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Your Time Is Now

How I Learned to Stop Worrying and Love Prime Infrastructure

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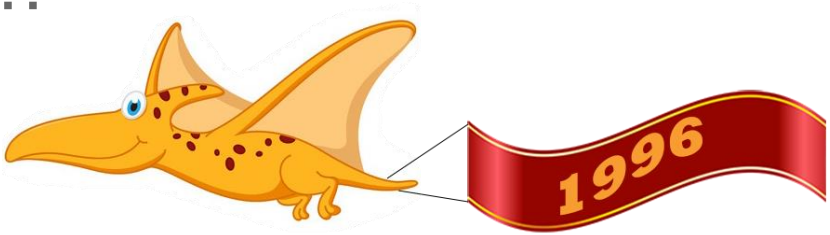
BRKNMS-2701

Agenda

- Overview
  - A History Of…
  - Why are we here?
- A Walk Through of Prime Infrastructure
  - Discovery and Inventory
  - Archiving and Configuring Devices
  - Baseline Configuration Compliance
  - Monitoring for Performance and Faults
  - Upgrading Software
  - Cool New Features
- Key Takeaways And A Look Ahead

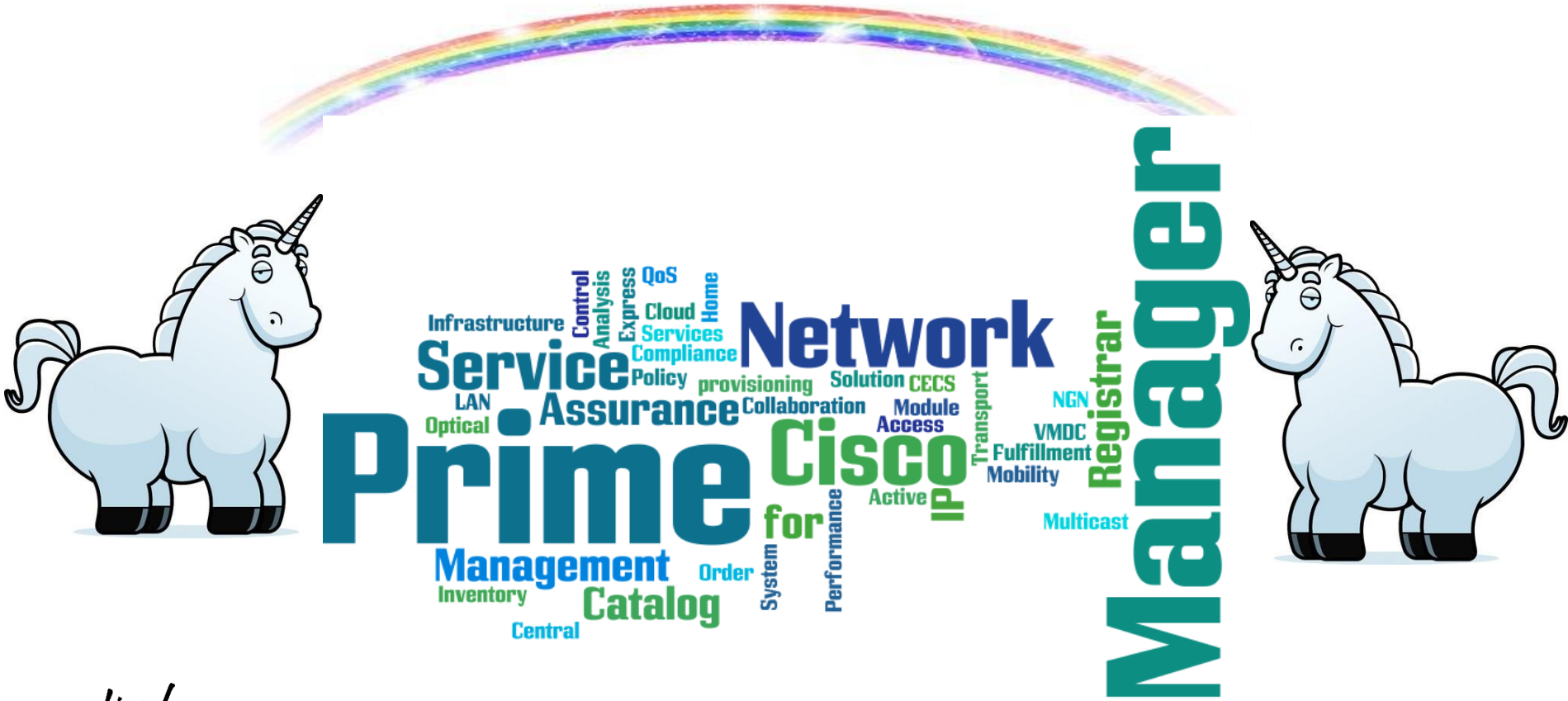
Overview

A History Of…

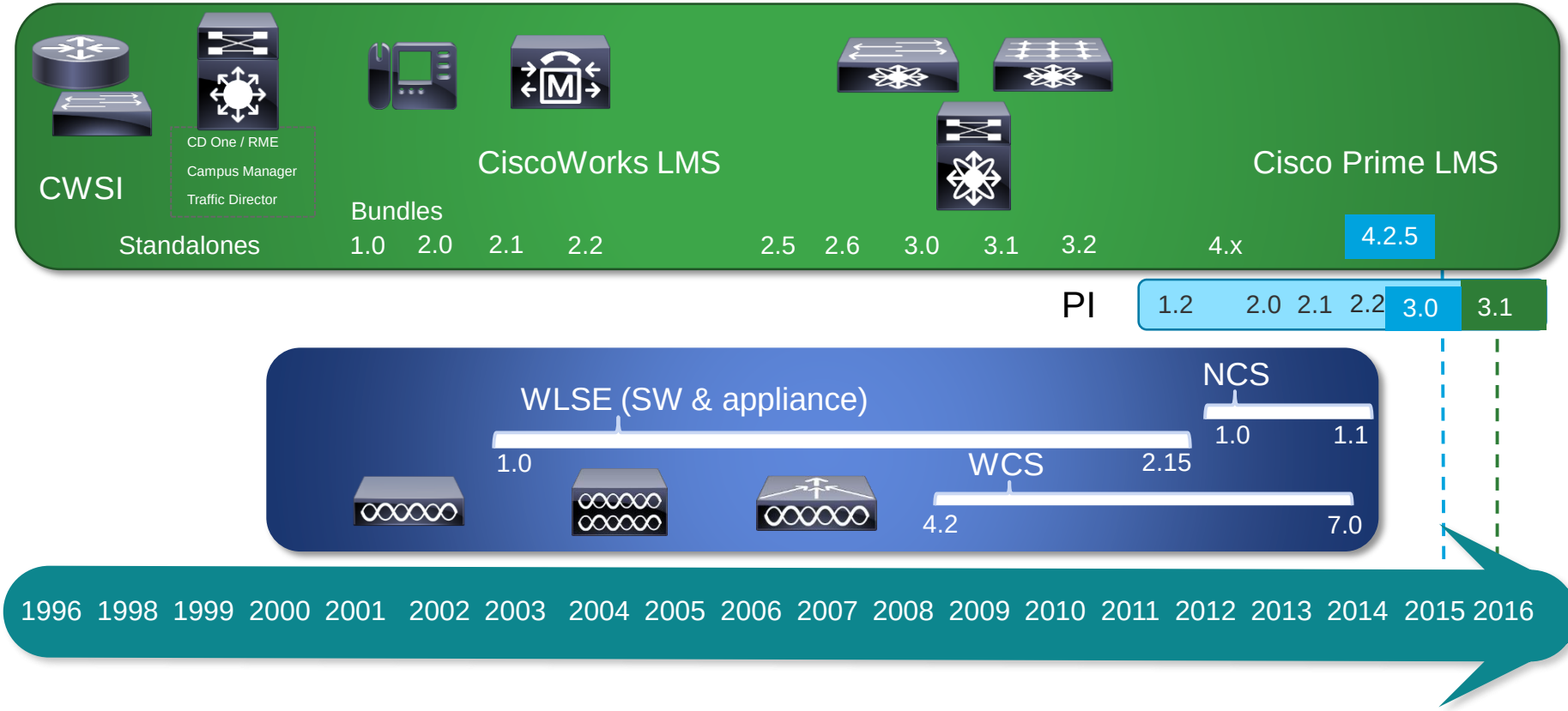


Content
CiscoWorks Monitor
CWSI VLANDirector
Flow TrafficDirector
AtmDirector NETSYS
CiscoView
CiscoWorksBlue
nGenius
SwitchProbes

And where we are now…

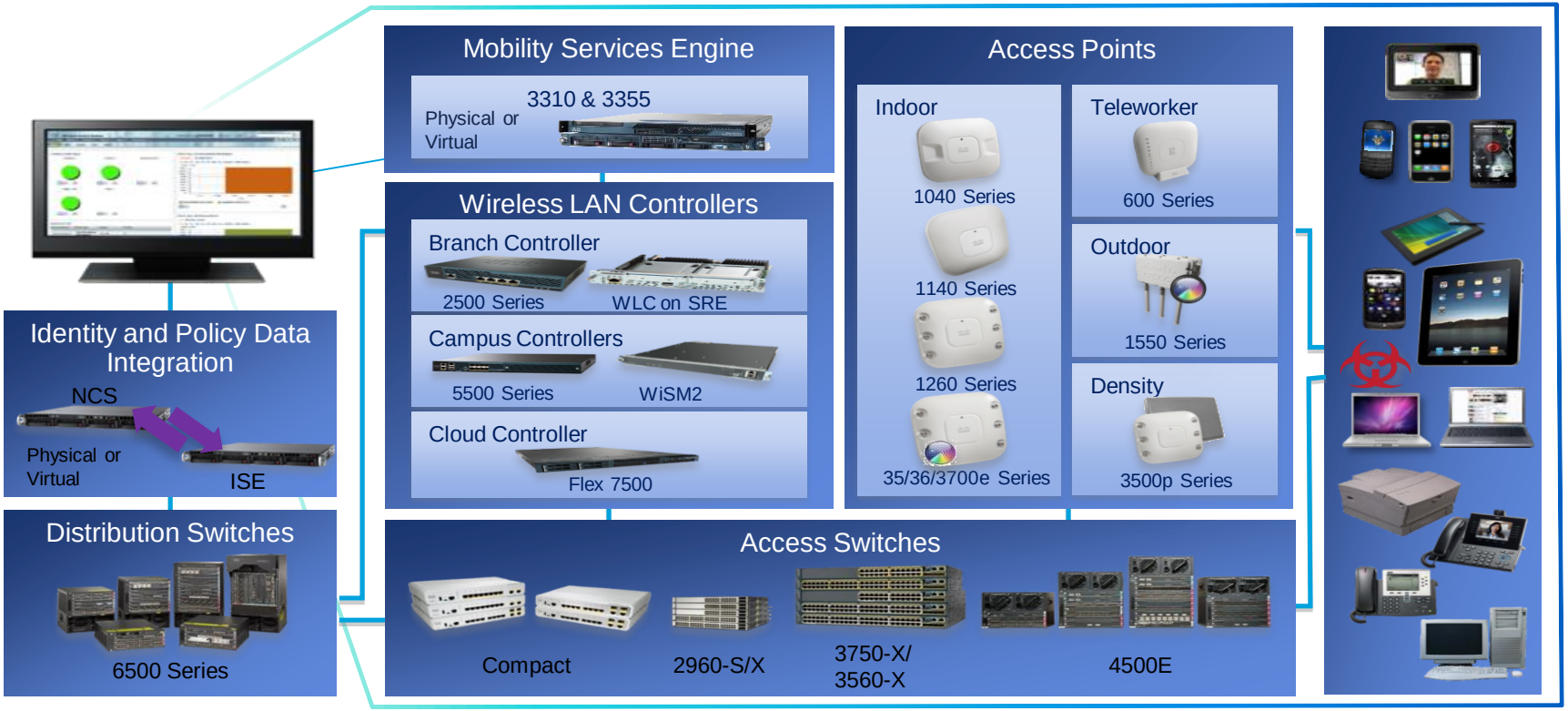


How Did We Get Here?



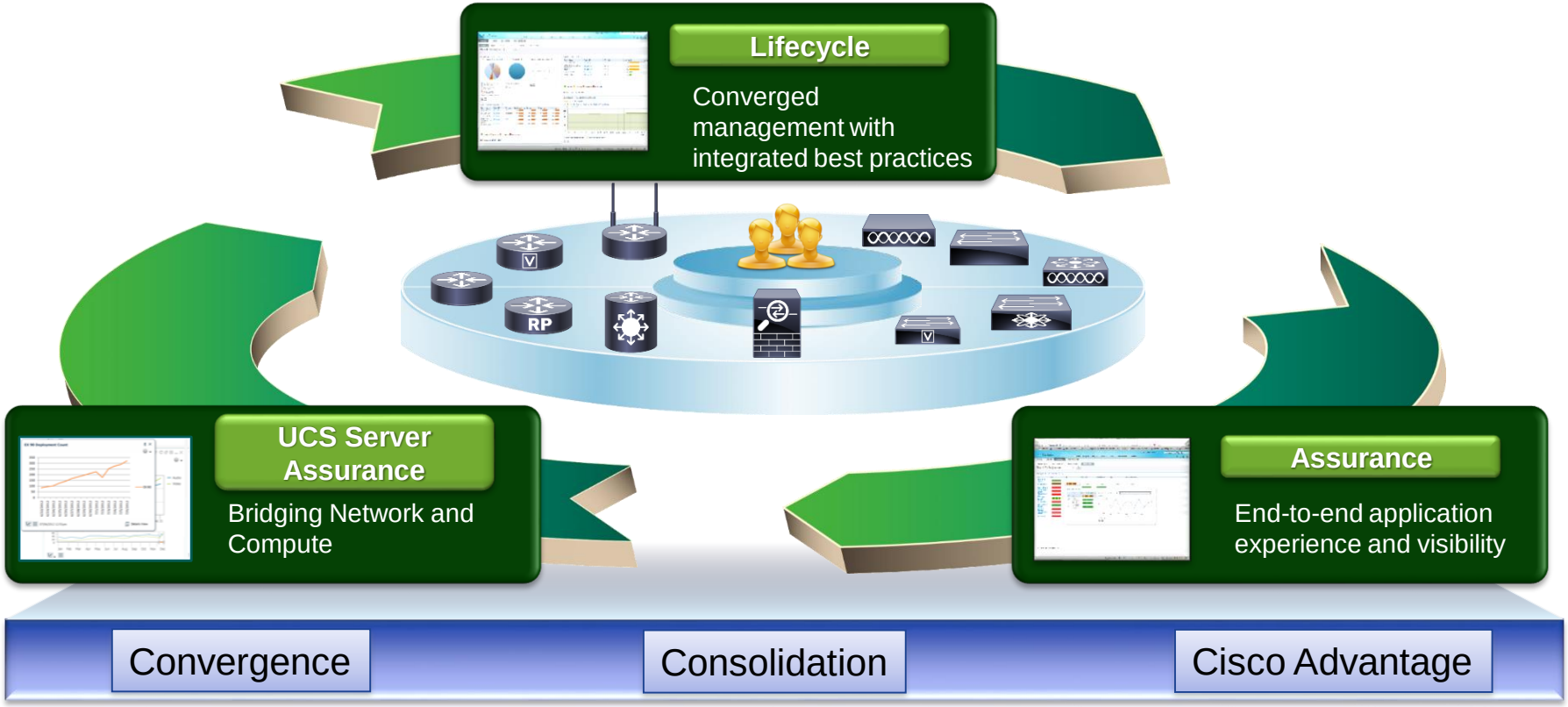
Cisco's One Network - Unified Access Portfolio

Control and Visibility for IT - Predictability for Users



Cisco Prime Infrastructure - Overview

Realizing the Vision of One Management



Operations Center

Centralized Visualization of Multiple PI Instances

Ops Center

Distributed

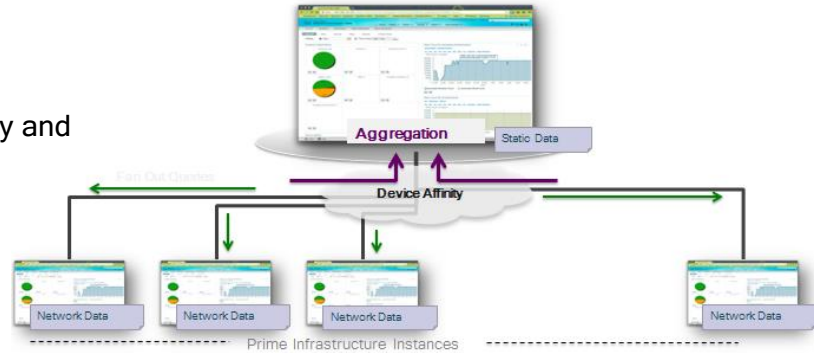
- Supports up to 10 Prime Infrastructure instances
- Addresses geographic distribution, scalability, resiliency and visibility
- Single pane of glass monitoring with click-through management

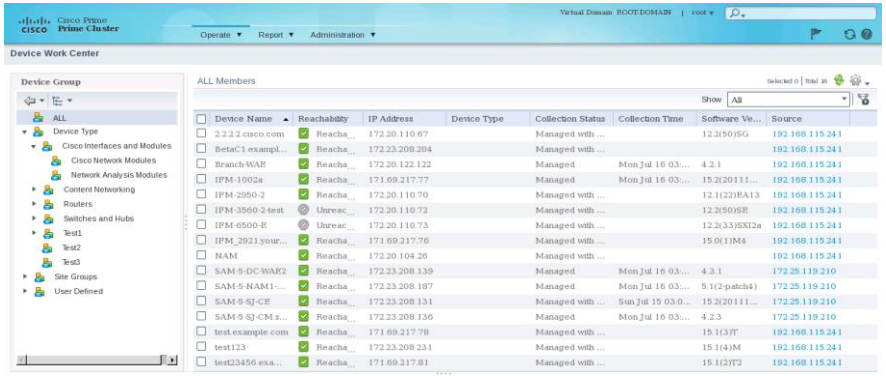
Centralized

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

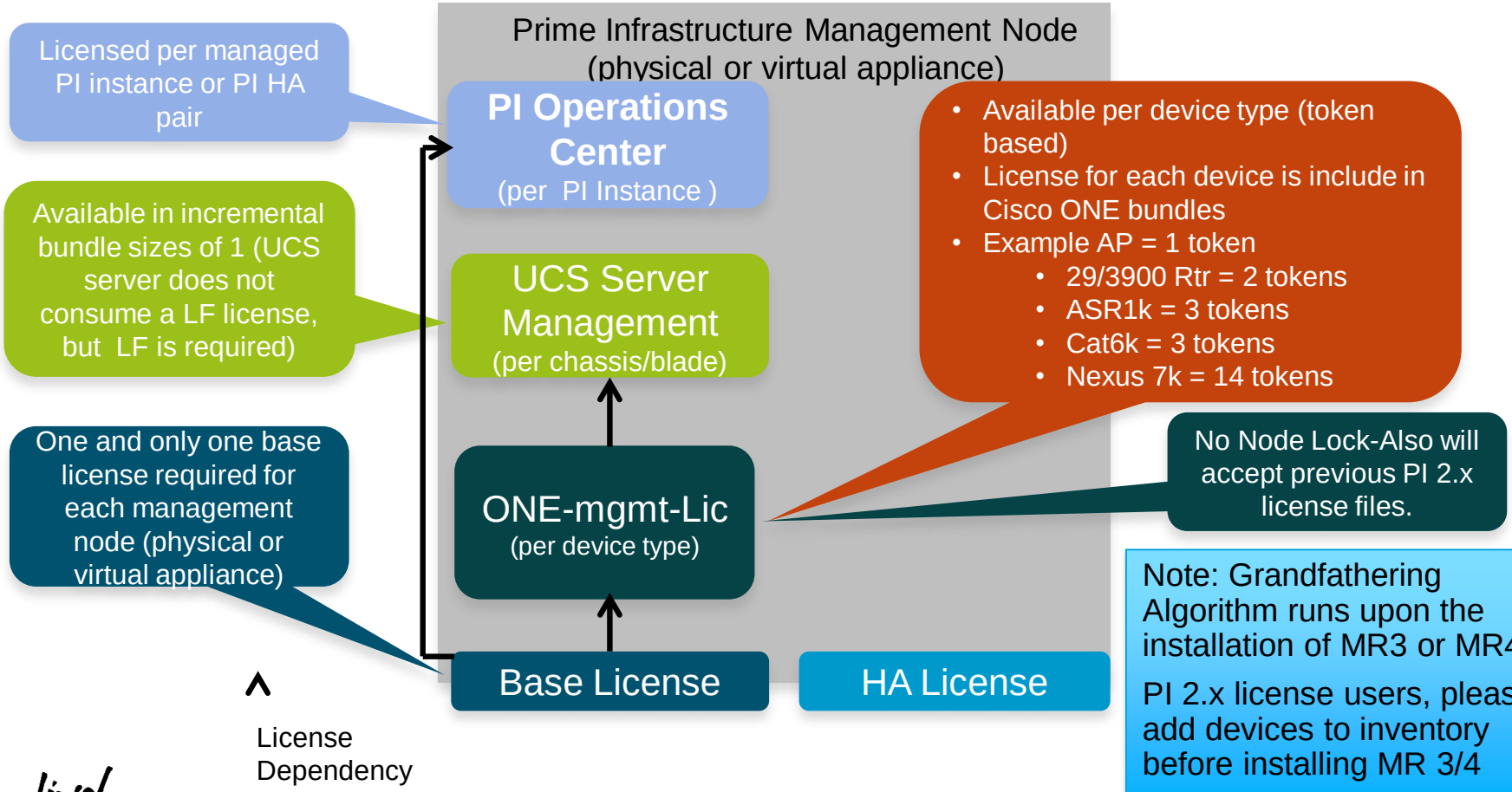
Scalable

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

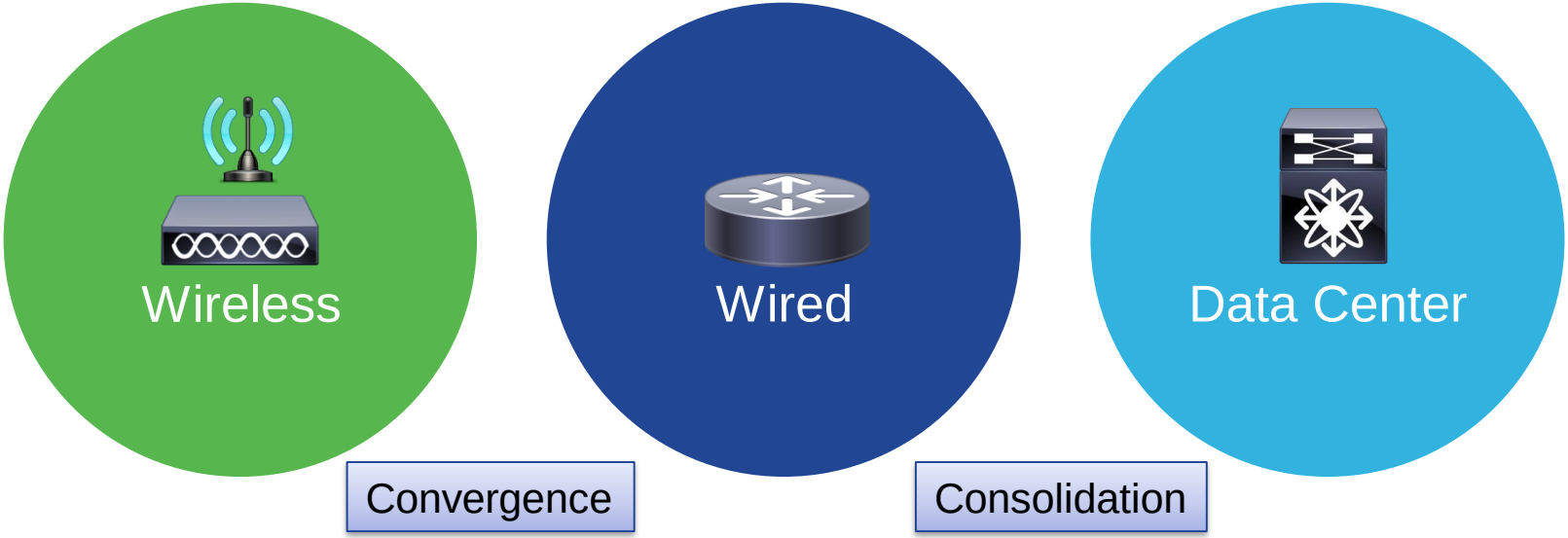




Prime Infrastructure 3.1 License Model Overview

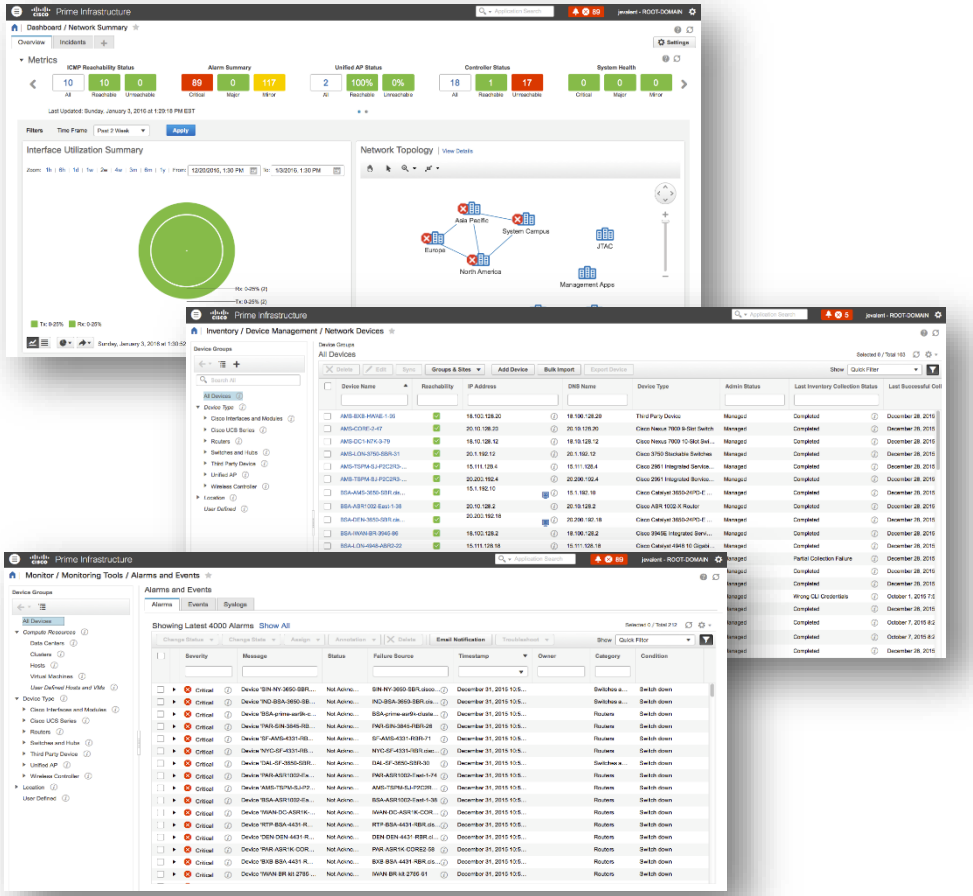


Why are we here?
Realizing the Vision of One Management



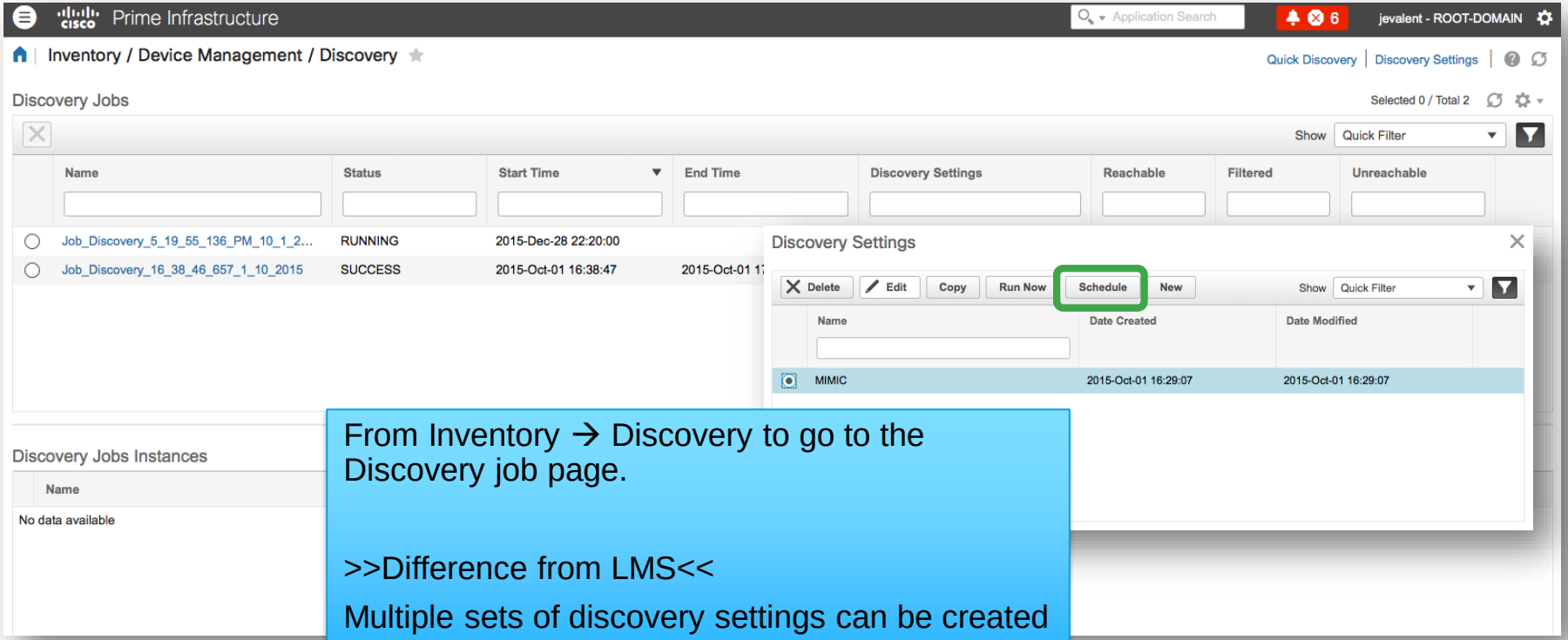
PI For Wired Management

- Inventory
- Configuration
- Compliance
- Monitoring and User Tracking
- Software Management



Walk Through

Finding Devices With Discovery

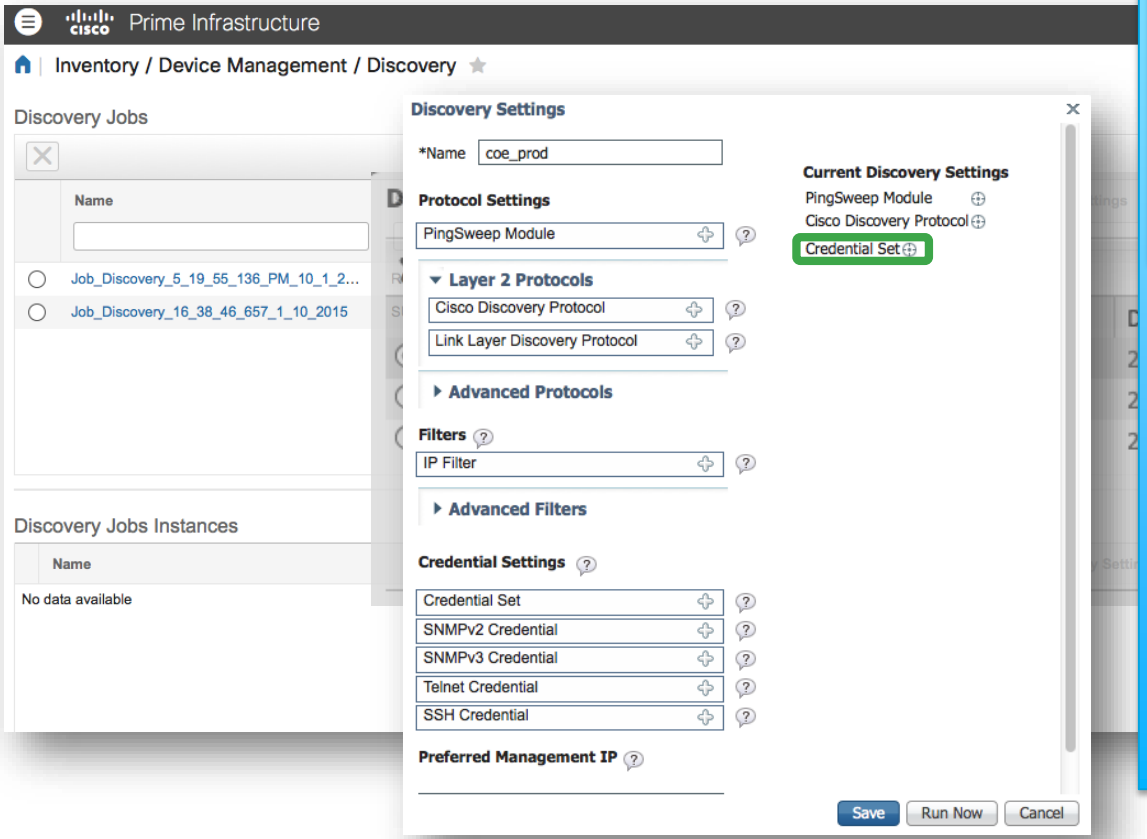


From Inventory → Discovery to go to the Discovery job page.

>>Difference from LMS<<

Multiple sets of discovery settings can be created and scheduled independently (think different schedules for work days/weekends).

Discovery Settings



Discovery settings share a number of similarities with LMS (in fact, it uses the same code). See https://supportforums.cisco.com/document/33526/understanding-lan-management-solution-lms-discovery for more on how discovery works.

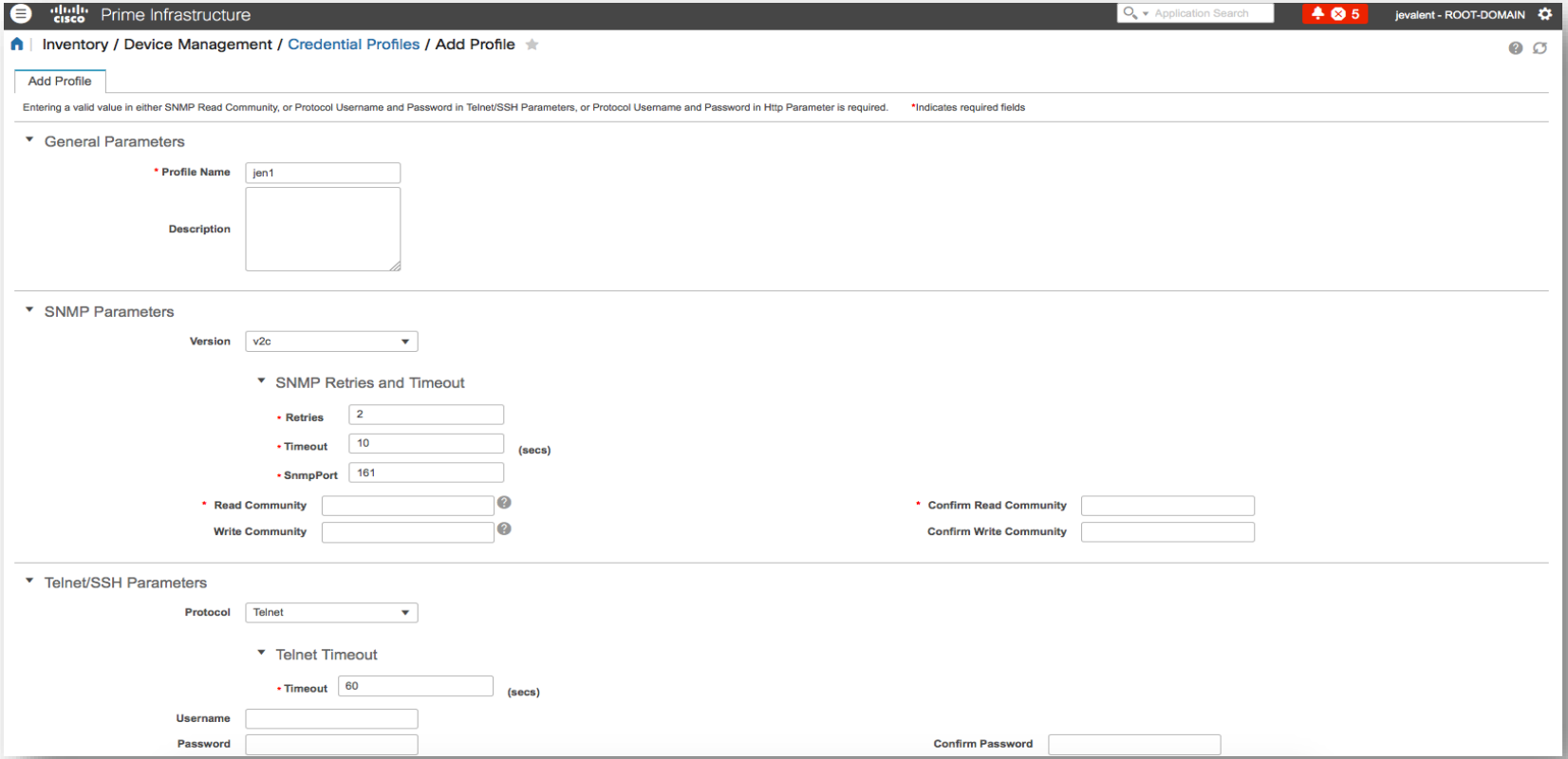
Pro-Tip: Ping sweep and CDP are the two most commonly used discovery modules.

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

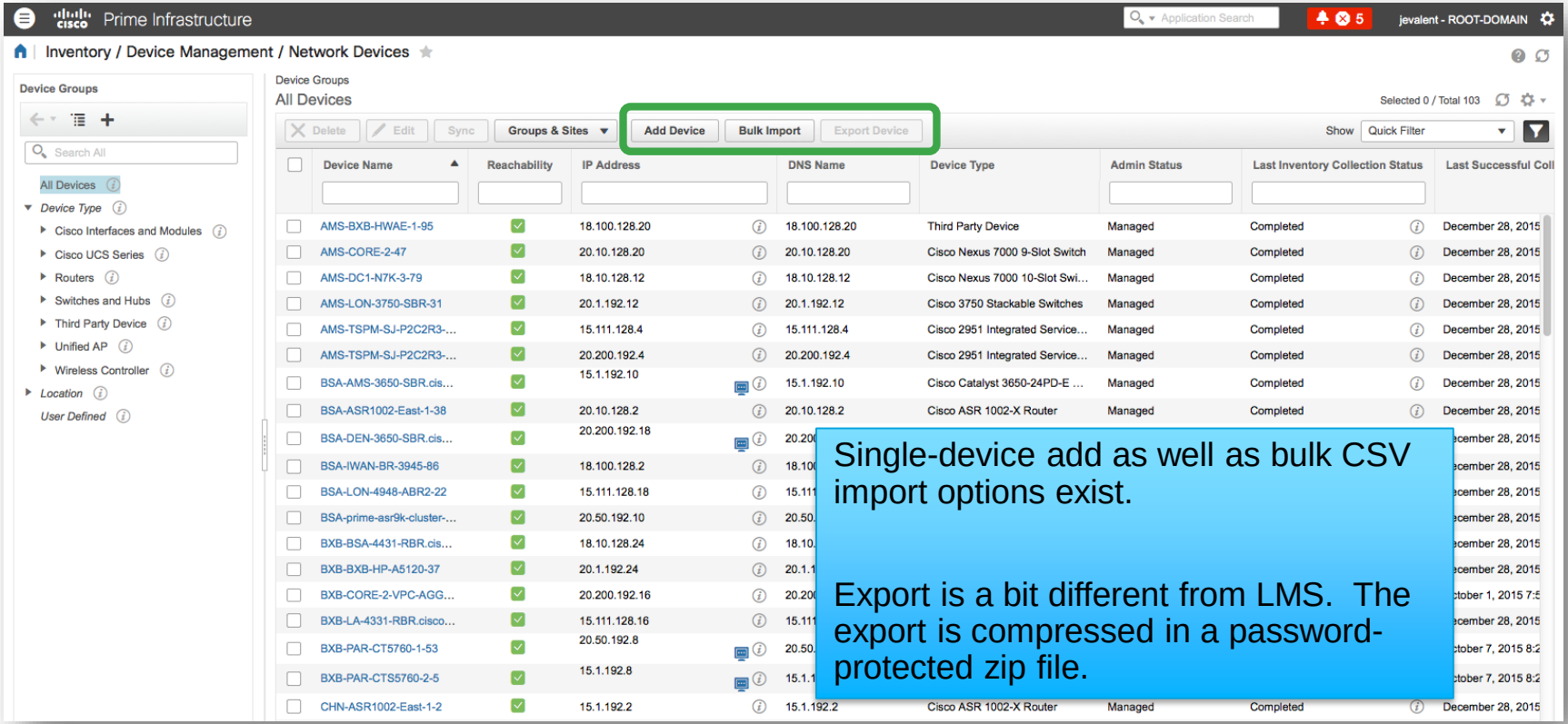
>>Difference from LMS<<

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

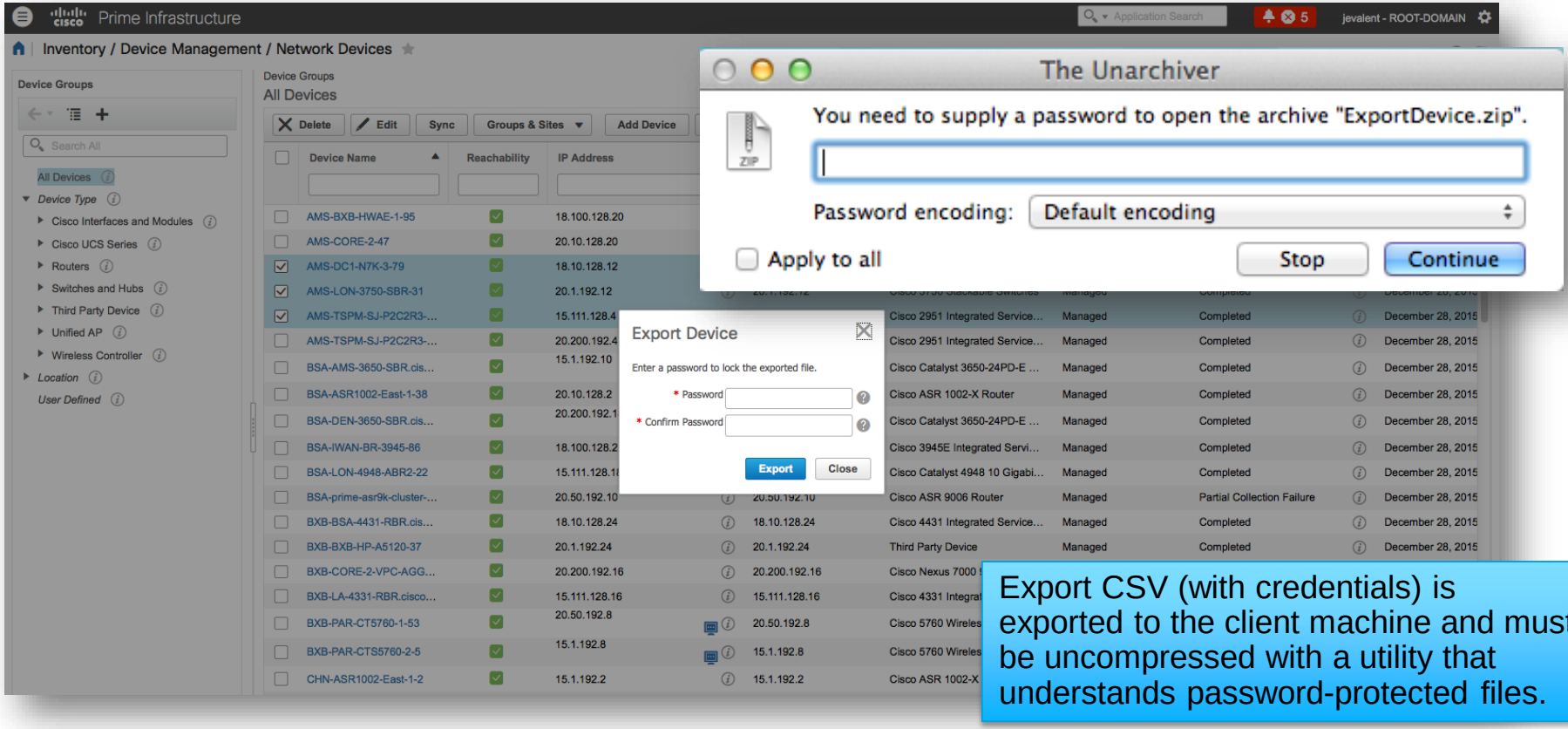
Credential Profiles



Add, Import, Export, Oh My!

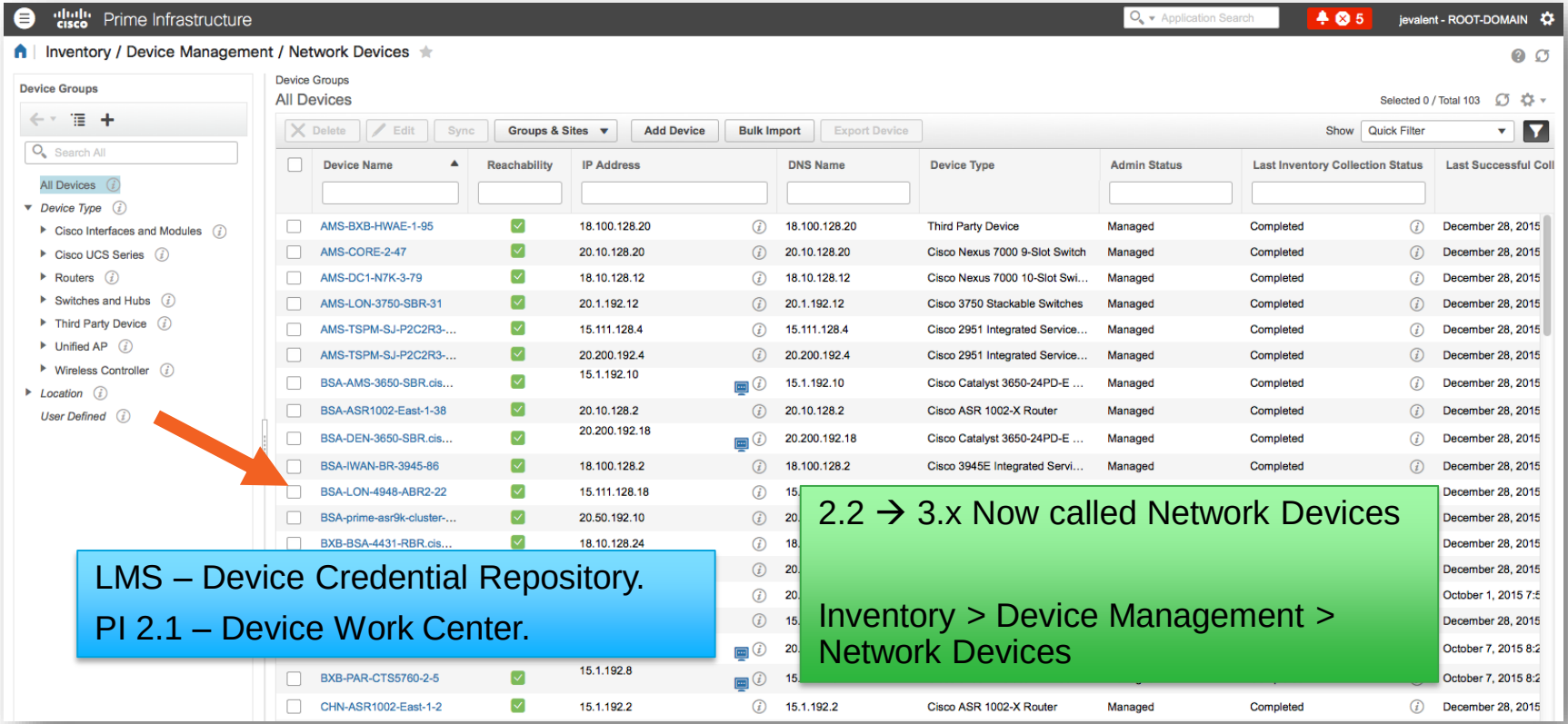


Secure Local Export

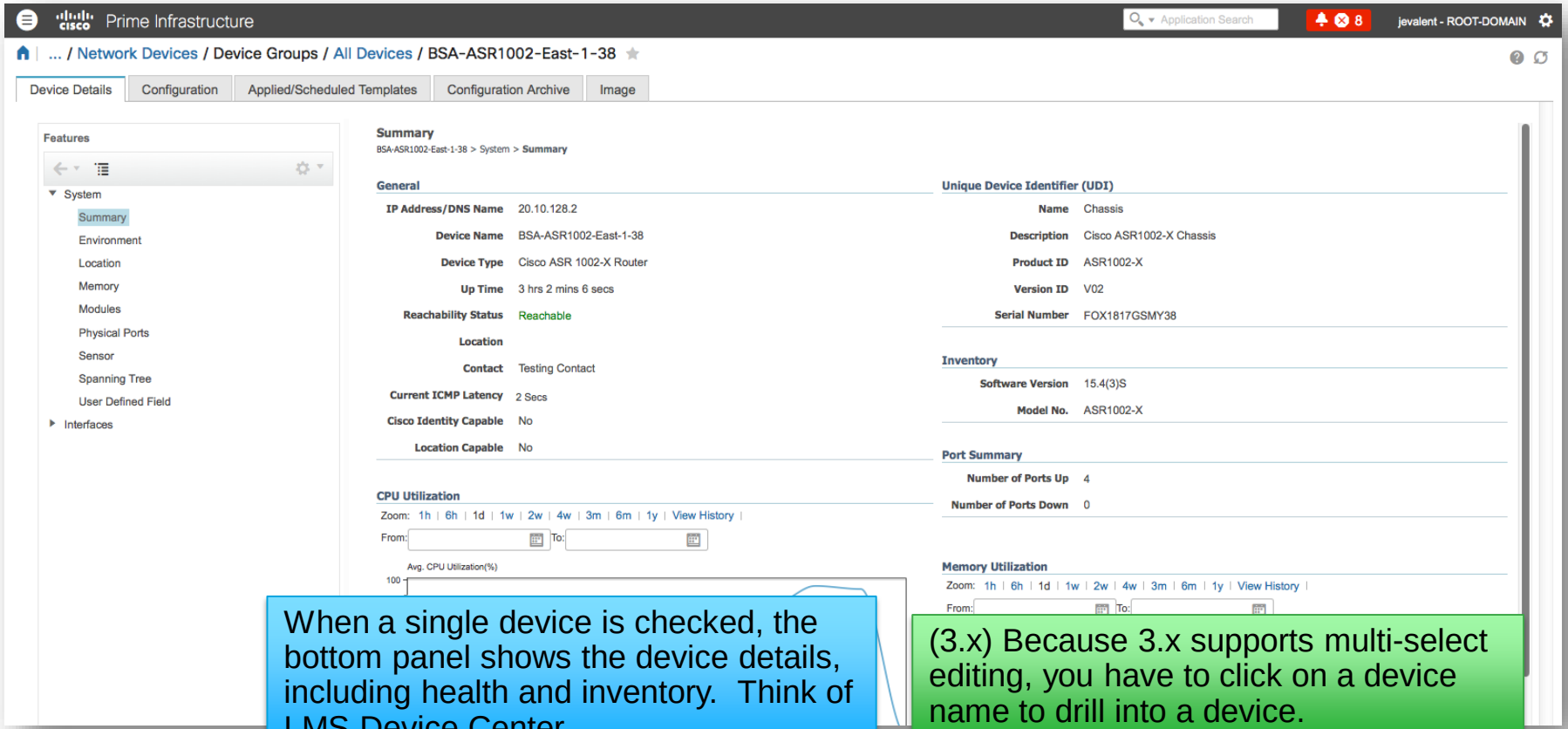


Export CSV (with credentials) is exported to the client machine and must be uncompressed with a utility that understands password-protected files.

Prime Inventory



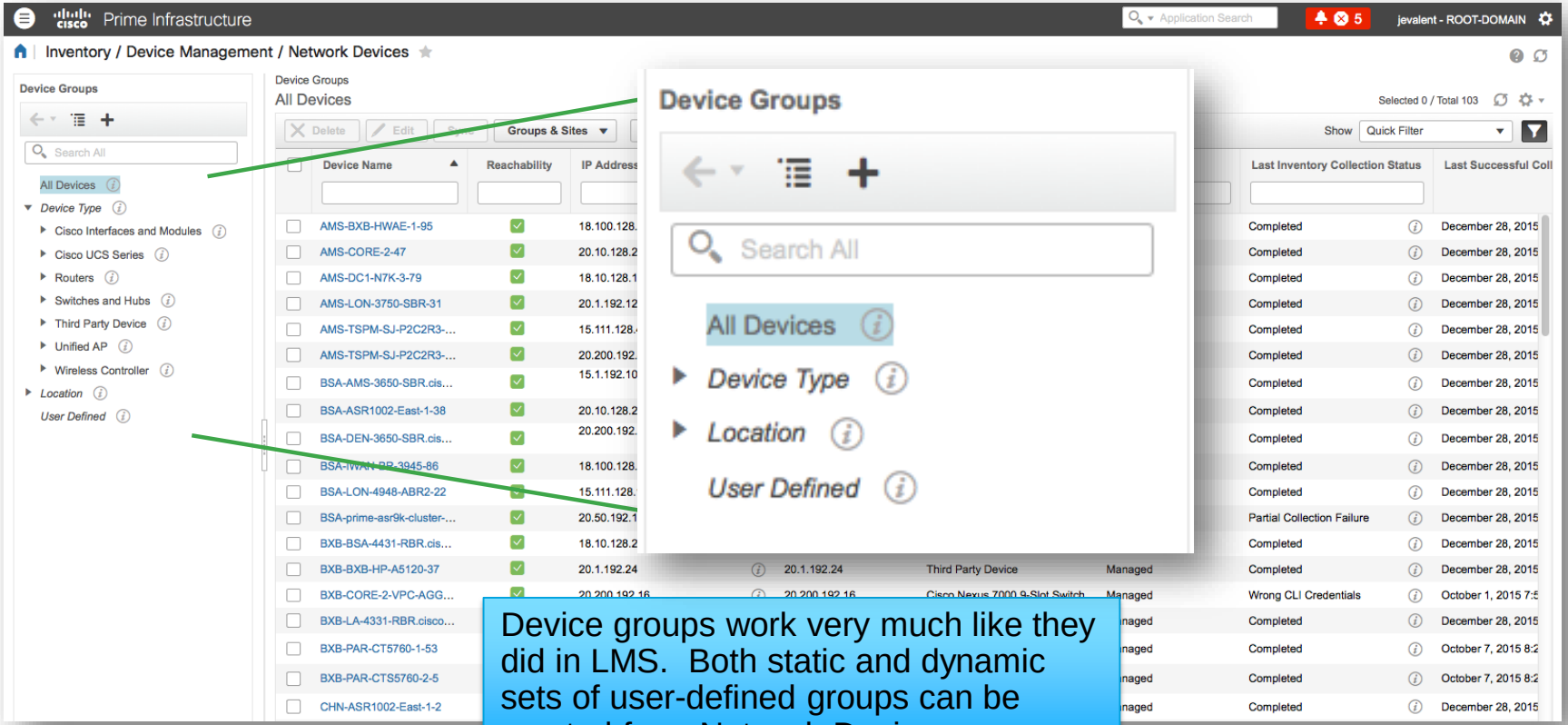
Drilling Into A Device



When a single device is checked, the bottom panel shows the device details, including health and inventory. Think of LMS Device Center.

(3.x) Because 3.x supports multi-select editing, you have to click on a device name to drill into a device.

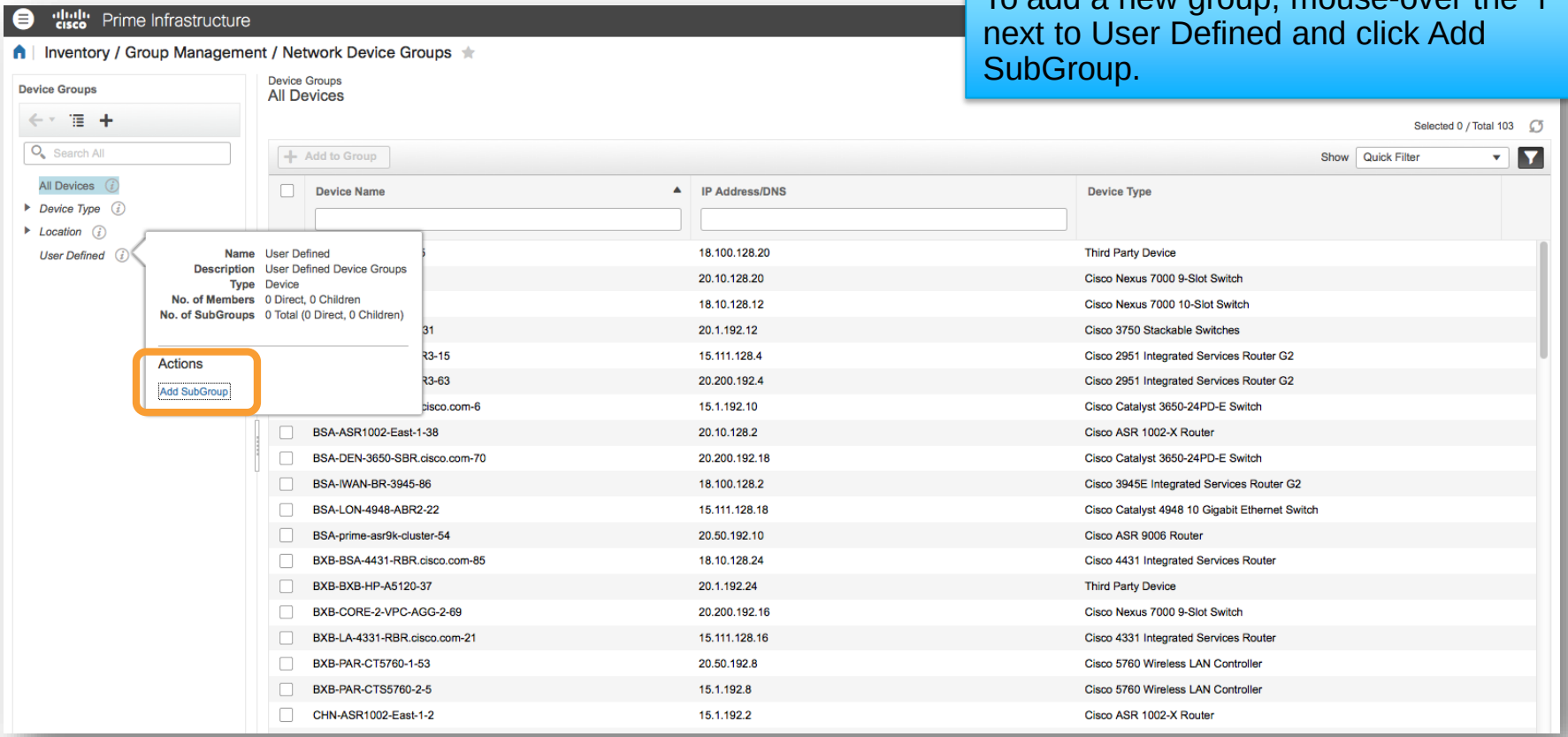
Device Groups In PI



Device groups work very much like they did in LMS. Both static and dynamic sets of user-defined groups can be created from Network Devices

Creating A New Group

To add a new group, mouse-over the “i” next to User Defined and click Add SubGroup.

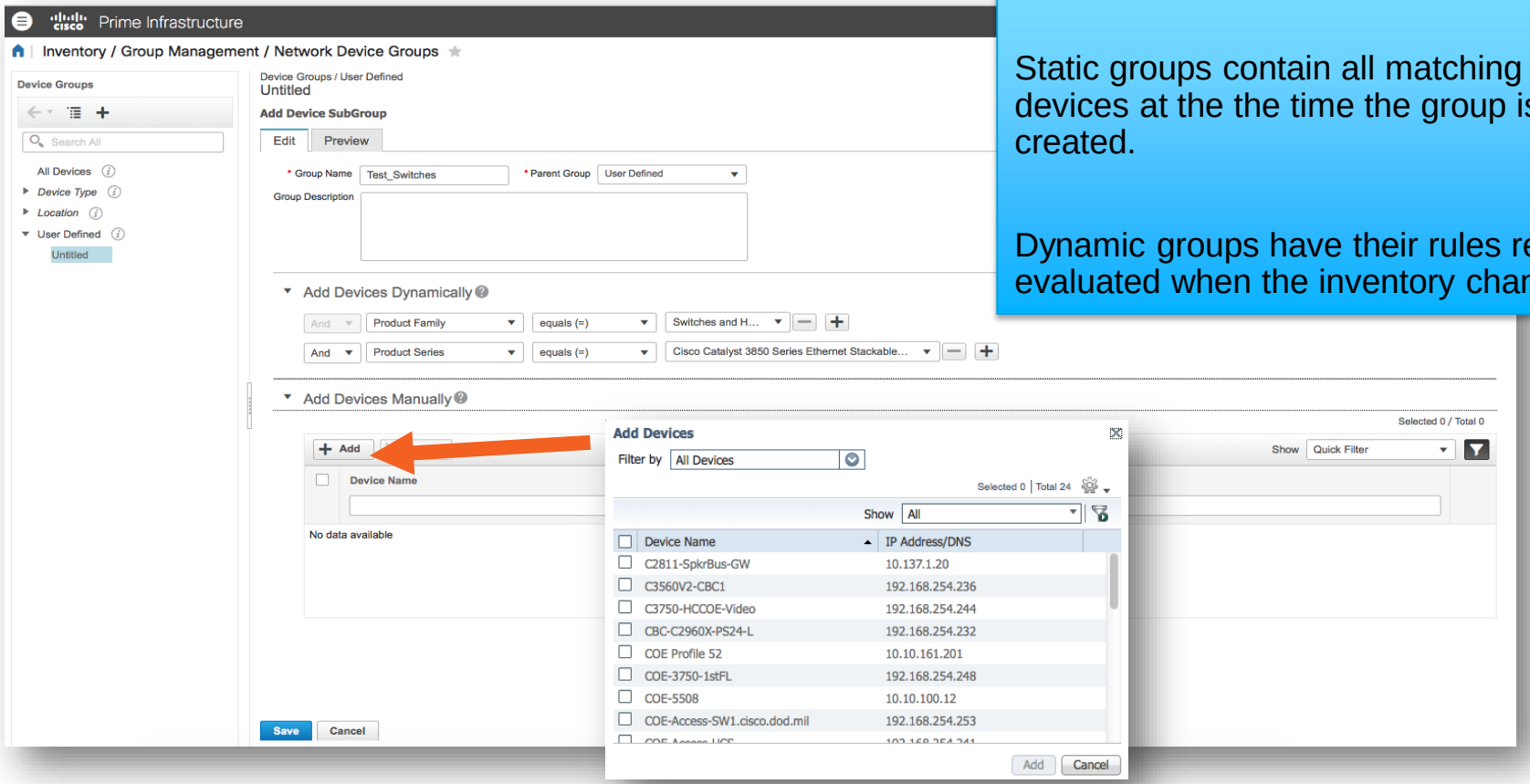


Group Rules

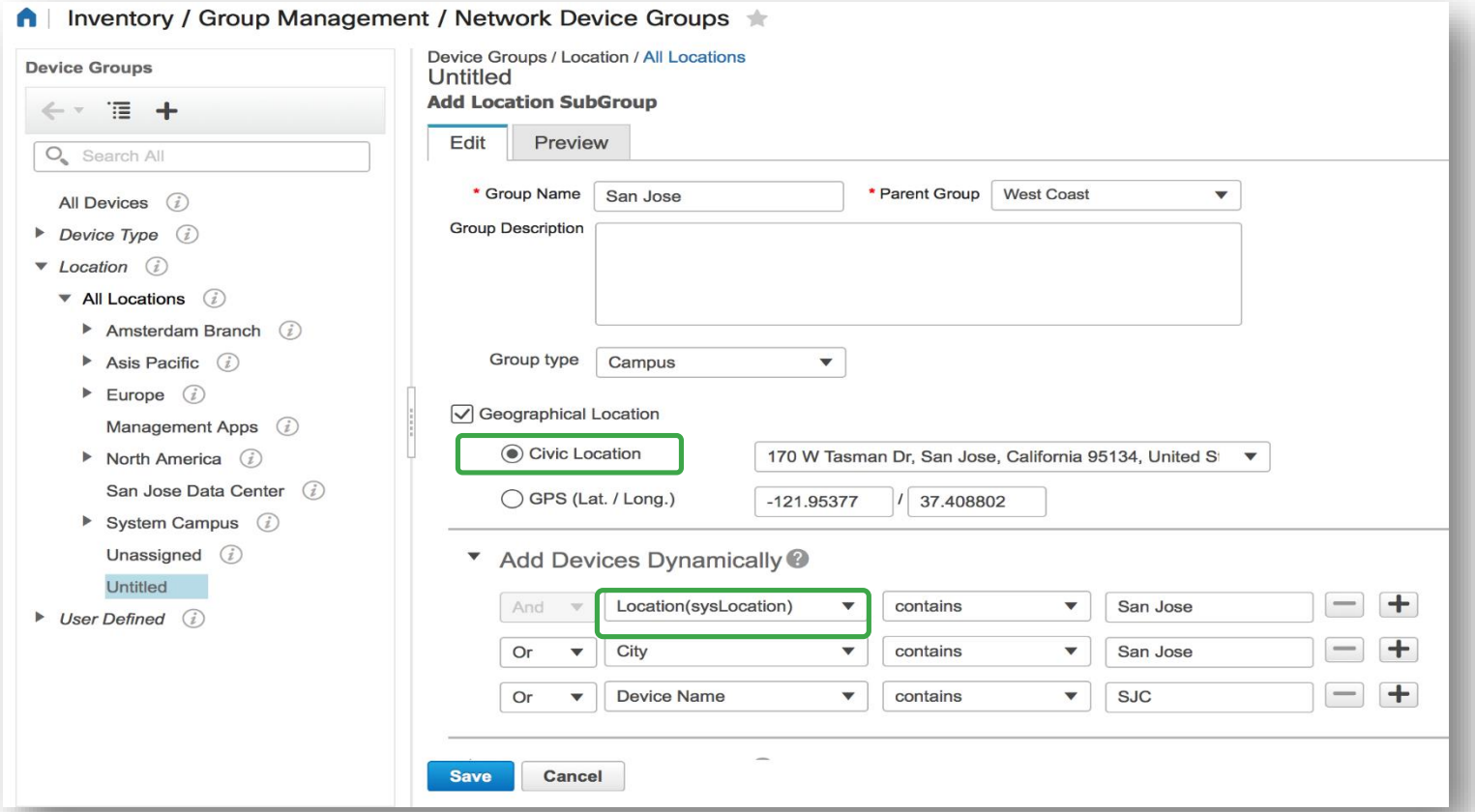
Specify the rules to match devices.

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

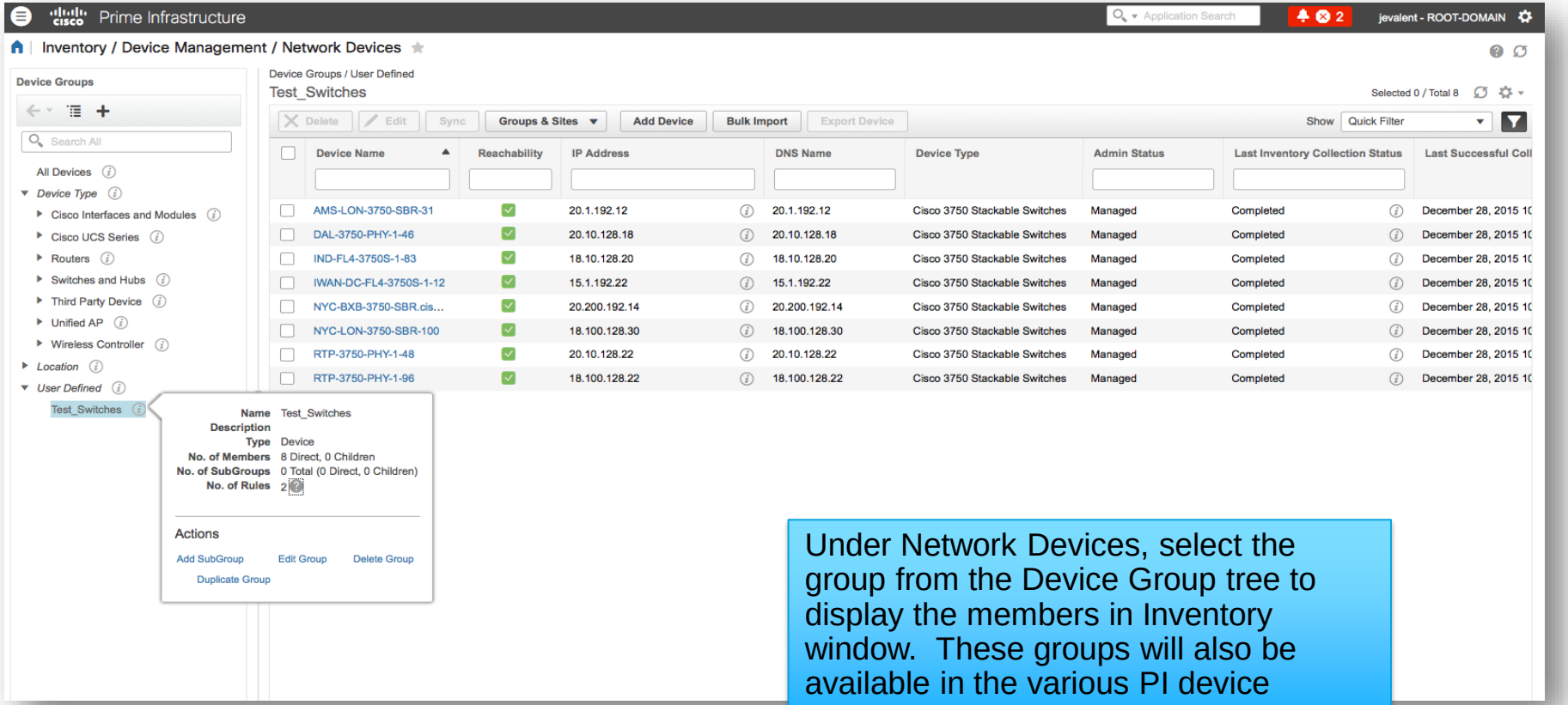
Dynamic groups have their rules re-evaluated when the inventory changes.



