



Cisco Expo
2008

Network Visibility



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NMS/OSS Consulting SE

Agenda

- What is Network Management ?
 - The CFO's view
 - Device Instrumentation
 - Visibility
-
- Questions are welcome
 - Mobile phone ring-tones are not

What is Network Management ?



What is Network Management ?

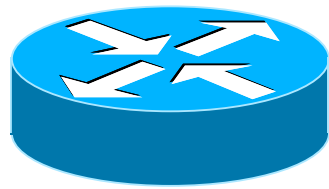
- Similar to a doctor treating a patient, similar to managing national health
- Because somebody wants to ***achieve a goal***
- Steps:
 - 1) Observe or Monitor
 - 2) Interfere; i.e. change the behaviour
 - 3) Measure; similar to Monitor, but more precise data
 - 4) Report; produce intelligible info for others

The CFO's view



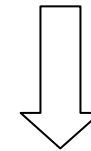
Why NMS ?

- Why Network Management **Systems** ?
- Enable owners of (Cisco) Kit to save on spending €€ while managing the kit



- €€€

Manual mgmt

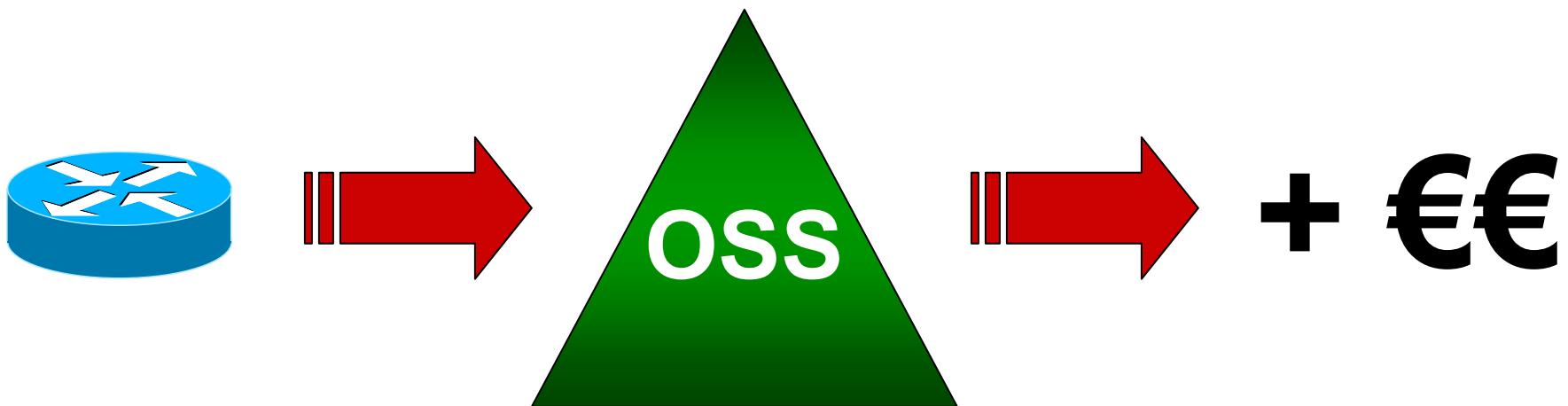


- €€

IT assisted mgmt

About OSS

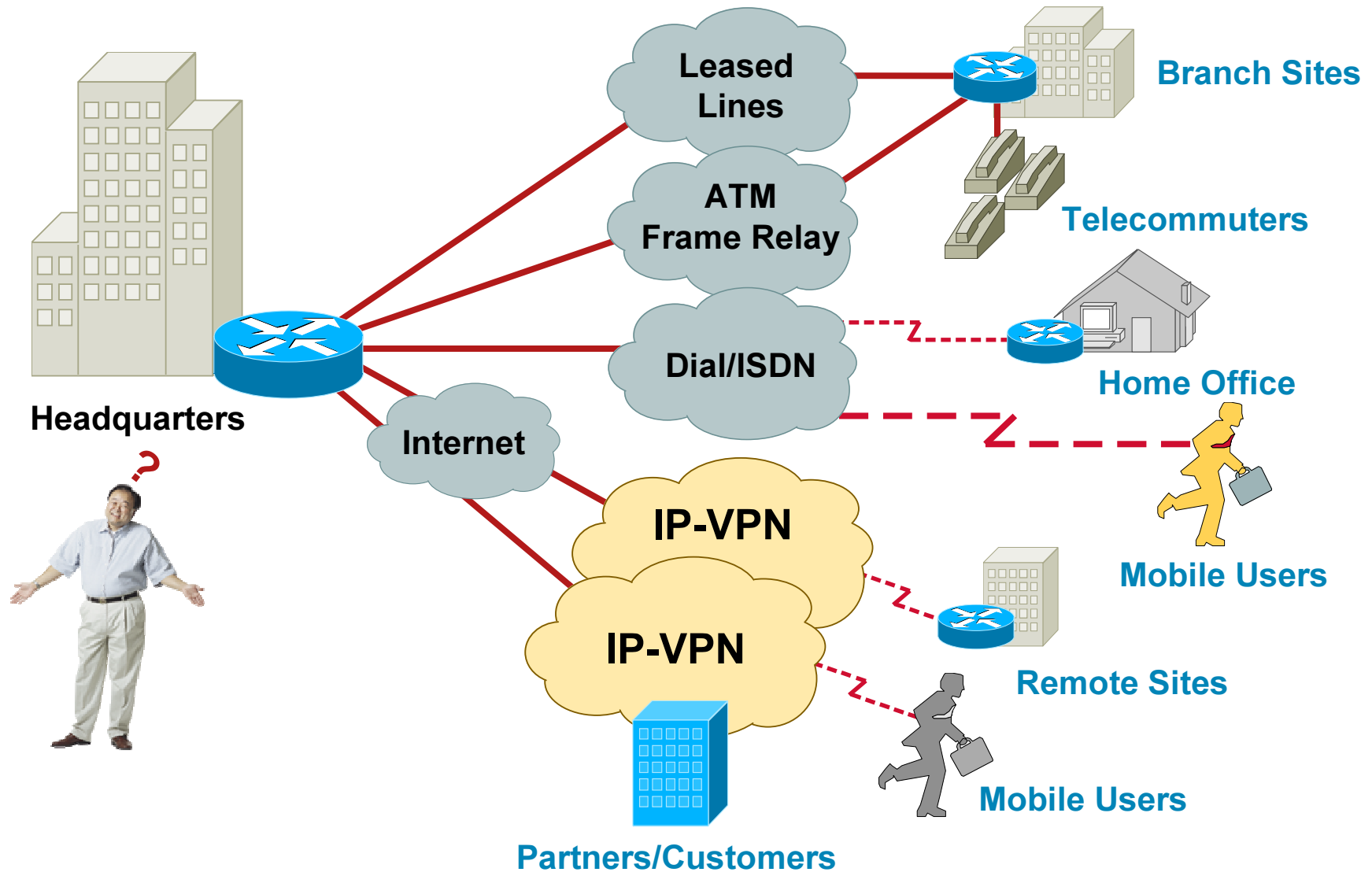
- Operations **S**upport **S**ystems help Service Providers to make €€ from (Cisco) Kit
- Some non-networking issues are taken care of also



Device Instrumentation



Network Visibility ?

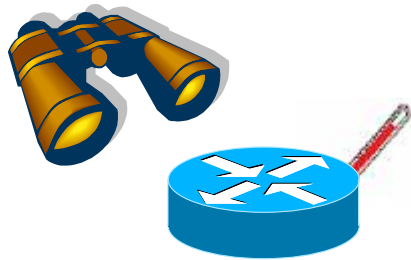


Embedded Instrumentation vs. External View



What Is Instrumentation?

- Provides operators, admins and applications with *a view* into what the device is doing and how it is behaving
- Gives us an ability to '*touch*' the device
- Our ability to understand how the device is behaving is only as good as the underlying instrumentation
- Instrumentation provides us with the intelligence to respond to conditions on the device and take corrective action, if necessary
It may even allow us to automate the response



Device Instrumentation

Carrier Ethernet focussed

- **SNMP instrumentation**
- **X-PI & CNS instrumentation**
- **Cisco IPSLA** & **NetFlow**
- **MPLS OAM** (*MPLS Operations Administration and Management*)
- **E-OAM** (Ethernet Operations Administration and Management)
- **WHAT IF ...**

SNMP instrumentation

MIBs

- IEEE8021-CFM-MIB
 - 802.3ah MIB
 - EVC-MIB
 - ELMI-MIB
 - IEEE8021-CFM-MIB enhancements
 - CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB
 - CISCO-VLAN-MEMBERSHIP-MIB
 - CISCO-VLAN-TRANSLATION-MIB
 - MPLS-VPN-MIB (MPLS VRF Status)
 - CISCO-RF-MIB (Redundancy Status IOS)
 - CISCO-L2-CONTROL-MIB (VLAN MAC Limit Notifications)
 - CISCO-PORT-SECURITY-MIB (Port Security Violations)
- + 1068 others

SNMP instrumentation

SNMP MIBs resources

MIB locator:

<http://tools.cisco.com/ITDIT/MIBS/servlet/index>

MIB download:

<ftp://ftp.cisco.com/pub/mibs/v2>

Please do read README-MIB.txt

Cisco IOS MIB Locator - Mozilla Firefox

File Edit View History Bookmarks Tools Help

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🏠

http://tools.cisco.com/ITDIT/MIBS/servlet/index

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Cisco IOS MIB Locator



Worldwide [change] Log In Register About Cisco

Solutions

Products & Services

Ordering

Support

Training & Events

Partner Central

HOME

PRODUCTS & SERVICES

TOOL INDEX

1700 Series Design Tool

Cisco Feature Navigator

Cisco IOS Software Selector

Cisco Product Advisor

MIB Locator

Product Approval Status

Solution Finder for Modular Routers

Products & Services

MIB Locator

Cisco IOS MIB Tools

A MIB (Management Information Base) is a database of the objects that can be managed on a device. The managed objects, or variables, can be set or read to provide information on the network devices and interfaces.

MIB Locator

SNMP Object Navigator

Cisco IOS XR MIBs

MIBs Supported by IOS XR Products CRS

MIBs Supported by IOS XR Products XR12000

Non-Cisco IOS MIBs

MIBs Supported by non IOS Products

General MIB Information

How to load Cisco MIBs

SNMP MIB Technical Tips

MIBs (Management Information Base) are in Cisco IOS Software so Network Managers can effectively manage the device the Cisco IOS software is installed into from Network Management Software such as Cisco Works 2000.

MIB Locator finds MIBs in Cisco IOS software releases.
SNMP Object Navigator translates OID's into SNMP names.

Cisco 7600 Series Network Intelligence Innovations, Release 12.2(33)SRB

Toolkit: Roll over tools below

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[Feedback](#) | [Help](#)

Related Tools

Bug Toolkit

Solution Finder for Modular Routers

IOS Upgrade Planner

Software Advisor (login required)

Extend Security, Voice, & Wireless



Done

FileZilla - Connected to New FTP site (ftp.cisco.com)

File Edit Transfer View Queue Server Help

Address: ftp-sj.cisco.com User: danteuni Password: Port: Quickconnect

Status: Directory listing successful
Command: TYPE I
Response: 200 Type set to I.
Command: TYPE A
Response: 200 Type set to A
Command: TYPE A
Response: 200 Type set to A

Local Site: Documents and Settings\danteuni\My Documents\people-site\ Remote Site: /pub/mibs/v2/

Filename	Filesize	Filetype	Last Modified	Filename	Filesize	File...	Date	Time	Permissions
..				CISCO-AAA-CLIENT-MIB.my	15050	MY File	12/04/2002		-rw-rw-r--
for-gilles		File Folder	11/9/2007 8:	CISCO-AAA-SERVER-CAPABILITY.my	4314	MY File	23/01/2004		-rw-rw-r--
products		File Folder	12/9/2007 15	CISCO-AAA-SERVER-EXT-CAPABILITY.my	15189	MY File	26/05/2006		-rw-rw-r--
solutions		File Folder	12/9/2007 15	CISCO-AAA-SERVER-EXT-MIB.my	49975	MY File	02/05/2006		-rw-rw-r--
cisco logo.gif	2 KB	GIF Image	18/6/2007 20	CISCO-AAA-SERVER-MIB.my	28727	MY File	22/01/2004		-rw-rw-r--
danteuni.html	157	Firefox Document	18/6/2007 20	CISCO-AAA-SESSION-MIB.my	14507	MY File	20/06/2007	15:24	-rw-rw-r--
Dragon-32-Microcompu...	34 KB	JPEG Image	18/6/2007 21	CISCO-AAL5-EXT-MIB.my	6734	MY File	11/06/2003		-rw-rw-r--
dragon90.gif	19 KB	GIF Image	18/6/2007 20	CISCO-AAL5-MIB.my	10149	MY File	19/07/2004		-rw-rw-r--
Expo Romania - NMS Br...	11 MB	Microsoft Powe...	3/5/2007 21:	CISCO-ACCESS-ENVMON-MIB.my	6437	MY File	25/06/1999		-rw-rw-r--
index.html	8 KB	Firefox Document	12/9/2007 16	CISCO-ADSL-CAP-LINE-MIB.my	28138	MY File	03/12/2001		-rw-rw-r--
Leafy_Sea_Dragon_1....	149 KB	JPEG Image	18/6/2007 20	CISCO-ADSL-DMT-LINE-MIB.my	57276	MY File	04/09/2001		-rw-rw-r--
links.html	761	Firefox Document	6/7/2007 8:3	CISCO-ALPS-MIB.my	85792	MY File	03/05/2000		-rw-rw-r--
solutions-products.html	3 KB	Firefox Document	12/9/2007 15	CISCO-ANNOUNCEMENT-MIB.my	21056	MY File	05/09/2004		-rw-rw-r--
The Safe Bet.ppt	847 KB	Microsoft Powe...	6/9/2007 14:	CISCO-APPLIANCE-REDUNDANCY-MIB.my	17614	MY File	25/10/2005		-rw-rw-r--
				CISCO-APS-EXT-MIB.my	32794	MY File	18/11/2002		-rw-rw-r--
				CISCO-APS-MIB.my	52026	MY File	19/01/2004		-rw-rw-r--
				CISCO-ASPP-MIB.my	18305	MY File	04/08/2003		-rw-rw-r--
				CISCO-ATM-ACCESS-LIST-MIB.my	30070	MY File	25/06/1999		-rw-rw-r--
				CISCO-ATM-ADDR-MIB.my	4627	MY File	14/10/1998		-rw-rw-r--
				CISCO-ATM-CAPABILITY.my	2709	MY File	27/11/2002		-rw-rw-r--
				CISCO-ATM-CELL-LAYER-CAPABILITY.my	23152	MY File	07/01/2004		-rw-rw-r--
				CISCO-ATM-CELL-LAYER-MIB.my	62897	MY File	08/01/2004		-rw-rw-r--
				CISCO-ATM-COMM-INFO-MIB.my	23049	MY File	05/09/2004		-rw-rw-r--

3 folders and 10 files with 12080179 bytes. 1075 files with 44492159 bytes.

