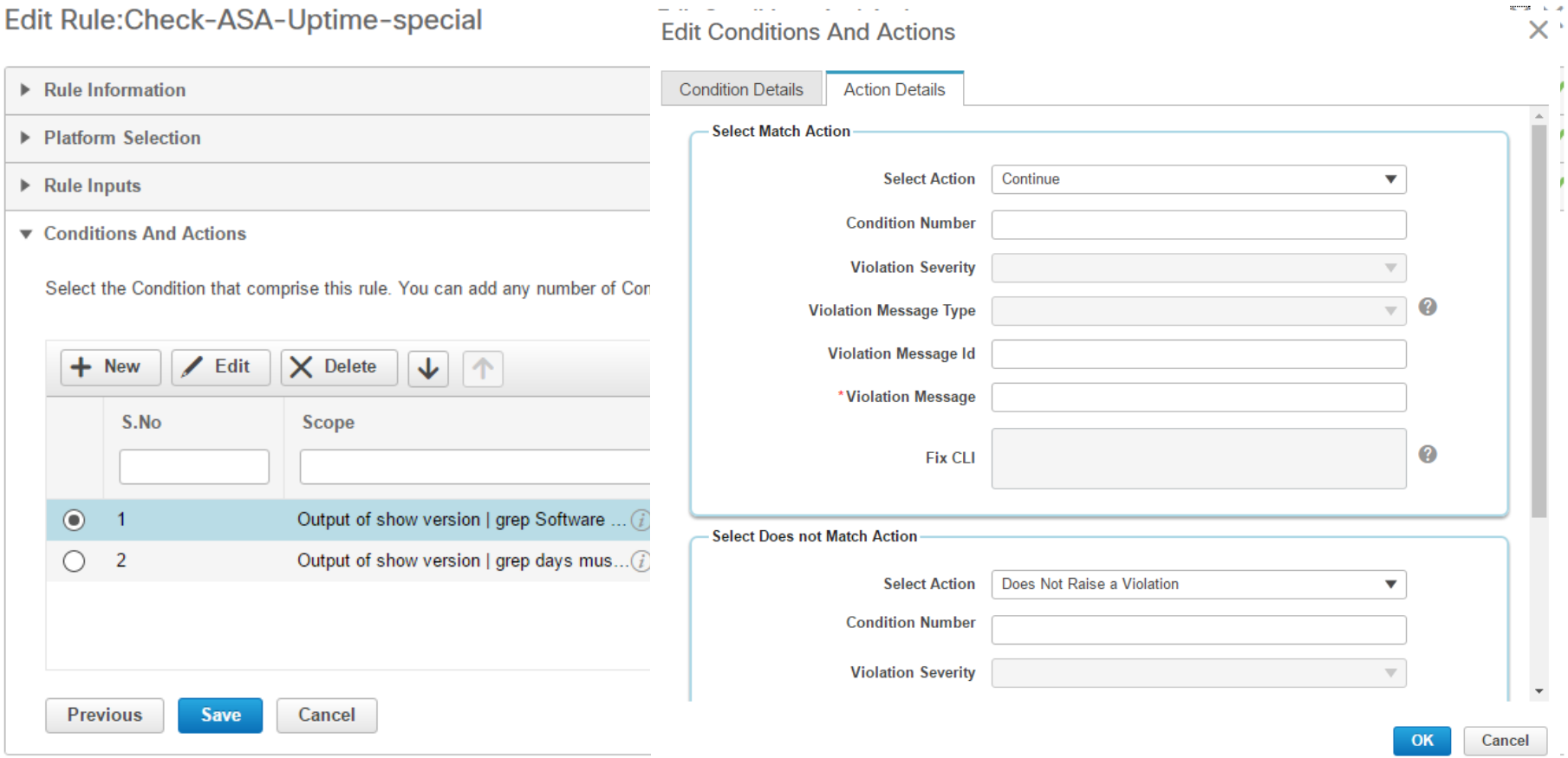
# Command output Compliance Policy (cont)



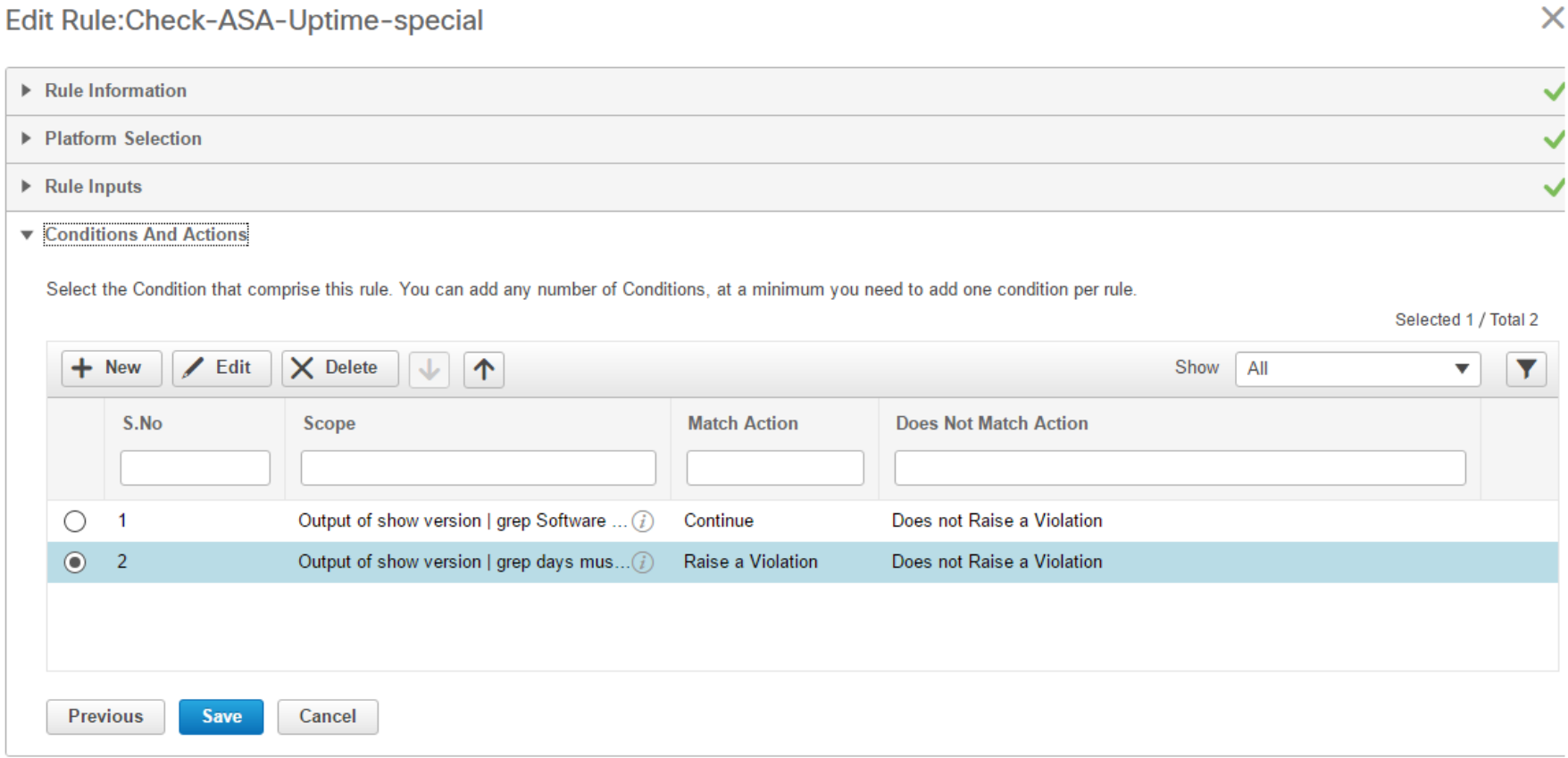
# Command output Compliance Policy (cont)



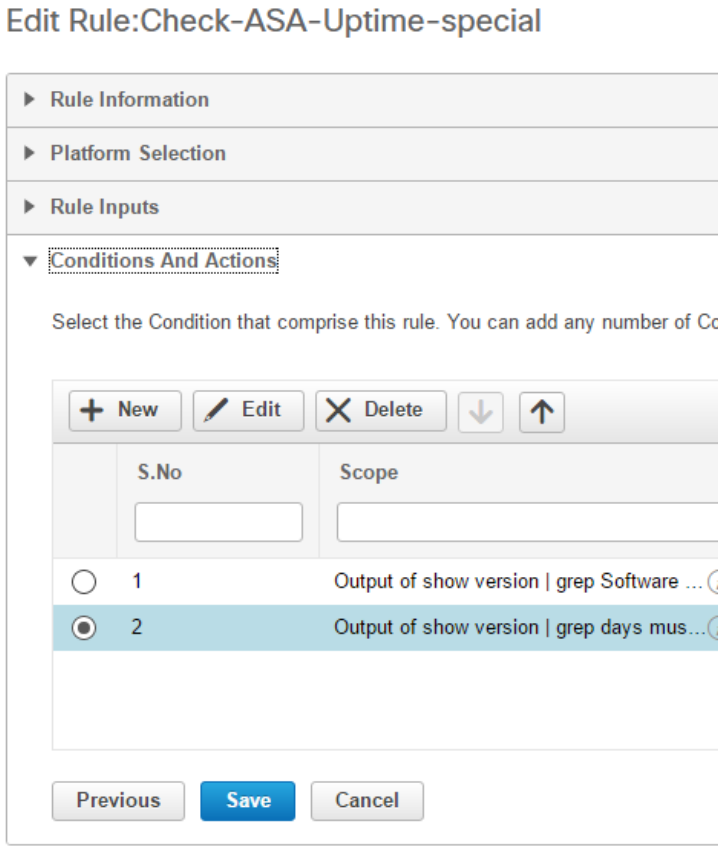
# Command output Compliance Policy (cont)

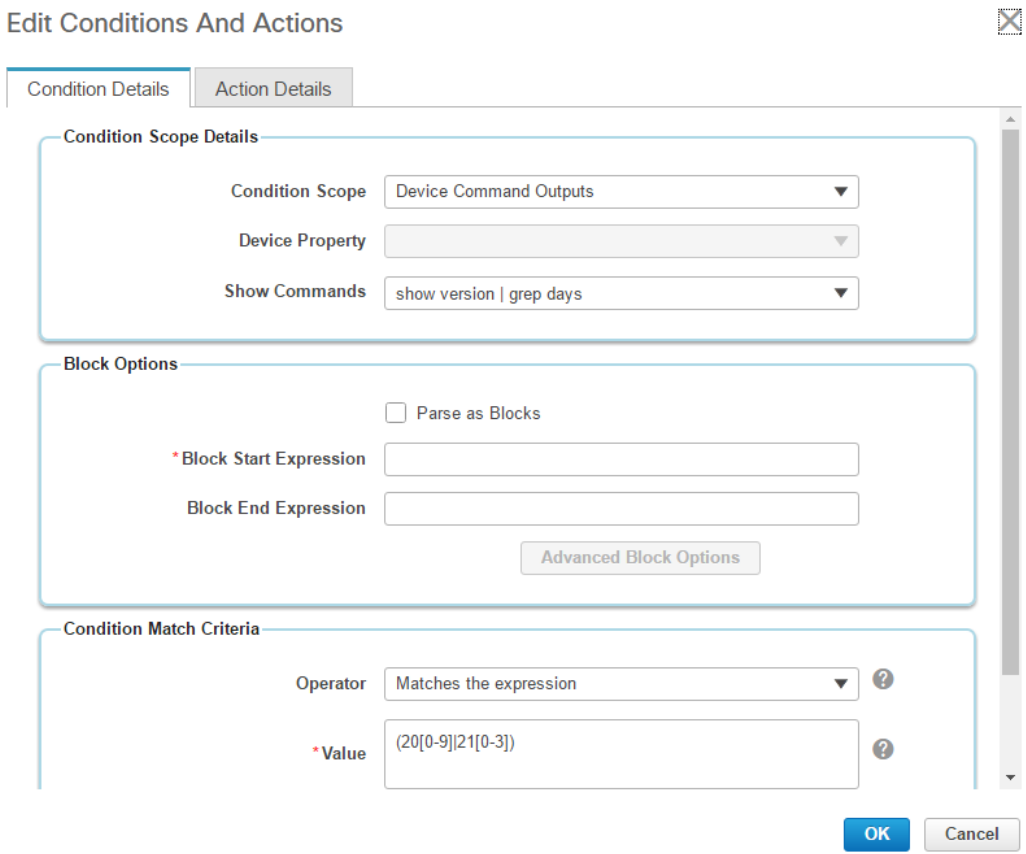


# Command output Compliance Policy (cont)

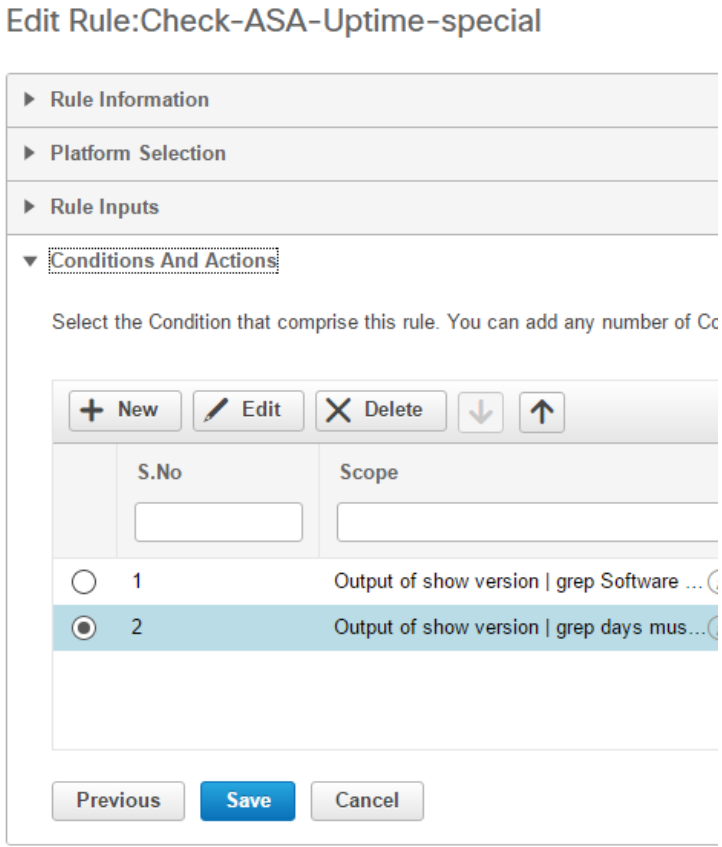


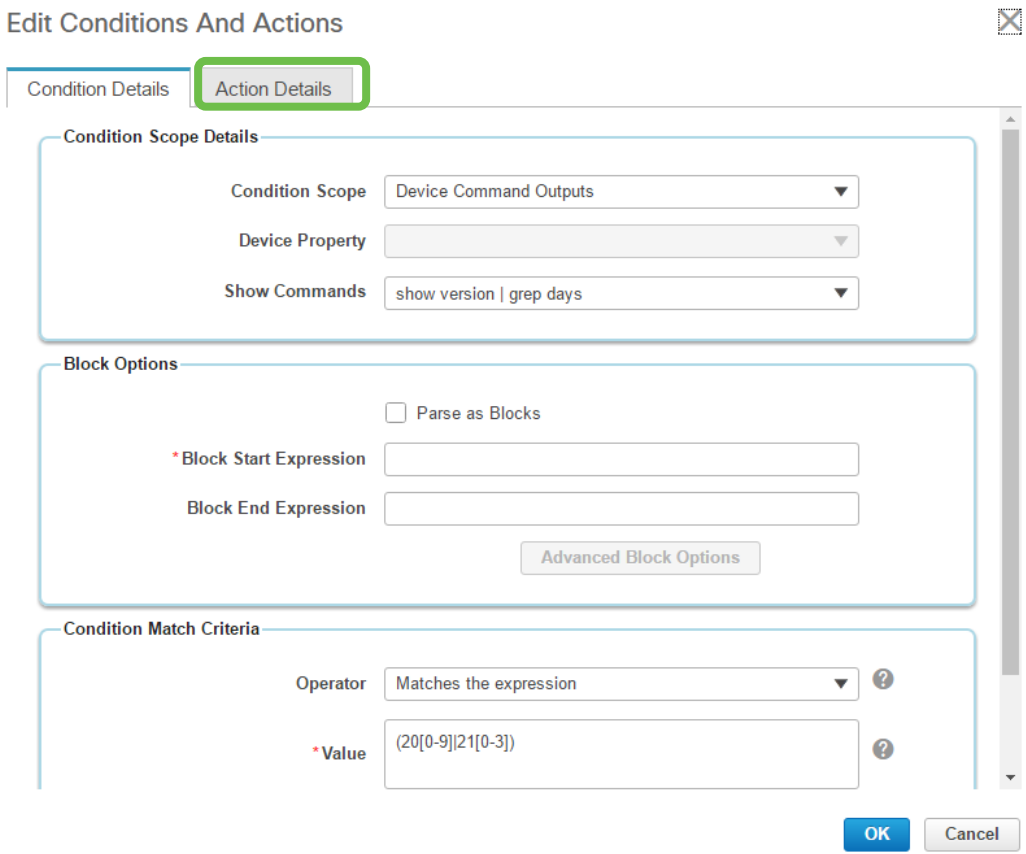
# Command output Compliance Policy (cont)



