



Toronto, Canada
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Cisco Prime for IP NGN

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PEARSON

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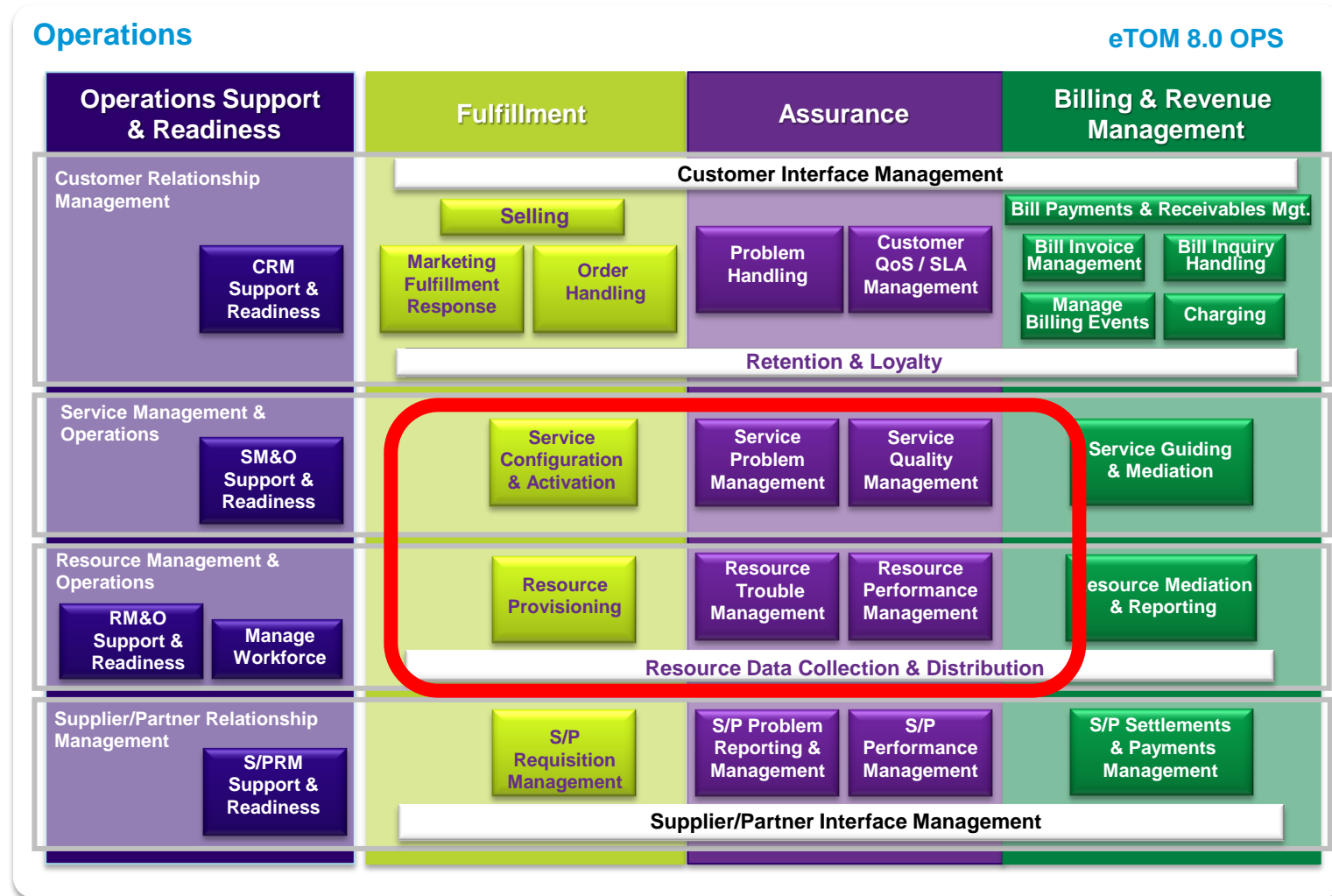


The **Cisco Prime Carrier Management** solution applied to the Next-Generation Networks Architectural Play drastically simplifies the design, provisioning and management of carrier-grade networks.

This comprehensive solution centralizes and automates service design, fulfillment, assurance and performance analysis to help you lower costs while meeting high customer expectations.

Agenda

- Overview
 - Prime for IP NGN
- Resource Management
 - Physical Inventory
 - Logical Inventory
 - Topology
- Service Provisioning
 - Service Building Blocks
 - Service Creation
- Service Assurance
 - Service Discovery and Troubleshooting
 - Alarm Management
 - Performance Management
- Summary

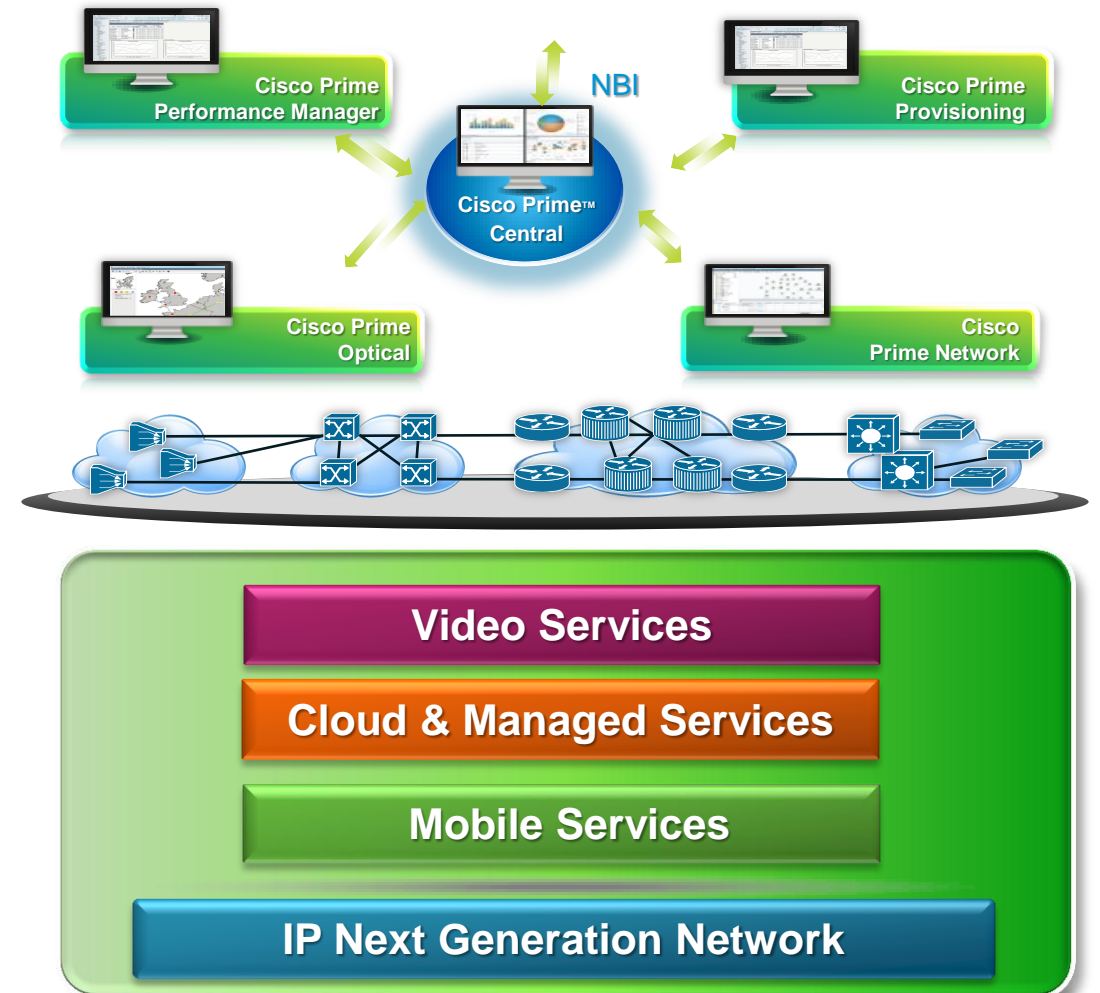


Overview



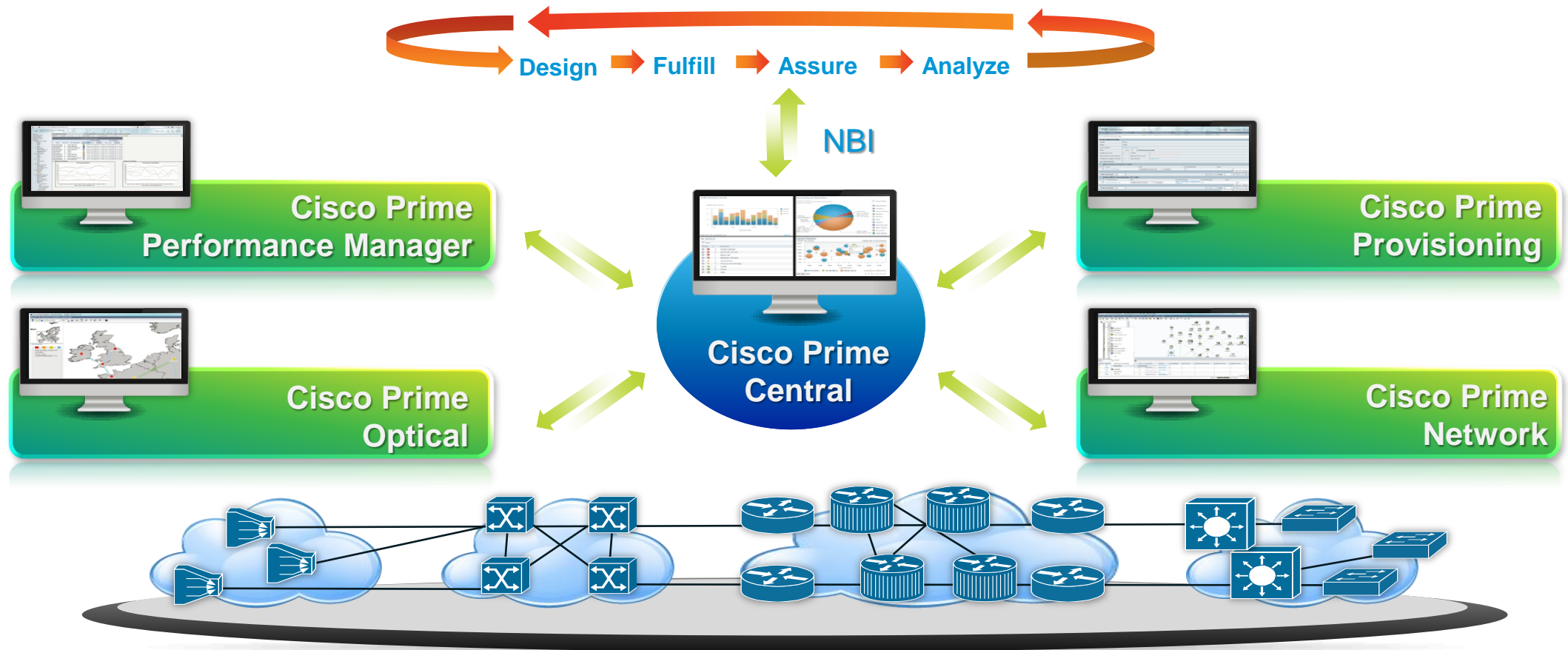
Cisco Prime Carrier Management

- **Operational scale:** Integrated operator workflows across the IP Next Generation Network, from the Core and Data Center to the Subscriber Access
- **Improved customer experience:** Centralized network visibility and advanced troubleshooting and diagnostics capabilities
- **Lower total cost of ownership:** Pre-integrated network management software components running in complete virtualized environment
- **Eases Service Provider network transitions:** Single integrated solution supporting both legacy and current network technologies



Cisco Prime Carrier Management

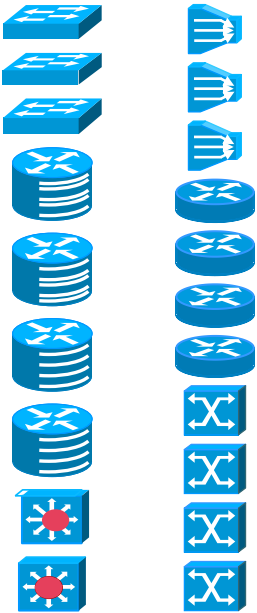
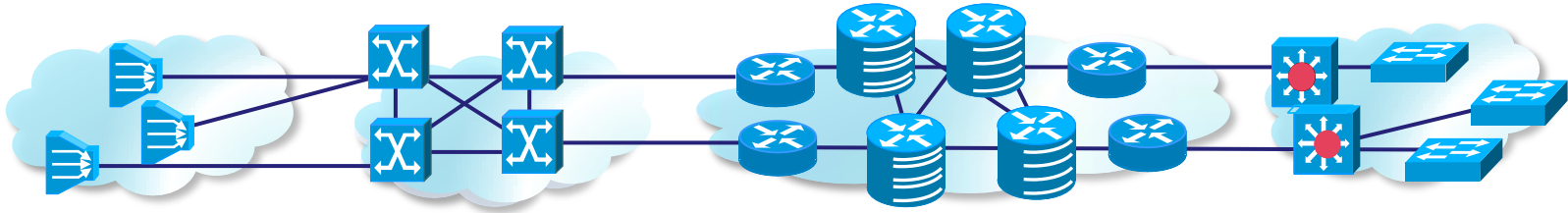
NGN Architectural Play Context: Prime for IP NGN