Enhanced Location Based Grouping

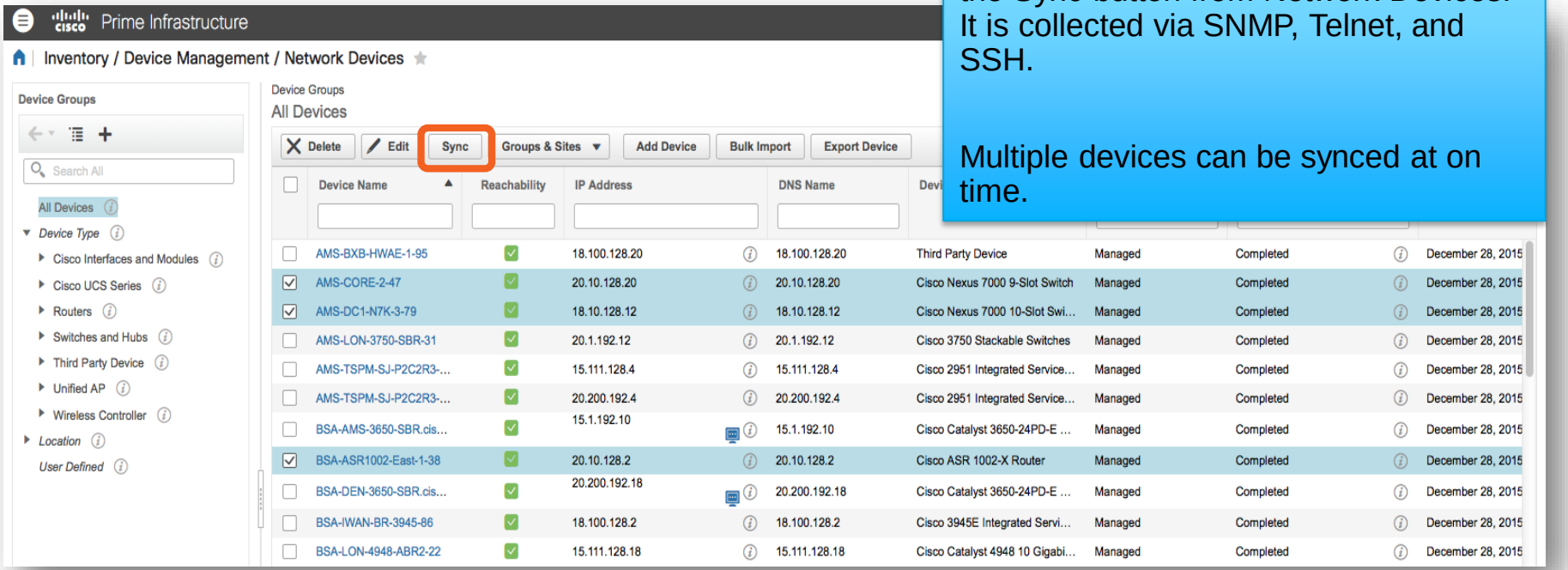


Viewing The Group Members



Under Network Devices, select the group from the Device Group tree to display the members in Inventory window. These groups will also be available in the various PI device selectors.

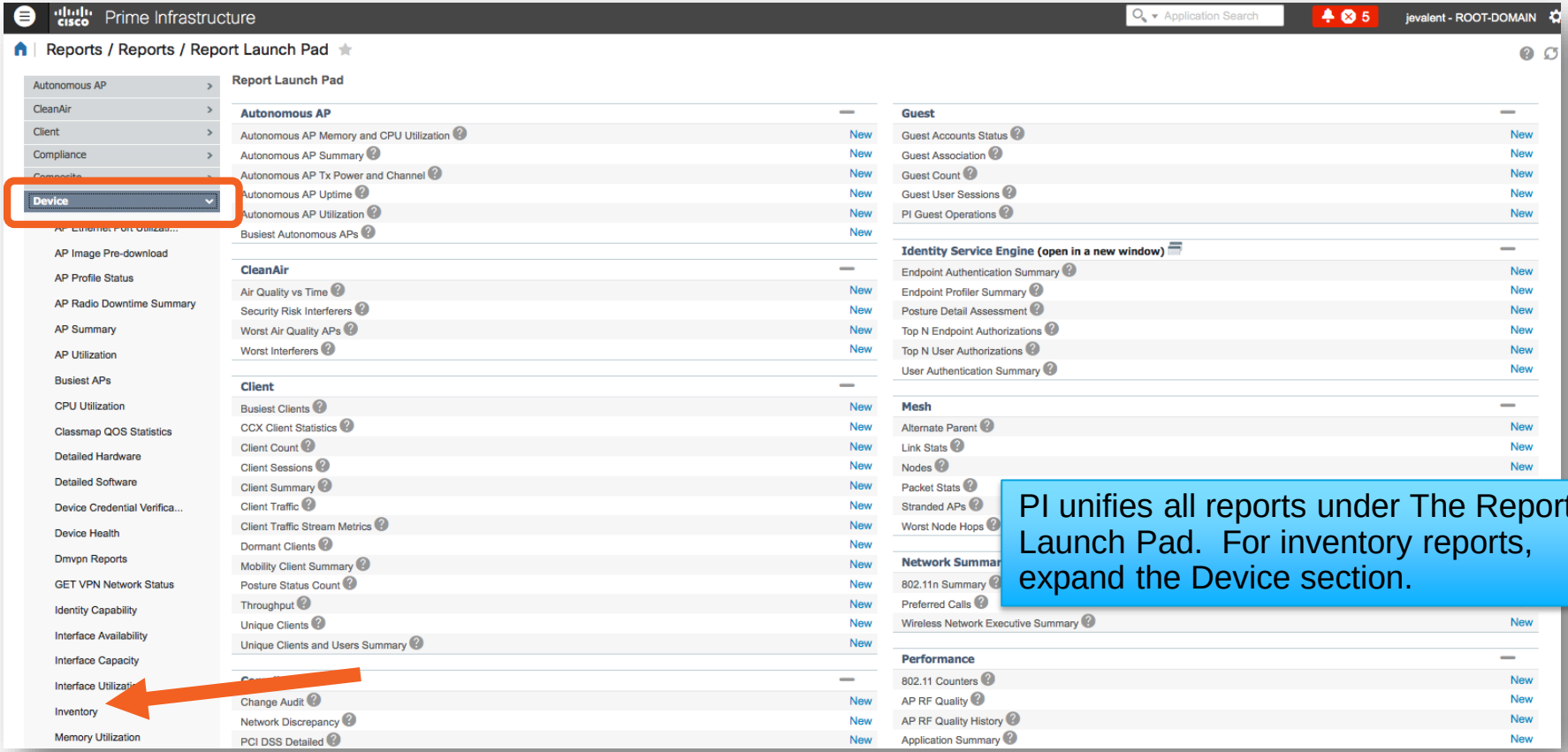
Inventory Collection



Inventory Collection is launched using the Sync button from Network Devices. It is collected via SNMP, Telnet, and SSH.

Multiple devices can be synced at on time.

Inventory Reporting



PI unifies all reports under The Report Launch Pad. For inventory reports, expand the Device section.

The Detailed Hardware Report

The serial number as well as other hardware attributes can be found in 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 Interfac
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 Cisco IOS Software, 2800			FTX1105A1TG	cevChassis		

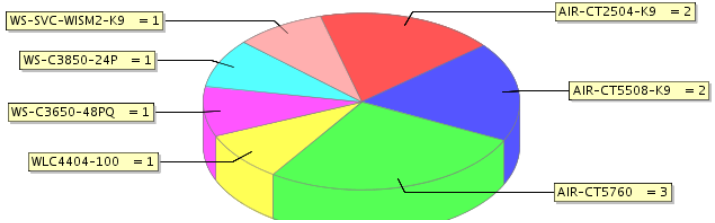
TIP: The Wired Detailed Device Inventory report will feel very familiar.

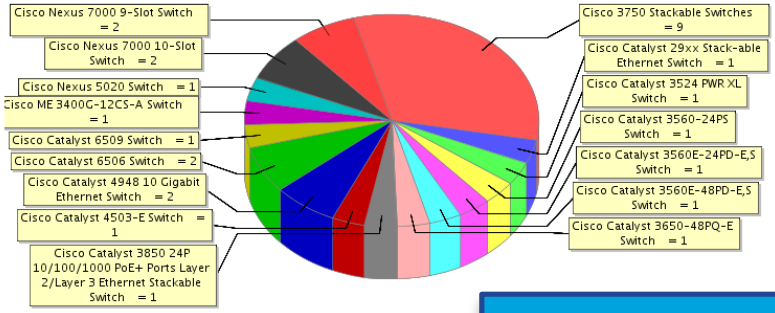
Asset Management with Prime Infrastructure

Device Inventory Reports

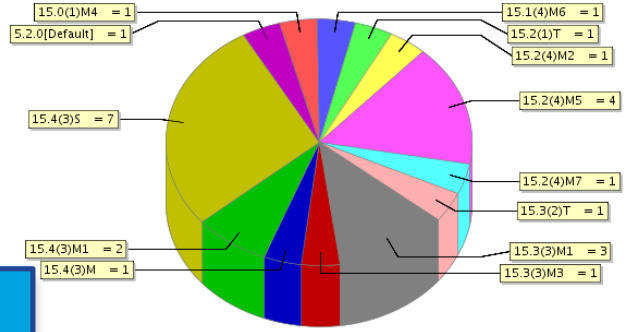
Count of Controllers by Model

Model Name	Number of Controllers
AIR-CT2504-K9	2
AIR-CT5508-K9	2
AIR-CT5760	3
WLC4404-100	1
WS-C3650-48PQ	1
WS-C3850-24P	1
WS-SVC-WISM2-K9	1



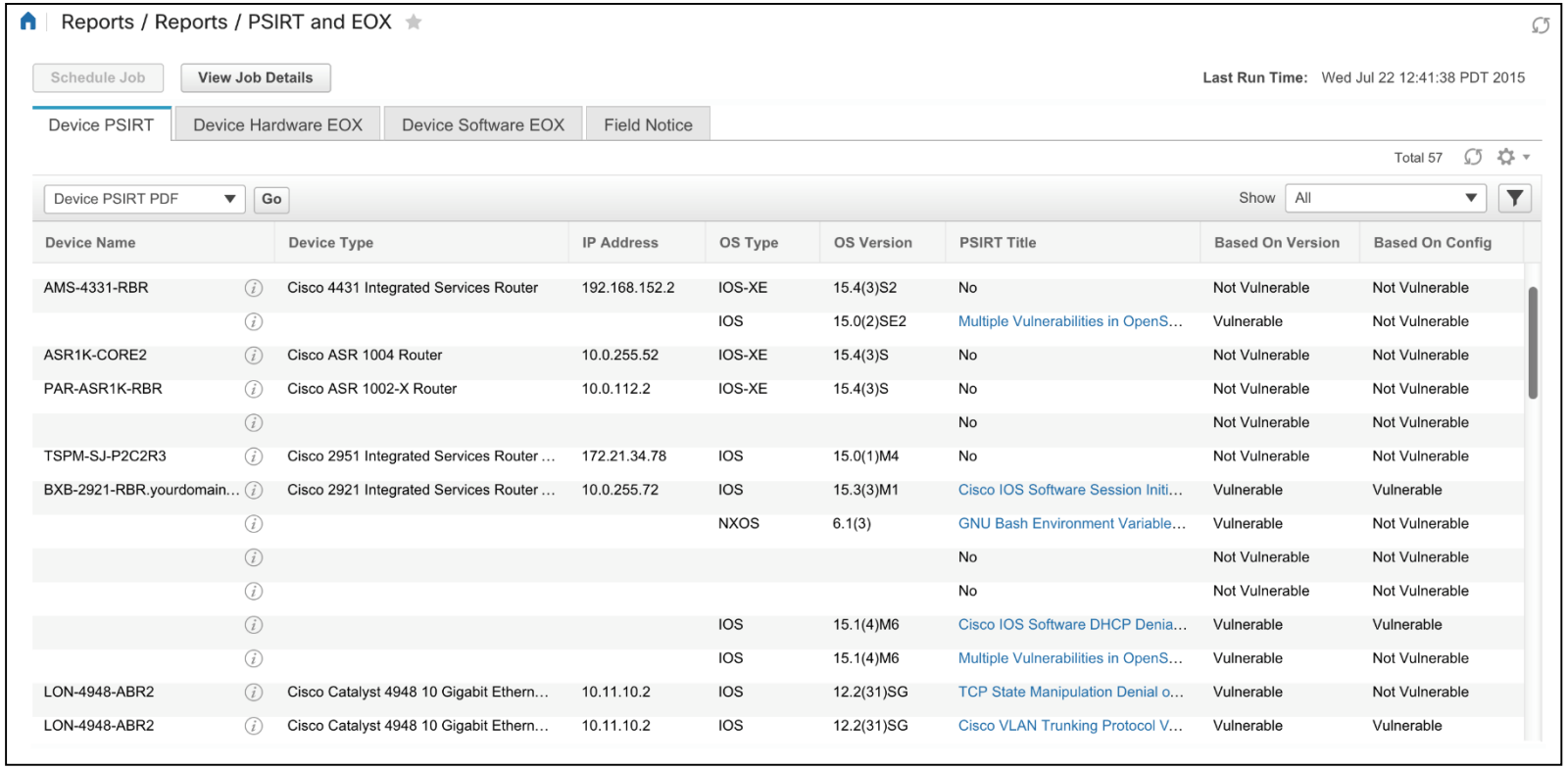


Count of Switches by Model



Count of Routers by Version

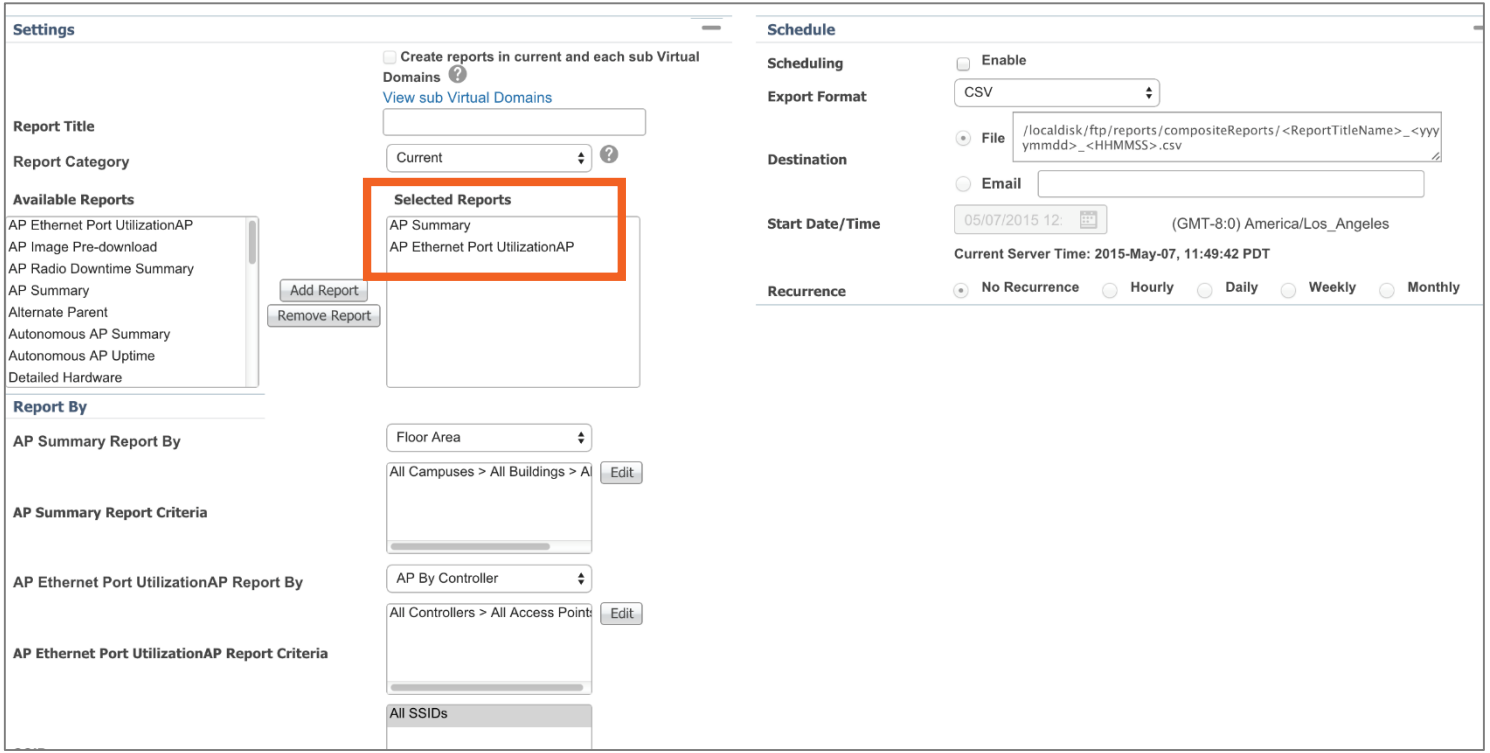
PSIRT/EOX Reports



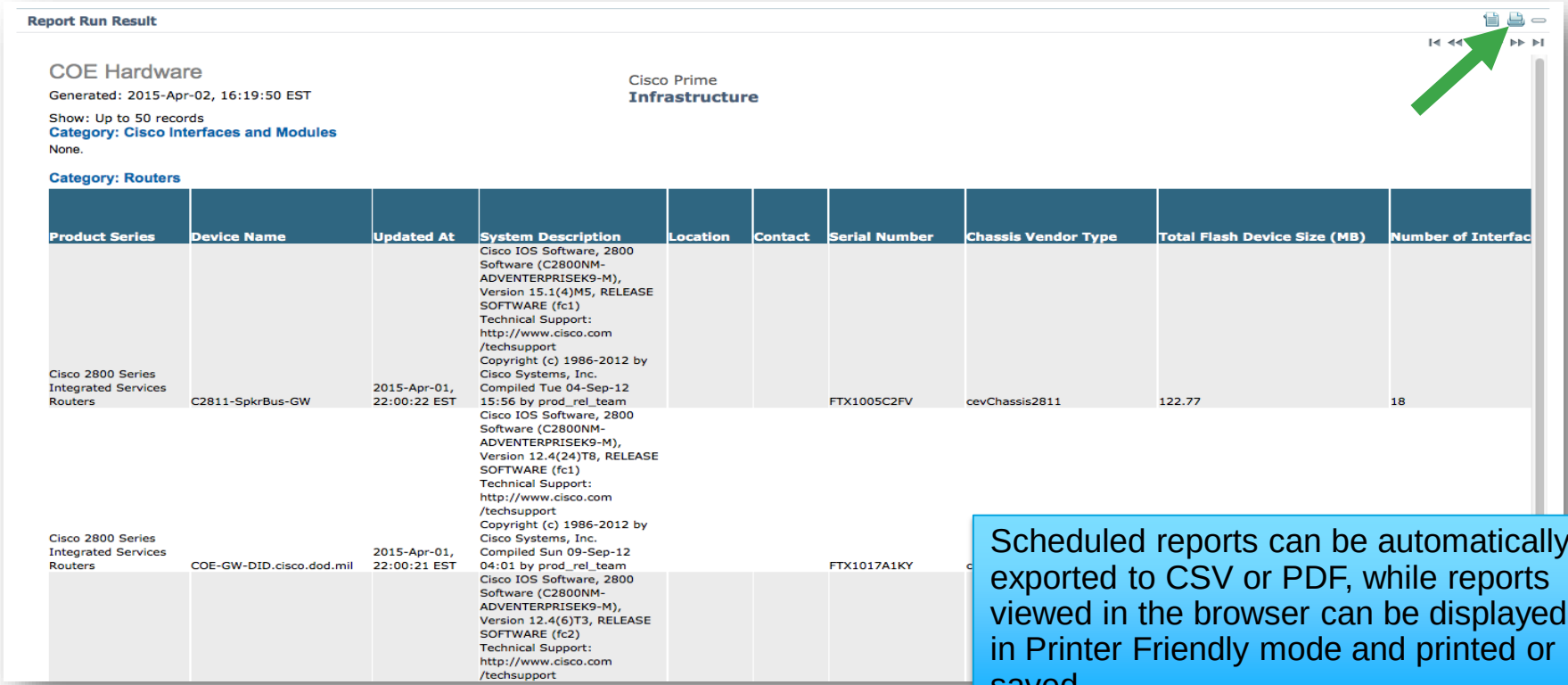
Device Name	Device Type	IP Address	OS Type	OS Version	PSIRT Title	Based On Version	Based On Config
AMS-4331-RBR	Cisco 4431 Integrated Services Router	192.168.152.2	IOS-XE	15.4(3)S2	No	Not Vulnerable	Not Vulnerable
			IOS	15.0(2)SE2	Multiple Vulnerabilities in OpenS…	Vulnerable	Not Vulnerable
ASR1K-CORE2	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

Composite Reports

Ability to combine multiple reports into a single report



Exporting Reports



Report Run Result

COE Hardware

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

Cisco Prime
Infrastructure

Show: Up to 50 records

Category: Cisco Interfaces and Modules

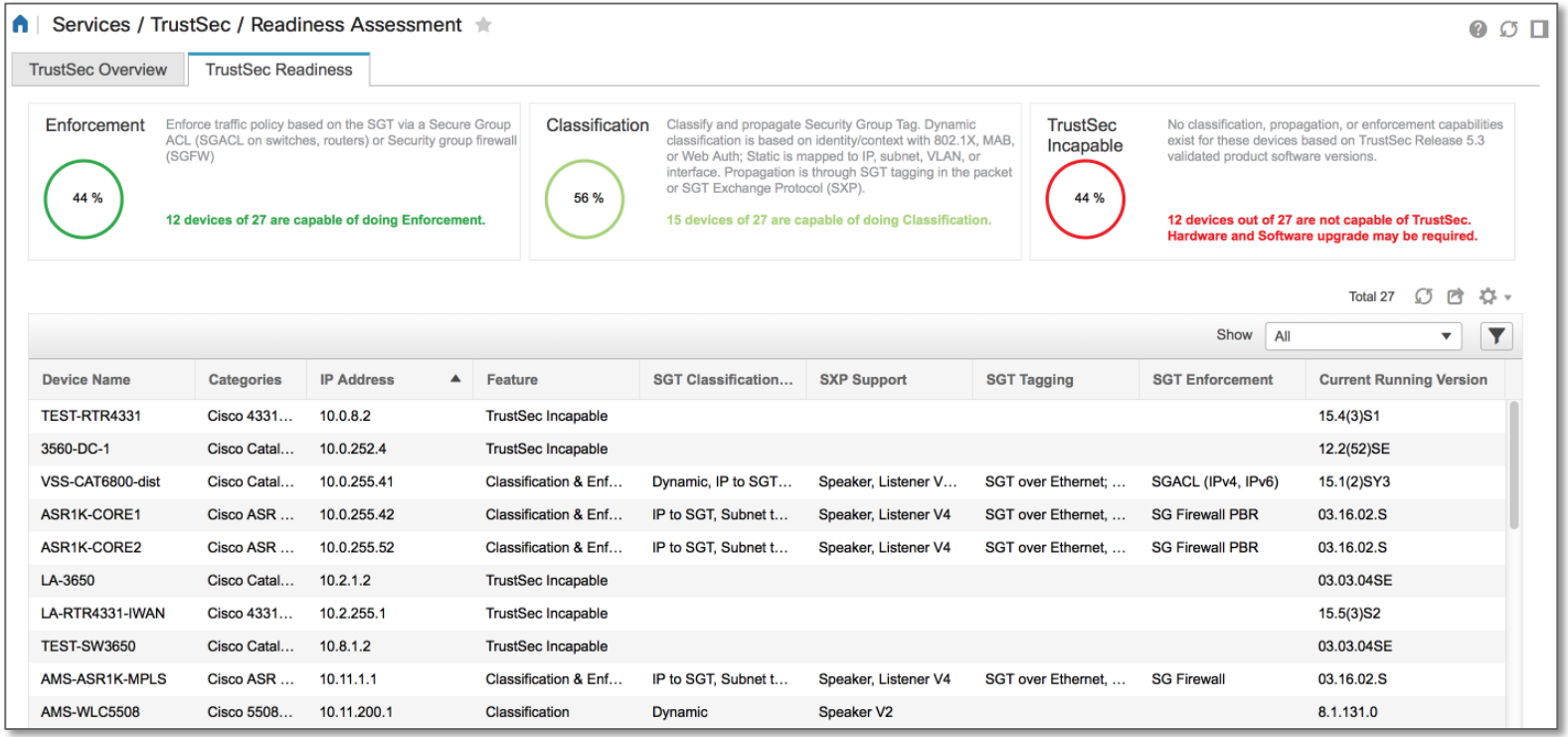
None.

Category: Routers

Product Series	Device Name	Updated At	System Description	Location	Contact	Serial Number	Chassis Vendor Type	Total Flash Device Size (MB)	Number of Interfac
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			
			Cisco IOS Software, 2800 Software (C2800NM-ADVENTERPRISEK9-M), Version 12.4(6)T3, RELEASE SOFTWARE (fc2) Technical Support: http://www.cisco.com /techsupport						

Scheduled reports can be automatically exported to CSV or PDF, while reports viewed in the browser can be displayed in Printer Friendly mode and printed or saved.

TrustSec Readiness Assessment

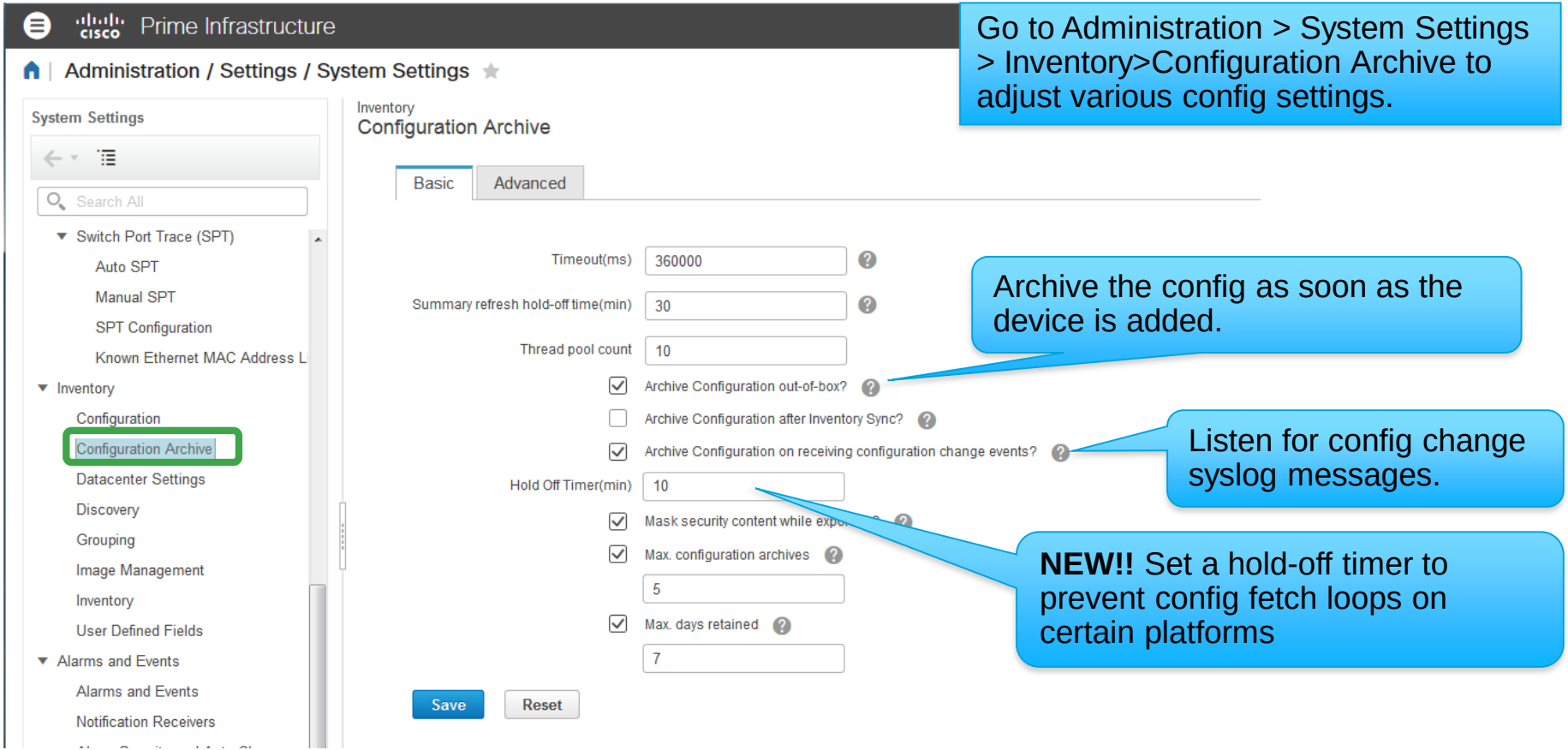


Device Name	Categories	IP Address	Feature	SGT Classification…	SXP Support	SGT Tagging	SGT Enforcement	Current Running Version
TEST-RTR4331	Cisco 4331…	10.0.8.2	TrustSec Incapable					15.4(3)S1
3560-DC-1	Cisco Catal…	10.0.252.4	TrustSec Incapable					12.2(52)SE
VSS-CAT6800-dist	Cisco Catal…	10.0.255.41	Classification & Enf…	Dynamic, IP to SGT…	Speaker, Listener V…	SGT over Ethernet; …	SGACL (IPv4, IPv6)	15.1(2)SY3
ASR1K-CORE1	Cisco ASR …	10.0.255.42	Classification & Enf…	IP to SGT, Subnet t…	Speaker, Listener V4	SGT over Ethernet, …	SG Firewall PBR	03.16.02.S
ASR1K-CORE2	Cisco ASR …	10.0.255.52	Classification & Enf…	IP to SGT, Subnet t…	Speaker, Listener V4	SGT over Ethernet, …	SG Firewall PBR	03.16.02.S
LA-3650	Cisco Catal…	10.2.1.2	TrustSec Incapable					03.03.04SE
LA-RTR4331-IWAN	Cisco 4331…	10.2.255.1	TrustSec Incapable					15.5(3)S2
TEST-SW3650	Cisco Catal…	10.8.1.2	TrustSec Incapable					03.03.04SE
AMS-ASR1K-MPLS	Cisco ASR …	10.11.1.1	Classification & Enf…	IP to SGT, Subnet t…	Speaker, Listener V4	SGT over Ethernet, …	SG Firewall	03.16.02.S
AMS-WLC5508	Cisco 5508…	10.11.200.1	Classification	Dynamic	Speaker V2			8.1.131.0

Configuration Management

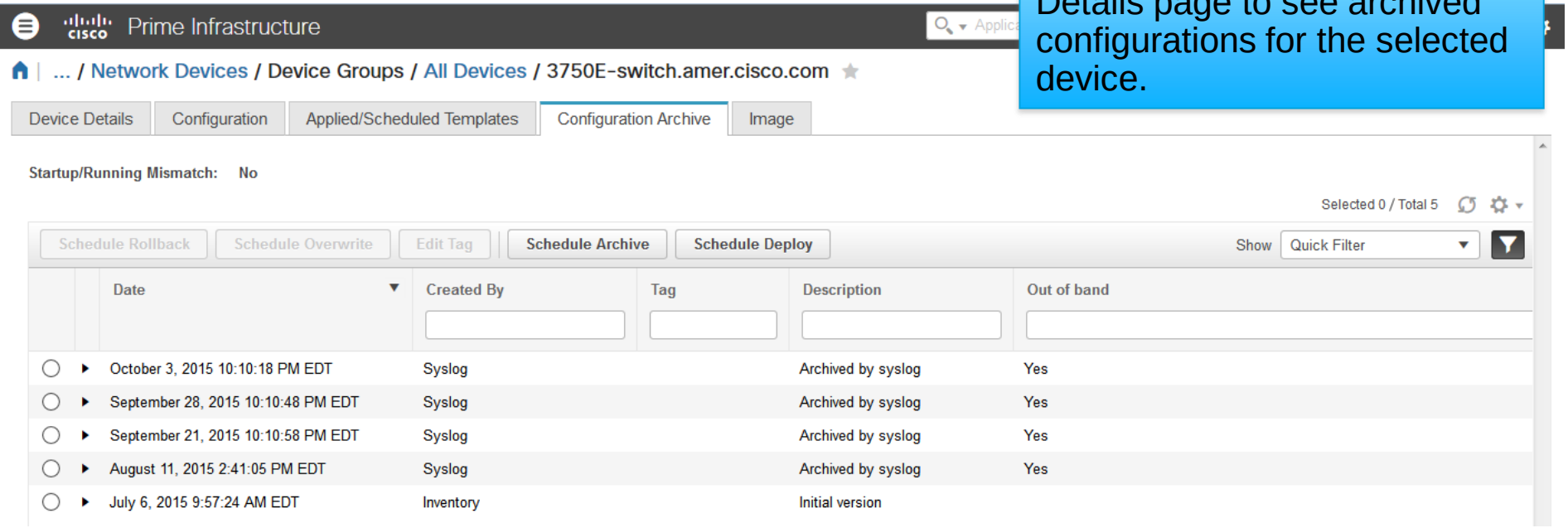
- PI offers configuration archive services
  - Multiple revisions
  - Compare between revisions and devices
  - Spot out of sync running and startup
- Wizard-based configuration forms to help enable and customize certain features
- Flexible templates to design your own configuration tasks
- Separation between network architect and engineer roles

Preparing The Configuration Archive



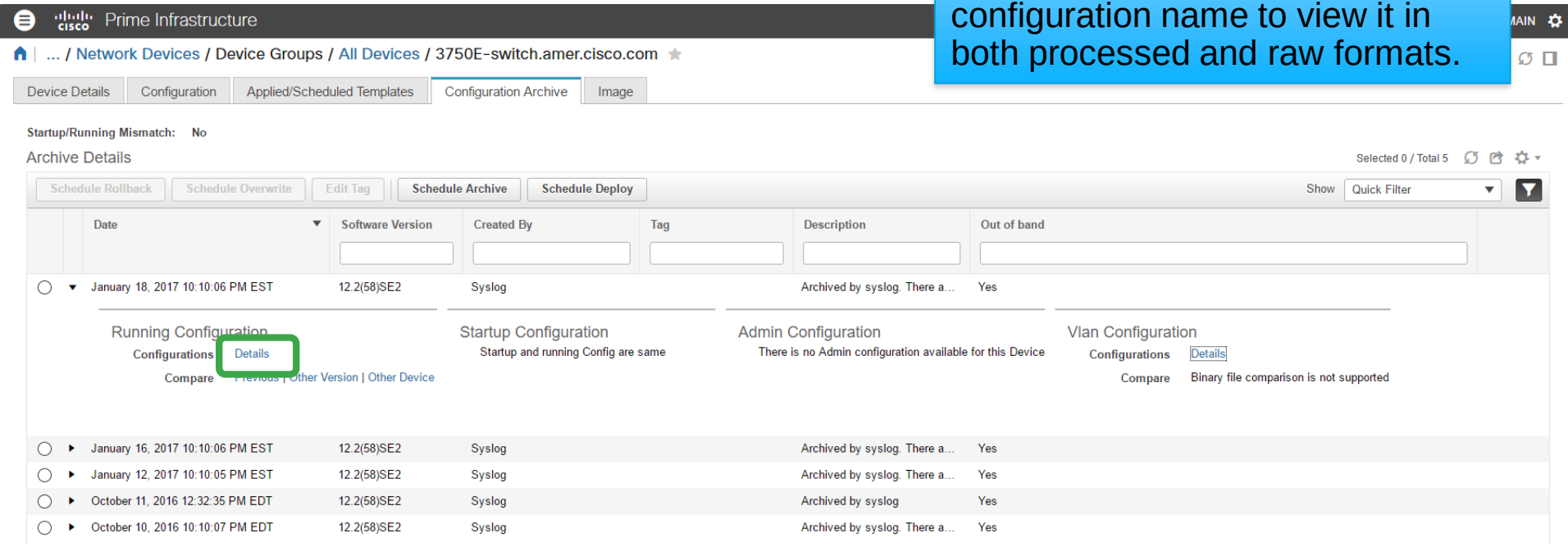
Viewing The Configuration Archive

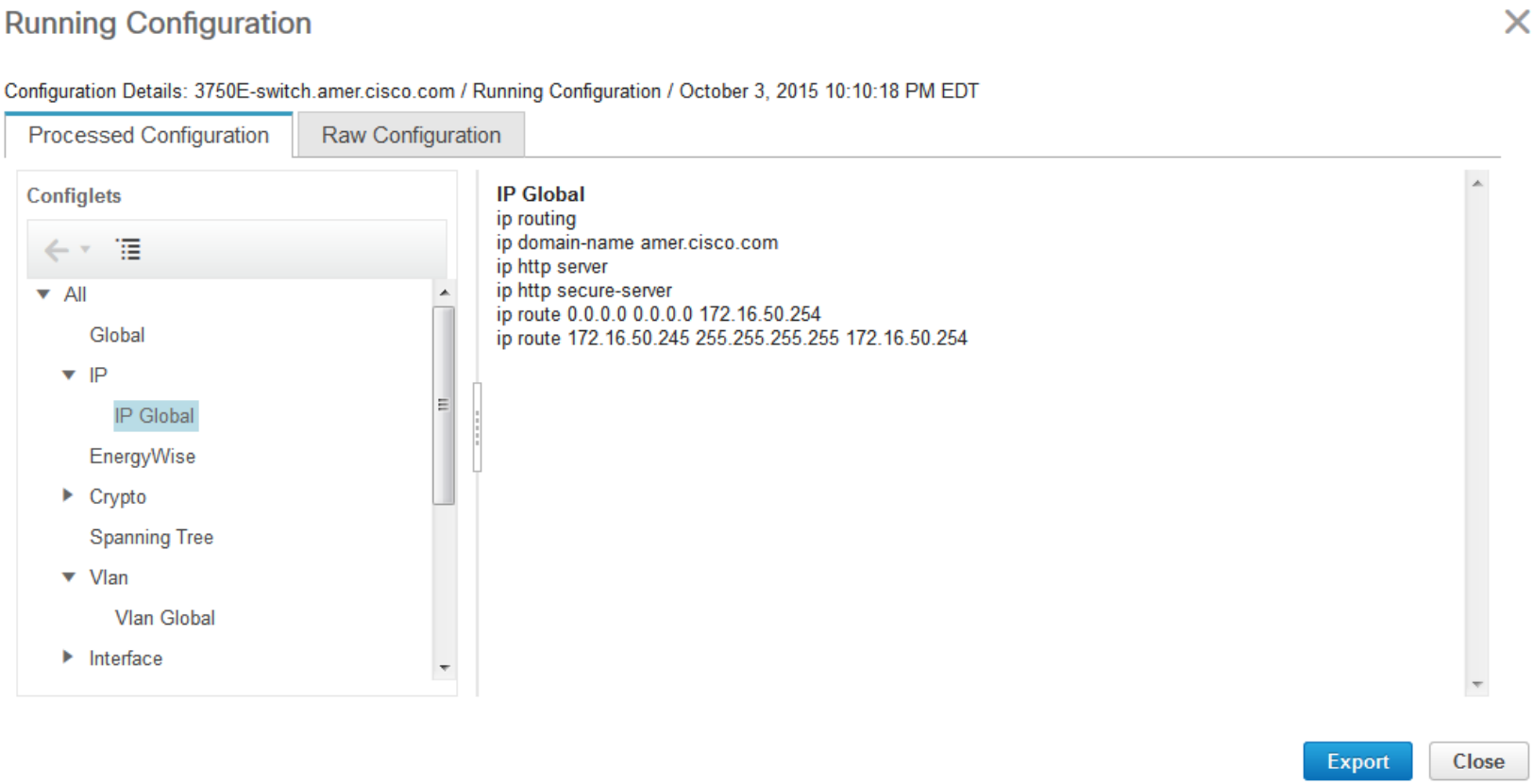
Click the Configuration Archive tab in Device Group>Device Details page to see archived configurations for the selected device.



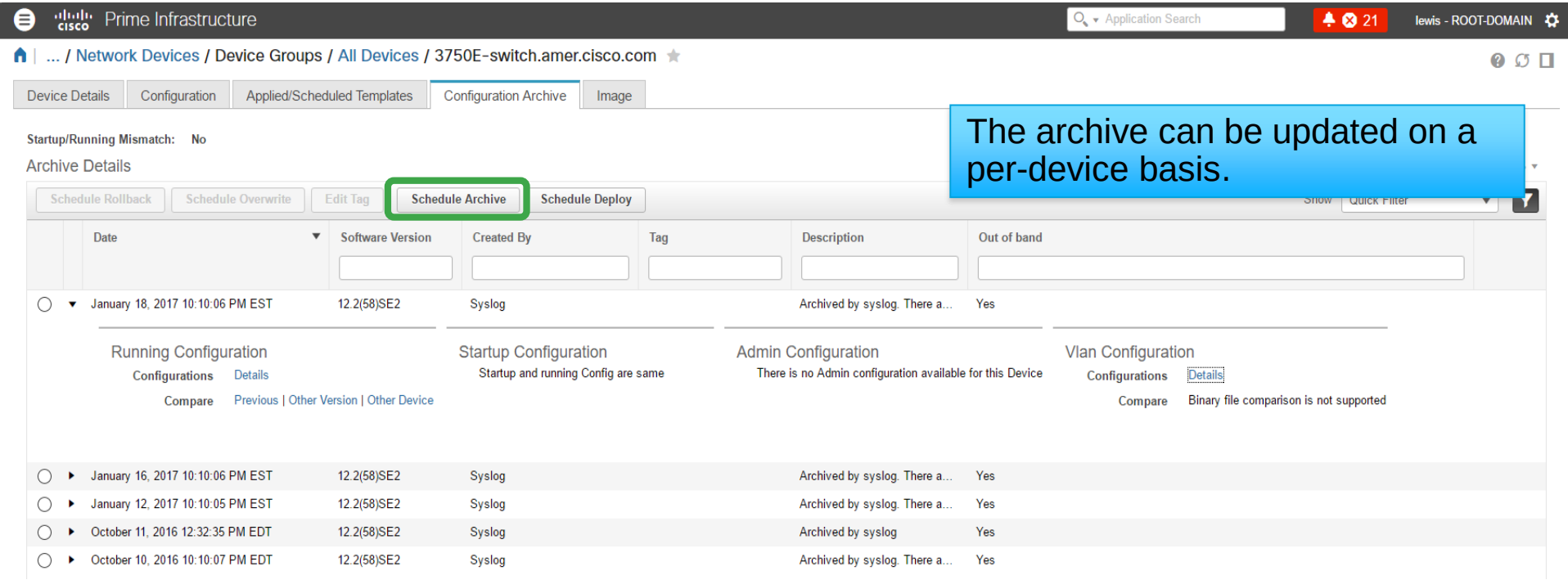
Configuration List

Each of the archived configurations are listed individually. Click on the configuration name to view it in both processed and raw formats.



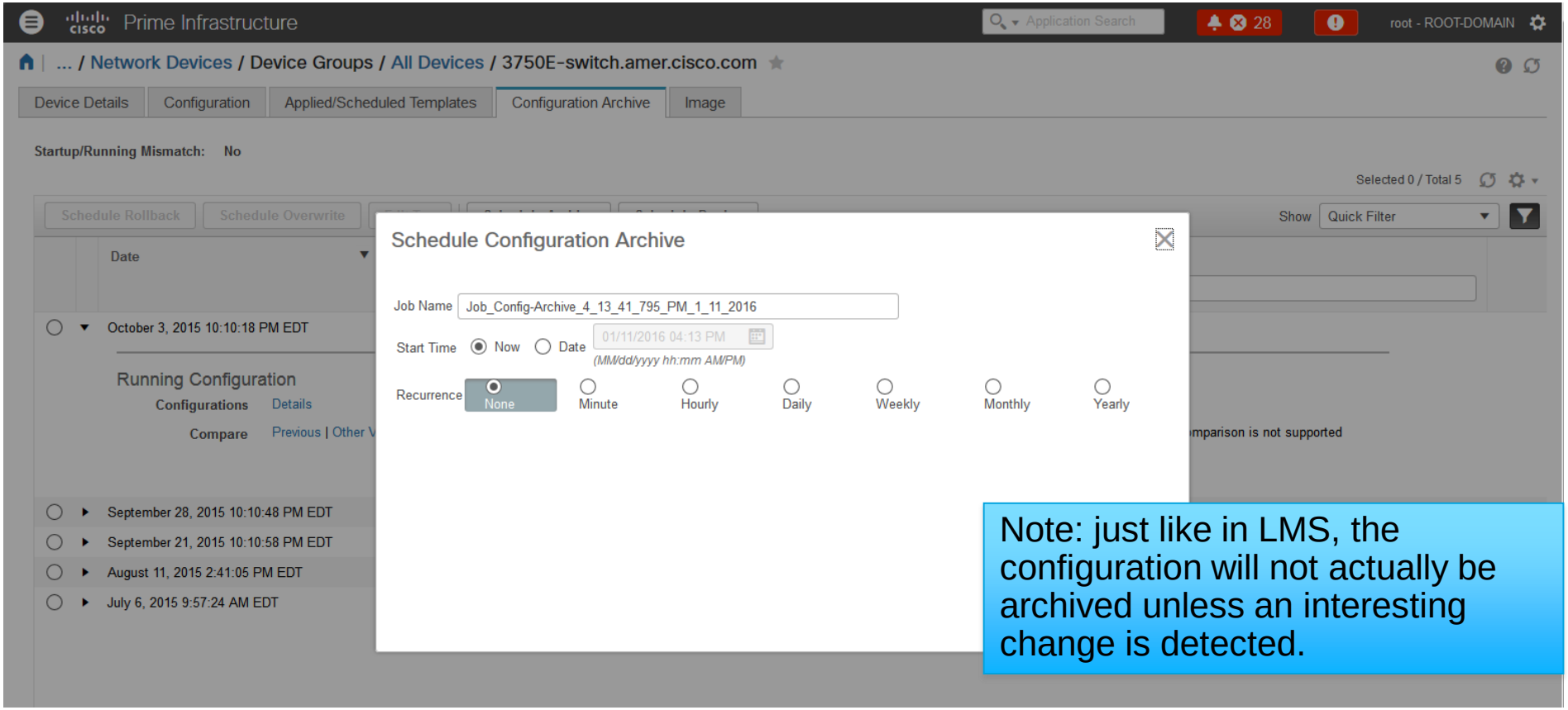


Scheduling Configuration Archive



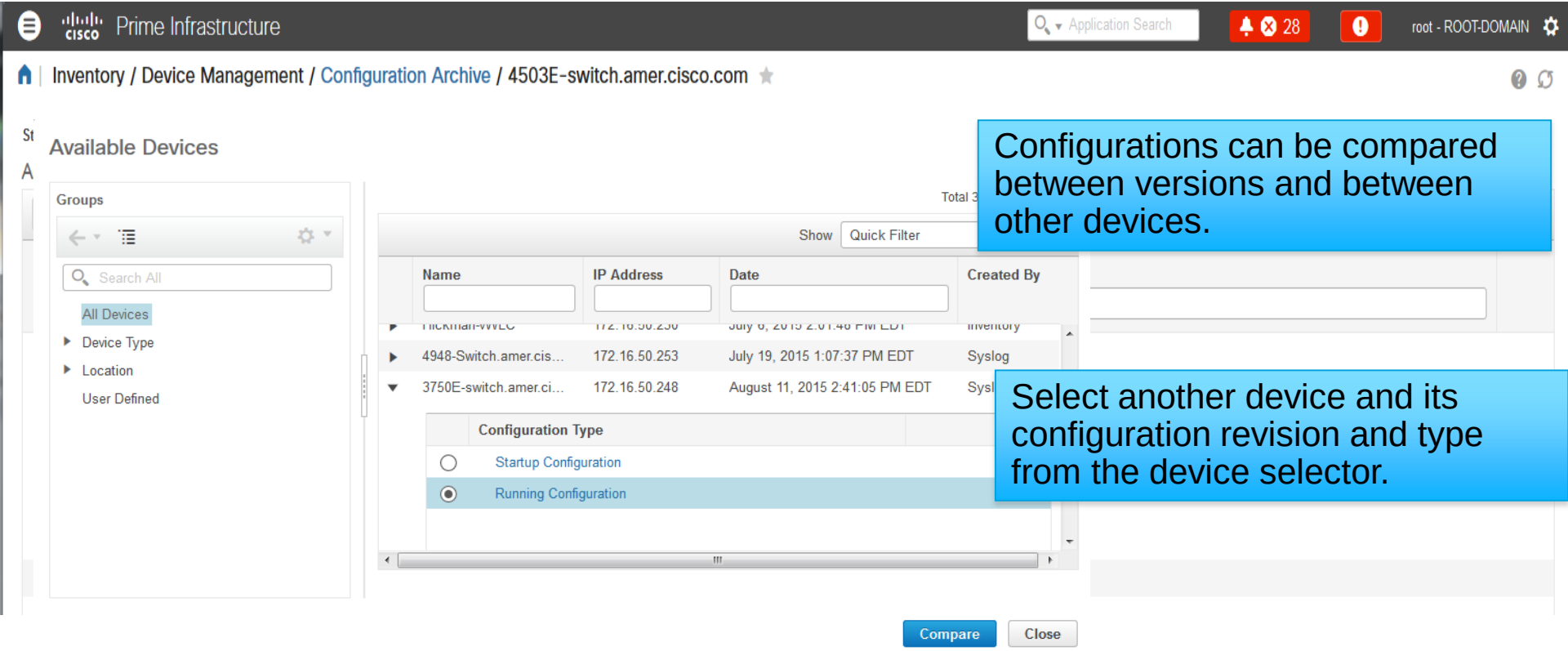
The archive can be updated on a per-device basis.

Scheduling Configuration Archive (cont.)



Note: just like in LMS, the configuration will not actually be archived unless an interesting change is detected.

Comparing Configs

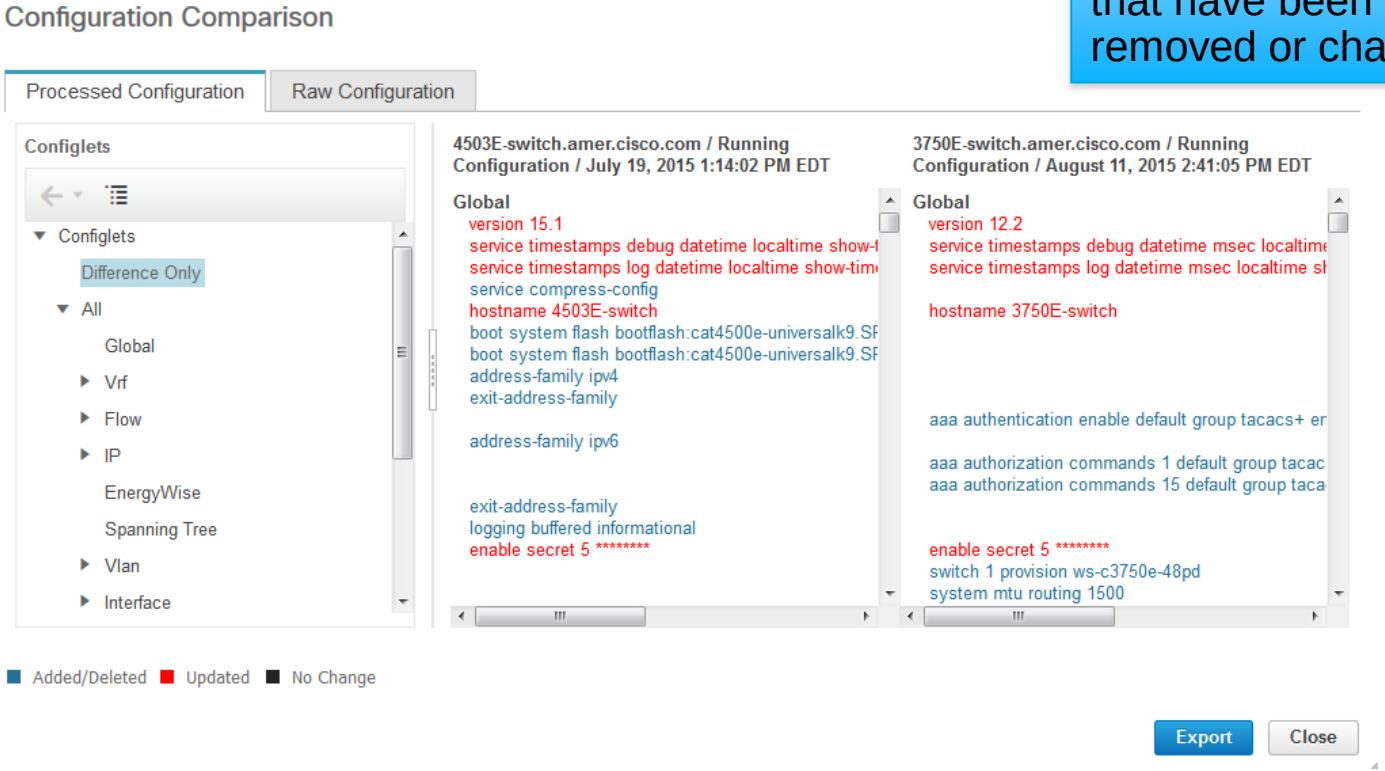


Configurations can be compared between versions and between other devices.

Select another device and its configuration revision and type from the device selector.

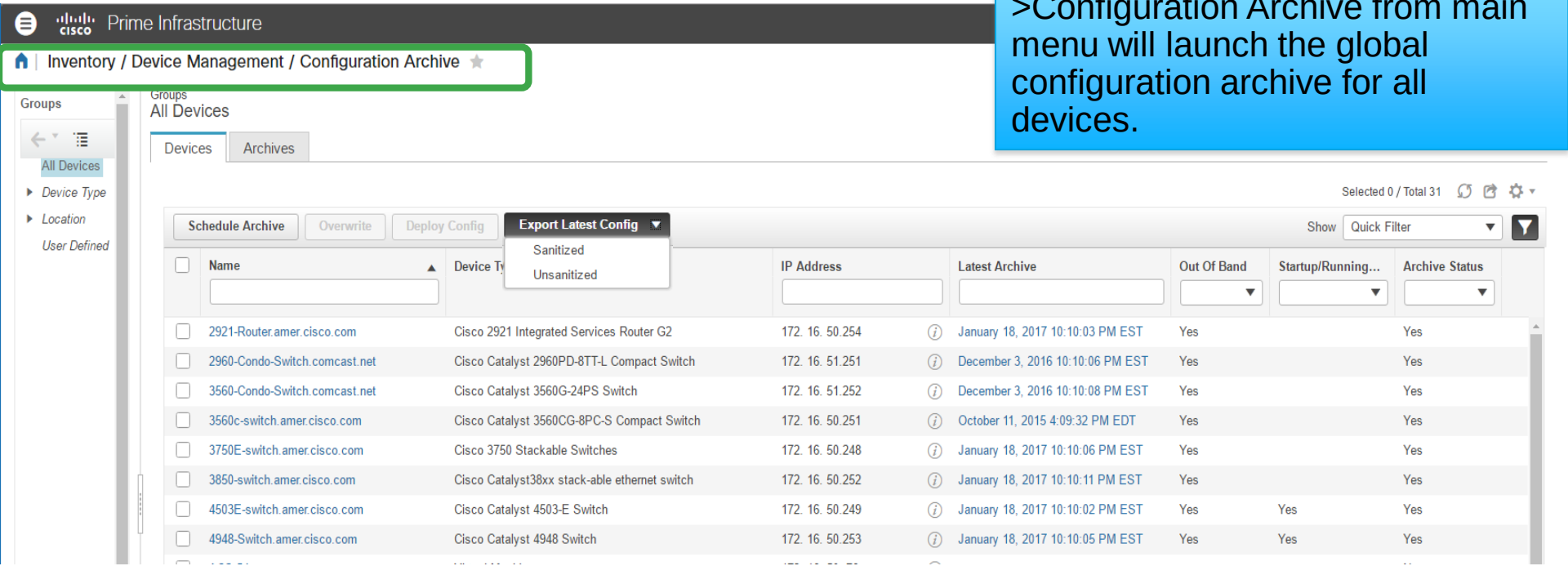
Configuration Diffs

Configuration diffs are shown side-by-side highlighting those lines that have been either added, removed or changed.



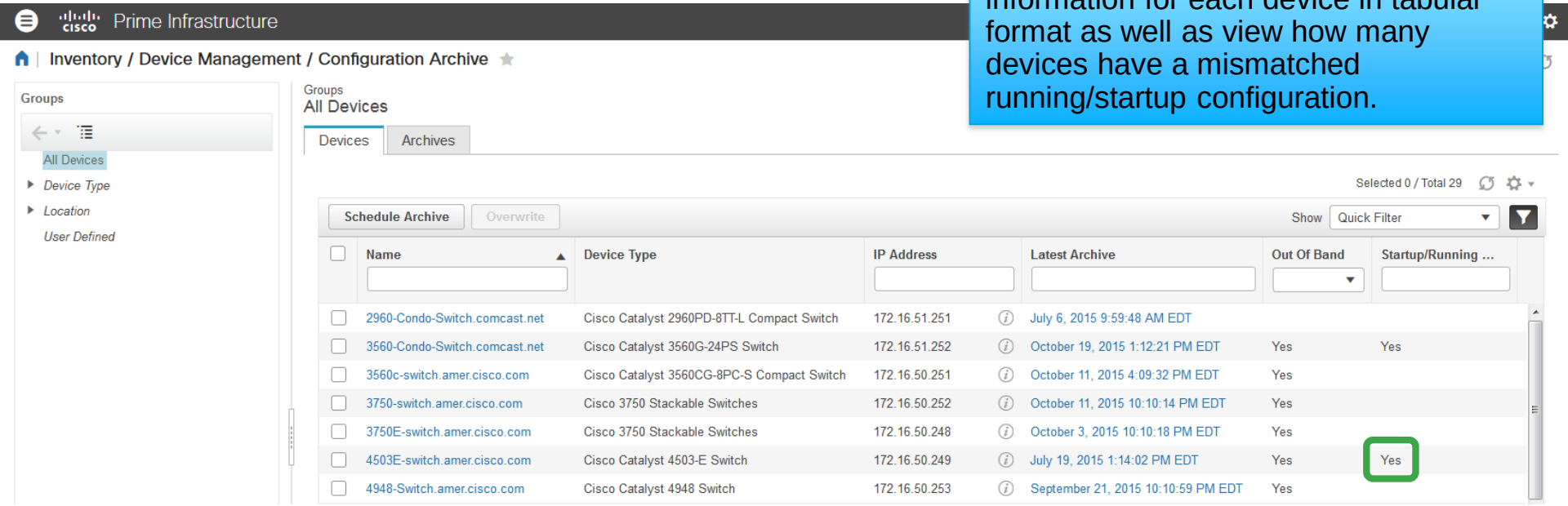
Viewing The Full Archive

Inventory > Device Management >Configuration Archive from main menu will launch the global configuration archive for all devices.



Viewing The Full Archive / Out-of-Sync

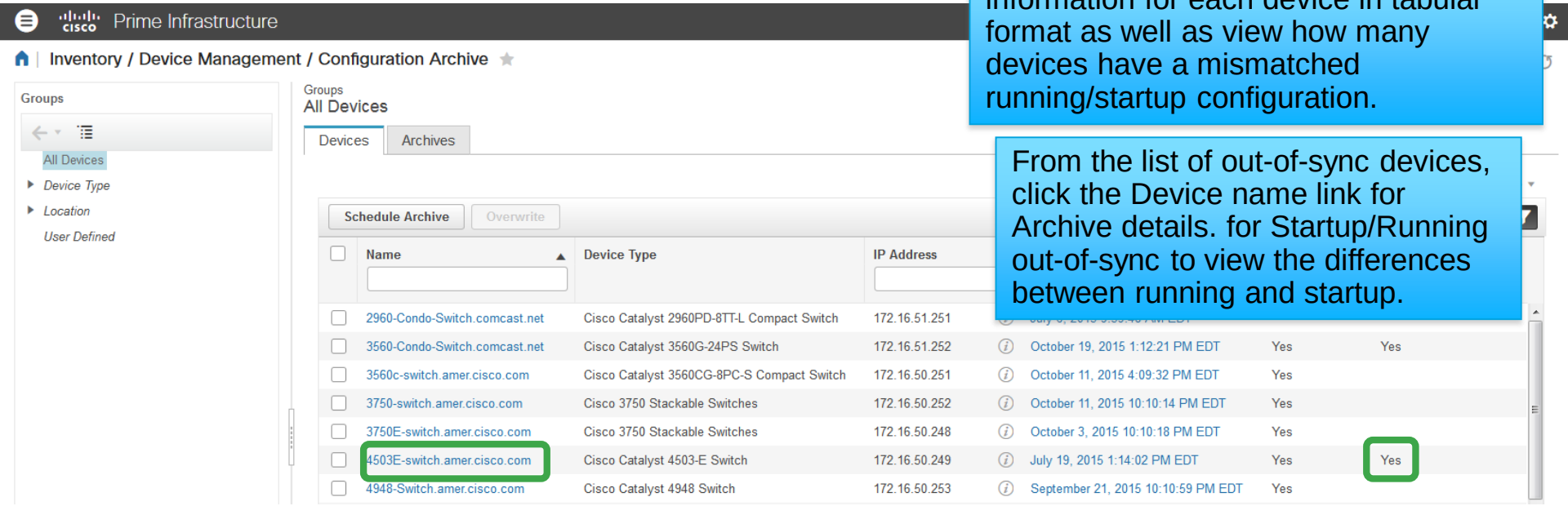
From here, one can view the archive information for each device in tabular format as well as view how many devices have a mismatched running/startup configuration.



Viewing The Full Archive / Out-of-Sync

From here, one can view the archive information for each device in tabular format as well as view how many devices have a mismatched running/startup configuration.

From the list of out-of-sync devices, click the Device name link for Archive details. for Startup/Running out-of-sync to view the differences between running and startup.



Viewing The Full Archive / Out-of-Sync

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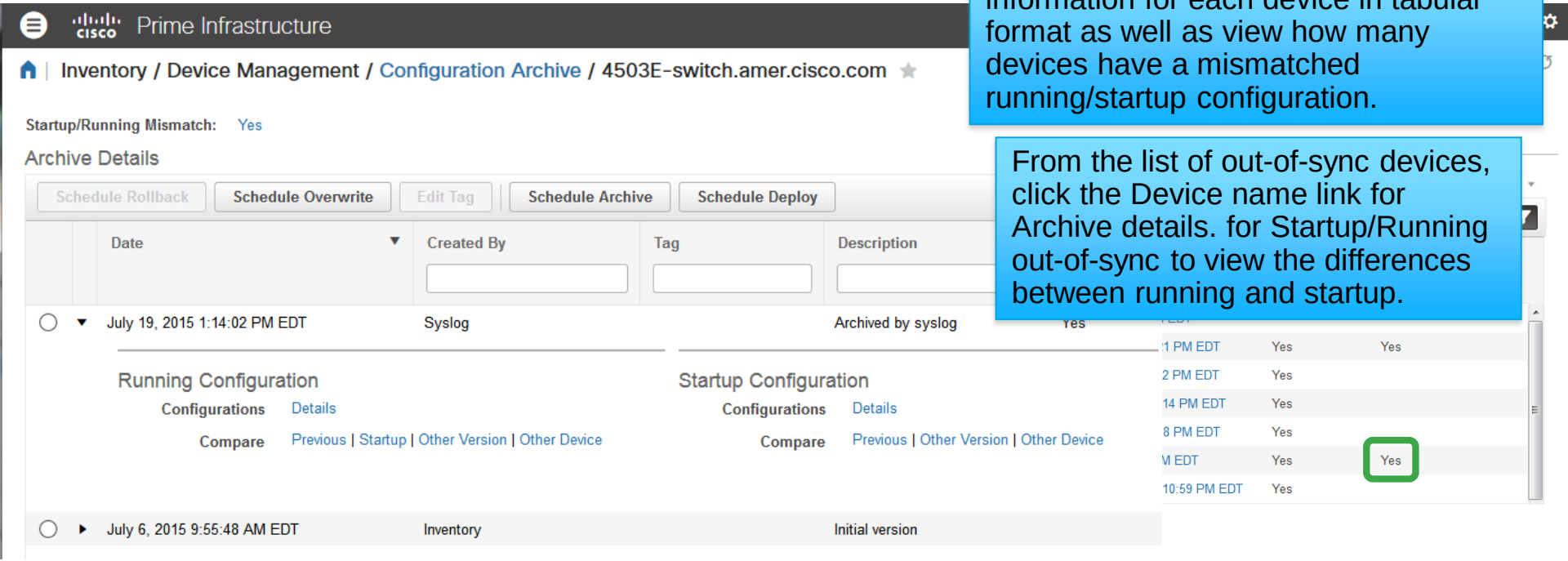
From the list of out-of-sync devices, click the Device name link for Archive details. for Startup/Running out-of-sync to view the differences between running and startup.

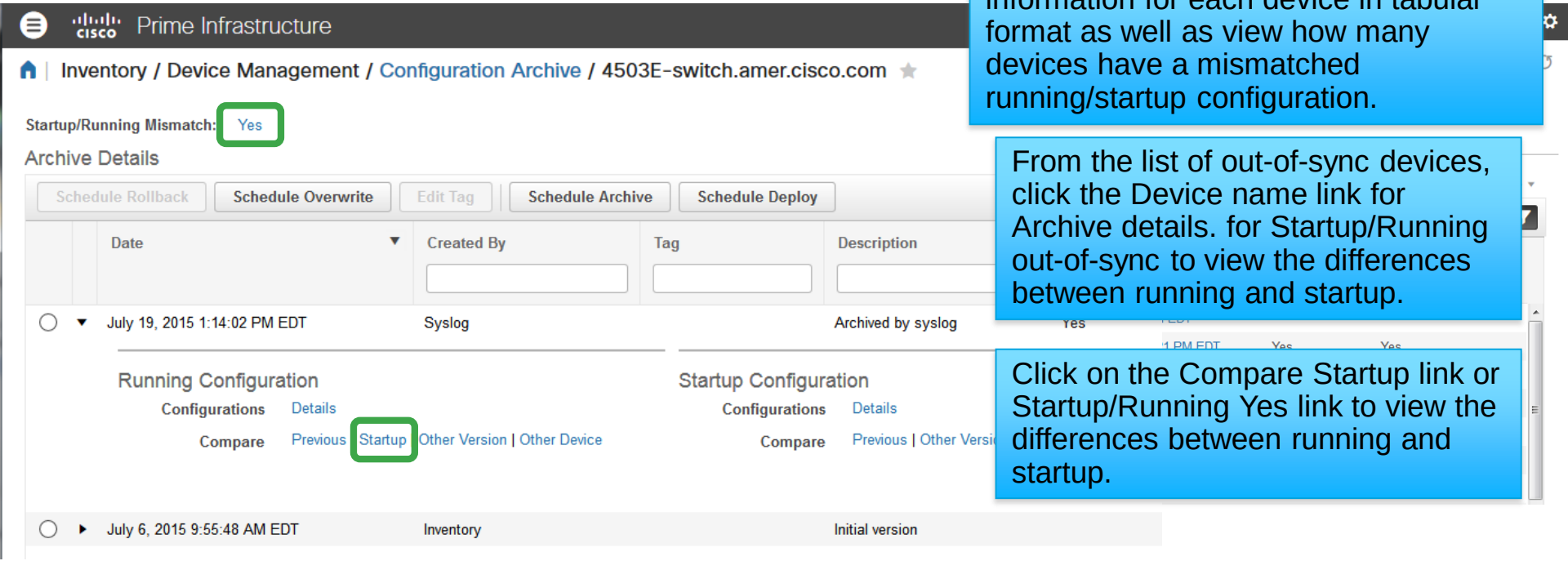


Viewing The Full Archive / Out-of-Sync

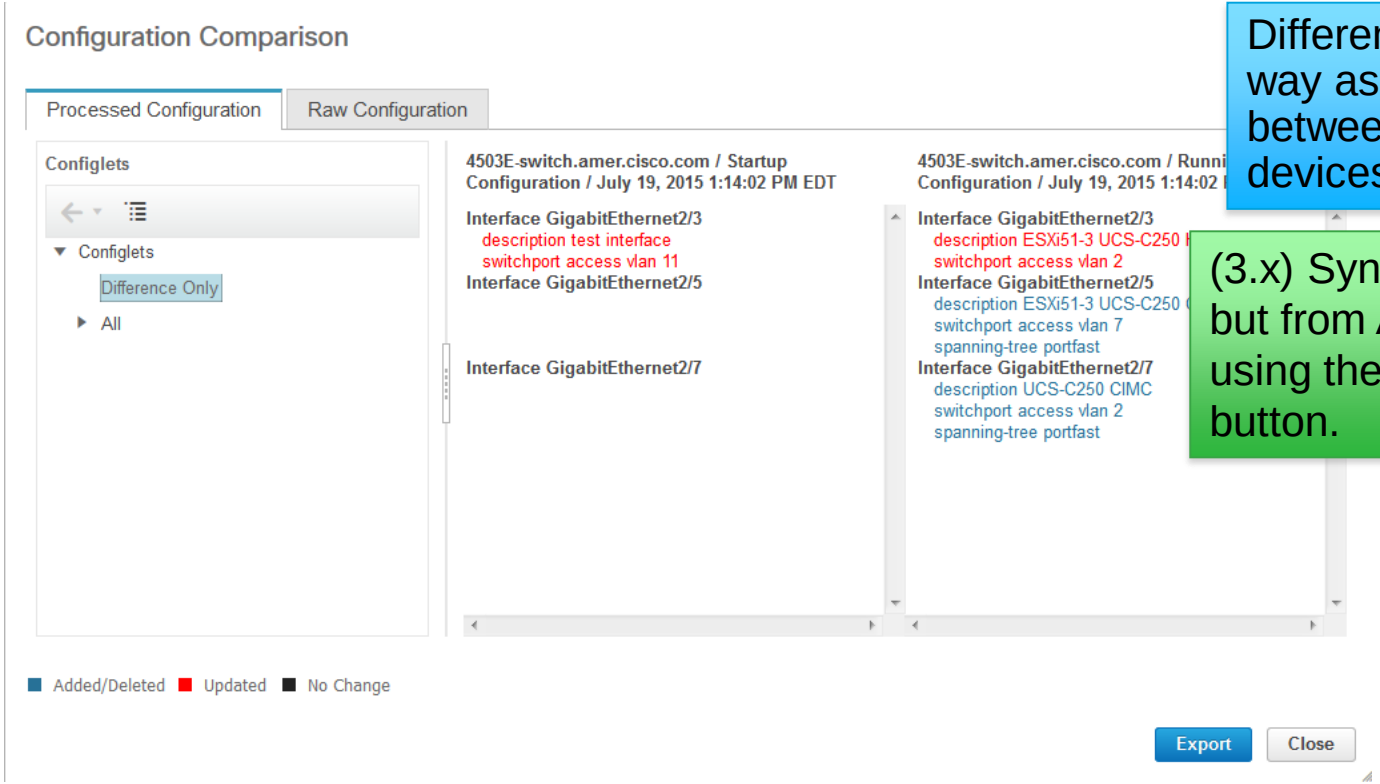
From here, one can view the archive information for each device in tabular format as well as view how many devices have a mismatched running/startup configuration.

From the list of out-of-sync devices, click the Device name link for Archive details. for Startup/Running out-of-sync to view the differences between running and startup.

Click on the Compare Startup link or Startup/Running Yes link to view the differences between running and startup.



