



# Network Operations Center - Update

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# Agenda

- **Introduktion**
- **Et par typiske eksempler vedr. RFP'er og NMS ☺**
- **Design processen**
- **Baseline design**
- **Valg af applikationer**
- **FCAPS modellen**
- **Network Operations Center design eksempel**

# Introduktion

- **Tænkt system løsning / kunde**
- **System / netværksdiagram**
- **Meget få krav beskrevet i RFP'en**
- **Sammensætte en række applikationer**
- **Skal dække FCAPS modellen (så'en cirka)**
- **System Integration**

# Kunde eksempel

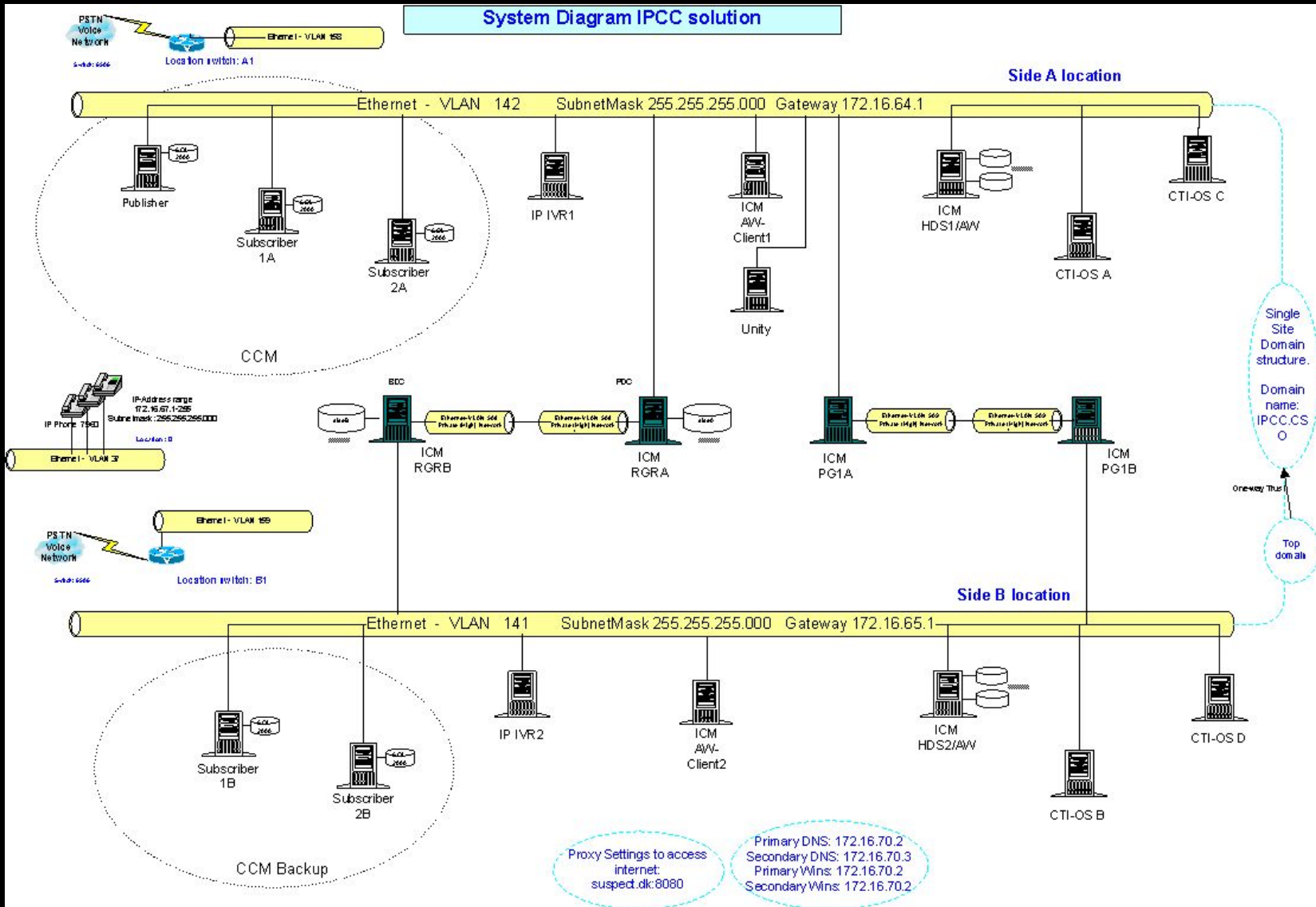
- **Mellemstor til stor dansk erhvervsvirksomhed**
- **300+ netværksenheder: routere / switches**
- **IPT løsning med cirka 2000+ telefoner**
- **RFP'en er skrevet af eksternt konsulenthus**

- **Er typisk fokuseret på selve løsningen**
- **F.eks IPT eller Data Center**
- **Har få eller ingen krav fremsat vedr. NMS**
- **Kommer næsten altid i sidste øjeblik mht besvarelse**
- **Er ikke skrevet af folk med NMS eller System Management erfaring**

# Typiske RFP spørgsmål

- **Systemet skal kunne administreres via et NMS system**
- **NMS systemet skal integreres til eksisterende NMS systemer**
- **Der må kun være en discovery process**
- **List samtlige SNMP variabler og objekter som systemet kan poll'e**
- **List samtlige SNMP traps som systemet kan sende**
- **Vi kører ITIL**
- **Det skal være muligt at måle performance og SLA**

# System / netværksdiagram



## Og 'så ?

Account Manageren har siddet på sine tommelfingre

Du skal aflevere om 3 dage

Du har få eller ingen krav at læne dig op a'

Christian Binow (cbinow@cisco.com)



# Back to basics

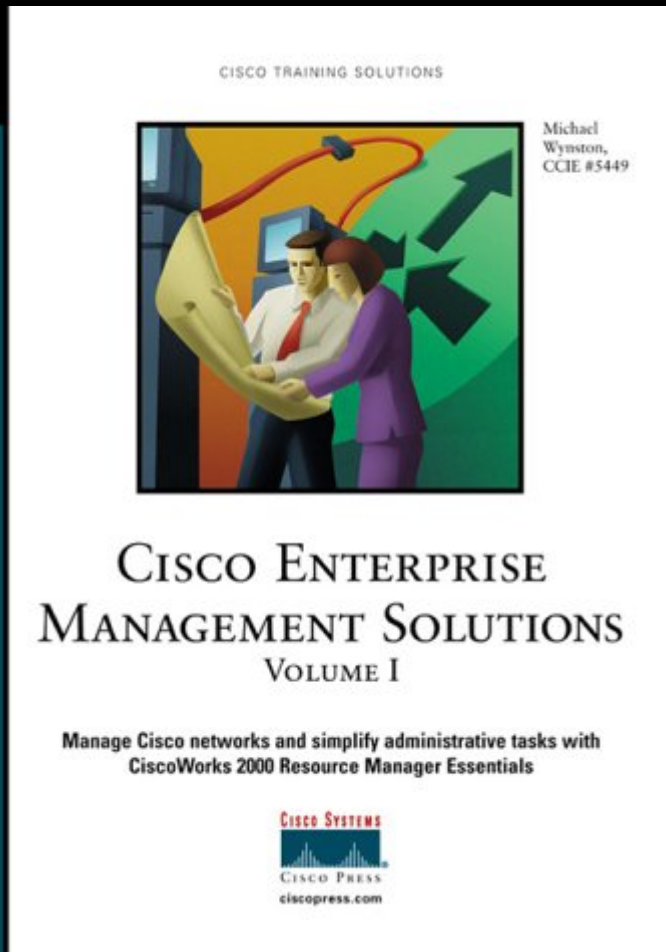
- **Start med et baseline design**
- **Gå udfra hvad du har af systemer**
- **Tænk FCAPS**
- **Næsten alle systemer har en korresponderende Element Manager eller "System" Manager kompleks**
- **Du er nødt til at tænke i system / vendor vertikaler**
- **Husk altid at Release Notes er din ven**
- **En anden ven er Cisco Press Books**
- **Du kommer altid langt med CW LMS 2.5 Deployment Guiden**

# Dokumentation



# Cisco Enterprise Management Solutions

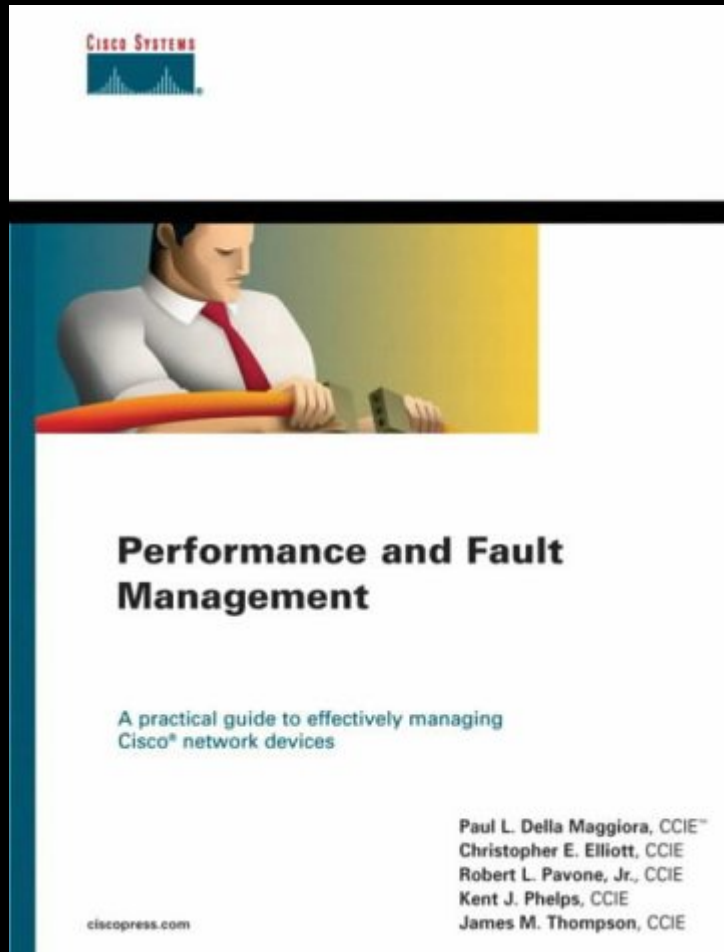
Cisco.com



## Michael Wynston ISBN 1587050064

# Performance and Fault Management

Cisco.com



**Della Maggiora**  
**ISBN 1578701805**

# CiscoWorks LMS 2.5 Deployment Guide(s)

Cisco.com



## Cisco LAN Management Solution 2.5 Deployment Guide

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## LMS 2.5 Large Scale Deployment

### Overview

Network managers are often faced with having to manage very large networks. Networks continue to grow in size, and the number of different management tools and products is often large as well. How can network managers effectively manage networks in this situation?

Cisco Systems® offers many CiscoWorks product bundles, each of which typically has a documented system recommendation and size limitation (for a single-server installation). Nonetheless, customers often need additional information about how to manage large networks (larger than the recommended limit for a single CiscoWorks installation).

This paper provides information and recommendations for these issues. It is important to understand that dealing with large-scale concerns is a complex problem, with many factors affecting the result. The most common question, "What size server do I need for CiscoWorks LMS to manage x number of devices?" is difficult to answer in a meaningful way. The following points must be considered:

- The number of devices is at best a vague way to estimate needed system resources—different devices can have vastly differing numbers and types of managed objects.
- What components and functions of the products are most important to the network managers?
- How many users will the network management tools have, and how many of them will use the tools simultaneously?
- In the case of very large networks, what are the administrative groupings of the network devices and network management users?

Answers to these questions, combined with the information contained in this document, will allow users to make informed decisions about how to deploy CiscoWorks LMS for managing their networks.

### LAN Management Solution (LMS) 2.5

LAN Management Solution (LMS) 2.5 is the current LMS offering by Cisco and includes the following components:

- **Common Services (CS) 3.0 (Includes CiscoView 6.1)**  
Common Services 3.0 provides a set of shared application services that are used by all LMS applications. CiscoView 6.1 is a graphical device management tool that helps monitor, and troubleshoot devices across your network. Integration Utility 1.6 is an integration module that supports integration with third-party Network Management Systems (NMS).
- **Resource Manager Essentials (RME) 4.0**  
RME provides the ability to manage device inventory and audit changes, configuration files, software images and Syslog analysis, helping in lifecycle management.
- **Campus Manager (CM) 4.0**  
CM provides tools to visualize network topology, manage VLANs, detect network discrepancies and best-practice non-compliance, perform Layer 2/3 data and voice traces and report on end-host user information.
- **Device Fault Manager (DFM) 2.0**  
DFM provides the ability to monitor device faults in real-time and determine the root cause by correlating device level fault conditions. DFM can notify you of critical network conditions via email or pager. Fault

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Page 1 of 24

# CiscoWorks LMS Quick Start Guide

Cisco.com



Quick Start



## Quick Start Guide for LAN Management Solution 2.5

- 1 SUPPLEMENTAL LICENSE AGREEMENT
- 2 LAN Management Solution 2.5 Overview
- 3 Server and Client System Requirements
- 4 Installation Paths
- 5 Upgrade Options
- 6 Installing LAN Management Solution 2.5
- 7 Installing CiscoWorks Common Services 3.0
- 8 Installing Resource Manager Essentials 4.0
- 9 Installing Campus Manager 4.0
- 10 Installing Device Fault Manager 2.0
- 11 Installing Internetwork Performance Monitor 2.6
- 12 Getting Started with LMS
- 13 Post-Installation Tasks
- 14 Where to Go Next
- 15 Related Documentation
- 16 Obtaining Documentation
- 17 Documentation Feedback
- 18 Obtaining Technical Assistance
- 19 Obtaining Additional Publications and Information



# ITU-T M.3400 TMN management functions

Cisco.com



INTERNATIONAL TELECOMMUNICATION UNION

**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**M.3400**

(02/2000)

SERIES M: TMN AND NETWORK MAINTENANCE:  
INTERNATIONAL TRANSMISSION SYSTEMS,  
TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE  
AND LEASED CIRCUITS

Telecommunications management network

---

**TMN management functions**

ITU-T Recommendation M.3400

(Formerly CCITT Recommendation)

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## FCAPS

- **Fault**
  - **Topology**
- **Configuration**
  - **Provisioning**
  - **Configuration**
  - **Inventory**
  - **Archiving**
- **Accounting**
- **Performance**
  - **SLA**
- **Security**
  - **Identity**
  - **AAA**
  - **...**