Resource Management



Inventory is an Important Asset



Common Inventory

Synchronize

Device Name	Device Type	Status	Management IP Address	Software Version	System Name	Vendor	Source
3800X-2	Cisco ME-3800X-24FS-M	Available	172.20.109.32	12.2(52)EY	3800X-2	Cisco	
3800X-1	Cisco ME-3800X-24FS-M	Available	172.20.109.31	12.2(52)EY	3800X-1	Cisco	
3400ME-ACC3	CISCO CATALYST ME-3400EG-12	Available	172.20.109.40	12.2(53)SE	3400ME-ACC3	Cisco	
3400ME-ACC4	CISCO CATALYST ME-3400EG-12	Available	172.20.109.41	12.2(53)SE	3400ME-ACC4	Cisco	

Common Inventory

Inventory > Devices > Physical Inventory

7609-DIST2

- Chassis
 - Slot Power
 - Slot Fan
 - Slot Backplane: Cisco Systems C
 - Slot 2: Card - 7600-ES20-10G3C
 - Slot 3: Card - 7600-ES+4TG3C
 - Slot 5: Card - RSP720-3C-10GE
 - Slot 9: Card - 7600-ES20-10G3C

Info

Equipment Name **Card - 7600-ES+4TG3C**
Equipment Holder Location **Slot 3**
Hardware Type **Module**
Description **7600-ES+4TG3C 4 ports 7600 ES+ Rev. 1.3**
Installed Serial Number **JAE14430Q3A**

Installed Version **V03**
Protection Role **NA**
Protection Scheme State **PSS_UNKNOWN**
Resource Fulfillment State **IN_SERVICE**

Physical Terminal Points

Name	State	Edge Point
TenGigabitEthernet3/1	WORKING	false
TenGigabitEthernet3/2	WORKING	false
TenGigabitEthernet3/3	WORKING	false
TenGigabitEthernet3/4	NON_WORKING	false

What Else can be in our Inventory?



Device Configuration



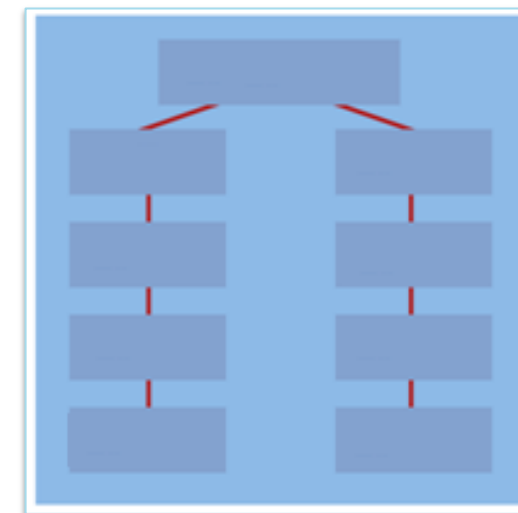
VRF



Forwarding Table



Routing Table



Logical Model

Logical Inventory

- NMS can Investigate Device Configuration and Represent it in its User Interface



The screenshot displays the NMS interface for a device named ASR9K-AGG1. The interface is divided into several sections:

- Logical Inventory Tree:** A hierarchical tree on the left side lists various configuration elements such as Access Gateway, Access Lists, ATM Traffic Profiles, Bidirectional Forwarding Detection, Cisco Discovery Protocol, IS-IS, Local Switching, LSEs, Modular OS, MPBGPs, OAM, OSPF Processes, Routing Entities, VC Switching Entities, and Physical Inventory. The Physical Inventory section is expanded to show details for Slot 0 and Slot 1, including card types (A9K-4T-B, A9K-40SE-B, A9K-RSP-4G) and interface configurations (TengigE0/0/0, TengigE0/0/1, TengigE0/0/2 - No Transceiver, TengigE0/0/3 - No Transceiver).
- Device Details Panel:** A large panel on the right provides detailed information about the device. It includes:
 - Element Name:** ASR9K-AGG1
 - Communication State:** Device Reachable
 - Investigation State:** Operational
 - Vendor:** Cisco
 - Product:** Router
 - Device Series:** Cisco ASR 9000 Series Aggregation Services Routers
 - Element Type:** Cisco ASR 9006
 - Serial Number:** FOX1325G3PB
 - CPU Usage:** 65 %
 - Memory Usage:** 1691818968
 - IP Address:** 172.20.109.14
 - System Name:** ASR9K-AGG1
 - Up Since:** 12-Jul-11 19:31:22
 - Contact:**
 - Location:**
 - DRAM Usage:** 42% (2306MB of 3918MB Free)
 - Flash Device Size:** Boot Flash = 67108864, Flash Disk 0 = 2055208960, Flash Disk 1 = 2055208960, Hard disk = 224256
 - NVRAM Size:** 224256
 - Software Version:** 4.0.3[Default]
 - System Description:** Cisco IOS XR Software (Cisco ASR9K Series), Version 4.0.3[Default] Copyright (c) 2011 by Cisco Systems, Inc.
 - Processor DRAM:** 4294967296
- Navigation and Status:** At the bottom, there are tabs for 'General' and 'Ports', a search bar, and a status bar showing 'Memory: 9%' and 'Connected'.

Unified MPLS Mobile Transport Solution

Logical Inventory Mobile Transport Gateway (MTG)

```
vrf LTE2
 address-family ipv4 unicast
  import route-target
    1001:1001
    10:101
    10:102
  export route-target
    1001:1001
 interface GigabitEthernet0/1/0/5
  description By VPNSC: Job Id# =
 58 (to IXIA:: G2/1 VPN)
 vrf LTE2
  ipv4 address 112.1.1.1
 255.255.255.252
 no shutdown
```

MTG-9006-11202 [31M+]

Logical Inventory [21M+]

- Access Gateway
- Access Lists
- ATM Traffic Profiles
- Bidirectional Forwarding Detection
- Cisco Discovery Protocol
- Clock
- Ethernet LMI
- IS-IS
- Local Switching
- LSEs
- Modular OS
- MPBGPs
- MPLS-TP
- OAM
- Pseudowires
- Routing Entities
- VC Switching Entities
- VRFs
 - LTE2@MTG-9006-11202
 - PWHE1@MTG-9006-11202
- Physical Inventory [9M+]

Name: **LTE2** Description: **not set**

Route Distinguisher: **1111:2222**

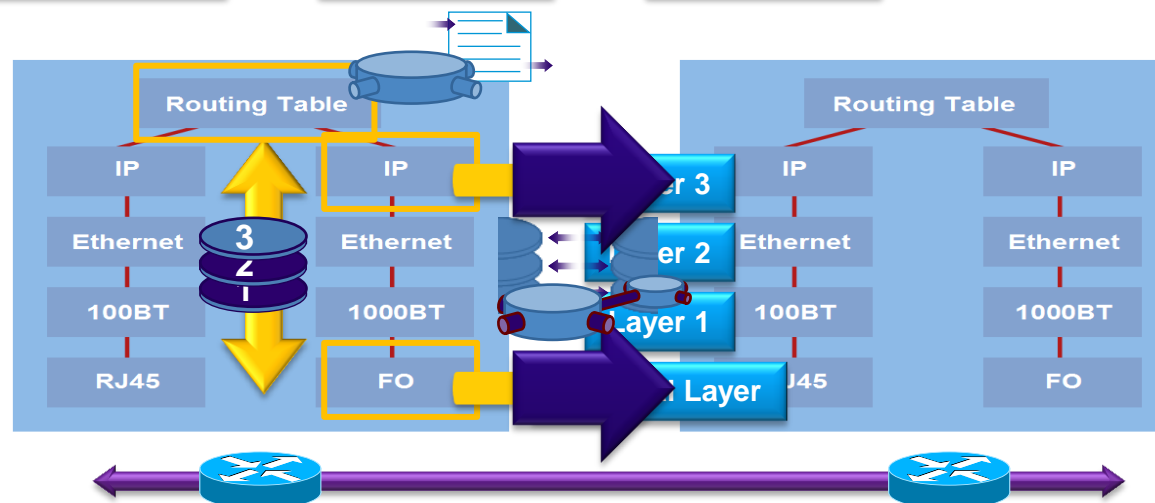
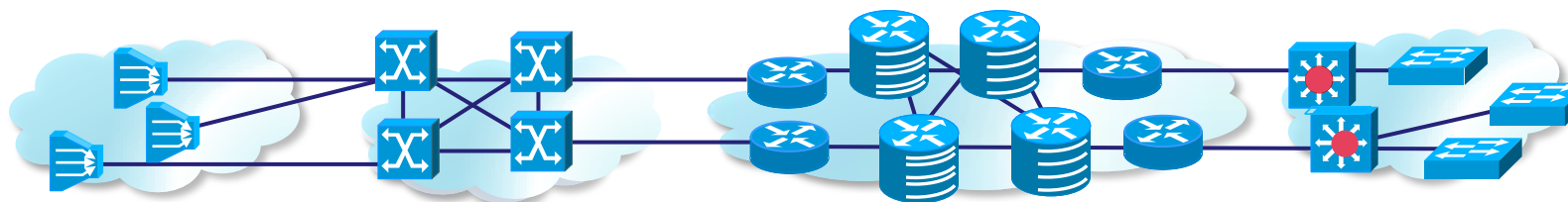
Export Route Targets: 1001:1001

Import Route Targets: 1001:1001, 10:102, 10:101

Routing Tables

Destination	Prefix ...	Next Hop	Outgoing Interface	Type	Routing Protocol	BGP Next Hop	Bottom In Label	Bottom Out Label
113.6.1.0	24			Indirect	BGP	100.110.13.6		43
113.5.1.0	24			Indirect	BGP	100.110.13.5		42
113.7.1.0	24			Indirect	BGP	100.110.13.7		42
112.1.1.0	30			Indirect	BGP	100.110.12.1		16000
112.2.1.0	30	112.2.1.1	GigabitEthernet0/1/0/5	Direct	Connected		16000	
200.110.12.2	32	200.110.12.2	Loopback1	Direct	Local		16000	
100.110.12.21	32			Indirect	BGP	100.110.12.1		16000
112.2.1.1	32	112.2.1.1	GigabitEthernet0/1/0/5	Direct	Local			