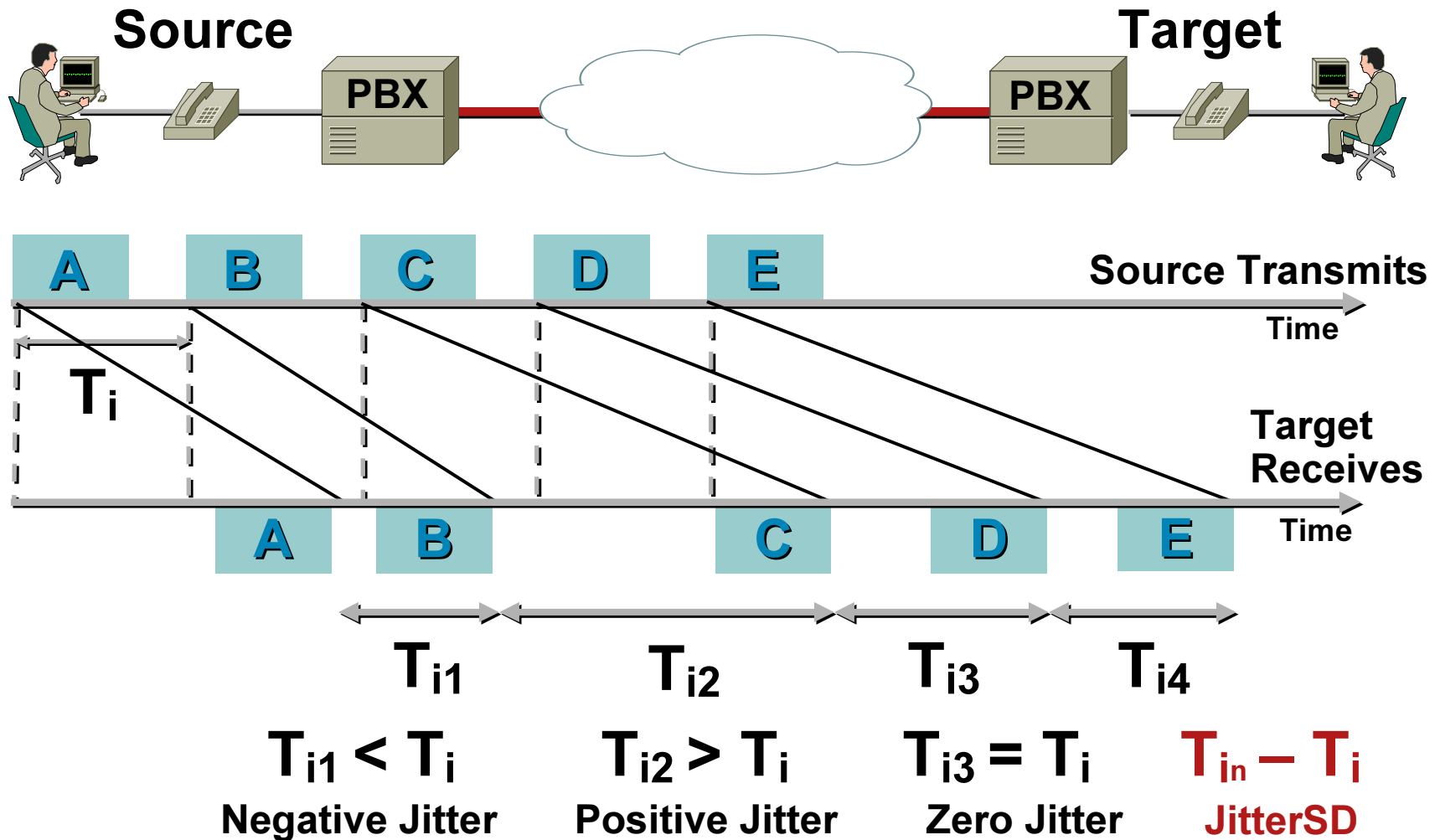
Local Filename	Size	Direction	Remote Filename	Host	Status
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Ready Queue: 0 bytes

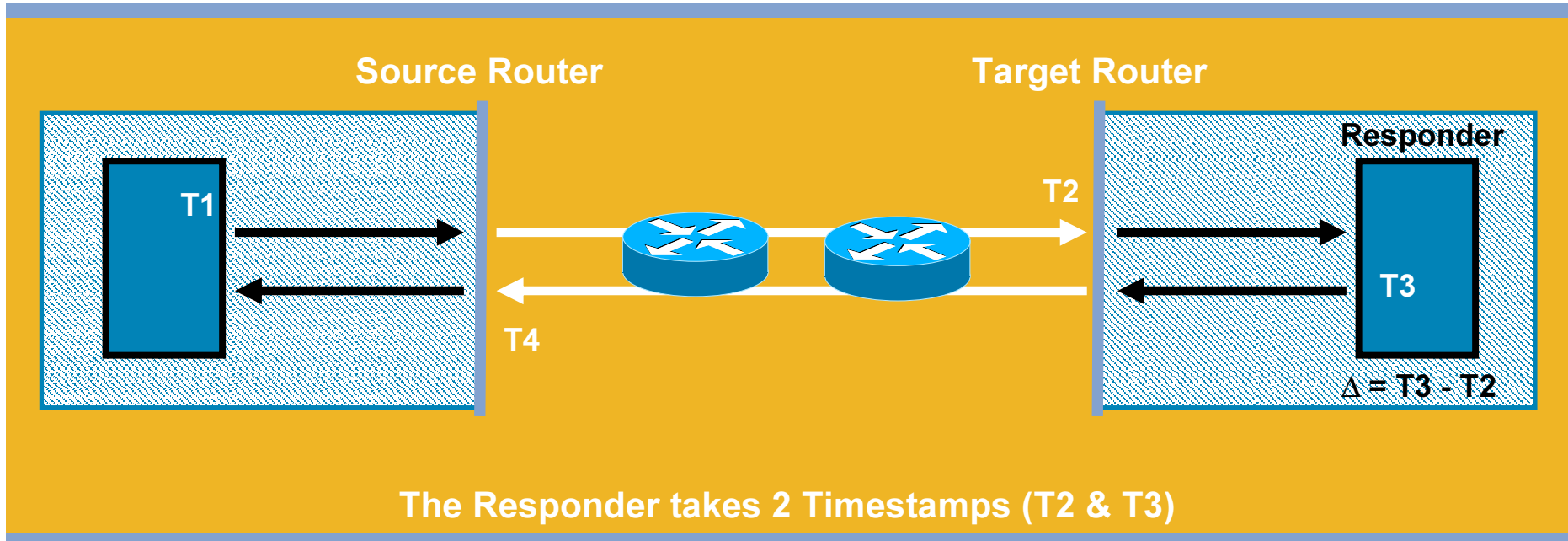
Traditional IPSLA

Feature/Release	11.2	12.0(3)T	12.0(5)T 12.0(8)S	12.1E	12.1(1)T 12.2	12.2(2)T	12.2(11)T (Infra2)	12.2(14)S	12.2(25)S
ICMP Echo	X	X	X	X	X	X	X	X	X
ICMP Echo Path	X	X	X	X	X	X	X	X	X
SSCP(SNA)	X	X	X	X	X	X		X	
UDP Echo		X	X	X	X	X	X	X	X
TCP Connect		X	X	X	X	X	X	X	X
UDP Jitter			X	X	X	X	X	X	X
HTTP			X	X	X	X	X	X	X
DNS			X	X	X	X	X	X	X
DHCP			X	X	X	X	X	X	X
DLSw+			X	X	X	X	X	X	X
SNMP Support			X	X	X	X	X	X	X
UDP Jitter One Way Latency					X	X	X	X	X
FTP Get					X	X	X	X	X
MPLS/VPN Aware						X	X		X
Frame-Relay (CLI)						X	X		X
ICMP Path Jitter						X	X		X
APM						X	X		X

ISPLA: Network Delay Variation - Jitter



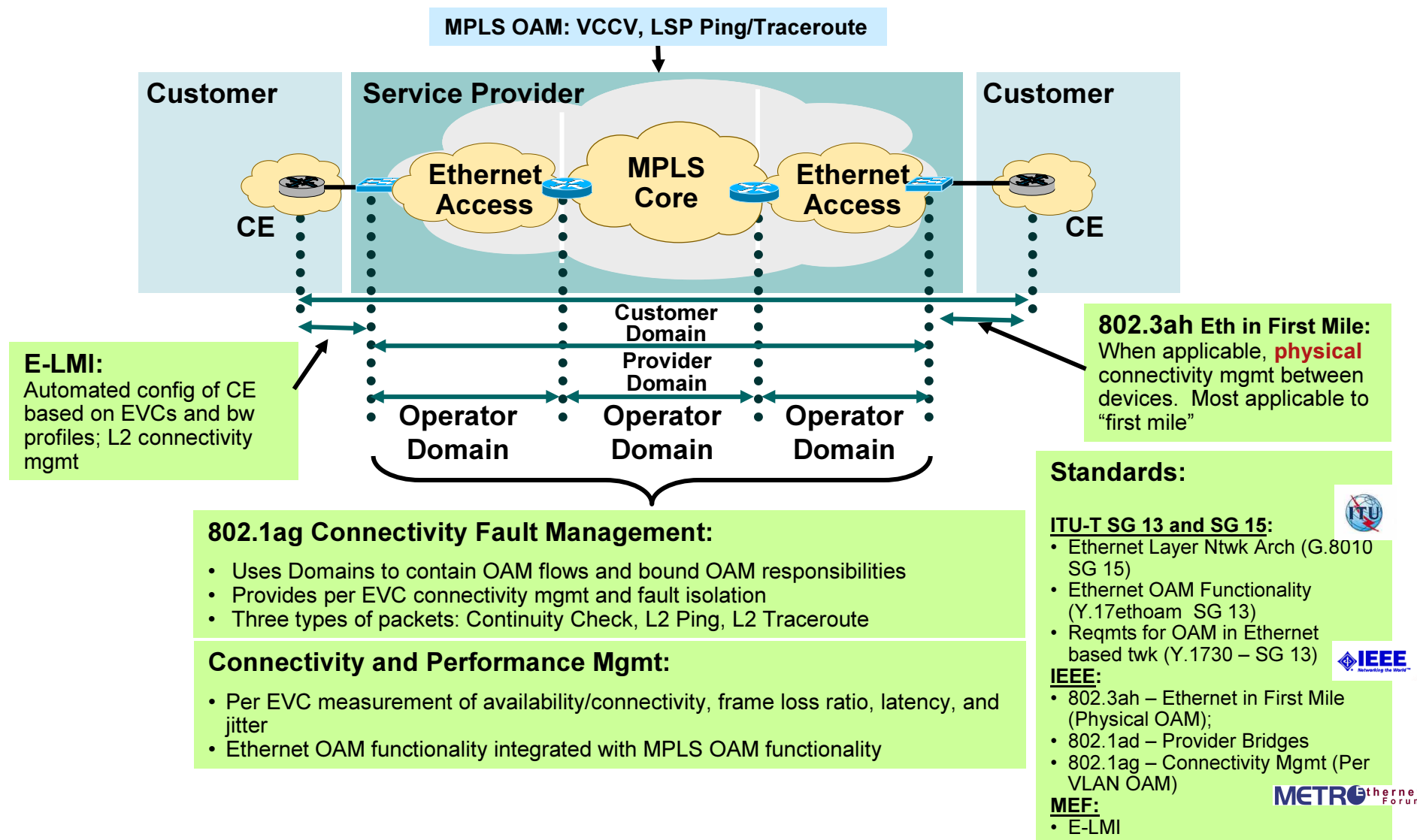
IPSLA Responder



- Responder factors out destination processing time, so the results are highly accurate
- Responder enable one-way measurements for latency, jitter, packet loss, and MOS