**Baseline design**

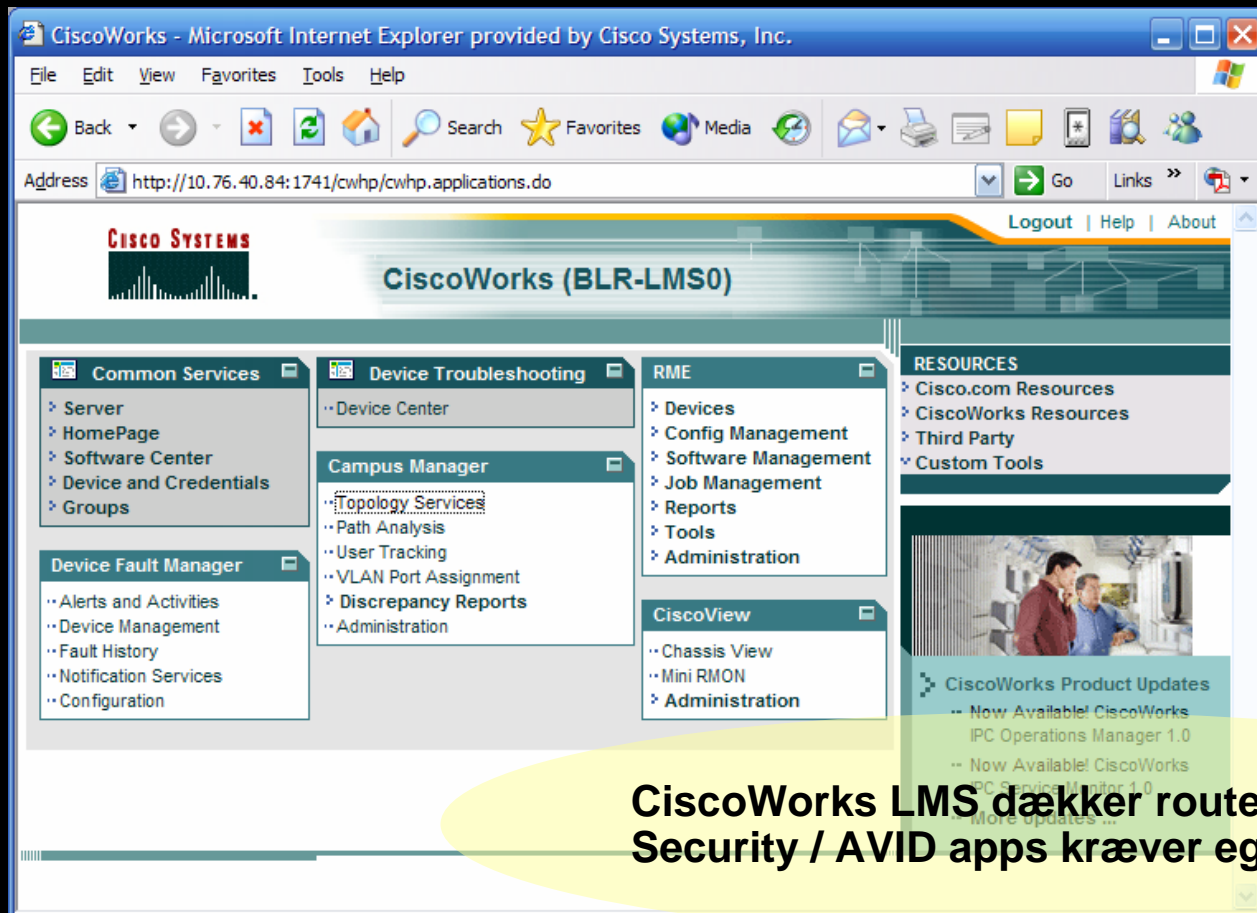
**CiscoWorks LMS 2.5**





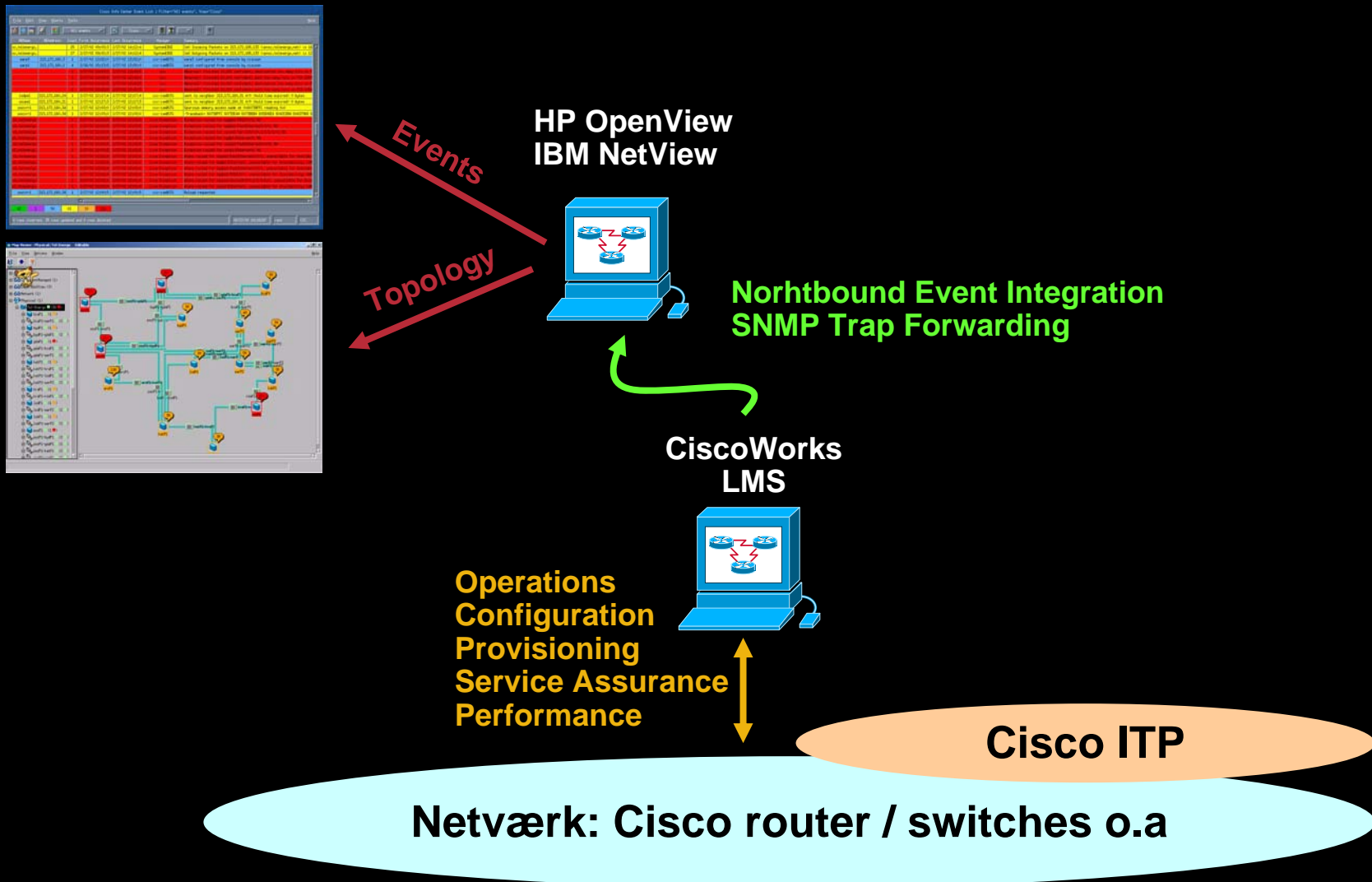
# Baseline design

- CiscoWorks LAN Management Suite

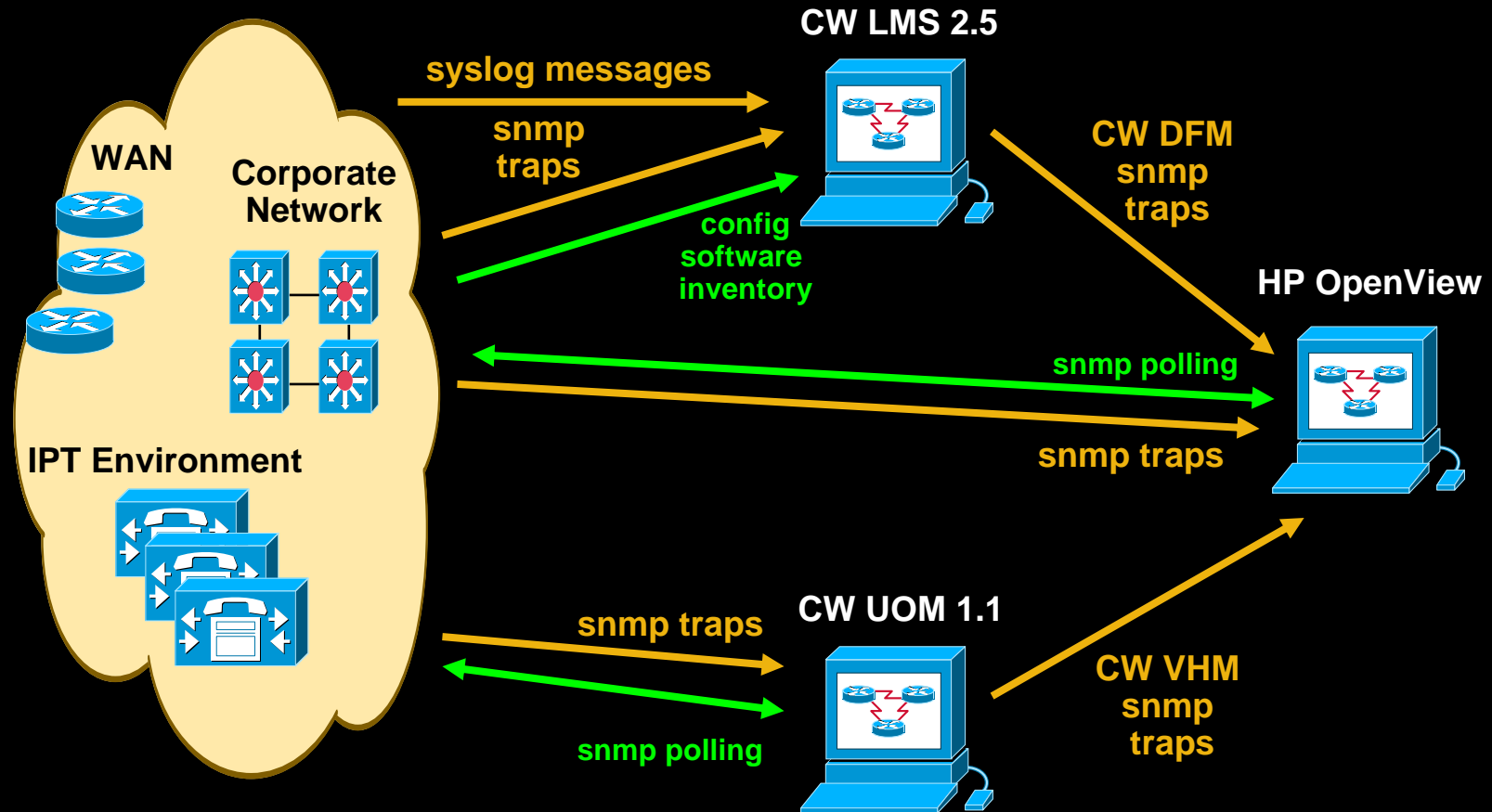


CiscoWorks LMS dækker routere / switches  
Security / AVID apps kræver egne apps

# Baseline design

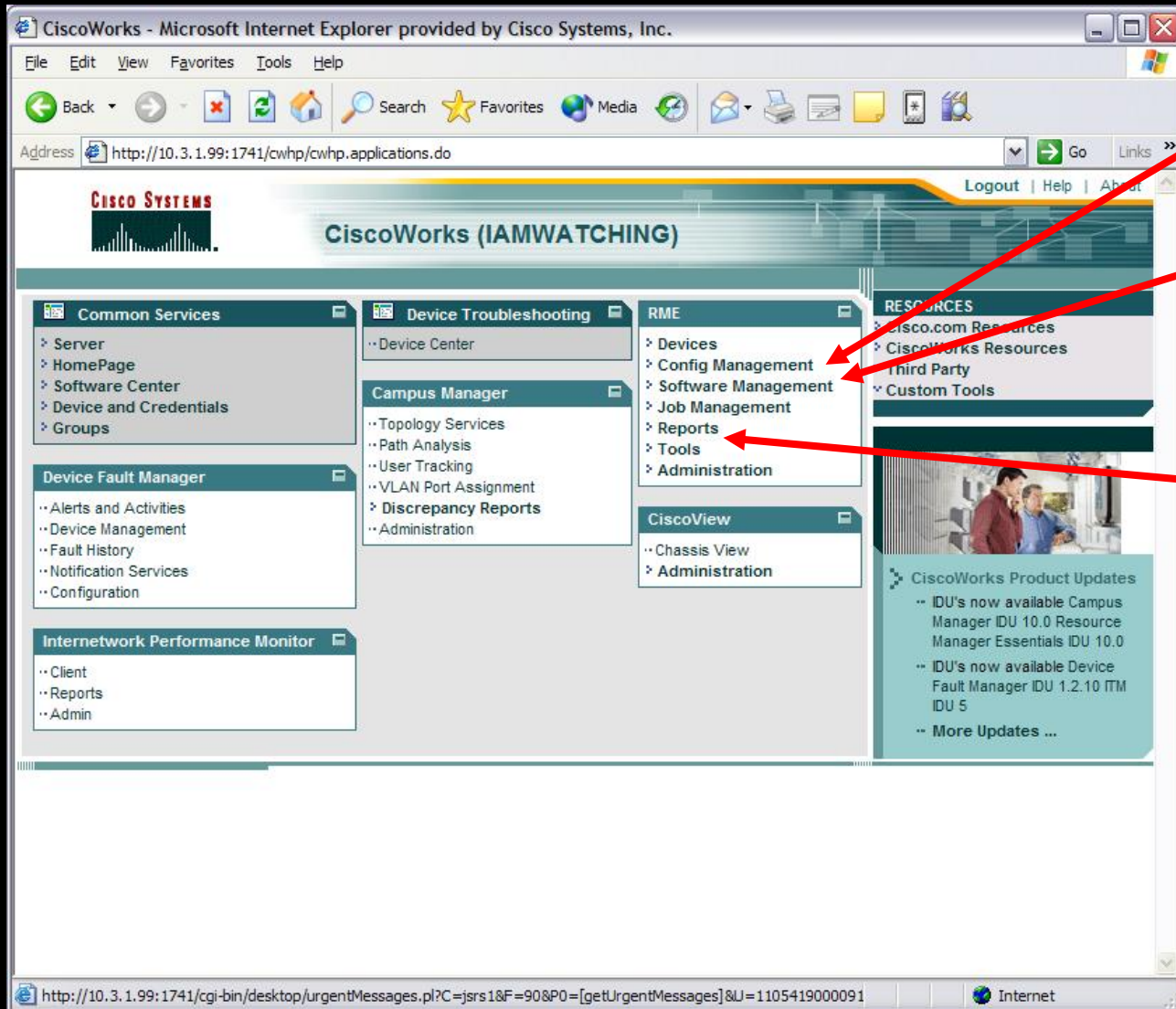


# Baseline design – Fault Management



# Baseline design CiscoWorks 2000 LAN Management Suite

Cisco.com



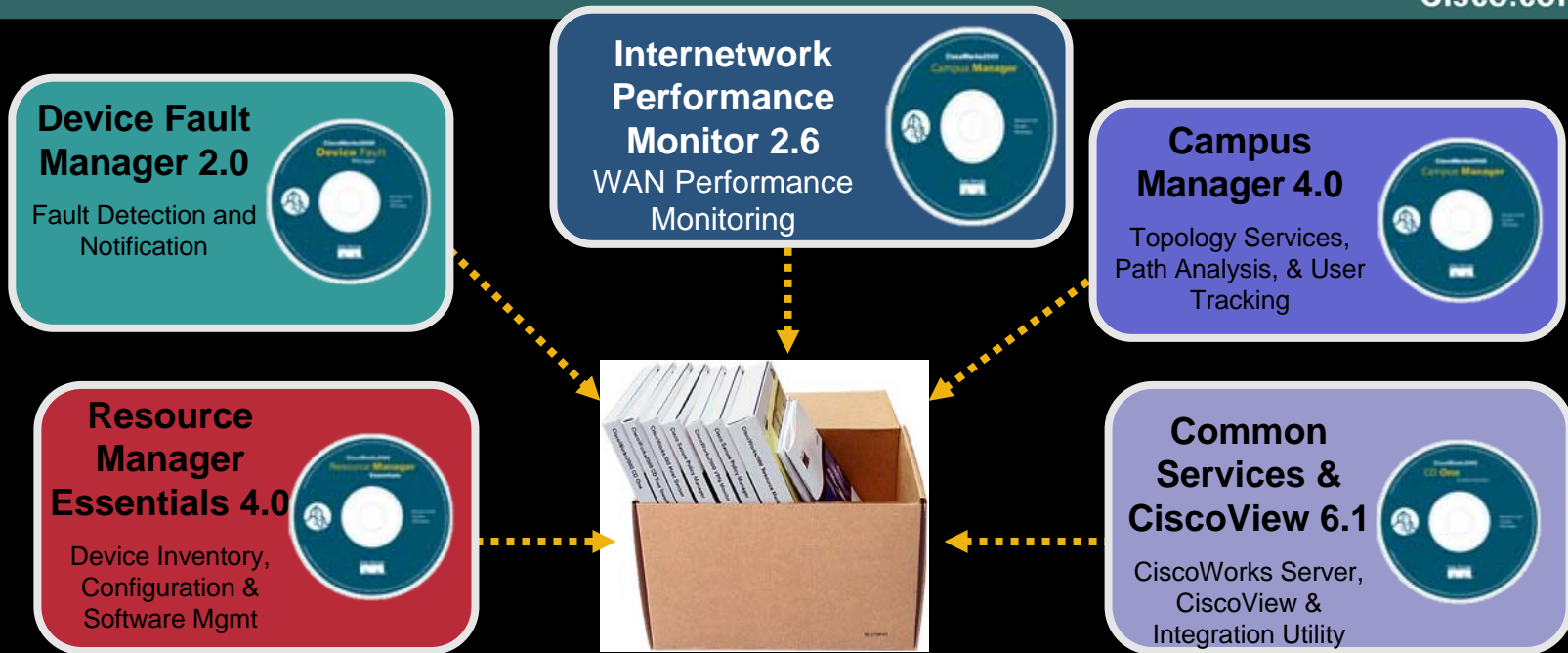
Device Configuration Management

Device Software/Image Management

Device Configuration Software/Image Auditing Management

# Baseline design CiscoWorks LMS 2.5 indeholder

Cisco.com



- **Network discovery, display, configuration and visualization of Layer 2 network configuration (topology, VLANs, ATM).**
- **Recognizes common network problems without forcing users to configure filters or polling intervals.**
- **Automates software distribution, change audit and authorization, device inventory, and syslog analysis for campus networks with switched infrastructures.**