... From Logical Inventory to Topology



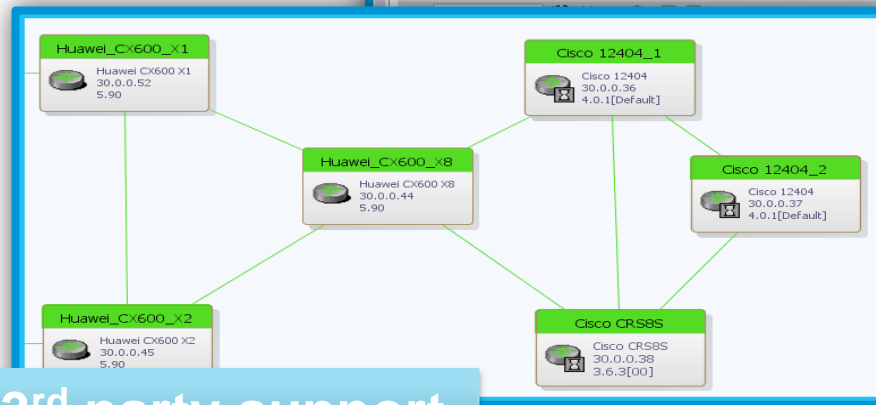
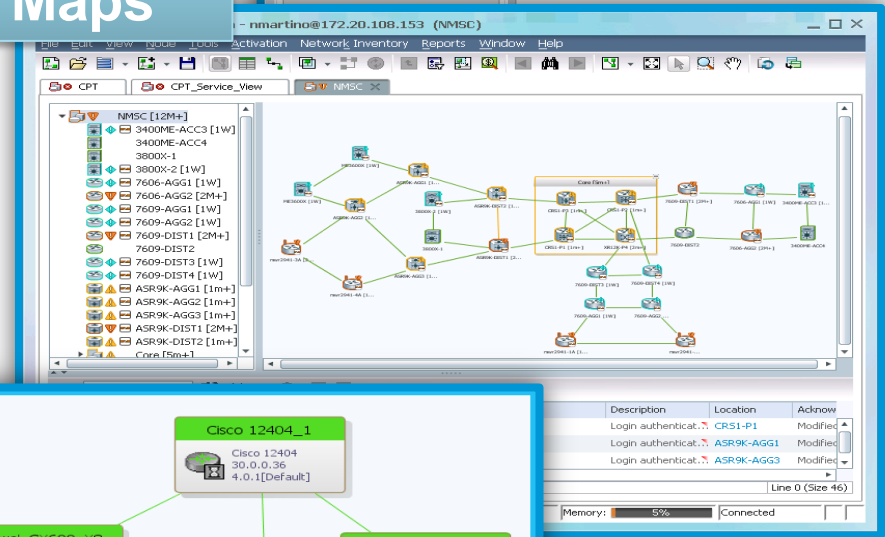
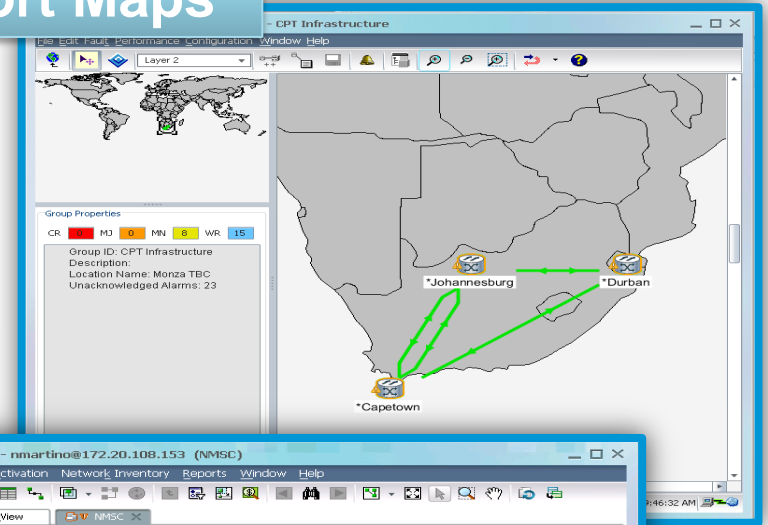
Network Discovery

- Faster and more cost effective Transport, Packet Transport, MPLS, Carrier Ethernet and RAN Backhaul management with automatic discovery of all network components
- Complete end-to-end visibility of all network elements, covering a wide range of Cisco Products from edge to access, aggregation and core
- Physical and Logical Topologies
- Support for multivendor IP devices

Transport Maps

Physical and Logical Maps

3rd party support

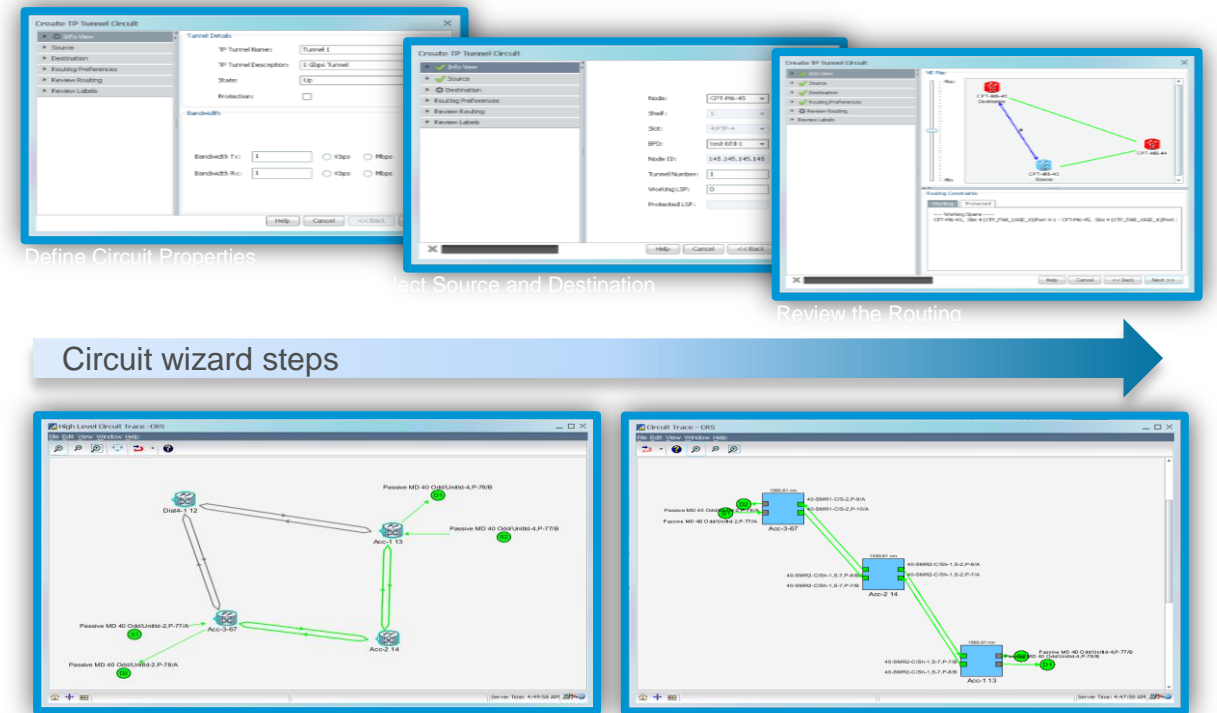


Service Provisioning

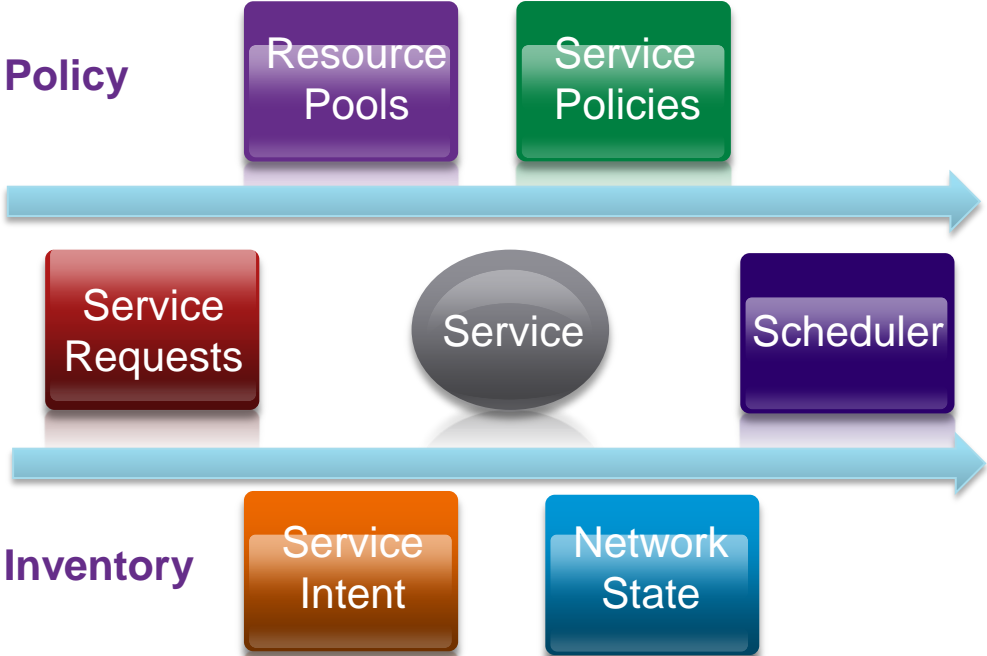
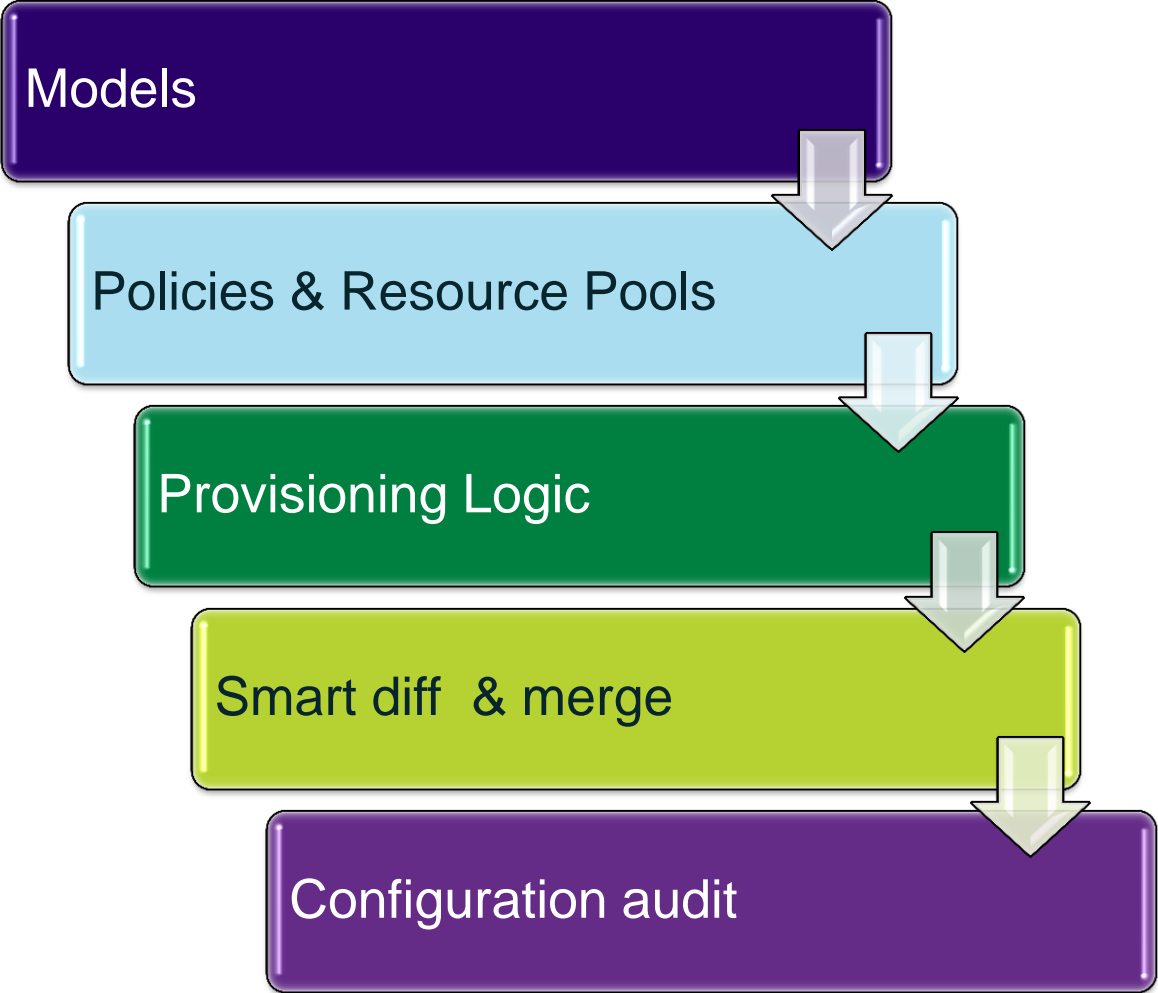


TDM and λ Service Delivery

- Simple point-and-click provisioning of SONET, SDH and DWDM networks
- Up-to-date support of current and new technologies
- Graphical circuit trace for troubleshooting services

