



EPN Manager

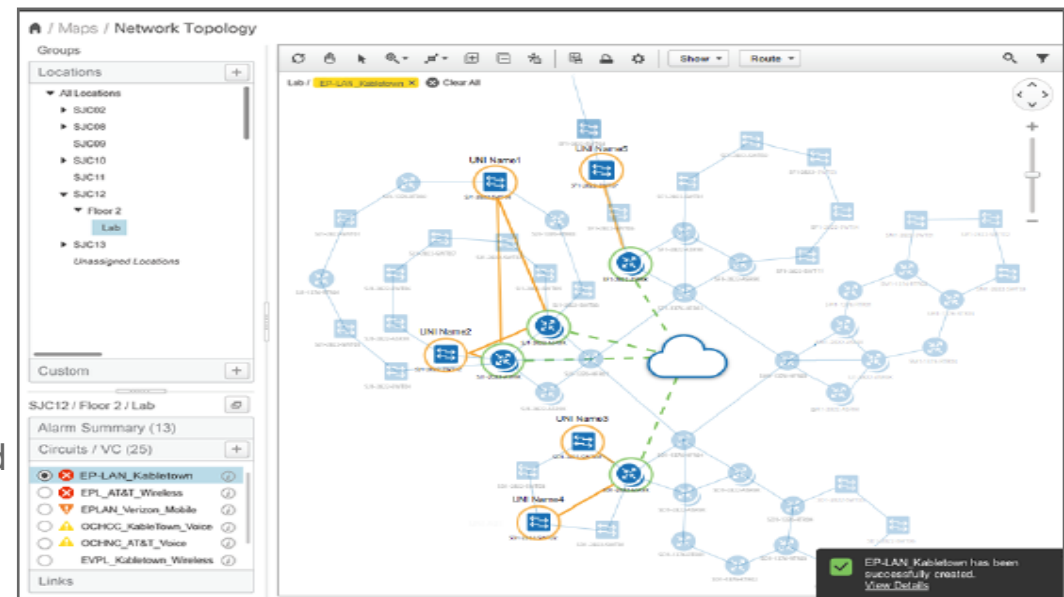
Henrik Bønnelycke

February 2016



EPN Manager – Integrated, multi-domain, multi-layer EMS/NMS

- “One” EMS/NMS covering network management lifecycle
- “One” GUI covering end-to-end task flows across provisioning, assurance, and device management
- Model-based framework allowing frequent network management content (device drivers, network feature support) updates and customization
- Out of the box workflows for Services provisioning and assurance
- Initial focus on Carrier Ethernet, L3VPN and Optical Transport

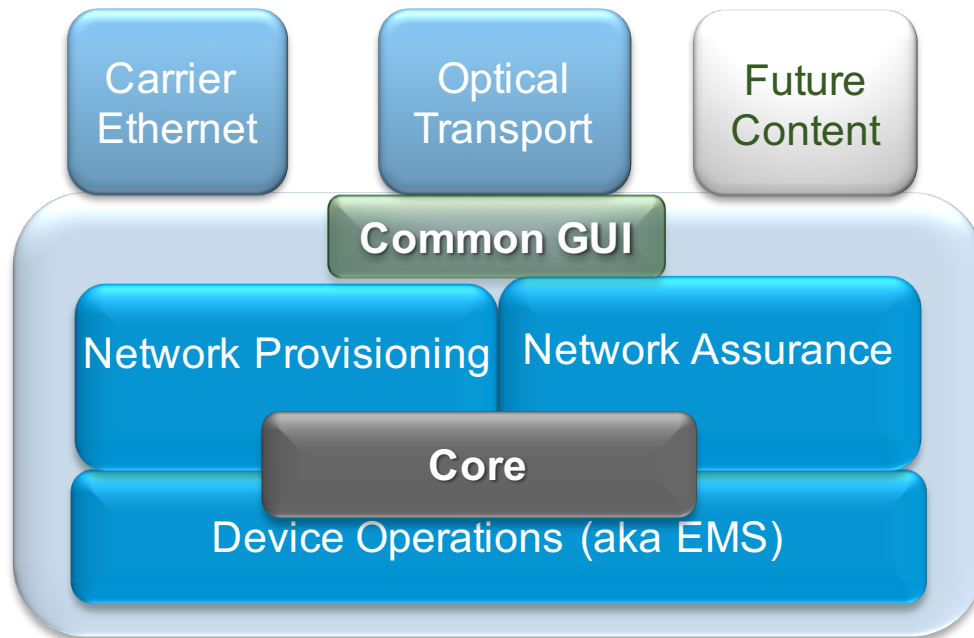


Introduction to EPN-M

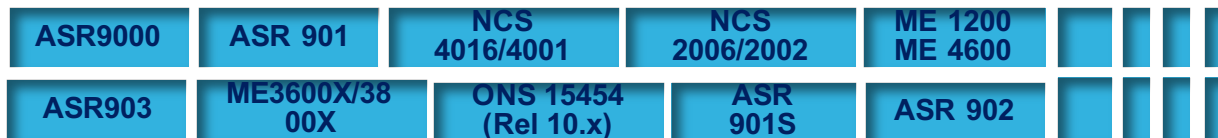
- What is Evolved Programmable Network Manager (EPN-M) 
- Unified network management platform for service provider architecture
- Optical and Carrier Ethernet (March 2015)
- SP Wi-Fi and Data Center (October 2015)
- Evolving for other SP technologies – Small Cell, Mobility, Cable

Allows you to manage multiple networks in a single box

Architecture Highlights



- Converged EMS & NMS
- Single User Experience
- Single Runtime Environment
- Small Footprint
- Single Database
- Common Model Shared across Applications
- Reconciliation between Provisioning and Assurance
- OVA Install
- Feature Extensibility
- SDK and Tooling capabilities



Multi Layer Multi Domain Convergence Management for Converged Service Provider Networks

Metro Ethernet



- E-Lan : E-Line : E-Tree
- E-Access : E-Transit
- QinQ and INNI
- L3 MPLS VPN
- RAN Backhaul
- Autonomic Networking

Optical



- Dense Wavelength Division Multiplexing (DWDM) Optical Channel (OCH) Circuit
- Optical Transport Network (OTN) Circuit
- Packet + Optical

SP Wi-Fi



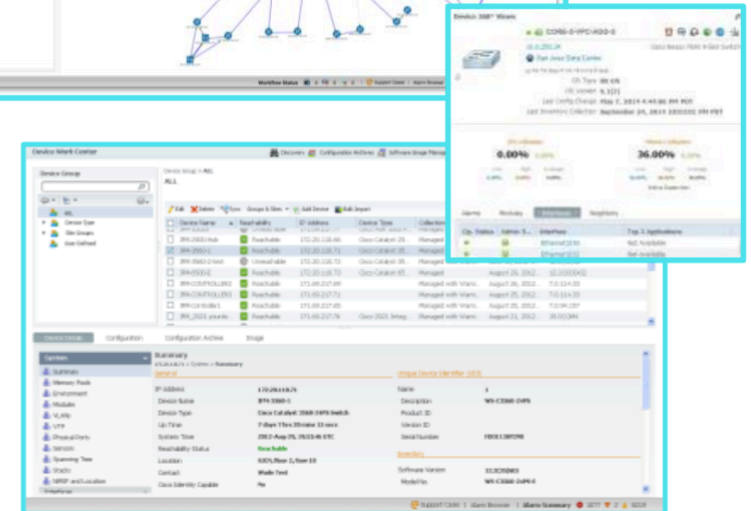
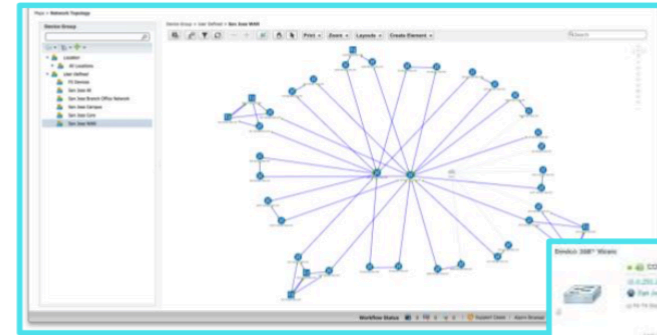
- Controllers
- Access Points
- Outdoor Wireless
- Meraki
- Content Visibility via AVC support

Lifecycle

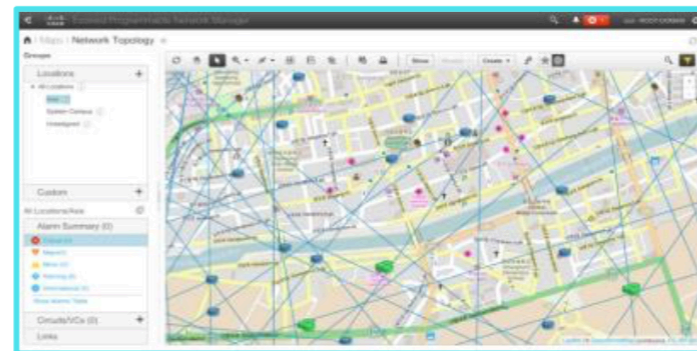
End-to-End Lifecycle Management

Lifecycle

- **Centralized lifecycle management** - discovery, inventory, configuration, SWIM, and service assurance
- **Advanced troubleshooting** of wired and wireless infrastructure issues
- **Rapid device support** through Device Packs for new Cisco® devices, routers, switches, controllers, access points.
- **Customizable configuration templates** based on Cisco validated designs and guided workflows
- **Cisco Unified Access™ management and client tracking**
 - Seamless integration with Cisco Identity Services Engine (ISE) for simplified troubleshooting
 - Seamless integration with Cisco Mobility Services Engine (MSE) for location-based services, rogue detection, etc.