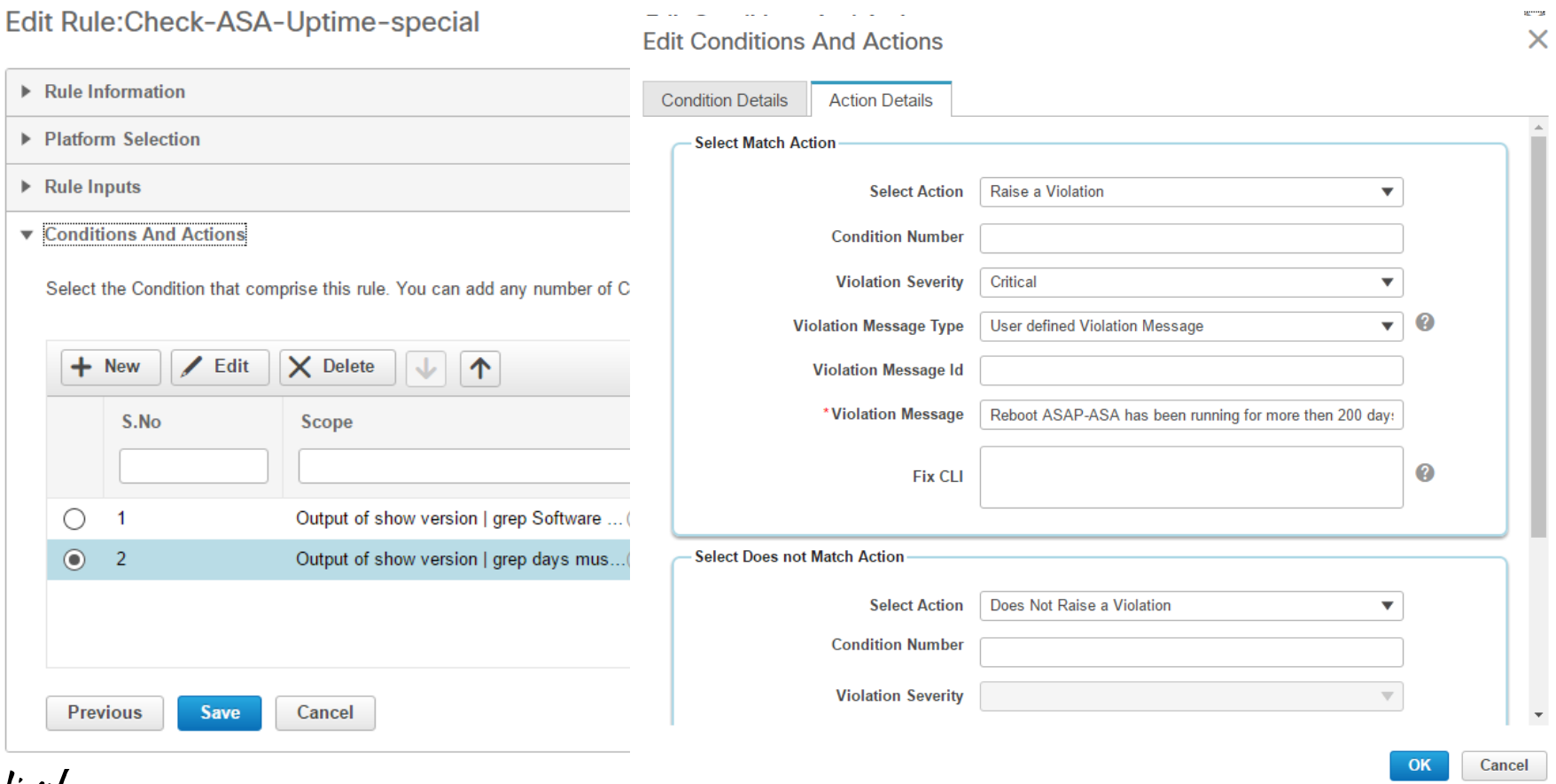



# Command output Compliance Policy (cont)

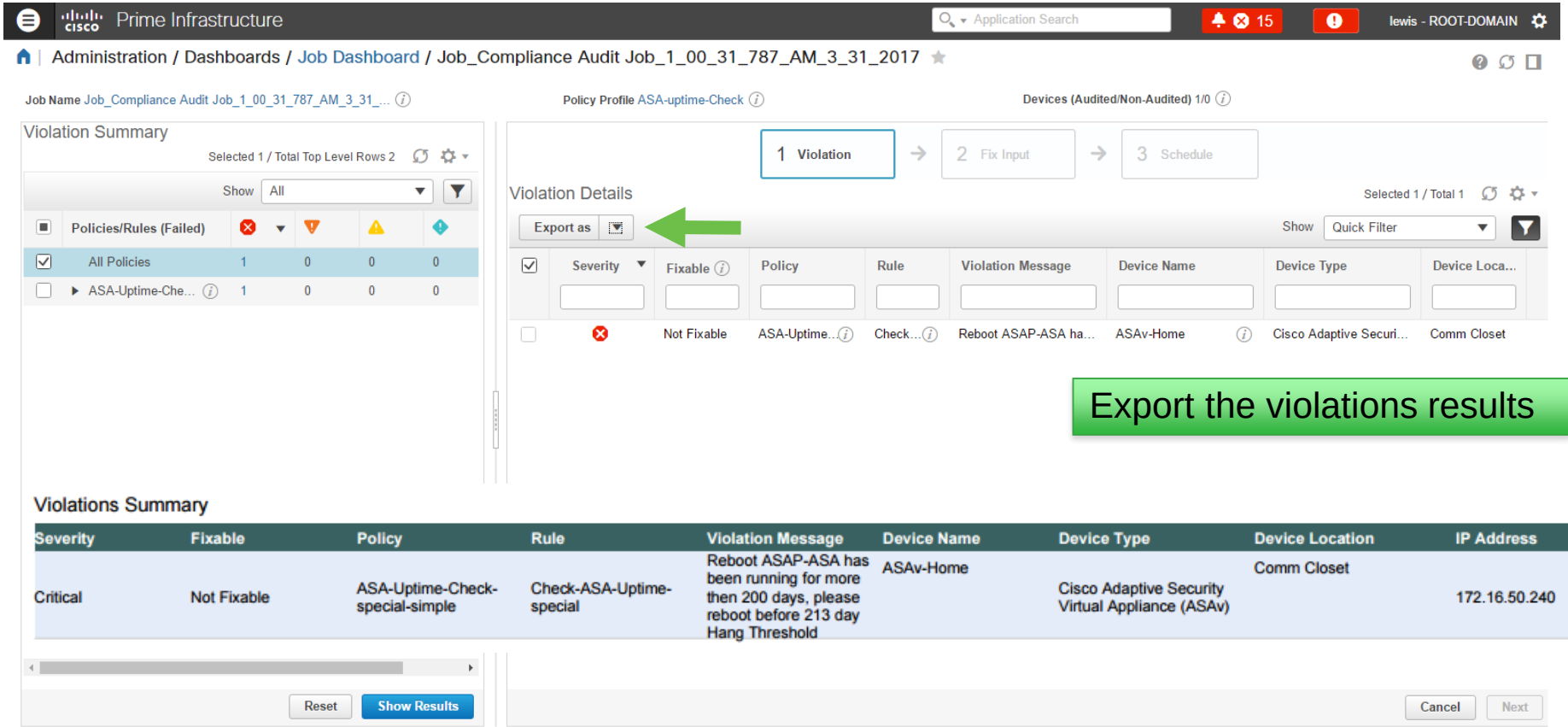


# Command output Compliance Policy (cont)



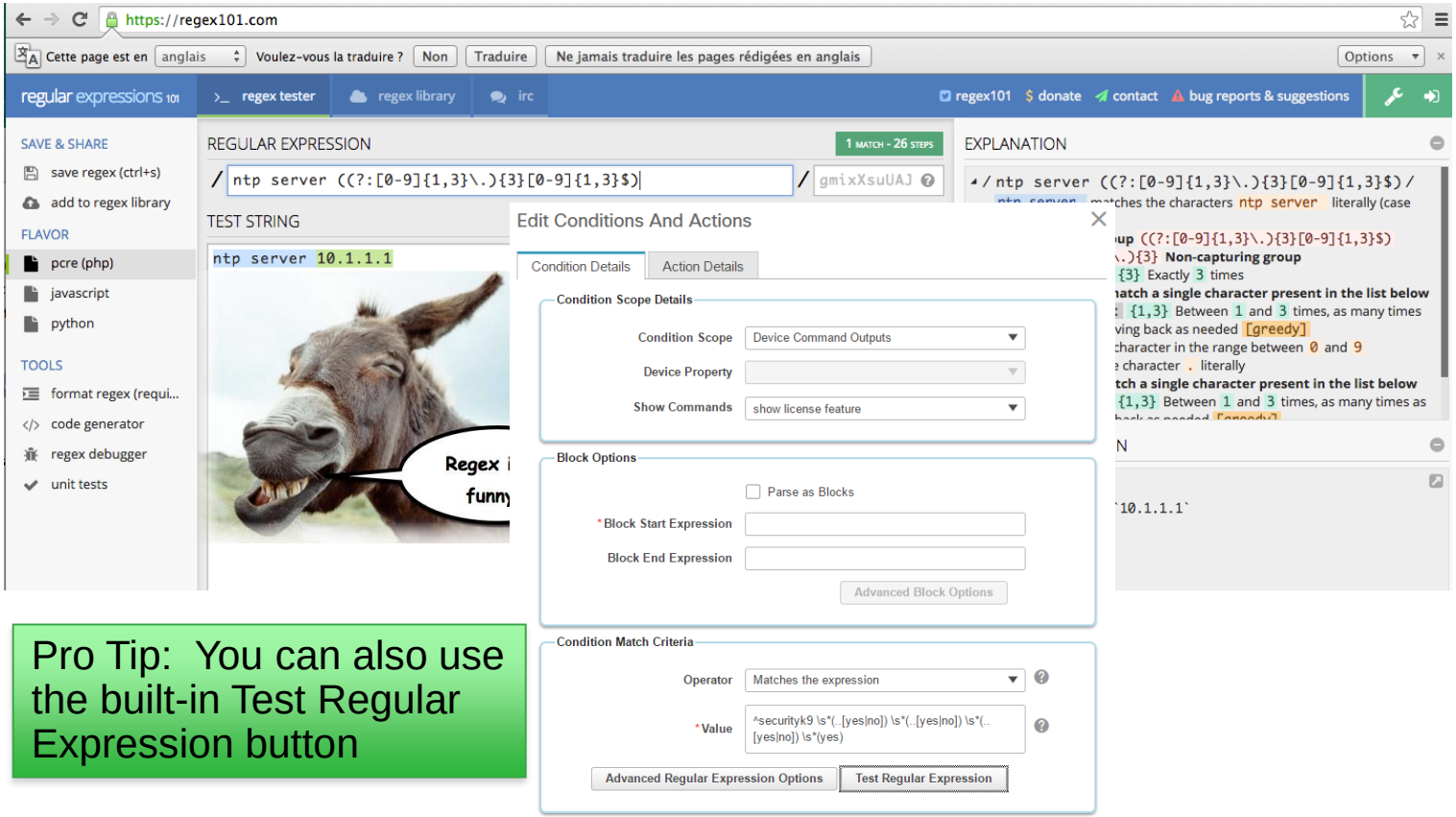
# Violation Summary



# ProTip: use Online Regex tester like https://regex101.com/

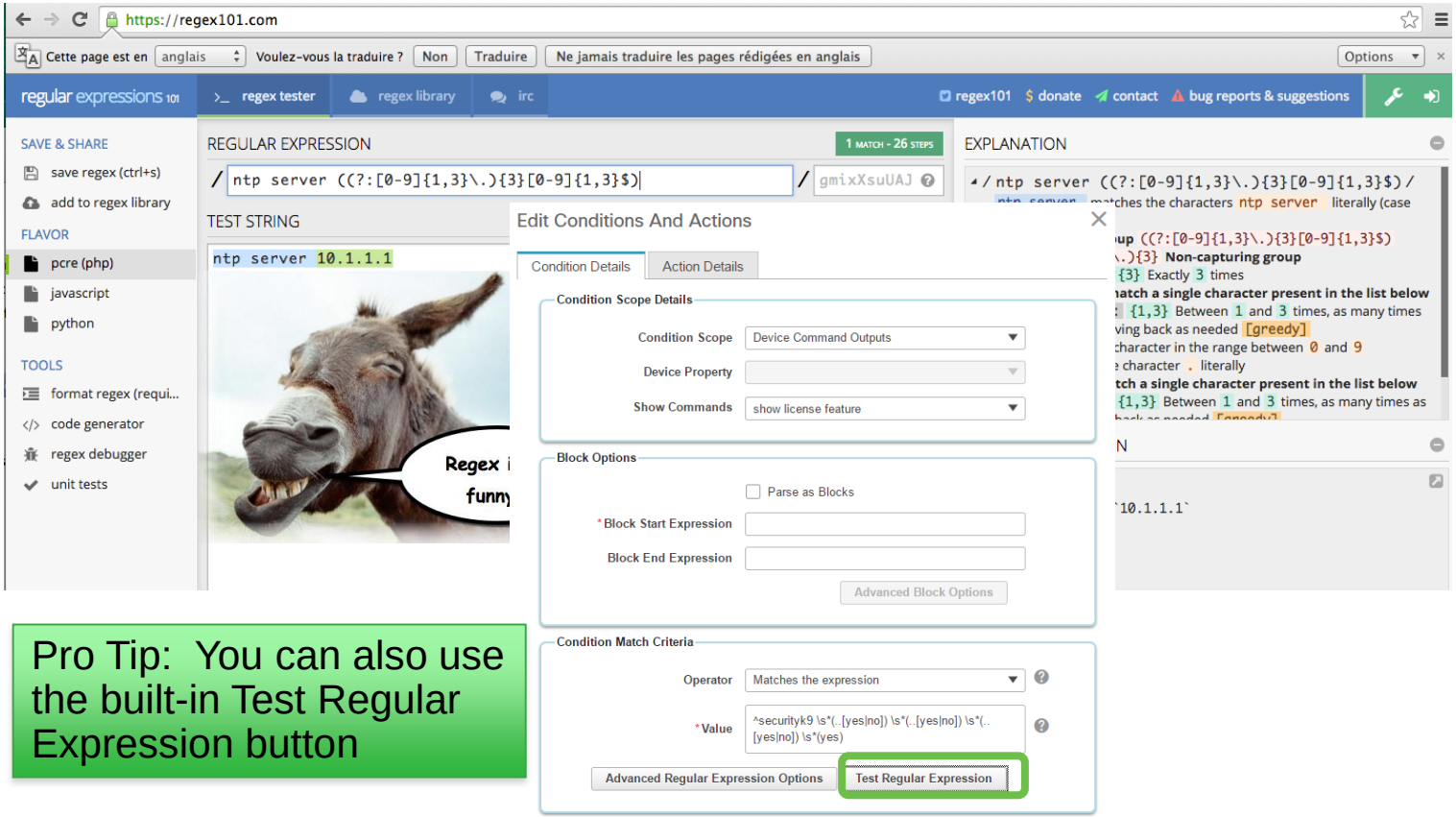

Pro Tip: You can also use the built-in Test Regular Expression button

# ProTip: use Online Regex tester like https://regex101.com/



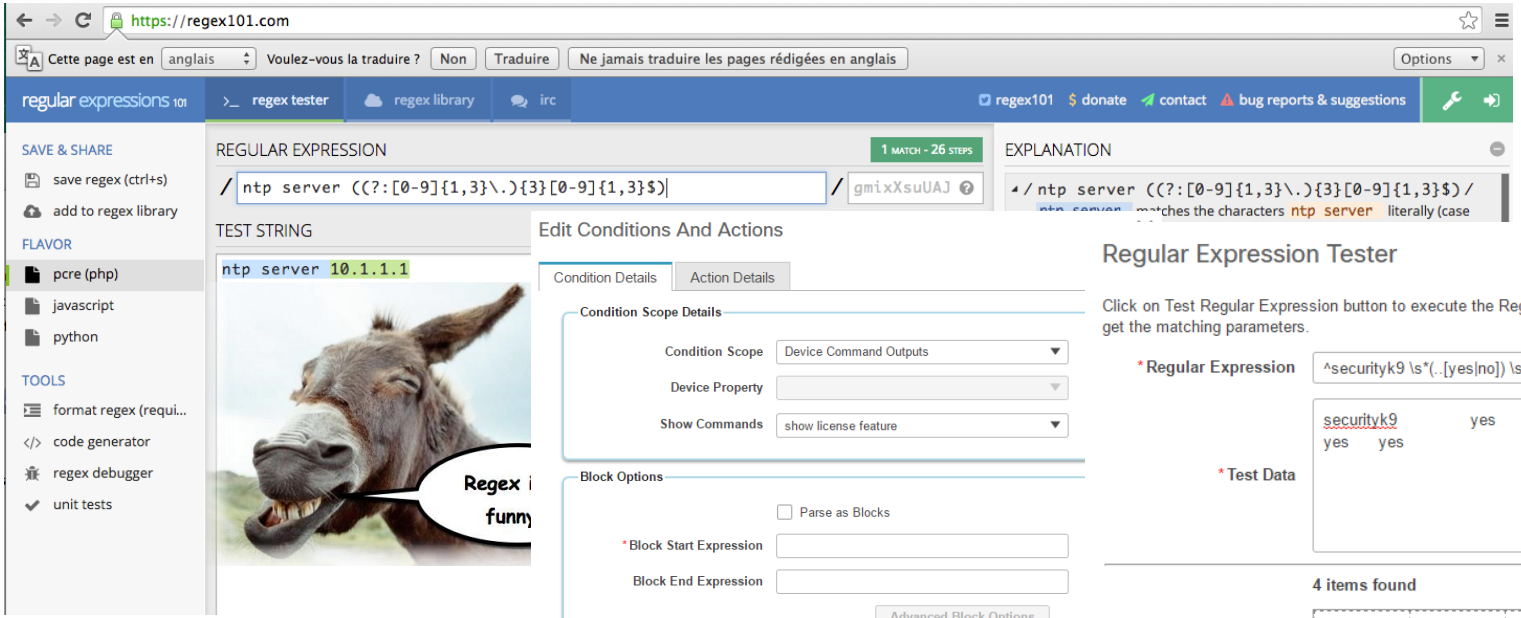

Pro Tip: You can also use the built-in Test Regular Expression button

# ProTip: use Online Regex tester like https://regex101.com/




Pro Tip: You can also use the built-in Test Regular Expression button

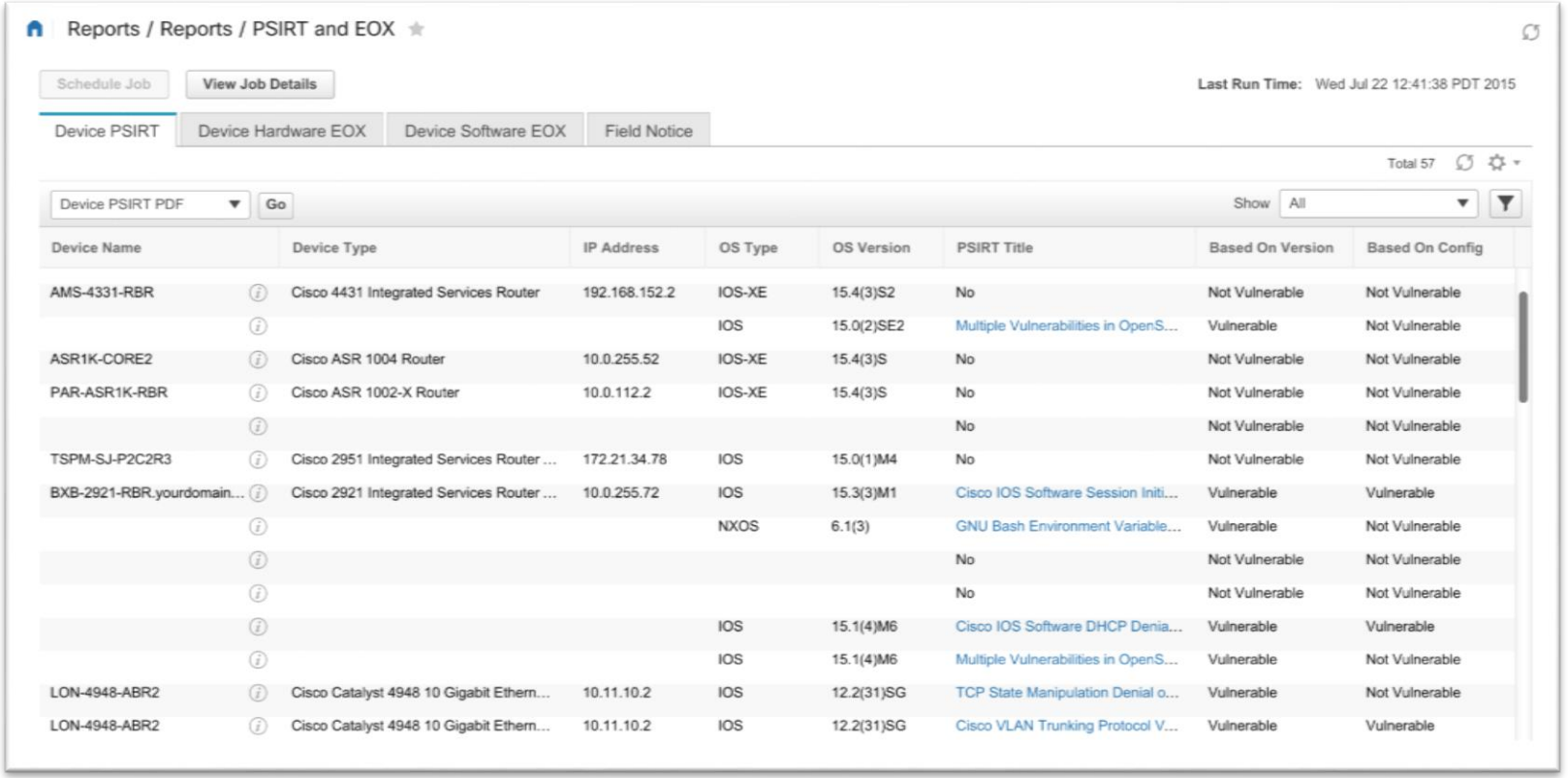
# ProTip: use Online Regex tester like https://regex101.com/




Pro Tip: You can also use the built-in Test Regular Expression button

# Customizing Reports

# PSIRT/EOX Reports




| Device Name | Device Type | IP Address | OS Type | OS Version | PSIRT Title | Based On Version | Based On Config |
|---|---|---|---|---|---|---|---|
| AMS-4331-RBR | Cisco 4431 Integrated Services Router | 192.168.152.2 | IOS-XE | 15.4(3)S2 | No | Not Vulnerable | Not Vulnerable |
| | | | IOS | 15.0(2)SE2 | Multiple Vulnerabilities in OpenS... | Vulnerable | Not Vulnerable |
| ASR1K-CORE2 | Cisco ASR 1004 Router | 10.0.255.52 | IOS-XE | 15.4(3)S | No | Not Vulnerable | Not Vulnerable |
| PAR-ASR1K-RBR | Cisco ASR 1002-X Router | 10.0.112.2 | IOS-XE | 15.4(3)S | No | Not Vulnerable | Not Vulnerable |
| | | | | | No | Not Vulnerable | Not Vulnerable |
| TSPM-SJ-P2C2R3 | Cisco 2951 Integrated Services Router ... | 172.21.34.78 | IOS | 15.0(1)M4 | No | Not Vulnerable | Not Vulnerable |
| BXB-2921-RBR.yourdomain... | Cisco 2921 Integrated Services Router ... | 10.0.255.72 | IOS | 15.3(3)M1 | Cisco IOS Software Session Initi... | Vulnerable | Vulnerable |
| | | | NXOS | 6.1(3) | GNU Bash Environment Variable... | Vulnerable | Not Vulnerable |
| | | | | | No | Not Vulnerable | Not Vulnerable |
| | | | | | No | Not Vulnerable | Not Vulnerable |
| | | | IOS | 15.1(4)M6 | Cisco IOS Software DHCP Denia... | Vulnerable | Vulnerable |
| | | | IOS | 15.1(4)M6 | Multiple Vulnerabilities in OpenS... | Vulnerable | Not Vulnerable |
| LON-4948-ABR2 | Cisco Catalyst 4948 10 Gigabit Ethern... | 10.11.10.2 | IOS | 12.2(31)SG | TCP State Manipulation Denial o... | Vulnerable | Not Vulnerable |
| LON-4948-ABR2 | Cisco Catalyst 4948 10 Gigabit Ethern... | 10.11.10.2 | IOS | 12.2(31)SG | Cisco VLAN Trunking Protocol V... | Vulnerable | Vulnerable |

# The Detailed Hardware Report

COE Hardware

Generated: 2015-Apr-02, 16:19:50 EST

Cisco Prime
**Infrastructure**

Show: Up to 50 records

**Category: Cisco Interfaces and Modules**

None.

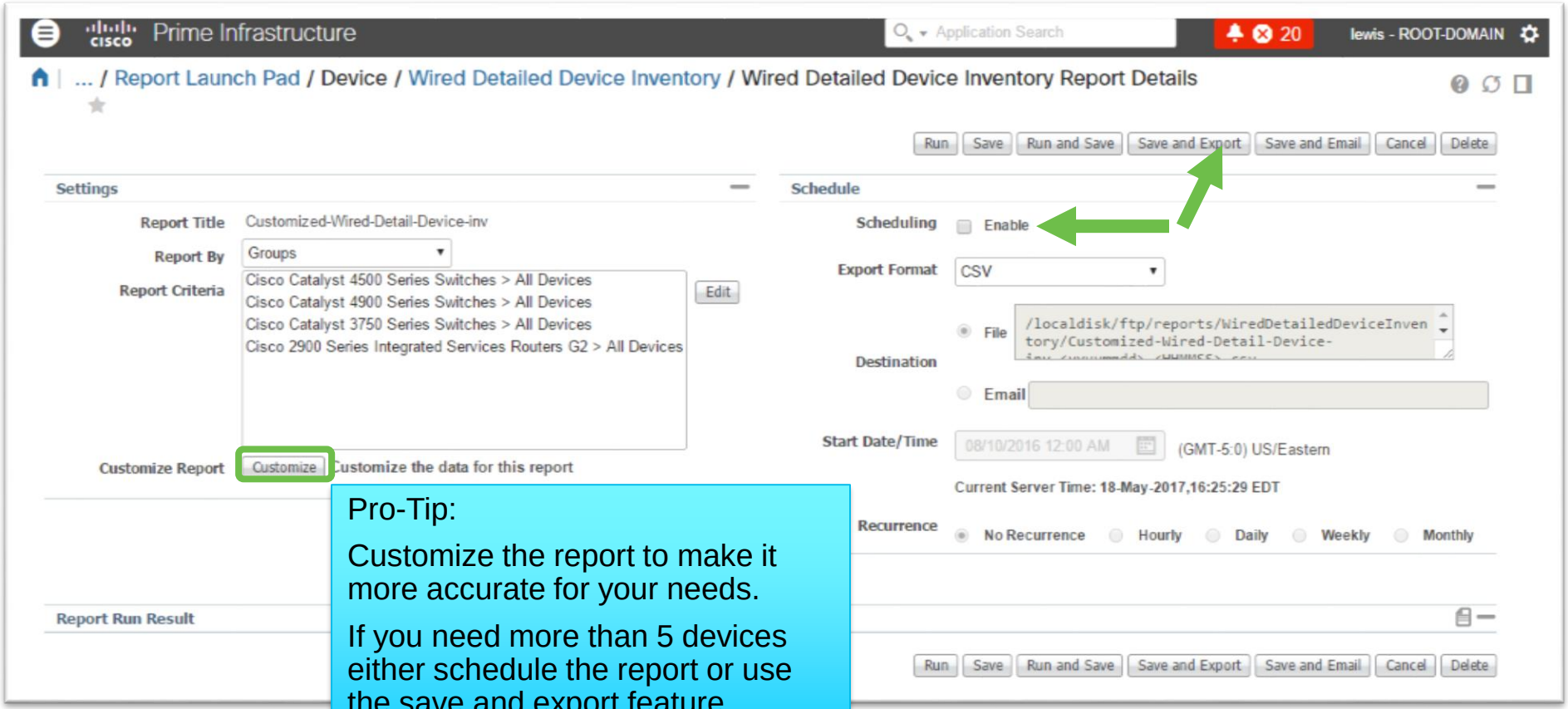
**Category: Routers**

| Product Series | Device Name | Updated At | System Description | Location | Contact | Serial Number | Chassis Vendor Type | Total Flash Device Size (MB) | Number of Interfa |
|---|---|---|---|---|---|---|---|---|---|
| Cisco 2800 Series Integrated Services Routers | C2811-SpkrBus-GW | 2015-Apr-01, 22:00:22 EST | Cisco IOS Software, 2800 Software (C2800NM-ADVENTERPRISEK9-M), Version 15.1(4)M5, RELEASE SOFTWARE (fc1) Technical Support: http://www.cisco.com /techsupport Copyright (c) 1986-2012 by Cisco Systems, Inc. Compiled Tue 04-Sep-12 15:56 by prod_rel_team | | | FTX1005C2FV | cevChassis2811 | 122.77 | 18 |
| Cisco 2800 Series Integrated Services Routers | COE-GW-DID.cisco.dod.mil | 2015-Apr-01, 22:00:21 EST | Cisco IOS Software, 2800 Software (C2800NM-ADVENTERPRISEK9-M), Version 12.4(24)T8, RELEASE SOFTWARE (fc1) Technical Support: http://www.cisco.com /techsupport Copyright (c) 1986-2012 by Cisco Systems, Inc. Compiled Sun 09-Sep-12 04:01 by prod_rel_team | | | FTX1017A1KY | cevChassis2811 | 122.24 | 110 |
| Cisco 2800 Series Integrated Services Routers | COE-RMS1.cisco.dod.mil | 2015-Apr-01, 22:00:30 EST | Cisco IOS Software, 2800 Software (C2800NM-ADVENTERPRISEK9-M), Version 12.4(6)T3, RELEASE SOFTWARE (fc2) Technical Support: http://www.cisco.com /techsupport Copyright (c) 1986-2006 by Cisco Systems, Inc. Compiled Fri 21-Jul-06 16:16 by kellythw | | | FTX1105A1TG | cevChassi | | |

The serial number as well as other hardware attributes can be found in the Detailed Hardware Report

TIP: The Wired Detailed Device Inventory has all the details of wired devices

# Customizing Wired Detailed Device Inventory Report

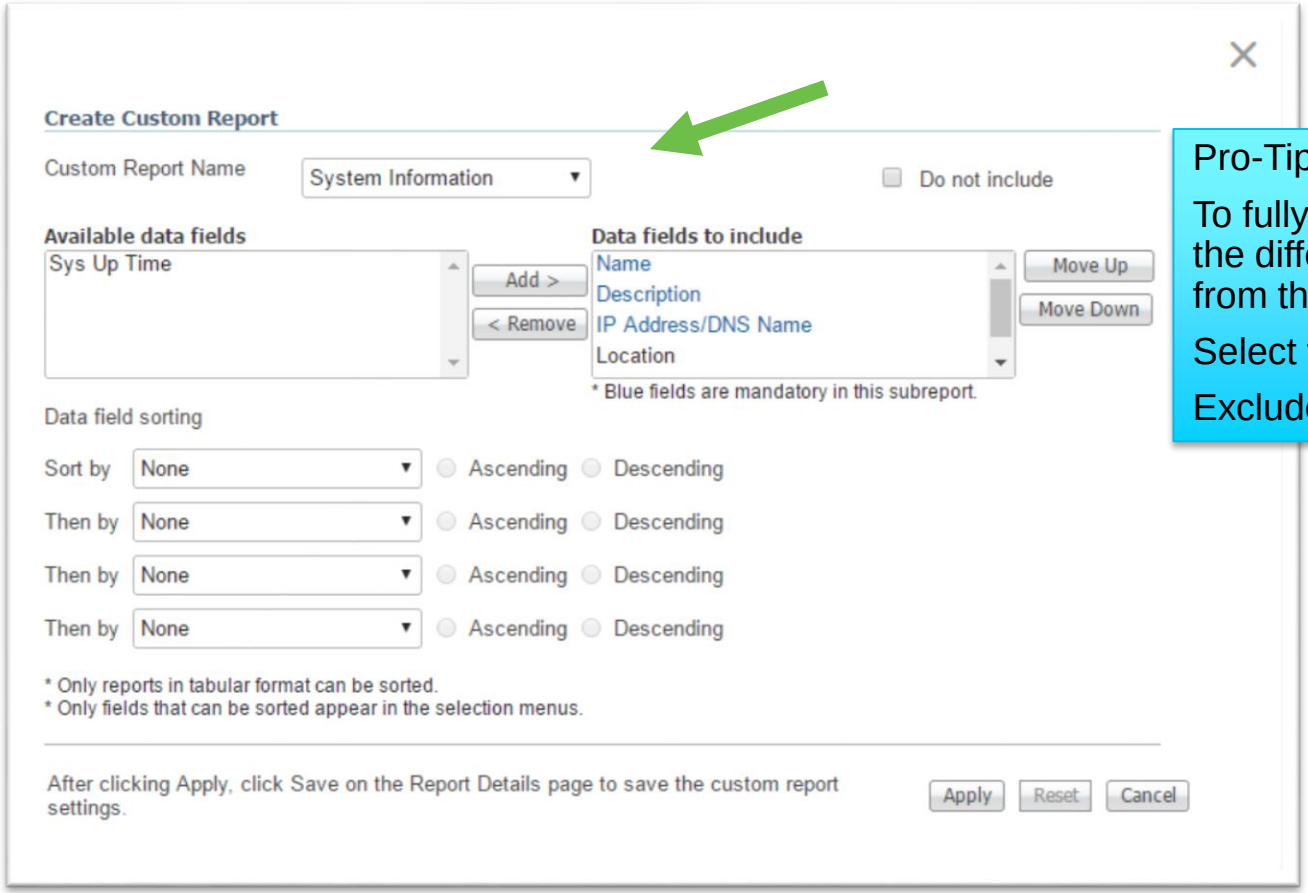



Pro-Tip:

Customize the report to make it more accurate for your needs.

If you need more than 5 devices either schedule the report or use the save and export feature

# Customizing Wired Detailed Device Inventory Report



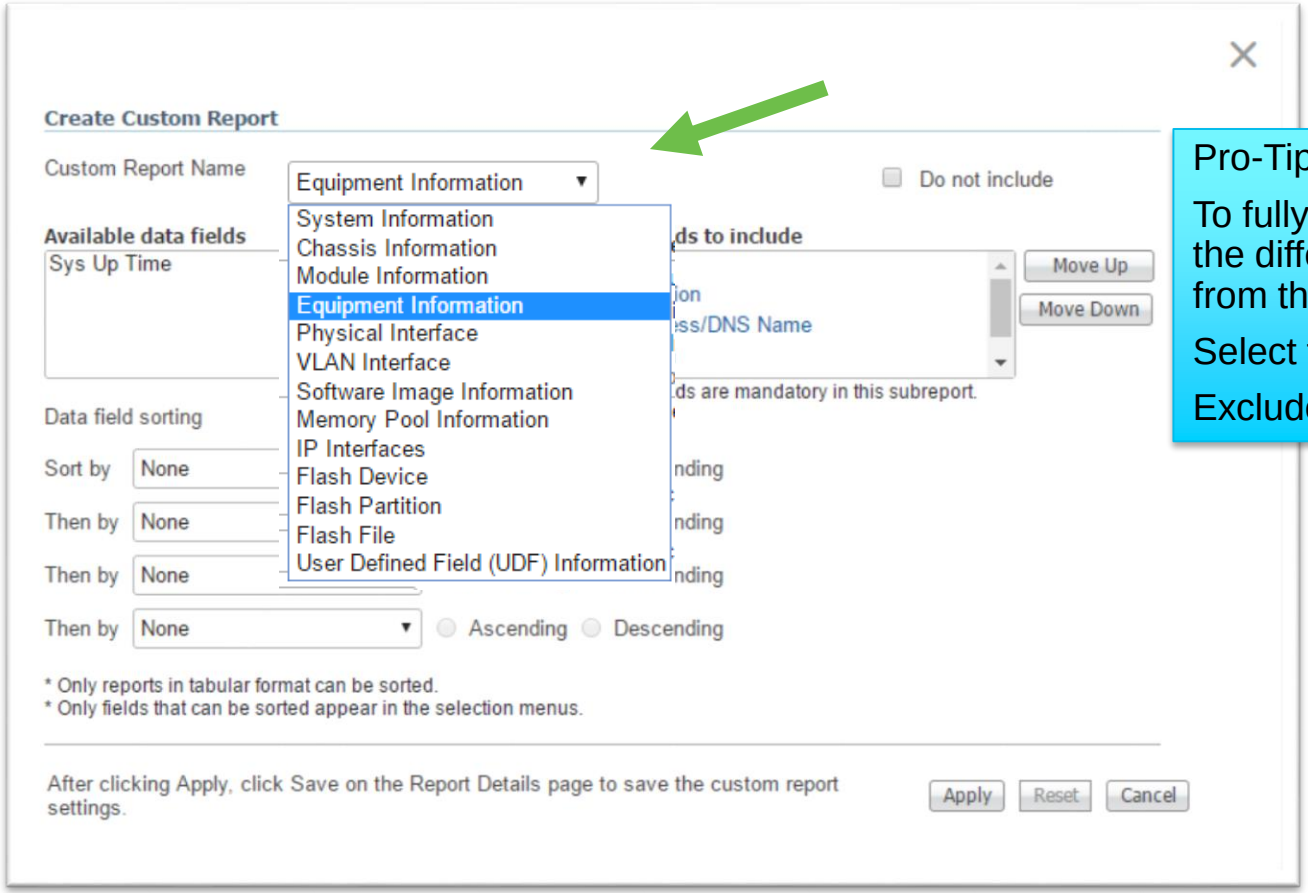

Pro-Tip:

To fully customize the report choose the different sections of the report from the dropdown

Select the Fields to include/exclude

Exclude the entire selection

# Customizing Wired Detailed Device Inventory Report



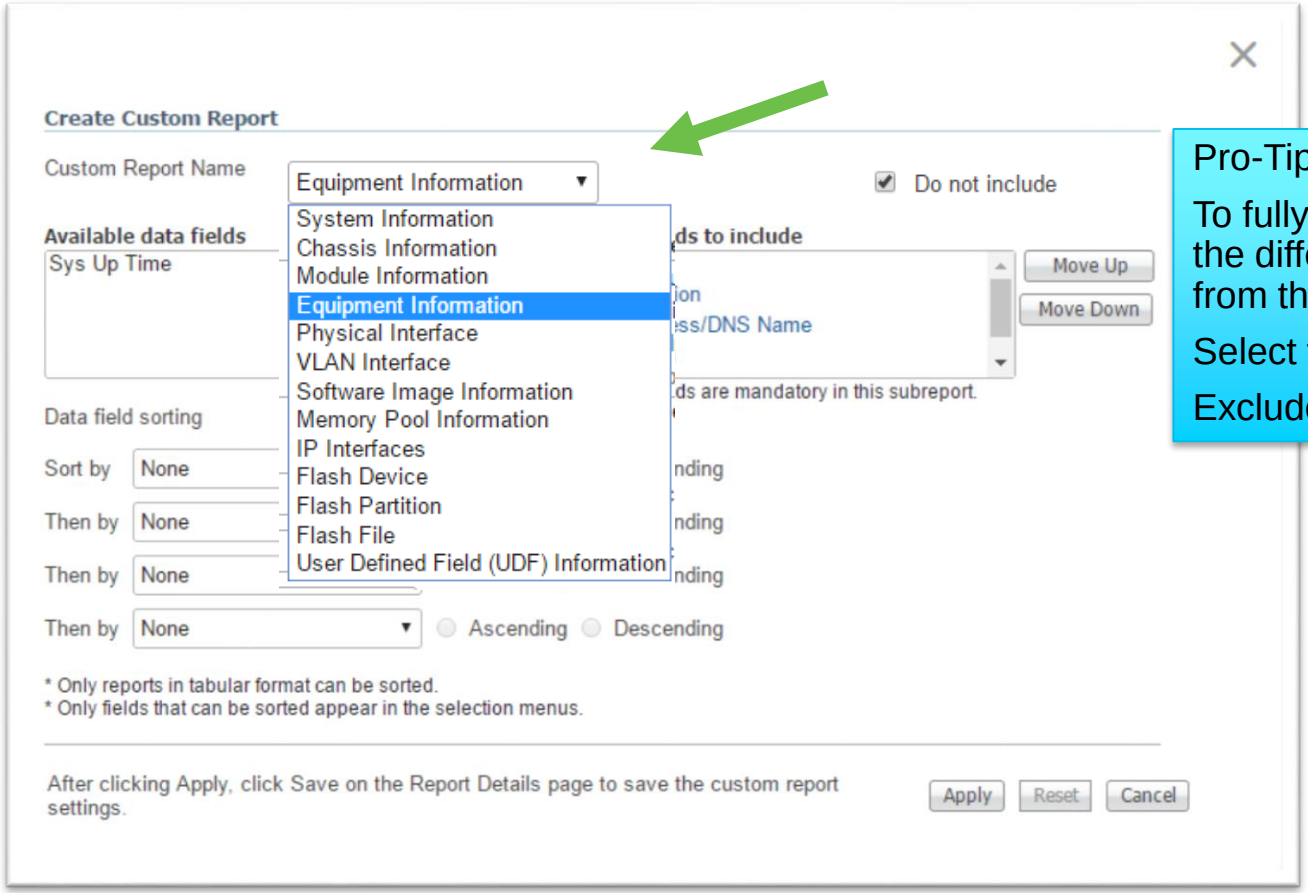

Pro-Tip:

To fully customize the report choose the different sections of the report from the dropdown

Select the Fields to include/exclude

Exclude the entire selection

# Customizing Wired Detailed Device Inventory Report



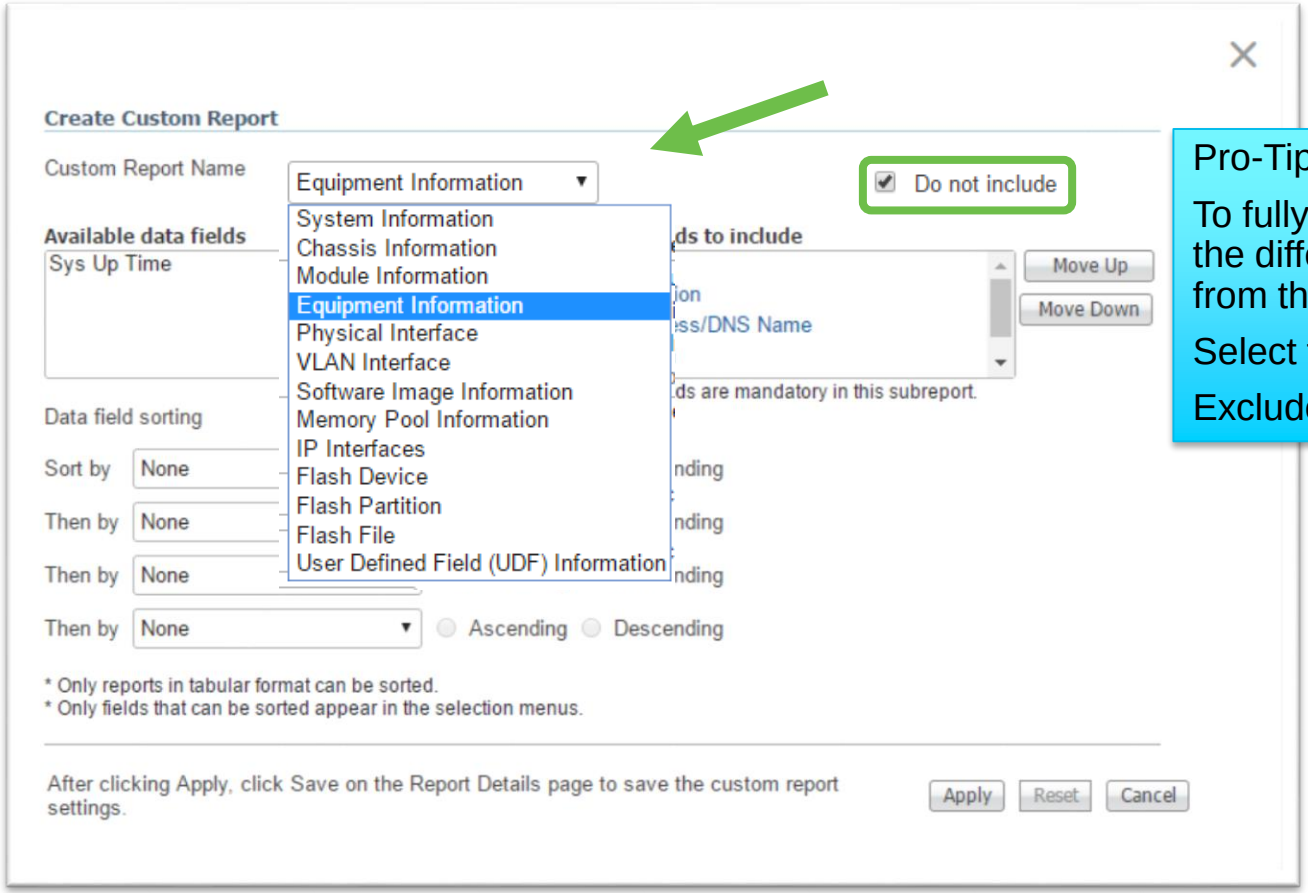

Pro-Tip:

To fully customize the report choose the different sections of the report from the dropdown

Select the Fields to include/exclude

Exclude the entire selection

# Customizing Wired Detailed Device Inventory Report



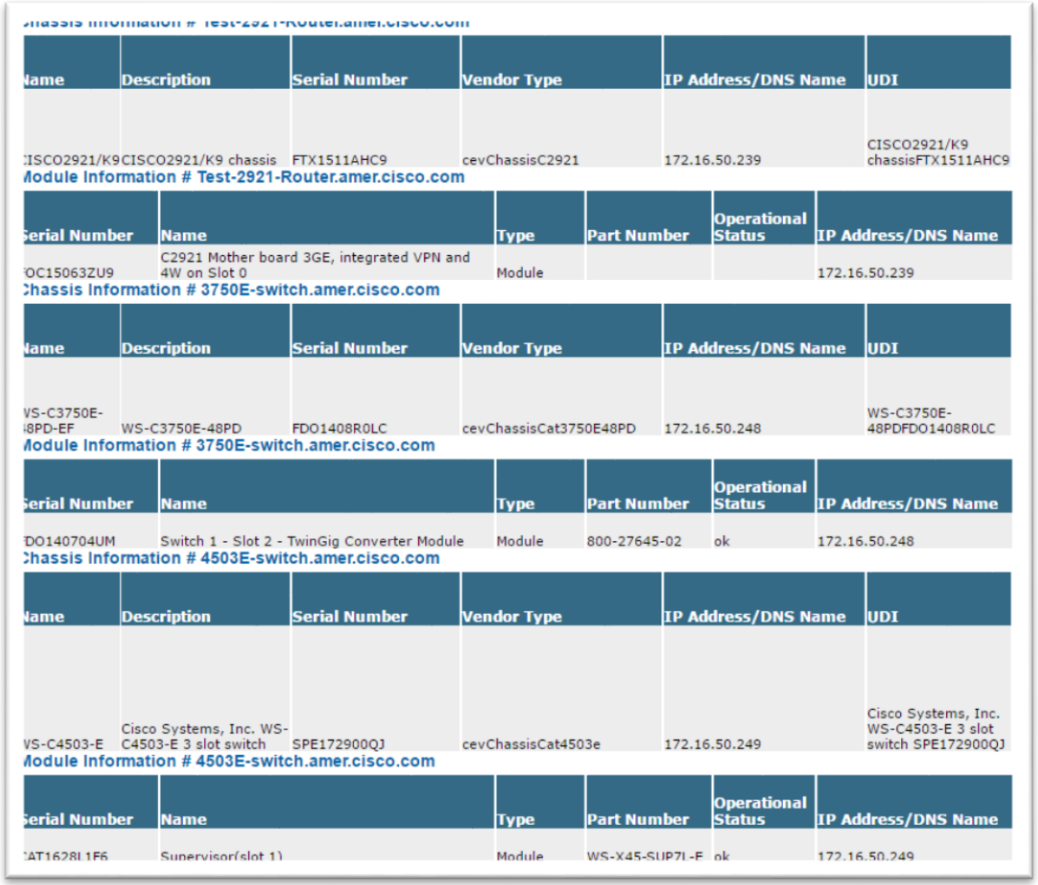

Pro-Tip:

To fully customize the report choose the different sections of the report from the dropdown

Select the Fields to include/exclude

Exclude the entire selection

# Customizing Wired Detailed Device Inventory Report



| Name | Description | Serial Number | Vendor Type | IP Address/DNS Name | UDI |
|---|---|---|---|---|---|
| CISCO2921/K9 | CISCO2921/K9 chassis | FTX1511AHC9 | cevChassisC2921 | 172.16.50.239 | CISCO2921/K9 chassisFTX1511AHC9 |

Module Information # Test-2921-Router.amer.cisco.com

| Serial Number | Name | Type | Part Number | Operational Status | IP Address/DNS Name |
|---|---|---|---|---|---|
| OC15063ZU9 | C2921 Mother board 3GE, integrated VPN and 4W on Slot 0 | Module | | | 172.16.50.239 |

Chassis Information # 3750E-switch.amer.cisco.com

| Name | Description | Serial Number | Vendor Type | IP Address/DNS Name | UDI |
|---|---|---|---|---|---|
| WS-C3750E-48PD-EF | WS-C3750E-48PD | FDO1408R0LC | cevChassisCat3750E48PD | 172.16.50.248 | WS-C3750E-48PDFDO1408R0LC |

Module Information # 3750E-switch.amer.cisco.com

| Serial Number | Name | Type | Part Number | Operational Status | IP Address/DNS Name |
|---|---|---|---|---|---|
| FDO140704UM | Switch 1 - Slot 2 - TwinGig Converter Module | Module | 800-27645-02 | ok | 172.16.50.248 |