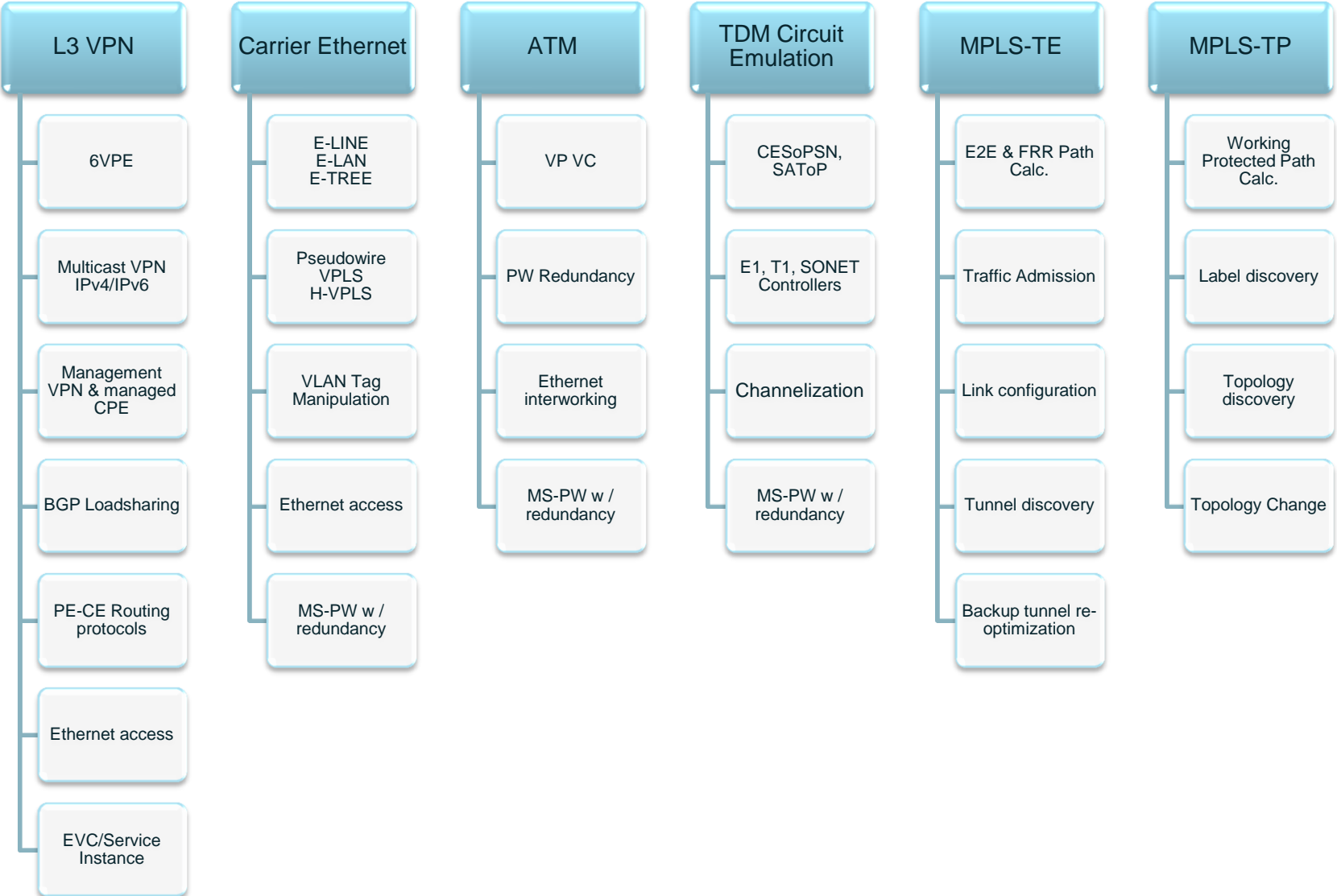


Service Provisioning Components



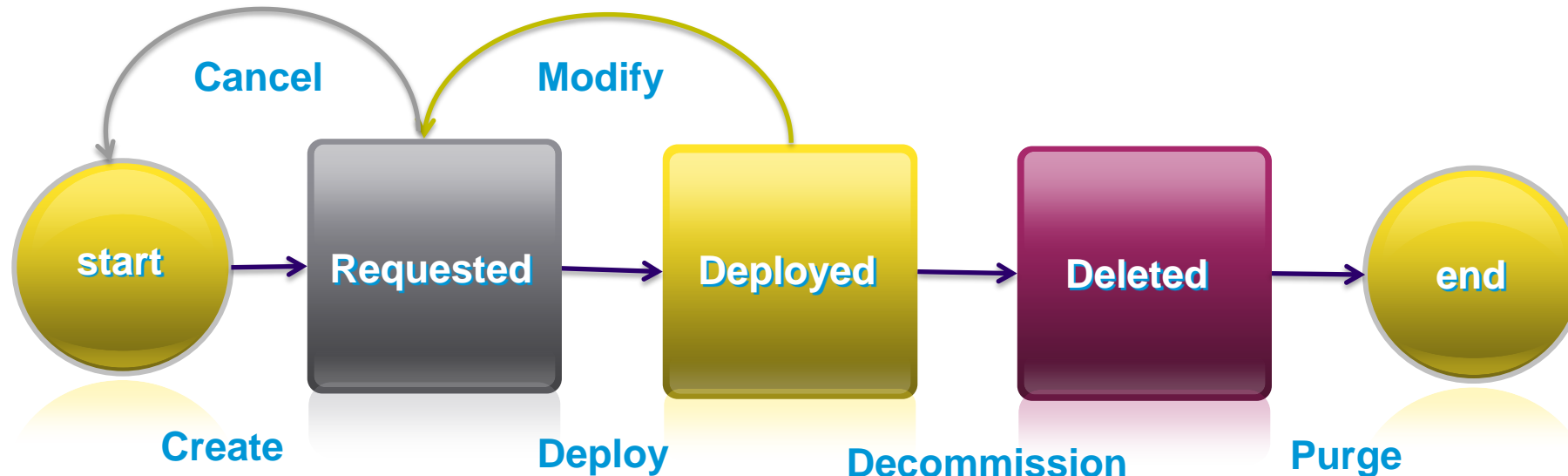
Service Design

Defined Service Policies



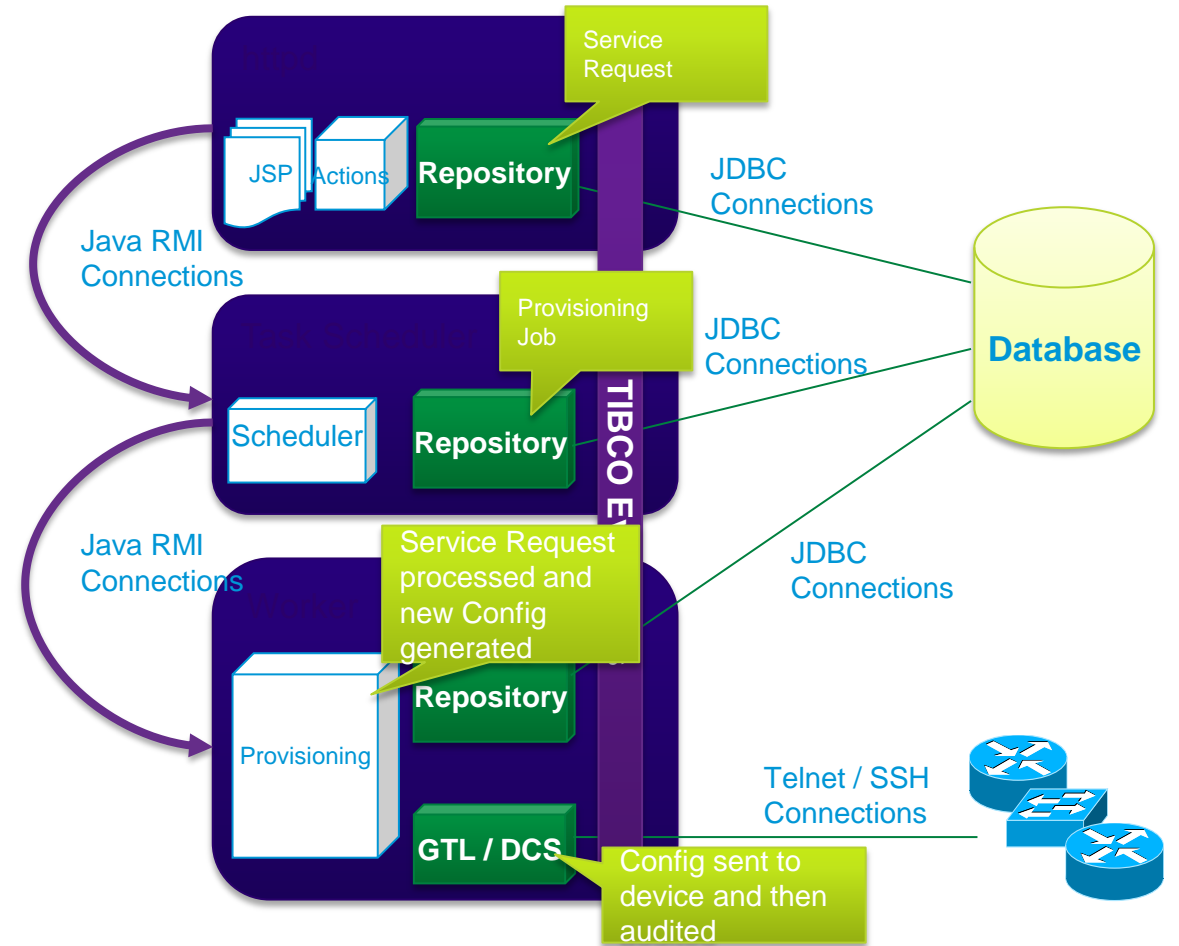
Service Request Lifecycle

- Service state is stored in a '**Service Request**' (**SR**)
- A history of all changes is kept (Including after decommissioning)
- The **SR** can be *edited*, then deployment can be *scheduled* at a later time
- The **SR** can be *anceled* so that resources are released



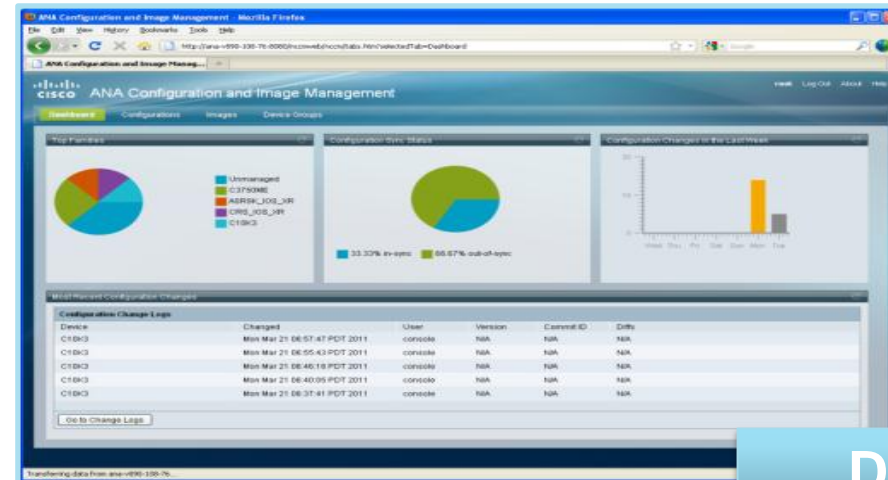
Provisioning Under the Hood

- Service Provisioning is controlled via 'Service Profiles' and 'Service Requests'
- Deployment Process:
 - **Read configuration from device**
 - **Compare with intent**
 - **Generate configuration differences**
 - **Apply configuration**
 - **Read configuration from device**
 - **Audit configuration**
 - **Report**
- Scheduled Audits can be used to detect unexpected configuration deviations



Change and Configuration Management

- Archive/backup configurations
- View, compare, remove, export, search, and restore configurations
- Synchronize devices with different running and startup configurations
- Configuration change history, logs and reports
- Schedule, i.e.: during authorized maintenance window
- Operations scheduled to act on dynamic device groups



Dashboard

Device Name	IP Address	Element Type	Version	Type	Commit ID	Date Changed	Labels
ASR9K	172.20.125.84	Cisco ASR 9910	1	admin	N/A	Thu Mar 17 15:45:58 PDT 2011	Add a label
ASR9K	172.20.125.84	Cisco ASR 9910	1	running	100000007	Mon Mar 21 14:23:58 PDT 2011	Add a label
C19K3	172.20.125.16	Cisco 10008	2	running	N/A	Mon Mar 21 06:58:40 PDT 2011	Add a label
C19K3	172.20.125.16	Cisco 10008	1	running	N/A	Mon Mar 21 06:58:22 PDT 2011	Add a label
C19K3	172.20.125.16	Cisco 10008	1	startup	N/A	Mon Mar 21 11:57:46 PDT 2011	Add a label
C9K3	172.20.125.13	Cisco C9348	1	running	100000064	Mon Mar 21 11:57:46 PDT 2011	Add a label
3750-341	172.25.87.141	Cisco Catalyst	1	running	N/A	Mon Mar 7 04:24:43 PST 2011	Add a label
3750-342	172.25.87.142	Cisco Catalyst	2	running	N/A	Tue Mar 22 01:39:15 PDT 2011	Add a label
	172.25.87.142	Cisco Catalyst	1	running	N/A	Tue Mar 22 01:20:43 PDT 2011	Add a label
	172.25.87.142	Cisco Catalyst	1	startup	N/A	Wed Mar 16 05:17:44 PDT 2011	Add a label

Configuration Archive

Manage Device Configurations

- Automatic archive, change history and device configuration comparison with color coding
- Network wide operations performed in bulk
- Basic compliance checking

The screenshot shows the Cisco Prime Network Change and Configuration Management interface. The main content area displays a table of Archived Configurations. The table has columns for Device Name, IP Address, Element Type, Version, Type, Commit Id, Date Changed, and Labels. There are 6 archived configurations listed, each with a checkbox for selection. The interface also includes a filter section with 'And' and 'Recently changed archive' options, and a 'Go' button. The top navigation bar includes 'Dashboard', 'Configurations', 'Images', and 'Device Groups'. The user is logged in as 'root'.