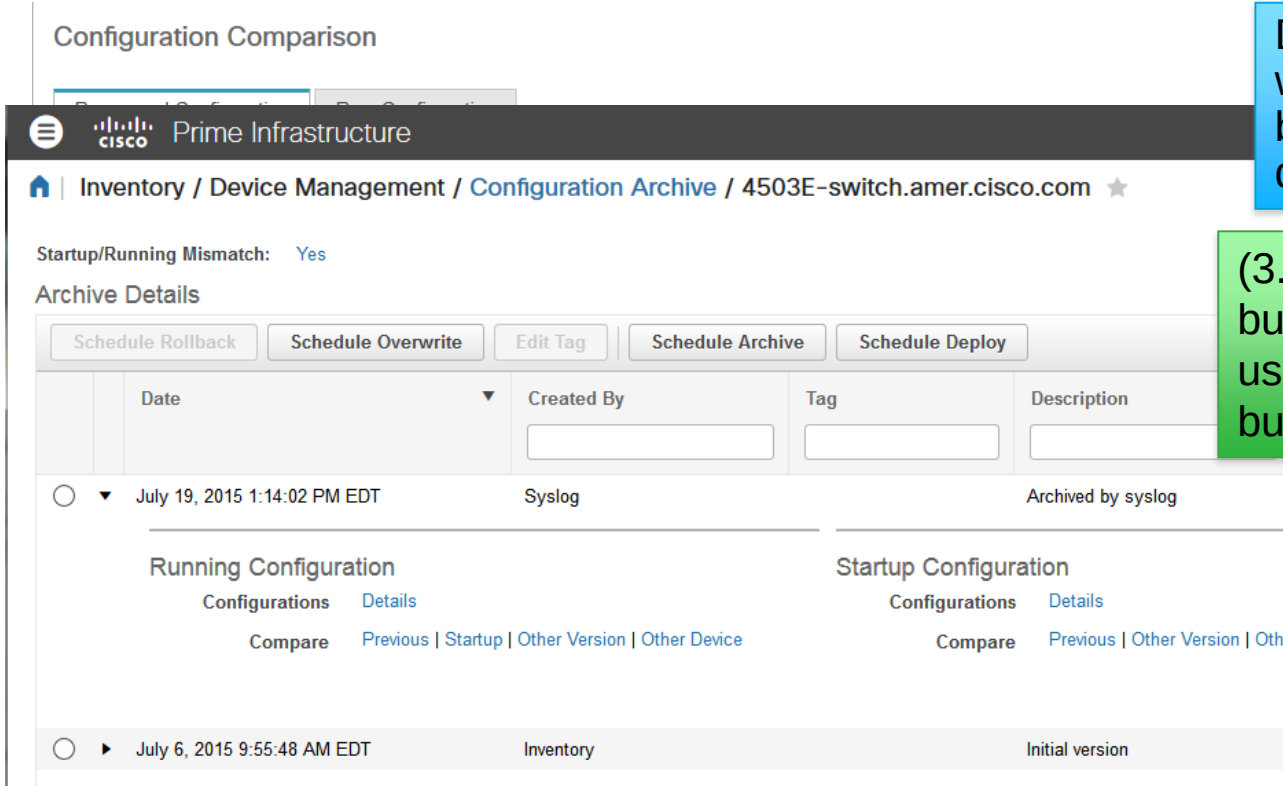
Startup/Running Out Of Sync (cont.)



Differences show up the same way as when comparing between versions or across devices.

(3.x) Synchronizing can be done, but from Archive Details screen using the Schedule Overwrite button.

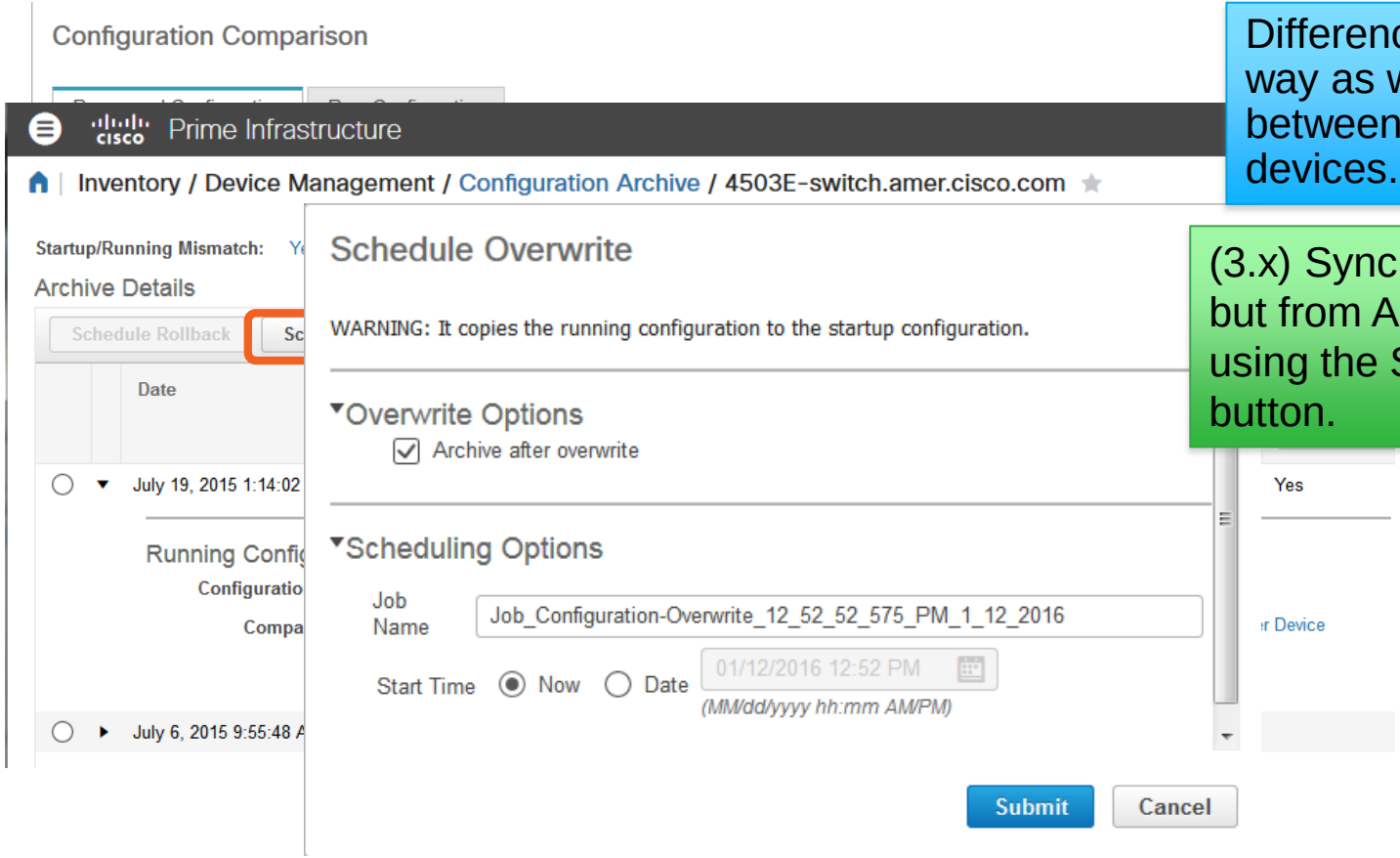
Startup/Running Out Of Sync (cont.)



Differences show up the same way as when comparing between versions or across devices.

(3.x) Synchronizing can be done, but from Archive Details screen using the Schedule Overwrite button.

Startup/Running Out Of Sync (cont.)



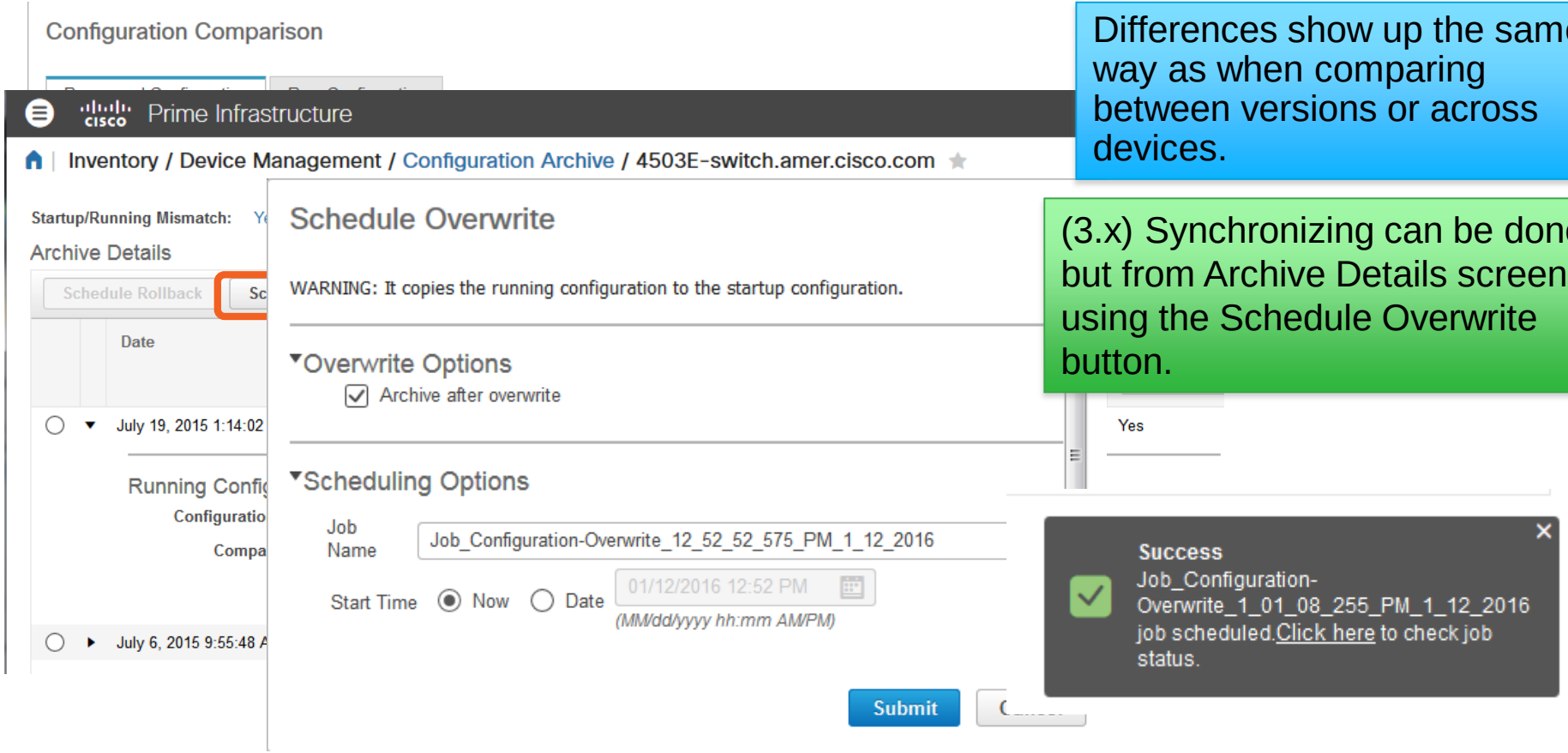
Differences show up the same way as when comparing between versions or across devices.

(3.x) Synchronizing can be done, but from Archive Details screen using the Schedule Overwrite button.

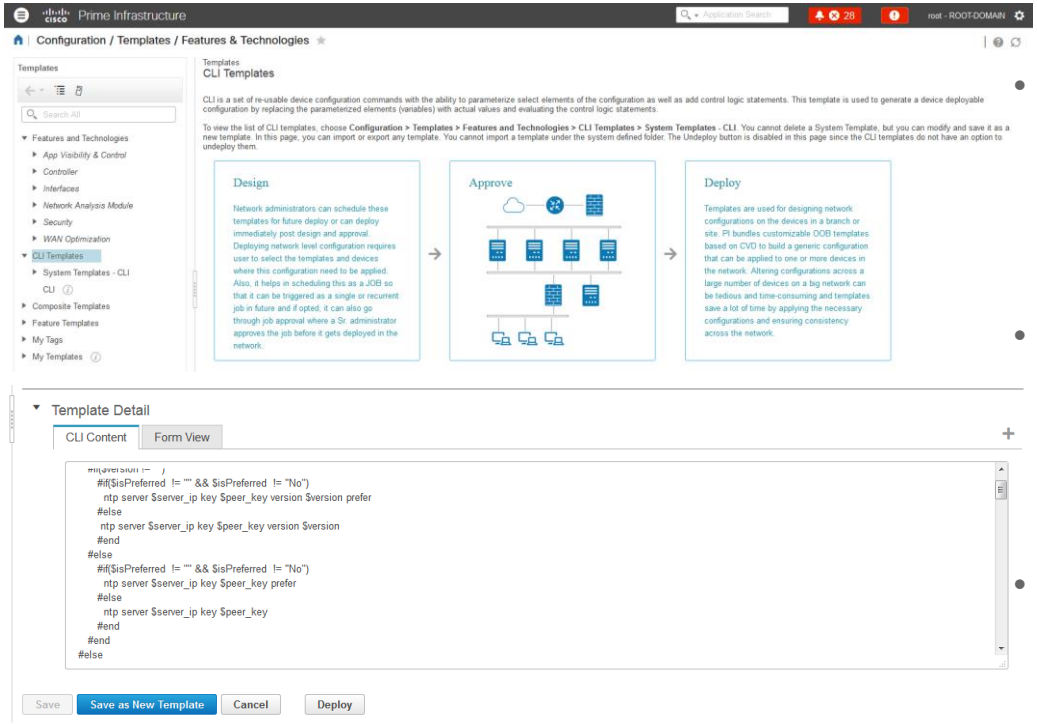
Startup/Running Out Of Sync (cont.)

Differences show up the same way as when comparing between versions or across devices.

(3.x) Synchronizing can be done, but from Archive Details screen using the Schedule Overwrite button.

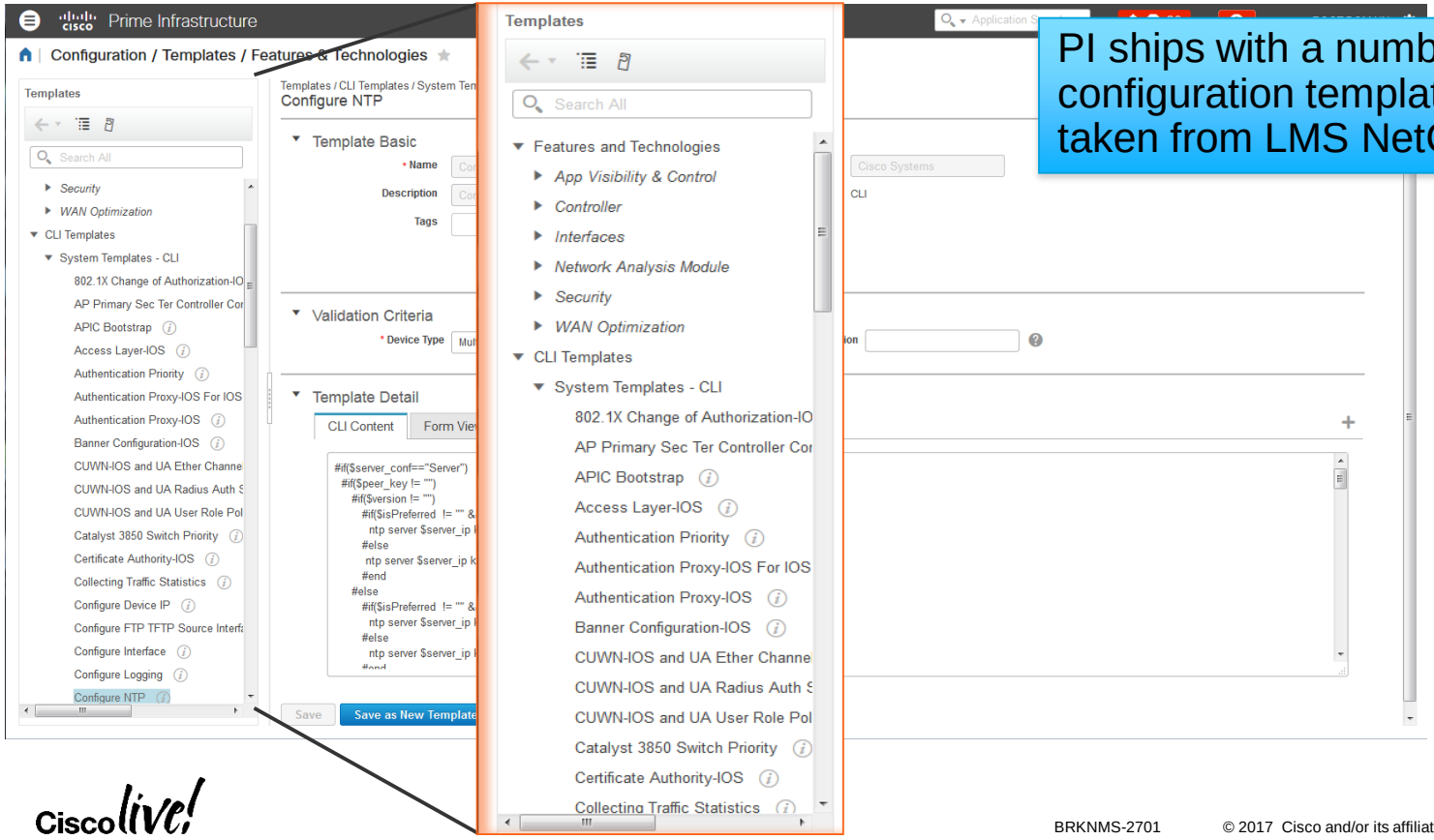


The PI Approach To Configuration



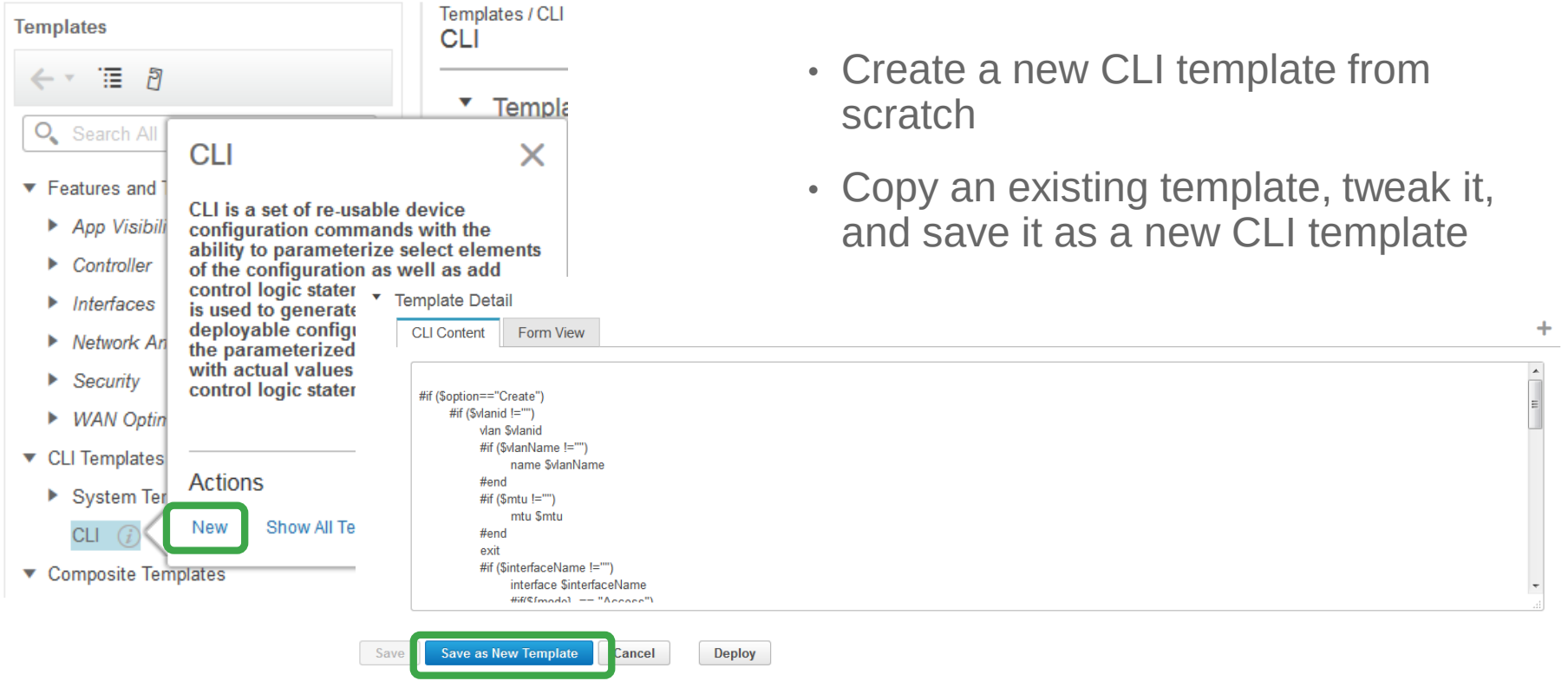
- Configuration tasks are distinctly split into two phases
  - Design
  - Deploy
- These phases mirror certain organizational roles
  - Architect
  - Engineer
- Once a design is finalized, it can be made available for deployment across the network

CLI Templates: The New NetConfig



PI ships with a number of built-in configuration templates (many taken from LMS NetConfig).

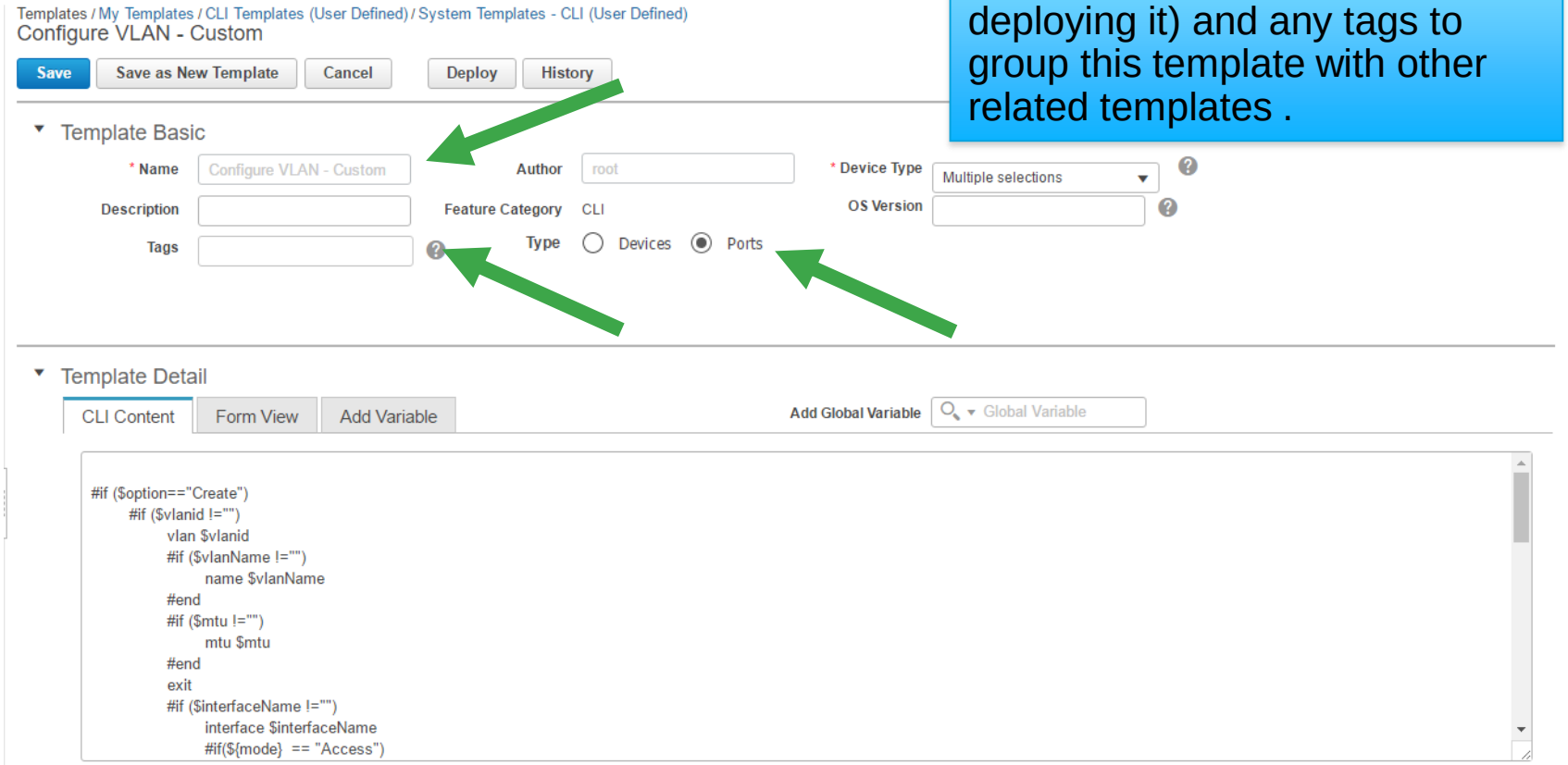
Designing A Custom Template



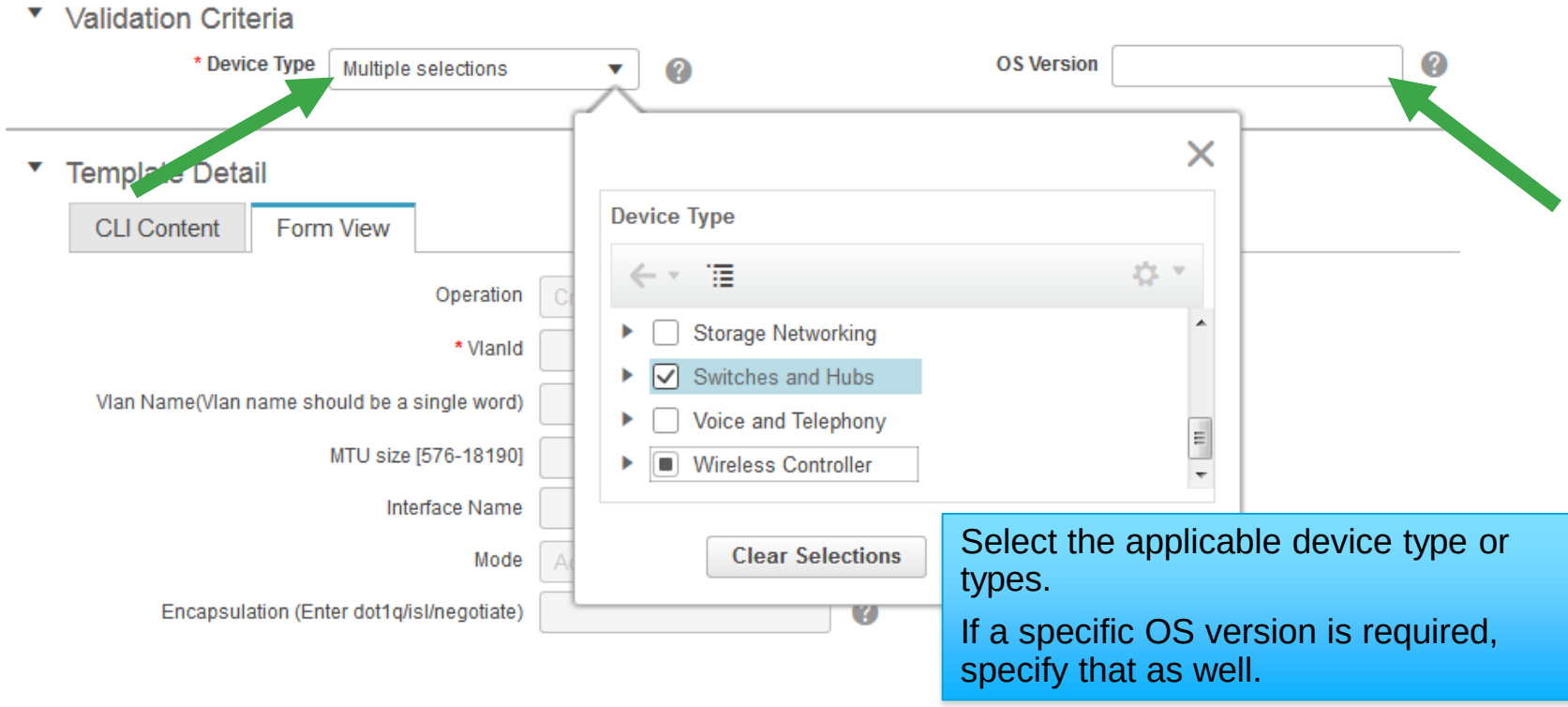
- Create a new CLI template from scratch
- Copy an existing template, tweak it, and save it as a new CLI template

Defining The Template

Specify a template description (helpful for engineers when deploying it) and any tags to group this template with other related templates .



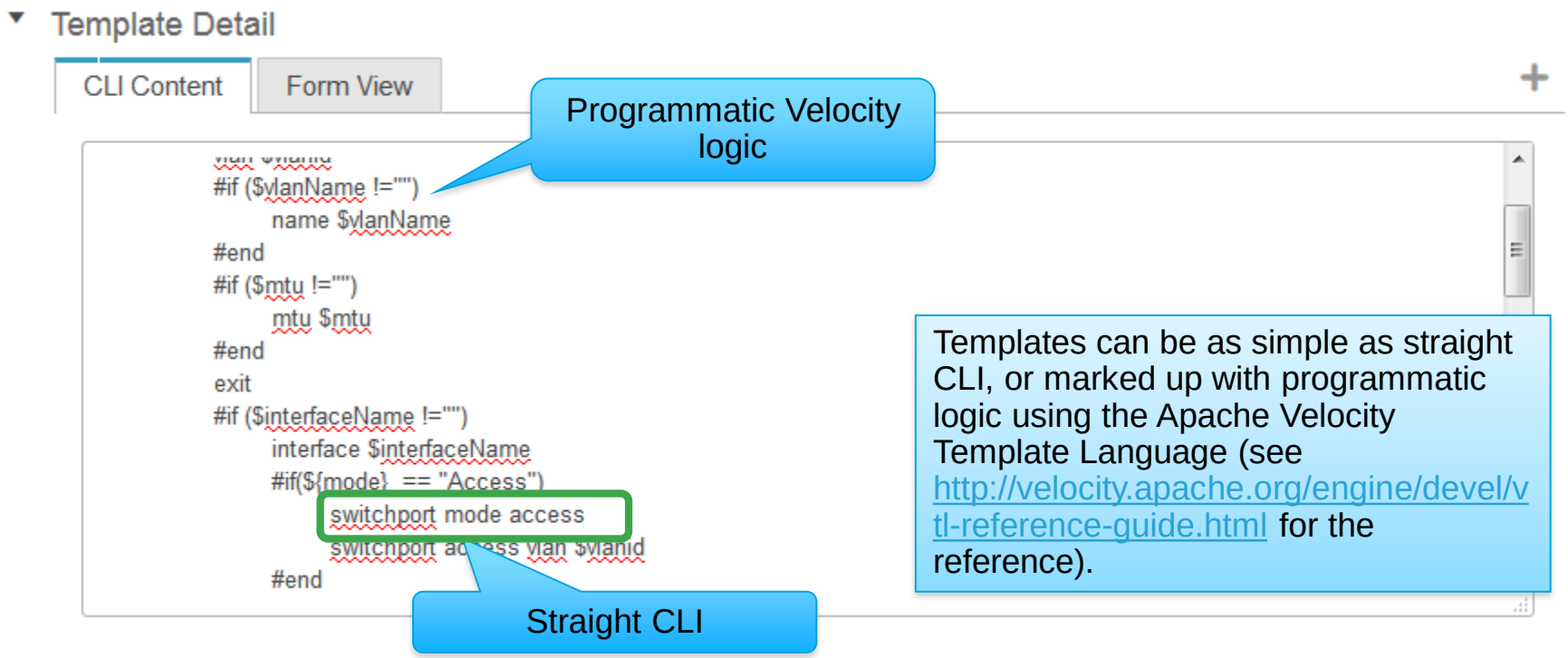
Defining The Template (cont.)



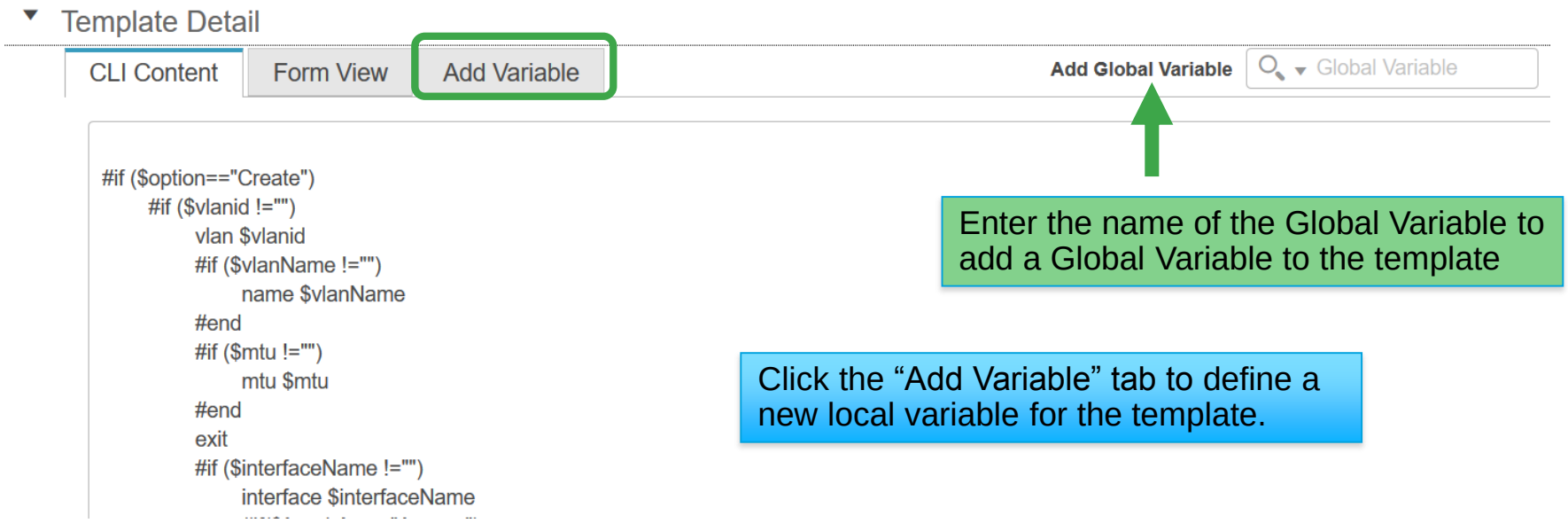
Select the applicable device type or types.

If a specific OS version is required, specify that as well.

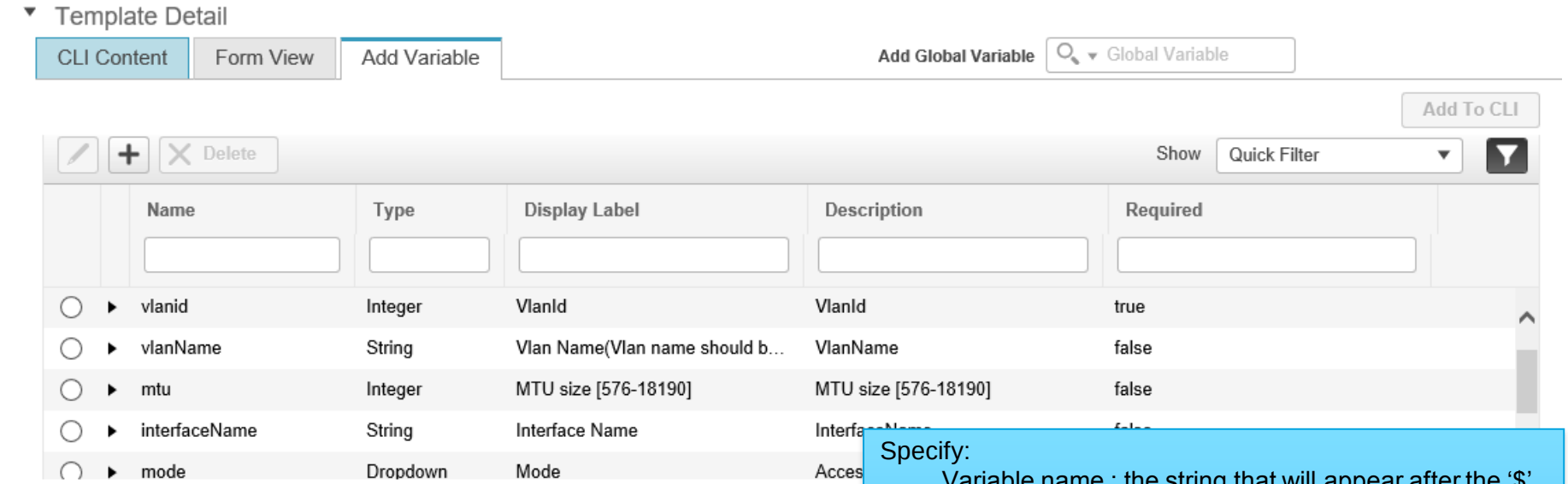
Scripting The Template Logic



Defining A New Template Variable



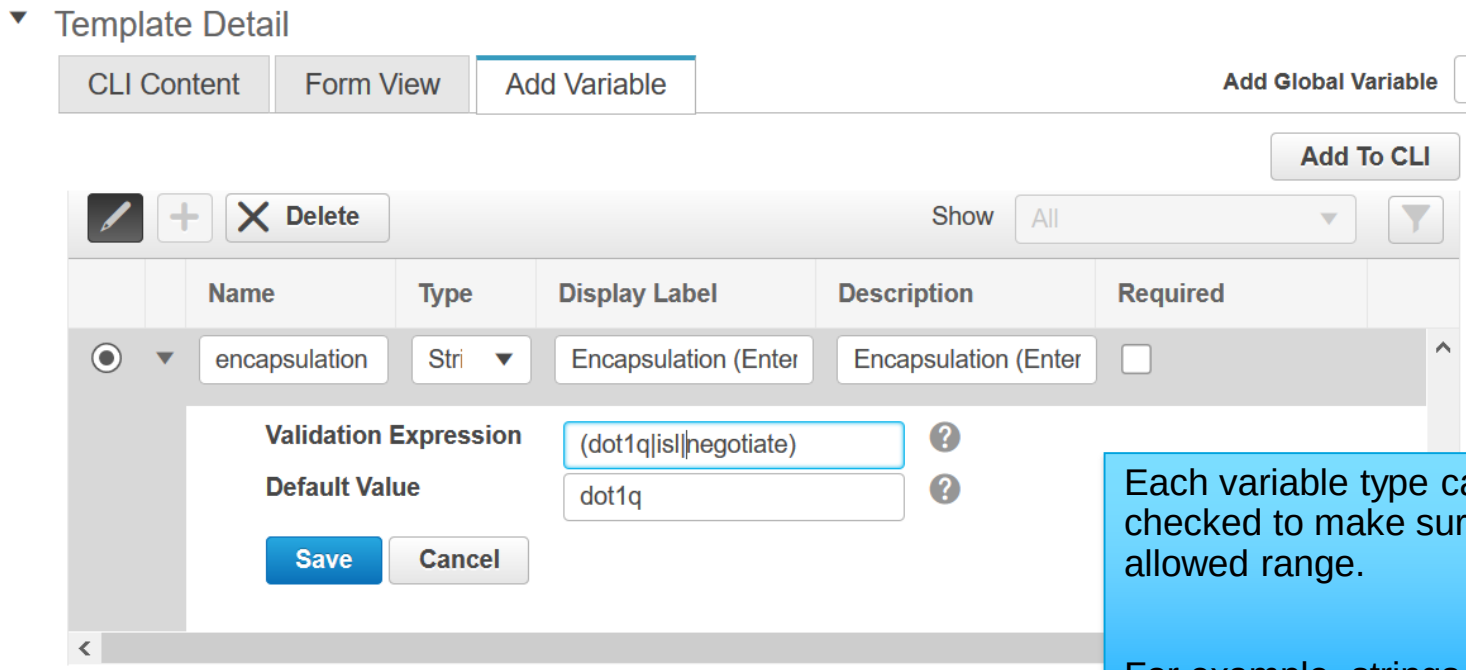
Defining A New Template Variable



Specify:

- Variable name : the string that will appear after the '$' in your template
- Type : type of form field
- Display Label : What to show in the GUI
- Description : Help text
- Required : Whether or not the field is required

Variable Validation

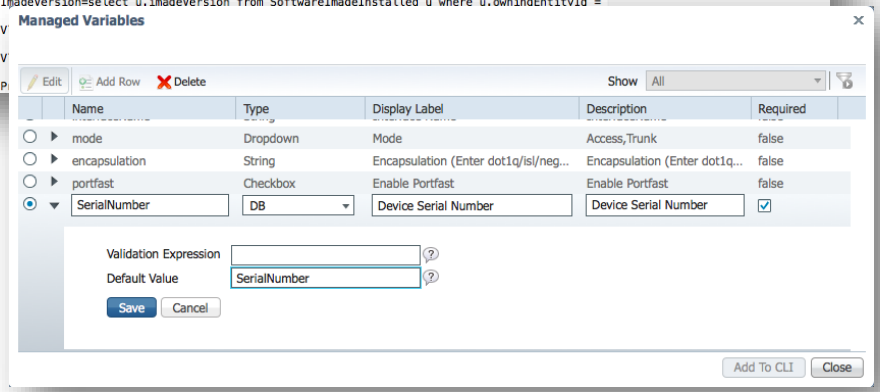


Each variable type can have its value checked to make sure it falls within an allowed range.

For example, strings can be checked against a regular expression.

Pro-Tip: Creating New Built-in Variables

```
IntfName=select u.name from EthernetProtocolEndpoint u where u.owningEntityId =
UpIntfName=select u.name from EthernetProtocolEndpointExtended u where u.adminStatus='1' and u.owningEntityId =
DownIntfName=select u.name from EthernetProtocolEndpointExtended u where u.adminStatus='2' and u.owningEntityId =
AllIntf=select u.name from EthernetProtocolEndpointExtended u where u.owningEntityId =
DeviceName=select u.name from NetworkResource u where 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 =
```

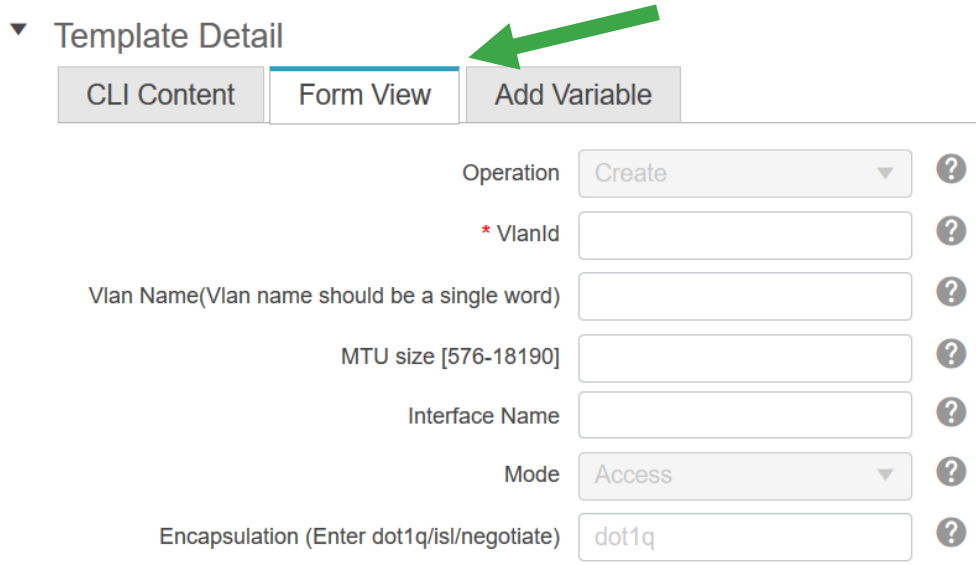


- Additional data can be extracted from the database and used in Velocity expressions
- Reference server file `/opt/CSCOlumos/conf/ifm/template/inventoryTagsInTemplate/CLITemplateDbVariablesQuery.properties` for existing keys or to define your own using SQL
- Define variables in the feature templates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

Pro-Tip: Interactive, Enable, and Multiline Commands

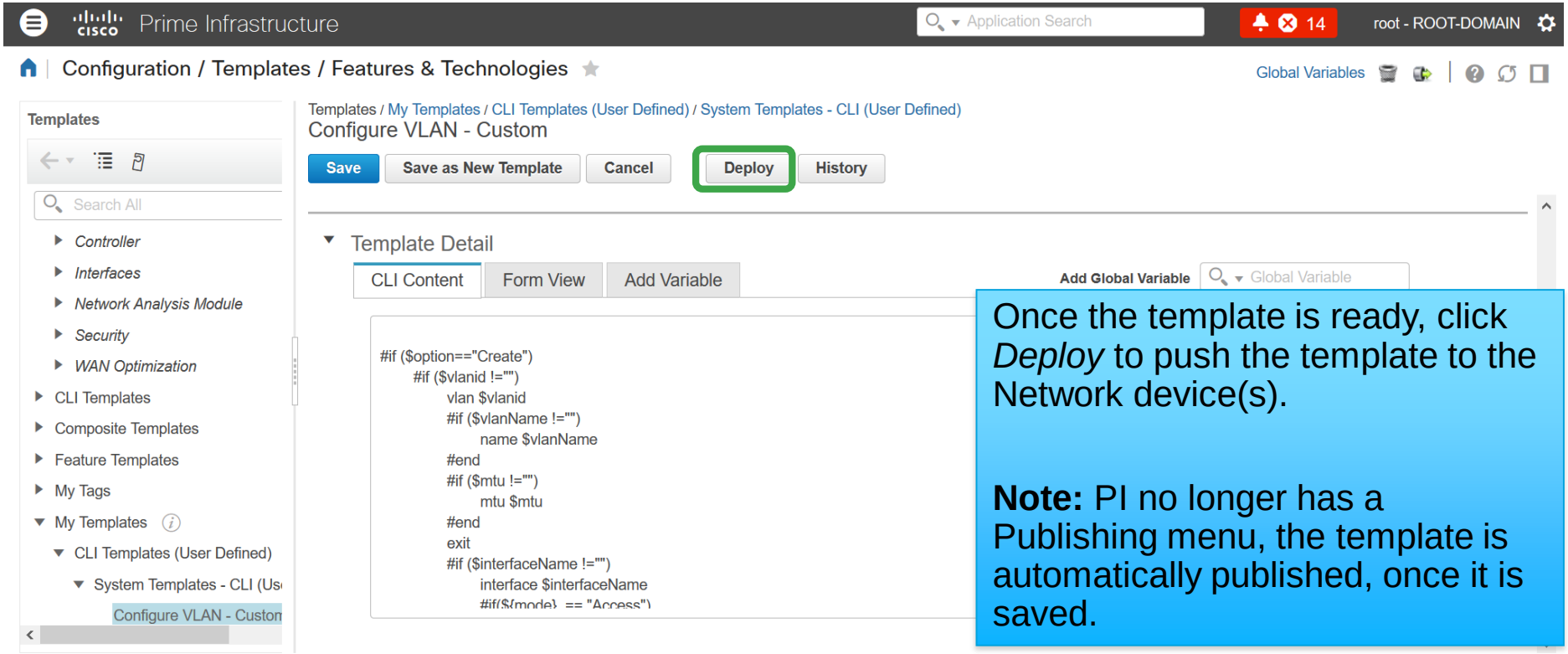
- Interactive commands can be done using the *#INTERACTIVE* command followed by *<IQ>* to denote a question and *<R>* to specify the reply
  - Use *#ENDS_INTERACTIVE* to denote the end of the interactive block
- Multi-line commands can be specified using the *<MLTCMD></MLTCMD>* tags
- Enable (i.e., EXEC)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

Previewing The Template Form



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

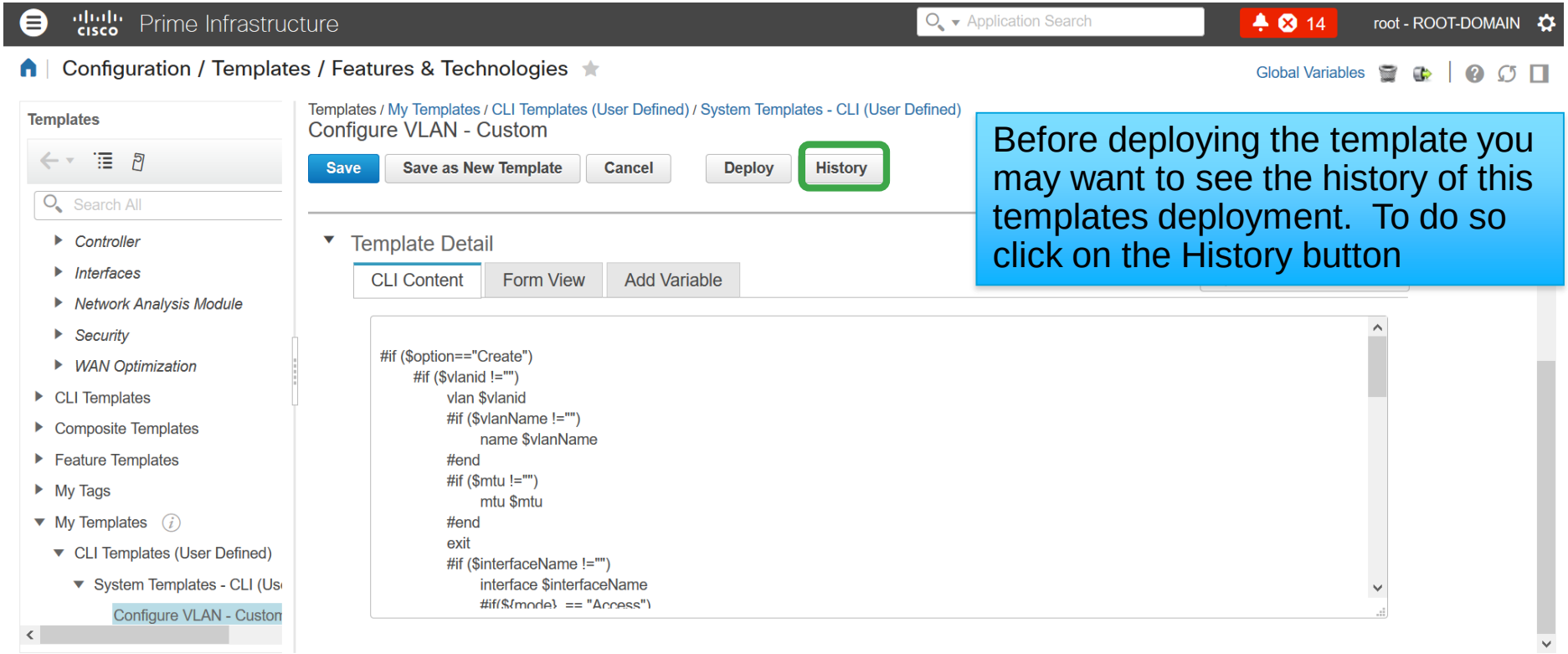
Deploying The Template



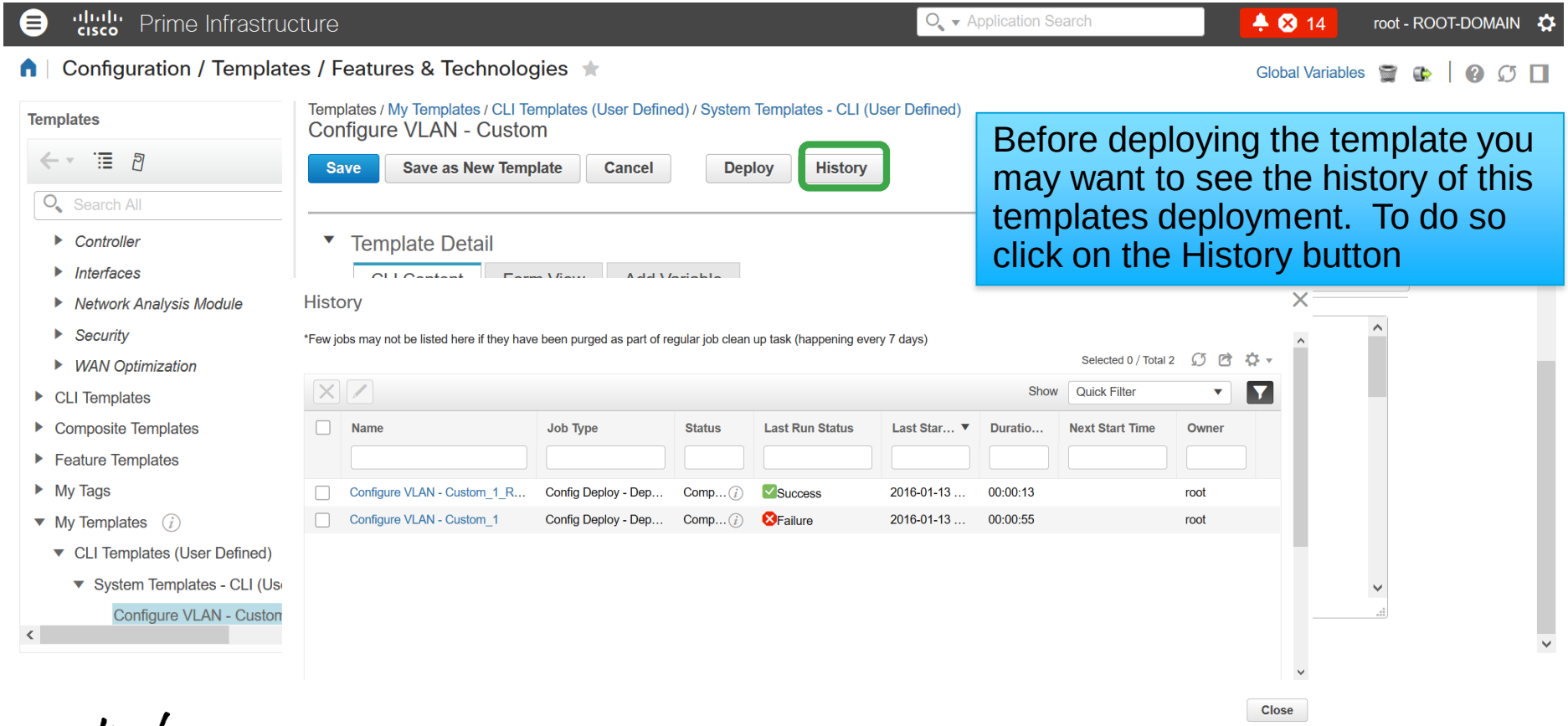
Once the template is ready, click *Deploy* to push the template to the Network device(s).

Note: PI no longer has a Publishing menu, the template is automatically published, once it is saved.

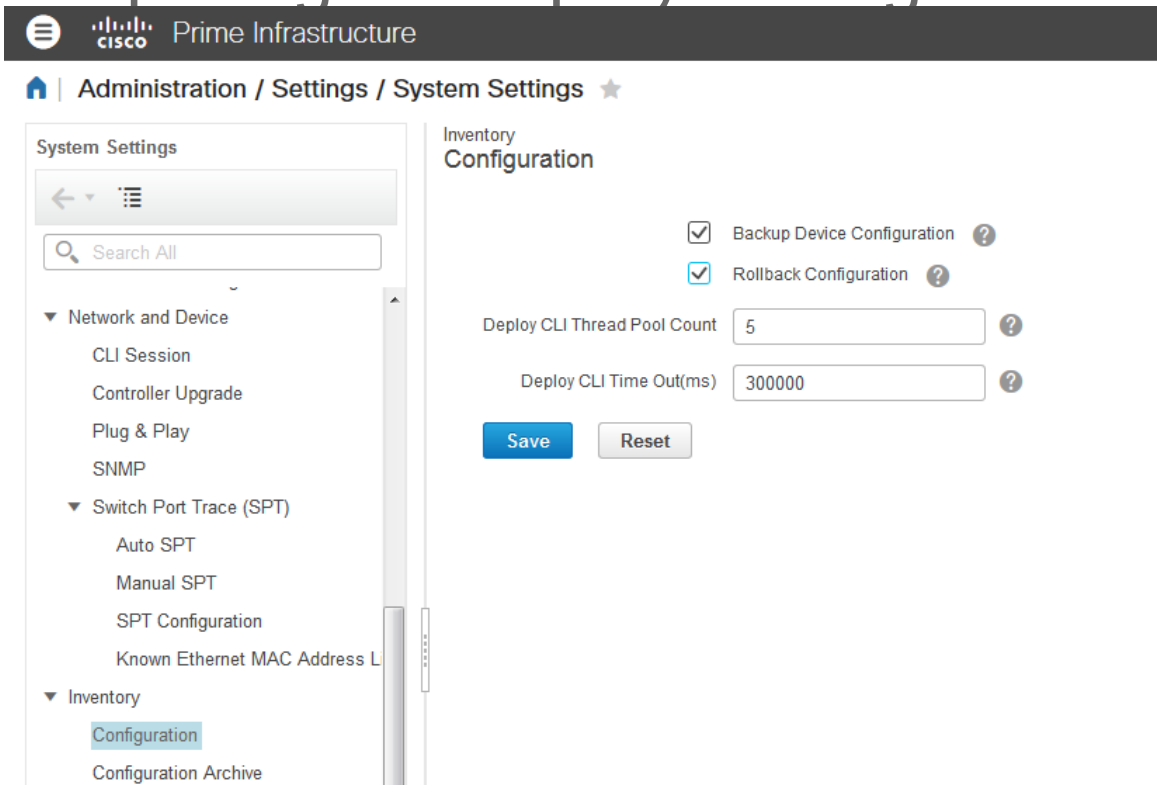
Deploying The Template



Deploying The Template



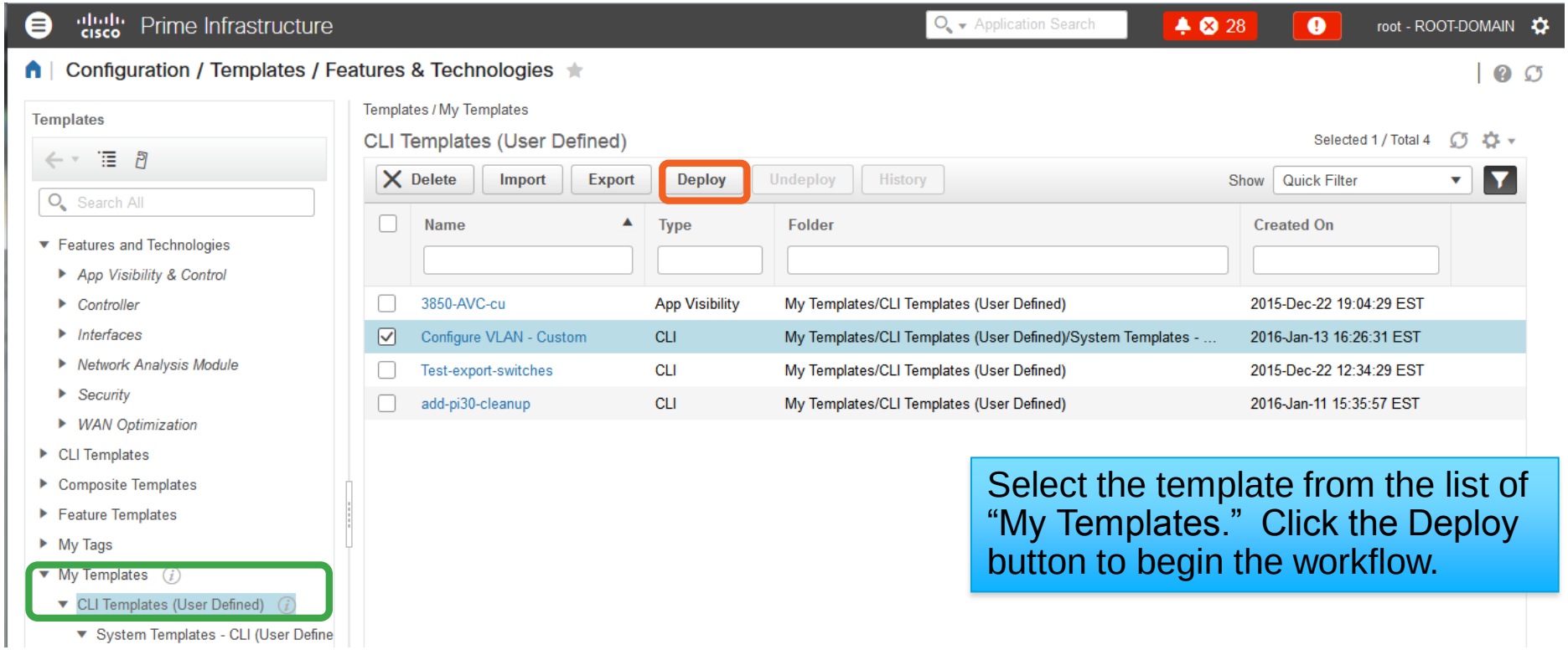
Preparing To Deploy Configurations



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.

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

Configuration / Templates / Features & Technologies ★

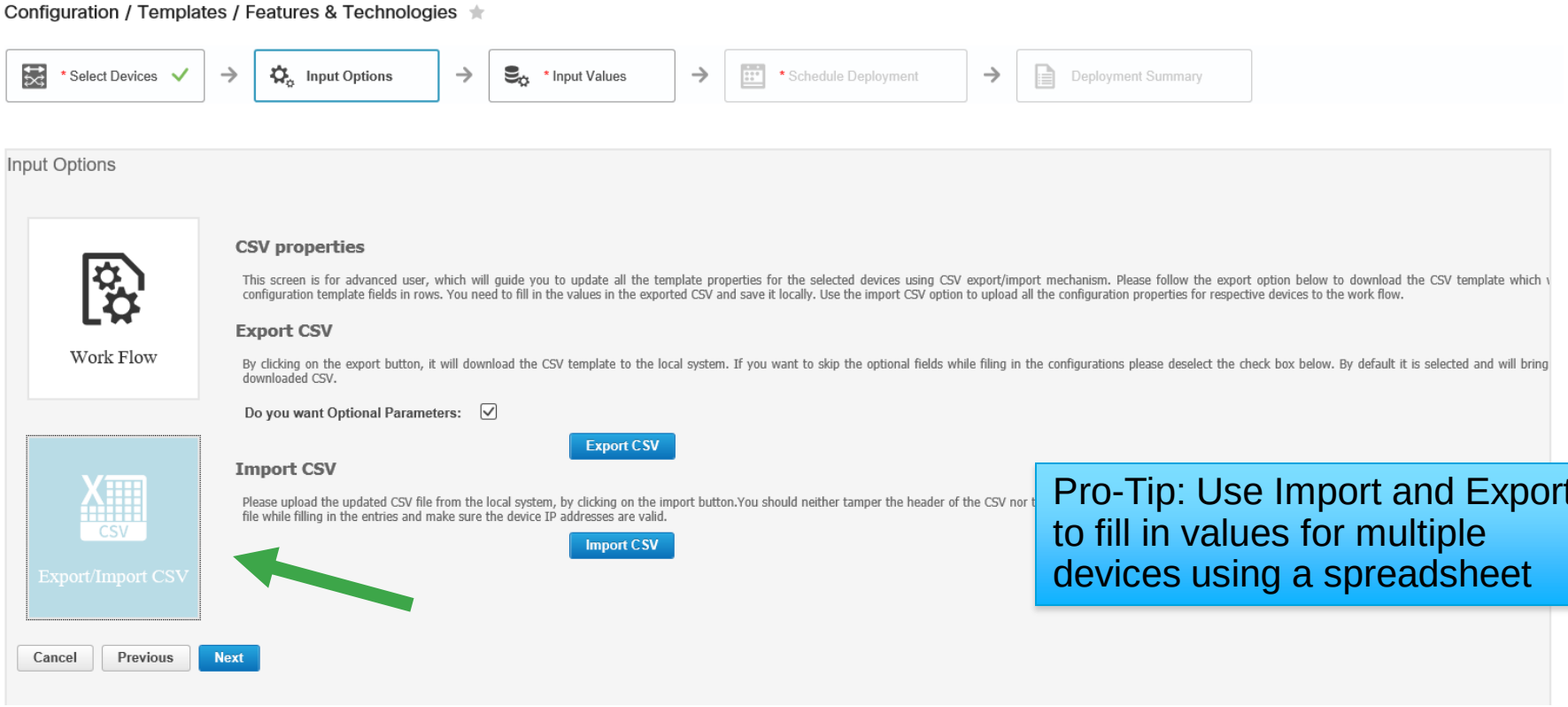
Global Variables

Show All

Name	Description	Type	IP Address/DNS	Vendor
All Devices	All Members			
3750E-switch.amer.cisc…	3750E-switch.amer.cisco.com	Switches and Hubs	172.16.50.248	Cisco
3850-switch.amer.cisco.…	3850-switch.amer.cisco.com	Switches and Hubs	172.16.50.252	Cisco
4948-Switch.amer.cisco.…	4948-Switch.amer.cisco.com	Switches and Hubs	172.16.50.253	Cisco
Device Type	Device Type			
Location	Location based groups			
User Defined	User Defined Device Groups			

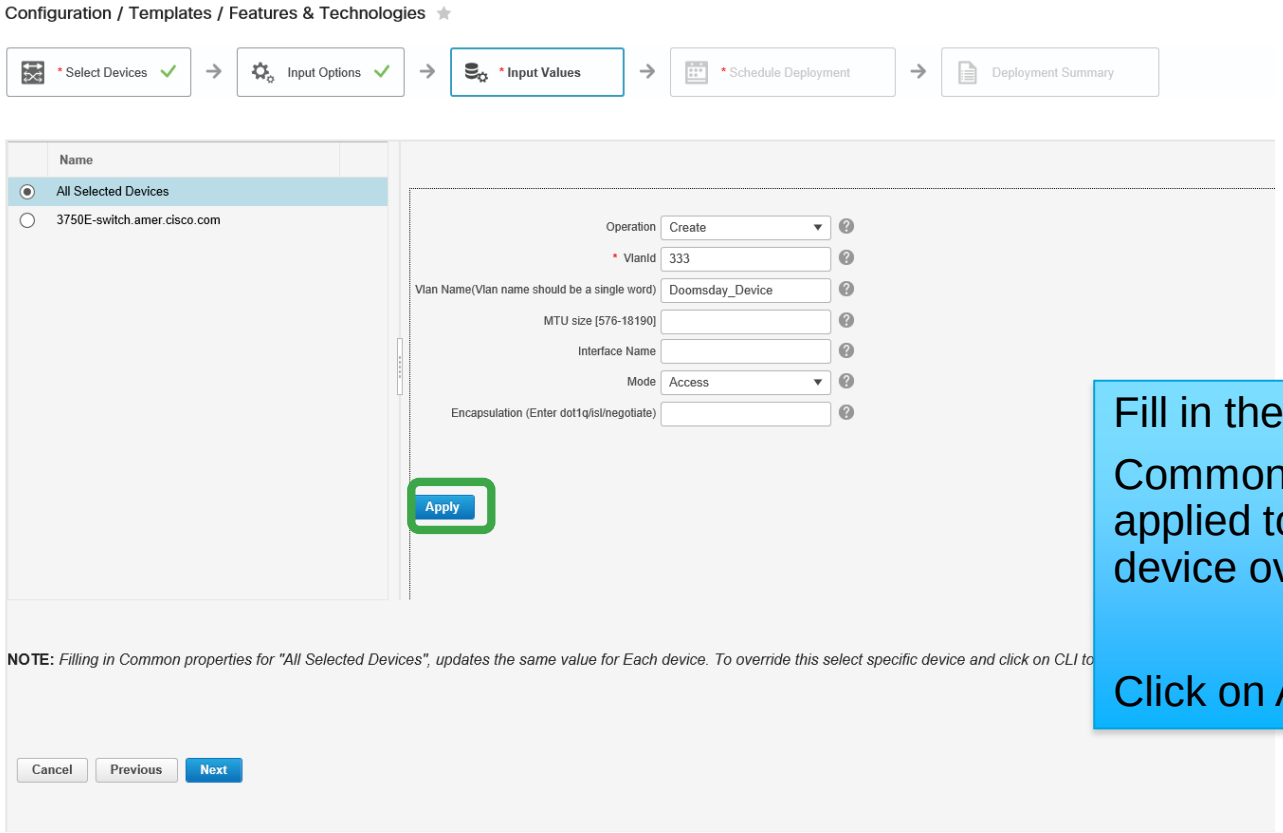
Choose the device or devices in which to apply this template.

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

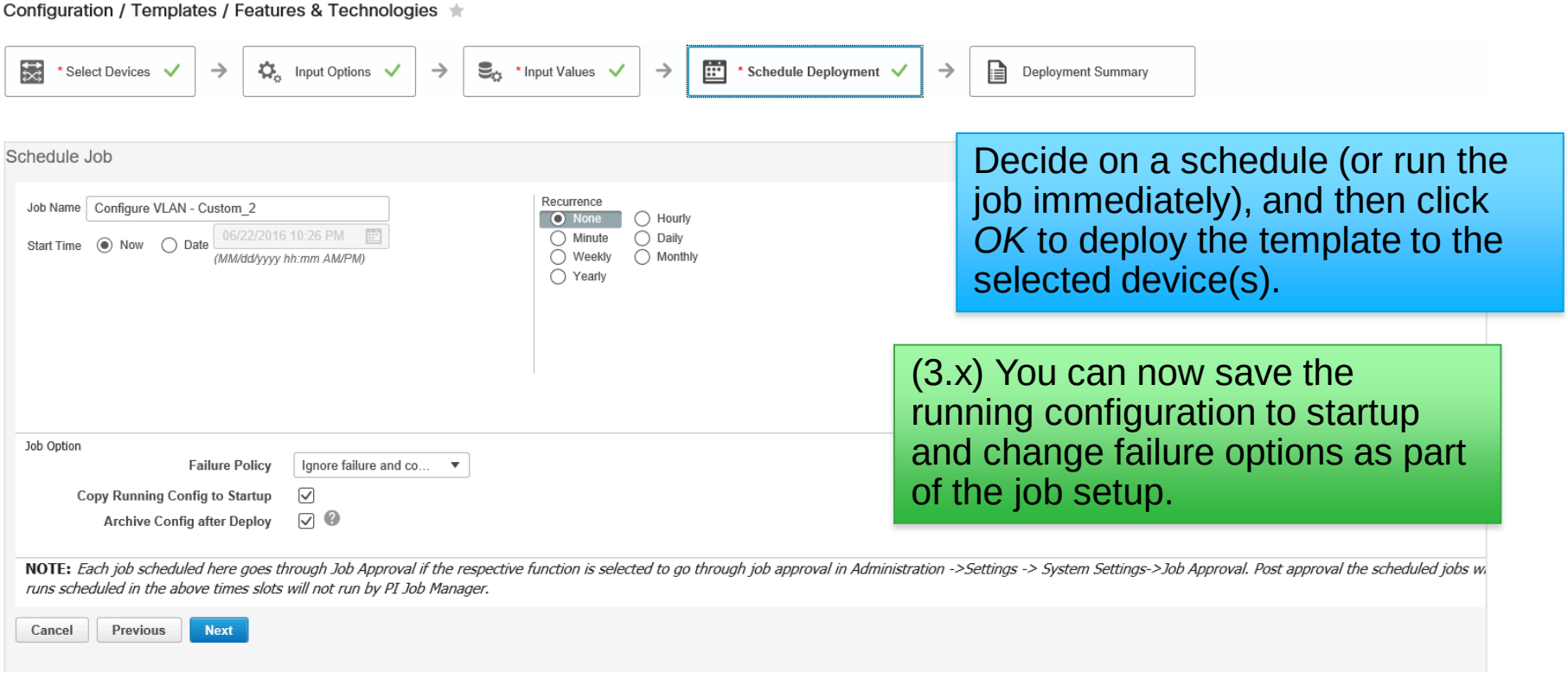


Fill in the parameters.

