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Cisco Prime Infrastructure

The future of Cisco Network Management

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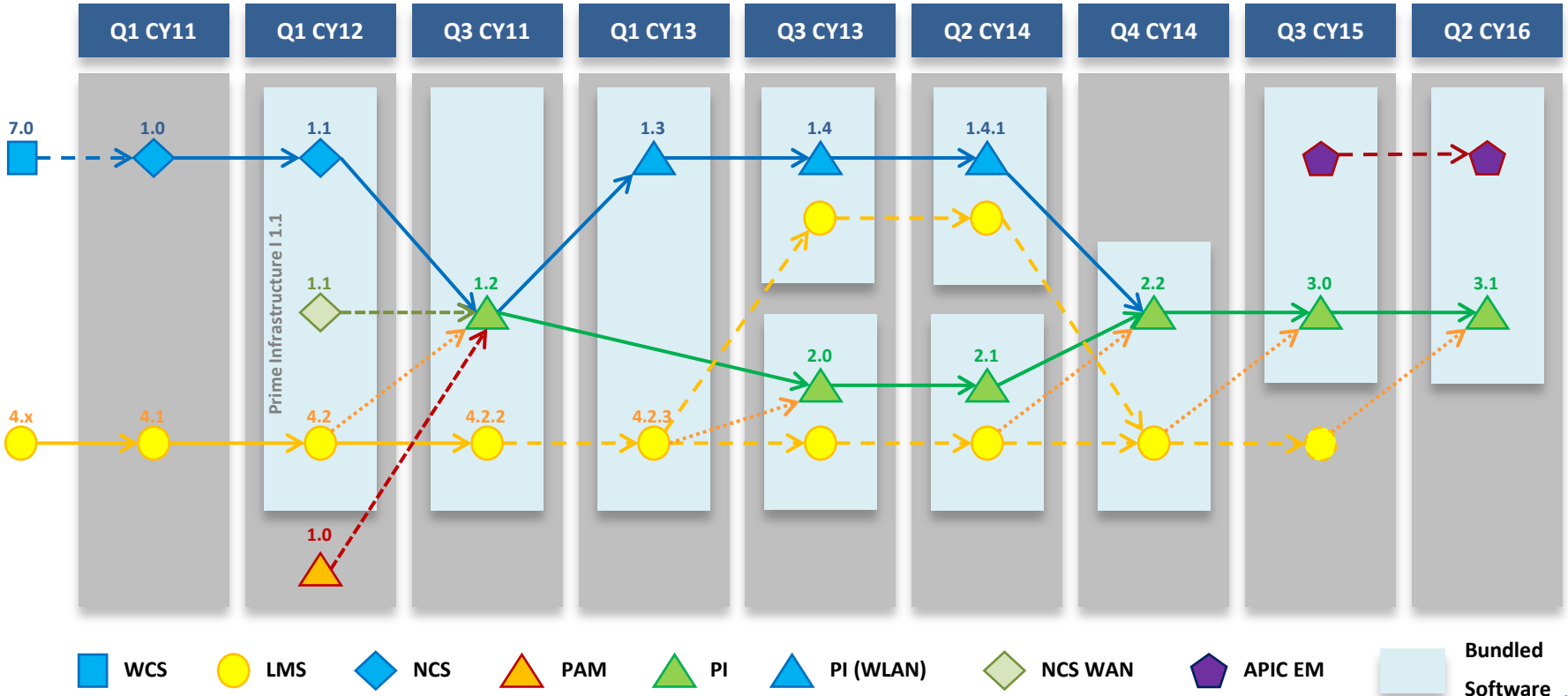
EMEAR Central

Belgrade, 31st March 2016

CISCO CERTIFIED CCIE 15 YEARS
 # 5724

cwne Certified Wireless Network Expert
 # 158

The history of Prime Infrastructure



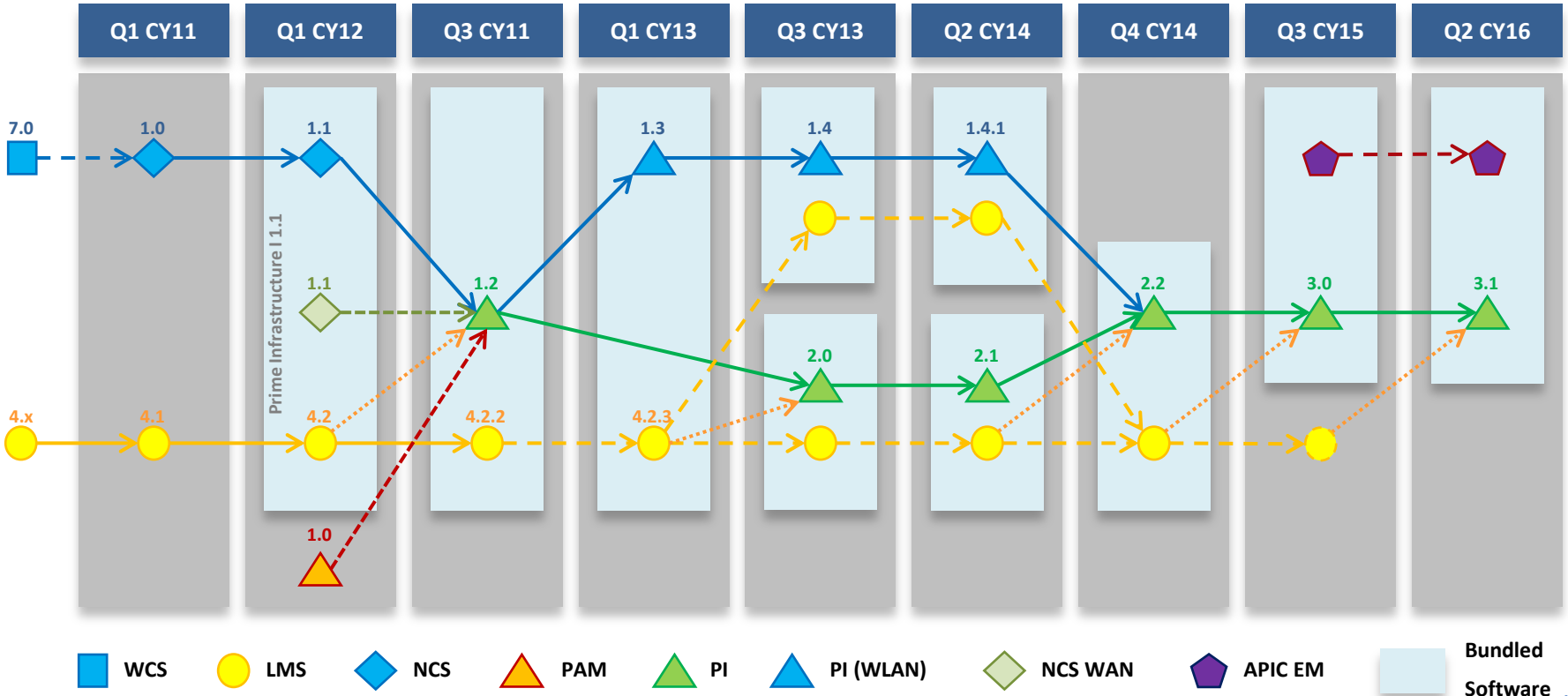
Managing Networks

Agenda

- **Where did we start?**
- **Where are we today?**
  - Prime Infrastructure 3.0
- **Where will we go in future?**
  - Prime Infrastructure 3.1
  - APIC-EM Integration

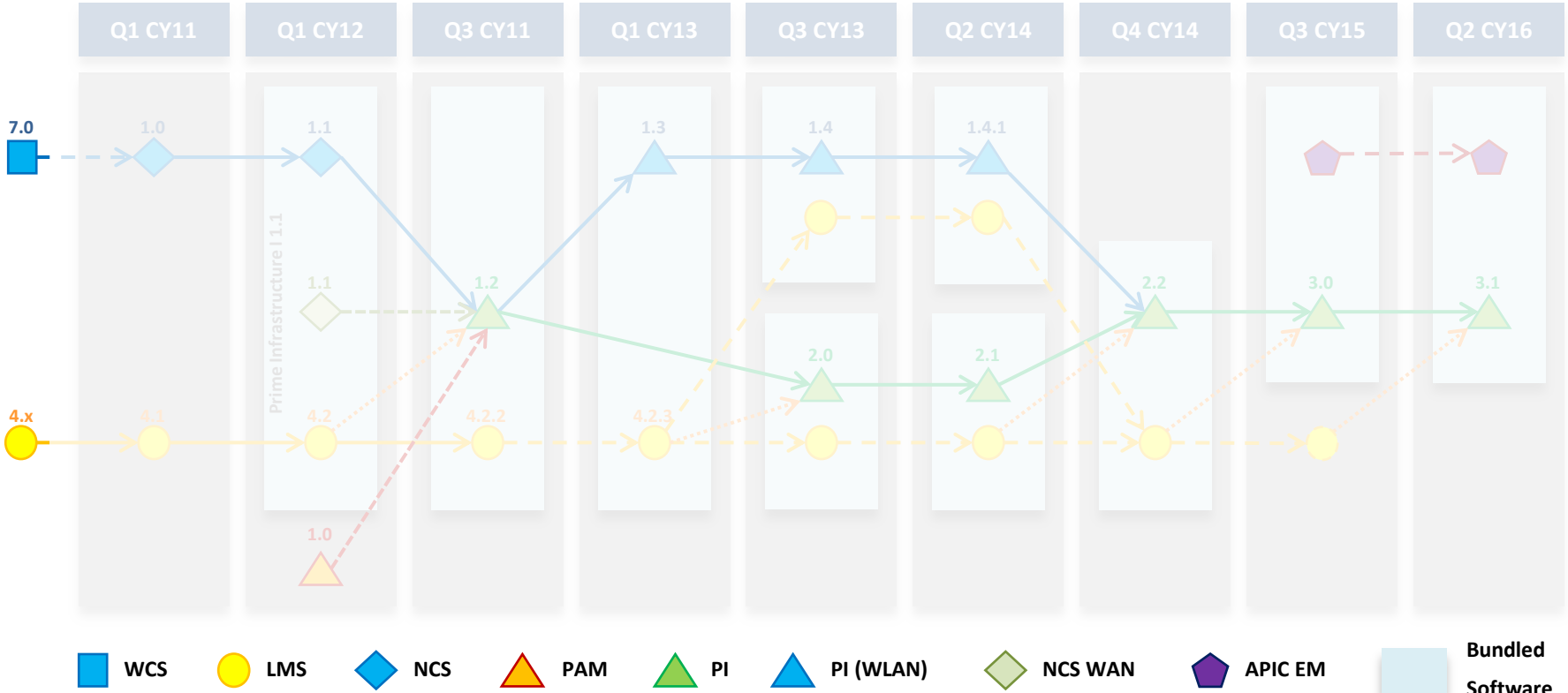
Where did we start?

The history of Prime Infrastructure



The history of Prime Infrastructure

The origins



The history of Prime Infrastructure

The origins

Wireless Management:
WCS was a very successful product, but was focused solely on Wireless Management.
Actually mainly on WLAN-Controllers!

The history of Prime Infrastructure

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WCS was a very successful product, but was focused solely on Wireless Management.
Actually mainly on WLAN-Controllers!

Winner

Wired Management:
Success of LMS was a highly discussed topic; some customers loved it, others clearly not.

CY14 | Q3 CY15 | Q2 CY16

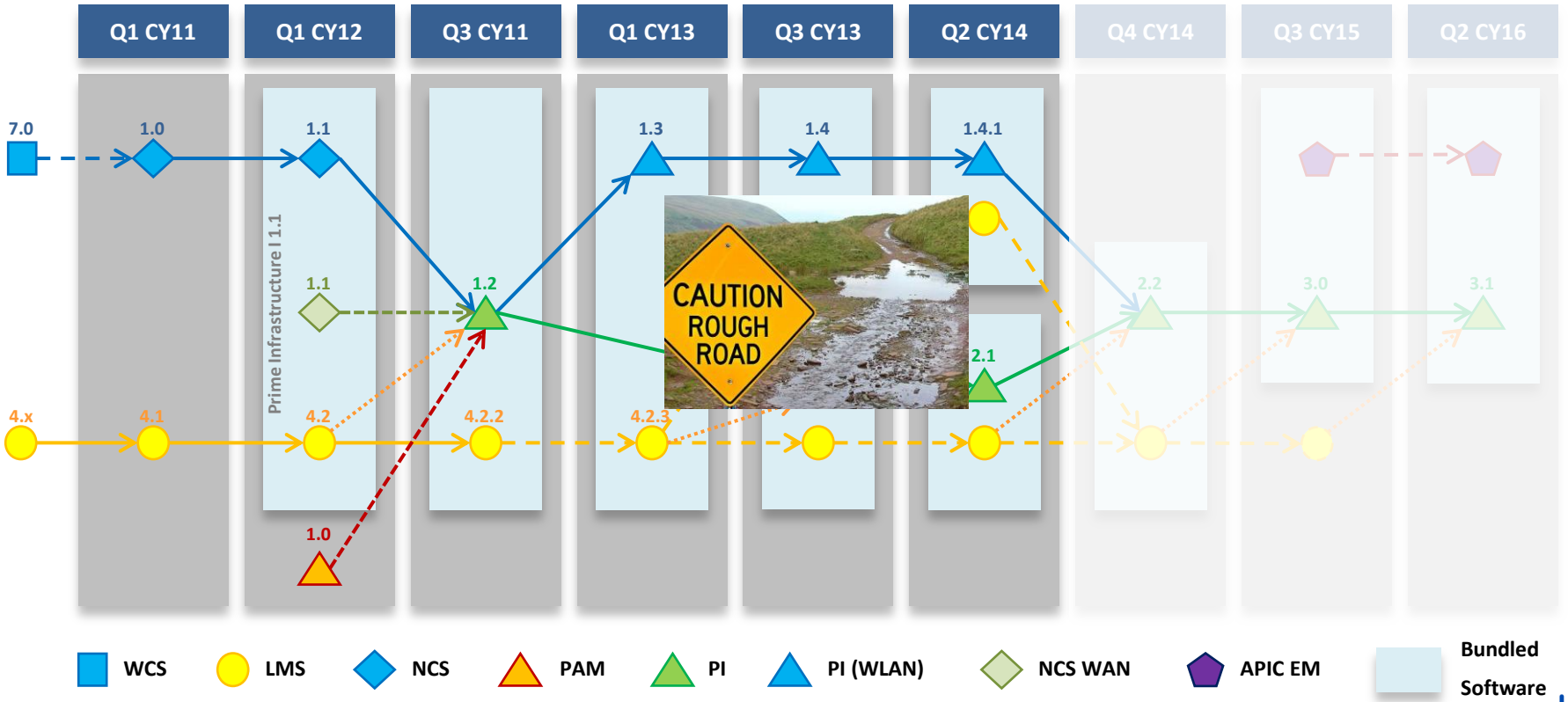
7.0 | 1.1 | 1.2 | 2.2 | 3.0 | 3.1

4.x | 1.0

WCS | LMS | NCS | PAM | PI | PI (WLAN) | NCS WAN | APIC EM | Bundled Software

The history of Prime Infrastructure

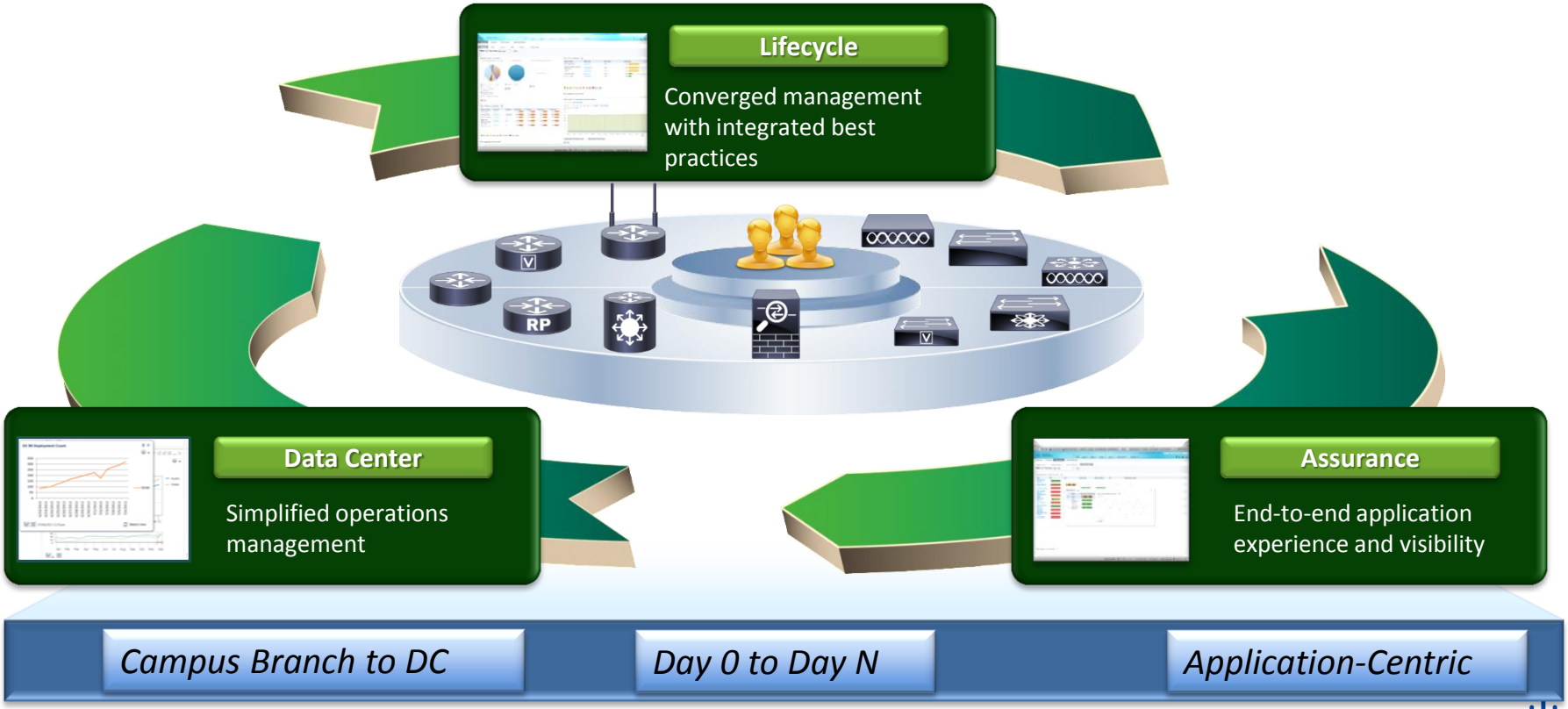
Integration of LMS Features into Prime Infrastructure



Where are we today?

Cisco Prime Infrastructure

Realizing the Vision of One Management



Prime Infrastructure Benefits

User and Application Centric Management End-to-End

- Manage Enterprise Routers, Switches and Wireless
- Monitoring all network elements reducing the number of tools required to manage the network

Management Simplicity and Automation

- Guided Workflows
- Provisioning API's

Reduces Operational Costs with integrated Day 0-Day N

- Enables tools consolidations across FCAPS
  (***F**ault, **C**onfiguration, **A**ccounting, **P**erformance, **S**ecurity according ISO)*
- Operations Center

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Lifecycle Management of Devices

Design

- Plan the network design
- Wireless network planning

Deploy

- Plug and Play for automated deployment
- Day 2 configuration changes for operational enhancements

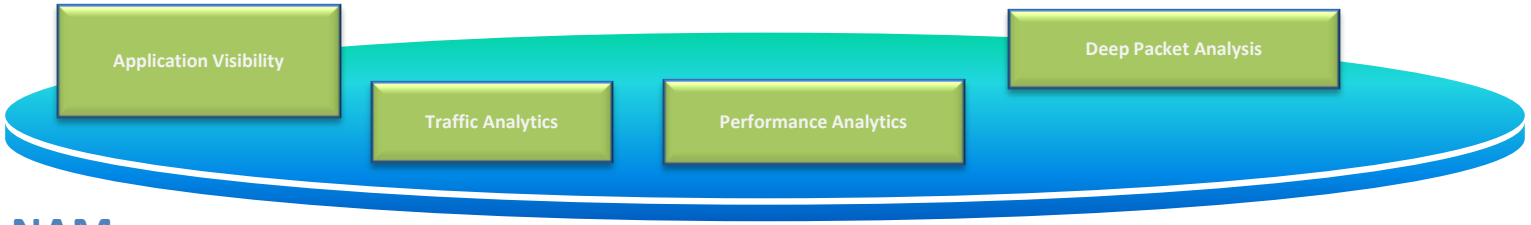
Operate

- Network Performance and Fault management
- Application Visibility and Control
- User experience monitoring

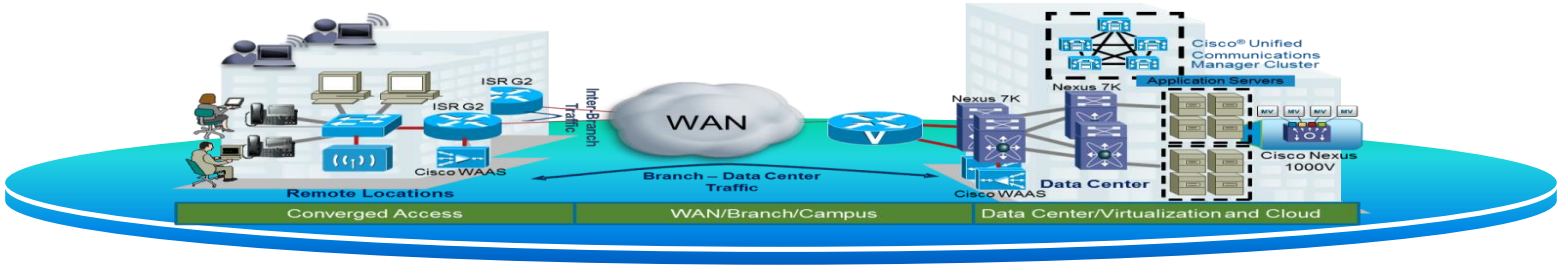
Prime Infrastructure – Assurance

Solution Architecture

Prime Infrastructure (Assurance)



Prime NAM



Embedded Instrumentation

How is Assurance achieved ?

Leverage the power of embedded Cisco instrumentation

NAM Appliance (23XX)
NBAR2, Voice, ART, SPAN, ERSPAN

NGA 3240

Netflow, SPAN, ERSPAN

Netflow, NAM module

Prime Infrastructure

Cisco ISR & NAM on SRE
NBAR2, PA, Medianet

Cisco ASR
NBAR2, AVC, Medianet

Cisco 6800 & NAM Blade
Netflow, MediaNet

Aironet APs
NBAR2

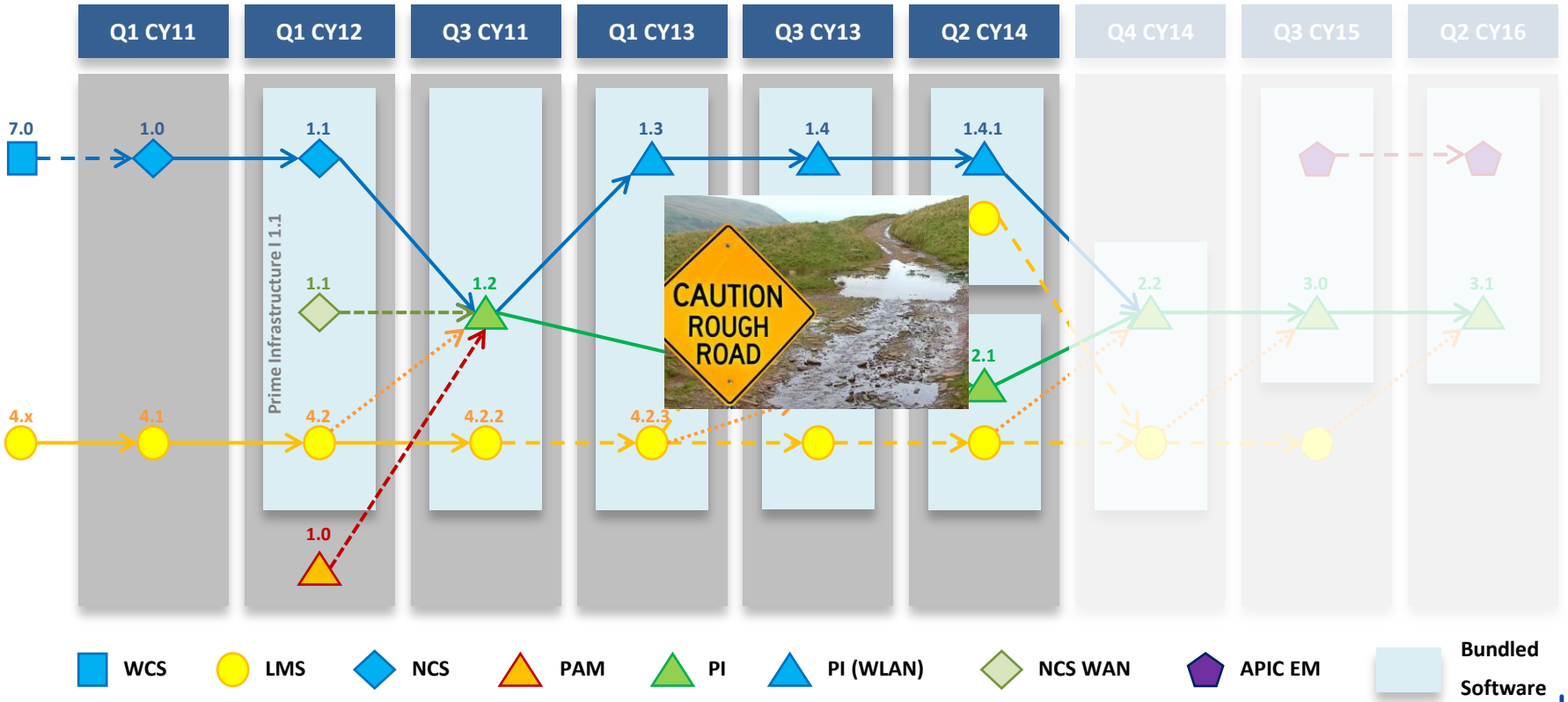
Wireless Controllers
NBAR2

Cisco Catalyst 3850-X w/ 3K-X 10G
Netflow, MediaNet

SNMP/CLI Polling | SPAN/ ERSPAN | Netflow | WAAS | PA | MEDIANET | NBAR | NBAR2

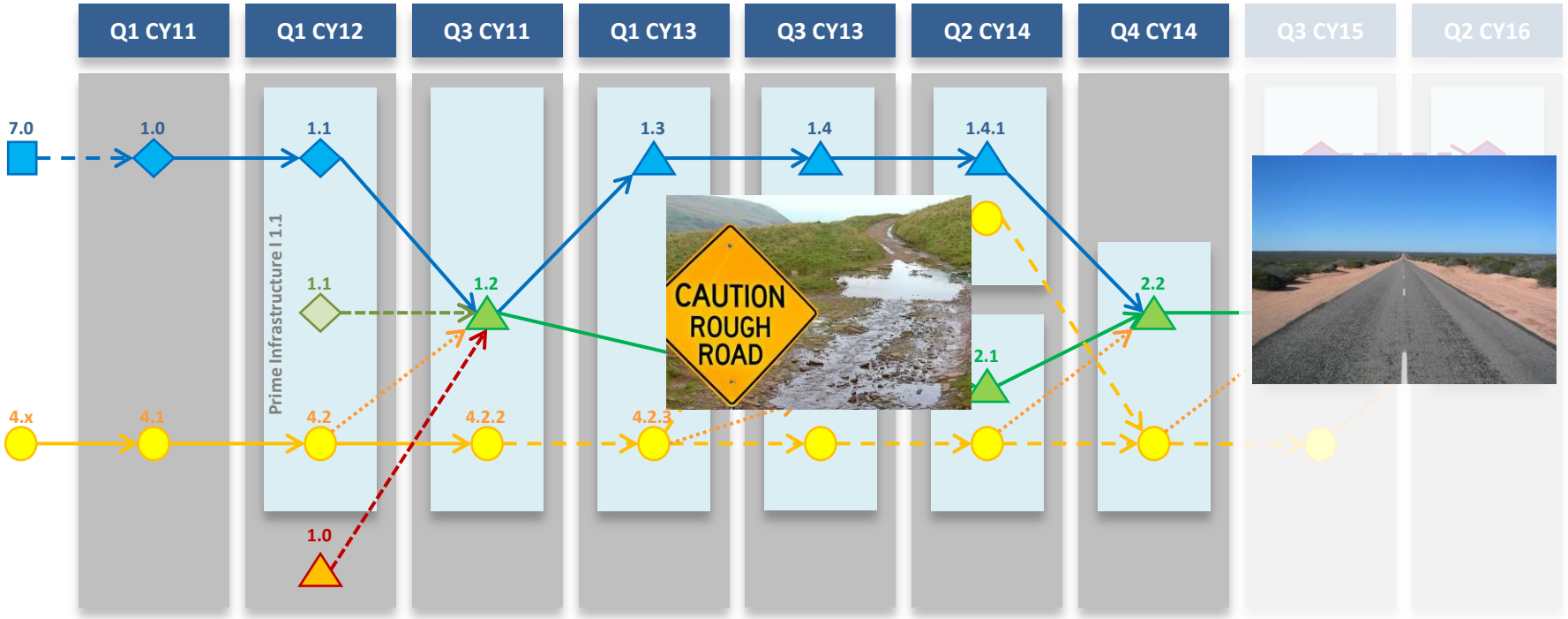
The history of Prime Infrastructure

Integration of LMS Features into Prime Infrastructure



The history of Prime Infrastructure

Convergence back on one release



The history of Prime Infrastructure

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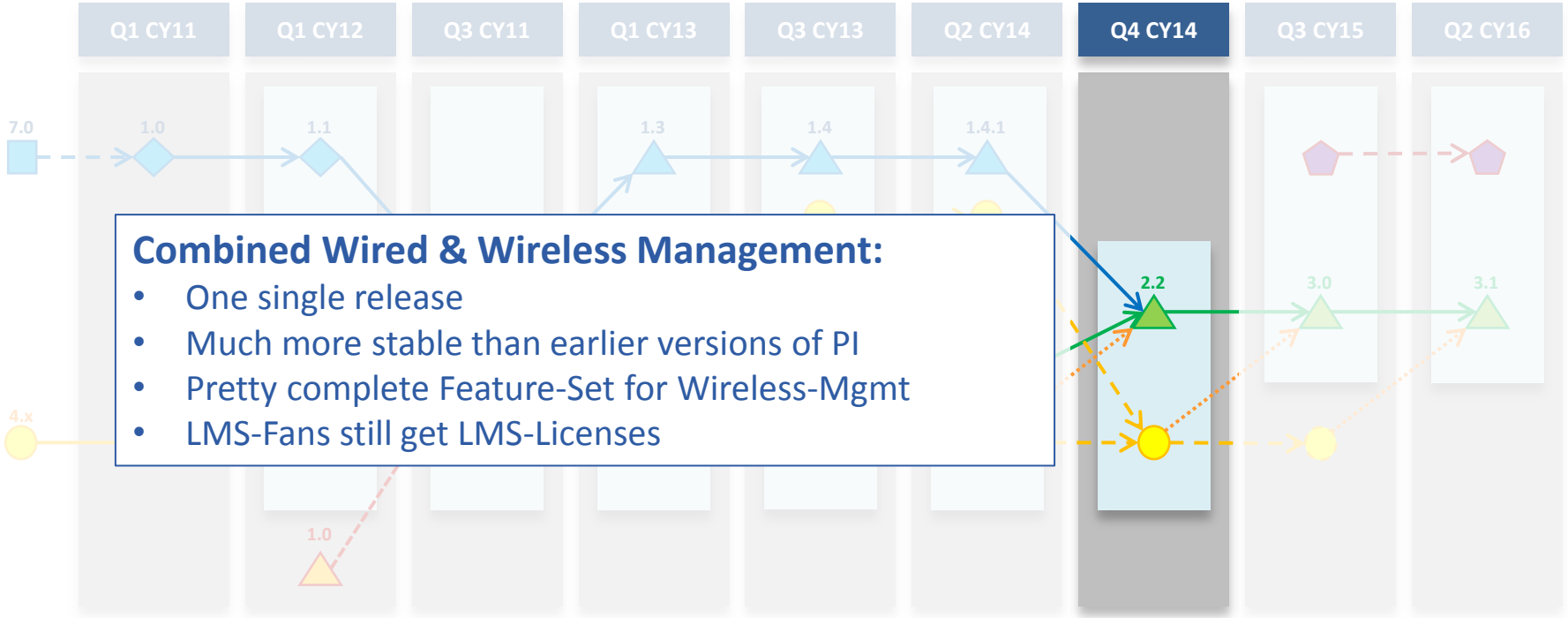

Combined Wired & Wireless Management:

- One single release
- Much more stable than earlier versions of PI
- Pretty complete Feature-Set for Wireless-Mgmt
- LMS-Fans still get LMS-Licenses

WCS LMS NCS PAM PI PI (WLAN) NCS WAN APIC EM Bundled Software

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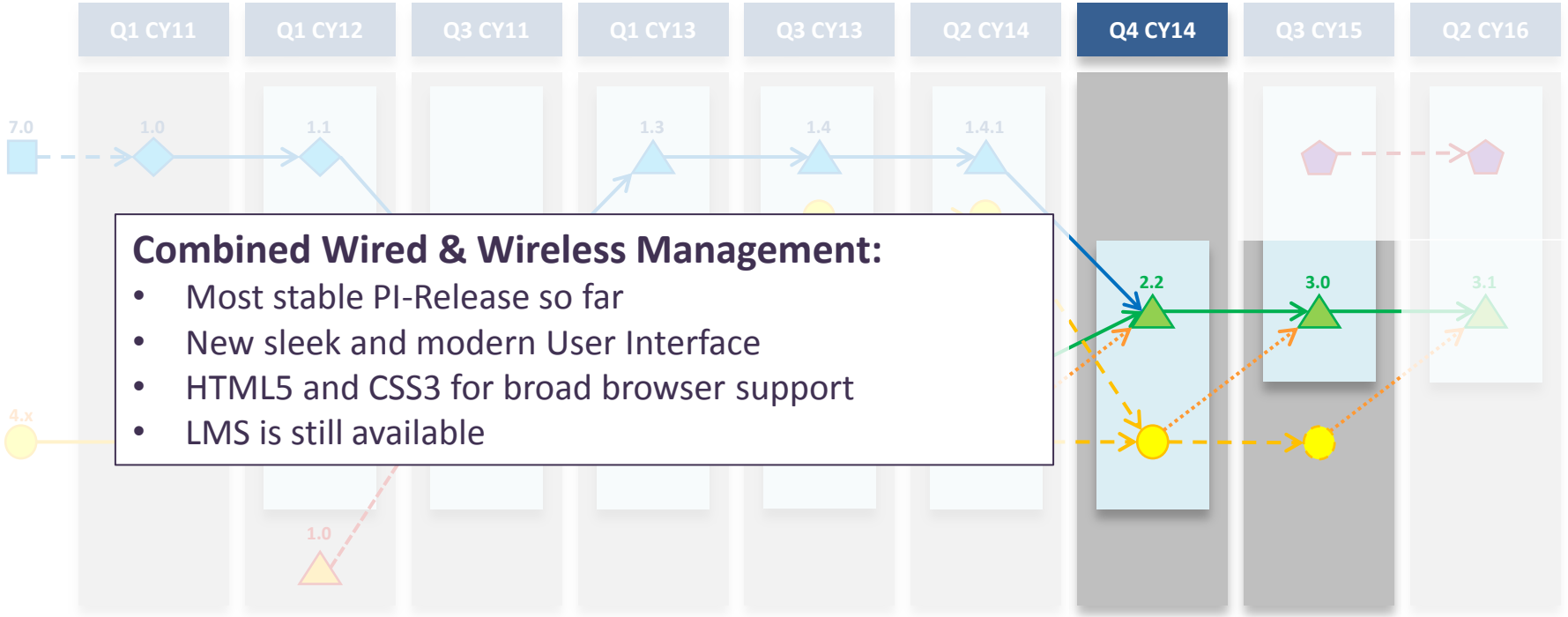
The history of Prime Infrastructure

Convergence back on one release



Combined Wired & Wireless Management:

- Most stable PI-Release so far
- New sleek and modern User Interface
- HTML5 and CSS3 for broad browser support
- LMS is still available

WCS LMS NCS PAM PI PI (WLAN) NCS WAN APIC EM Bundled Software

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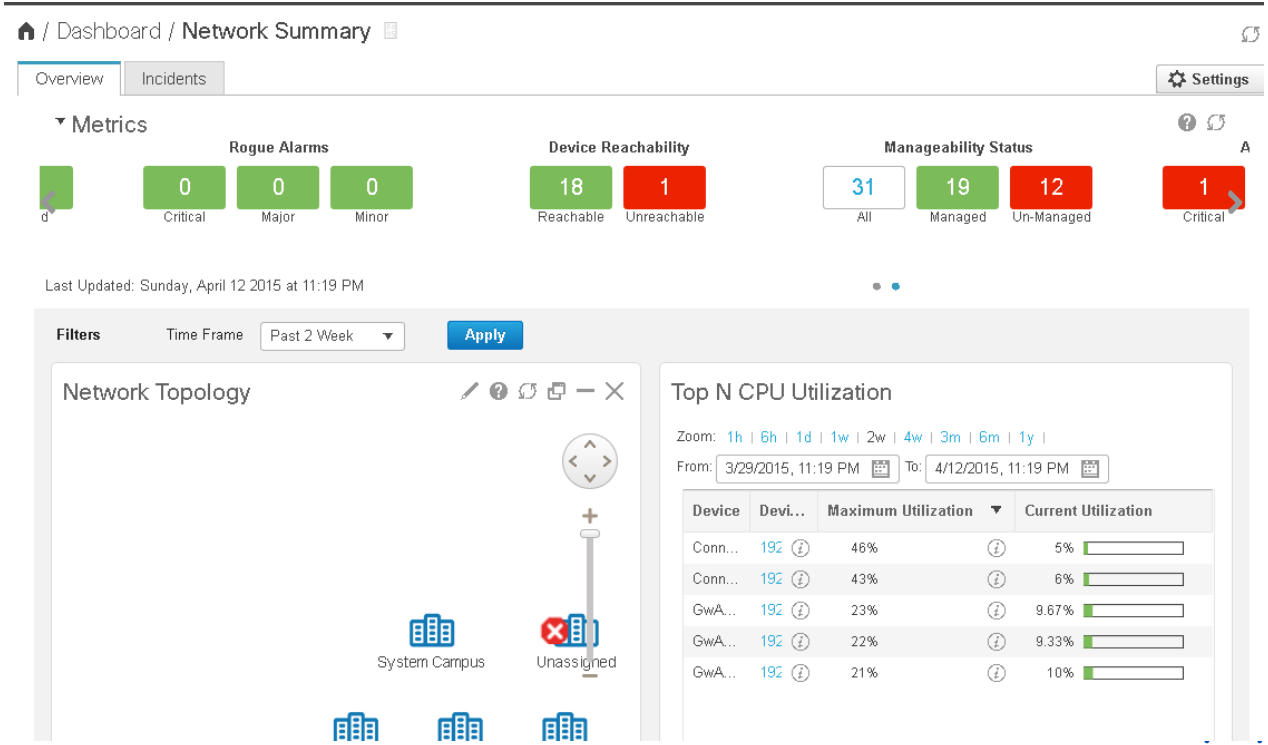
Prime Infrastructure 3.0

Prime Infrastructure 3.0

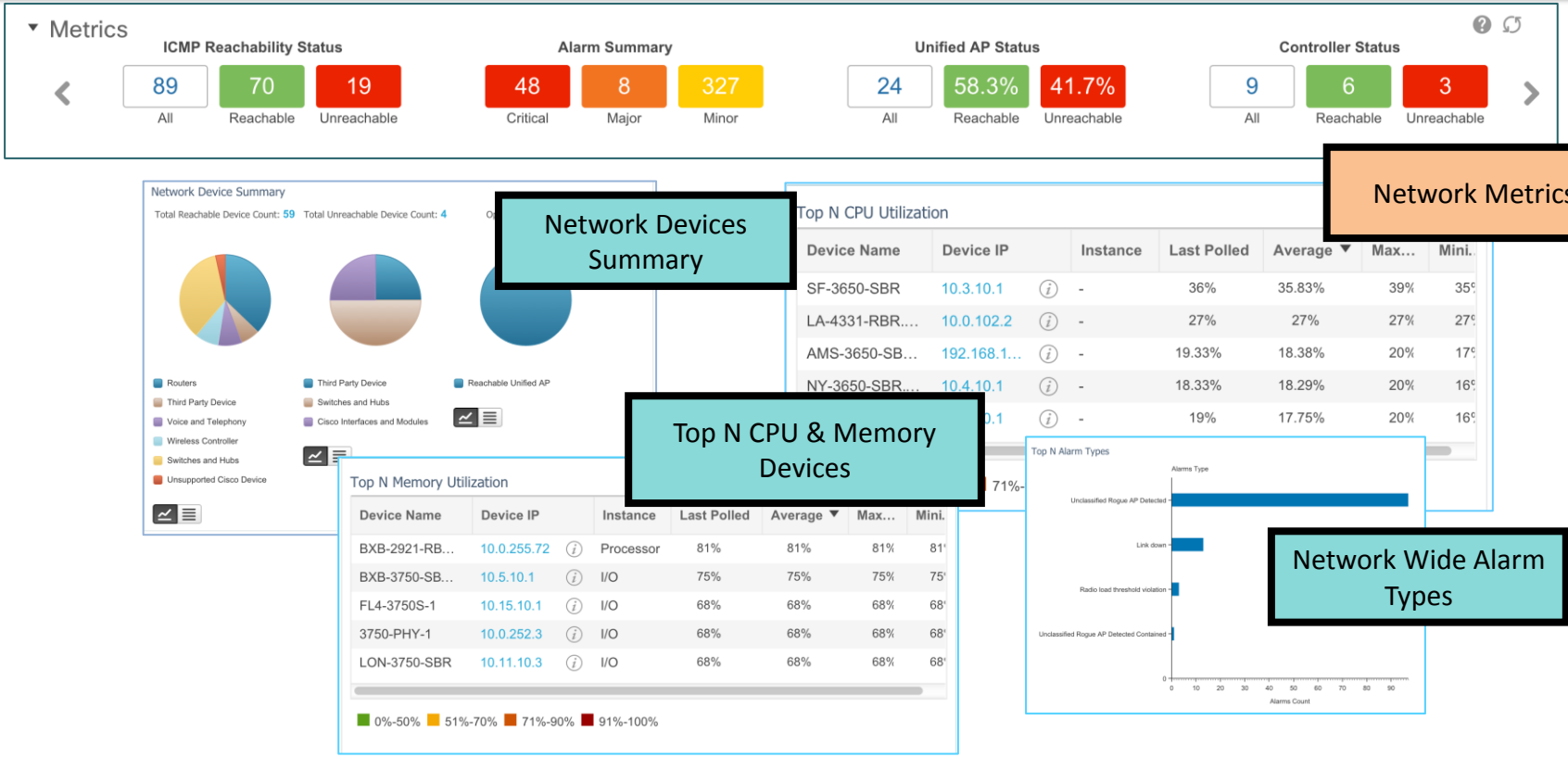
New User Interface

- Tablet friendly
- Metrics widgets
- Same menu as 2.2
- Correlated Charts
- Dashboard Export



Dashboards

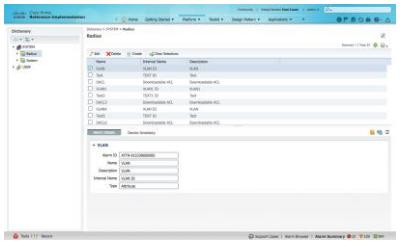
Monitoring – Overall Network Health



Simplified Layouts – Master Detail

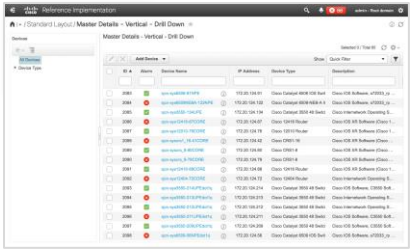
Better use of screen real estate and white space

PI 2.0

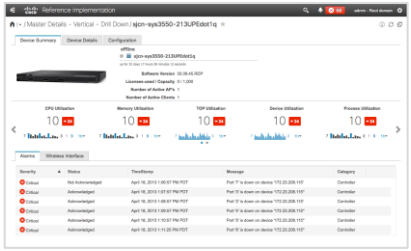


Master/Detail

PI 3.0



Master Page



Detail Page

Detail panel requires **scrolling**

Space constraints

Fluid navigation between pages

Book-markable Details page

More Space to show large data

Client View Enhanced

/ Monitor / Clients and Users / **a8:86:dd:a6:29:f1**

Test ▾ D

Overview | Location | ISE | Troubleshoot and Debug | Clean Air | Events | RTTS | More

Client Attributes Summary

Client Attributes

Refresh from Device (Refreshed 2015-Apr-17, 00:20:27 IST)

General

User Name	Unknown
IP Address	9.1.98.102
MAC Address	a8:86:dd:a6:29:f1
Vendor	Apple
Endpoint Type	none
Client Type	Regular
Media Type	Lightweight

Session

Controller Name	ATN-5500
Controller IP Address	9.1.98.40
AP Name	atn-1602-bc16.65b6.22be
AP IP Address	9.1.98.101
AP Type	Cisco AP
AP Base Radio MAC	0c:27:24:76:be:e0
802.11 State	Associated

Show More ..