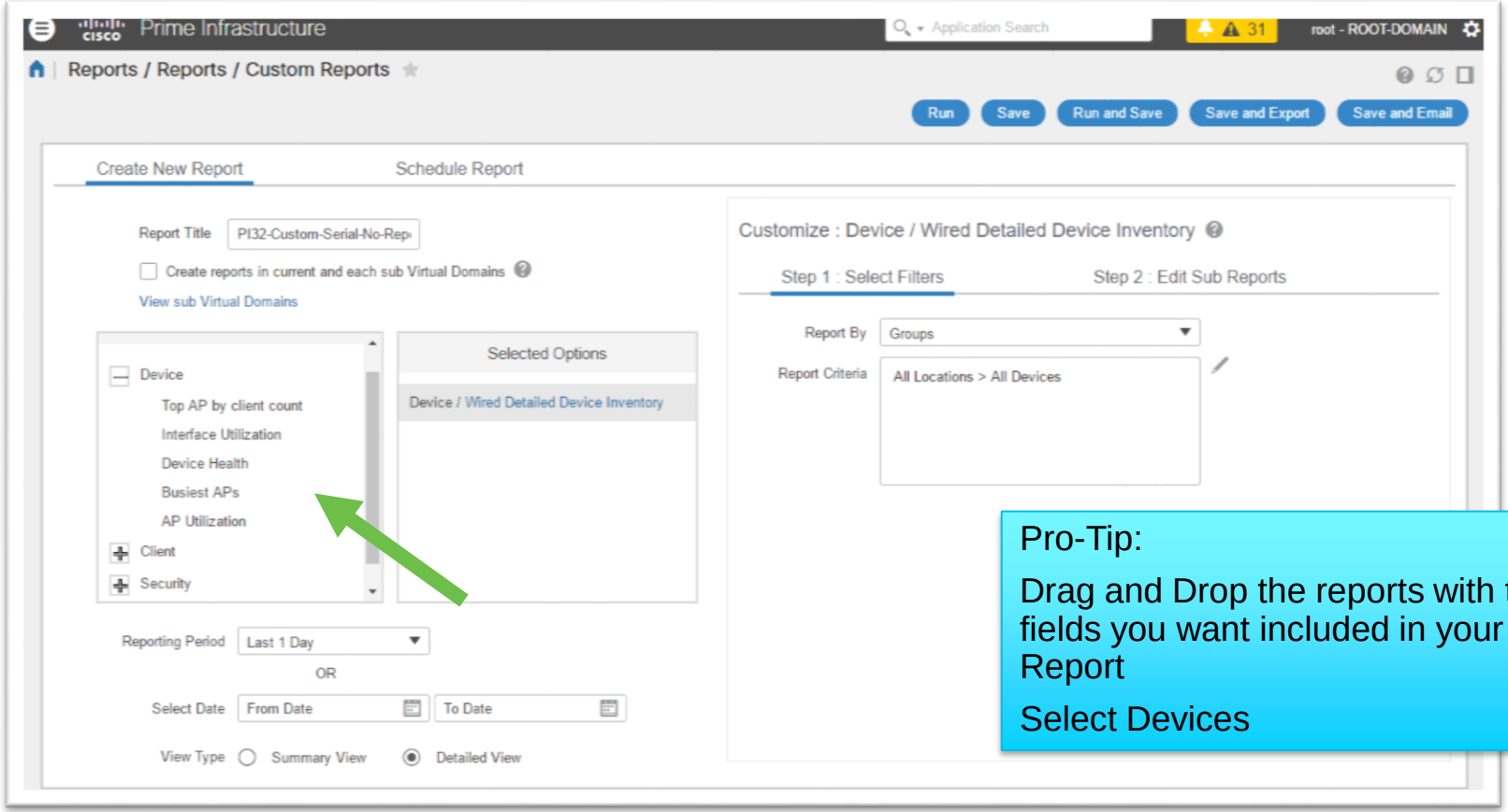
Chassis Information # 4503E-switch.amer.cisco.com

| Name | Description | Serial Number | Vendor Type | IP Address/DNS Name | UDI |
|---|---|---|---|---|---|
| WS-C4503-E | Cisco Systems, Inc. WS-C4503-E 3 slot switch | SPE172900QJ | cevChassisCat4503e | 172.16.50.249 | Cisco Systems, Inc. WS-C4503-E 3 slot switch SPE172900QJ |

Module Information # 4503E-switch.amer.cisco.com

| Serial Number | Name | Type | Part Number | Operational Status | IP Address/DNS Name |
|---|---|---|---|---|---|
| CAT1628L1F6 | Supervisor(slot 1) | Module | WS-X45-SUP7L-E | ok | 172.16.50.249 |

# Customized Reports in PI 3.2/3.3

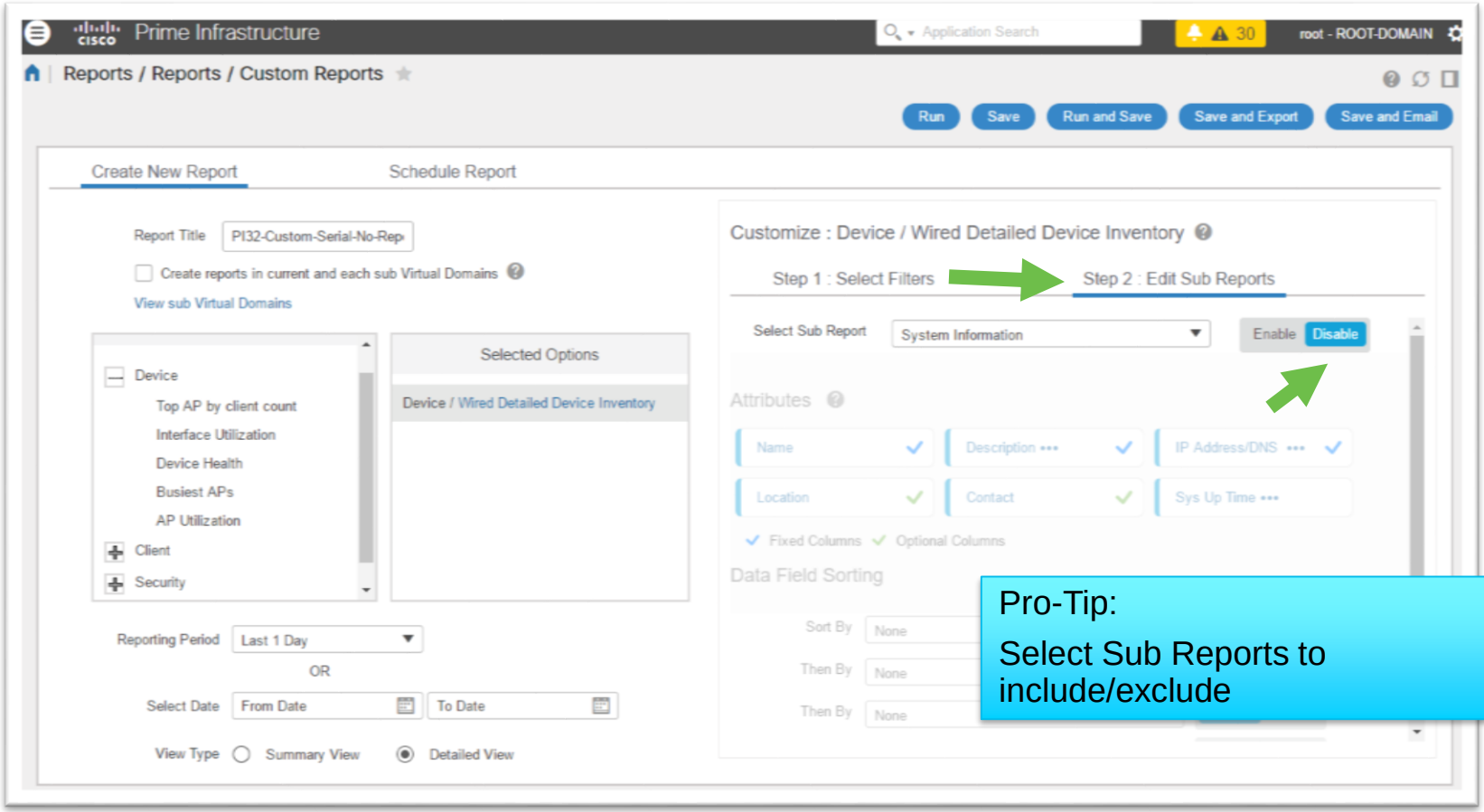



Pro-Tip:

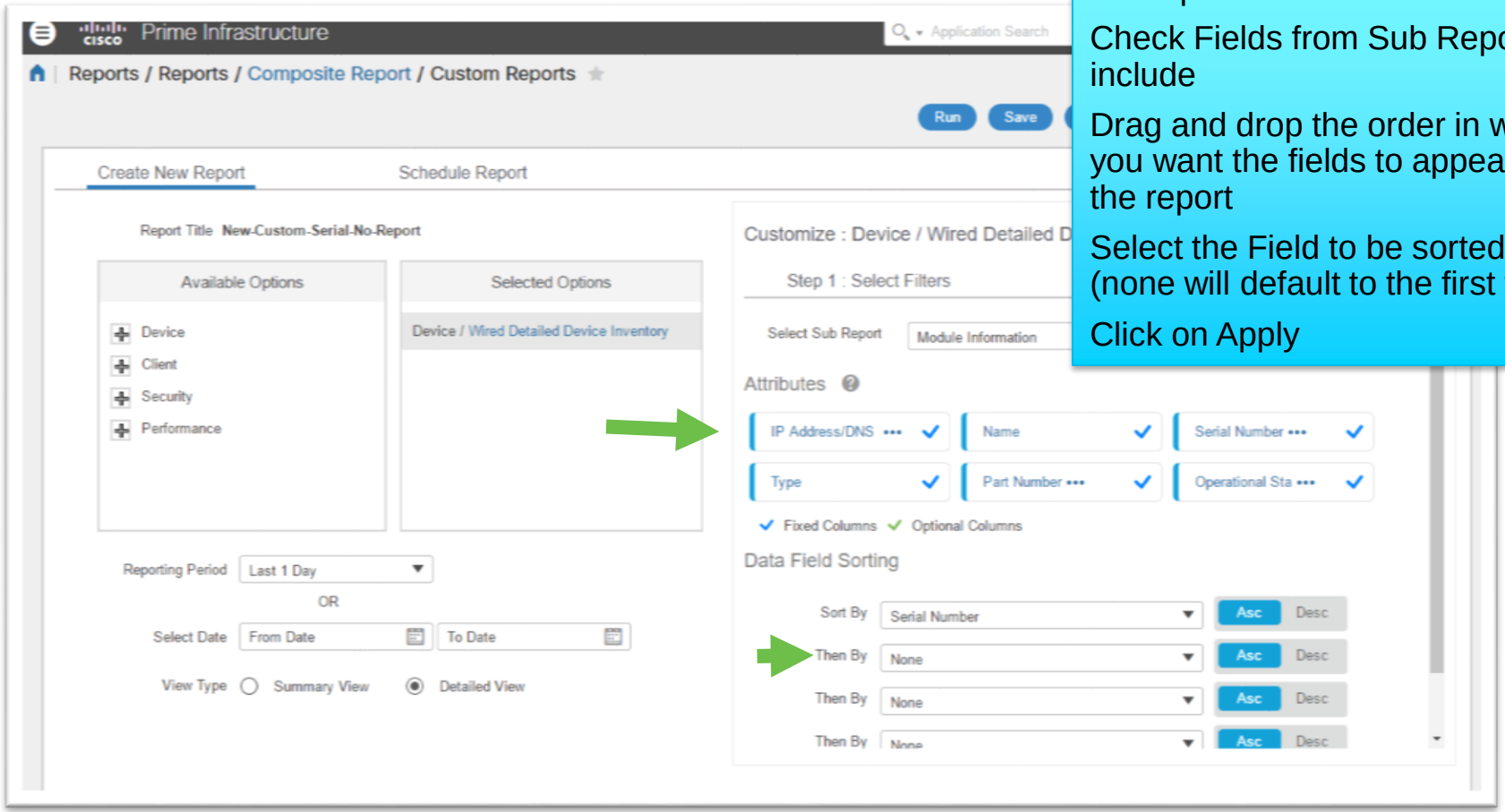
Drag and Drop the reports with the fields you want included in your Report

Select Devices

# Customized Reports in PI 3.2



# Customized Reports in PI 3.2/3.3




Pro-Tip:

Check Fields from Sub Reports to include

Drag and drop the order in which you want the fields to appear in the report

Select the Field to be sorted on (none will default to the first field).

Click on Apply

# Customized Reports in PI 3.2/3.3

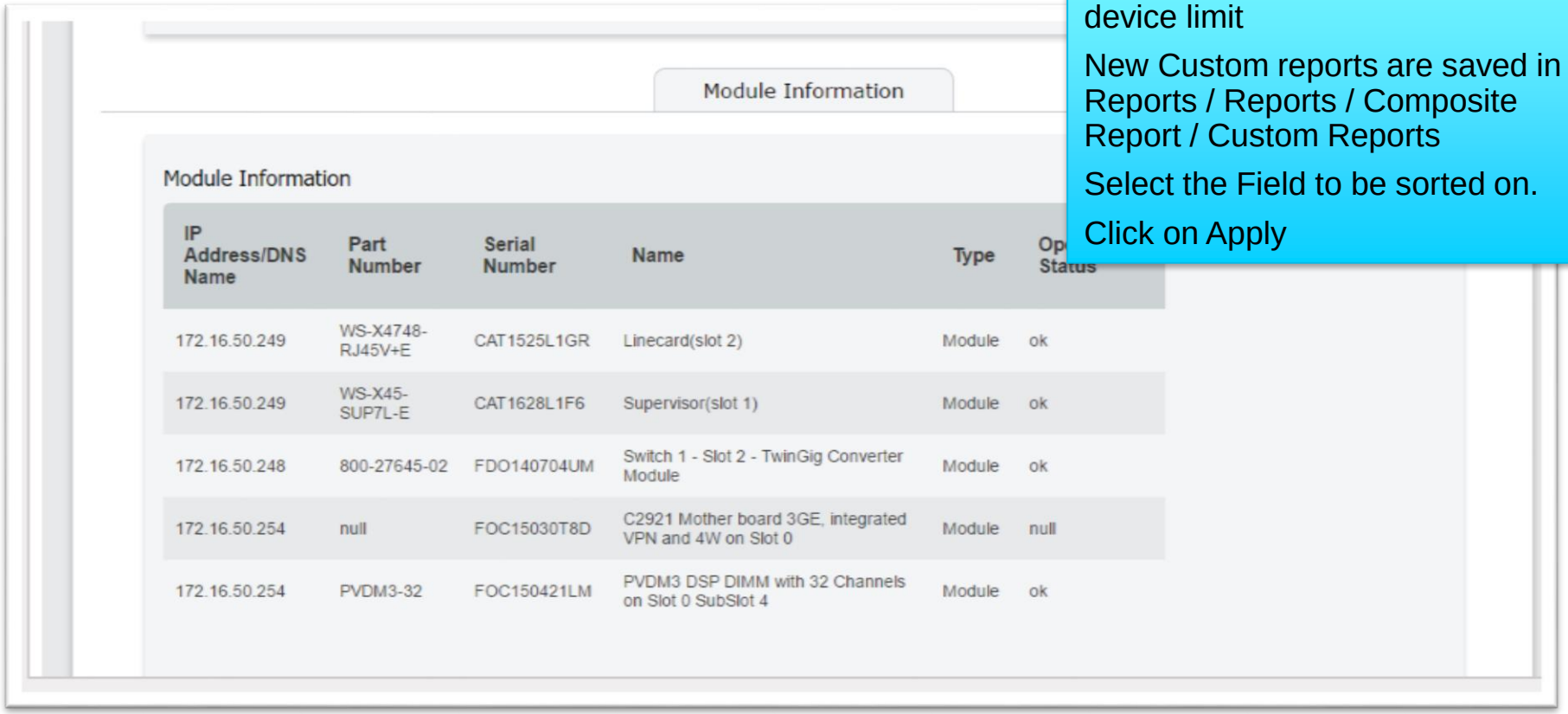
Pro-Tip:

PI 3.2/3.3 does not have the 5 device limit

New Custom reports are saved in Reports / Reports / Composite Report / Custom Reports

Select the Field to be sorted on.

Click on Apply




| IP Address/DNS Name | Part Number | Serial Number | Name | Type | Op Status |
|---|---|---|---|---|---|
| 172.16.50.249 | WS-X4748-RJ45V+E | CAT1525L1GR | Linecard(slot 2) | Module | ok |
| 172.16.50.249 | WS-X45-SUP7L-E | CAT1628L1F6 | Supervisor(slot 1) | Module | ok |
| 172.16.50.248 | 800-27645-02 | FDO140704UM | Switch 1 - Slot 2 - TwinGig Converter Module | Module | ok |
| 172.16.50.254 | null | FOC15030T8D | C2921 Mother board 3GE, integrated VPN and 4W on Slot 0 | Module | null |
| 172.16.50.254 | PVDM3-32 | FOC150421LM | PVDM3 DSP DIMM with 32 Channels on Slot 0 SubSlot 4 | Module | ok |

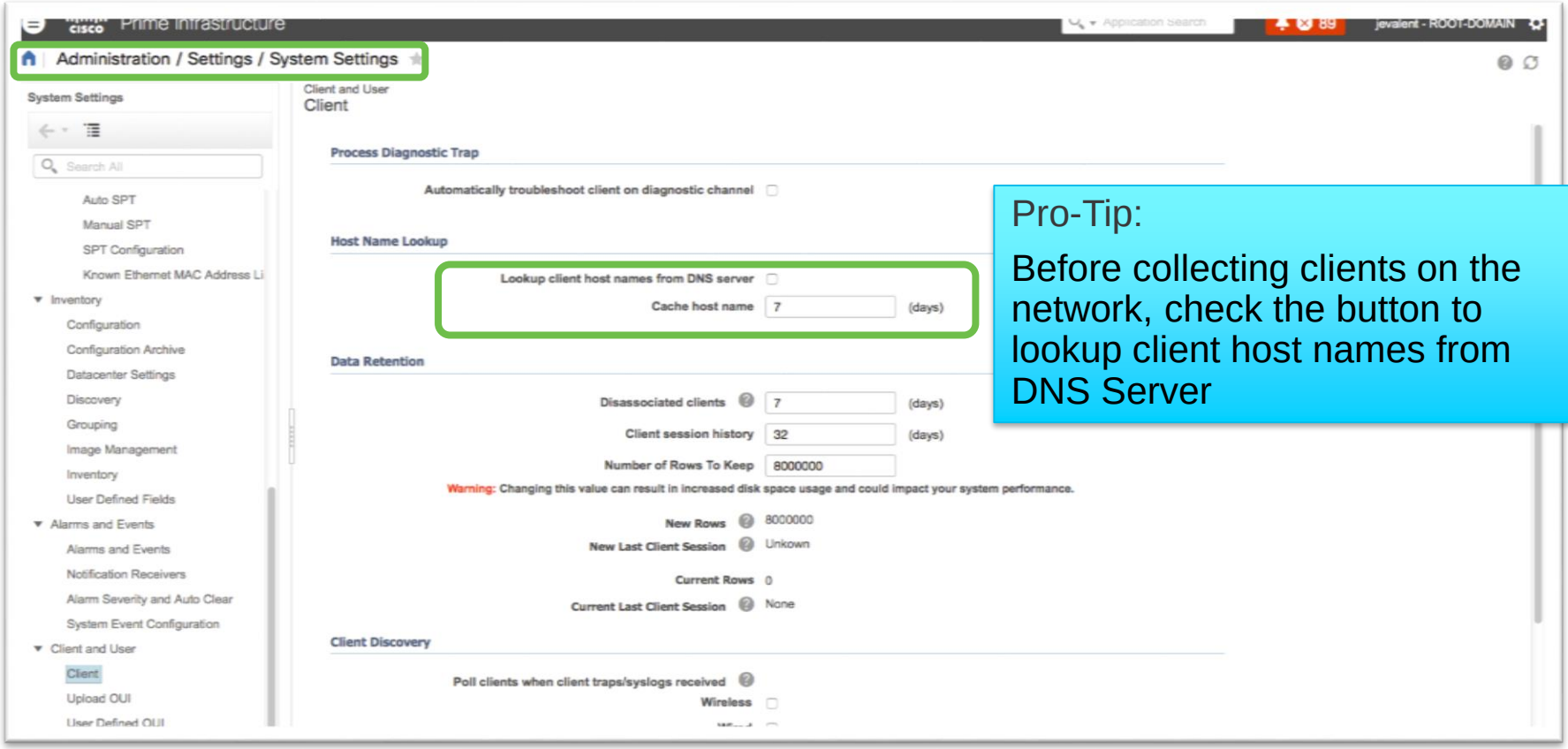
# Customized Reports in PI 3.2/3.3-PDF export

## Module Information

| IP Address/DNS Name | Part Number | Serial Number | Name | Type | Operational Status |
|---|---|---|---|---|---|
| 172.16.50.249 | WS-X4748-RJ45V+E | CAT1525L1GR | Linecard(slot 2) | Module | ok |
| 172.16.50.249 | WS-X45-SUP7L-E | CAT1628L1F6 | Supervisor(slot 1) | Module | ok |
| 172.16.50.248 | 800-27645-02 | FDO140704UM | Switch 1 - Slot 2 - TwinGig Converter Module | Module | ok |
| 172.16.50.254 | | FOC15030T8D | C2921 Mother board 3GE, integrated VPN and 4W on Slot 0 | Module | |
| 172.16.50.254 | PVDM3-32 | FOC150421LM | PVDM3 DSP DIMM with 32 Channels on Slot 0 SubSlot 4 | Module | ok |
| 172.16.50.239 | PVDM3-32 | FOC150542QR | PVDM3 DSP DIMM with 32 Channels on Slot 0 SubSlot 4 | Module | ok |
| 172.16.50.239 | | FOC15063ZU9 | C2921 Mother board 3GE, integrated VPN and 4W on Slot 0 | Module | |
| 172.16.50.252 | C3850-NM-2-10G | FOC20087VRX | Switch 1 FRU Uplink Module 1 | Module | |
| 172.16.50.253 | WS-C4948 | FOX1233GCFW | Linecard(slot 1) | Module | ok |

# Tips for Client/Host Tracking

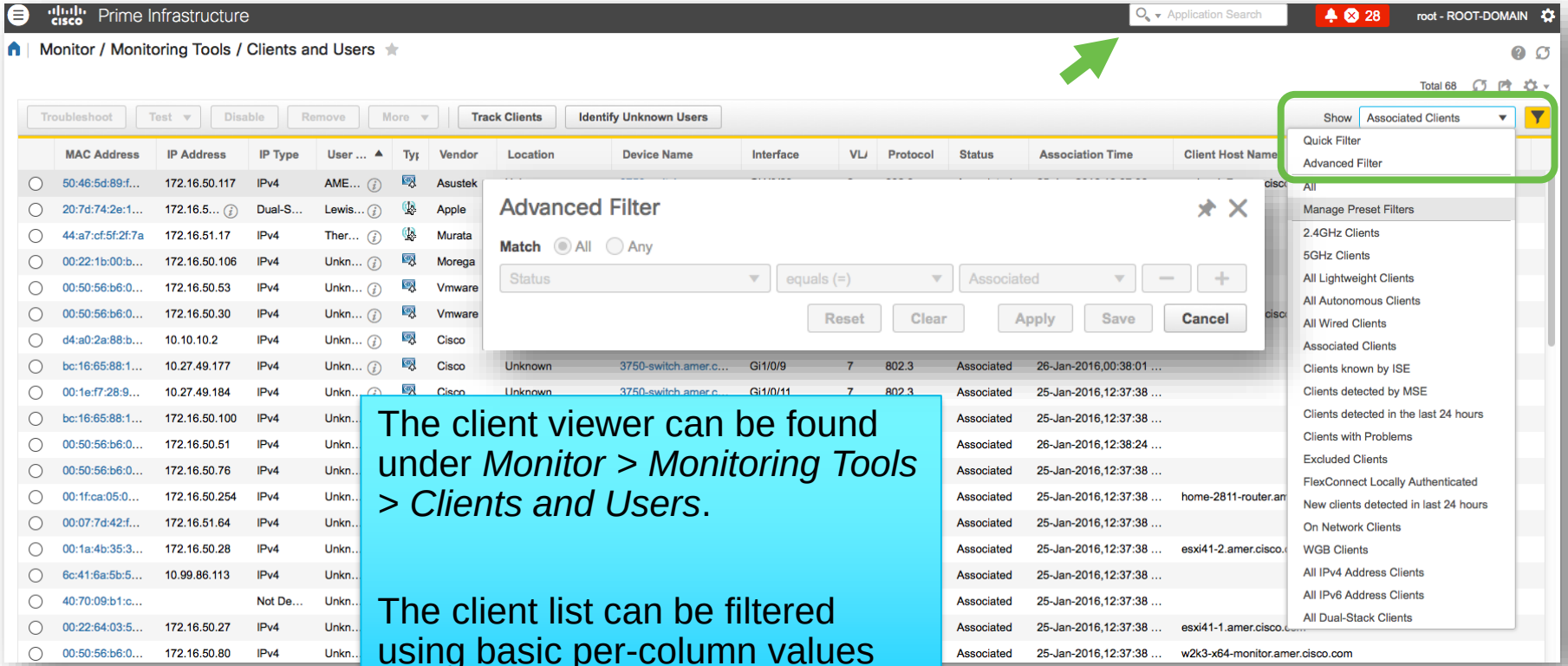
# Setting Up For Client Tracking




Pro-Tip:

Before collecting clients on the network, check the button to lookup client host names from DNS Server

# Viewing/Filtering The Clients

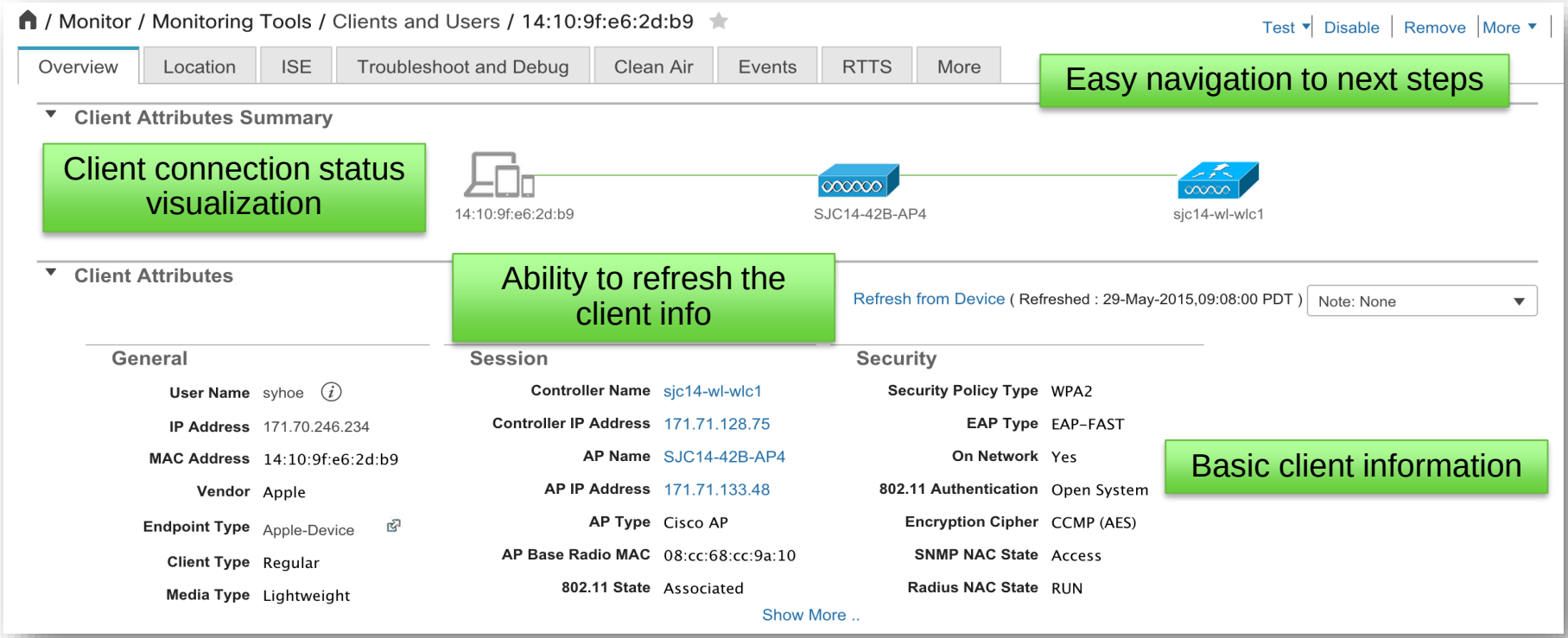



The client viewer can be found under *Monitor > Monitoring Tools > Clients and Users*.

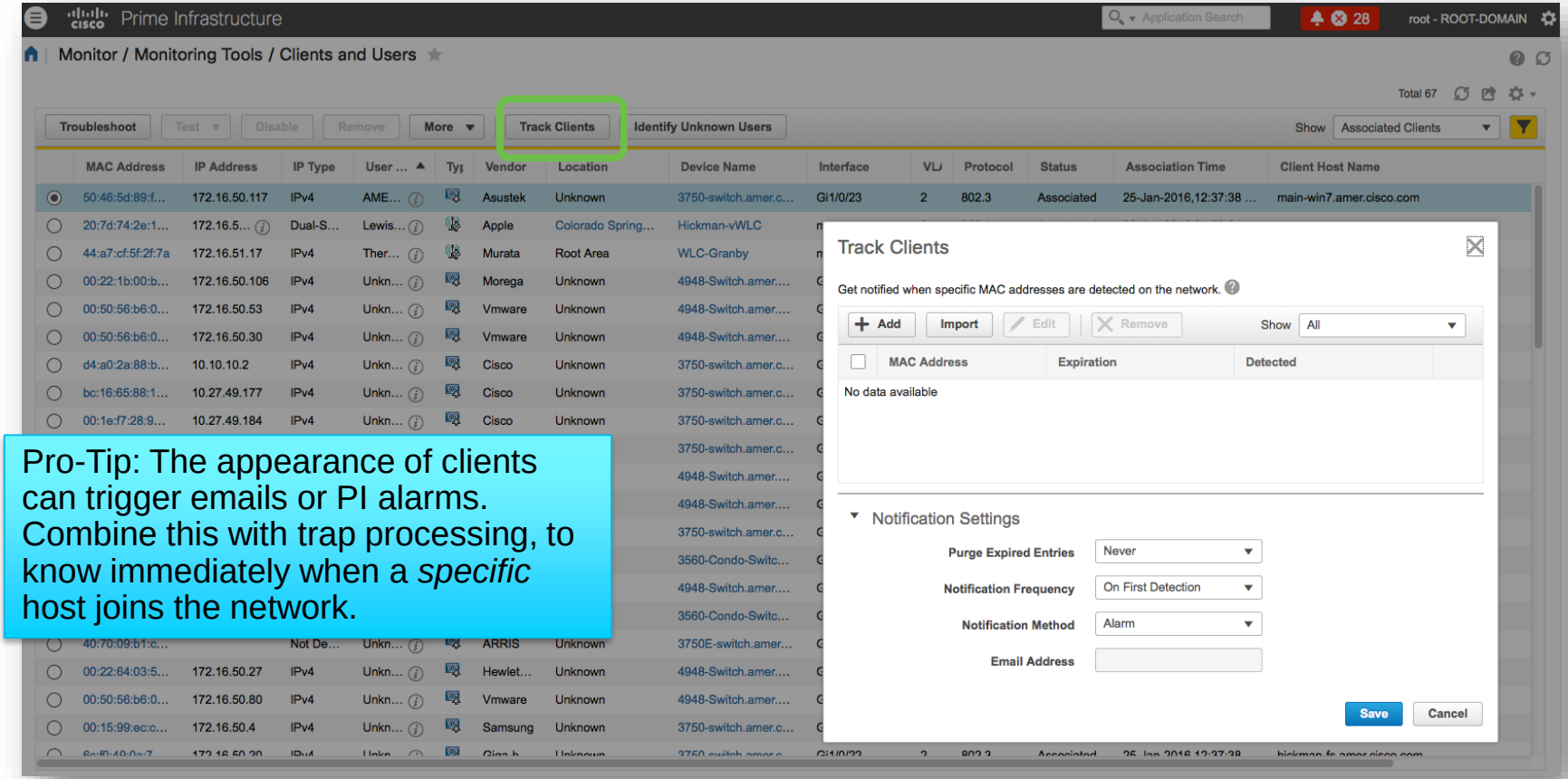
The client list can be filtered using basic per-column values with the *Quick Filter* "Show" option…

# Viewing Client Details

Clicking the hyperlink of the MAC address of the client opens the client details pane.



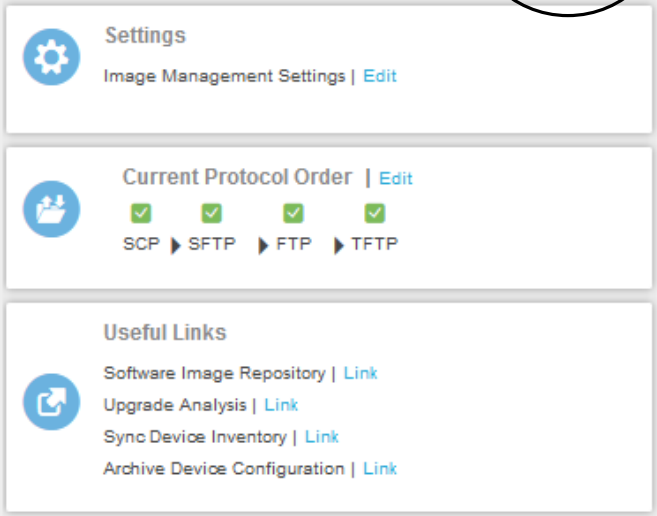
# Tracking Clients




Pro-Tip: The appearance of clients can trigger emails or PI alarms. Combine this with trap processing, to know immediately when a *specific* host joins the network.