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

Click on Apply

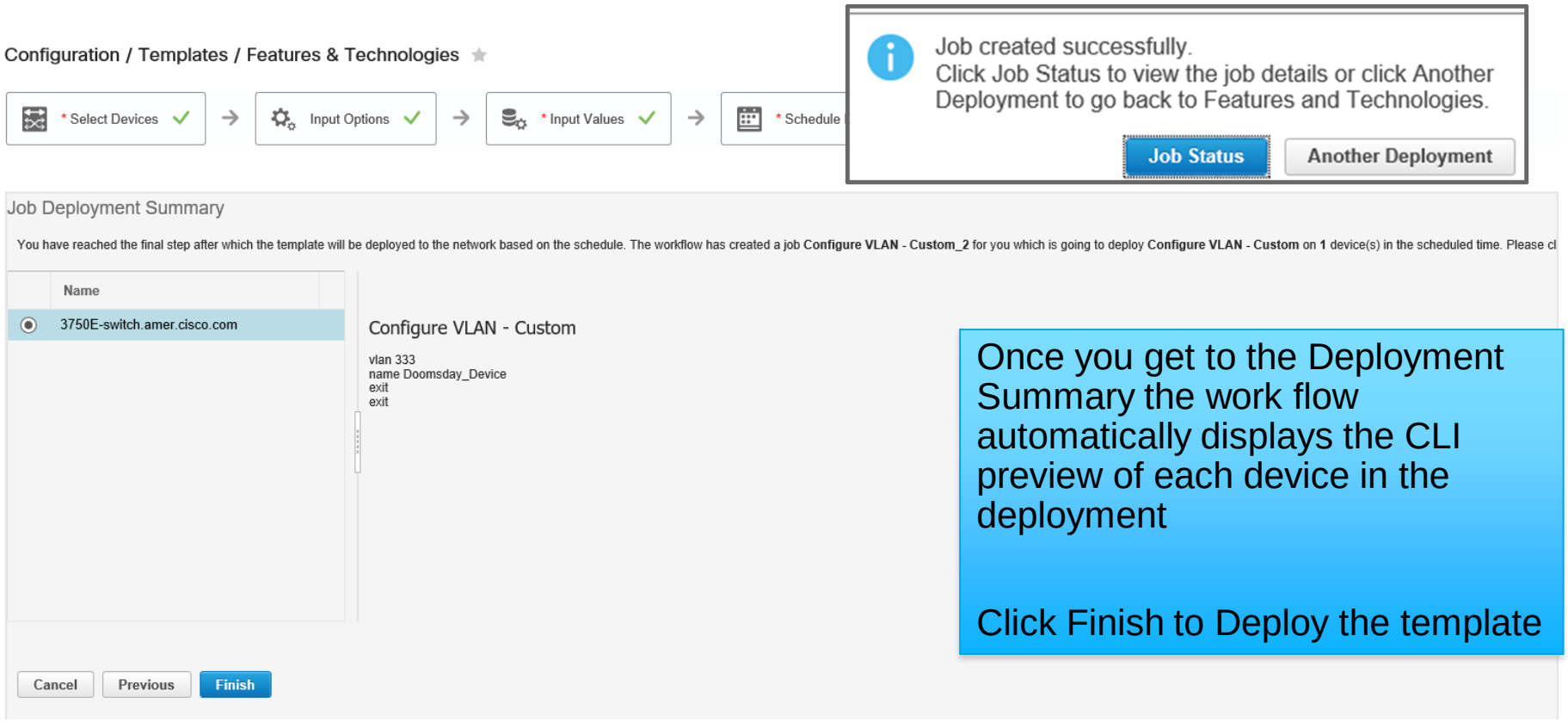
Select Job Options



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

(3.x) You can now save the running configuration to startup and change failure options as part of the job setup.

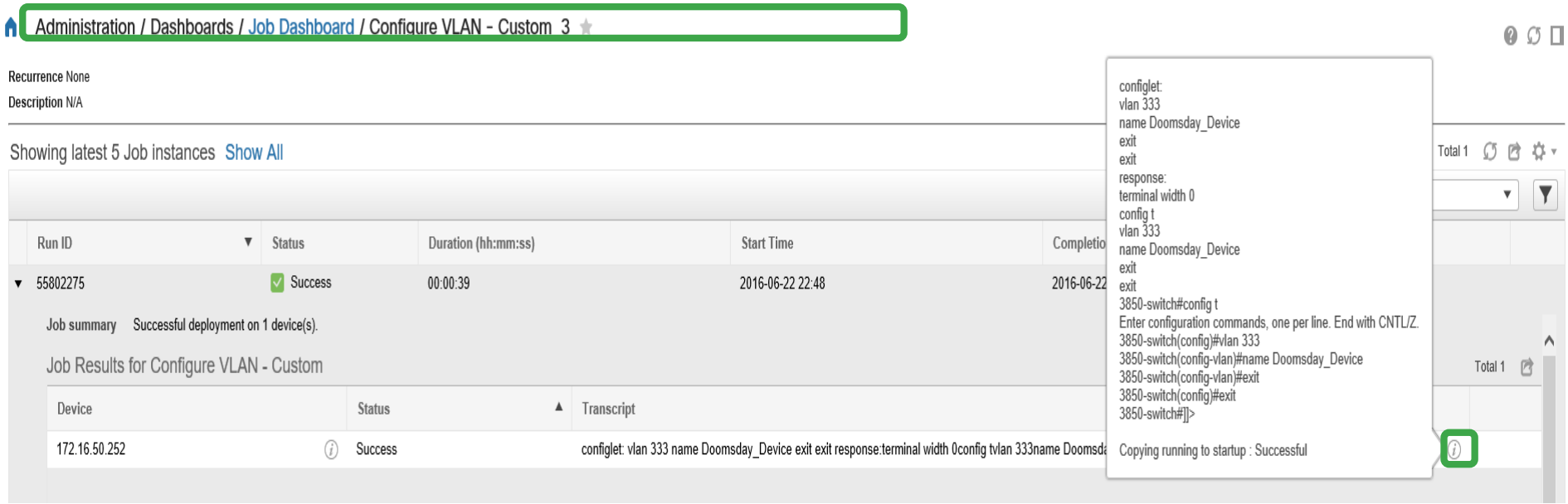
Preview CLI and Finish



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

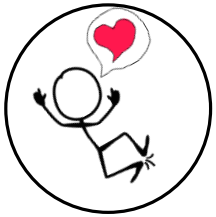
Verifying The Job's Status



The job's results will be displayed under *Administration > Dashboard >Job Dashboard*

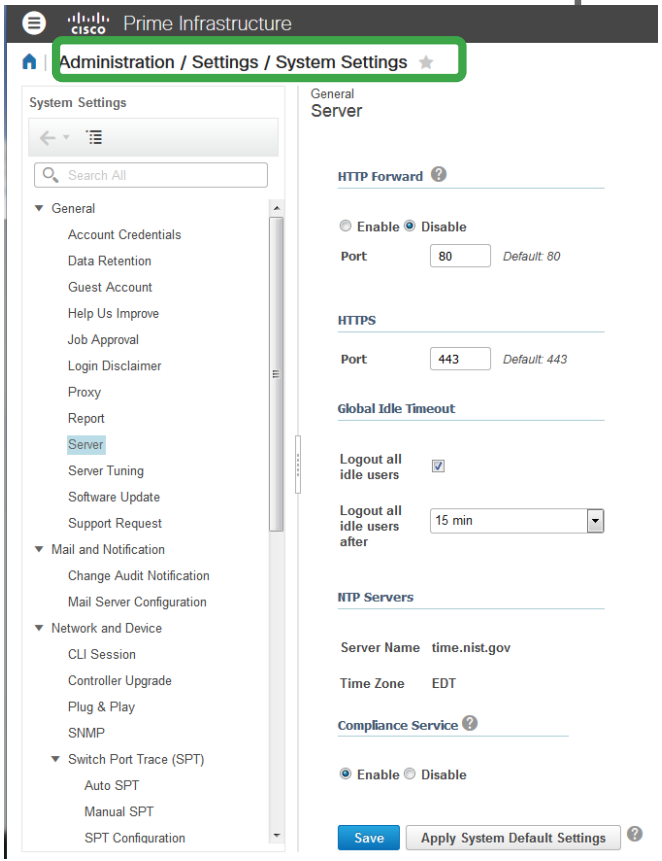
(3.x) Mouse-over the *i* to view the details pop-up

Baseline Configuration Compliance



- Define configuration baseline policies
- Perform compliance audits
- View compliance audit violations
- Option to fix violations
- Support for IOS, IOS-XE, IOS-XR, NX-OS, AirOS and ASA devices

Getting Started with Compliance



(3.x) Compliance needs to be enable

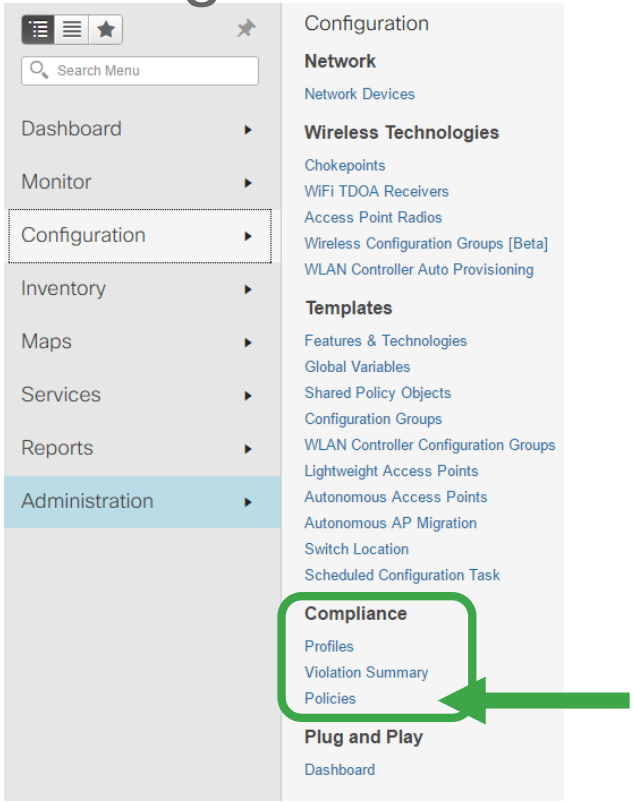
Go to Administration > Settings >System Settings > Server

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



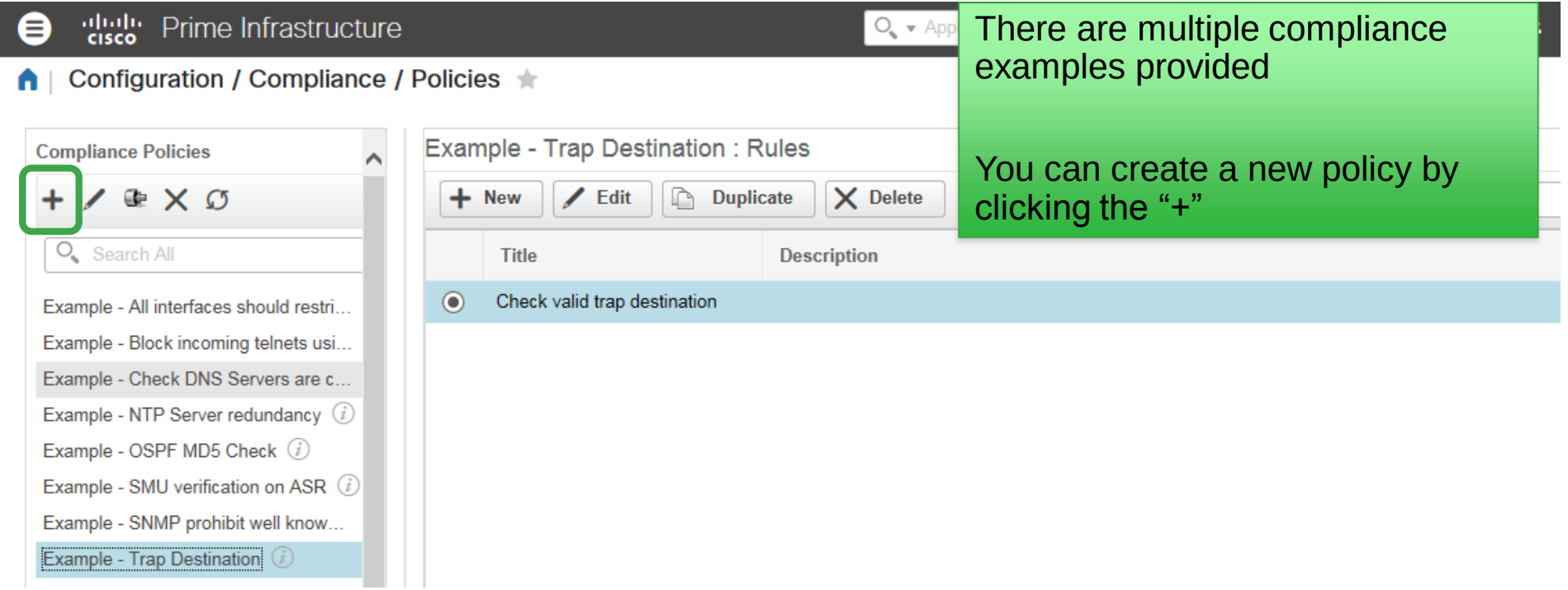
Once enabled, Configuration> Compliance section will appear on the Menu

Compliance follows a 3-Level Model

- Policies
- Profiles
- Violation Summary

To get started, we click on Policies

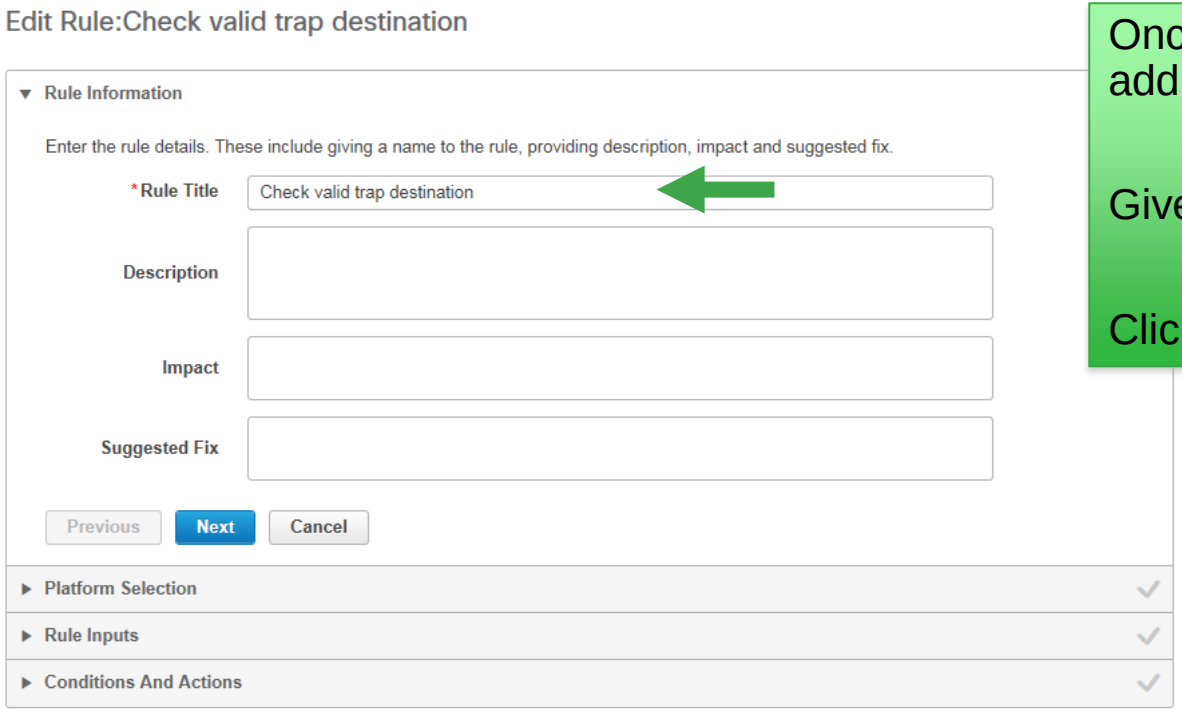
Define Compliance Policy



There are multiple compliance examples provided

You can create a new policy by clicking the “+”

Define Compliance Policy (cont)

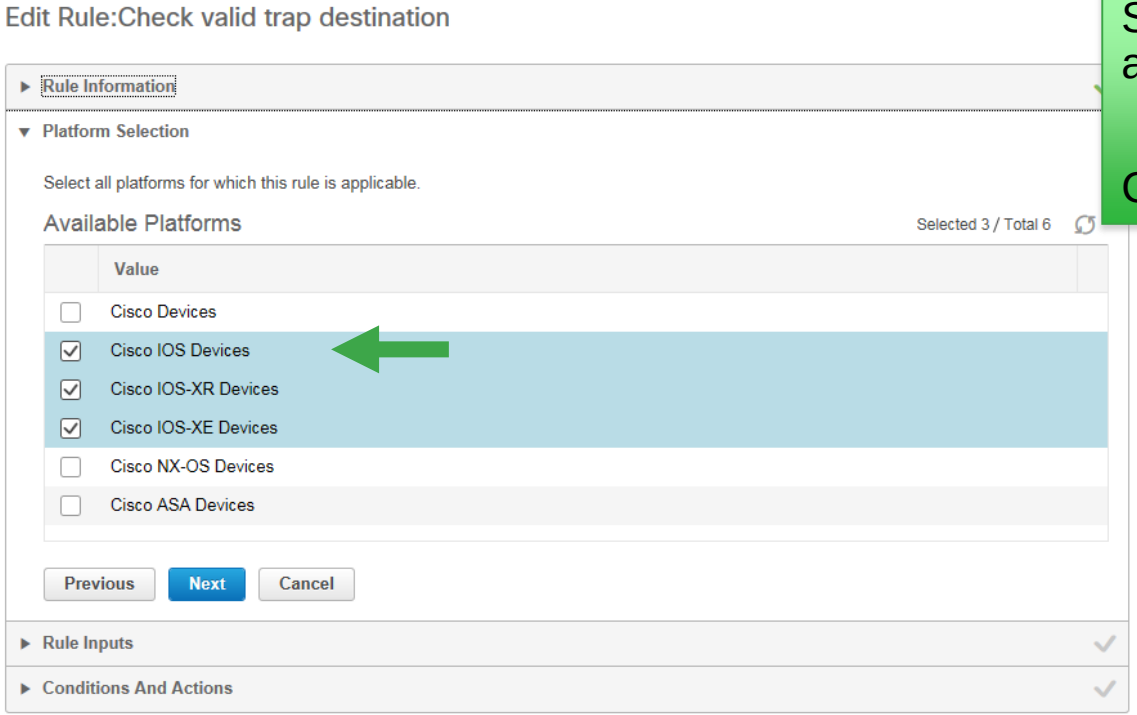


Once you Name the Policy you add a rule

Give the Rule a title

Click Next

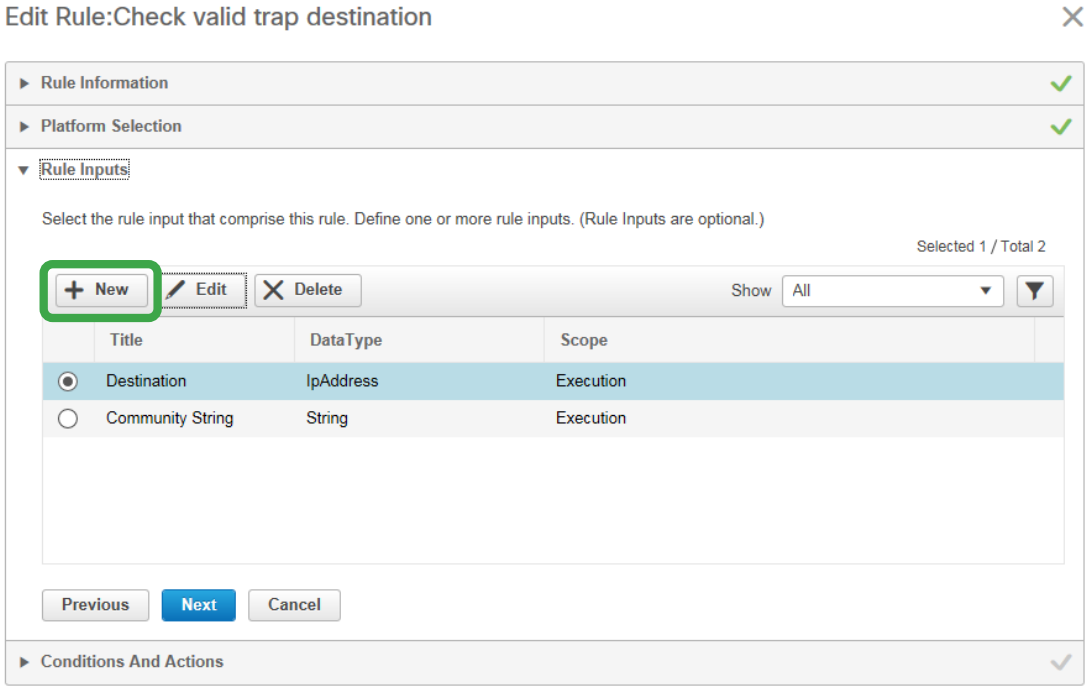
Define Compliance Policy (cont)



Select the OS(es) the Policy applies to

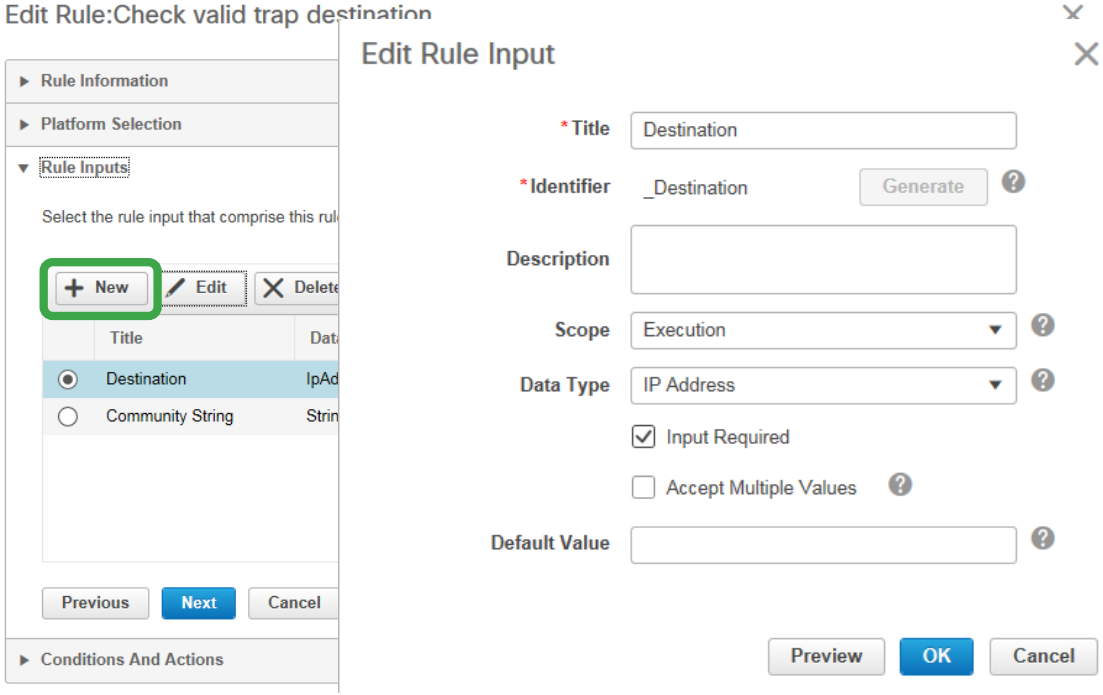
Click Next

Define Compliance Policy (cont)



Create new input Variables that are needed for the conditions and Actions Section

Define Compliance Policy (cont)



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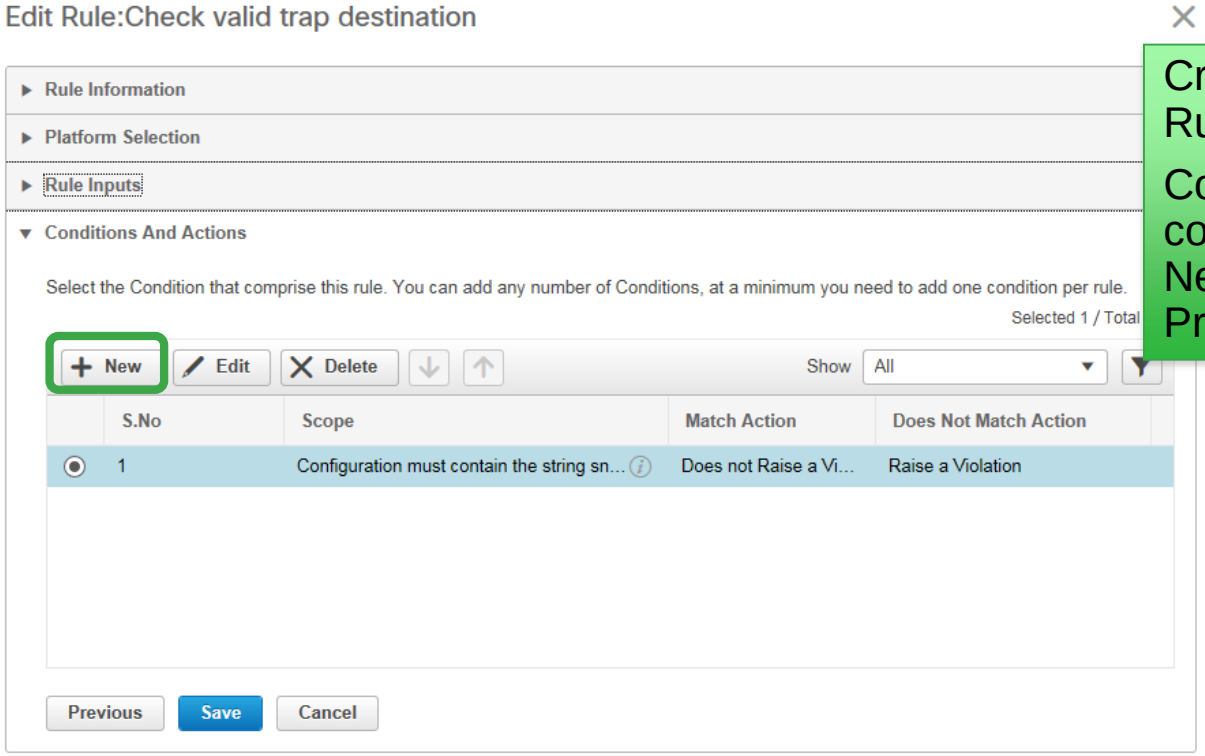

Create the Condition and Action Rules

Condition Scope can be based on config, Command Output >>LMS Netshow replacement<<, Properties or Previous Blocks

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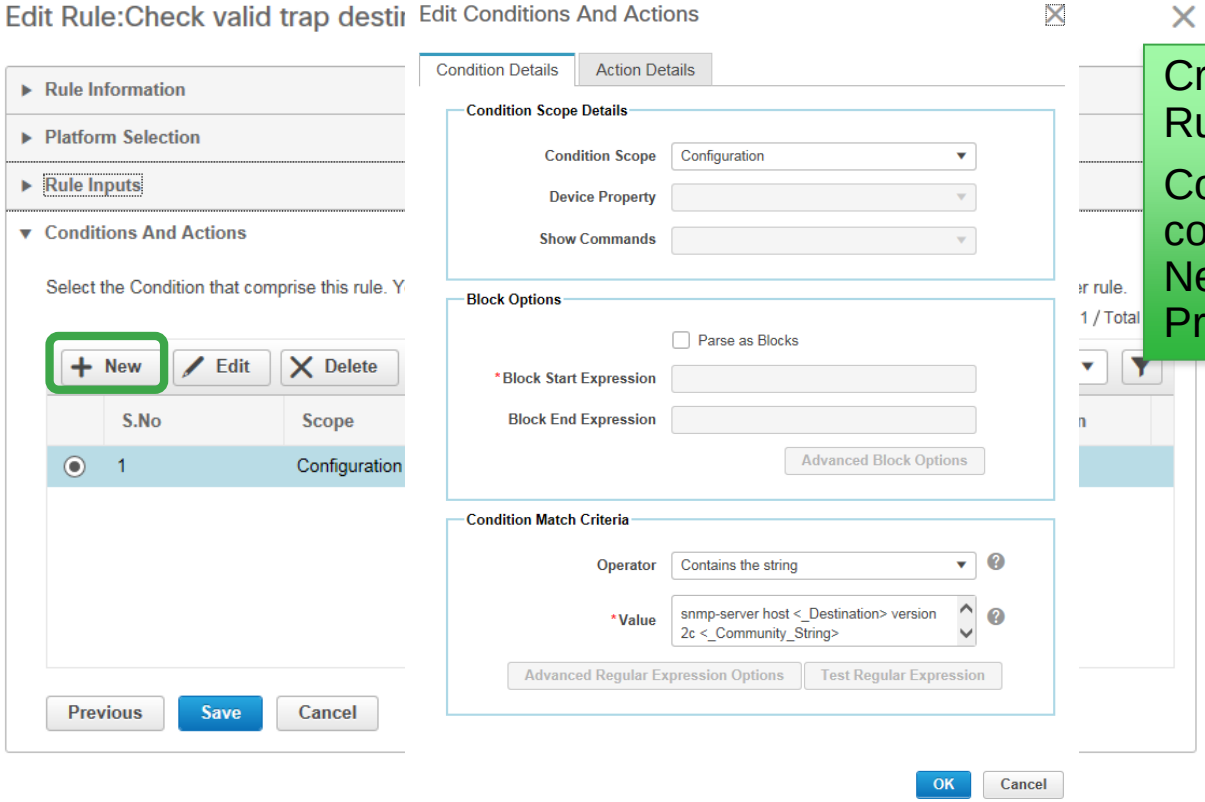

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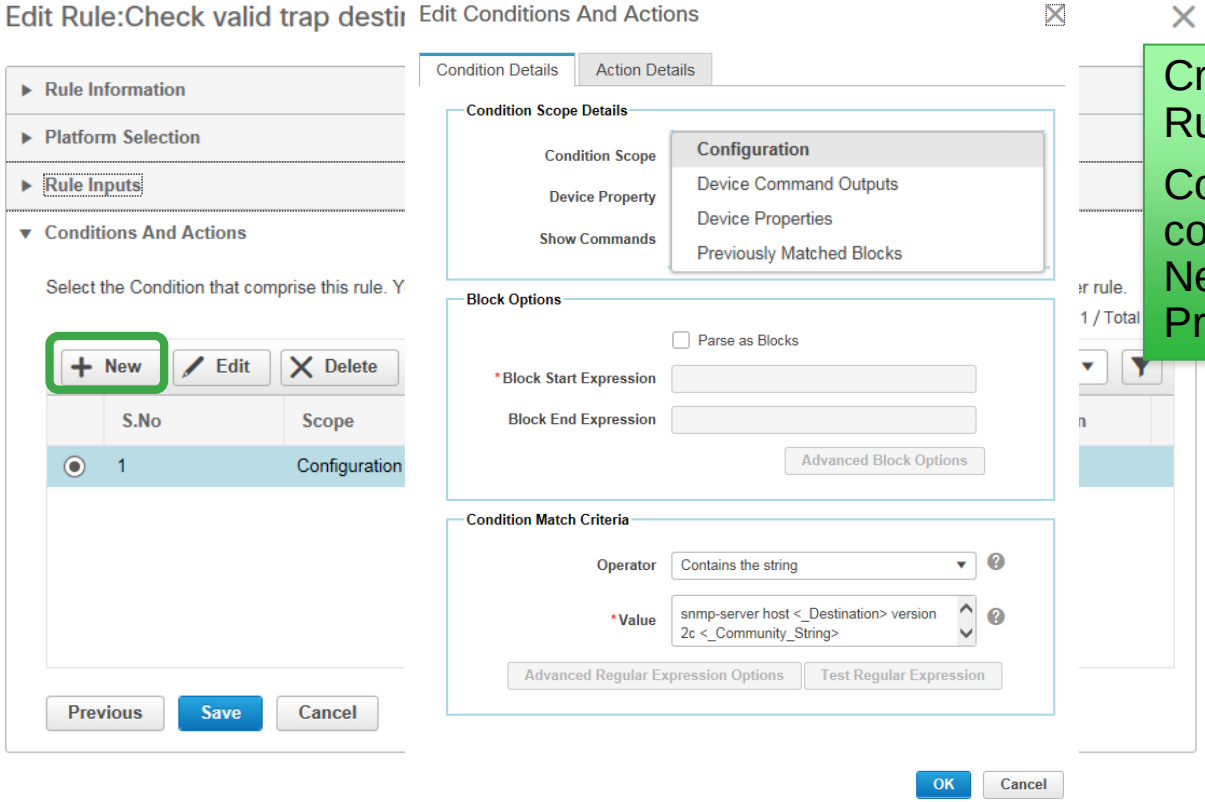

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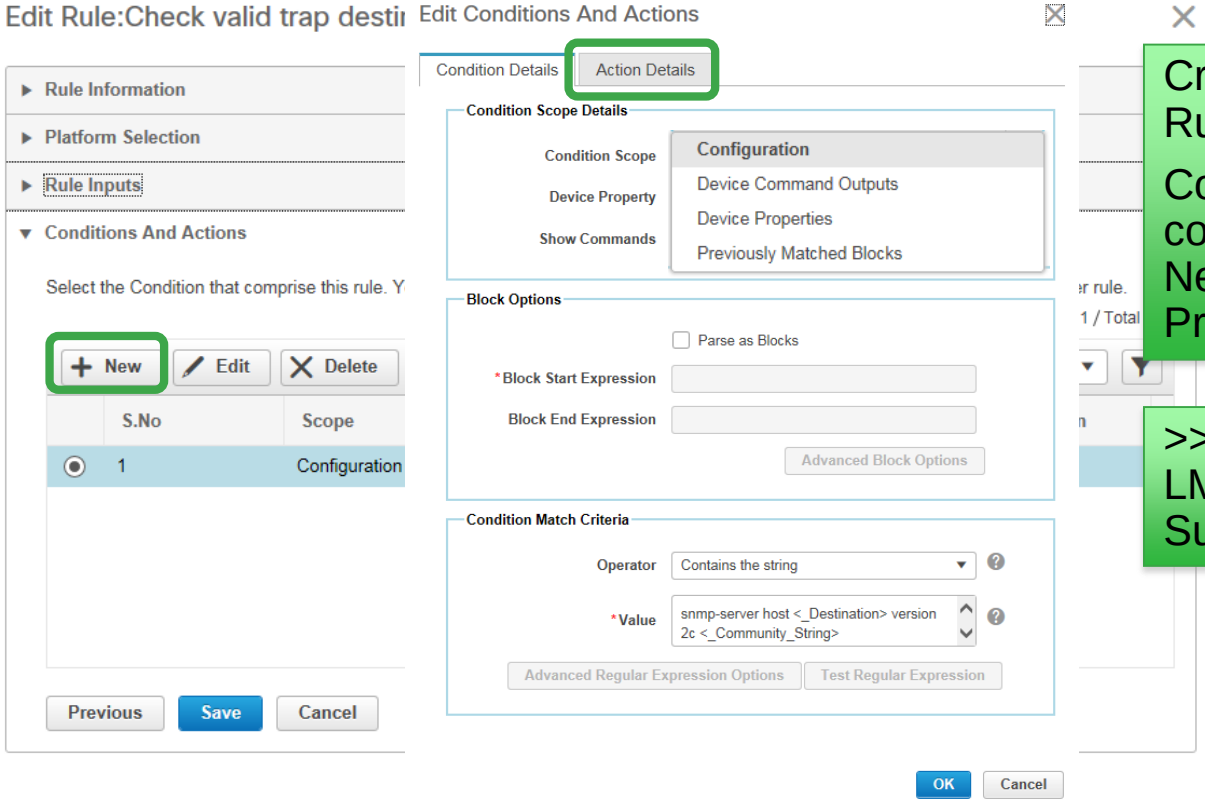

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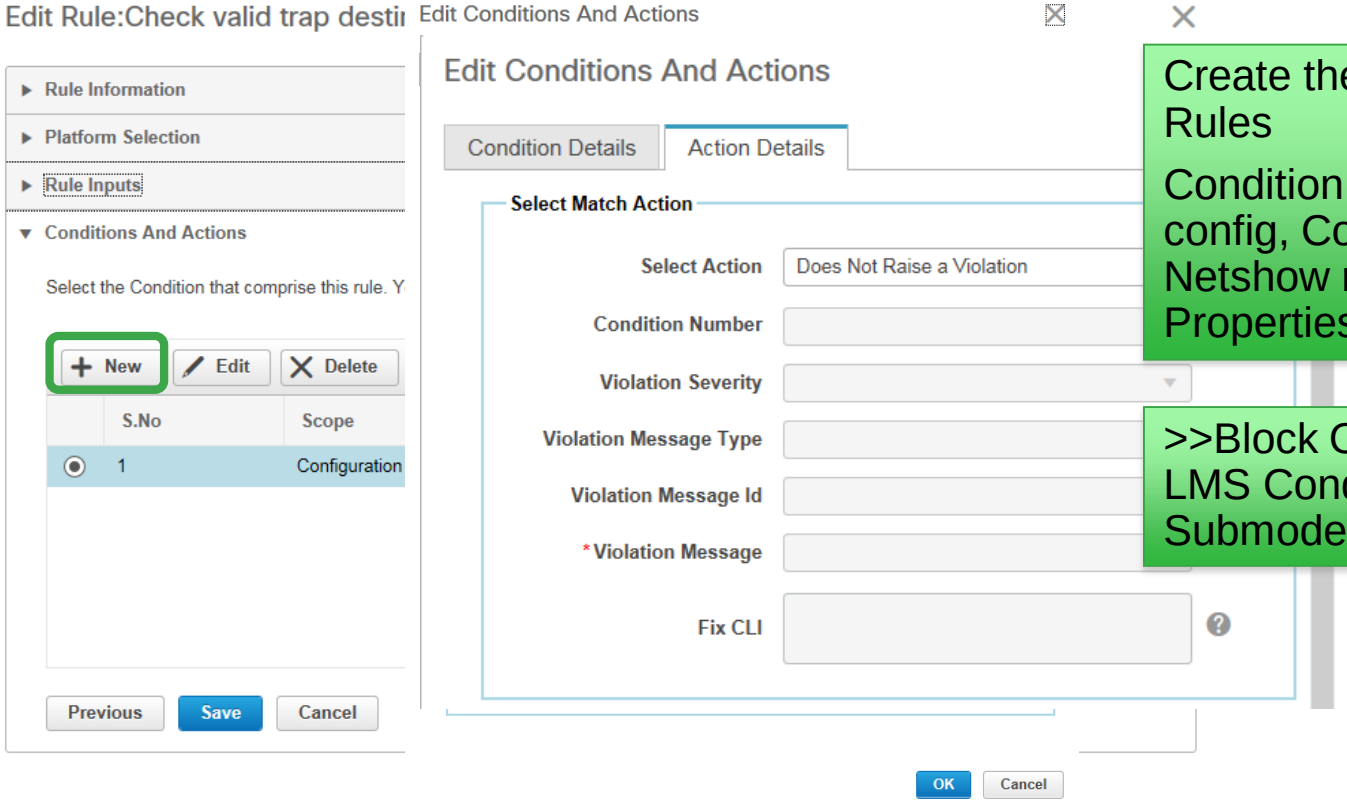

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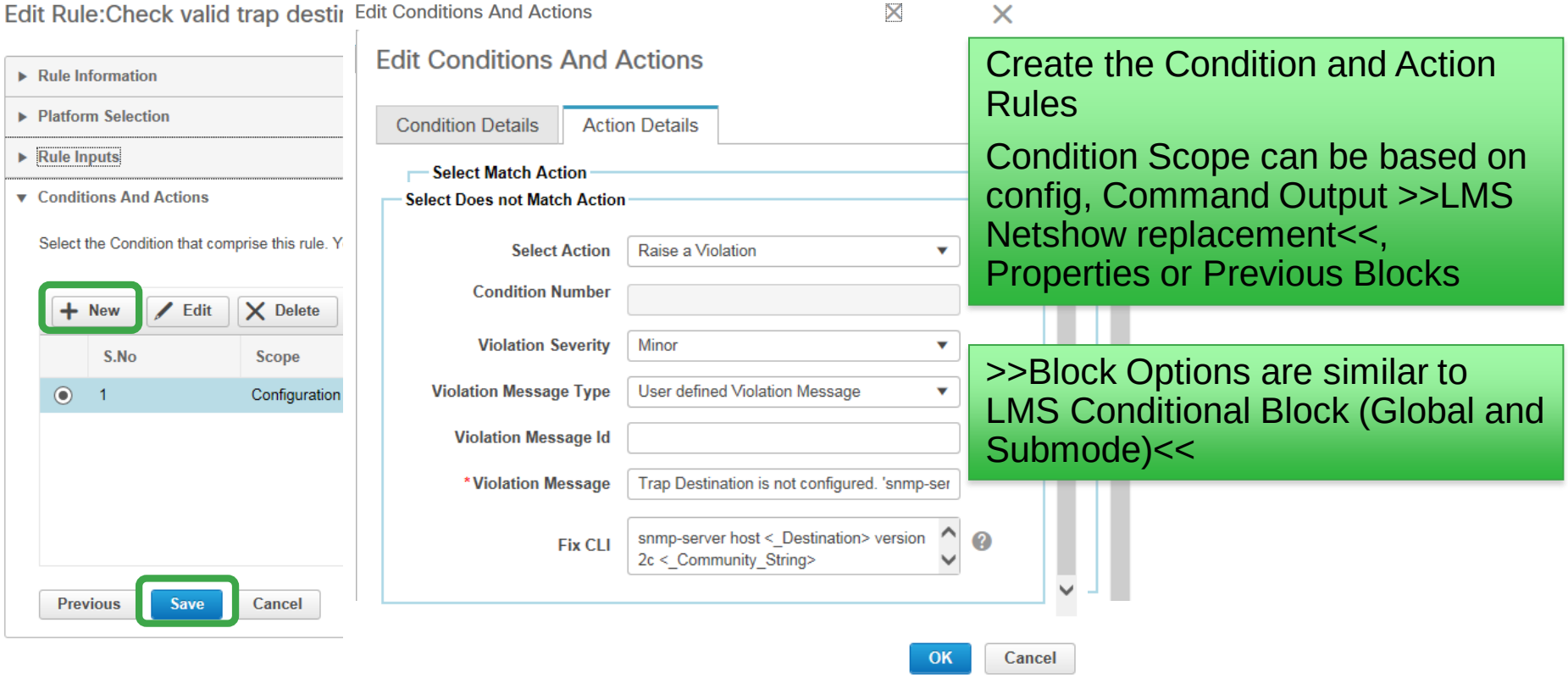

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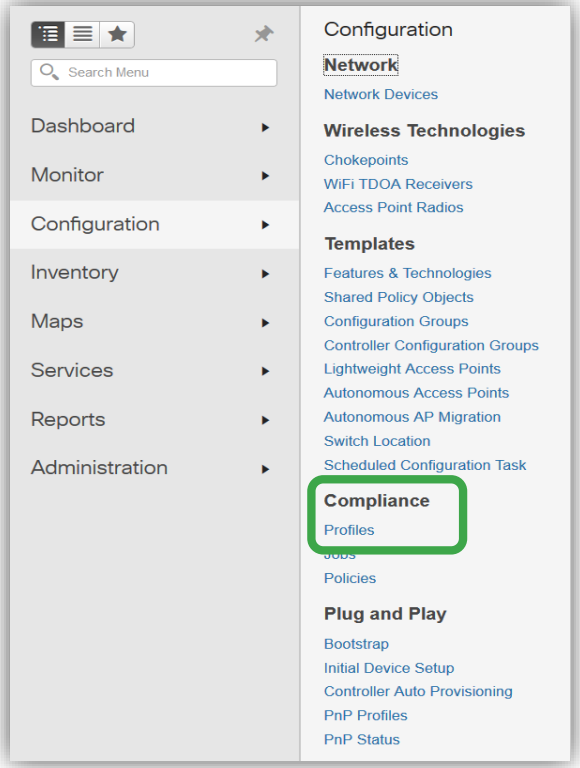

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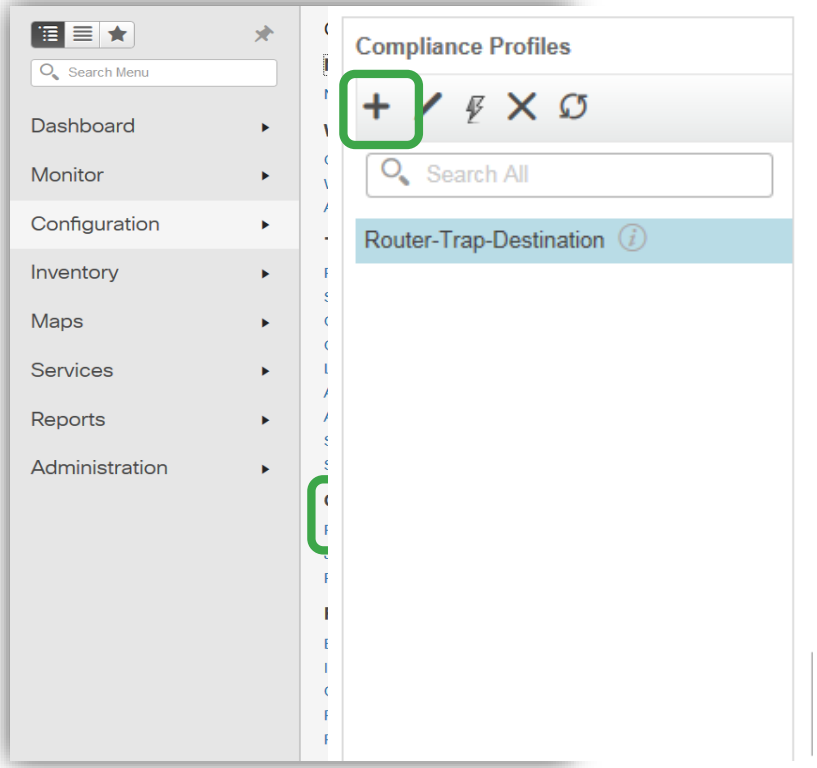

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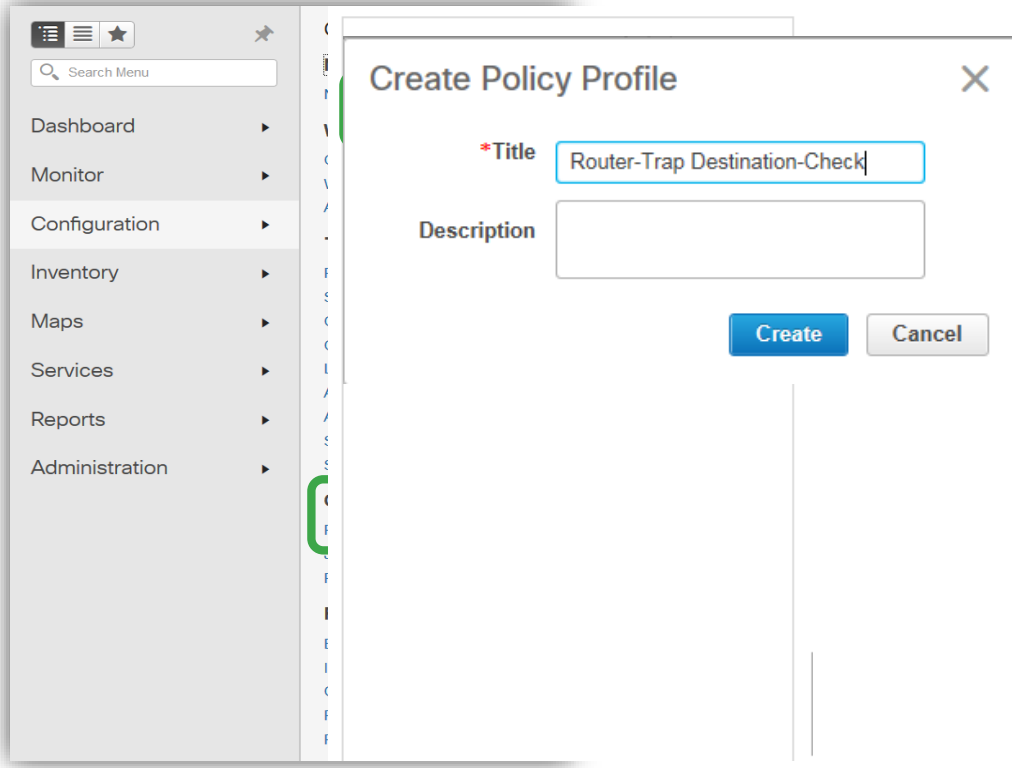

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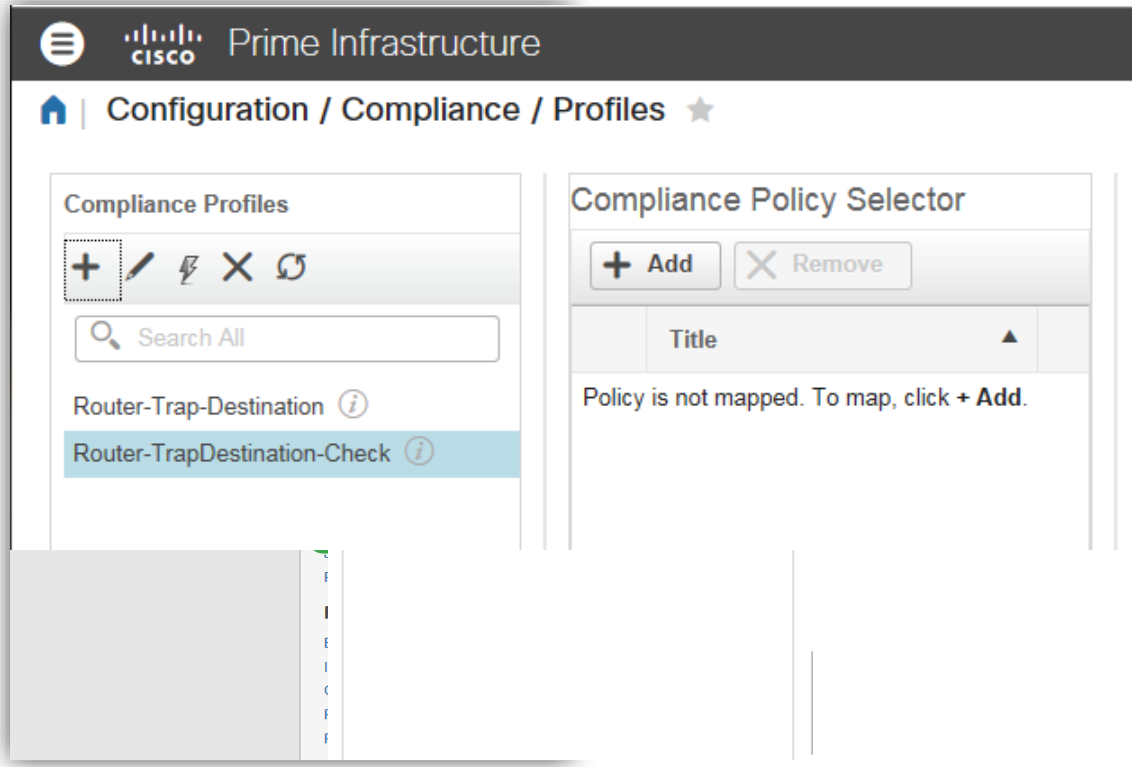

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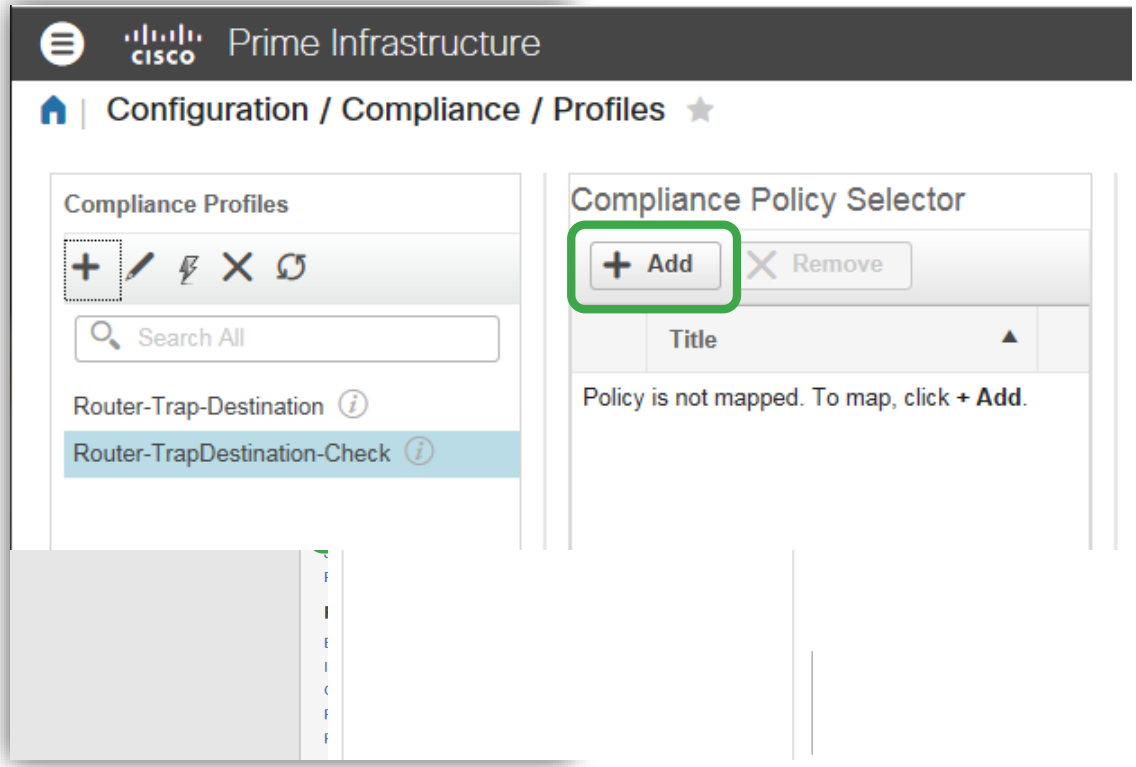

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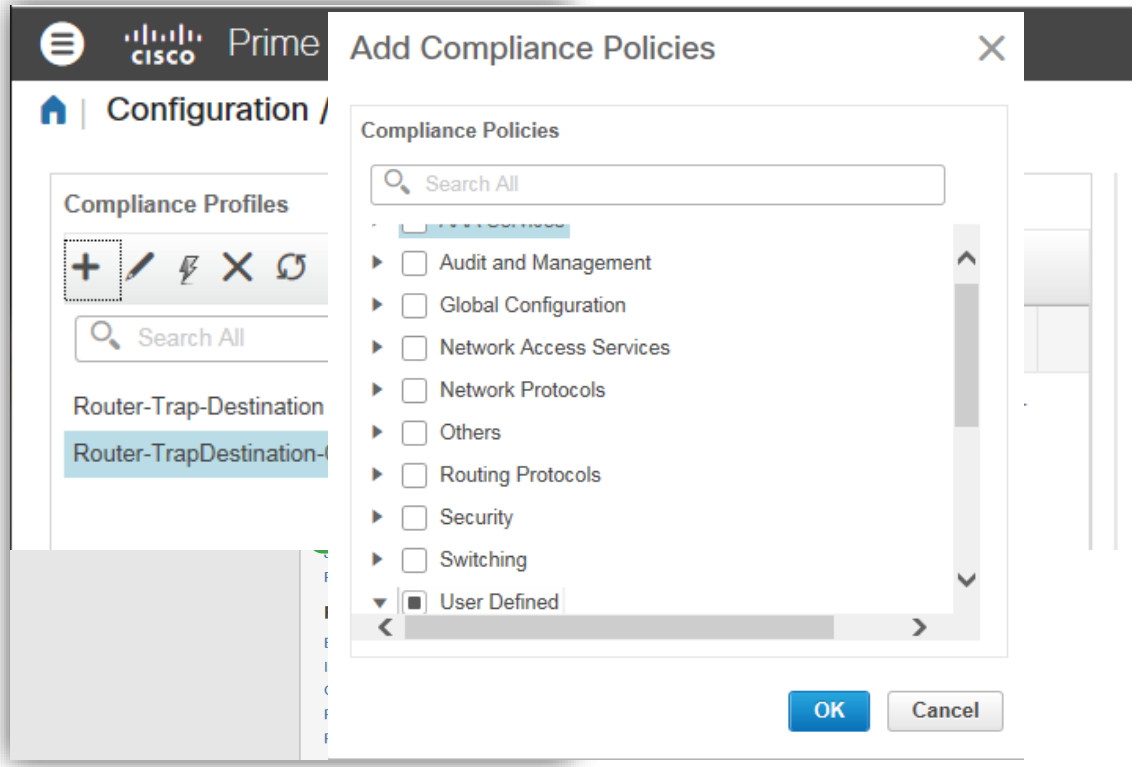

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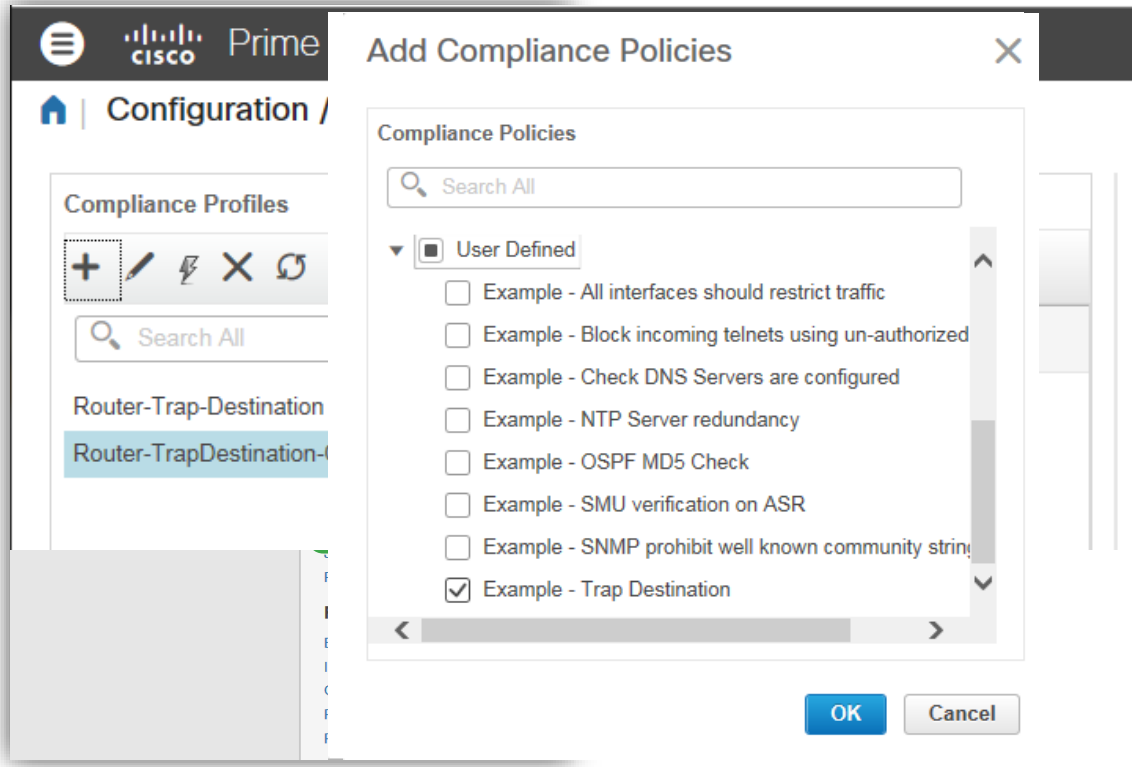

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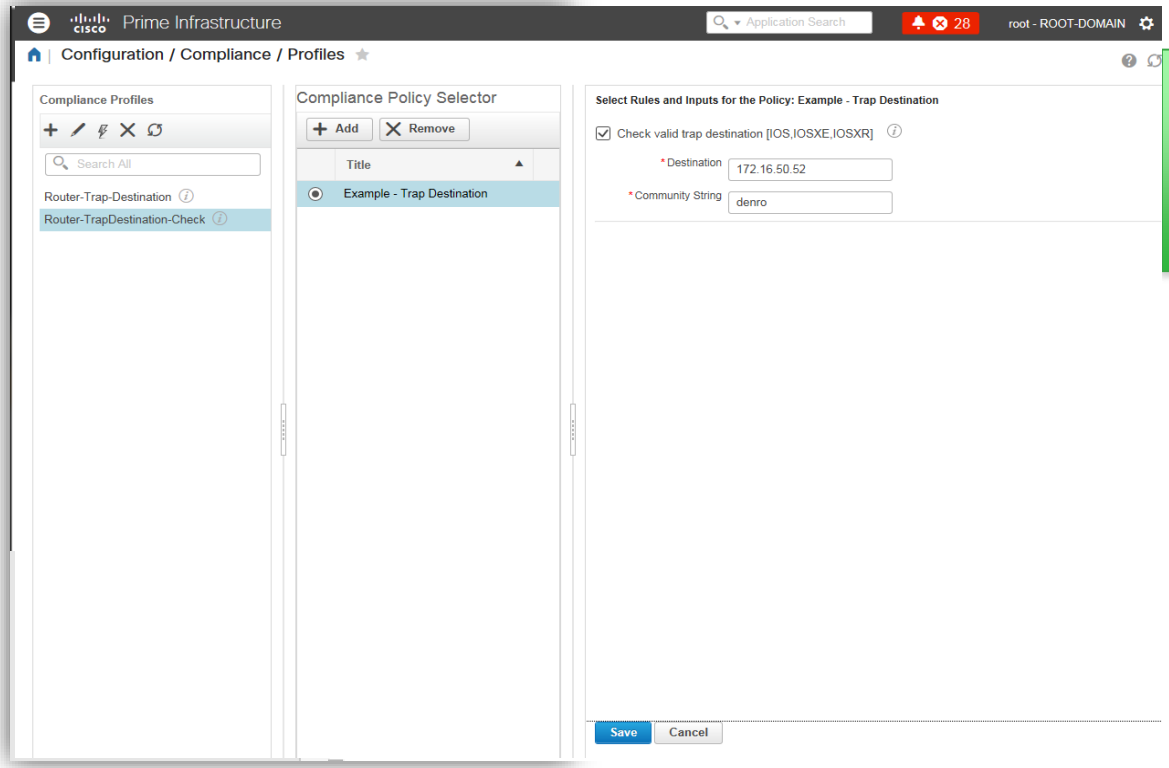

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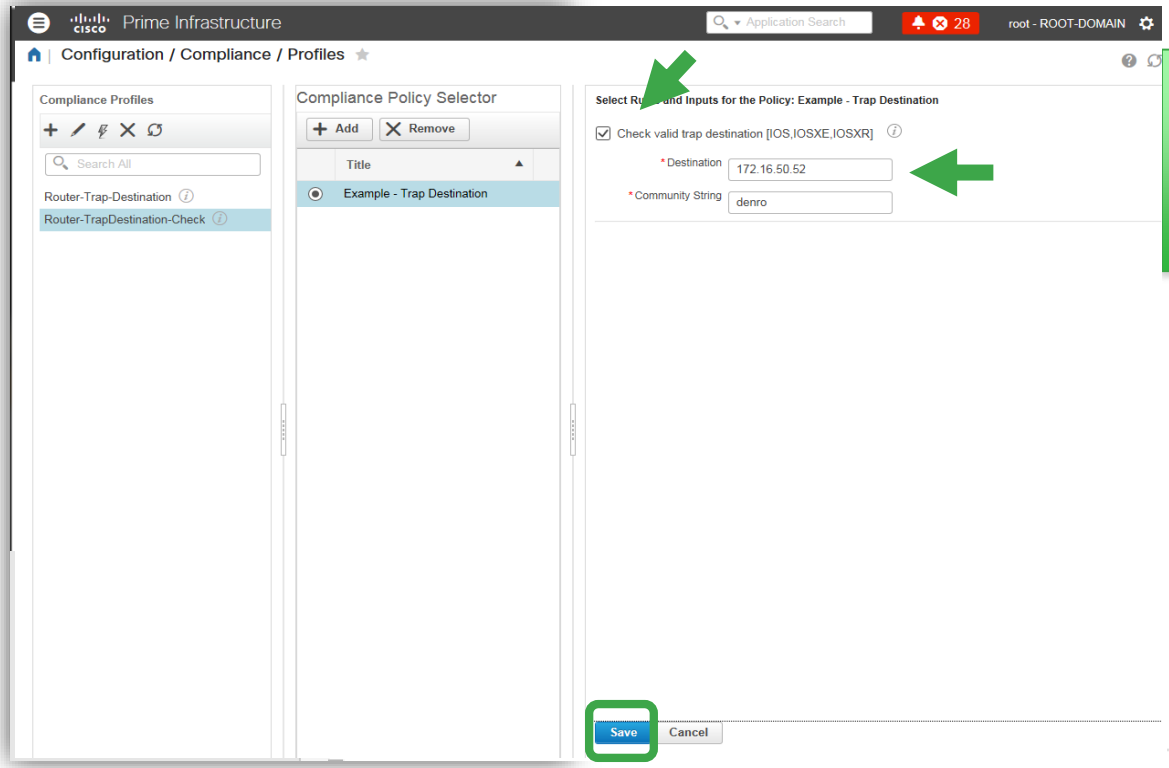

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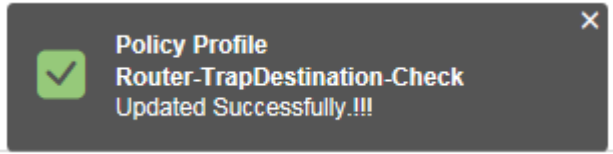
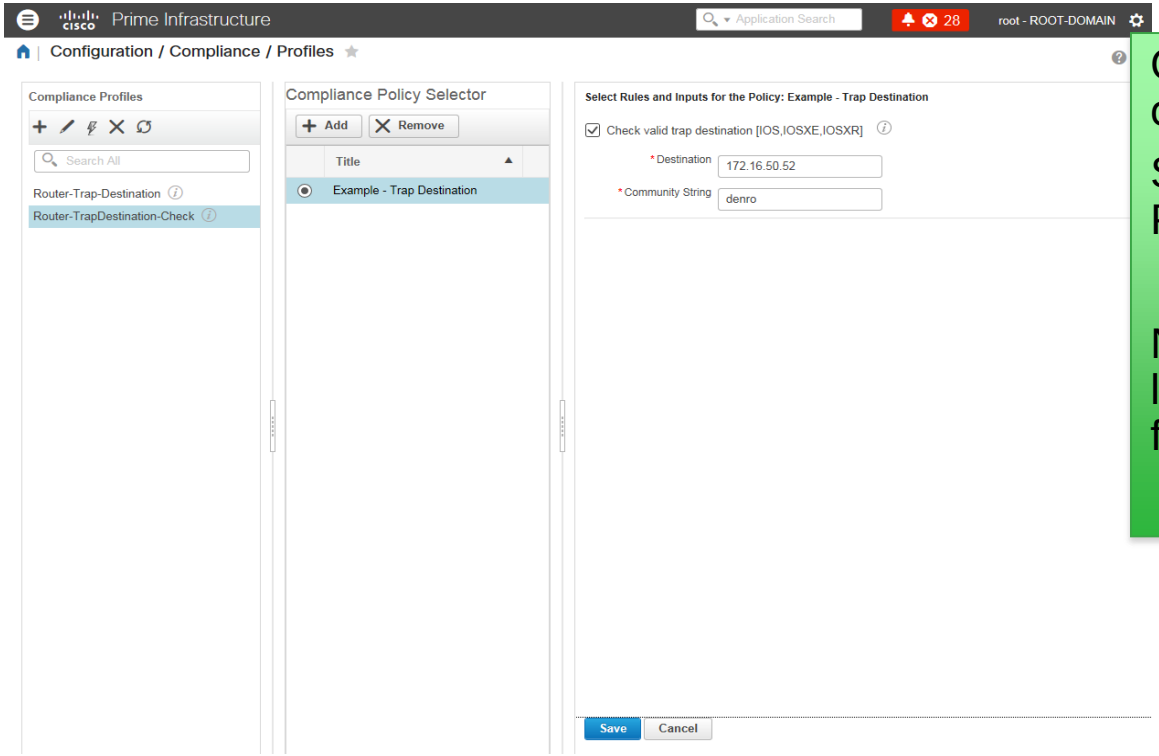


Run the Compliance Job

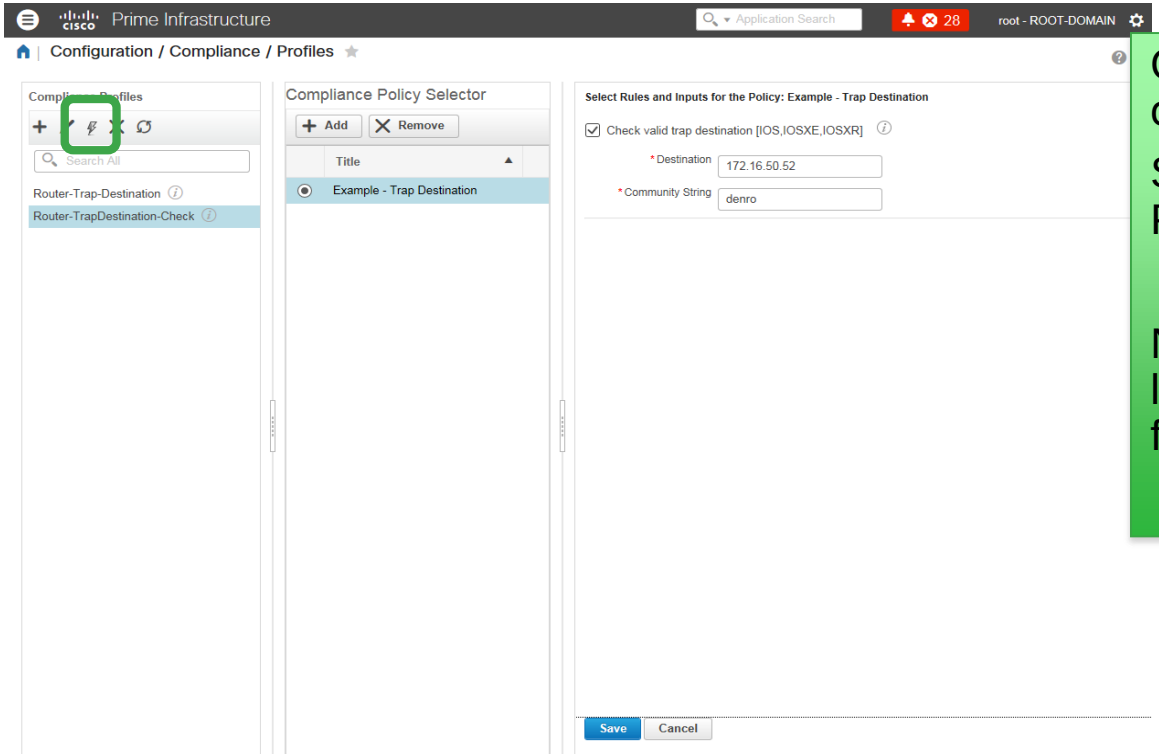


Once the Profile is created, You click on the “Lightening Bolt”