Security

Security Policy Type	N/A
EAP Type	Unknown
On Network	Yes
802.11 Authentication	Open System
Encryption Cipher	None
SNMP NAC State	Access
Radius NAC State	RUN

System Settings

Better clarity

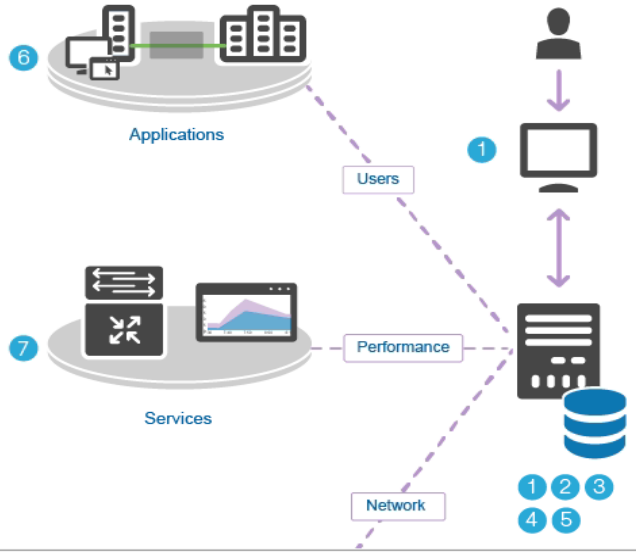
System Settings

Search All

- General
  - Account Credentials
  - Data Retention
  - Guest Account
  - Help Us Improve
  - Job Approval
  - Login Disclaimer
  - Proxy
  - Report
  - Server
  - Server Tuning
  - Software Update
  - Support Request
- Mail and Notification
  - Change Audit Notification
  - Mail Server Configuration

System Settings

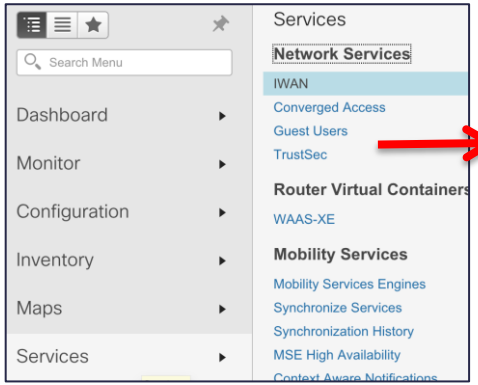
The product allows an administrator to configure or modify the network and system wide settings. You will want to customize many of these settings when you are first setting up the product, but once in production, you modify them only rarely.



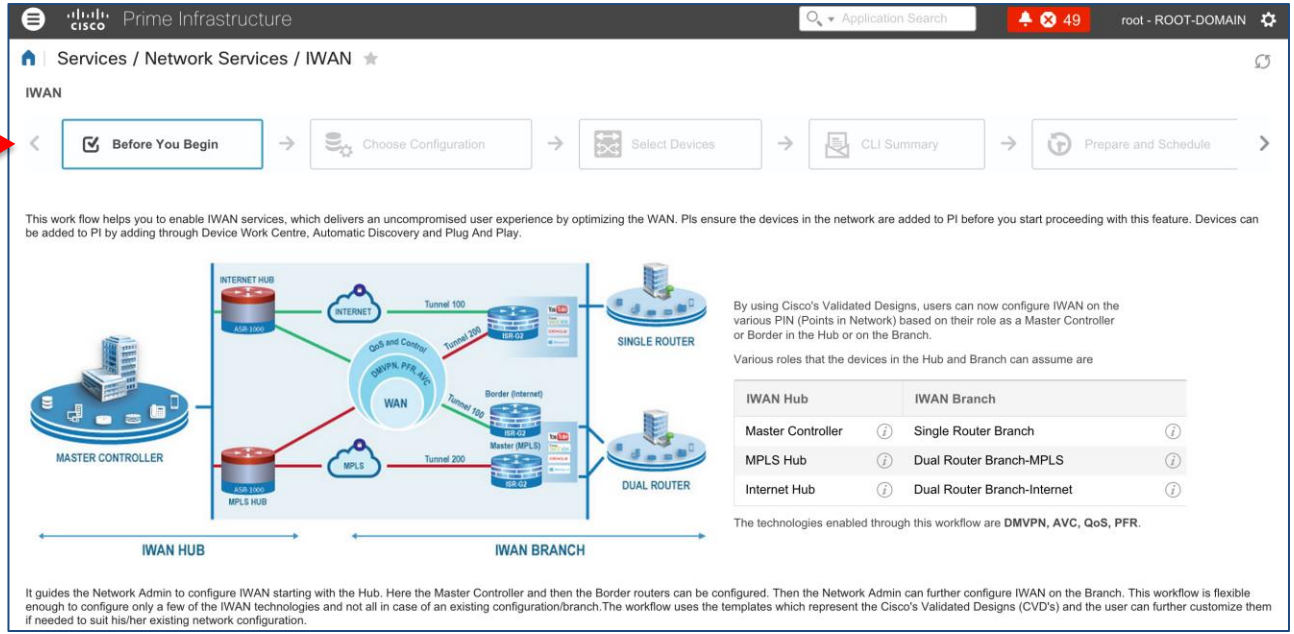
1. **General**
   Configure system wide settings like cisco.com credentials, Database, Jobs, Server Tuning, Software updates and TAC support.
2. **Mail and Notifications**
   Configure the mail server and notification receivers.
3. **Network and Devices**
   Configure the network and Device level settings like CLI session, SNMP, Controller Upgrade, Plug & Play.
4. **Inventory**
   Configure inventory functions like configuration, configuration Archives, Image Managements, Group Management, Discovery settings.
5. **Alarms and Events**
   Configure Fault functions like Alarm settings, Severity configurations, System Events, notification receivers.
6. **Clients and Users**
   Configure Clients and Users settings like client trouble shooting, Database settings, Client discovery, OUI.
7. **Services**
   Configure Service functions like Container Management

Guided Workflows

I don’t need to be a CCIE



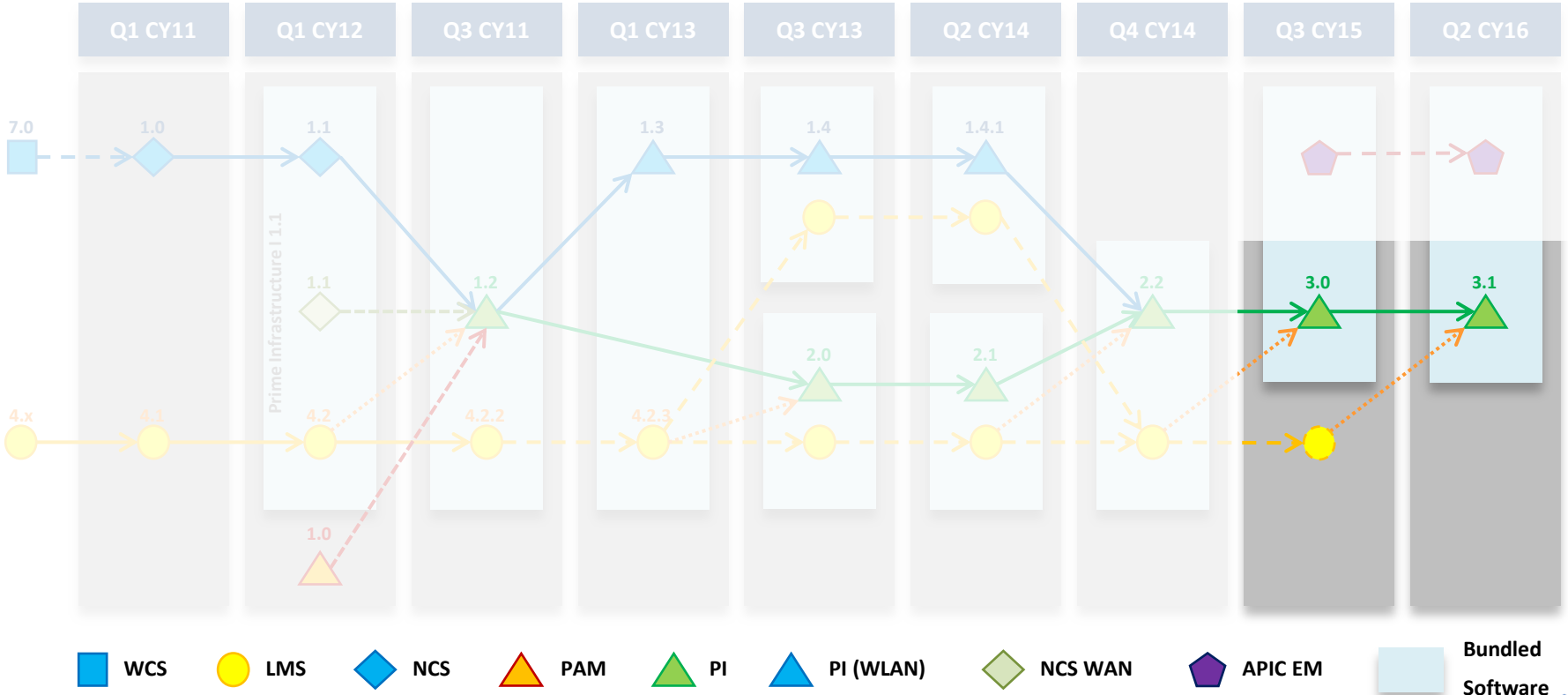
Guided Workflow to help you deploy IWAN across the Hub and Branches



Where will we go in future?

The history of Prime Infrastructure

Beta-Testing of PI 3.1 did start End of February



Prime Infrastructure 3.1 (Q2 CY16)

For Your Reference

Platform	Wireless	Switching	Routing	APIC-EM
Network Health Dashboard	AP Health Index	End Point config workflows	IWAN 2.1 provisioning	ZTD – AP/NfvOS
Geo Maps Views	Rogue Management – Enhanced AutoSPT	Instant Access deployment Workflows	Monitoring – DMVPN/BGP	IWAN App Monitoring
*Configuration Compliance – Wireless extension	*Configuration Groups – Config vs Audit	*VLAN Configuration	Router Health Index	NfV branch deployment
Config templates for compliance audit	Client Troubleshooting – Syslog Viewer	Trustsec Provisioning workflows	PfR Monitoring – Phase 2	

** LMS Transition Features*

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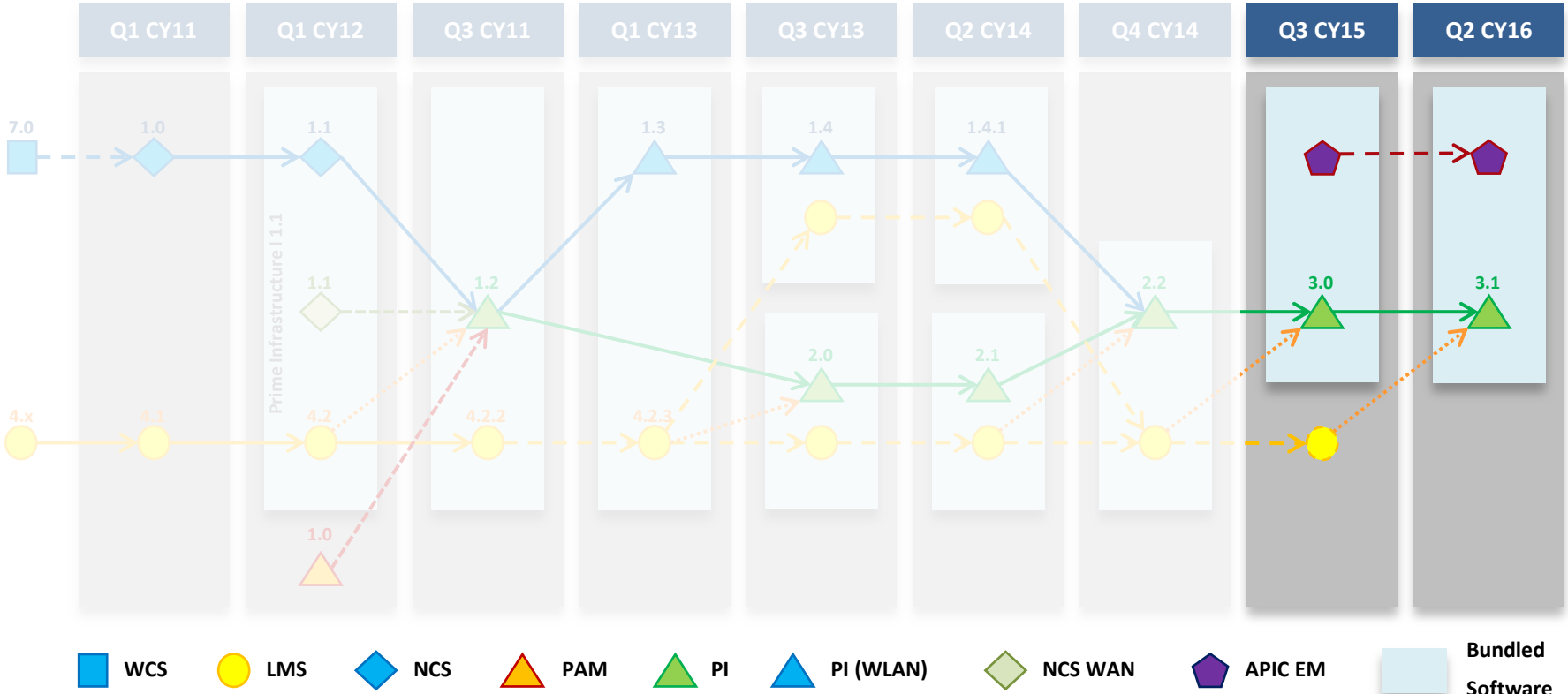
The history of Prime Infrastructure

The future has already started with PI 3.0



APIC-EM Integration

Changes in Market

Traditional to SDN led Management

Traditional Management

Customer developed provisioning tools, manual CLI changes, and run book automation for IT Operations support

Prime Infra (NMS)
NW (LF, AS)*, UCS

NE NE NE NE

SDN Led Management

Customer input on business / service intent

Automation
(Workflow / Orchestration)

Prime Infra (NMS)
(Provisioning and Assurance)

Controller (APIC-EM)

NE NE NE NE

* LF: Lifecycle, AS: Assurance

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Changes in Market

Traditional to SDN led Management

SDN Led Management

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Automation
(Workflow / Orchestration)

Prime Infra (NMS)
(Provisioning and Assurance)

Controller
(APIC-EM)

NE NE NE NE

Advanced

App App App App
Automation

APIC-EM Advanced Apps
(BSA, Prime Insight, ...)

Solution

PI 3.x

App App App App

APIC-EM Solution Apps
(iWAN, ...)

Foundation

APIC-EM

App App App App

APIC-EM Foundation Apps
(Inventory, PnP, Topology, ...)

Controller

APIC-EM Controller SW

Individual

Mgmt 3.x

Free

NE NE NE NE

System of Record vs. System of Change

APIC - EM

System of Change

- Policy enforcement
- Discovery (for change)
- Topology (for change)
- PnP
- Network state monitoring
- Device abstraction
- Network Control

Prime Infrastructure

System of Record

- Policy definition
- Historical reporting on events & performance
- Configuration archive
- Troubleshooting workflows
- Capacity Trending
- Predictive Analytics

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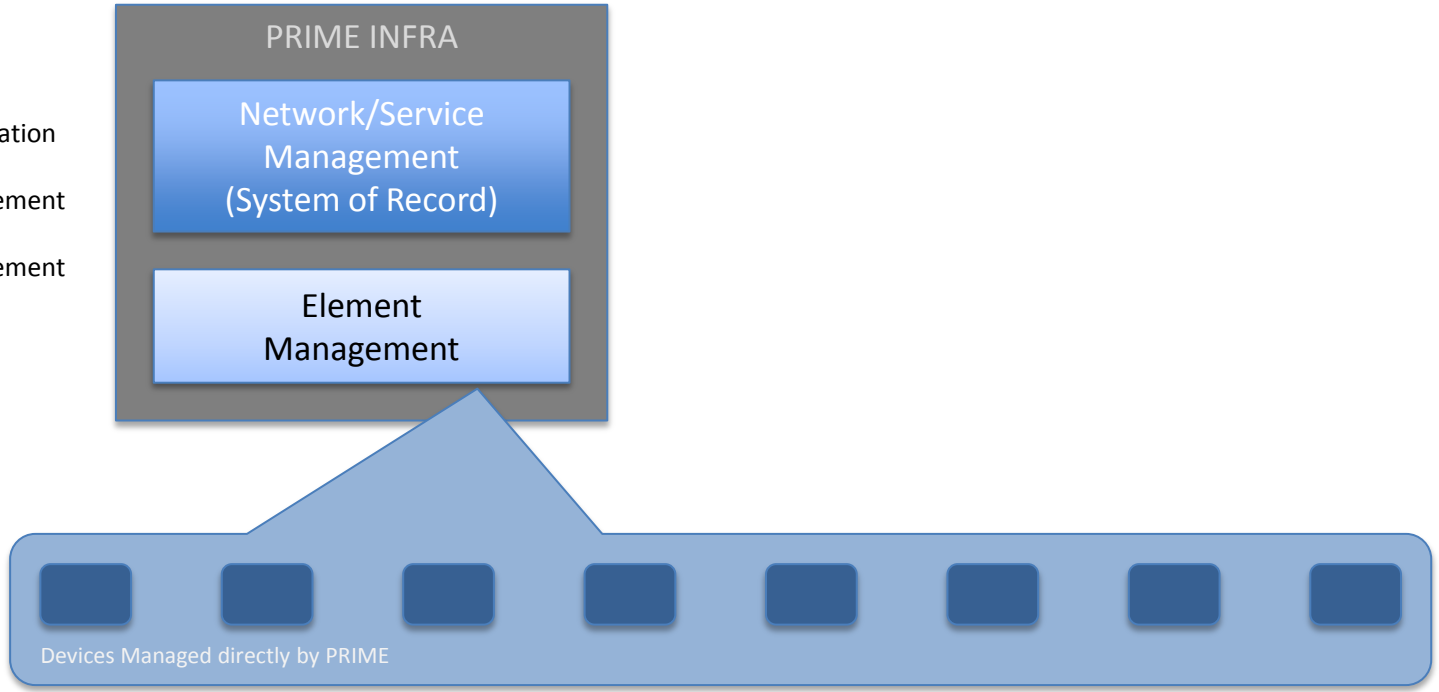
Prime Infrastructure and APIC EM

Evolution of Element Management

Core Functions

- Management Platform
  - Visualization
  - User Management
  - Data Management
- Assurance
- Analytics



Prime Infrastructure and APIC EM

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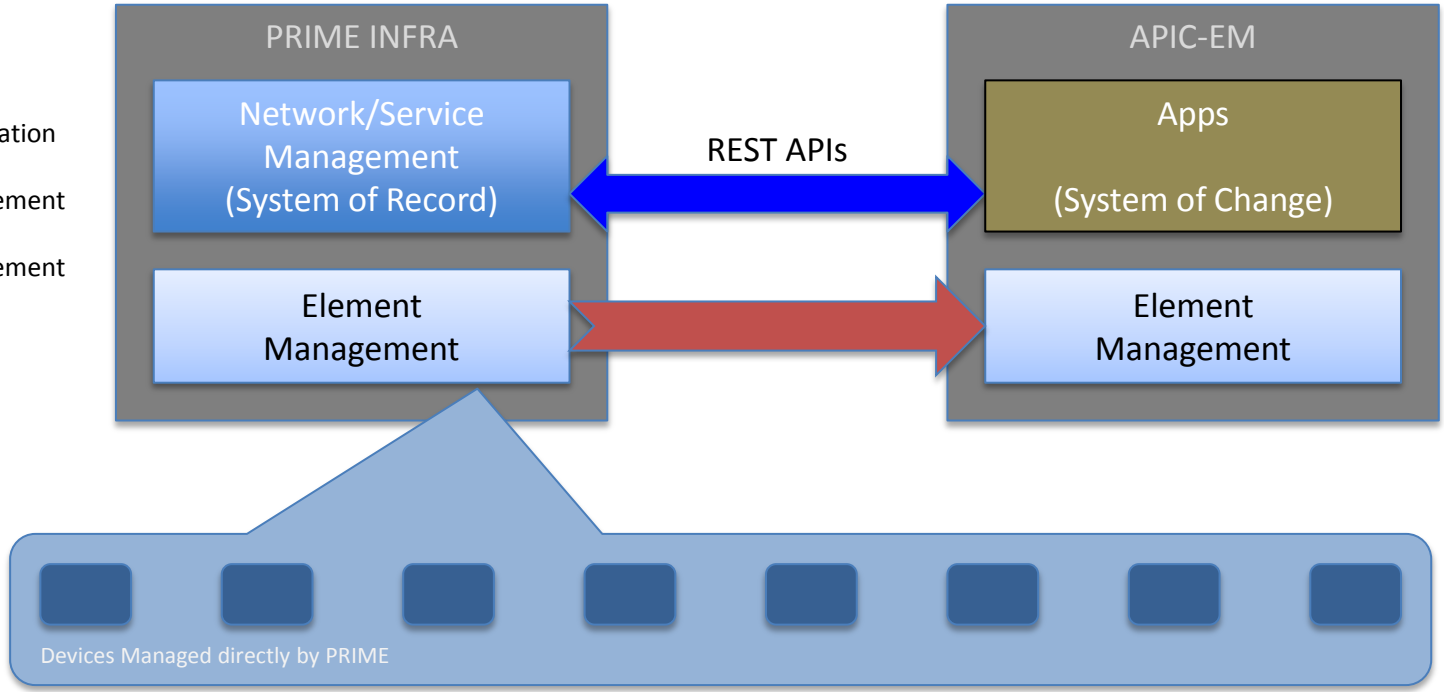

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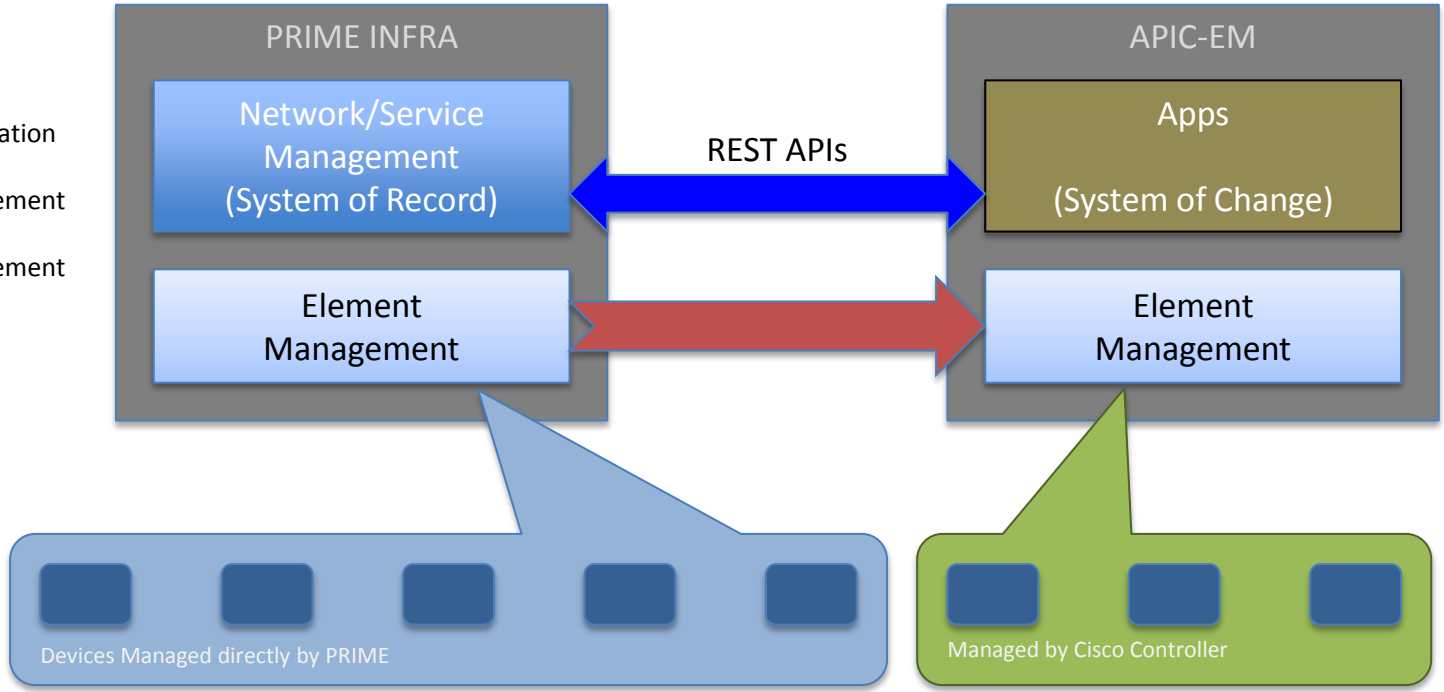

PRIME Services Applied to Cisco Controller Managed Devices are via REST APIs

Prime Infrastructure and APIC EM

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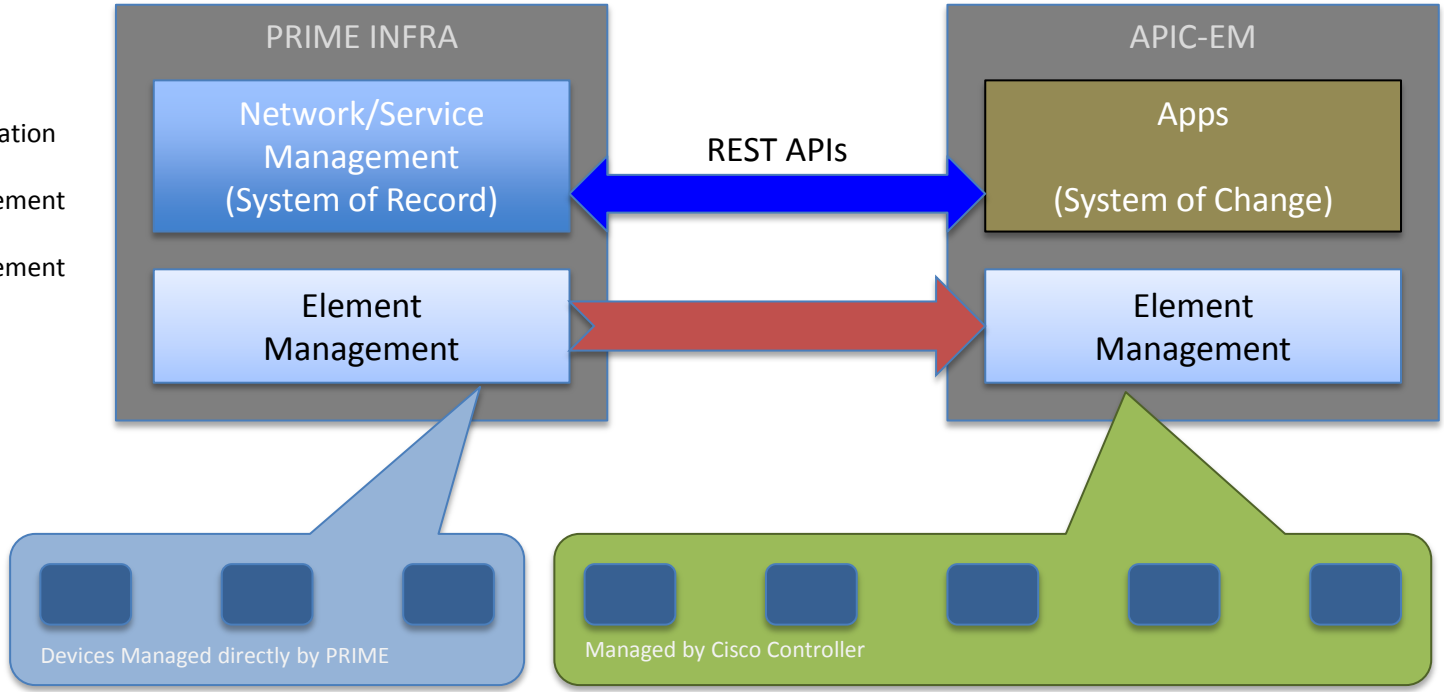

PRIME Services Applied to Cisco Controller Managed Devices are via REST APIs

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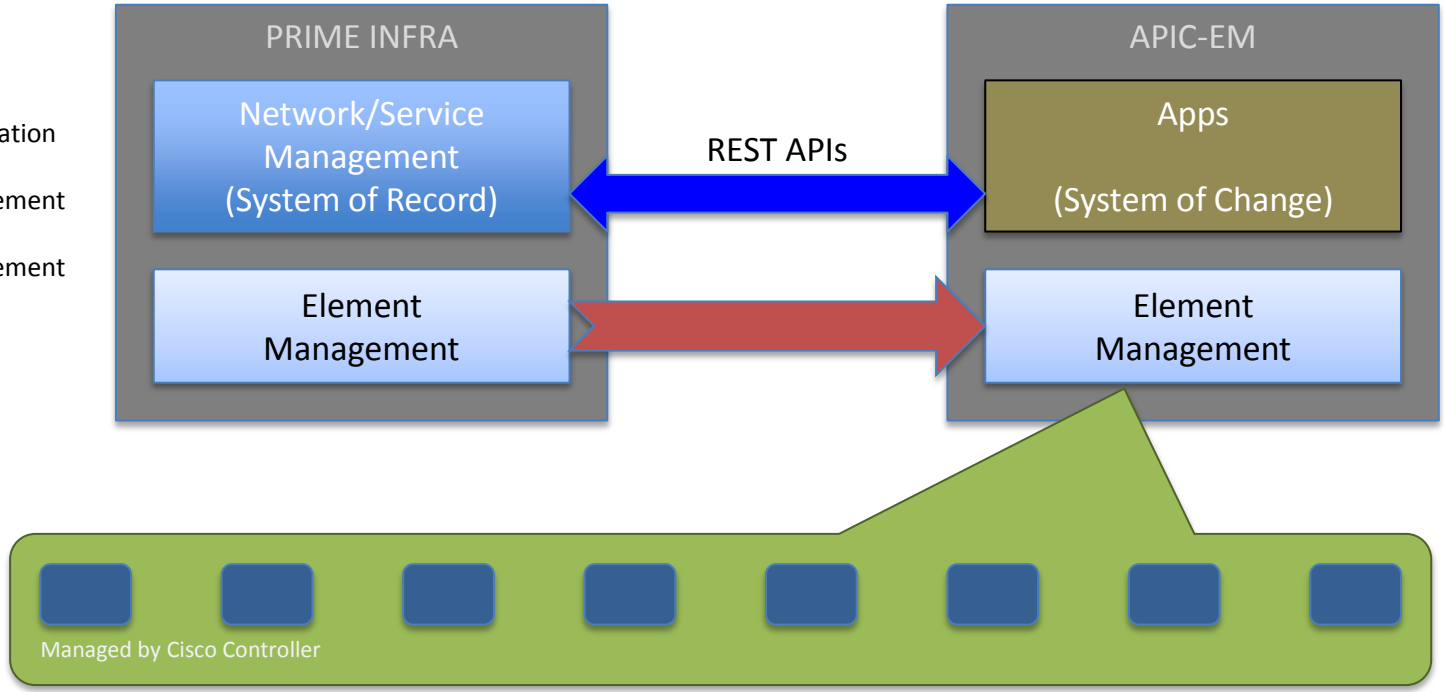

PRIME Services Applied to Cisco Controller Managed Devices are via REST APIs

Summary of the transition

One Management

- Feature provisioning from Branch to DC
- Solution workflows by domain e.g. IWAN

One Assurance

- Single pane monitoring from Branch to DC
- System of Record

Mid-2015

- PI communicates directly with network
- System of Record for APIC-EM Apps

+12 months

- 50% of network communication via APIC-EM
- System of record for APIC-EM Apps

+ 18 months

- 100% of network communication via APIC-EM
- Transitions to a full APIC-EM Application

Prime Infrastructure and APIC EM

Evolution of Element Management

Core Functions

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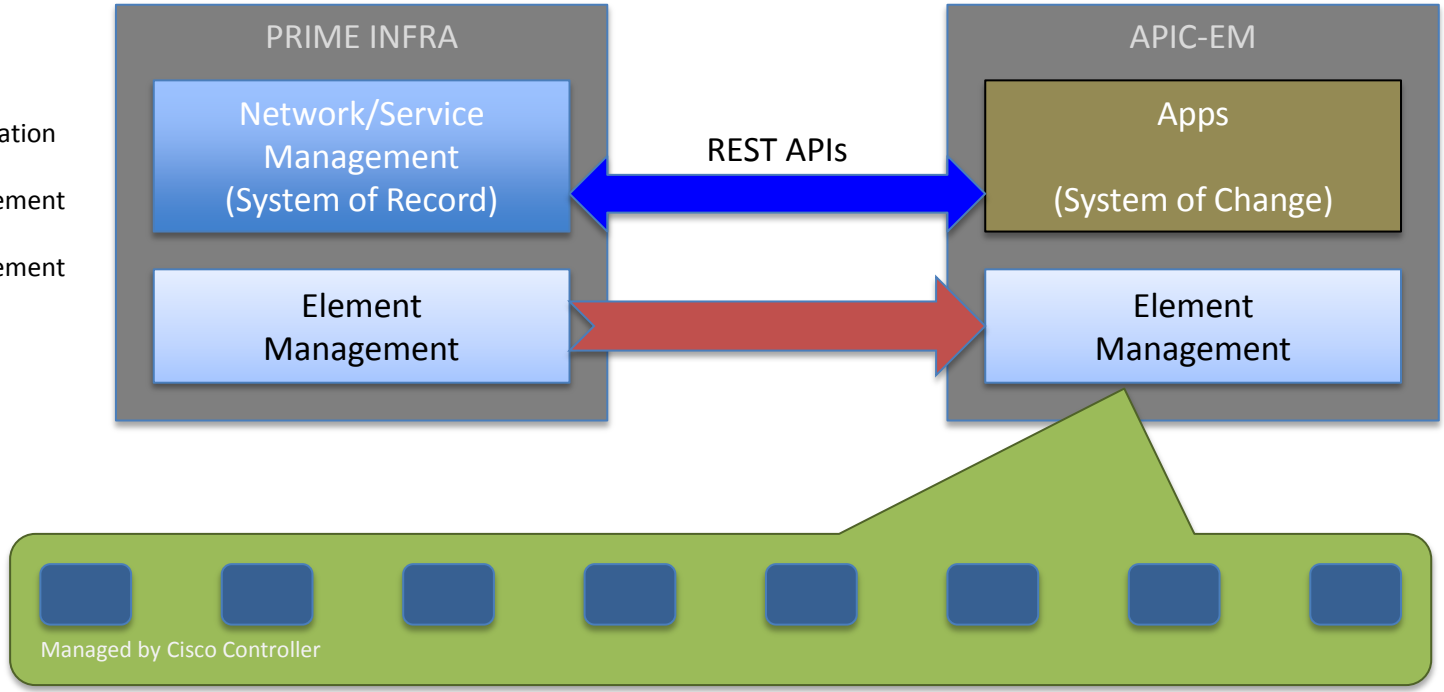
- Analytics