# Software Image Mgmt (SWIM)

# Effective Software Image Management (SWIM)


- Ability to add images to software repository
  - Archive from current devices
  - Manual upload
- Ability to handle parallelism and sequencing

- Enhance Image meta-data with DRAM/Flash requirements for pre-qual checks
- Ability to push image using different transport protocols

# Pro-Tip  Backup all Currently deployed Images


Next Task: Backup all currently deployed images

Go to Inventory > Device Management > Software Images

Click ‘Import’

Source: Device

Collection Options: All Devices

Schedule:

# Pro-Tip  Backup all Currently deployed Images


Next Task: Backup all currently deployed images

Go to Inventory > Device Management > Software Images

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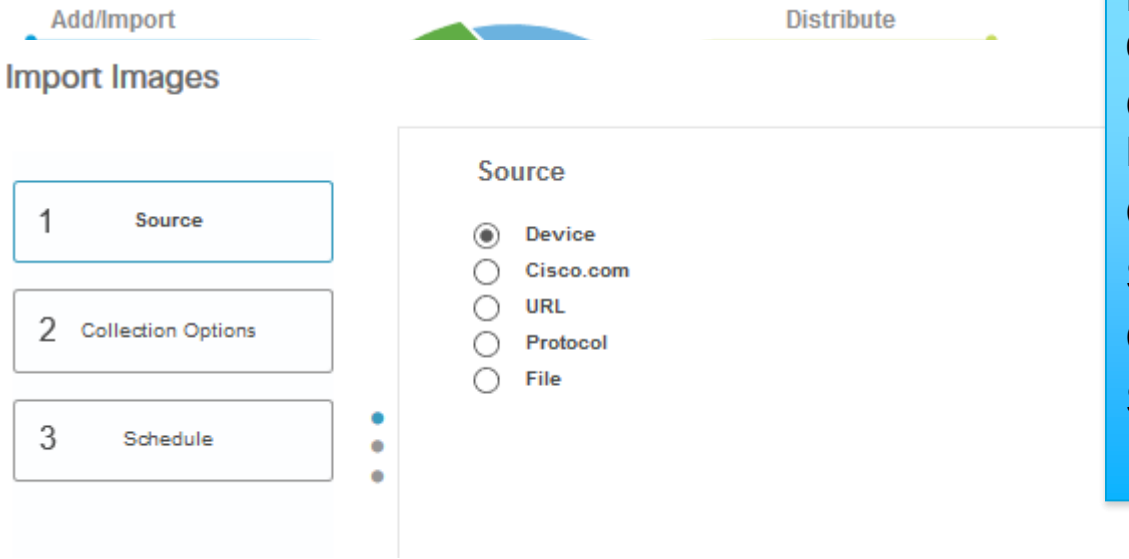
Schedule:

# Pro-Tip  Backup all Currently deployed Images




Next Task: Backup all currently deployed images

Go to Inventory > Device Management > Software Images

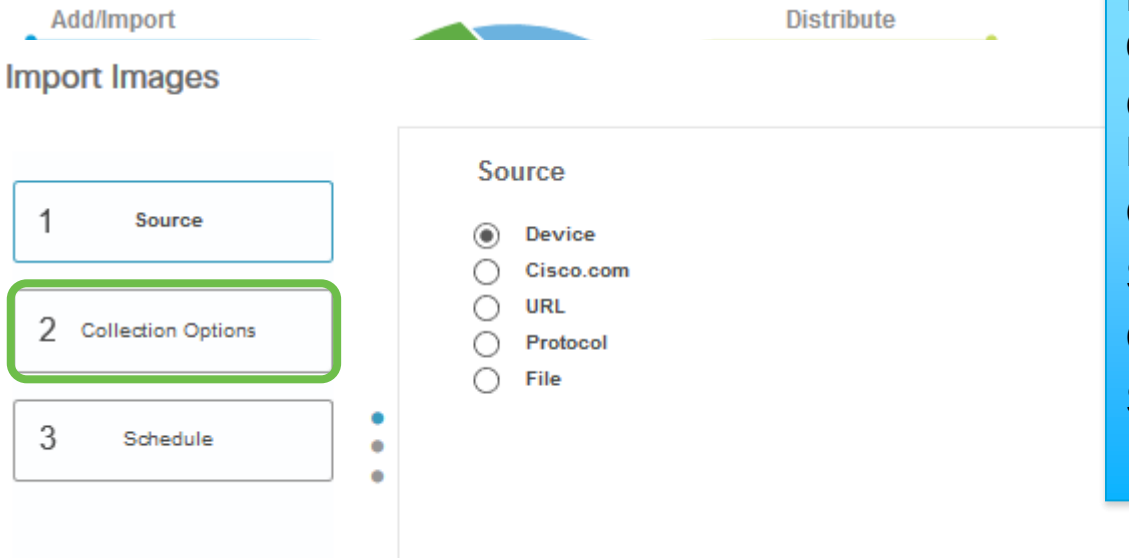
Click ‘Import’

Source: Device

Collection Options: All Devices

Schedule:

# Pro-Tip  Backup all Currently deployed Images




Next Task: Backup all currently deployed images

Go to Inventory > Device Management > Software Images

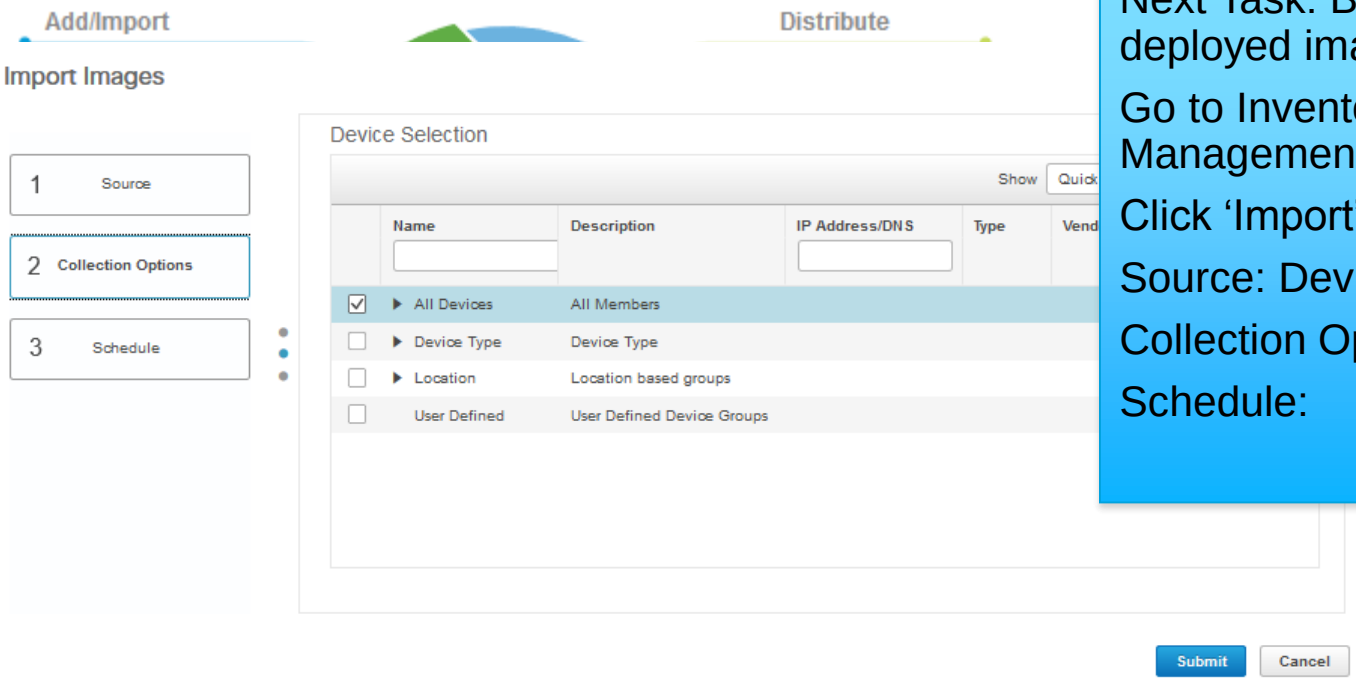
Click ‘Import’

Source: Device

Collection Options: All Devices

Schedule:

# Pro-Tip  Backup all Currently deployed Images




Next Task: Backup all currently deployed images

Go to Inventory > Device Management > Software Images

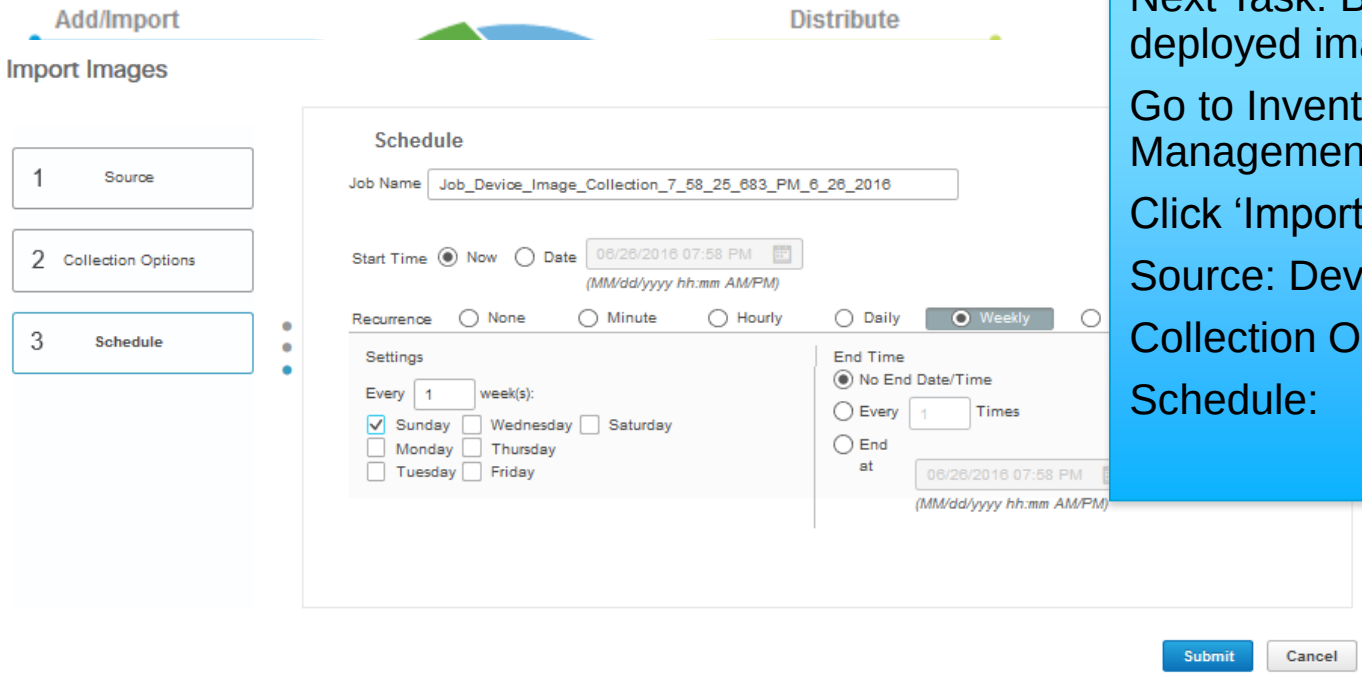
Click ‘Import’

Source: Device

Collection Options: All Devices

Schedule:

# Pro-Tip  Backup all Currently deployed Images




Next Task: Backup all currently deployed images

Go to Inventory > Device Management > Software Images

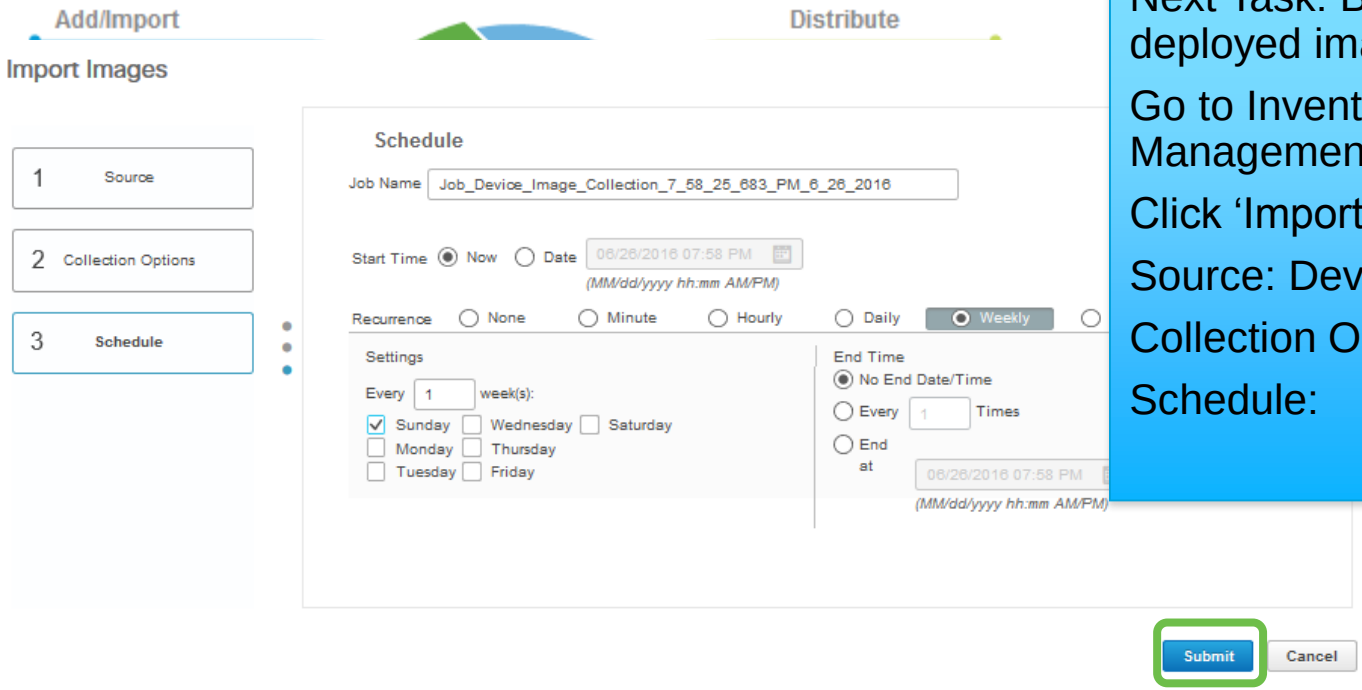
Click ‘Import’

Source: Device

Collection Options: All Devices

Schedule:

# Pro-Tip  Backup all Currently deployed Images




Next Task: Backup all currently deployed images

Go to Inventory > Device Management > Software Images

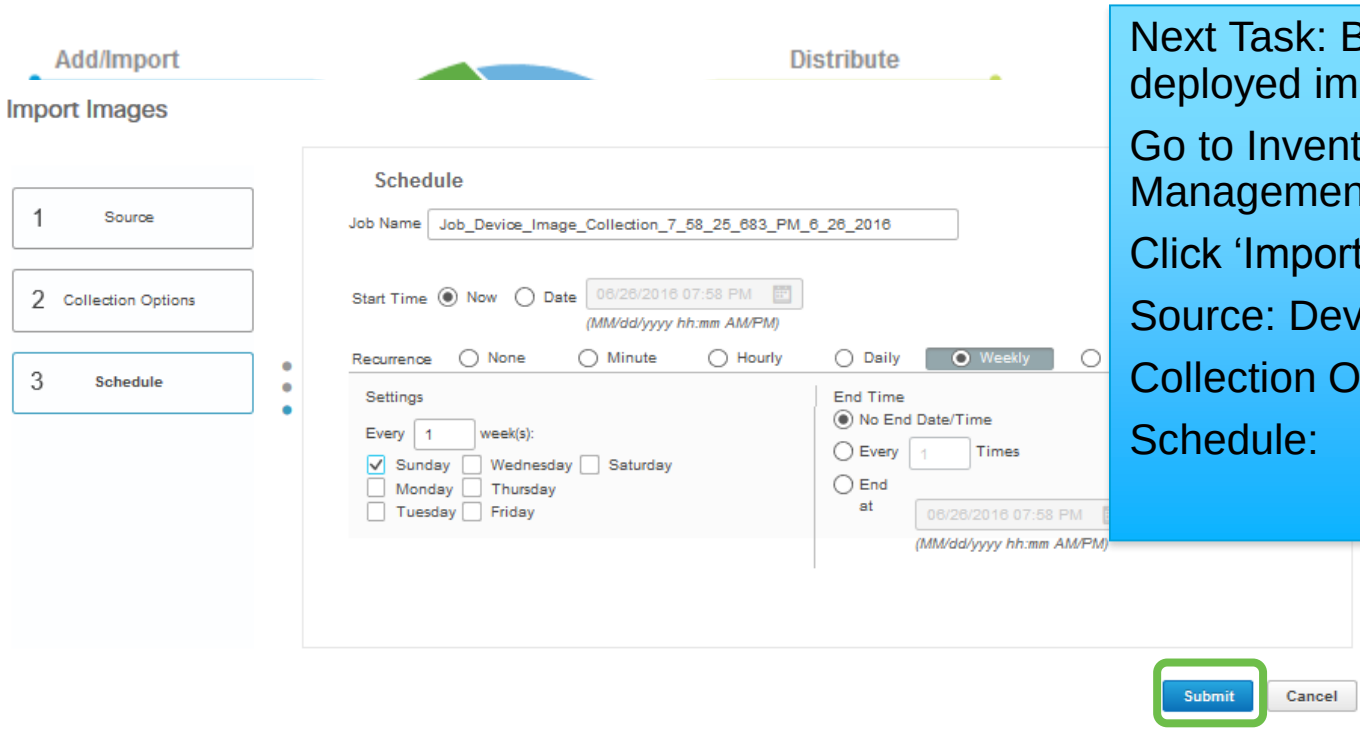
Click ‘Import’

Source: Device

Collection Options: All Devices

Schedule:

# Pro-Tip  Backup all Currently deployed Images




Next Task: Backup all currently deployed images

Go to Inventory > Device Management > Software Images

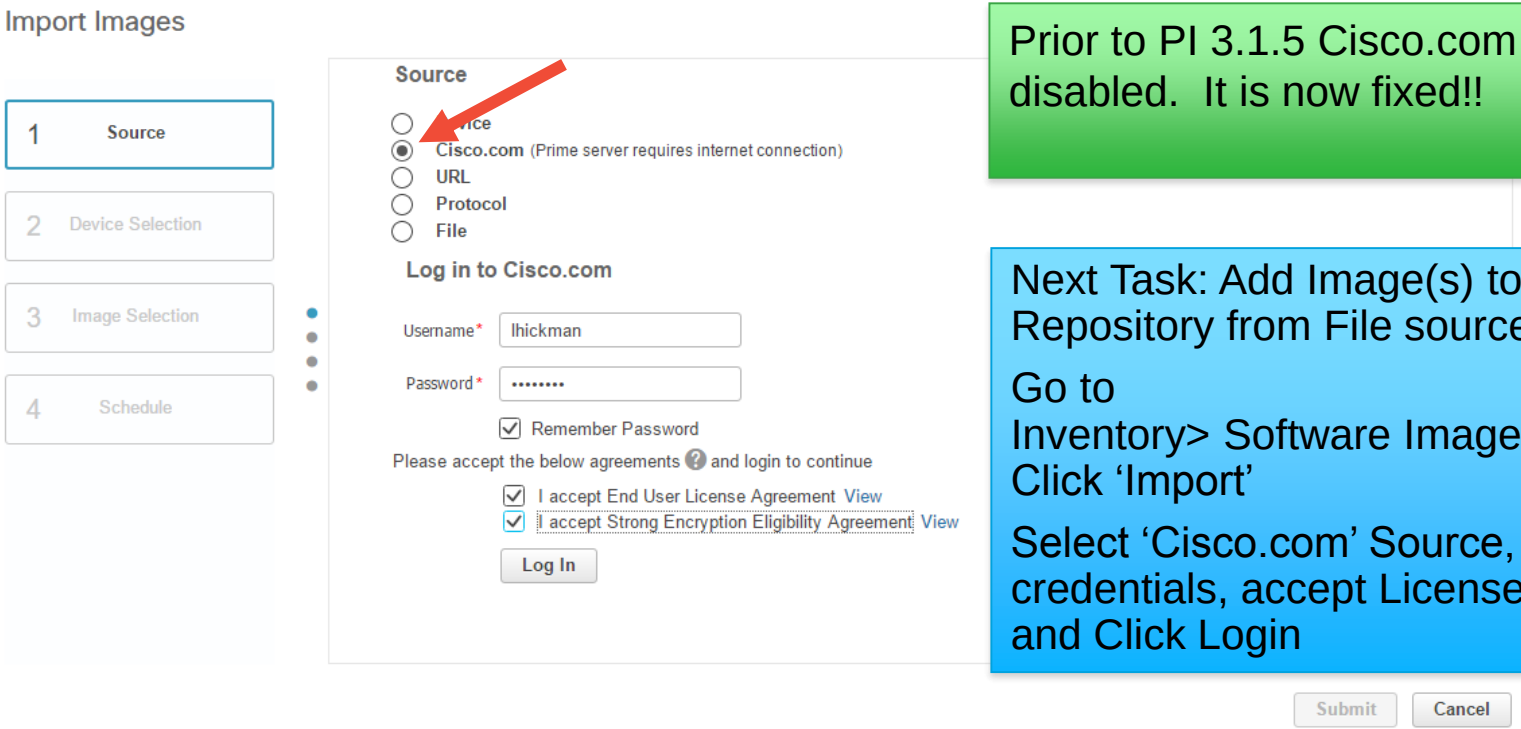
Click ‘Import’

Source: Device

Collection Options: All Devices

Schedule:

# Pro-Tip: Import Image into PI Software Repository




Prior to PI 3.1.5 Cisco.com Import was disabled. It is now fixed!!

Next Task: Add Image(s) to Software Repository from File source

Go to
Inventory> Software Images,
Click 'Import'

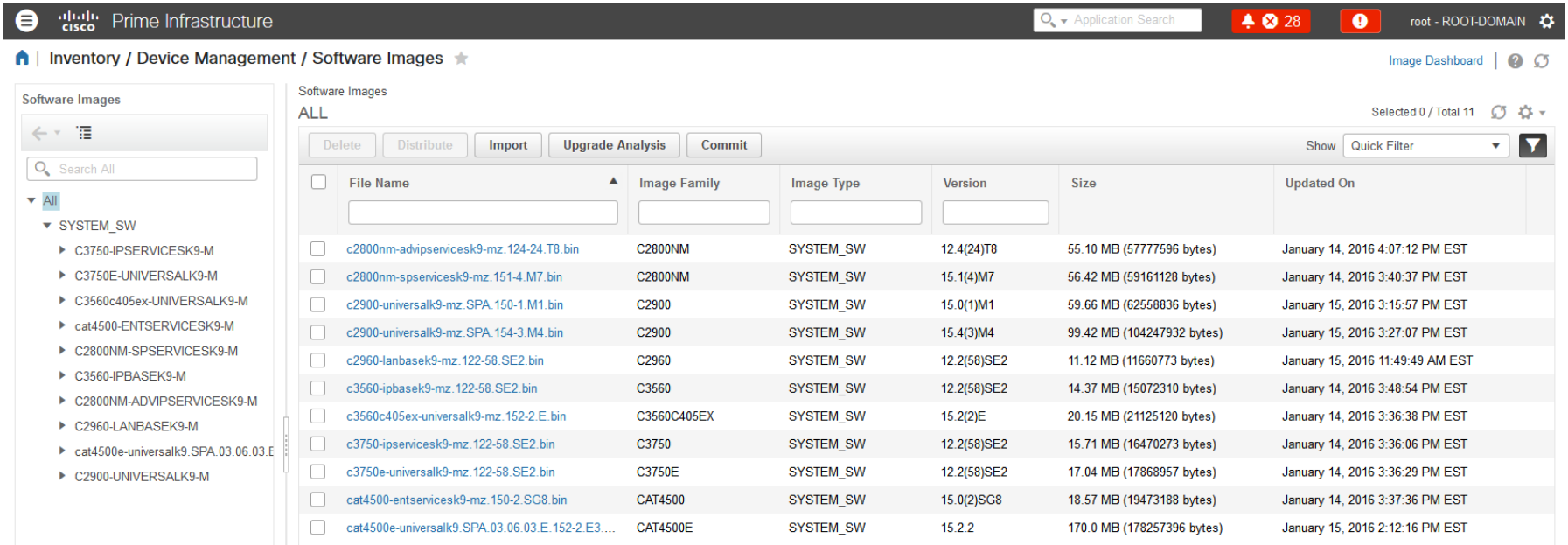
Select 'Cisco.com' Source, enter CCO credentials, accept License agreements and Click Login

# PI Software Repository Image Import from cisco.com

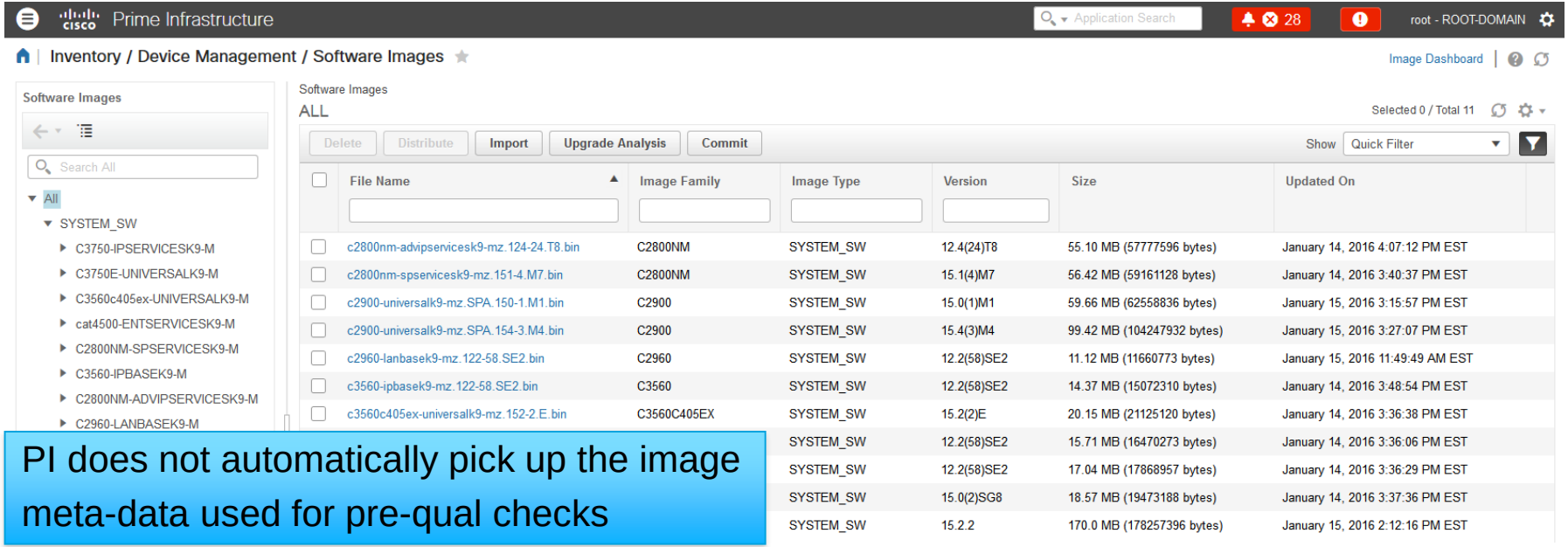
| Cisco 2900 Series Integrated Services Routers G2 | | | | | | |
|---|---|---|---|---|---|---|
| **Device Type** | **SYSOIDS** | **S/W Version** | **Software** | **Cisco.com Image Support(Y/N)** | **Image Import from Device ( FTP, TFTP, SFTP, SCP)** | **Image Distribution Server ( FTP, TFT** |
| Cisco 2951 Integrated Services Router G2 | OID:1.3.6.1.4.1.9.1.1043 | >=15.0(1)M, >=15.2(4)M2 | IOS | Y | TFTP, SCP | FTP, TFTP, SCP |
| Cisco 2911 Integrated Services Router G2 | OID:1.3.6.1.4.1.9.1.1045 | >=15.0(1)M, >=15.2(4)M2 | IOS | Y | TFTP, SCP | FTP, TFTP, SCP |
| Cisco 2921 Integrated Services Router G2 | OID:1.3.6.1.4.1.9.1.1044 | >=15.0(1)M, >=15.2(4)M2 | IOS | Y | TFTP, SCP | FTP, TFTP, SCP |
| Cisco 2901 Integrated Services Router G2 | OID:1.3.6.1.4.1.9.1.1046 | >=15.0(1)M, >=15.2(4)M2 | IOS | N | TFTP, SCP | FTP, TFTP, SCP |
| Cisco 2911-T Integrated Services Router | OID:1.3.6.1.4.1.9.1.2138 | >=15.0(1)M, >=15.2(4)M2 | IOS | N | TFTP, SCP | FTP, TFTP, SCP |