# Baseline design LMS Resource Manager Essentials (RME)

Cisco.com

## Inventory Manager

Complete Cisco asset management

## Software Image Manager

Software lifecycle management of Cisco hardware

Improved browse bug by device

## Configuration Manager

Version control, archival, editing and reporting of device configurations

Network-wide config changes

## Change Audit Services

Single interface for all hardware, software, and configuration changes

The screenshot displays the Cisco LMS Resource Manager Essentials (RME) interface. At the top, it shows the 'Archive Mgmt' section with a 'Config Diff Viewer' for 'nmtg-demo-6000-msfc.cisco.com Config' as of Jan 25 04:19:00 PST 2005. Below this, two configuration versions are compared: 'Version:3' and 'Version:2'. The configurations are identical, listing settings like 'version 12.0', 'no service pad', 'service timestamps debug uptime', 'no service password-encryption', 'hostname nmtg-demo-6000-msfc', 'boot system flash bootflash:c6mfc-js-mz.120-3.XE1', 'enable secret 5 \*\*\*\*\*', 'enable password \*\*\*\*\*', 'logging trap debugging', and 'logging 192.168.138.24'. Below the diff viewer is a 'Hardware Report' section, generated on Jan 25 2005 04:23:20. It includes a 'Go to Device Category' dropdown and a 'Summary' table. The summary table shows: Total number of devices: 6, Devices with Report Data: 6, and Devices without Report Data: None. Below the summary, there are two tables for device categories: 'Cisco Catalyst 2900 Series XL Switches' and 'Cisco Catalyst 8500 Series Campus Switch Routers'. The first table has columns for Device Name, Updated At, System Description, Location, Contact, Serial Number, Chassis Vendor Type, Total RAM Size (MB), NVRAM Size (KB), NVRAM Used (KB), and Total Flash Device Size (MB). The second table has columns for Device Name, Updated At, System Description, Location, Contact, Serial Number, Chassis Vendor Type, Backplane Vendor Type, Total RAM Size (MB), NVRAM Size (KB), NVRAM Used (KB), ROM Version, Total Flash Device Size (MB), Type of PCMCIA Slot 0, and Type of PCMCIA Slot 1.

Device Name	Updated At	System Description	Location	Contact	Serial Number	Chassis Vendor Type	Total RAM Size (MB)	NVRAM Size (KB)	NVRAM Used (KB)	Total Flash Device Size (MB)
nmtg-branch-2900xl.cisco.com	Jan 21 2005 00:30:13	Cisco Internetwork Operating System Software IOS (tm) C2900XL Software (C2900XL-C3H2S-M), Version 12.0(5.2)XL, MAINTENANCE INTERM SOFTWARE Copyright (c) 1986-2000 by cisco Systems, Inc. Compiled Mon 17-Jul-00 17:35 by ayounes			FAB0432U2RM	ws-c2924-xlv	9.00	32.00	1.37	

Device Name	Updated At	System Description	Location	Contact	Serial Number	Chassis Vendor Type	Backplane Vendor Type	Total RAM Size (MB)	NVRAM Size (KB)	NVRAM Used (KB)	ROM Version	Total Flash Device Size (MB)	Type of PCMCIA Slot 0	Type of PCMCIA Slot 1
192.168.158.110	Jan 07 2005 00:30:14	Cisco Internetwork Operating System Software IOS (tm) L3 Switch/Router Software (C8540CSR-IN-M), Version 12.0(44)WX5(11a) RELEASE SOFTWARE Copyright (c) 1986-1999 by cisco Systems, Inc. Compiled Thu 09-Sep-99 16:18 by intg	San Jose			c8540	c8540	256.00	507.99	3.04	12.0(4)6 WE(13)	16.00		

# Baseline design LMS Campus Manager (CM)

Network based management of switch services and traffic performance

Enhanced network discovery and topology mapping

Auto Network Discovery

VLAN Management

Extended ATM Management

End-station mobility and tracking

Path Trace Analysis

Cisco.com

The screenshot displays the Cisco LMS Campus Manager interface, showing a network topology view and a path analysis window. The main window is titled "Network Topology - Layer 2 View (admin@ANIServer3.0-oregano)". It features a menu bar with File, Edit, View, Reports, Window, and Help. The main area shows a network diagram with various devices connected. A context menu is open over a device, listing actions such as Device Attributes, Port Attributes, Rediscover Device(s), Delete Device(s), Device Center, and Cisco Call Manager. The right sidebar contains "Topology Filters" with a "Types Filter" section.

The "Path Analysis" window (admin@ANIServer3.0-oregano) is also visible, showing a "Voice Trace" configuration. The "From" field is set to 192.168.79.86 and the "To" field is set to 192.168.76.252. The "Find Call..." button is present. Below the configuration fields, there are tabs for "Map", "Trace", and "Table". The "Map" tab is selected, showing a path trace diagram with nodes labeled "wan-2900a.embu-mlab.cisco.com", "qdm-7200.embu-mlab.cisco.com", "core-8540.embu-mlab.cisco.com", and "serv-4000.embu-mlab.cisco.com". The path starts at 192.168.79.86 and ends at 192.168.76.252.

The "VTP Domain Topology - field-demo (admin@ANIServer3.0-oregano)" window is also visible, showing a network diagram with various devices labeled "field-c5000d", "field-c5000c", "field-c5000a-rsm", "field-8510a", "field-c5000a", "field-8510b", and "field-c5000b-rs".

At the bottom of the interface, there is a status bar with the following information: "Request to delete 1 device(s) accepted by A...", "Last discovery: 2000/12/12 16:00 (local)", "Idle", "Warning: Applet Window", "Devices: 1", "Links: 9", and "ANI: Idle UT: Idle".

# Baseline design LMS CiscoView (CV)

Cisco.com

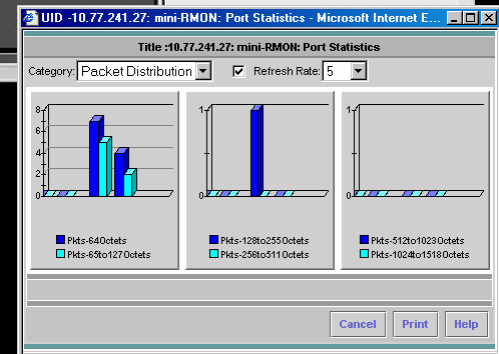
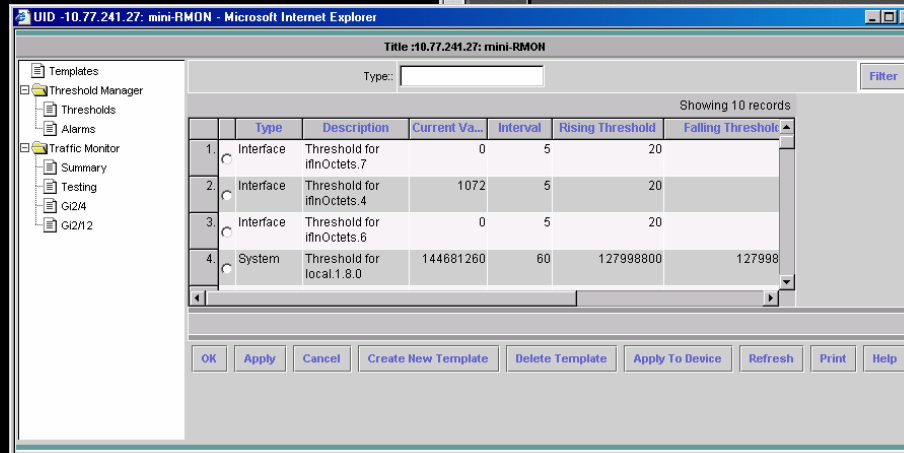
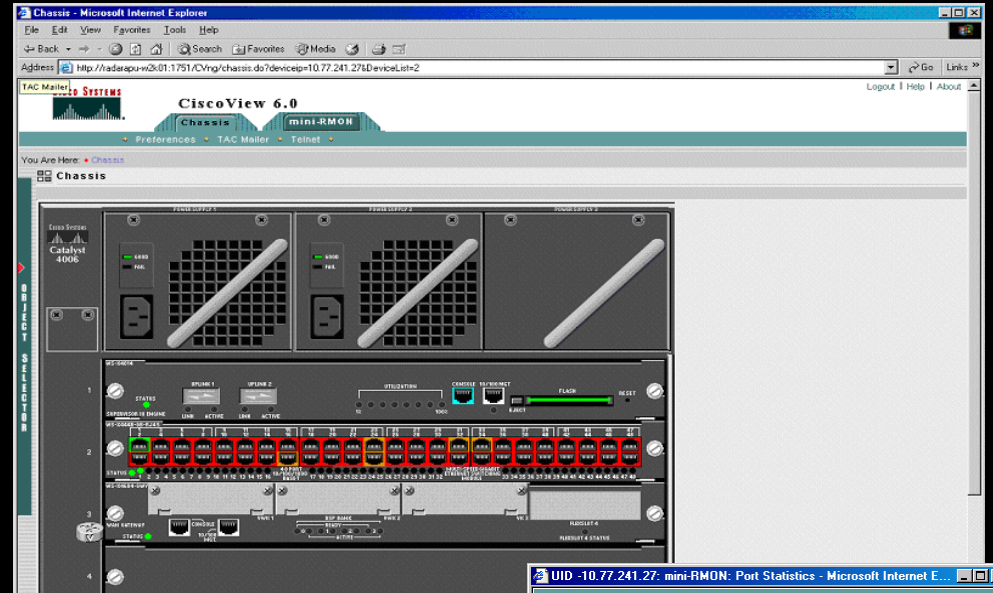
- **SNMP-based device management tool – all monitoring and configuration capabilities based on MIB support**
- **Monitor real-time statistics for interfaces, resource utilization, and device performance**
- **Simple point and click to configure multiple ports and chassis parameters**
- **Currently supports entire range of switches and routers.**

The screenshot displays the CiscoView 6.0 interface for configuring a Cisco Catalyst 4503 switch. The main window shows a physical view of the switch with a red box highlighting a port. A configuration panel on the right shows details for 'Interface Gi1/2', including Name, Description, Index, Speed, Mtu, Physical Address, Admin Status, Operational Status, Last Change, Up/Down Traps, Aggregation Protocol, and Local Description. The bottom of the interface shows a row of 48 ports, with the selected port highlighted in red.

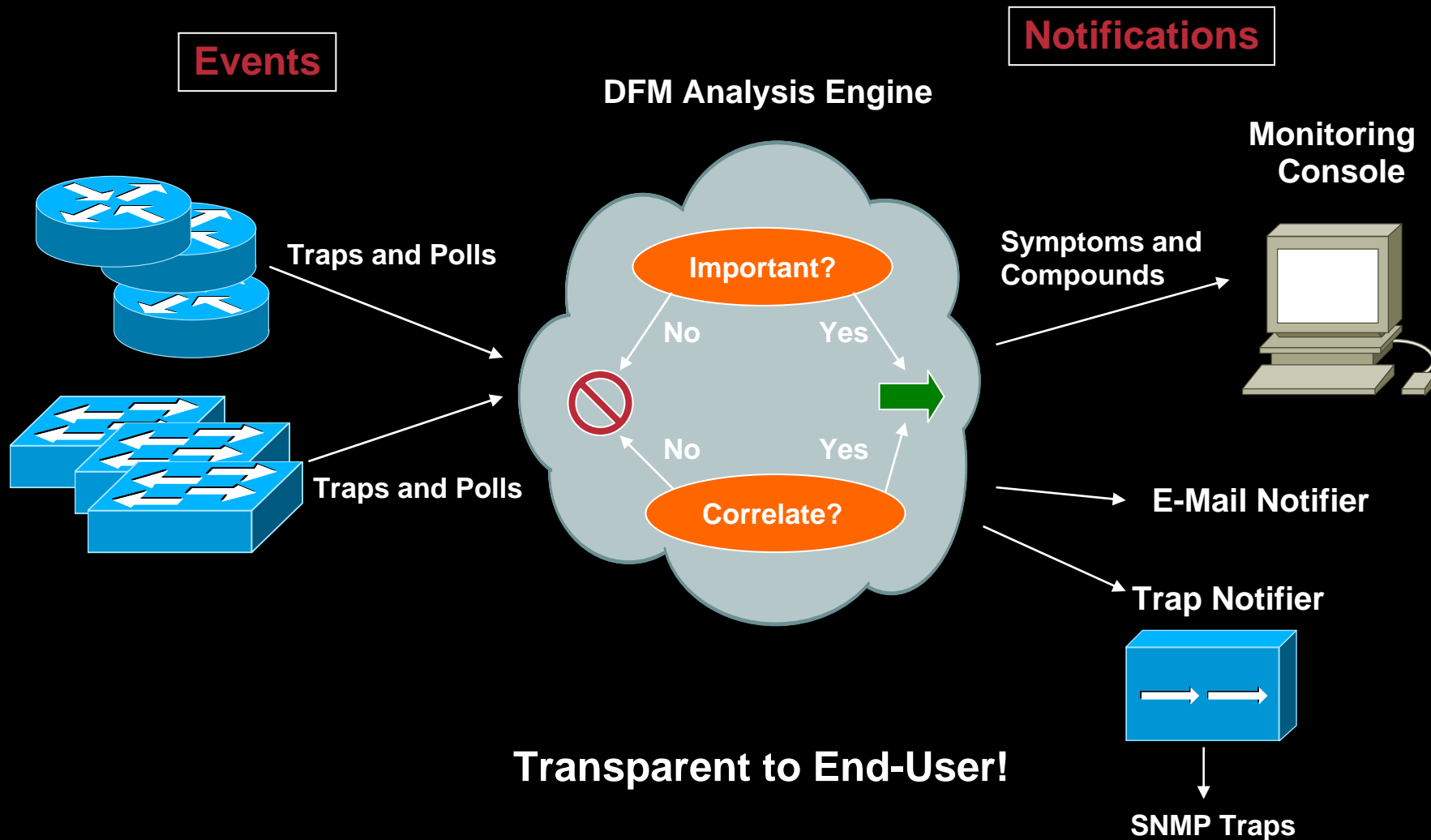


# Baseline design LMS CiscoView (CV)

- New lightweight HTML interface
- IPv6 compliance
- Mini-RMON support
- SNMPv3 (AuthNoPriv)
- More granularity in user-roles through the ability to integrate with an ACS server



# Baseline design LMS DFM Fault Analysis



# Baseline design LMS - DFM Event Management GUI

Cisco.com

- New lightweight Active Alarm Display
- Device Grouping
  - “Random” grouping – pick what devices you want for any group
- Improved Integration
  - Synchronization with Common Services Device Credential Repository
  - Launch Fault History, CiscoView and Device Center from AAD
  - Common Groups shared from Common Services



































The screenshot displays the Cisco Device Fault Manager (DFM) interface. The title bar reads "Device Fault Manager" and "Alerts and Activities as of Thu 27-Mar-2003 11:06:41 PST". Below the title bar, there is a navigation pane on the left with "All Alerts" selected. The main area shows a table of alerts with 16 entries. The table columns are: Alert ID, Device, Duration, Last Change, Device Name, Description, and Status. Each row has a red exclamation mark icon in the first column.