Select the devices to run the Profile against

Note: you can choose between latest archive or real-time config fetch

Run the Compliance Job



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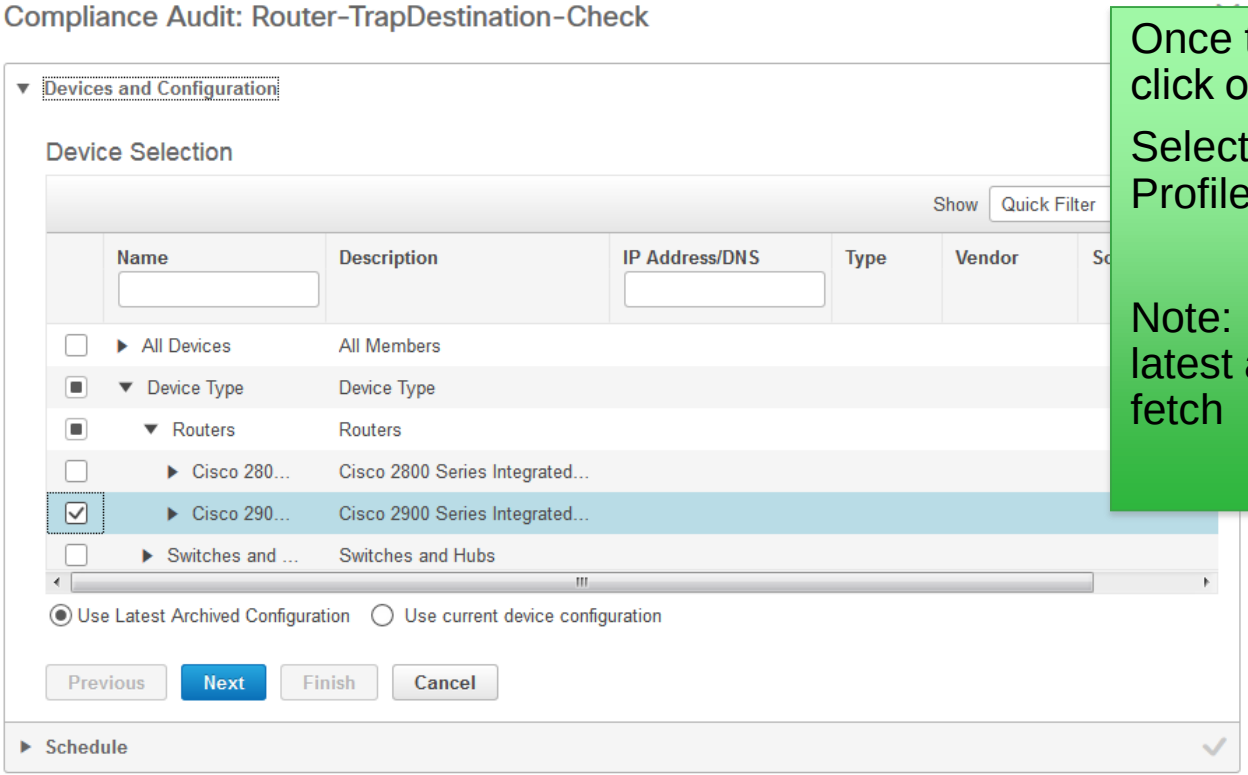

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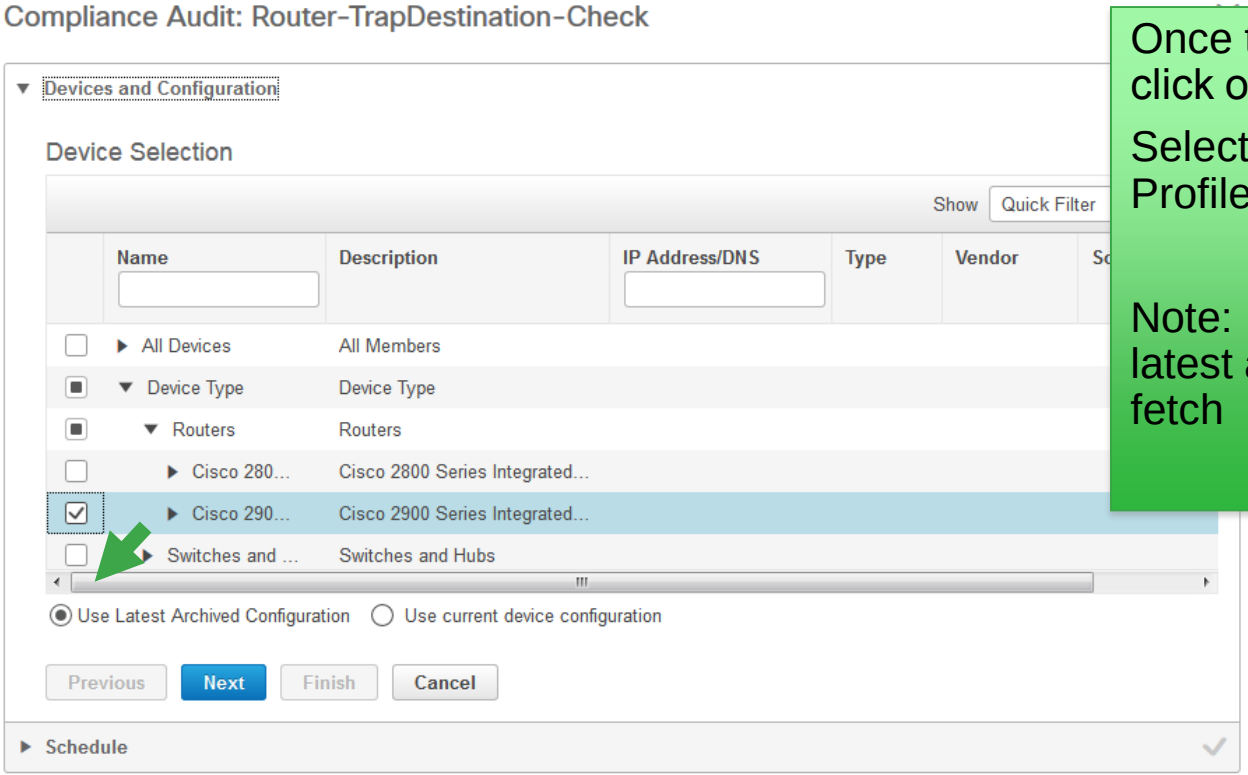

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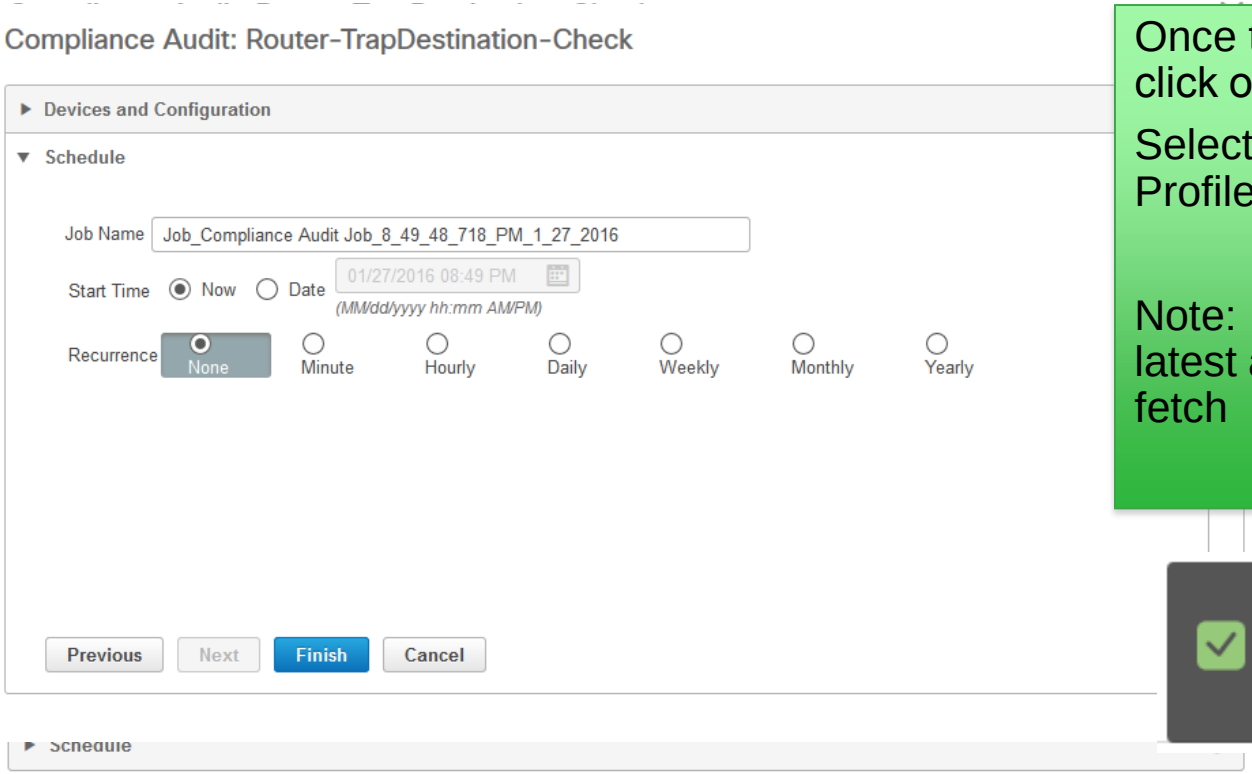

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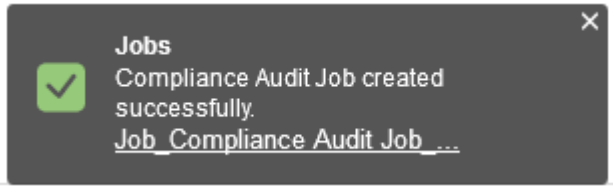
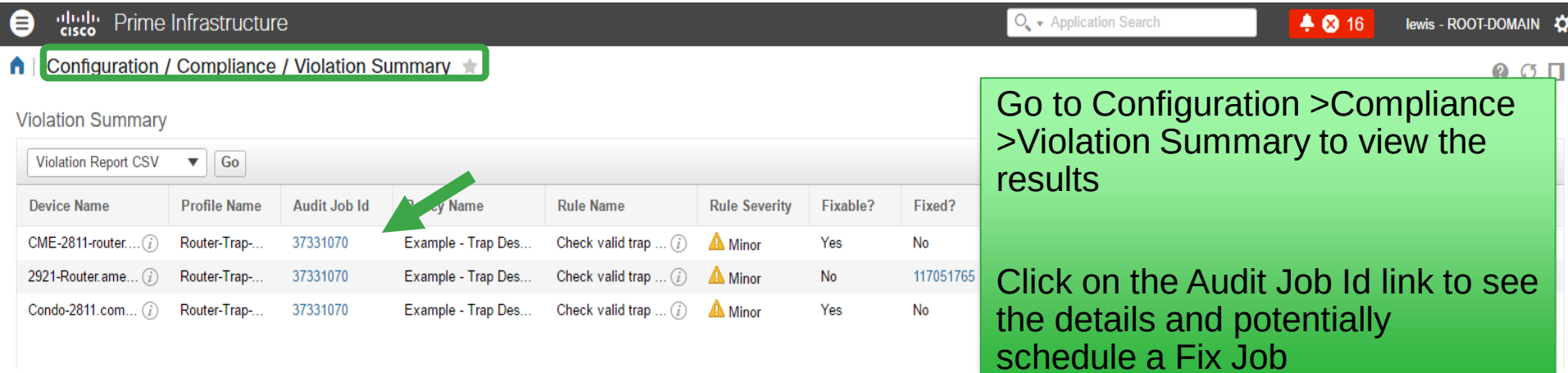


View Audit Job Results/Violation Summary

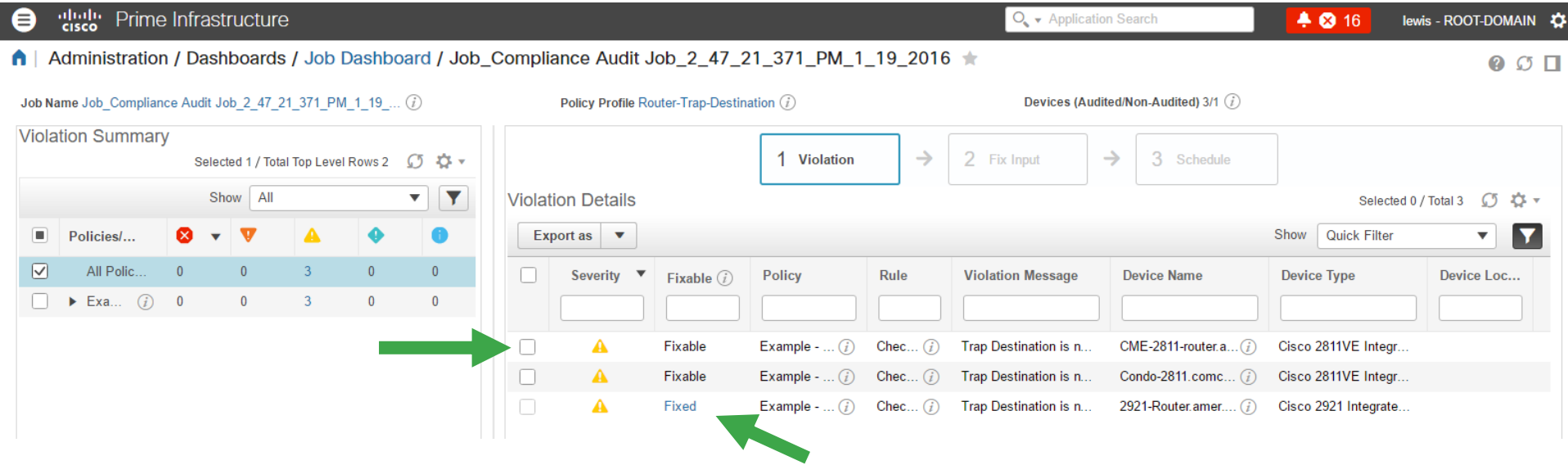


Go to Configuration >Compliance >Violation Summary to view the results

Click on the Audit Job Id link to see the details and potentially schedule a Fix Job

>>Difference from LMS<<
Audit Job results cannot yet be e-mailed.

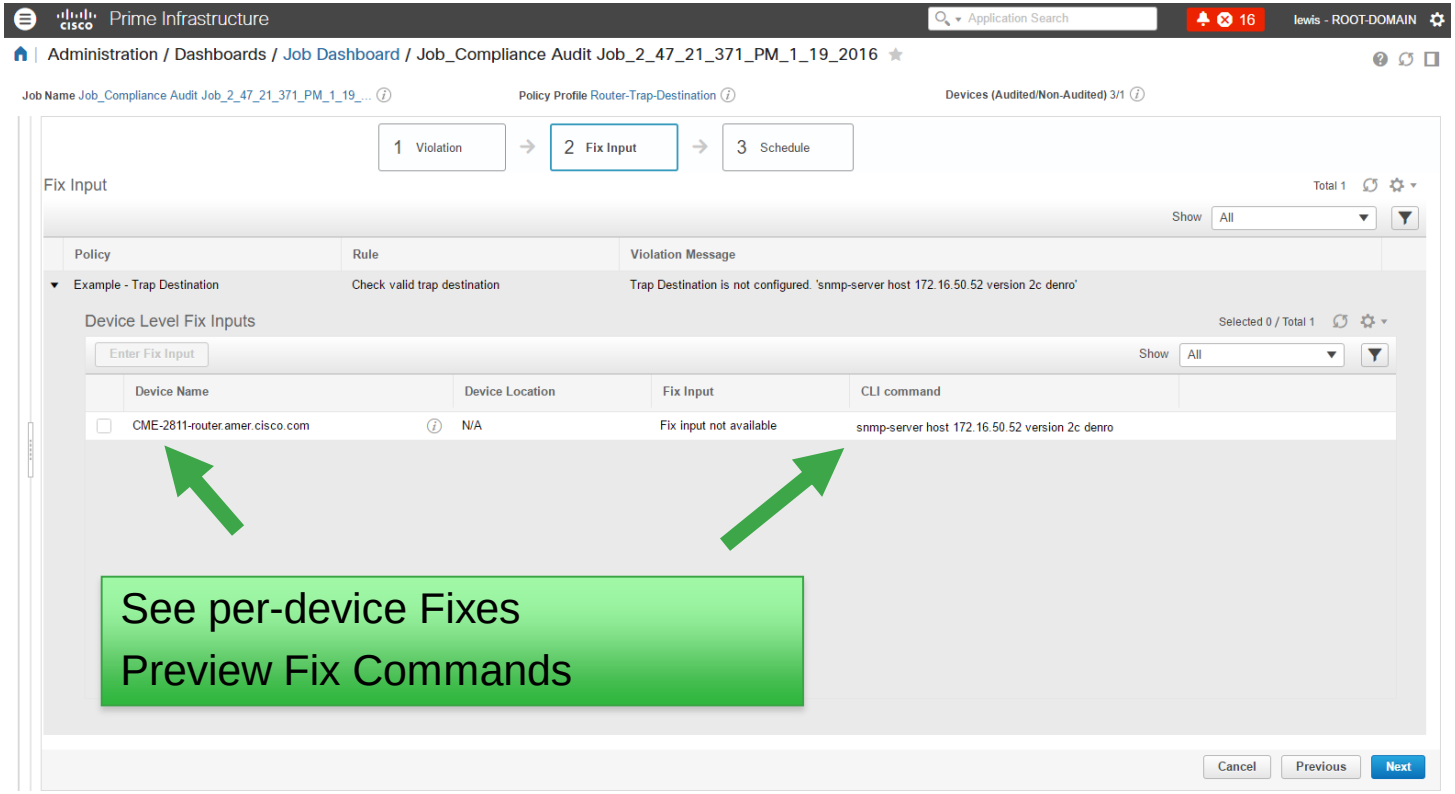
Generate Fix Jobs



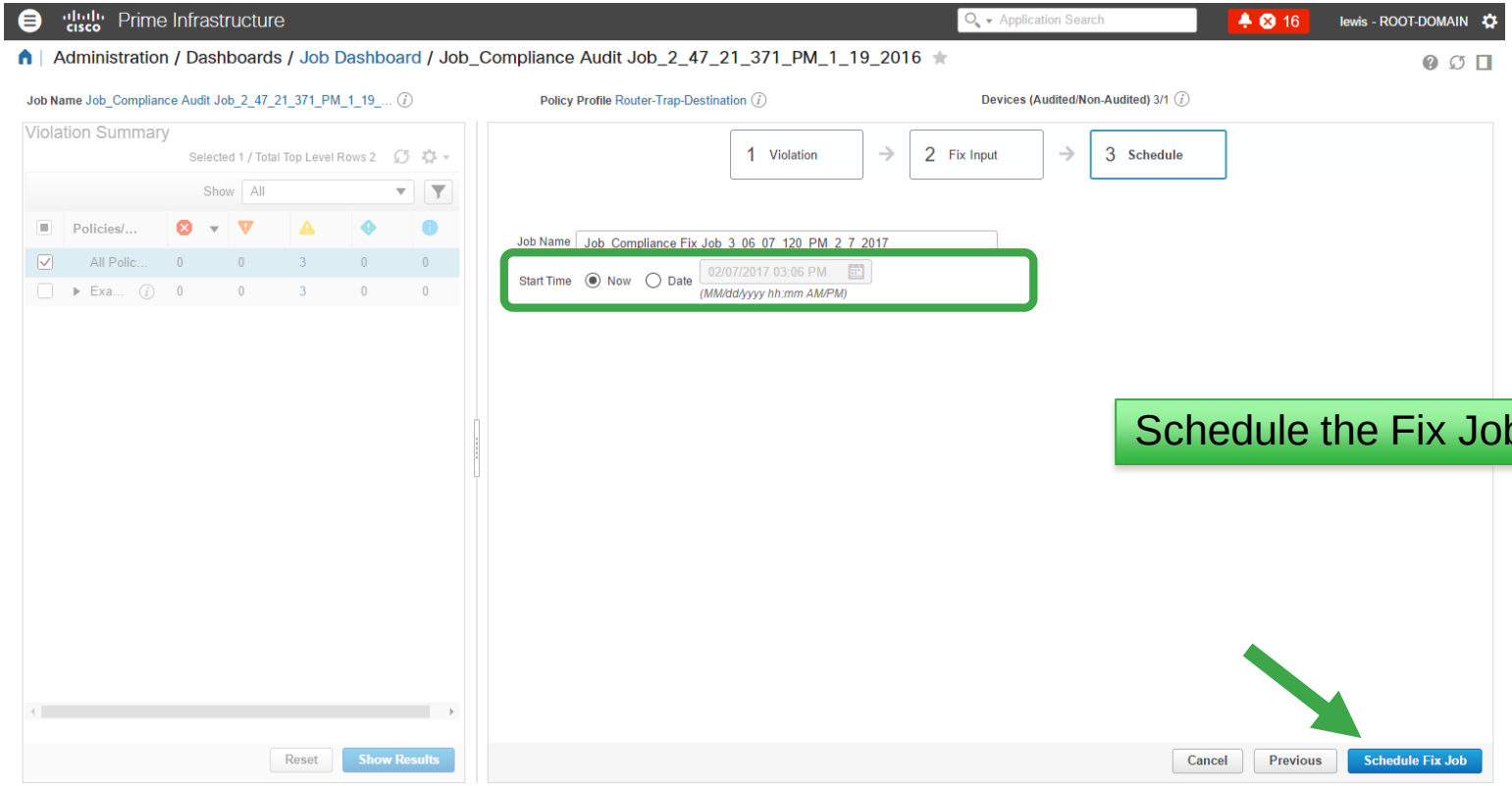
Select/Fix per-device Violations

See Fixed Devices

Generate Fix Jobs



Generate Fix Jobs

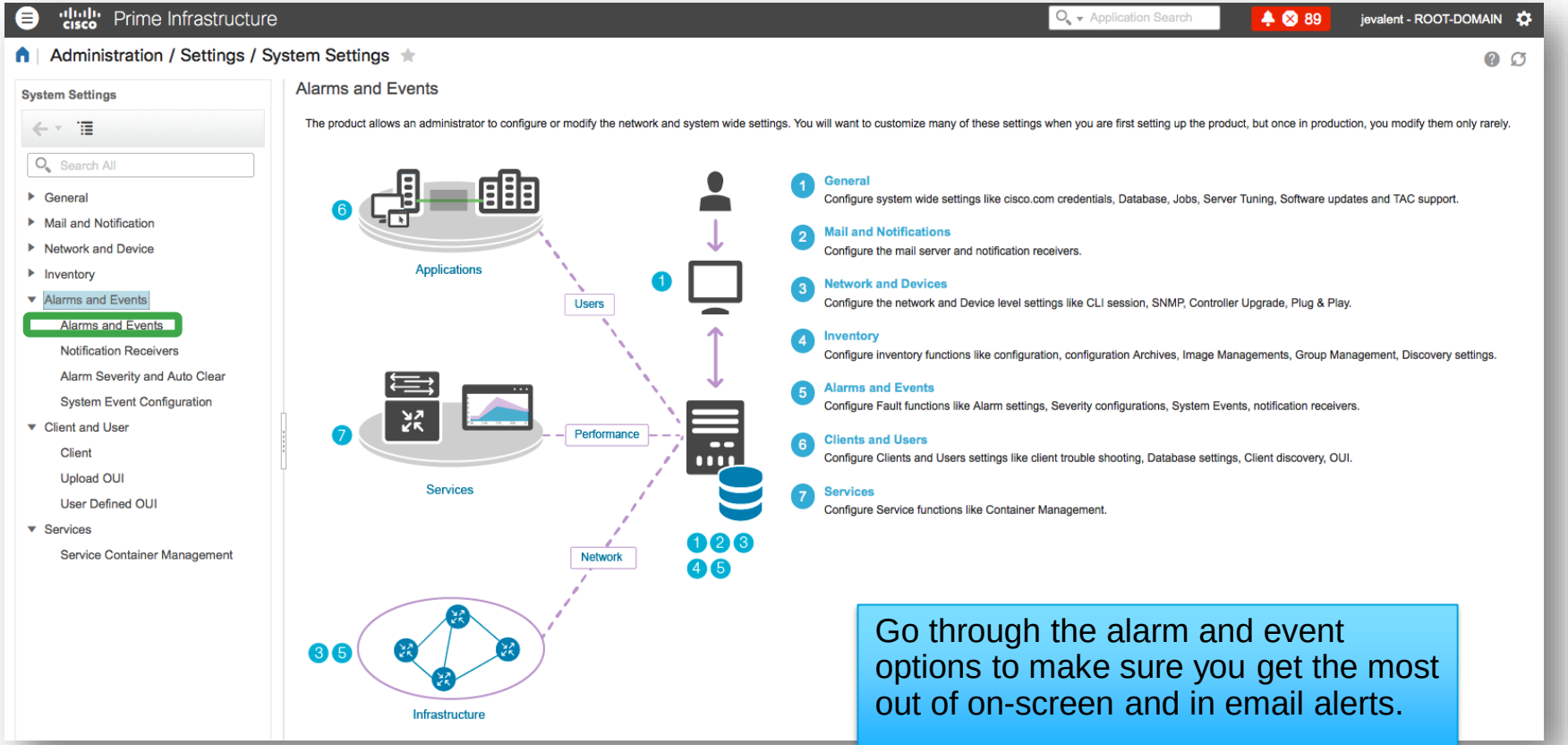


Schedule the Fix Job

PI Fault Monitoring

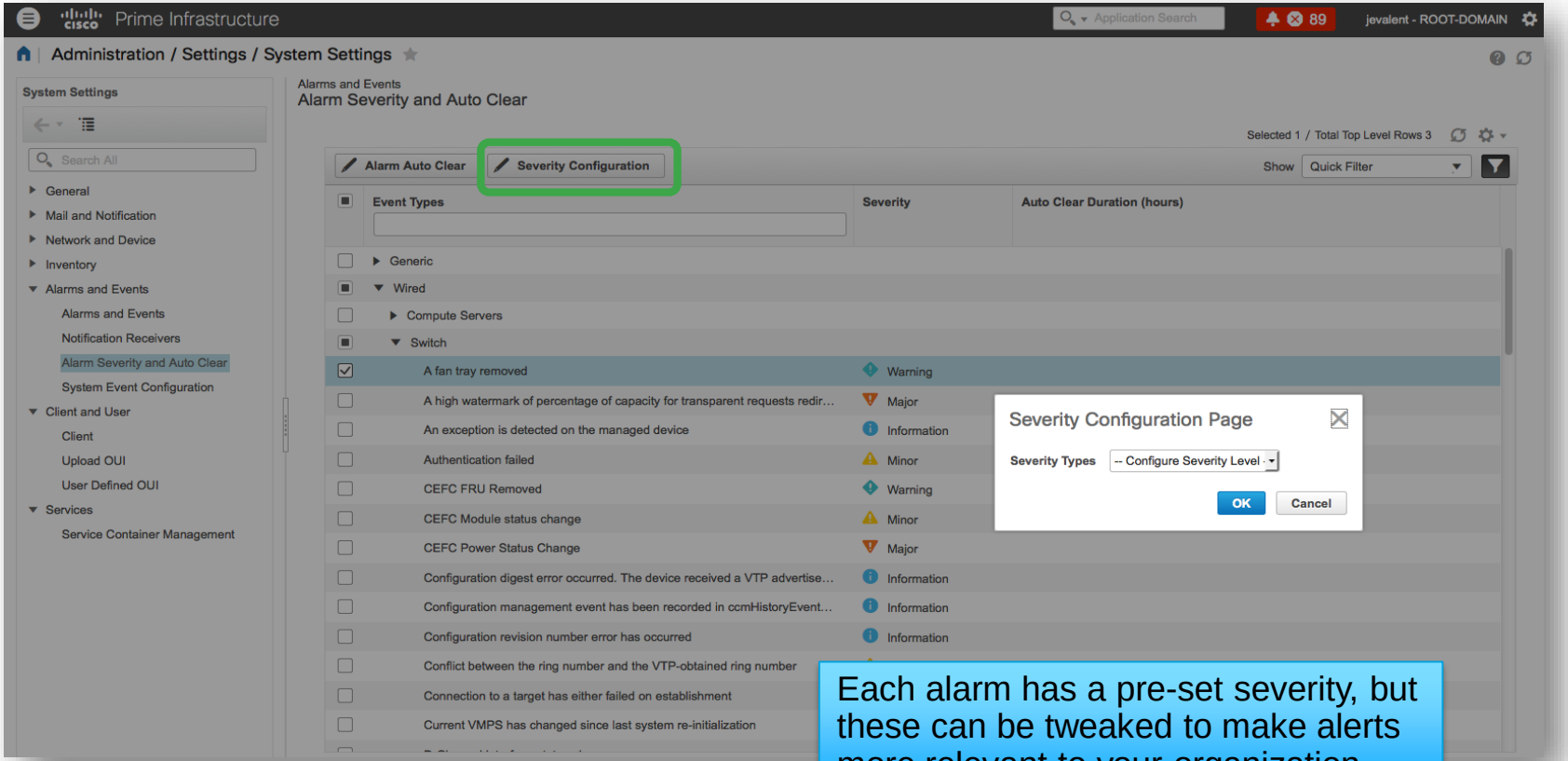
- PI does fault collection and monitoring out of the box
  - Device-level faults
  - Server faults
- Alarms and events can be sent as email notifications
- Alert severity can be customized for specific organizational needs
- Alerts can be acknowledged, cleared and annotated to help identify and prioritize operational work

Configuring Alarm Options



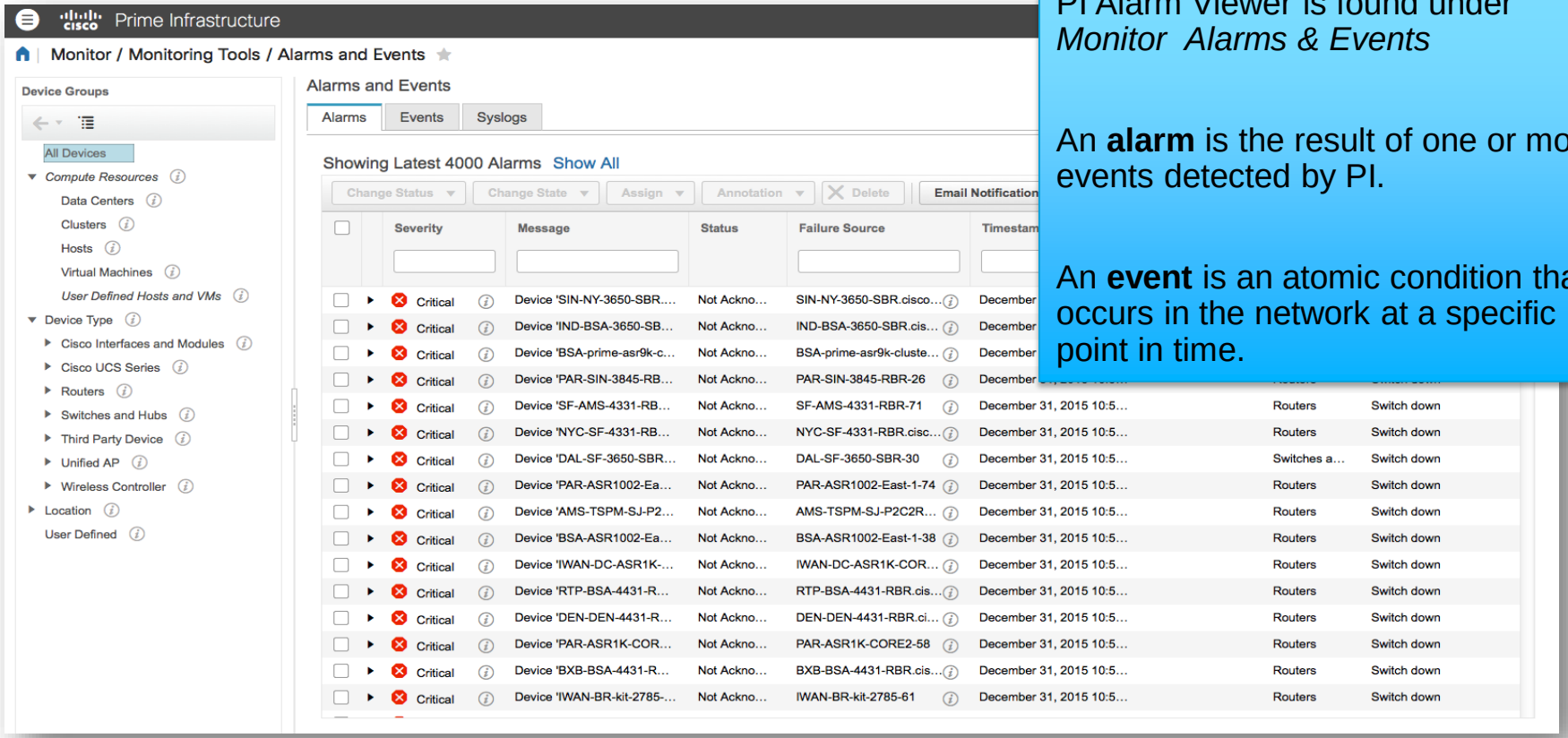
Go through the alarm and event options to make sure you get the most out of on-screen and in email alerts.

Changing Alarm Severities



Each alarm has a pre-set severity, but these can be tweaked to make alerts more relevant to your organization.

PI Alarms And Events

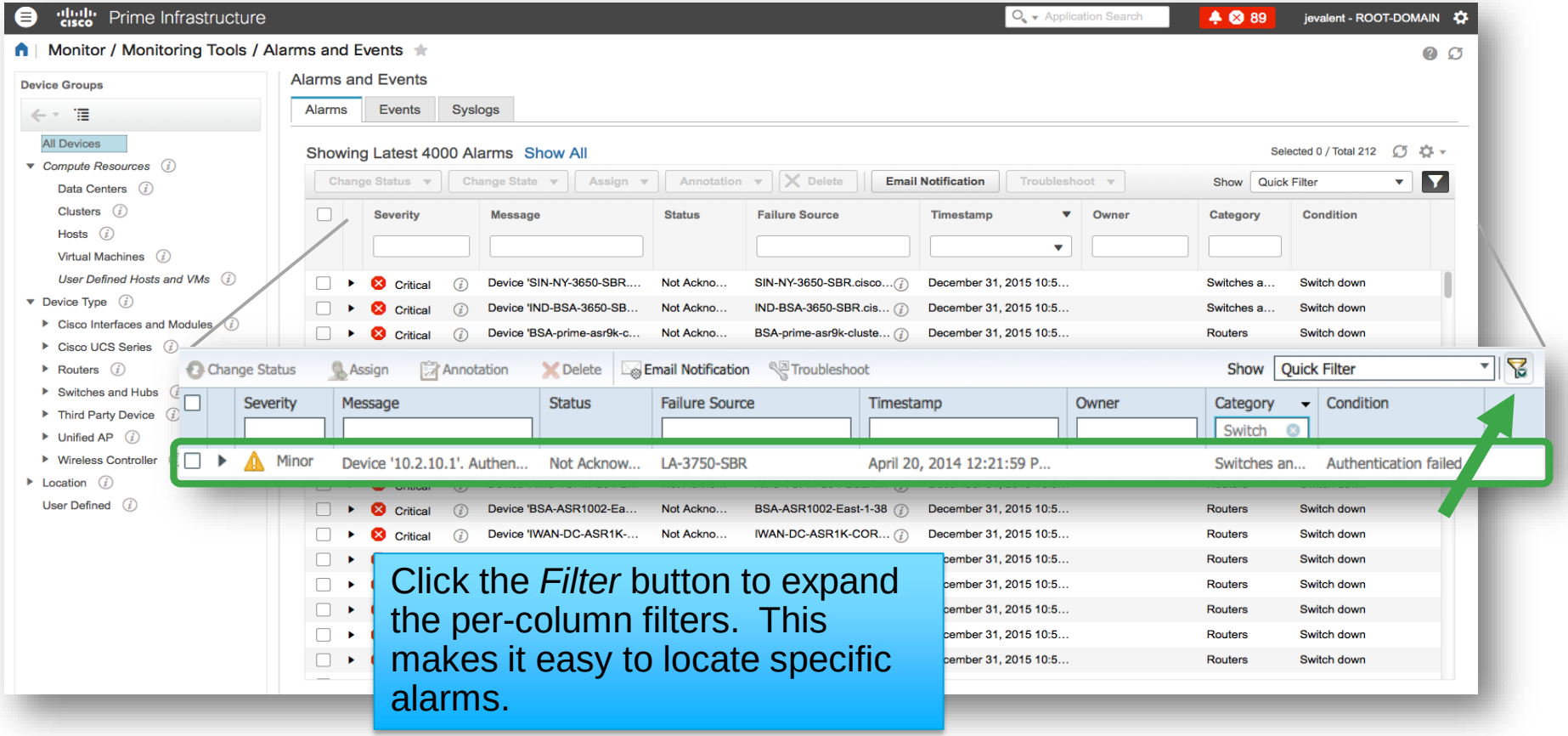


PI Alarm Viewer is found under *Monitor Alarms & Events*

An **alarm** is the result of one or more events detected by PI.

An **event** is an atomic condition that occurs in the network at a specific point in time.

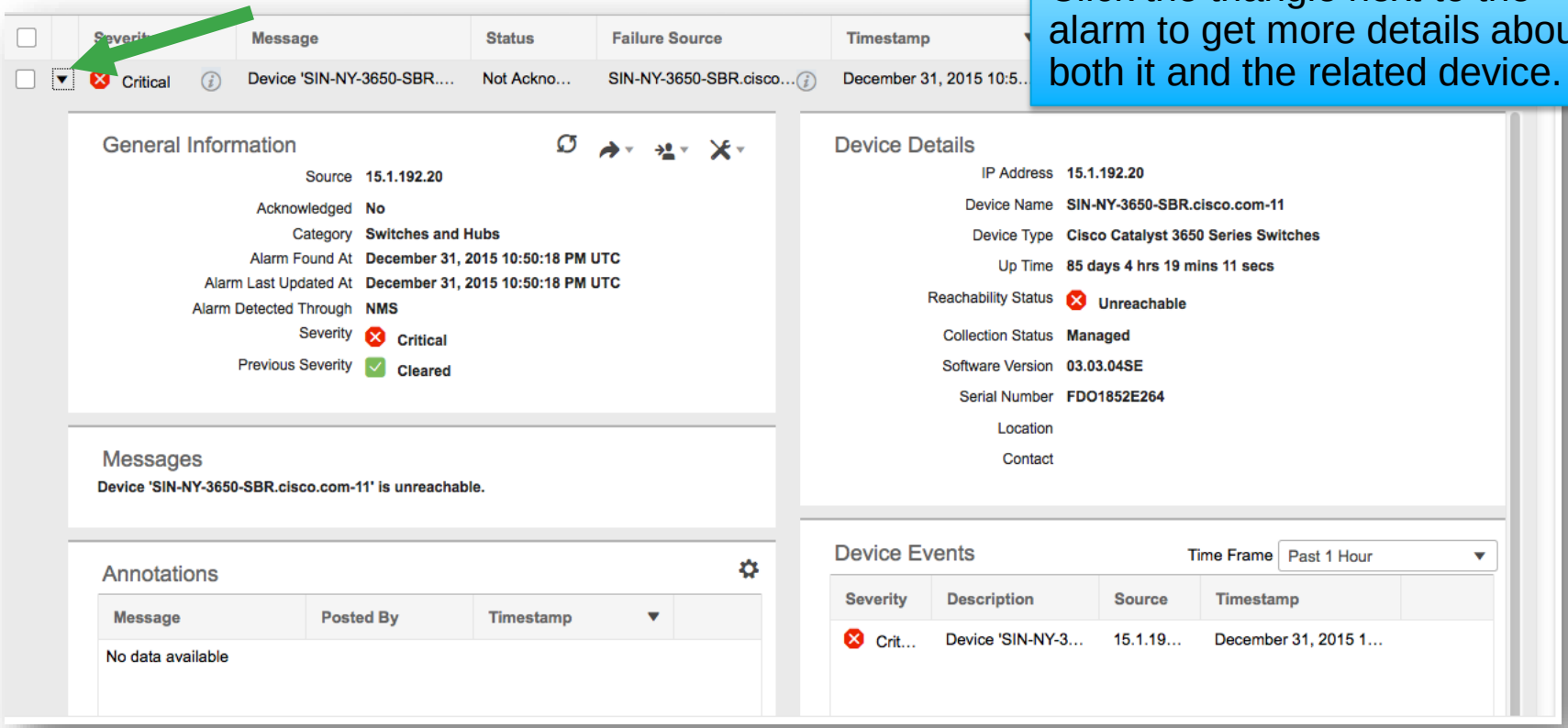
Filtering Alarms



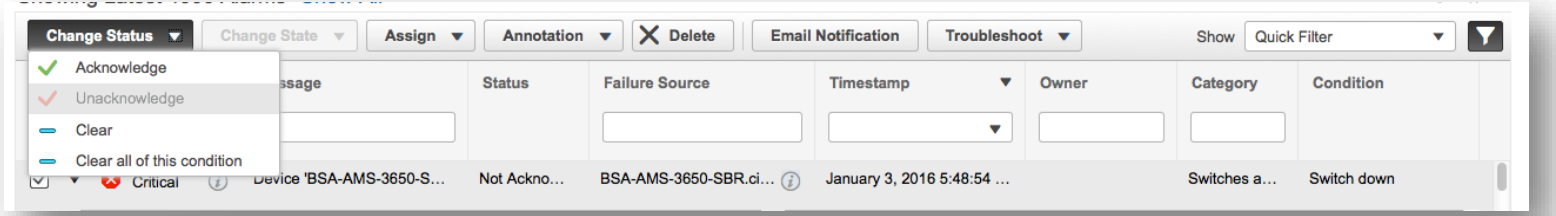
Click the *Filter* button to expand the per-column filters. This makes it easy to locate specific alarms.

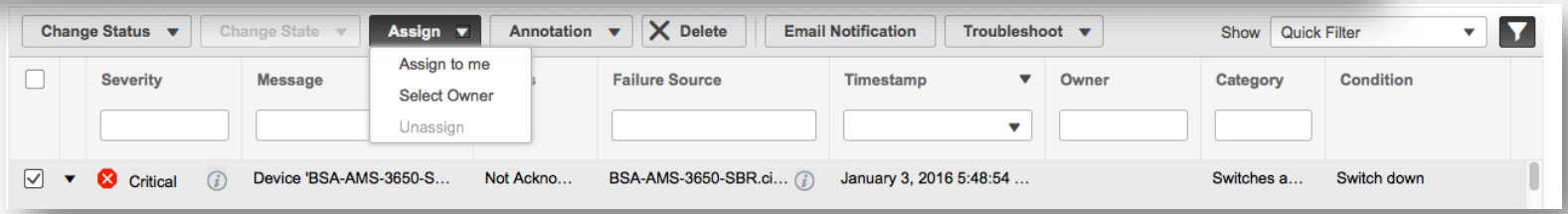
Viewing Alarm Details

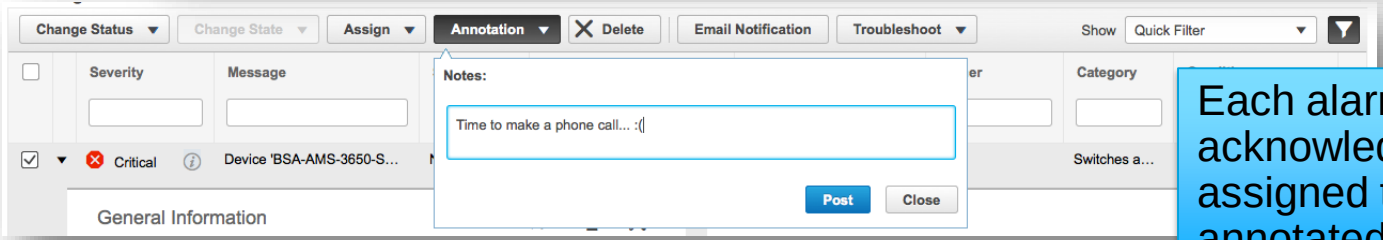
Click the triangle next to the alarm to get more details about both it and the related device.



Alarm Actions

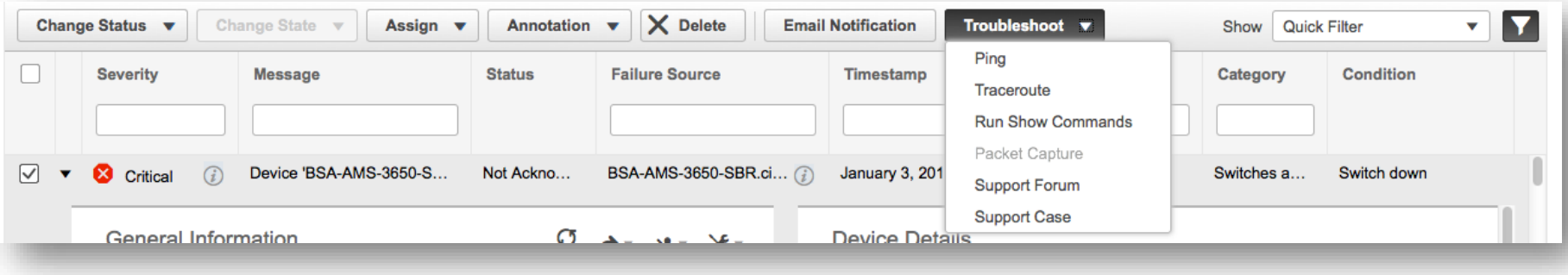






Each alarm can be acknowledged or cleared, assigned to a particular user, annotated, and/or deleted.

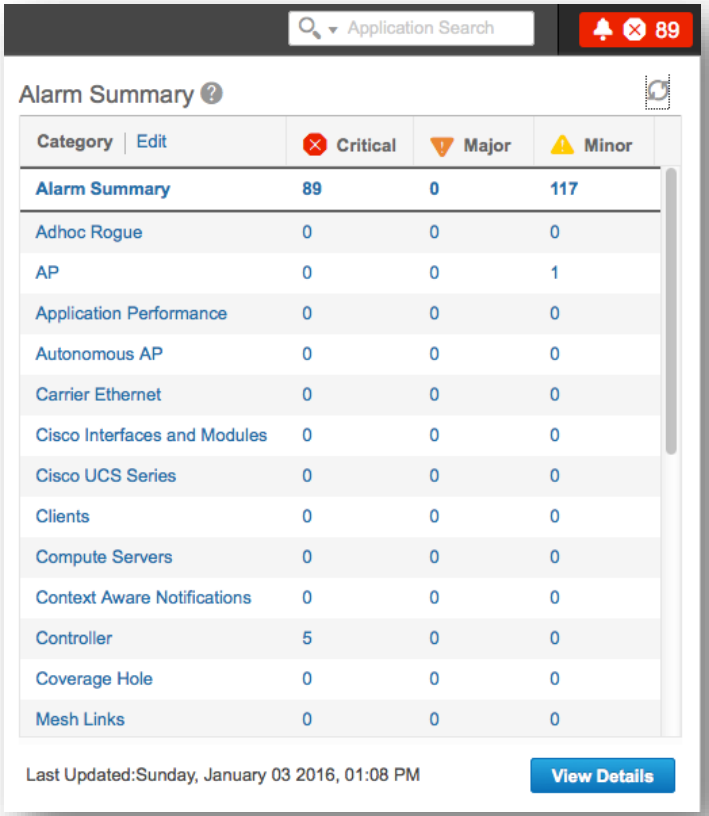
Troubleshooting Alarms



Troubleshooting and support workflows can be launched, within context, directly from an alarm.

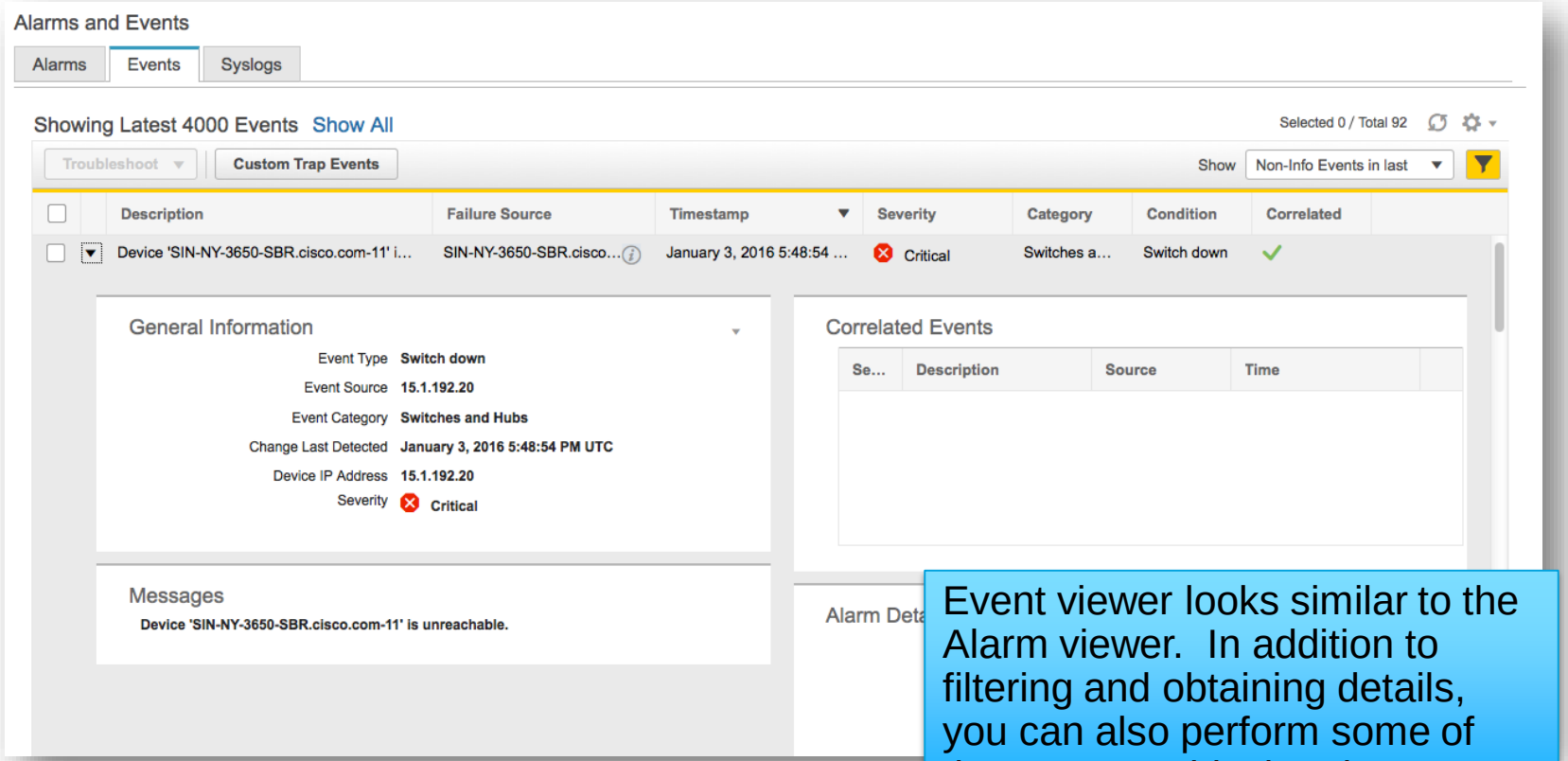
E.g., if a switch is down, run a quick ping to make sure it wasn't a transient issue.

Alarms From The “Toaster”



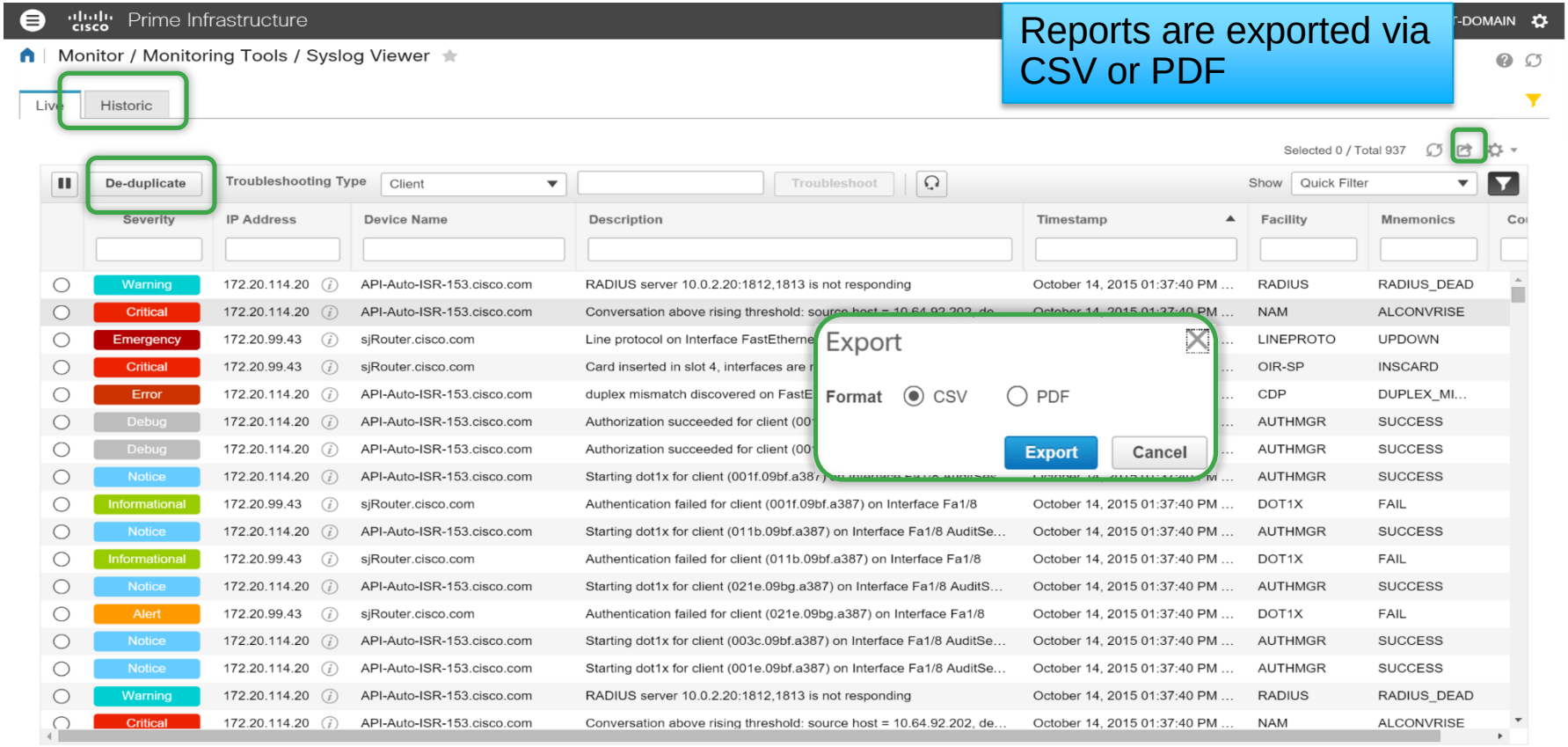
Active alarms are also visible throughout PI from the “toaster” popup at the bottom of all PI windows.

Event Viewer



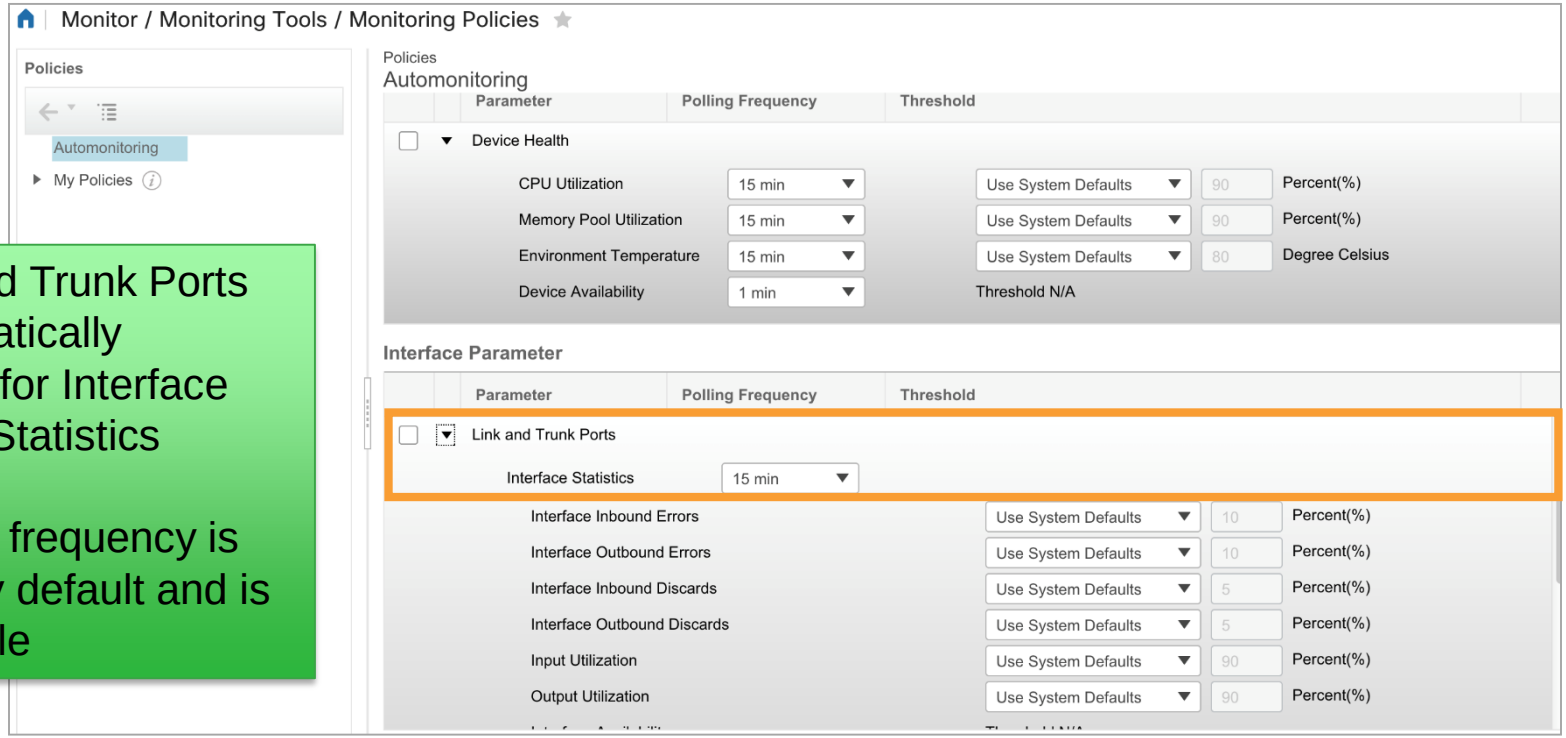
Event viewer looks similar to the Alarm viewer. In addition to filtering and obtaining details, you can also perform some of the same troubleshooting steps.

Viewing Syslog Messages



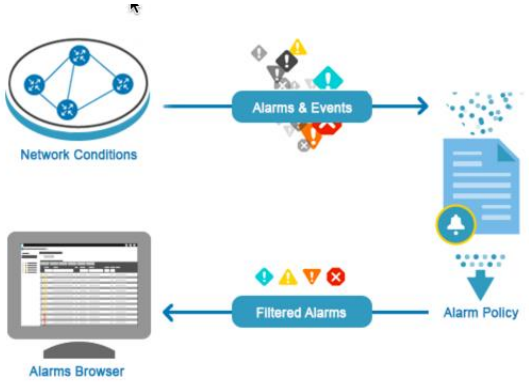
Link/Port Auto-Monitoring

- Access and Trunk Ports are automatically monitored for Interface and QOS Statistics
- Monitor frequency is 15 mins by default and is configurable



Simplify Alarm Noise Reduction

- Flexibility to choose events to be alarmed
- Allows filtering alarms on
  - Device Groups / Location Groups
  - Port Groups
- Suppress alarms, out of the box, for Access Switch Ports
- Advance suppression for wireless alarms based on
  - Percentage down on Location Group / Floors

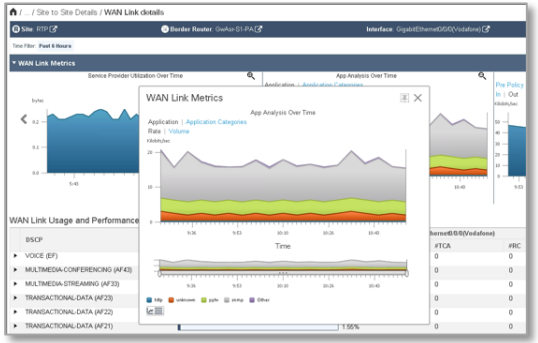


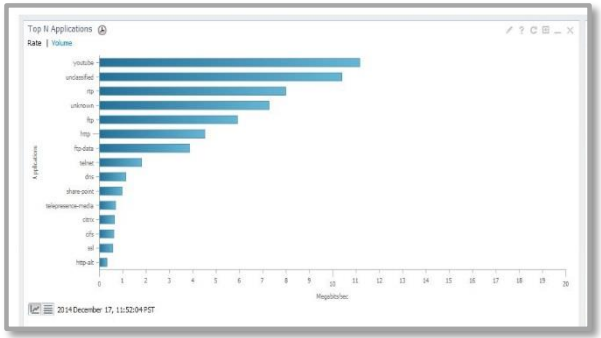
Raise critical alarms that needs action
Reduce time to clean up alarms

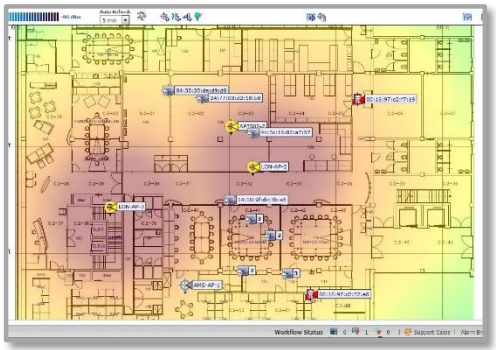
Client Tracking

- User (or Client) Tracking in PI shows converged wired and wireless clients
- Clients on autonomous APs, lightweight APs, and switches are supported
  - 802.1x authentication can be detected
  - Non-authenticated also supported
- Like LMS, live tracking of clients can be done by enabling MAC address notification traps on switches

Cisco Live Milan 2015: The Bit-Torrent Incident

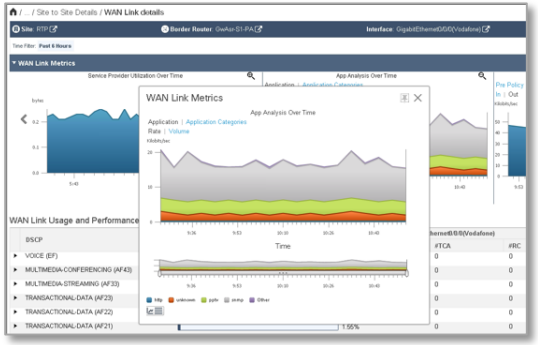


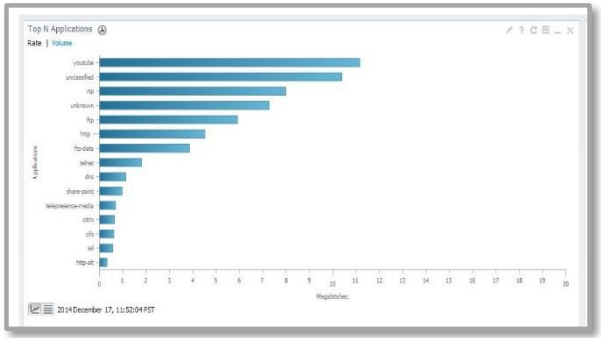


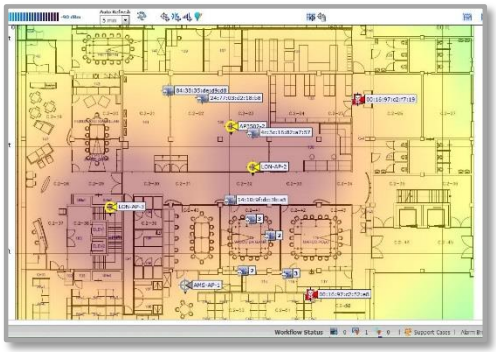


- On Friday before the show, staff is looking at network health with Prime Infrastructure
- They notice a large volume of traffic, taking up a lot of WAN bandwidth
- Easily able to see that the traffic is all from one user, and is all **Bit-Torrent** !!??!?!
- Immediately able to see the exact end-point (IP & MAC address)
- NAM shows hostname is “Matt’s MacBook”
- Integration with MSE lets wireless maps show the exact location of “Matt”

Cisco Live Milan 2015: The Bit-Torrent Incident



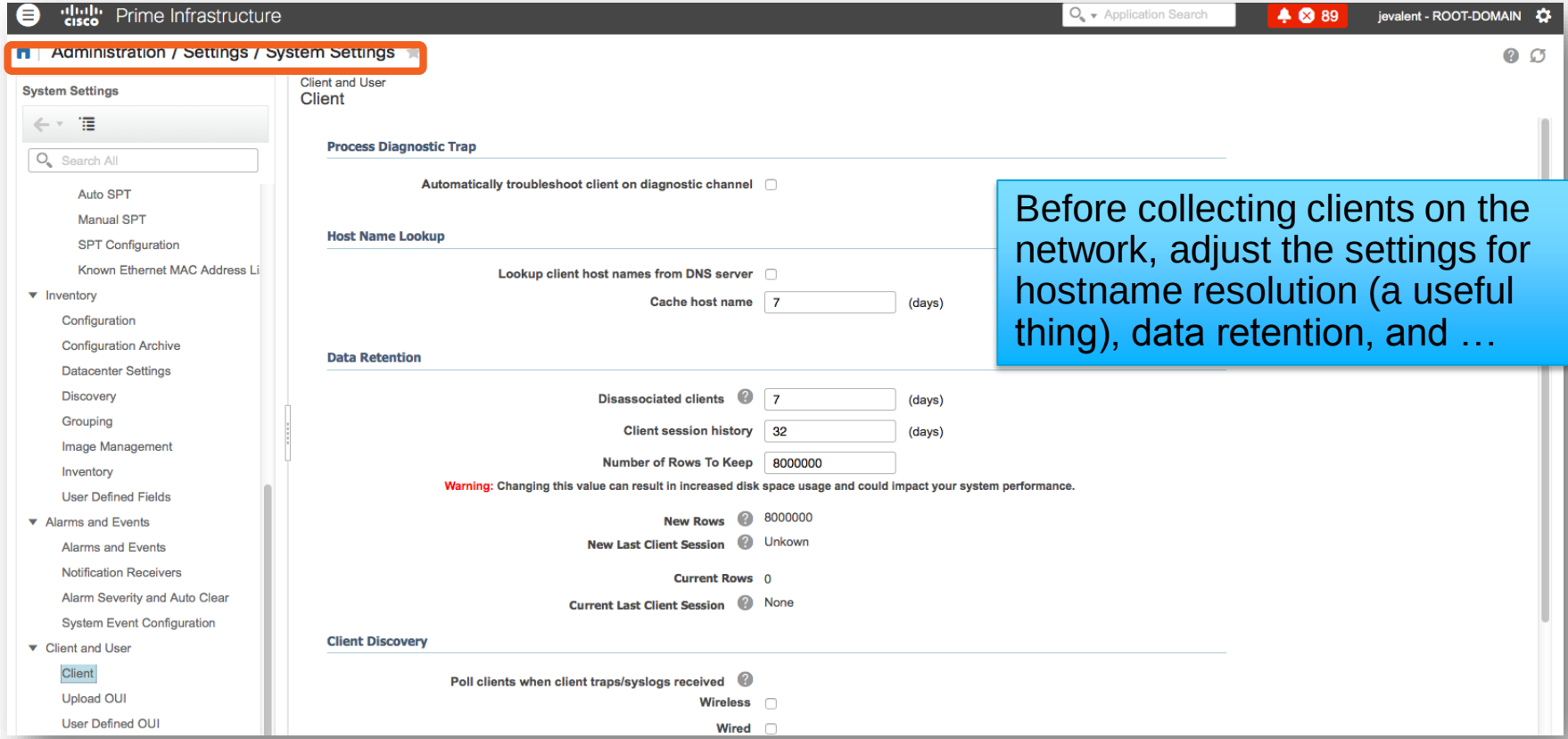




- Staff walks down and has a chat with “Matt”
- He shuts off Bit-Torrent
- ACL added to WAN interface
- **Problem solved in less than 15 minutes** - including the time to walk downstairs to find Matt!

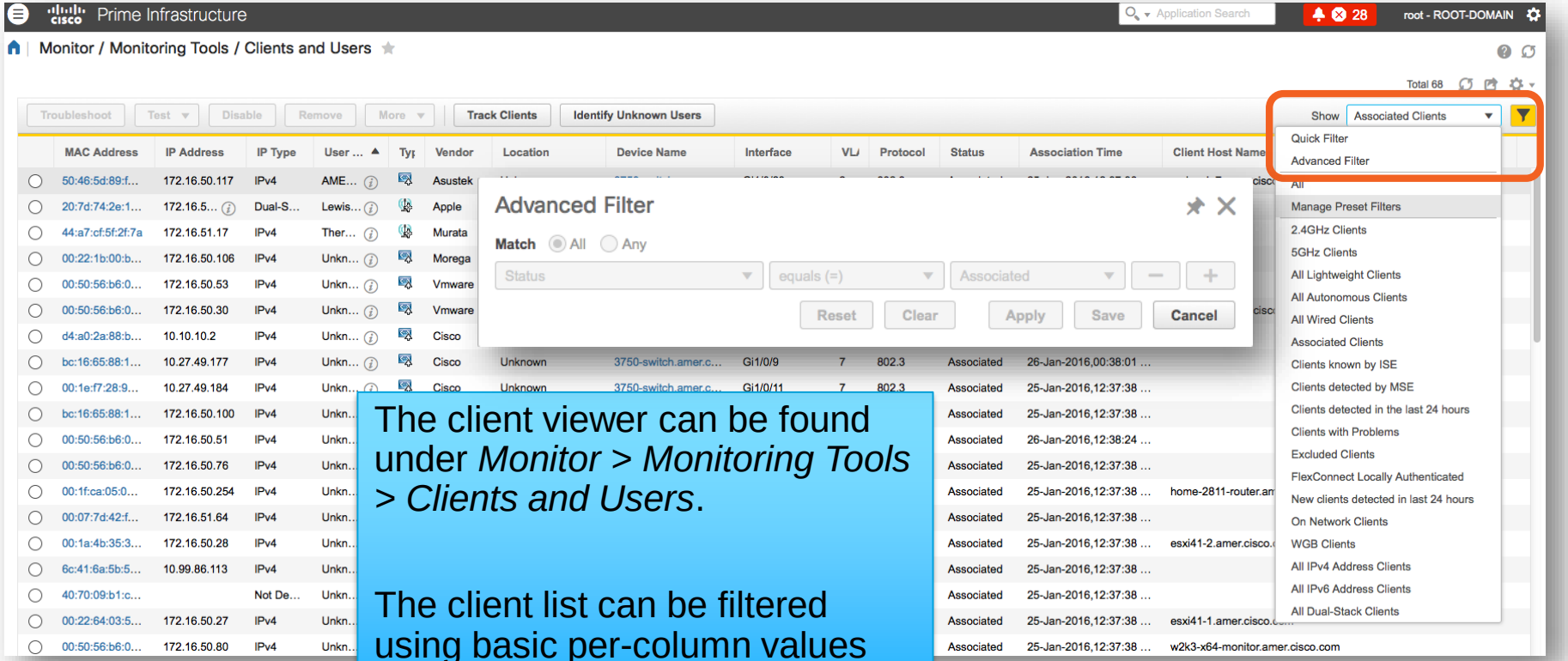
Silo tools cannot do this!