Check Device Support Matrix on CCO for supported Devices

# Image Import (cont)

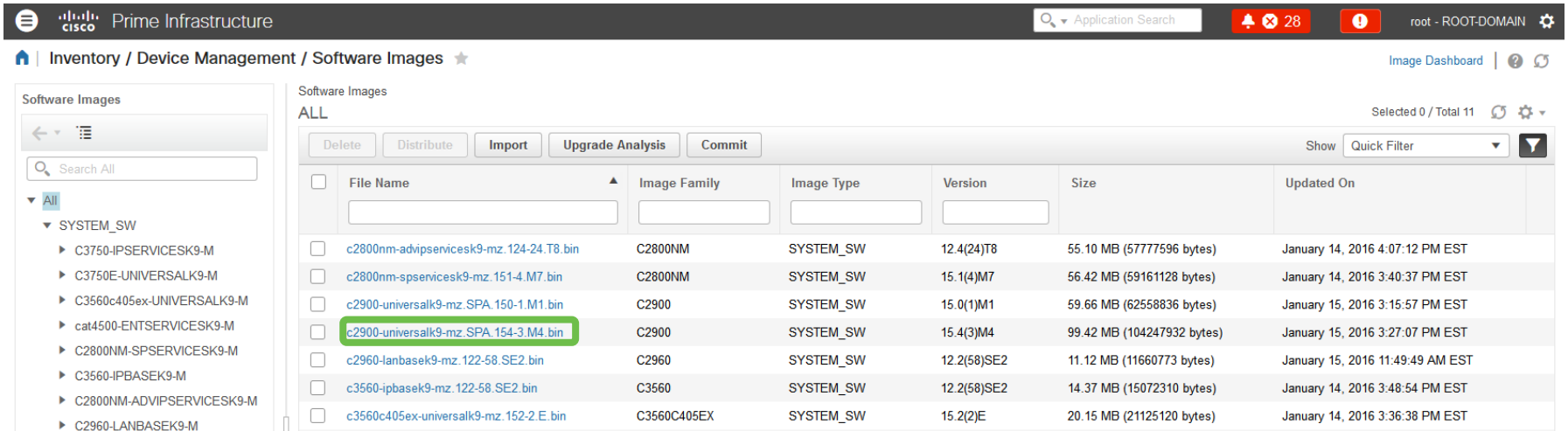


# Image Import (cont)



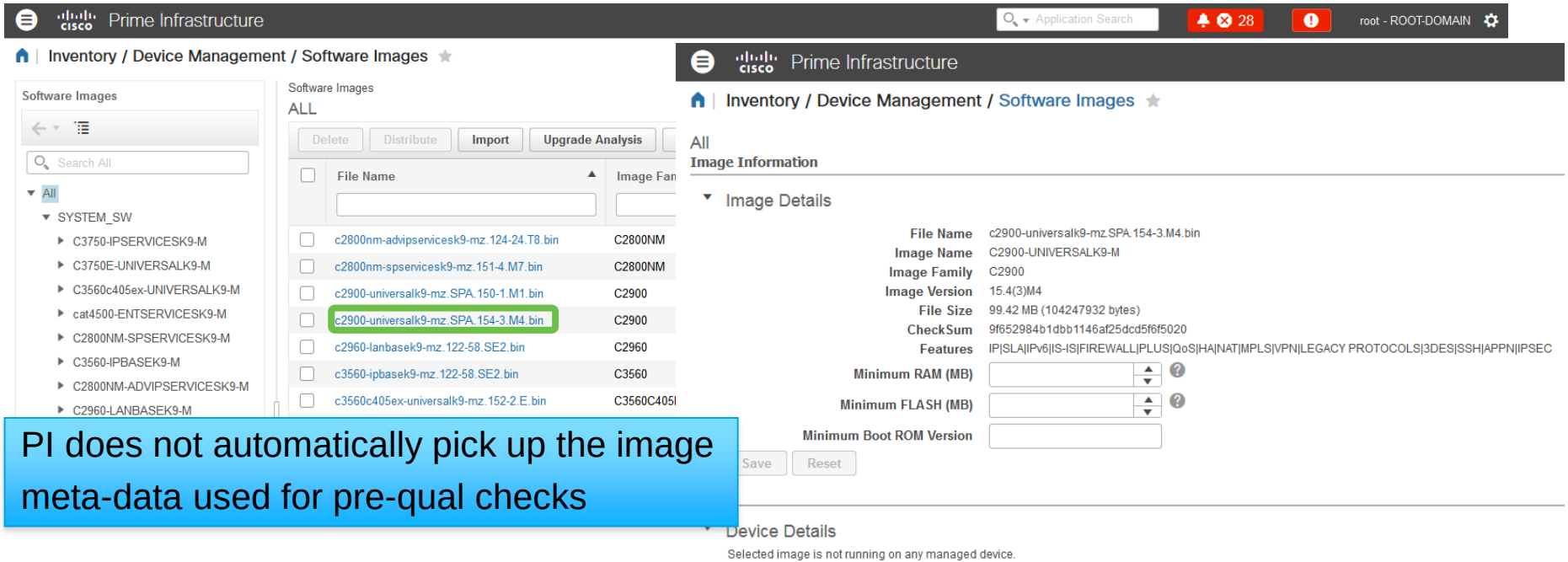

PI does not automatically pick up the image meta-data used for pre-qual checks

# Image Import (cont)



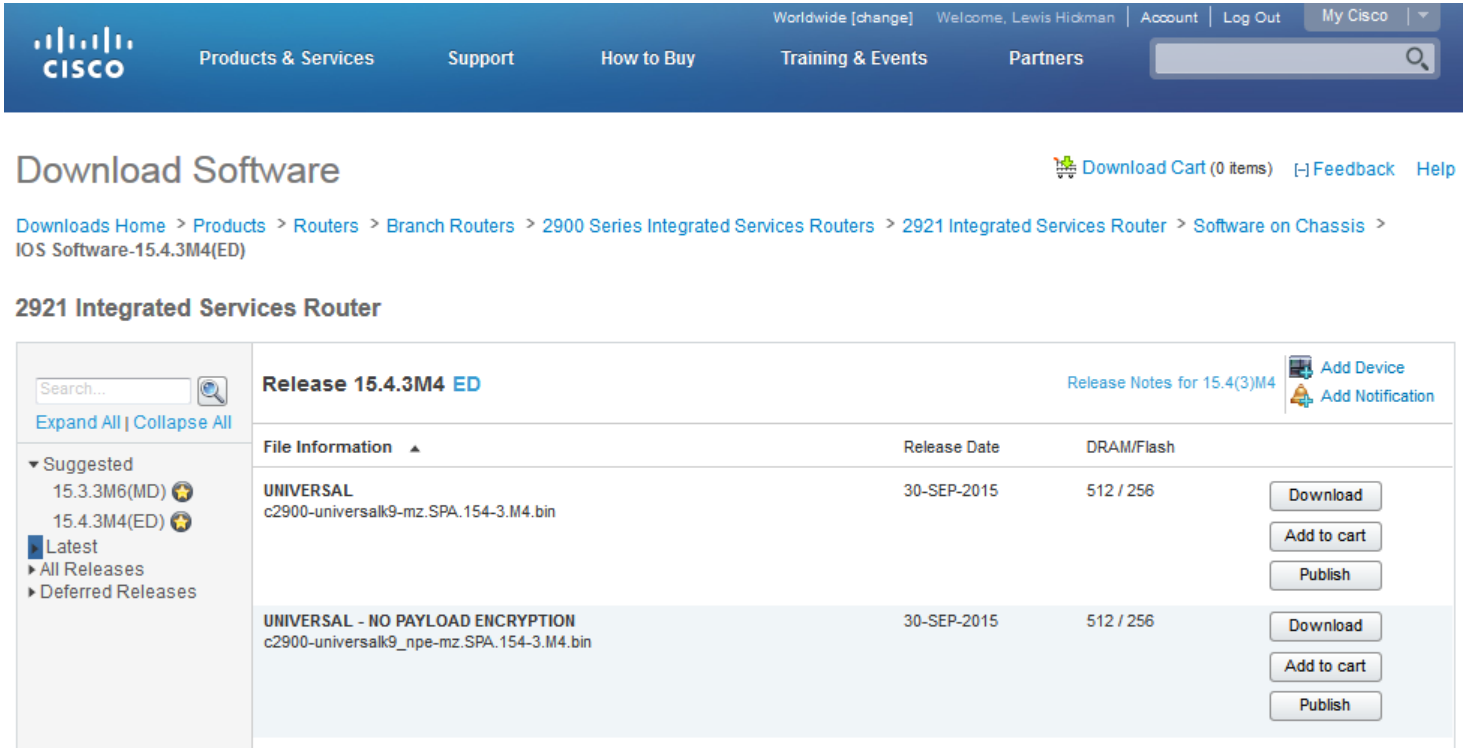

PI does not automatically pick up the image meta-data used for pre-qual checks

# Image Import (cont)

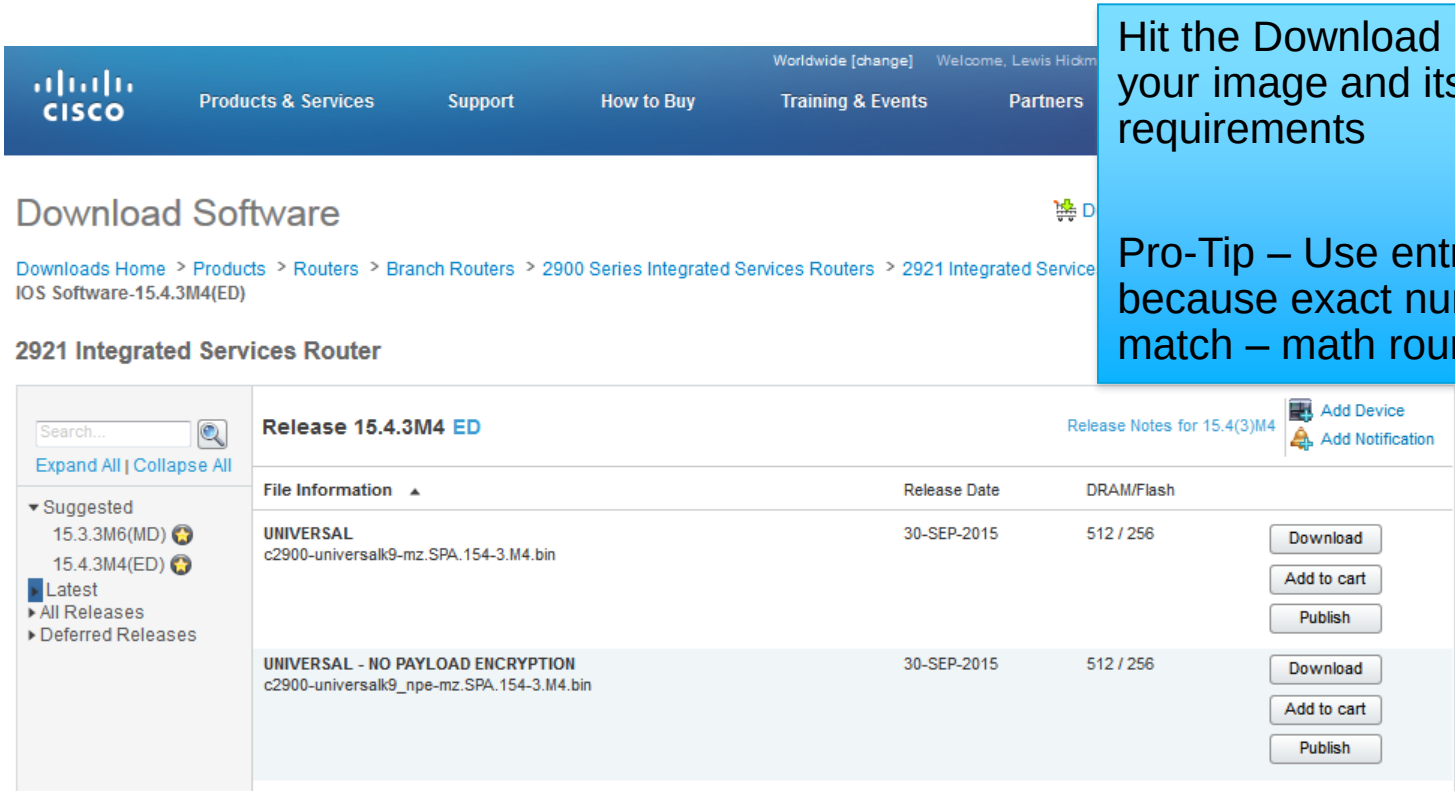



PI does not automatically pick up the image meta-data used for pre-qual checks

# Import Image (cont)



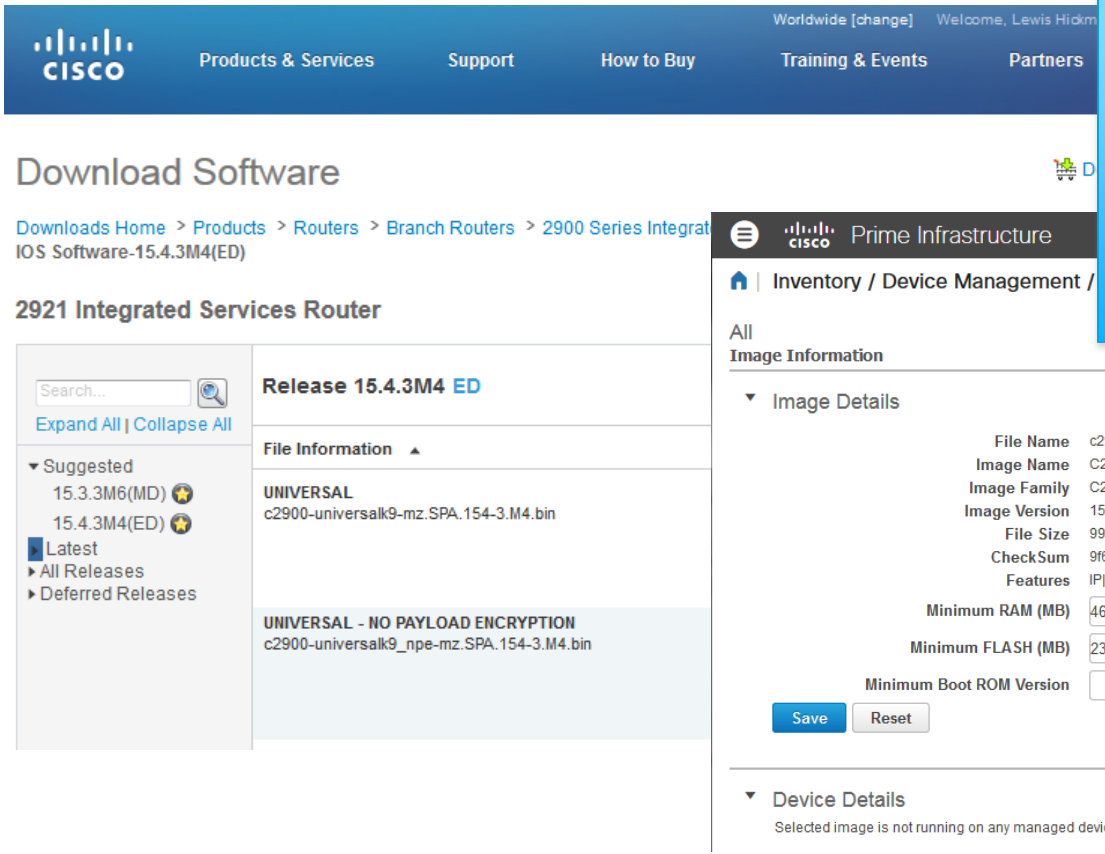
# Import Image (cont)

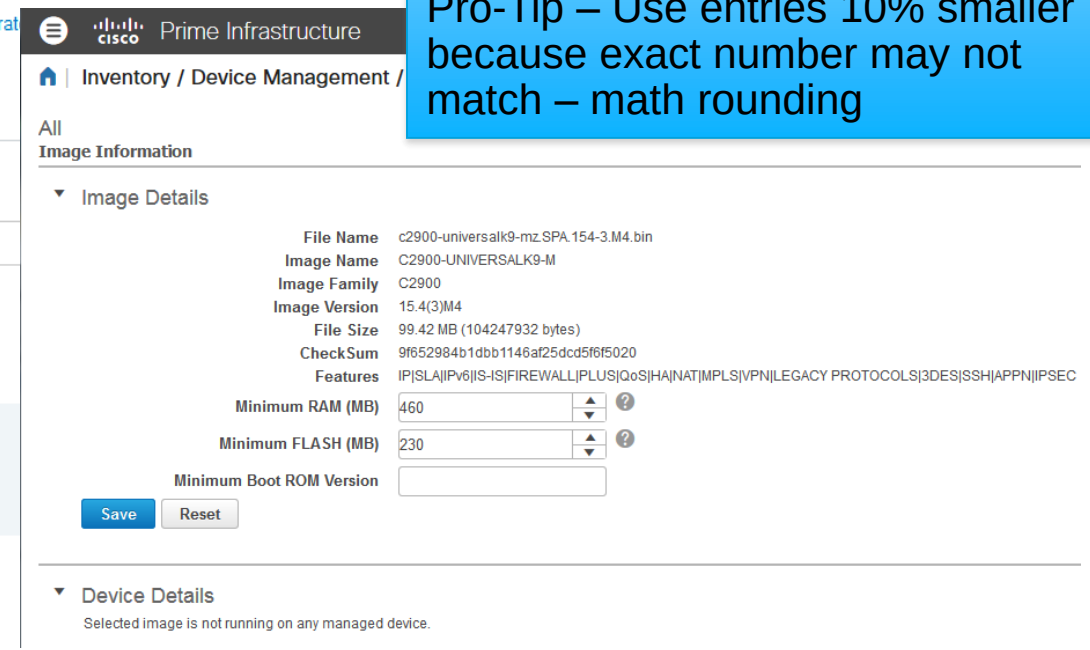



Hit the Download Center to find your image and its RAM/Flash requirements

Pro-Tip – Use entries 10% smaller because exact number may not match – math rounding

# Import Image (cont)

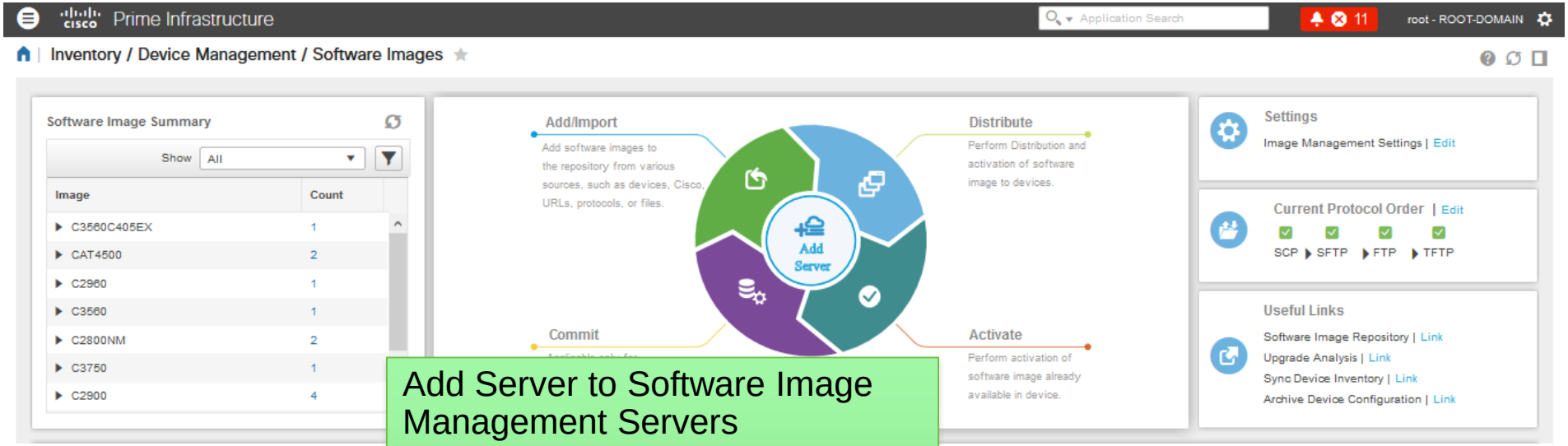



Hit the Download Center to find your image and its RAM/Flash requirements

Pro-Tip – Use entries 10% smaller because exact number may not match – math rounding

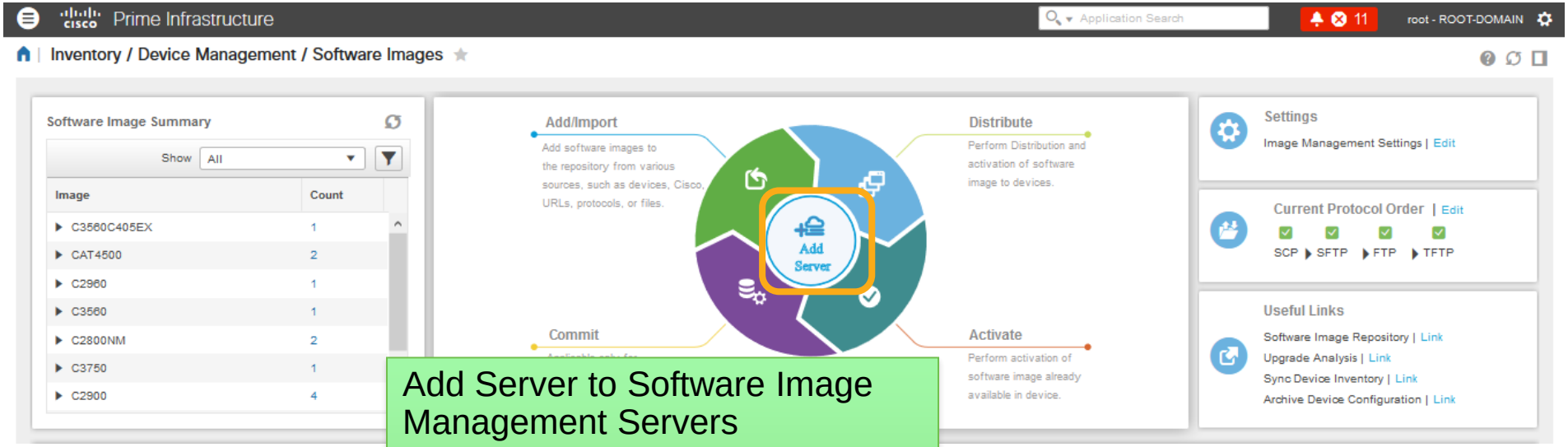
# Distribute Image from Repository using External Server




## Add Server to Software Image Management Servers

1. From the SWIM dashboard select Add Server
2. Enter Server information (IP address, Description)
3. Select Site Location(s) serviced by this server

# Distribute Image from Repository using External Server

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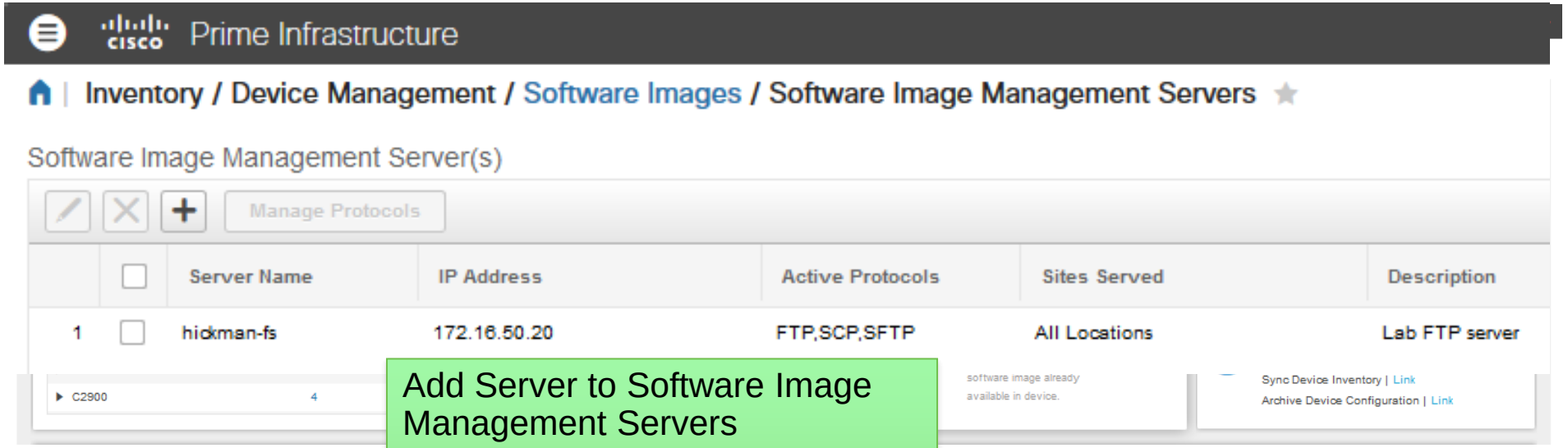


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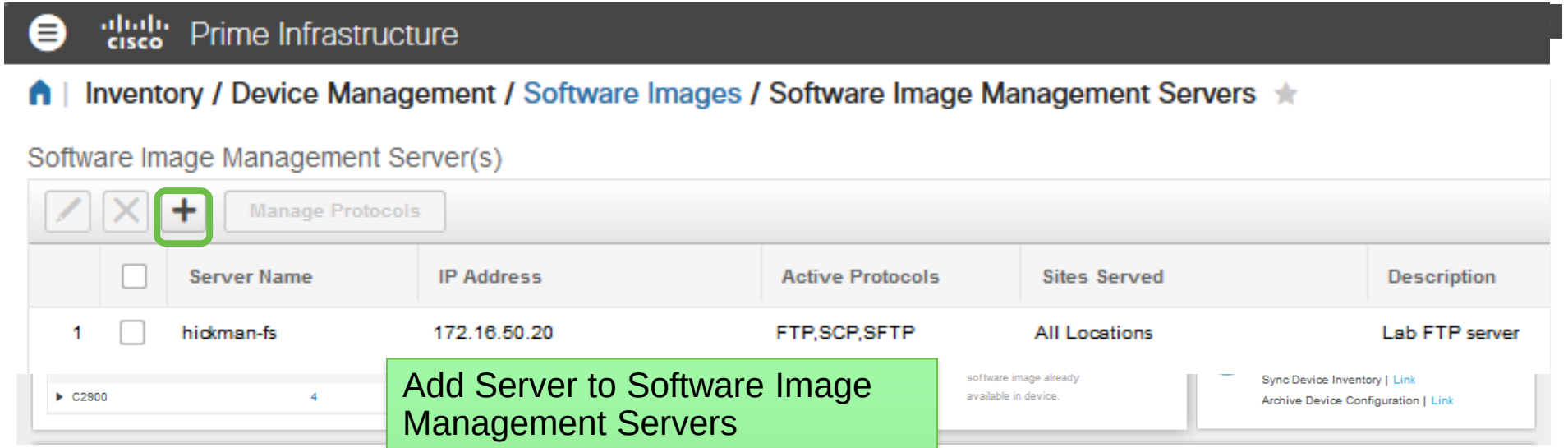


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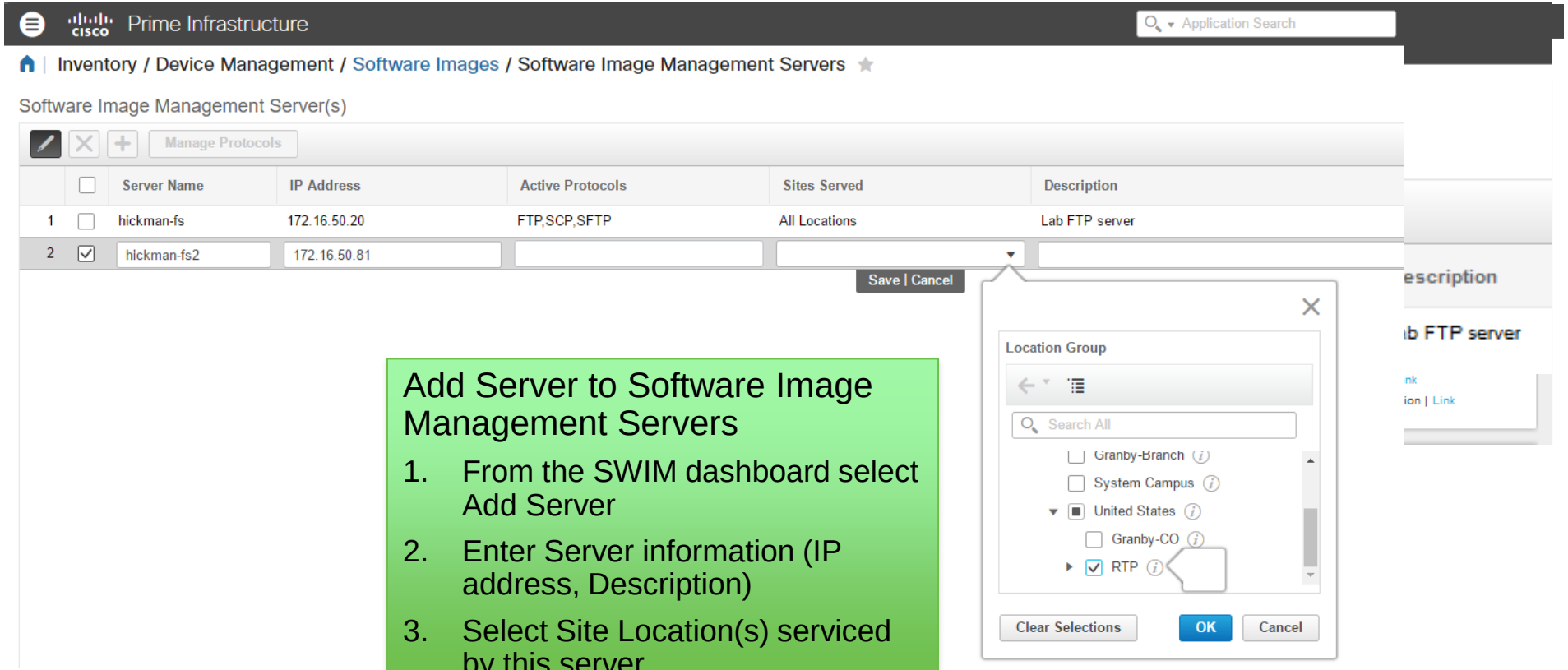


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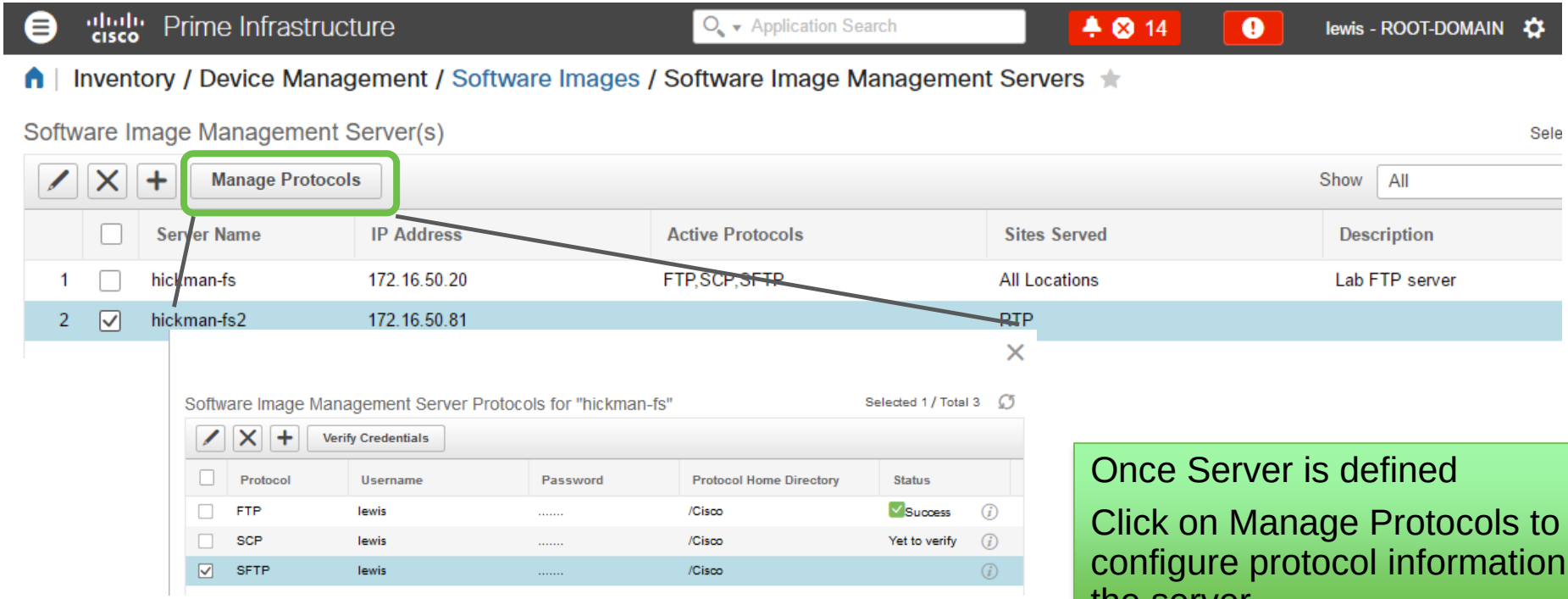
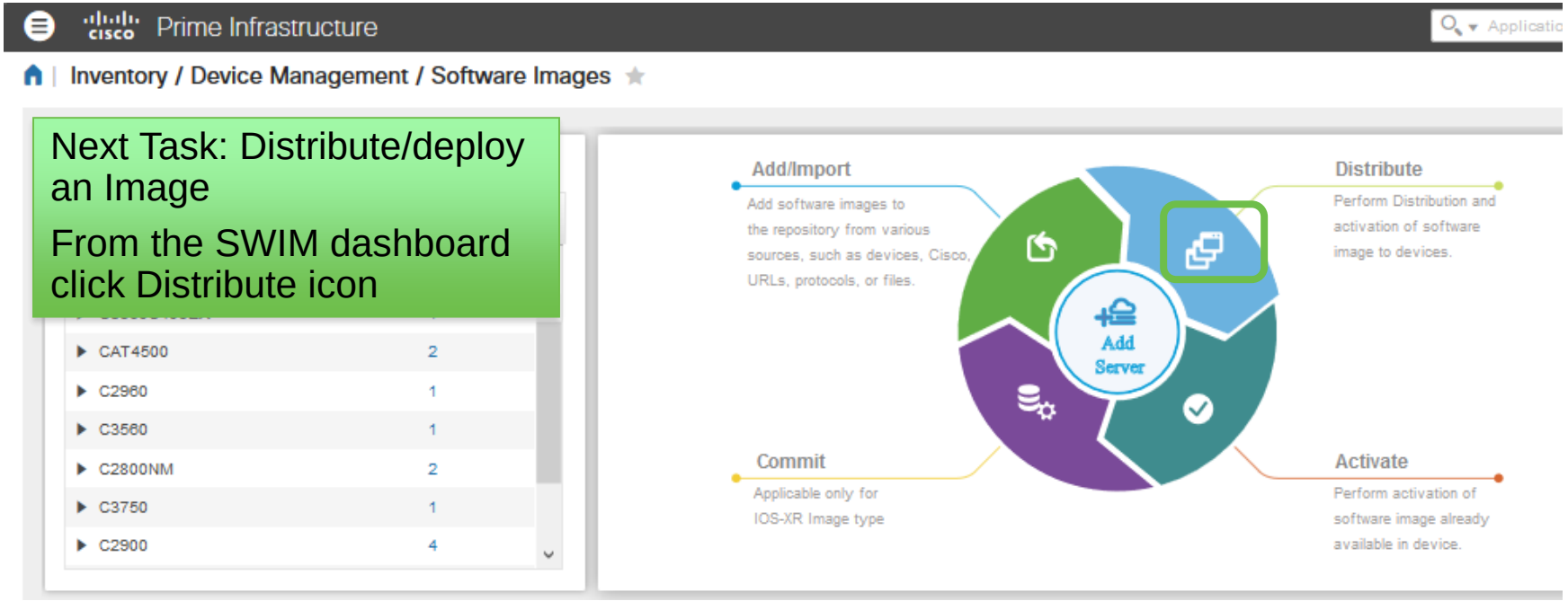



Once Server is defined

Click on Manage Protocols to configure protocol information for the server

# Distribute Image (cont)



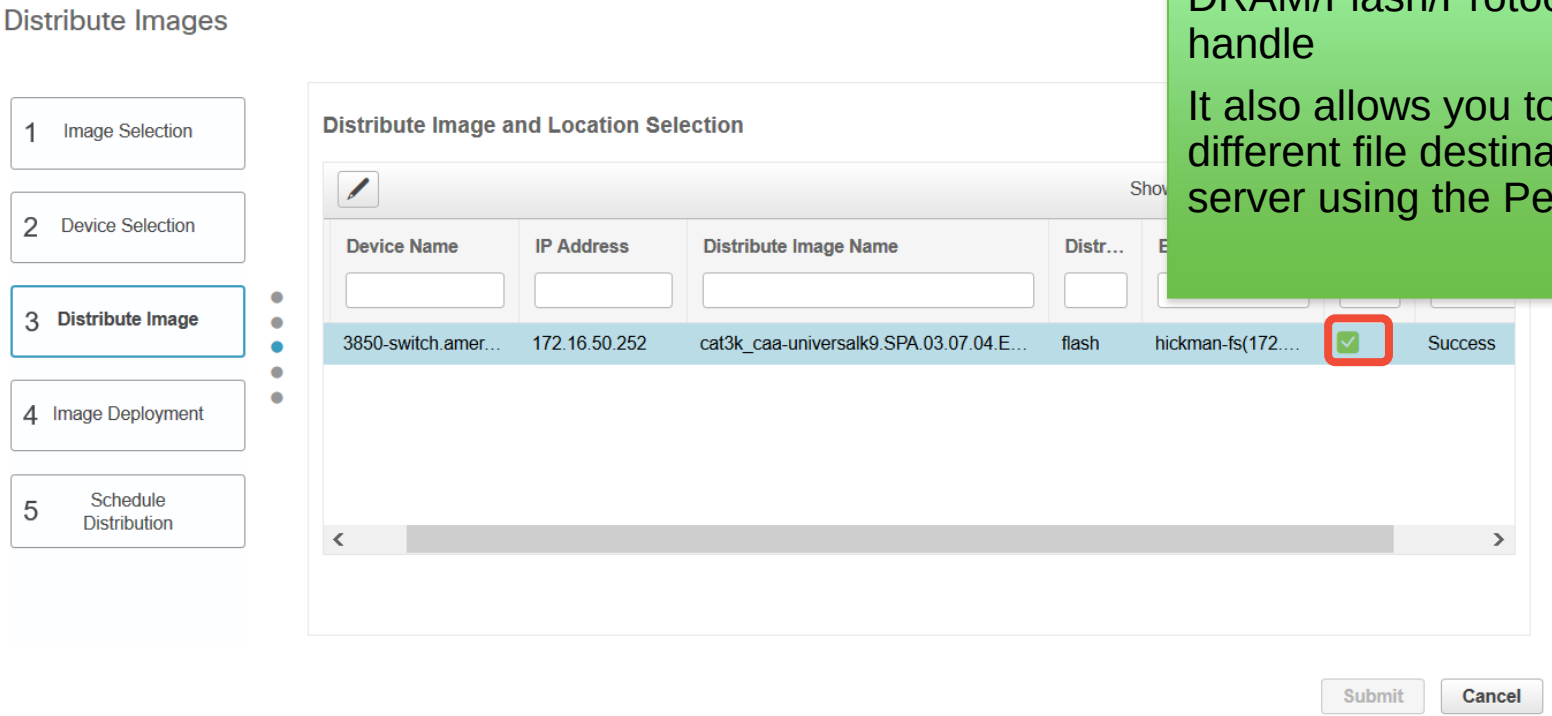
# Distribute Image (cont)