Device Name	Reachability	IP Address	Device Type	Collection
SW1000-1	Reachable	172.20.10.46	Core Catalyst 3500	Managed
SW1000-2	Reachable	172.20.10.47	Core Catalyst 3500	Managed
SW1000-3	Reachable	172.20.10.48	Core Catalyst 3500	Managed
SW1000-4	Reachable	172.20.10.49	Core Catalyst 3500	Managed
SW1000-5	Reachable	172.20.10.50	Core Catalyst 3500	Managed
SW1000-6	Reachable	172.20.10.51	Core Catalyst 3500	Managed
SW1000-7	Reachable	172.20.10.52	Core Catalyst 3500	Managed
SW1000-8	Reachable	172.20.10.53	Core Catalyst 3500	Managed
SW1000-9	Reachable	172.20.10.54	Core Catalyst 3500	Managed
SW1000-10	Reachable	172.20.10.55	Core Catalyst 3500	Managed

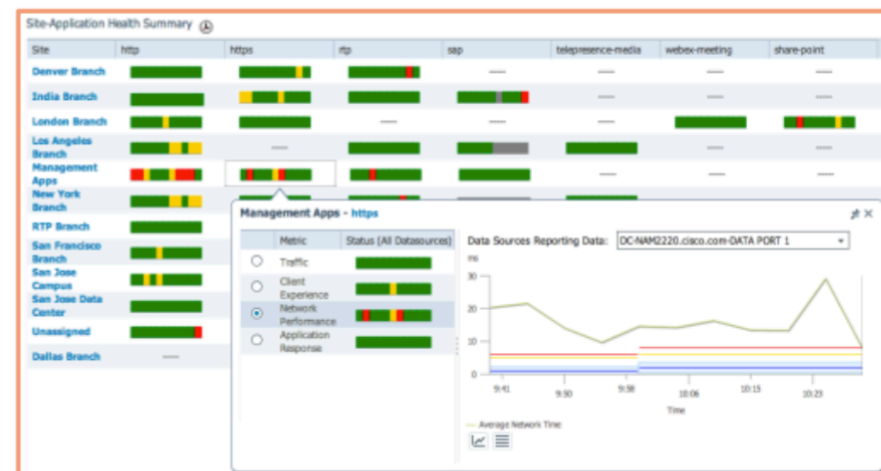
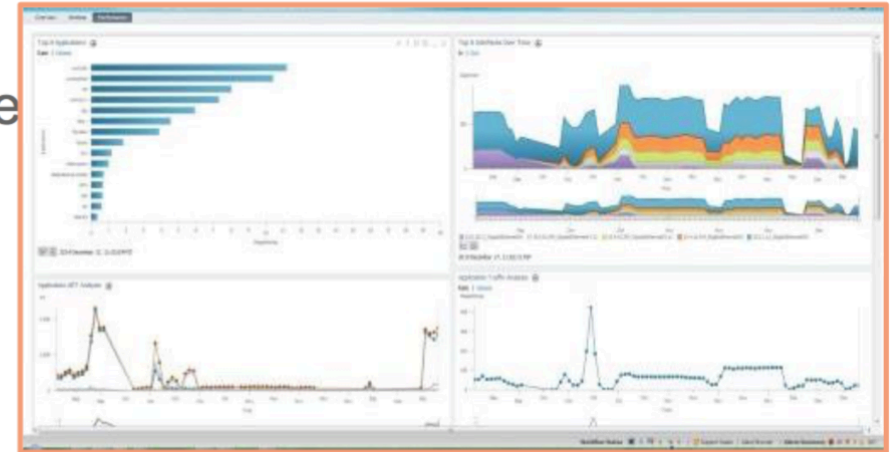


Assurance

Application Experience and End User Experience

Assurance

- **End-to-end visibility** for service-aware networking by applications, services, and end users
- **Out-of-the-box support** for Cisco® advanced technologies, including AVC 2.0, NetFlow, Flexible NetFlow, NBAR2, Performance Agent, Medianet, and more
- **Service health dashboard** allows quick health check on your business-critical applications
- **Simplified troubleshooting** of applications and client access issues

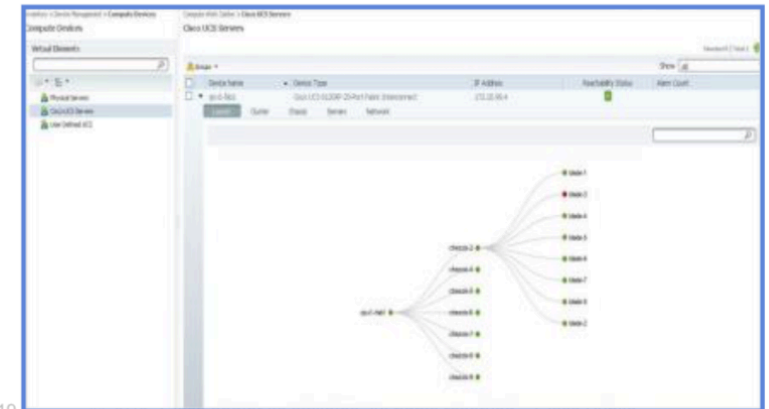
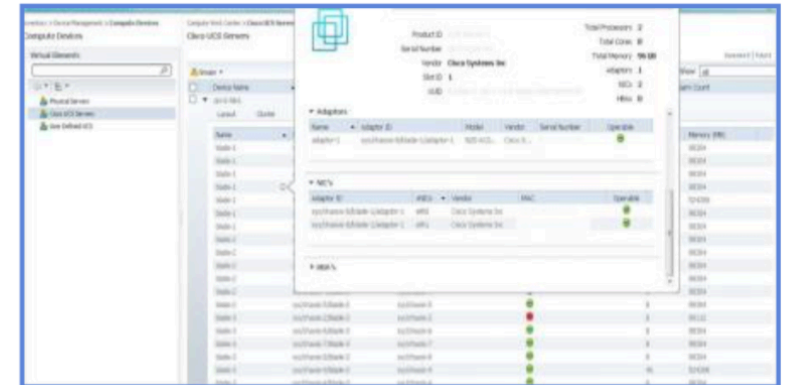


UCS Server Management

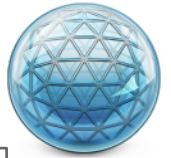
Bridging Network and Compute

UCS Server Management

- **Extends One Management** – Visibility of infrastructure and assurance from Branches all the way through campus and data center
- **Cisco UCS B and C series** – Discovery, inventory of compute infrastructure and mapping that back to the network elements of the data center
- **Fault and Root cause analysis** – Identify and isolate the source of the problem. Help pin point the issues to the right network or compute elements. Understand the impact of network problems onto the compute infrastructure. Remediate the issues at its source
- **Availability and Performance** – Monitor the availability status of the UCS physical servers. Provides visibility to the UCS ports health status and performance
- **Server 360 Degree view** – Concise and easy to consume server details accessible from any where in the product. Allows for quick troubleshooting



EPNM 1.2 for Network Transport



One Framework

- Common Core/Admim
- Common MTOSI/RESTConf
- Common html GUI
- Common Topology
- Fulfillment:
 - Device/Network Provisioning
 - Discovery & Reconciliation
- Assurance
 - Device & Network/Service testing
 - Faults
 - Performance data reporting
- Access:
 - RBAC
 - By network domain (multi-tenancy)
 - Programming Guide

Network Transport

- Optical Transport
 - OCH(DWDM)/OTN
- IP WAN:
 - MEF 2.0 Services
 - E-Line, E-LAN, E-TREE, E-ACCESS
 - MPLS to the Edge plus Ethernet Access
 - G.8032
 - ICCP-SM
 - L3VPN
 - ASR9K as PE