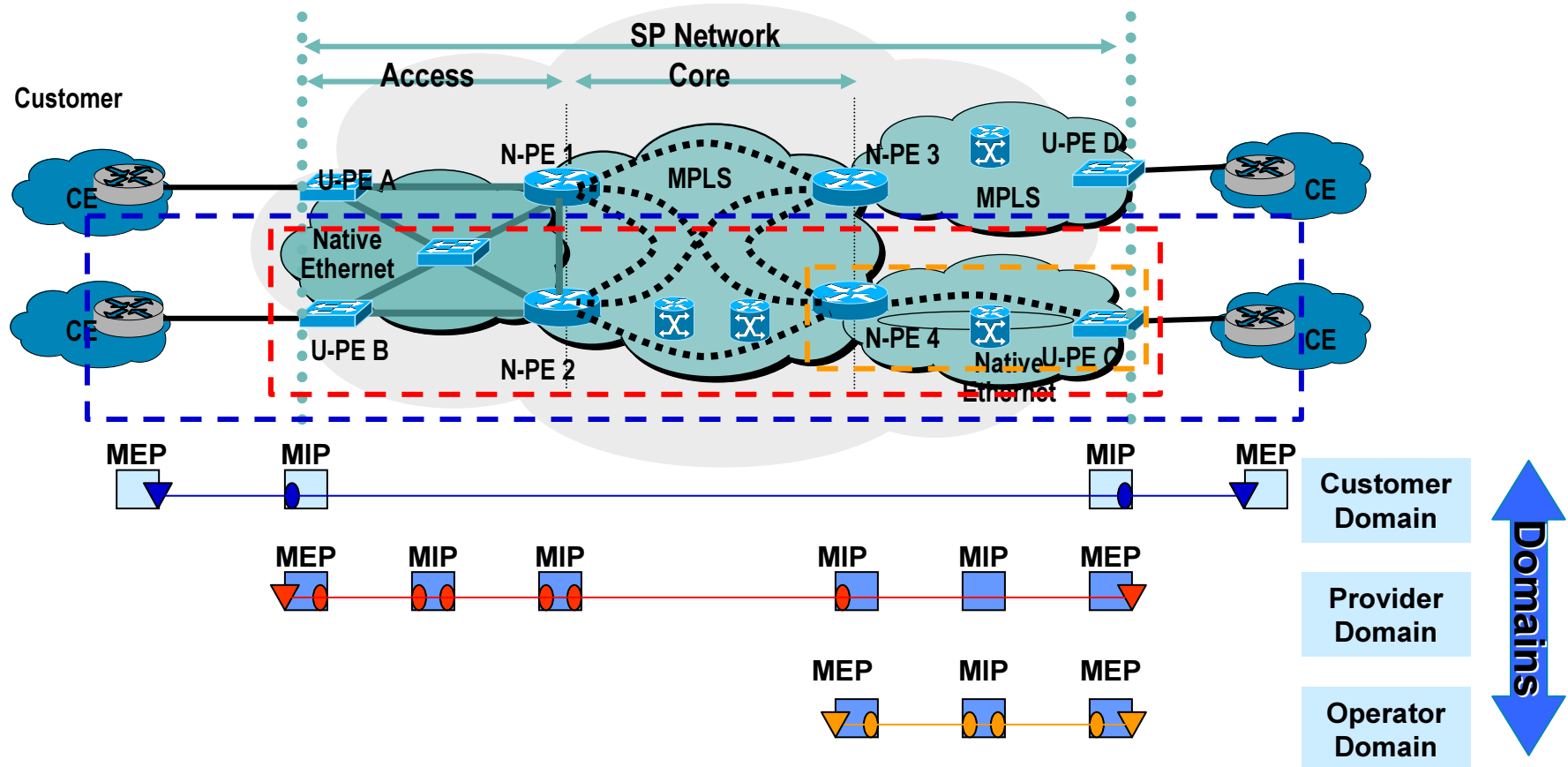
Ethernet OAM

functionalities and related standards



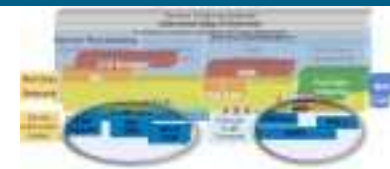
Ethernet OAM

802.1ag Connectivity Fault Management (CFM)



Ethernet OAM

IEEE 802.3ah OAM vs IEEE 802.1ag CFM



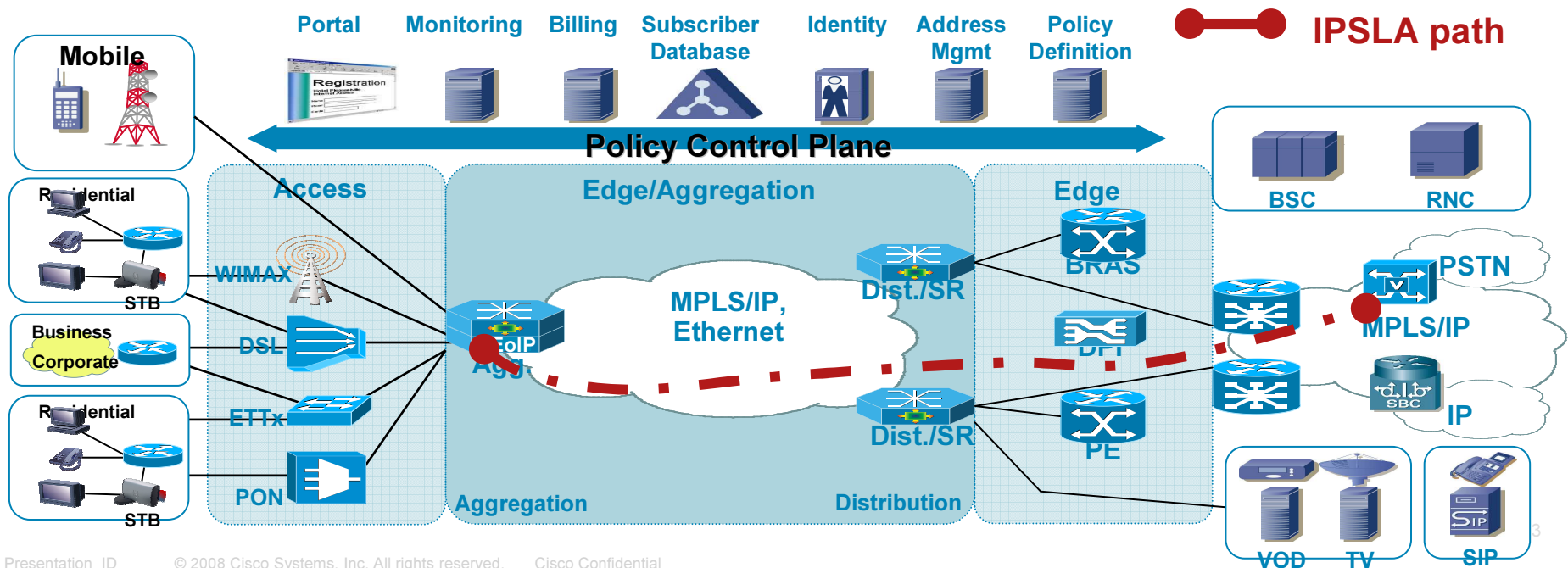
IEEE 802.3ah clause 57 Link OAM	IEEE 802.1ag Connectivity Fault Management
Operates on physical link only, cannot pass through a bridge	May be per-service or per-wire. Passes end-to-end through bridges
Discovery, Statistics enquiry, Keepalive, Loopback (mirror) mode	Connectivity Verification, Traceroute, Ping, Alarm Indication/Suppression
Single instantiation per wire	Multiple instances operating at multiple levels simultaneously
Created by one committee (IEEE 802.3)	Joint effort by IEEE 802.1, ITU-T
Standard approved by IEEE 802	IEEE P802.1ag, ITU SG 13/3

Cisco IP SLA

L2 path analysis

IP SLA can be used to verify L2 connectivity quality across the end to end

- IP SLA planned on 802.1ag 802.3ah
availability
quality
round-trip measurement



Cisco Ethernet SLA

- **In-band Performance Management Tool**
 - Uses native Ethernet frames
 - No IP Overlay required (does not rely on IP/UDP)
- **Incorporates Connectivity Fault Management (CFM) principles**
 - Use Ethernet CFM frames to collect statistics
 - Probes performed in context of a VLAN and a CFM Maintenance Domain
 - CFM Maintenance End Points (MEPs) define probe endpoints

Cisco IP SLA

- IOS IP SLA's + CFM Integration Advantage
 - Policy Threshold Alerts via SNMP Traps
 - Thresholds can also trigger additional IP SLA Operations
 - Users can define any number of alerts for each operation
 - New "CISCO-IPSLA-ETHERNET-MIB"
 - Jitter and echo measurement
 - History Data Stored in CISCO-RTTMON-MIB
- Automatic Discovery of Probe Endpoints
 - Rely on CFM Continuity Check Database (CCDB) to automatically discover Probe Endpoints
 - Ethernet Virtual Circuit (EVC) and Maintenance Domain based
 - Support 'static' probes and exclusions

What if we put the NMS inside the box ?

Embedded Management Tools

Tool Command Language (Tcl)
Embedded Event Manager (EEM)
Embedded Syslog Manager (ESM)
Embedded Resource Manager (ERM)
Embedded Menu Manager (EMM)
Kron
Configuration Archive and Rollback

- (Change Markus Clarke's .ppt)

Device Instrumentation

Wrap-Up

- **Cisco put instrumentation necessary for network management in the devices themselves**

- **E-OAM**

Cisco IOS implements a full, standard based, E-OAM instrumentation to support operators in operating, monitoring and troubleshoot Carrier Ethernet networks

- **Cisco IPSLA**

Cisco IPSLA provides an “in band” monitoring of the Services delivered on the network. The Service provider can measure the “Service Experience” perceived by the end customer

- **SNMP instrumentation**

An extensive and fully featured set of MIBs and traps are made available in all Cisco devices

Visibility Applications



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http://www.cisco.com/go/nms

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Network Management - Products...

Product Portfolio

Data Center Management Cisco Application Networking Manager Cisco Data Center Network Manager Cisco VFrame Data Center	Routing and Switching Management (continued) - CiscoWorks LAN Management Solution Extensions CiscoWorks Health and Utilization Monitor CiscoWorks Interface Configuration Manager - Cisco Diagnostics Expert Products Cisco MPLS Diagnostics Expert - Multicast Management Cisco Multicast Manager Cisco Route Manager - Programmatic Interfaces Cisco Enhanced Device Interface - WAN Management Cisco Network Registrar Cisco VVAN Manager Cisco Configuration Engine Cisco Configuration Professional Cisco NetFlow Collection Engine Cisco Network Assistant Cisco Service Path Analyzer
IP Communications Management - Cisco Unified Communications Management Cisco Unified Operations Manager Cisco Unified Provisioning Manager Cisco Unified Service Monitor Cisco Unified Service Statistics Manager CiscoWorks Voice Manager - QoS Policy Management CiscoWorks QoS Policy Manager - Service Provider IP Communications Management Cisco Extensible Provisioning and Operations Manager Cisco Media Gateway Controller Node Manager Cisco Voice Services Provisioning Tool	Security and Identity Management - Cisco Secure Access Control Server Products Cisco Secure Access Control Server for Unix Cisco Secure Access Control Server for Windows Cisco Secure Access Control Server Solution Engine Cisco Secure Access Control Server Express Cisco Secure Access Control Server View Cisco Access Registrar Cisco Network Registrar Cisco Router and Security Device Manager
Network Analysis and Planning Cisco Bandwidth Quality Manager Cisco Performance Visibility Manager	
Network Configuration and Change Management CiscoWorks Network Compliance Manager	
Network Management Services Modules - Cisco Network Analysis Module (NAM) Cisco Branch Routers Series Network Analysis Module (NME-NAM) Cisco Catalyst 6500 Series Network Analysis Module (NAM-1/NAM-2) Cisco Network Analysis Module Software	

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Network Management - Products...

[Cisco Network Analysis Module Software](#)

Optical Management

[Cisco Transport Manager](#)

Other Network Management Products

[Cisco Application Deployment Engine](#)

[Cisco License Manager](#)

[Cisco Router Web SetUp Tool](#)

Routing and Switching Management

Cisco Active Network Abstraction Products

[Cisco Active Network Abstraction](#)

[Cisco ANA Carrier Ethernet Activation](#)

[Cisco CRS-1/MOS-XR Device Management](#)

Cisco Active Network Abstraction SDKs

[Cisco Active Network Abstraction Integration SDK](#)

Cisco Assurance Managers

[Cisco Assurance Management Solution](#)

[Cisco Video Assurance Management Solution](#)

Cisco Info Center Products

[Cisco Info Center](#)

[Cisco Info Center for Security Monitoring](#)

[Cisco Info Center VPN Policy Manager](#)

Cisco IP Solution Center Products

[Cisco IP Solution Center](#)

[Cisco IP Solution Center L2 VPN Management](#)

[Cisco IP Solution Center MPLS VPN Management](#)

[Cisco IP Solution Center Security Management](#)

[Cisco IP Solution Center Traffic Engineering Management](#)

Cisco Network Connectivity Center Products

[Cisco Network Connectivity Center Business Impact Manager](#)

[Cisco Router and Security Device Manager](#)

[Cisco Security Manager](#)

Small and Medium Business Network Management

[Cisco Configuration Assistant](#)

[Cisco Monitor Director](#)

[Cisco Monitor Manager](#)

[Cisco netManager IP Infrastructure](#)

[Cisco netManager Unified Communications](#)

TelePresence Network Management

[Cisco Bandwidth Quality Manager](#)

[Cisco Branch Routers Series Network Analysis Module \(NME-NAM\)](#)

[Cisco Catalyst 6500 Series Network Analysis Module \(NAM-1/NAM-2\)](#)

[CiscoWorks QoS Policy Manager](#)

[Cisco TelePresence Readiness Assessment Manager](#)

[Cisco Unified Operations Manager](#)

Video, Cable and Content Delivery Management

[Cisco Broadband Access Center](#)

[Cisco Broadband Configurator](#)

[Cisco Broadband Policy Manager](#)

[Cisco Broadband Troubleshooter](#)

[Cisco Network Registrar](#)

[ROSA Hardware](#)

[ROSA Headend and Network Management](#)

[Transport Stream Monitoring](#)

[Cisco Video Assurance Management Solution](#)

Wireless Access Management

CiscoWorks Wireless LAN Solution Products

[CiscoWorks Wireless LAN Solution Engine \(WLSE\)](#)

[CiscoWorks Wireless LAN Solution Engine \(WLSE\)](#)

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Network Management - Products...