Alert ID	Device	Duration	Last Change	Device Name	Description	Status
00000SA	VoiceGateway	16 hr 43 min	27-Mar-2003 11:06:35	60.60.202.100	Environment	Active
00000RX	VoiceGateway	67 hr 06 min	27-Mar-2003 02:02:39	vegas-c6k.cisco.com	Other	Active
00000RY	VoiceGateway	67 hr 03 min	27-Mar-2003 02:02:32	172.20.119.9	Other	Active
00000RV	VoiceGateway	67 hr 06 min	27-Mar-2003 02:02:20	vegas-3640.cisco.com	Other	Active
00000RV	VoiceGateway	67 hr 06 min	25-Mar-2003 11:10:28	172.20.121.170	Interface	Active
00000S7	PhoneAccessSwitch	67 hr 02 min	24-Mar-2003 16:04:21	c3524x-vm.cisco.com	Reachability	Active
00000S5	MediaServer	67 hr 03 min	24-Mar-2003 16:04:09	ny-ccm1.cisco.com	Application	Active
00000S6	VoiceCluster	67 hr 02 min	24-Mar-2003 16:04:05	VC-mirage-ccm1-Cluster	Application	Active
00000RZ	MediaServer	67 hr 03 min	24-Mar-2003 16:04:04	vegas-ccm11.cisco.com	Application	Active
00000S4	MediaServer	67 hr 03 min	24-Mar-2003 16:03:25	vegas-ccm12.cisco.com	Environment	Active
00000S3	MediaServer	67 hr 03 min	24-Mar-2003 16:03:18	mirage-cm4.cisco.com	Environment	Active
00000S2	MediaServer	67 hr 03 min	24-Mar-2003 16:03:16	vegas-ccm13.cisco.com	Environment	Active
00000S1	MediaServer	67 hr 03 min	24-Mar-2003 16:03:15	mirage-cm3.cisco.com	Environment	Active
00000S0	MediaServer	67 hr 03 min	24-Mar-2003 16:03:14	mirage-cm1.cisco.com	Environment	Active
00000RU	VoiceGateway	67 hr 06 min	24-Mar-2003 16:00:47	vm-vg248.cisco.com	Interface	Active
00000RT	VoiceCluster	67 hr 08 min	24-Mar-2003 15:58:35	VC-ICS7700-031EL82-Cu...	Application	Active

# Baseline design – LMS DFM

## System Elements Monitored

Cisco.com

	Routers	Switches	Hubs	Exception
<b>Connectivity</b>				
IP polling				Operational
SNMP polling				Operational
Excessive Restarts				Operational
<b>Environmenta</b>				
Temp state				Temperature
Relative temp				Temperature
Voltage state				Power Supply
Relative voltage				Power Supply
Fan state				Temperature
Power supply state				Power Supply
<b>Processor &amp; Memory</b>				
Backplane utilization				Resource
Free memory				Resource
Memory buffer misses				Resource
Memory buffer utilization				Resource
Memory fragmentation				Resource
Processor utilization				Resource

# Baseline design – LMS DFM

## Port & Interface Elements Monitored

Cisco.com

	'Managed' Switch Port Groups		'Managed' IP Addressable Interfaces						
	Ethernet	ATM	Ethernet	ATM Serial	TR FDDI	Others	Dial on Demand		Backup
Broadcasts	●	●	●	●	●	●			Performance Exception
Collisions	●		●						
Discards	●	●	●	●	●	●			
Errors	●	●	●	●	●	●			
Queue Drops	●	●	●	●	●	●			
Utilization	●	●	●	●	●	●			
Port Flapping				●		●			Operational Exception
Backup Activated								●	
Maximum Uptime							●	●	
Oper Down	●	●	●	●	●	●			

# Baseline design – LMS IPM Internetwork Performance Monitor

Cisco.com

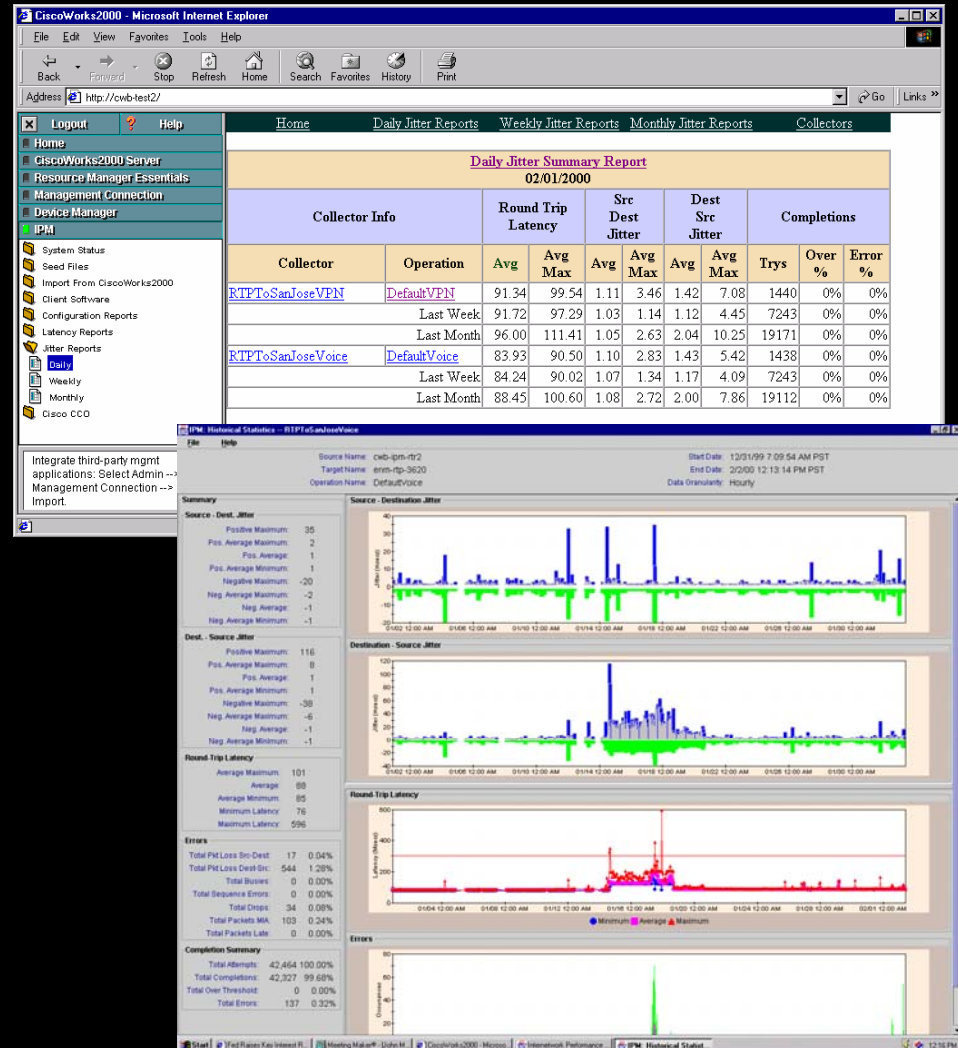
- **WAN Troubleshooting**

Measures hop-by-hop response time, availability, jitter, and drops

Provides real-time and historical reports

- **Utilizes IP SLA (previously known as Cisco's Service Assurance Agent) embedded in Cisco IOS**

Validates & measures TCP, UDP, HTTP, VoIP, DNS, ICMP with QoS awareness



# Valg af applikationer til support af andre systemer



# Valg af applikationer

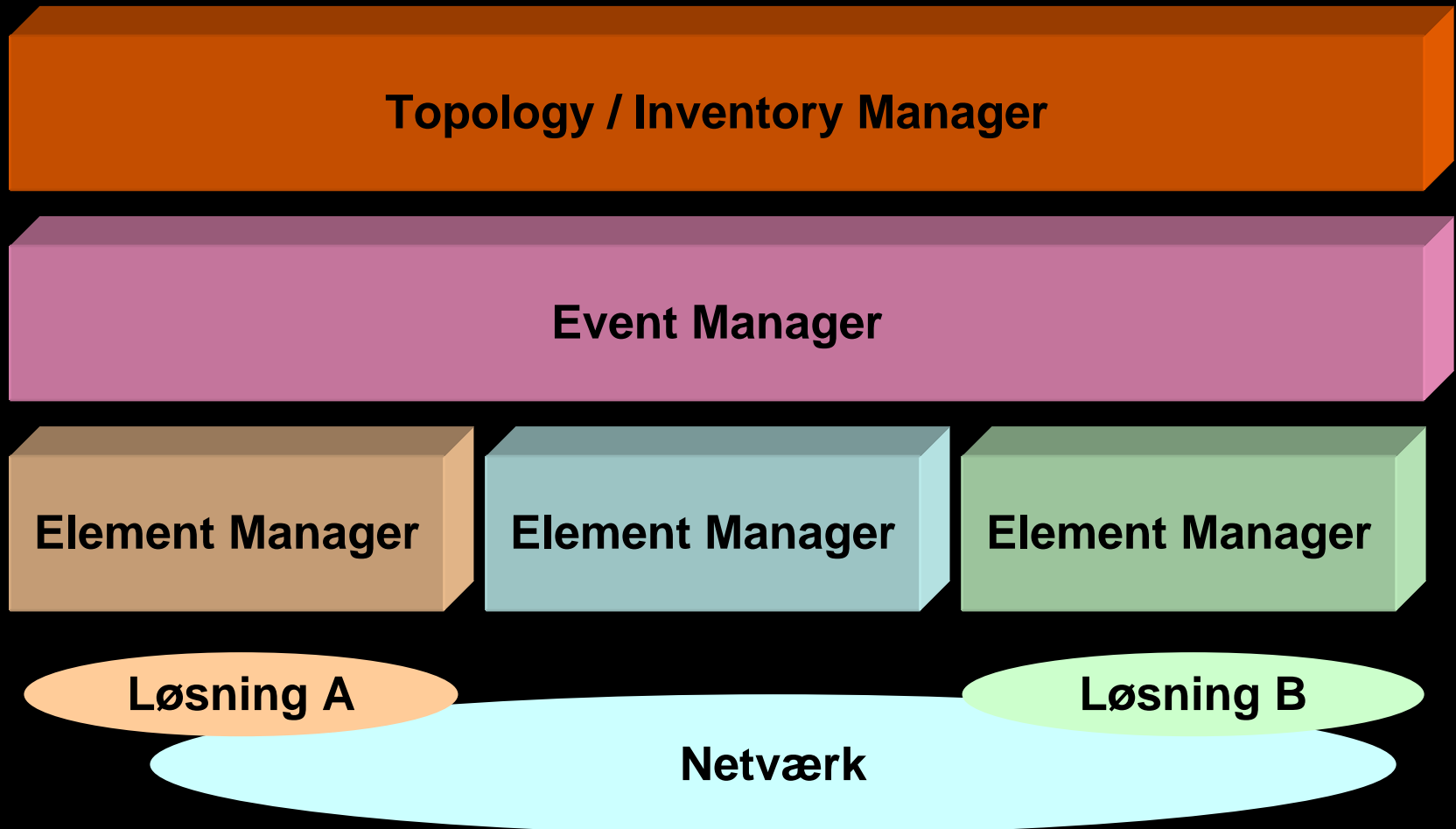
- Du har Cisco routere og switches  
CiscoWorks LAN Management Suite → Operations  
Configuration  
Provisioning  
Service Assurance  
Performance
- Du har en Cisco IPT løsning  
CiscoWorks Unified Operations Manager → Operations  
Configuration  
Provisioning  
CiscoWorks Unified Service Monitor → Service Assurance  
Performance
- Security  
Cisco Security Manager (ASA / PIX) → Operations  
Configuration  
Provisioning  
CiscoSecure Access Control Server (TACACS+) → Operations  
Configuration  
Provisioning  
CiscoWorks Security Info Management Solution → Service Assurance  
Performance

**Tænk FCAPS!**



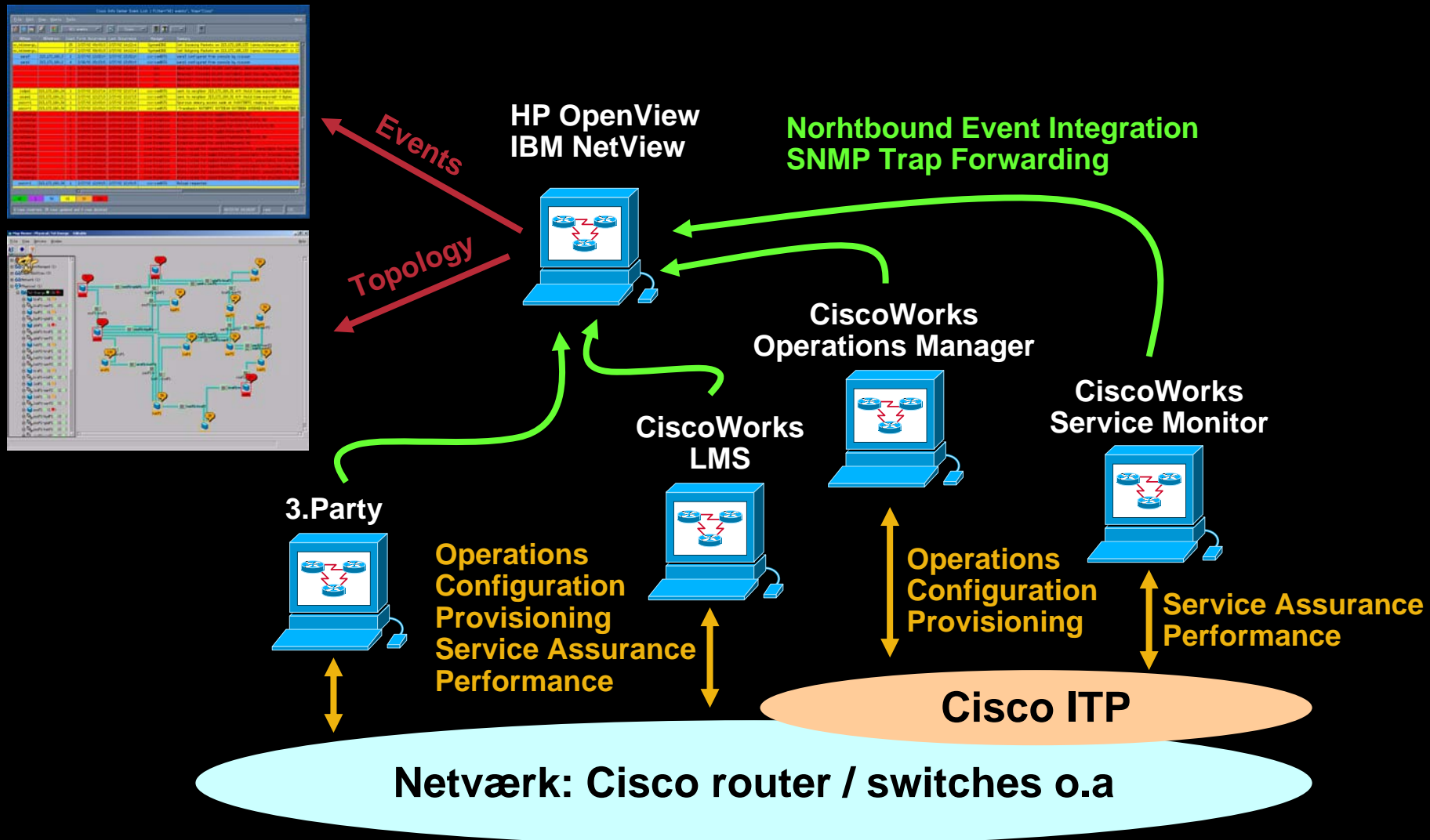
# Hvad er system / vendor vertikaler

Cisco.com



# Hvad er system / vendor vertikaler (pratisk)

Cisco.com



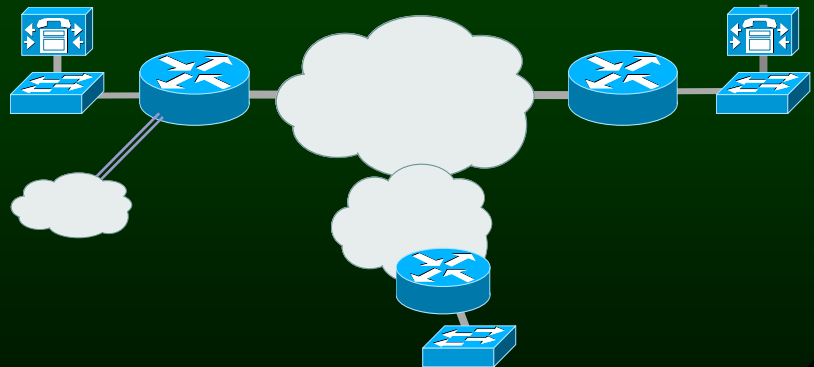
# CiscoWorks IPT Solution Voice Monitoring & Management

## CiscoWorks UOM Unified Operations Manager



# CiscoWorks Unified Operations Manager

Cisco.com



- Device discovery
- Logical relationships
- Polling & Traps
- Synthetic testing (Skinny, IP SLA)

**'helpful' User Interface**

**Fault Status  
Service Impact  
Performance**



**AAD & DDV**

A screenshot of the IP Telephony Monitor interface, showing a table of call records with columns for call ID, time, and status.