PRIME Services Applied to Cisco Controller Managed Devices are via REST APIs

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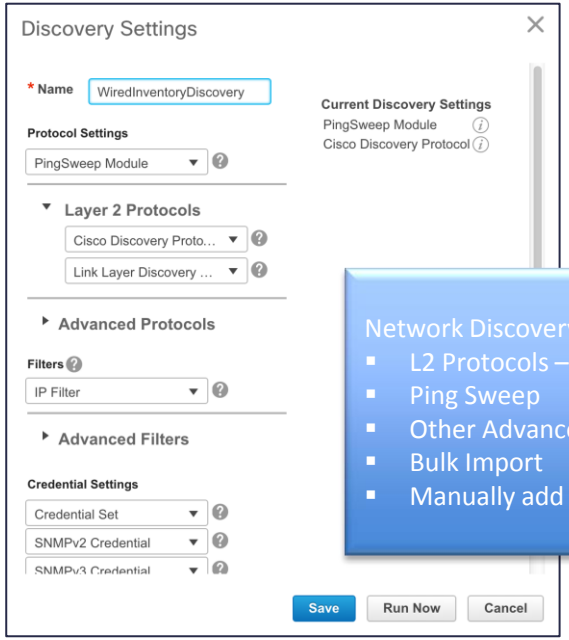
Backup Slides

LAN (Access) Configuration

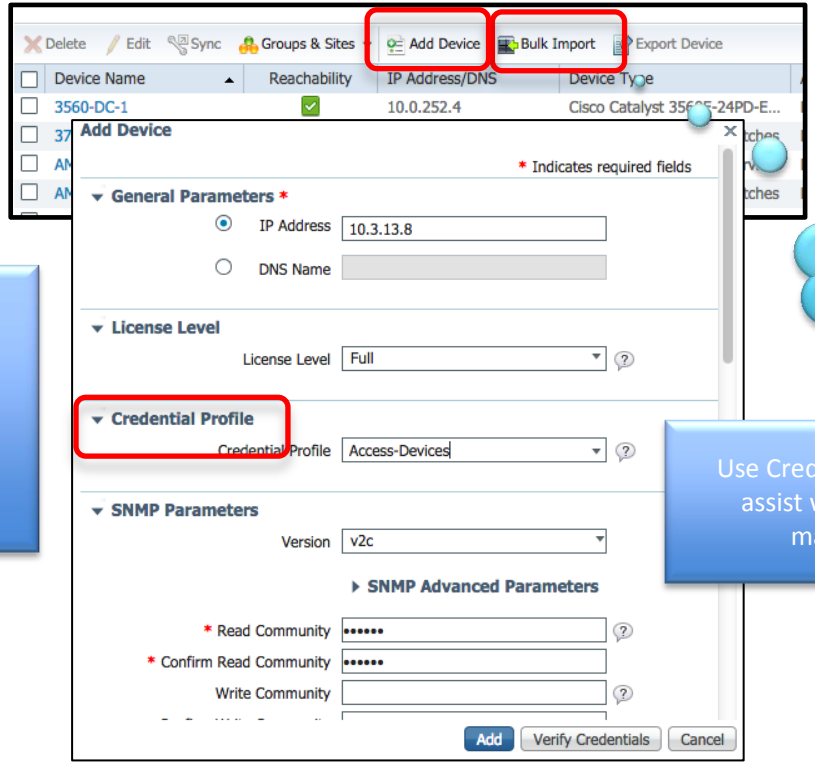
Network Discovery

Methods to discover existing Wired/Wireless Network



Network Discovery :

- L2 Protocols – CDP, LLDP
- Ping Sweep
- Other Advanced Protocols
- Bulk Import
- Manually add devices

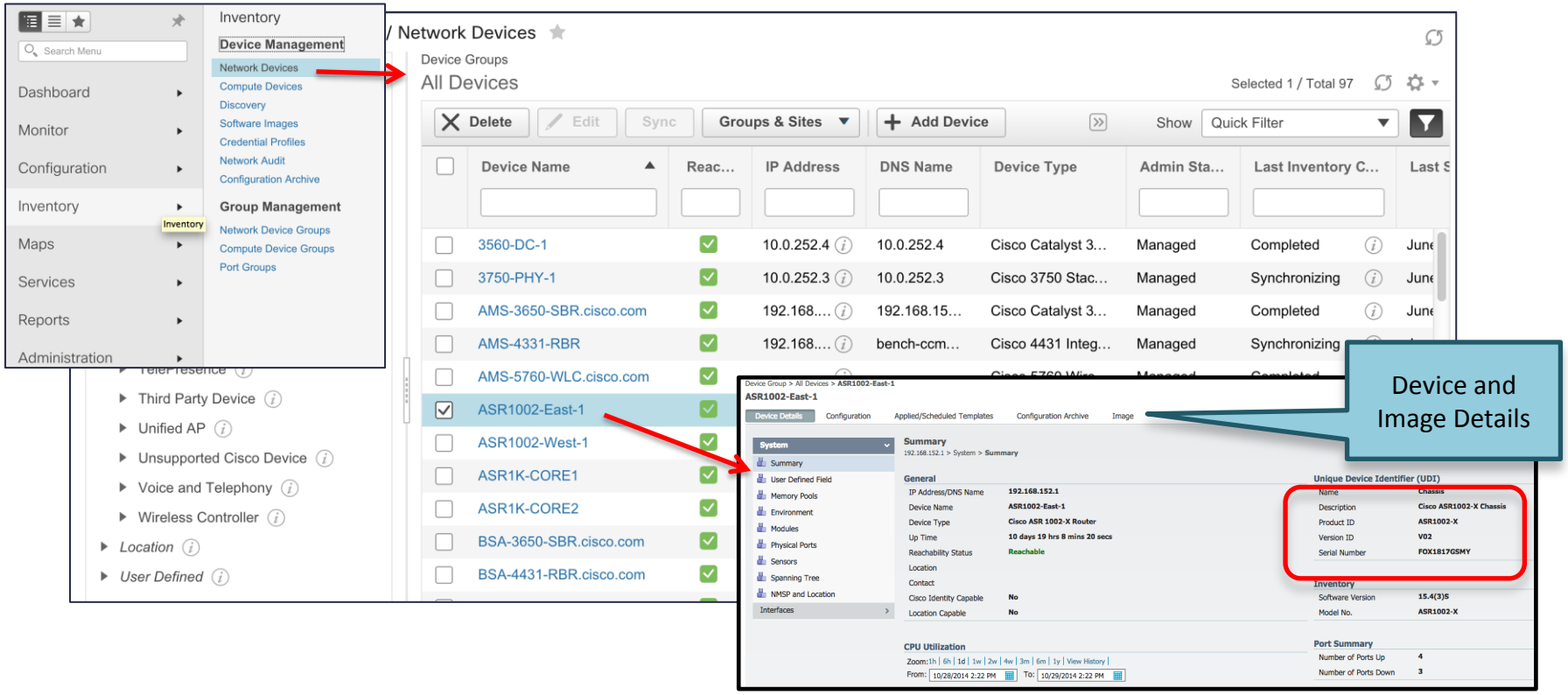


Bulk Import devices using CSV

Use Credentials Profiles to assist with credentials management

Inventory Information

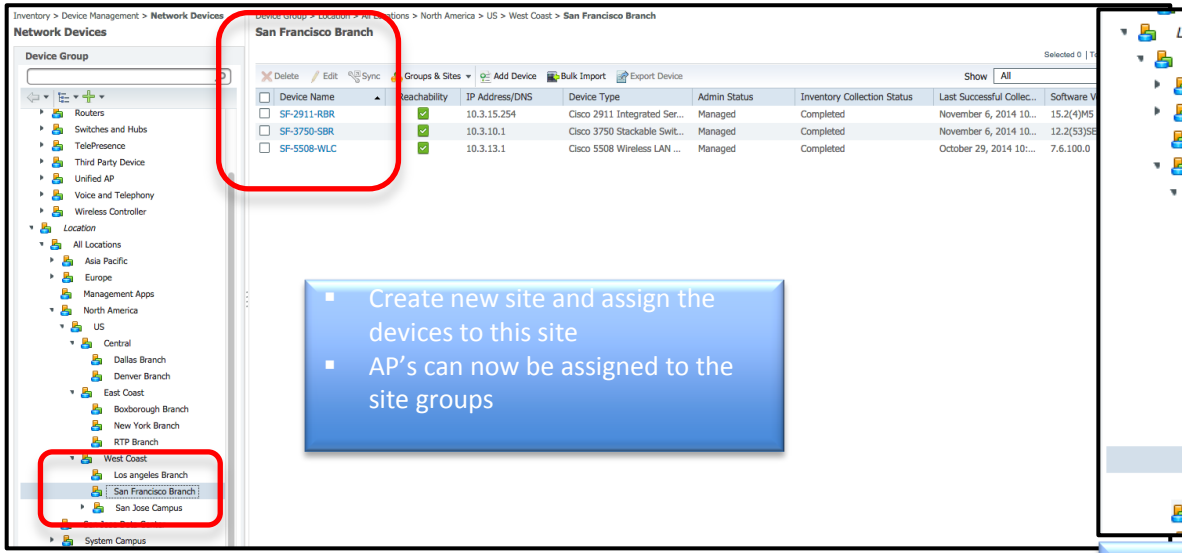
View Details for the Network Devices



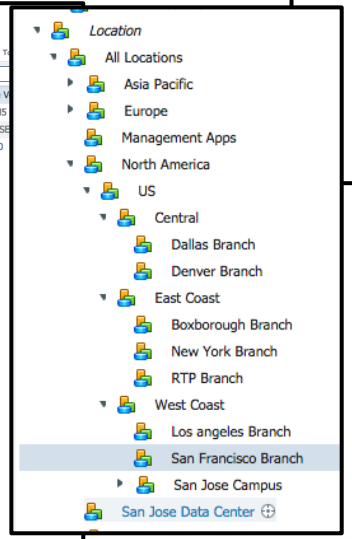
Site Configuration

Location Groups to mimic the physical topology of your network

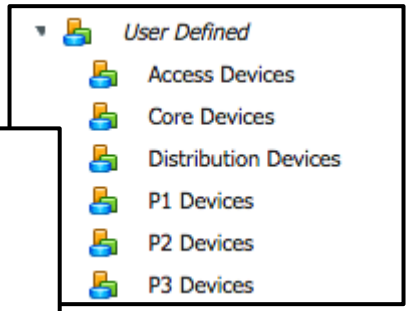
- Location Groups help to create multi-level hierarchy for the device groups
- A single device can now belong to multiple groups
- Apart from the site based grouping, users can also create their own groups based on different criteria



- Create new site and assign the devices to this site
- AP's can now be assigned to the site groups



Grouping based on Locations



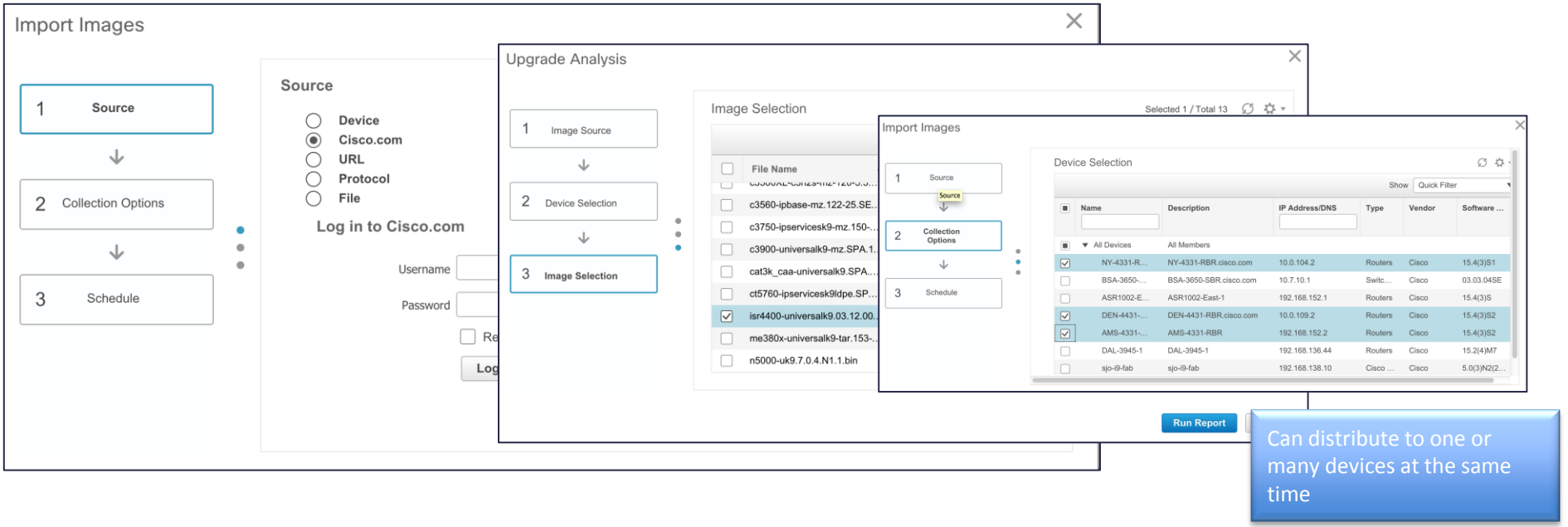
Examples of User defined groups :

- Groups based on the device role – Access, Core & Distribution
- Groups based on Priority of network devices – Pi, P2, P3 etc

Software Image Management

Ability to Bulk upgrade Images

Import → Analyze → Distribute



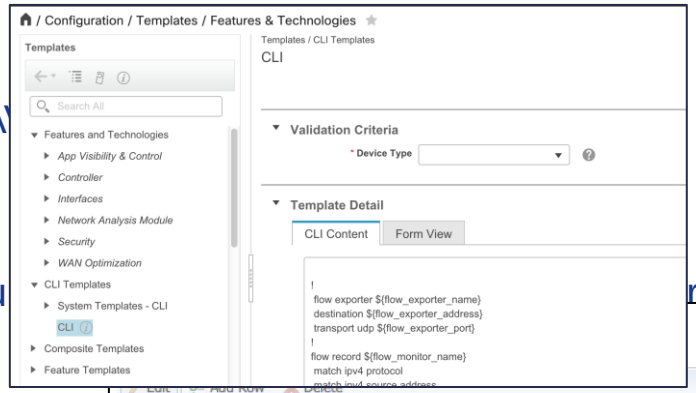
Can distribute to one or many devices at the same time

Configuring Wired Devices

Templates for Routers and Switches using Best Practices

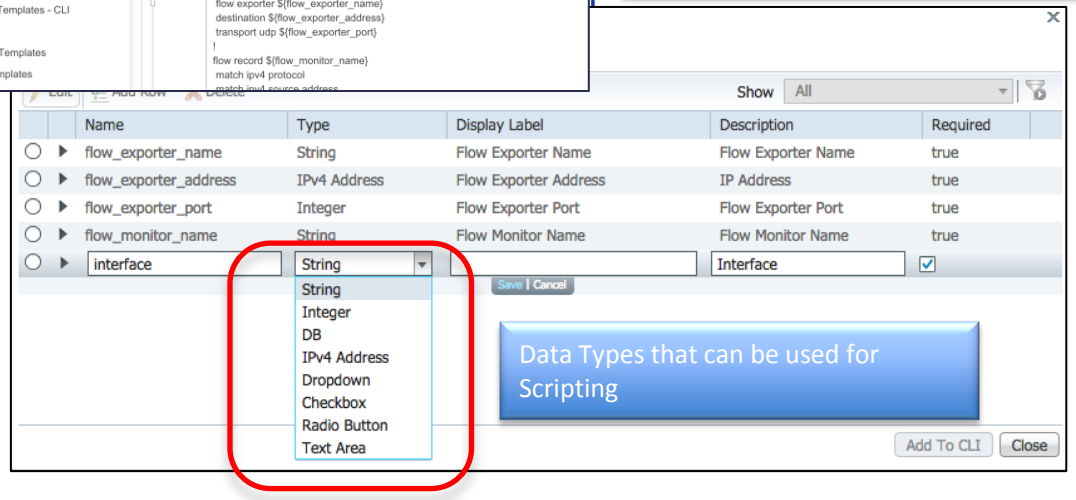
Types of Templates :

- Model Based Templates for A
- CLI OOTB Templates
- User Defined CLI Templates
- Composite Templates to grou



User Defined Templates :

- Has CLI converted to set of parameters whose values are provided during deploy time
- Use Apache's Velocity Template Language (VTL)

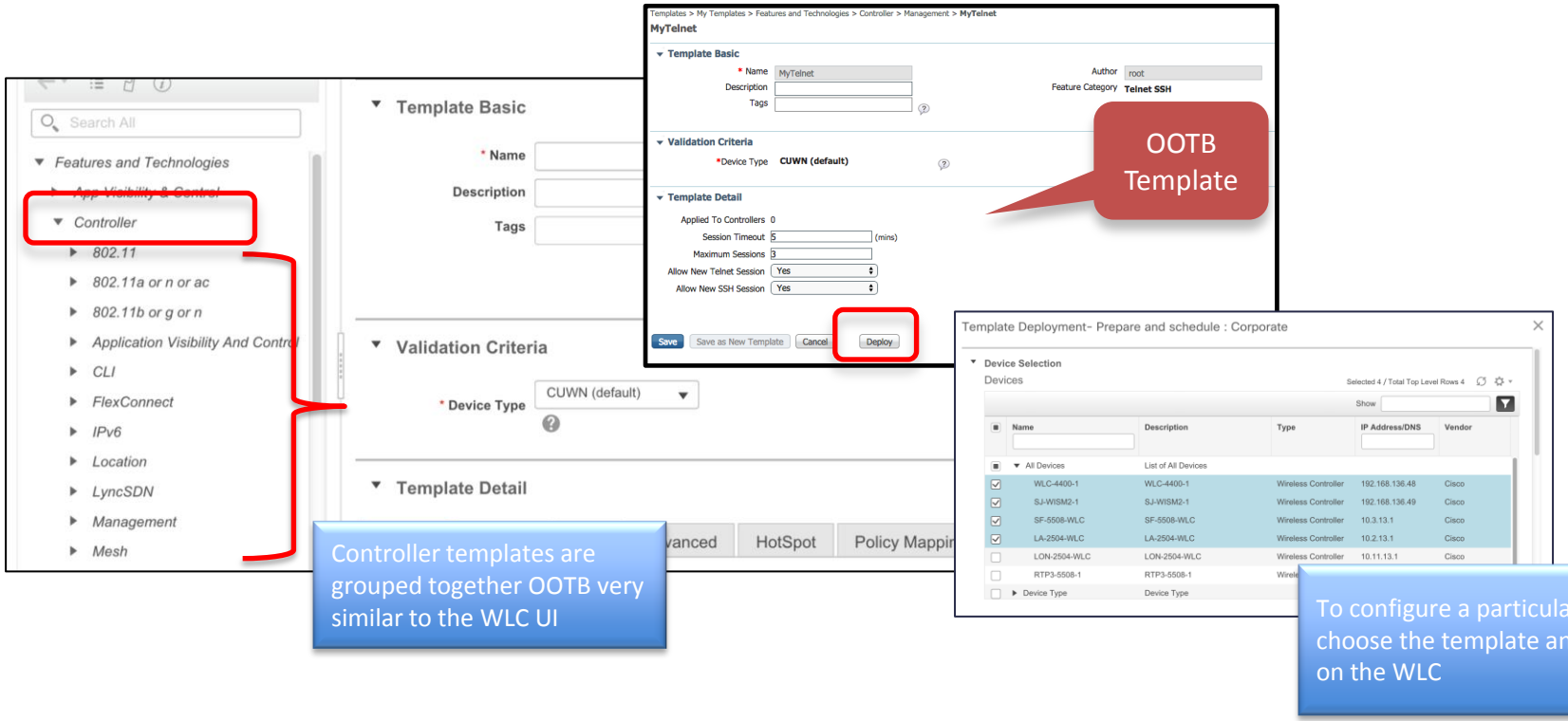


Data Types that can be used for Scripting

Configuring Wireless Controllers

- Configuration Templates
- Learning from an existing Controller
- CLI Templates

Configuring Wireless Controllers
Configuration Templates



Configuring Wireless Controllers

Learning from an existing Controller

/ Configuration / Network / Network Devices

Device Groups

Search All

All Devices

Device Type

- Cisco Interfaces and Modules
- Cisco UCS Series
- Routers
- Switches and Hubs
- TelePresence
- Third Party Device
- Unified AP
- Unsupported Cisco Device
- Voice and Telephony
- Wireless Controller
- Location
- User Defined

Device Groups / Device Type

Wireless Controller

Selected 1 / Total 17

Delete | Edit | Sync | Groups & Sites | Reboot | Show | Quick Filter

Download | Configure | Add Device | Bulk Import | Export Device

Discover Templates from Controller

Templates Applied to Controller

Update Credentials

Device Name	Reac...	IP Address/DNS	Device	AP D...	ry Colle...	Admin St...
AMS-3650-SBR.cisco....	✓					Managed
AMS-5760-WLC.cisco...	✓					Managed
BSA-3650-SBR.cisco....	✓	10.7.10.1	Cisco C...	Compl...	20-MAY-15 15:1...	Managed
DEN-3650-SBR.cisco....	✓	10.9.10.1	Cisco C...	Compl...	03.03.0...	27-MAY-15 22:5...	Managed
LA-2504-WLC	✗	10.2.13.1	Cisco 2...	Compl...	7.2.110.0	04-AUG-14 21:1...	Managed
LA-3650-SBR.cisco.com	✓	10.2.10.1	Cisco C...	Compl...	03.03.0...	27-MAY-15 22:5...	Managed
LON-2504-WLC	✓	10.11.13.1	Cisco 2...	Compl...	8.0.110.0	02-DEC-14 21:0...	Managed
NY-3650-SBR.cisco.com	✓	10.4.10.1	Cisco C...	Compl...	03.03.0...	27-MAY-15 23:0...	Managed
PAR-3650-1	✗	10.12.33.254	Cisco C...	Compl...	03.03.0...	01-MAY-15 11:5...	Managed
PAR-3850-1	✓	10.12.0.2	Cisco C...	Compl...	03.06.0...	27-MAY-15 22:4...	Managed
PAR-CT5760-1	✓	10.12.11.253	Cisco 5...	Compl...	03.06.01E	21-APR-15 21:4...	Managed
PAR-CTS5760-2	✓	10.12.22.253	Cisco 5...	Compl...	03.03.0...	21-APR-15 21:4...	Managed
RTP3-5508-1	✓	10.122.86.51	Cisco 5...	Compl...	8.1.102.0	26-MAY-15 00:1...	Managed

Choose 1 or many WLC's

Templates

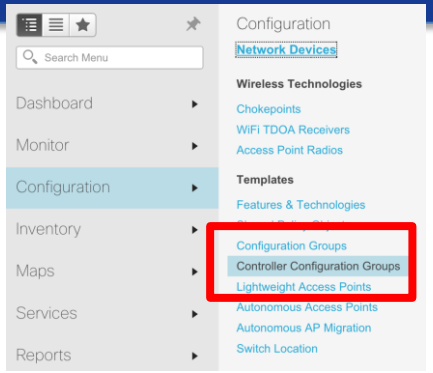
Search All

- Features and Technologies
- CLI Templates
- Composite Templates
- Feature Templates
- My Tags
- My Templates
  - Discovered Templates
    - Controller
      - 802.11a or n or ac
      - 802.11b or g or n
      - FlexConnect
        - Store-FlexConnectGrp
      - IPv6
      - Location
      - ...nagement
      - ...stem
      - WLANs
      - mDNS

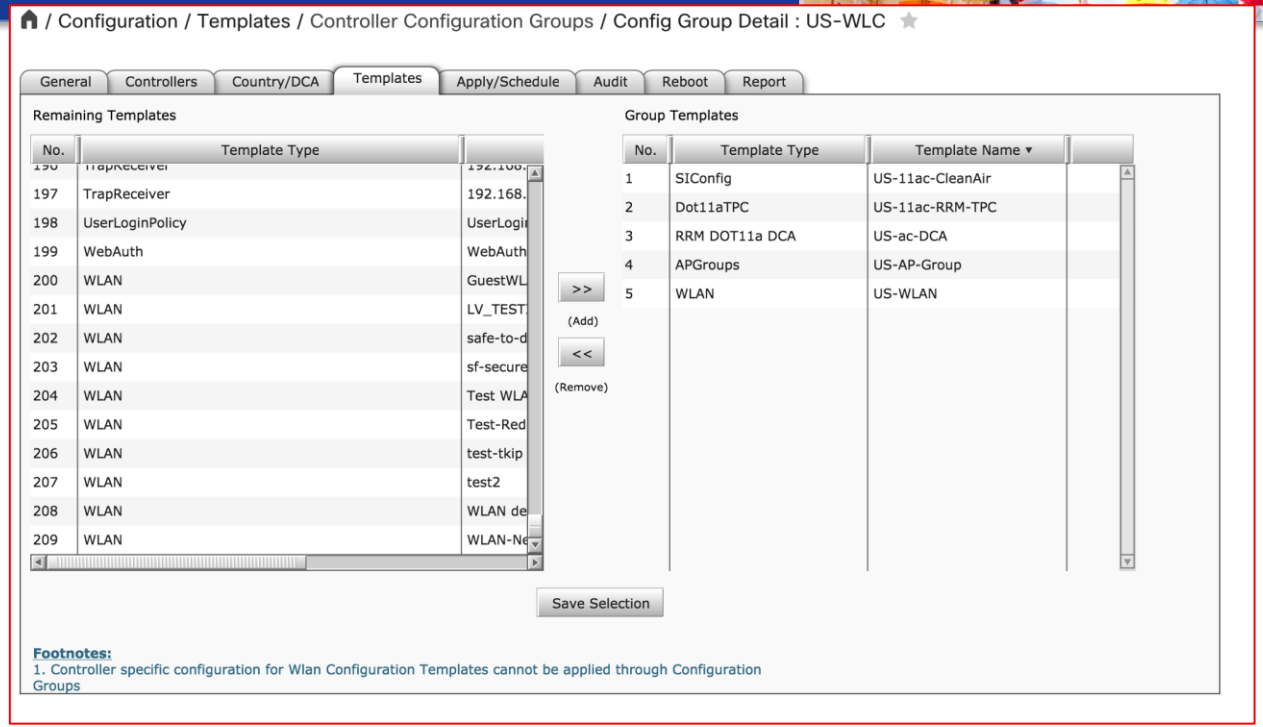
- The discovered templates are automatically grouped under the different categories
- Use the Controller Configuration Groups to deploy the templates on one or more WLC's

Configuring Wireless Controllers

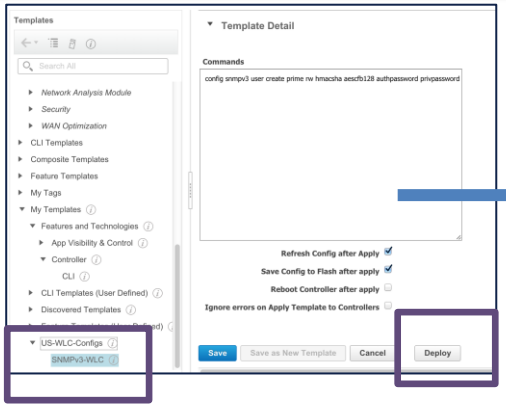
Configuration-Groups Setup for Bulk Deployment



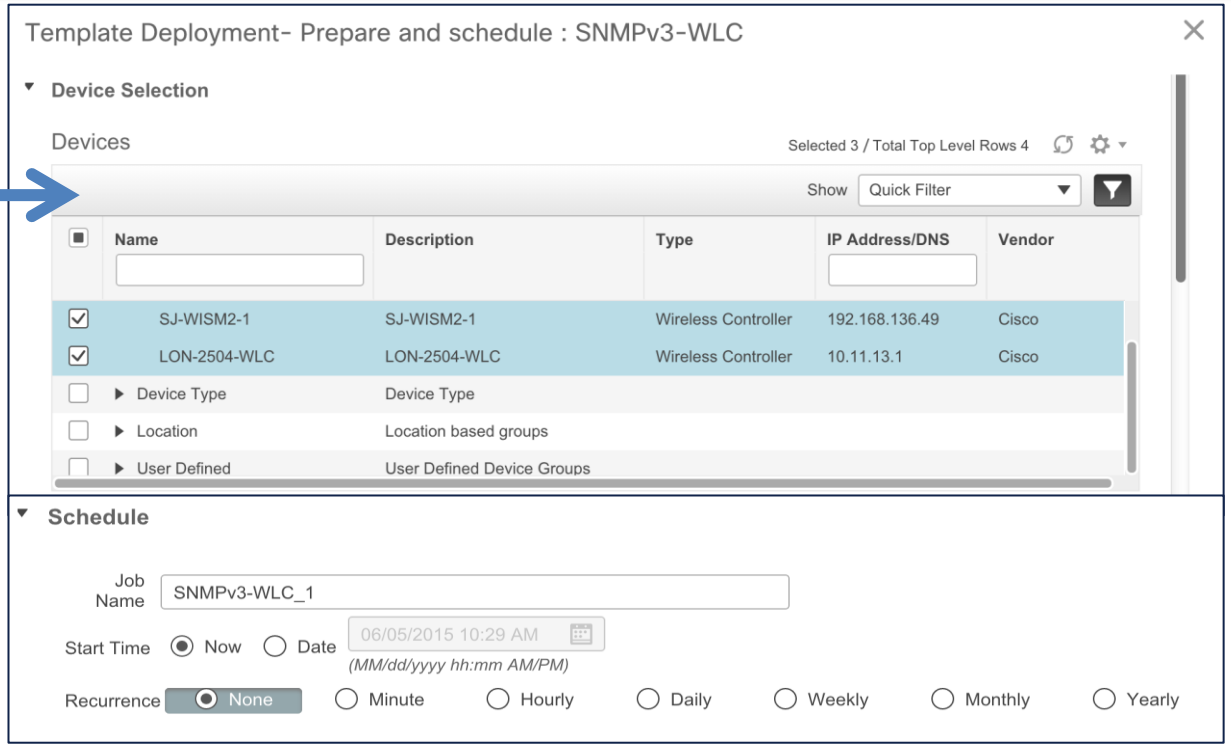
- Option 1 : Create the Group and Add the Controllers and the Templates later
- Option 2 : Copy the Templates from one of the Controllers (Golden Config) managed by PI and apply them to the WLC's that will belong to this group



Configuring Wireless Controllers
CLI Templates



This option can be used to configure features for situations where PI does not provide an Out-of-the-box template and can be deployed on multiple WLC's at once. Ex: SNMPv3



Configuring Access Points

Lightweight AP Configuration using Templates

/ Configuration / Templates / Lightweight Access Points / Lightweight AP Template Detail : Manor ISD

Configuration | AP Selection | Schedule | Deploy Status

Template Basic | AP Parameters | Mesh | 802.11a/n/ac | 802.11a SubBand | 802.11b/g/n | CDP | FlexConnect

General

Location		Domain Name	
Admin Status	Enable	Server IP Address	0.0.0.0
AP Mode	Local	Encryption	Enable
AP Sub Mode	None	Rogue Detection	
Enhanced wIPS Engine	Enable	SSH Access	
AP Height (feet)	3	Telnet Access	
Mirror Mode	Enable	Link Latency	
Country Code	AR - Argentina	AP Led Status	
Stats Collection Interval	0	3G Module Status	
Cisco Discovery Protocol	Enable	TCP Adjust MSS	
AP Failover Priority	Low	TCP Adjust MSS	

/ Configuration / Templates / Lightweight Access Points / Lightweight AP Template Detail : Manor ISD

Configuration | AP Selection | Schedule | Deploy Status

AP Selection

Search APs

Selected 3 / Total 17

Show Quick Filter

		AP Name	Ethernet MAC	Controller IP	AP IP	Controller Na...	AP Model
1	☑	AP-PARIS-PLUG13486	f4:0f:1b:1a:1a:36	10.12.33.254	10.12.33.13	PAR-3650-1	AIR-CAP3602I...
2	☑	AP-PARIS-INRACK	64:12:25:6e:1a...	10.12.33.254	10.12.33.12	PAR-3650-1	AIR-CAP3702I...
3	☐	LA-AP-1	24:e9:b3:61:80...	10.2.13.1	10.2.13.10	LA-2504-WLC	AIR-CAP3502I...
4	☐	APc471.fe49.e7ee	c4:71:fe:49:e7:...	192.168.152.11	192.168.152.36	AMS-5760-WL...	AIR-CAP3502I...
5	☑	AMS-AP-1	24:e9:b3:61:80...	192.168.152.11	192.168.152.35	AMS-5760-WL...	AIR-CAP3502I...
6	☐	AP-PARIS-PLUG13391	f4:0f:1b:1a:1b:ce	10.12.0.2	10.12.111.3	PAR-3850-1	AIR-CAP3602I...
7	☐	AP-PARIS-PLUG13397	f4:0f:1b:1a:1b:cc	10.12.0.2	10.12.111.5	PAR-3850-1	AIR-CAP3602I...
8	☐	AP-PARIS-PLUG13415	f4:0f:1b:1a:1a:f7	10.12.0.2	10.12.111.4	PAR-3850-1	AIR-CAP3602I...

PI can push this template to multiple AP's in bulk

Baseline Compliance

Configuration Archive
Wired Devices

Archive and Versioning of Configuration

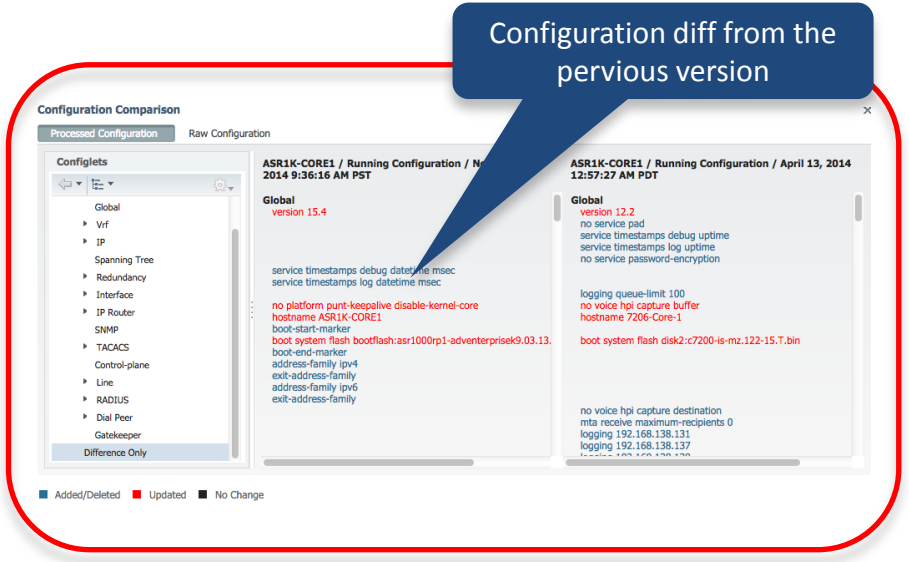
- ❑ Fetch & store all the configurations on network devices
- ❑ Store multiple versions of configurations.
- ❑ Job based for periodic archival
- ❑ Detect changes done outside the PI server and archive the change

Compare Configuration

- ❑ View configurations
- ❑ Compare configurations between versions of same or different devices
- ❑ Reporting configuration mismatches

Rollback Configuration Rollback

- ❑ Update the configuration on a device in the network
- ❑ Ability to specify which configurations to download.
- ❑ Ability to specify options like reboot, write mem etc
- ❑ Job based



Configuration Archive
Wireless Controllers

/ ... / Device Groups / Device Type / Wireless Controller / RTP3-5508-1

Device Details | Configuration | Applied/Scheduled Templates | Configuration Archive | Image | Latest Config Audit Report

Startup/Running Mismatch: N/A

Selected 1 / Total 4

Schedule Rollback | Schedule Overwrite | Edit Tag | Schedule Archive | Schedule Deploy | Show Quick Filter

Date	Created By	Tag	Description	Out of band
October 10, 2014 1:33:12 PM PDT	prime		Archived By Job Name: Job…	
July 29, 2014 4:50:40 AM PDT	prime		Archived By Job Name: Job…	
July 29, 2014 3:14:44 AM PDT	prime		Archived By Job Name: Job…	
June 16, 2014 12:17:01 PM PDT	Inventory		Initial version	

Configuration Management
Wireless Configuration Audit

Administration > Settings > Background Tasks > Other Background Tasks > **Wireless Configuration Audit**

Wireless Configuration Audit

Last Execution Information

Start Time	End Time	Elapsed Time (Seconds)	Result
2014-Nov-01, 04:00:00 PDT	2014-Nov-01, 04:00:00 PDT	39	Success
2014-Nov-02, 04:00:00 PST	2014-Nov-02, 04:00:00 PST	38	Success
2014-Nov-03, 04:00:00 PST	2014-Nov-03, 04:00:00 PST	43	Success
2014-Nov-04, 04:00:00 PST	2014-Nov-04, 04:00:00 PST	41	Success
2014-Nov-05, 04:00:00 PST	2014-Nov-05, 04:00:00 PST	54	Success

Automatic Audit Sync on a daily basis by default – Background Job

Device Group > Device Type > **Wireless Controller**

Wireless Controller

Selected 0 | Total 11

Delete | Edit | Sync | Groups & Sites | Add Device | Bulk Import | Export Device | Reboot | Download | Configure | Show All

Device Name	Reachability	IP Address/DNS	Device Type	AP Discovery...	Software Version	Admin Status	Mobility Group ...	Audit Status	AP Count	Client C
AMS-5760-WLC...		192.168.152.11	Cisco 5760 Wir...	Completed	03.02.02.SE	Managed	AMS-Mobility-Group	Not Available	0	2
LA-2504-WLC		10.2.13.1	Cisco 2504 Wir...	Completed	7.2.110.0	Managed	LA-monility-group	Not Available	1	0
LON-2504-WLC		10.11.13.1	Cisco 2504 Wir...	Completed	7.4.100.0	Managed	London	Mismatch	2	1
PAR-3650-1		10.12.33.254	Cisco Catalyst ...	Completed	03.03.04SE	Managed		Identical	2	2
PAR-3850-1		10.12.0.2	Cisco Catalyst ...	Completed	03.03.04SE	Managed		Identical	3	5
PAR-CT5760-1		10.12.11.253	Cisco 5760 Wir...	Completed	03.03.04SE	Managed	PARIS	Identical	0	0
PAR-CTS5760-2		10.12.22.253	Cisco 5760 Wir...	Completed	03.03.04SE	Managed	PARIS	Identical	0	0
RTP3-5508-1		10.122.86.51	Cisco 5508 Wir...	Completed	8.0.100.0	Managed	standard	Mismatch	5	0
SF-5508-WLC		10.3.13.1	Cisco 5508 Wir...	Completed	7.6.100.0	Managed	sf-mobility			

Audit Status

Audit Now

Audit Result

Device name **RTP3-5508-1**

Audit Time **Nov 5, 2014 10:18:48 AM**

Audit Status **Mismatch**

Prime Infrastructure Config Discrepancies

(Type)Configuration Name	Audit Status	Attribute	Prime	
(Multicast Config) 10.122.86.51	Not Present in Controller	-	-	
(Mobility Group Config) 10.122.86.51/88:43:e1:61:f5:80	Not Present in Controller	-	-	
(Policy Configuration) test	Not Present in Prime Infrastructure	-	-	-
(MDNS Service Group) 10.122.86.51/default-mdns-policy	Not Present in Prime Infrastructure	-	-	-