[Cisco Assurance Management Solution](#)
[Cisco Video Assurance Management Solution](#)

Cisco Info Center Products

[Cisco Info Center](#)
[Cisco Info Center for Security Monitoring](#)
[Cisco Info Center VPN Policy Manager](#)

Cisco IP Solution Center Products

[Cisco IP Solution Center](#)
[Cisco IP Solution Center L2 VPN Management](#)
[Cisco IP Solution Center MPLS VPN Management](#)
[Cisco IP Solution Center Security Management](#)
[Cisco IP Solution Center Traffic Engineering Management](#)

Cisco Network Connectivity Center Products

[Cisco Network Connectivity Center Business Impact Manager](#)
[Cisco Network Connectivity Monitor](#)

CiscoWorks LAN Management Solution Bundle

[CiscoWorks Assistant](#)
[CiscoWorks Campus Manager](#)
[CiscoWorks CiscoView](#)
[CiscoWorks Common Services Software](#)
[CiscoWorks Device Fault Manager](#)
[CiscoWorks Internetwork Performance Monitor](#)
[CiscoWorks LAN Management Solution](#)
[CiscoWorks LMS Portal](#)
[CiscoWorks Resource Manager Essentials](#)

[Cisco Unified Operations Manager](#)

Video, Cable and Content Delivery Management

[Cisco Broadband Access Center](#)
[Cisco Broadband Configurator](#)
[Cisco Broadband Policy Manager](#)
[Cisco Broadband Troubleshooter](#)
[Cisco Network Registrar](#)
[ROSA Hardware](#)
[ROSA Headend and Network Management](#)
[Transport Stream Monitoring](#)
[Cisco Video Assurance Management Solution](#)

Wireless Access Management

CiscoWorks Wireless LAN Solution Products

[CiscoWorks Wireless LAN Solution Engine \(WLSE\)](#)
[CiscoWorks Wireless LAN Solution Engine \(WLSE\) Express](#)

Mobile Wireless Center for Cisco Mobile Exchange

[Cisco Content Services Gateway Service Manager](#)
[Cisco GPRS Gateway Support Node Service Manager](#)
[Cisco Mobile Wireless Center for Cisco Mobile Exchange](#)
[Cisco Mobile Wireless Fault Mediator](#)

[Cisco Access Point Name Manager](#)
[Cisco Mobile Wireless Transport Manager](#)
[Network Management for Mobile Wireless](#)
[Cisco Network Registrar](#)

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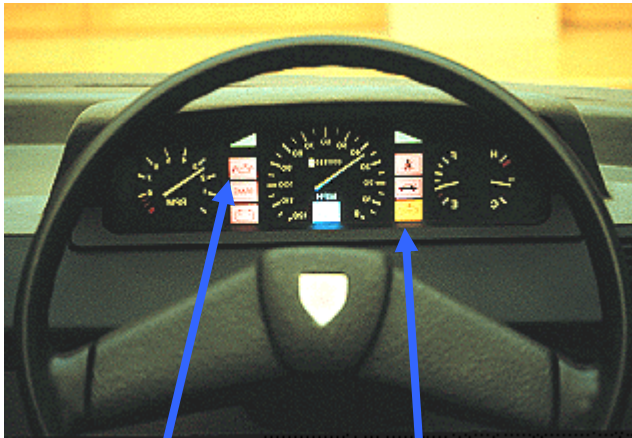
Diagnostics & Automated Troubleshooting

What Traditional Fault OSSs Do

What Cisco MPLS Diagnostics Expert Does

Alarm Management

**Customer reported fault -
Smoking exhaust ... (or
condition with no alarm)**



**Basic
alarm -
Oil
lamp**

**Root Cause
Analysis –
from Engine
Management
System”**



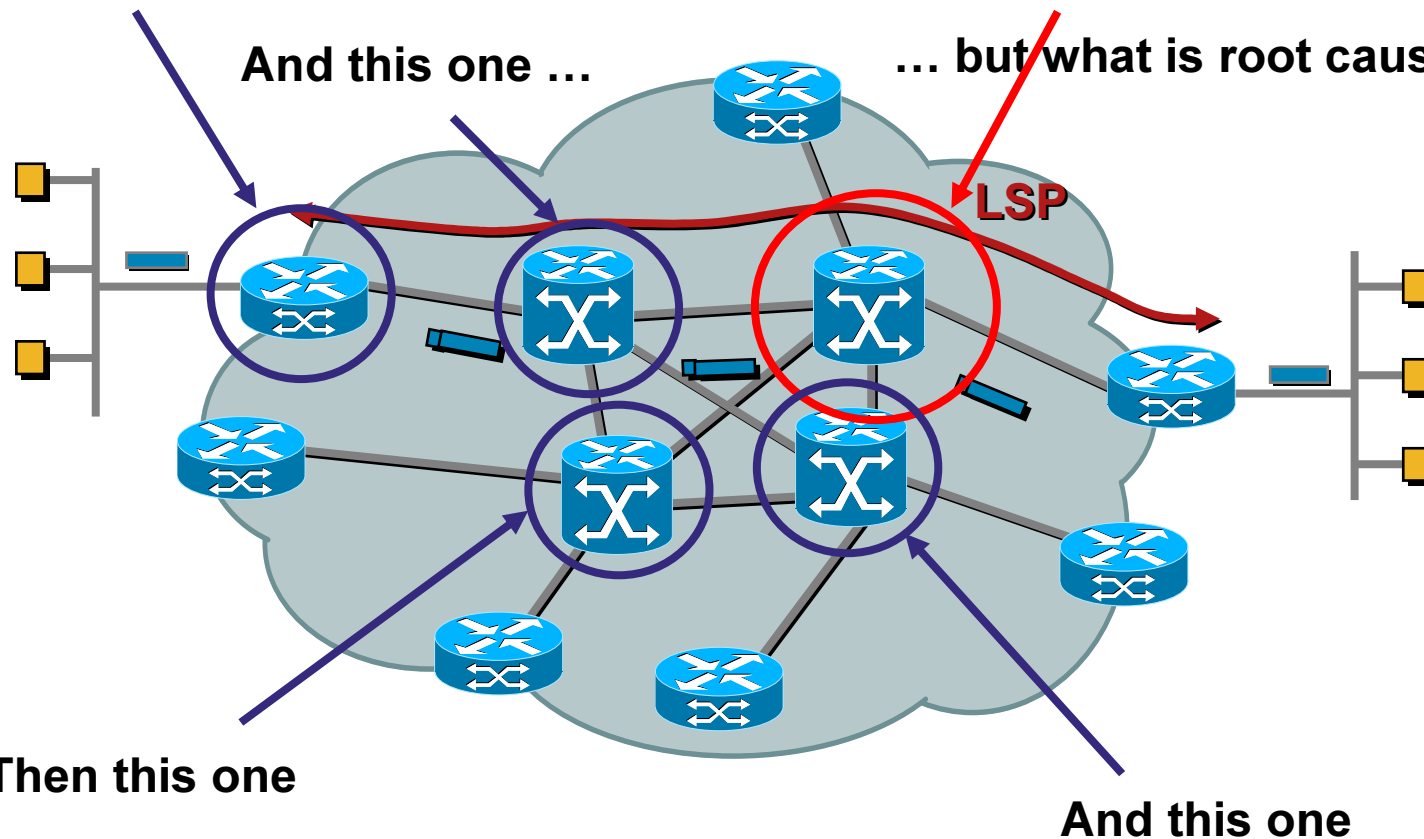
Troubleshooting & Diagnostics



How find fault location in other vendor's networks ... or Pre Cisco IOS 12.0(27)S

Check this node,
using MIBs & CLI

The fault is here ... but you had to check
70 out of 100 P/PE nodes before you
found the location of this “black hole”



Real Life Example ... Took 17 Hours of Outage to Find and Diagnose

Complexity of the Manual Process ...

1 Problem reported by customer

1. Which VPN?
2. Which sites?
3. Which PE devices?
4. Which VRFs?
5. Which interfaces?
6. Which protocols?
7. Which configurations?

Assumes critical MPLS
OAM instrumentation that
Cisco IOS® has today!

2 Troubleshooting – Where is the problem located?

1. Login to the ingress PE
2. VRF present? - pass
3. Test local A/C- pass
4. Test to remote site - fail
5. IP Test to egress PE – pass
6. LSP test to egress PE - pass
- VRF ping to egress PE - fail
- Route present in ingress PE? - fail
- Route present in egress PE? - pass

3 Why

1. Login to the egress PE
2. Route advertised into BGP? – pass
3. Login to ingress PE
4. Route present in BGP table? - fail
5. BGP neighbor up? - fail

4 How can the problem be fixed?

1. Login to egress PE
2. Enter configuration
3. Add vpnv4 address family
4. Add vpnv4 address

5 Has the problem been fixed?

1. Login to ingress PE
2. VRF ping to remote site - **ok**

CCIE Expertise Required
Humans can forget key steps

Product = MDE

Unleash the power of OAM *built into IOS*

Reactive Test Configuration

Local Site

PE Hostname *: cl-7206-2 Select

PE Access Circuit Interface *: POS3/0

CE Access Circuit Interface IP Address *: 7.1.1.2

Type in simple details
e.g. Customer Edge IP
addresses ... and
press “OK” to start

Simple GUI telling you
where problem is, what
is underlying root cause
... and recommended
action ... ~140 potential
failure scenarios
checked automatically –
repeatable process

Reactive Test Results

VPN Connectivity Test Result

View: ☒ Test Details ☐ Test Log

Summary: No VPN connectivity within VPN1 on london-pe to 10.52.21.2

Possible Cause(s): LSP broken, No LFIB entry on core-2 for prefix 144.254.117.190

Recommended Action:

1. Clear IP route for prefix 144.254.117.190
2. Check LDP session
3. Check LSP/RC inconsistency on each previous hop
4. Check for duplicate loopbacks in path

WARNING: Clearing route may be service affecting operation

Advanced Re-test Cancel

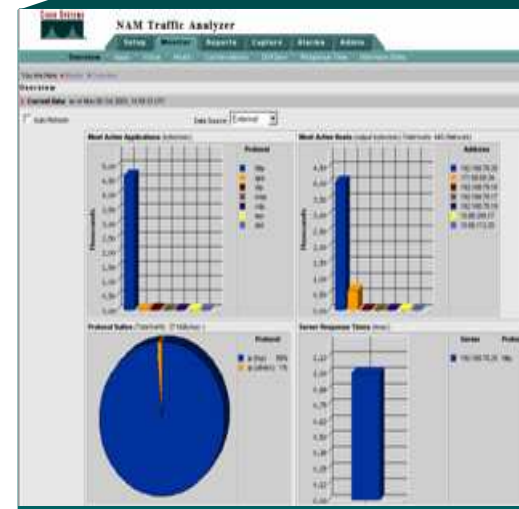
Product = NAM

NAM

- Provides integrated traffic analysis at critical points in the network to enhance visibility
- Quick to deploy and easy to use with embedded web-based Traffic Analyzer GUI
- Analyzes traffic flows for applications, hosts, conversations, and IP-based services such as QoS and VoIP
- Collects NetFlow Data Export to broaden application-level visibility
- Tracks response times using the ART MIB
- Offers integrated manageability with CiscoWorks LMS



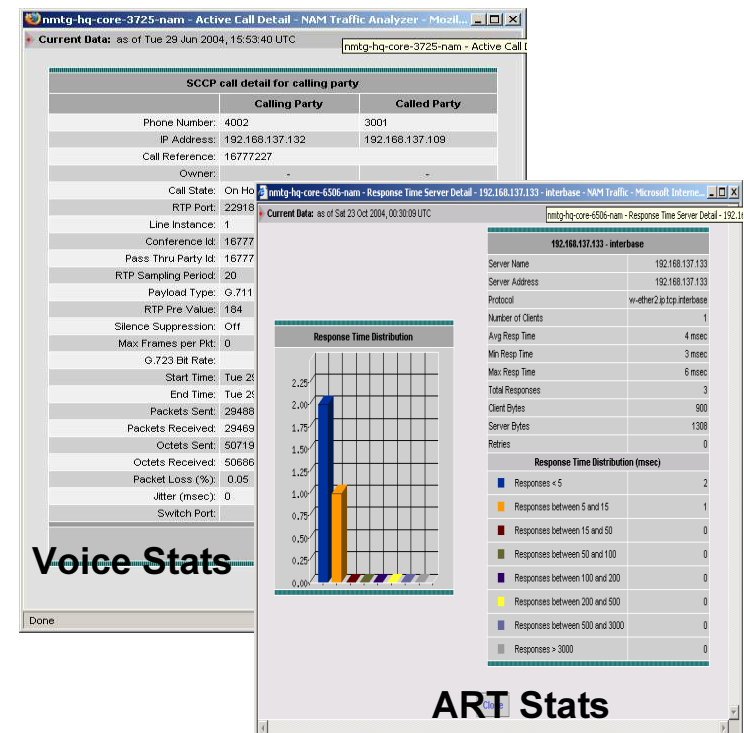
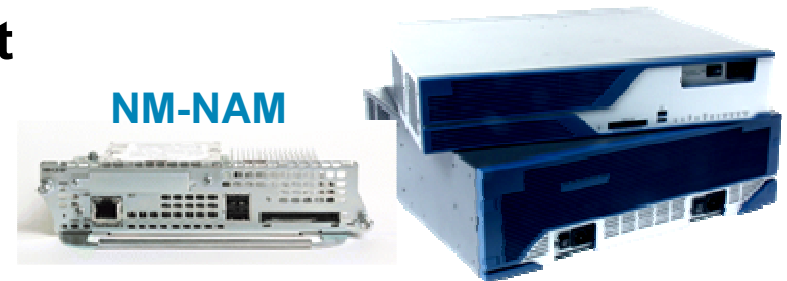
Cat 6K/Cisco 7600 NAMs