Key Device Drivers

- ASR9001, 9004, 9006, 9010, 9912, 9922, 9000v, 9000v2
- ASR 901
- ASR 901S
- ASR 902
- ASR 903
- ASR 920
- ME3600X
- ME3800X
- NCS2002, 2006, 2015
- NCS4009, 4016

EPN Manager 1.2 – Optical Transport (L0/L1)



- OCH (Optical Channel Circuits) – Deploy via TL1
 - **OCHNC** - *circuits establish connectivity between two optical nodes on a specified C-band wavelength*
 - **OCHCC** - *OCHCC circuits extend the OCHNC to create an optical connection from the source client port to the destination client port of the TXP/MXP cards*
 - **OCH-Trail** - *OCH trail circuits transport the OCHCCs*
- OTN (Optical Transport Network) – Deploy via IOS CLI
 - **ODU UNI** – end to end OTN circuits (ODU0, ODU2, ODU3, ODU4 multiplex hierarchy)
 - **ODU Tunnel** – it is the implicit tunnel that supports the UDU UNI (it can be created alone to support open ended connections)

EPN Manager 1.2 – Carrier Ethernet and L3VPN Virtual Connections (L2/L3/L4)



- Supported VC configuration in EPN Manager 1.2
 - E-Line (EPL/EVPL) MPLS to the Edge
 - E-Line (EPL/EVPL) Ethernet Access: local access, G.8032, ICCP-SM
 - E-Lan (EP-Lan/EVP-Lan) MPLS to the Edge – VPLS/H-VPLS with redundant PW
 - E-Lan (EP-Lan/EVP-Lan) Ethernet Access: VPLS based with G.8032 or ICCP-SM
 - E-Tree (EP-Tree/EVP-Tree) MPLS to the Edge
 - E-Access (EP-Access/EVP-Access) MPLS to the Edge
 - L3VPN: ASR9K as PE device

EPN Manager 1.2 – QoS and Connectivity Verification Options



- Options included with EPN Manager provisioning, discovery, and assurance applications:
 - Quality of Service
 - Bandwidth profiles
 - Classification and admission criteria
 - Policy enforcement
 - EMS-level (per device) QoS policy discovery and configuration application
 - Ethernet OAM
 - ELMI
 - Link OAM
 - CCM (end-to-end connectivity)
 - Y.1731

EPN Manager 1.2 – Resource Readiness and On-boarding



- Device existence and inventory discovery
- Network service discovery
- Templates
 - Device Set up – SNMP, Trap, Access Security (e.g. TACACS) config etc
 - Troubleshooting – incl., CFM Ping, Trace etc.
- Model Based Configuration for BGP, OSPF, ISIS including Remote LFA, BGP 3107...

Cisco EPN Manager: Differentiating Categories

Features

- Web-based HTML client*
- Multilayer view/circuit trace*
- 360 view*
- Future: RAN backhaul scenarios
- Future: “multilayer” performance reporting
- Future: Dynamic, geographic map, 3D multi-layer and map view.

Good Vision

- Packet and optical convergence
- Integration of design/plan (MATE) + optimize (WAE) + NMS (EPN Manager)
- Long term: unified multilayer platform for CE, Optical, Cable, Mobility, SP-Wifi, data center and more
- Long term: Unified Multilayer Initiative (SDN controller dependency)

Good Table Stakes

- Single product experience
- Single product, fast deployment
- MTOSI NBI
- REST API
- Modular and model-driven architecture
- GUI-based provisioning with fewer clicks
- Geo background map integration
- Carbon toolkit to demo NBI

EPNM 1.2 Features

OCH & OTN Circuit Provisioning

One Platform



Circuit Details : Circuit Section

▼ Circuit Details

Label

* State

Bi-directional

* Protection

UNI

▼ Route Properties

Validation

Acceptance Threshold

Protect Acceptance Threshold

Ignore Path Alarms

Allow Regeneration

Upstream (dBm)

Downstream (dBm)

Restoration

Priority

Restoration Validation

Restoration Acceptance Threshold

Restoration Protect Acceptance Threshold

Revert Automatic Manual

Soak Time

▶ Work Port Properties

▶ Protect Port Properties

Task flow driven procedure

Graphical and Textual selection

Circuit Details : Endpoint Section

▼ Endpoints

		Device Name	Termination Point
<input type="radio"/>	A	Site1	CHAN-2-6-2
<input checked="" type="radio"/>	Z	SITE15_OLA	CHAN-2-6-2

Cancel

Previous

Next

Preview

Create Now



MEF 2.0 CE and L3 MPLS VPN Provisioning

One Platform

Service Details

★ Service Name: EVPLAN_Blue

Service Description: [Empty]

Service Type: EVP-LAN

★ Service MTU: 1522

★ Core Technology: VPLS

Bundling:

CE-VLAN ID Preservation:

CE-VLAN ID CoS Preservation:

Maps / Network Topology

Locations: All Locations, SJC02, SJC08, SJC09, SJC10, SJC11, SJC12, Floor 2

Lab / OCHCC_Kabletown

Circuit/VC 360

OCHCC_Kabletown_Data-01

Type: OCHCC
Protected: Yes
Last Change: Tuesday March 8, 2014, 10:31 AM PST
Created: Tuesday March 8, 2014, 10:31 AM PST
Customer: Kabletown
Active Route: Working

Alarms

Status	Timestamp	Message
Not Acknowledged	August 15, 2013 9:57:16 PM UTC	Port '8' is down on device '17...
Not Acknowledged	August 15, 2013 9:57:16 PM UTC	Port '7' is down on device '17...
Not Acknowledged	August 15, 2013 9:57:16 PM UTC	Port '6' is down on device '17...
Not Acknowledged	August 15, 2013 9:57:16 PM UTC	Port '5' is down on device '17...
Not Acknowledged	August 15, 2013 9:57:16 PM UTC	Port '4' is down on device '17...

EP-LAN Kabletown has been successfully created. View Details

Provisioning flow includes:

- Service type
- Service attributes
- UNI definition
- QoS profiles
- EOAM options for EVCs

Chassis View

Chassis View

Node information bar updates to show overview

Each shelf shows in a separate tab with the shelf ID for a label.

Equipment that isn't implemented yet shows an icon.

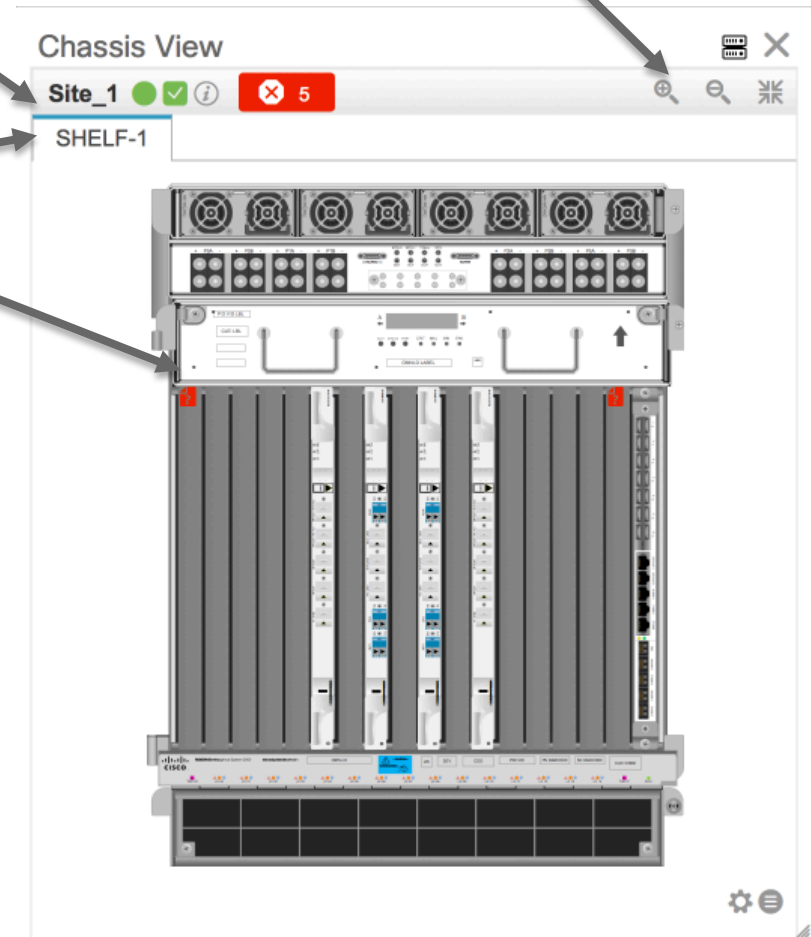
Hovering gives you the equipment details.