Next

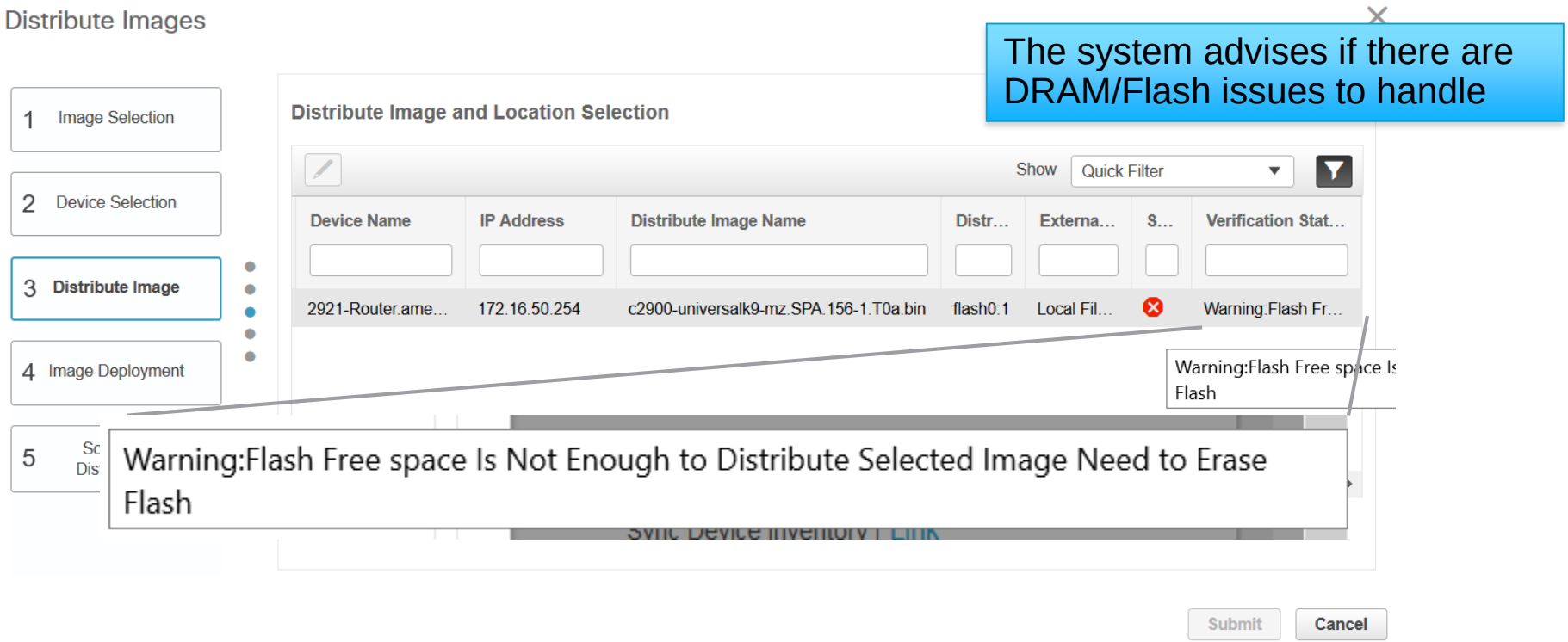
3 Distribute image:

The system advises if there are DRAM/Flash/Protocol issues to handle

It also allows you to select a different file destination or SWIM server using the Pencil Icon



# Upgrading Devices

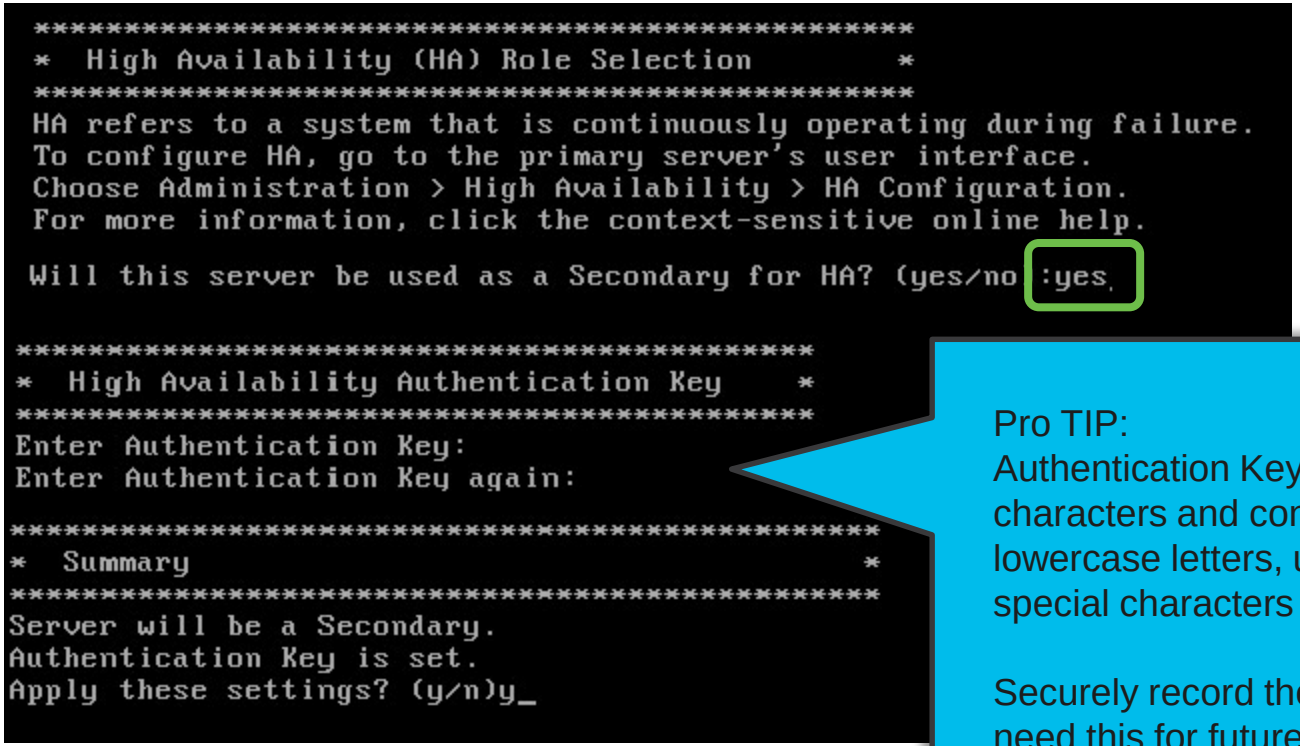


# Implementing High Availability

# Key Points for Enabling HA on PI 3.x

- Primary and Secondary need to be at the same MR and DP level
- Email server needs to be configured on PI before enabling HA
- Latency <= 220 milliseconds
- Minimum of 86 Mbps net throughput
- TCP/UDP ports
  - 8082 Used by Health Monitor
  - 1522  Used by Oracle to synch data
- PI Administrator Guide (High Availability) http://www.cisco.com/c/en/us/td/docs/net_mgmt/prime/infrastructure/3-1/administrator/guide/PIAdminBook/config_HA.htm

# Enabling HA




Pro TIP:
Authentication Key must be between 8 and 80 characters and contain at least 3 of the following lowercase letters, uppercase letters, digits and special characters

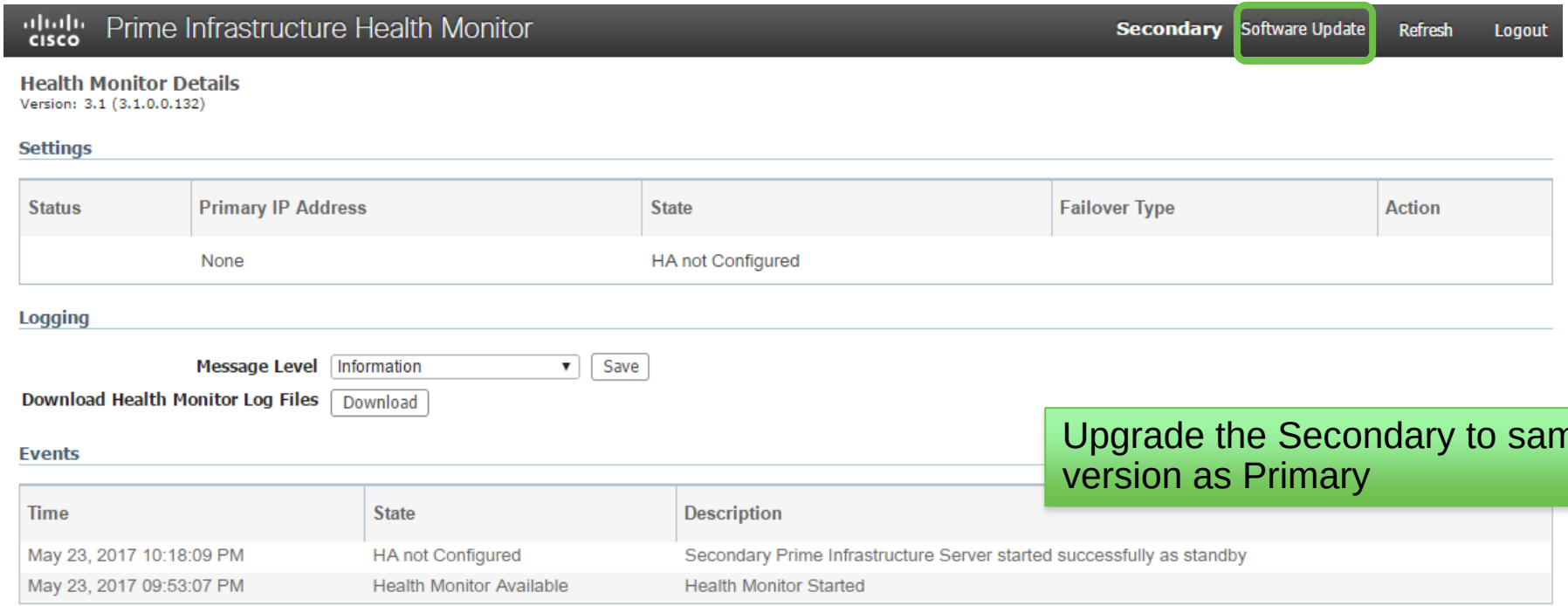
Securely record the Authentication key, you will need this for future for maintenance and troubleshooting

# Enabling HA


Login to the Secondary Health Monitor (https://secondary_IP:8082)

Enter the Authentication Key to Login

# Enabling HA



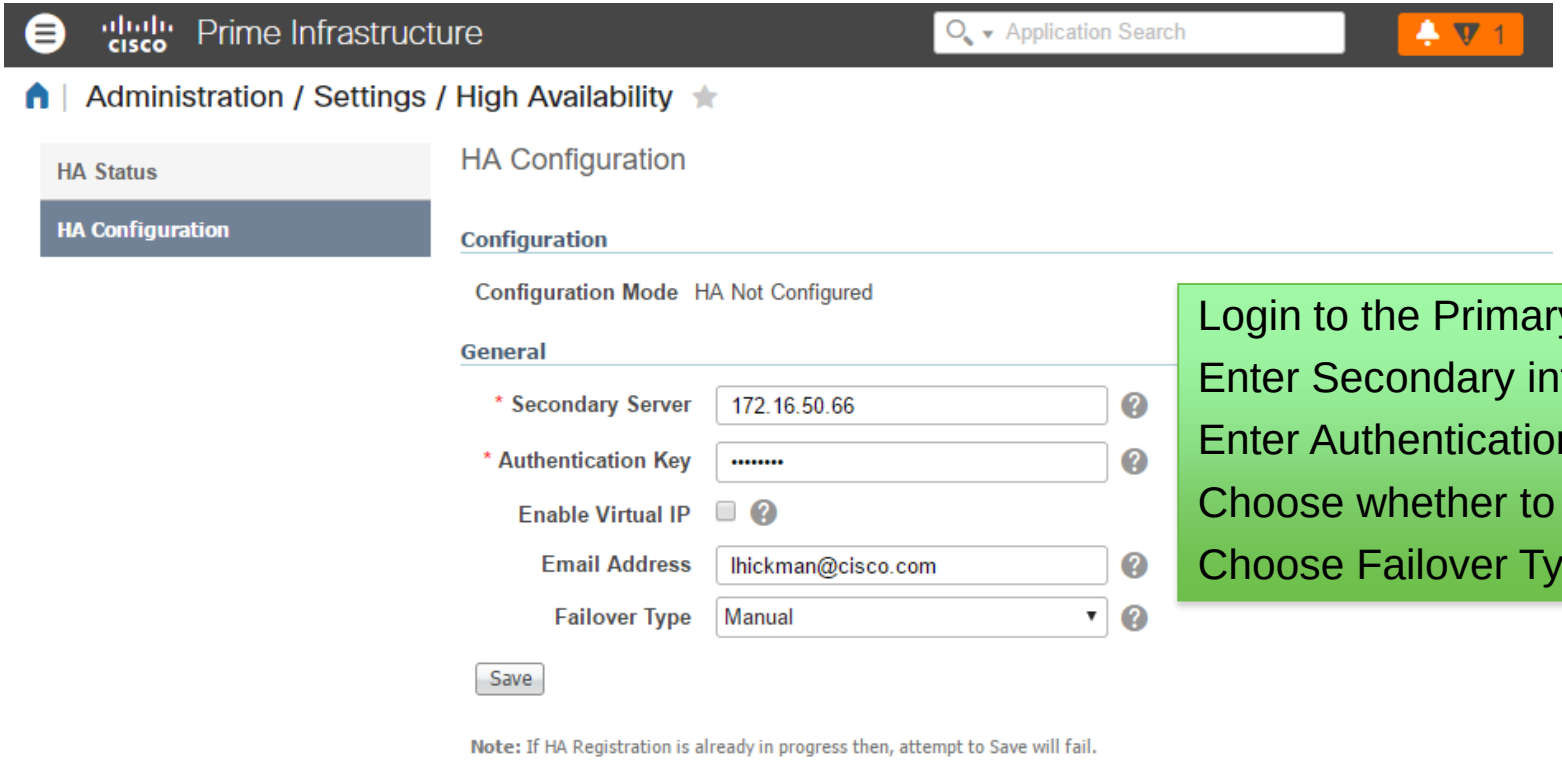

Upgrade the Secondary to same version as Primary

# Enabling HA after the fact

- admin# shell
- Enter shell access password :
- Starting bash shell ...
- ade # sudo -i bash
- bash-4.1# cd /opt/CSCOlumos/bin
- bash-4.1# ./hamode.sh secondary

Pro Tip!

# Enabling HA on Primary

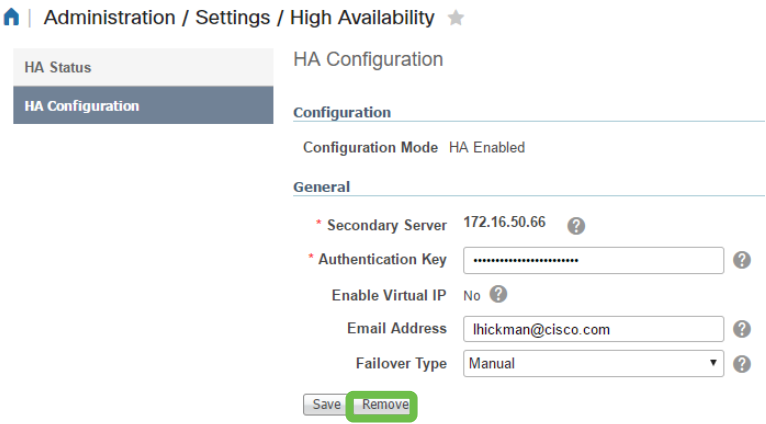



Login to the Primary Server
Enter Secondary information
Enter Authentication Key
Choose whether to use VIP
Choose Failover Type

# Patching PI in HA Pair

- Manual Failover: Patch Primary First.  No Failover is required during Primary restart (Patch time ~ 30 minutes, Downtime is ~ 20 minutes for Primary restart
- Automatic Failover:  Verify Primary Active, Secondary Syncing states, Patch Primary First, restart will cause Failover, Patch Secondary, restart will be about ~20 minutes downtime, Manually Failback to Primary
- Catch all –
  - Remove HA Pairing
  - Patch Primary and Secondary individually
  - Restore HA Pairing (Need Authentication Key)

admin# **ncs ha remove**



# Things to be aware of with HA

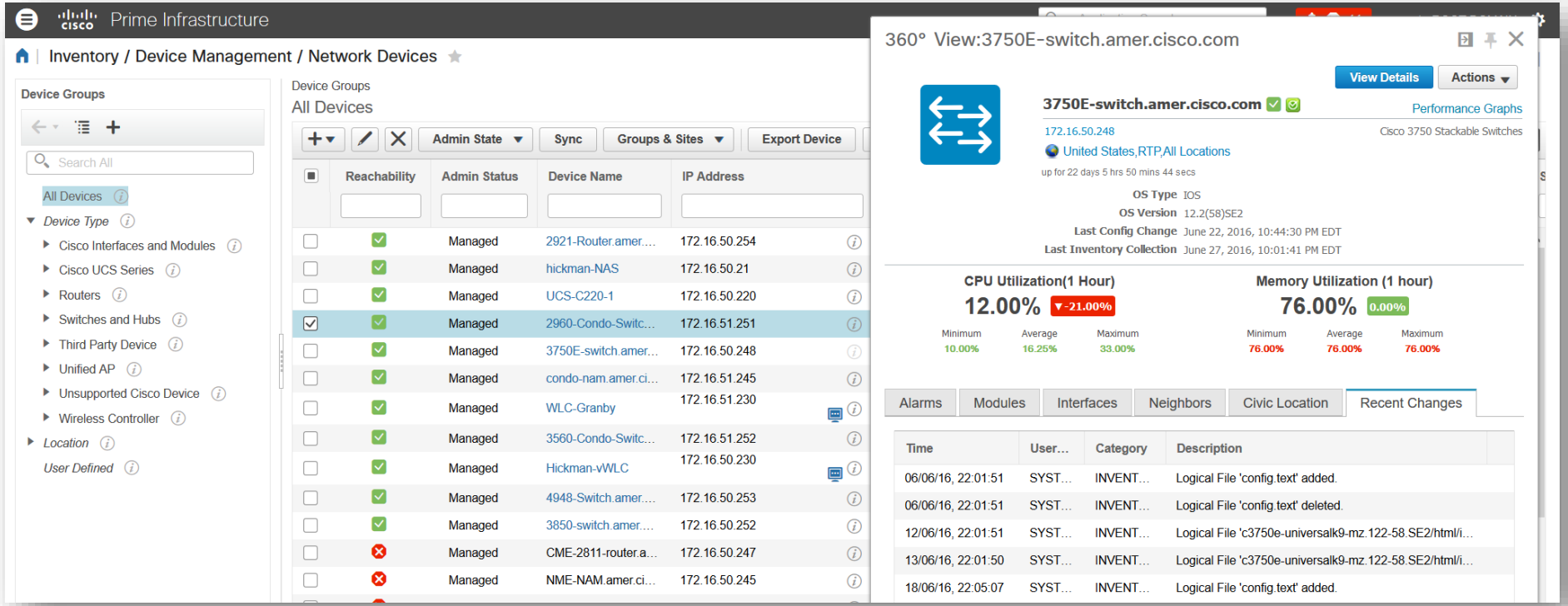
- Average DB size is 125 GB
- 1 Gbps links, 1 ms Latency, complete DB copy is < 1 hr
- 255 Mbps, 70 ms Latency, complete DB copy is ~ 2 hrs
- 86 Mbps, 220 ms Latency, complete DB copy is ~ 4.5 hrs
- HA Registration States

| Primary HA State Transitions... | Secondary HA State Transitions... |
|---|---|
| From: HA Not Configured | From: HA Not Configured |
| To: HA Initializing | To: HA Initializing |
| To: Primary Active | To: Secondary Syncing |

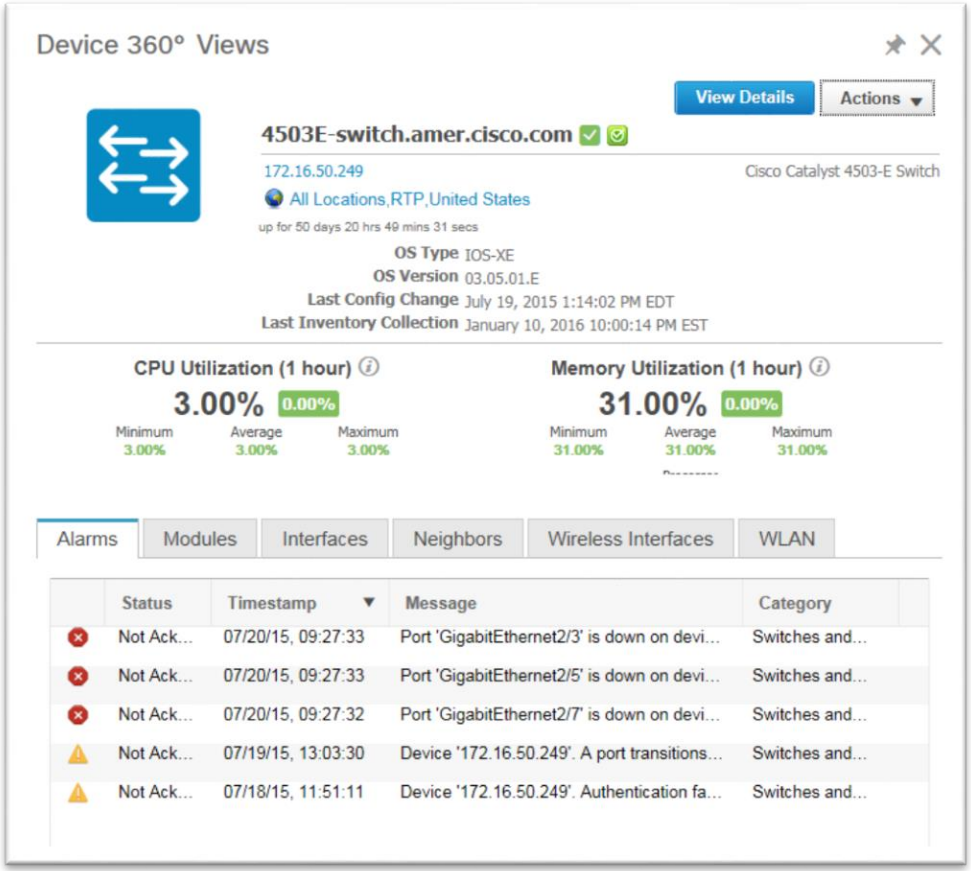
- CLI for resetting HA authkey
  - **NCS HA authkey** *authkey*
- High Availably Reference Information
  http://www.cisco.com/c/en/us/td/docs/net_mgmt/prime/infrastructure/3-1/administrator/guide/PIAdminBook/config_HA.html#30402