Device Name	IP Address	Element Type	Version	Type	Commit Id	Date Changed	Labels
<input type="checkbox"/> 10.56.101.80	10.56.101.80	Cisco 7604	1	running	N/A	Tue Aug 23 13:55:25 IDT 2011	(add a label)
<input type="checkbox"/> 10.56.101.80	10.56.101.80	Cisco 7604	1	startup	N/A	Mon Jul 25 10:30:39 IDT 2011	(add a label)
<input type="checkbox"/> 10.56.101.153	10.56.101.153	Cisco ASR 9006	1	running	1000000045	Tue Aug 23 10:57:12 IDT 2011	(add a label)
<input type="checkbox"/> 10.56.101.153	10.56.101.153	Cisco ASR 9006	1	admin	N/A	Thu Jan 1 02:00:00 IST 1970	(add a label)
<input type="checkbox"/> 10.56.101.154	10.56.101.154	Cisco ASR 9006	1	running	1000000156	Sun Aug 21 08:01:00 IDT 2011	(add a label)
<input type="checkbox"/> 10.56.101.154	10.56.101.154	Cisco ASR 9006	1	admin	N/A	Thu Jan 1 02:00:00 IST 1970	(add a label)

The screenshot shows the Compare Configurations interface. It displays two configuration files side-by-side for comparison. The left file is for device 10.56.101.80, version 1, type startup, archived on Mon Jul 25 10:30:39 IDT 2011. The right file is for device 10.56.101.80, version 1, type running, archived on Tue Aug 23 13:55:25 IDT 2011. The configuration lines are color-coded: green for new lines, red for missing lines, and grey for excluded lines. The left configuration has a red line for 'version 15.2', while the right configuration has a green line for 'version 15.1'. Both configurations include settings for service timestamps, password encryption, counters, and VRF definitions.

```
Device: 10.56.101.80
Version: 1
Type: startup
Module Name: N/A
Label(s):

2 |
3 | Last configuration change at 18:31:07 UTC Thu Feb 7 2002 by Mgr
4 |
5 | version 15.2
6 | service timestamps debug datetime msec
7 | service timestamps log datetime msec
8 | service password-encryption
9 | service counters max age 10
10 |
11 | hostname c7-npe1-76
12 |
13 | boot-start-marker
14 | boot system flash disk0:c7600rsp72043-advipservices_dbg-mz_mplstp_15.1S-
   RLS10.2011-07-15
15 | boot-end-marker
16 |
17 | mls ipv6 vrf
18 |
19 | vrf definition VRF_SAMPLE_A
20 | rd 1.1.0.80:777
21 |
22 | address-family ipv4
23 | route-target export 777:777

Device: 10.56.101.80
Version: 1
Type: running
Module Name: N/A
Label(s):

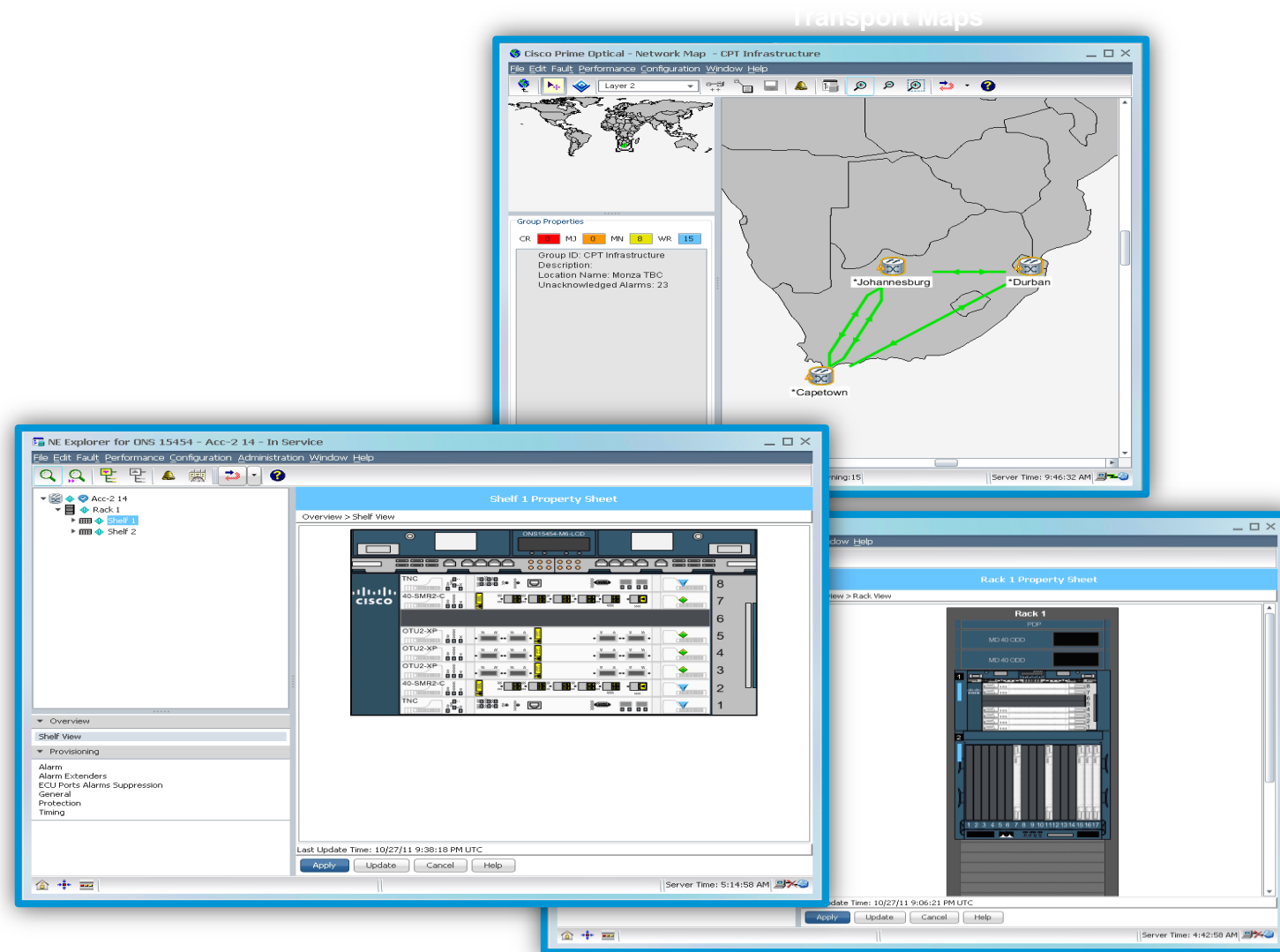
2 |
3 | Last configuration change at 22:10:37 UTC Fri Mar 8 2002 by a
4 |
5 | version 15.1
6 | service timestamps debug datetime msec
7 | service timestamps log datetime msec
8 | service password-encryption
9 | service counters max age 10
10 |
11 | hostname c7-npe1-76
12 |
13 | boot-start-marker
14 | boot system flash disk0:c7600rsp72043-advipservices_dbg-mz_mplstp_15.1S-
   RLS10.2011-07-15
15 | boot-end-marker
16 |
17 | mls ipv6 vrf
18 |
19 | vrf definition VRF_SAMPLE_A
20 | rd 1.1.0.80:777
21 |
22 | address-family ipv4
23 | route-target export 777:777
```

Service Assurance



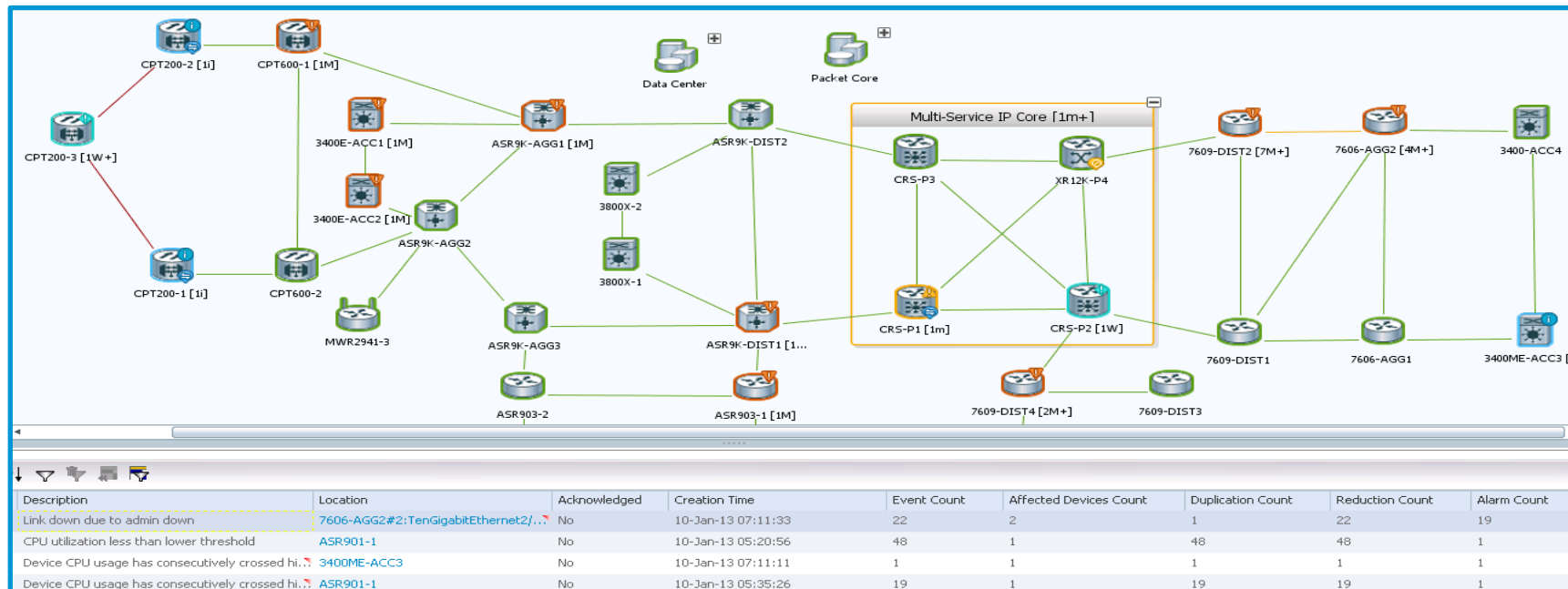
In-Depth Visibility into Transport Layer

- Realistic view of the device to facilitate NOC and technician interaction
- DWDM/TDM topology and multilayer link management
- Node provisioning and facilities configuration using Network Element Explorer



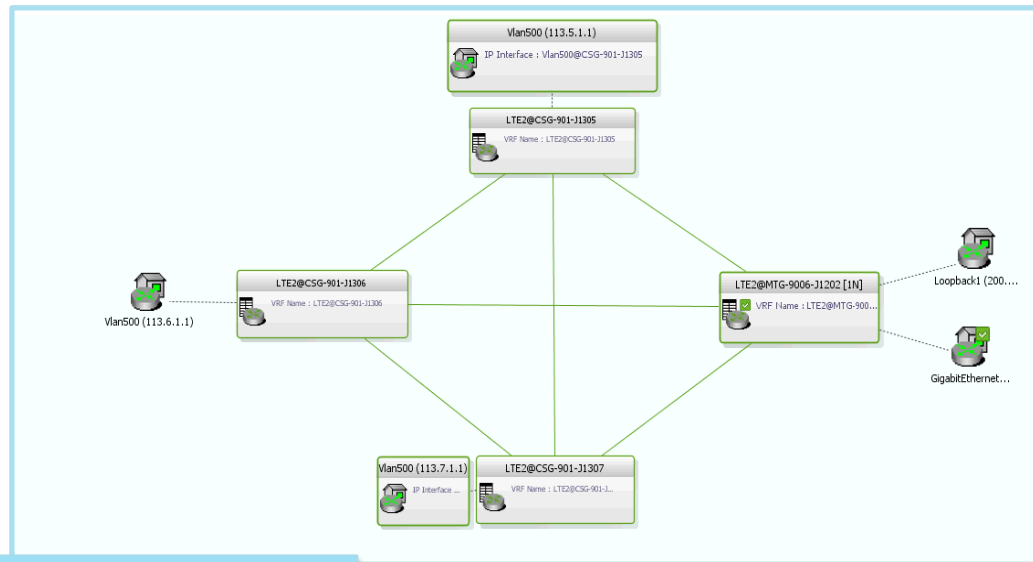
In-Depth Visibility into Packet Transport Network

- Discovery of physical topology among devices
- Topological views that identify the location and severity of alarms
- Common launch point for the majority of element management operations
- Up-to-date display of network event, state, and configuration changes