Clicking on the equipment gives you a zoomed view.

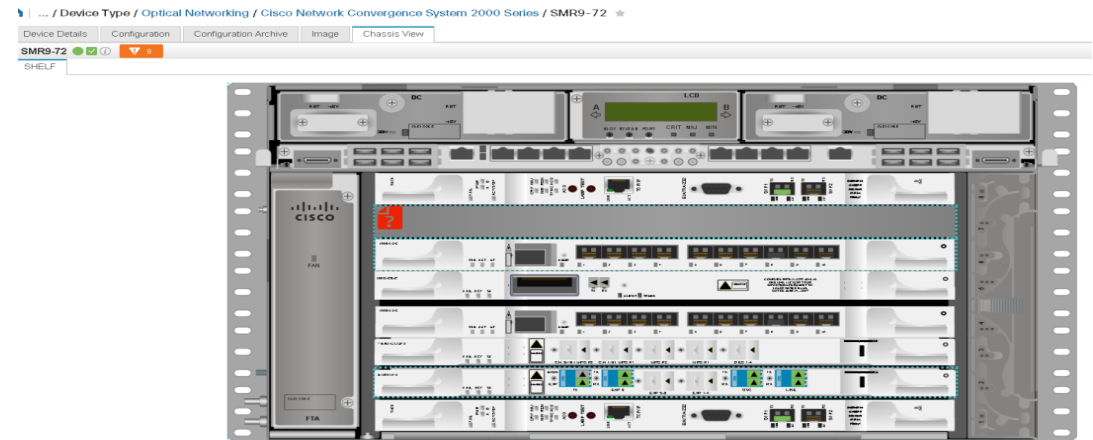
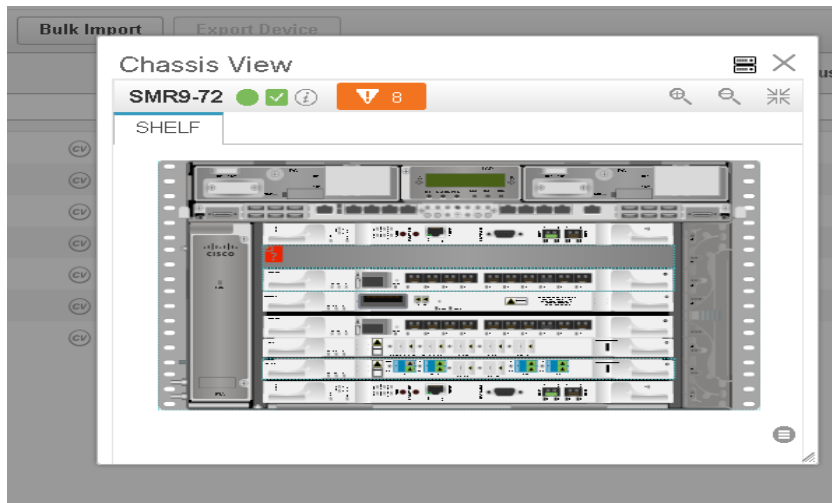
Any equipment alarms will overlay icons on the image.

Card state, including pre-provisioned, shows on image.

Zooming and Panning make it easy to desired details.



Chassis View (NCS 2006)



From Network Devices Table
-> click on 'CV' icon

From the Device Details page
-> click on 'Chassis View' tab

Supported chassis: NCS 2002, NCS 2006, NCS 2015, NCS 4009, NCS 4016



Inventory Reporting

Accessible from the dashboard

The screenshot displays the Cisco Programmable Network Manager dashboard. The left sidebar contains a navigation menu with categories like Dashboard, Monitor, Configuration, Inventory, Maps, WiFi Services, Reports, and Administration. The main content area is titled 'Programmable Network Manager' and features a 'Service Performance Summary' section with various status indicators (e.g., 0 Critical, 0 Major, 0 Minor). Below this, there are sections for 'Client Count By Association/Authentication' and 'Top N Interface Utilization'. The dashboard is accessible from the 'Overview' tab in the left sidebar.

Dashboard -> Network Summary -> Overview

Inventory report with manufacturing date

Evolved Programmable Network Manager

Application Search | 2 | root - ROOT-DOMAIN

Dashboard / Network Summary

Overview Incidents Network Inventory

Network Inventory

Device Name	Product ID	Operational Status	Product Name	Physical Location	Serial Number	Manufacture Date	CLEI Code
Bologna	ONS-XC-10G-37.4	2	STM-64-G.709/10GE/10F...	PPM-2-2-19	FLJ1111G113	Mar-2007	WMOTB86AAA
Verona	ONS-XC-10G-37.4	2	STM-64-G.709/10GE/10F...	PPM-2-6-19	FLJ1111G105	Mar-2007	WMOTB86AAA
Bologna	ONS-XC-10G-40.5	2	STM-64-G.709/10GE/10F...	PPM-2-4-3	FLJ1124G008	Jun-2007	WMOTB89AAA
Venice	ONS-XC-10G-40.5	2	STM-64-G.709/10GE/10F...	PPM-4-3	FLJ1128G030	Jul-2007	WMOTB89AAA
Bologna	ONS-XC-10G-58.9	2	STM-64-G.709/10GE/10F...	PPM-2-7-9	FLJ1115G055	Apr-2007	WMOTB90AAA
Verona	ONS-XC-10G-58.9	2	STM-64-G.709/10GE/10FC-1559NM		FLJ1144G009	Nov-2007	WMOTB90AAA
Venice	ONS-XC-10G-S1	2	STM-64-G.709/10GE/10F...	PPM-4-1	ONT11241047	Jun-2007	WMOTCAVAAA
Venice	ONS-XC-10G-S1	2	STM-64-G.709/10GE/10F...	PPM-4-2	ECL103400KL	Aug-2006	WMOTCAVAAA
Bologna	ONS-XC-10G-S1	2	STM-64-G.709/10GE/10F...	PPM-2-4-1	ECL103400KR	Aug-2006	WMOTCAVAAA
Bologna	ONS-XC-10G-S1	2	STM-64-G.709/10GE/10F...	PPM-2-4-2	ONT1030102G	Jul-2006	WMOTCAVAAA
Bologna	ONS-SE-Z1	2	STM-1/STM-4/STM-16/1G...	PPM-2-2-13	ECL112801J5	Jul-2007	WMOTCMTAAA

Friday, October 2, 2015 at 7:11:06 PM W. Europe Daylight Time

Circuit Management

Circuit History

□ Why do we need it?

- ❖ History allows us to take a snapshot of a service for future reference.
- ❖ Based on history, the user will be able to track a service and find out what happened to it and when.

Circuit History: OCHCC_Kabletown

Select any two events to compare them on the network map

Show

Show	Timestamp	Events	Source
<input checked="" type="checkbox"/>	Active - Working Path	?	
<input type="checkbox"/>	February 23, 2015 2:48:46 AM EST	Name ?	Don.Joe@cisco.com
<input type="checkbox"/>	January 23, 2015 9:09:29 AM EST	Name ?	Don.Joe@cisco.com
<input type="checkbox"/>	December 19, 2014 3:13:23 AM EST	Name ?	Don.Joe@cisco.com
<input type="checkbox"/>	December 21, 2014 3:25:00 AM EST	Route - Protected ?	Automatic
<input type="checkbox"/>	December 10, 2014 9:31:10 AM EST	Route - Restored ?	Automatic
<input type="checkbox"/>	December 07, 2014 2:55:13 AM EST	Provisioning ?	Don.Joe@cisco.com
<input type="checkbox"/>	November 19, 2014 8:48:26 AM EST	Name ?	Don.Joe@cisco.com

Route details	Provisioning details
Event Details <input type="button" value="x"/>	Event Details <input type="button" value="x"/>
Description	Description
Route changed	Device 123 added
Port 123 went down	Node ABC was removed
Working route changed	Link DEF was added
Working route changed to protected	Device 123 added

Performance Management

Example of Tabular Optical Reports

Report Interval have an option of 15 minutes or 1 day

First 50 records will be shown as default

Tabular Output

Report Run Result

OTN
Generated: 2015-Jan-22, 12:06:19 IST
Report By: Interfaces By Device
Report Interval: 15 minutes
Reporting Period: Last 1 Year
Show: Up to 50 records
Section Monitoring Near End Report