Product = NAM

Branch Routers Series NM-NAM

- Provides integrated traffic analysis at branch offices to enhance visibility
- Quick to deploy and easy to use with embedded web-based Traffic Analyzer
- Leverages standards-based technologies such as RMON2 and NetFlow
- Supports real-time capture, decode, and analysis of data, and Application Response Time (ART)
- Analyzes traffic flows for applications, hosts, conversations & IP-Based services such as Voice and QoS
- Offers integrated manageability with CiscoWorks LMS



NAM Value Proposition

- NAM integrates application-level visibility within the network infrastructure

Serves a variety of applications

Easy to deploy and manage

Offers cost of ownership benefits

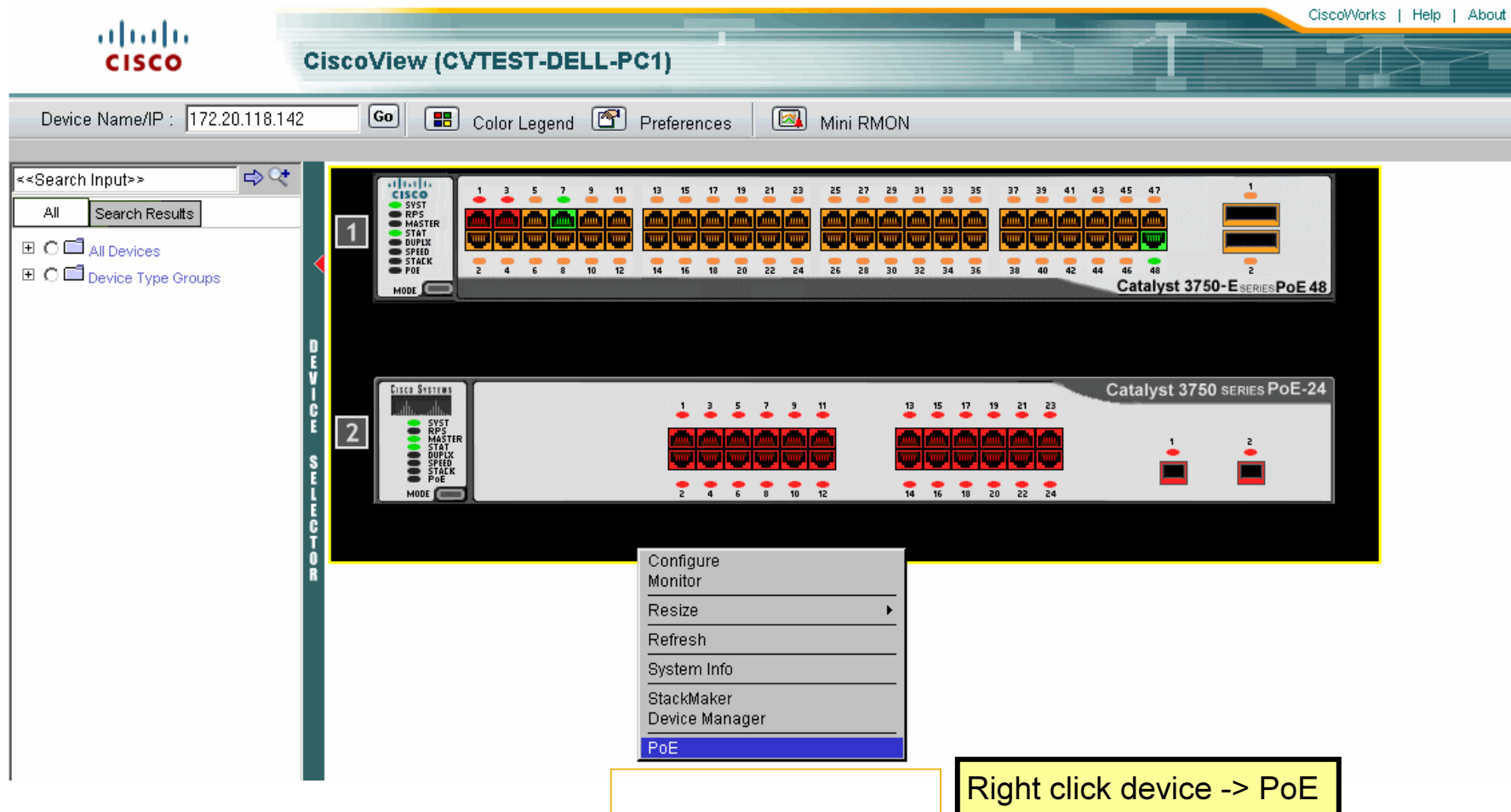
- Improved visibility enables enterprises to maximize IT investments and enhance network security