Setting Up For Client Tracking



Before collecting clients on the network, adjust the settings for hostname resolution (a useful thing), data retention, and …

Viewing/Filtering The Clients

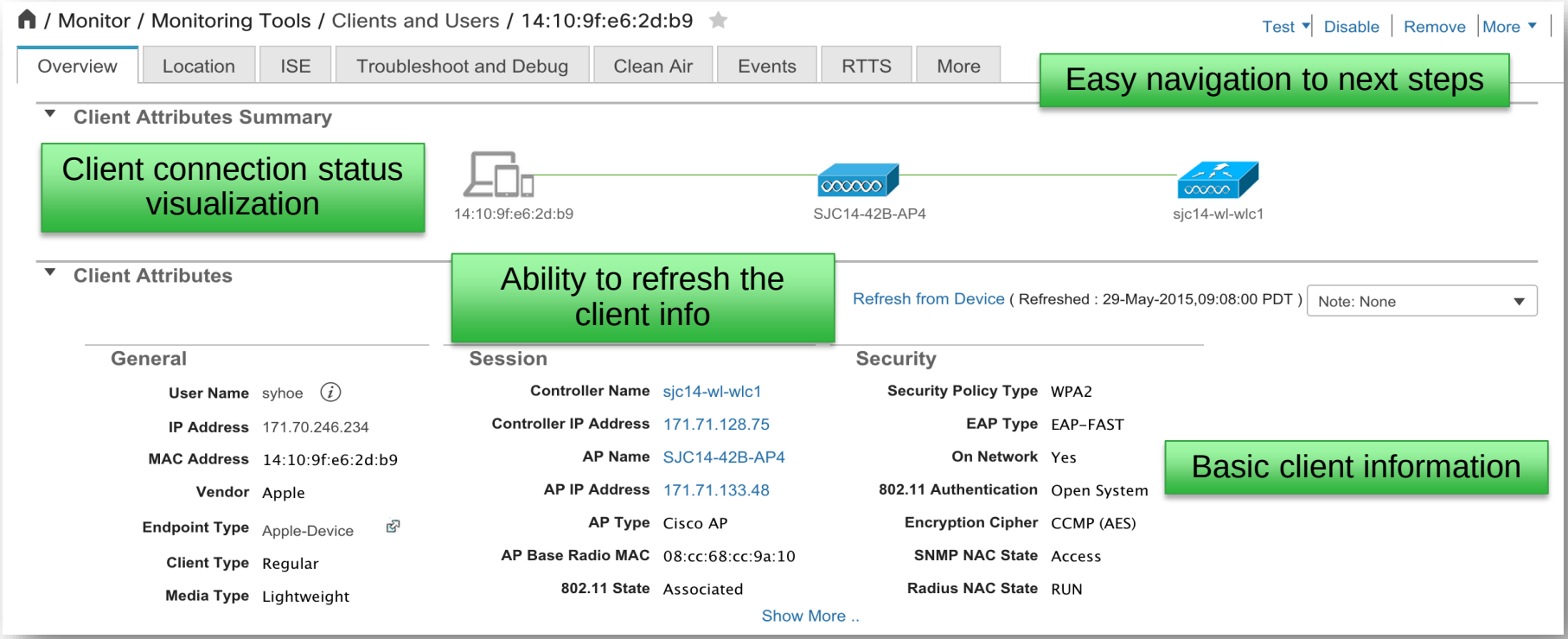


The client viewer can be found under *Monitor > Monitoring Tools > Clients and Users*.

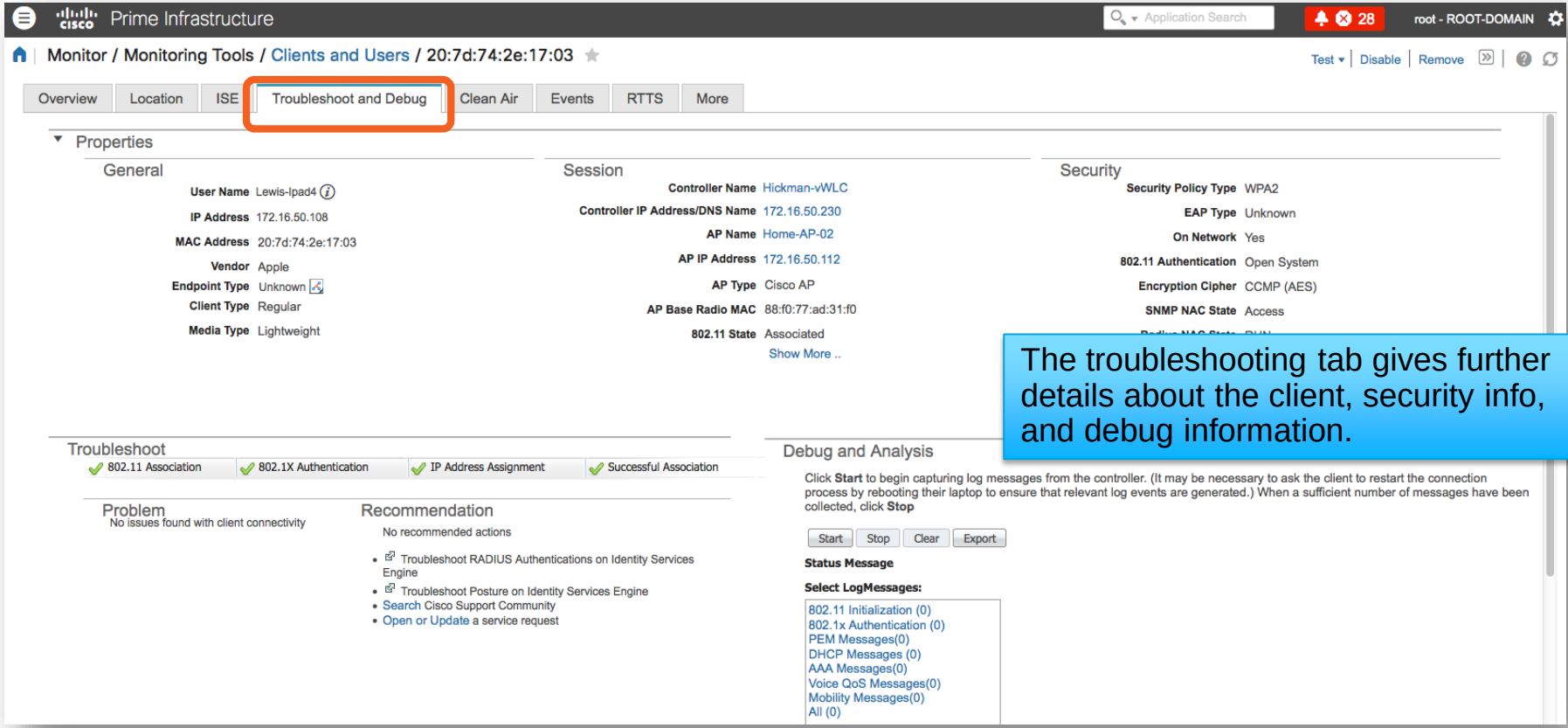
The client list can be filtered using basic per-column values with the *Quick Filter* "Show" option…

Viewing Client Details

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

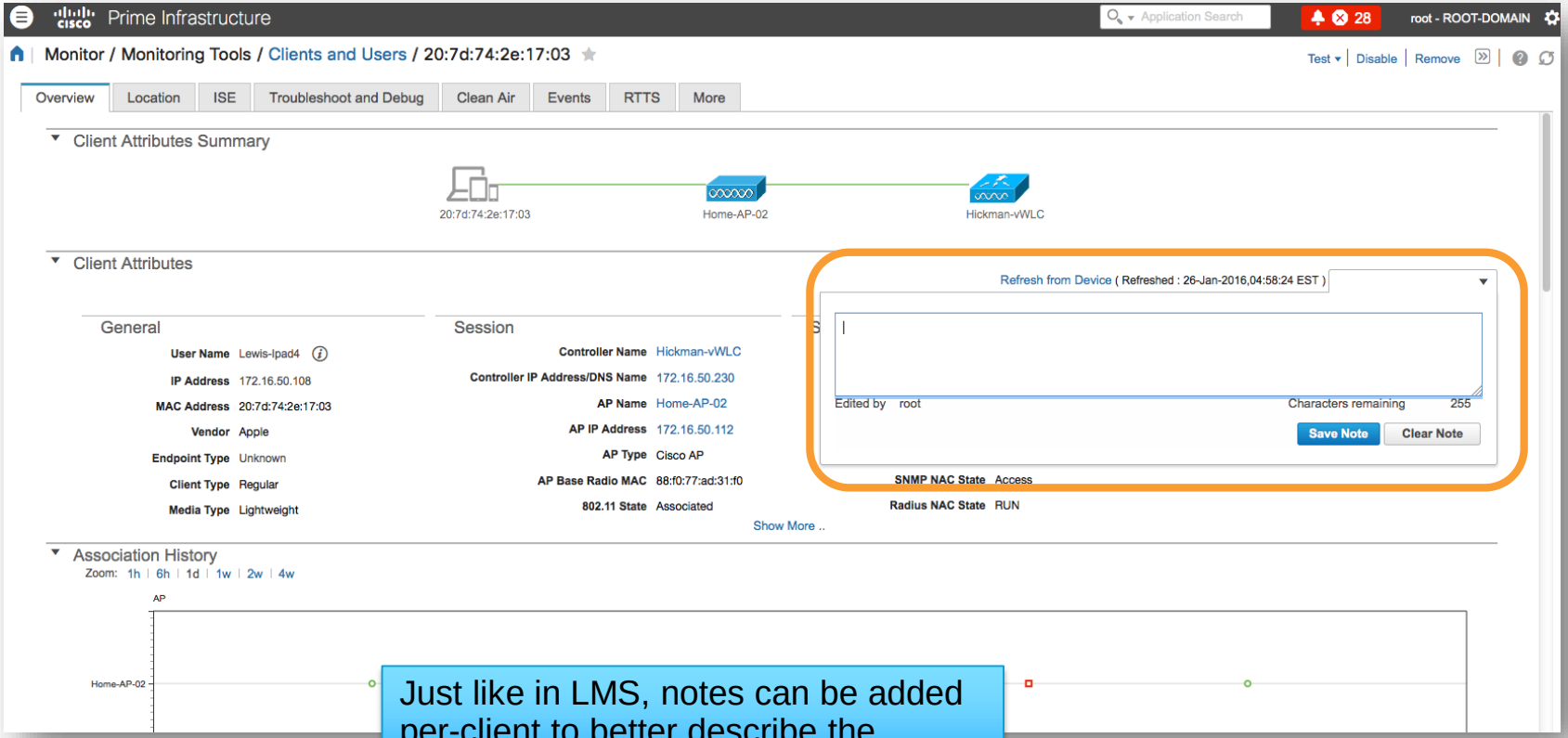


Viewing Client Details - Troubleshooting



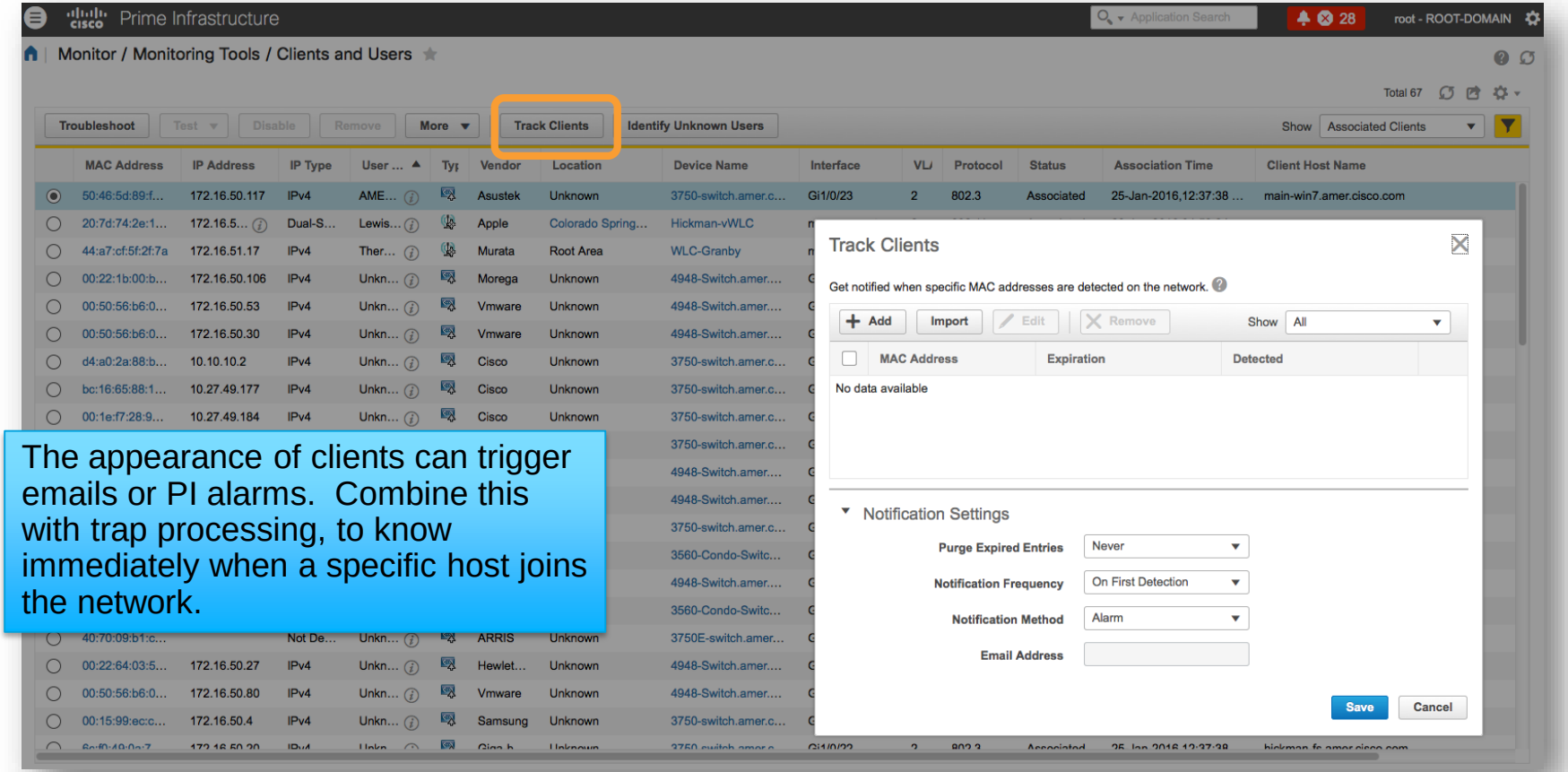
The troubleshooting tab gives further details about the client, security info, and debug information.

Annotating Client Information



Just like in LMS, notes can be added per-client to better describe the client's purpose.

Tracking Clients

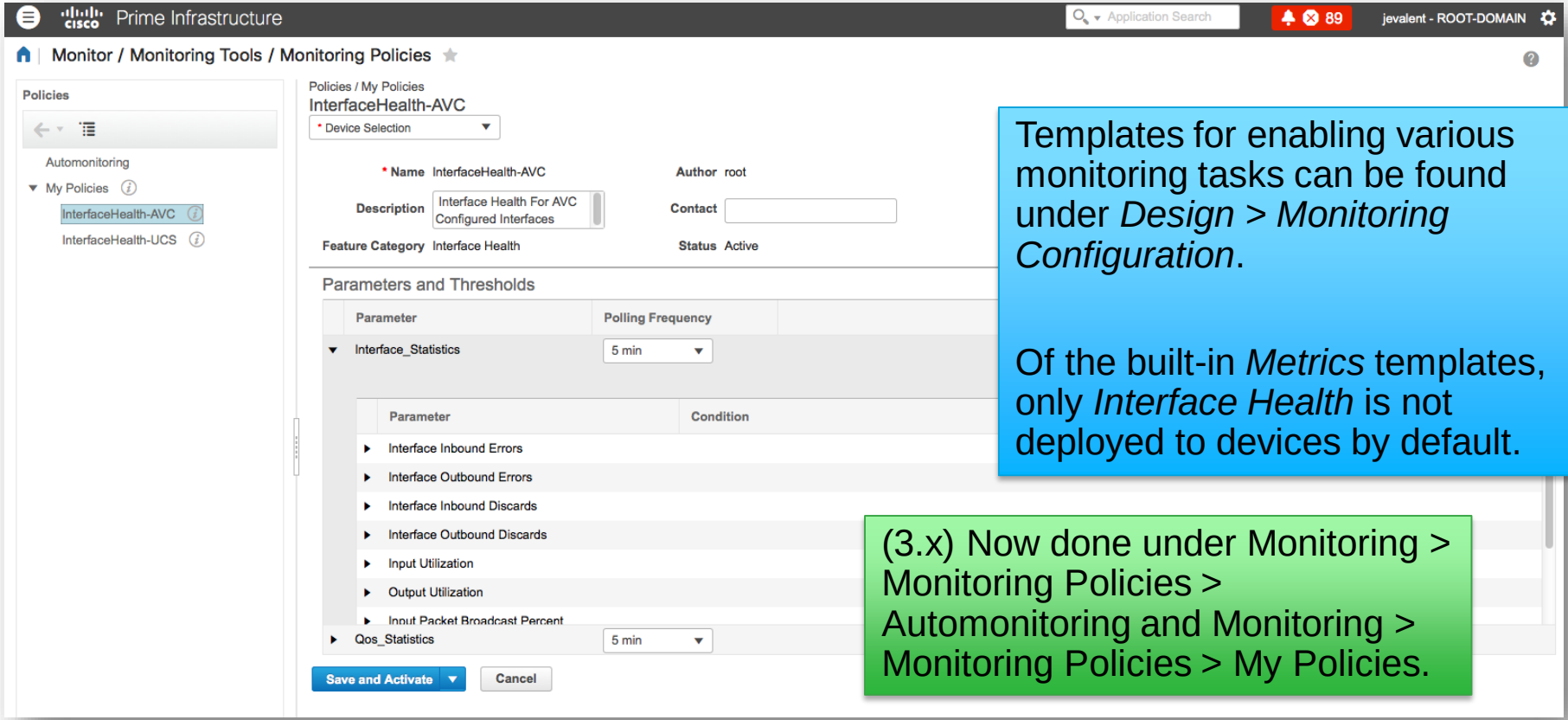


The appearance of clients can trigger emails or PI alarms. Combine this with trap processing, to know immediately when a specific host joins the network.

Network Monitoring

- PI has a number of monitoring features
  - Device health
  - Interface utilization
  - Performance and application
- Performance and application monitoring requires the Assurance License
- Many of PI's monitoring features are enabled out-of-the-box
- Dashlets make it easy to quickly spot problems in the network

Enabling Monitoring Templates

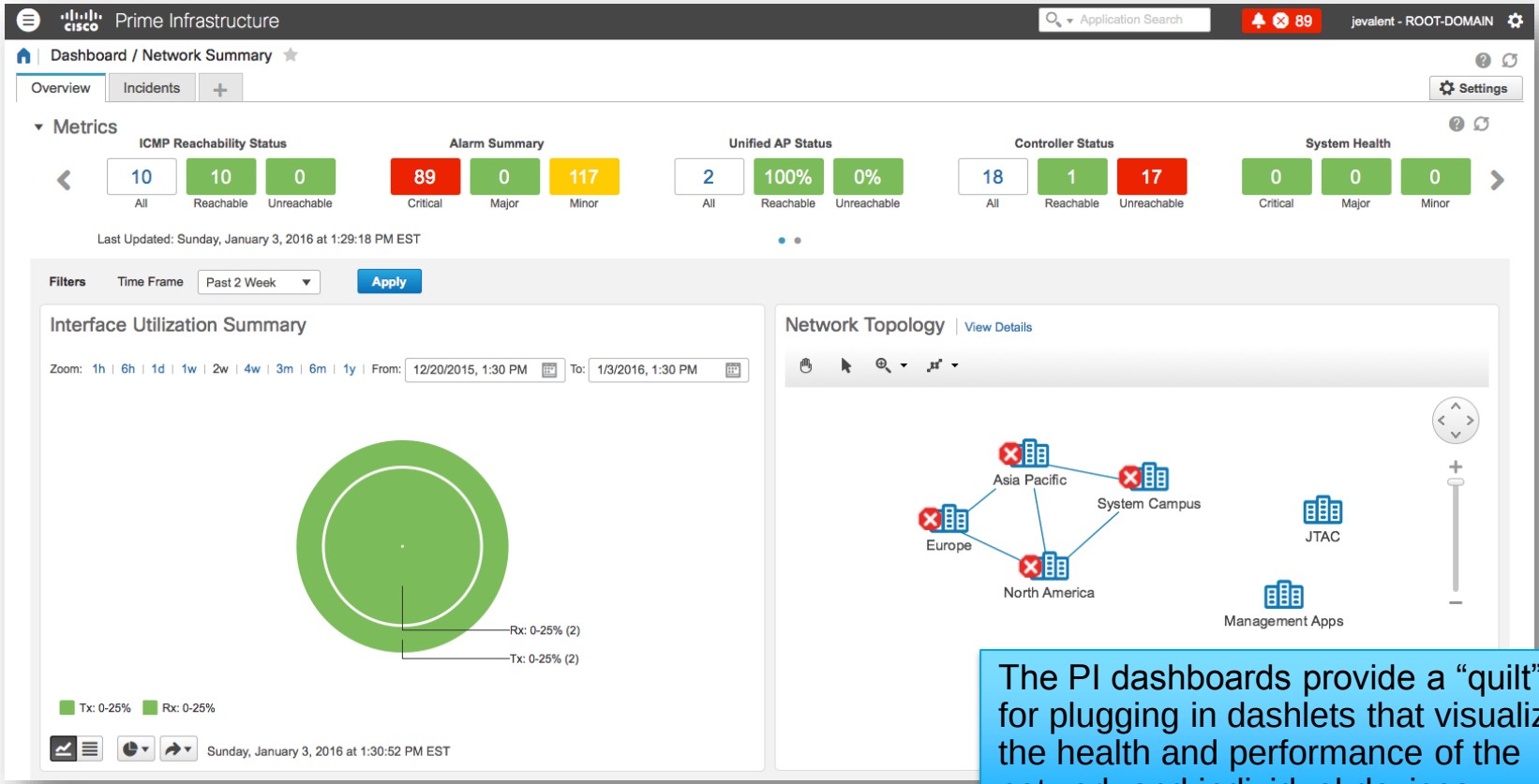


Templates for enabling various monitoring tasks can be found under *Design > Monitoring Configuration*.

Of the built-in *Metrics* templates, only *Interface Health* is not deployed to devices by default.

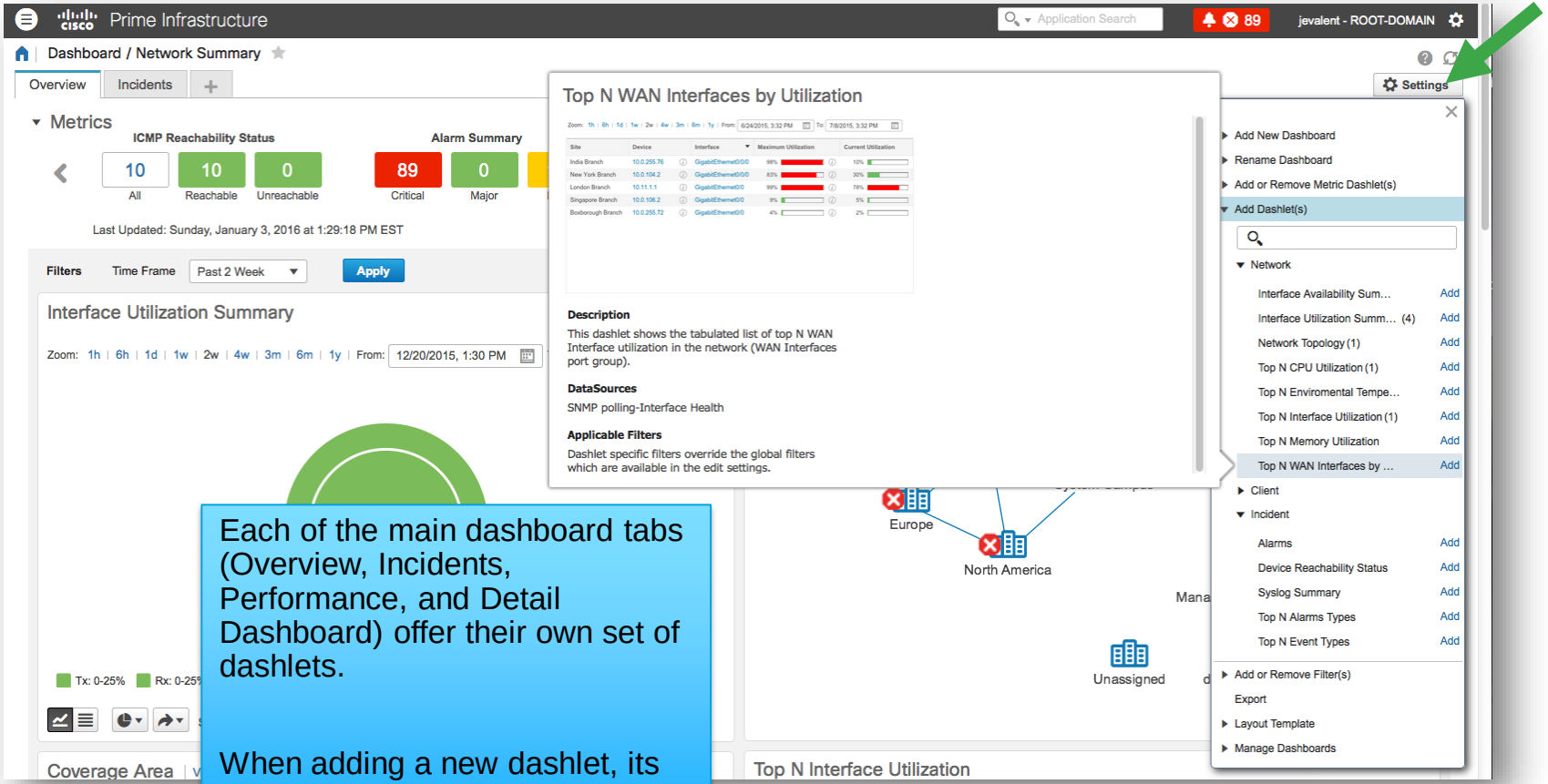
(3.x) Now done under Monitoring > Monitoring Policies > Automonitoring and Monitoring > Monitoring Policies > My Policies.

Dashboards and Dashlets



The PI dashboards provide a “quilt” for plugging in dashlets that visualize the health and performance of the network and individual devices.

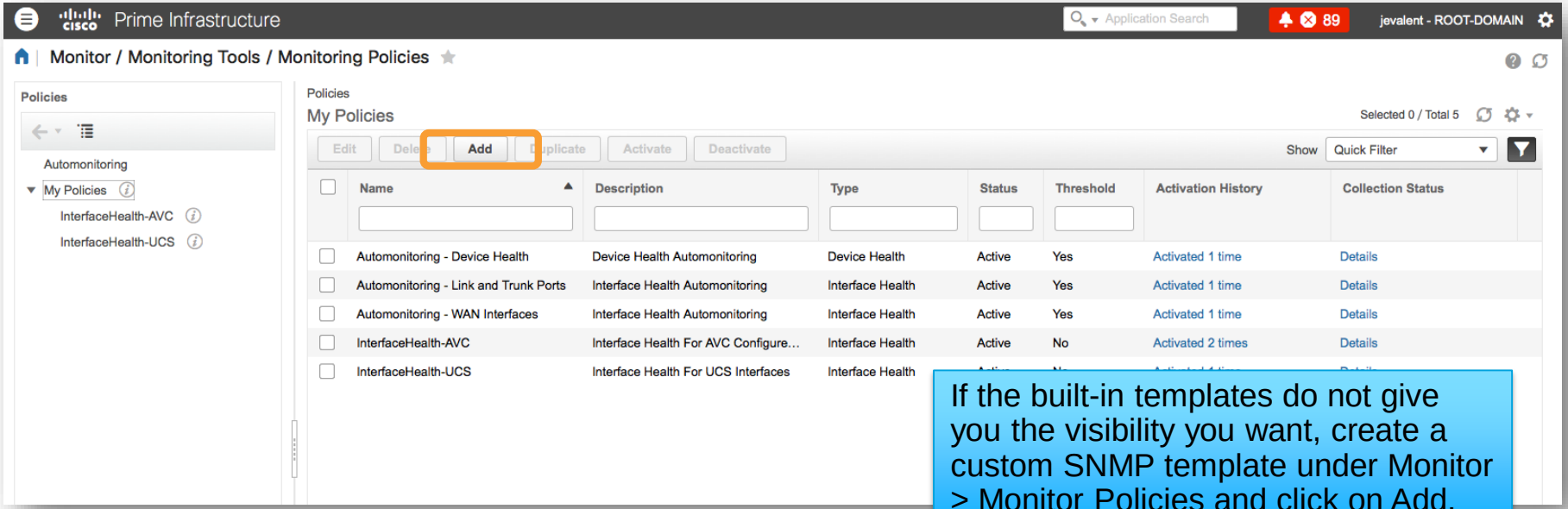
Dashboards and Dashlets



Each of the main dashboard tabs (Overview, Incidents, Performance, and Detail Dashboard) offer their own set of dashlets.

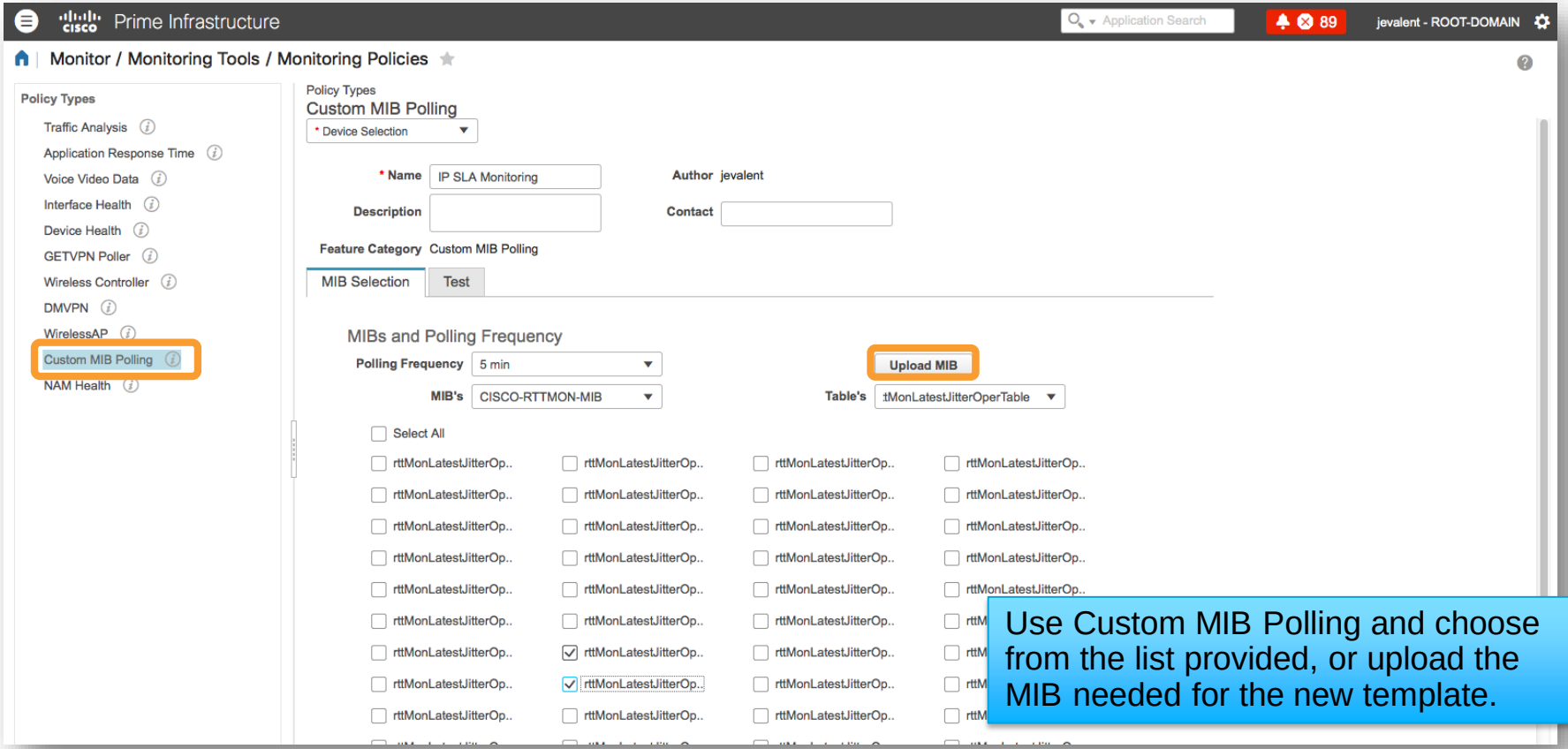
When adding a new dashlet, its preview will show up when you mouse-over the reticle.

Custom SNMP Templates

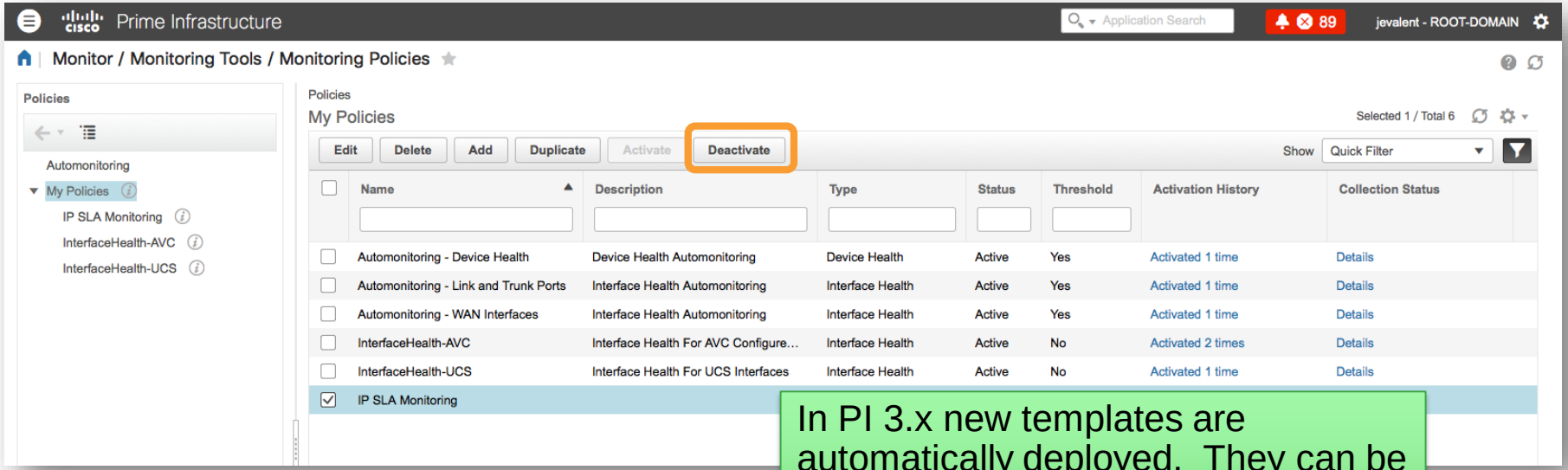


If the built-in templates do not give you the visibility you want, create a custom SNMP template under Monitor > Monitor Policies and click on Add.

Custom SNMP Templates

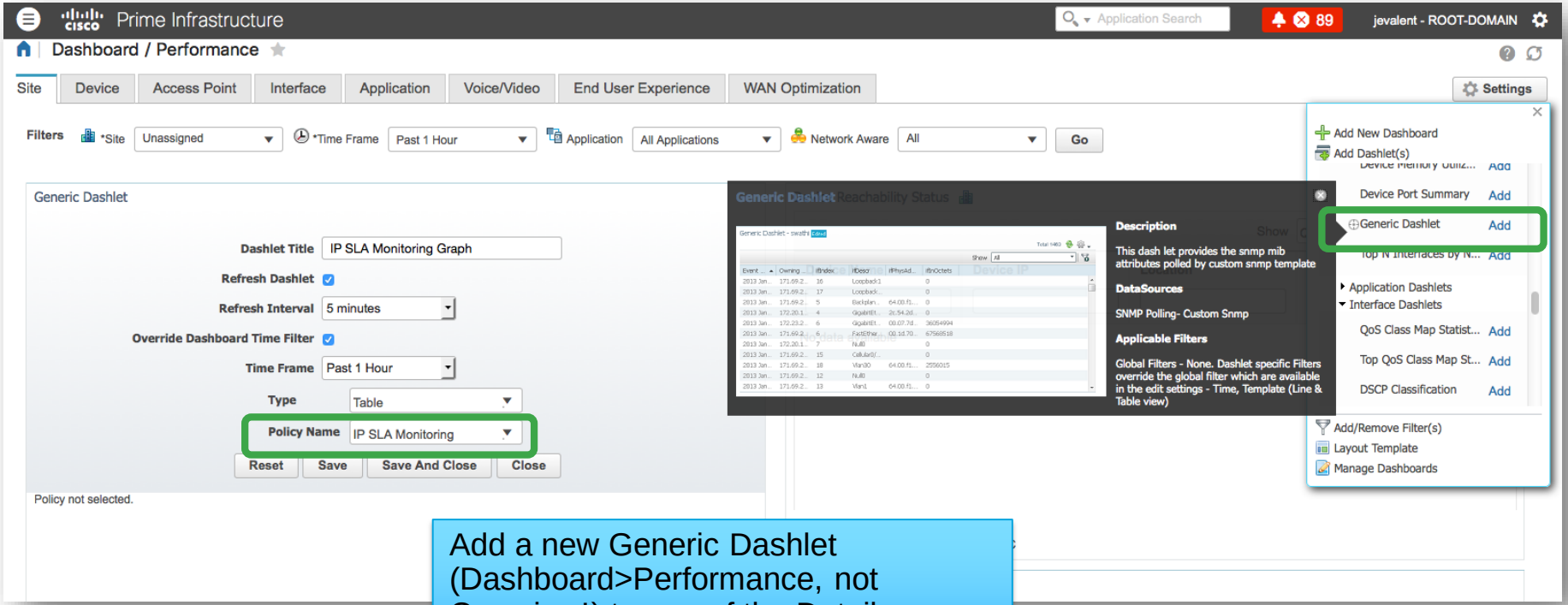


Custom SNMP Templates



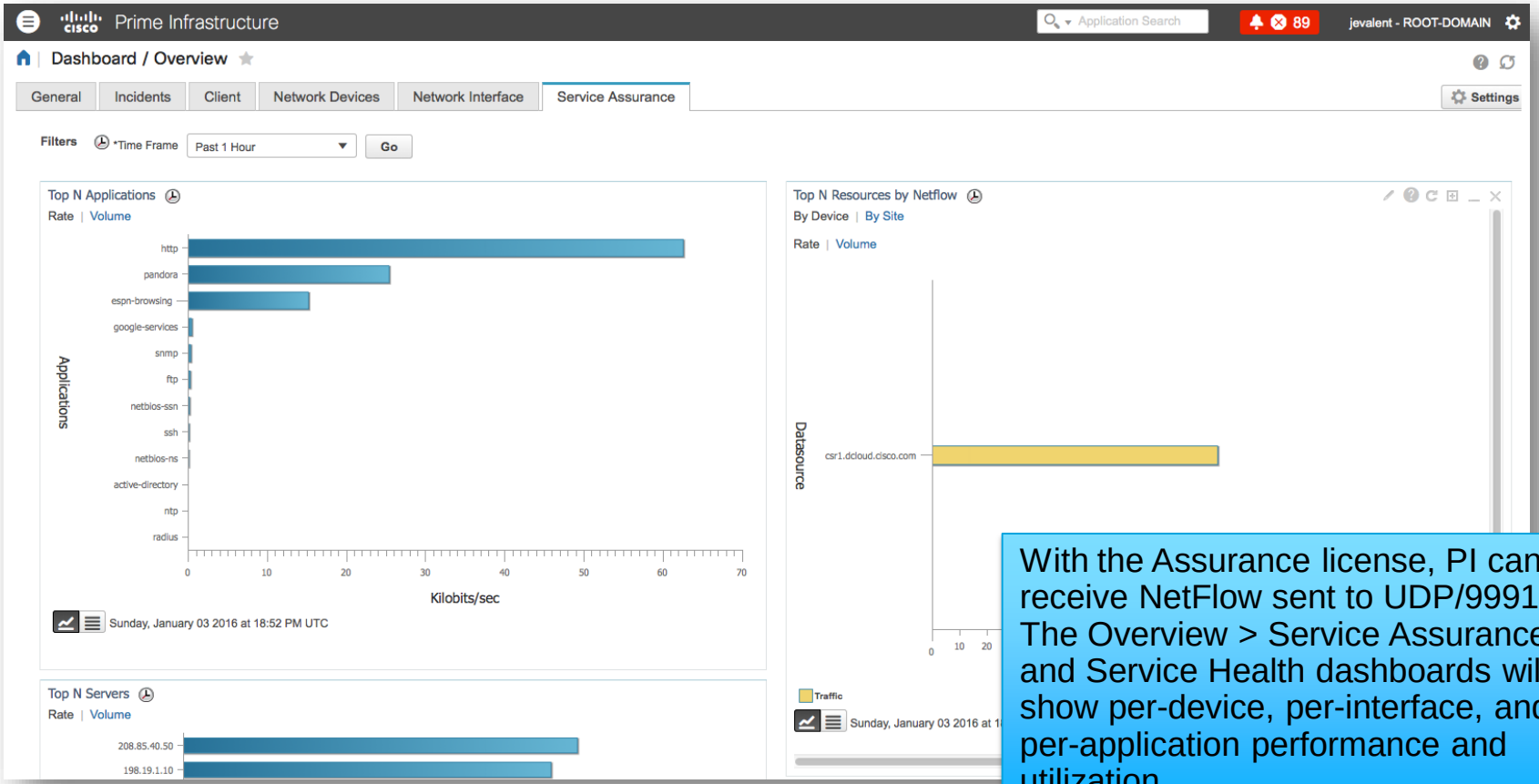
In PI 3.x new templates are automatically deployed. They can be deactivated by going to Monitor>Monitoring Policies>My Policies, and selecting the new policy.

Monitoring The New Template



Add a new Generic Dashlet (Dashboard>Performance, not Overview!) to one of the Detail Dashboards and fill in the desired parameters for your custom template.

Monitoring Application Performance



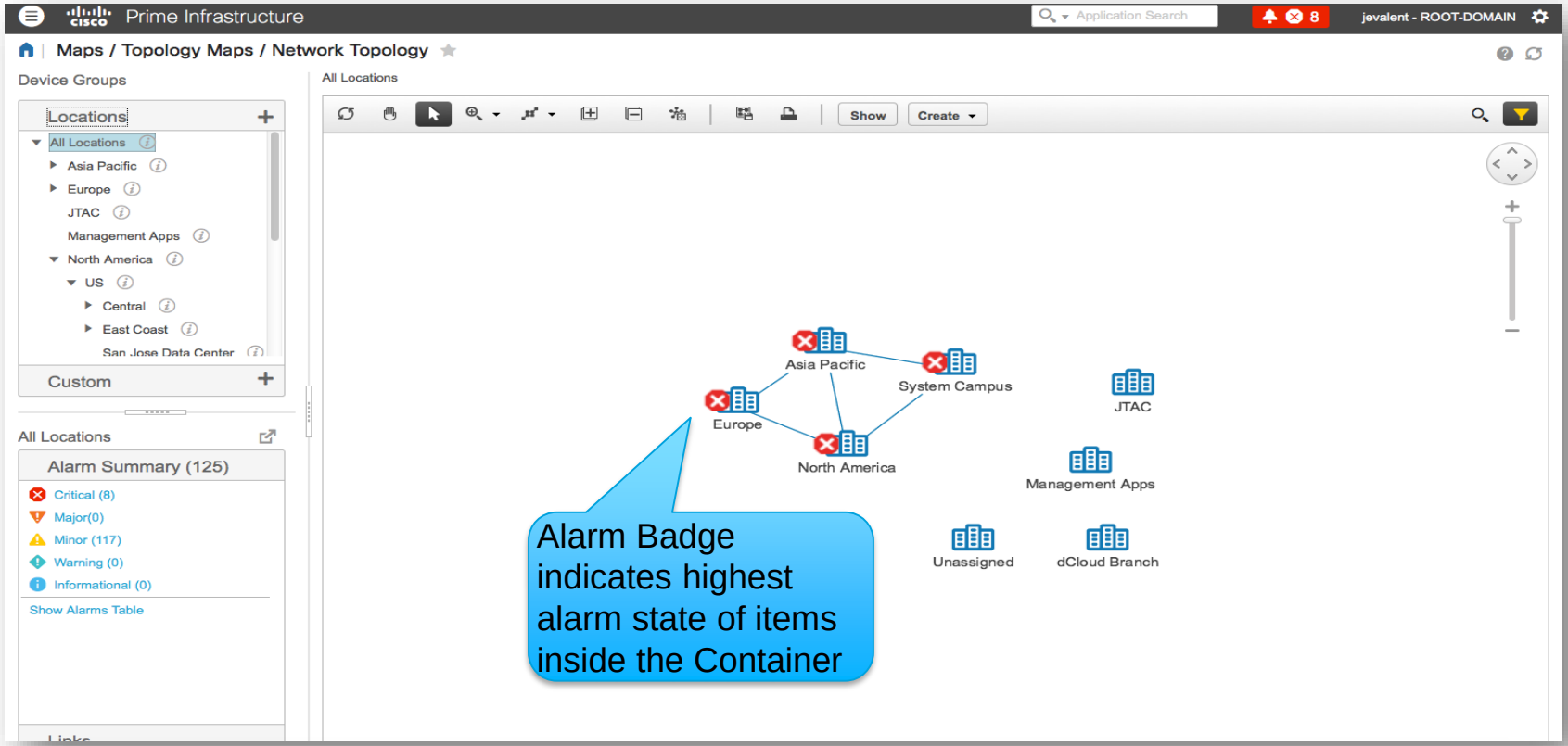
With the Assurance license, PI can receive NetFlow sent to UDP/9991. The Overview > Service Assurance and Service Health dashboards will show per-device, per-interface, and per-application performance and utilization.

Performance Graphs

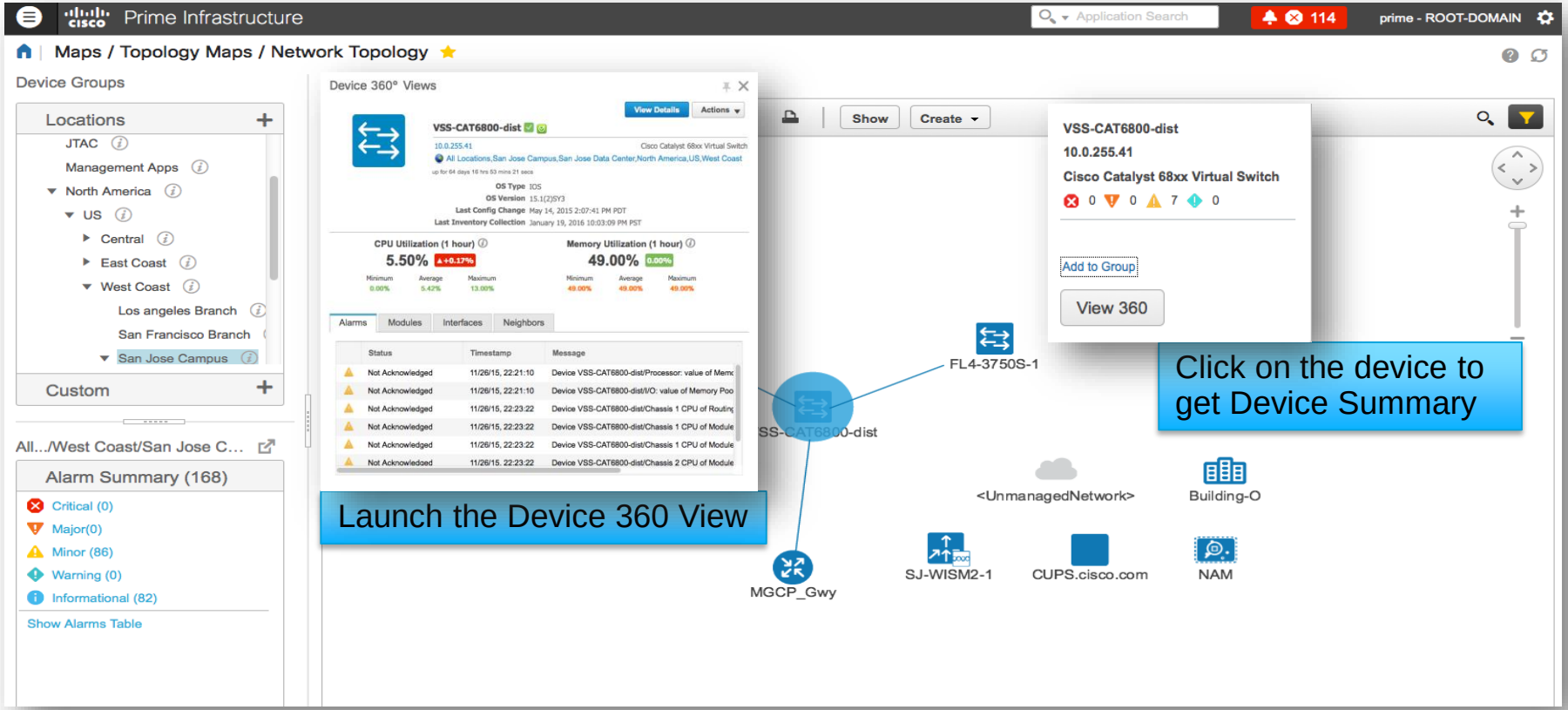
Network Topology

- **Network Topology Page**
  - Maps> Network Topology
  - Main landing page for viewing network topology
- **Topology Dashlets**
  - Topology Dashlets available for Overview level dashboards
  - Multiple Topology dashlets supported
  - Any topology map can be viewed in a dashlet
- **Device 360 “N-Hop” contextual topology view**
  - Device 360 adds new action icon to see device context topology

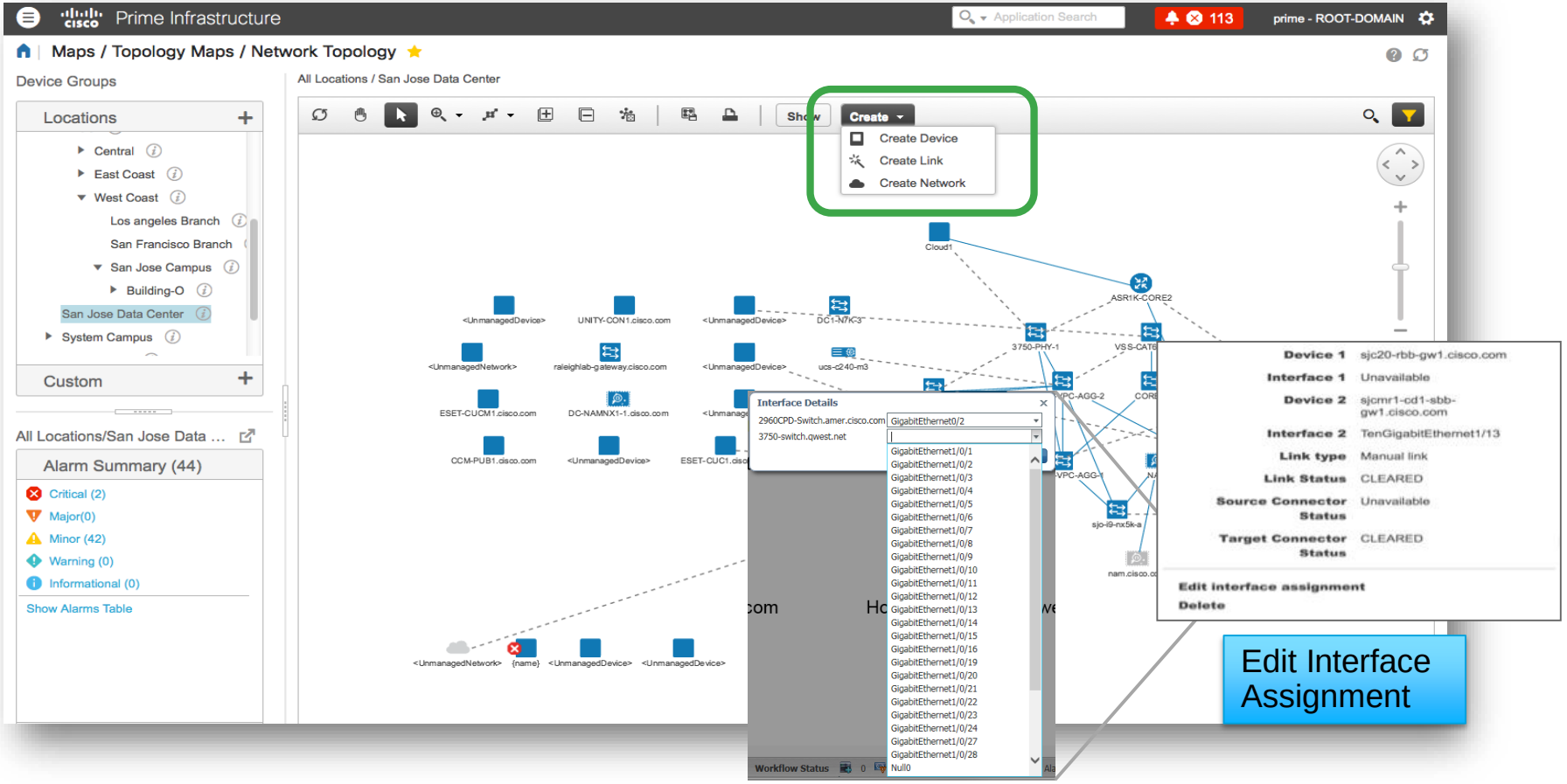
Topology Maps



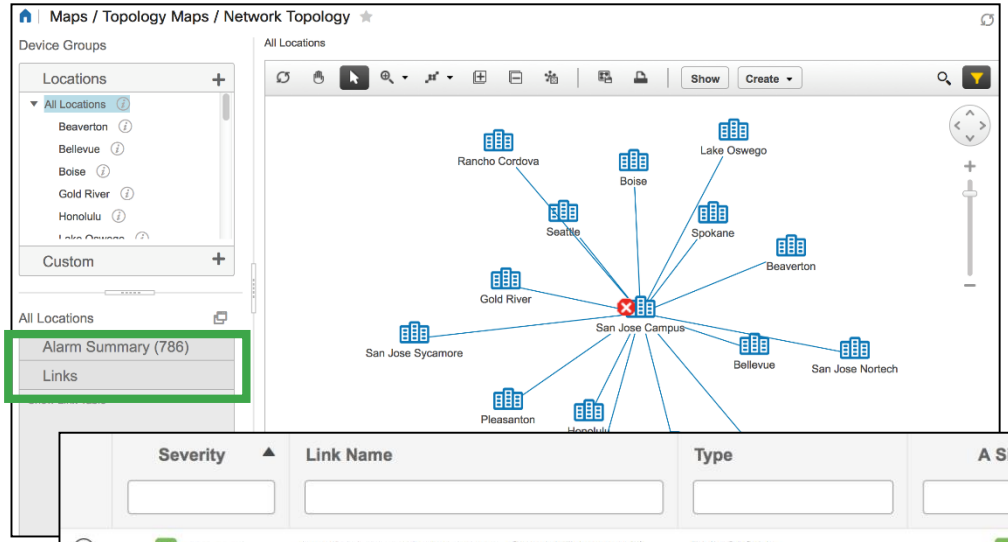
Location Group Topology



Manually Create Elements - Network / Device / Link



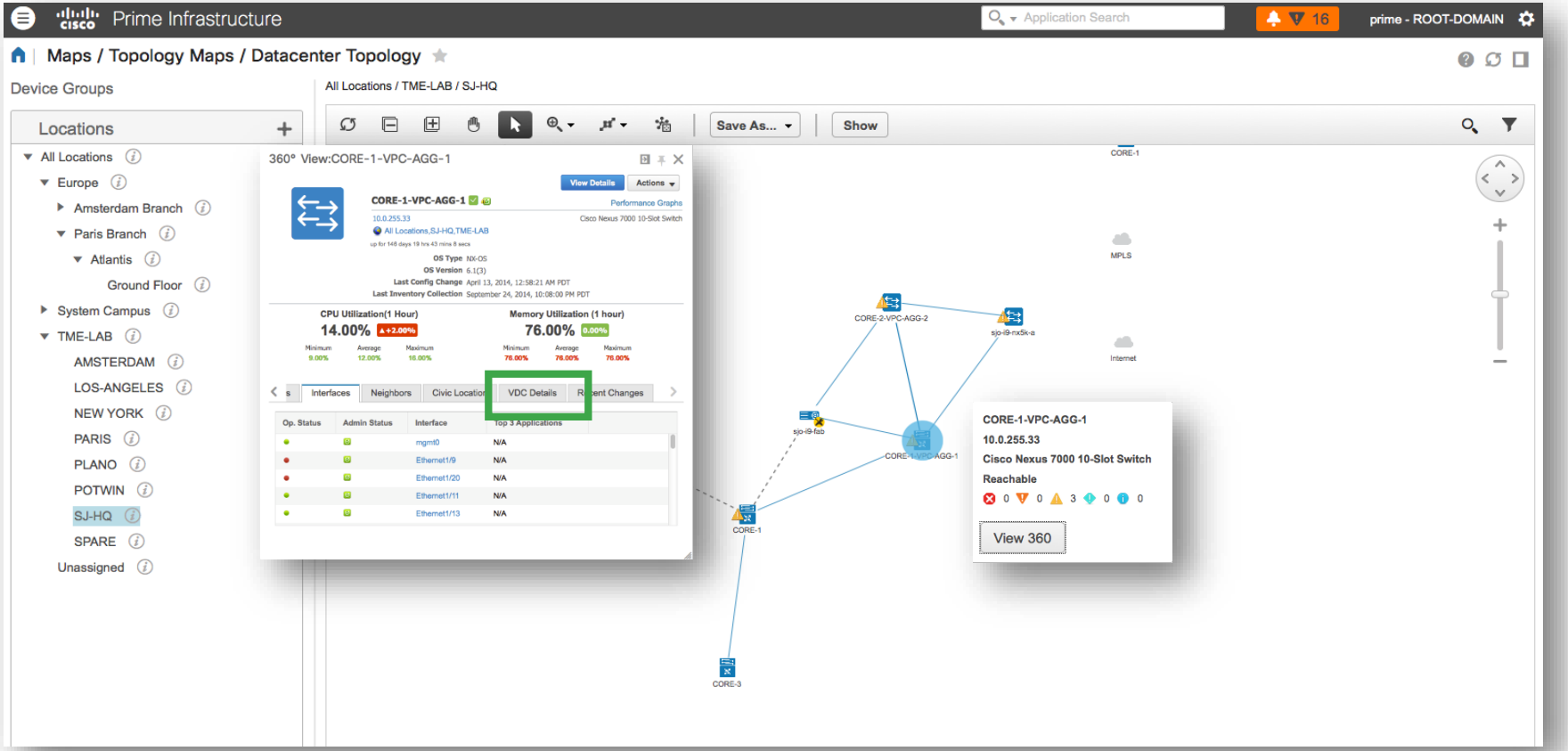
Critical Links View



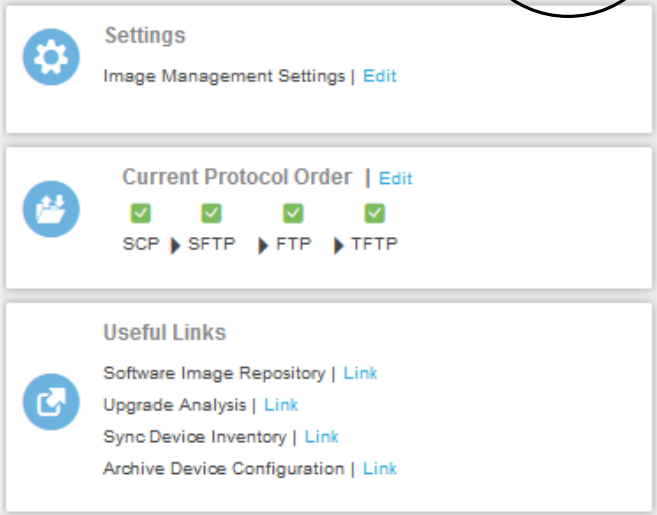
View the Critical Link Status, Type, Alarms on either ends of the link etc based on the location

Severity	Link Name	Type	A Side Severity	A Side	Z Side Severity	Z Side
Cleared	bvw01-lab-gw1.cisco.com_GigabitEthernet0/…	PHYSICAL	Cleared	GigabitEthernet0/1	Cleared	GigabitEthernet2…
Cleared	bvw01-lab-gw1.cisco.com_GigabitEthernet0/…	PHYSICAL	Cleared	GigabitEthernet0/0	Cleared	GigabitEthernet1…
Cleared	bvw01-cs1.cisco.com_GigabitEthernet0/0:bv…	PHYSICAL	Cleared	GigabitEthernet1…	Cleared	GigabitEthernet0/0
Cleared	bvw01-sw1.cisco.com_GigabitEthernet1/0/1:…	PHYSICAL	Cleared	GigabitEthernet1…	Cleared	GigabitEthernet0/0
Cleared	bvw01-wan-gw1.cisco.com_GigabitEthernet…	PHYSICAL	Cleared	GigabitEthernet0/1	Cleared	GigabitEthernet0/1
Cleared	bvw01-sw1.cisco.com_GigabitEthernet2/0/1:…	PHYSICAL	Cleared	GigabitEthernet2…	Cleared	GigabitEthernet0/0

Datacenter Topology



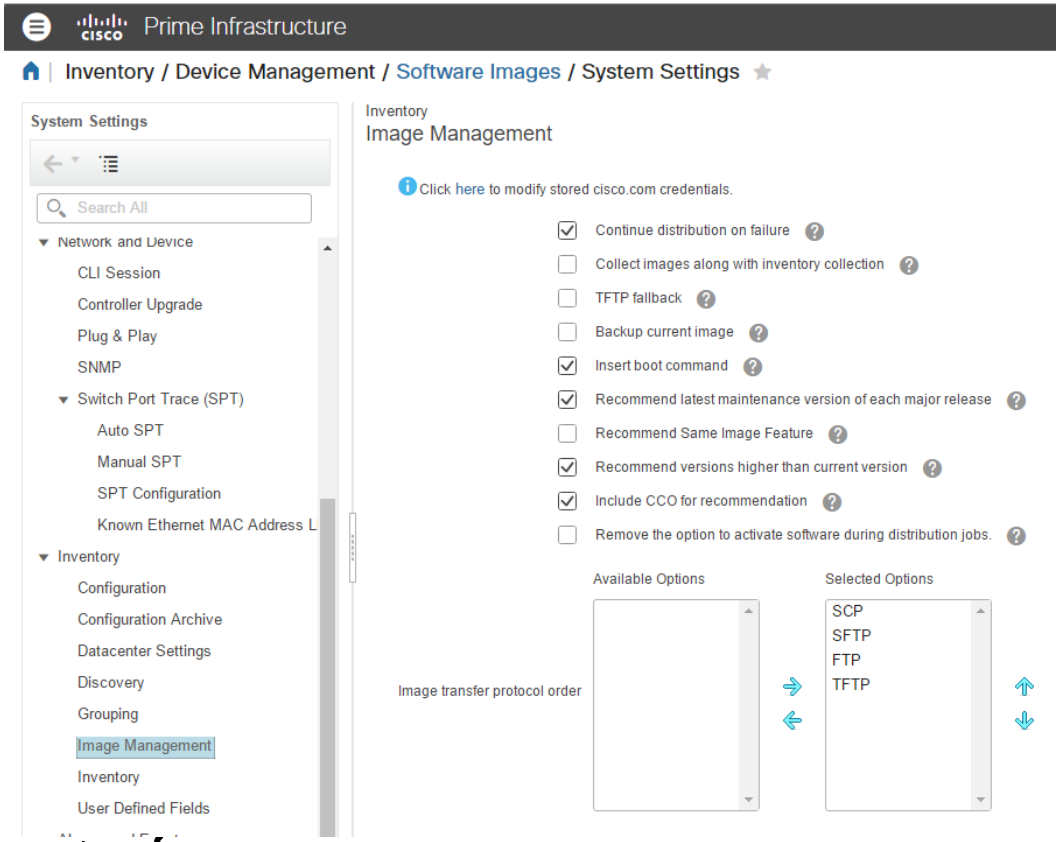
Effective Software Image Management (SWIM)



- 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

Image Management Settings



Start by visiting Administration > System Settings > Inventory >Image Management to set your desired defaults

Pro-Tip Backup all Currently deployed Images

Next Task: Backup all currently deployed images

Go to Inventory > Device Management > Software Images

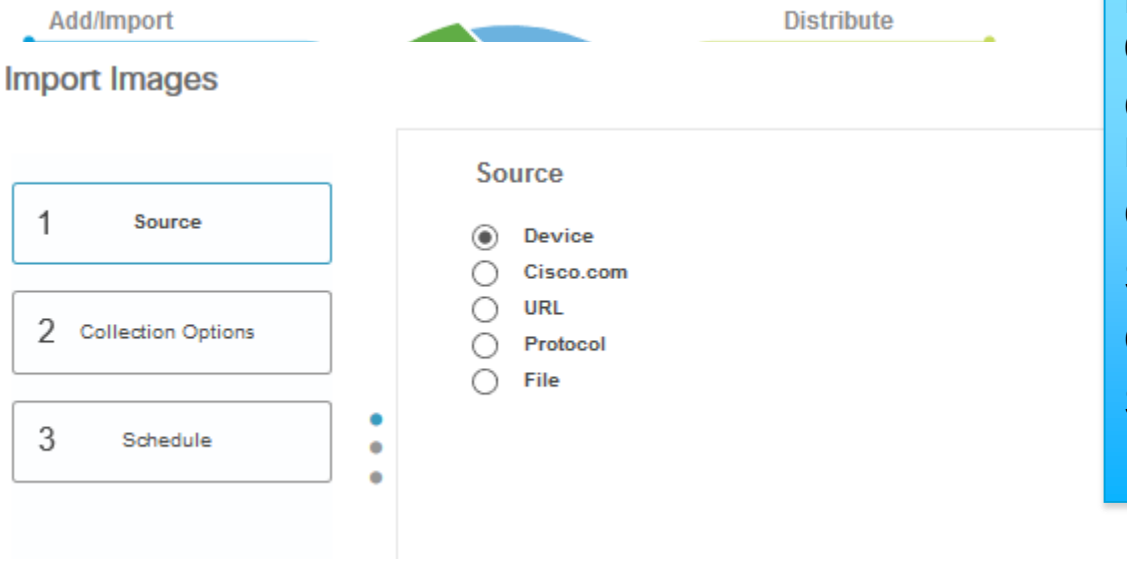
Click ‘Import’

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

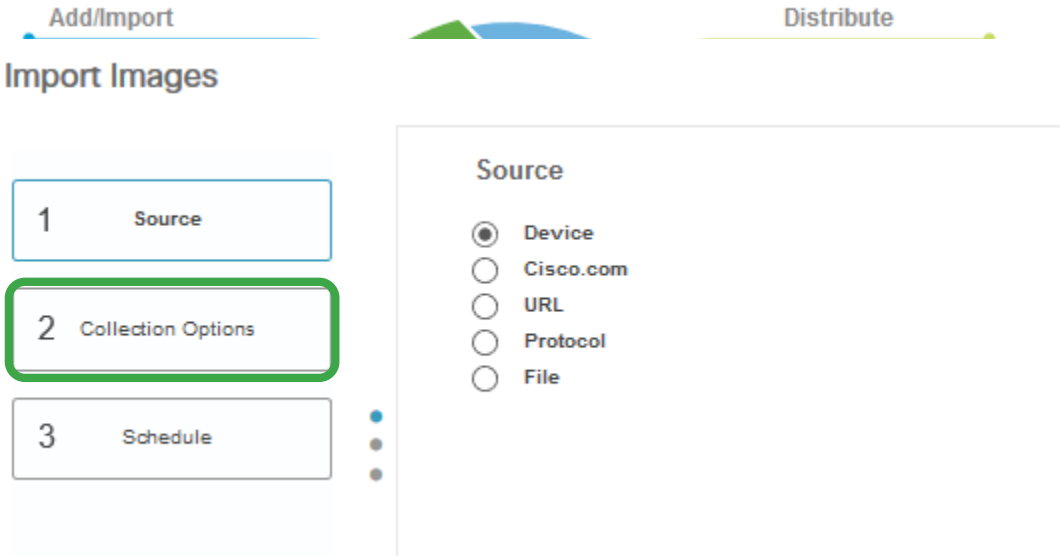
Click ‘Import’

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

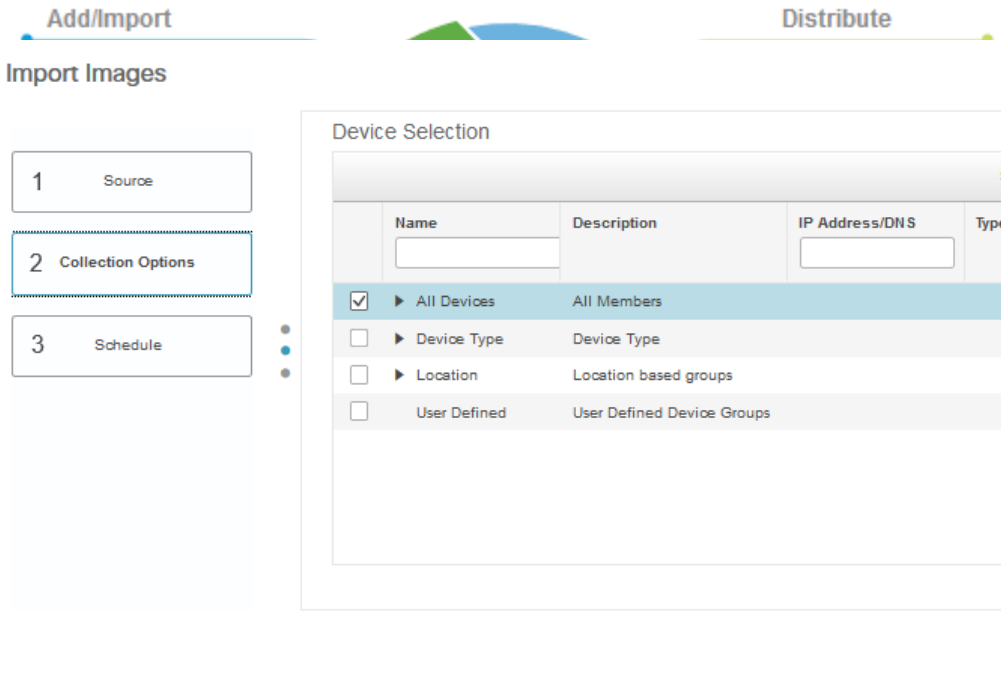
Click ‘Import’