Easy reconciliation in the event of an audit mismatch

Restore Prime Infrastructure Values to Controller

Refresh Config from Controller

Site Maps Configuration

Maps Layout – Monitoring the RF Environment

/ Maps / Wireless Maps / Site Maps

Maps Tree View

- Root Area
- System Campus
- CVG-Bldg-N
- First Floor
- Second Floor
- Unassigned

Building View

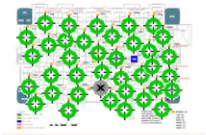
Site Maps > System Campus > **CVG-Bldg-N**

-- Select a command -- | Go

- ✓ -- Select a command --
- New Floor Area
- ----------
- Edit Building
- Delete Building
- Copy Building ...
- ----------
- Configure Interferer Notifications

Floor | Map

2



Floor Area	**Second Floor**	Total APs	**38**
Floor Index	**2**	a/n/ac Radios	**38**
Contact		b/g/n Radios	**38**
Status		Radios with Critical Alarms	**0**
a/n/ac Clients	**28**	b/g/n Clients	**0**
Wired Clients	**0**		

1

Floor Area	**First Floor**	Total APs	**18**
Floor Index	**1**	a/n/ac Radios	**18**
Contact		b/g/n Radios	**18**
Status			
a/n/ac Clients	**19**		
Wired Clients	**0**		

Adding Campuses and Buildings are made easy with the drop down menu and the wizard walks you though the provisioning of floor plans and AP's

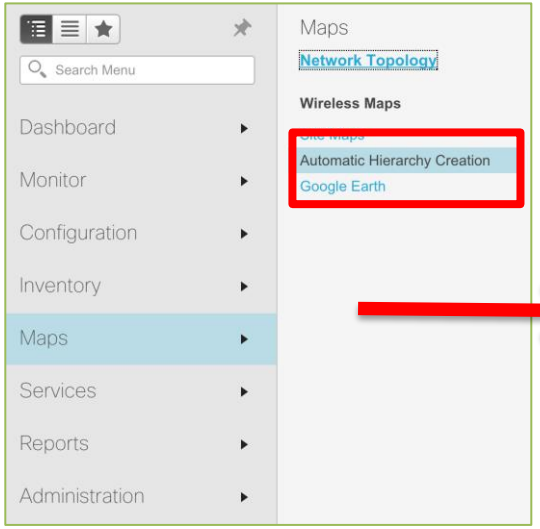
Building View provides a quick look into the floors status and alarm summary for quick troubleshooting

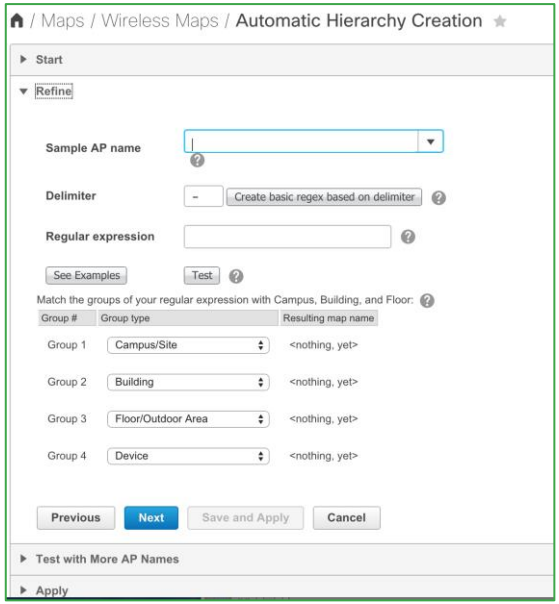
Hierarchical representation of Campuses, Buildings, Floors

cisco

AP Placements on the Maps

Manual or Dynamic (Automatic Hierarchical AP Provisioning)

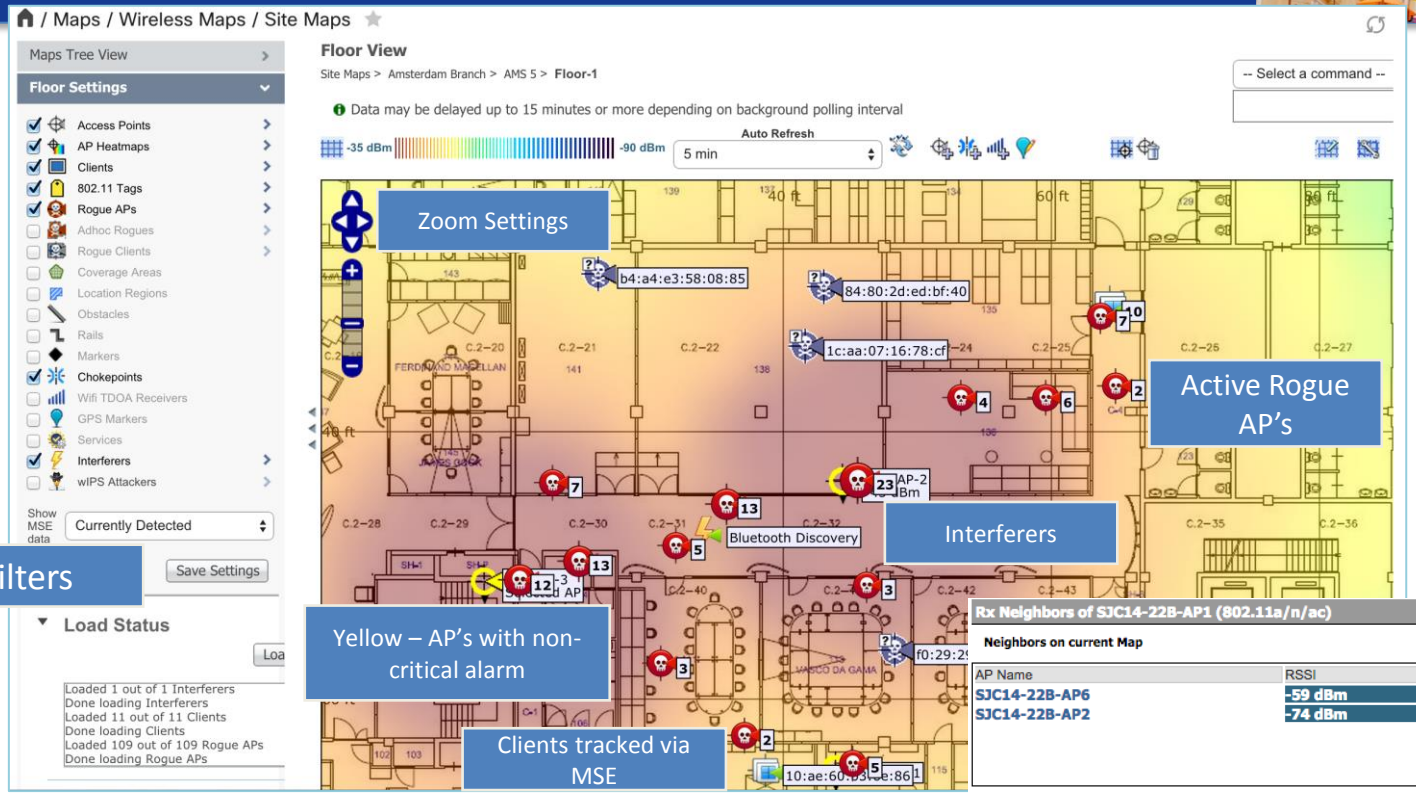




Using a sample AP name, AP's matching the regular expression can now be automatically placed on that particular Campus/Building/Floor

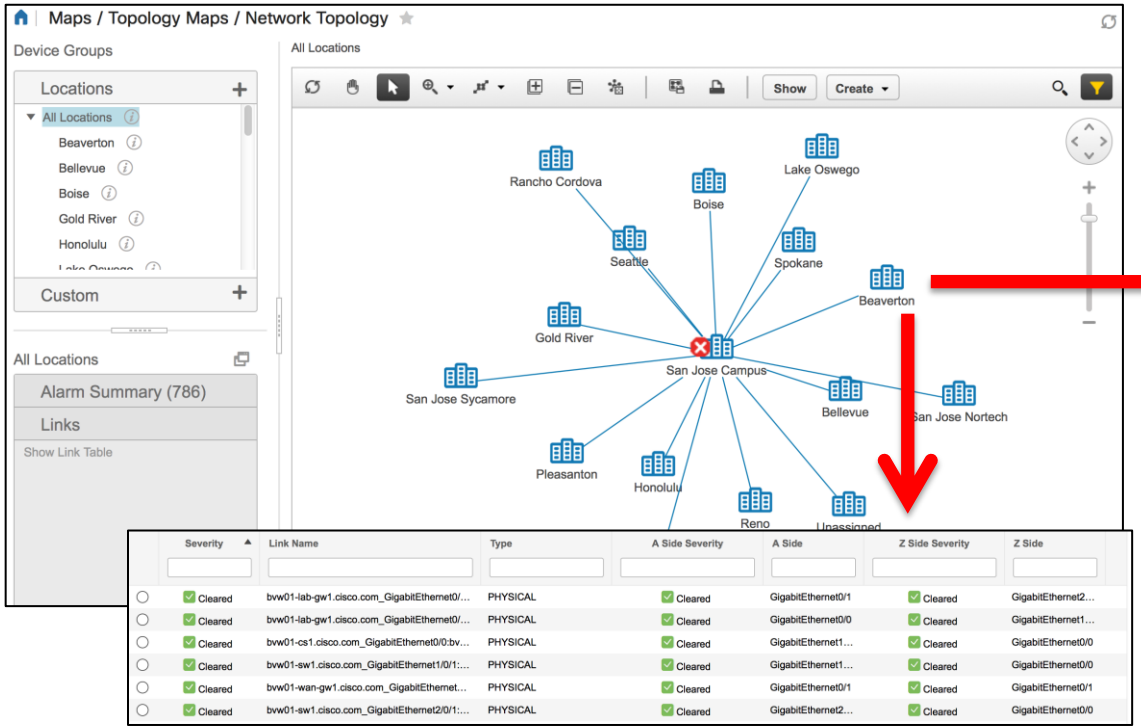
Site Maps Configuration

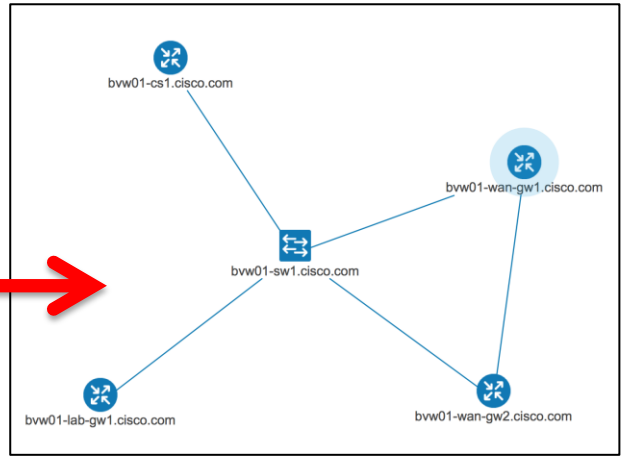
Heat Maps to visualize the RF environment



Network Topology

Monitor the status/services of the Sites in your network





Visualize

- L2 Topology of the network
- Alarms for the Devices
- Device 360 View
- Links status between the devices
- Link 360 View

Virtual Domain

Geographic/Organization Separation of Network

/ Administration / Users / Virtual Domains

Export Custom Attributes

Virtual Domains

Search All

- ROOT-DOMAIN
  - My domain
  - West-Coast
  - sample
  - test

West-Coast

Virtual Domains / ROOT-DOMAIN / West-Coast

* Name: West-Coast

Time Zone: -- Select Time Zone --

Parent Domain: ROOT-DOMAIN

Email Address:

Description:

Site Maps | Network Devices | Access Points | Virtual Elements

Selected Site Maps

Add | Delete | Show

Hierarchial Name	Site Type
Los angeles Branch	Campus/Site
San Francisco Branch	Campus/Site

Submit | Cancel

Virtual Domain Custom Attributes

Copy and paste the appropriate protocol-specific data from the custom/vendor-specific attribute field in your AAA server. You should only appen
field that you wish the user should have access to.

TACACS+ Custom Attributes

virtual-domain0=ROOT-DOMAIN
virtual-domain1=My domain
virtual-domain2=test2
virtual-domain3=test1
virtual-domain4=test
virtual-domain5=West-Coast
virtual-domain6=sample
virtual-domain7=subdomain

RADIUS Custom Attributes

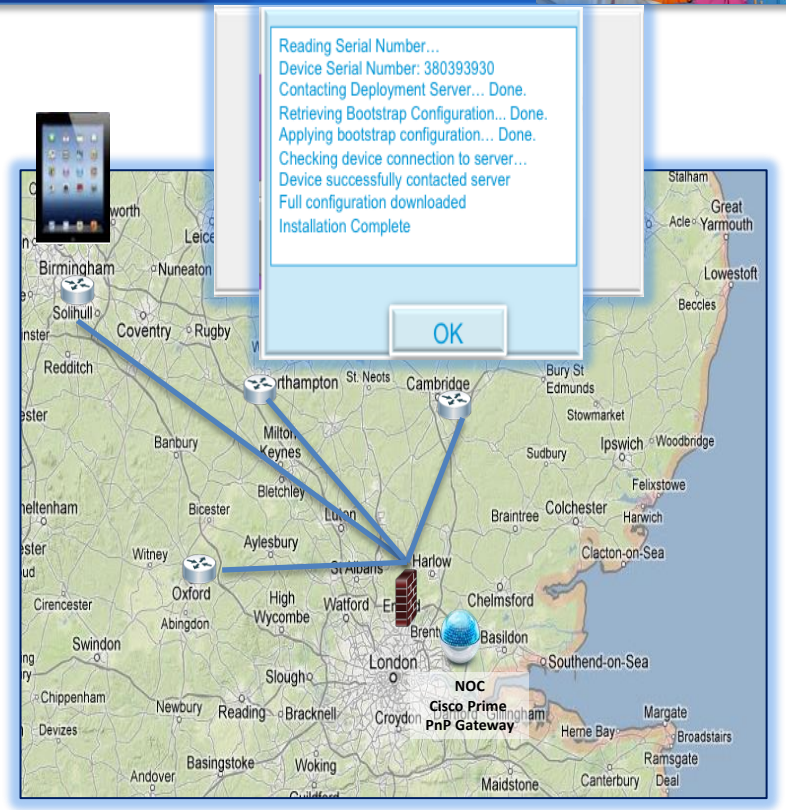
NCS:virtual-domain0=ROOT-DOMAIN
NCS:virtual-domain1=My domain
NCS:virtual-domain2=test2
NCS:virtual-domain3=test1
NCS:virtual-domain4=test
NCS:virtual-domain5=West-Coast
NCS:virtual-domain6=sample
NCS:virtual-domain7=subdomain

Cisco ACS Attributes

- Virtual Domains allow certain users to have visibility into a certain portion of their network
- Each virtual Domain can be associated with Site Maps, Wired and Wireless devices, AP's & Virtual Elements (DC, Cluster, Host)

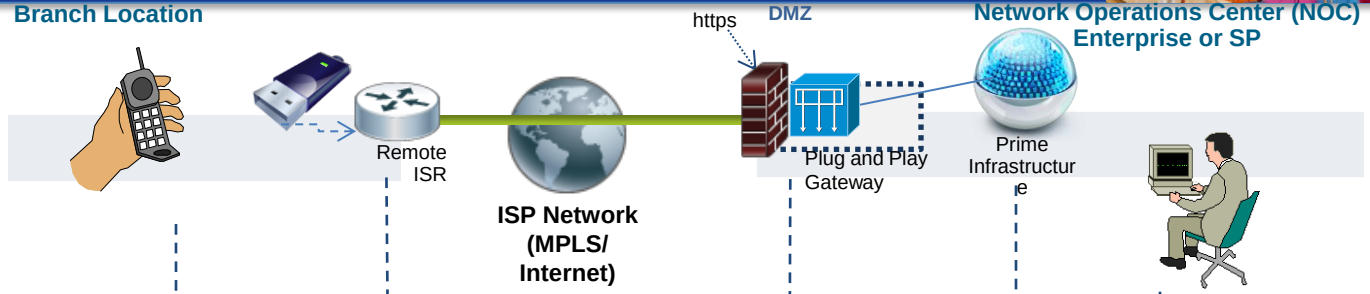
Plug and Play (PnP) for New Site Creation
Overview – Day 0 Deployment

- Provides a quick and easy error-free way to configure devices in remote offices
- Removes the need for technical personnel onsite
- Remote device gets “bootstrap” configuration from admin (USB iPhone, iPad)
- Remote device connects to Cisco Prime™ Infrastructure server through DMZ and retrieves full configuration



Plug and Play (PnP) for New Site Creation

Option 1 : Using PI as the Plug and Play Gateway



1) Installer calls the NOC admin and requests activation for the ISR Serial number with Plug and Play

2) Installer connects the ISR to the WAN

3) Installer insets the USB which contain the CNS bootstrap commands in the ISR USB port and powers-up the box

4) The ISR boots, reads the CNS commands from the USB stick and connects to the Plug and Play Gateway and ask for its config based on its serial number

5) Plug and Play Gateway gets the ISR full config from Prime Infrastructure

6) ISR downloads its config

Sample of the USB config

```
ip host PnP 10.1.3.99
cns config initial 10.1.3.99 443
cns config partial 10.1.3.99 443
cns id hardware-serial
cns id hardware-serial event
cns id hardware-serial image
cns event PnP 11011 keepalive 60 3
cns exec 80
```

This option requires the CVO (most 800/1900) or ZTD (2900) factory config from cisco.

cisco

Plug and Play (PnP) for New Site Creation

Option 2 : Using APIC-EM SDN Controller as the Plug and Play Gateway

Branch

ISR

1

Power On!

2

Router PnP agent starts "call-home"

Internet

MPLS

3G/LTE

- Connect Internet and MPLS cables
- Insert PnP bootstrap USB stick
- Power up ISR

Data Center

DMZ

HTTP Proxy

Prime Infrastructure

Rest APIs

Cisco IOS®

PnP/PKI

APIC-EM

3

APIC-EM PnP pushes new IOS if needed

4

PKI Cert

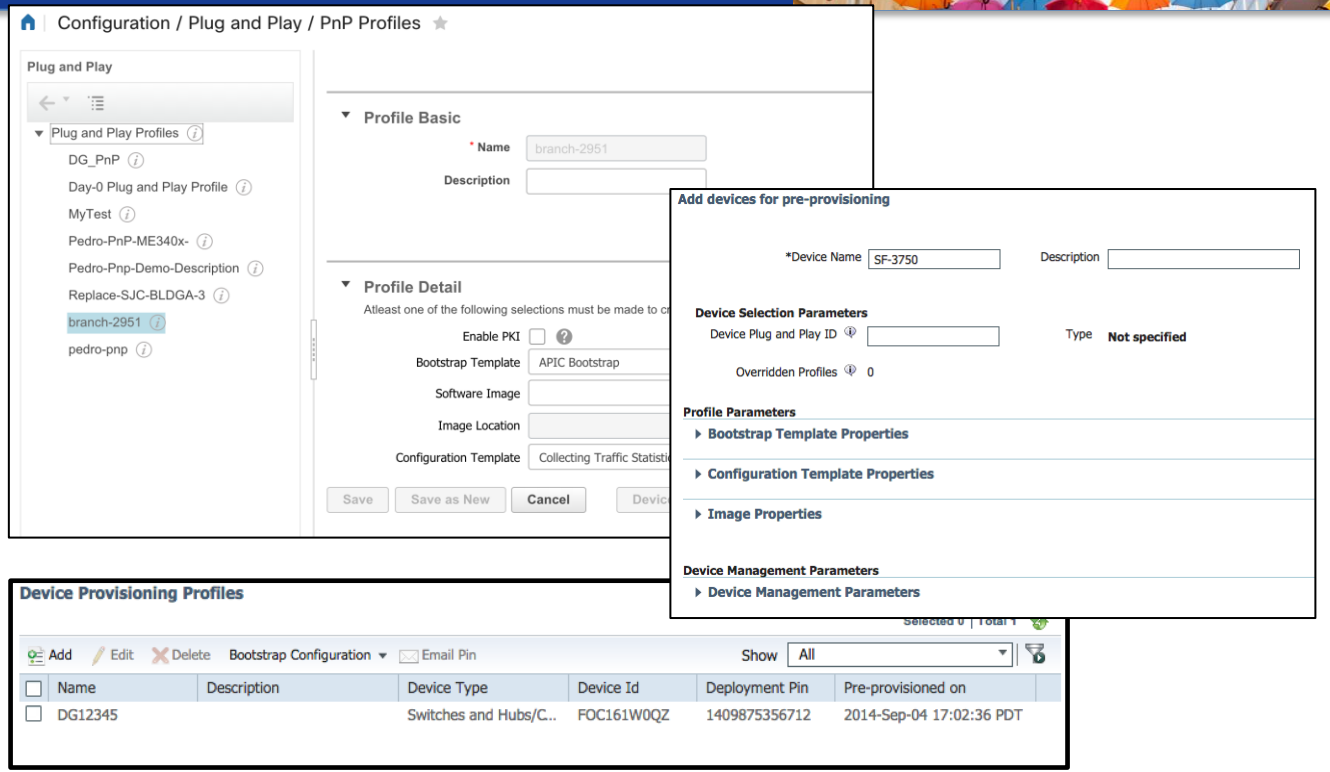
APIC-EM PnP calls PKI service to push a PKI 509.X certificate

- Network wide settings have been defined
- Datacenter has been configured
- Application policies have been set

Plug and Play (PnP) for New Site Creation

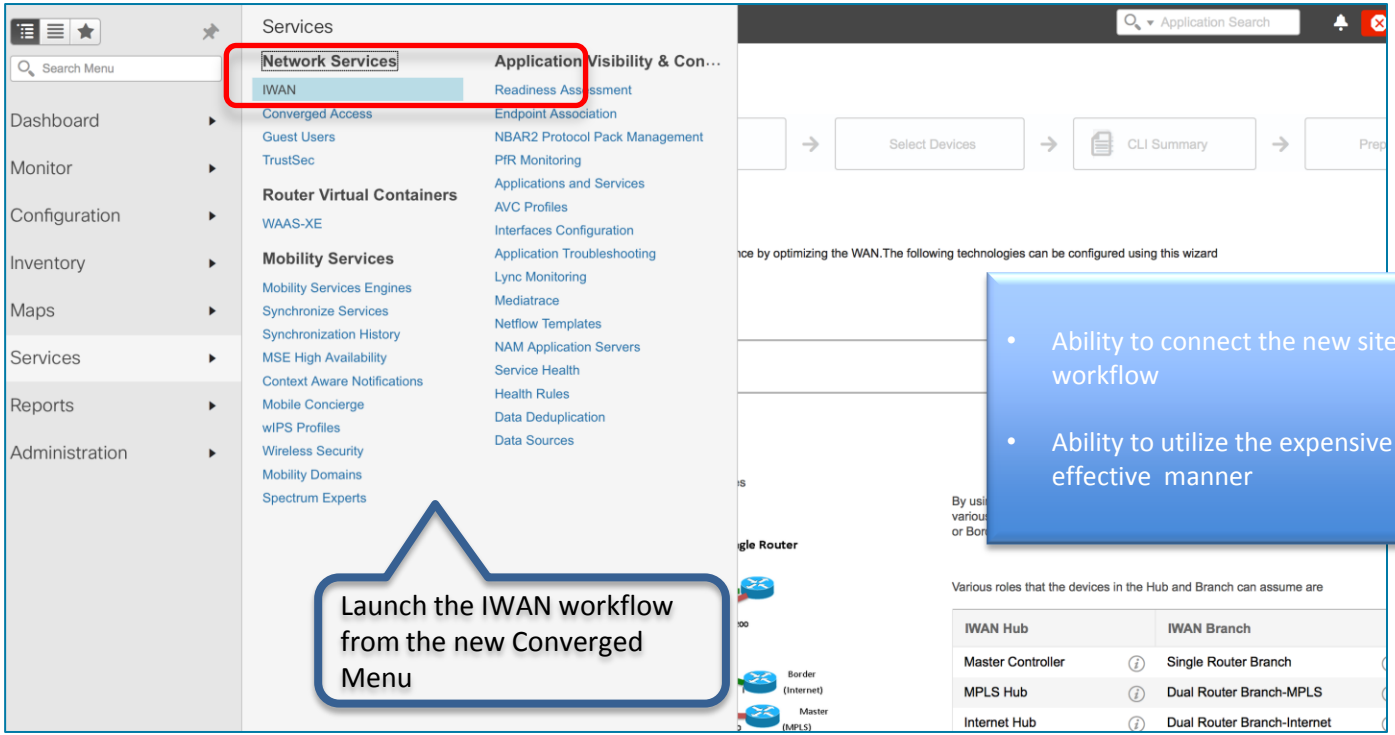
Creating Profile

- Create a Profile consisting of the Bootstrap Template (PI or APIC based Bootstrap), Software Image, Configuration Template etc
- Add the details for one more or more devices for pre-provisioning
- Provision the profile using either the USB or the Prime Utilities option
- Monitor the status of deployment
- Device is automatically managed by PI



WAN Configuration

IWAN Configuration Workflow



Launch the IWAN workflow from the new Converged Menu

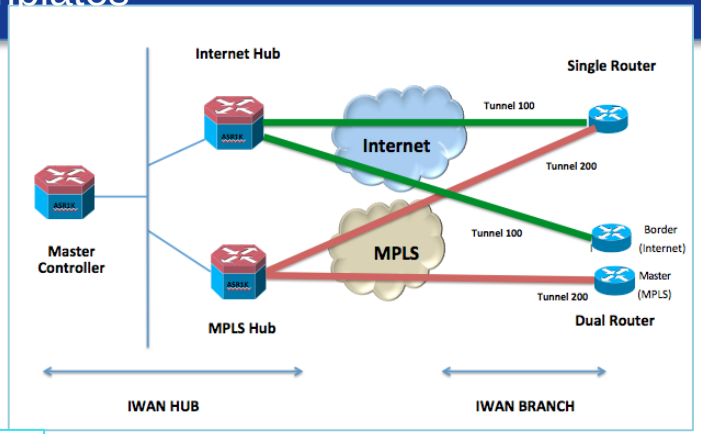
- Ability to connect the new sites to the DC using the workflow
- Ability to utilize the expensive MPLS WLAN in a cost effective manner

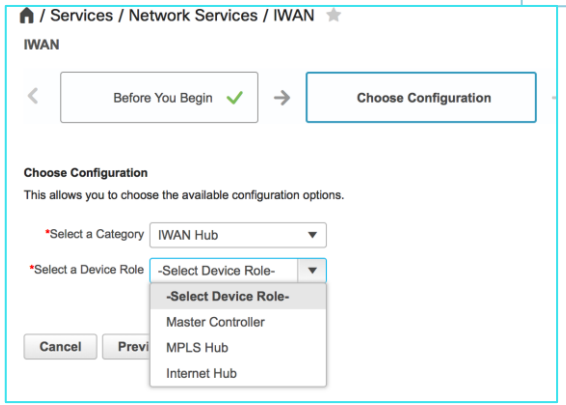
Configuring various PIN (Points In the Network)

Using Out-of-the-box Templates

Need Assurance License

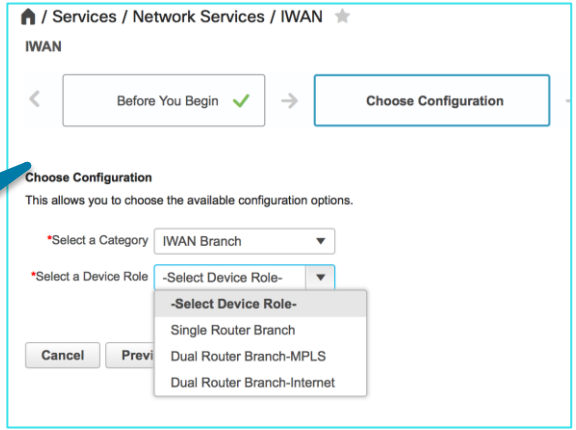
PfRv3
DMVPN
AVC
QOS





Hub with PfRv3 Master Controller & Border Routers

Spoke with Single Router and Dual Routers



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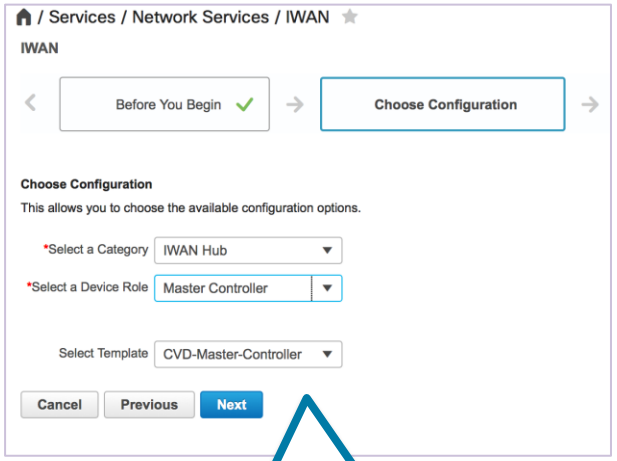
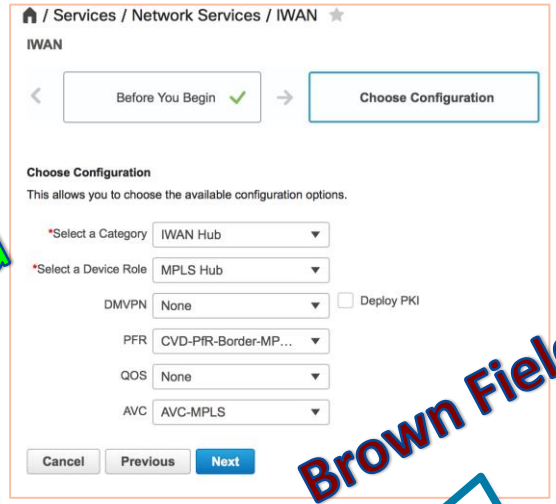
Hub Configuration
Master Controller and Border Routers



PfRv3 Master Controller Configuration

Green Field

Ability to configure the entire IWAN solution



Brown Field

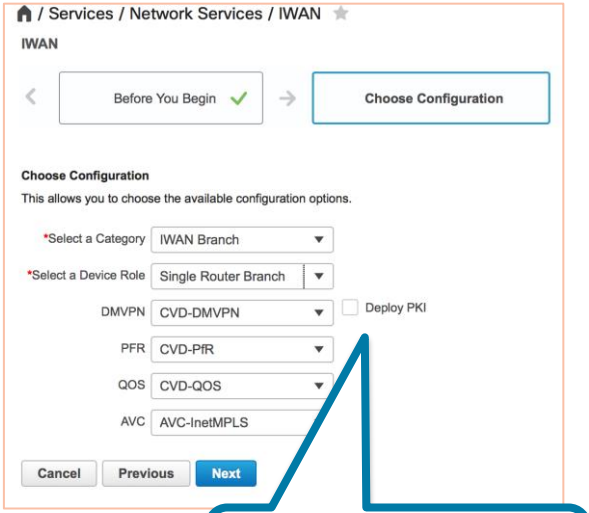
Ability to choose certain IWAN technologies

All Templates are based on CVD's

Master Controller

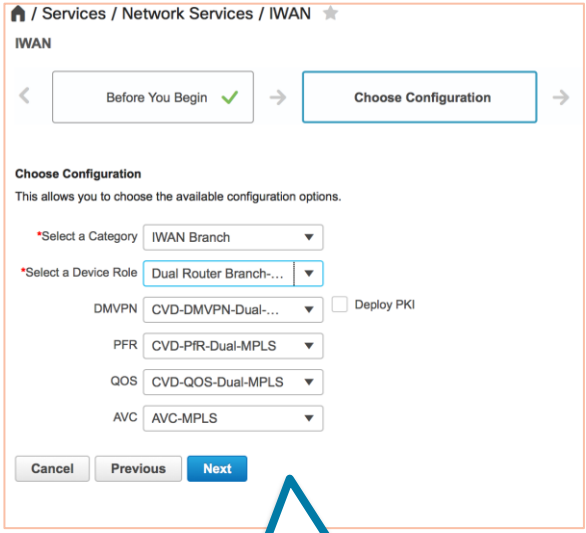
Border Routers

Spoke Configuration
Single or Dual Router Branch

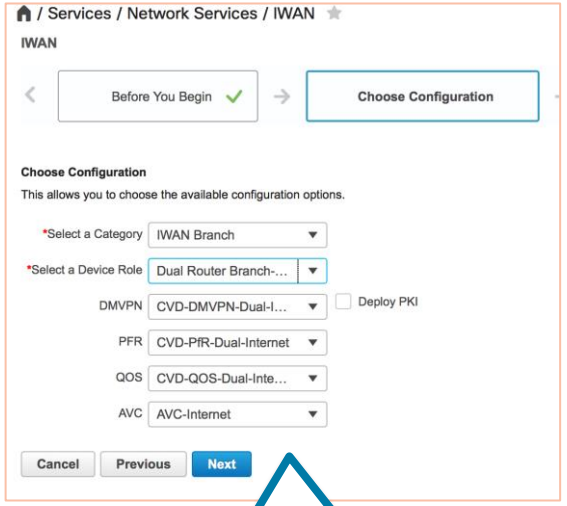


Ability to also deploy PKI using APIC-EM SDN Controller

Single Router Branch



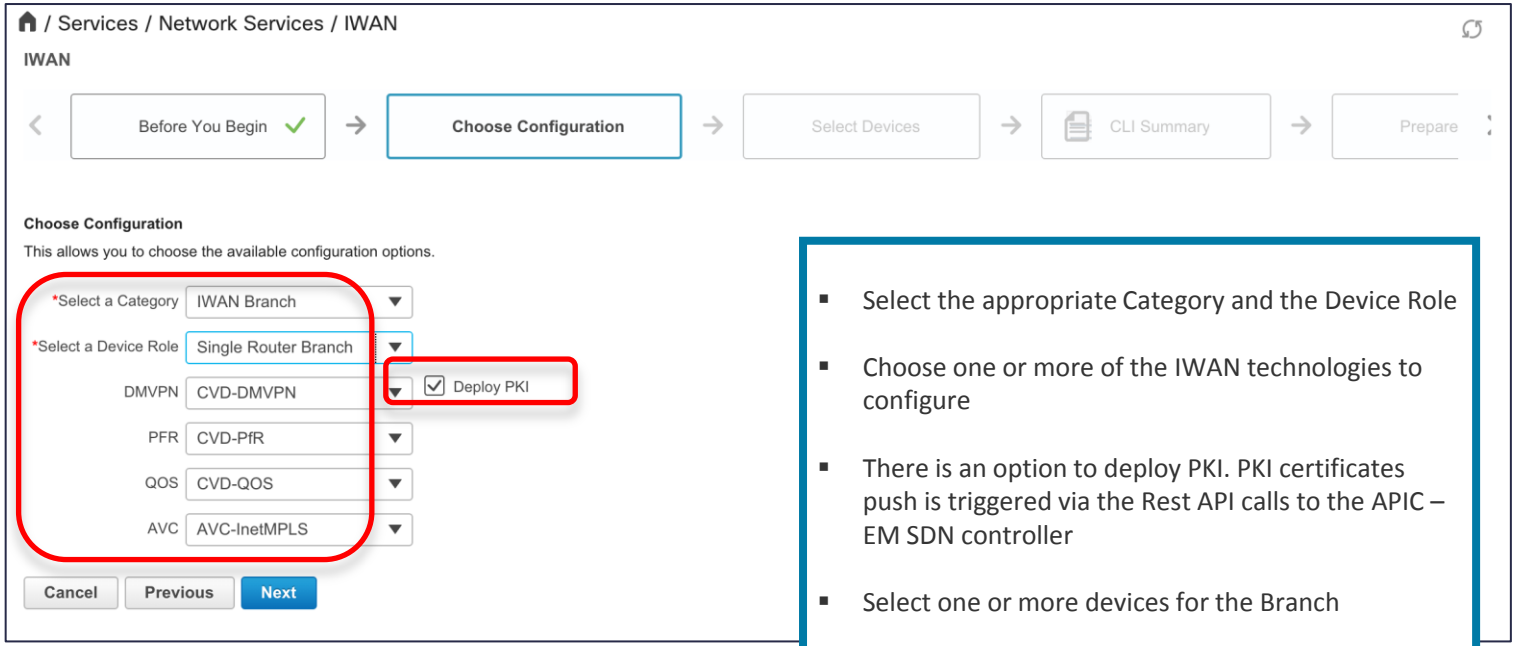
Dual Master Router



Dual Border Router

Dual Router Branch

IWAN Branch Configuration
Single Router Branch



- Select the appropriate Category and the Device Role
- Choose one or more of the IWAN technologies to configure
- There is an option to deploy PKI. PKI certificates push is triggered via the Rest API calls to the APIC – EM SDN controller
- Select one or more devices for the Branch

IWAN Branch Configuration
Single Router Branch

/ Services / Network Services / IWAN

IWAN

Choose Configuration ✓ → Select Devices ✓ → CVD-DMVPN ✓ → **CVD-PfR** → CVD-QOS

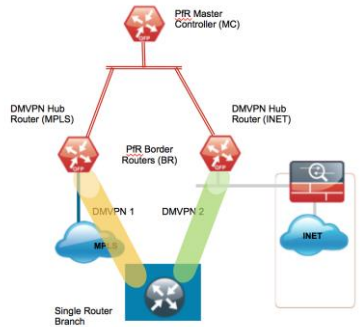
Values filled for the **'ALL Selected Devices'** will be used for each device. Any device specific value will override the value provided in **'ALL Selected Devices'**. When a user clicks **APPLY**, the mandatory parameters are not validated for the **'ALL Selected Devices'** option.