Improves network performance

Prevents unauthorized/frivolous use of network resources

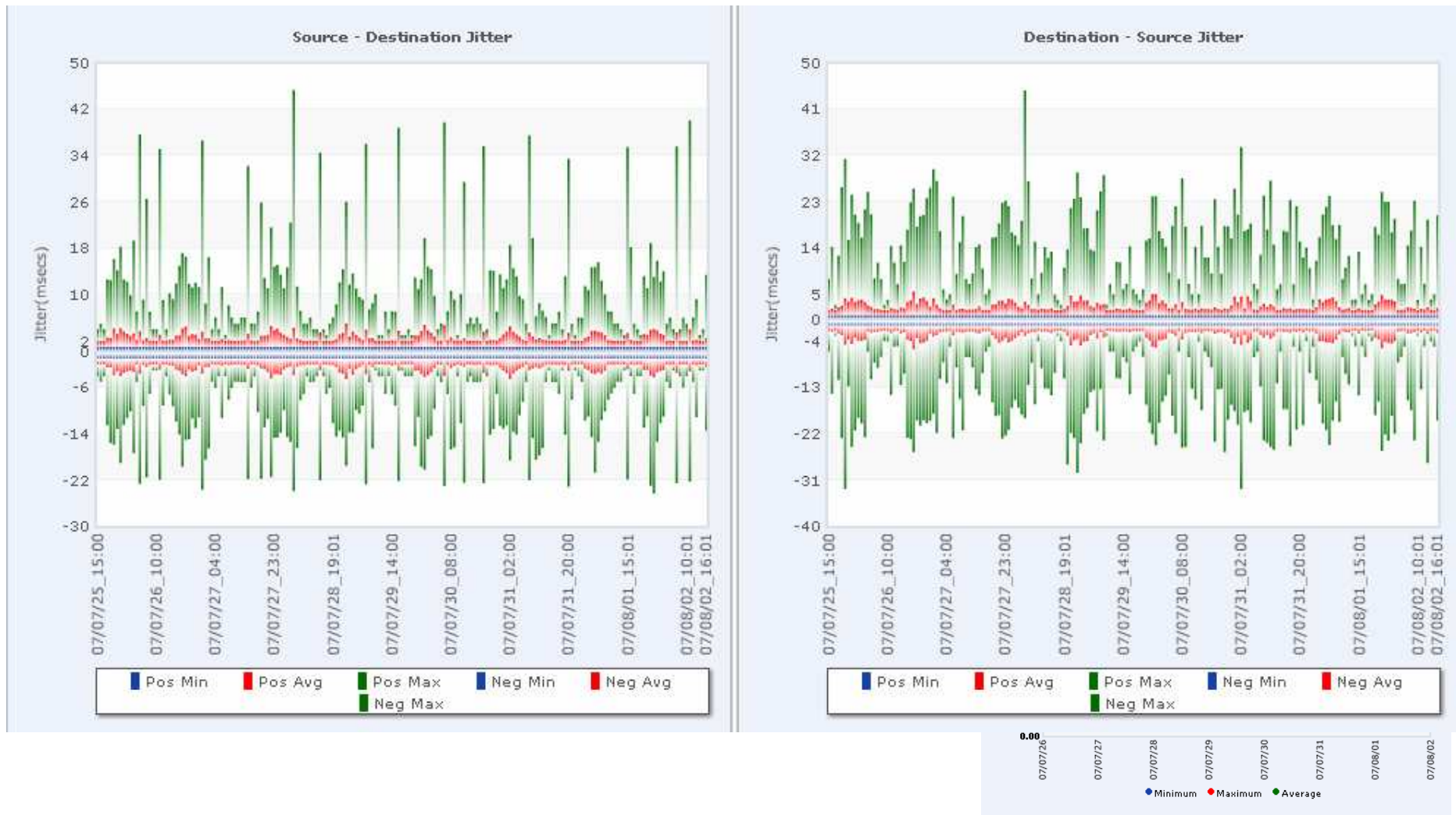
Reduces down-time and failures

Typical CiscoView



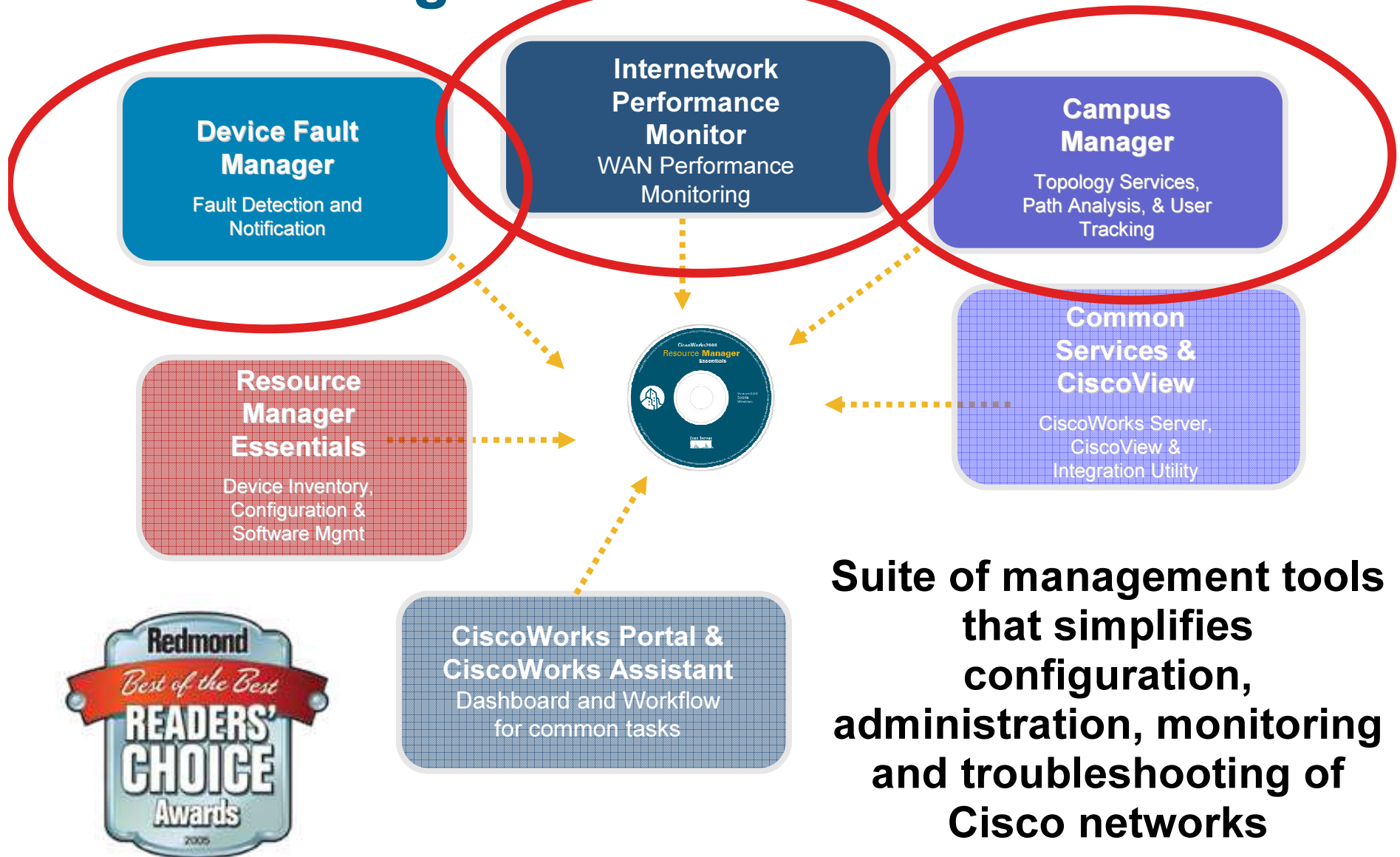
Product = LMS

IPM - Rich Graphs – Hourly Jitter Graphs



Product = LMS

LAN Management Solution 3.2

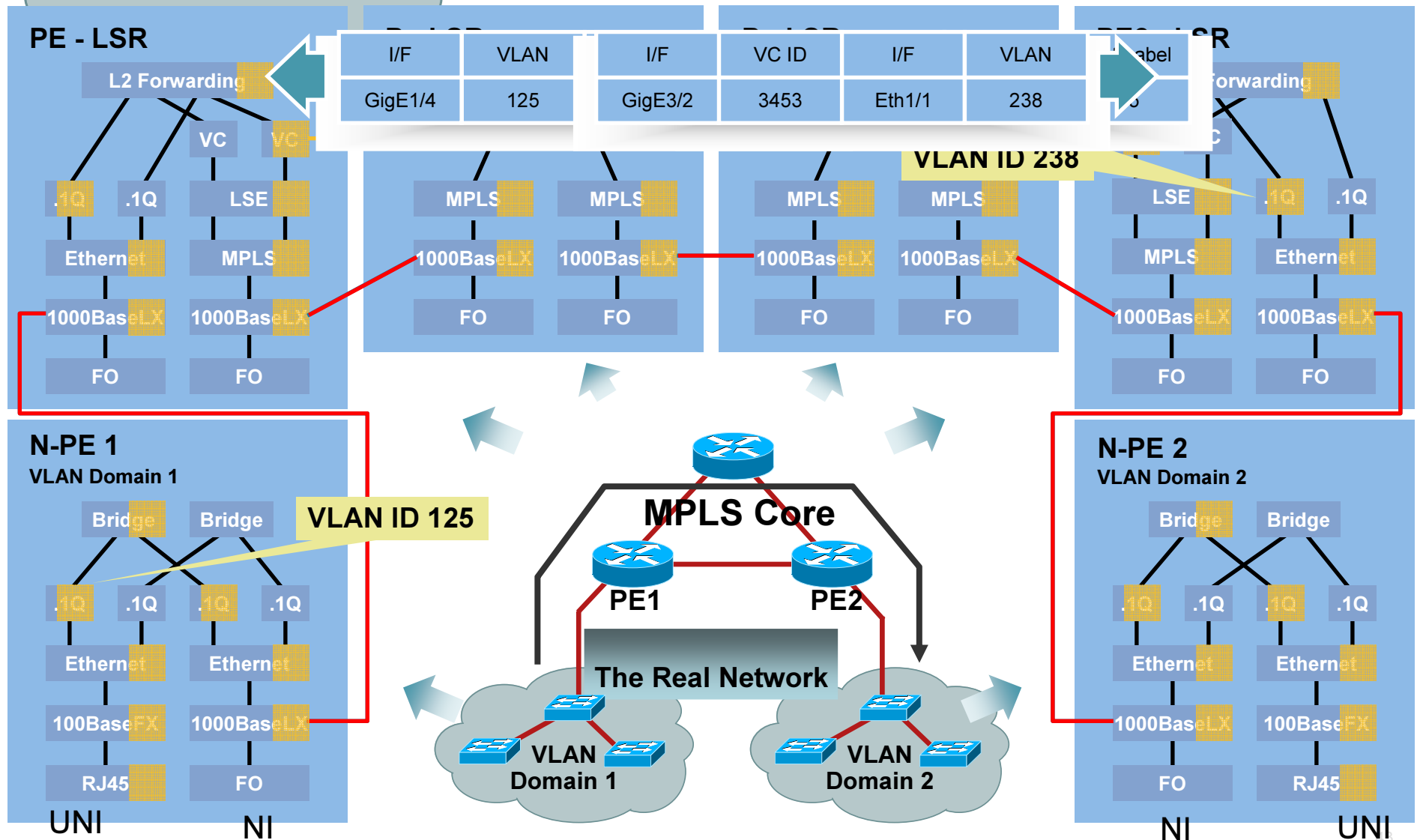


Product = CSPA

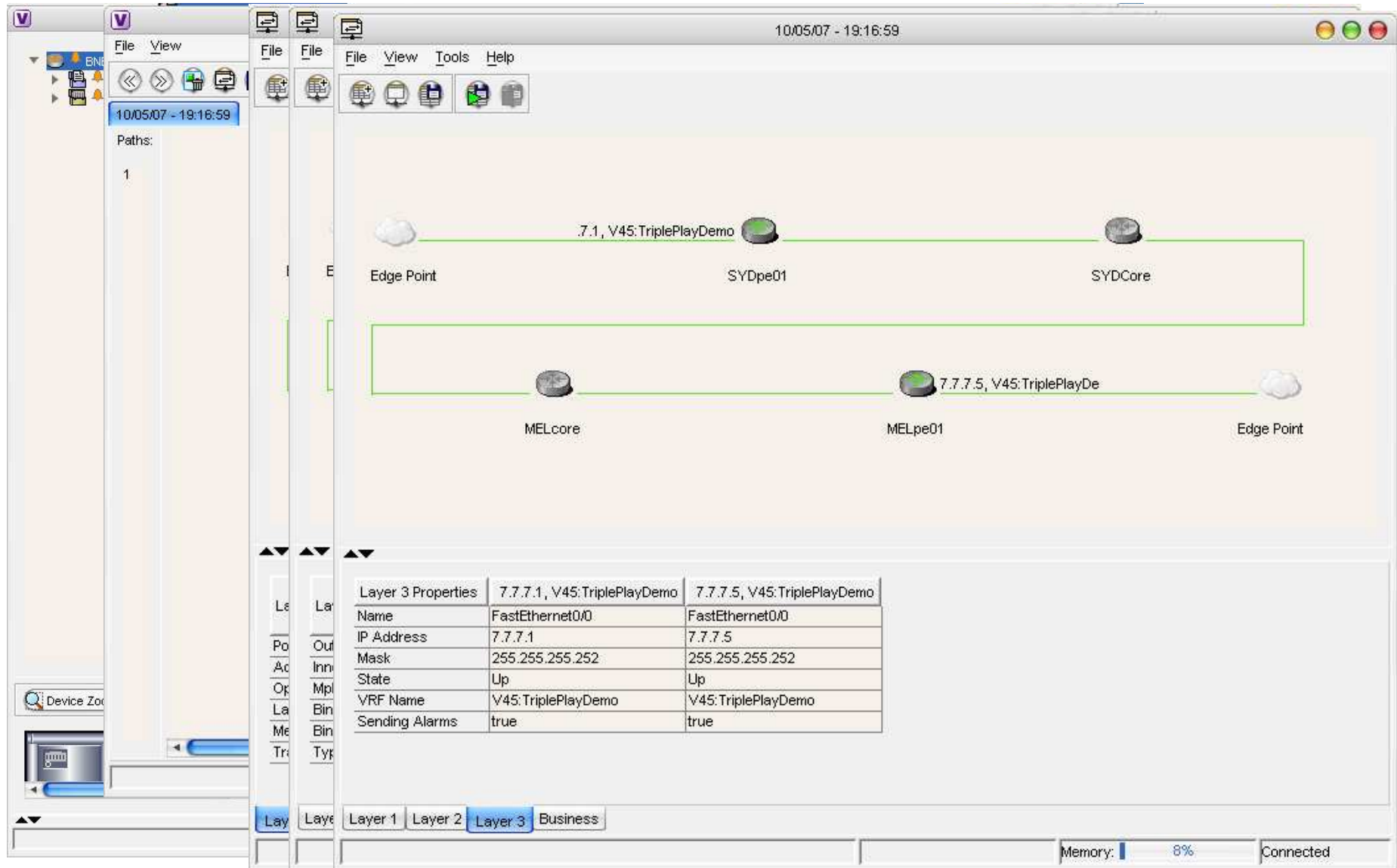
Cisco Active Network Abstraction

Product = ANA

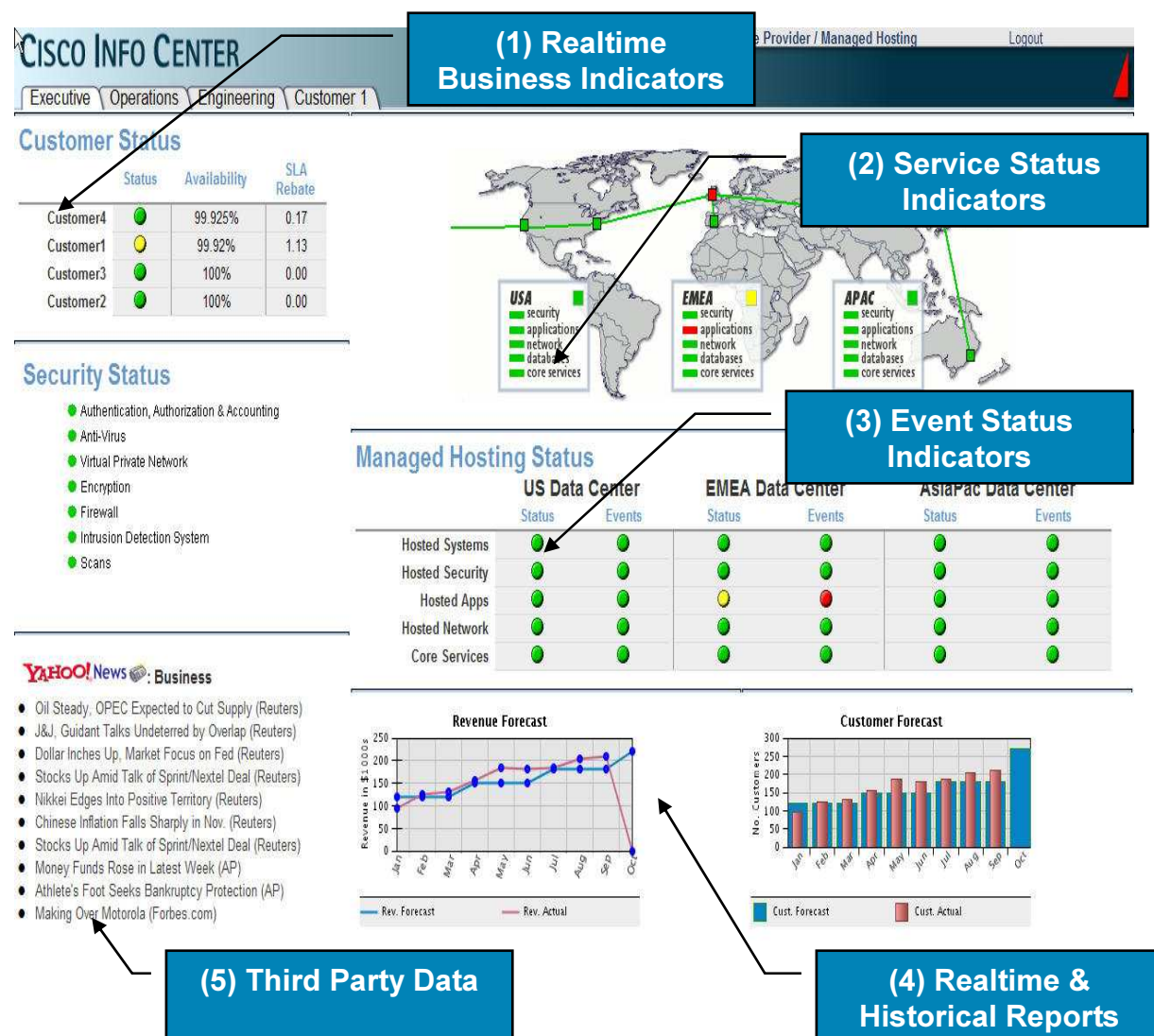
The long journey of a packet



Path Trace in ANA 3.6



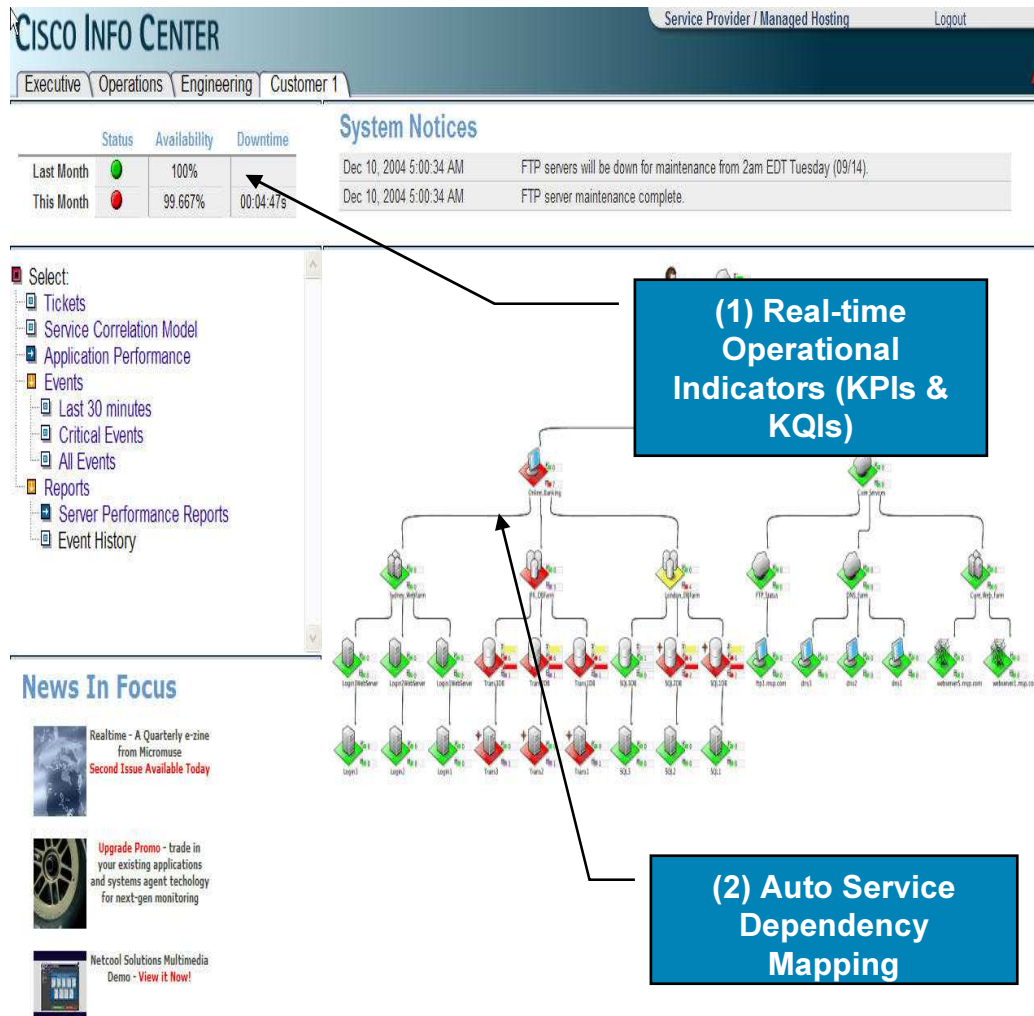
Cisco Info Center: Executive View



Business Health

- Provides overall Health of business with respect to revenue, processes & services
- Managers get real-time transparent access to the services
- Visibility into the state of their services
- Instantaneous SLA violation
- Historical Reports and business metrics