# Troubleshooting with Prime Infrastructure

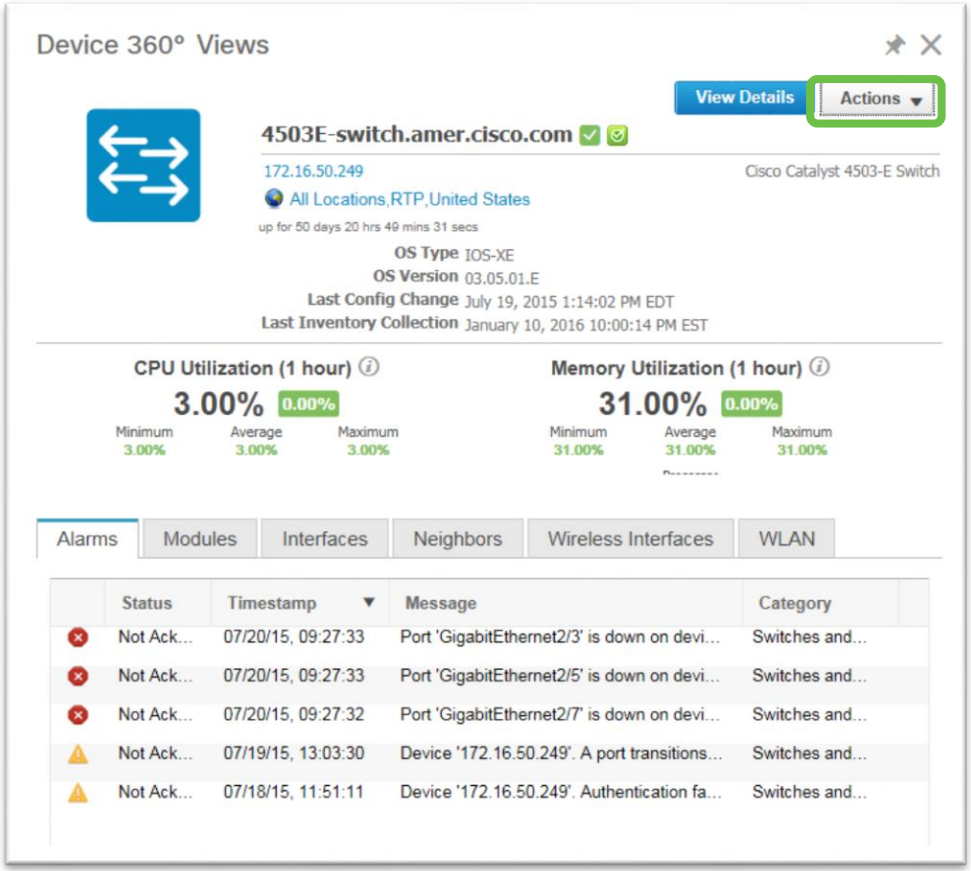
# Efficient Use of Information



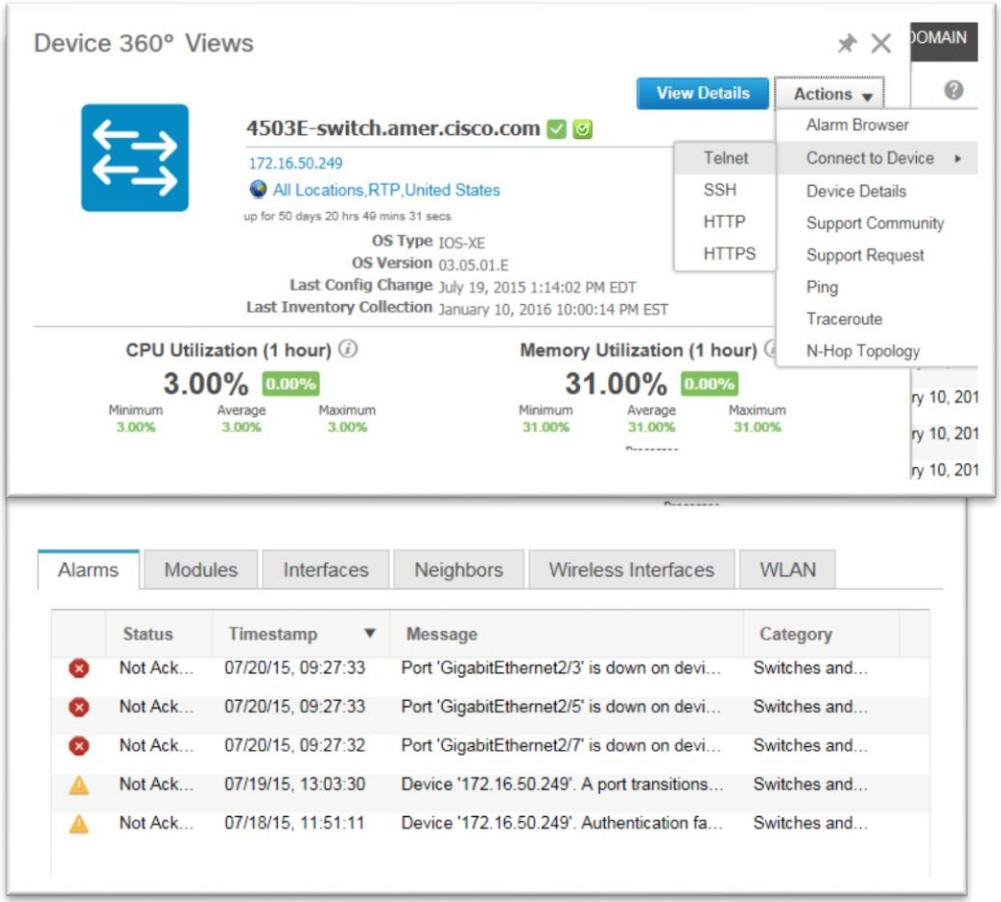
# New Troubleshooting tools in PI 3.1



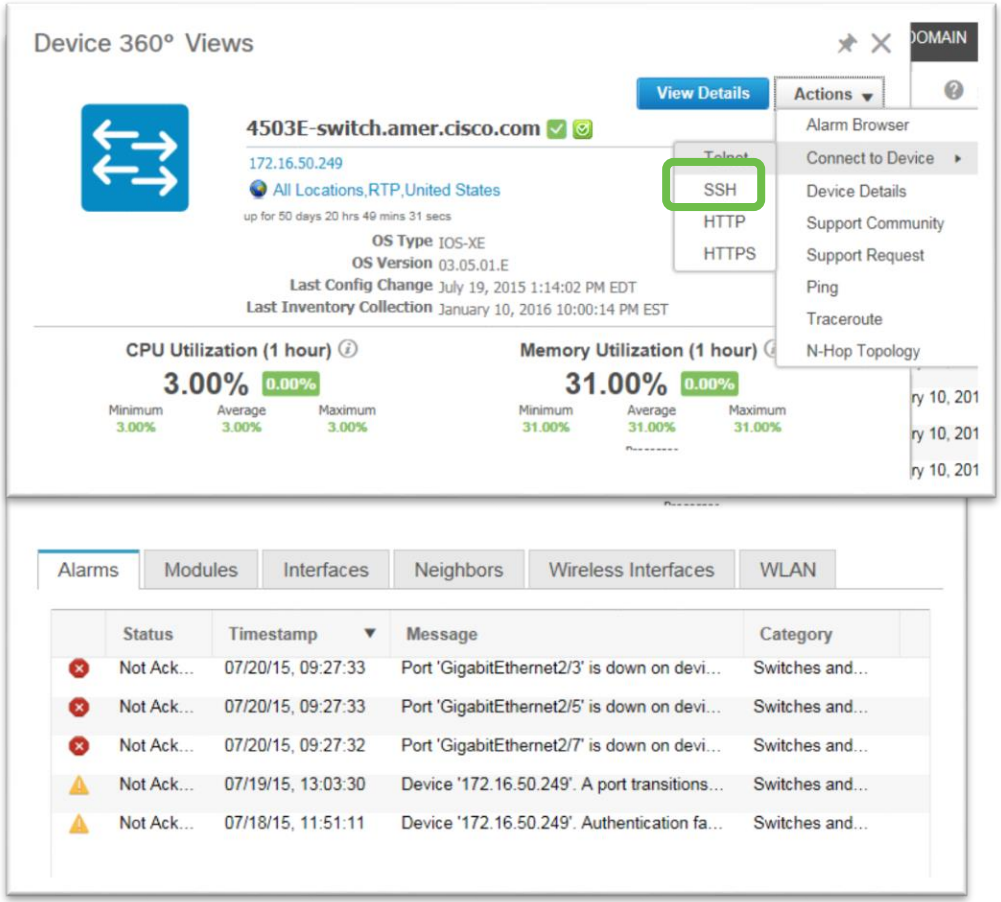
# New Troubleshooting tools in PI 3.1



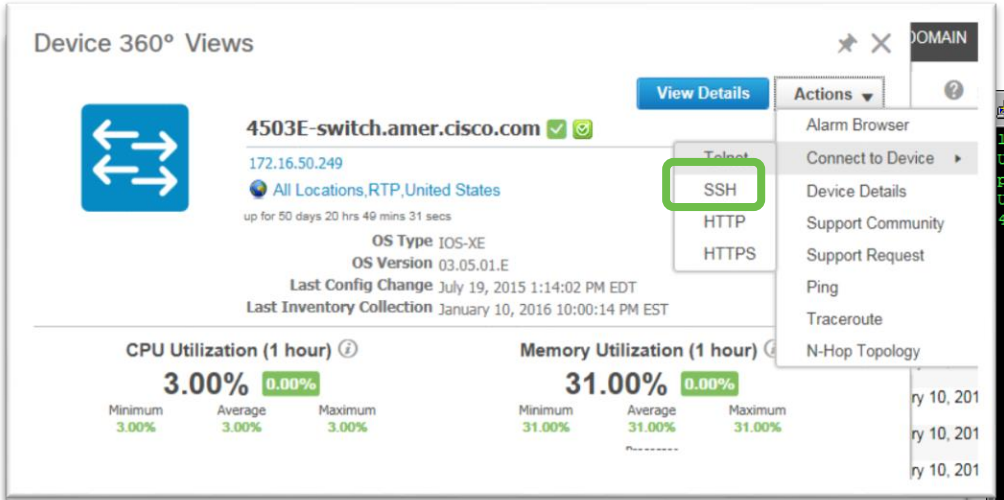
# New Troubleshooting tools in PI 3.1

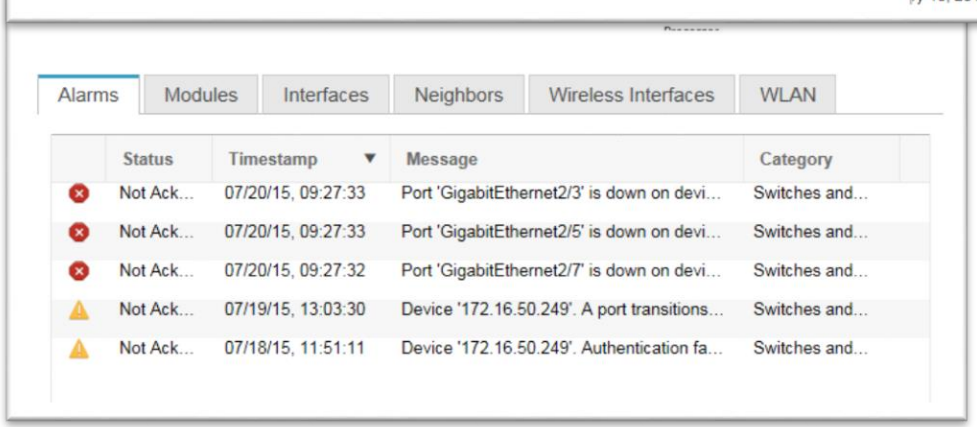


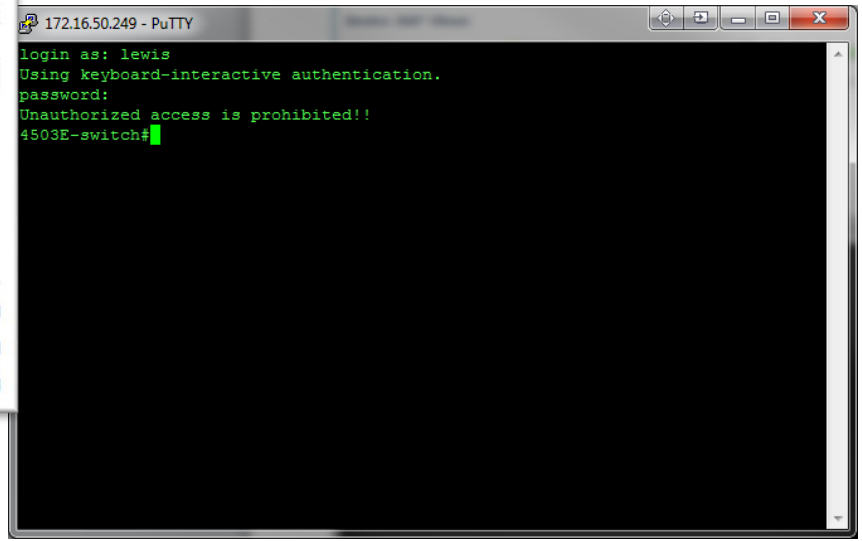
# New Troubleshooting tools in PI 3.1



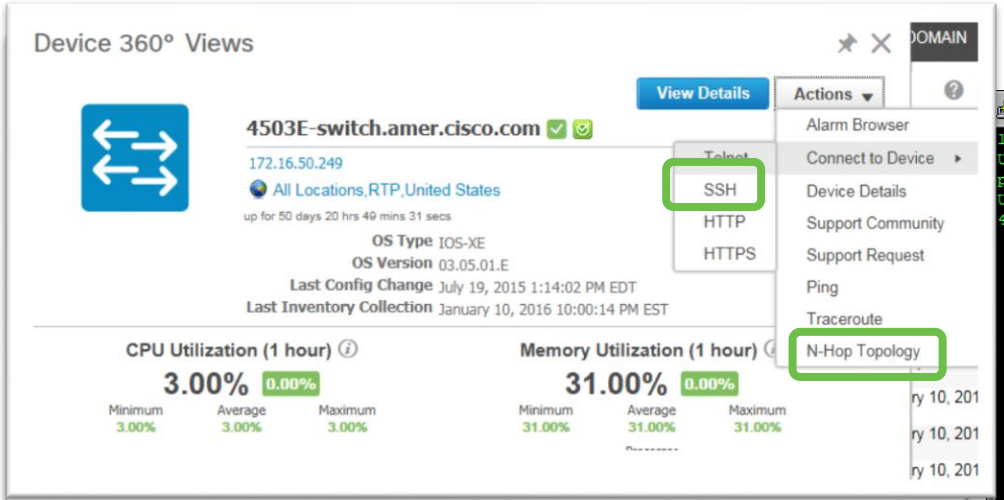
# New Troubleshooting tools in PI 3.1

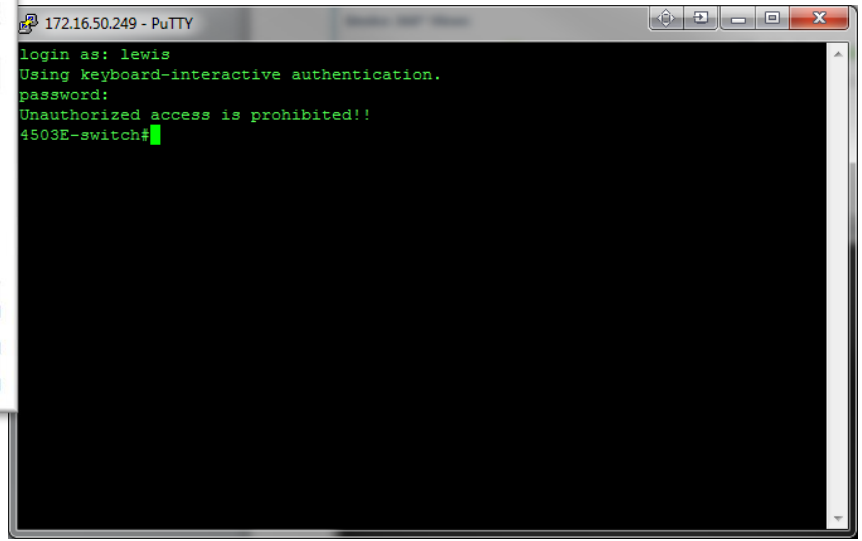


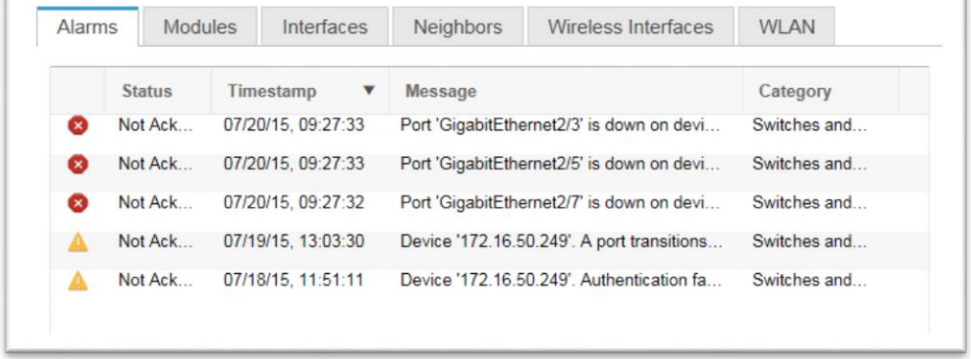



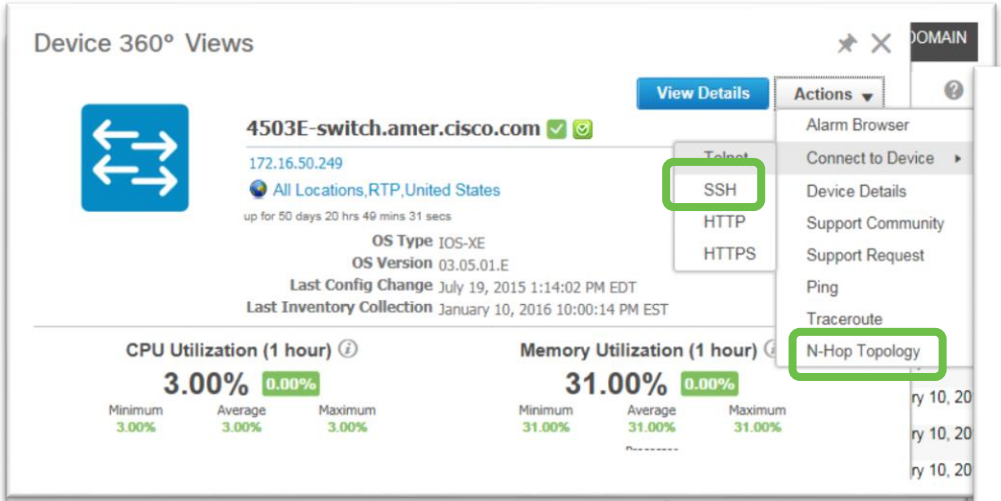
# New Troubleshooting tools in PI 3.1

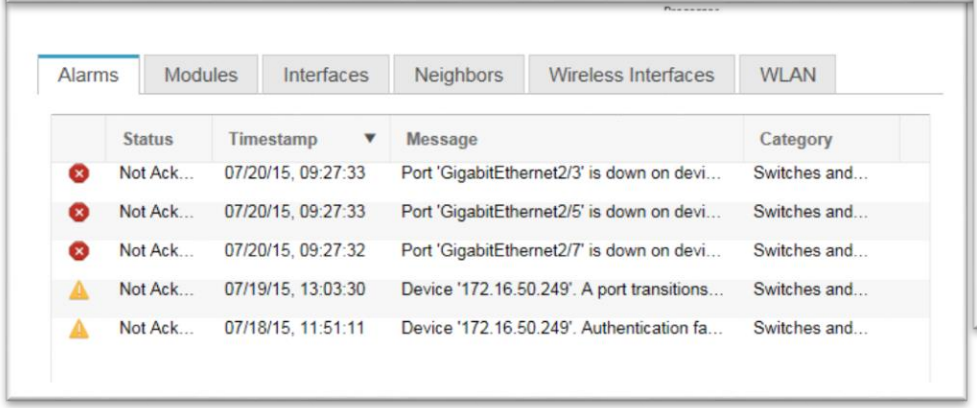


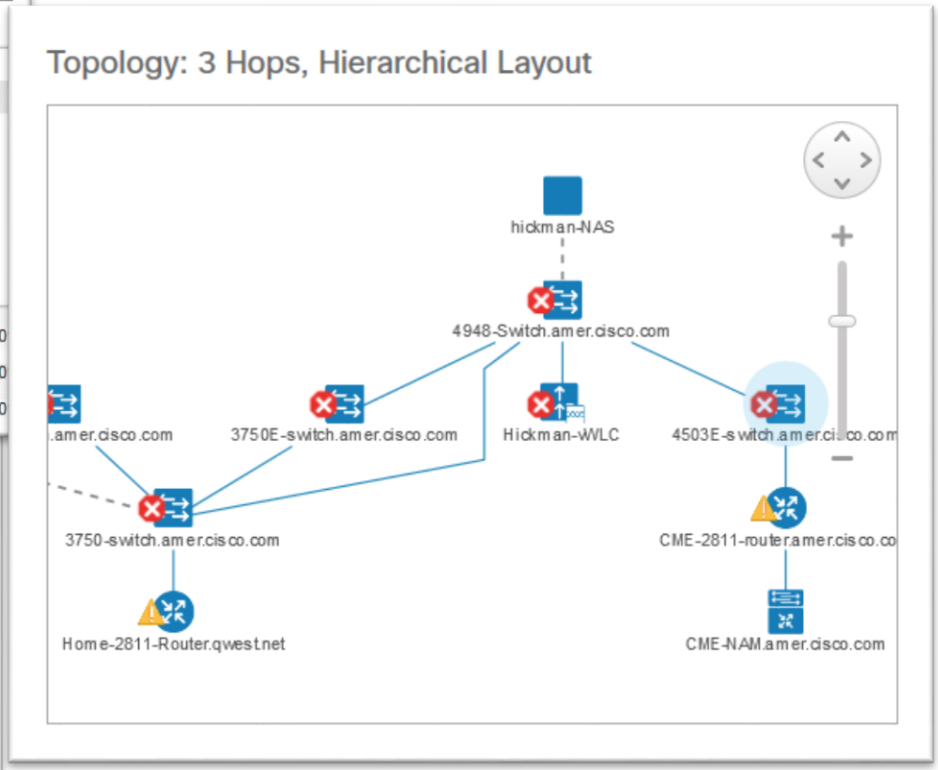



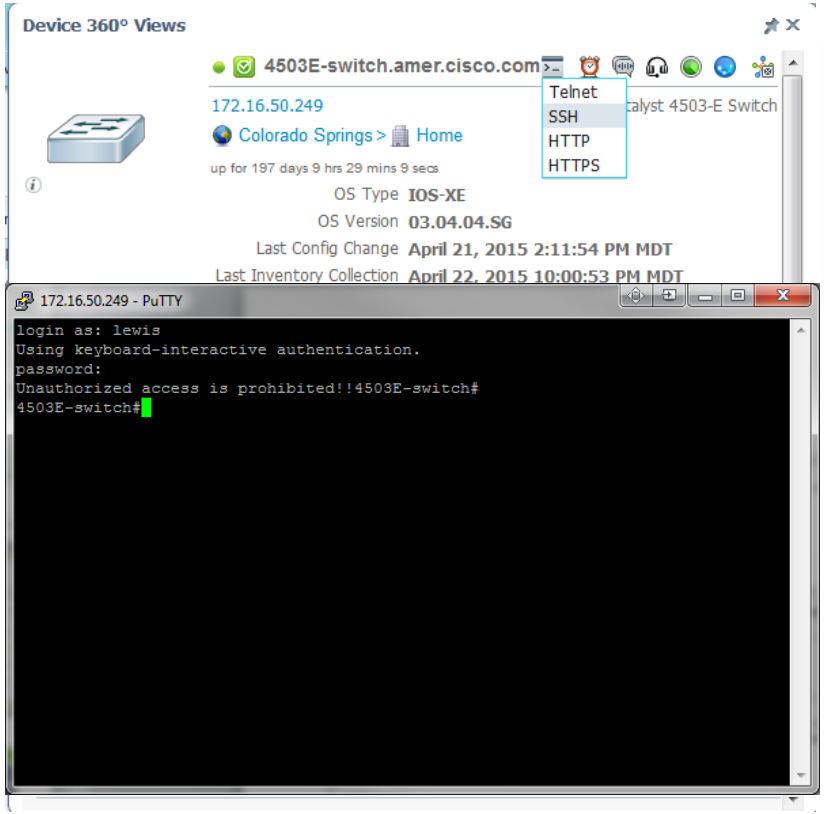
# New Troubleshooting tools in PI 3.1



# New Troubleshooting Tools in PI 3.x




Pro-Tip:

For Windows 7/8/10, we need to teach Windows about the SSH protocol. Create file called ssh.reg with this content (This calls powershell and strips the unneeded characters off of the putty call so that putty opens with the correct ip address/device name:

*REGEDIT4*

*[HKEY_CLASSES_ROOT\ssh]*

*@="URL:ssh Protocol"*

*"URL Protocol"=""*

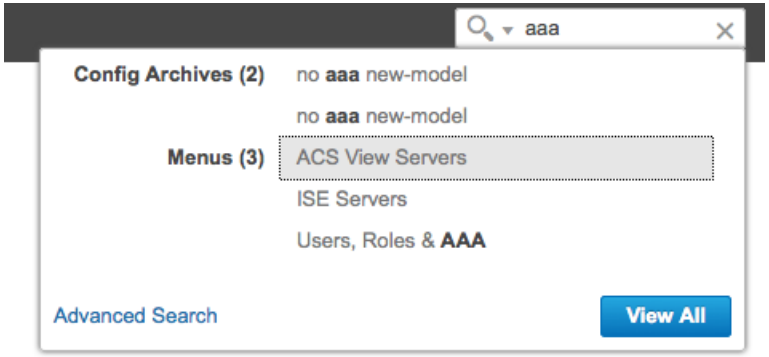
*[HKEY_CLASSES_ROOT\ssh\shell]*

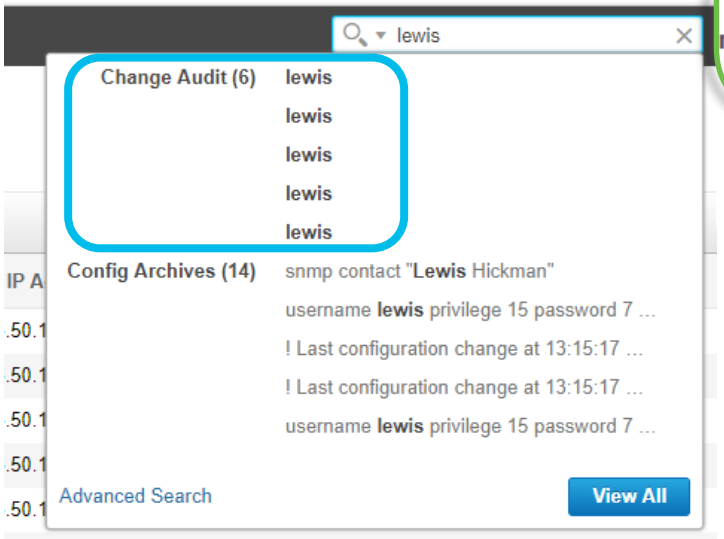
*[HKEY_CLASSES_ROOT\ssh\shell\open]*

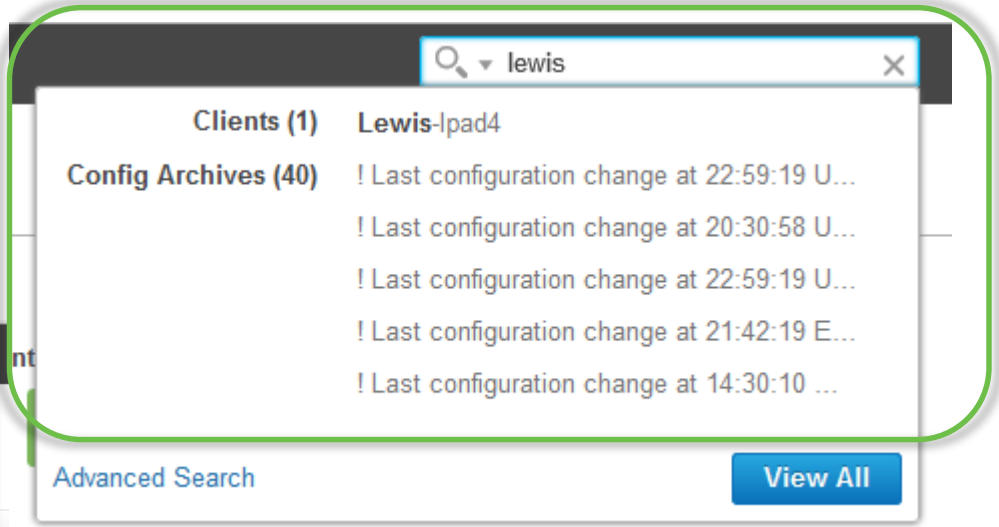
*[HKEY_CLASSES_ROOT\ssh\shell\open\command]*

*@="C:\\Windows\\System32\\WindowsPowerShell\\v1.0\\powershell.exe -Command \"& 'C:\\Program Files (x86)\\PuTTY\\putty.exe' '%l'.TrimStart('ssh://').TrimEnd('/')\""*

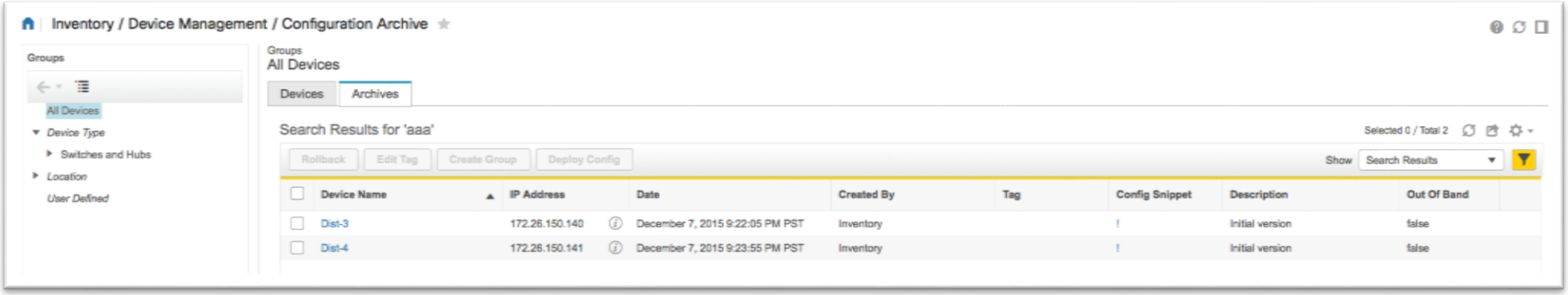
# Simplified Lookups with Elastic Search



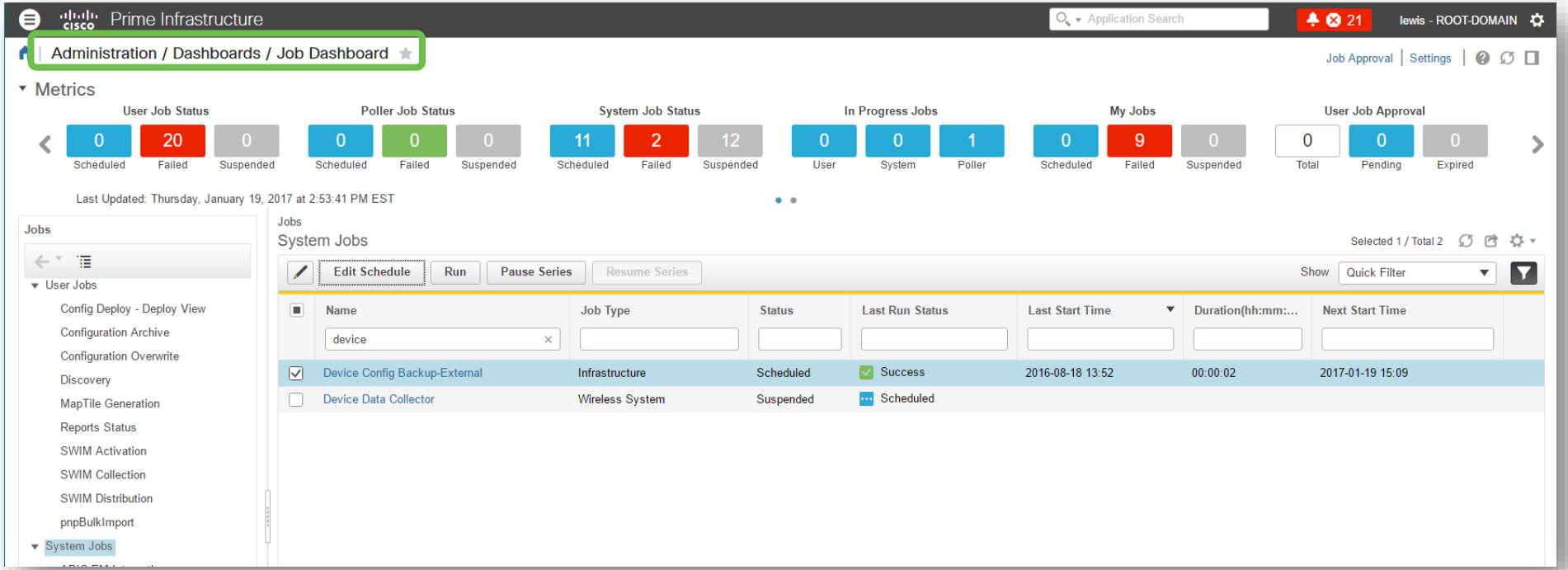



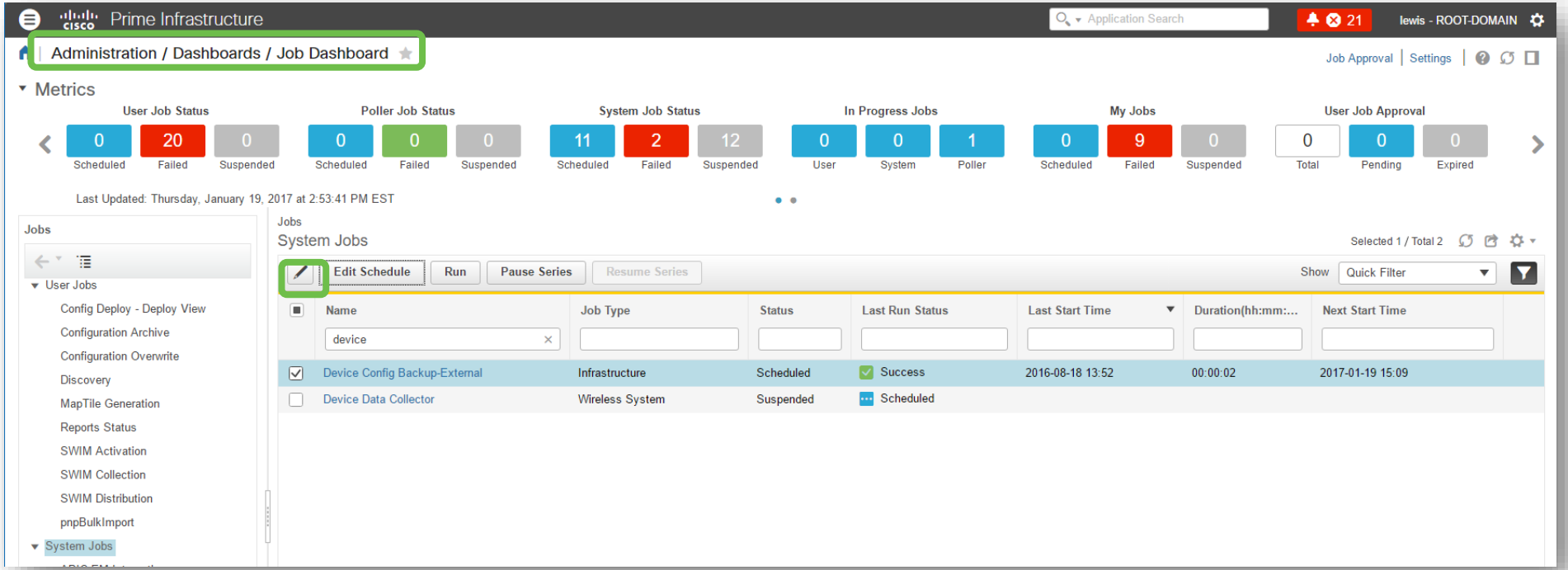
# Search for Keywords within Configuration Archives



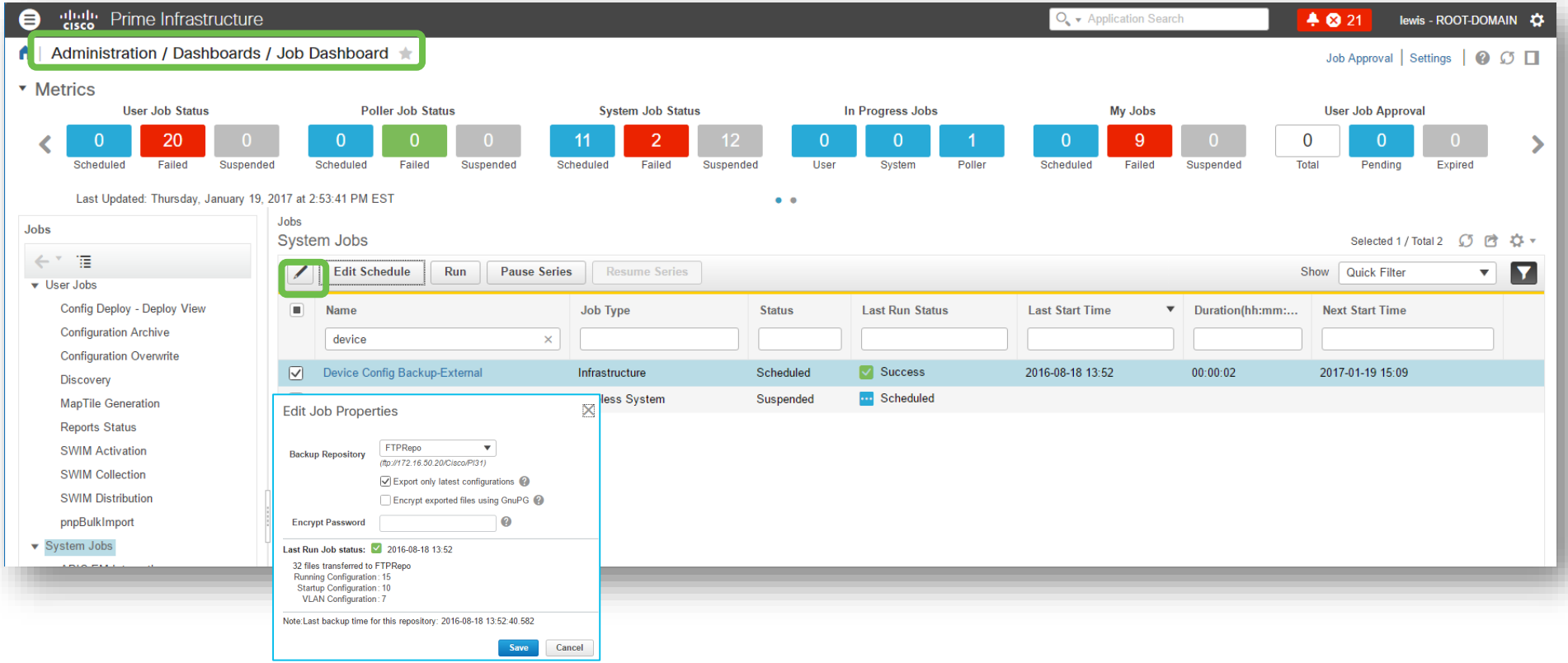
# External Device Configuration Backup (Shadow Directory)



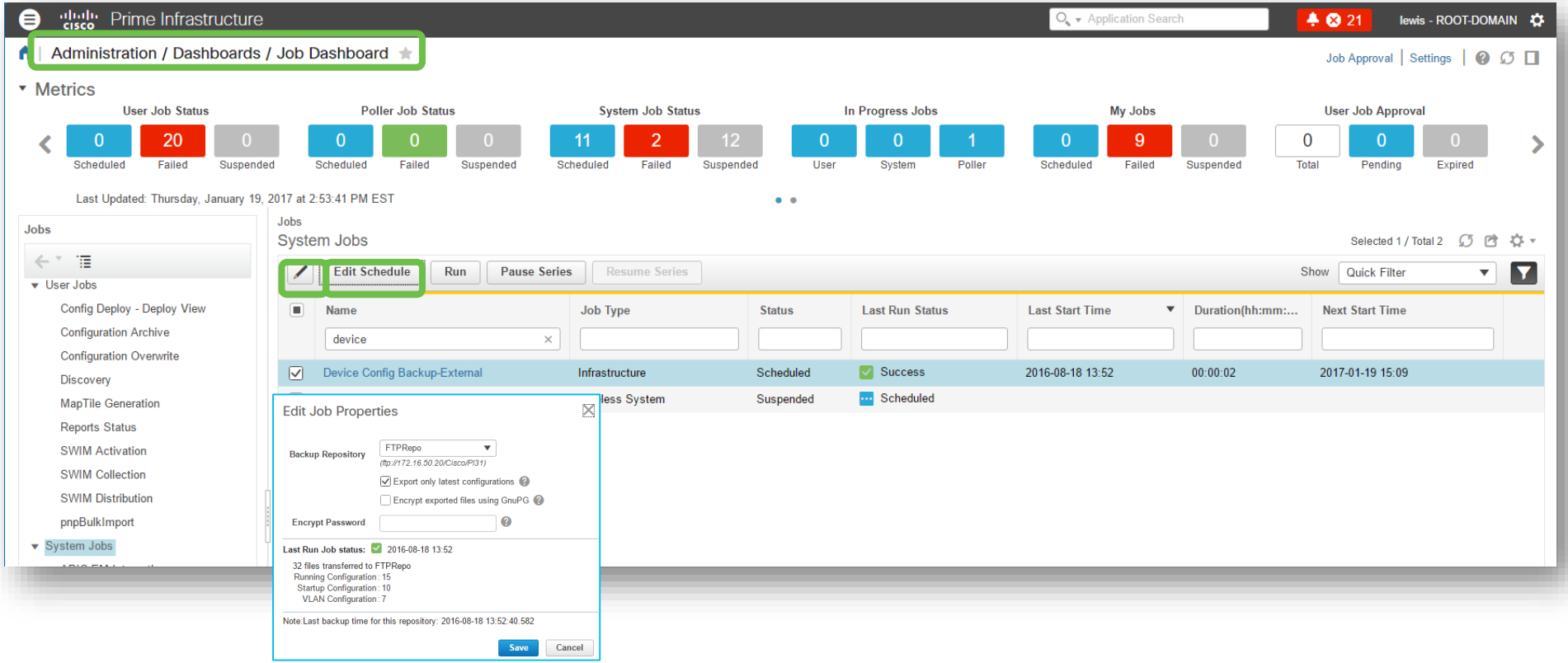
# External Device Configuration Backup (Shadow Directory)