Devices

Name
All Selected Devices
NY-4331-RBR.cisco.com
DEN-4431-RBR.cisco.com
AMS-4331-RBR
PAR-ASR1K-RBR

*Auth-Password prime123

*Master-Controller-IP 10.1.1.1



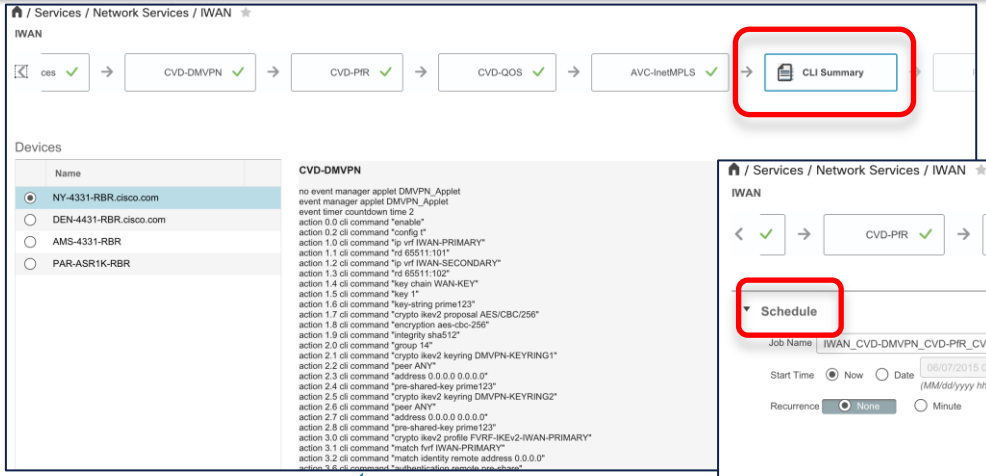
Provide branch specific input for each of the chosen technologies

Use the Help Icons to understand the required input

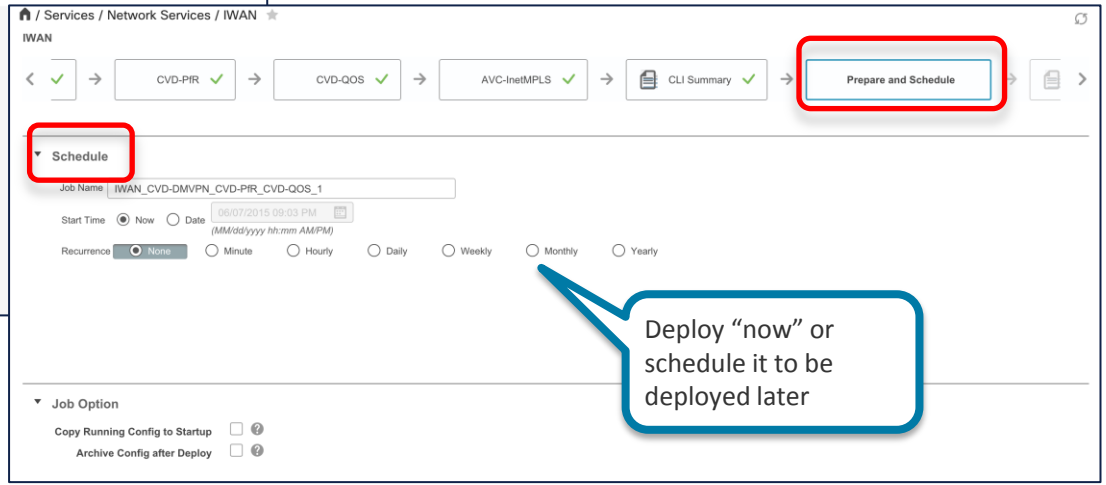
Bulk Deploy on multiple routers using the Import/Export options

IWAN Branch Configuration

Single Router Branch – CLI Summary and Deploy



Preview CLI per IWAN technology per device



Deploy “now” or schedule it to be deployed later

IWAN Configuration
Customize the CVD Based Templates

/ Configuration / Templates / Features & Technologies

Templates

Search All

- Network Analysis Module
- Security
- WAN Optimization
- CLI Templates
- Composite Templates
- Feature Templates
  - IWAN
    - AVC
    - Hub
      - CVD-DMVPN-Internet
      - CVD-DMVPN-MPLS
      - CVD-Master-Controller
      - CVD-PfR-Border-Internet
      - CVD-PfR-Border-MPLS
      - CVD-QOS-Internet
      - CVD-QOS-MPLS
    - Spoke
- My Tags
- My Templates

Templates / Feature Templates / IWAN / Hub

CVD-DMVPN-MPLS

Delete Ex

Template Basic

* Name: CVD-DMVPN-MPLS
Author: root
Description:
Feature Category: CLI
Tags: IWAN-DMVPN, IWAN-HUB-MPLS

Tags retain the template type for your custom templates to appear in the IWAN workflow

Validation Criteria

* Device Type: Routers
OS Version: 15.4

Template Detail

CLI Content | Form View

Loopback

*Loopback-IP

MPLS Tunnel

*MPLS-WAN-Bandwidth-KBPS
*Tunnel-IP
*Tunnel-Subnet-Mask

Make changes to the existing CVD

LAN/WAN Monitoring

Dashboards

What can we monitor ?

Site

Devices Reachability, Busiest AP's, Top Applications, Top Talkers, Client Traffic, Top Events

Device

CPU & Memory Utilization Trend, Top Applications, Top Talkers, Client Traffic, Top Events

AP

AP Details, Channel Utilization, Client Count, Top Talkers, Top Applications

Interface

Interface Utilization, Top Applications, Top Talkers, QoS Classes

Clients

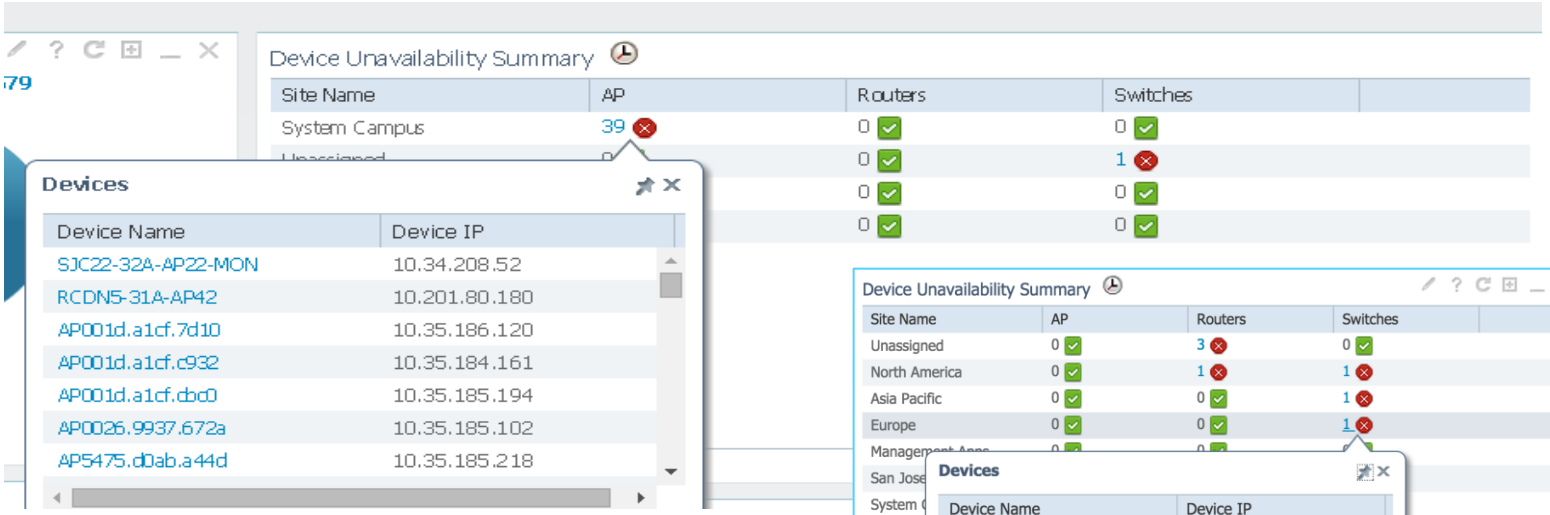
Clients Distribution, Client Count, Traffic

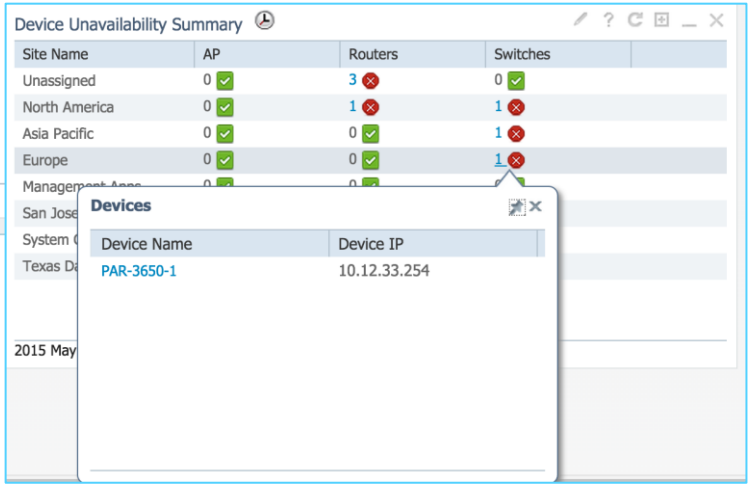
Rogues

Malicious, Friendly and Unclassified Rogues

Dashboards

Monitoring – Overall Network Health





Ping Reachability for Devices

- Ability to know if the AP is up/down
- Health of the Network/Site

Site Monitoring

Dashboard / Performance

Site | Device | Access Point | Interface | Application | Voice/Video | End User Experience | WAN Optimization | Settings

Filters | *Site: Amsterdam Branch | *Time Frame: Past 1 Hour | Application: All Applications | Network Aware: All | Go

Device Reachability Status

Device Name	Device IP	Location	SNMP Reachability
AMS-5760-WLC.cisco.com	192.168.152.11		Unreachable
AMS-2921-RBR	192.168.152.2		Reachable
AMS-3750-SBR	192.168.152.10		Reachable
3560-DC-1	10.0.252.4		Reachable

Top N Memory Utilization

Device Name	Device IP	Instance	Last Polled	Average	Maximum	Minimum
AMS-3750-SBR	192.168.152.10	I/O	75%	75%	75%	75%
AMS-3750-SBR	192.168.152.10	Processor	69%	69%	69%	69%
3560-DC-1	10.0.252.4	I/O	67%	67%	67%	67%
AMS-2921-RBR	192.168.152.2	I/O	50%	50%	50%	50%
3560-DC-1	10.0.252.4	Processor	40%	40%	40%	40%

Quick look into the devices that need maintenance

Busiest Access Points

By Utilization | By Assurance Dat

AP Name	Radio Type	Rx Utillizati...	Tx Utillizati...	Channel Utillizati...	Controller Name	Map Location	Controller IP Address
req01-22l-ap3	802.11b/g/n	0	0	77.75	req01-32a-...	Richfield > REQ >...	10.130.28.8
req01-31l-ap4	802.11b/g/n	0	0	68.5	req01-32a-...	Richfield > REQ >...	10.130.28.8
req01-32l-ap6	802.11b/g/n	0	0	67.25	req01-32a-...	Richfield > REQ >...	10.130.28.8
req01-21l-ap8	802.11b/g/n	0	0	66	req01-32a-...	Richfield > REQ >...	10.130.28.8
req01-21l-ap7	802.11b/g/n	0	0	63	req01-32a-...	Richfield > REQ >...	10.130.28.8
req01-21l-ap4	802.11b/g/n	0	0	62	req01-32a-...	Richfield > REQ >...	10.130.28.8
req01-21l-ap5	802.11b/g/n	0	0	61.75	req01-32a-...	Richfield > REQ >...	10.130.28.8
req01-22l-ap1	802.11b/g/n	0	0	61.5	req01-32a-...	Richfield > REQ >...	10.130.28.8
req01-31l-ap5							10.130.28.8

Do I need to allocate more AP's to this site based on their utilization ?

Top N CPU Utilization

Device Name	Device IP	Last Polled	Average	Maximum
3560-DC-1	10.0.252.4	14%	14%	14%
AMS-3750-SBR	192.168.152.10	8%	8%	8%
AMS-2921-RBR	192.168.152.2	2%	2%	2%

Top N WAN Interfaces by Utilization

Site	Device	Interface	Maximum Utilization	Average Utilization
Amsterdam Branch	192.168.152.2	GigabitEthernet0/0	0.5%	0.5%

Do I need more bandwidth on my WAN Interfaces based on their Utilization?

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Site Monitoring……Continued

Need Assurance License

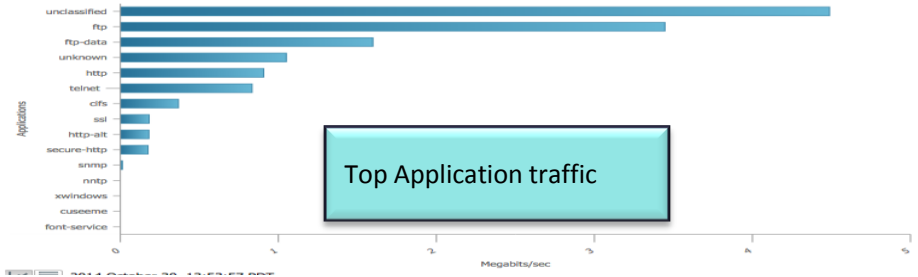
Dashboard / Performance

Site | Device | Access Point | Interface | Application | Voice/Video | End User Experience | WAN Optimization | Settings

Filters | *Site: Amsterdam Branch | *Time Frame: Past 1 Hour | Application: All Applications | Network Aware: All | Go

Top N Applications

Rate | Volume



Top Application traffic

Client Conversations

Conversations From User

From	To	To User	Application	Traffic Rate(bytes/s...	Time
10.4.12.14	10.0.250.13	-	ssl	2138	Thu, 30 Oct 20
10.0.250.11	10.4.12.13	-	ssl	320	Thu, 30 Oct 20
10.0.250.13	10.4.12.14	-	ssl	286	Thu, 30 Oct 20
10.0.250.14	10.4.12.13	-	ssl	266	Thu, 30 Oct 20
10.0.250.12	10.4.12.13	-	ssl	217	Thu, 30 Oct 20
10.0.250.13	10.4.12.16	-	ssl	161	Thu, 30 Oct 20

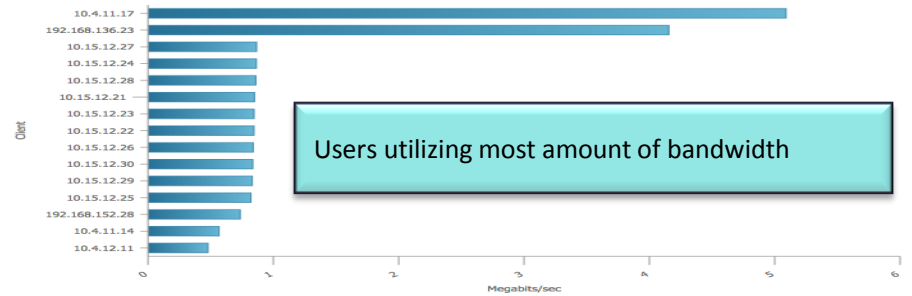
Conversations To User

From	From User	To	Application	Traffic Rate(bytes/s...	Time
10.4.12.14	-	10.0.250.13	ssl	2138	Thu, 30 Oct 20
10.0.250.11	-	10.4.12.13	ssl	320	Thu, 30 Oct 20
10.0.250.13	-	10.4.12.14	ssl	286	Thu, 30 Oct 20
10.0.250.14	-	10.4.12.13	ssl	266	Thu, 30 Oct 20
10.0.250.12	-	10.4.12.13	ssl	217	Thu, 30 Oct 20
10.0.250.13	-	10.4.12.16	ssl	161	Thu, 30 Oct 20

Top N Clients

Client | User

Rate | Volume



Users utilizing most amount of bandwidth

Worst N Clients by ART Metrics

Selected Metric : Transaction Time

Client	Type	User	Application	Maximum Transacti...	Average Transactio...	Art Analysis
192.168.152.30		DC-0E-...	http	240000	112016	Show Analysis
192.168.152.28		jfields	youtube	40057	6631	Show Analysis
192.168.152.28		jfields	http	8432	1079	Show Analysis
10.0.250.11			telnet	280	129	Show Analysis
10.0.250.14			telnet	358	122	Show Analysis

Users with Application Performance Issues

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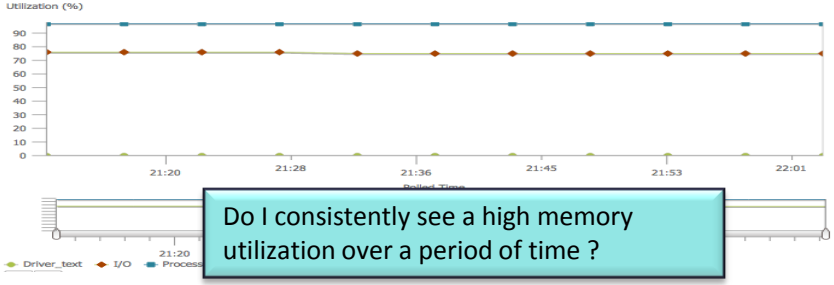
Device Monitoring (Wired/Wireless)

Dashboard / Performance

Site | Device | Access Point | Interface | Application | Voice/Video | End User Experience | WAN Optimization | Settings

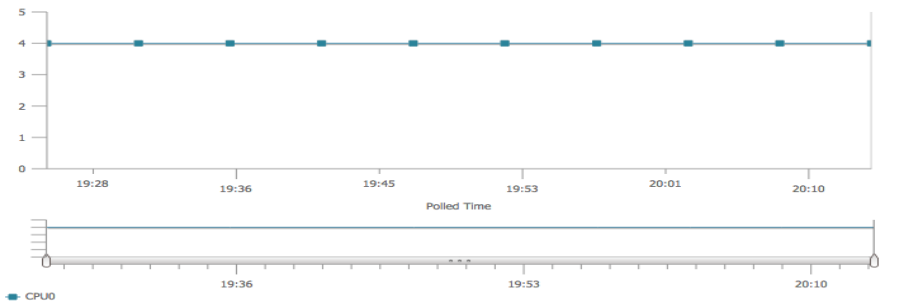
Filters *Device SF-4331-RBR.cisco... *Time Frame Past 1 Hour Go

Device Memory Utilization Trend



Do I consistently see a high memory utilization over a period of time ?

Device CPU Utilization Trend



Device Health Information

Health Statistics	Values
Temperature	37.5°C
Alarms	0
Events	0
Reachability	Reachable

Device Temperature

Device Port Summary

Ports	Number
Up Ports	3
Operationally Down Ports	0
Administratively Down Ports	3

Down Ports	Status
GigabitEthernet0/2	Administratively Down
SM1/0	Administratively Down
Embedded-Service-Engine0/0	Administratively Down

How many ports are operationally down ?

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Device Monitoring

Need Assurance License

Dashboard / Performance

Site | Device | Access Point | Interface | Application | Voice/Video | End User Experience | WAN Optimization | Settings

Filters *Device SF-4331-RBR.cisco... *Time Frame Past 1 Hour Go

Top N Applications

Rate | Volume

Client Conversations

Conversations From User

From	To	To User	Application	Traffic Rate(bytes/...	Time
10.4.12.13	10.0.250.13	-	ssl	2346	Wed, 5 Nov 2
10.4.12.12	10.0.250.11	-	ssl	1801	Wed, 5 Nov 2
10.4.12.14	10.0.250.12	-	ssl	1341	Wed, 5 Nov 2
10.4.12.11	10.0.250.12	-	ssl	1338	Wed, 5 Nov 2
10.4.12.13	10.0.250.14	-	ssl	1236	Wed, 5 Nov 2
10.0.250.11	10.4.12.12	-	ssl	1197	Wed, 5 Nov 2

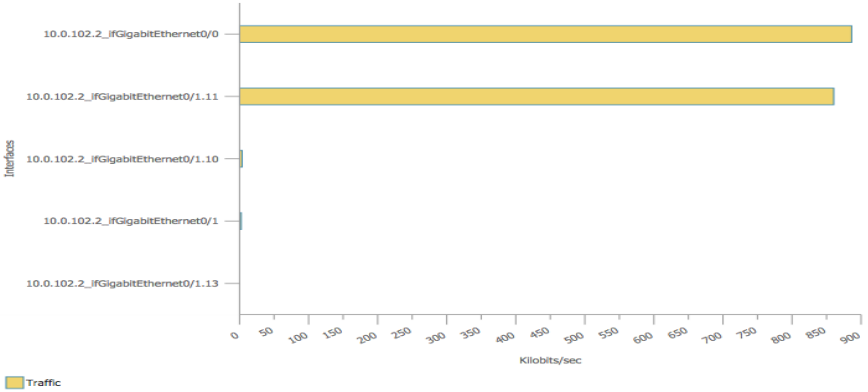
Conversations To User

From	From User	To	Application	Traffic Rate(bytes/...	Time
10.4.12.13	-	10.0.250.13	ssl	2346	Wed, 5 Nov 2
10.4.12.12	-	10.0.250.11	ssl	1801	Wed, 5 Nov 2
10.4.12.14	-	10.0.250.12	ssl	1341	Wed, 5 Nov 2
10.4.12.11	-	10.0.250.12	ssl	1338	Wed, 5 Nov 2
10.4.12.13	-	10.0.250.14	ssl	1236	Wed, 5 Nov 2
10.0.250				1197	Wed, 5 Nov 2

Client Conversations across this device

Top N Interfaces by Netflow

Rate | Volume



Do I see significant amount of netflow traffic from one particular interface ?

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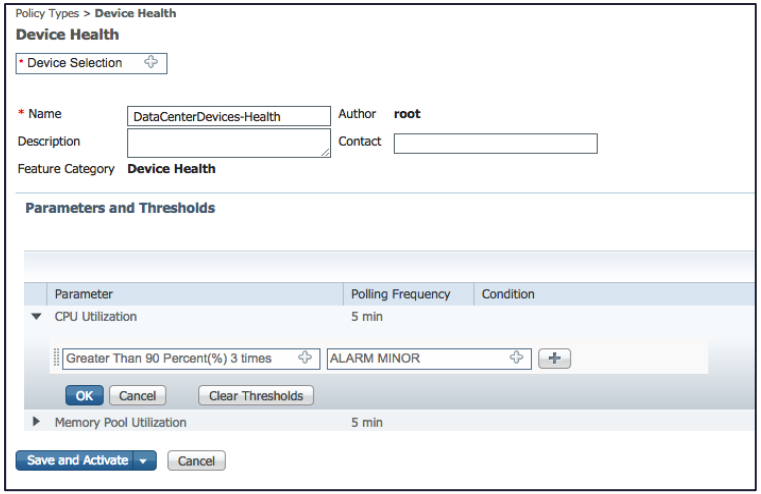
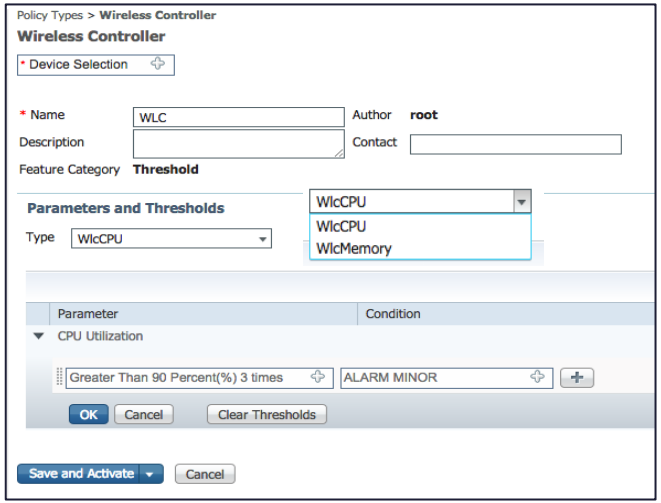
Device Monitoring
Thresholding and Alerting



If the devices in the Data center have a CPU Utilization of more than 90% for 3 times, then raise a minor alarm



If the WLC's have a CPU Utilization of more than 90% for 3 times, then raise a minor alarm

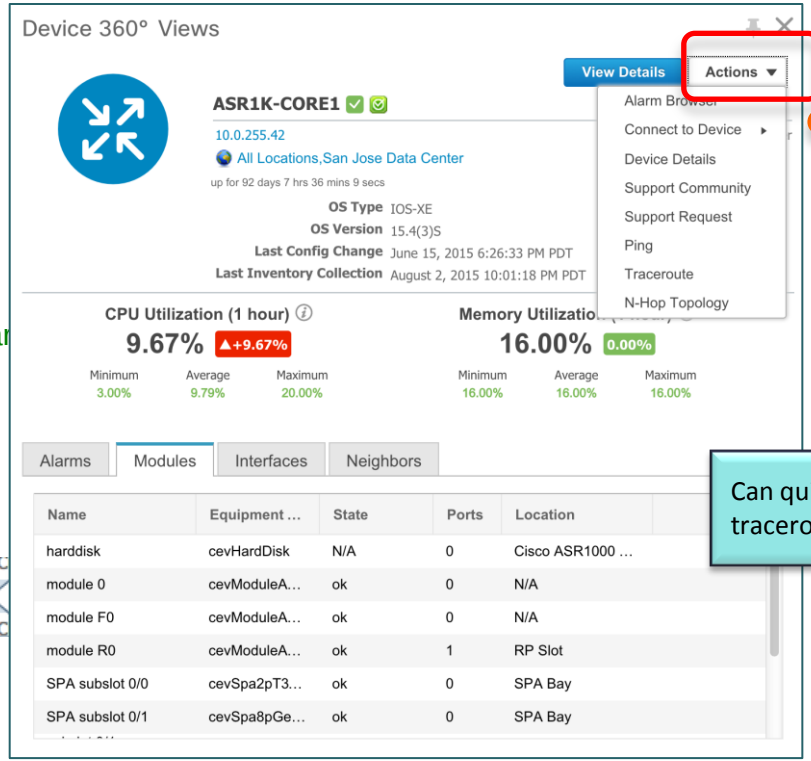
Device Monitoring

Device 360 View – Device Troubleshooting (Wired and Wireless)

On click shows the following

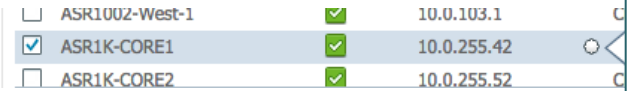
- OS version and status
- License used/Capacity
- Number of Active Aps
- Number of Active Clients
- CPU and Mem utilization

Provides snapshot of wired/wireless interfaces, alar



Quick Launch point for Smart Interactions

Can quickly do a ping and traceroute to this device

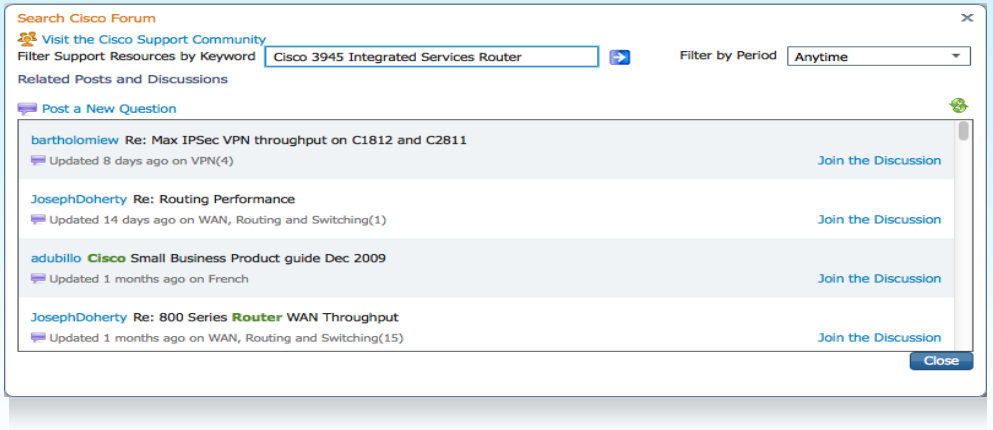


Launch the 360 view from any dashboard

Device Monitoring - Smart Interactions

Allows to communicate with Cisco Support Community

- ✓ **Context Sensitive Device search**
- ✓ **Post to Cisco Support Community from the same interface**
- ✓ **One click access to support communities & Cisco knowledge base**

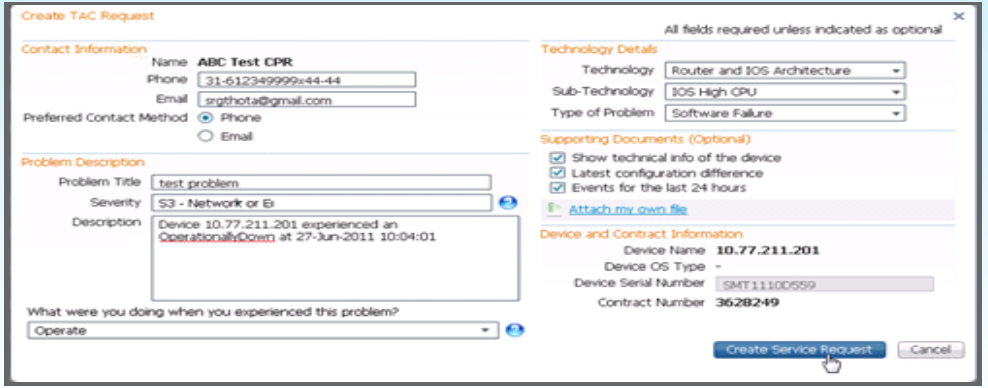


- Less time needed to resolve problems
- Communicate with other Cisco experts

Device Monitoring - Smart Interactions

Allows to open ticket (Service Requests)

- ✓ **Integrated Cisco service request management: Automates the service request process**
- ✓ **Create support cases with Cisco-TAC and partners**
- ✓ **Case status look-up**
- ✓ **Automatic attachment of problem context to the support cases**



- Less time needed to resolve problems
- Communicate with other Cisco experts

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AP Monitoring

Dashboard / Performance

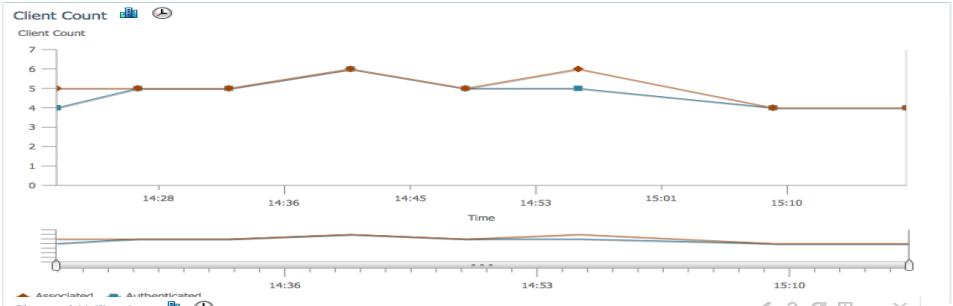
Site | Device | Access Point | Interface | Application | Voice/Video | End User Experience | WAN Optimization | Settings

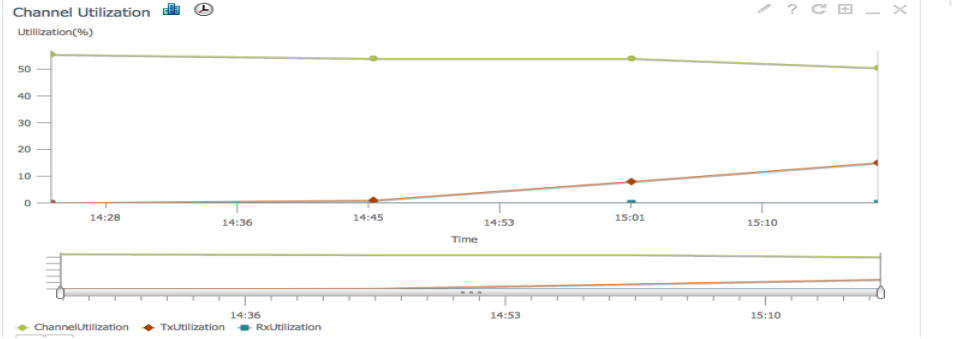
Filters *Access Point AMS-AP-1 *Time Frame Past 1 Hour Go

Access Point Details

Property	Value
AP Name	AMS-AP-1
Radio Mac	5c:a4:8a:d7:98:60
Ethernet Mac	24:e9:b3:61:80:ef
Model	AIR-CAP3502I-A-K9
Controller	192.168.152.11
Location	default location
Map Location	Amsterdam Branch > AMS 5 > Floor-1
Base Radio	AP AMS-AP-1, Interface 802.11a/n AP AMS-AP-1, Interface 802....

- AP Details
- Top applications by bandwidth
- Top clients by bandwidth
- Clients count on the AP over time
- Channel Utilization and AP throughput over time





AP Monitoring
Thresholding and Alerting

Policy Types > **Wireless AP**

Wireless AP

* Device Selection

* Name: AP-Client Count
Author: **root**
Description:
Contact:
Feature Category: **Threshold**

Parameters and Thresholds

Type: ApClientCount

Parameter	Condition
Client Count	
Greater Than 10 Per Polling Inte...	ALARM MINOR

OK | Cancel | Clear Thresholds

For a given set of AP's or AP Group, when the client count is more than 10 then raise a minor alarm

Type: ApClientCount

- ApParentChange
- ApRadioChannelChange
- ApFlapping
- ApClientThroughput
- ApClientCount
- ApChannelUtil

Various available parameters

Interface Monitoring

Dashboard / Performance

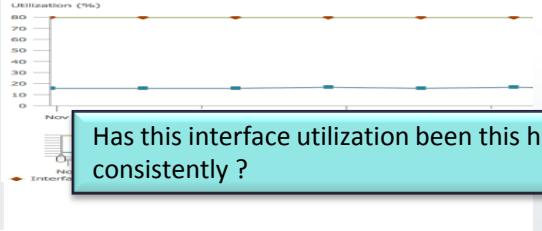
Site | Device | Access Point | Interface | Application | Voice/Video | End User Experience | WAN Optimization | Settings

Filters | *Interface: GigabitEthernet0/0 | *Time Frame: Past 1 Hour | Application: All Applications | Network Aware: All | Go

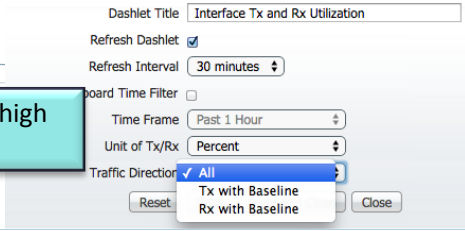
Interface Details

Property	Value
Name	GigabitEthernet0/0
Device SysName	LON-3945-RBR
Device IP Address	10.11.1.1
Device Location	
Device SysDescr	Cisco IOS Software, C3900 Software (C3900-UNIVERSALK9-M), Version 15.2(4)M...
Polling Enabled	YES
Polling Parameters	dropOctetsPerc, ifOutDiscards, ifInDiscards, outputUtilization, inputUtilization, ifO...
IfIndex	2
Description	### connecter to ASR1K-Core2 , g0/1/2 ###
IfType	Ethernetcsmacd
Interface Operational Status	Up
Interface Admin Status	Up
IfPhysical Address	44:d3:ca:ae:f1:00
Configured Speed	10Mbps

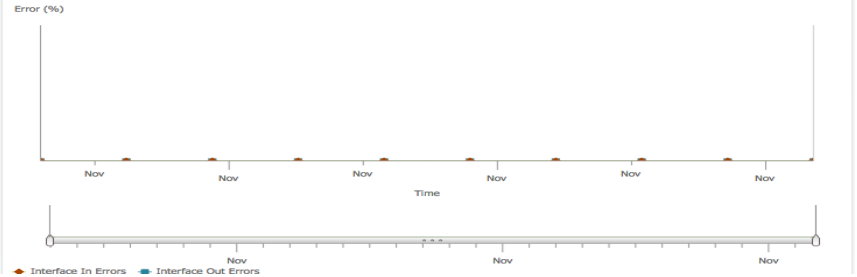
Interface Tx and Rx Utilization



Has this interface utilization been this high consistently ?



Interface In and Out Errors



Am I seeing Errors and discards consistently ?

QoS Class Map Statistics

Class Name	Direction	Pre Policy Rate (bps)	Post Policy Rate (bps)	Drops
TRANSACTIONAL-DATA	Output	53305678.57	16804392.86	68.53%
TRAFFIC-SHAPER	Output	232418178.57	100008517.86	56.9%
SIGNALING	Output	8339892.86	3624839.29	50.66%
CLASS-DEFAULT	Output	144447053.57	68689375	32.45%
NETWORK-CONTROL	Output	20093660.71	6308714.29	25.9%
SCAVENGER	Output	2840303.57	1270160.71	19.93%
VOICE	Output	3382660.71	3342285.71	1.19%
BULK-DATA	Output	7410.71	7410.71	0%
MULTIMEDIA-CONFERENCING	Output	0	0	0%

0%-50% 51%-70% 71%-90% 91%-100%

Are there drops across the critical queues ?