Cisco Info Center: Operations View



Operational Status

- How is my service performing (KPI's & KQI's)?
- Root cause analysis
- Service impact- customer impact
- How many tickets are being worked?
- Granular visibility

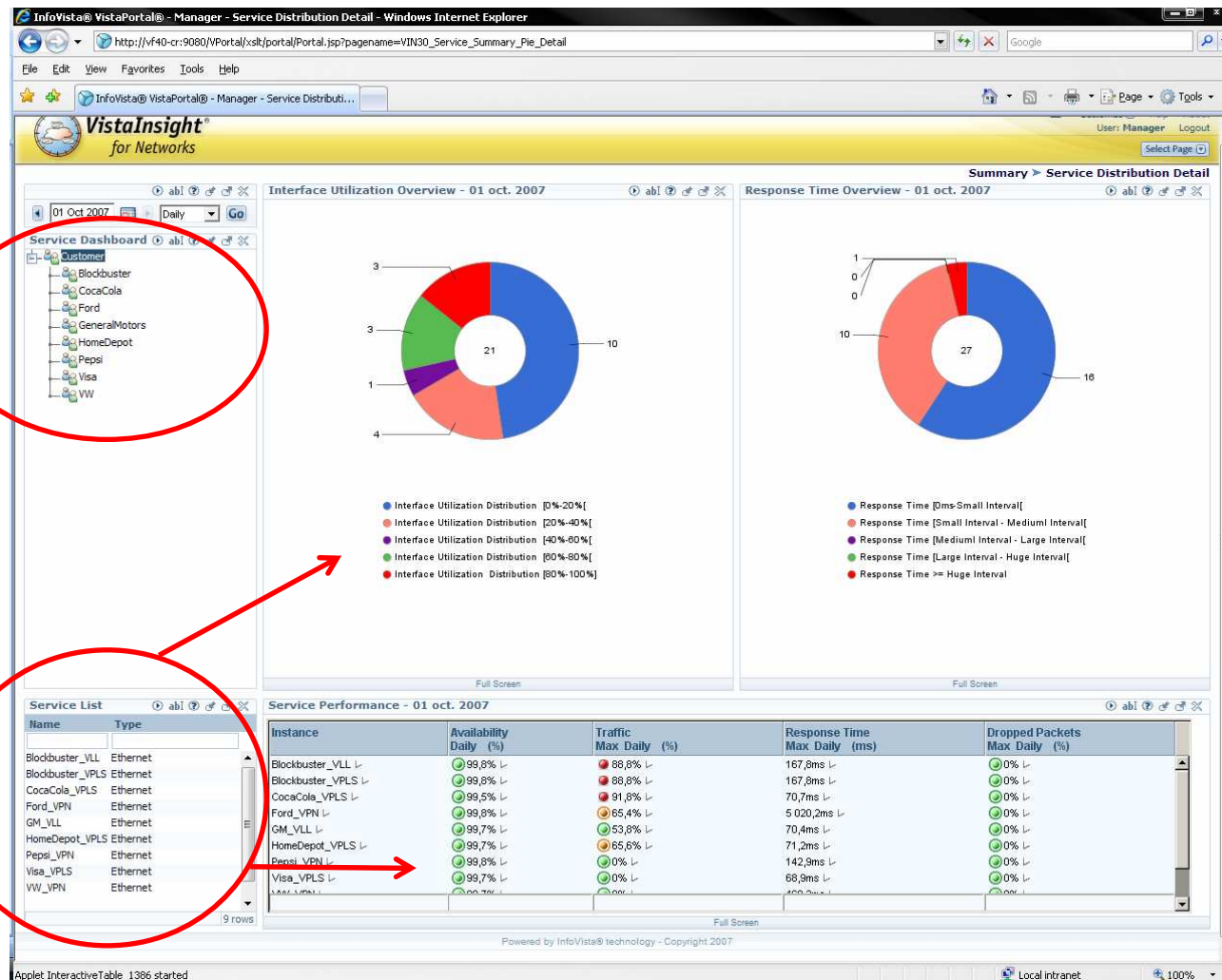
Holistic Monitoring

- Support for 1,000+ resources
- Out of the box integration's with other OSS/BSS solutions
- Layer 1-7 monitoring

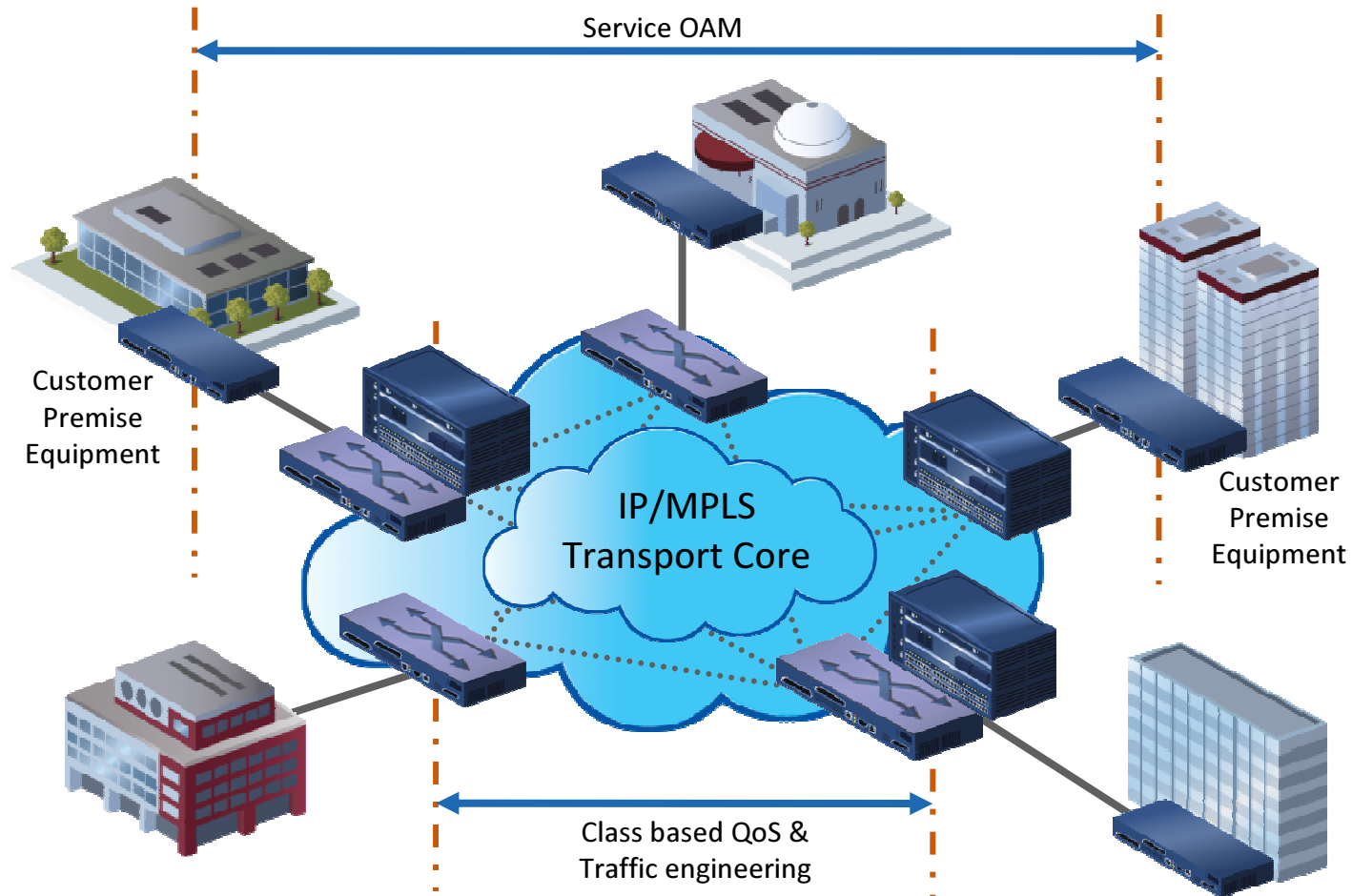
Carrier Ethernet Service KPI's

List of customers

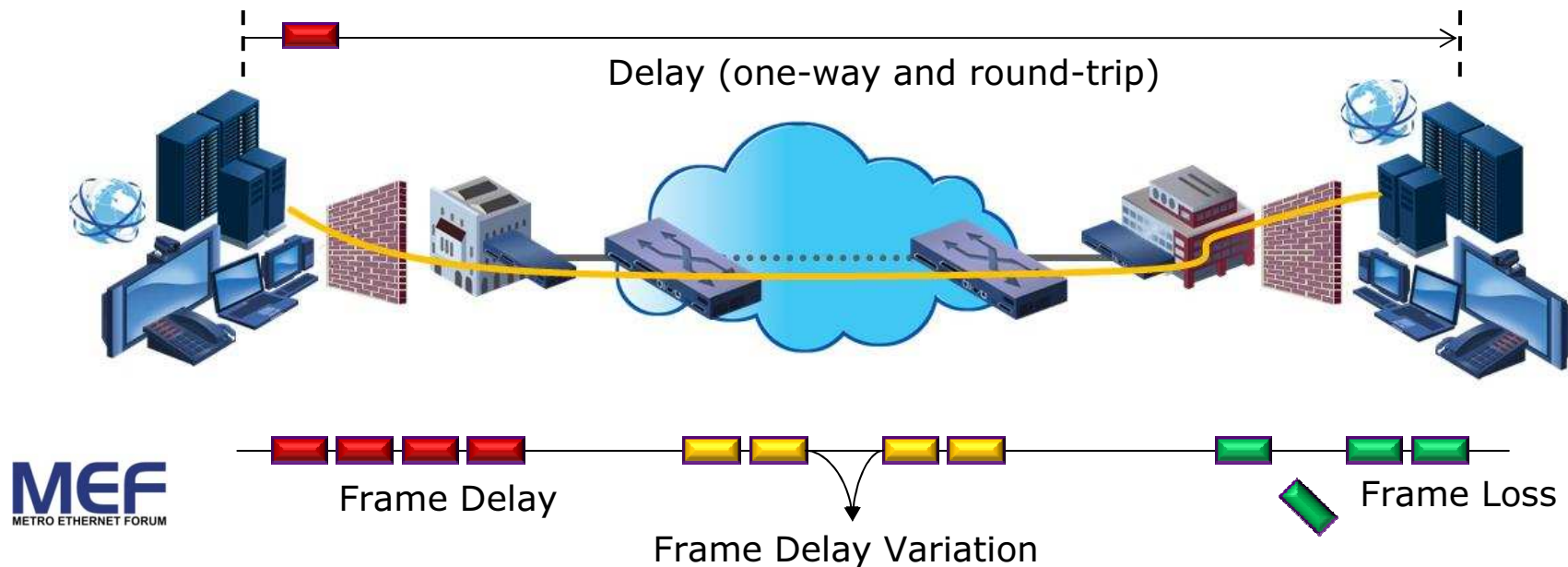
VPN Services
E-Line
E-LAN
IP VPN



Ethernet OAM



Key service performance characteristics



LATENCY

- Time taken for packet transit
- One-way or round trip delay
- Factors:-
 - Propagation (time taken)
 - Medium (Handling)
 - Processing (Router)