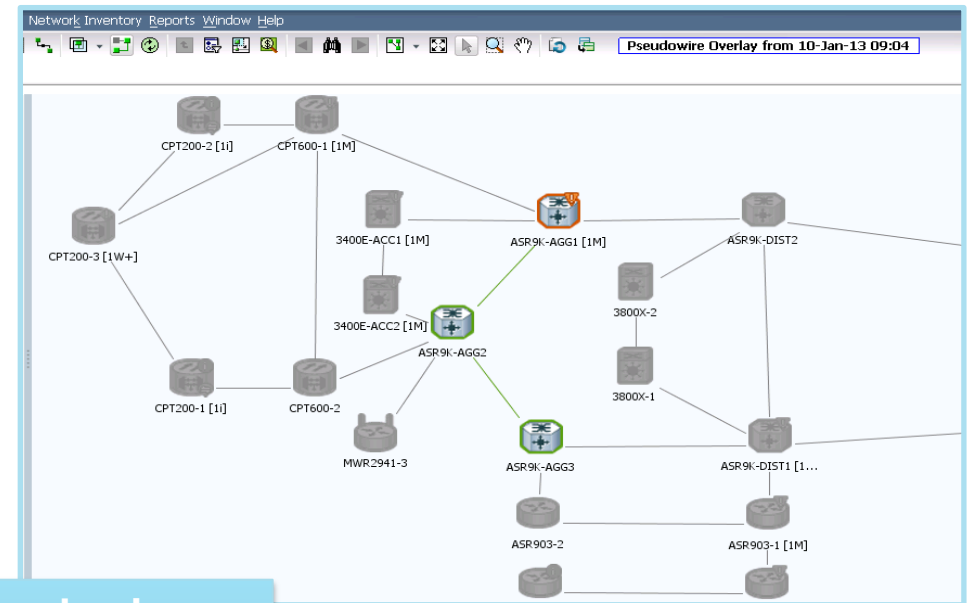


Service Visualization

- Enables visualization of the services configured on the network
- Ability to visualize services such as cross-connects, ethernet services, MPLS-TP tunnels, pseudowires, VLAN's, VPLS, MPLS VPN's
- Overlays allow viewing which devices and links are part of a specific service (VPN, Pseudowire, VLAN, MPLS-TP, clocking ... etc)



VPN Service

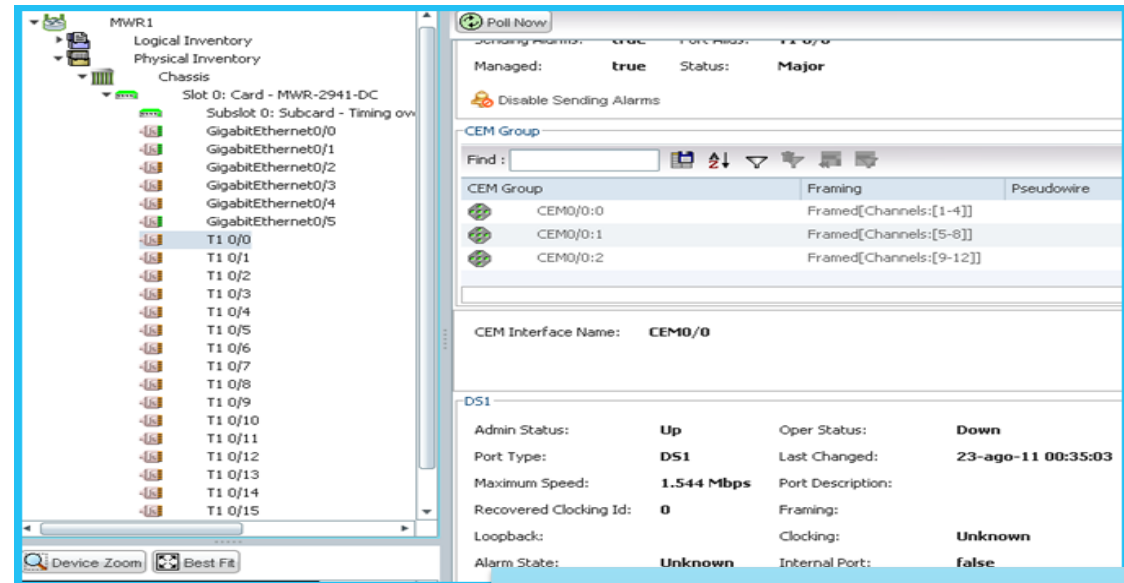


Pseudowire Overlay

In-Depth Visibility

Example: RAN Backhaul Network

- Full visibility into SAToP, CESoPSN, and ATM configurations on cell site and aggregation routers
- Enables operator to view virtual connections for cellular traffic across a packet network
- Clocking:
 - ITU-T Synchronous Ethernet (SynchE)
 - IEEE 1588-2008
 - Adaptive Clock Recovery (ACR)



Managed: **true** Status: **Major**

Disable Sending Alarms

CEM Group

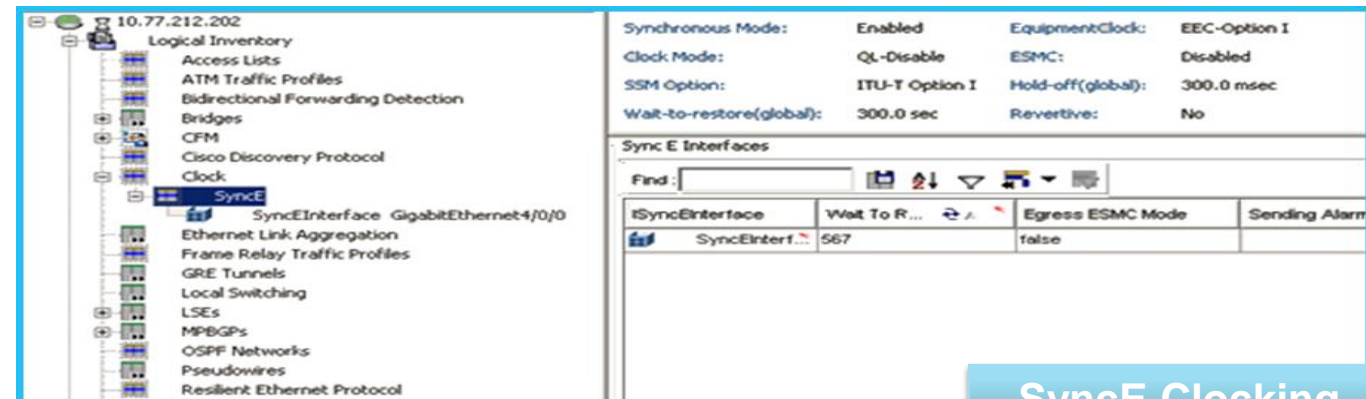
CEM Group	Framing	Pseudowire
CEM0/0:0	Framed[Channels:[1-4]]	
CEM0/0:1	Framed[Channels:[5-8]]	
CEM0/0:2	Framed[Channels:[9-12]]	

CEM Interface Name: **CEM0/0**

DS1

Admin Status:	Up	Oper Status:	Down
Port Type:	DS1	Last Changed:	23-ago-11 00:35:03
Maximum Speed:	1.544 Mbps	Port Description:	
Recovered Clocking Id:	0	Framing:	
Loopback:		Clocking:	Unknown
Alarm State:	Unknown	Internal Port:	false

T1/E1 Circuit Emulation Properties



Synchronous Mode: **Enabled** EquipmentClock: **EEC-Option I**

Clock Mode: **QL-Disable** ESMC: **Disabled**

SSM Option: **ITU-T Option I** Hold-off(global): **300.0 msec**

Wait-to-restore(global): **300.0 sec** Revertive: **No**

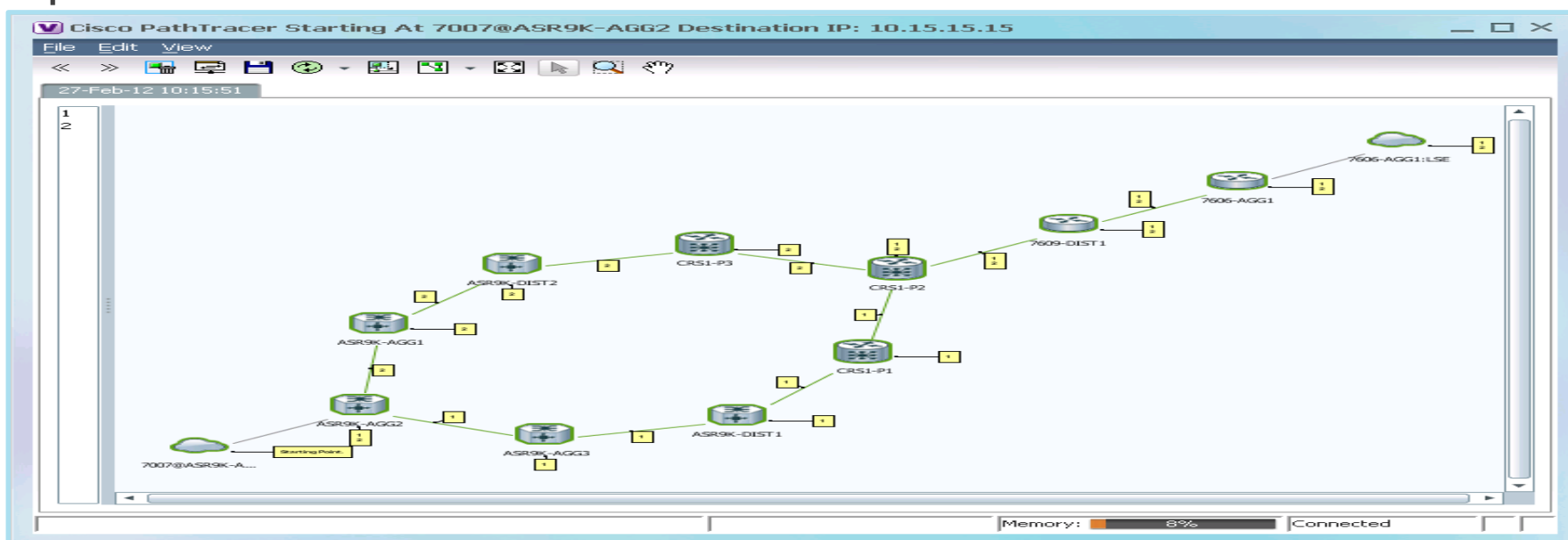
Sync E Interfaces

ISyncInterface	Wait To R...	Egress ESMC Mode	Sending Alarm
SyncEnterf...	567	false	

SyncE Clocking

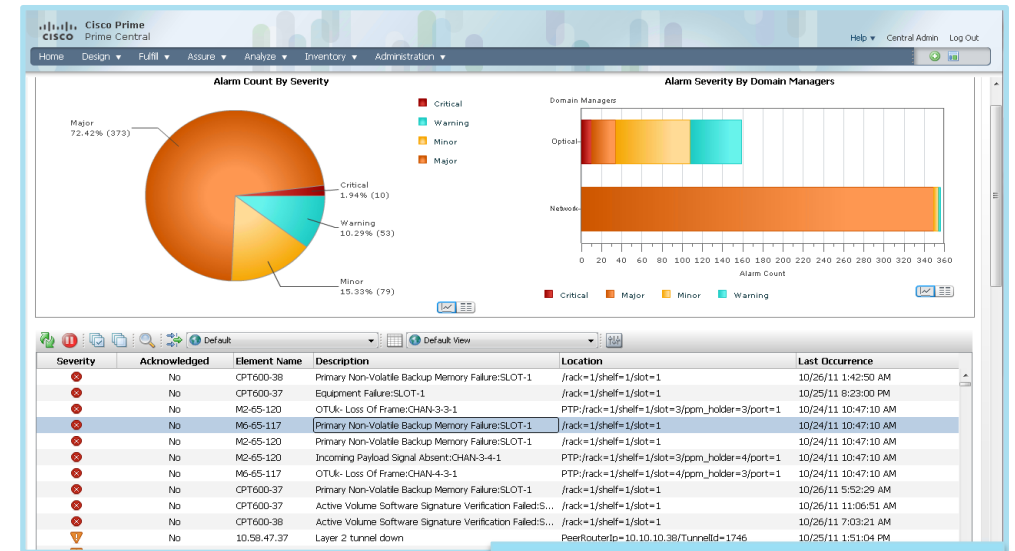
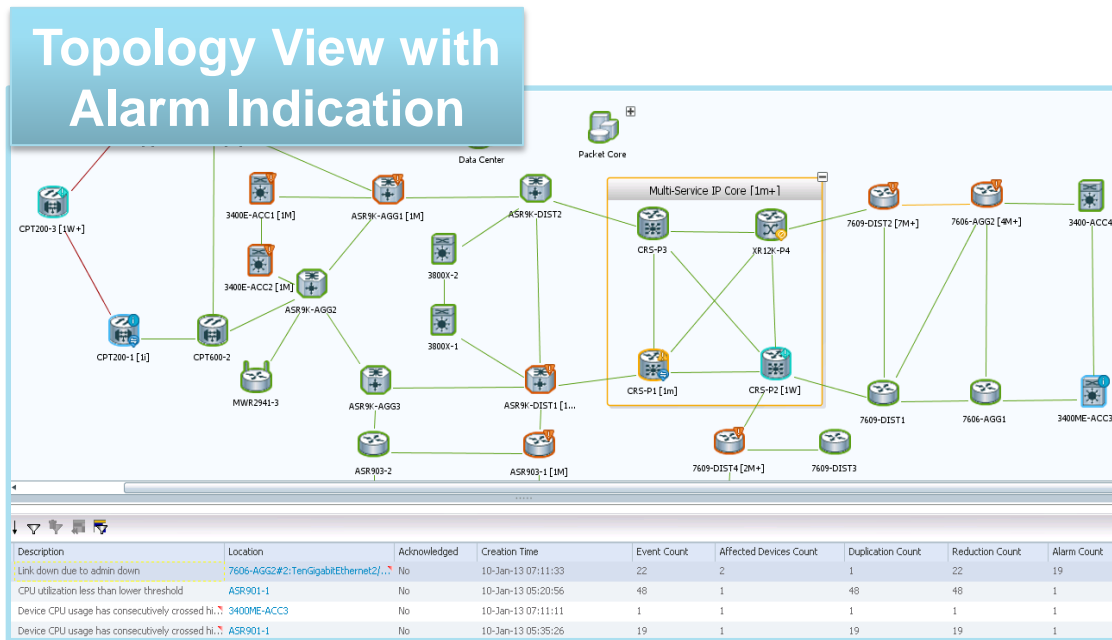
Path Tracer