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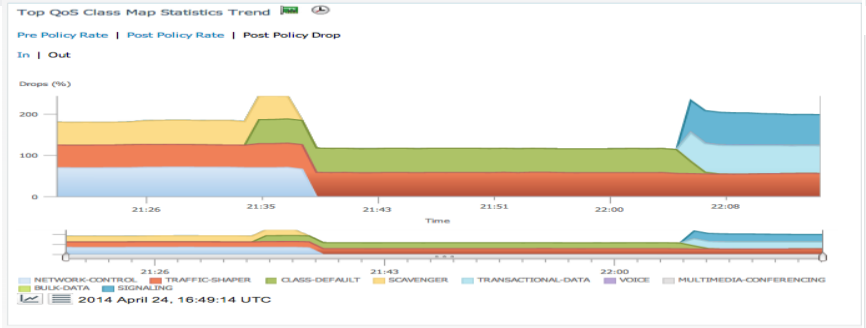
Interface Monitoring

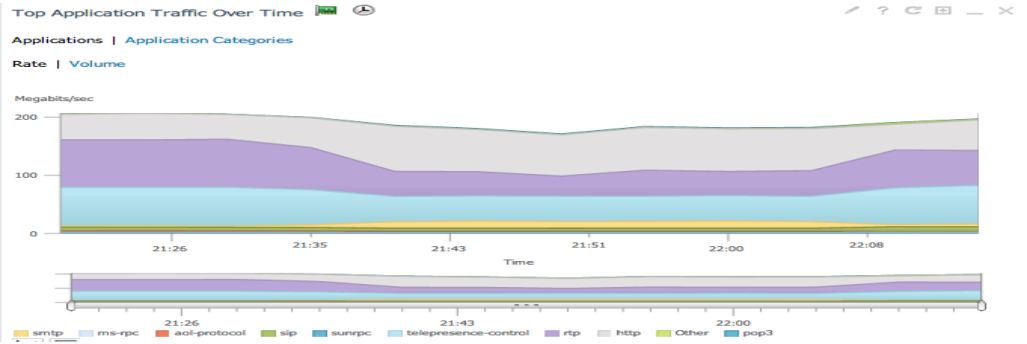
Need Assurance License

Dashboard / Performance

Site | Device | Access Point | Interface | Application | Voice/Video | End User Experience | WAN Optimization | Settings

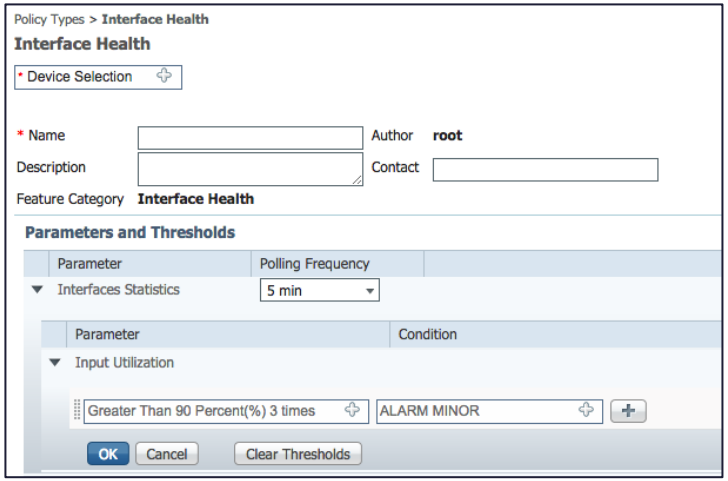
Filters | *Interface: GigabitEthernet0/0 | *Time Frame: Past 1 Hour | Application: All Applications | Network Aware: All | Go

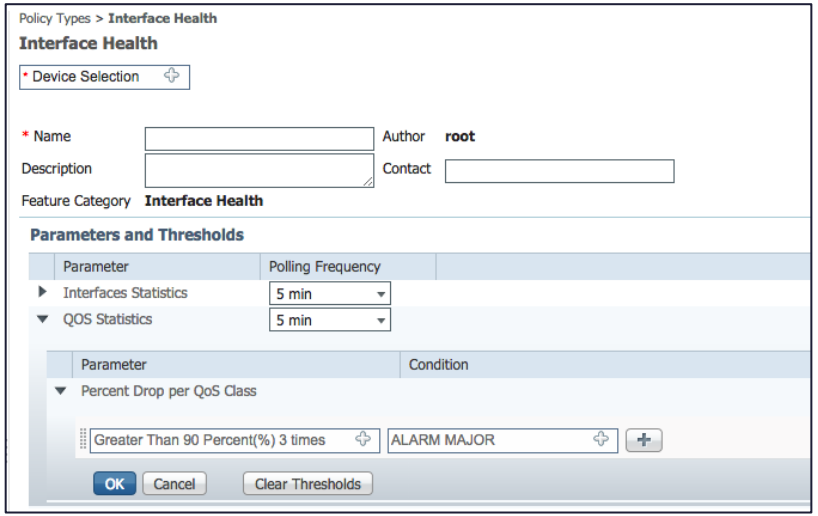




Ability to “look” into the QOS Classes

Interface Monitoring
Thresholding and Alerting





For a set of devices/port groups, raise a minor alarm if the interface's Input Utilization is greater than 90% for 3 times

For my WAN interfaces port group, raise a major alarm if the QOS Drop Per Class is greater than 90% for 3 times

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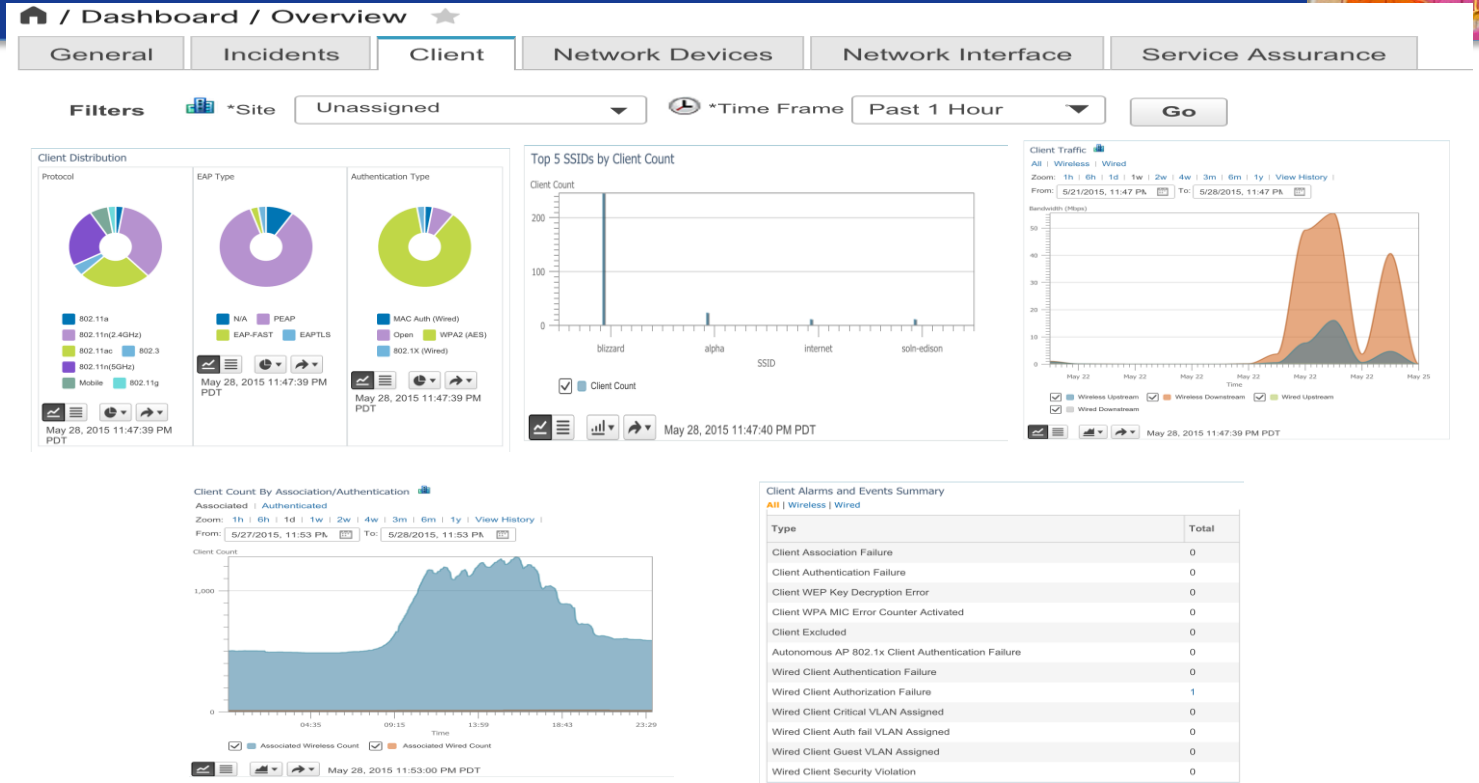
Client Monitoring



Client Alarms and Events Summary

All | Wireless | Wired

Type	Total
Client Association Failure	0
Client Authentication Failure	0
Client WEP Key Decryption Error	0
Client WPA MIC Error Counter Activated	0
Client Excluded	0
Autonomous AP 802.1x Client Authentication Failure	0
Wired Client Authentication Failure	0
Wired Client Authorization Failure	1
Wired Client Critical VLAN Assigned	0
Wired Client Auth fail VLAN Assigned	0
Wired Client Guest VLAN Assigned	0
Wired Client Security Violation	0

View Client Distribution, Client Association/Authenticated count, Top SSIDs, Client Traffic etc

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Client Monitoring & Troubleshooting

Single pane of glass to view wired and wireless clients

Monitor / Monitoring Tools / Clients and Users

Total 144

Troubleshooot | Test | Disable | Remove | More | Track Clients | Identify Unknown Users | Show: Associated Clients

MAC Address	IP Address	IP Type	User ...	...	Vendor	Location	Device Name	Interface	Port	...	Protocol	Status	Association T
00:0a:02:0c:0...		Not De...	00-0A...		Annso	Unknown	LON-3750-SBR	Fa1/0/1	N/A	12	802.3	Associated	02-Aug-2015
12:22:0a:04:0...		Not De...	1222...		Unknown	Unknown	NY-3650-SBR....	Gi1/0/20	N/A	12	802.3	Associated	
dc:0e:a1:b9:2...	192.168.15...	IPv4	DC-0...		Compal	Unknown	AMS-3650-SB...	Gi1/0/6	N/A	12	802.3	Associated	24-Jul-2015,(
00:30:94:c4:1...	10.5.11.19	IPv4	Joe B...		Cisco	Unknown	BXB-3750-SB...	Gi1/0/2	N/A	11	802.3	Associated	24-Jul-2015,(
68:86:a7:ff:51...	192.168.15...	IPv4	jfields		Cisco	Unknown	AMS-3650-SB...	Gi1/0/8	N/A	12	802.3	Associated	24-Jul-2015,(
ac:22:0b:40:d...	192.168.15...	IPv4	jfields		ASUS...	Amsterdam Branch > ...	AMS-5760-WL...	VLAN0013	1	13	802.11n...	Associated	02-Aug-2015
00:26:0b:b8:c...	192.168.136.4	IPv4	Unkn...		Cisco	Unknown	VSS-CAT6800...	Gi101/2/0/5	N/A	1...	802.3	Associated	01-Aug-2015
00:1d:a2:b7:8...	10.4.11.14	IPv4	Unkn...		Cisco	Unknown	NY-3650-SBR....	Gi1/0/11	N/A	11	802.3	Associated	01-Aug-2015
1c:e6:c7:73:a...	10.4.11.15	IPv4	Unkn...		Cisco	Unknown	NY-3650-SBR....	Gi1/0/10	N/A	1	802.3	Associated	02-Aug-2015
00:16:c7:62:6...		Not De...	Unkn...		Cisco	Unknown	NY-3650-SBR....	Gi1/0/8	N/A	12	802.3	Associated	24-Jul-2015,(
00:14:1c:7f:6...		Not De...	Unkn...		Cisco	Unknown	VSS-CAT6800...	Gi101/2/0/5	N/A	1...	802.3	Associated	24-Jul-2015,(
00:50:60:06:f...		Not De...						0/8	N/A	1	802.3	Associated	01-Aug-2015
e8:b7:48:7c:1...	192.168.13...	IPv4						rnet1/8	N/A	1...	802.3	Associated	25-Jul-2015,(
00:10:f3:20:0f...	192.168.13...	IPv4	Unkn...		Nexcom	Unknown	3750-PHY-1	Gi1/0/12	N/A	1...	802.3	Associated	25-Jul-2015,(

All the “Associated” wired and wireless clients

Use Case :

User is unable to access Business Critical Application within his Enterprise

Workflow

- Lookup a client: MAC Address, Username, IP Address, Client type, Client state, From AP Details Page
- Where is the client now (and how is their RF profile)
- Where has this client been (Location playback, session and AP history)
- Active troubleshooting (DB vs Real Time)
- ISE Posture Status
- Application Information

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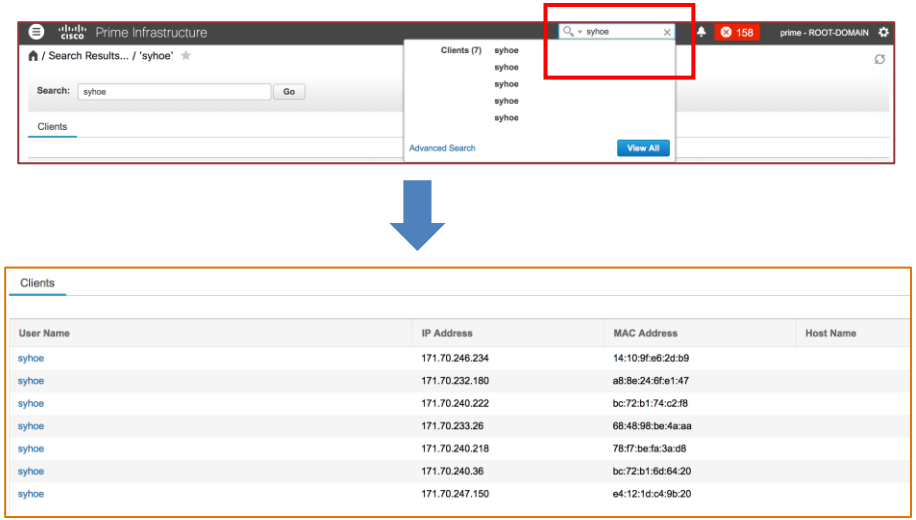
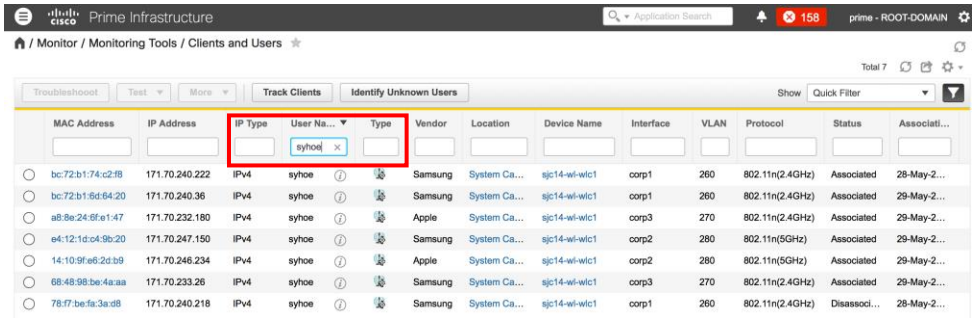
Search for the Client

Multiple search options



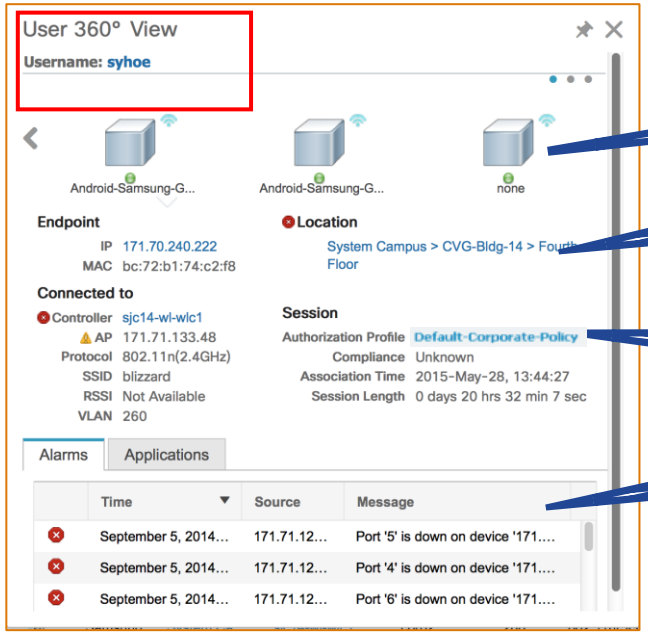
Search for the username/IP/Mac of the client using the “Application Search” option



Search for the username/IP/Mac of the client in the Clients and Users Page

User 360 View

Ability to view all the clients for a user

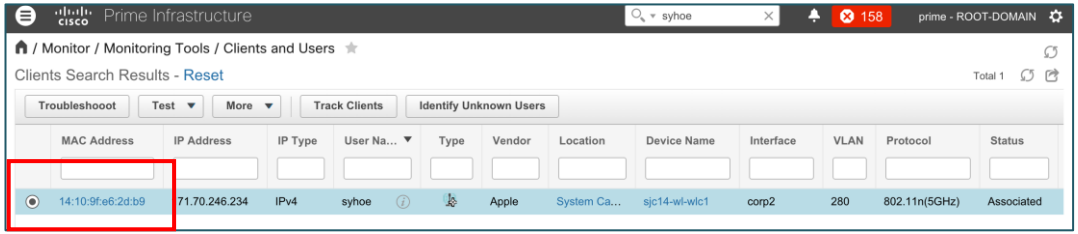


Quick list of the all the clients (wired & wireless) associated with this user

Endpoint & Location Info for each of the clients

Access & Session Information

Alarms and Applications associated with each of the clients



Client Details

/ Monitor / Monitoring Tools / Clients and Users / 14:10:9f:e6:2d:b9

Test | Disable | Remove | More

Overview | Location | ISE | Troubleshoot and Debug | Clean Air | Events | RTTS | More

Easy Navigation to next steps

Client Attributes Summary

Client connection status visualization

14:10:9f:e6:2d:b9 — SJC14-42B-AP4 — sjc14-wl-wlc1

Client Attributes

Ability to Refresh the client info from the WLC

Refresh from Device (Refreshed : 29-May-2015,09:08:00 PDT) Note: None

General

User Name	syhoe
IP Address	171.70.246.234
MAC Address	14:10:9f:e6:2d:b9
Vendor	Apple
Endpoint Type	Apple-Device
Client Type	Regular
Media Type	Lightweight

Session

Controller Name	sjc14-wl-wlc1
Controller IP Address	171.71.128.75
AP Name	SJC14-42B-AP4
AP IP Address	171.71.133.48
AP Type	Cisco AP
AP Base Radio MAC	08:cc:68:cc:9a:10
802.11 State	Associated

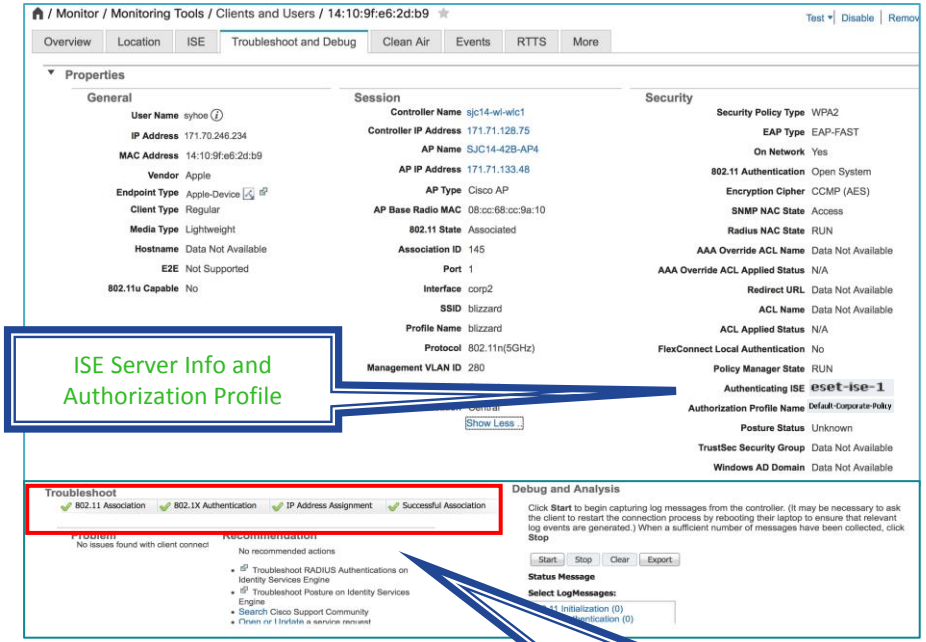
Show More ..

Security

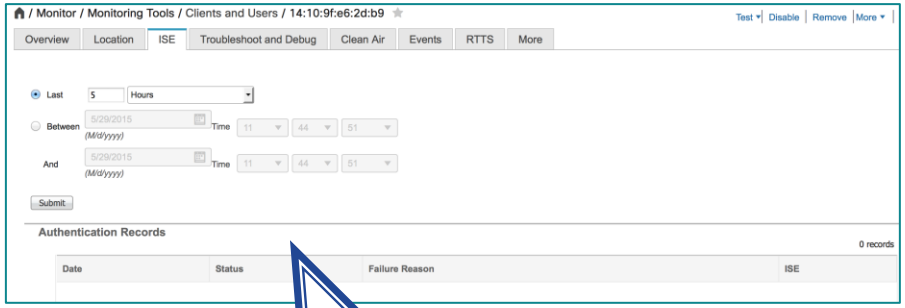
Security Policy Type	WPA2
EAP Type	EAP-FAST
On Network	Yes
802.11 Authentication	Open System
Encryption Cipher	CCMP (AES)
SNMP NAC State	Access
Radius NAC State	RUN

Basic Client Information

ISE Policies for the Client



ISE Server Info and Authorization Profile



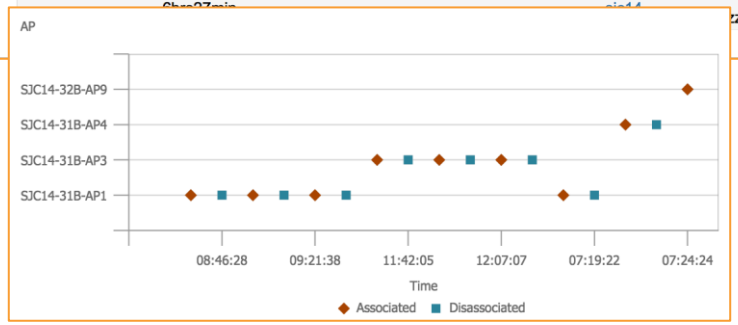
Ability to fetch the Authentication records from ISE in case of an authentication failure

Quick checks to see if the client is successfully authenticated and connected to the network

RF Profile for the Client

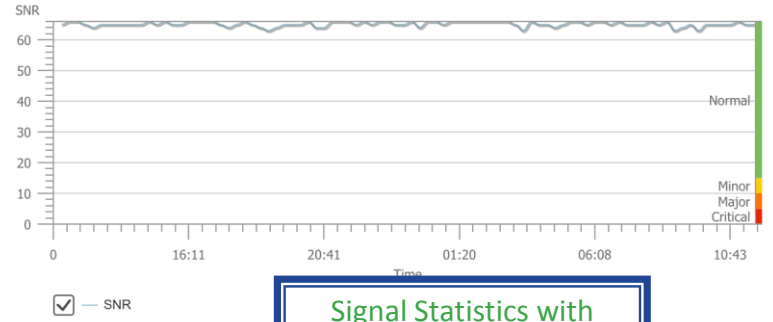
Association History

Associat...	Duration	User ...	IP Address	AP Name	Control...	SSID	Tra...
27-Apr-201...	1hrs10min 57sec	syhoe	171.70.246.10	SJC14-42B-AI	sjc14-wl-wlc1	blizzard	1,867.
27-Apr-201...	10min 1sec	syhoe	171.70.246.10	SJC14-42B-AI	sjc14-wl-wlc1	blizzard	293.4
27-Apr-201...	6hrs22min 35sec	syhoe	171.70.246.10	SJC14-42B-AI	sjc14-wl-wlc1	blizzard	7,698.
28-Apr-201...	2hrs55min 57sec	syhoe	171.70.246.10	SJC14-42B-AI	sjc14-wl-wlc1	blizzard	3,052.
28-Apr-201...	3hrs46min 25sec	syhoe	171.70.246.10	SJC14-42B-AI	sjc14-wl-wlc1	blizzard	3,565.
						zard	506.2



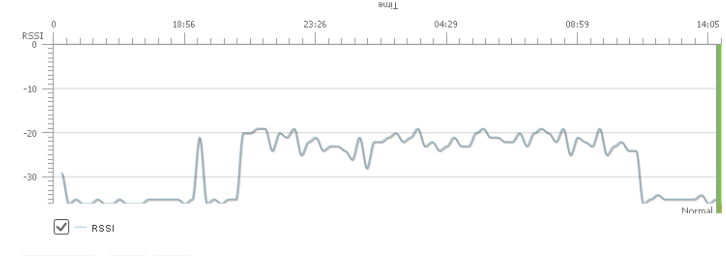
Client-AP Association History

Client SNR History

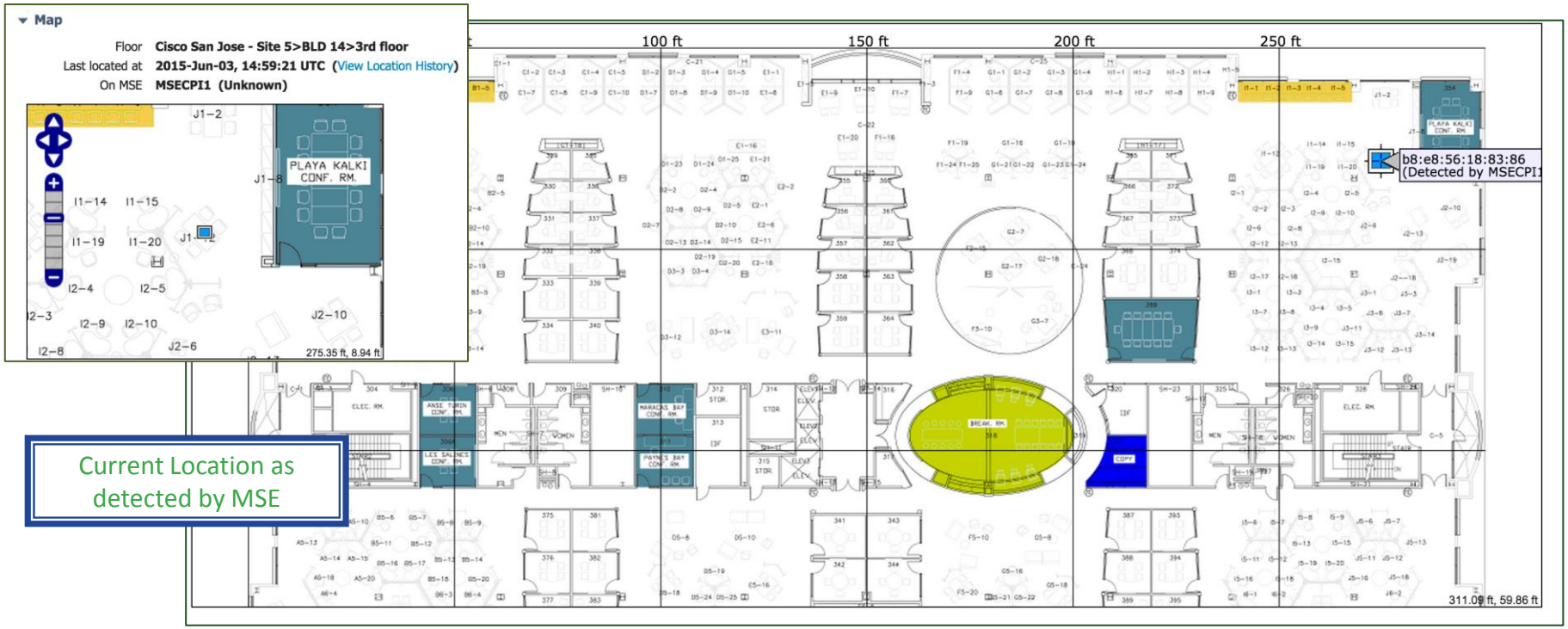


Signal Statistics with default thresholds

Client RSSI History(dBm)



Client's Current Location



Current Location as detected by MSE

Client's Location History

Client Properties

Data Collected at	2015-Jun-03, 14:21:04 UTC	Controller	171.71.128.75	Policy Manager State	
User Name	ssiddha	Interface	1	Anchor Controller	
IP Address	171.70.246.180	802.11 State	Associated	CCX	Not Supported
IPv6 Addresses		Mobility Status	Local	E2E	Not Supported
MAC Address	b8:e8:56:18:83:86				
Vendor	Apple				

Ability to play back client's location history

Client Location History (From : 2015-May-27, 11:09:37 UTC To : 2015-Jun-03, 14:21:14 UTC) Generate Report

MSE Name: MSECPI1 Show: All Go

Change selection every 2 secs Play Stop

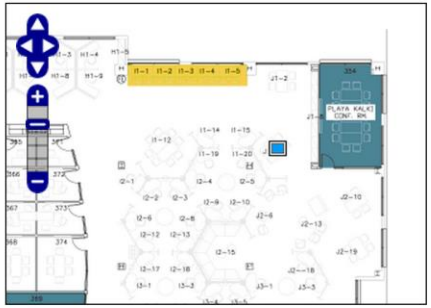
Entries 1 - 50 of 207 1 2 3 4 5

	Time Stamp	Floor	Username	Associated AP	IP Address	Status
1	2015-Jun-03, 14:21:14 UTC	Cisco San Jose - Site 5>BLD 14>3rd floor	ssiddha	SJC14-32B-AP9	171.70.246.180	Associated
2	2015-Jun-03, 14:21:13 UTC	Cisco San Jose - Site 5>BLD 14>3rd floor	ssiddha	SJC14-32B-AP9	171.70.246.180	Associated
3	2015-Jun-03, 14:21:04 UTC	Cisco San Jose - Site 5>BLD 14>3rd floor	ssiddha	SJC14-32B-AP8	171.70.246.180	Associated
4	2015-Jun-03, 14:20:53 UTC	Cisco San Jose - Site 5>BLD 14>3rd floor	ssiddha	SJC14-32B-AP6	171.70.246.180	Associated
5	2015-Jun-03, 14:20:44 UTC	Cisco San Jose - Site 5>BLD 14>3rd floor	ssiddha	SJC14-32B-AP6	171.70.246.180	Associated
6	2015-Jun-03, 14:20:34 UTC	Cisco San Jose - Site 5>BLD 14>3rd floor	ssiddha	SJC14-31B-AP1	171.70.246.180	Associated
7	2015-Jun-03, 14:20:33 UTC	Cisco San Jose - Site 5>BLD 14>3rd floor	ssiddha	SJC14-31B-AP1	171.70.246.180	Associated
8	2015-Jun-03, 14:20:13 UTC	Cisco San Jose - Site 5>BLD 14>3rd floor	ssiddha	SJC14-31B-AP5	171.70.246.180	Associated
9	2015-Jun-03, 14:19:13 UTC	Cisco San Jose - Site 5>BLD 14>3rd floor	ssiddha	SJC14-31B-AP3	171.70.246.180	Associated

Client Location

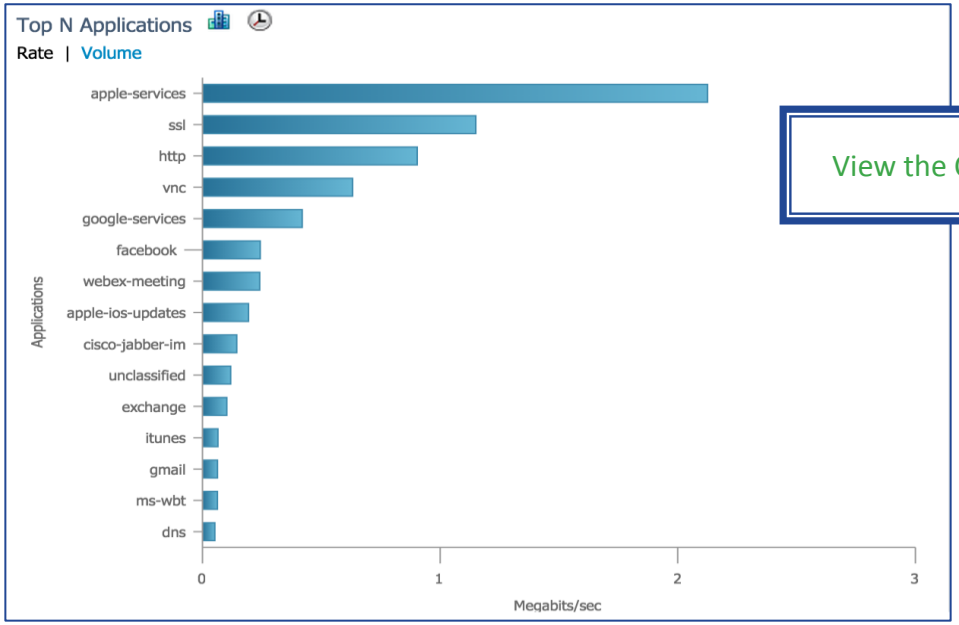
Location Calculated at 2015-Jun-03, 14:21:14 UTC

Floor Cisco San Jose - Site 5>BLD 14>3rd floor

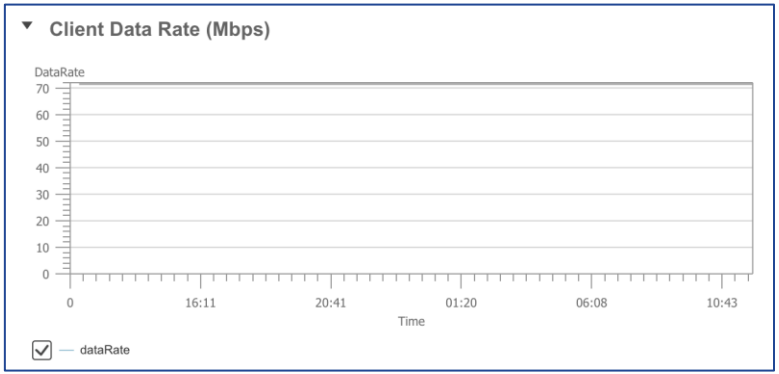


Enlarge

Client's Application Information



View the Client Application Information



Data Rate for the Client

Monitoring Rogue AP's

Search All 25

Alarm Summary

Category	Critical	Major	Minor
Mesh Links	0	0	0
Mobility Service	0	0	1
Performance	0	0	0
Rogue AP	0	0	201
Routers	4	0	7
RRM	0	0	0
SE Detected Interferers	0	0	0
Security	0	1	0
Switches and Hubs	5	0	4
System	0	2	12
Third Party AP	0	0	0
Third Party Controller	0	0	0
Wireless Controller	0	0	0

/ Alarms

Searched By - Category : Rogue AP & Severity : minor - Reset

Selected 0 / Total 201

Change Status | Change State | Assign | Annotation | Delete | Email Notification | Troubleshoot | Show Quick Filter

Severity	Rogue MAC ...	Vendor	Classifica...	Radio Type	Strongest ...	No. Of Rogue...	Owner	Last Time Seen	State	SSID
Minor	00:24:b1:02:03...	Coulomb	Unclassified	802.11n(2.4GHz)	-66	0		May 6, 2015 8:16:04 PM PDT	Alert	0024b1000002
Minor	00:24:b1:02:04...	Coulomb	Unclassified	802.11n(2.4GHz)	-80	0		May 6, 2015 8:16:07 PM PDT	Alert	0024b1000002
Minor	5c:a4:8a:d7:98...	Cisco	Unclassified	802.11g	-51	0		May 6, 2015 1:06:05 PM PDT	Alert	AMS-dot1x
Minor	ec:c8:82:fb:32:ae	Cisco	Unclassified	802.11a	-48	0		May 6, 2015 1:05:50 PM PDT	Alert	AMS-dot1x
Minor	ec:c8:82:fb:32:a1	Cisco	Unclassified	802.11g	-43	0		May 6, 2015 1:05:49 PM PDT	Alert	AMS-dot1x
Minor	5c:a4:8a:d7:98...	Cisco	Unclassified	802.11a	-59	0		May 6, 2015 1:05:26 PM PDT	Alert	AMS-dot1x
Minor	5c:a4:8a:d7:98...	Cisco	Unclassified	802.11n(2.4GHz)	-53	0		May 6, 2015 1:06:05 PM PDT	Alert	AMS-open
Minor	ec:c8:82:fb:32:a0	Cisco	Unclassified	802.11n(2.4GHz)	-40	0		May 6, 2015 1:03:36 PM PDT	Alert	AMS-open
Minor	ec:c8:82:fb:32:af	Cisco	Unclassified	802.11n(5.0GHz)	-47	0		May 6, 2015 1:05:55 PM PDT	Alert	AMS-open
Minor	5c:a4:8a:d7:98...	Cisco	Unclassified	802.11n(5.0GHz)	-58	0		May 6, 2015 1:04:20 PM PDT	Alert	AMS-open
Minor	5c:a4:8a:d7:98...	Cisco	Unclassified	802.11n(2.4GHz)	-52	0		May 6, 2015 1:06:05 PM PDT	Alert	AMS-secure
Minor	ec:c8:82:fb:32:ad	Cisco	Unclassified	802.11n(5.0GHz)	-47	0		May 6, 2015 1:06:06 PM PDT	Alert	AMS-secure

Use the Alarm Summary Panel to view the Rogue Alarms

View the Alarms page for details regarding the rogues

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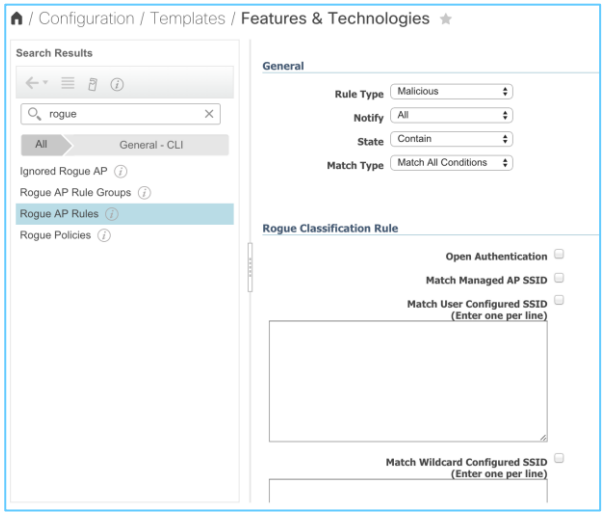
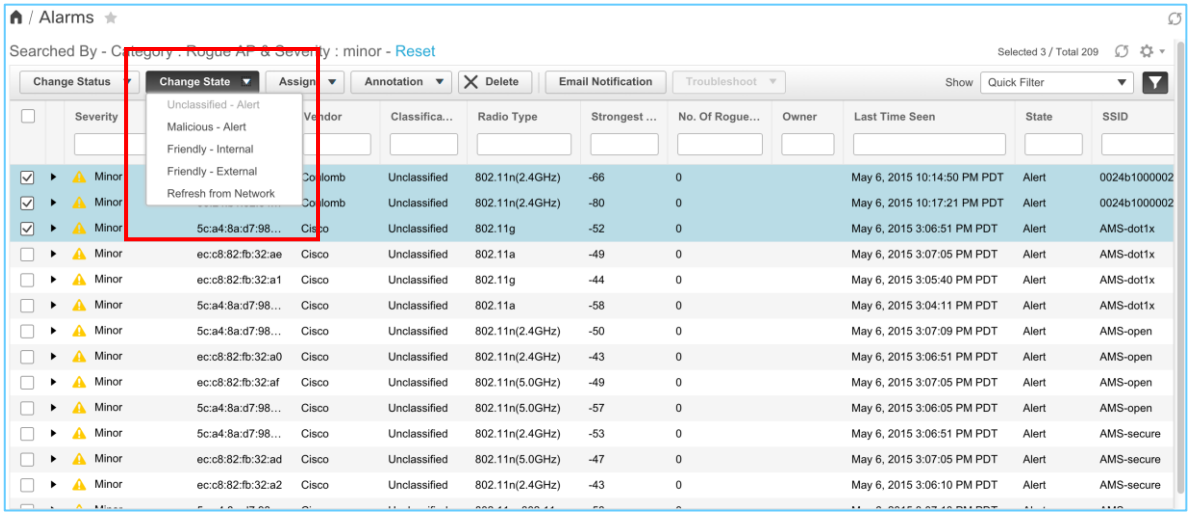
Managing Rogue AP's





Use the Rogue AP's Templates to automatically classify the Rogues based on SSID, Min RSSI etc

Filter the Rogue AP's based on SSID, Radio Type, Vendor etc and Bulk edit their status

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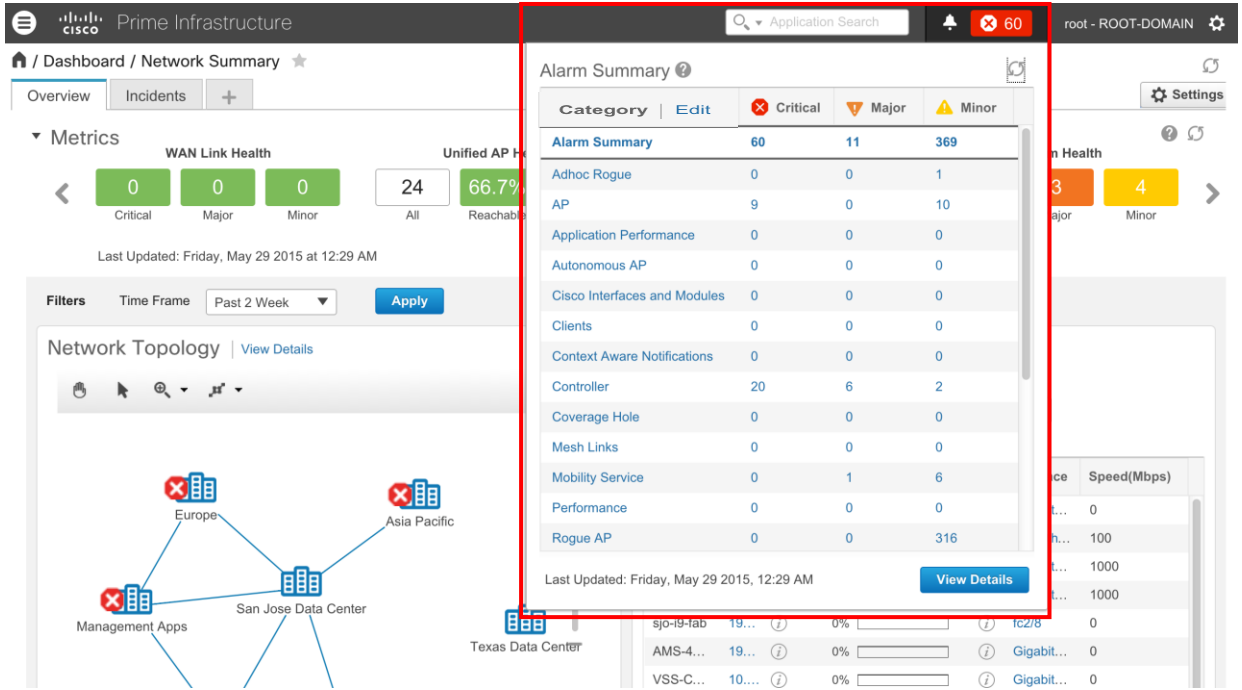
Monitoring Alarms & Events
Alarm Summary



- Persistent Alarm Summary at any dashboard
- Shows the alarms count against different Alarm Categories & Severities
- Ability to edit the categories that should be displayed by default
- Ability to cross launch to the details using the hyper links

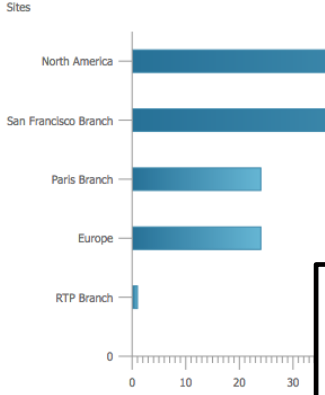
Alarm Management
Incidents Dashboard

Device Reachability Status

Device Name	Device IP	Location	SNMP Reachability
Router.cisco.com	128.107.150.66		Unreachable
LA-2504-WLC	10.2.13.1	LA Branch	Unreachable
eset-lms-42-1	192.168.138.138	Unknown	Unreachable
Router.cisco.com	10.155.12.153		Unreachable
PAR-3750-SBR	10.12.10.1	Paris 3750 switch	Unreachable
DG-demo-892W.cisco.com	128.107.150.77		
Cat6K-Dist-1	10.0.255.41		
CCM-PUB1.cisco.com	192.168.138.201		
CORE-2	10.0.255.32		
RTP-NAM-SRE.cisco.com	192.168.136.131		

SNMP Reachability check and the ability to launch Device 360

Top N Sites with Most Alarms



Which site has most number of Alarms ?