**Topology Views**

A screenshot of the IP Communications Operations Manager interface, displaying a network topology with various nodes and connections.

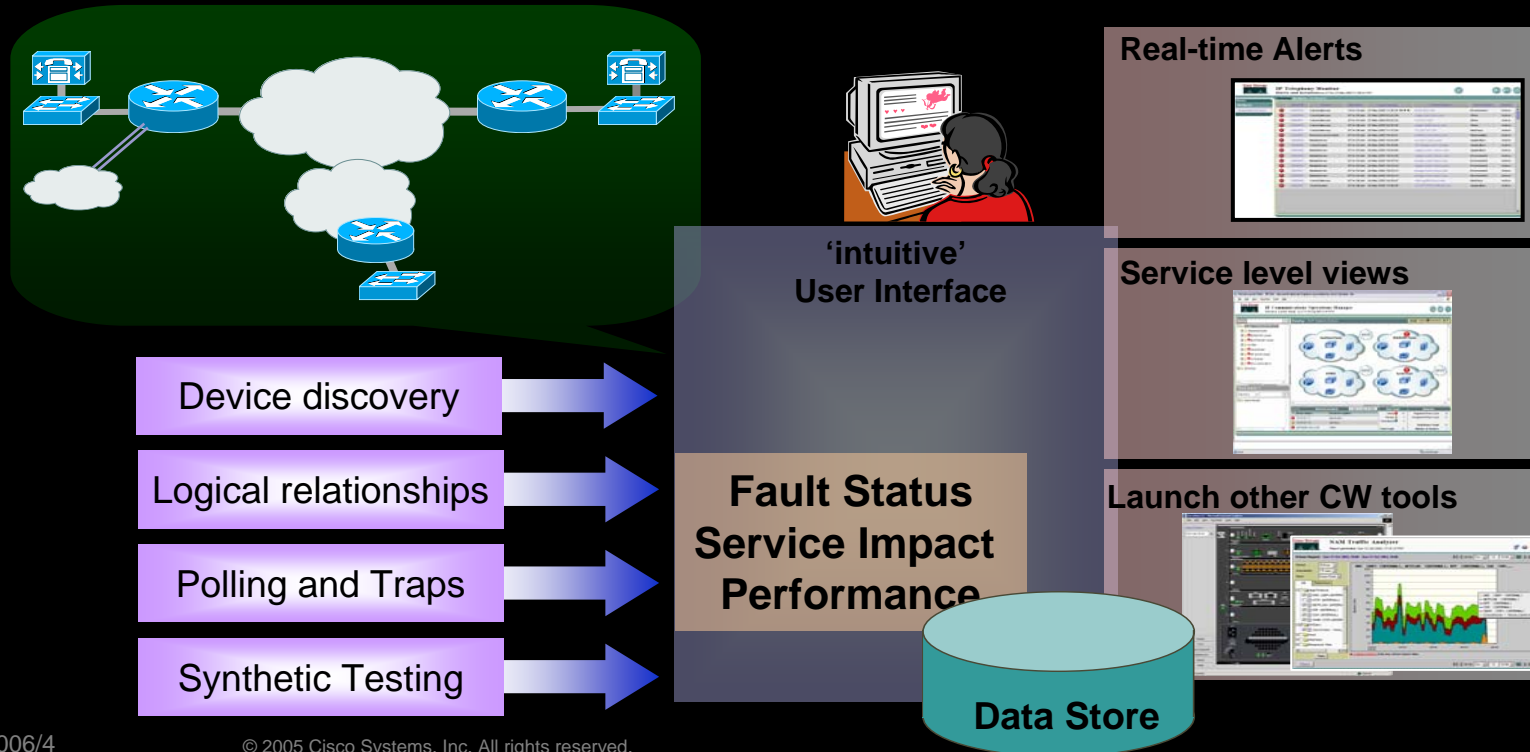
**Launch other CW tools**

A screenshot of the NAM Traffic Analyzer interface, showing a graph of traffic volume over time.

# CiscoWorks Unified Operations Manager Product Overview/System Architecture

Cisco.com

- Actionable, service level View of full IP Communications implementation
- Real-time alerting on IP Communications and IP devices in the deployment
- Integrated Service quality alerting and reporting
- Extensive Phone and device inventory reporting
- Integrates with other CiscoWorks tools like LMS, ACS etc



# CiscoWorks Communications Operations Manager Startup GUI

Cisco.com

The screenshot shows the CiscoWorks Communications Operations Manager interface. At the top, the browser title is "IP Communications Operations Manager - Microsoft Internet Explorer provided by Cisco Systems, Inc.". Below the browser title is a menu bar with "File", "Edit", "View", "Favorites", "Tools", and "Help". The main header features the Cisco Systems logo and the title "IP Communications Operations Manager". A navigation bar contains tabs for "Monitoring Dashboard", "Diagnostics", "Reports", "Notifications", "Devices", and "Administration". Below this is a secondary navigation bar with dropdown menus for "Service Level View", "Alerts and Events", "IP Phones", "Service Quality Alerts", and "Manage Views". A breadcrumb trail indicates "You Are Here > Monitoring Dashboard". The main content area is divided into four panels:

- Service Level View:** Contains an icon of a magnifying glass over a network diagram. Description: "Current status of different devices, applications and phones and the connectivity and relationships between them."
- Alerts and Events:** Contains an icon of a red emergency light. Description: "Current alerts and events on different devices and applications supporting IP telephony services."
- Service Quality:** Contains an icon of a speedometer labeled "SERVICE QUALITY" with a needle pointing to the number 3. Description: "Current alerts and issues regarding poor service quality in the IP telephony services."
- Phone Status:** Contains an icon of a Cisco IP phone. Description: "List of IP Phones that are experiencing outages in service."

# CiscoWorks Unified Operations Manager Service Level View

Service Level View



Current status of various devices, applications, and phones, and the connectivity and relationships among them.

- **Actionable, service level View of full IP Communications implementation**
  - Correlation of device and IPC application fault status to endpoint and service availability
  - Service Level reports
- **Support for CCM, Unity, CME, CUE, IPCC, IPCCE, Gateways, Routers, Switches, Phones and Applications**

Service Level View - IPCOM - Microsoft Internet Explorer provided by Cisco Systems, Inc.

**CISCO SYSTEMS**  
IP Communications Operations Manager  
Service Level View as of Fri 26-Aug-2005 22:45:50 IST

Showing: All IP Telephony Devices ZOOM 41%

Device: [All IP Telephony Devices (default)]

- StandAloneCluster
- BLRSKATE1-Cluster
- BLR-PARCHE1-Cluster
- KATMAI
- ParcheCluster
- IPF-SKATE-Cluster
- 10.76.93.69
- IPCC-LOGICA [IPCC]
- All Devices

Phone Search

Extension: [ ] GO

Search Results

Most Recent Alerts		Alert Count	Summary
!	Device Name	Critical	Registered Phone Count
!	10.76.91.77	Warning	Unregistered Phone Count
!	10.76.91.171	Informational	
!	ipif-skate.cisco.com		
		<b>Total Count</b>	<b>Total Device Count</b>
		26	43
			<b>Number of Clusters</b>
			7

# CiscoWorks Unified Operations Manager Service Level View

Cisco.com

Service Level View



Current status of various devices, applications, and phones, and the connectivity and relationships among them.

- Comprehensive monitoring and alerting with intuitive work flow and ease of use
- Integrated Diagnostic Tools for monitoring and active testing (end-to-end, node-to-node; signaling, transport)
- Physical and logical topology views of IPC implementation
- Real-time phone status display and path trace between phones / devices

Service Level View - IPCOM - Microsoft Internet Explorer provided by Cisco Systems, Inc.

File Edit View Favorites Tools Help

Search Web

CISCO SYSTEMS IP Communications Operations Manager Service Level View as of Wed 21-Sep-2005 11:33:59 PDT

Device: [input] GO

Showing: 1-Skate-SanJose-Cluster1 ZOOM 0%

Threshold parameters  
Performance  
Operations Manager Device Center  
Alert History  
Alert Details  
Polling parameters  
Connectivity Details  
Detailed Device View  
Associated Phones  
End-to-End Call Test  
Dial Tone Test  
Phone Registration Test  
Launch CallManager Administration  
CallManager Serviceability  
Settings...  
About Macromedia Flash Player 7...

Device Name	Event Description
172.20.118.6	Interface
SD-PUB	Other
1-skate-7845h.cisco.com	SystemHardware



# CiscoWorks Unified Operations Manager Alerts & Events

Cisco.com

## Alert and Events



Current alerts and events on various devices and applications supporting IP telephony services.

- Real time alerts on transport as well as IP Communications devices
- Drill down views for detailed information and diagnostic/troubleshooting tools

Alerts and Events - IPCOM - Microsoft Internet Explorer provided by Cisco Systems, Inc.

File Edit View Favorites Tools Help

**CISCO SYSTEMS** IP Communications Operations Manager  
Alerts and Events as of Fri 26-Aug-2005 18:02:45 PDT

Showing: All Alerts, 5 records

#	!	ID	Device Type	Device Name	Alert Age	Latest Event Time	Latest Event Description	Status
1.	!	00000S0	MediaServer	1-skate-7845h.cisco.com	31 hr 52 min	25-Aug-2005 10:10:42	Other	Active
2.	!	00000RX	MediaServer	skate-ccm1.cisco.com	44 hr 28 min	24-Aug-2005 21:40:09	Environment	Active
3.	!	00000RW	PH					
4.	!	00000RV	PH					
5.	!	00000RU	PH					

Alerts and Events - IPCOM - Microsoft Internet Explorer provided by Cisco Systems, Inc.

File Edit View Favorites Tools Help

**CISCO SYSTEMS** Alert Details  
as of Fri 26-Aug-2005 18:03:10 PDT

Device Name: skate-ccm1.cisco.com Device Type: MediaServer  
Status: Active Alert ID: 00000RX Alert Age: 44 hr 28 min Latest Event Time: 24-Aug-2005 21:40:09

Events (3)

#	Event ID	Description	Component	Time	Status
1.	00000T1	PowerSupplyDown	PWR-skate-ccm1.cisco.com/1	24-Aug-2005 21:40:09	Active
2.	00000T0	InterfaceOperationallyDown	IF-skate-ccm1.cisco.com/16777219	24-Aug-2005 21:40:09	Active
3.	00000SZ	ServiceDown	VS-skate-ccm1.cisco.com/12	24-Aug-2005 21:34:11	Active

Notes:

Refresh Acknowledge Clear Suspend Notify Close

AFDAction.do?C=jsrs1&F=getFirst&P0=[Alert]&P1=[LastU

AFDAction.do?C=jsrs3&F=getAnnotation&P0=[Event]&P1=[1005]&U=1125104052683

Internet

# CiscoWorks Unified Operations Manager Service Quality Alerts

Cisco.com

- Real time alerting on service-quality issues (detected by IPC Service Monitor)
- Identification of endpoints (IP Phones, gateways, messaging/conferencing systems) involved in the call segment
- MOS score and other detailed information about the cause of the service quality issue
- Drill down views for detailed information and diagnostic/troubleshooting tools

Service Quality Alerts



Current alerts and issues regarding service quality in the IP telephony services.

Service Quality Alerts - IPCOM - Microsoft Internet Explorer provided by Cisco Systems, Inc.

**CISCO SYSTEMS** IP Communications Operations Manager  
Service Quality Alerts as of Fri 26-Aug-2005 17:55:39 PDT

Showing: All Alerts with 1 alerts

#	!	ID	Destination Type	Destination	Latest Event Time
1.	!	00000S3	IP Phone	4101	26-Aug-2005 16:32:12

Service Quality Events Attributes - I...

Event ID: 00000UP

Property	Value
Destination	4101
Destination IP Address	172.20.119.106
Destination Type	IP Phone
Destination Model	7960
Switch For Destination	172.20.119.161
Destination Port	G11/0/26
SourceEndPoint	4102
Source IP Address	172.20.119.28
Source Type	IP Phone
Source Model	7940
Switch For Source	172.20.119.161
Source Port	G11/0/24
Detection Algorithm	G.107
MOS	2.0
Critical MOS Threshold	3
Cause	Jitter
Codec	G729
Jitter	40 ms
Packet loss	9 Packets
Probe ID	37

Clear Close

Service Quality Events - IPCOM - Microsoft Internet Explorer provided by Cisco Systems, Inc.

**CISCO SYSTEMS** Service Quality Alert Detail  
as of Fri 26-Aug-2005 17:56:16 PDT

Destination: 4101 Destination Type: IP Phone  
Status: Active Age: 3 hr 02 min ID: 00000S3

Events: (2)

#	!	MOS	Cause	Timestamp	Codec	Source Type	Source	Event ID	Tools
1.	!	2.0	Jitter	26-Aug-2005 16:32:12	G729	IP Phone	4102	00000UP	---- Select ----
2.	!	4.0	Jitter	26-Aug-2005 16:30:51	G729	IP Phone	4102	00000UO	---- Select ----

# CiscoWorks Unified Operations Manager Ip Phone Stations

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## IP Phone Status



List of IP phones that are experiencing outages in service.

- Auto discovery of IP Phones in the network
- Phone status, and status change reports (Moves, Adds, Changes)

IP Communications Operations Manager - Microsoft Internet Explorer provided by Cisco Systems, Inc.



## IP Communications Operations Manager All IP Phones Report



Showing 1 - 4 of 4 records

<input type="checkbox"/>	Extn	User	IP Address	MAC Address	Model	Protocol	Regd	CCM	CCM/CME Name	CCM/CME Address	Switch Name	Switch Address	Port	Port Status	VLAN Name	VLAN ID	SRST mode	SRST Router
1.	<input type="checkbox"/> 4104	Susan	172.20.119.62	00137f7aa882	7960	SCCP	yes	CCM	skate-ccm1.cisco.com	172.20.119.43	172.20.119.161	172.20.119.161	Gi1/0/23	up	default	1	-	-
2.	<input type="checkbox"/> 4102	Manoj	172.20.119.28	000a412b7aec	7940	SCCP	yes	CCM	skate-ccm1.cisco.com	172.20.119.43	172.20.119.161	172.20.119.161	Gi1/0/24	up	default	1	-	-
3.	<input type="checkbox"/> 4101	John	172.20.119.106	0009e8812655	7960	SCCP	yes	CCM	skate-ccm1.cisco.com	172.20.119.43	172.20.119.161	172.20.119.161	Gi1/0/26	up	default	1	-	-
4.	<input type="checkbox"/> 4103	Bill	172.20.119.65	00137f7aa8aa	7960	SCCP	yes	CCM	skate-ccm1.cisco.com	172.20.119.43	172.20.119.161	172.20.119.161	Gi1/0/25	up	default	1	-	-

Rows per page: 10

Go to page: 1 of 1 Pages

Select an item then take an action

Launch

# CiscoWorks Unified Operations Manager Product Feature-by-Feature Benefits

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## Features

## Benefits

### Service level views

Provides network managers the ability to visualize their IPC deployment.