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

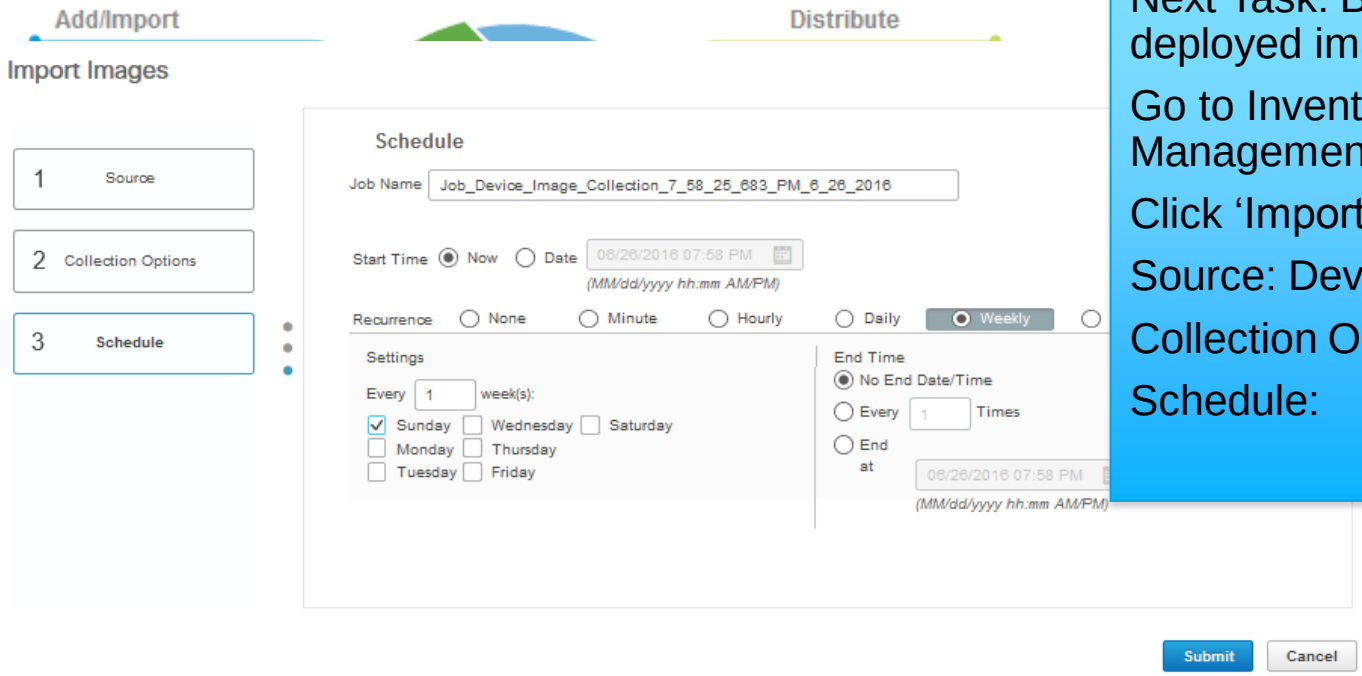
Click ‘Import’

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

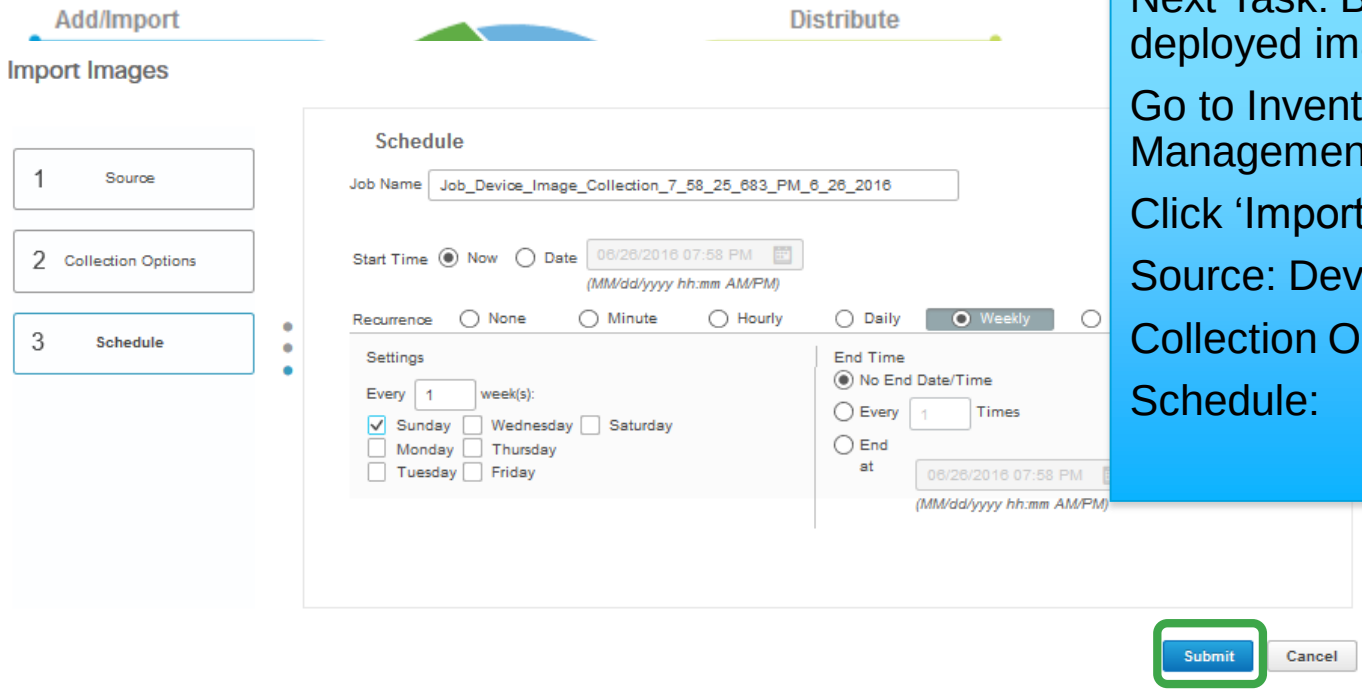
Click ‘Import’

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

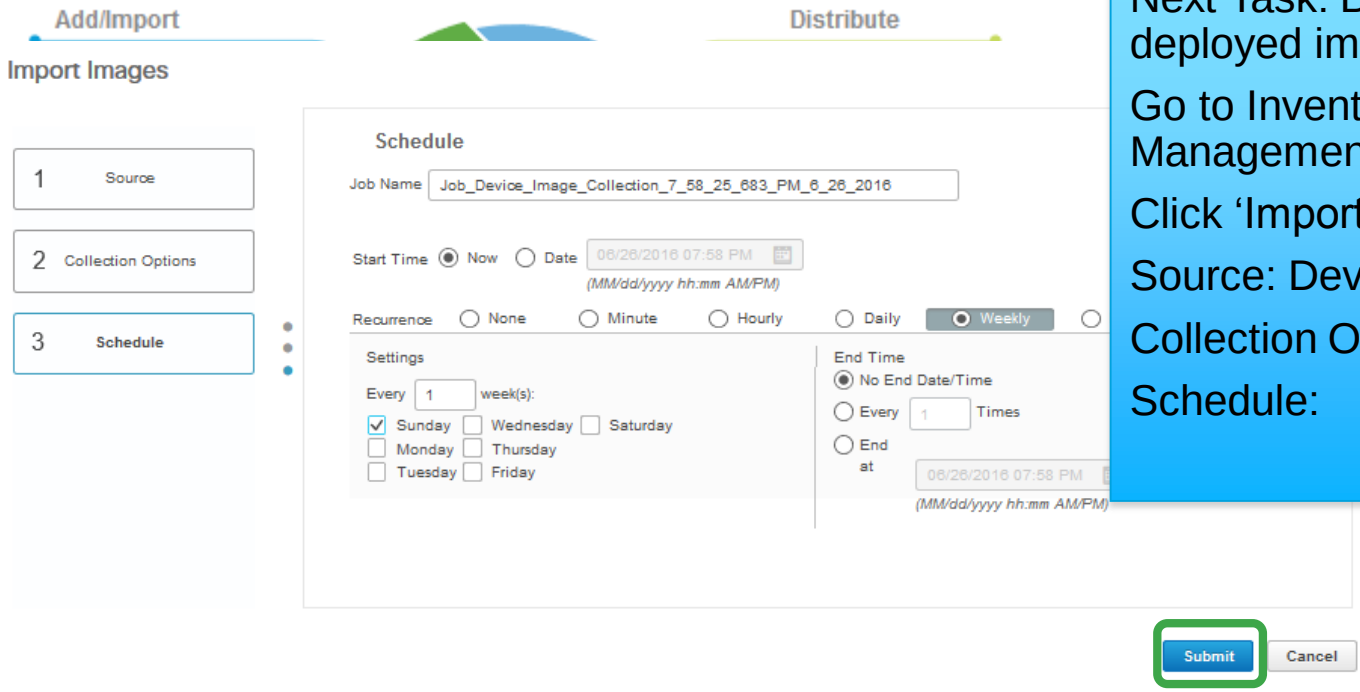
Click ‘Import’

Source: Device

Collection Options: All Devices

Schedule:

Pro-Tip Backup all Currently deployed Images



Next Task: Backup all currently deployed images

Go to Inventory > Device Management > Software Images

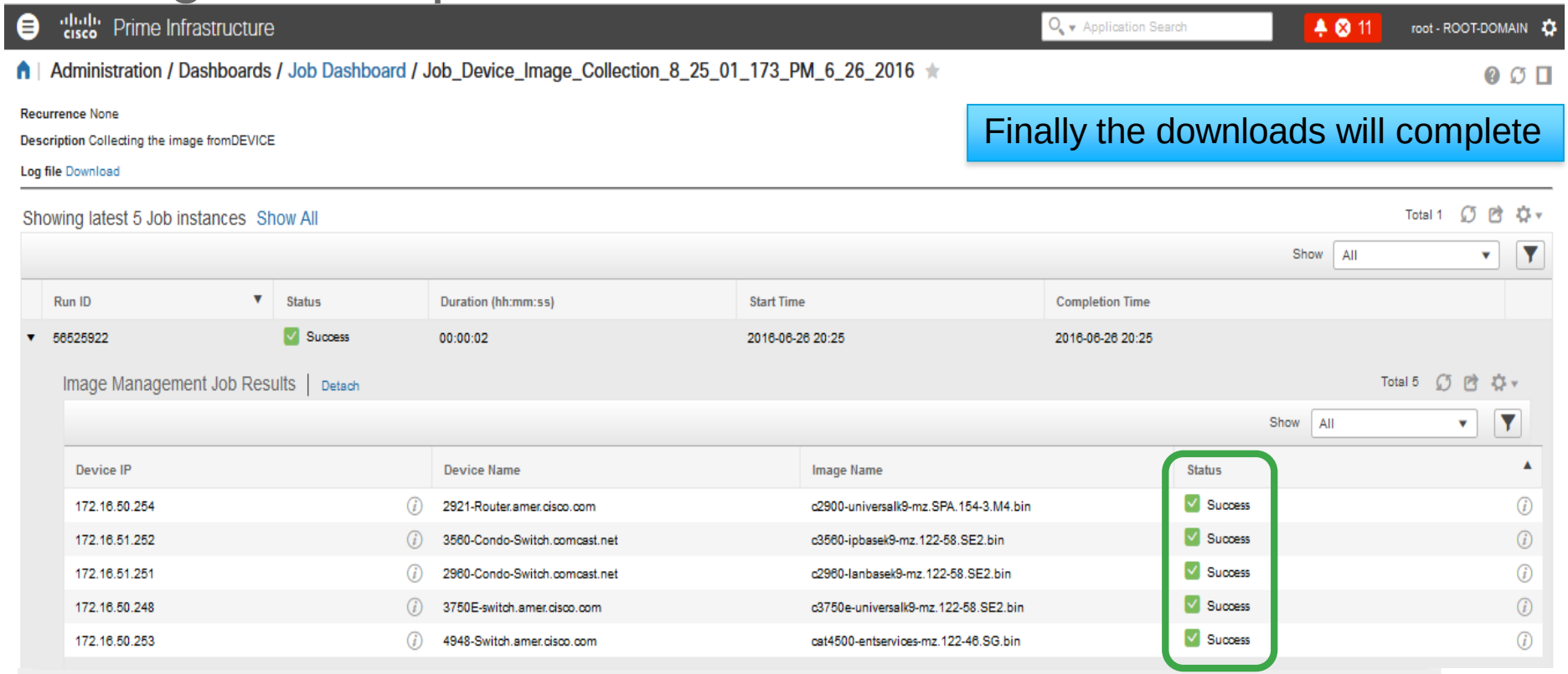
Click ‘Import’

Source: Device

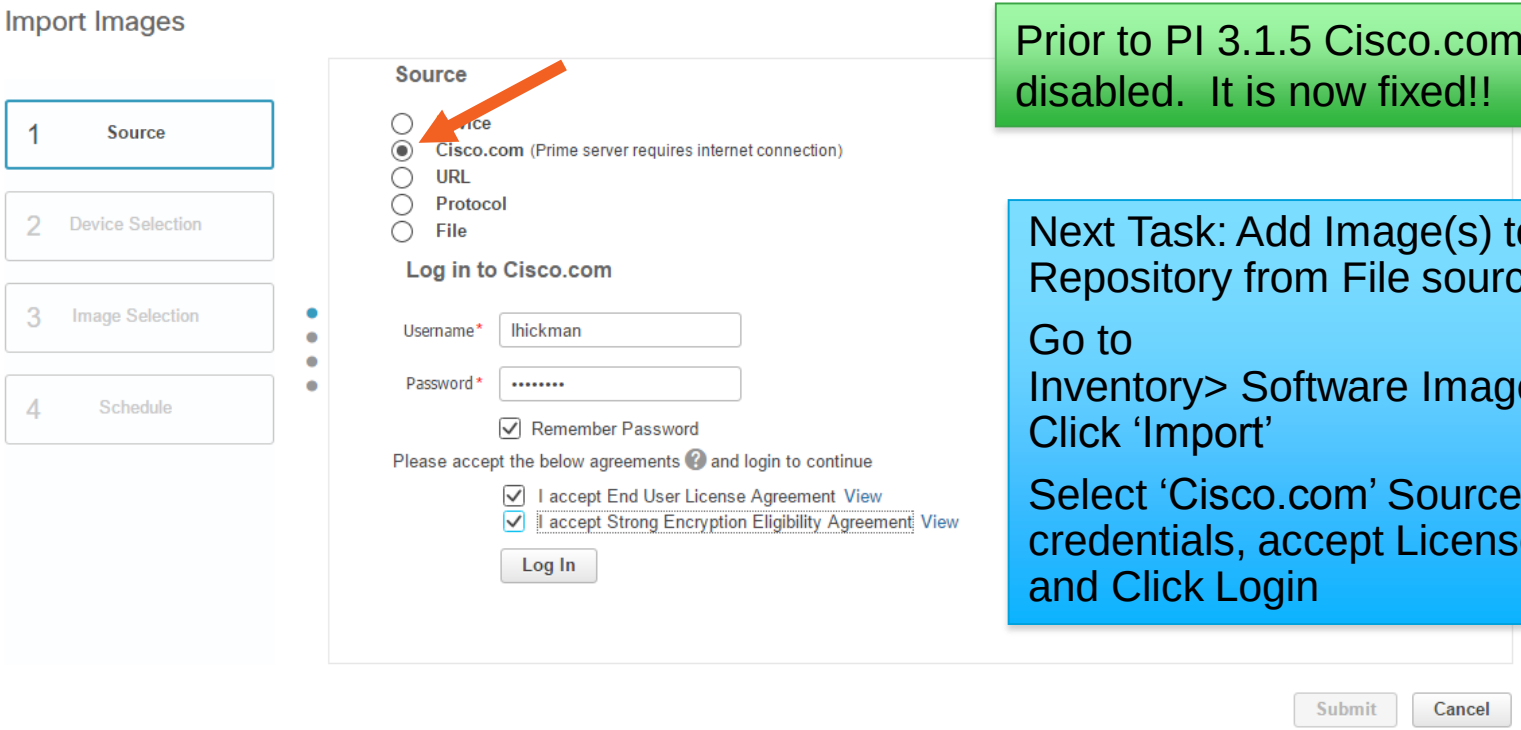
Collection Options: All Devices

Schedule:

Image Backup



Import Image into PI Software Repository



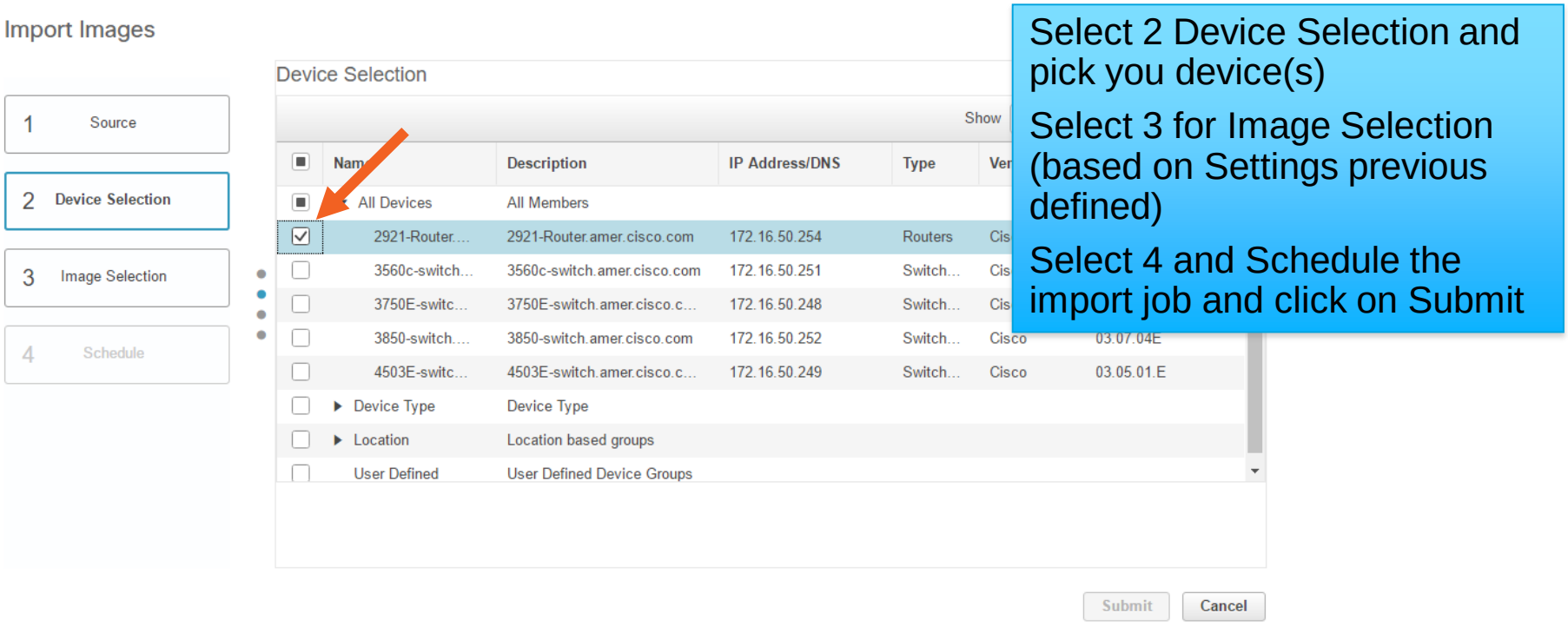
Prior to PI 3.1.5 Cisco.com Import was disabled. It is now fixed!!

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

Import Image into PI Software Repository

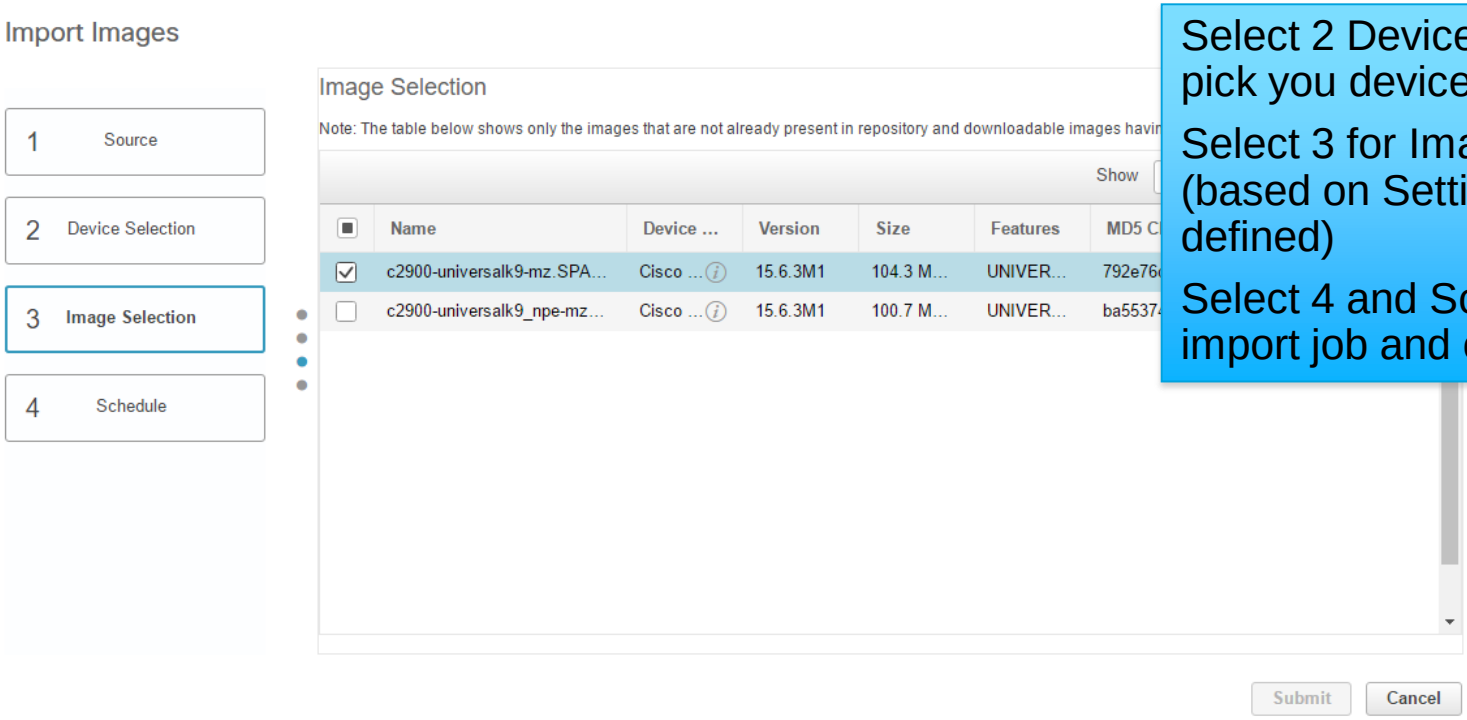


Select 2 Device Selection and pick you device(s)

Select 3 for Image Selection (based on Settings previous defined)

Select 4 and Schedule the import job and click on Submit

Import Image into PI Software Repository

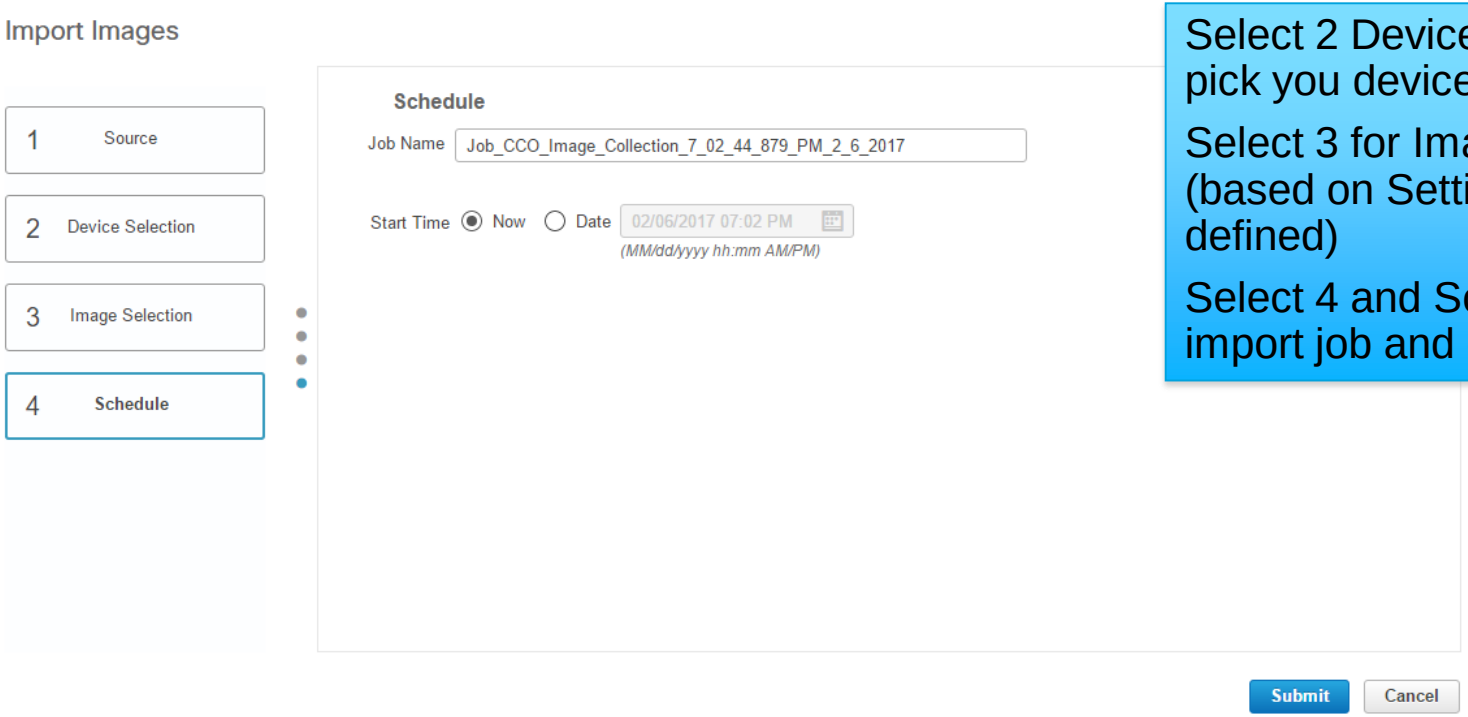


Select 2 Device Selection and pick you device(s)

Select 3 for Image Selection (based on Settings previous defined)

Select 4 and Schedule the import job and click on Submit

Import Image into PI Software Repository

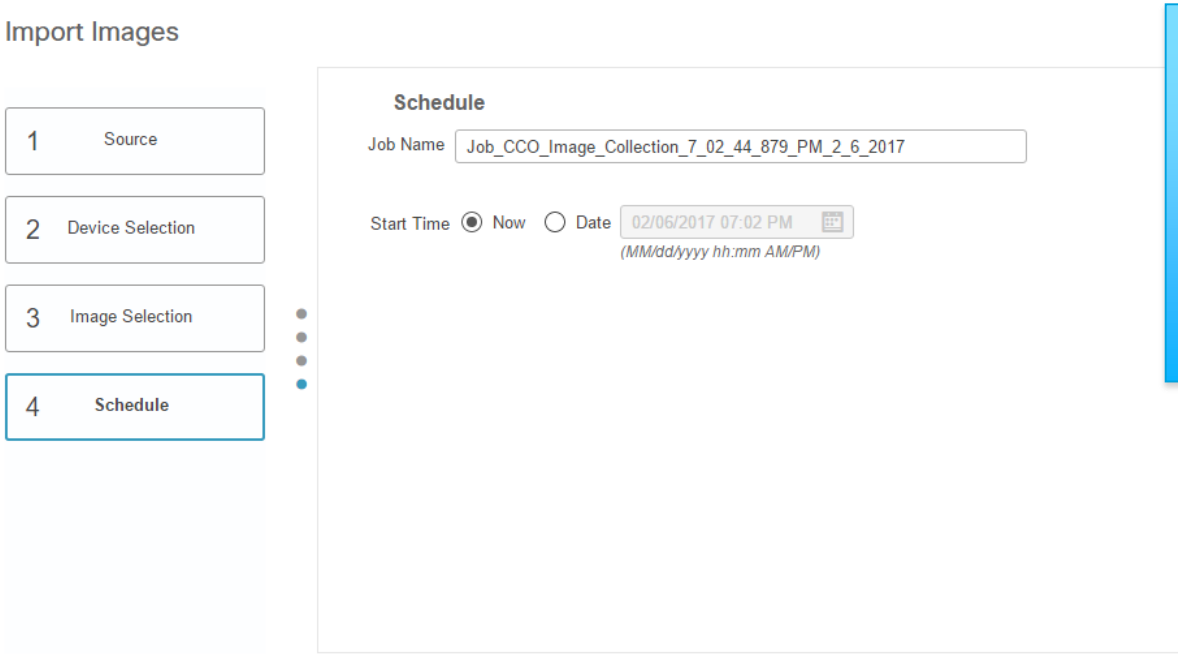


Select 2 Device Selection and pick you device(s)

Select 3 for Image Selection (based on Settings previous defined)

Select 4 and Schedule the import job and click on Submit

Import Image into PI Software Repository



Select 2 Device Selection and pick you device(s)

Select 3 for Image Selection (based on Settings previous defined)

Select 4 and Schedule the import job and click on Submit

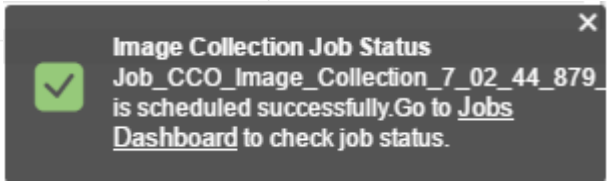
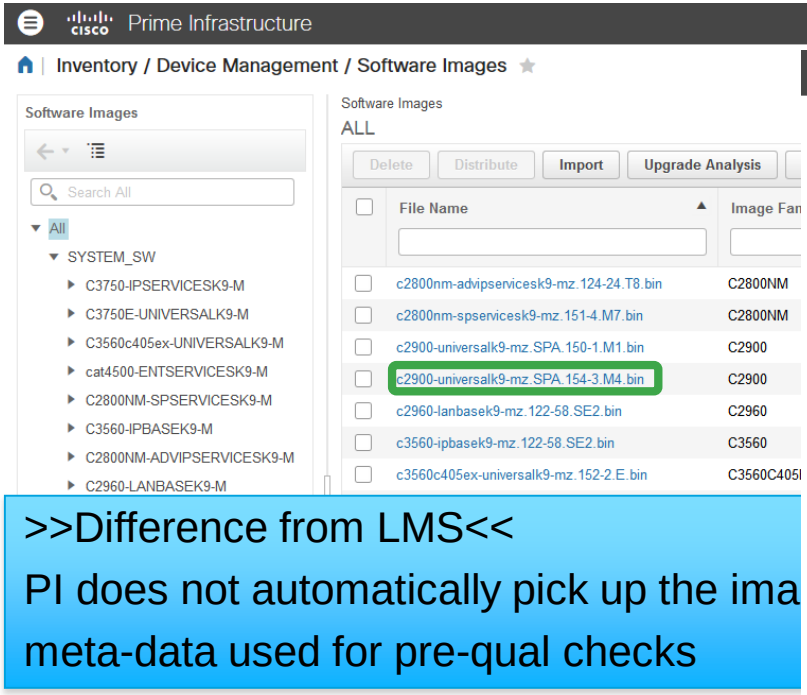
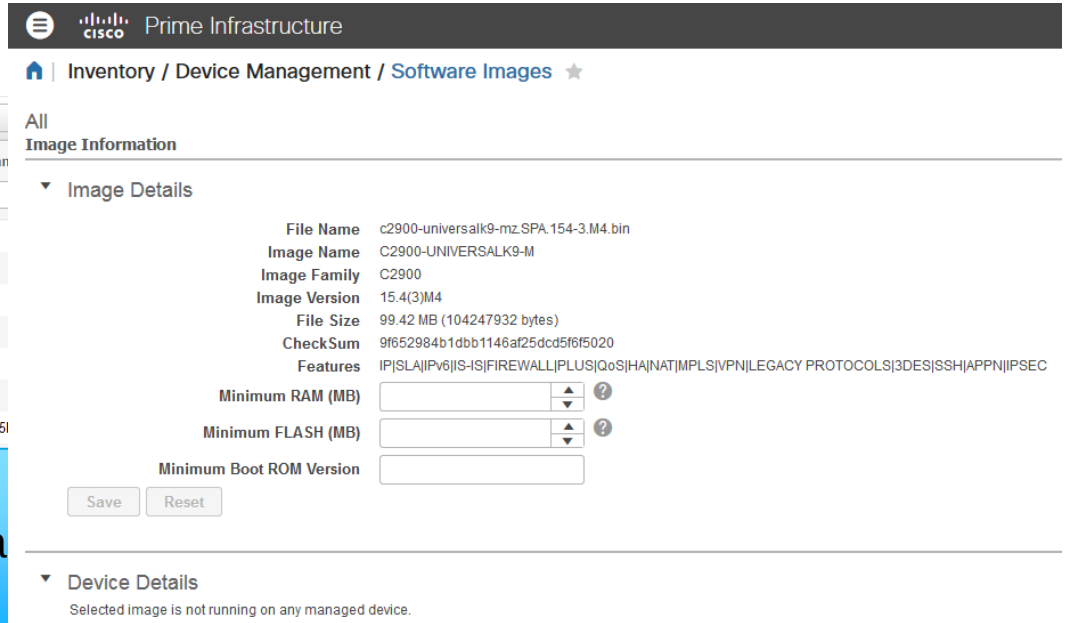
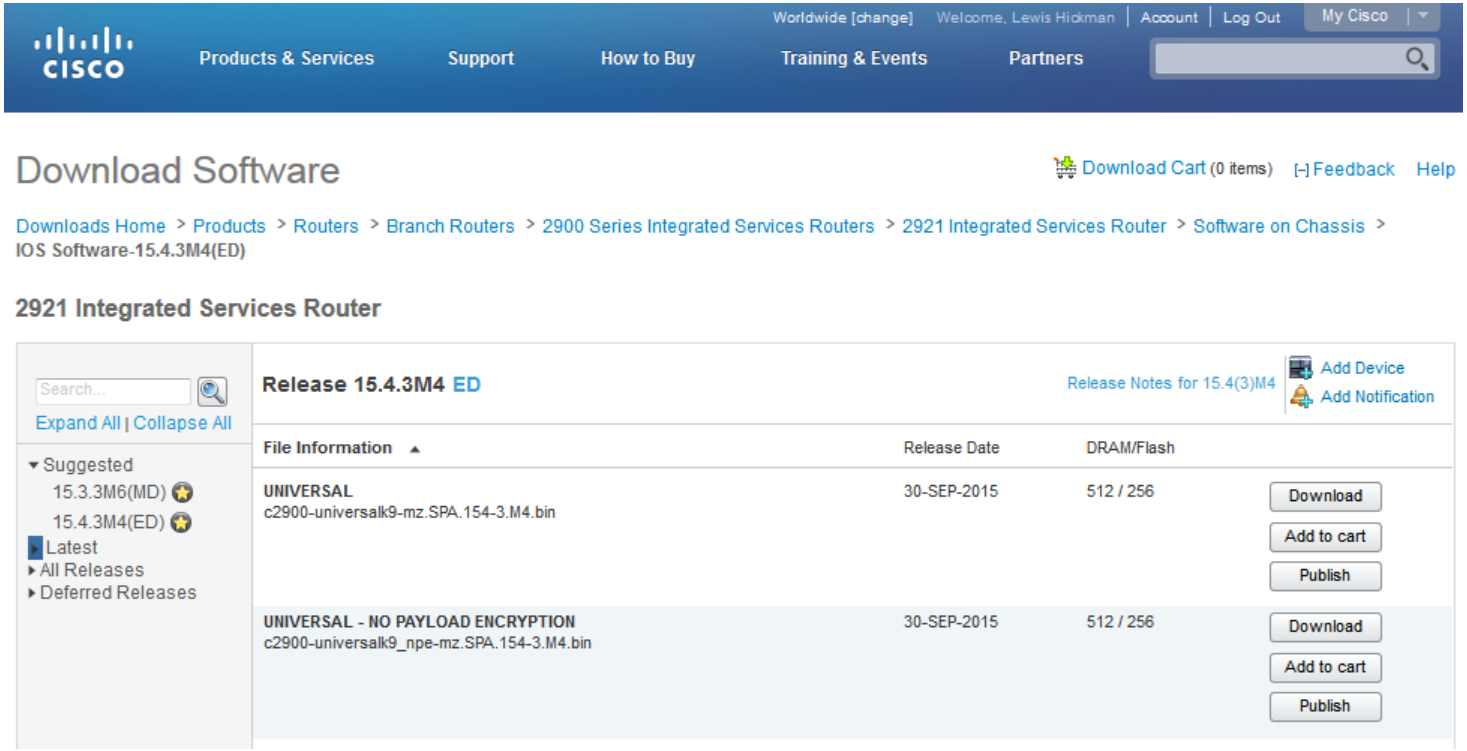


Image Import (cont)

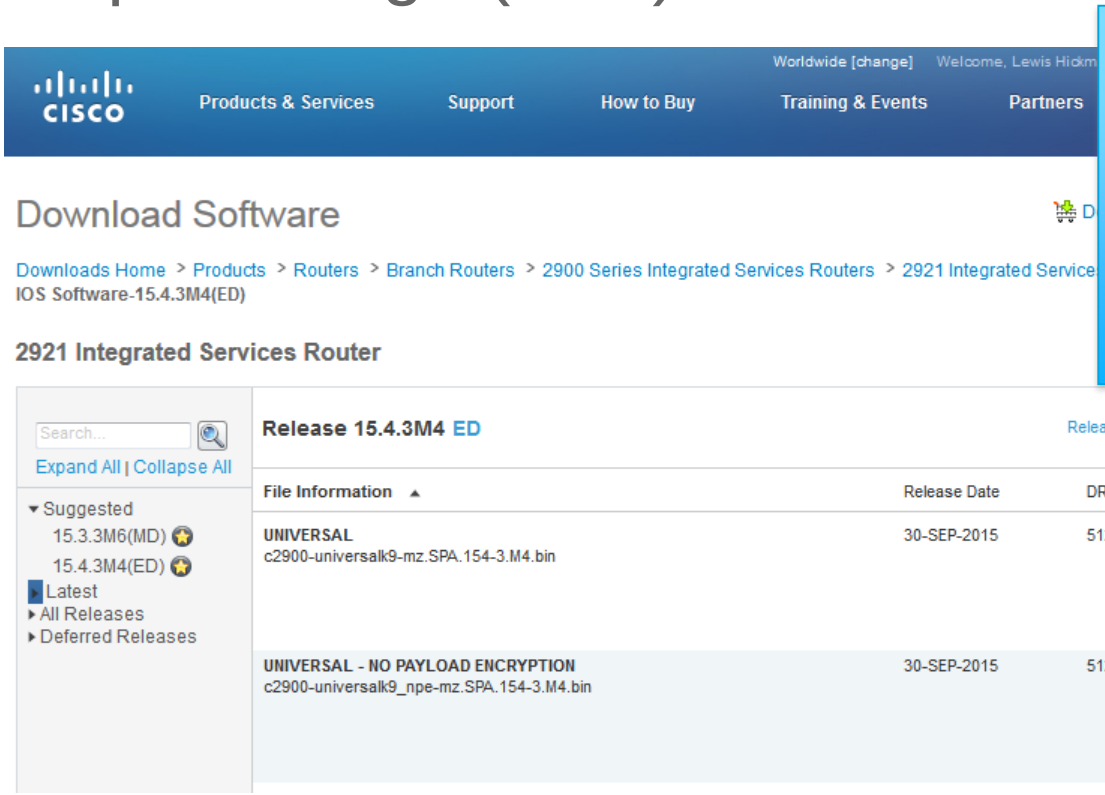




Import Image (cont)



Import Image (cont)



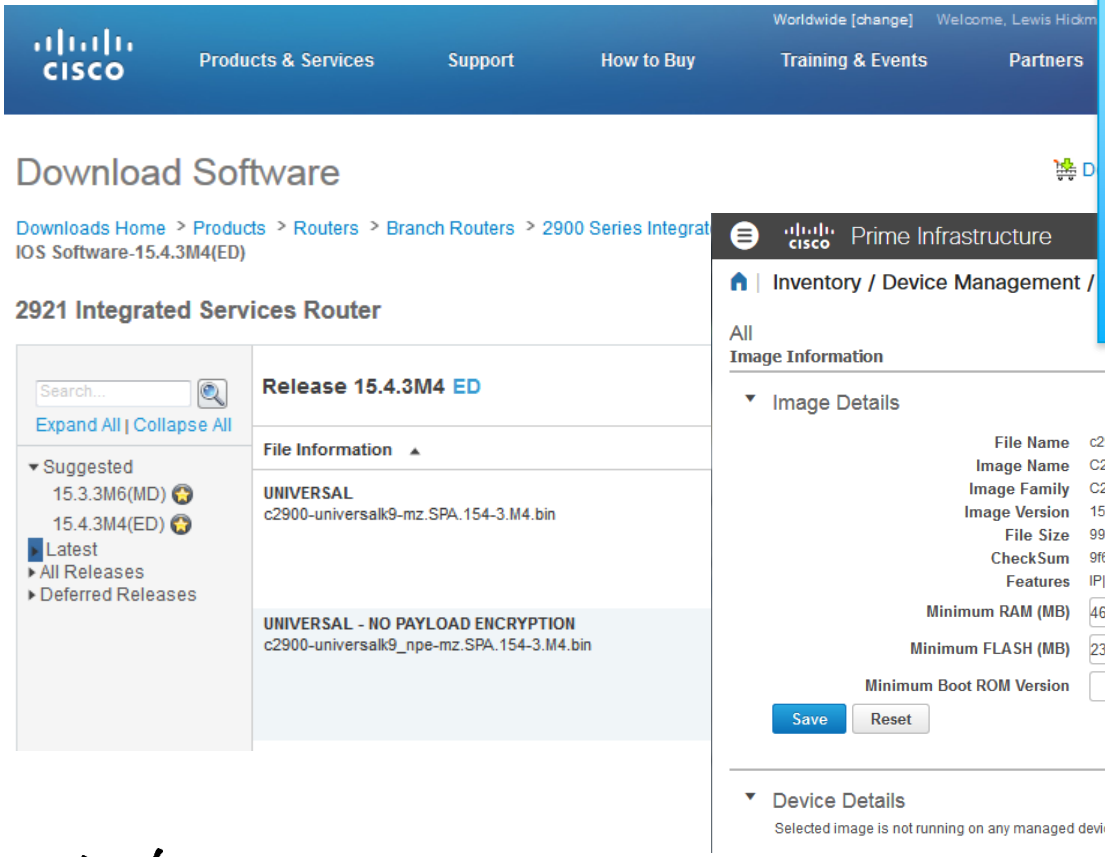
Hit the Download Center to find your image and its RAM/Flash requirements

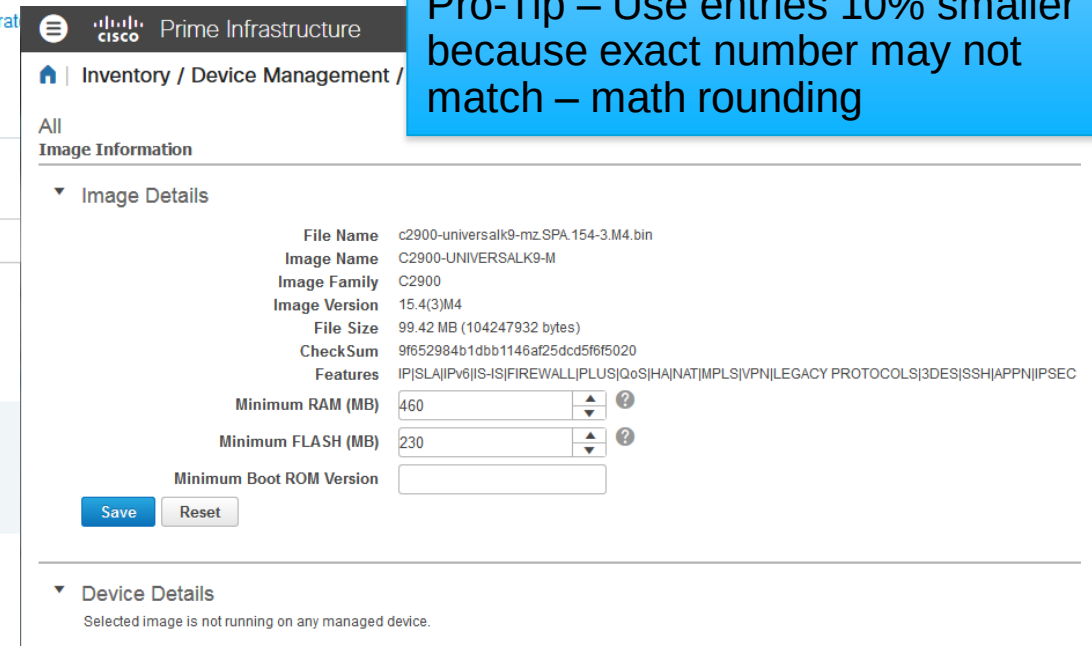
Pro-Tip – Use entries 10% smaller because exact number may not match – math rounding

Import Image (cont)

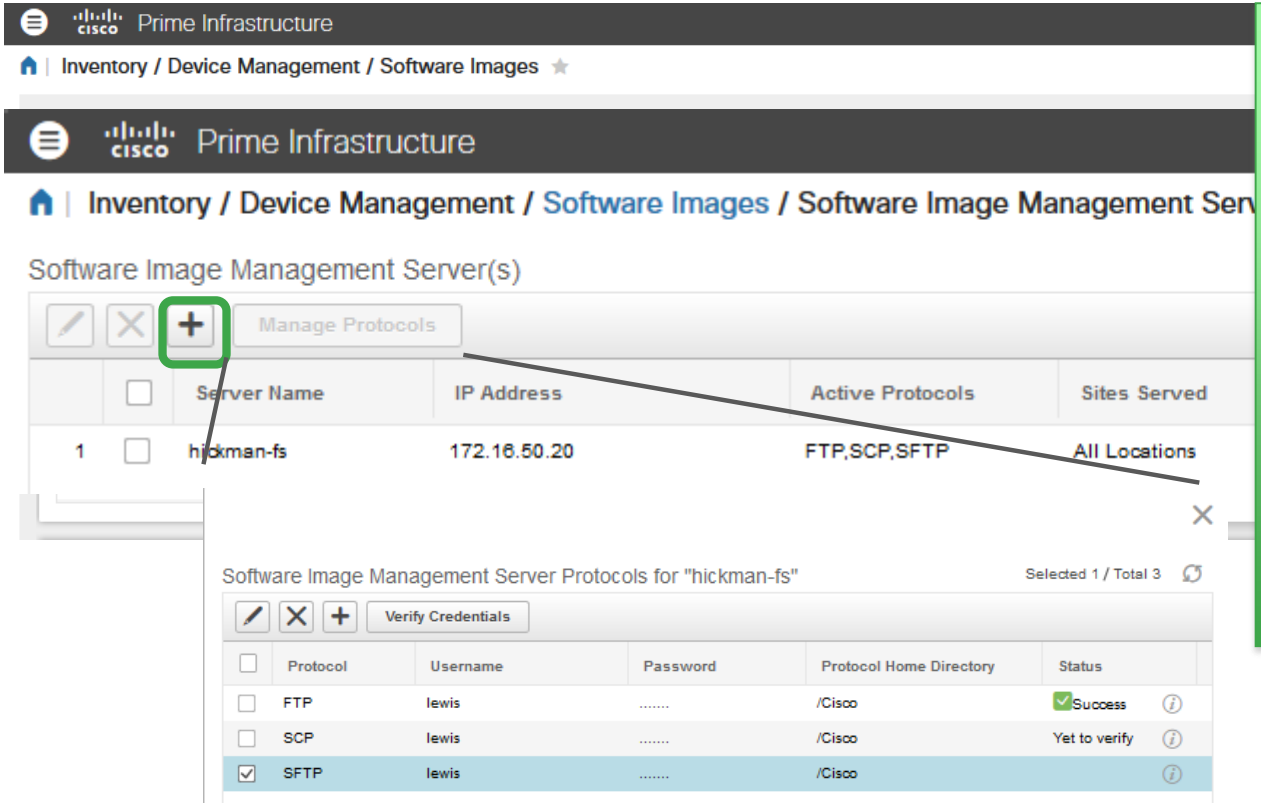
Hit the Download Center to find your image and its RAM/Flash requirements

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





Distribute Image from Repository using External Server



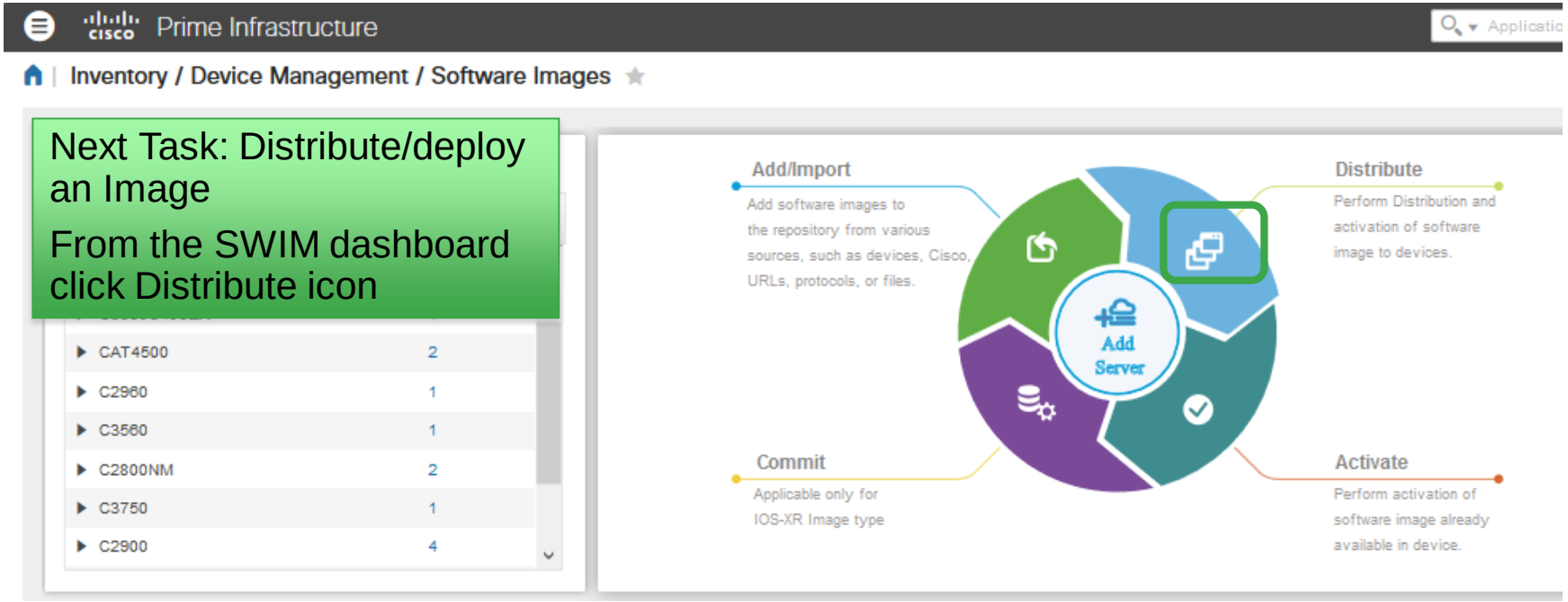
Next Task: Add Server to Software Image Management Servers

From the SWIM dashboard select Add Server

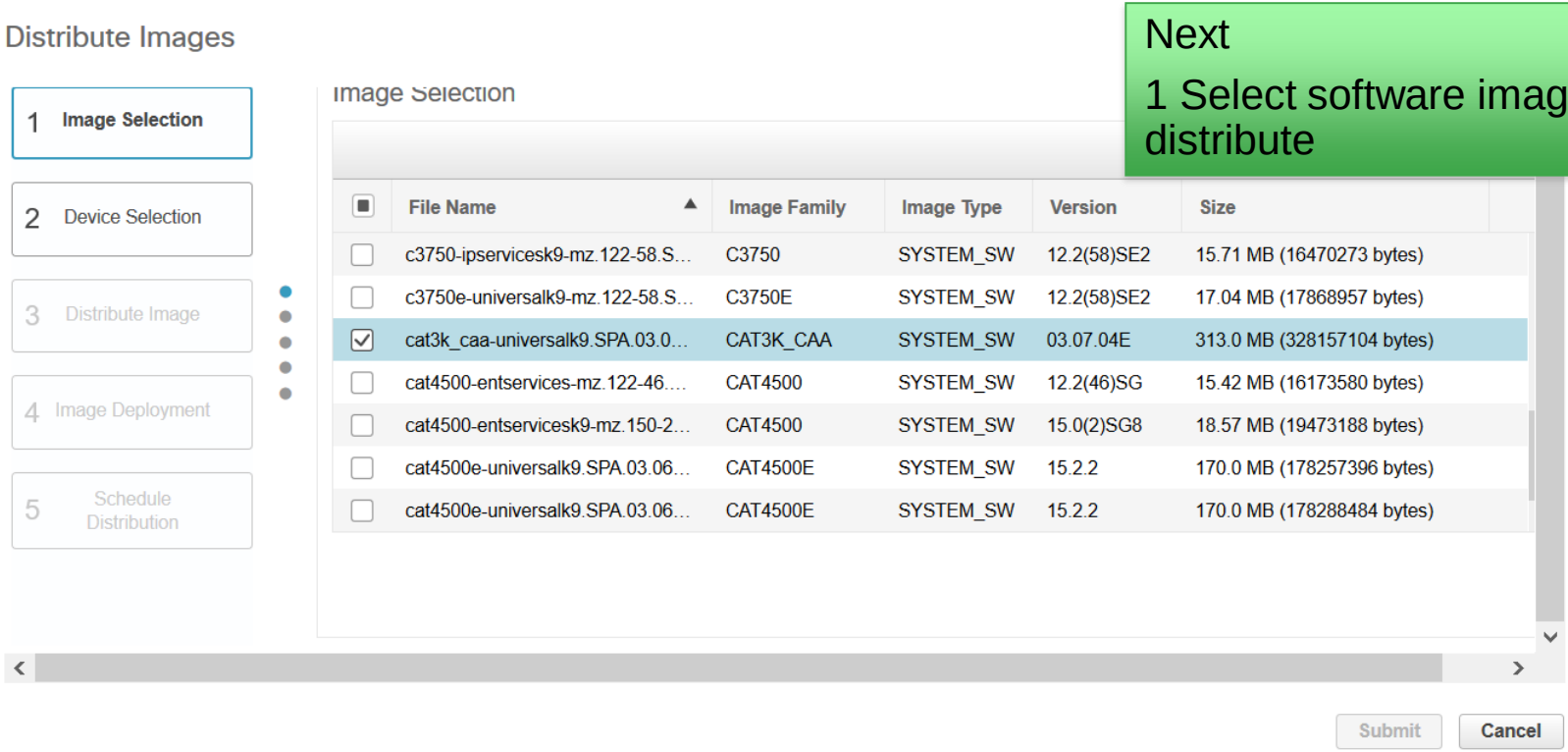
Enter Server information (IP address, Location)

Click on Manage Protocols to configure protocol information for the server

Distribute Image (cont)



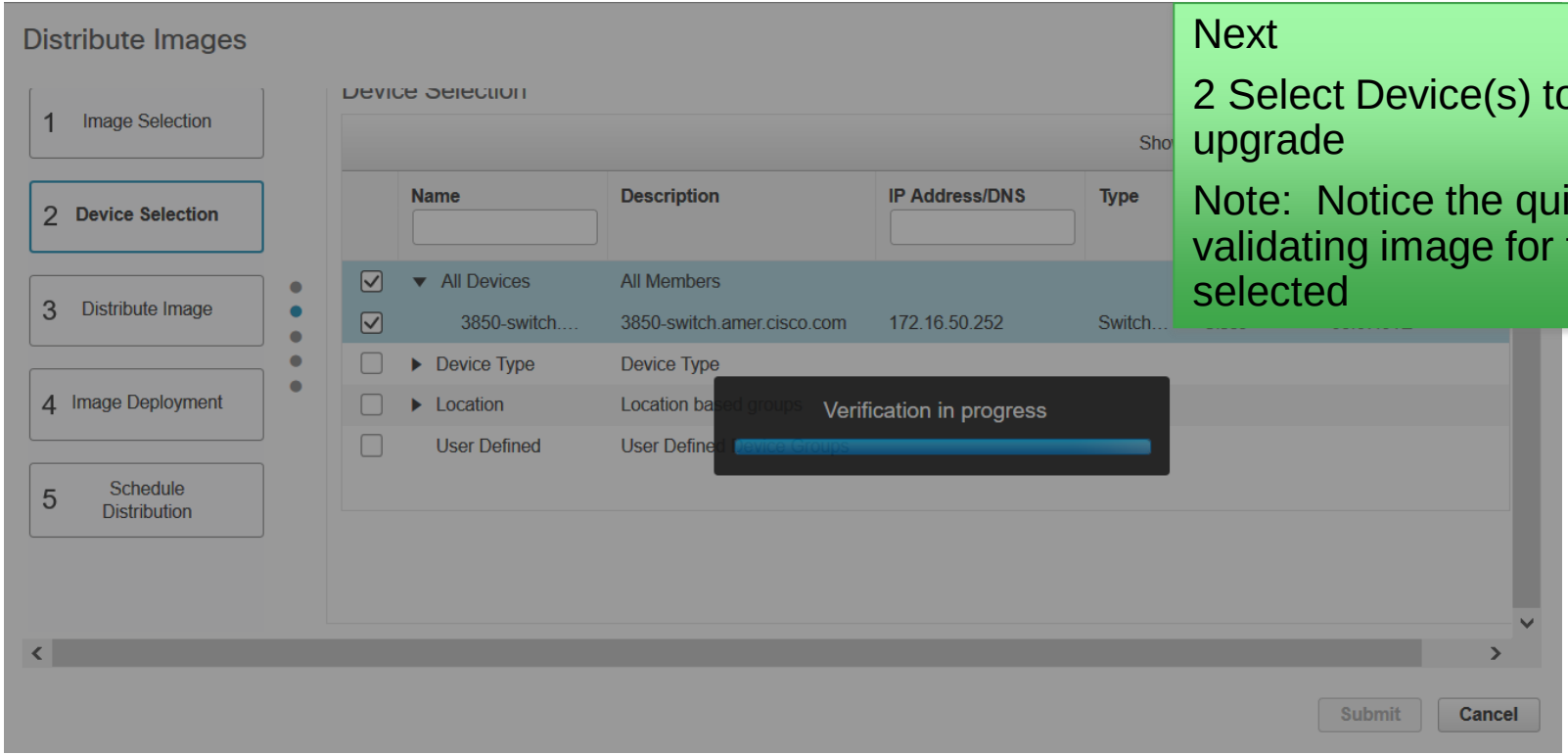
Distribute Image (cont)



Next

1 Select software image to distribute

Distribute Image (cont)



Next

2 Select Device(s) to software upgrade

Note: Notice the quick pop-up validating image for the device(s) selected

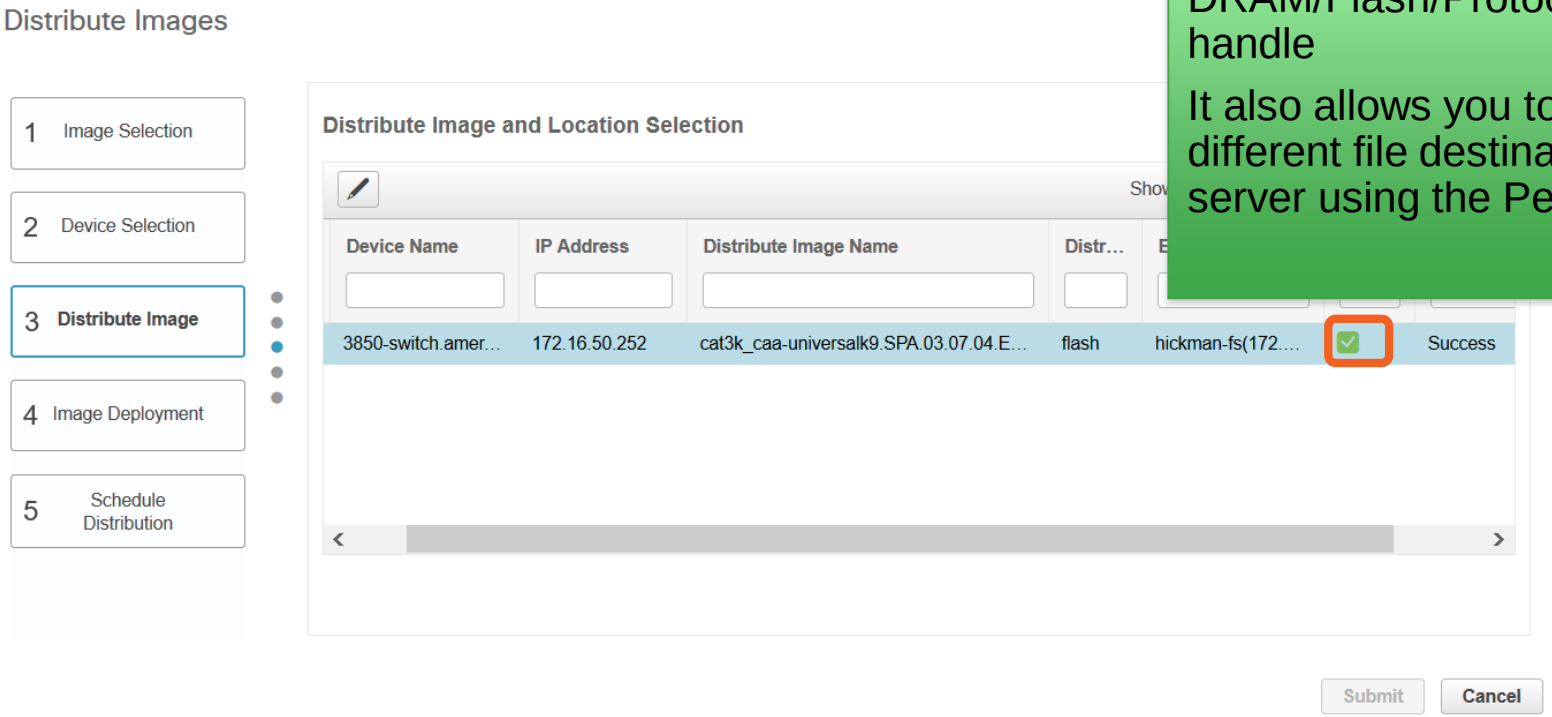
Distribute Image (cont)

Next

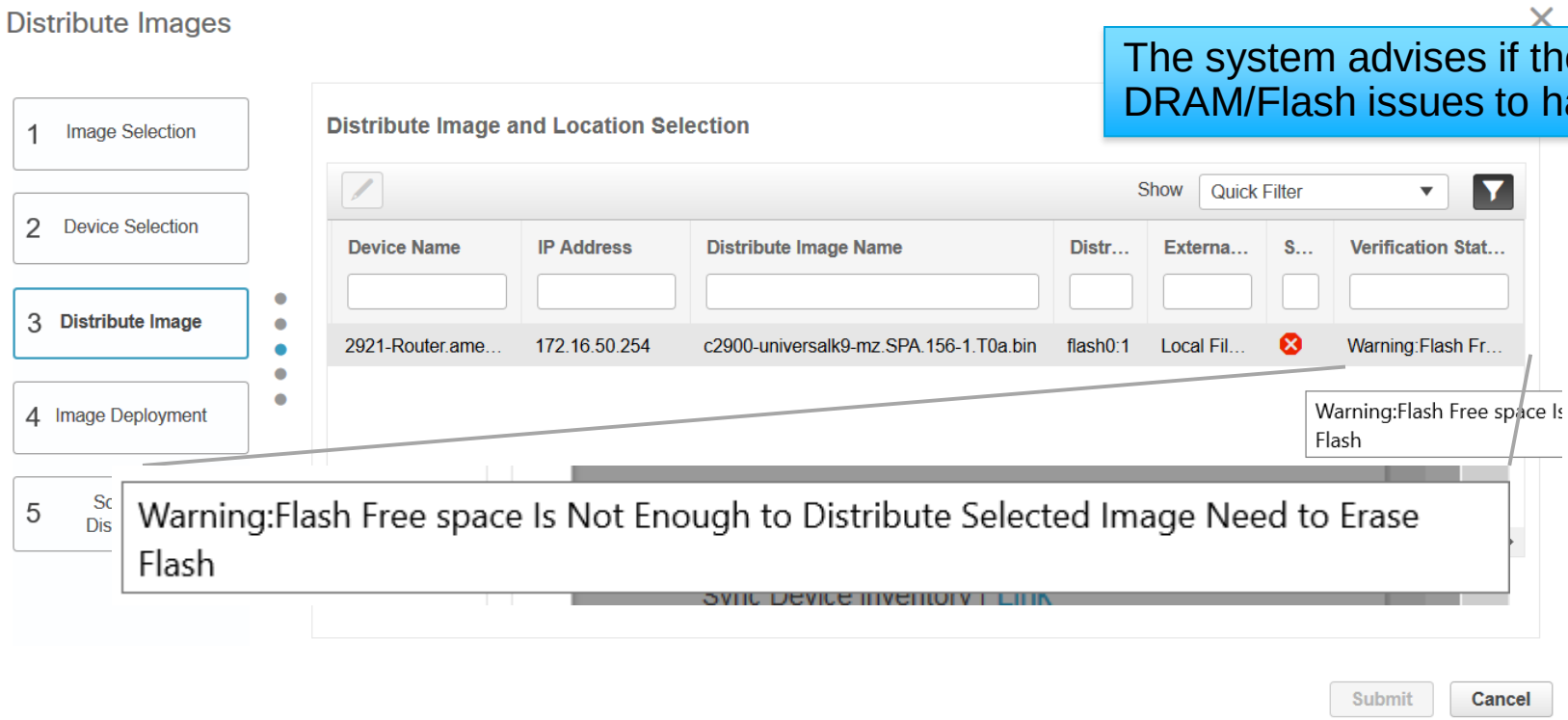
3 Distribute image:

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

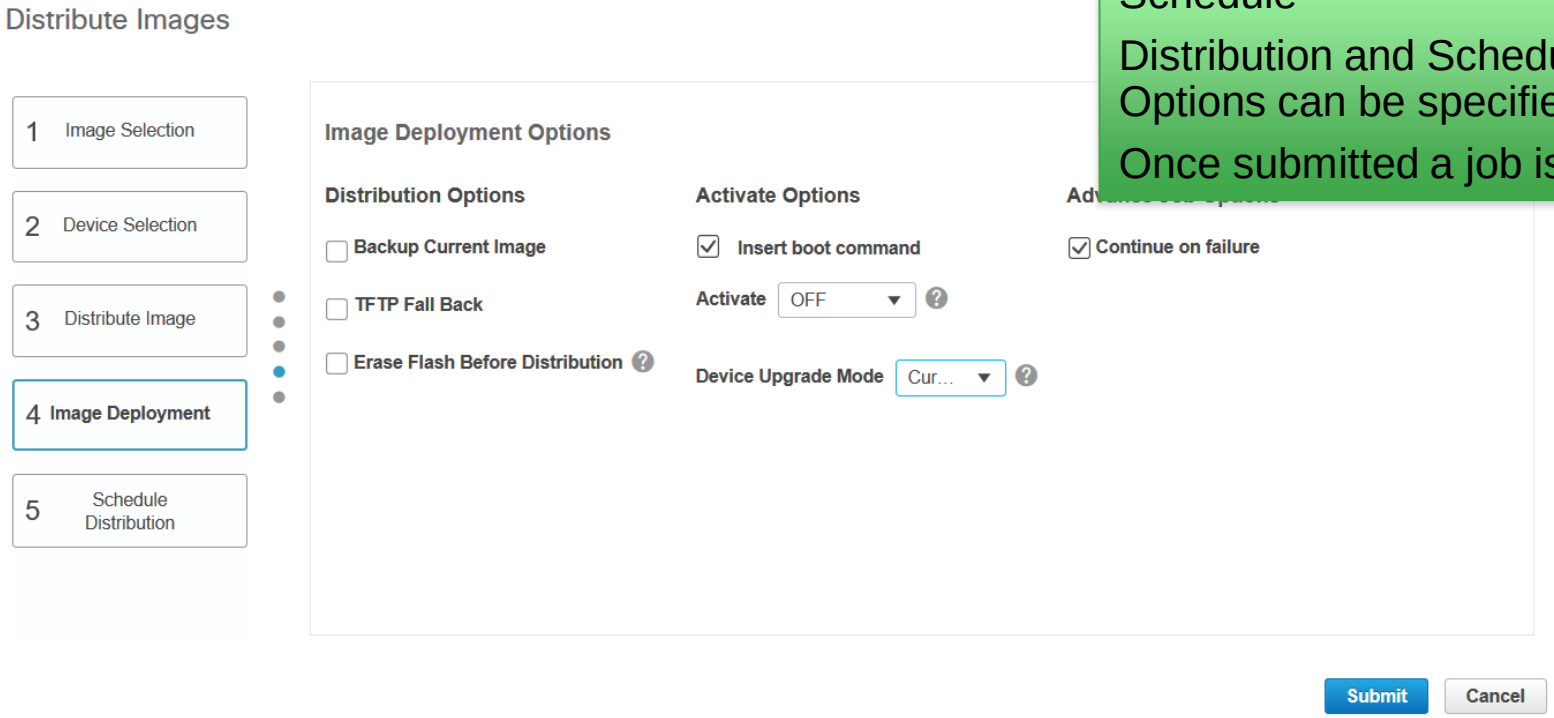


Upgrading Devices

4+5 Image Deployment/ Schedule

Distribution and Scheduling Options can be specified

Once submitted a job is created

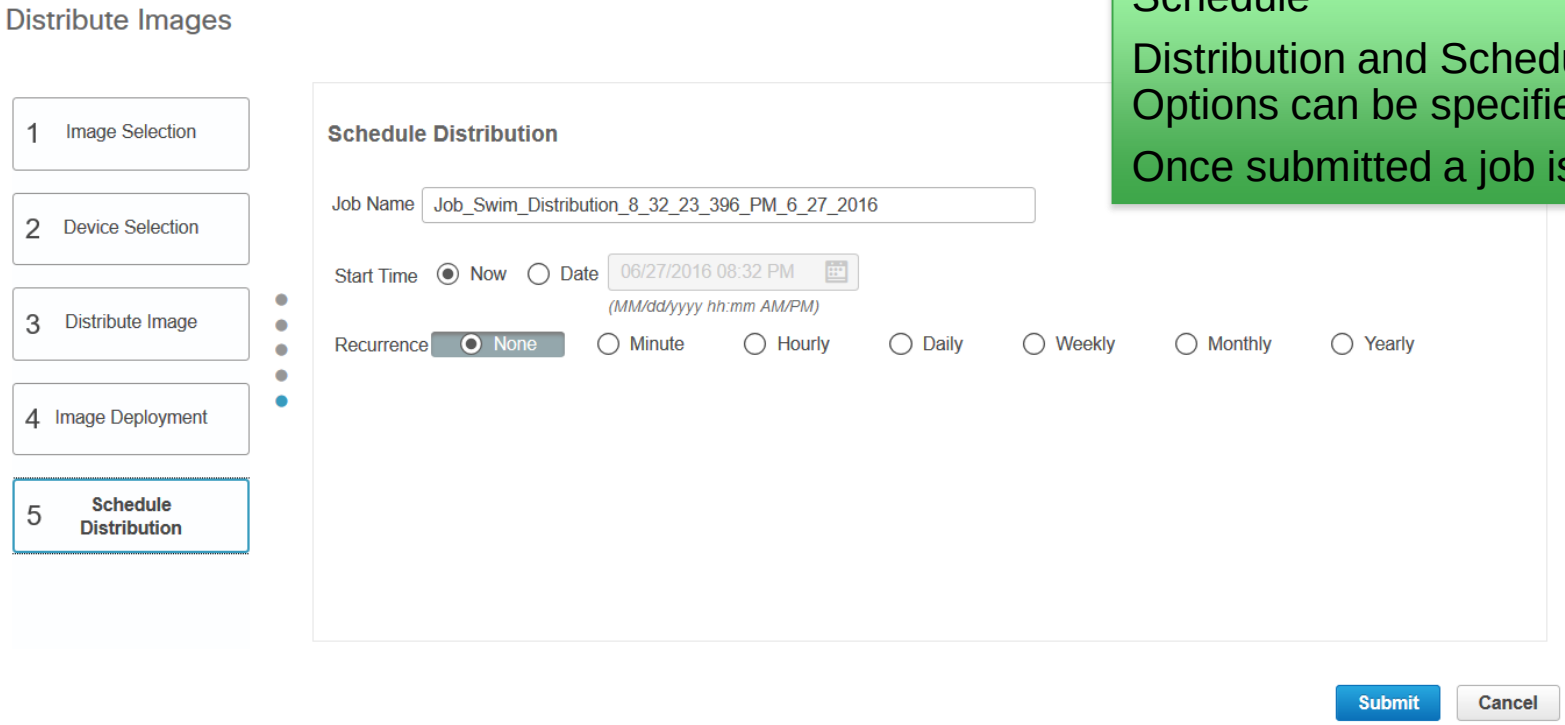


Upgrading Devices

4+5 Image Deployment/ Schedule

Distribution and Scheduling Options can be specified

Once submitted a job is created



Upgrading Devices

4+5 Image Deployment/ Schedule

Distribution and Scheduling Options can be specified

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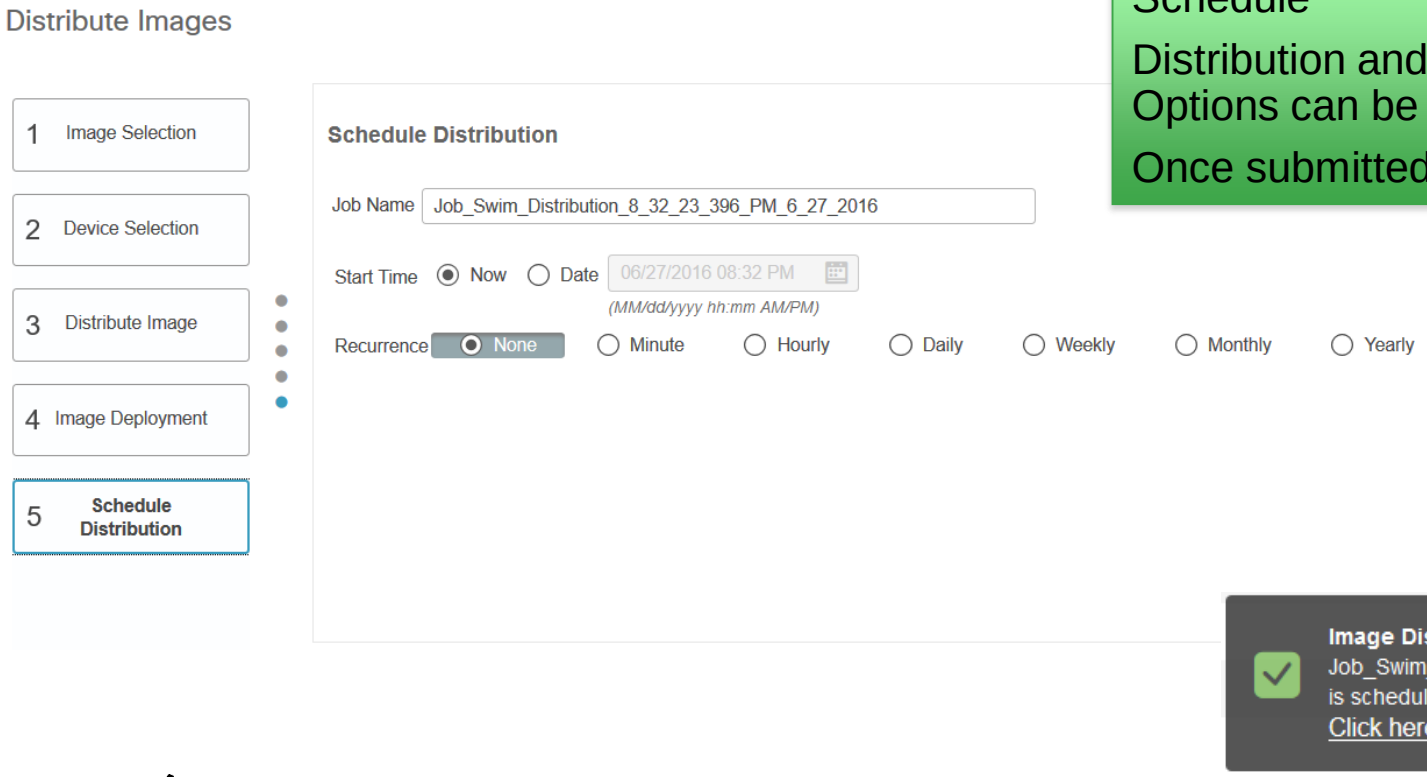
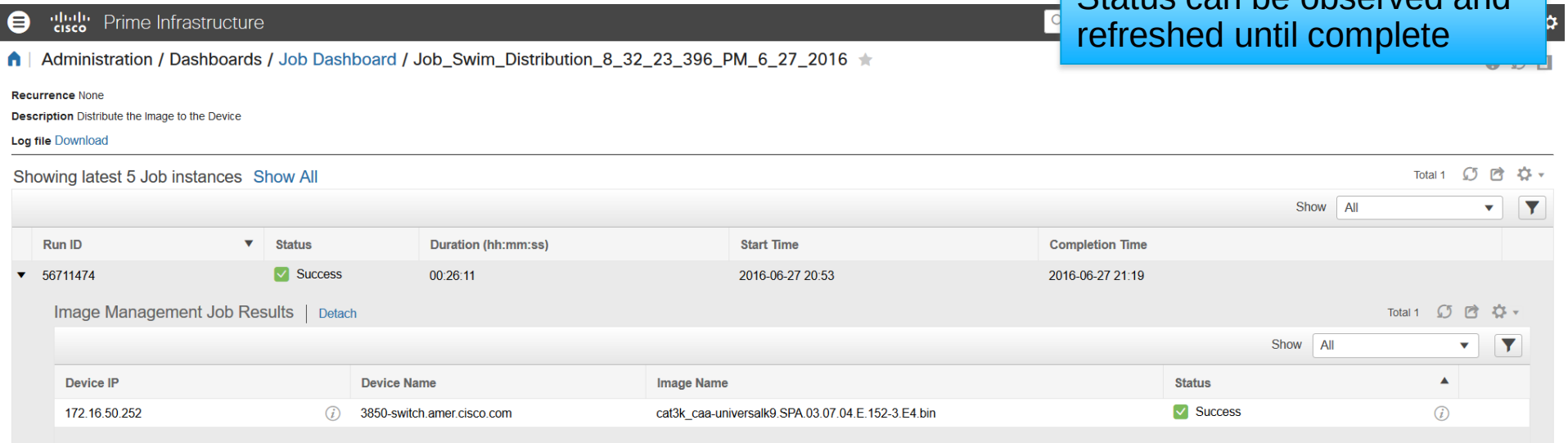