- Path Tracer enables end-to-end route tracing to be performed with information displayed simultaneously for the multiple networking layers
 - Uses network model to trace route and display traffic stats per hop, across technologies and layers
 - Devices in the route path are queried at a greater frequency to provide near real-time statistics
- Includes all properties at Layer 1, 2 and 3, plus alarm information, counters, and more
- View multiple paths between the source and destination



Alarms and Topology

- NOC operator activities are triggered by alarms or fault notifications
- Alarm indications available in various views



Alarm Dashboard & Alarm Browser

Alarm Dashboard & Alarm Browser

Displaying 3 links

Summary

- ASR9K-AGG2
- ASR9K-AGG1 [1M]

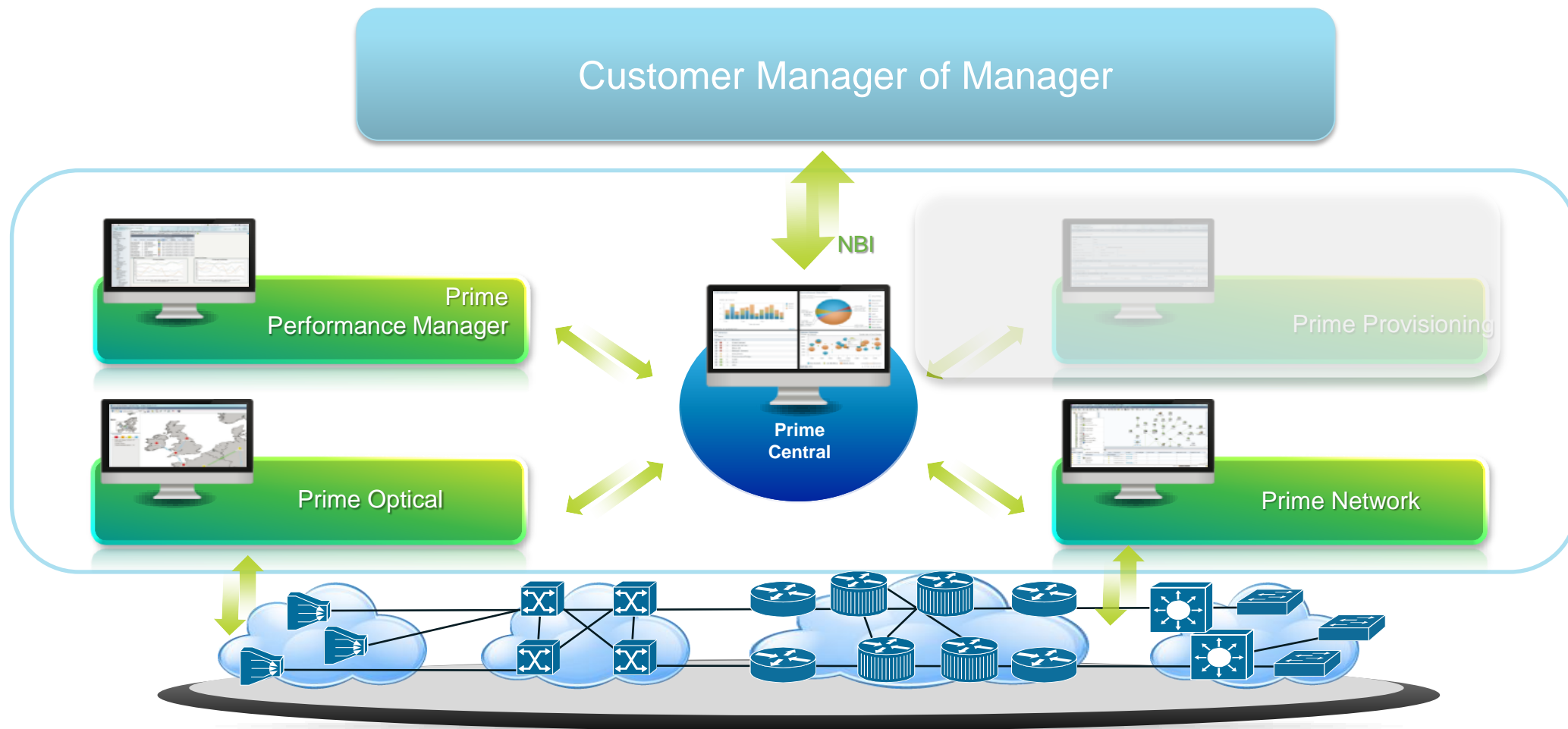
Details

- ASR9K-AGG2
 - PHY #1: GigabitEthernet0/1/0/0
 - ETH #1: GigabitEthernet0/1/0/0
 - MPLS IP: GigabitEthernet0/1/0/0
- ASR9K-AGG1 [1M]
 - PHY #0.1: GigabitEthernet0/1/0/0
 - ETH #0.1: GigabitEthernet0/1/0/0
 - MPLS IP: GigabitEthernet0/1/0/0

Properties

Alarmed Link

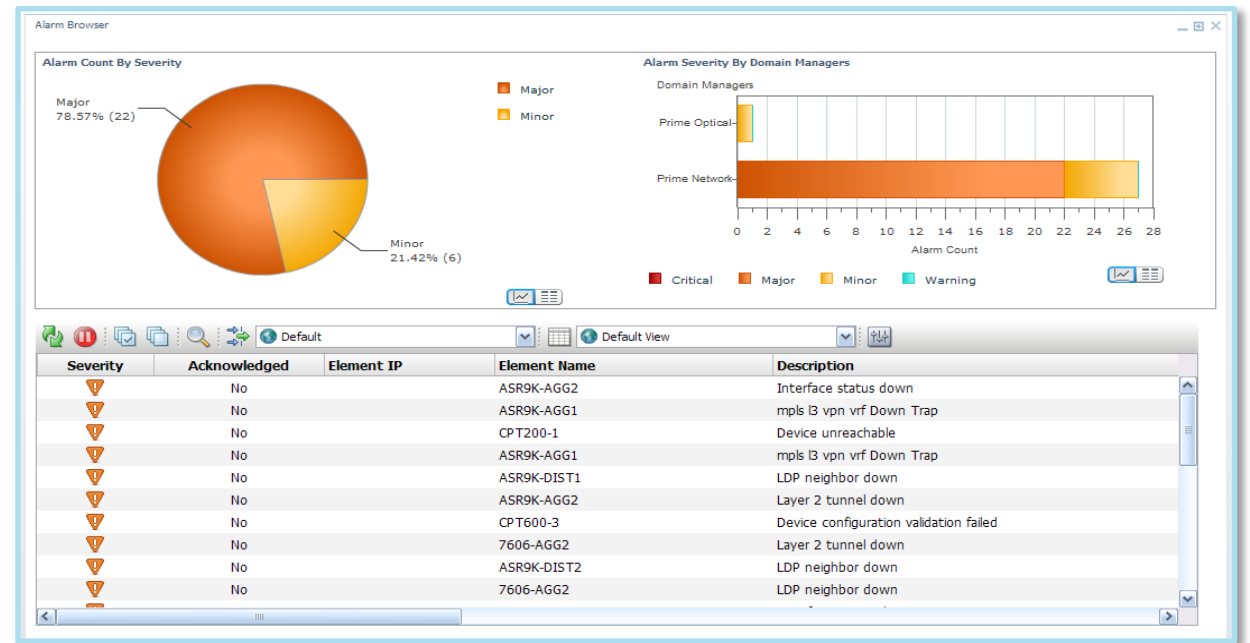
Components Involved in Fault Management



Alarm Management

Prime Central

- Collects alarms from underlying Domain Managers
- Cross Domain Event Management
- Aggregation, Correlation and De-duplication rule-based
- Portlet with Customized Views and Filters
- Full Alarm Lifecycle Support
- Seamless X-Launch of Source Domain Manager



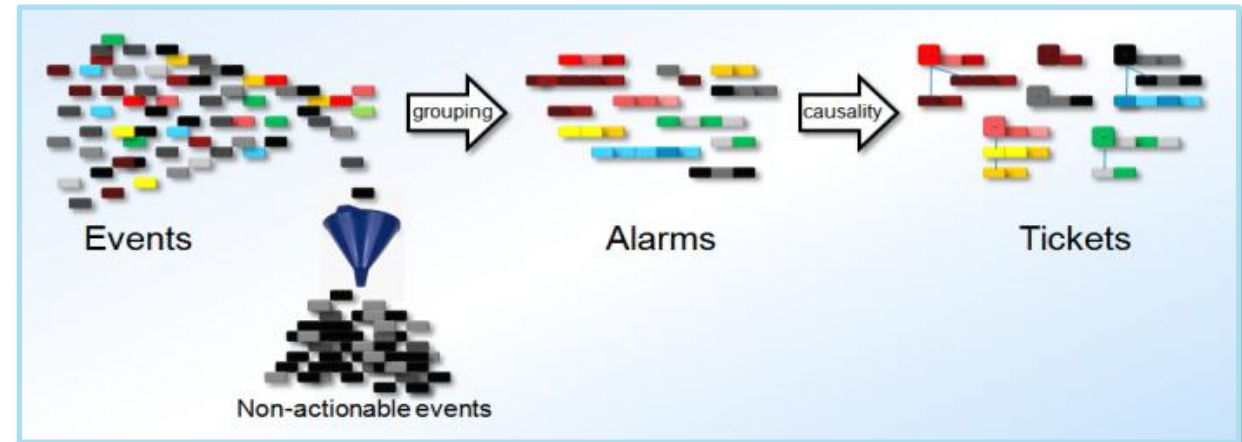
Alarm Management

Prime Network

- Through Prime Network's modeling of the topological relationship between network elements, it is possible to reduce the alarms and help the user to identify the root cause
- This modeling enables:
 - Local event reduction: regular-expression filters (dropping), suppression of flapping events, etc.
 - Grouping of related events (same cause) into alarms
 - Alarm correlation, to identify causality

Local correlation: alarms emitted within a single NE

Topology-based correlation: alarms from multiple NEs



Alarm Management

Prime Performance Manager

- Prime Performance Manager provides ability to define thresholds on Key Performance Indicators (KPI's)
- When a KPI is crossed, an alert can be raised
- Threshold Customizations Available:
 - Applicable to single device or group of devices
 - Testing Interval
 - Scheduling – date/time range
 - Alarm Severity
 - Onset and Abate Occurrences

Add Threshold

General Information

Name	<input type="text"/>	Enabled	<input checked="" type="checkbox"/>
KPI Name	Average Utilization	Alarm Type	Communications
KPI Report	CPU 5 Min Utilization	Probable Cause	ThresholdCrossed
KPI Type	Rising	Alarm Nature	ADAC
Interval	15 Minute	Run Script	<input type="text"/>
Scope	Node=172.20.109.14	Mail To	<input type="text"/>
		Description	<input type="text"/>

Applicable

<input checked="" type="checkbox"/> Monday	<input checked="" type="checkbox"/> Tuesday	<input checked="" type="checkbox"/> Wednesday	<input checked="" type="checkbox"/> Thursday	Begin time	12	:	00	AM
<input checked="" type="checkbox"/> Friday	<input checked="" type="checkbox"/> Saturday	<input checked="" type="checkbox"/> Sunday		End Time	12	:	00	AM