Enables them to identify details about different CCM and IPC clusters deployed along with the current status and composition of each of these clusters.

Display serves as the central point to initiate different functions that are available in the CiscoWorks IPC Operations Manager.

### Proactive monitoring, Performance and capacity monitoring

Constantly polls the devices and applications in the IPC implementation and identifies potential issues that might lead to outages.

Ability to poll performance and capacity metrics on IPC network elements such as CallManager, Unity, IPCC, CallManager Express, Unity Express and different gateways to aid in diagnostics and troubleshooting. These metrics can be polled on demand and graphed over a 72 hour rolling window.

### Real-time alerts

Any threshold violation or fault on a device/application is notified on a real-time basis through the Service level views, Alerts displays and North-Bound interfaces

### Diagnostic tests

Runs synthetic testing simulating end-user behavior (such as off-hook, end to end calls, voice mails etc), phone status monitoring as well as simulated network traffic tests (through IP SLA)

### IP Phone Status

Automatic discovery of every single IP phone deployed in the network. Provides current registration status, switch connection details etc.

Enables network managers to get instant access to IP Phone outage information. Two types of outages are monitored; signaling related outages as well as IP connectivity related outages.

# CiscoWorks Unified Operations Manager Product Feature-by-Feature Benefits

Cisco.com

## Features

## Benefits

### Northbound Interfaces

Syslogs, SNMP traps and Emails can be sent out whenever IPC Operations Manager diagnoses a fault

Notifications also contain context sensitive links

### Reports

Historical alert, event and service quality reports

IP Phone inventory and Phone status reports (Moves, Adds, Changes)

Personalized reports.

### Service quality alerting

Leverages IPC Service Monitor

Real-time service quality alerting

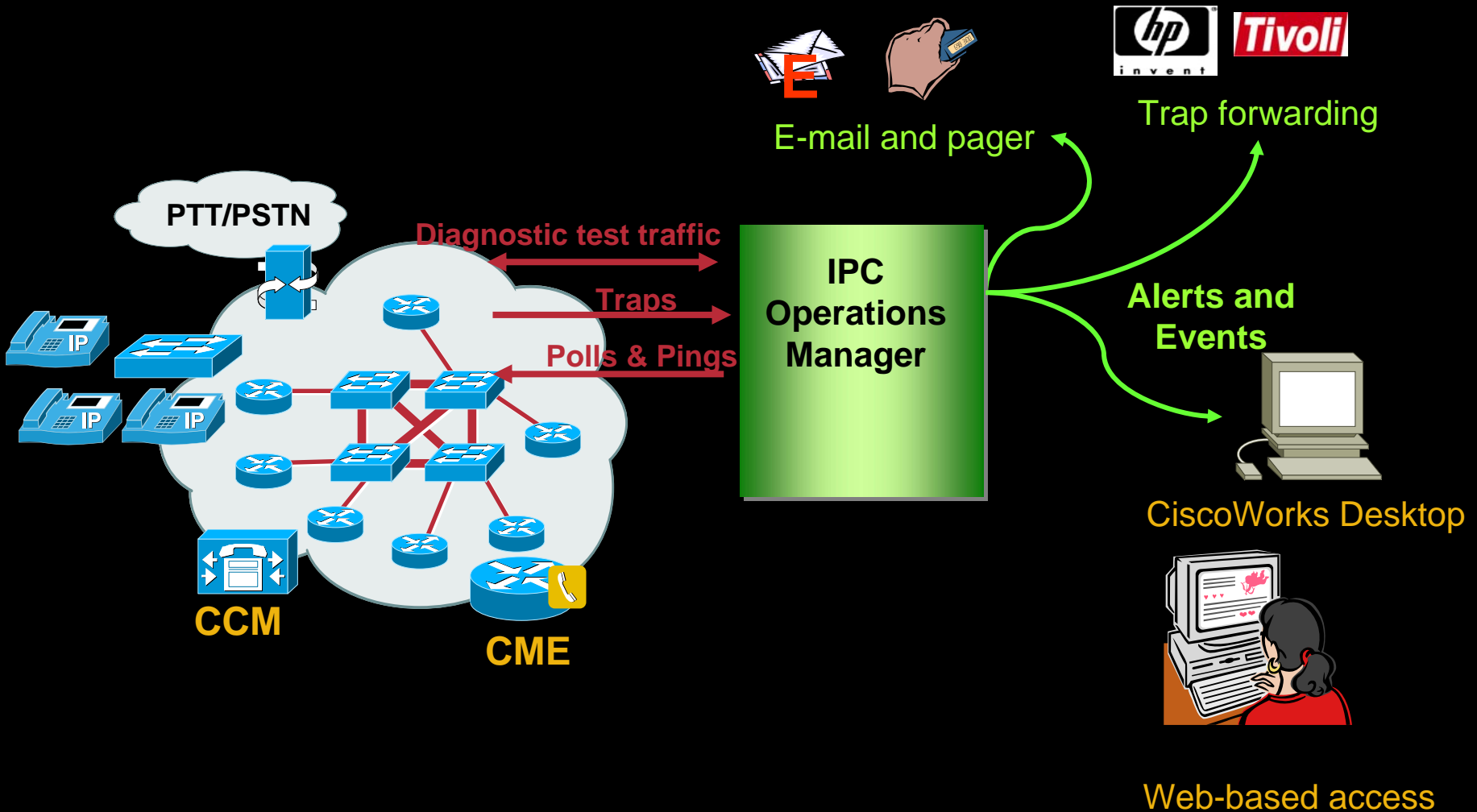
Identification of endpoints (IP Phones / gateways / messaging systems)

MOS scores for call segments that violate user defined threshold

Contextual diagnostic functions (historical information, probable path trace, IPSLA tests)

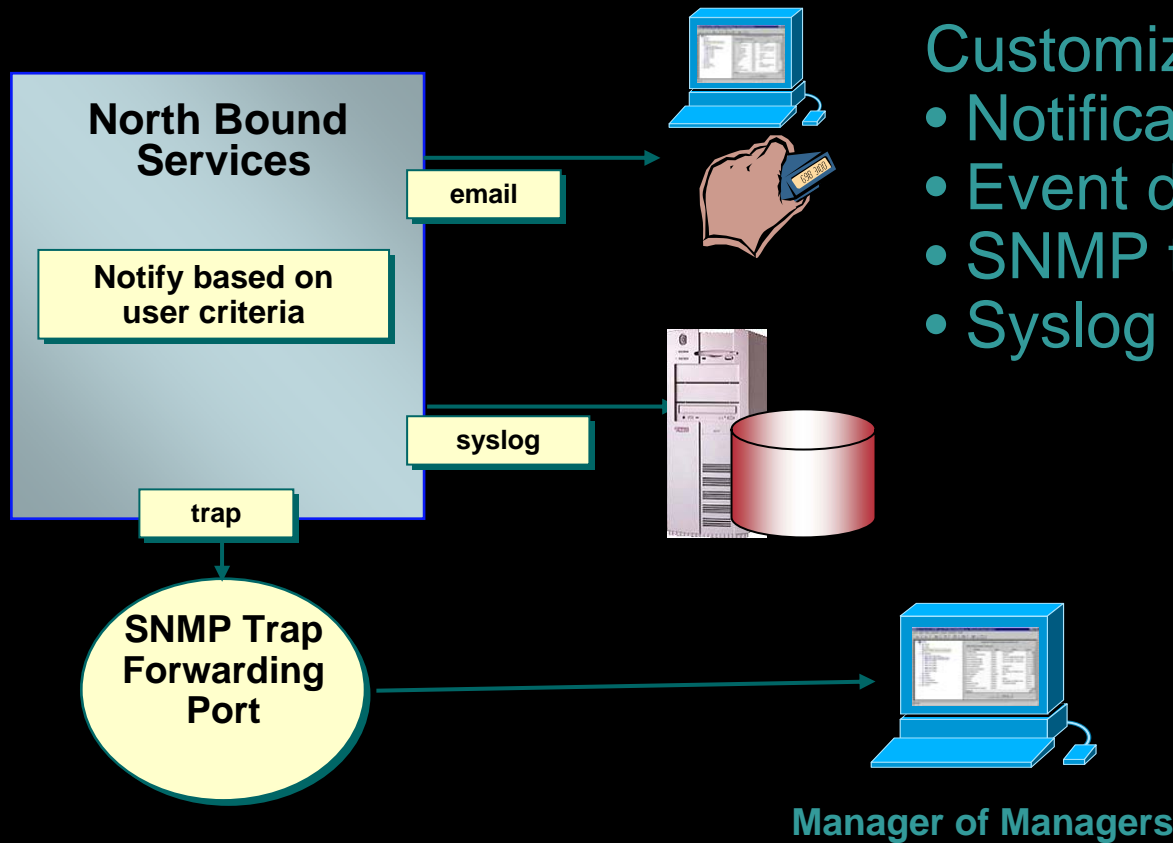
# CiscoWorks Unified Operations Manager Deployment Scenario

Cisco.com



# CiscoWorks Unified Operations Manager Northbound Interfaces

Cisco.com

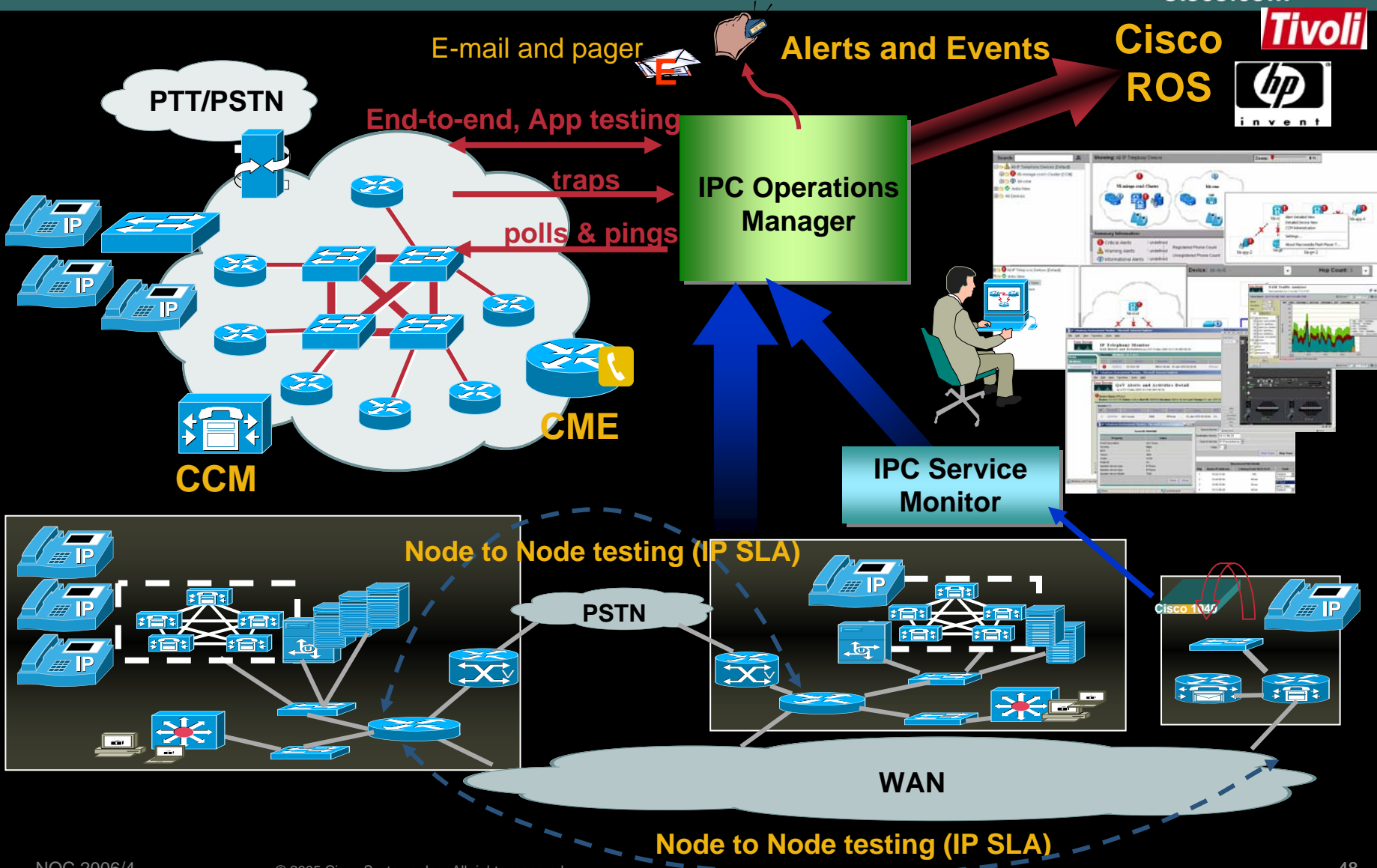


- Customize NB messages with:
- Notification Groups
  - Event descriptions
  - SNMP trap customization
  - Syslog Messages

E-mail/syslog/trap contains context sensitive links to detailed information

# CiscoWorks Unified Operations Manager & Unified Service Monitor – Deployment Scenario

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# CiscoWorks Unified Operations Manager Summary

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- **Actionable, service level View of full IP Communications implementation**
  - Correlation of device and IPC application fault status to endpoint and service availability
  - Service Level reports, logical and physical topology views
- **Real-time alerting on IP Communications and IP devices in the deployment**
  - CallManager, CallManager Express, Unity, Unity Express, IPCC, IPCC Express, Routers, Gateways, Switches, IP Phones and IPC Applications
- **Integrated Diagnostic Tools for monitoring and active testing (end-to-end, node-to-node; signaling, transport)**
- **Integrated Service quality alerting and reporting**
- **Real-time phone status display and path trace between phones / devices**
- **Extensive Phone and device inventory reporting**
- **Integrates with other CiscoWorks tools like LMS, ACS etc**
- **Flexible N-B interfaces with context sensitive links to detailed information**

# CiscoWorks Unified Operations Manager Integrated Diagnostics

Cisco.com

- **Integrated diagnostics linked to monitoring and proactive testing**

Replicate end user activities

End to End Call (Signaling and RTP)