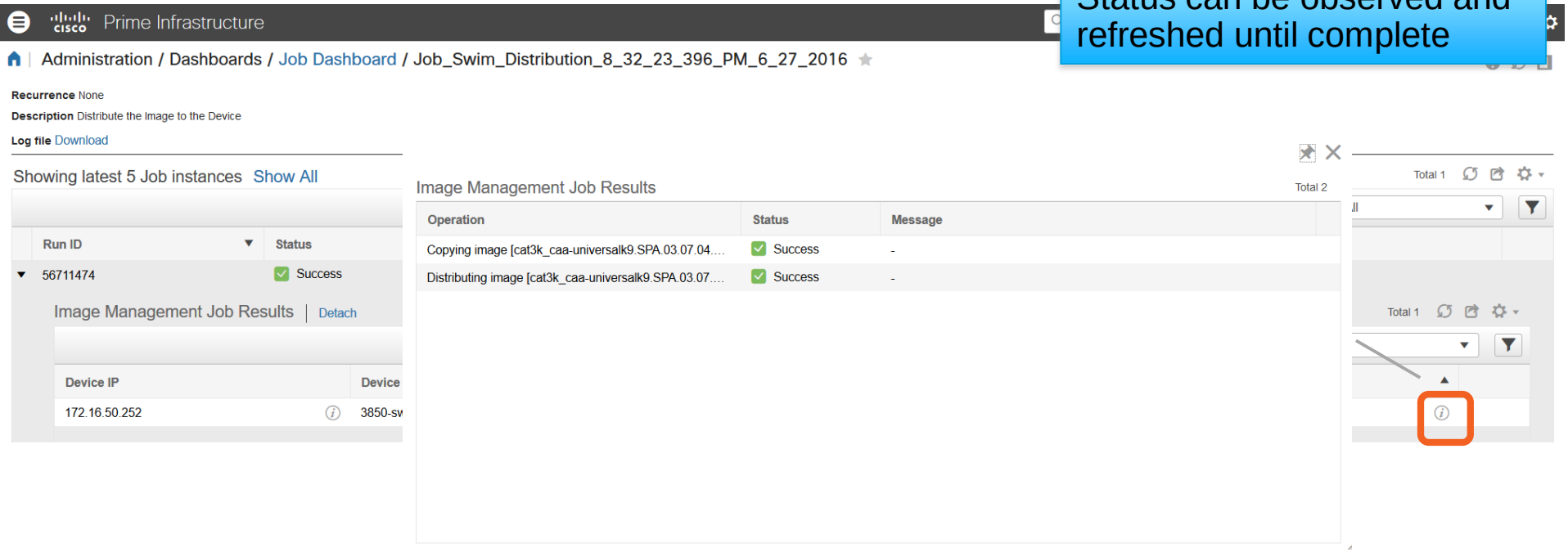
Upgrading Devices (cont)

Status can be observed and refreshed until complete

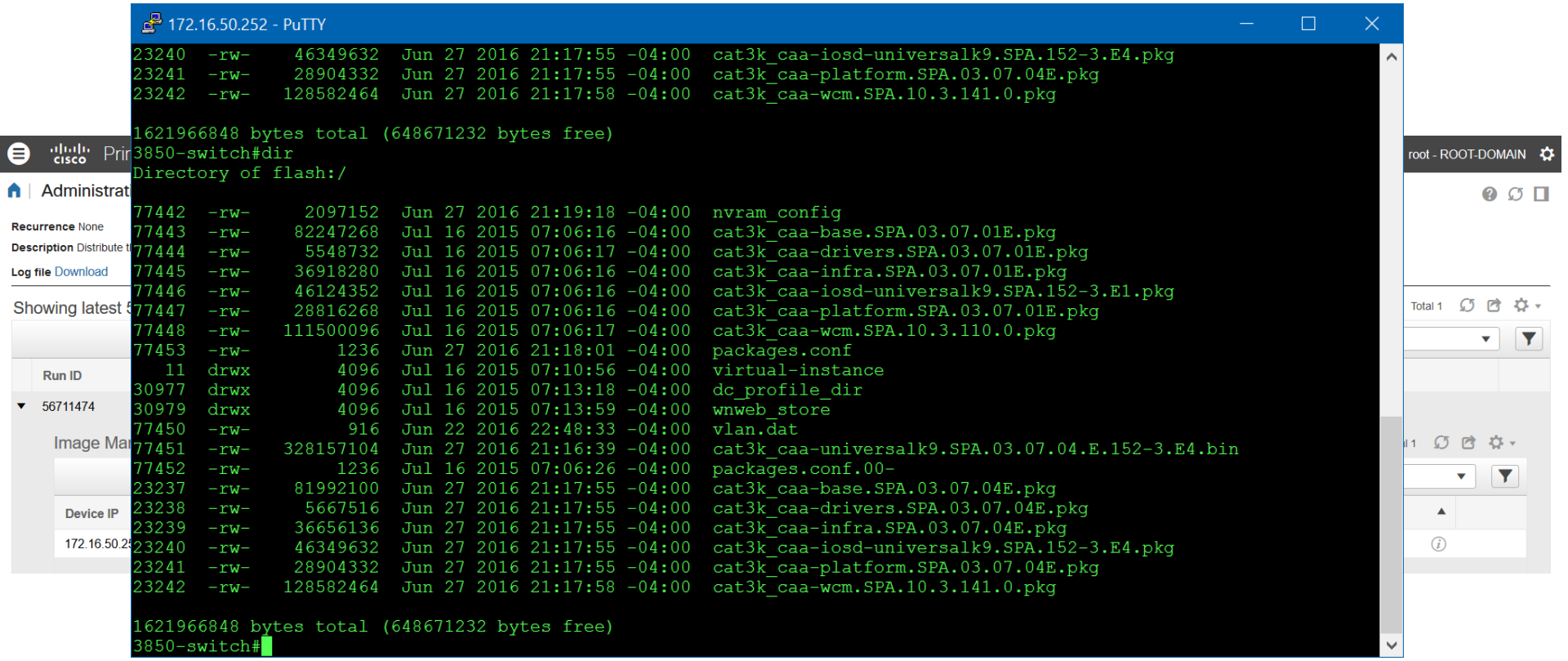


Upgrading Devices (cont)

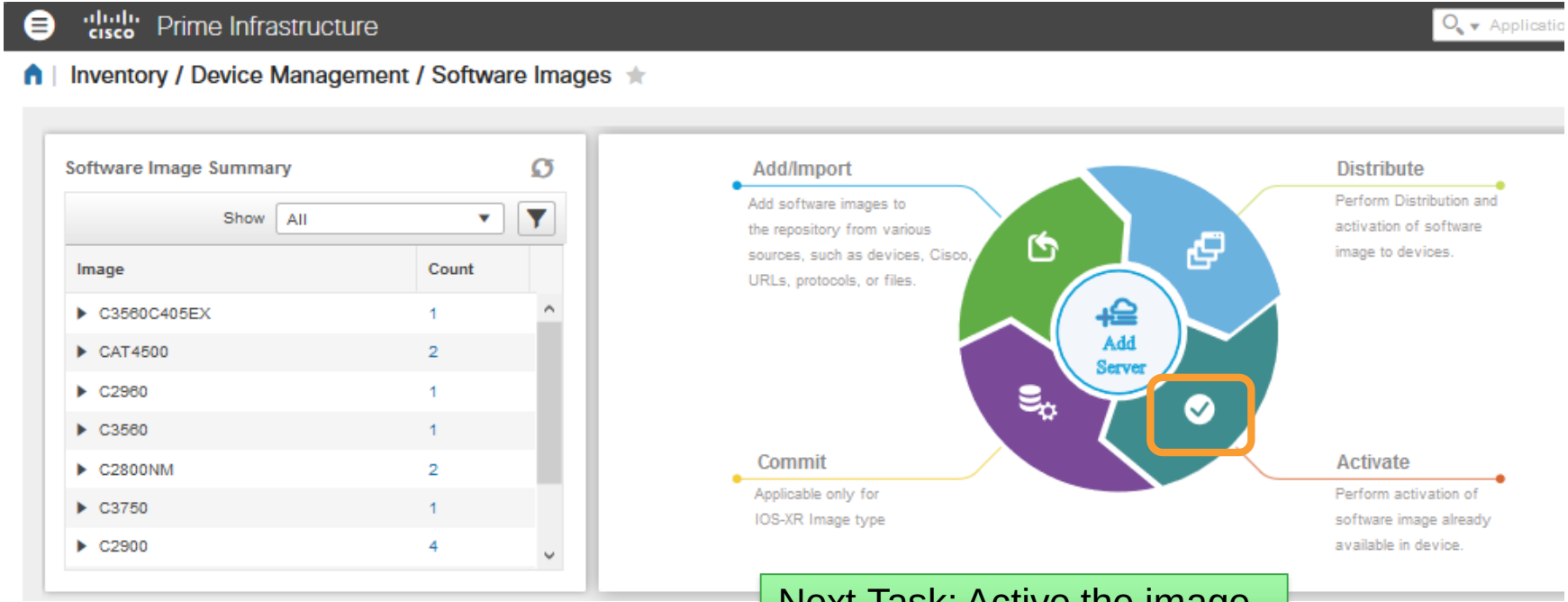
Status can be observed and refreshed until complete



Upgrading Devices (cont)

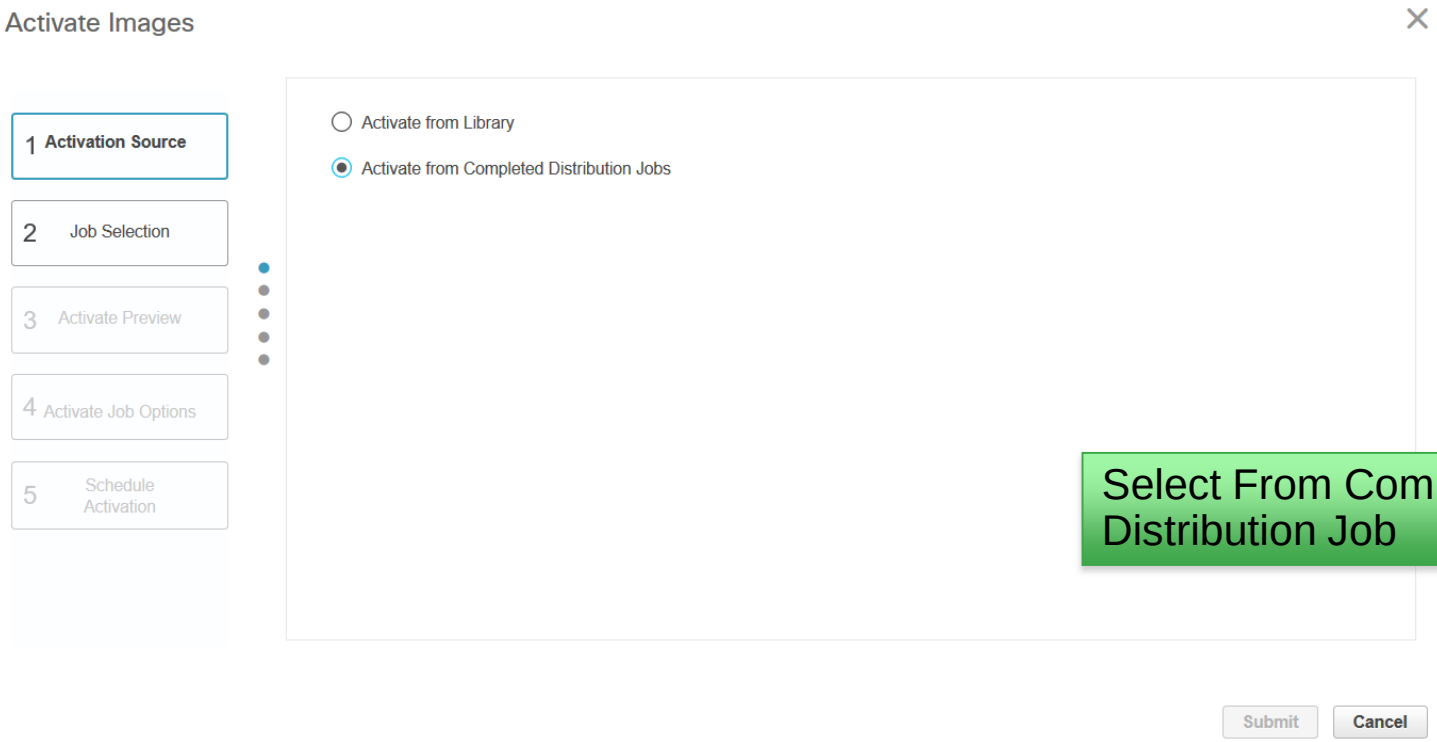


Activate Image



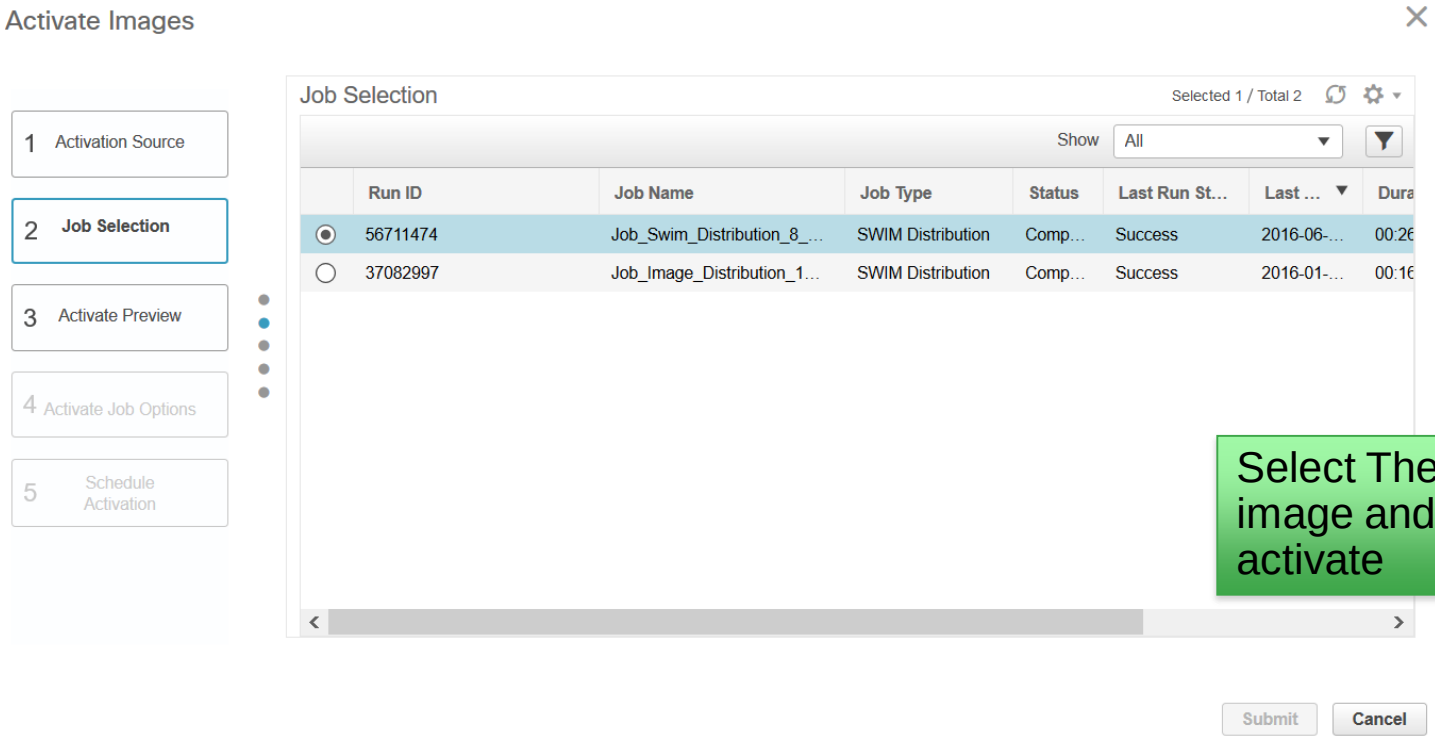
Next Task: Active the image that we just deployed

Activate Image (cont)



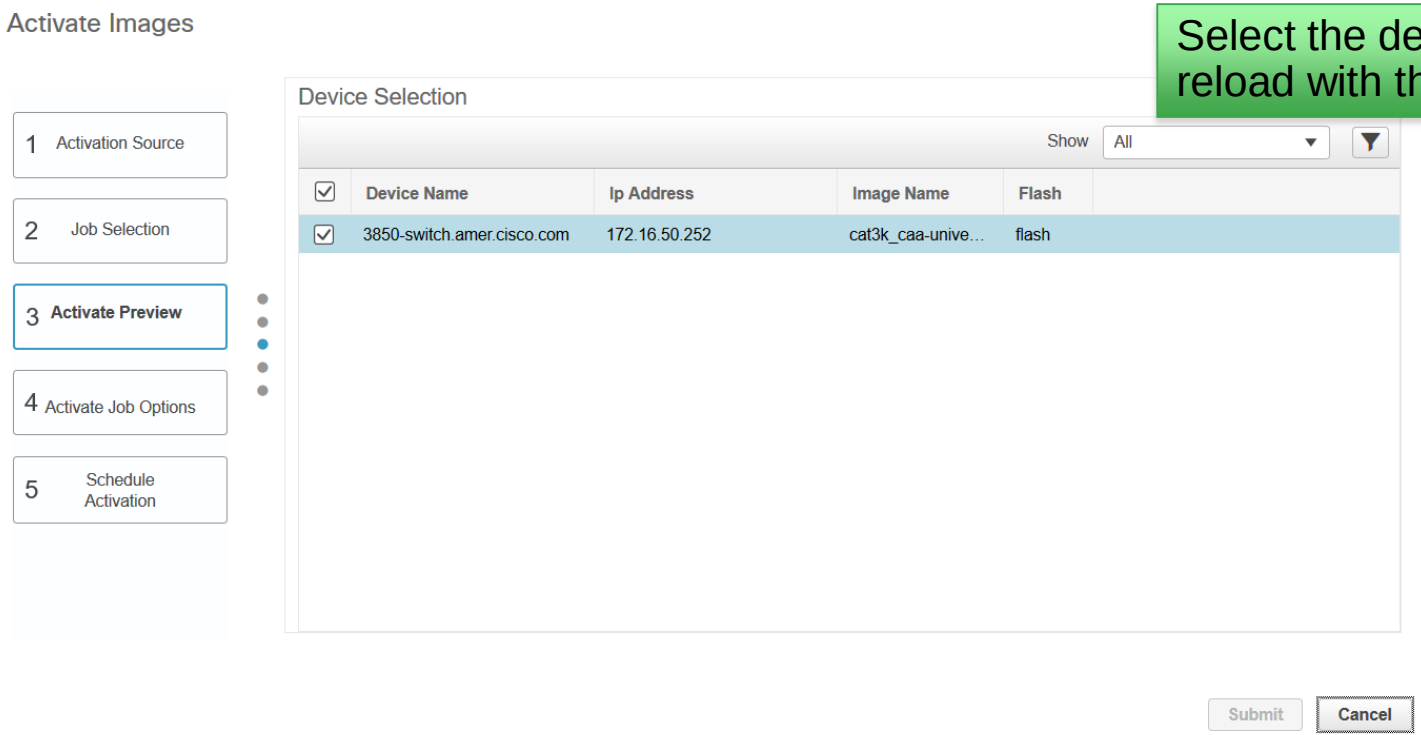
Select From Completed Distribution Job

Activate Image (cont)



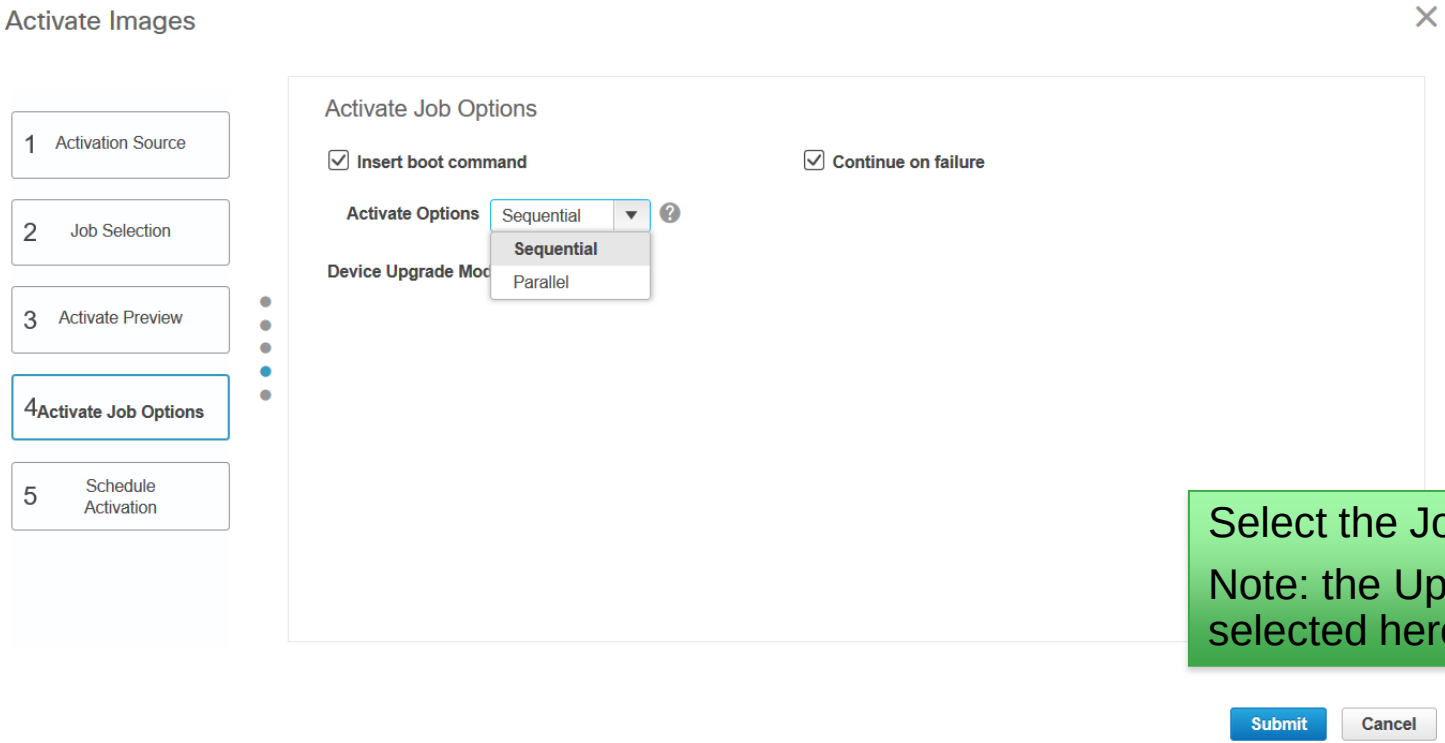
Select The Job that contains the image and devices you want to activate

Activate Image (cont)



Select the device(s) you want to reload with the new image

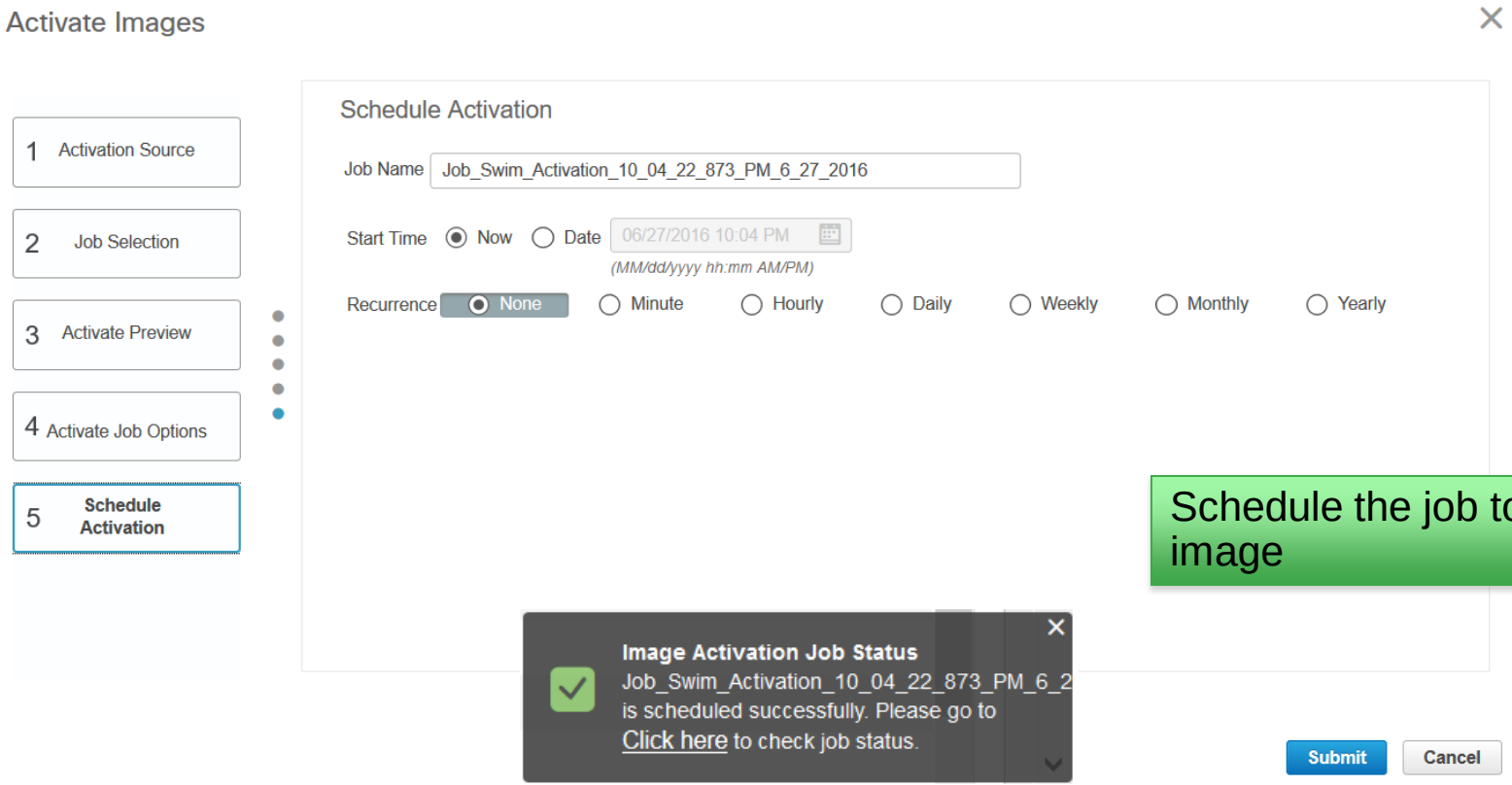
Activate Image (cont)



Select the Job options

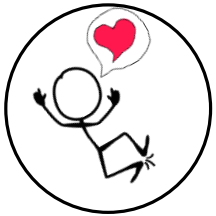
Note: the Upgrade Order is selected here

Activate Image (cont)

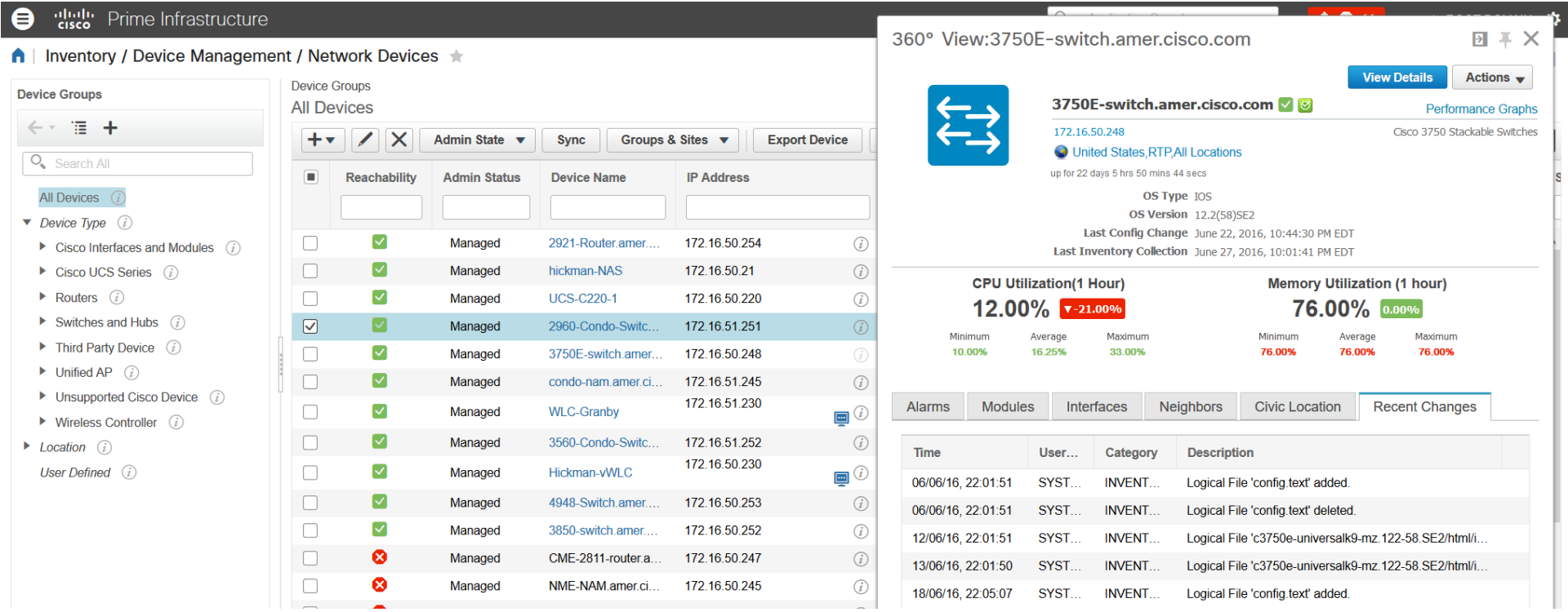


Schedule the job to activate the image

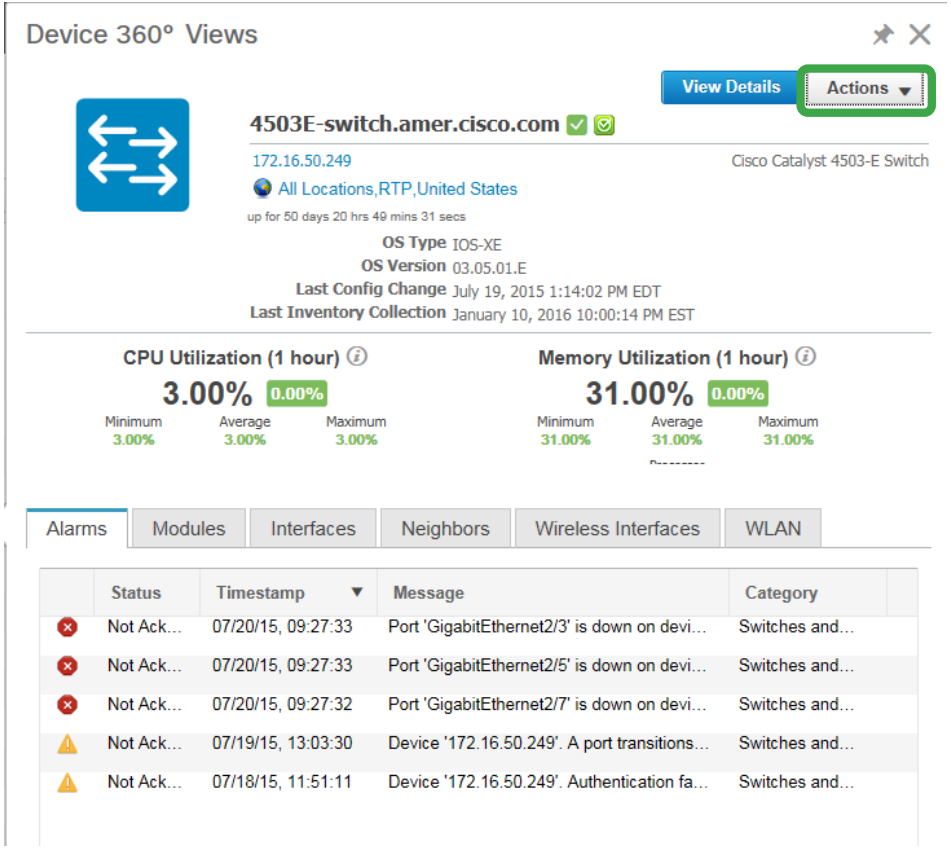
PI 3.1 What's New/Cool



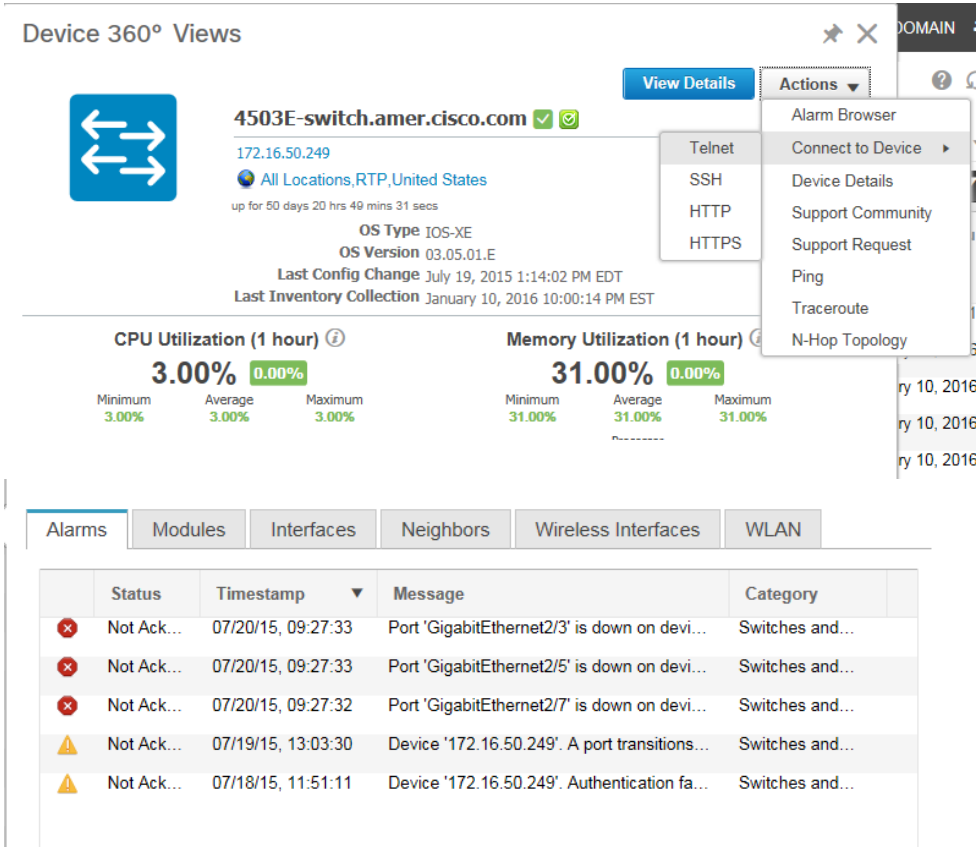
- Enhanced troubleshooting with new 360 view features
- Elastic Global Search
- External Device Config Backup (Shadow Directory)



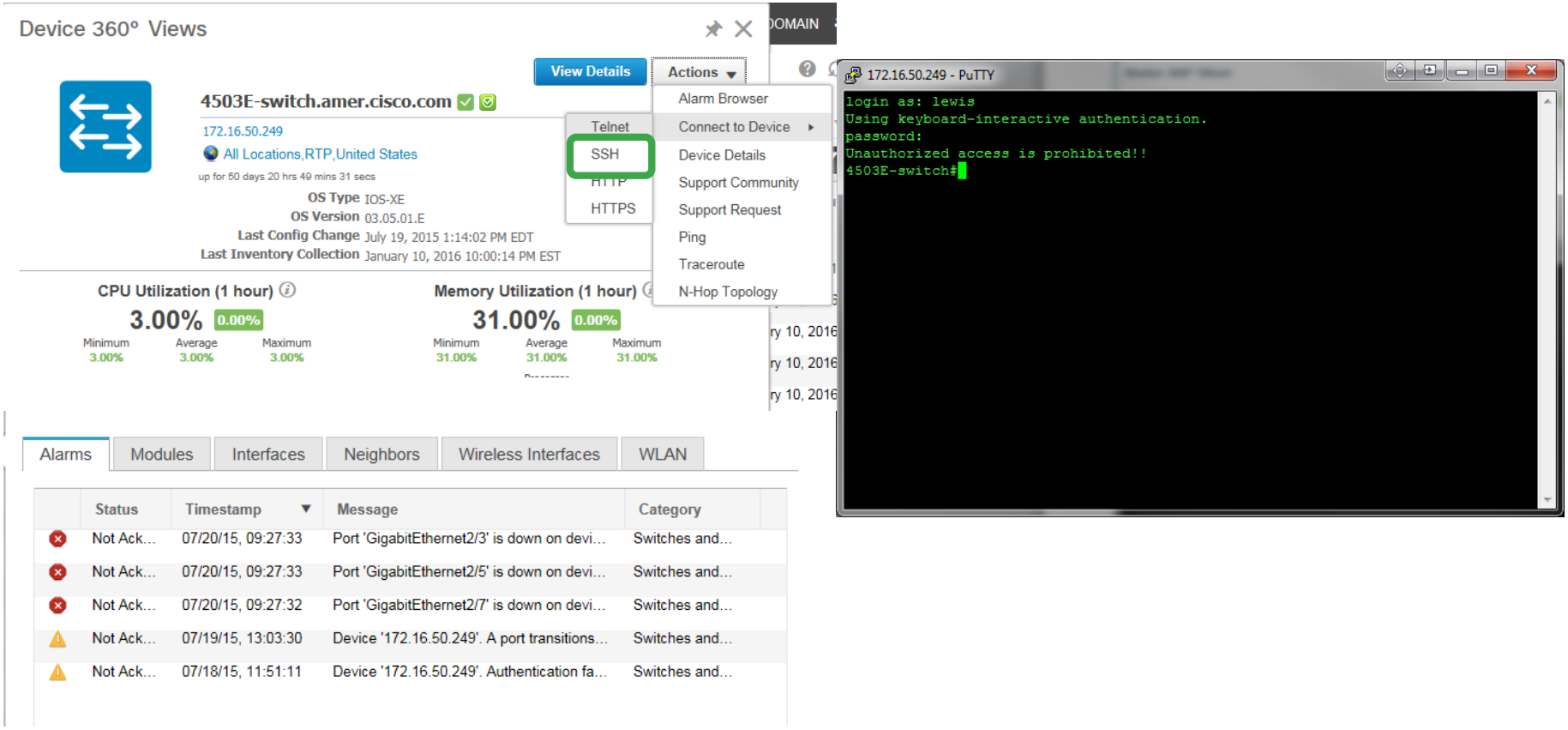
New Troubleshooting tools in PI 3.1



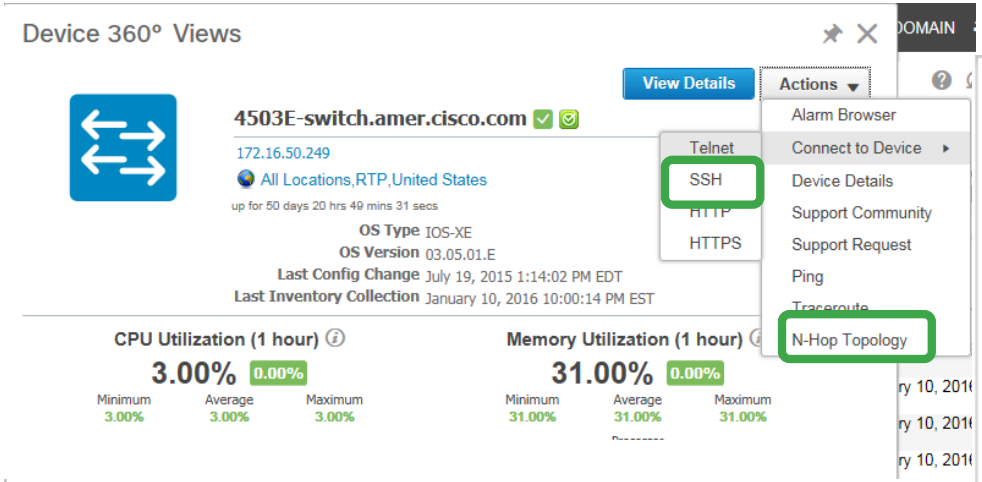
New Troubleshooting tools in PI 3.1

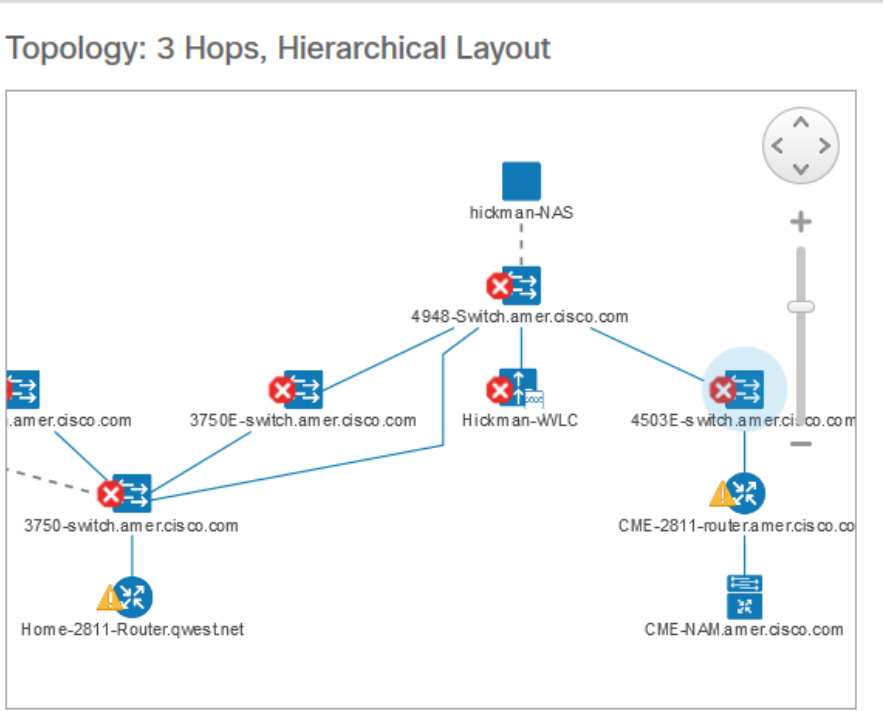


New Troubleshooting tools in PI 3.1

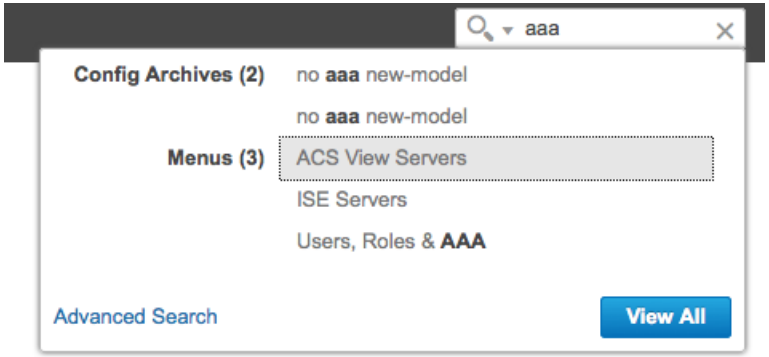


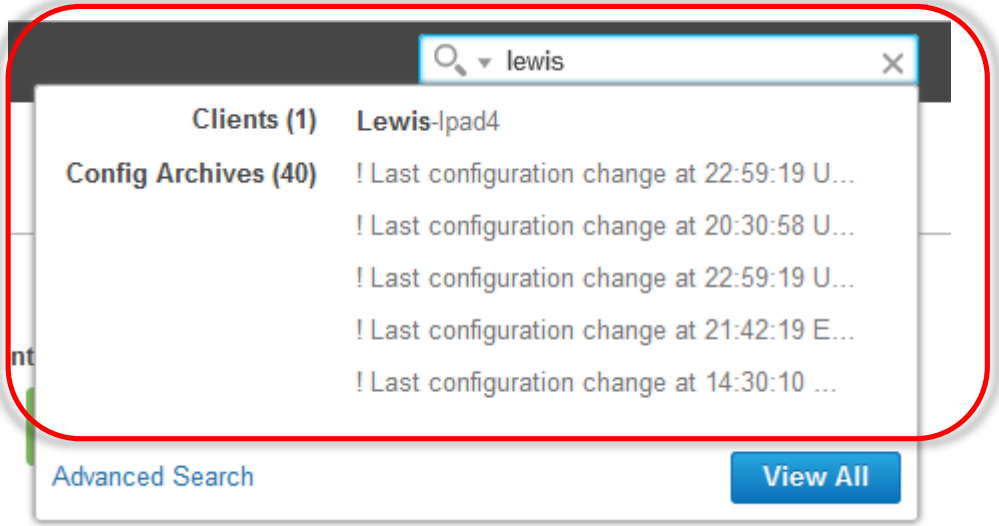
New Troubleshooting tools in PI 3.1





PI 3.1 Simplifies Search for Keywords within Configuration Archives and take action on them





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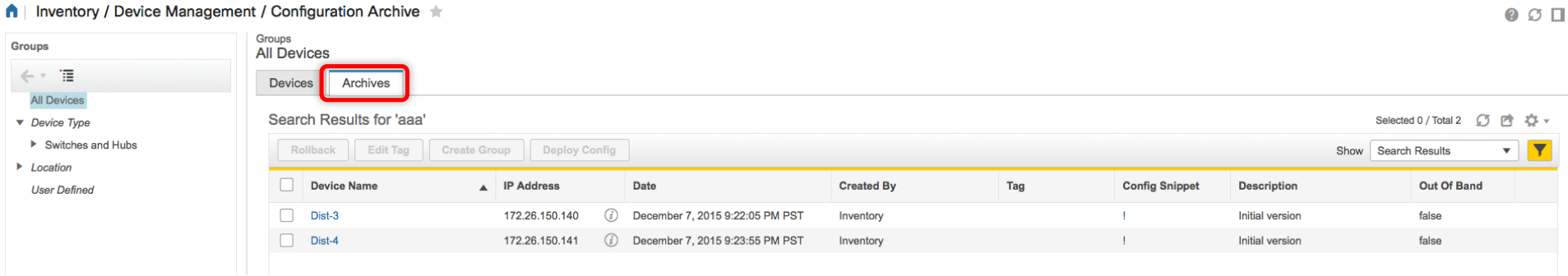
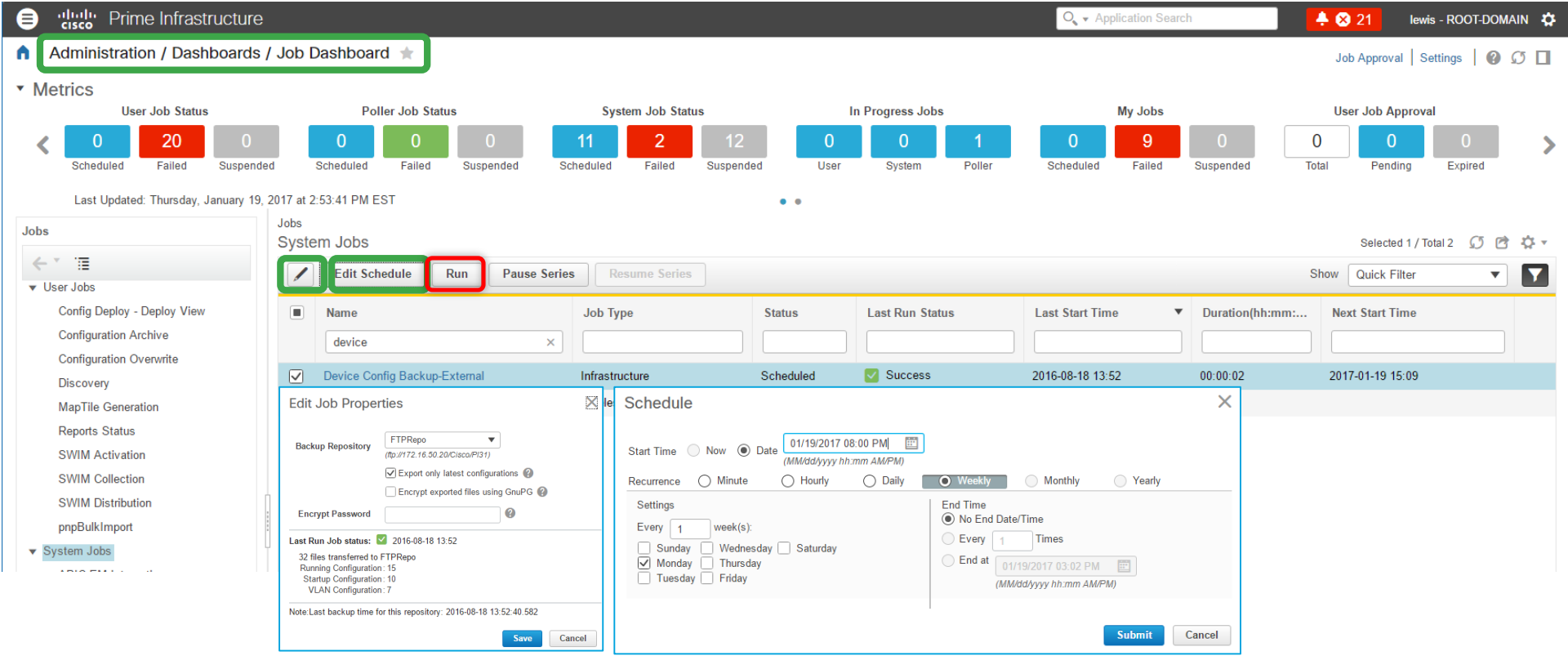


External Device Configuration Backup (Shadow Directory)



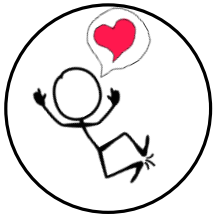
Key Takeaways and Looking Ahead

Key Takeaways/Conclusion

- We hope you see the usability and highly customizable interface that PI brings to the table
- There are many good features in Prime Infrastructure
  - many are better than LMS
- Feature Parity with LMS has made great strides
  - The Time is NOW
- PI 3.2 and APIC-EM will continue the progression

Prime Infrastructure 3.2 Highlights

Available End of April 2017



- Hyper-V hypervisor Support (2012 + 2016)
- New Custom Reporting Framework
- Granular Customization of Alarms and Notifications
- DMVPN Monitoring

Useful Information

- Cisco Prime LMS 4.2 and Cisco Prime Infrastructure 3.x Functional Comparison
- Cisco Prime Infrastructure Deployment Guide
- Cisco Prime Infrastructure Video Series
- Cisco Prime Infrastructure Job Aids (detailed guides on how to specifically deploy/implement many of the PI 3.x features)

Cisco Prime LMS 4.2 and Cisco Prime Infrastructure 3.0 Functional Comparison

October 2015

This document outlines the high-level Cisco Prime™ Infrastructure plans to support Cisco Prime LAN Management Solution (LMS) functionality. This document provides Cisco Prime LMS customers guidance and recommendations to help ensure a smooth transition to Cisco Prime Infrastructure.

The objective of Cisco Prime Infrastructure is to advance today's IT operational and productivity capabilities. In view of this, each Cisco Prime LMS feature was reevaluated for usefulness, usability, and practical value. Table 1 will help customers quickly assess which LMS features will transition into Cisco Prime Infrastructure.

Cisco advises customers to reach out to their authorized Cisco® channel partner or Cisco account team if there are questions, concerns, or requests regarding the status or implementation plans of specific Cisco Prime LMS features or if migration assistance is needed.

Note that some of the features described in Table 1 remain in varying stages of development and will be offered on a when-and-if-available basis. Roadmap information provided in this document is subject to change at the sole discretion of Cisco, and Cisco will have no liability for delay in the delivery or failure to deliver any of the products or features set forth herein.

Table 1. High-Level Cisco Prime LMS Functional Comparison to Cisco Prime Infrastructure

Legend	
●	Equivalent support
○	Partial support
-	Pending support
X	Not supported
Green	Supported today or is intended to be supported in Cisco Prime Infrastructure only

Functional Capability	LMS 4.2	CPI 3.0	Cisco Prime Infrastructure Future Plan	Additional Notes
Scope	Wired	Converged	Converged	
System				
Virtual machine (VM) soft appliance server	●	●	●	
Physical appliance server	○	●	●	
Maximum scalability	5000	15,000	100,000+	With Cisco Prime Infrastructure Operations Center
High availability	○	●	●	
Cisco Technical Assistance Center (TAC)	●	●	●	

Cisco Spark

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Use Cisco Spark to communicate with the Speaker and fellow participants after the session

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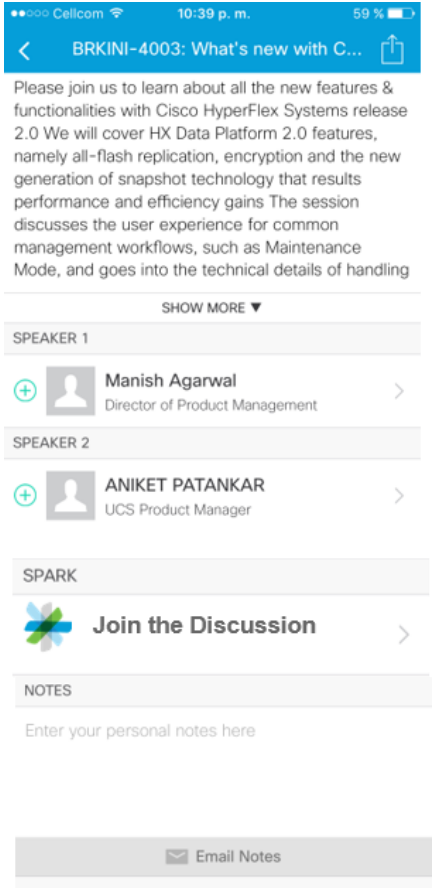
1. Go to the Cisco Live Berlin 2017 Mobile app
2. Find this session
3. Click the Spark button under Speakers in the session description
4. Enter the room, room name = **2701**
5. Join the conversation!

The Spark Room will be open for 2 weeks after Cisco Live

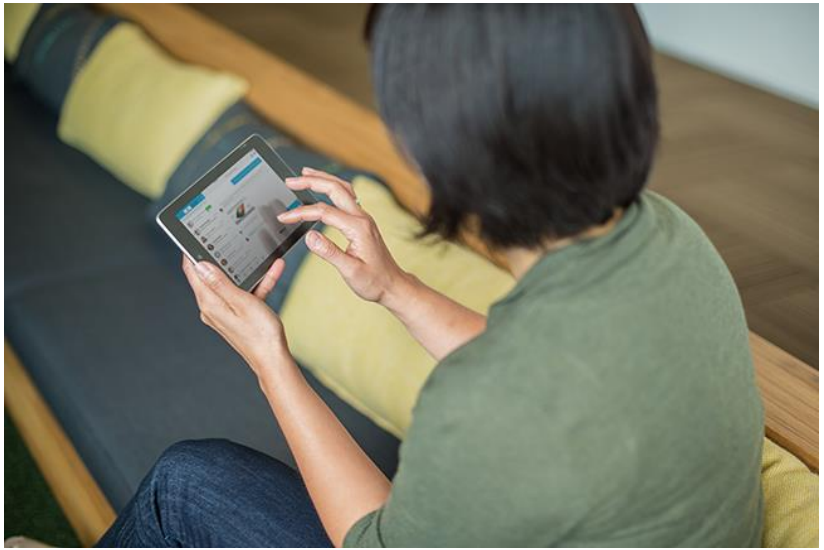


Continue Your Education

- Visit the World of Solutions for
  - Cisco Campus: EN and ACI areas for Prime Infra and APIC-EM Demos
  - Whisper Suites: Get in touch with your Cisco Account/Partner team to schedule 1-on-1 meetings with Product Teams at SDN and Network Transformation Whisper Suites
- Visit the NOC to see a Prime Infrastructure managing the CL network live!
- Prime Infrastructure related labs and sessions
  - BRKNMS-2036 - Configuration Compliance Management with Prime Infrastructure 3
  - BRKNMS-1040 - IWAN and AVC Management using Cisco Prime Infrastructure and APIC-EM
  - BRKNMS-2658 - Securely Managing Your Networks with SNMPv3
  - BRKEWN-2011 Managing an Enterprise WLAN with Cisco Prime Infrastructure
  - BRKNMS-2848 - How to Manage Wired Networks With Cisco Prime Infrastructure
  - BRKNMS-2847 - Wireless Troubleshooting with Cisco Prime Infrastructure
  - LTRNMS-2007 - PnP Deep Dive Hands-on with APIC-EM and Prime Infrastructure

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 CiscoLive.com/Online

Thank You

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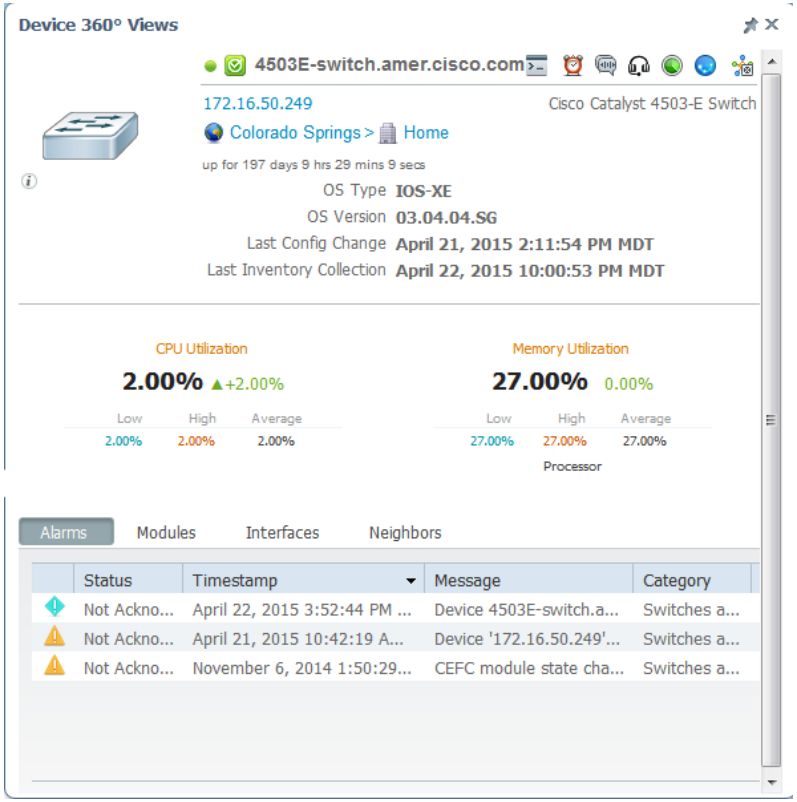
cisco

Your Time Is Now

New Troubleshooting tools in PI 3.x Extra



For Windows 7/8, 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('/')\""

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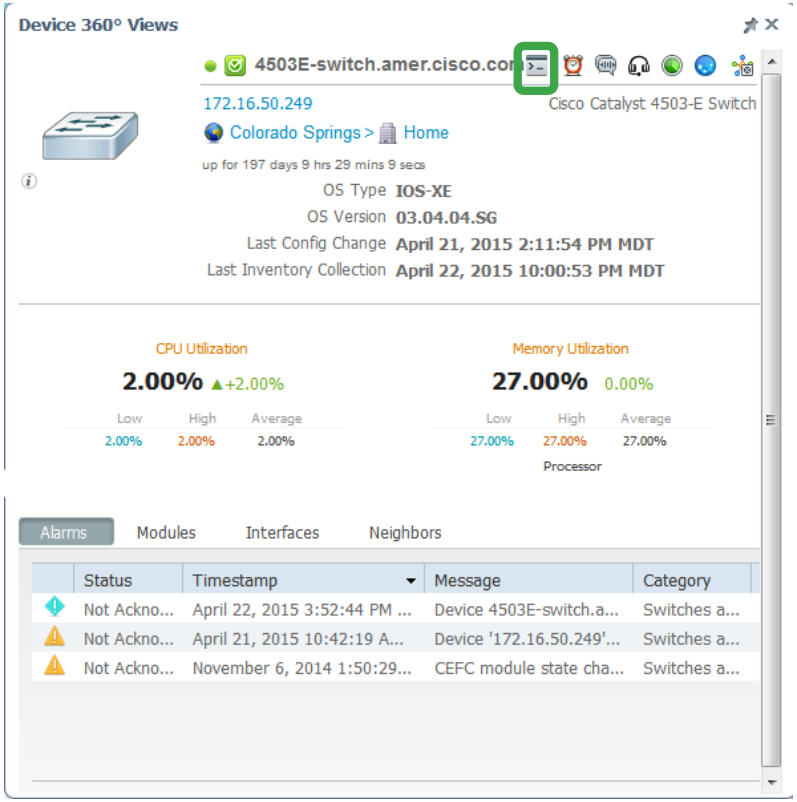

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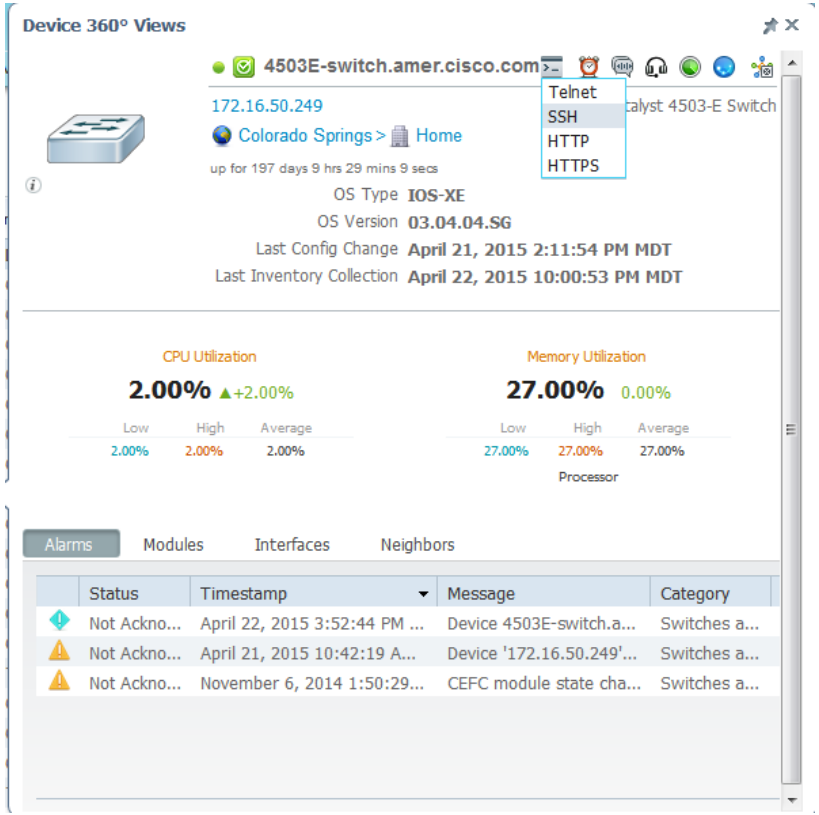

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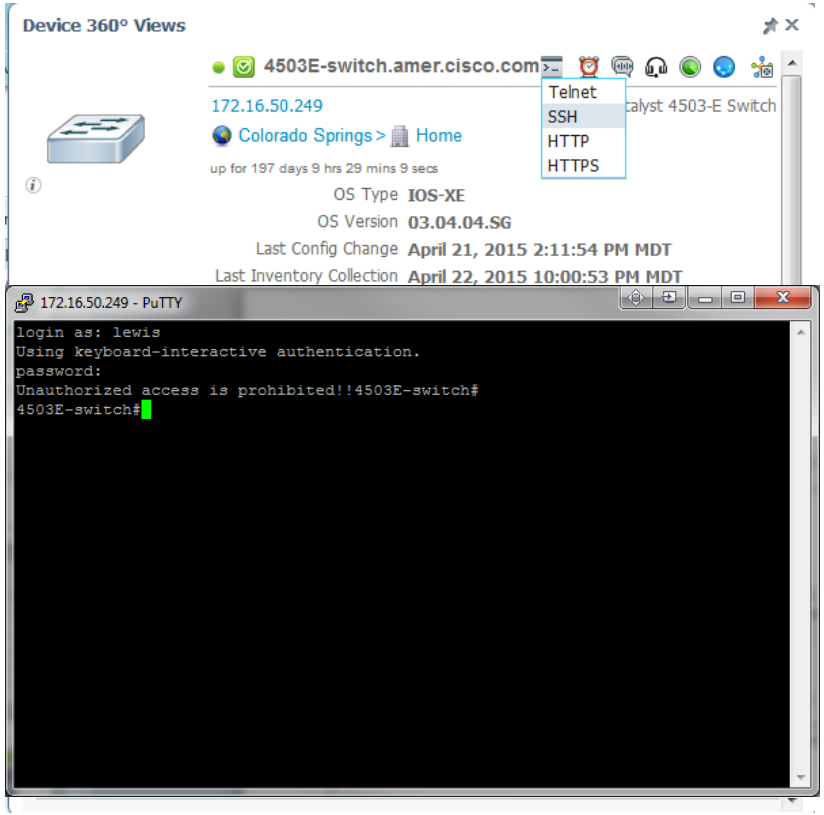

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CLITemplateDBVariablesQuery.properties

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 =