Device Unavailability Summary

Site Name	AP	Routers	Switches
Unassigned	0	5	1
Europe	0	0	2
Asia Pacific	0	0	0
Management Apps	0	0	0
North America	0	0	0
San Jose Data Center	0	0	0
[illegible]	0	0	0

Network Reachability Check

Alarms and Events

Monitor > Alarms and Events

Alarms and Events

Device Groups

- All Devices
- Device Type
- Location
  - All Locations
    - System Campus
    - Unassigned
    - Management Apps
    - San Jose Data Center
    - North America
      - US
        - East Coast
          - Boxborough Branch
          - New York Branch
          - RTP Branch
        - West Coast
          - Los angeles Branch
          - San Francisco Branch
          - San Jose Campus
        - Central
    - Asia Pacific
    - Europe
- User Defined

All Devices

Alarms | Events | Syslogs

Take actions on the alarm

Automatic Email Notifications

Troubleshooting Mechanisms

Run appropriate commands on the device

Change Status | Assign | Annotation | Delete | Email Notification | Troubleshoot

Selected 4 | Total 677

Severity	Message	Status	Failure Source
Critical	Device 'RTP-3945-RBR.your...	Not Acknowl...	Switch RTP-3945-RBR.your...
Critical	Device 'RTP-3750-SBR' is u...	Not Acknowl...	Switch RTP-3750-SBR
Critica	Port 'FastEthernet1/0/6' is d...	Not Acknowl...	LA-3750-SBR(If: FastEthern...

Troubleshoot: Ping, Traceroute, Run Show Commands, Packet Capture, Support Forum, Support Case

Run Show Commands

Device Name LA-3750-SBR(If: FastEthernet1/0/6; connected to IXIA on port 1 for data client) Device IP Address 10.2.10.1

sh interface | Run

Results

sh interface FastEthernet1/0/6; connected to IXIA on port 1 for data client
FastEthernet1/0/6 is down, line protocol is down (notconnect)
Hardware is Fast Ethernet, address is b8be.bfc6.6588 (bia b8be.bfc6.6588)
Description: connected to IXIA on port 1 for data client
MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)

General Information

Source **10.2.10.1**
Acknowledged **No**
Switches and Hubs
October 23, 2014 4:10:05 PM PDT
November 5, 2014 2:08:43 PM PST
Wired Switch
Critical
Previous Severity **Cleared**

Device Details

IP Address **10.2.10.1**
Device Name **LA-3750-SBR**
Device Type **Cisco Catalyst 3750 Series Switches**
Up Time **42 days 10 hrs 4 mins 56 secs**
Reachability Status **Reachable**
Collection Status **Managed**
Software Version **15.0(2)SE2**
Serial Number **FDO1509X25Z**
Location **LA 3750 switch**

Ability to roll up the alarms to the Parent Site

Messages

Port 'FastEthernet1/0/6' is down o

Device Events Time Frame: Past 1 Hour

Severity	Description	Source	Timestamp
Cleared	Port 'FastEthernet1/...	10.2.10.1	November 5, 2014 2:09:...
Information	Interface FastEther...	10.2.10.1	November 5, 2014 2:09:...
Information	Interface FastEther...	10.2.10.1	November 5, 2014 2:09:...
Critical	Port 'FastEthernet1/...	10.2.10.1	November 5, 2014 2:09:...
Cleared	Port 'FastEthernet1/...	10.2.10.1	November 5, 2014 2:08:...
Information	Interface FastEther...	10.2.10.1	November 5, 2014 2:08:...
Information	Interface FastEther...	10.2.10.1	November 5, 2014 2:08:...

Event Correlation

cisco

LifeCycle Reports

Reports

- Autonomous AP
  - Autonomous AP Memory and C...
  - Autonomous AP Summary
  - Autonomous AP Tx Power and...
  - Autonomous AP Uptime
  - Autonomous AP Utilization
  - Busiest Autonomous APs
- CleanAir
- Client
- Compliance
- Composite
- Custom NetFlow
- Device
- Guest
- Identity Service Engine
- Mesh
- Network Summary
- Performance
- Raw NetFlow
- Security

Reports Categories for easy access

Report Launch Pad

Autonomous AP	
Autonomous AP Memory and CPU Utilization	New
Autonomous AP Summary	New
Autonomous AP Tx Power and Channel	New
Autonomous AP Uptime	New
Autonomous AP Utilization	New
Busiest Autonomous APs	New

CleanAir	
Air Quality vs Time	New
Security Risk Interferers	New
Worst Air Quality APs	New
Worst Interferers	New

Client	
Busiest Clients	New
CCX Client Statistics	New
Client Count	New
Client Sessions	New
Client Summary	New
Client Traffic	New
Client Traffic Stream Metrics	
Dormant Clients	
Mobility Client Summary	
Posture Status Count	
	New
	New
d Users Summary	New

This report displays the busiest and least busy clients on your wireless network by throughput, utilization, and other statistics. You can sort this report by Client MAC address, by Protocol, or by other parameters.

Quick Help on the contents of this report

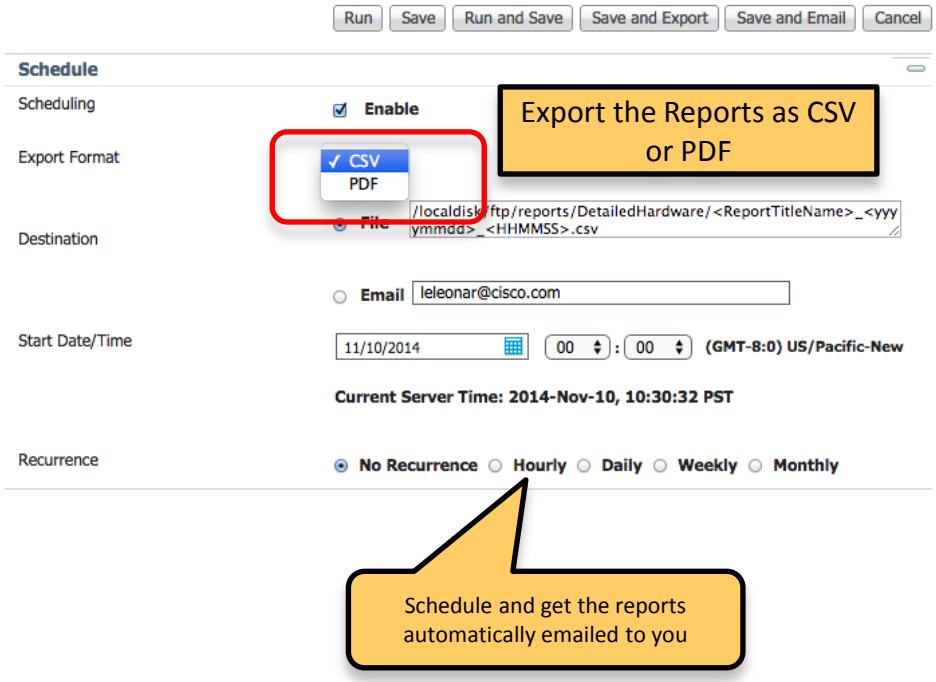
Identity Service Engine (open in a new window)	
Endpoint Authentication Summary	New
Endpoint Profiler Summary	New
Posture Detail Assessment	New
Top N Endpoint Authorizations	New
Top N User Authorizations	New
User Authentication Summary	New

MSE Analytics	
Client Location	New
Client Location Density	New
Device Count by Zone	New
Device Dwell Time by Zone	New
Guest Location Density	New
Location Notifications by Zone	New
Mobile MAC Statistics	New
Rogue AP Location Density	New
Rogue Client Location Density	New
Service URI Statistics	New
Tag Location	New
Tag Location Density	New

Mesh	
Alternate Parent	New
Link Stats	New
Nodes	New
Packet Stats	New
Stranded APs	New
Worst Node Hops	New

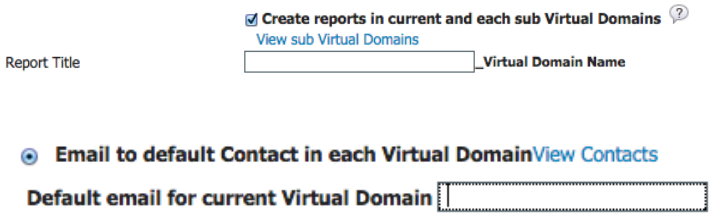
Create a new report

Reports
Actions



Export the Reports as CSV or PDF

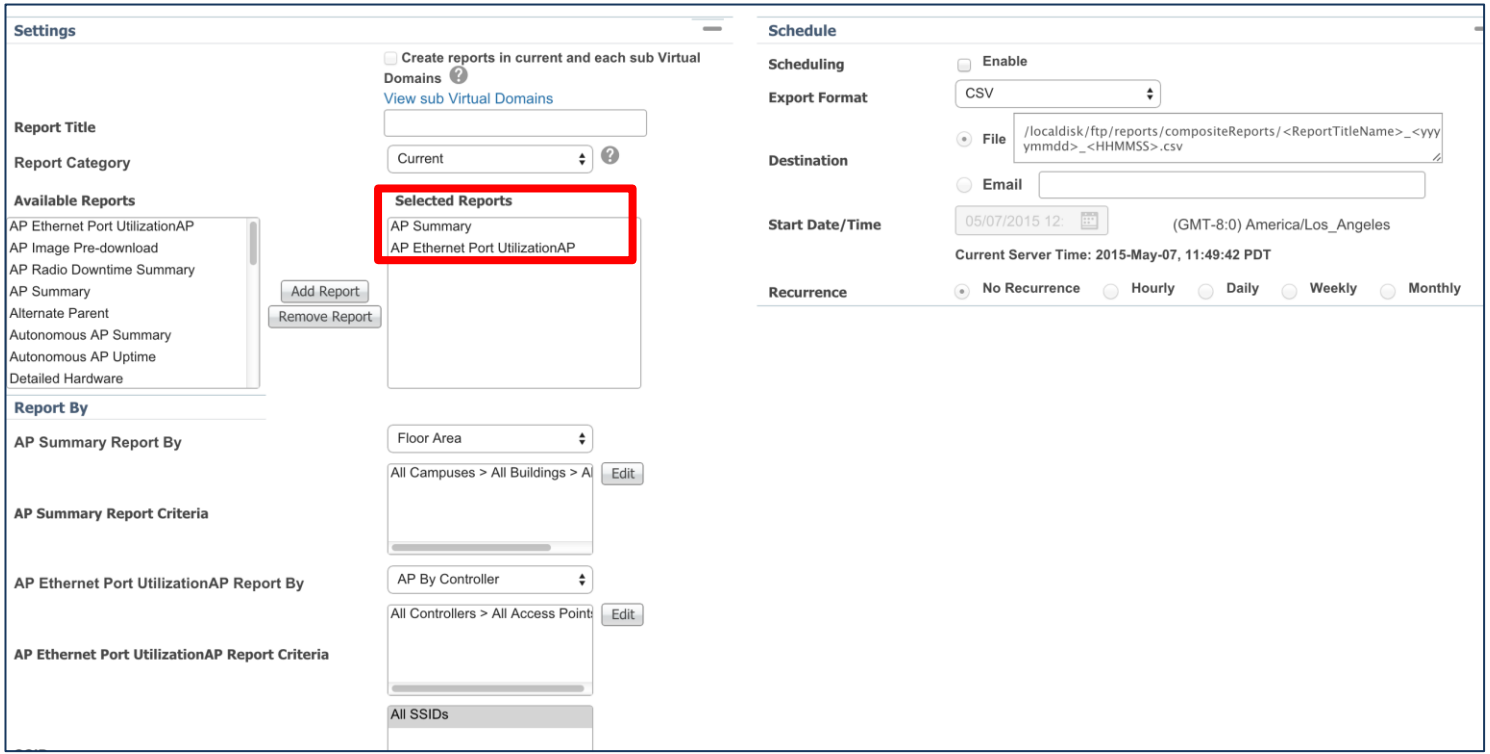
Schedule and get the reports automatically emailed to you



- Generate Reports specific to a Virtual Domain
- Reports delivered via Email only to the folks responsible for that particular Virtual Domain

Composite Reports

Ability to combine multiple reports into a single report



Reports
Summary

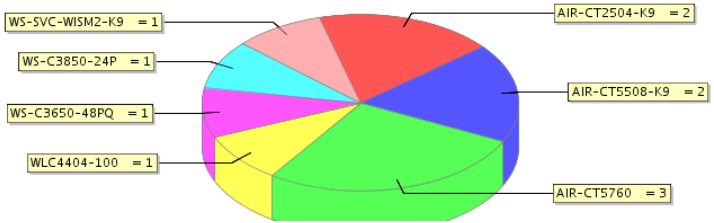
Device Reports	Client Reports (Wired & Wireless)	Compliance Reports	Network Summary Reports
Inventory – Wired and Wireless	Busiest Clients	PSIRT Summary & Detailed Reports	Wireless Executive Summary
Detailed Hardware/Software	Client Count on the network	PCI DSS Summary & Detailed Reports	
Device Health Tends – CPU & Memory	Clients Summary	Wireless Configuration Audit	
Interface Trends – Utilization, Availability	Clients Sessions		
AP – Utilization & Summary	Client Traffic		
Busiest AP's			
Wireless Uptime			
EOX – Hardware & Software Detailed Reports			
PSIRT Reports			

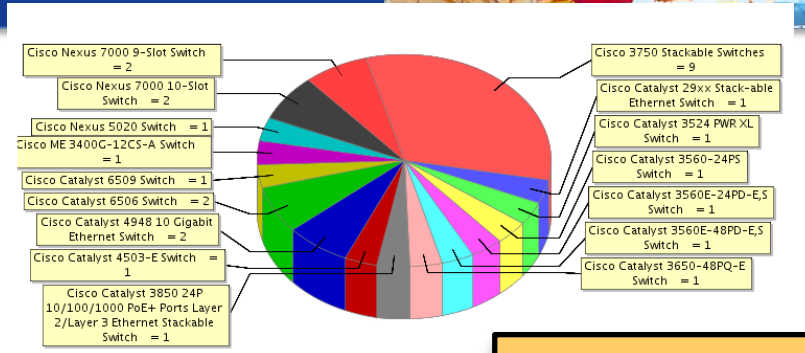
Device Reports
Inventory

Count of Controllers by Model

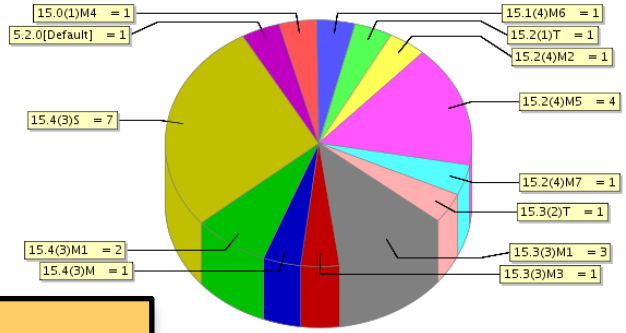
Model Name	Number of Controllers
AIR-CT2504-K9	2
AIR-CT5508-K9	2
AIR-CT5760	3
WLC4404-100	1
WS-C3650-48PQ	1
WS-C3850-24P	1
WS-SVC-WISM2-K9	1

Controllers by Model





Count of Switches by Model



Count of Routers by Version

Device Reports

Inventory reports - Detailed Hardware

Detailed Hardware

Generated: 2014-Nov-10, 10:30:28 PST

Cisco Prime **Infrastructure**

Report Type

Show

- ✓ Combined Inventory
- Cisco Interfaces and Modules
- Routers
- Switches and Hubs
- Storage Networking
- Voice and Telephony
- Wireless Controllers
- Access points
- Security And VPN

Category: Routers

Product Series	Device Name	Updated At	System Description	Location	Contact	Serial Number	Chas		
Cisco 2800 Series Integrated Services Routers	MGCP_Gwy		Cisco IOS Software, 2800 Software (C2800NM-ADVENTERPRISEK9-M), Version 15.1(4)M, RELEASE SOFTWARE (fc1) Technical Support: http://www.cisco.com/techsupport Copyright (c) 1986-2011 by Cisco Systems, Inc. Compiled Thu 24-Mar-11 14:26 by prod_rel_team		Testing ContactTesting ContactTesting ContactTesting ContactTesting ContactTesting Contact	FHK0816F029	cevChassis2851	121.99000	55

Category: Switches and Hubs

Product Series	Device Name	Updated At	System Description	Location	Contact	Serial Number	Chassis Vendor Type	Tot	
Cisco Catalyst 2960 Series Switches	DEN-2960S-SBR	2014-Nov-09, 22:13:17 PST	Cisco IOS Software, C2960S Software (C2960S-UNIVERSALK9-M), Version 12.2(55)SE, RELEASE SOFTWARE (fc2) Technical Support: http://www.cisco.com/techsupport Copyright (c) 1986-2010 by Cisco Systems, Inc. Compiled Sat 07-Aug-10 23:21 by prod_rel_team		Testing Contact	FOC1411Z4GA	cevChassisWsC2960s48fpsL	110.50000	114

Category: Wireless Controllers

Product Series	Device Name	Updated At	System Description	Location	Contact	Serial Number	Chassis Vendor Type	Total Flash Device Size (MB)	Number of Inter
Cisco 2500 Series Wireless LAN Controller	LA-2504-WLC	2014-Aug-04, 21:15:47 PDT		LA Branch	Rashmi Ramesh	PSJ15330GT3			2

Report Customizations

Device Reports
Interface Utilization

Interface Utilization

Generated: 2014-Nov-10, 23:58:12 PST

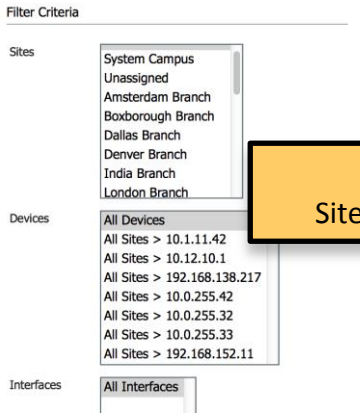
Cisco Prime
Infrastructure

Report By: Interfaces by Sites
Sites: All Sites
Reporting Period: Last 1 hour
Show: Up to 20 records

Top-N Rx Utilization

Device Name	Device IP Address	Interface Name	Min Rx(%)	Max Rx(%)	Avg Rx(%)
LON-3750-SBR	10.11.10.3	FastEthernet1/0/8	94	94	94.0
LON-3945-RBR	10.11.1.1	GigabitEthernet0/0	80	81	80.4
AMS-2921-RBR	192.168.152.2	GigabitEthernet0/0	58	80	69.3
LON-3750-SBR	10.11.10.3	GigabitEthernet1/0/1	10	10	10.0
LON-4948-ABR1	10.11.10.1	GigabitEthernet1/1	9	9	9.0
ASR1002-East-1	192.168.152.1	GigabitEthernet0/0/1	3	4	3.2
FL4-3750S-1	10.15.10.1	FastEthernet1/0/24	3	3	3.0
NY-2911-RBR	10.0.104.2	GigabitEthernet0/0	2	3	2.4
Cat6K-Dist-1	10.0.255.41	GigabitEthernet1/48	2	3	2.1
LA-2921-RBR	10.0.102.2	GigabitEthernet0/0	1	2	1.2
LA-3750-SBR	10.2.10.1	FastEthernet1/0/7	1	2	1.2
LA-2921-RBR	10.0.102.2	GigabitEthernet0/1.11	1	2	1.2

Top 20 – Most utilized interfaces across the network



Filter by Site/Device/Interface

Device Reports
PSIRT/EOX Reports

Reports / Reports / PSIRT and EOX

Schedule Job | View Job Details

Last Run Time: Wed Jul 22 12:41:38 PDT 2015

Device PSIRT | Device Hardware EOX | Device Software EOX | Field Notice

Total 57

Device PSIRT PDF | Go | Show: All

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

Clients Reports
Busiest Clients

Settings

Create reports in current and each sub Virtual Domains

View sub Virtual Domains

Report Title

Report By

Report Criteria

Connection Protocol

Reporting Period

- ✓ All
- All Wireless
- All Wired
- Device IP Address
- Device Host Name
- Autonomous AP IP Address
- Autonomous AP Host Name
- Floor Area
- Outdoor Area
- AP By Controller
- AP By Floor Area
- AP By Outdoor Area
- SSID
- AP By RAP Mesh Role

Busiest Clients

Generated: 2014-Nov-06, 17:08:22 PST

Report By: All

All: All

Connection Protocol: All Clients

Reporting Period: Last 1 hour

Show: Up to 5 records

Cisco Prime
Infrastructure

Busiest Clients

Client MAC Address	Client IP Address	Username	Protocol	Throughput	Utilization (%)
4c:8d:79:ea:04:40	171.70.241.167	gchanda	802.11n_5GHz	4.6Mbps	2
b8:e8:56:49:3b:86	171.70.242.165	jaweinst	802.11n_2.4GHz	3.6Mbps	1.33
14:10:9f:e6:3f:09	171.70.241.139	pavramas	802.11n_5GHz	2.0Mbps	1
84:3a:4b:8f:98:b8	171.70.242.30	CISCO\asingiri	802.11n_5GHz	1.6Mbps	0.33
3c:15:c2:b7:f1:14	171.70.240.252	yinghzha	802.11ac	1.5Mbps	0

Filter by wired/wireless and other criteria

Clients Reports
Client Count

Client Count

Generated: 2014-Nov-11, 00:15:46 PST

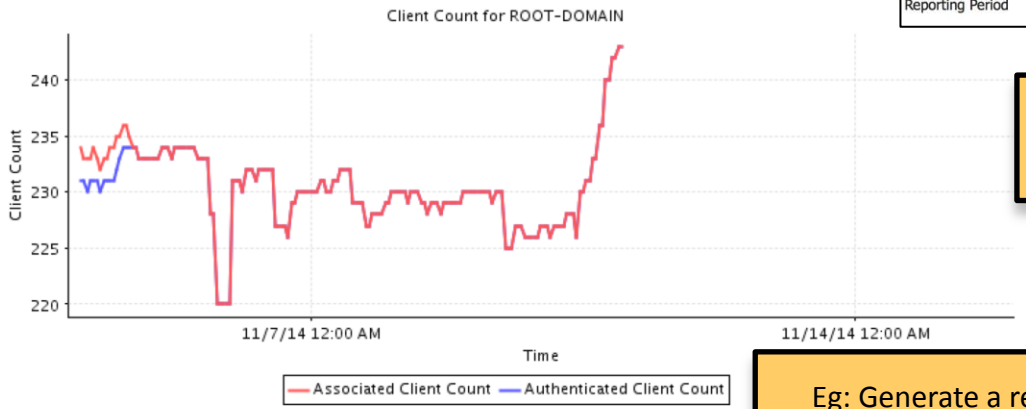
Report By: All

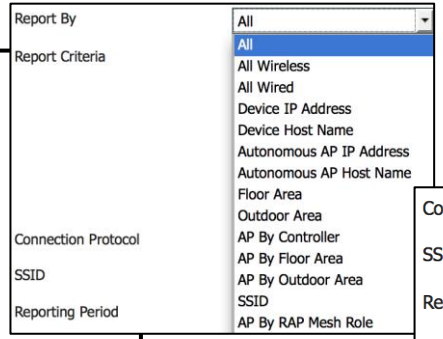
Connection Protocol/SSID: All Clients/All SSIDs

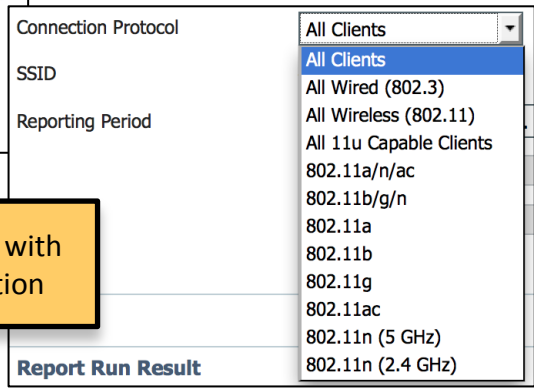
Reporting Period: Last 7 days

Cisco Prime **Infrastructure**

Device Client Count







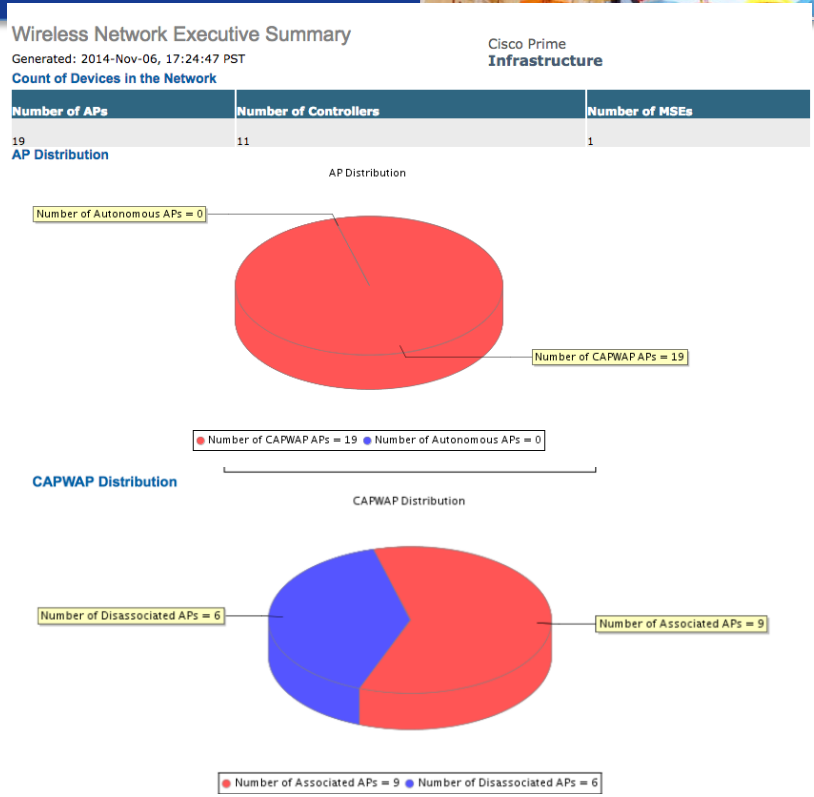
Various filters help with report customization

Eg: Generate a report for the total number of 802.11ac wireless clients attached to the network over the past 7 days

Network Summary Reports
Wireless Executive Summary

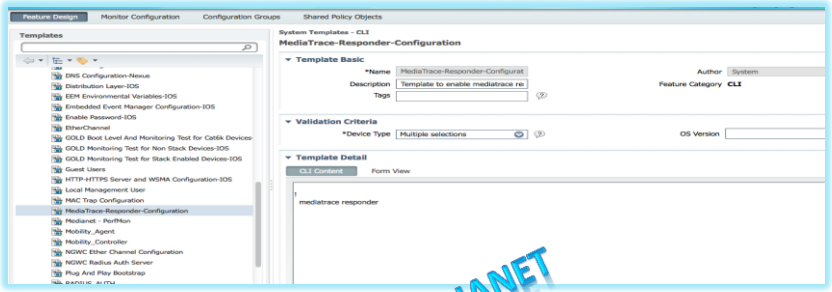
This Report contains the following information :

- Count of wireless devices in the network (AP/WLC/MSE)
- AP Distribution
- CAPWAP Distribution
- Associated Clients count
- Associated Client Count by IP
- Guest Client count
- Client Throughput
- Wireless network Utilization
- Network Air Quality vs Time

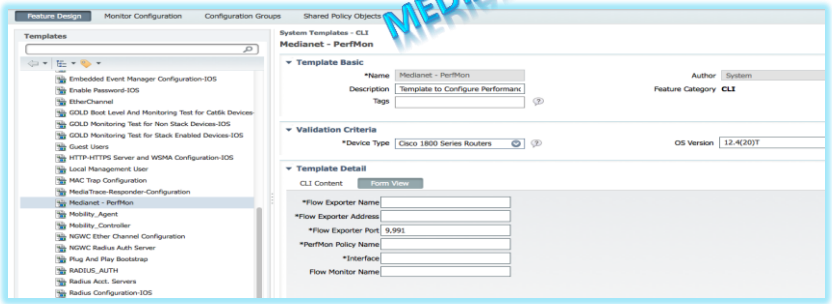


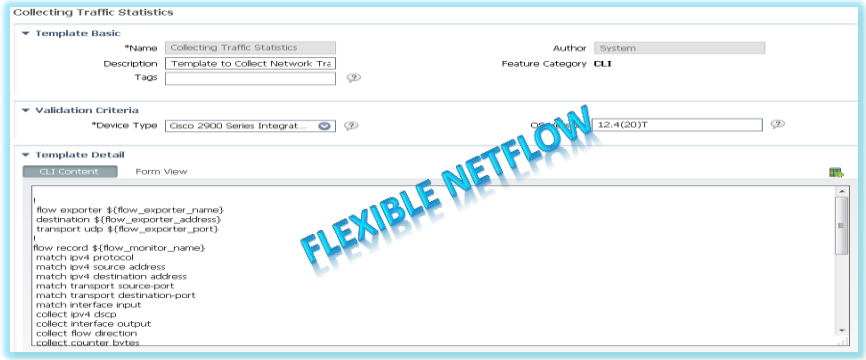
Assurance

Out-of-the-box Assurance Templates



MEDIANET





FLEXIBLE NETFLOW

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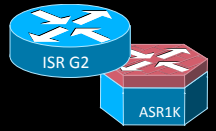
Application Visibility and Control (AVC)

Enabling AVC Solution through Prime

Application Recognition

NBAR2



NFv9/IPFIX

Reporting Tools

Performance Collection

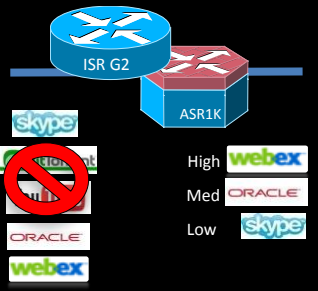
FNF
ART

App Visibility & User Experience Report

App	BW	Transaction Time	...
SAP	3M	150 ms	...
Sharepoint	10M	500 ms	...

Management Tool

Cisco Prime
Infrastructure

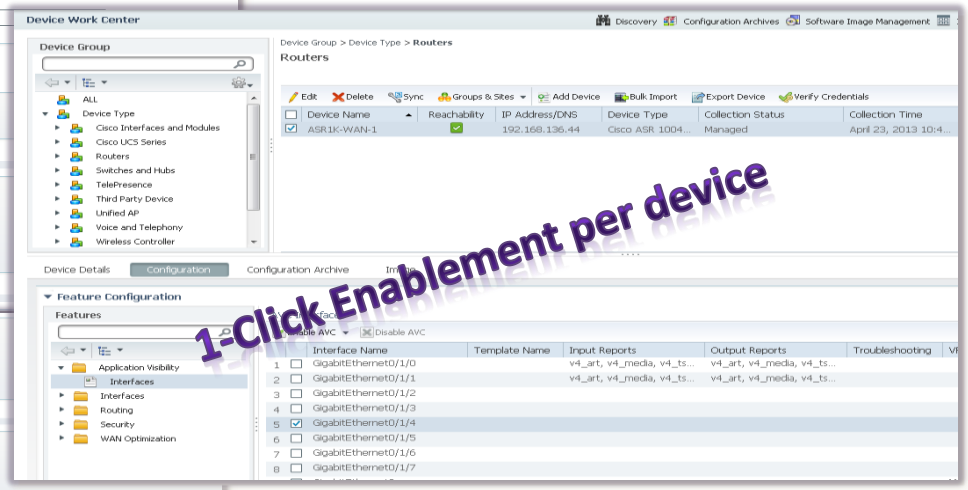


Control

WAAS
QoS
PfR

AVC Configuration for Routers

CLI Configuration for AVC - Simplified



Enabling AVC on Multiple Devices

1-Click Enablement per device

THIS CORRESPONDS UP TO 700 LINES OF CLI !!

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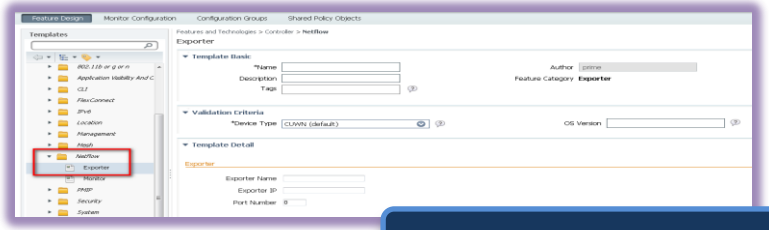
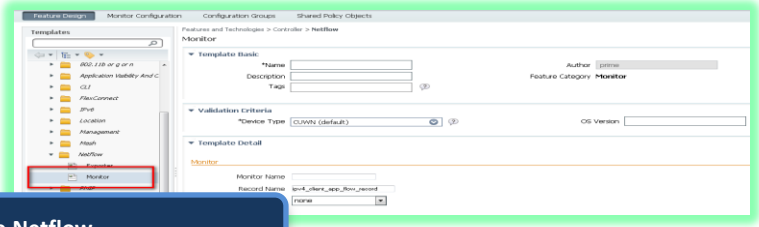
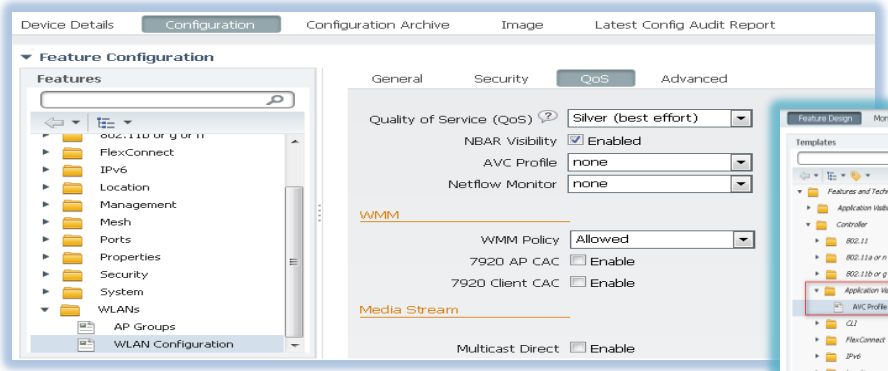
AVC Configuration for Wireless Controllers

Simplifying configuration

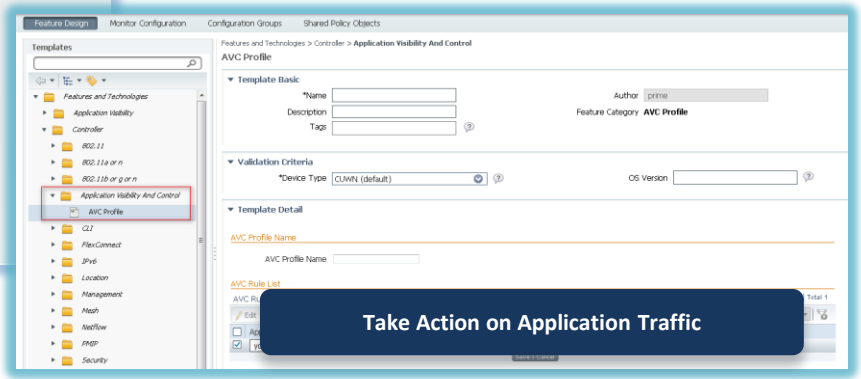




Templates to configure Netflow



1-click enablement of AVC

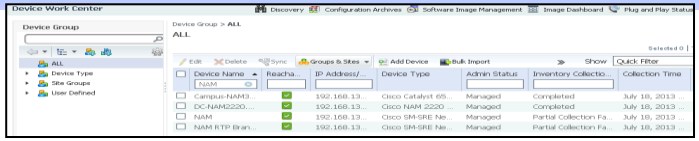


Take Action on Application Traffic

Multi-NAM Management

Single place to manage multiple NAM's for Netflow collection

DISCOVER **MANAGE** **CONFIGURE** **DATA-SOURCE**



Prime NAM

Cisco Prime Virtual NAM (vNAM)

Cisco Prime NAM for Nexus 1110

Prime Infrastructure

NAM 2300 Series Appliance

Cat65xx NAM Blade (NAM3)

Cat65xx/C76xx (NAM1, NAM2) Blades

Nexus 7K Series NAM Blade (NAM-NX1)

Cisco Prime NAM for ISR G2 SRE

Prime Infrastructure provides central discovery, reporting of data (ART/TA/RTP), packet capture, WAN Optimization metrics, image mgmt across multiple NAMs in an enterprise

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Benefits of NAM in Prime Infrastructure

Enhanced Troubleshooting and Optimization Analysis

- Local troubleshooting when PI isn't available (connectivity lost)
  - Netflow will be missing in PI in diagnosing issue when connectivity is re-established; local NAM will have full visibility
- Device CPU Offload
  - NAMs can be used in areas where Netflow isn't supported, possible or feasible
  - For instance, in the branch where a device may have high CPU utilization or in the Data Center where a device may not have Netflow capability
- Packet Capture & Traffic Visibility
  - Packet capture and analysis for enhanced troubleshooting
  - Application visibility
    - Application Response Time and other metrics in devices where AVC isn't configured or supported
  - Voice traffic visibility
    - MOS scores for all actual voice RTP streams are obtained via NAMs
  - Layer 2 network visibility
    - In scenarios where traffic that does not cross a router

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Assurance

Improve Application visibility and end user experience

Network Performance

- Network Availability and Performance polling with Event/Alarm generation
- Custom MIB polling
- Network Traffic Analysis & Reporting
- Data and flow collection: NetFlow, Medianet, PA, NBAR, AVC, SPAN, ERSPAN, RSPAN

Visibility

- Application Visibility
- Voice and Video Quality of Experience (Media trace and users voice troubleshooting)
- Packet level debugging and troubleshooting

End User Experience

- Users Wired/Wireless experience - Applications, bandwidth utilization and voice quality experience by user's end points
- Optimized Business critical application delivery
- WAN Optimization – Visibility and Performance

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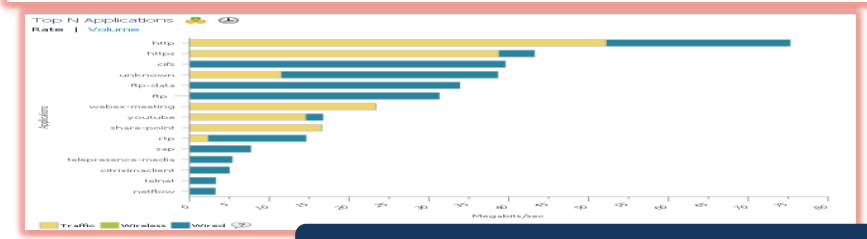
Network Performance

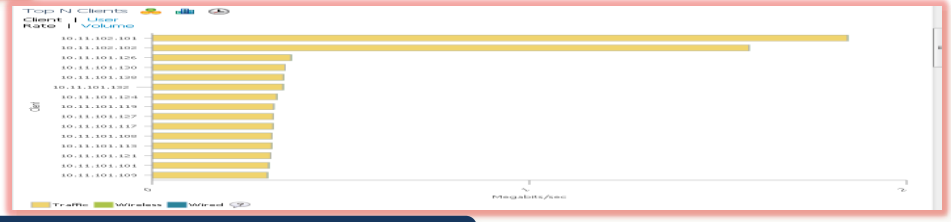
Troubleshoot Bandwidth Congestion per Site

Top N WAN Interfaces by Utilization

Site	Device	Interface	Maximum Utilization	Average Utilization
London Branch	10.11.1.1	GigabitEthernet0/0	82.5%	77.33%
Unassigned	10.0.103.1	GigabitEthernet0/1	28.5%	3.13%
Los Angeles Branch	10.0.102.2	GigabitEthernet0/0	2.5%	2.36%
New York Branch	10.0.104.2	GigabitEthernet0/0	2.5%	2.01%
Unassigned	192.168.152.1	GigabitEthernet0/1	2.5%	1.95%