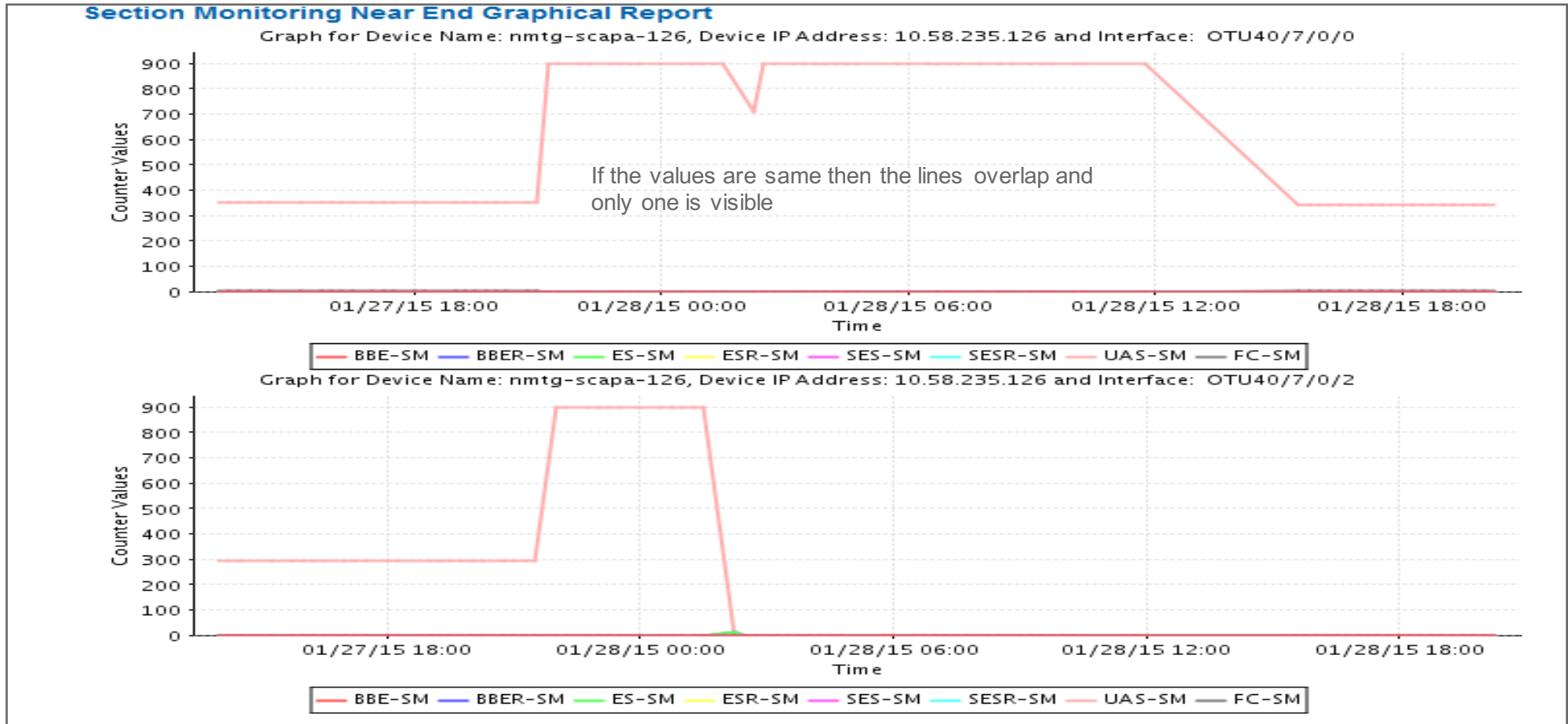
Cisco EPN Manager

Pagination →

Device Name	Device IP Address	Interface	DateTime	BBE-SM	BBER-SM	ES-SM	ESR-SM	SES-SM	SESR-SM	UAS-SM	FC-SM
nmtg-scapa-122	10.58.235.122	OTU20/1/0/1	2015-Jan-21, 02:00:00 IST	0	0.00000	0	0.00000	0	0.00000	900	0
nmtg-scapa-122	10.58.235.122	OTU20/1/0/1	2015-Jan-21, 02:45:00 IST	0	0.00000	0	0.00000	0	0.00000	900	0
nmtg-scapa-122	10.58.235.122	OTU20/1/0/1	2015-Jan-21, 03:15:00 IST	0	0.00000	0	0.00000	0	0.00000	900	0
nmtg-scapa-122	10.58.235.122	OTU20/1/0/1	2015-Jan-21, 03:45:00 IST	0	0.00000	0	0.00000	0	0.00000	900	0
nmtg-scapa-122	10.58.235.122	OTU20/1/0/1	2015-Jan-21, 04:00:00 IST	0	0.00000	0	0.00000	0	0.00000	900	0



Example Graphical Optical Report Output



Report Scheduling

Home / ... / OTN / New OTN ★

Settings

Create reports in current and each sub Virtual Domains [?]
[View sub Virtual Domains](#)

Report Title

Report Type

Report By

Report Criteria

Report Interval

Reporting Period
 Last 1 Year
 From To

Show
 Up to records
(Enter a number between 5 and 50000, or leave blank to show all records.)

Schedule

Scheduling Enable

Export Format

Destination
 File
 Email

Start Date/Time
 (GMT+2:0) Asia/Jerusalem
 Current Server Time: 2015-Jan-29, 02:34:55 IST

Recurrence
 No Recurrence Hourly Daily Weekly Monthly

Home / Reports / Report Launch Pad ★

Saved Scheduled Reports

Report Title ▲	Report Type	Scheduled	Virtual Domain	Run Now
<input type="checkbox"/> Forward Error Correction Report	OTN	● Enabled	ROOT-DOMAIN	
<input type="checkbox"/> Section Monitorin Near End Graphical ...	OTN	● Enabled	ROOT-DOMAIN	
<input type="checkbox"/> Section Monitorin Near End Report	OTN	● Expired	ROOT-DOMAIN	

Total Entries 3



Geo Map

Geographical Map

Maps / Topology Maps / Network Topology

Device Groups

Locations

- All Locations
- Optical
- System Campus
- Unassigned

Custom

All Locations/Unassigned

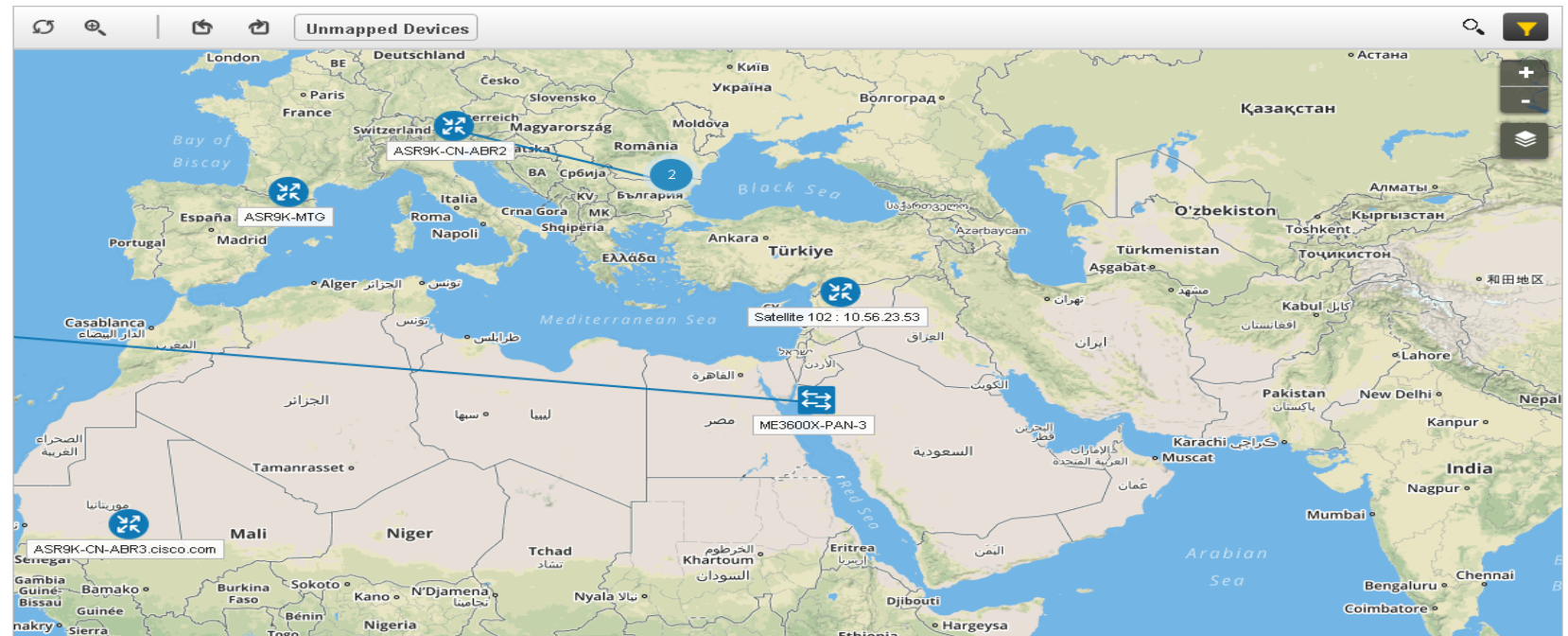
Alarm Summary (0)