Phone Registration

Dial-tone

Message Waiting Indicator

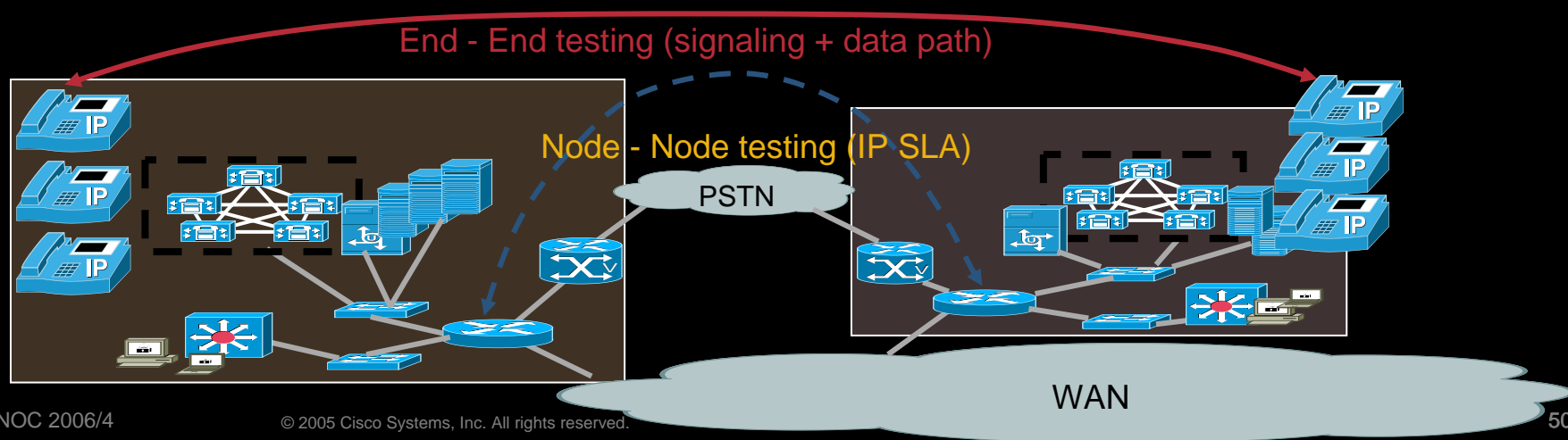
Conference

Emergency Call

Replicate voice traffic (IP SLA/SAA based)

Quality/Latency/Jitter/packet loss

Gateway registration



# Voice Quality Monitoring Solution

## CiscoWorks USM Unified Service Monitor



# CiscoWorks Unified Service Monitor - Overview

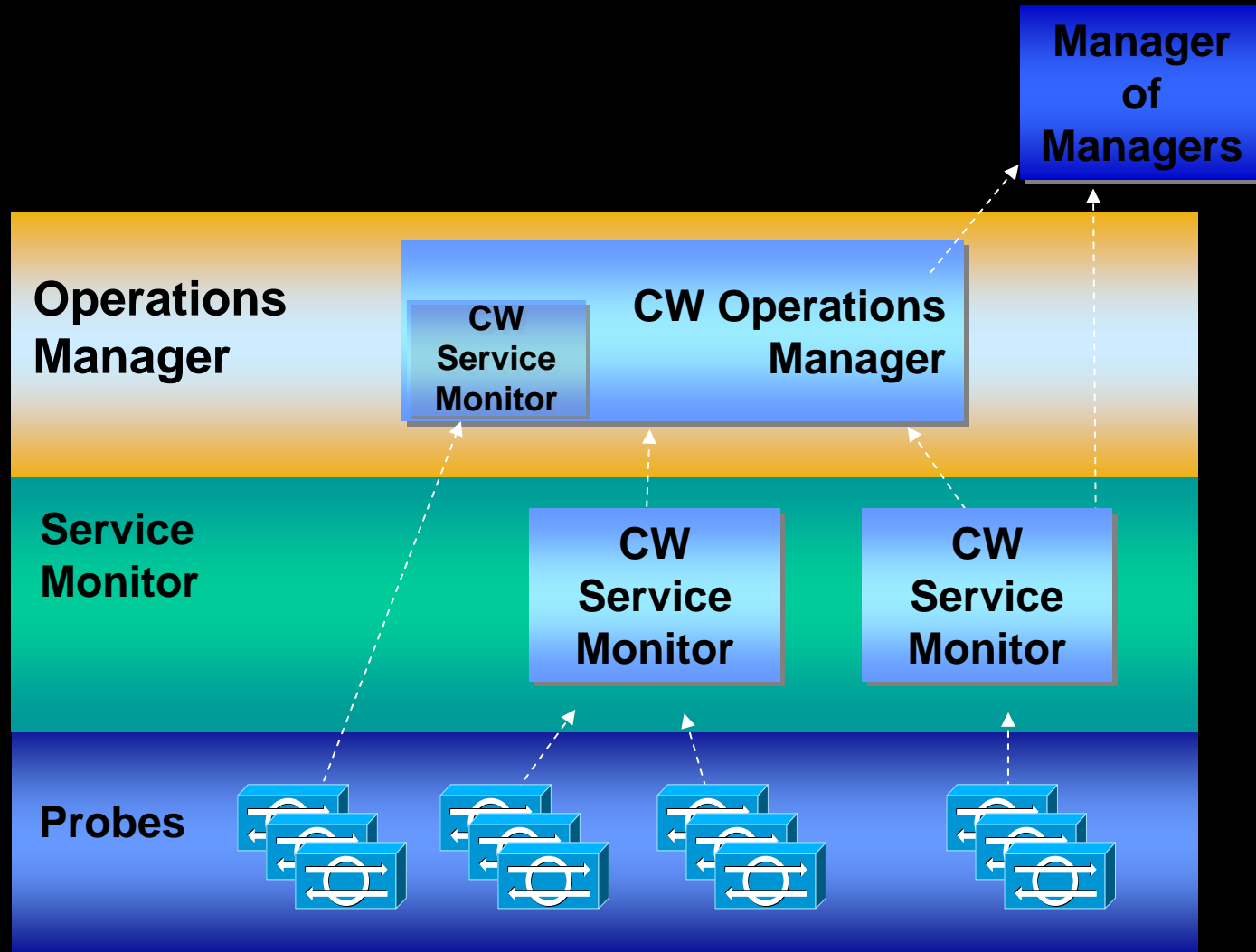
Cisco.com



- Real-time monitoring of voice quality for actual calls
- R-factor MOS for every 60 second interval
- Built-in system-level availability and redundancy
- Easily installs and configures itself just like a Cisco IP phone
- Uses switch SPAN port
- Real-time alerting with details
- Analysis and archival-based on MOS thresholds
- Integrates with IPC OM or Manager of Managers

# IPT Solution Overview: Unified Operations Manager and Service Monitor

Cisco.com



- Multiple Service Monitor can talk to IPCOM

- 10 probes per Service Monitor
- Support IEEE 802.3af PoE

# Unified Service Monitor - Product Overview

## Two Component Solution

Cisco.com

CiscoWorks IP Communications Service Monitor is a two-component solution that monitors, evaluates, and reports quality of voice metrics about active IP telephony calls



### Cisco 1040 Sensor

- Evaluates up to 80 RTP streams per second
- Calculates a Mean Opinion Score (MOS)
- Forwards results to IPCSM software component every 60 seconds

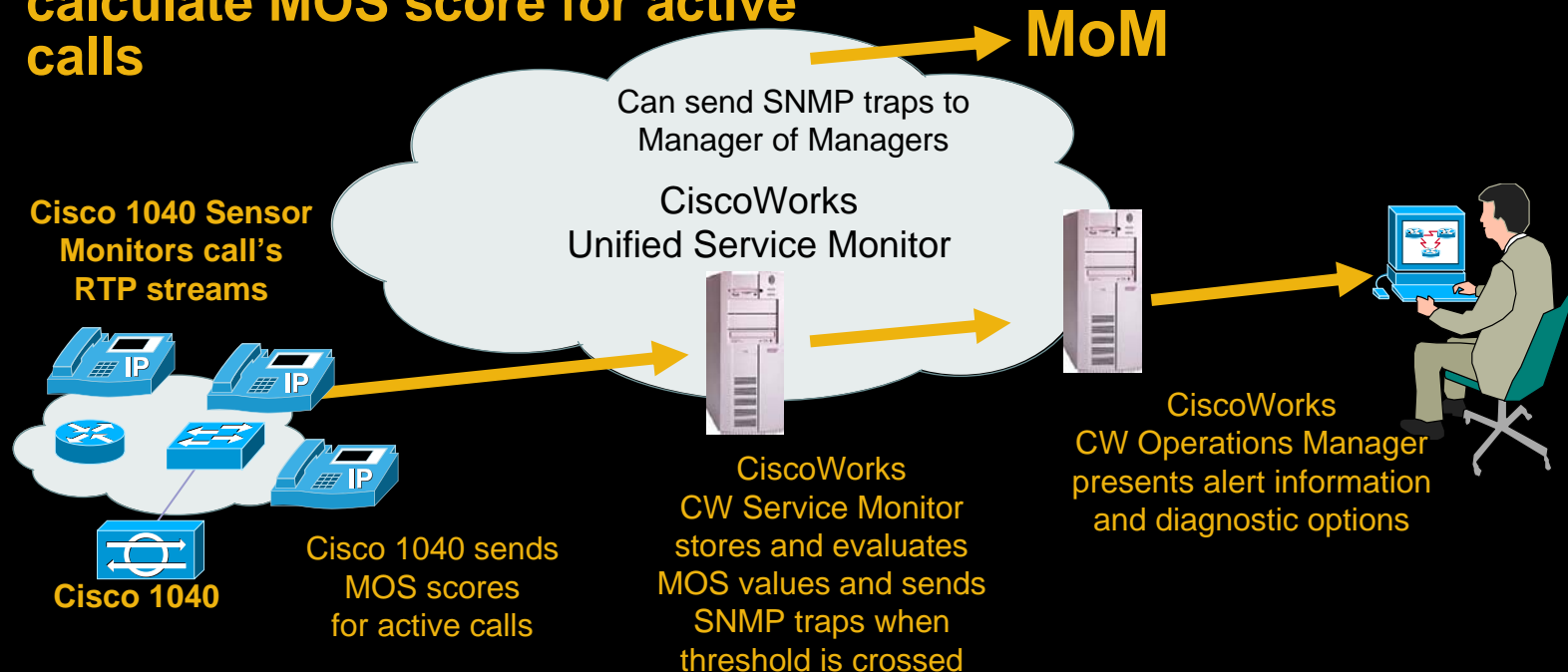
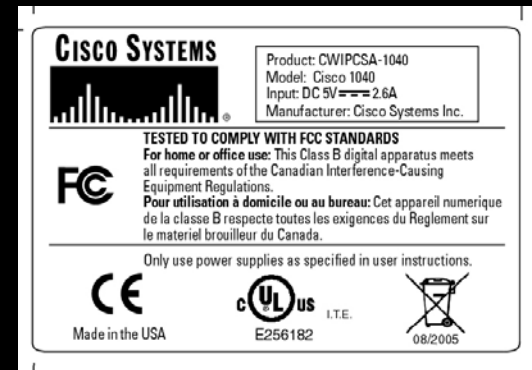
### CW USM Software Component

- Compares incoming MOS to user-defined threshold
- Sends SNMP trap for MOS below threshold
- Optional data archive
- Manages Cisco 1040 Sensors

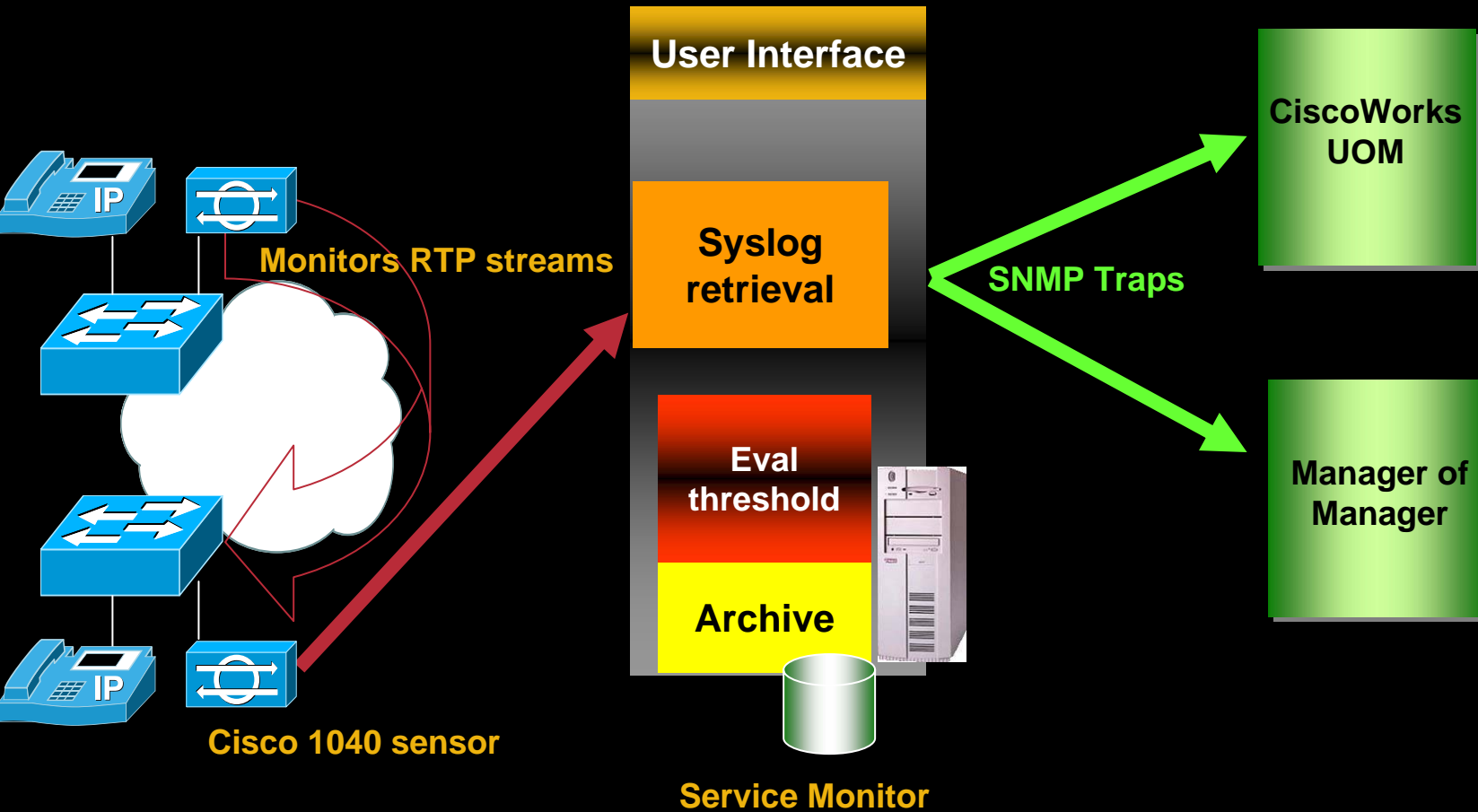
# CiscoWorks Unified Service Monitor

Cisco.com

- **FCC Class B certified for desktop or wiring closet deployment**
- **PoE (IEEE 802.3af)**
- **Uses ITU G.107 R-factor to calculate MOS score for active calls**