Identify the Congested Interface



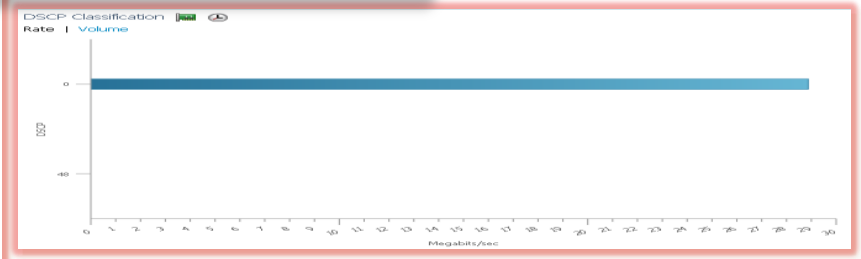


View Applications and Clients over the Congested Interface

Class Map Statistics

Class Name	Direction	Pre Policy Rate(Bps)	Post Policy Rate(Bps)	Drops
WAN:class-default	Output	4902550741.5	4705336244	4.02%
WAN:BGP-ROUTING	Output	0	0	0%
MARK-BGP:DATA	Output	0	0	0%
WAN-INTERFACE-G0/0:NETWORK-CRITICAL	Output	46	46	0%
MARK-BGP:CRITICAL-...	Output	0	0	0%
MARK-BGP:VOICE	Output	0	0	0%
WAN-INTERFACE-G0/0:class-default	Output	45.7	120	0%
WAN:SCAVENGER	Output	0	0	0%
WAN-INTERFACE-G0/0:INTERACTIVE-VI...	Output	0	0	0%

0%-50% 51%-70% 71%-90% 91%-100%



Change the QOS settings to shape traffic for non-critical applications

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Visibility

Business Critical Applications Performance

Site | Device | Interface | **Application** | Voice/Video | End User Experience | WAN Optimization

Filters | *Application: citriximaclient | *Time Frame: 5/23/2013 2:... | Network Aware | Site: All

Worst N Sites by ART Metrics

Selected Metric : Transaction Time

Site	Application	Maximum Transaction Time (ms)	Average Transaction Time (m
India Branch	sap	16055	5665
Unassigned	sap	1491	564
San Francisco Branch	sap	2417	528
Los Angeles Branch	sap	1061	502
RTP Branch	sap	945	483

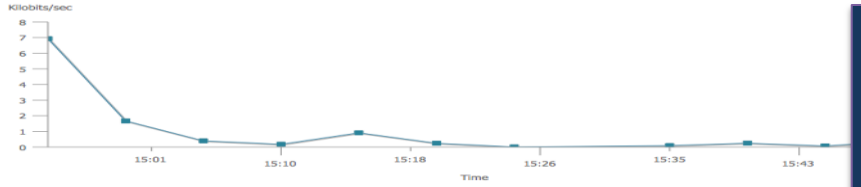
Experience

Top N Clients

Client | User
Rate | Volume

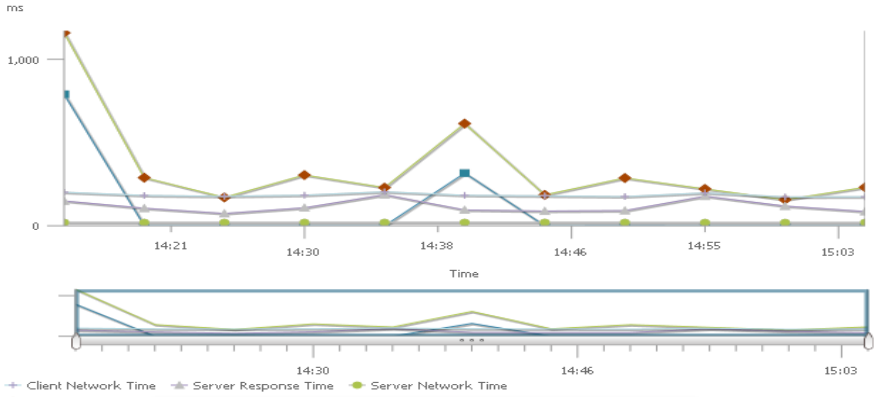
Application Traffic Analysis

Rate | Volume



Analysis

Application ART Analysis — Edited



Application Server Performance

Application Server	Site	Application	Avg. Server Response Time (ms)	Max. Server Response Time (ms)	Analysis
10.0.250.13	San Jose Data Center	citriximaclient	534	621	
10.0.250.11	San Jose Data Center	citriximaclient	535	614	
10.0.250.15	San Jose Data Center	citriximaclient	538	584	
10.0.250.14	San Jose Data Center	citriximaclient	525	583	
10.0.250.12	San Jose Data Center	citriximaclient	510	570	

Application/Server Delay

Client & Network Delay

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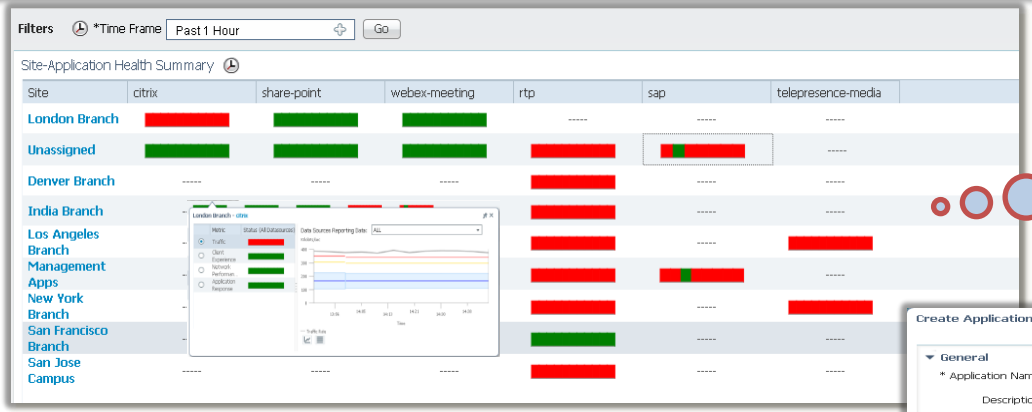
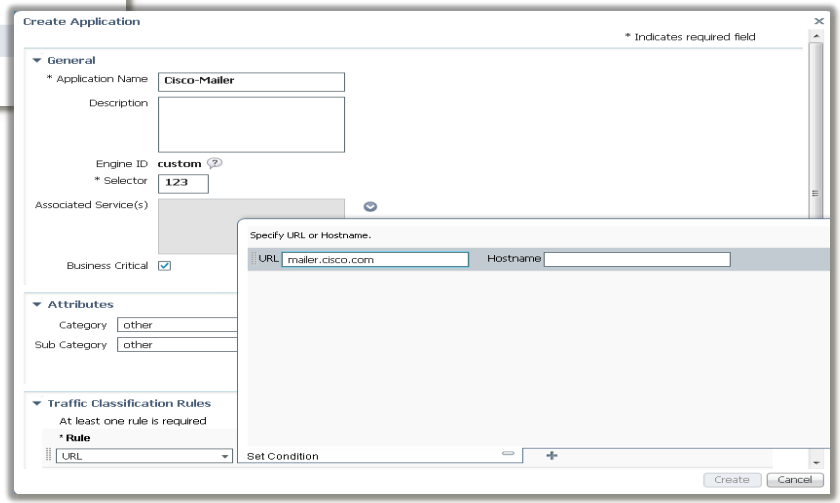
Visibility

Business Critical Applications Management



Hourly Base lining - Bird's Eye view of health of business critical applications across all sites

Ability to create Custom Business Critical Applications



Visibility

Business Critical Applications Thresholding

Policies > My Policies > **Salesforce Threshold**

Salesforce Threshold

* Metric Selection

Please input a Client IP address or Server IP address

Client

Server 33.3.3.3

Location Group

Application salesforce

OK Cancel

Parameter	Condition	Reaction
Average Network Time		
Average Client Network Time		
Average Server Network Time		
Average Transaction Time		
Average Server Response Time	1. Greater Than 1000 3 times	1. ALARM MINOR
Maximal Network Time		

Save and Activate Cancel

Alerts when a specific application's performance exceeds the threshold

Monitor

Monitoring Tools

Monitoring Policies

Alarms and Events

Monitor > **Monitoring Policies**

Monitoring Policies

Policy Types

- Device Health
- Interface Health
- NAM Health
- Traffic Analysis
- Application Response Time
- Voice Video Data
- DMVPN
- GETVPN Poller
- Wireless AP
- Wireless Controller
- Custom MIB Polling

Policy Types > **Traffic Analysis**

Traffic Analysis

* Metric Selection

Please input a host or location group

Host

DSCP

Location Group Asia Pacific

Application exchange

OK Cancel

Parameter	Condition	
Total Bytes		
	Greater Than 1000000000 3 times	ALARM MINOR

OK Cancel Clear Thresholds

Total Packets

Alerts when a specific application's traffic exceeds the threshold

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Monitoring Policies
Thresholds

Monitor > **Monitoring Policies**

Monitoring Policies

Policy Types

- Device Health
- Interface Health
- NAM Health
- Traffic Analysis
- Application Response Time
- Voice Video Data

Policies > My Policies > **Salesforce Threshold**

Salesforce Threshold

* Metric Selection

Please input a Client IP address or Server IP address

Client

Server 33.3.3.3

Location Group

Application salesforce

OK Cancel

Parameter	Condition	Reaction
Average Network Time		
Average Client Network Time		
Average Server Network Time		
Average Transaction Time		
Average Server Response Time	1. Greater Than 1000 3 times	1. ALARM MINOR
Maximal Network Time		

Save and Activate Cancel

Policy Types > **Traffic Analysis**

Traffic Analysis

* Metric Selection

Please input a host or location group

Host

DSCP

Location Group Asia Pacific

Application exchange

OK Cancel

Parameter	Condition
Total Bytes	
Greater Than 1000000000 3 times	ALARM MINOR

OK Cancel Clear Thresholds

Total Packets

Visibility

View voice/video quality for your Enterprise

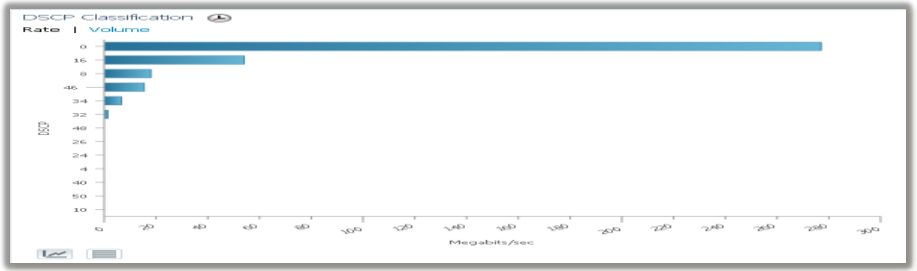
Worst N RTP Streams by MOS

RTP Streams	Max. MOS	Avg. MOS	Min. MOS
Los Angeles Branch to San Jose Campus	3.78	3.75	3.63
Unassigned to Management Apps	4.38	4.31	4.24
Management Apps to San Jose Campus	4.38	4.31	4.24
RTP Branch to San Jose Campus	4.36	4.35	4.35
Management Apps to Unassigned	4.38	4.38	4.38

Worst RTP Streams

Worst N RTP Streams By Packet Loss

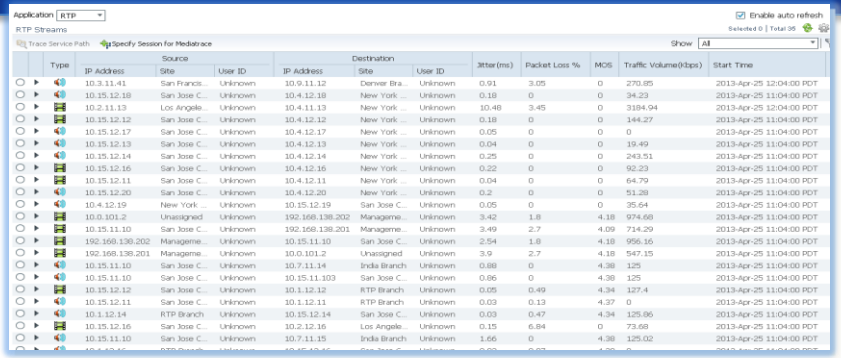
RTP Streams	Maximum Packet Loss (%)	Average Packet Loss (%)	Minimum Packet Loss (%)
Los Angeles Branch to New York Branch	6.3	6	5.7
Los Angeles Branch to San Jose Campus	9.7	3	0
San Francisco Branch to Denver Branch	7.2	3	0
San Jose Campus to Los Angeles Branch	4.1	2.1	0
New York Branch to Los Angeles Branch	4.1	2	0



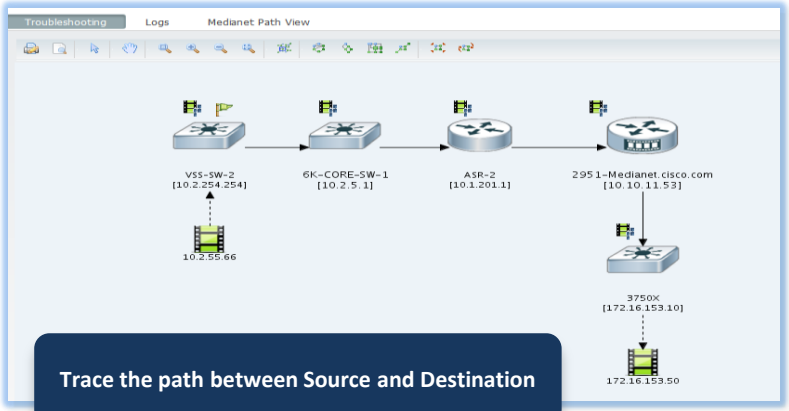
QOS Policy

Visibility

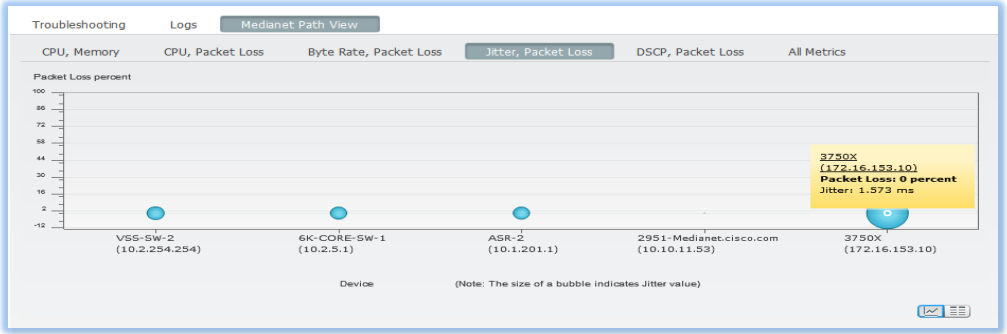
Voice/Video Troubleshooting for a session



Choose the session to troubleshoot

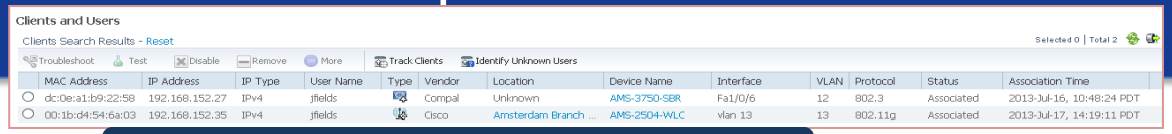


Trace the path between Source and Destination

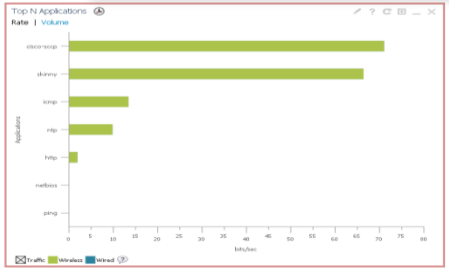


Pin-point the device which originates jitter

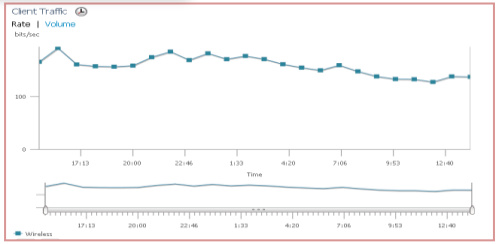
End User Experience



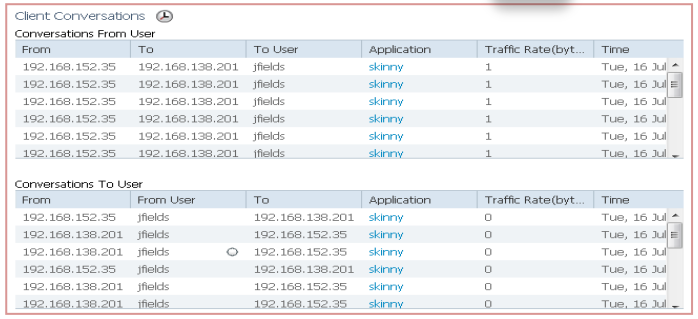
Client's List for user Jack Fields - jfields



Wireless Client's Application Traffic



User 360 – View all clients for the user



Wireless Client's Conversation

Troubleshooting Access Issues

Packet Level Troubleshooting

Decode | Merge | Export | Copy To | Delete | Add Folder | View Jobs

Name	IP Address	Device Type	Size (MB)	Start Time	End Time
ASR1K-WAN-1	192.168.136.44	Cisco ASR 1004 Router			
Session__sharepoint__1366129444.pc			9.47	N/A	2013-Jun-13 6:11:11 PDT
DC-NAM2220.cisco.com	.168.136.32	Cisco NAM 2220 Appliance			
abp_1.capture			10.00	N/A	2013-May-01 2:00:07 PDT
abp_1.pcap			9.11	N/A	2013-May-01 2:02:02 PDT
Campus-NAM3.eset-cisco.com	192.168.136.129	Cisco Catalyst 6500 Series Network Analysis			

Centralized view for Packet Captures from ASR1K's and NAM's

Session__sharepoint__1366129444.pcap

1 — 17289 — 34578

Packet List

TCP Stream | Go To | Filter

Pkt	Time	Source	Destination	Protocol	Length	Info
1	2013-04-16 09:22:07.000568	10.2.12.15	10.0.250.11	HTTP	1518	Continuation or non-HTTP traffic[Packet ...
2	2013-04-16 09:22:07.000568	10.2.12.13	10.0.250.13	HTTP	1518	Continuation or non-HTTP traffic[Packet ...
3	2013-04-16 09:22:07.000569	10.2.12.12	10.0.250.15	HTTP	1518	Continuation or non-HTTP traffic[Packet ...
4	2013-04-16 09:22:07.000569	10.2.12.15	10.0.250.11	HTTP	986	Continuation or non-HTTP traffic[Packet ...
5	2013-04-16 09:22:07.000569	10.2.12.13	10.0.250.13	HTTP	1518	Continuation or non-HTTP traffic[Packet ...

Centralized decode/deownload of Packet Capture files from ASR1K's and NAM's

Decode | Merge | View Jobs

Merge

* Name: Session__sharepoint__136

pi-cl-1

Name	Device Type
ASR1K-WAN-1	Cisco ASR 1004 Router
Campus-NAM3.eset	Cisco Catalyst 6500 Series Network Analysis
jerry-api_1.pcap	

Ability to merge different Packet Captures

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PI-NAM integration

Use Case – Client is unable to access a business critical application

User 360° View

Username : bbecker

Compal

Endpoint
IP 192.168.152.27
MAC dc:0e:a1:b9:22:58

Location
Unknown

Connected to
Switch AMS-3750-SBR
Interface FastEthernet1/0/6
VLAN 12

Session
Authorization Profile Not Available
Compliance Unknown
Association Time Not Available
Session Length Not Available

Alarms | Applications

Application	Last 1 Hour Volume (Mb)
http	439.4381
youtube	147.7350
unknown	25.9934
rtp	10.2991
rtcp	0.0808

Find the client using the User 360 view

Client Troubleshooting Go back

Properties

General
User Name bbecker
IP Address 192.168.152.27
MAC Address dc:0e:a1:b9:22:58
Vendor Compal
Endpoint Type Unknown
Media Type Wired
Hostname Data Not Available
CDP Device ID Data Not Available
Software Version Data Not Available
Model Data Not Available
UDI Data Not Available

Session
Switch Name AMS-3750-SBR
Switch IP Address 192.168.152.10
Interface FastEthernet1/0/6
Wired Speed 100Mbps
VLAN ID 12
VLAN Name Campus_Data
Status Associated
On Network No

Traffic
No statistics information available for this client.

Security
Authenticating ISE Data Not Available
Authentication Method 802.1X
Auth Status Authorization Failed
Authorization Profile Name N/A
Posture Status Unknown
TrustSec Security Group Data Not Available
Audit Session ID C0A8980A000034FA40C9CB03
Windows AD Domain Data Not Available
EAP Type Unknown

Troubleshoot

Link Connectivity | 802.1x Authentication | Authorization | IP Connectivity

Problem
802.1X Authentication Failure

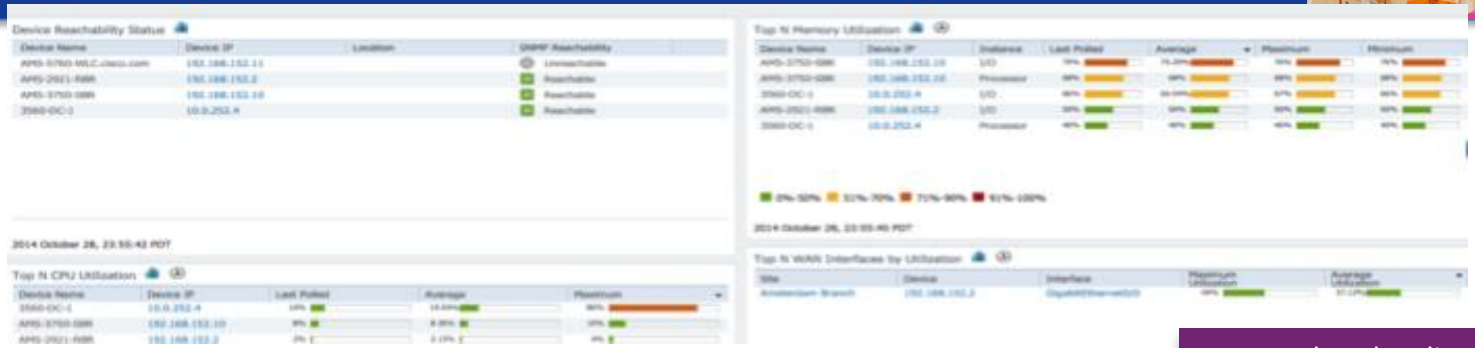
Recommendation
1. Verify that the Radius server(s) is reachable from the switch.
2. Verify that Radius server(s) supports the client EAP choice.
3. Verify that the client credentials and certificate are valid.
4. Verify that the Radius server certifcates are accepted by the client.

- Search Cisco Support Community
- Open or Update a service request

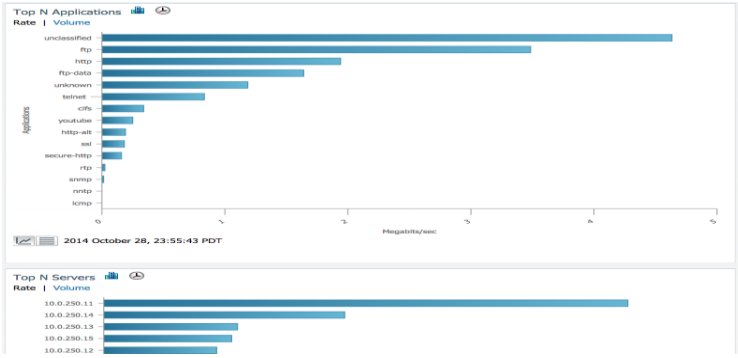
System Detail
802.1x Status: Failed over
Session State is : Authz Failed

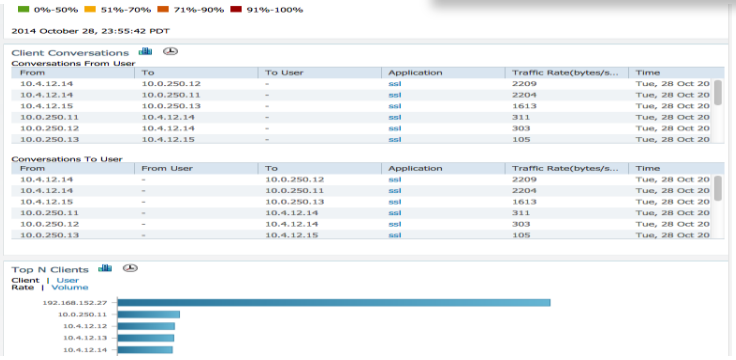
Ensure that the client can indeed access the network

PI-NAM integration

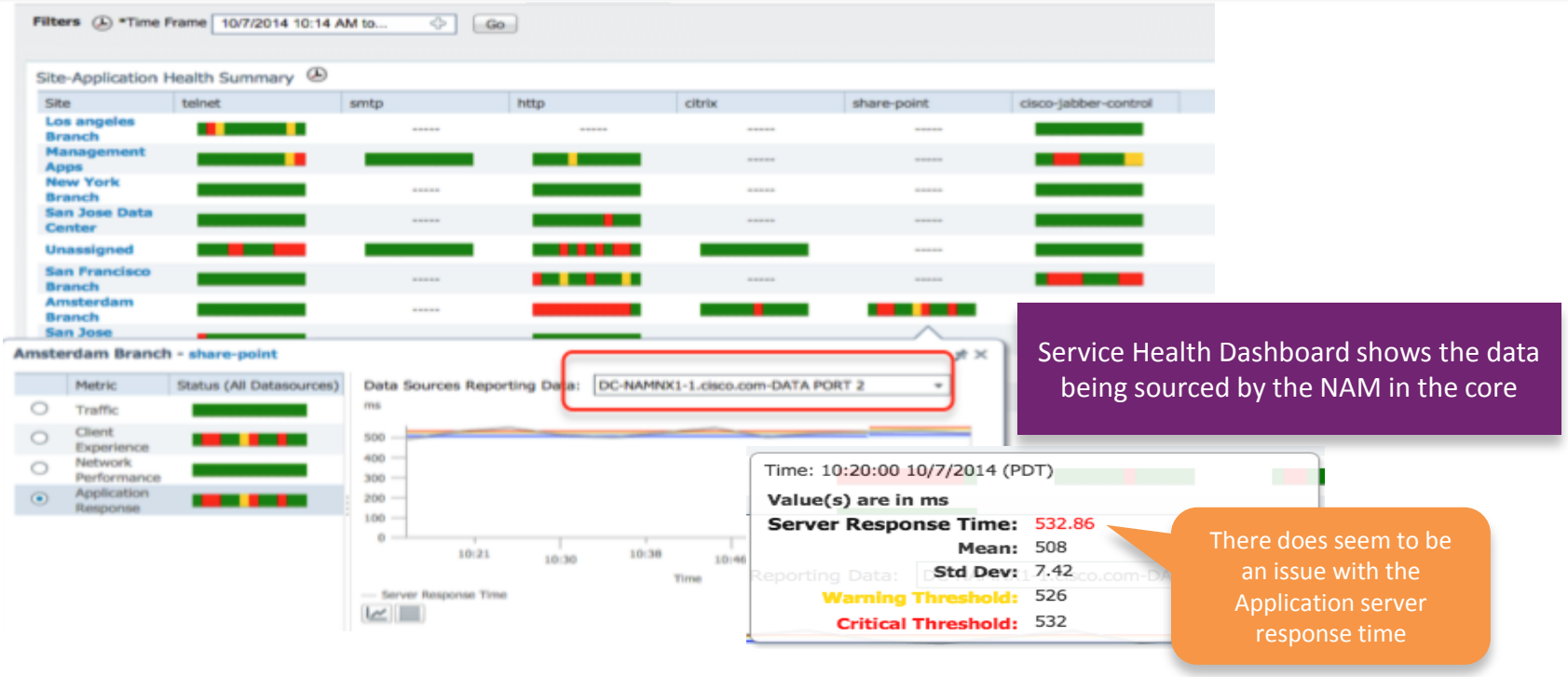


Ensure that the client's site has no issues wrt the WAN Interface utilization





PI-NAM Integration



Service Health Dashboard shows the data being sourced by the NAM in the core

There does seem to be an issue with the Application server response time

PI-NAM Integration

NAM Data Collector

Enable | Disable

	Name	Type	Host IP Address	Data Usage in System	Data Source Status
▶	DC-NAMNX1-1.cisco.com	Cisco NAM Nexus 7K Service Blade	192.168.136.93	Enabled	
▶	DC-NAMNX1-2.cisco.com	Cisco NAM Nexus 7K Service Blade	192.168.136.94	Disabled	

Cross launch into the NAM on the core

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Video/Voice Visibility in PI

Differences Between Prime Infrastructure and Prime Collaboration

- Prime Infrastructure provides network video/voice visibility and mediatrace troubleshooting features
  - Positioning: primarily to network infrastructure engineers to help determine that the network isn't to blame for poor voice/video performance
  - Statistics is from a **network** perspective, and not delving into source/destination of voice/video traffic
    - Conversation is an RTP stream and is irrespective of endpoint vendor/type
  - Leverages NAMs and/or Perf-Mon
    - MOS scoring is unsupported using Perf-Mon statistics
- Prime Collaboration provide far richer management beyond the RTP stream, including:
  - Positioning: Primarily to service operators for provisioning, monitoring and troubleshooting of voice/video services as well as powerful analytics for improved planning and trending
  - Statistics is from a **service** perspective, including voice/video endpoint involved in a conversation, traffic type, point-to-point or multi-point, etc.
  - Leverages CDRs, 1040 probes/NAMs and endpoint statistics

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Assurance Reports

Reports

Reports

Reports

Report Launch Pad

PSIRT and EOX

Scheduled Run Results

Saved Report Templates

Report Launch Pad

- Autonomous AP
- CleanAir
- **Client**
  - Busiest Clients
  - CCX Client Statistics
  - Client Count
  - Client Sessions
  - Client Summary
  - Client Traffic
  - Client Traffic Stream Metr...
  - Dormant Clients
  - Mobility Client Summary
  - Posture Status Count
  - Throughput
  - Unique Clients
  - Unique Clients and Users S...
- Compliance
- Custom NetFlow
- Device
- Guest
- Identity Service Engine
- MSE Analytics
- Mesh
- Network Summary
- Performance
- Raw NetFlow
- Security

Reports Categories for easy access

Report Launch Pad

Autonomous AP	
Autonomous AP Memory and CPU Utilization	New
Autonomous AP Summary	New
Autonomous AP Tx Power and Channel	New
Autonomous AP Uptime	New
Autonomous AP Utilization	New
Busiest Autonomous APs	New

CleanAir	
Air Quality vs Time	New
Security Risk Interferers	New
Worst Air Quality APs	New
Worst Interferers	New

Client	
Busiest Clients	New
CCX Client Statistics	New
Client Count	New
Client Sessions	New
Client Summary	New
Client Traffic	New
Client Traffic Stream Metrics	
Dormant Clients	
Mobility Client Summary	
Posture Status Count	
	New
	New
d Users Summary	New

This report displays the busiest and least busy clients on your wireless network by throughput, utilization, and other statistics. You can sort this report by Client MAC address, by Protocol, or by other parameters.

Quick Help on the contents of this report

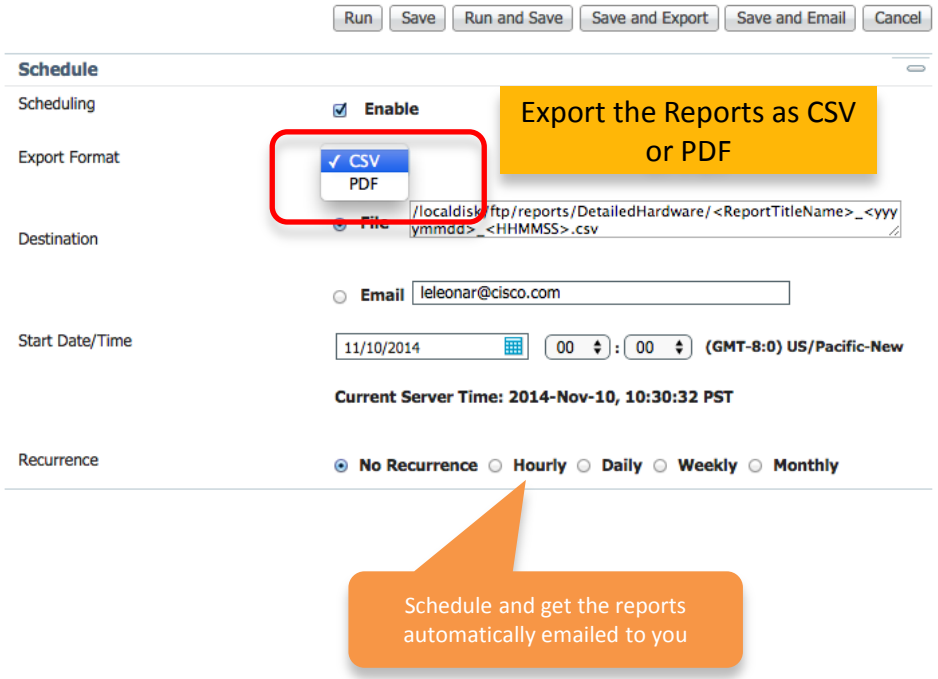
Identity Service Engine (open in a new window)	
Endpoint Authentication Summary	
Endpoint Profiler Summary	
Posture Detail Assessment	
Top N Endpoint Authorizations	
Top N User Authorizations	
User Authentication Summary	

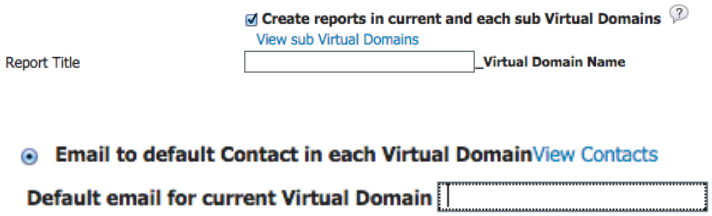
MSE Analytics	
Client Location	New
Client Location Density	New
Device Count by Zone	New
Device Dwell Time by Zone	New
Guest Location Density	New
Location Notifications by Zone	New
Mobile MAC Statistics	New
Rogue AP Location Density	New
Rogue Client Location Density	New
Service URI Statistics	New
Tag Location	New
Tag Location Density	New

Mesh	
Alternate Parent	New
Link Stats	New
Nodes	New
Packet Stats	New
Stranded APs	New
Worst Node Hops	New

Create a new report

Reports
Actions





- Generate Reports specific to a Virtual Domain
- Reports delivered via Email only to the folks responsible for that particular Virtual Domain

Reports
Summary

Application Reports

Top Clients

Top Servers

Worst Clients by Transaction Time

Application Traffic analysis

Application Server Performance

Filter Criteria :
- Network Wide
- Per Site
- Per Virtual Domain

End User Summary Reports

Top Applications

Average RTP Packet Loss Trend

Client Traffic Analysis Trend

Filter Criteria :
- Network Wide
- Per Site
- Per Virtual Domain
- All Wired/Wireless Clients
- Per user (Based on User ID, IP/MAC)

Application Reports

Top N Clients by Traffic

Generated: 2014-Nov-11, 23:39:15 PST

Cisco Prime
Infrastructure

Report By: Applications By Category
DataSource/Site/Data Type/Network Aware: Default Datasource/Amsterdam Branch/Rate/All
Reporting Period: Last 1 hour
Show: Up to 50 records

Top N Clients (In and Out)

Clients	In Traffic	Out Traffic	Total Traffic
192.168.152.11	1.68	14.83	16.51
192.168.152.30	4.92	4.34	9.25
192.168.152.28	4.44	1.91	6.35
10.11.13.5	0	3.94	3.94
192.168.152.28	0	2.90	2.90
192.168.152.28	1.21	0.51	1.73
192.168.152.28	0	1.32	1.32
192.168.152.2	1.29	0	1.29
192.168.152.11	1.18	0	1.18
192.168.152.30	0.69	0.40	1.08

Top Clients for Amsterdam Branch

Application Traffic Analysis

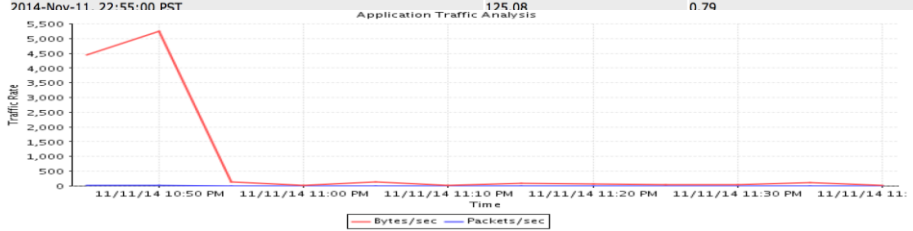
Generated: 2014-Nov-11, 23:41:21 PST

Cisco Prime
Infrastructure

Report By: Applications By Category
DataSource/Site/Network Aware: Default Datasource/Amsterdam Branch/All
Reporting Period: Last 1 hour
Show: Up to 50 records

Application Traffic Analysis

Time	Bytes/sec	Packets/sec
2014-Nov-11, 22:45:00 PST	4454.05	21.08
2014-Nov-11, 22:50:00 PST	5251.03	20.61
2014-Nov-11, 22:55:00 PST	125.08	0.79



Application Traffic Analysis for Amsterdam Branch

End User Summary Reports

Top N Applications

Generated: 2014-Nov-11, 23:44:40 PST

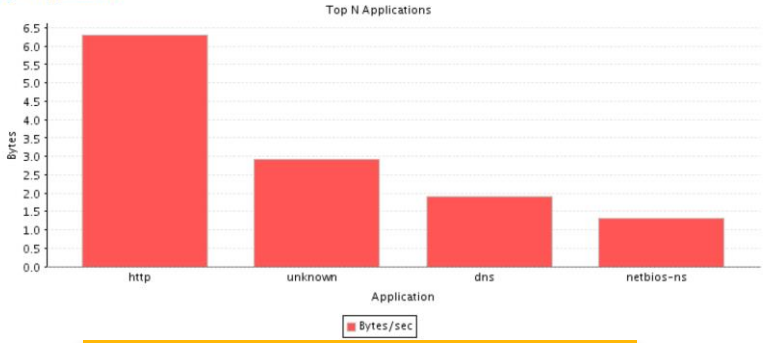
Cisco Prime
Infrastructure

Report By: Applications By Category
NetworkAware/User ID/IP Address/Mac Address: Wired/jfields
Reporting Period: Last 1 hour
Show: Up to 50 records

Top N Applications

Application	Bytes/sec
http	6.31
unknown	2.91
dns	1.89
netbios-ns	1.31

Top N Applications



Top Applications for the user - jfields

ART Conversations

Generated: 2014-Nov-11, 23:46:31 PST

Cisco Prime
Infrastructure

Report By: Applications By Category
Source IP/Destination IP/DataSource: Default Datasource
Reporting Period: Last 1 hour
Show: Up to 5000 records

ART Conversations

#	Time	Server	ServerSite	Client	ClientSite	Application	DataSource
1	2014-Nov-11, 23:10:00 PST	10.0.250.14	Unassigned	10.7.12.11	India Branch	http	10.0.107.2
2	2014-Nov-11, 23:00:00 PST	10.0.250.14	Unassigned	10.7.12.11	India Branch	http	10.0.107.2
3	2014-Nov-11, 23:00:00 PST	10.0.250.13	Unassigned	10.7.12.11	India Branch	http	10.0.107.2
4	2014-Nov-11, 23:40:00 PST	10.0.250.12	Unassigned	10.7.12.11	India Branch	ssl	10.0.107.2
5	2014-Nov-11, 23:45:00 PST	10.0.250.11	Unassigned	10.7.12.11	India Branch	unknown	10.0.107.2
6	2014-Nov-11, 23:45:00 PST	10.0.250.14	Unassigned	10.7.12.11	India Branch	unknown	10.0.107.2

ART Conversations

CISCO