- Critical (0)
- Major (0)
- Minor (0)
- Warning (0)
- Informational (0)

Alarms Table

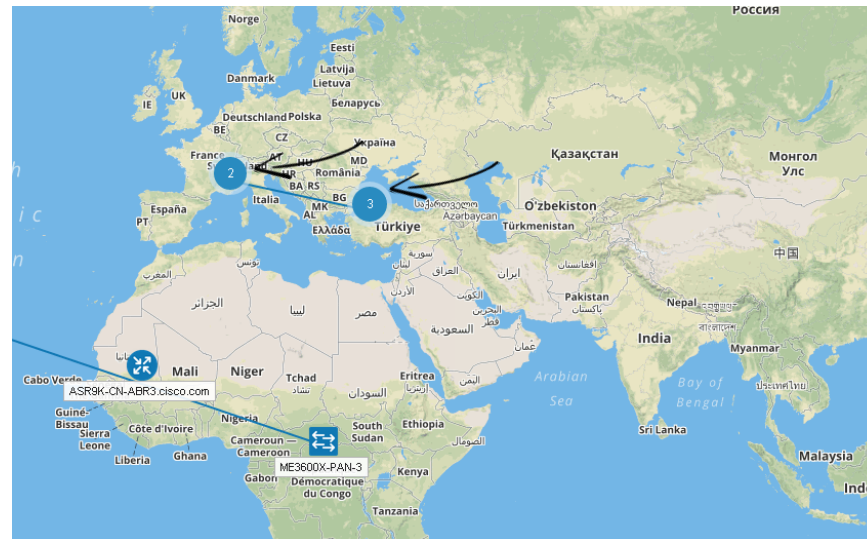
Links

All Locations / Unassigned



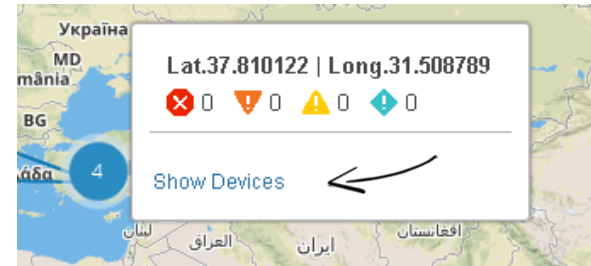
Geo Device “Clusters”

- A device “cluster” is formed when two or more devices are located close to one another on the map.
- The cluster is represented on the geo map by a circle with a number in its center, indicating the number of devices in the cluster.
- Zoom in to see the individual devices on the map.
- If devices location is too close (less than 5-8 meters) then even on max zoom level there will be a cluster.
- Alarms are shown on clusters based on highest severity of all its devices.



Show Devices

- To see the list of devices which are part of the same “cluster”, select the cluster -> Show Devices
- The list of devices will appear to the right.
- You can now change the location of devices in this cluster, by either drag & drop to a new location, or set the location manually.
- Note: This list is a snapshot list, so it will not update if you edit the location of a device.



Lat.37.810122 | Long.31.508789 (Temp. List) X

Organize devices by dragging them onto locations on the map. Use the "Set Manually" button to set GPS coordinate manually

Selected 0 / Total 4

Set Manually		Show	Quick Filter
	Device Name		
<input type="checkbox"/>	Satellite 102 : 10.56.23.53		
<input type="checkbox"/>	Satellite 203 : 10.56.23.51		
<input type="checkbox"/>	ME3600X-PAN-3		
<input type="checkbox"/>	ASR901-CSG-1-DOMAIN3.cisco.com		

Link Layers View

Maps / Topology Maps / Network Topology

Device Groups

All Locations / Unassigned

Locations

- All Locations
- Optical
- System Campus
- Unassigned

Custom

All Locations/Unassigned

Alarm Summary (0)

- Critical (0)
- Major (0)
- Minor (0)
- Warning (0)
- Informational (0)

Alarms Table

Links

Unmapped Devices

Control Plane

Physical Layer

Multi Layer Trace

Multi Layer Trace – recap

- The EPN Manager Multi Layer Circuit Trace supports only Optical Circuits
- Launched from Circuit 360 and Circuit Overlay

The screenshot displays the 'Circuit/VC 360° View' in the EPN Manager. On the left, a sidebar shows 'Locations' with 'Optical' selected. Below it, an 'Alarm Summary (275)' table lists various circuits, with 'oc192-2' highlighted. The main area shows a network diagram with three nodes: 'LMDM04', 'sit02', and 'OMFLS02'. A context menu is open over the 'oc192-2' entry, with 'Multi-Trace' selected. To the right, a details panel for 'oc192-2' shows attributes: Type (ODU Tunnel), Protected (true), Last Change, Created (September 28, 2015 10:31:55 AM JDT), Customer (NA), Provisioning State (Discovered), and Active Route (Working). Below this, there are sections for 'Error Transmitted - MAX - U20/10/0/0/42 (Watt)' and 'Background block errors - Section Monitoring - NEND - ODU20/13/0/0/22 (Number)'. At the bottom, there are tabs for 'points', 'History', and 'Carrying Circuits/VCs', and a table with columns for 'Timesta...', 'Device', 'Affected Object', and 'Alarm...'.

Multi-Layer Show/Hide

- Labels
- Physical Flow
- Links
- Power Level
- Span Loss
- Faults

The screenshot displays the Cisco Evolved Programmable Network Manager interface. The main window shows a network topology with three vertical columns representing different network elements: DWDM04, SIT02, and GMPLS02. Each column is divided into layers: ODU (top, pink), OTU (middle, light pink), OCH (light blue), and OPS (bottom, blue). A 'Show' dropdown menu is open, revealing a control panel with the following options:

- Labels
- Physical Flow
- Links
- Power Levels
- Span Loss
- Fault

Below the 'Fault' option is a vertical slider for 'Informational' (top) to 'Critical' (bottom) fault severity. The slider is currently positioned at the 'Minor' level. The interface also includes a search bar, navigation tabs (Linear View, 3D View, Show), and a status bar at the bottom showing system information like time (3:46 PM) and date (9/30/2015).

NBI

MTOSI North Bound Interface

- MTOSI Interface
 - SOAP Web Services
 - Standard based
 - MTOSI 3.0 (TMF 864)
 - WSDL 1.1
 - SOAP 1.1
 - XML Schema 1.0

RestConf North Bound Interface

- Restconf Interface
 - Designed to have “parity” with MTOSI API for Physical Inventory and Optical Service Retrieval
 - Carrier Ethernet is out of scope for Bora (EPNM 1.2)
 - Standards based
 - RESTCONF Protocol (draft-ietf-netconf-restconf-06)
 - HTTP 1.1
- Key Features – read-only access to the following
 - Physical Inventory
 - Optical Link Inventory
 - Optical Circuit Inventory
 - Optical Channel (OCH)
 - Optical Transport Network (OTN)

Packet-related Features Update

Cisco EPN Manager 1.2 Carrier Ethernet and L3 VPN Support

One Integrated Framework

- EMS/Core/MTOSI
- UI/UX Baseline
- Topology
- Network/Service Provisioning
- Service Discovery
- Network Assurance
 - Service Testing/Validation (RFC 2544/Y.1564)
 - Faults
 - Performance©

4 Types of Carrier Ethernet Services

- MEF 2.0 Services including EOAM and QOS configuration
- E-Line, E-LAN, E-TREE, E-ACCESS
 - MPLS to the Edge
 - Ethernet Access

Supported Devices

- ASR9K
- ASR 901/903
- ASR 901S
- ASR 902/920
- ASR 907
- ME3600X, ME3800X

L3VPN

- ASR9K as PE
- BGP as PE-CE protocol

EPNM 1.2 (Bora): What is new?

Device Configuration

- LAG Support
- OSPF Configuration
- IS-IS Configuration

Inventory/Topology

- Interface 360 View
- Geographical maps

L3VPN Support

- VRFs on ASR9K
- VPN, RT And RD management
- Discovery and Provisioning for L3VPNs
- BGP as PE-CE protocol
- QOS Profile management

Provisioning

- Service Promotion
- Port filtering when provisioning

Interface 360 & Link 360

Interface 360 View

- Interface 360 gives a quick look of port/interface attributes, metrics and status of device interfaces. It is divided into the following 3 sections.
- Summary data – This section provides the information about Port type, name, adjacent port, layer rate, status, description etc.
- Performance data -This section shows graphs reflecting various aspects of the interface performance
- Tabs data – This section provides a detailed information of Alarms, Interfaces and circuit/VCS.