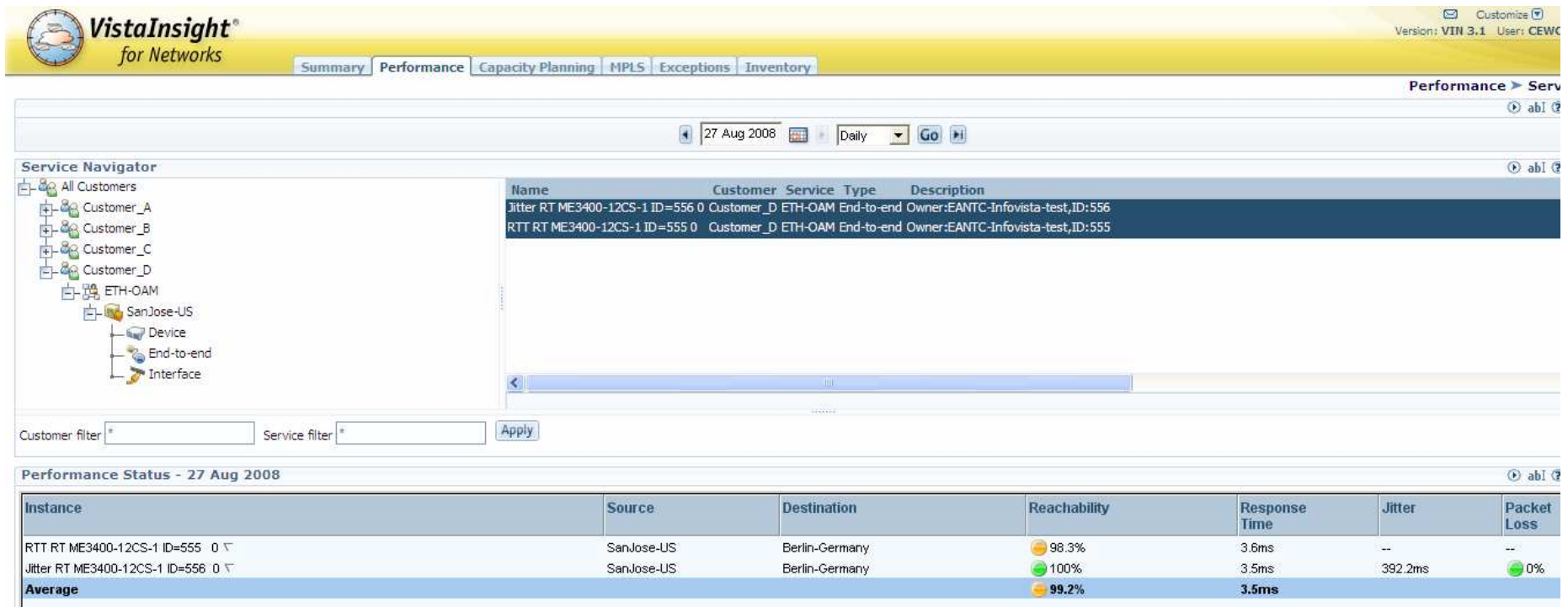
JITTER

- Variation in time between the packets
- Caused by:-
 - Congestion
 - Timing drift
 - Route changes
- Buffers used to help

LOSS

- Failure of one or more packets to arrive
- Inadequate signal strength
- Human or network interference
- Effects:-
 - Data mutilation
 - Broken-images
 - Unintelligible speech

Cisco Ethernet OAM reports



VistaInsight® for Networks Version: VIN 3.1 User: CEWC

Summary Performance Capacity Planning MPLS Exceptions Inventory

Performance Status - 27 Aug 2008

Instance	Source	Destination	Reachability	Response Time	Jitter	Packet Loss
RTT RT ME3400-12CS-1 ID=555 0	SanJose-US	Berlin-Germany	98.3%	3.6ms	--	--
Jitter RT ME3400-12CS-1 ID=556 0	SanJose-US	Berlin-Germany	100%	3.5ms	392.2ms	0%
Average			99.2%	3.5ms		

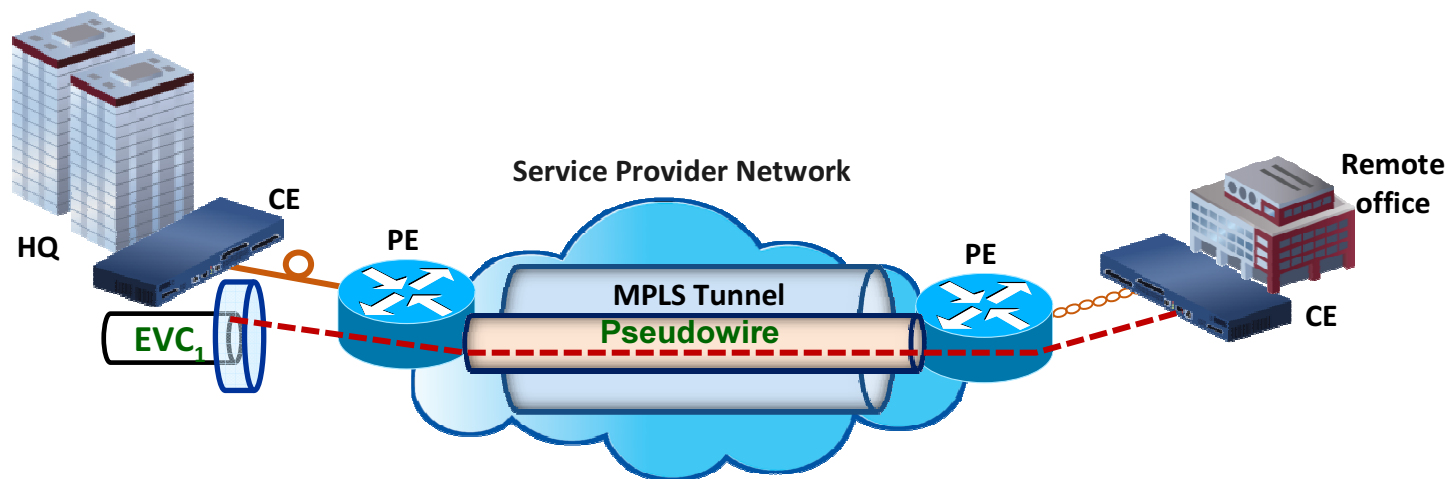
- InfoVista discovers Ethernet OAM probes including configuration parameters:
Type of operation, VLAN ID, CFM domain, Type of service, Frequency etc.

Cisco Ethernet OAM reports

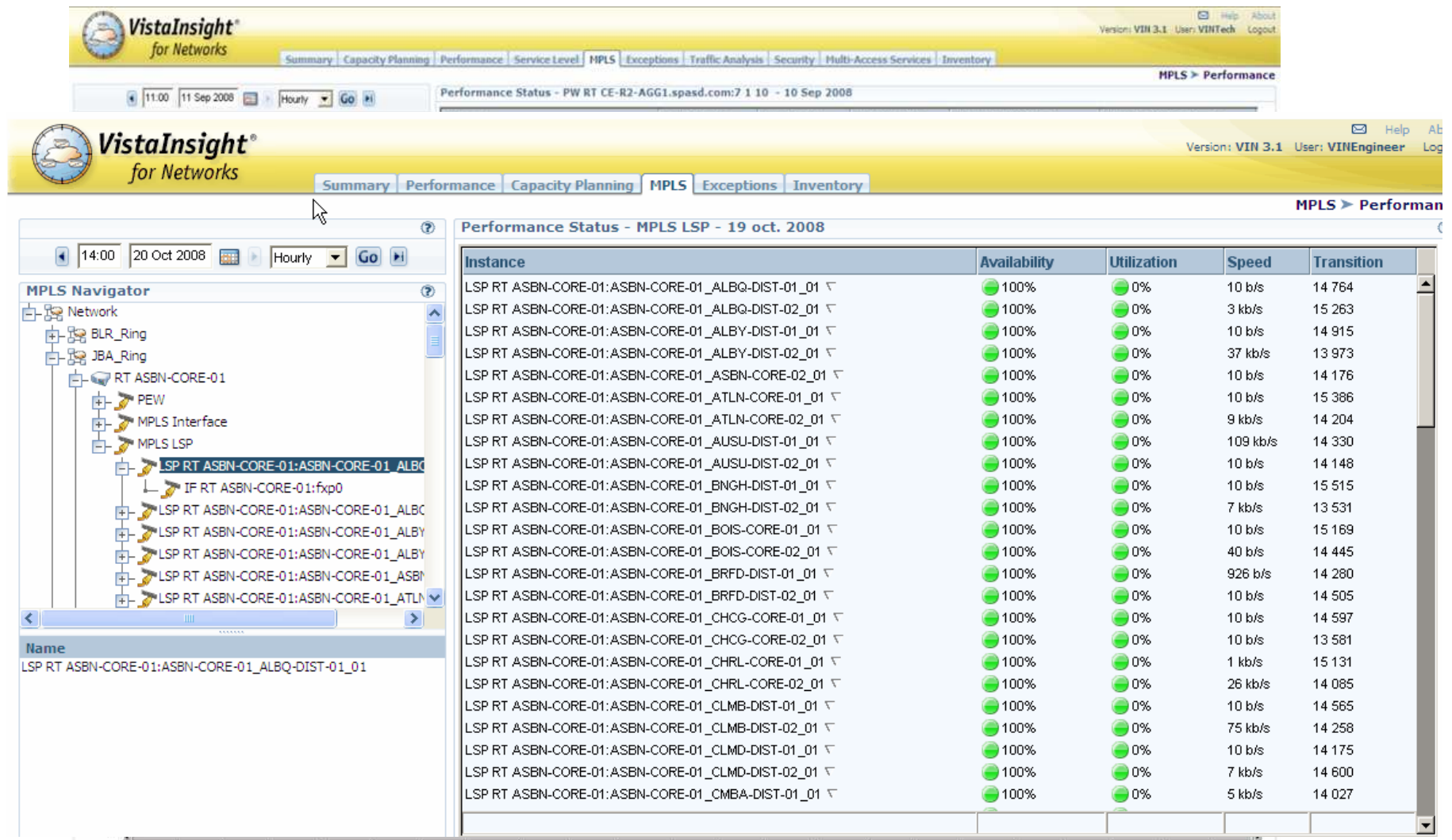


MPLS traffic management

- Service Design is aided by Pseudowire MPLS Tunnel reports
Which tunnel to use for service creation?
Can tunnel handle the service upgrade?
- Capacity Planning
Which service/pseudowire is causing over utilization?
- Troubleshooting
Which tunnels are changing paths frequently?



Pseudowire & MPLS Tunnel reports



The screenshot displays the VistaInsight for Networks interface. The top navigation bar includes tabs for Summary, Capacity Planning, Performance, Service Level, MPLS, Exceptions, Traffic Analysis, Security, Multi-Access Services, and Inventory. The current view is 'MPLS > Performance'. The left pane shows the 'MPLS Navigator' tree with a hierarchy: Network > BLR_Ring > JBA_Ring > RT ASBN-CORE-01 > PEW > MPLS Interface > MPLS LSP. The selected item is 'LSP RT ASBN-CORE-01:ASBN-CORE-01_ALBQ-DIST-01_01'. The main pane displays the 'Performance Status - MPLS LSP - 19 Oct. 2008' report. The report includes a table with columns: Instance, Availability, Utilization, Speed, and Transition. The table lists 24 instances, all showing 100% availability and 0% utilization.

Instance	Availability	Utilization	Speed	Transition
LSP RT ASBN-CORE-01:ASBN-CORE-01_ALBQ-DIST-01_01	100%	0%	10 b/s	14 764
LSP RT ASBN-CORE-01:ASBN-CORE-01_ALBQ-DIST-02_01	100%	0%	3 kb/s	15 263
LSP RT ASBN-CORE-01:ASBN-CORE-01_ALBY-DIST-01_01	100%	0%	10 b/s	14 915
LSP RT ASBN-CORE-01:ASBN-CORE-01_ALBY-DIST-02_01	100%	0%	37 kb/s	13 973
LSP RT ASBN-CORE-01:ASBN-CORE-01_ASBN-CORE-02_01	100%	0%	10 b/s	14 176
LSP RT ASBN-CORE-01:ASBN-CORE-01_ATLN-CORE-01_01	100%	0%	10 b/s	15 386
LSP RT ASBN-CORE-01:ASBN-CORE-01_ATLN-CORE-02_01	100%	0%	9 kb/s	14 204
LSP RT ASBN-CORE-01:ASBN-CORE-01_AUSU-DIST-01_01	100%	0%	109 kb/s	14 330
LSP RT ASBN-CORE-01:ASBN-CORE-01_AUSU-DIST-02_01	100%	0%	10 b/s	14 148
LSP RT ASBN-CORE-01:ASBN-CORE-01_BNGH-DIST-01_01	100%	0%	10 b/s	15 515
LSP RT ASBN-CORE-01:ASBN-CORE-01_BNGH-DIST-02_01	100%	0%	7 kb/s	13 531
LSP RT ASBN-CORE-01:ASBN-CORE-01_BOIS-CORE-01_01	100%	0%	10 b/s	15 169
LSP RT ASBN-CORE-01:ASBN-CORE-01_BOIS-CORE-02_01	100%	0%	40 b/s	14 445
LSP RT ASBN-CORE-01:ASBN-CORE-01_BRFD-DIST-01_01	100%	0%	926 b/s	14 280
LSP RT ASBN-CORE-01:ASBN-CORE-01_BRFD-DIST-02_01	100%	0%	10 b/s	14 505
LSP RT ASBN-CORE-01:ASBN-CORE-01_CHCG-CORE-01_01	100%	0%	10 b/s	14 597
LSP RT ASBN-CORE-01:ASBN-CORE-01_CHCG-CORE-02_01	100%	0%	10 b/s	13 581
LSP RT ASBN-CORE-01:ASBN-CORE-01_CHRL-CORE-01_01	100%	0%	1 kb/s	15 131
LSP RT ASBN-CORE-01:ASBN-CORE-01_CHRL-CORE-02_01	100%	0%	26 kb/s	14 085
LSP RT ASBN-CORE-01:ASBN-CORE-01_CLMB-DIST-01_01	100%	0%	10 b/s	14 565
LSP RT ASBN-CORE-01:ASBN-CORE-01_CLMB-DIST-02_01	100%	0%	75 kb/s	14 258
LSP RT ASBN-CORE-01:ASBN-CORE-01_CLMD-DIST-01_01	100%	0%	10 b/s	14 175
LSP RT ASBN-CORE-01:ASBN-CORE-01_CLMD-DIST-02_01	100%	0%	7 kb/s	14 600
LSP RT ASBN-CORE-01:ASBN-CORE-01_CMBA-DIST-01_01	100%	0%	5 kb/s	14 027

Q and A



Visibility Applications

- **Cisco sells a lot of them, 3rd parties sell a lot of them**
- **What is shown ?**
- **What instrumentation is needed ?**
- **Statistical – Realistic Time – algorithmic**

Recommended Reading

Network Management: Accounting and Performance Strategies