# External Device Configuration Backup (Shadow Directory)



# External Device Configuration Backup (Shadow Directory)



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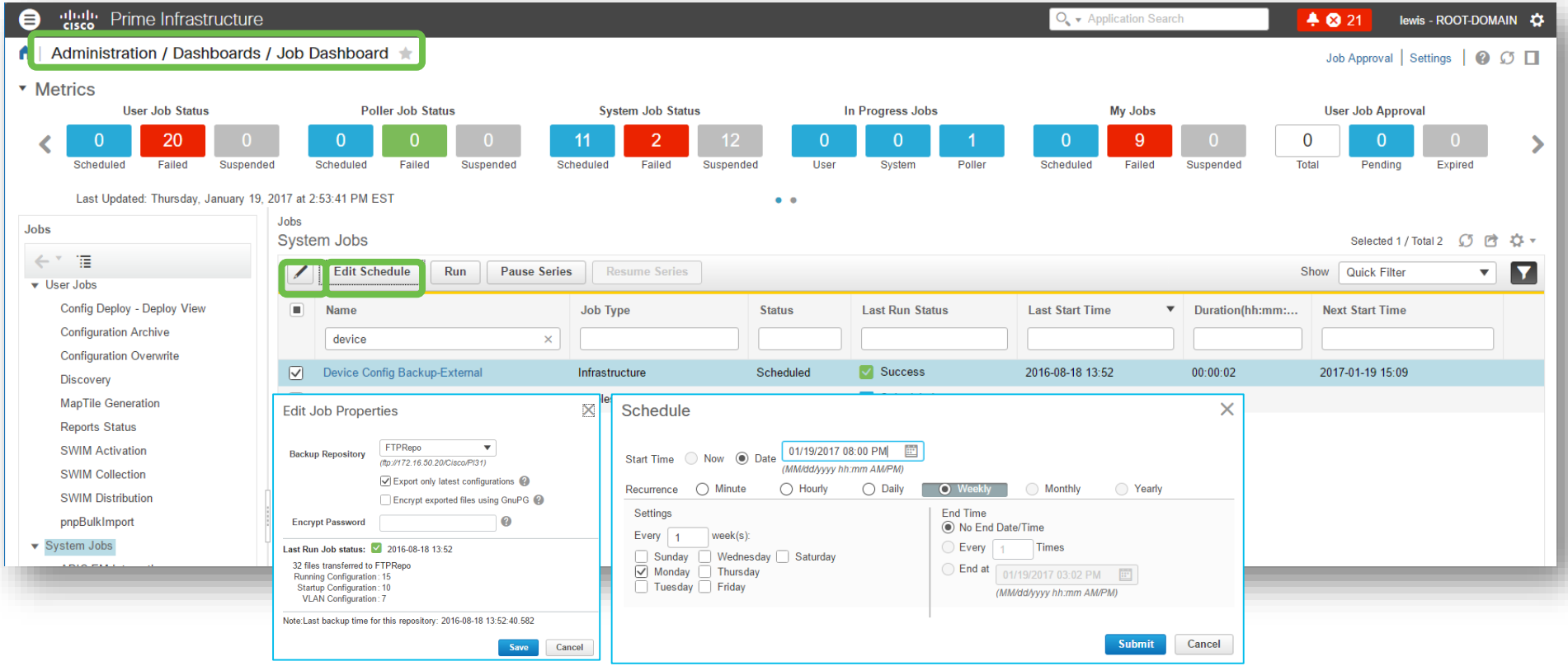
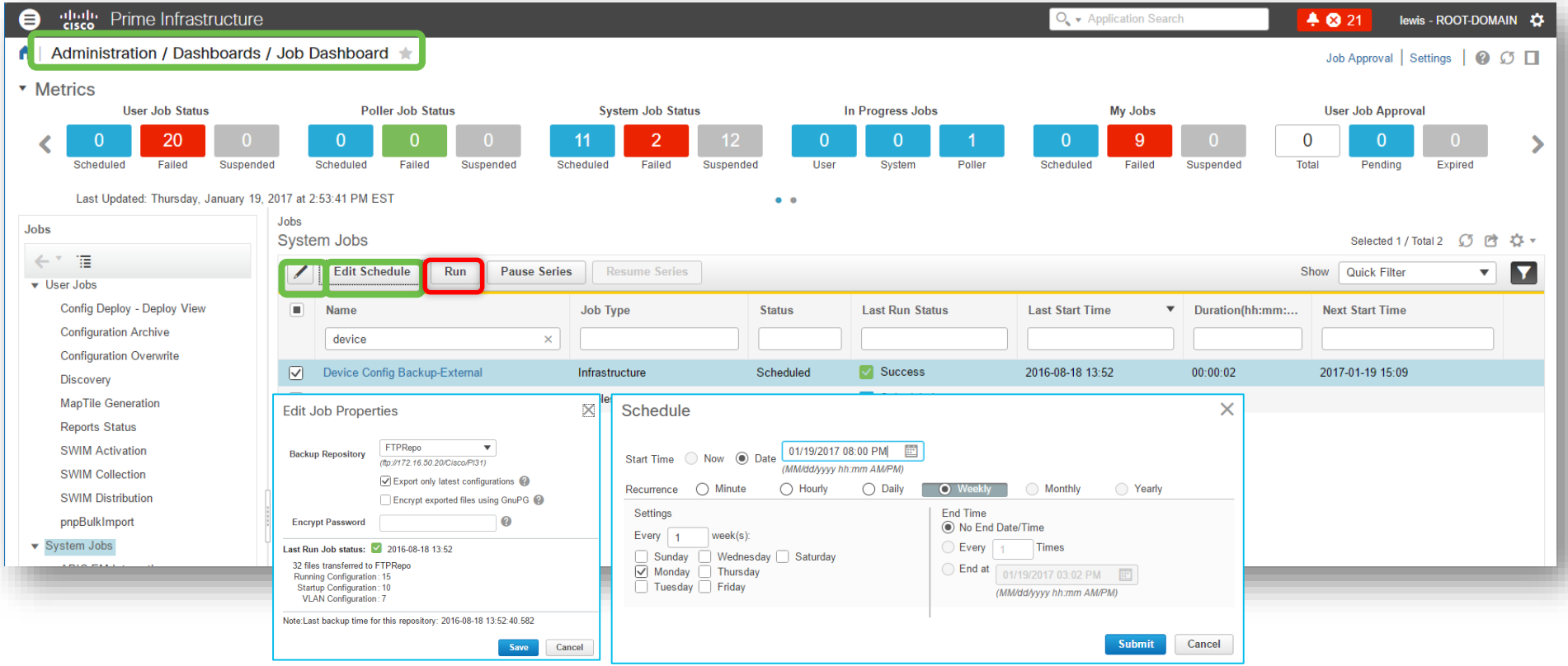
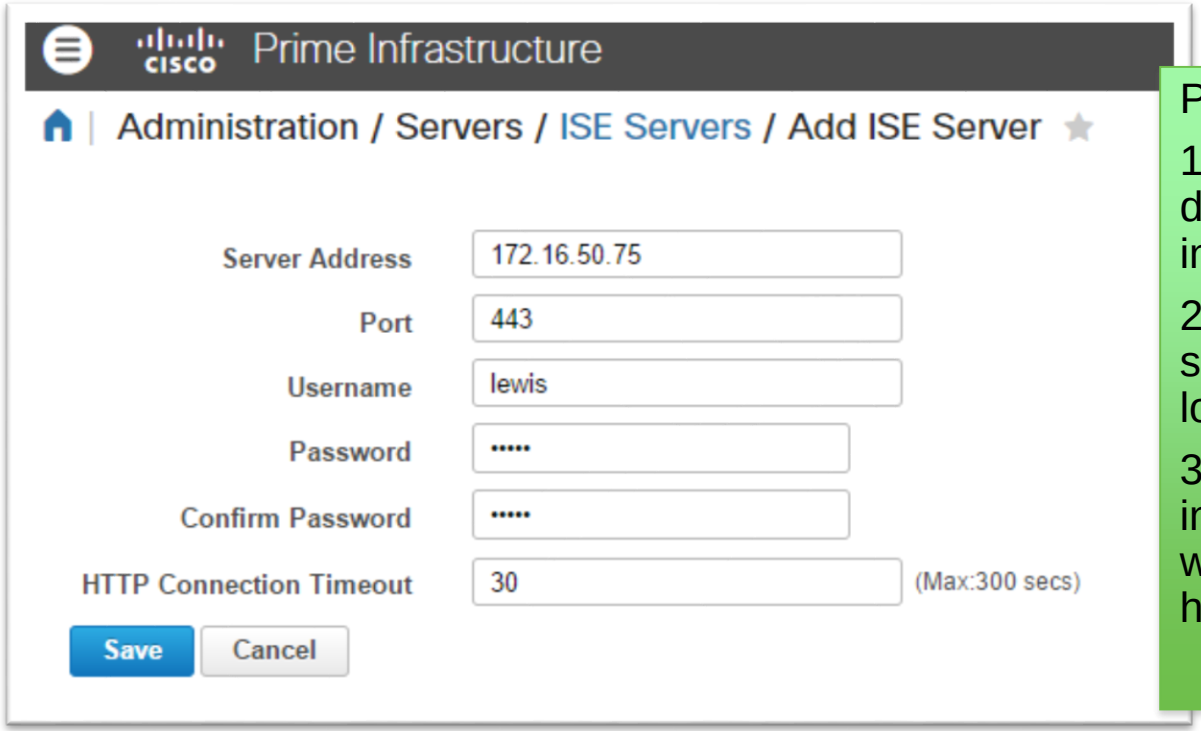


# External Device Configuration Backup (Shadow Directory)



# Integration with other Systems

# Integrating PI w. ISE



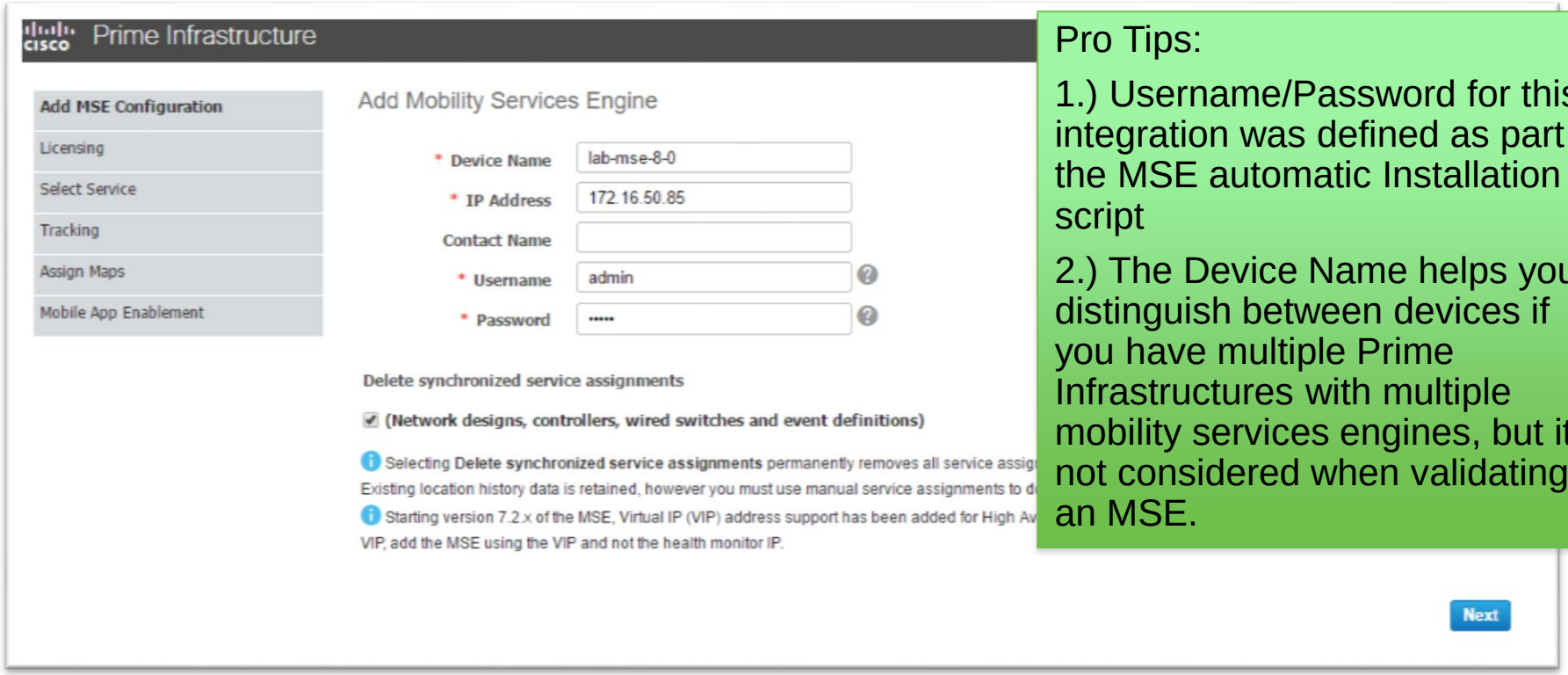

Pro Tips:

1.) For larger Multi-node ISE deployments, PI only needs to integrate with the MNT node

2.) Username for integration should be superuser credentials local to ISE

3.)PI 3.2+ will support ISE 2.2+ integration—use PxGRID, so it will require ISE Plus license or higher

# Integrating PI w. MSE

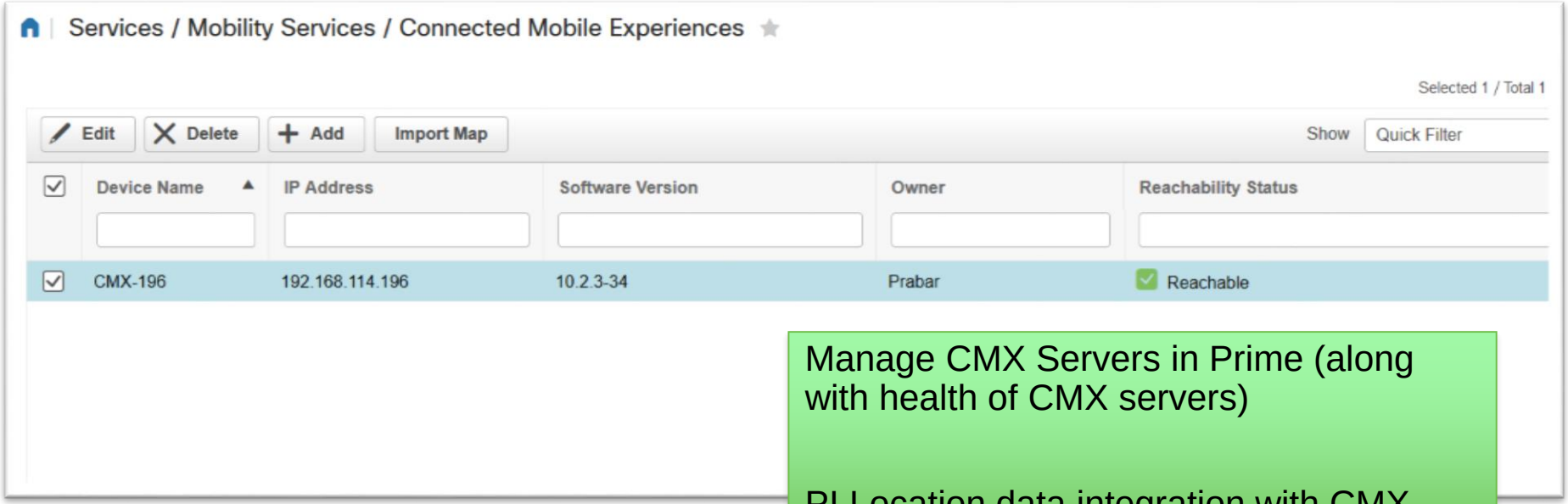



Pro Tips:

1.) Username/Password for this integration was defined as part of the MSE automatic Installation script

2.) The Device Name helps you distinguish between devices if you have multiple Prime Infrastructures with multiple mobility services engines, but it is not considered when validating an MSE.

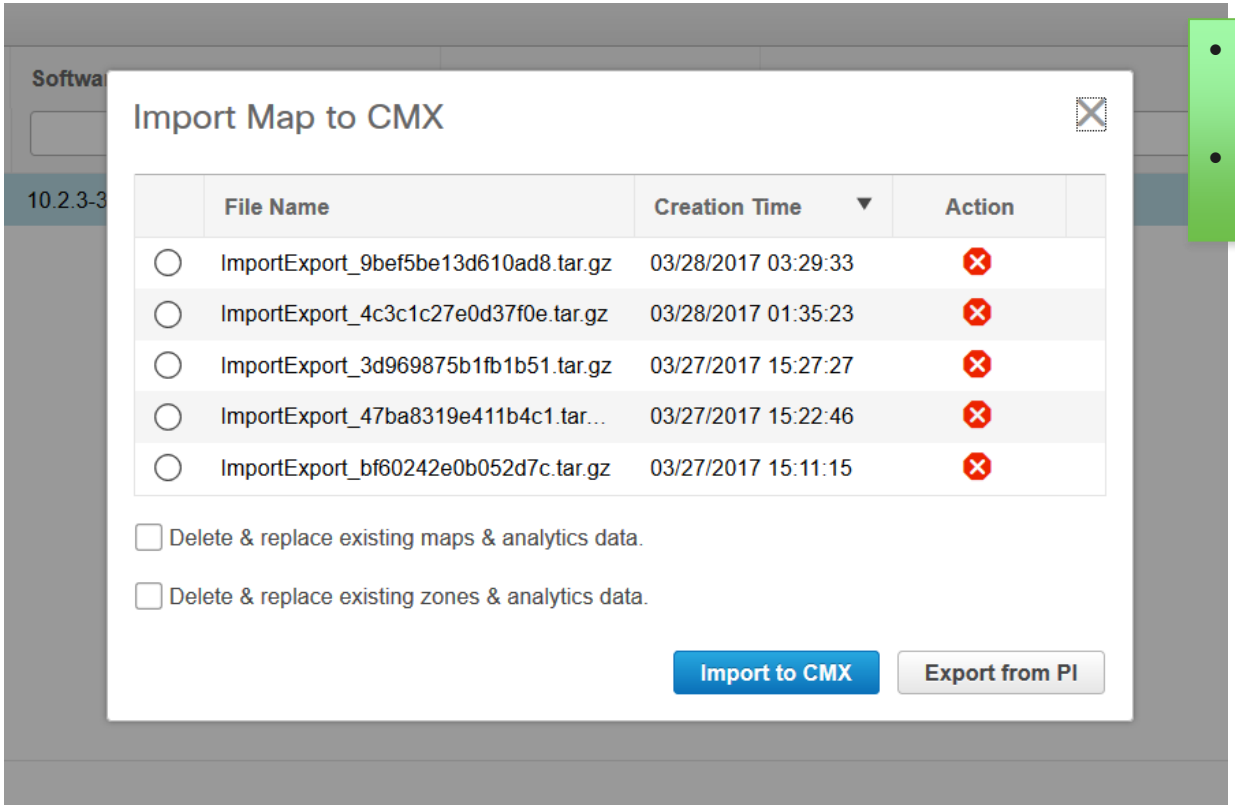
# Integrating PI w. CMX




Manage CMX Servers in Prime (along with health of CMX servers)

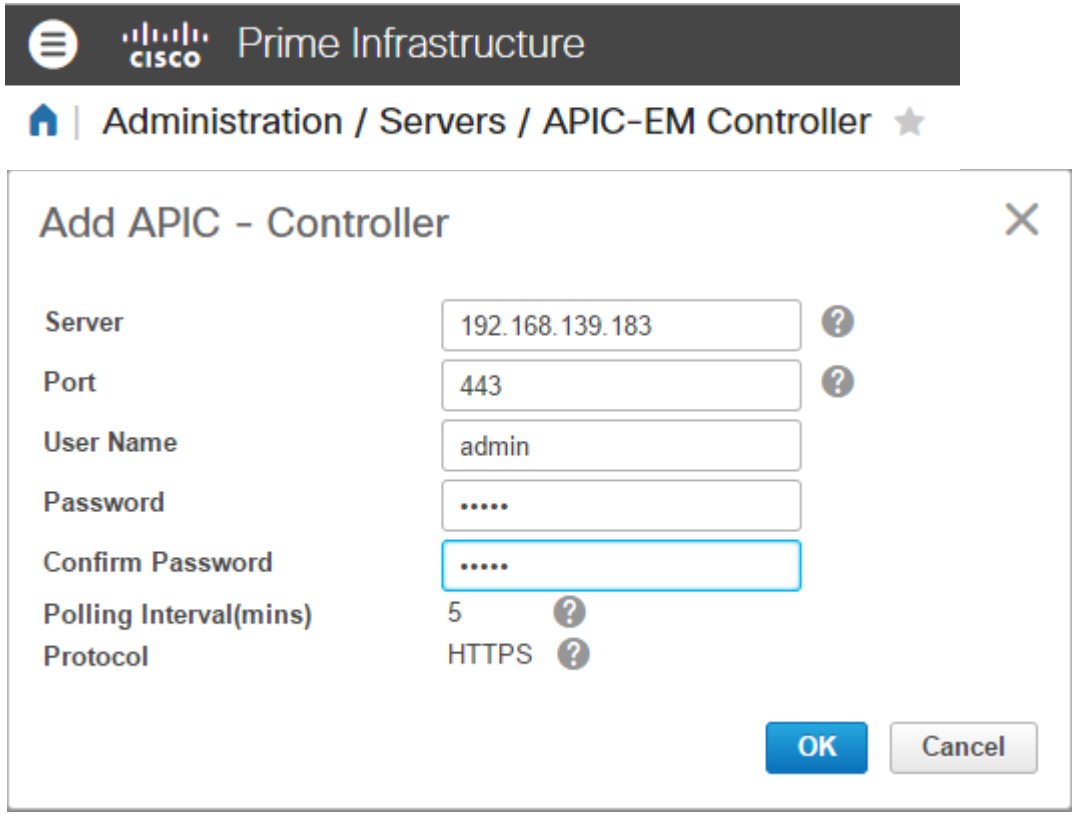
PI Location data integration with CMX
- Clients
- Interferers

# Integrating PI w. CMX Map Import/Export




- Selectively import only specific maps (Building/Floors)
- Delete and Replace or Add maps to CMX

# Integrating PI w. APIC-EM (For PnP)

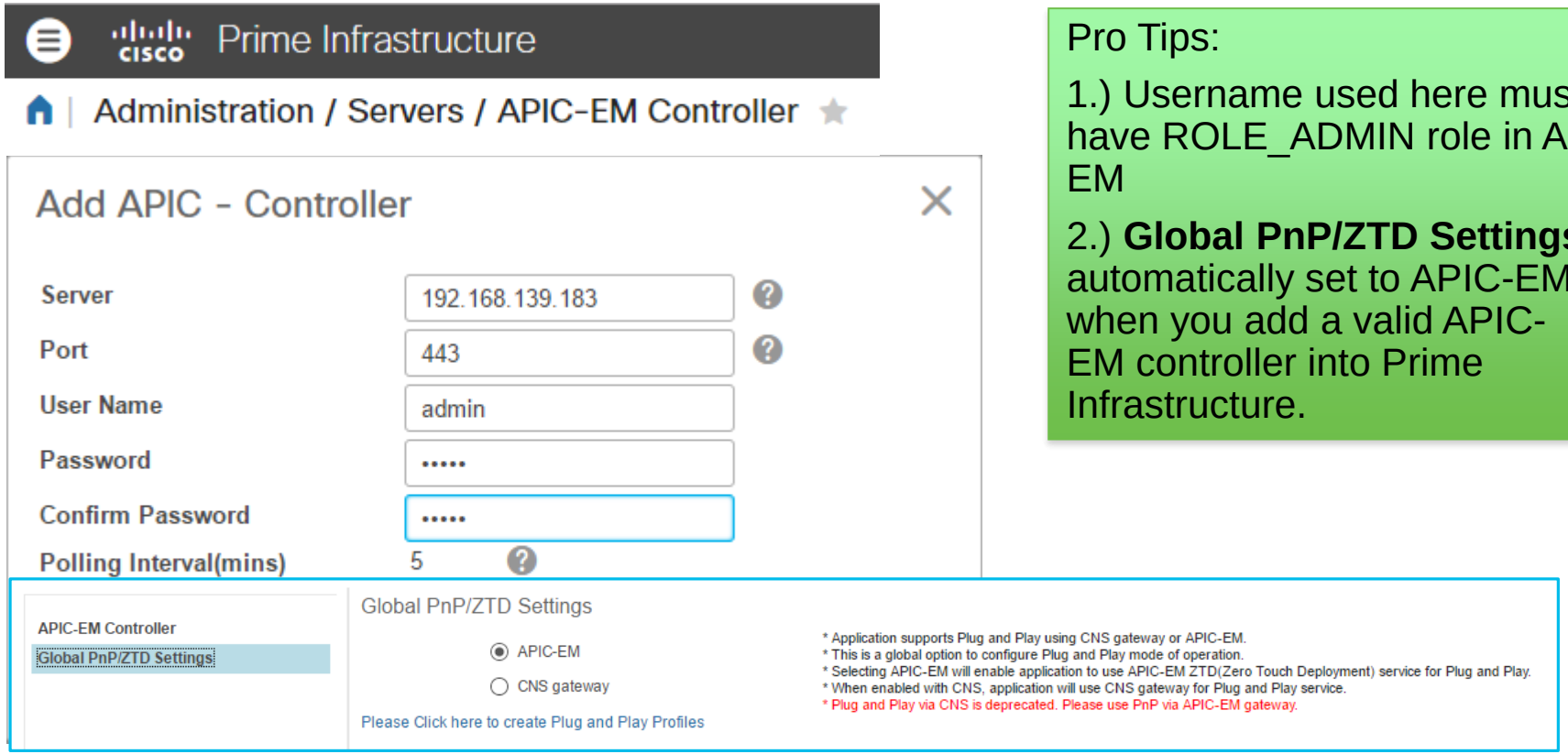



Pro Tips:

1.) Username used here must have ROLE_ADMIN role in APIC-EM

2.) **Global PnP/ZTD Settings** is automatically set to APIC-EM when you add a valid APIC-EM controller into Prime Infrastructure.

# Integrating PI w. APIC-EM (For PnP)

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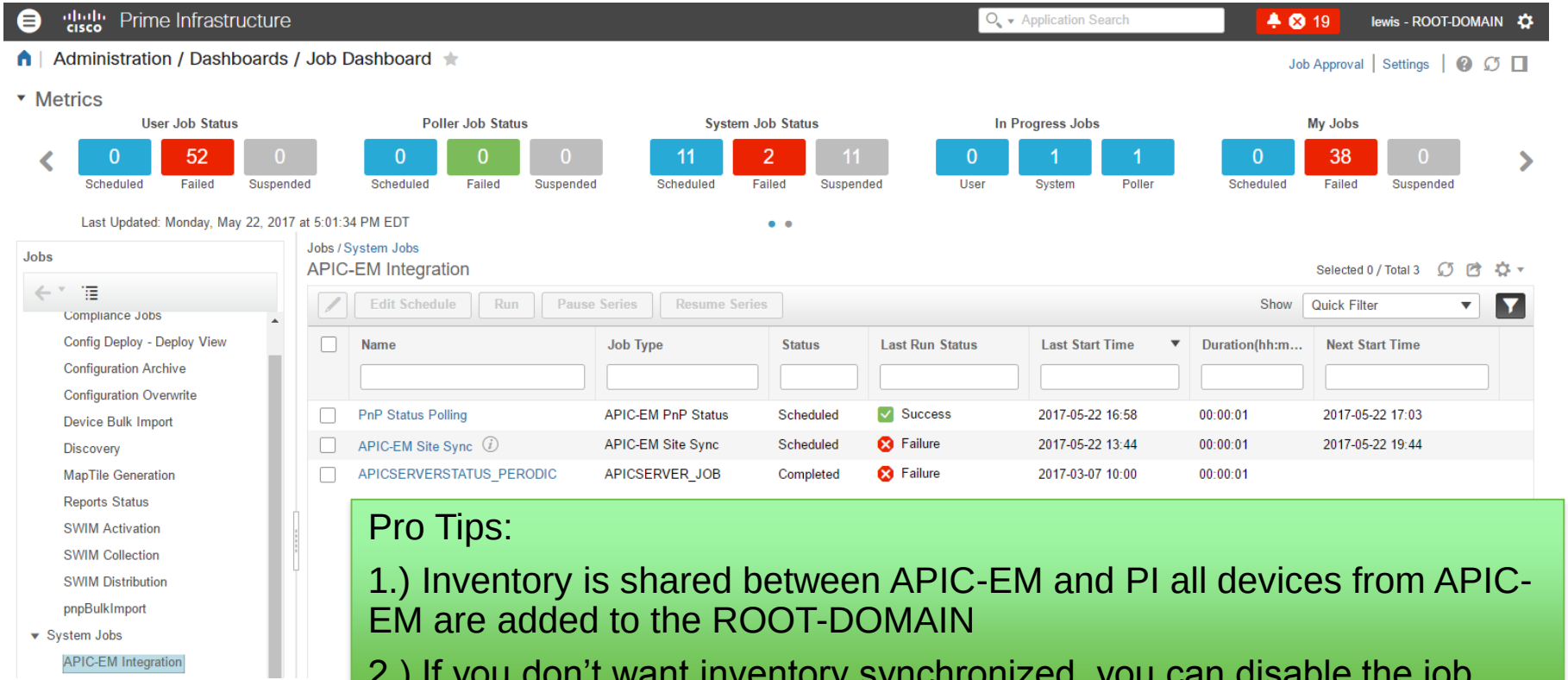



Pro Tips:

1.) Inventory is shared between APIC-EM and PI all devices from APIC-EM are added to the ROOT-DOMAIN

2.) If you don't want inventory synchronized, you can disable the job.

# Looking Ahead

# Future Prime Infrastructure Highlights


- 3.4 –Full Support for Mobility Express
- 3.4 – Notification email Customization
- 3.4 – New Port Group Attributes
- 3.4 – Global Dashboard Time filter

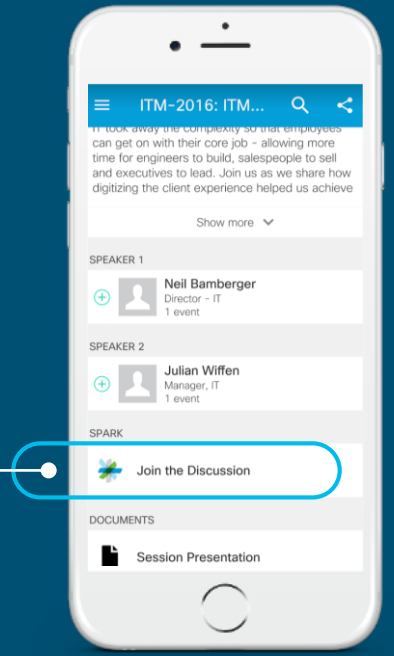
# Cisco Spark

## Questions?

Use Cisco Spark to communicate with the speaker after the session

## How

1. Find this session in the Cisco Live Mobile App
2. Click “Join the Discussion”
3. Install Spark or go directly to the space
4. Enter messages/questions in the space

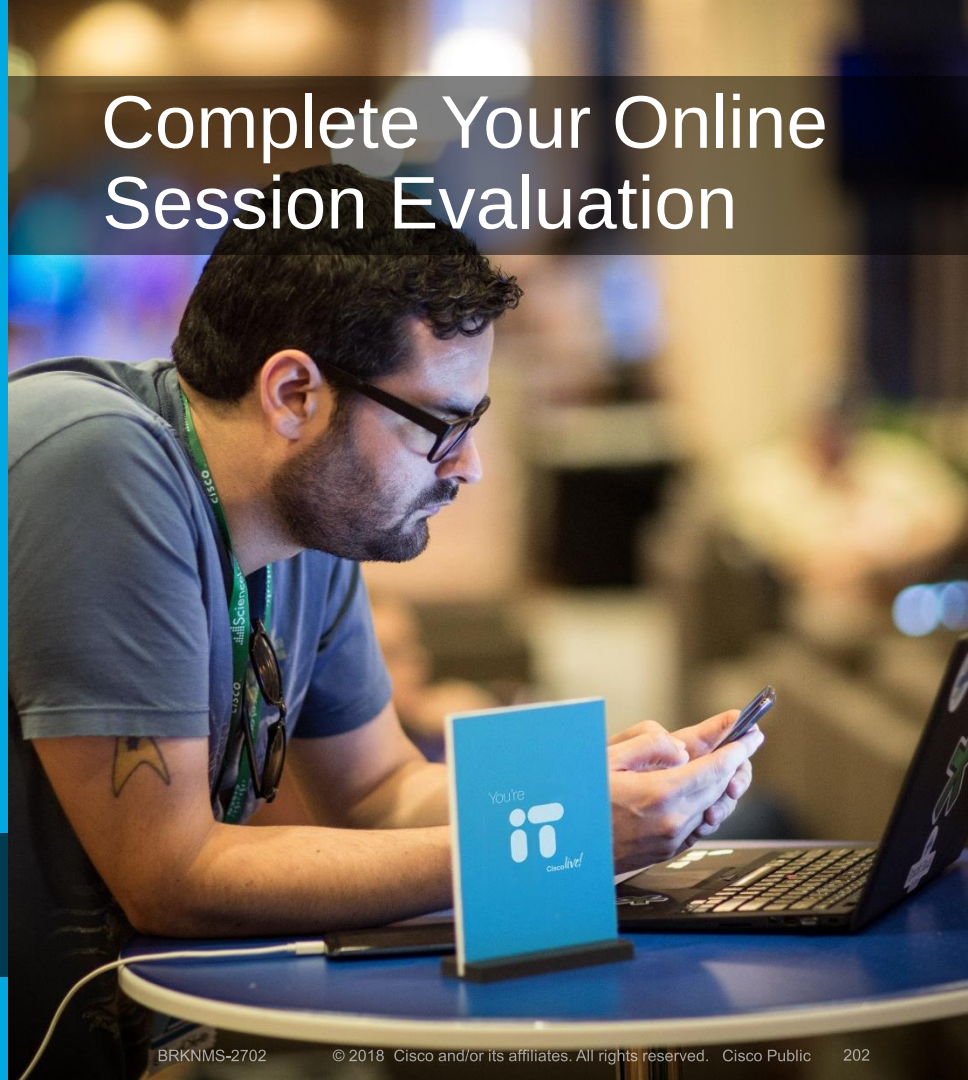



cs.co/ciscolivebot#BRKNMS-2702

# Complete Your Online Session Evaluation

- Please complete your Online Session Evaluations after each session
- Complete 4 Session Evaluations & the Overall Conference Evaluation (available from Thursday) to receive your Cisco Live T-shirt
- All surveys can be completed via the Cisco Live Mobile App or the Communication Stations

Don’t forget: Cisco Live sessions will be available for viewing on-demand after the event at www.ciscolive.com/global/on-demand-library/.



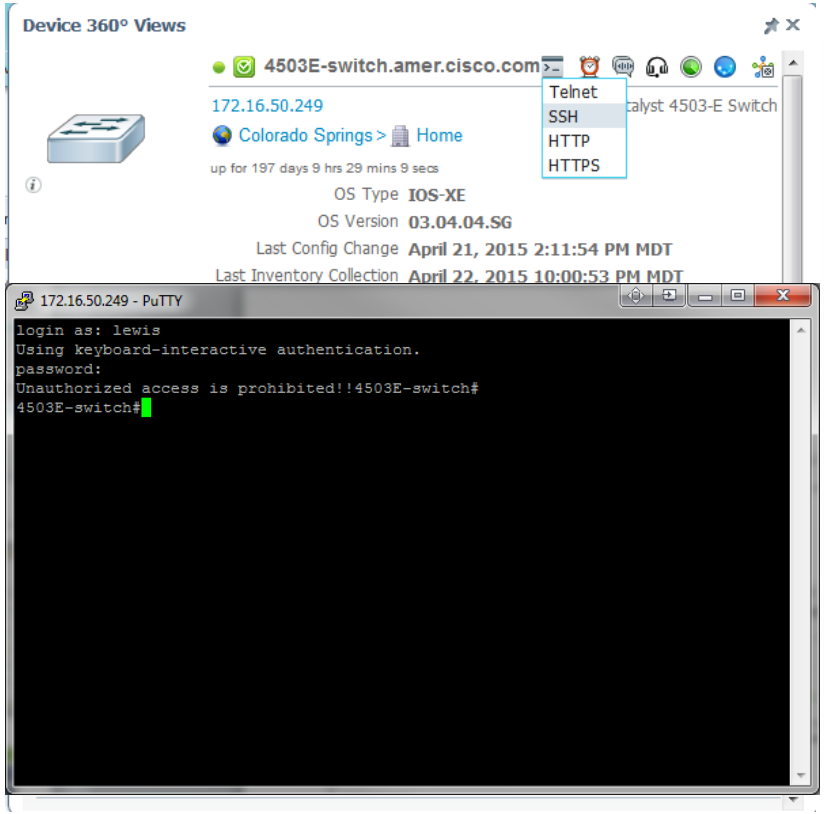
# Continue Your Education

- Demos in the Cisco campus
- Walk-in Self-Paced Labs
- Tech Circle
- Meet the Engineer 1:1 meetings
- Related sessions

# Thank you


You're
Cisco live!

# New Troubleshooting Tools in PI 3.x-SecureCRT

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*"URL Protocol"=""*

*[HKEY_CLASSES_ROOT\ssh\shell]*

*[HKEY_CLASSES_ROOT\ssh\shell\open]*

*[HKEY_CLASSES_ROOT\ssh\shell\open\command]*

*@="C:\\Windows\\System32\\WindowsPowerShell\\v1.0\\powershell.exe -Command \"& 'C:\\Program Files\\VanDyke Software\\SecureCRT\\SecureCRT.EXE' '%l'"*