Interface 360

Evolved Programmable Network Manager

Maps / Topology Maps / Network Topology

Device Groups

Locations

- All Locations
 - System Campus
 - TME CE Network
 - Unassigned
 - VIMERCATE_HEROBU_DO_NOT_...
- Custom

All Locations / VIMERCATE_H...

Alarm Summary (2)

- Critical (2)
- Major(0)
- Minor (0)
- Warning (0)
- Informational (0)

Alarms Table

Circuits/VCs (4)

Device 360

Bologna 10.58.238.79

up for N/A

OS Type NCS SDH
OS Version 10.03.00
Last Config Change September 26, 2015 6
Last Inventory Change September 29, 2015 1

Alarms | Modules | **Interfaces** | Neighbors

Op. S...	Admin...	Interface
✖	✖	FAC-2-4-2-1
✖	⚠	VFAC-2-4-3-1
✖	✖	FAC-2-4-1-1

Interface 360 View

FAC-2-4-1-1

Description No data available
If Speed 10000000000 bps
MTU 9700 bytes
Interface Type GIGABITETHERNET
Protection Role Working
Protection Status Standby
Service State locked-enabled,disabled
Soak 8:0
Transport Admin State locked,disabled
Device Name Bologna
Adjacent Interface(s) N/A

Output Power Transmitted - MIN (Watt) Output Power Transmitted - MAX (Watt)
No Data Available No Data Available

Alarms | **Interface** | Circuits/VCs

Severity	Condi...	Timestamp	Affected Obj...	Alarm ID
No data available				

Link 360°

View Details Actions

OTDR



NCS2k_ATL399: Shelf 1, slot 3, port 2
NCS2k_PNS824: Shelf 2, slot 3, port 2

State ↑ Up
 Alarm Status ✓ Cleared
 Type OTS
 Direction Bidirectional
 Link Capacity 96 channels (50 GHz spacing)
 Common Attribute <TBD>
 Utilization 20%
 Specific Link Attribute <TBD>

Span Loss

-25 db →
-25 db ←

Power Level



Alarms End Points Circuits/Vcs

Device	Interface	Tx Power	Rx Power
NCS2k_ATL399 ⓘ	Shelf 1, slot 3, port 2 ↑ ✓ ⓘ	20 db	-5 db
NCS2k_PNS824 ⓘ	Shelf 2, slot 3, port 2 ↑ ✓ ⓘ	21 db	-4 db

- Link 360 basics (for OTS and Ethernet)
- Alarms and endpoints of the link
- OTDR launch point
- Circuits using the link
- Utilization/Capacity information
- Aggregated Link State
- Endpoint power levels
- Charts/Graphs to provide additional info
- Additional information and control of Loopbacks
- Additional link type support
- Port name redesigned to resemble CTC
- Expand Link 360 to cover patchcords
- Free text Link label



Bandwidth Utilization

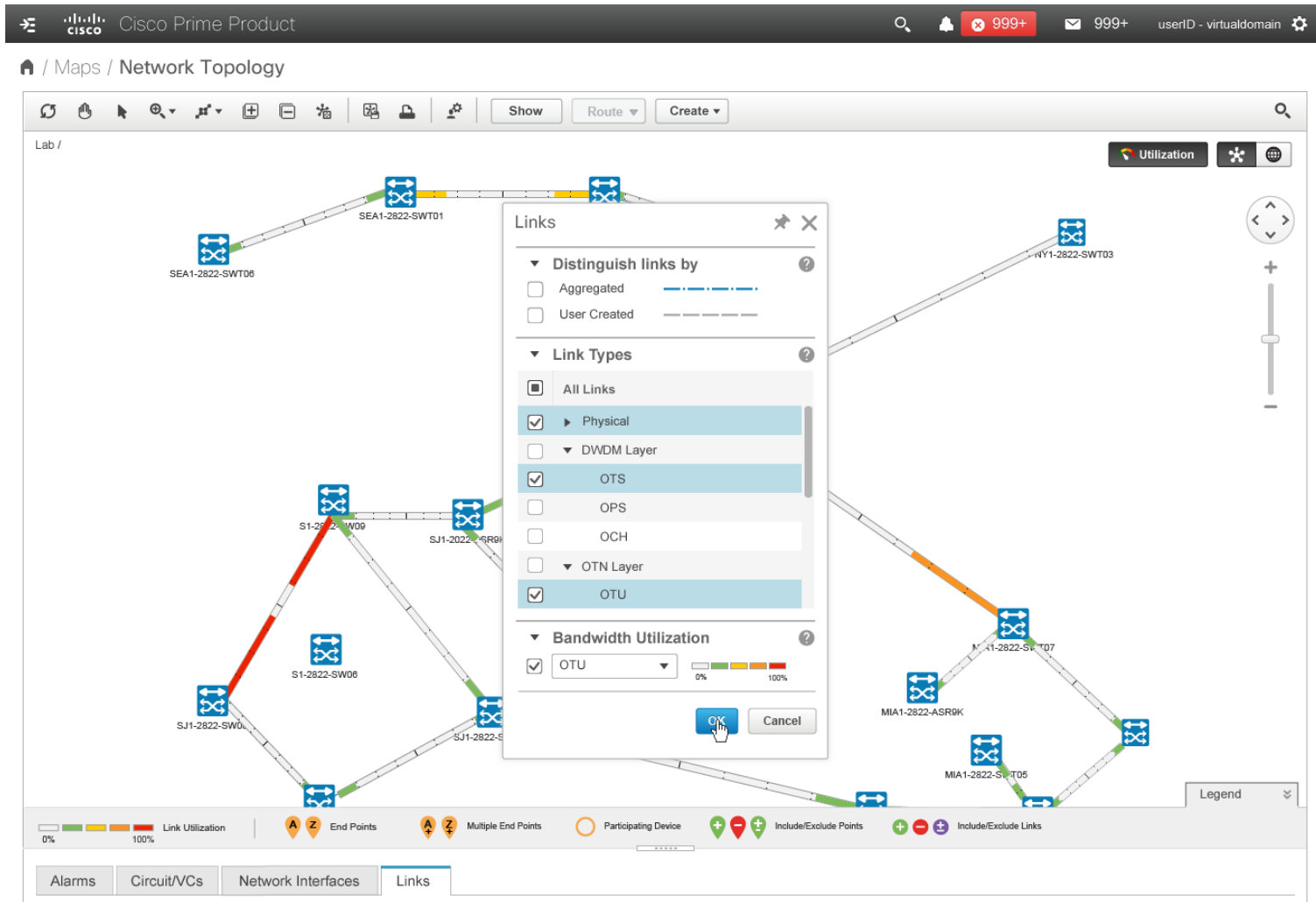
Bandwidth Utilization Graphical Display

OTS:

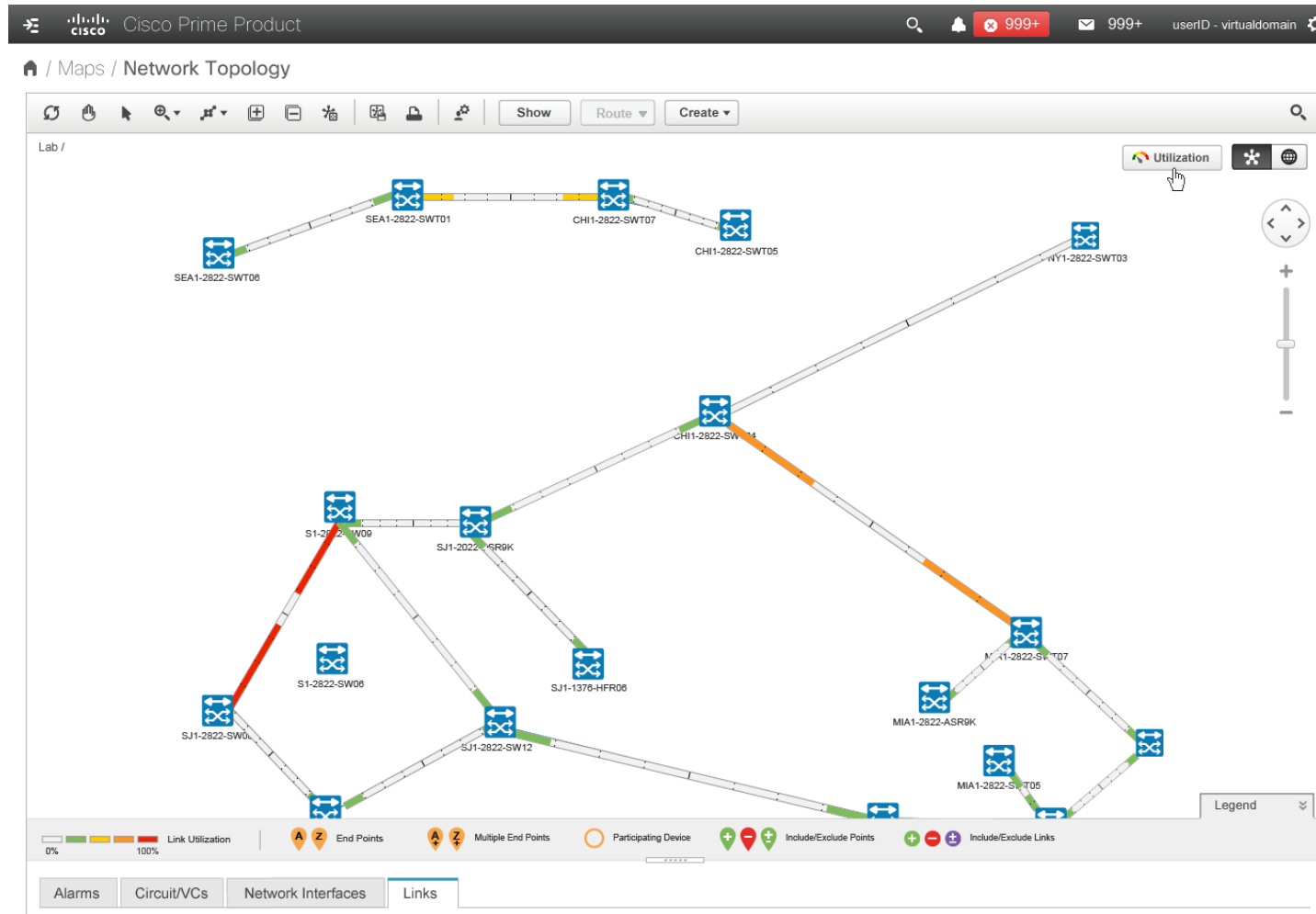
- Capacity of link expressed in number of channel (12.5 or 50 Ghz wide) that can be configured
- Utilization expressed in percentage and in number of channels used.

OTU:

- Capacity in Gb (for OTN)
- Utilization In percentage of capacity (for OTN)



Bandwidth Utilization Graphical Display

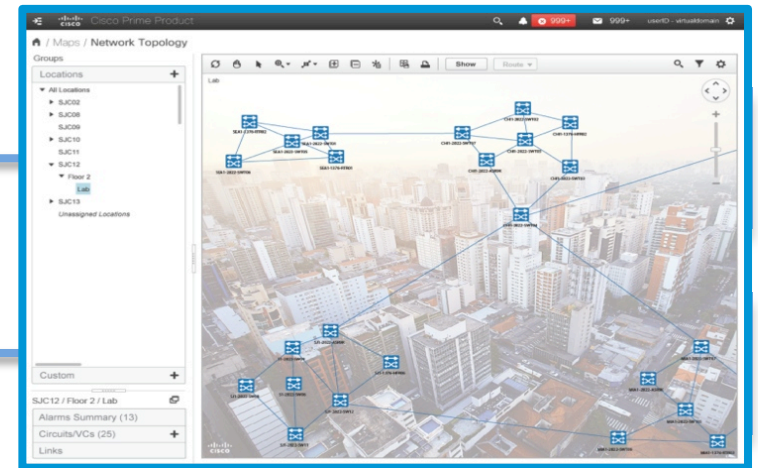
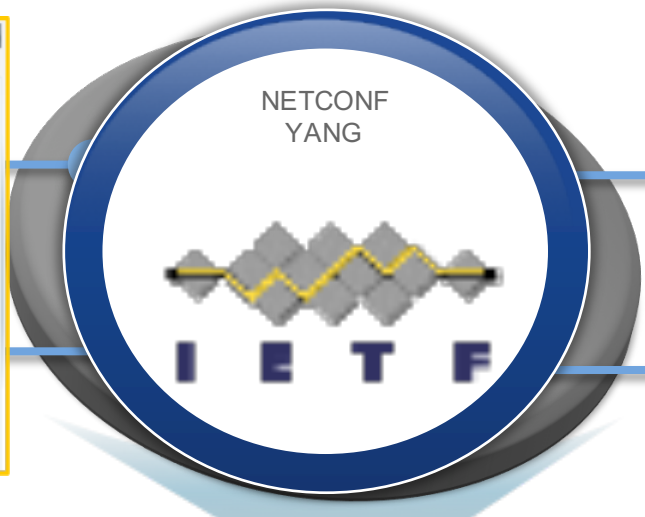
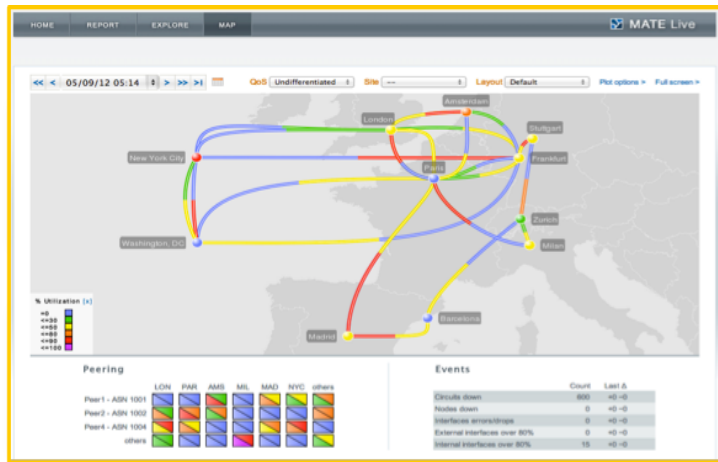


EPN-M Vision

The Way to Multilayer Service Lifecycle Management

WAN Automation Engine

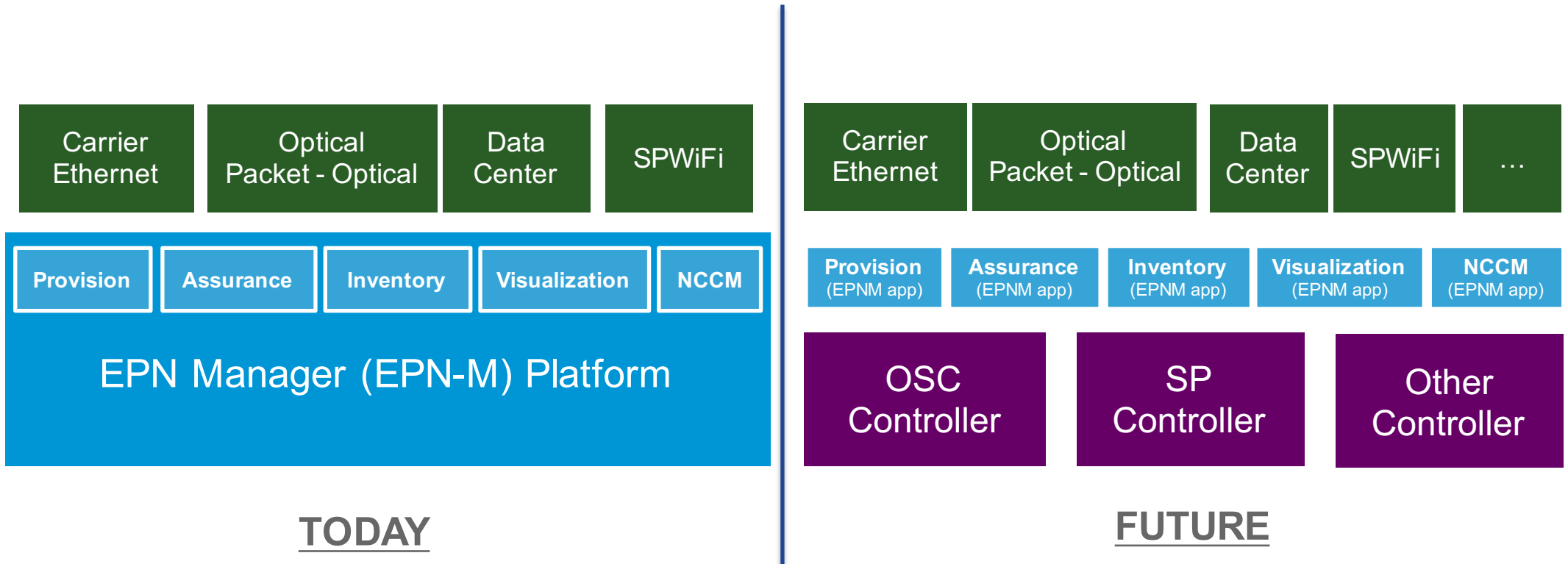
EPN Manager



SDN Controllers



EPN Manager NfV/SDN Strategy





TOMORROW starts here.