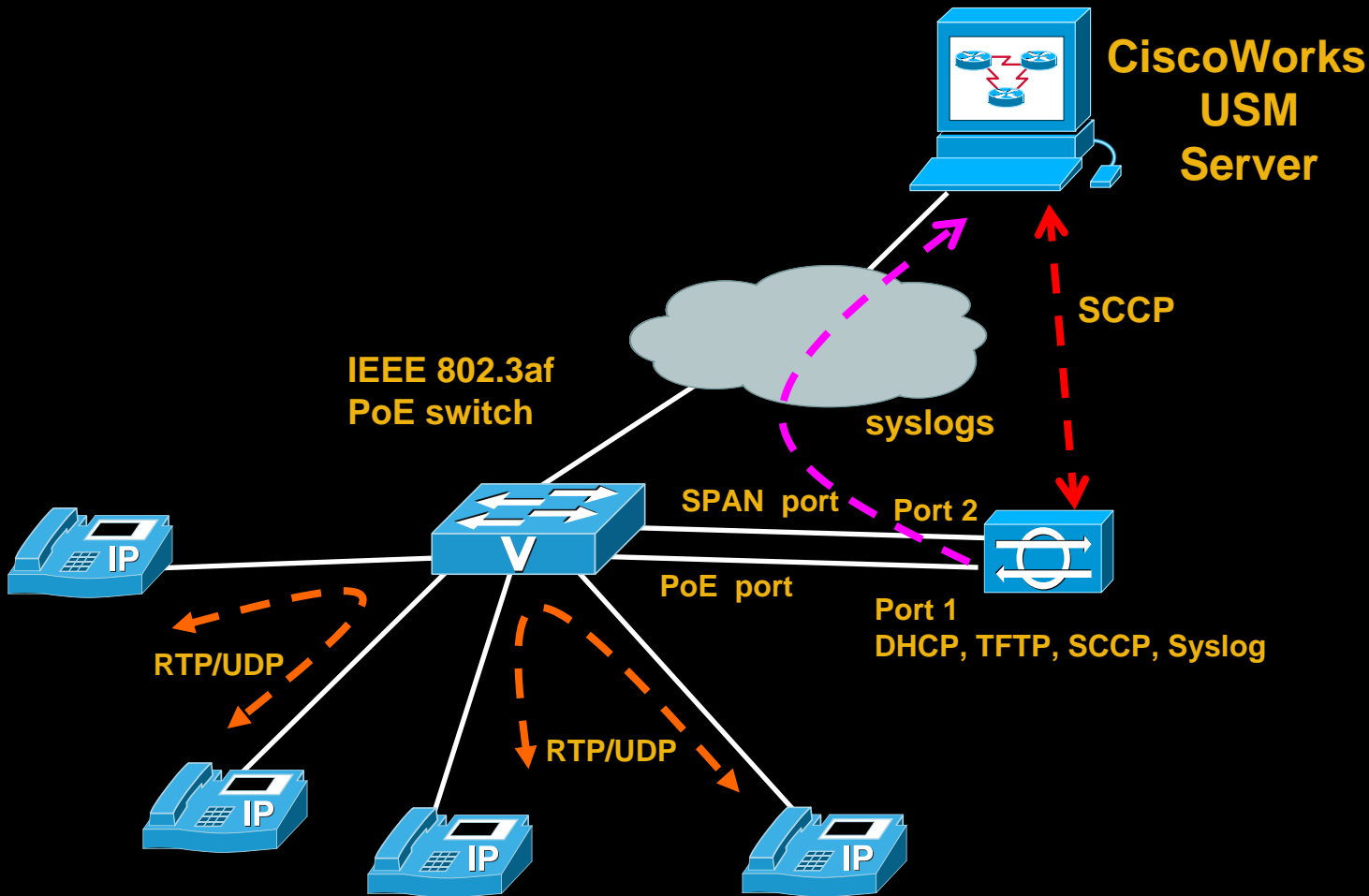


# CiscoWorks Unified Service Monitor Architecture





# CiscoWorks Unified Service Monitor Flow diagram



# Cisco 1040 Port Usage

Protocol	Port Number	Service Name
UDP	53	DNS
UDP	67 and 68	DHCP
UDP	69	TFTP
UDP	514	Syslog
TCP	2000	SCCP
TCP	80	HTTP

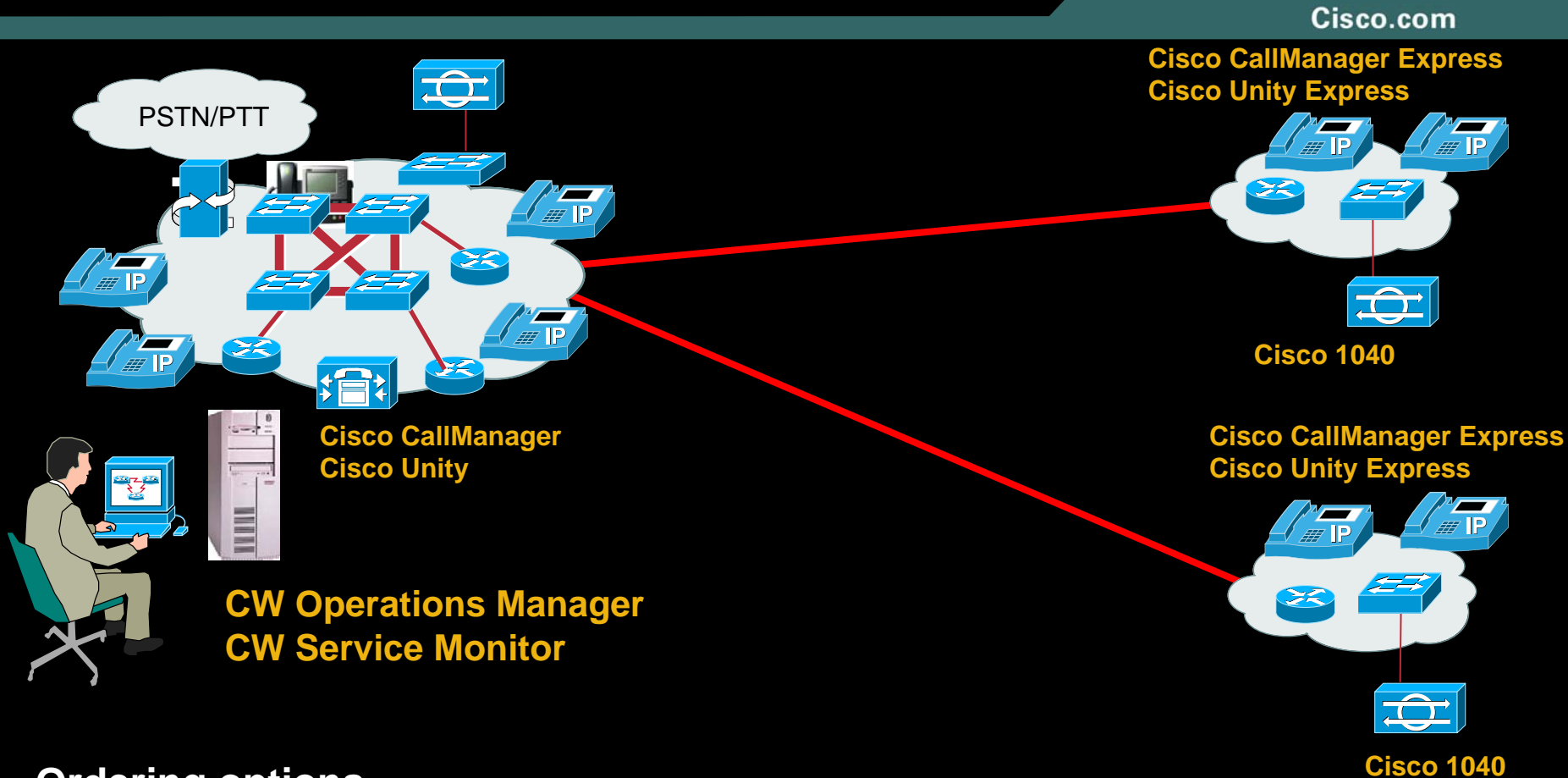


# Understanding MOS Scores

## MOS Quality Rating

<u>Quality Scale</u>	<u>Score</u>	<u>Listening Effort Scale</u>
Excellent	5	No effort required
Good	4	No appreciable effort required
Fair	3	Moderate effort required
Poor	2	Considerable effort required
Bad	1	No meaning understood with reasonable effort

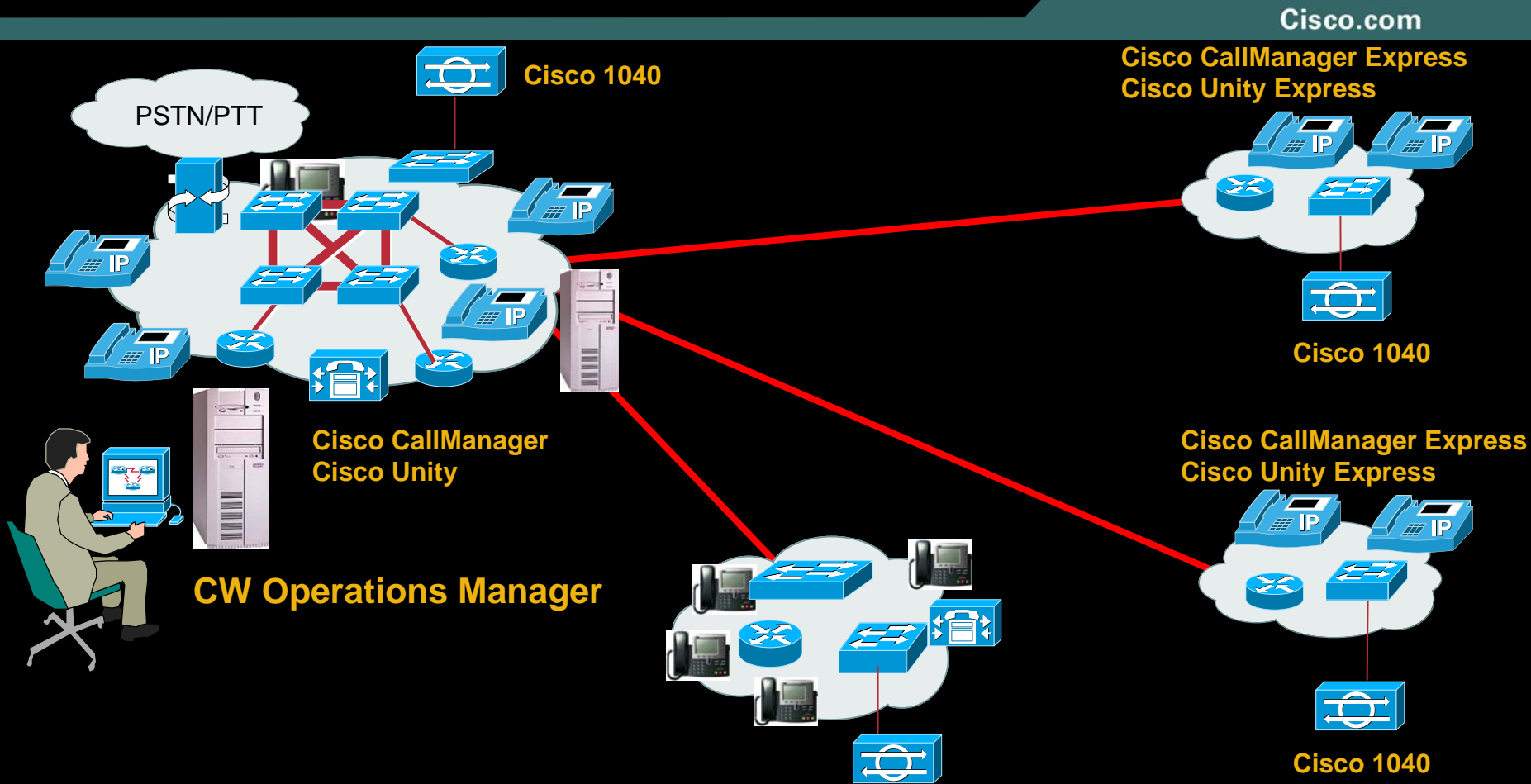
# CiscoWorks UOM and USM Small and Medium Enterprise Deployments



## Ordering options

- CiscoWorks IPC Mgmt Bundle OR
- CiscoWorks IPC OM + 6 pack IPCSM bundle

# CiscoWorks UOM and USM Large Enterprise Deployments



**CiscoWorks IPC OM (w/ appropriately sized license)  
+ multiple 6 pack IPCSM bundles**

# Opsummering



**“Der findes *ingen* do-it-all Network- eller System Management applikation**

- Start altid med et baseline design og byg videre derfra**
- Tænk i systemer**
- Del netværk og løsninger op i vertikaler**
- Læs applikationernes Release Notes”**

**Christian Binow (cbinow@cisco.com)**

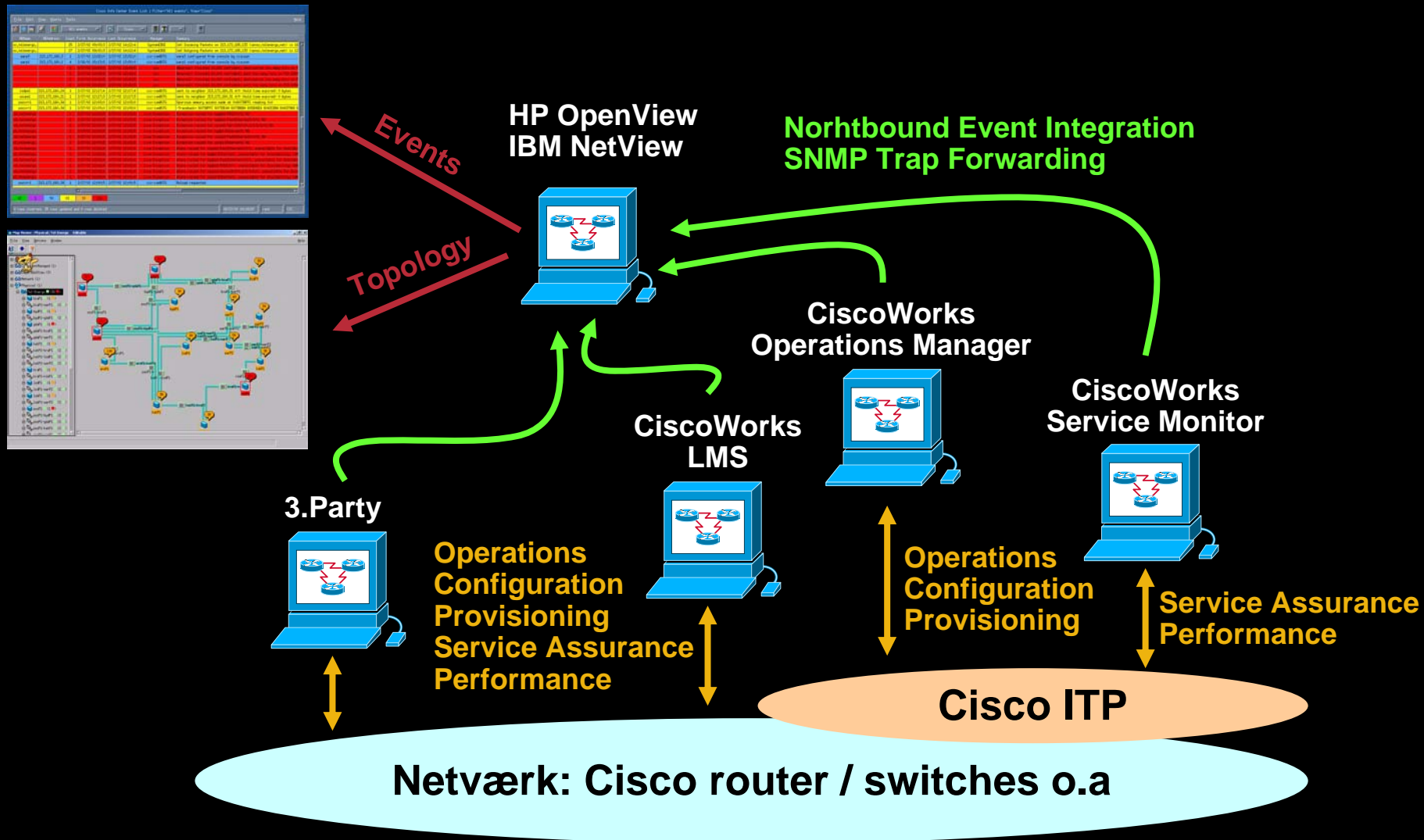
A blurred background image of a server rack with multiple units and ventilation grilles.

“ Network Management er ikke Rocket Science.”

Christian Binow ([cbinow@cisco.com](mailto:cbinow@cisco.com))



# NOC Design - Opsummering



# NOC Design – Cost Calculation

Cisco.com

## CiscoWorks LAN Management Solution

CWLMS-2.5-UR-K9	LMS 2.5.1 Large Ent WIN/SOL Dev UnRestricted - Rev Dec05	S	\$24,995
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## CiscoWorks IP Communications Operations Manager

CWIPCOM-1.0-2K-K9	CiscoWorks IPC Operations Manager 1.0 - Max 2K Phones	N/A	\$24,995
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CWIPCOM-1.0-K9	CiscoWorks IPC Operations Manager 1.0	N/A	\$100
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## CiscoWorks IP Communications Service Monitor

CWIPCSA-1040	CiscoWorks IP Communications Service Monitor	N/A	\$100
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CWIPCSA-1.0-6PK-K9	CiscoWorks IPC Sensor A 1.0 - 6 Pack 1 IPCSM SW	N/A	\$17,995
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CWIPCSM-1.0-K9	CiscoWorks IPC Service Monitor 1.0	N/A	\$8,995
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# Q and A



# CISCO SYSTEMS