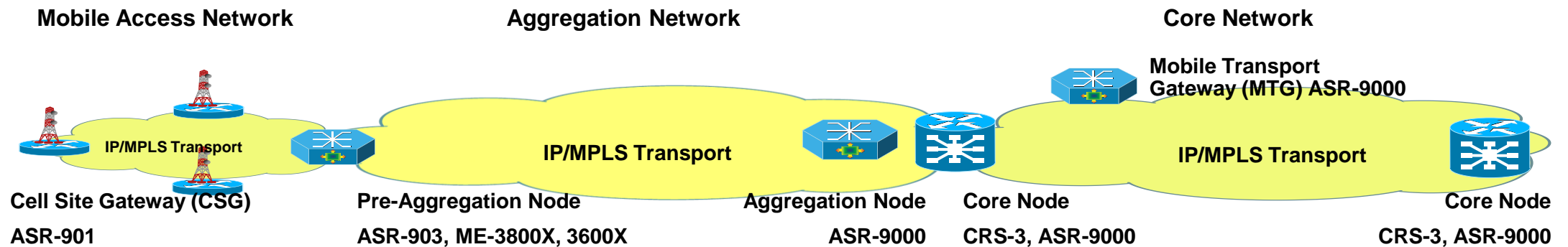
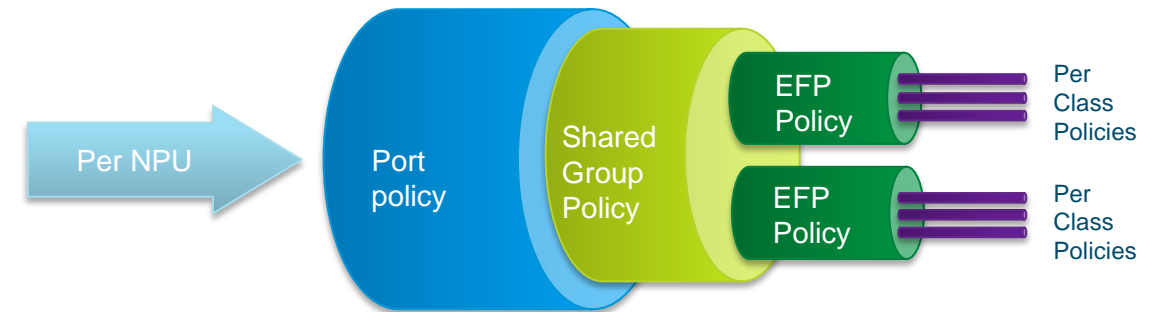
Threshold Values

Level	Onset	Abate	Onset Occurrences	Abate Occurrences
Critical	<input type="text"/>	<input type="text"/>	1	1
Major	<input type="text"/>	<input type="text"/>	1	1
Minor	<input type="text"/>	<input type="text"/>	1	1

OK Cancel Help

Performance Monitoring

- Network resource monitoring
Device and interface utilization and availability
- Network congestion monitoring
Class-based QoS, TE tunnels
- Network service monitoring
Pseudowire, EVC and EVC QoS, IP SLA,
Ethernet OAM, MPLS segments, LDP, Inline video monitoring



Support for multiple technologies

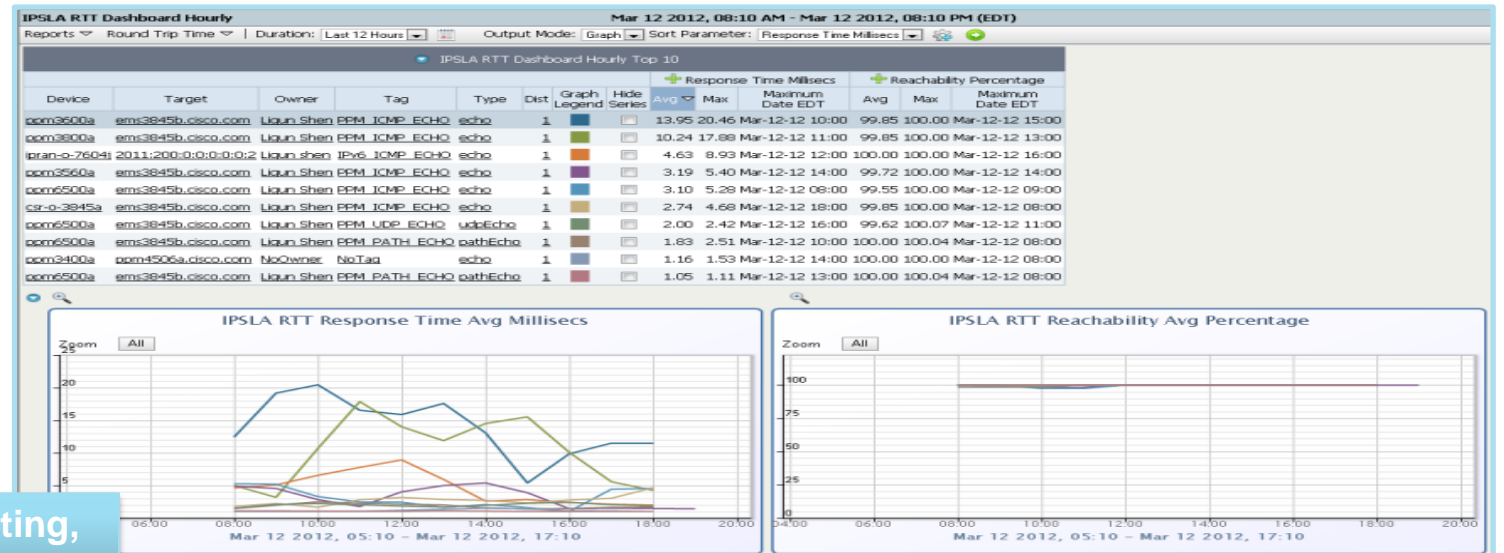
Performance Management

Key Features

- Dashboards present data from different sources on a single page
- Information is viewable in both Tabular and Graphical Format
- Dashboards can be modified and/or new ones created
- Supports Threshold Crossing Alerts
- 1000's of built-in reports

IP-SLA, Y.1731, QoS,

Service-level reporting – VPN, VLAN,
pseudowire



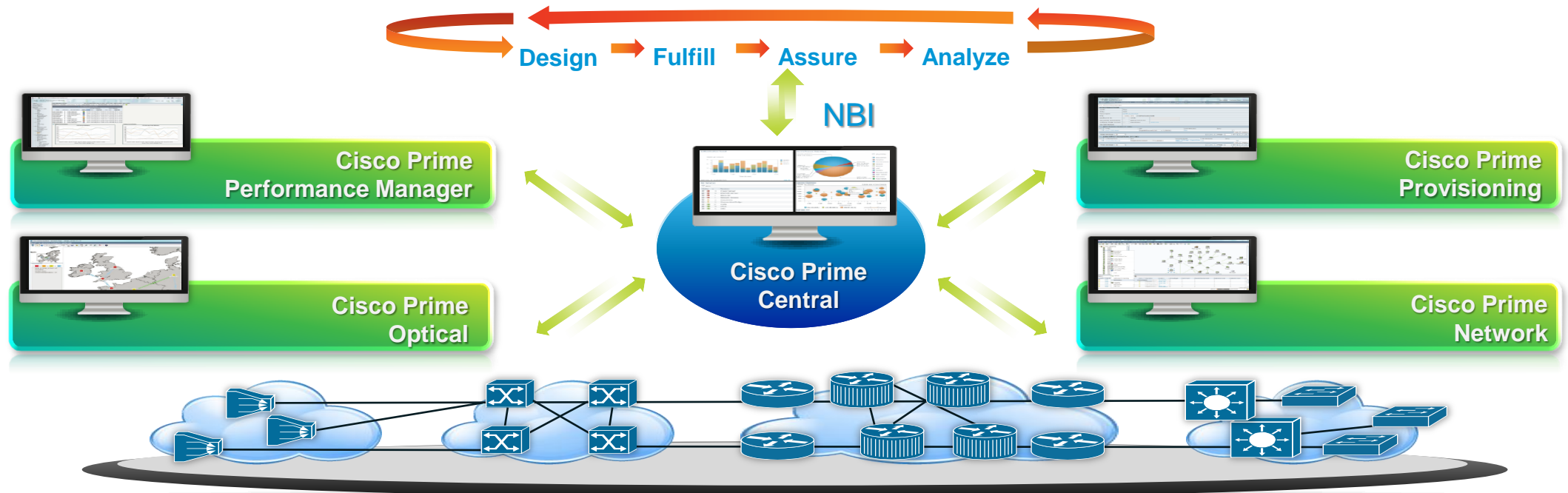
IPSLA reporting,
including EOAM

Summary



Prime for IP NGN Solution

Key Capabilities



- Physical/Logical Inventory
- Complete Network Discovery
- Physical/Logical Topology Discovery
- Image and Configuration Management
- Service Provisioning and Activation
- Resource Management
- Service Visualization
- Service Path Tracing
- Alarm Management
- Root Cause Analysis
- Performance Monitoring
- Threshold Monitoring

Prime for IP NGN Solution Benefits

- Accelerate service deployment

Significantly reduce time to deploy services consistently with GUI-based provisioning

- Lower capital expenditure (CapEx)

Maximize existing network investment through efficient utilization of network resources and assets

- Reduce operating expenses (OpEx)

Lower operating costs through a central point of access that enables efficient execution of design, fulfillment, assurance and analysis tasks

- Reduce Mean Time to Repair (MTTR)

Powerful visualization and troubleshooting tools provide rapid fault isolation and repair of network issues

- Increase operational efficiency

Leverage automation and seamless integration between domain managers and service lifecycle management applications

Proactive Monitoring of the network

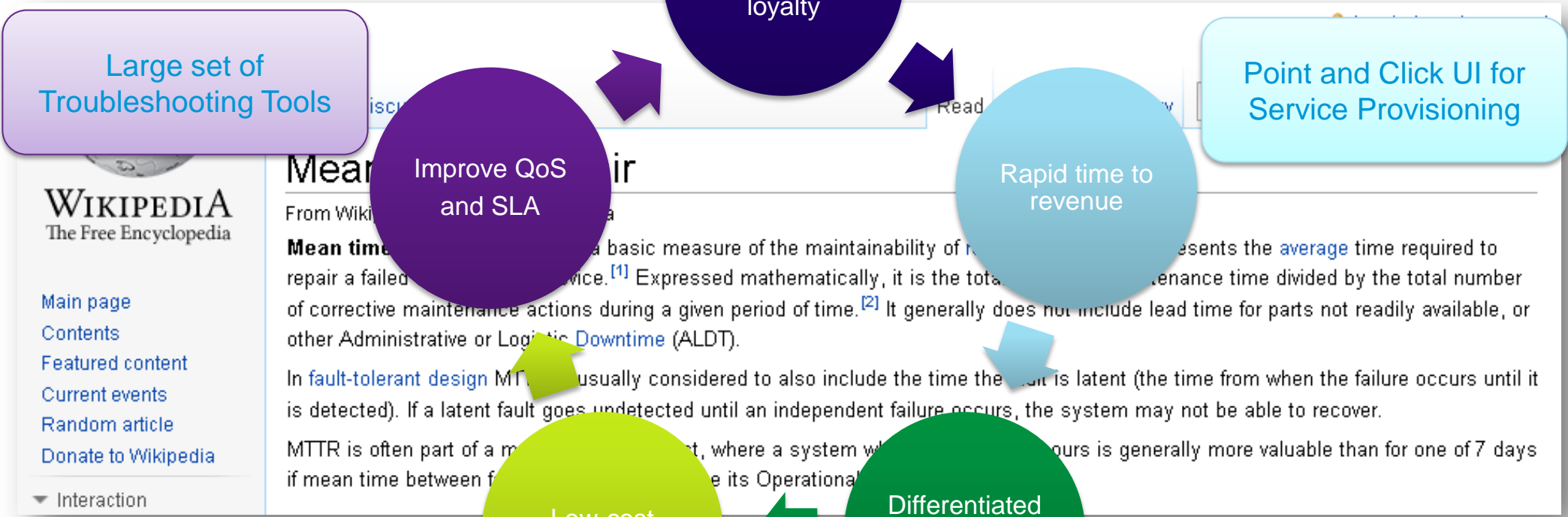
Grow ARPU
Increase loyalty

Large set of Troubleshooting Tools

Improve QoS and SLA

Point and Click UI for Service Provisioning

Rapid time to revenue



Configuration Management

Low-cost operator

Differentiated and new services

Policy that can be adapted to the Operation

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<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*Please rate this session's content

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Please rate the Speaker on the following:

a) *Presentation Skills:

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<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

b) *Subject Matter Expertise:

Excellent	Good	Fair	Poor	Very Poor
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Additional feedback: (please be specific)

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Company: _____ Email: _____

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